Admiral Danish Fleet HQ,
National Operations, Maritime Environment

Sub-regional risk of spill of oil and hazardous substances in the Baltic Sea (BRISK)

Response Resources

January 2012

Part-financed by the European Union
(European Regional Development Fund)

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1 Introduction

1.1 BRISK Project setup

The project is defined in response to an increased concern about accidents and environmental damage in the Baltic Sea due to the significant increase of ship traffic, particularly the oil tanker traffic. Major oil spills can affect the economy of several countries and are hence a trans-national problem. The increased risk of oil spills is of great concern in the whole Baltic Sea region.

The objective of the project is to identify specific proposals for increased co-operation. The project will result in increased preparedness of authorities to respond to medium size oil spills and enhanced sub-regional co-operation. The network of responsible persons will be further developed. The project will promote building partnerships and co-operations among trans-national, national and regional authorities that are responsible for emergency and response operations in the Baltic Sea.

The BRISK project is partly financed by EU´s Baltic Sea Regional Programme 2007-2011with 3.3 million EUR for the period 2009 to 2012.The co-financing varies between 15 % and 25 %, depending on the home country of Project Partner.

The project partnership consists of the national authorities responsible for oil spill preparedness around the Baltic Sea together with HELCOM. The countries involved are: DK, SE, FI, EE, LT, LV, PL, DE, plus HELCOM. Russia in involved indirectly through the BRISK-RU project, which is financed by the Nordic Council of Ministers with 200.000 EUR. A list of the contracting authorities and the contact persons involved is given in the appendix.

The project activities are divided into the following 6 Work Packages (WP):
WP1: Management, responsible: LP (Lead Partner, Denmark)

WP2: Communication and information, responsible HELCOM

WP3: Risk assessment: Common methodology, unified data collection, common risk model, common assessment of risk of pollution and impact, Identification of additional response resources needed, resp. LP

WP4: Agreements: Development of proposals to remove administrative obstacles to the efficient response, resp.: LP

WP5: Investment plans: Preparation of integral and comparable investment plans for response resources, resp.: LP.

The structure of the project reports is given in below

Table 1-1 Document list of the BRISK project

Document number	**Document Title**
70618 3.1.1	Method Note
70618 3.1.2.1	Data Collection Note
70618-3.1.2.2	Data Collection Report
70618-3.1.3.0	Model Note,0- Introduction
70618-3.1.3.1	Model Note,1-Traffic
70618-3.1.3.2	Model Note,2- Transport
70618-3.1.3.3	Model Note,3- Vulnerability
70618-3.1.3.4	Model Note,4- Frequency
70618-3.1.3.5	Model Note,5- Spreading
70618-3.1.3.6	*Model Note,6- Numerical calculations*
70618-3.1.3.7	Model Note,7-Model modification
70618-3.2.1	Model scenarios
70618-3.2.2	Model results
70618-3.3	Response Resources
70618-4	Agreements
70618-5	Investment plans

2 Introduction

The present report includes the description of resources to respond to oil spills in the Baltic Sea. In the project application it is stated that three reports should be prepared on:

- Needed resources
- Existing resources and
- Additional needed resources

During the course of the project it became evident that the above titles could be formulated more precise and it also became evident that the three reports could be concentrated into one report.

The present report comprises three main chapters that correspond to the three reports requested in the project application, mentioned above. The chapters are reformulated and called:

- Criteria for adequate response level
- Inventory of existing response measures
- Indications for future response levels

The present chapter deals with the capacity to recover an oil spill of a certain size. This value indicates the

3 Criteria for adequate response level

The present chapter gives a brief description of the discussion in the group of Project Partners regarding formulation of criteria for adequate response levels.

A response level in connection with combat of oil spills is often described as a design spill size that the response system is capable to cope with within a reasonable time and with a satisfying result. Therefore, a response level is given as a certain design oil spill, expressed in tonnes. This design spill is determined by the national experts on oil spill response based on their experience that comprise inventory of equipment, man power, knowledge of the specific performance of the system, knowledge of the local geographical conditions and other issues of relevance. The design spill is a subjective value, but it is highly applicable and important number.

The discussion of preparedness to the design spill is a supplement to the modelling of the specific risk reduction and spill response measures as reported in the other reports of this projects.

The response levels are determined for sub-regions as defined in Figure 3-1below:

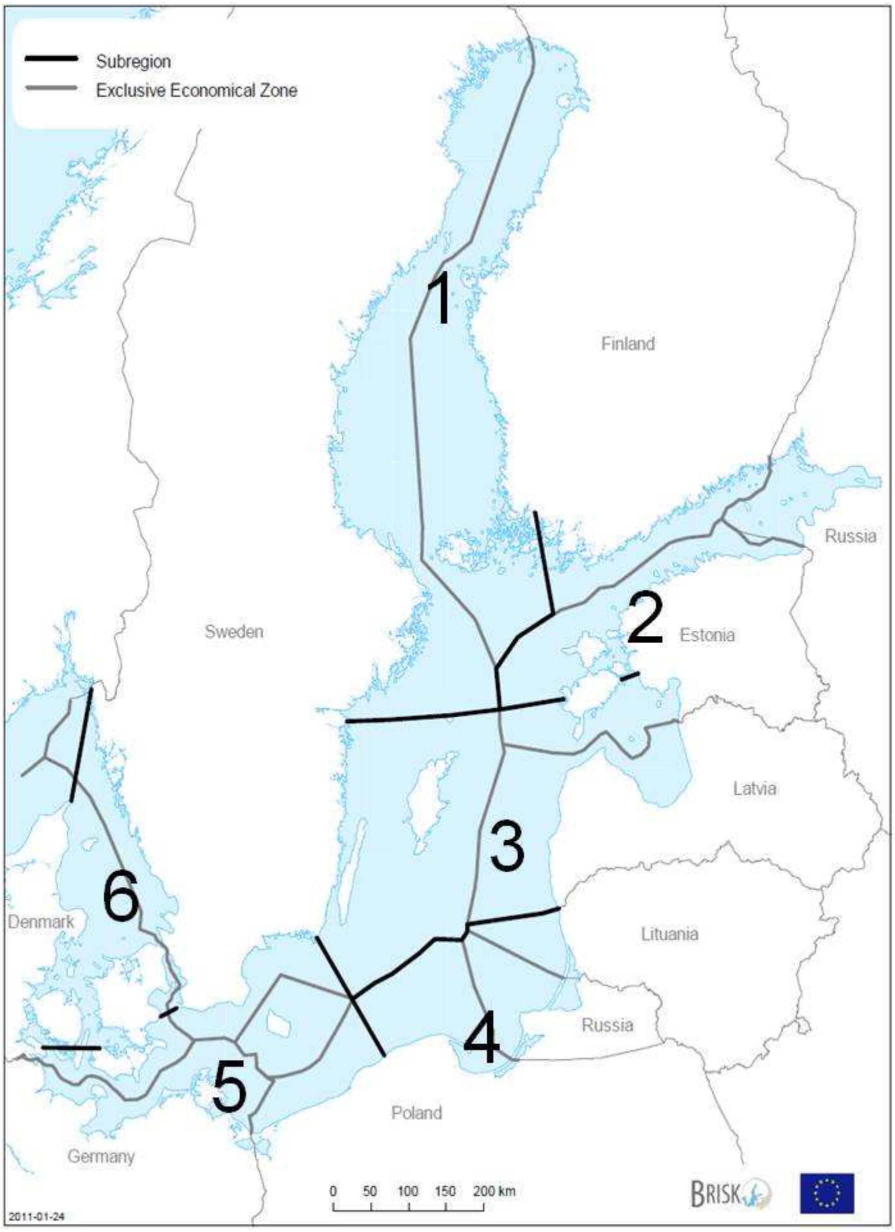

Figure 3-1 Map of sub-regions for co-ordinated oil spill response in the Baltic Sea

3.1 Background

The background of what an adequate response capacity is the existing HELCOM recommendation (HELCOM, 2007a), see appendix 1. Here it is recommended that every country should have equipment and man-power to cope with a 5.000 ton oil spill within 3 days. This recommendation is also imbedded in the Baltic Sea Action Plan (HELCOM, 2007b).

With the present sub-regional division of the Baltic Sea, the full implementation of this recommendation would result in the following list for design spills, see Table 3-1:

Table 3-1 Sub regional design capacity according to HELCOM recommendation. The respective return period for a design spill is added.

Sub-region	Countries in sub-region	Design spill capacity (tonnes)	Return period (years)
1	SE; FI	10.000	800
2	FI, RU, EE	15.000	380
3	SE, EE, LV	15.000	250
4	LT, RU, PL	15.000	1800
5	SE, DK, GE, PL	20.000	165
6	DK, SE	10.000	75

Although this recommendation comprises space for interpretation it gives a simple standard for national response capacities. However, it does not consider the different sizes of the areas that each the different countries are responsible for, and it does not consider the different risk levels in the different national waters.

Both factors, area and risk distributions are included in the present BRISK project approach, which makes it possible to differentiate the national areas with an objective and mutually agreed method.

The risk analysis gives the integrated risk for spill of certain volumes in each sub-region, see Figure 3-2. It makes it possible to identify potential hotspots, i.e. sub-regions where the existing capacities correspond to a spill with a recurrency period that is much lower than in the other sub-regions of the Baltic Sea. This provides the possibility to adjust the preparedness within a certain sub-region that it matches a spill volume with similar risk as in other sub-regions of the Baltic Sea.

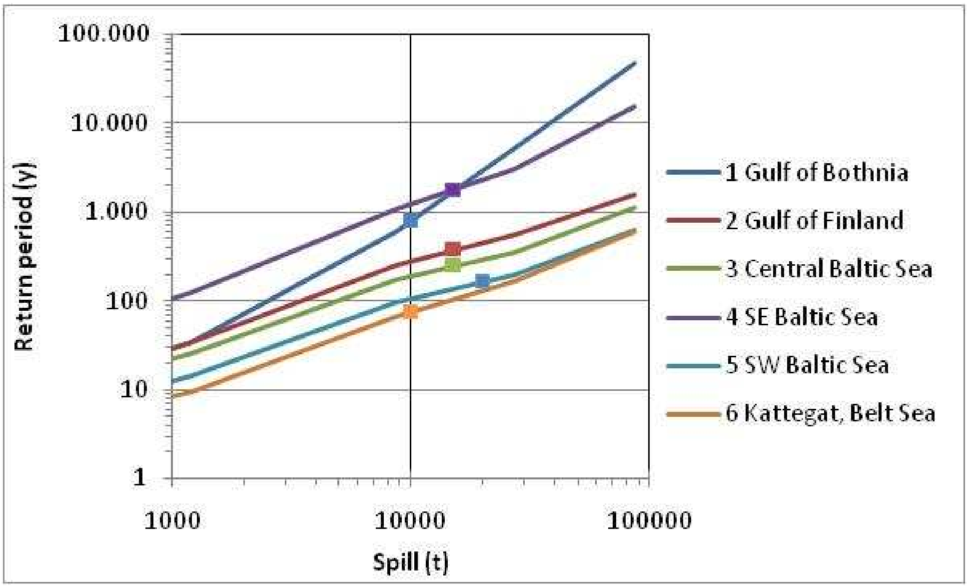

Figure 3-2 Return period for different spill sizes in each sub-region. The dots indicate the design spill response according to HELCOM recommendation.

It is seen from Table 3-1 and from Figure 3-2 that some countries should be prepared for a spill that is likely to occur every 1000 years or even rarer whereas others only should be prepared for spills likely to occur every 75 years.

3.2 Response level based on risk profile

Based on the consideration presented by Finland how Finland distributes their resources between the Gulf of Finland and the Bothnian Sea, the group of experts within BRISK project agreed to define the criteria for an adequate response level based on the risk profile. The sizes of design spills in the different sub-regions should match the same or at least a similar level of probability. Approaching the same level of probability for the design spill implies that the response systems are prepared for a comparable risk level.

It is evident that the chosen level for response capacity will not influenced the risk for accidents.

The resulting proposed design spills per sub-region are given in chapter **Error! Reference source not found.**.

4 Inventory of existing response measures

An inventory of the existing response capacities is based on the existing inventory by HELCOM. It is updated and upgraded during the course of the BRISK project.

The inventory is given in full in Appendix 2. Here four tables are given comprising the following parameters:

1. Table: Record nr, Country, Name of vessel, Location, Longitude, Latitude, Max boat speed, Length, Width, Draught.

2. Table: Record nr, Country, Name of vessel, Max. action radius for different periods between alarm and on-site arrival (including 2 hrs mobilisation)l: 4 hrs, 8 hrs, 23 hrs, 16 hrs, Call signal, Recovery system, Recovery rate.

3. Table: Record nr, Country, Name of vessel, Storage capacity, Towing capacity (ton), Fire fighting capacity, Lightering.

4. Table: Record nr, Country, Name of vessel, Boom type, Boom length, Remarks.

5 Indications for future response levels

Based on discussions within the Group of experts the following list for the spill response capacities was prepared including the planned investments. The detailed investment plans are reported in report "5 Investments".

Table 5-1 Existing sub regional design capacity. The respective return period for a design spill is added.

Sub-region	Countries in sub-region	Design spill capacity (tonnes)	Return period (years)
1	SE; FI	5.000	270
2*	FI, RU, EE	45.000	850
3	SE, EE, LV	5.000	105
4	LT, RU, PL	12.000	1400
5	SE, DK, GE	34.000	250
6	DK, SE	20.000	120

*) The design spill capacity was not provided explicitly in the report "5 Investment" but is based on information provided during the discussions at the Project Partner Meeting in Copenhagen, November 2011.
The above capacities include the effects of EMSA vessels.

It is seen that the sum of the design spills is larger than for the HELCOM recommendation. Furthermore, the range between the maximum and the minimum return period is significantly decreased. It is also seen that the lowest return periods are higher in the existing response system than the lowest return period according t the recommendation. Also the highest return period in the existing system is lower than in the recommended.

The values are plotted on the risk profile curves below in Figure 5-1.

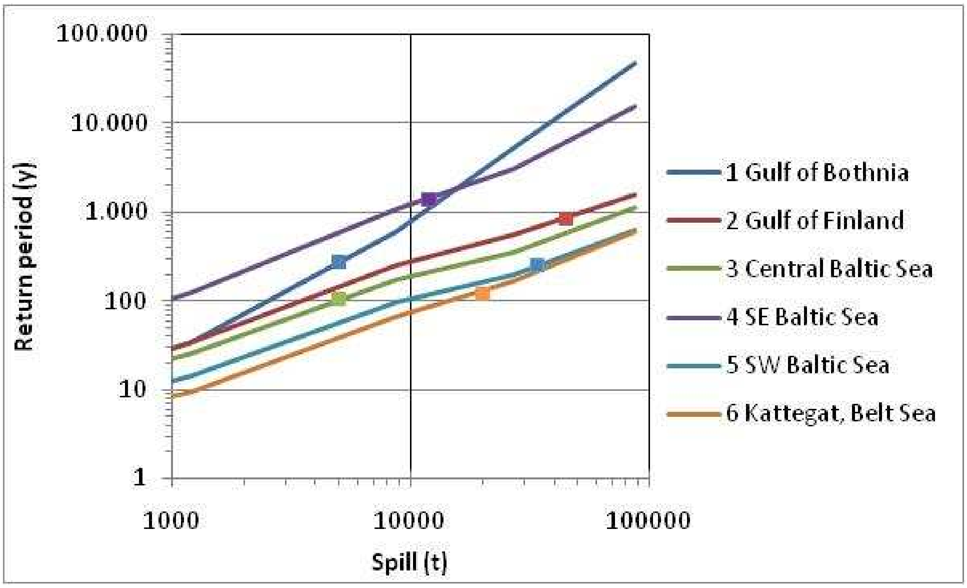

Figure 5-1 Return period for different spill sizes in each sub-region. The dots indicate the spill response capacities including until 2020 investments.

It is seen that the range of the return periods is narrower, whereas the range of the design spills is much wider. This indicates that the response is more evenly distributed.

Compared to the response level recommended by the HELCOM recommendation the investment plan situation appears to be more adapted to the present risk profile.

It is anticipated that development of the response capacities with due consideration to the risk pattern will provide a Baltic sea wide cost efficient response system. The Baltic Sea countries hereby now have a guideline of how to develop there respective response systems in a way that is consistent in comparison with the situation in countries in the other Baltic sub-regions.

Dots that are localised relatively low characterise sub-regions where the response system is designed to spill sizes that occur relatively often. This is valid in particular for sub-region 6 and 3. On the other hand is seen that the dots localised relatively high indicate sub-regions where the preparedness id designed for a spill that is likely to occur relative seldom.

It also should be taken into consideration that neighbouring areas will be able to use each others resources. Good examples are sub-region 2 (Gulf of Finland) and sub-region 3 (Central Baltic Sea). Many of the resources in sub-region 2 (particularly from Finland) will be able to intervene relatively quickly in sub-region 3 and somehow increase the response capacity in sub-region 3. Similar conditions are valid for sub-region 4 supporting sub-region 3 and sub-region 5 supporting sub-region 6.

In order to achieve a higher level of preparedness, the dot of a specific sub-region should obtain a higher position. The countries of the specific sub-region have two possibilities:

1 They can either change the risk profile by means for enhanced Navigational Aids (The curve will then be steeper and the dot of the sub-region move upward with the curve, the value of the x-axis being constant as the design spill remains unchanged), or

2 They can increase the response capacity to a higher design spill (The curve will remain unchanged but the dot will move along the curve to the new design spill size.

Both possibilities can be used. A cost benefit analysis as indicated in the report no. 5, "Investment Plan" advises what option will be the most cost efficient. The report also describes what specific measures will be prioritized in the different sub-regions.

Finally, it must be emphasised that there is no final and correct solution. The choice of design spill size and its return period is a political choice that indicates the balance between costs and response preparedness.

6 References

HELCOM, 2007,a: HELCOM RECOMMENDATION 28E/12, Adopted 15 November 2007, having regard to Article 20, Paragraph 1 b) of the Helsinki Convention. http://www.helcom.fi/Recommendations/en_GB/rec28E_12/

HELCOM, 2007,b: HELCOM Baltic Sea Action Plan adopted on 15 November 2007 in Krakow, Poland, by the HELCOM Extraordinary Ministerial Meeting. http://www.helcom.fi/BSAP/ActionPlan/en_GB/ActionPlan/

Appendix 1: HELCOM recommendation 28/E/12

Adopted 15 November 2007,
having regard to Article 20, Paragraph 1 b) of the Helsinki Convention

STRENGTHENING OF SUB-REGIONAL CO-OPERATION IN RESPONSE FIELD

THE COMMISSION,

BEING AWARE that the increasing maritime traffic is causing a potential threat of a pollution incident at sea,

BEING ALSO AWARE that spills of oil or other harmful substances can have a long-lasting harmful impact on the sensitive marine environment and the coastal areas of the Baltic Sea,

RECOGNISING the efficiency of an operational “three tier” approach for planning and response to pollution incidents in the Baltic, whereby minor oil spills are addressed by one Contracting State, spills of medium size are addressed by well-organised and timely action by several Contracting State located in the vicinity of the accident, and the largest spills are addressed by the co-ordinated efforts of all Contracting Parties and, if necessary, with use of external assistance,

NOTING the significance of sub-regional approach to ensure timely and well-organised emergency towing, fire-fighting and lightering and, if needed, response to a pollution incident, including shoreline response, and in that way to minimise environmental damage caused by an accident,

NOTING FURTHER that sub-regional co-operation is of crucial importance when effectively using the emergency and response resources,

RECOMMENDS that the Contracting Parties take necessary steps to assess the risk of oil and chemical pollution and on that basis review emergency and response resources on a sub-regional basis in order to ensure that:

- there are sufficient emergency resources in the area to provide adequate emergency towing, fire-fighting and lightering capacity to a ship in need of assistance within a reasonable period of time;
- there are sufficient response resources/capacity to ensure effective collection of pollutants in case of a “medium-size” pollution incident or to control large-scale pollution incidents until the assisting forces arrive on the scene;
- there is adequate response capacity to enable effective shoreline response,

RECOMMENDS ALSO that the Contracting Parties draw up bilateral or multilateral agreements and/or response plans for major risk areas and/or dangerous objects located in the vicinity of their borders and where co-ordinated efforts are needed to ensure adequate response to pollution incidents,

RECOMMENDS FURTHER that the Contracting States cooperate by carrying out joint surveillance operations and/or flights by one Contracting State over the responsibility area of the other Contracting State(s) in order to ensure that the minimum HELCOM requirements on aerial surveillance are fulfilled,

RECOMMENDS ADDITIONALLY that the Contracting States endeavour to do their best in order to ensure that a ship in need of assistance would be accommodated in the most appropriate place of refuge without undue delay,

RECOMMENDS FINALLY that the Contracting States integrate shoreline response into national contingency plans, and cooperate by conducting trainings and organising exchange programmes to ensure swift and adequate response capacity and to develop best practices.

- - - - Attachment

Guidance for sub-regional plans to quantify needed emergency/response resources

The idea of enhanced sub-regional co-operation, which has been discussed and agreed in HELCOM RESPONSE, rests on a four-step logic:

- Analysis of the likely accident scenarios taking into account sub-regional specifics;
- Identification (both quantitative and spatial) of the emergency and response resources needed sub-regionally to respond to an accident of Tier 1 and 2 and how to deal with a Tier 3 accident until the assistance arrives;
- Comparison of the identified needs to the available resources and development of plans to meet the needs for resources in the sub-region in the most effective way;
- By the above standing steps, achieving adequate emergency and response preparedness in the most cost-efficient way.
- Even though the risks and likely accident scenarios certainly vary sub-regionally, it might be beneficial to have a general discussion on certain aspects of the assessments in order to facilitate sub-regional actions:
- Likely maximum accident for which the sub-regions should be prepared;
- Principles for the estimation of the needed emergency and response resources as well as their preparedness and spatial allocation.

Emergency towing

Every sub-region should have adequate emergency towing capacity to be able to handle the largest vessels sailing in the region in rough sea conditions (e.g. Beaufort 10-12 in the Baltic Sea).

Spatial allocation and preparedness should correspond to the time limits for approaching and securing a ship in distress along the major shipping lane(s) in the sub-region before it reaches shallow waters.

Emergency lightering

Emergency lightering capacity (pumping capacity, intermediate storing and possible places of refuge) should be analysed for a lightering operation of the biggest ships sailing in the area (up to 150,000 tonnes).

Emergency fire fighting

Emergency fire fighting capacity should ensure at least availability of Fire Fighters class 1 according to Det Norske Veritas (DNV) or similar (around 20,000 litres/minute).

Places of refuge

Based on risk assessment in a sub-regional context, including evaluation of the environmental factors, adequate response capacities should be available for places of refuge.

Shoreline response

Every sub-region should have adequate equipment and trained personnel to protect the coast, especially vulnerable habitats and areas (Baltic Sea Protected Areas, BSPAs) and to ensure immediate and appropriate action on shore.

Shoreline response capacity should be addressed and arranged in its complexity within sub-regional agreements between adjacent Contracting States. Such agreements are aimed at ensuring fast and sharp reaction when a second and/or third tier or transboundary pollution accident has occurred.

The logic described in HELCOM Recommendation 11/13 serves as a basis to analyse and utilise the personnel, amount and type of booms, skimmers, vacuum cleaners, washers and other relevant equipment needed to maintain readiness for actual operations in such accidents.

All priorities related to vulnerable areas (BSPAs) are to be pre-planned within sub-regional action plans; this may include wildlife response as deemed feasible.

Response capacity

Response capacity should be available for responding to a 1,000- 5,000 tonnes (depending on the likely accident in the area) oil spill at sea in favourable weather within 3 days. Local geographical and other specifics (e.g. archipelago area, shallow water, etc.) should be taken into account.

Action Plan

When the above standing analysis has been performed, there should be an action plan for how together to improve the capacity. Who buys what and when? How do the others get hold of it in an emergency situation, etc.

Notification

NB -There is no need for special alarm procedures, etc. Normal HELCOM routines should be applied, but of course it is permitted to call or mail the sub-regional partners as a first notification.

Appendix 2: Existing resources

Table 6-1 Existing resource: Record nr., Country, Name of vessel, Location, Longitude, Latitude, Max boat speed, Length, Width, Draught.

Rec	Country	Name of vessel	Location	Lon	Lat	Max. speed [knots]	Length [m]	Width [m]	Draught [m]
1	Denmark	GUNNAR SEID ENFADEN	Korsör	11,133	55,333	18,2	56	12,3	3,9
2	Denmark	MARIE MILJÖ	Korsör	11,133	55,333	13,3	30	8,0	1,6
3	Denmark	GUNNAR THO RSON	Frederik-shavn	10,550	57,430	18,2	56	12,3	3,9
4	Denmark	METTE MILJÖ	Frederik-shavn	10,550	57,430	13,3	30	8,0	1,6
5	Germany	KIEL	Kiel	10,167	54,333	16,8	48	9,2	3,0
6	Germany	SCHARHÖRN	Kiel	10,167	54,333	18,2	56	14,2	4,7
7	Germany	BOTTSAND	Rostock	12,133	54,158	16,5	46	12,0	3,1
8	Germany	VILM	Rostock	12,133	54,158	16,9	49	10,2	2,6
9	Germany	STRELASUND	Stralsund	13,100	54,317	13,9	33	8,4	2,7
10	Germany	ARKONA	Stralsund	13,100	54,317	20,2	69	15,0	4,5
11	Poland	CZESLAW II	Swinoujscie	14,267	53,917	11,4	22	6,0	2,4
12	Poland	KAPITAN POIN C	Gdynia	18,550	54,533	17,8	53	13,6	4,6
13	Poland	ZODIAK	Gdansk	18,667	54,400	19,0	61	10,8	3,5
14	Lithuania	SAKIAI	Klaipeda	21,133	55,717	18,2	56	10,5	4,7
15	Lithuania	Soll Tengiz	Klaipeda/B utinge	20,967	56,050	16,8	48	13,0	4,8
16	Lithuania	Smit Sulawesi	Klaipeda/B utinge	20,967	56,050	17,0	49	12,0	5,6
17	Latvia	KA-14 ASTRA	Ventspils	21,550	57,400	12,2	25	6,0	1,2
18	Latvia	A-90 VARONIS	Riga	24,100	56,967	18,7	60	11,1	3,7
19	Latvia	JL - 1	Liepaja	21,017	56,517	10,8	20	5,7	1,3

Rec	Country	Name of vessel	Location	Lon	Lat	Max. speed [knots]	Length [m]	Width [m]	Draught [m]
20	Latvia	RK-12 "VALPAS"	Riga	24,100	56,967	16,9	48	8,7	4,3
21	Estonia	EVA-316	Tallinn	24,767	59,450	18,8	60	12,2	3,8
22	Estonia	VALVAS PVL-109	Talinn	24,767	59,450	18,2	56	11,5	3,7
23	Estonia	KATI - PVL202	Tallinn/Paldiski	24,055	59,352	15,4	40	6,6	3,0
24	Finland	LETTO	Helsinki	24,950	60,167	15,9	43	12,2	3,8
25	Finland	SEILI	Helsinki	24,950	60,167	17,3	51	12,2	3,8
26	Finland	Oili I	Helsinki	24,950	60,167	12,0	25	6,6	2,1
27	Finland	MERIKARHU	Helsinki	24,950	60,167	18,5	58	11,0	4,7
28	Finland	HYLJE	Kirkkonummi	24,367	60,083	17,9	54	12,5	3,2
29	Finland	Oili III	Kotka	26,950	60,467	12,0	25	6,6	2,1
30	Finland	Oili II	Turku	22,250	60,450	12,0	25	6,6	2,1
31	Finland	HALLI	Turku	22,250	60,450	18,9	61	12,4	4,0
32	Finland	Tursas	Turku	22,250	60,450	19,0	61	10,2	4,9
33	Finland	Uisko	Turku	22,250	60,450	19,0	61	10,2	4,9
34	Finland	LINJA	Oulu	25,467	65,000	14,4	35	9,0	2,8
35	Finland	SEKTORI	Talinn, Estonia	24,767	59,450	14,0	33	7,9	2,5
36	Sweden	KBV 045	Gävle	17,167	60,683	14,7	36	7,3	3,7
37	Sweden	KBV 046	Södertälje	17,633	59,200	14,7	36	7,3	3,7
38	Sweden	KBV 047	Kalmar	16,367	56,667	14,7	36	7,3	3,7
39	Sweden	KBV 201	Karlskrona	15,583	56,167	17,5	52	8,6	2,8
40	Sweden	KBV 202	Simrishamn	14,367	55,550	17,5	52	8,6	2,8

Rec	Country	Name of vessel	Location	Lon	Lat	Max. speed [knots]	Length [m]	Width [m]	Draught [m]
41	Sweden	KBV 048	Helsingborg	12,683	56,050	14,7	36	7,3	3,7
42	Sweden	KBV 051	Gothen-burg	11,917	57,700	15,5	41	8,5	2,4
43	Sweden	KBV 050	Kungshamn	11,233	58,350	15,5	41	8,5	2,5
44	Sweden	KBV 001 Po-seidon	Göteborg	11,917	57,700	21,9	81	16,0	5,5
45	Sweden	KBV 002 Triton	Slite	18,800	57,700	21,9	81	16,0	5,5
46	Sweden	KBV 003 Am-fitrite	Karlskrona	15,583	56,167	21,9	81	16,0	5,5
47	Russia	YASNYY	St.Petersbu rg	30,217	59,900	20,5	71	16,3	4,9
48	Russia	Vyborg	St.Petersbu rg	30,217	59,900	14,3	35	8,2	2,8
49	Russia	Tonas	St.Petersbu rg	30,217	59,900	18,6	59	12,6	4,7
50	Russia	Portovyi-1	St.Petersbu rg	30,217	59,900	11,8	23	5,9	1,9
51	Russia	Vodolaz-15	St.Petersbu rg	30,217	59,900	13,0	29	5,2	1,8
52	Russia	Arneb	St.Petersbu rg	30,217	59,900	9,3	15	4,6	0,8
53	Russia	Aliot	St.Petersbu rg	30,217	59,900	9,3	15	4,6	0,8
54	Russia	Alfred	St.Petersbu rg	30,217	59,900	9,3	15	4,6	0,8
55	Russia	Altair	St.Petersbu rg	30,217	59,900	9,3	15	4,6	0,8
56	Russia	SPRUT-2	St.Petersbu rg	30,217	59,900	13,3	30	12,0	1,2
57	Russia	MT-77	St.Petersbu rg	30,217	59,900	6,0	6	1,2	

Rec	Country	Name of vessel	Location	Lon	Lat	Max. speed [knots]	Length [m]	Width [m]	Draught [m]
58	Russia	SPRUT-1	Vysotsk	28,560	60,620	15,4	40	7,4	3,6
59	Russia	OB-6	Vysotsk	28,560	60,620	13,0	29	6,3	1,2
60	Russia	Bryansk	Primorsk	28,610	60,360	15,6	41	8,2	3,2
61	Russia	Kazan	Primorsk	28,610	60,360	10,3	18		
62	Russia	Tumen	Primorsk	28,610	60,360	10,3	18	4,8	1,3
63	Russia	Orlan	Primorsk	28,610	60,360	7,9	11	3,5	0,6
64	Russia	Urok	Primorsk	28,610	60,360	5,4	5	2,0	1,2
65	Russia	Striz	Primorsk	28,610	60,360	6,7	8	2,6	0,4
66	Russia	KIT	Kaliningrad	20,510	54,710	14,5	36	7,2	1,7
67	Russia	Pribrezhnyy	Kaliningrad	20,510	54,710	14,5	36	7,2	1,6

Table 6-2 Existing resource: Record nr., Country, Name of vessel, Max. action radius for different periods between alarm and on-site arrival (including 2 hrs mobilisation)l: 4 hrs, 8 hrs, 23 hrs, 16 hrs, Call signal, Recovery system, Recovery rate

Rec	Country	Name of vessel	Action radius (4 hours) [km]	Action radius (8 hours) [km]	Action radius (12 hours) [km]	Action radius (16 hours) [km]	Call sig-nal	Recovery system	Recov-ery (m^3/hr)
1	Denmark	GUNNAR SEID ENFADEN	67	202	337	471	OUD V	Ro-Clean Desmi	60
2	Denmark	MARIE MILJÖ	49	148	246	345	OUE A	Ro-Clean Desmi	50
3	Denmark	GUNNAR THO RSON	67	202	337	471	OUD U	Ro-Clean Desmi	60
4	Denmark	METTE MILJÖ	49	148	246	345	OUE B	Ro-Clean Desmi	50
5	Germany	KIEL	62	187	312	437	DLQ O	LAMOR Brus h 2 X 80 m3/ h, 2 GT 260 Skimmer	160
6	Germany	SCHARHÖRN	67	202	337	472	DGO Q	2xSide walls with Marflex pumps 320 m3/h	640
7	Germany	BOTTSAND	61	184	306	429	DRH R	2 X 160 m^3/h	320
8	Germany	VILM	63	188	313	439	DFG H	2xSide walls with BÖRGER pumps 160 m3/h	320
9	Germany	STRELASUND	51	154	257	359	DBV E	LAMOR Brus h 2 X 80 m3/ h	160
10	Germany	ARKONA	75	225	374	524	DBB U	2xSide walls with BÖRGER pumps 320 m3/h	640

Rec	Country	Name of vessel	Action radius (4 hours) [km]	Action radius (8 hours) [km]	Action radius (12 hours) [km]	Action radius (16 hours) [km]	Call sig-nal	Recovery system	Recov-ery (m^3/hr)
11	Poland	CZESLAW II	42	127	211	295	SPLN	LAMOR	40
12	Poland	KAPITAN POIN C	66	197	329	460	SQR U	LAMOR	280
13	Poland	ZODIAK	70	211	352	493	SQLX	LAMOR	160
14	Lithuania	SAKIAI	68	203	338	473	LYKP	LAMOR Free float-ing brush ski mmer (2 skimmers of 100 m3/h each)	200
15	Lithuania	Soll Tengiz	62	187	312	437	-	Lamor Brush Skimmer Free Floating LFF 100 2C	100
16	Lithuania	Smit Sulawesi	63	188	314	440	LYOO	Desmi termin ator threshol d skimmer	78
17	Latvia	KA-14 ASTRA	45	135	225	315	YLON	LAMOR BLA MOR Brush S kim-mer Box syst em 2 x 80 m3 /h	60
18	Latvia	A-90 VARONIS	69	208	347	486	YLNS	LAMOR adva ncing system + free-float-ing skimmer	160
19	Latvia	JL - 1	40	120	201	281	-	LAMOR OPC-4	0
20	Latvia	RK-12 "VALPAS"	63	188	313	438	YLRS	DESMI TERMINATO R skimmer head	60

Rec	Country	Name of vessel	Action radius (4 hours) [km]	Action radius (8 hours) [km]	Action radius (12 hours) [km]	Action radius (16 hours) [km]	Call sig-nal	Recovery system	Recov-ery (m^3/hr)
21	Estonia	EVA-316	70	209	348	488	ESTF	LAMOR Brus h	120
22	Estonia	VALVAS PVL-109	67	202	337	471	ESY 2109	-	0
23	Estonia	KATI - PVL202	57	171	285	398	ESY 2 202	LAMOR Side Collector LSC-3 with automatic jib; bucket skimmer	220
24	Finland	LETTO	59	176	294	412	OIRP	Built in LAM OR system	73
25	Finland	SEILI	64	192	320	448	OG-5907	Built in LAM OR system	72
26	Finland	Oili I	45	134	223	312	OF-4175	Built in oil re cov-ery system	60
27	Finland	MERIKARHU	69	206	343	480	OJEG	Built in Mobi mar	91
28	Finland	HYLJE	66	199	331	463	OIM G	Built in LORI system	96
29	Finland	Oili III	45	134	223	312	OF-4174	Built in oil re cov-ery system	60
30	Finland	Oili II	45	134	223	312	OF-4149	Built in oil re cov-ery system	60
31	Finland	HALLI	70	210	350	490	OIMX	Built in LORI system	108
32	Finland	Tursas	71	212	353	494	OIUI	Built in Lamo r system	72
33	Finland	Uisko	71	212	353	494	OIU	Built in Lamo	72

Rec	Country	Name of vessel	Action radius (4 hours) [km]	Action radius (8 hours) [km]	Action radius (12 hours) [km]	Action radius (16 hours) [km]	Call sig-nal	Recovery system	Recov-ery (m^3/hr)
							M	r system	
34	Finland	LINJA	53	160	266	372	OIRZ	Built in LAIVA TEOLLISUUS system	67
35	Finland	SEKTORI	52	155	259	362	OF-4184	Built in LORI system	60
36	Sweden	KBV 045	54	163	272	380	SIWA	LAMOR adva ncing system + free-float-ing skimmers	50
37	Sweden	KBV 046	54	163	272	380	SIWR	LAMOR adva ncing system + free-float-ing skimmers	50
38	Sweden	KBV 047	54	163	272	380	SMJY	LAMOR adva ncing system + free-float-ing skimmers	50
39	Sweden	KBV 201	65	195	325	454	SMK T	LAMOR adva ncing system + free-float-ing skimmers	50
40	Sweden	KBV 202	65	195	325	454	SML A	LAMOR adva ncing system + free-float-ing skimmer	50
41	Sweden	KBV 048	54	163	272	380	SKIU	LAMOR adva ncing system + free-float-ing skimmers	50

Rec	Country	Name of vessel	Action radius (4 hours) [km]	Action radius (8 hours) [km]	Action radius (12 hours) [km]	Action radius (16 hours) [km]	Call sig-nal	Recovery system	Recov-ery (m^3/hr)
42	Sweden	KBV 051	57	172	287	402	SKIY	LORI advancing system + free-float-ing skimmers	30
43	Sweden	KBV 050	57	172	287	402	SKIX	LORI advancing system + free-float-ing skimmers	30
44	Sweden	KBV 001 Po-seidon	81	243	406	568	SBDT	LORI advancing system + free-float-ing skimmers + transfer system	500
45	Sweden	KBV 002 Triton	81	243	406	568	SBHI	LORI advancing system + free-float-ing skimmers + transfer system	500
46	Sweden	KBV 003 Am-fitrite	81	243	406	568	SBIW	LORI advancing system + free-float-ing skimmers + transfer system	500
47	Russia	YASNYY	76	228	380	533		LAMOR MINIMAX 100, LAMOR ICE-EATER» LAMOR OPC-4	250
48	Russia	Vyborg	53	159	265	371		LAMOR	30

Rec	Country	Name of vessel	Action radius (4 hours) [km]	Action radius (8 hours) [km]	Action radius (12 hours) [km]	Action radius (16 hours) [km]	Call sig-nal	Recovery system	Recov-ery (m^3/hr)
								"MINIMAX 30"	
49	Russia	Tonas	69	207	345	482		Lamor Free Floating Off-shore «LAMOR ICE-EATER»	190
50	Russia	Portovyi-1	44	131	218	305		LAMOR "MINIMAX 30" – 2 шт.	30
51	Russia	Vodolaz-15	48	144	240	336		LAMOR "MINIMAX 20"	20
52	Russia	Arneb	35	104	173	242		-	0
53	Russia	Aliot	35	104	173	242		-	0
54	Russia	Alfred	35	104	173	242		-	0
55	Russia	Altair	35	104	173	242		-	0
56	Russia	SPRUT-2	49	148	246	345		LAMOR "MINIMAX 20", LAMOR "MINIMAX 10"	30
57	Russia	MT-77	22	66	110	154		LAMOR "MINIMAX 20", LAMOR "MINIMAX 10"	30
58	Russia	SPRUT-1	57	172	286	400		Lamor Free Floating Off-shore, LAMOR "MINIMAX 10"	130

Rec	Country	Name of vessel	Action radius (4 hours) [km]	Action radius (8 hours) [km]	Action radius (12 hours) [km]	Action radius (16 hours) [km]	Call sig-nal	Recovery system	Recov-ery (m^3/hr)
59	Russia	OB-6	48	145	242	338		LAMOR “MINIMAX 10” – 2 шт.	10
60	Russia	Bryansk	58	173	289	404		«LAMOR-MINIMAX 100»	100
61	Russia	Kazan	38	115	191	267		«LAMOR-MINIMAX 10»	10
62	Russia	Tumen	38	115	191	267		«LAMOR-MINIMAX 10»	10
63	Russia	Orlan	29	88	147	206		-	0
64	Russia	Urok	20	60	101	141		-	0
65	Russia	Striz	25	74	123	173		-	0
66	Russia	KIT	54	161	269	377		LAMOR Mini max 100, LA MOR Minima x 30,LAMOR Mini-max 20,LAM OR Minimax 10,Desmi Mi nimax	110
67	Russia	Pribrezhnyy	54	161	269	377		LAMOR Mini max 30, Ter mite	110

Table 6-3 Existing resource: Record nr., Country, Name of vessel, Storage capacity, Towing capacity (ton), Fire fighting capacity, Lightering

Rec	Country	Name of vessel	Storage capacity	Towing capacity	Fire fighting capacity	Lightering
1	Denmark	GUNNAR SEIDE NFADEN	312	20 ts.	none	none
2	Denmark	MARIE MILJÖ	64	none	none	none
3	Denmark	GUNNAR THO RSON	312	20 ts.	none	none
4	Denmark	METTE MILJÖ	64	none	none	none
5	Germany	KIEL	325	none	18000 l/min, 14 m3 foa m	none
6	Germany	SCHARHÖRN	430	40 to	40000 l/min, 20 m3 foa m	500 m3/h + 190 m3/h
7	Germany	BOTTSAND	790	none	none	none
8	Germany	VILM	500			
9	Germany	STRELASUND	200			
10	Germany	ARKONA	400		23000 l/min, 15 m3 foa m	500 m3/h + 190 m3/h
11	Poland	CZESLAW II	20			100 m3/h (DESMI)
12	Poland	KAPITAN POIN C	516	74 ton s	44167 l/min	400 m3/h (MARFLEX)
13	Poland	ZODIAK	72			
14	Lithuania	SAKIAI	200	16	yes	FRAMOMERSEDES BENZ OM 422 with 3 pumps 750, 180 ir 180 m3/val
15	Lithuania	Soll Tengiz	150	60	2 x Skum 1400 m^3/hr at 13 bar. 2 x Skum 1200 m^3/hr water/foam/fog monitors, remote controlled	no
16	Lithuania	Smit Sulawesi	Rub-	71	6000 l/h (2 pumps x	no

Rec	Country	Name of vessel	Storage capacity	Towing capacity	Fire fighting capacity	Lightering
			ber Ro-Tanks 25 m3 (3 x 5m3 and 1x 10 m3		3000 l/h)	
17	Latvia	KA-14 ASTRA	300 bags	none	1 water jet	none
18	Latvia	A-90 VARONIS	30 m3	none	none	OILBAG 2x50 m3
19	Latvia	JL - 1	100 m3	none	none	none
20	Latvia	RK-12 "VALPAS"	14	none	1 water jet	
21	Estonia	EVA-316	200	35	40000 l/min	none
22	Estonia	VALVAS PVL-109	-	-	-	none
23	Estonia	KATI - PVL202	113 (tank)	N/A	1000 l/min	none
24	Finland	LETTO	43			
25	Finland	SEILI	196	yes		
26	Finland	Oili I	80			
27	Finland	MERIKARHU	40+oil bags	yes	yes	
28	Finland	HYLJE	800			
29	Finland	Oili III	80			
30	Finland	Oili II	80			
31	Finland	HALLI	1400			
32	Finland	Tursas	100	yes(32	yes	none

Rec	Country	Name of vessel	Storage capacity	Towing capacity	Fire fighting capacity	Lightering
				5 kN)		
33	Finland	Uisko	100	yes(325 kN)	yes	
34	Finland	LINJA	77			
35	Finland	SEKTORI	108			
36	Sweden	KBV 045	150	7	3000 l/min	OILBAG 100 m3
37	Sweden	KBV 046	150	7	3000 l/min	OILBAG 100 m3
38	Sweden	KBV 047	150	7	3000 l/min	OILBAG 100 m3
39	Sweden	KBV 201	104	15	5000 l/min	OILBAG 100 m3
40	Sweden	KBV 202	104	15	5000 l/min	OILBAG 100 m3
41	Sweden	KBV 048	150	7	3000 l/min	OILBAG 100 m3
42	Sweden	KBV 051	190	6.6	8500 l/min	OILBAG 100 m3
43	Sweden	KBV 050	190	6.6	8500 l/min	OILBAG 100 m3
44	Sweden	KBV 001 Poseidon	1150	100	2 x 1200 l/min Water 300 l/min foam	Lamor Transfer system
45	Sweden	KBV 002 Triton	1150	100	2 x 1200 l/min Water 300 l/min foam	Lamor Transfer system
46	Sweden	KBV 003 Amfitrite	1150	100	2 x 1200 l/min Water 300 l/min foam	Lamor Transfer system
47	Russia	YASNYY	300	60 ton	5000 l/min	
48	Russia	Vyborg	15			
49	Russia	Tonas				
50	Russia	Portovyi-1	25			
51	Russia	Vodolaz-15				
52	Russia	Arneb				
53	Russia	Aliot				

Rec	Country	Name of vessel	Storage capacity	Towing capacity	Fire fighting capacity	Lightering
54	Russia	Alfred				
55	Russia	Altair				
56	Russia	SPRUT-2				
57	Russia	MT-77				
58	Russia	SPRUT-1	400			
59	Russia	OB-6	100			
60	Russia	Bryansk	475			
61	Russia	Kazan	20			
62	Russia	Tumen	20			
63	Russia	Orlan	2,4			
64	Russia	Urok				
65	Russia	Striz				
66	Russia	KIT	80			oil-bag 2x10m3 1x15m3
67	Russia	Pribrezhnyy	20			oilbag 1x15m3 1x5m3

Table 6-4 Existing resource: Record nr, Country, Name of vessel, Boom type, Boom length, Remarks

Rec	Country	Name of vessel	Boom type	Boom length (m)	Remarks
1	Denmark	GUNNAR SEIDE NFADEN	Ro-Boom Ocean	600	16 hours
2	Denmark	MARIE MILJÖ	Ro-Boom Ocean	200	1 hour
3	Denmark	GUNNAR THO RSON	Ro-Boom Ocean	600	16 hours
4	Denmark	METTE MILJÖ	Ro-Boom Ocean	200	1 hour
5	Germany	KIEL	Hydrotechnik 850	600	
6	Germany	SCHARHÖRN	Ro-Boom 2000	400	
7	Germany	BOTTSAND	none	0	
8	Germany	VILM		0	
9	Germany	STRELASUND		0	
10	Germany	ARKONA	Ro-Boom 2000	800	
11	Poland	CZESLAW II	Expandi 4300	340	
12	Poland	KAPITAN POIN C	Ro-Boom 1500	600	
13	Poland	ZODIAK		0	
14	Lithuania	SAKIAI	Ro-Boom 2000 2 x 2 50m	500	oily water separation - 2 tanks with 90 and 70 m3
15	Lithuania	Soll Tengiz	Ro-Boom 1500	250	Power (kW): 2 x Wartsila 8L20C each 1440 kW,Speed: 13.5 knots,Dispersant: 5 m³, 2 x detergent spray booms.,Deck Crane: 2 T @ 16 m & 4 T @ 8 m, telescopic.,Stern Roller: 3.6 m wide, x 1.5m Ø, 60 T SWL.
16	Lithuania	Smit Sulawesi	Ro-Boom 1500 2 x 2	500	Power (kW): 2 main engines x 2358 kW,Max speed: 12 knots,Min Crew:

Rec	Country	Name of vessel	Boom type	Boom length (m)	Remarks
			50m		10 persons,Telescope hydraulic deck crane 4 tons,Towing winch 1x20tons,Portable dispersant spray-ing system BOATSPRAY 100
17	Latvia	KA-14 ASTRA	none	0	Restricted overseas capacity
18	Latvia	A-90 VARONIS	Ro-Boom 1500	800	2 hrs readiness
19	Latvia	JL - 1	Ro-Boom 1500	400	Non-propelled barge, (built in accor-dance with BV classification rules)
20	Latvia	RK-12 "VALPAS"	Booms AP3001	600	1 hr readiness
21	Estonia	EVA-316	not usually on b oard	0	
22	Estonia	VALVAS PVL-109	1.5m Ro-boom	800	
23	Estonia	KATI - PVL202	1.5m Ro-boom	200	
24	Finland	LETTO	3 x 200m LAMO R boom(1.5m hi gh)	600	REC_RATE assuming one brush can lif t 6m3/h
25	Finland	SEILI		0	REC_RATE assuming one brush can lif t 6m3/h
26	Finland	Oili I		0	REC_RATE assuming one brush can lif t 6m3/h
27	Finland	MERIKARHU	3 x 200m LAMO R boom (1.5m hi gh)	600	REC_RATE assuming one brush can lif t 6m3/h
28	Finland	HYLJE	4 x 200m Ro-Boom(2m high) + 2x200m (1.5m high)	1200	REC_RATE assuming one brush can lif t 6m3/h
29	Finland	Oili III		0	REC_RATE assuming one brush can lif t 6m3/h
30	Finland	Oili II		0	REC_RATE assuming one brush can lif t 6m3/h

Rec	Country	Name of vessel	Boom type	Boom length (m)	Remarks
31	Finland	HALLI	5 x 200m Ro-Boom(1.5m high) + 3 x 200m Ro-Boom(2m high)	1600	REC_RATE assuming one brush can lif t 6m3/h
32	Finland	Tursas	none	0	REC_RATE assuming one brush can lif t 6m3/h
33	Finland	Uisko		0	
34	Finland	LINJA		0	REC_RATE assuming one brush can lif t 6m3/h
35	Finland	SEKTORI		0	REC_RATE assuming one brush can lif t 6m3/h
36	Sweden	KBV 045	Expandi 4300	300	
37	Sweden	KBV 046	Expandi 4300	300	
38	Sweden	KBV 047	Expandi 4300	300	
39	Sweden	KBV 201	Expandi 4300	300	
40	Sweden	KBV 202	Expandi 4300	300	
41	Sweden	KBV 048	Expandi 4300	300	
42	Sweden	KBV 051	Expandi 4300	300	
43	Sweden	KBV 050	Expandi 4300	300	
44	Sweden	KBV 001 Poseidon	Nofi 600S	600	
45	Sweden	KBV 002 Triton	Nofi 600S	600	
46	Sweden	KBV 003 Amfitrite	Nofi 600S	600	
47	Russia	YASNYY			
48	Russia	Vyborg			
49	Russia	Tonas			
50	Russia	Portovyi-1			
51	Russia	Vodolaz-15			

Rec	Country	Name of vessel	Boom type	Boom length (m)	Remarks
52	Russia	Arneb			
53	Russia	Aliot			
54	Russia	Alfred			
55	Russia	Altair			
56	Russia	SPRUT-2			
57	Russia	MT-77			
58	Russia	SPRUT-1			
59	Russia	OB-6			
60	Russia	Bryansk			
61	Russia	Kazan			
62	Russia	Tumen			
63	Russia	Orlan			
64	Russia	Urok			
65	Russia	Striz			
66	Russia	KIT	Ro-Boom 1500+North Sea Boom BPP 830, BPP 1100	850	
67	Russia	Pribrezhnyy			