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Technical Sub report 4: Historical accidents and spills

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The Greater North Sea and its wider approaches is one of the busiest and most highly used maritime areas in the world. With the ever-increasing competition for space comes an increased risk of accidents that could result in marine pollution.

Currently the area has no overall risk assessment for marine pollution; risk is mapped with a variety of national risk assessments which are undertaken with differing methodologies; thus reducing comparability.

The BE-AWARE project is therefore undertaking the first area-wide risk assessment of marine pollution using a common methodology that allows the risk to be mapped and compared under different scenarios.

The project outcomes will improve disaster prevention by allowing North Sea States to better focus their resources on areas of high risk.

The project is a two year initiative (2012-2014), co-financed by the European Union, with participation and support from the Bonn Agreement Secretariat, Belgium, Denmark and the Netherlands, with co-financing from Norway.

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Executive summary

The main objective of the BE-AWARE project is to conduct an area-wide risk assessment of the spillage of oil and HNS in the Bonn Agreement area. One of the main tasks in the project is gathering information related to the risk assessment. Important input information for the risk assessment is the overview of historical accidents and spills in the area. The results are given for two main groups:

1. Accidents and spills caused by shipping activities
2. Spills with causes other than shipping accidents

Accidents and spills caused by shipping activities

In Table 6-1 the average number of accidents within the area per accident type is given. The average number of accidents that result in a spill is presented in the third column.

Most of the accidents in the area involve a collision with a vessel or grounding. The total annual number is almost 118 accidents. In order to verify this, the total accident numbers for the entire region have been compared to the IHS Fairplay Casualty statistics for the period 2008-2011. It was found that in the corresponding area, during the years 2008 – 2010 about 168 accidents took place in this area involving ships larger than 300 GT and excluding machinery failures without consequences. This corresponds to 56 accidents every year.

There seems to be a large difference between the average number of 56 from the Fairplay data and the 107 accidents resulting from the collected data from the different Bonn Agreement countries. However this difference is mostly explained by the type of ships and accidents that are included in the Fairplay dataset. Only the more serious accidents will be included in this dataset. The data received from the different countries also includes relatively small accidents with little or no consequences, which are not included in the Fairplay accident database.

Table 6-1 also shows that the accident type that has the highest probability of resulting in a spill is the sinking of ships (as to be expected). On average 2.7 % of all shipping accidents result in some kind of spillage.

Table 0-1 Number of accidents resulting in a spill, per accident type

Accident type (2002 - 2011)	Annual number	Number of cases resulting in a spill	% of cases resulting in a spill
Collision with vessel	27.5	1.0	3.6%
Collision with object	6.7	0.0	0.0%
Grounding	42.7	0.4	0.9%
Fire	12.3	0.2	1.6%
Sunk other cause	0.9	0.8	88.9%
Hull damage other cause	1.9	0.1	5.3%
Unknown	14.9	0.4	2.7%
Total	106.9	2.9	2.7%

For the reported incidents resulting in a spill the size of the spill and the type of oil has also been analysed. The results are shown in Figure 6-1. Only 5 reported spills were larger than 5000 tonnes.

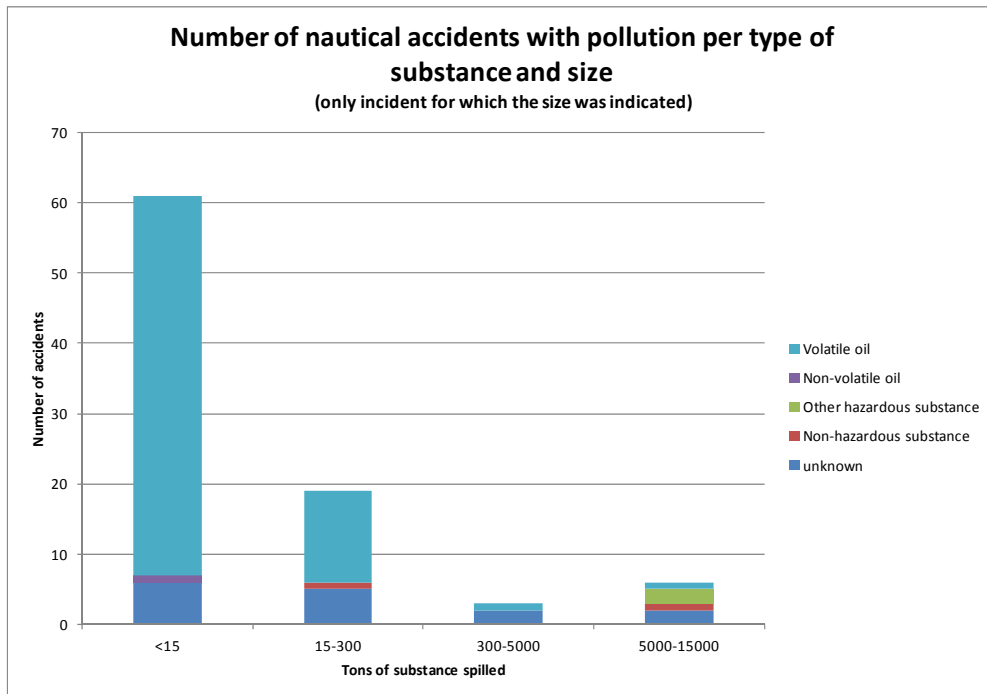


Figure 0-1 Spill sizes per substance

The contribution of “volatile oils” is dominant accounting for 87% of all spills. The second largest group is “unknown”. It is likely that many spills in this category are in fact also related to volatile oils.

Norway and France reported by far most of the accidents of this type. Unfortunately the size of the spills is not expressed in terms of quantities but in spill area. There is no direct relationship between the amount of substance spilled and the area of the spill, as this depends on the substance characteristics and, more importantly, on how long the substance has been in the water.

Spills from offshore activities

The OSPAR Offshore Industry Committee collects data on accidental spills of oily or chemical substances from offshore installations. An overview of the results is given in Table 6-2.

The number of spills from offshore installations has been decreasing over the period 2000 - 2011 from 722 spills to 454 spills per year. As the number of platforms has been increasing, this leads to a strong decrease in the average number of spills per platform: this number decreased from 1.5 in 2000 to 0.6 in 2011.

Table 0-2 Oil spill statistics in the OSPAR region

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Number of installations	[-]	489	537	586	592	649	666	677	725	741	743	784	741	641
Number of oil spills	[-]	722	768	801	621	678	655	509	515	491	485	467	454	7166
Oil spills per installation	[-]	1.48	1.43	1.37	1.05	1.04	0.98	0.75	0.71	0.66	0.65	0.60	0.61	0.94
Quantity of oil	[t]	514	605	214	824	199	399	173	3907	305	180	131	63	7320
Quantity per platform	[t]	1.05	1.13	0.37	1.39	0.31	0.60	0.26	5.39	0.41	0.24	0.17	0.09	1.11
Quantity per spill	[t]	0.7	0.8	0.3	1.3	0.3	0.6	0.3	7.6	0.6	0.4	0.3	0.1	1.0

The total quantity that is spilled each year does not show such a clear trend. Especially remarkable is the large amount of oil spilled in 2007: 3907 tonnes. Of this, 3815 tonnes can be accounted for by a single oil spill. This shows that most spills can be regarded as small and that the effect of a single large spill is significant. Only one such spill was reported during the period 2000 – 2011. This spill happened in the Bonn Agreement area, in offshore Norway, during loading operations of a tanker at an offshore loading buoy.

1. Introduction

The main objective of the BE-AWARE project is to conduct an area-wide risk assessment in the spillage of oil and HNS. One of the main tasks in the project is gathering information related to the risk assessment. One of the important pieces of input information for the risk assessment is the overview of historical accidents and spills in the area.

1.1 Objective of the report

The objective of this report is to analyse available accident and spill statistics relevant for the outflow of oil in the Bonn Agreement area. The results of the analysis are to be used as calibration of the probability and outflow models in the risk assessment. This is done by evaluating accident frequencies and spill frequencies respectively.

Report structure

Section 2 describes the approach followed. The results concerning accidents and spills caused by shipping activities is given in section 3. The overview of spills with causes other than shipping is presented in section 4. In section 5 the reported spills of HNS are discussed and finally a summary and conclusions are given in section 6.

2. Approach

To establish an overview of the historical accidents and spills in the area the available accident statistics of the area have been analysed.

The reported incidents are divided into two main groups:

1. Accidents and spills caused by shipping activities
2. Spills with other causes than shipping accidents

Within the first group the following accident types are considered:

- Collision with vessel;
- Collision with object;
- Grounding;
- Fire;
- Sinking/foundering;
- Hull damage;
- Pollution other causes.

For each of the accident types an overview will be given of the number of accidents and the number of accidents which have resulted in a spill of oil or HNS.

For accidents, the frequencies are determined for each accident type separately. For spills, the frequencies are determined per spill size.

3. Accidents and Spills Caused by Shipping Activities

3.1 Data overview

All Contracting Parties have supplied data on shipping accidents and oil and HNS spills in their waters. However, as the different countries have their own systems to archive these data, the amount and scope of the data differs. In the table below the scope of the data on shipping accidents and spills has been summarized per country.

Most of the countries have submitted data on individual accidents. Germany only provided annual statistics. The data received covered different periods that varied between 10 and 21 years. Therefore a considerable period is covered. However, it is known that in general the safety of navigation increases in time. On the other hand the amount of shipping changes and the characteristics of ships change in time. For these reasons older accident data are less representative for the present or future situation. Therefore it is decided to limit the analyses of the historical data to a period of ten years (2002 -2011), thus sufficient data can be obtained which are not too old.

All countries indicated for the different accidents whether pollution was involved. Belgium, France, Germany, Ireland and Norway also included the results of aerial observations. These are not included in this analysis.

Country	Data on accidents	Data on spills
Belgium	1992 - 2011	Including aerial observations 1992 – 2011
Denmark	2002 - 2011	Only as a result of shipping accidents 2002 - 2011
France	2002 - 2011	Including aerial observations 2002 – 2011
Germany	Statistics 2000 – 2011	Including aerial observations 2000-2011
Ireland	2000 - 2011	Including aerial observations 2000 – 2011
Netherlands	2000 - 2011	Only as a result of shipping accidents 2000 - 2011
Norway	2000 - 2011	Including aerial observations 2000 – 2011
Sweden	2002 – 2011	Only as a result of shipping accidents 2002 - 2011
United Kingdom	1991 - 2011	Only as a result of shipping accidents 1991 - 2011

3.2 Selection of accidents and spills

For each country the total number of accidents and spills has been determined over a period of 10 years, from 2002 to 2011. In order to compare the different countries and to derive a total number of accidents for the entire Bonn Agreement area, the average number of accidents per year has also been calculated. An overview of the total number of reported accidents per type and country is given in Table 3-1. The first row indicates the reporting period. The incidents represent all entries in each database in the 10 year period, as delivered by the different countries, so this indicates the combination of the accidents and accidents with spill.

The results have been corrected for double entries for different countries. Also the data has been corrected to only take into account ships above 300 GT and shipping accident types that are relevant for marine pollution. For instance, machinery failures have not been taken into account unless they have led to an actual accident such as grounding. Also all accidents marked as 'pollution other cause' are not included in this overview as these cannot be related to shipping accidents.

Table 3-1 Total number of reported incidents/accidents per country and incident type (for the 2002 – 2011 period)¹

Total number of accidents (2002-2011)	Belgium	Denmark	France	Germany	Ireland	Netherlands	Norway	Sweden	United Kingdom	Total
<i>Time period [years]</i>	10	10	10	10	10	10	10	10	10	10
Collision with vessel	4	24	21	13	0	8	106	0	99	275
Collision with object	0	2	0	0	0	0	19	0	46	67
Grounding	3	21	6	18	0	0	268	1	110	427
Fire	1	11	3	6	0	0	38	1	63	123
Sunk other cause	1	0	5	1	0	1	0	0	1	9
Hull damage other cause	0	0	5	1	0	0	0	0	13	19
Unknown	0	0	3	10	0	0	94	0	42	149
Total reported accidents	9	58	43	49	0	9	525	2	374	1069

In Table 3-2 the average number of reported incidents/accidents per year for each country is given. It can be seen that according to the received data on average 106.9 accidents were reported on an annual basis.

Table 3-2 Average number of reported incidents/accidents per country and incident type

Average number of accidents per year	Belgium	Denmark	France	Germany	Ireland	Netherlands	Norway	Sweden	United Kingdom	Total
<i>Time period</i>	10	10	10	10	10	10	10	10	10	10
Collision with vessel	0.4	2.4	2.1	1.3	0.0	0.8	10.6	0.0	9.9	27.5
Collision with object	0.0	0.2	0.0	0.0	0.0	0.0	1.9	0.0	4.6	6.7
Grounding	0.3	2.1	0.6	1.8	0.0	0.0	26.8	0.1	11.0	42.7
Fire	0.1	1.1	0.3	0.6	0.0	0.0	3.8	0.1	6.3	12.3
Sunk other cause	0.1	0.0	0.5	0.1	0.0	0.1	0.0	0.0	0.1	0.9
Hull damage other cause	0.0	0.0	0.5	0.1	0.0	0.0	0.0	0.0	1.3	1.9
Unknown	0.0	0.0	0.3	1.0	0.0	0.0	9.4	0.0	4.2	14.9
Total reported accidents	0.9	5.8	4.3	4.9	0.0	0.9	52.5	0.2	37.4	106.9

It can be seen that by far most accidents happened in the Norway. This is due to the large number of groundings in the database. Norway has a rocky coast so the impact of grounding can be large. For this reason groundings are monitored accurately. The second country with many accidents is the UK. This could be explained by the large sea area that is covered by this country and the dense shipping activities taking place here. However, it cannot be excluded that this very high number could also be related to reporting and definition issues.

¹ Ireland provided accident data. However, for the period 2002 – 2011 these were all accidents marked as 'pollution other cause' and these are not included in this overview.

Ship type

For almost 87% of the reported accidents the ship type is known. In Table 3-3 an overview is given of the total number of ships involved in the accidents per ship type (over the different reporting periods) and the average number of ships involved in an incident per year.

Table 3-3 Overview of the number of reported accidents per ship type

Ship type	Total number of reported accidents	Average number of reported accidents per year	Contribution per shipping ship type
Bulk carrier	62	6.2	5.80%
Containership	31	3.1	2.90%
Fishing vessel	88	8.8	8.23%
General cargo	303	30.3	28.34%
Other	254	25.4	23.76%
Passenger/Ro-Ro	209	20.9	19.55%
Tanker	105	10.5	9.82%
Vehicle carrier	6	0.6	0.56%
unknown	11	1.1	1.03%
Total	1069	106.9	100.00%

Verification

In order to verify this, the total accident numbers for the entire region have been compared to the IHS Fairplay Casualty statistics for the period 2008-2011.

In the IHS Fairplay casualty database all accidents have been attributed to a cell in the Marsden Grid. This is a grid of cells with a size of 10° latitude and 10° longitude. Although the cells do not exactly match the Bonn Agreement area, it is possible to verify the order size of total accident numbers. The figure below indicates which cells of the Marsden grid have been included. For the most southern part of the English Channel one fifth of the accidents in the cell covering the coast of Bretagne have been included. This is indicated by the smaller “cell” in the figure.

It was found that in the indicated area, during the years 2008 – 2010 about 168 accidents took place in this area involving ships larger than 300 GT and excluding machinery failures without consequences. This corresponds to 56 accidents every year.

There seems to be a large difference between the average number of 56 from the Fairplay data and the 107 accidents resulting from the collected data from the different countries. However this difference is mostly explained by the type of ships and accidents that are included in the Fairplay dataset. Only the more serious accidents will be included in this dataset. In the data received from the different countries also relatively small accidents are included, with no or minor consequences, which are not included in the Fairplay accident database.

It can therefore be concluded that Norway and UK have the highest likelihood of an accident taking place followed by the French and Danish North Sea area. The Swedish and Irish parts of the Bonn Agreement area have the lowest likelihood of accidents. For Sweden the main reason is that this area is very small, for Ireland it is most probably because the traffic density is relatively low.

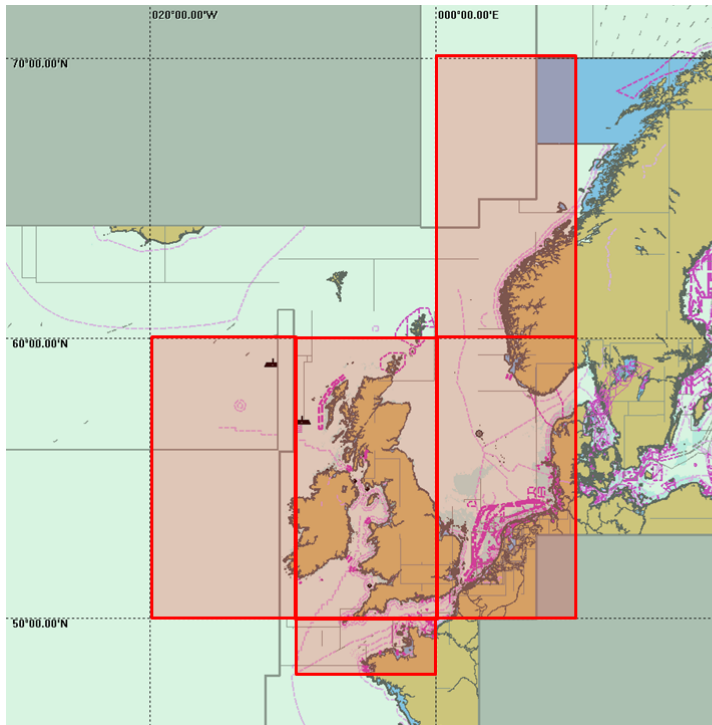


Figure 3-1 Selection of area for accidents from IHS Fairplay casualty database

3.3 Locations

Based on the location included in the datasets delivered by the different countries a geographical overview of the accidents can be created. Note that all datasets cover the same time period (2002 – 2011). Exact locations for all accidents are not known. For some countries accidents are included just outside their economic zone. This can be due to a position error in the database or because it was actually handled by this country.

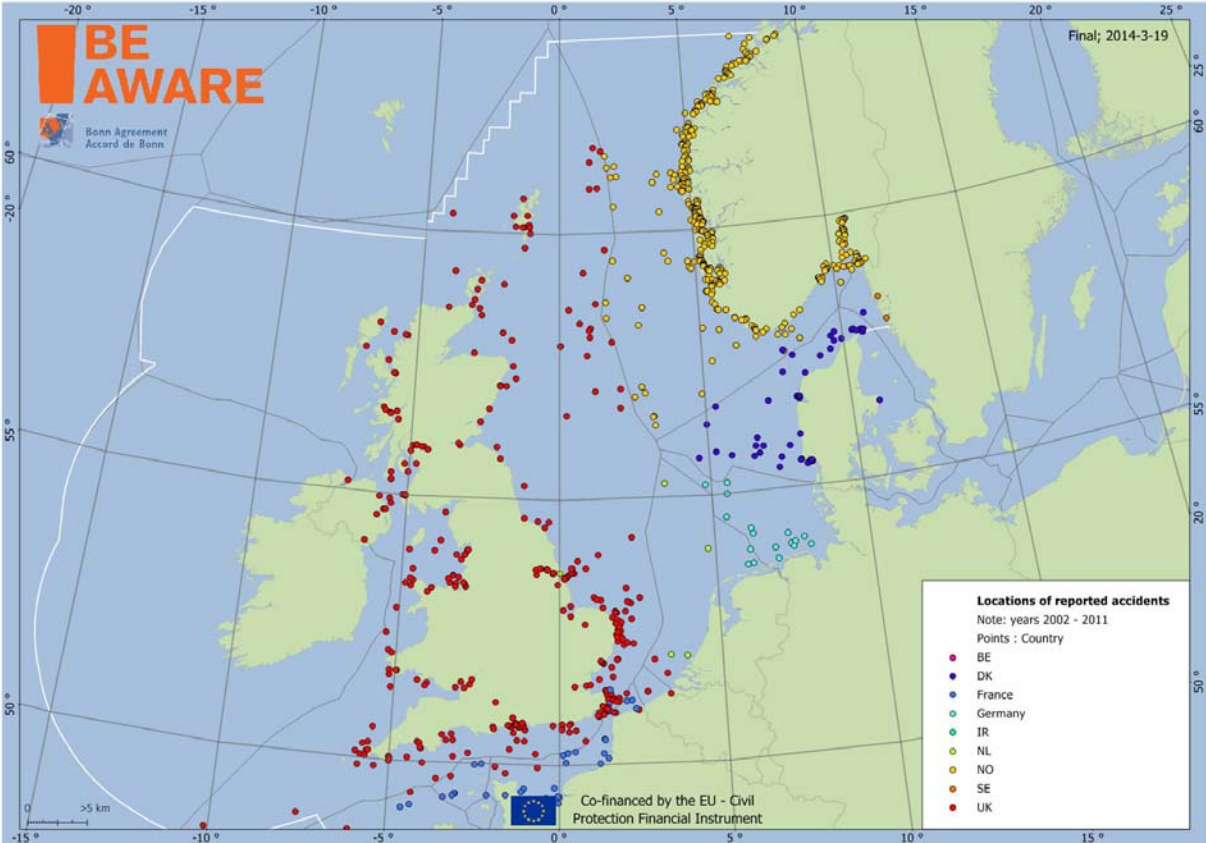


Figure 3-2 Location of the reported incidents per country

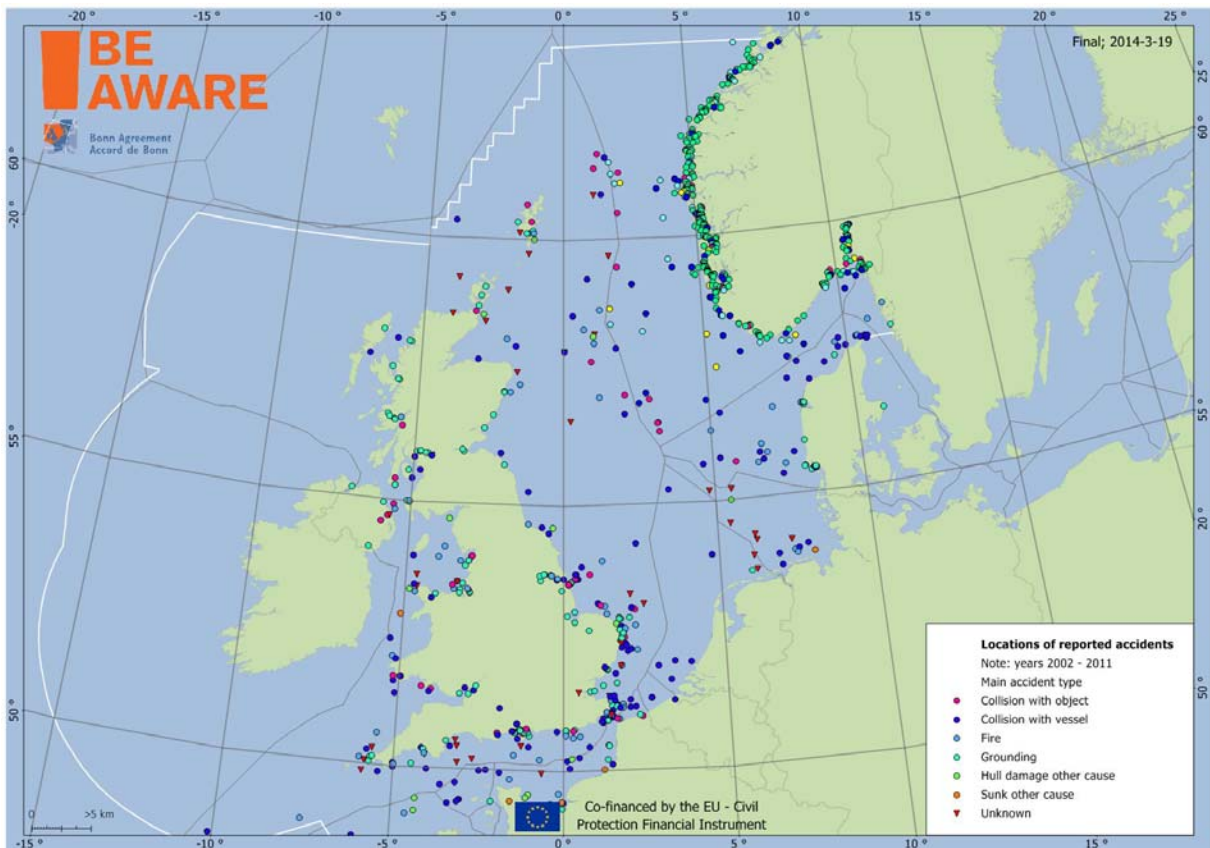


Figure 3-3 Locations the reported incidents per accident type

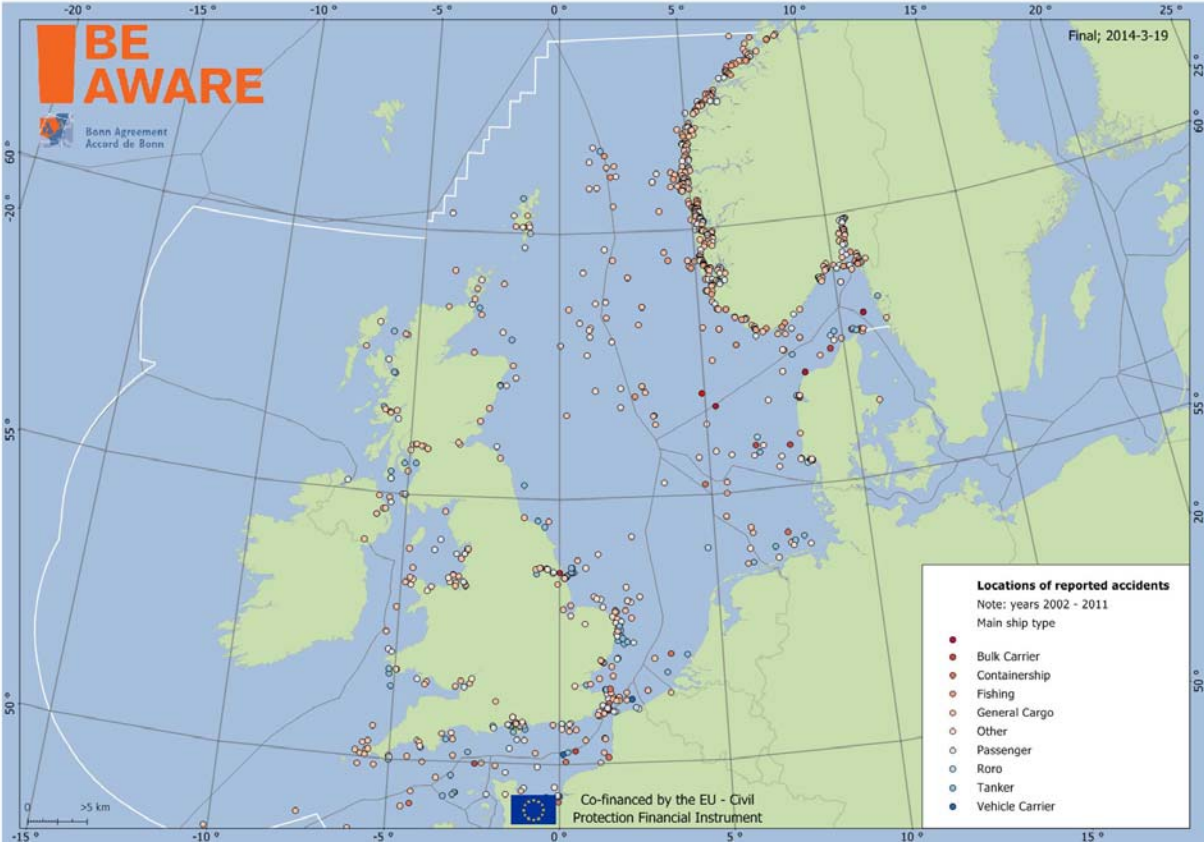


Figure 3-4 Locations of the reported incidents per ship type, zoomed in to the study area

3.4 Shipping accidents and spills caused by accidents

3.4.1 Shipping accident types

This part of the analysis is aimed at determining the annual number of shipping accidents of different types in the entire Bonn Agreement area. As such, each accident has been attributed to a specific type. This is displayed in Table 3-4 and in Figure 3-5. The total number of accidents was calculated by summing the average annual number of accidents per country, as was done in the previous section. As such it is independent of the data period for which different countries provided data.

Table 3-4 Shipping accidents per accident type

Accident type (2002 - 2011)	Av number of accidents	% of total
Collision with vessel	27.5	25.7%
Collision with object	6.7	6.3%
Grounding	42.7	39.9%
Fire	12.3	11.5%
Sunk other cause	0.9	0.8%
Hull damage other cause	1.9	1.8%
Unknown	14.9	13.9%
Total reported accidents	106.9	100.0%

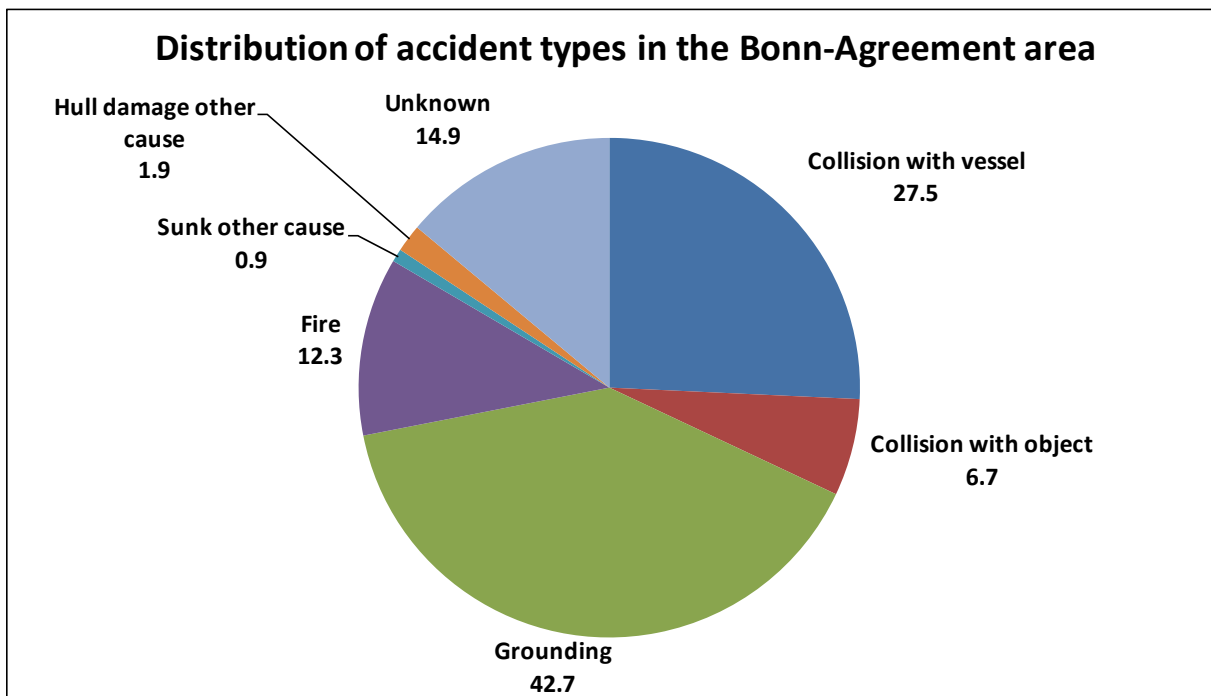


Figure 3-5 Shipping accidents per accident type

The largest accident type, representing 40% of all accidents is grounding. The second largest contributor, accounting for 23% of all accidents is collisions between two vessels. For 13% of the accidents not enough information was available to identify the accident type. This group contains accidents that actually belong to another accident type but possibly also accidents which are not relevant for this study, such as loss of containers. However, as it was not possible to remove these accidents from the available information, all accident types have been taken together.

3.4.2 Spill probability as a result of shipping accidents

For each of the accident types the total annual number of accidents as well as the annual number of accidents that led to a spill are displayed in Table 3-5 and in Figure 3-6. It can clearly be seen that collisions are the most common type of accident type that result in a spill; however in relative terms sinkings have a higher percentage of cases resulting in spills. More than 99% of the accidents involving sinking of the vessel resulted in pollution. Also the probability of a spill after grounding is significant, approximately 10%. For the remaining accident types the likelihood is below 10% that an accident will result in a spill. Of all accidents, about 2.7 % of the cases caused a spill.

Table 3-5 Number of accidents resulting in a spill, per accident type

Accident type (2002 - 2011)	Annual number	Number of cases resulting in a spill	% of cases resulting in a spill
Collision with vessel	27.5	1.0	3.6%
Collision with object	6.7	0.0	0.0%
Grounding	42.7	0.4	0.9%
Fire	12.3	0.2	1.6%
Sunk other cause	0.9	0.8	88.9%
Hull damage other cause	1.9	0.1	5.3%
Unknown	14.9	0.4	2.7%
Total	106.9	2.9	2.7%

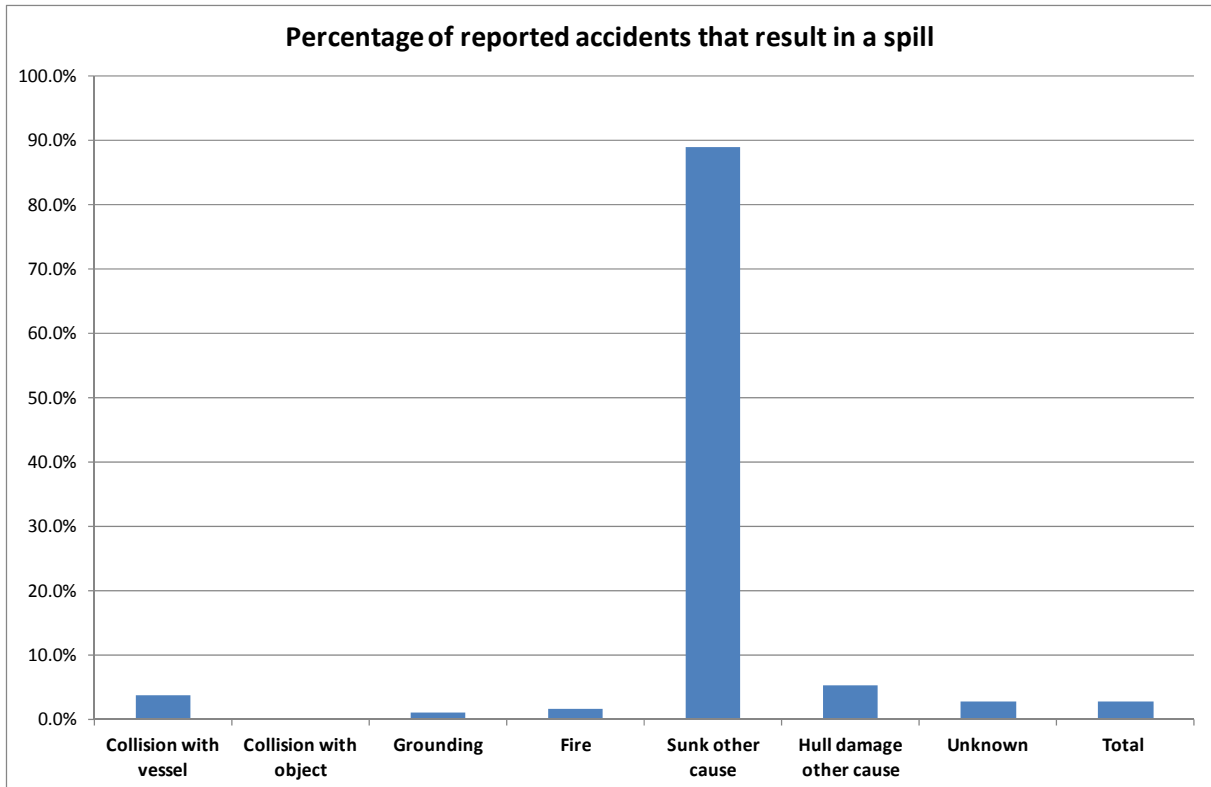


Figure 3-6 Percentage of accidents resulting in a spill, per accident type

3.4.3 Spill sizes as a result of shipping accidents

For 181 shipping accidents in the dataset details are available on the type and size of the pollution resulting from the accident. By far most of these spills (76%) involved the release of volatile oils in the marine environment, see Figure 3-7. The contribution of other types of pollution is much smaller. Also for a very large number of accidents (20%) the substance was unknown.

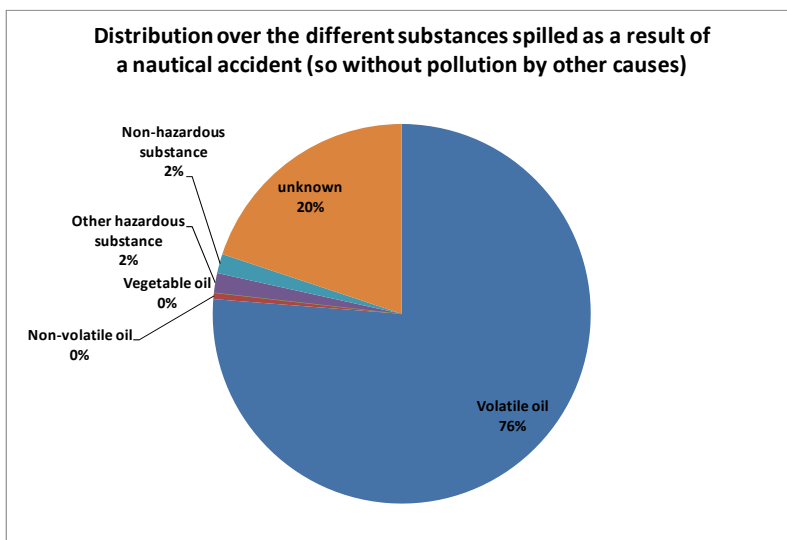


Figure 3-7 Spills per pollution type

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For 89 of those accidents the size of the spills is known too. Most of the spills involved the release of 1 – 15 tonnes of substance. In 6 cases more than 5000 tonnes was released. However, this involved only two cases of volatile oil. In the other cases the substance was either not harmful or not known. Spills larger than 15,000 tonnes were not reported by any of the member states.

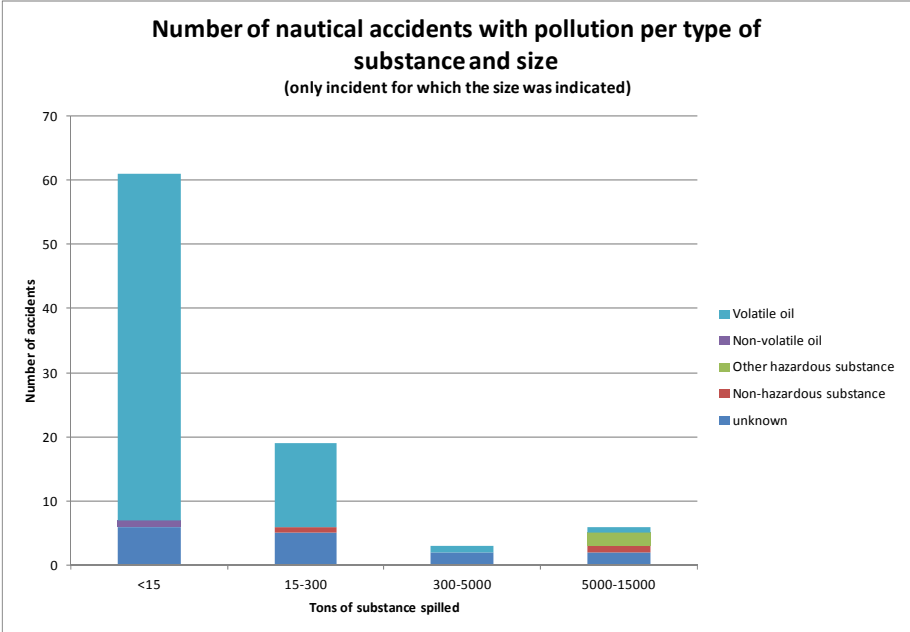


Figure 3-8 Spill sizes per substance

4. Spills with causes other than shipping accidents

Spills that fall into this category are deliberate and inadvertent spills on board ships as well as spills caused by offshore activities. As outlined in section 2.2.3 of the Methodology Note, deliberate and inadvertent spills are not included in the risk assessment. The reason for the exclusion of this type of spills is that these spills are small compared to spills that were caused by nautical accidents and do not always require a response action as they will naturally evaporate and disperse. As the obtained data contain many of this type of spills, they can be used to verify this assumption.

Spills resulting from offshore activities involve spills from offshore platforms and pipelines. OSPAR publishes reports on the discharges, spills and emissions from offshore oil and gas installations in the OSPAR region. From the data collected in these reports over the period 2001 – 2011 it is possible to derive some statistics on spills resulting from offshore installations.

4.1 Spills from offshore activities

The OSPAR database contains data for the Bonn Agreement contracting parties but also for additional countries. Data from these countries has been removed from the dataset in order to derive representative statistics.

The OSPAR data contain numbers and spilled quantities for the following spill scenarios: discharges of produced water, displacement water and accidental spills of oily or chemical substances. For the risk assessment only the latter type of scenarios is considered relevant as spills resulting from the discharge of polluted water is not taken into account in the risk assessment.

The data also contains the Atlantic waters of France, Spain and Norway. Although these sea areas are not part of the Bonn Agreement area, the data is taken into account as well. This is not considered a problem as the majority of the platforms are located in the Bonn Agreement area. The statistics of the entire area for oil spills are presented in the following table. It can be seen that the total number of platforms is not available for each year. For these cases, the values for the surrounding years have been interpolated in order to calculate the average number and quantity of spills per platform.

The number of spills has been decreasing over the period 2000 - 2011 from 722 spills to 454 spills. As the number of platforms has been increasing, this leads to a strong decrease in the average number of spills per platform: this number decreased from 1.5 in 2000 to 0.6 in 2011.

Table 4-1 Oil spill statistics in the OSPAR region

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Number of installations	[-]	489	537	586	592	649	666	677	725	741	743	784	741	641
Number of oil spills	[-]	722	768	801	621	678	655	509	515	491	485	467	454	7166
Oil spills per installation	[-]	1.48	1.43	1.37	1.05	1.04	0.98	0.75	0.71	0.66	0.65	0.60	0.61	0.94
Quantity of oil	[t]	514	605	214	824	199	399	173	3907	305	180	131	63	7320
Quantity per platform	[t]	1.05	1.13	0.37	1.39	0.31	0.60	0.26	5.39	0.41	0.24	0.17	0.09	1.11
Quantity per spill	[t]	0.7	0.8	0.3	1.3	0.3	0.6	0.3	7.6	0.6	0.4	0.3	0.1	1.0

The total quantity that is spilled each year does not show such a clear trend. Especially remarkable is the large amount of oil spilled in 2007: 3907 tonnes: 3815 tonnes can be accounted for by a single oil spill. This shows that most spills can be regarded as small and that the effect of a single large spill is significant. Only one such spill was reported during the period 2000 – 2011. This spill happened in the Bonn Agreement area, offshore Norway, during loading operations of a tanker at an offshore loading buoy.

The same numbers are presented for chemical spills in Table 4-2. In contrast to oil spills, the number of chemical spills has been increasing from 2006 towards 2009. The number of spills per platform has been more or less constant: between 0.34 and 0.48. However the dataset is too limited to base such a relationship upon.

For the years analysed the average spill size was 14.1 tonnes. However, in 2009 the quantity spilled is much higher. This can again be attributed to a single spill of 12,600 tonnes. This spill from an oil platform in the southern part of the Norwegian North Sea resulted from the continuous injection of drilling cuttings and drilling fluid into the well which then started leaking through a crack in the structure. The leaking had been going on for a substantial period before it was discovered and stopped, which explains the considerable size of the spill.

Table 4-2 Chemical spill statistics in the OSPAR region

		2006	2007	2008	2009	Total
Number of installations	[-]	677	725	741	743	722
Number of chemical spills	[-]	230	307	306	354	1197
Spills per installation	[-]	0.34	0.42	0.41	0.48	0.41
Quantity spilled	[t]	732	1164	1075	13941	16912
Quantity per platform	[t]	1.08	1.61	1.45	18.76	5.73
Quantity per spill	[t]	3.2	3.8	3.5	39.4	14.1

5. Spills of HNS

Part of the risk assessment is to perform a qualitative assessment for the risk on HNS spills as a result of shipping activities. As input for this qualitative study, the data from the shipping accidents can be used. In total 13 HNS spills were reported by the contracting parties.

Three types of HNS spills can be distinguished: spills that are a result of a shipping accident, spills that are a result of a loss of cargo without damage to the vessel and other types of spills. A typical loss of cargo scenario is the case in which deck cargo such as containers and drums wash overboard a container or general cargo ship. If the content of these containers or drums is pollutant, this is a possible cause of pollution. Other causes are related to procedures on board such as tank washing.

First, the accidents resulting in HNS spills are studied and then the cases in which a loss of cargo lead to HNS spills are discussed.

5.1 Pollution as a result of shipping accidents

Of all shipping accidents that reportedly resulted in pollution, 2 resulted in pollution of type “other hazardous substance”. It is assumed that all of these substances can be classified as HNS. These accidents do not include accidents with pollution of type “unknown”. Hence, it is possible that the actual number of accidents resulting in HNS pollution is in fact higher. One of the accidents involved sinking of the ship while the other concerned hull damage.

In order to determine the average annual number of HNS accidents, the number of accidents per country again needs to be divided by the number of years for which the country provided data. This correction leads to an annual average of 0.15 accidents per year or one accident every 6.8 years.

5.2 Pollution as a result of loss of deck cargo

Several of the countries reported multiple cases of the loss of containers and drums as an accident in their datasets. Only the cases, for which it was indicated that the content of the lost cargo was hazardous, have been taken into account. As the countries did their accidents reporting in different formats, it is possible that not all cases of this type of event are recognised. The reason is that some countries could have placed these incidents under “pollution other cause” while others explicitly named this type of event.

In total 5 cases were recognized. When corrected to the period for which data is available for each country, this results in a total of 0.33 accidents per year or one accident every three years.

5.3 Types and sizes of HNS spills

In total 13 cases of HNS spills are available for study. Unfortunately, for the majority of these cases the actual substance is not known. For the remaining cases, the substance types are summarized in the below table.

Table 5-1 Characteristics of reported HNS spills

Type of accident	Substance name	Substance number	Quantity
Lost cargo	Methanesulfonic acid	UN 2922/IMO Cl.8	15 barrels
Lost cargo	Serpentine-based paint, toluene-di-isocyanate, Alkylbenzene, Repneu IIB resins		20 m ³
Lost cargo	Isopropanol		13 barrels
Lost cargo	Arsenic pentoxide		3 containers and 63 drums
Sunk other cause	Xylene		2500 tonnes

6. Summary and Conclusions

Based on the available information received by the different contracting parties an overview has been created of the number of accidents in the area.

The results are given for two main groups:

1. Accidents and spills caused by shipping activities
2. Spills with causes other than shipping accidents

Accidents and spills caused by shipping activities

In Table 6-1 the average number of accidents within the area per accident type is given. Also the average number of accidents that result in a spill is presented in the third column.

Most of the accidents in the area involve a collision with a vessel or grounding. The total annual number is almost 107 accidents. In order to verify this, the total accident numbers for the entire region have been compared to the IHS Fairplay Casualty statistics for the period 2008-2011. It was found that in the representing area, during the years 2008 – 2010 about 168 accidents took place in this area involving ships larger than 300 GT and excluding machinery failures without consequences. This corresponds to 56 accidents every year.

There seems to be a large difference between the average number of 56 from the Fairplay data and the 107 accidents resulting from the collected data from the different countries. However this difference is mostly explained by the type of ships and accidents that are included in the Fairplay dataset. Only the more serious accidents will be included in this dataset. In the data received from the different countries also relatively small accidents are included, with no or minor consequences, which are not included in the Fairplay accident database.

Table 6-1 also shows that the accidents type that has the higher probability of resulting in a spill is sinking of ships (as to be expected). On average 2.7% of all shipping accidents result in some kind of spillage.

Table 6-1 Number of accidents resulting in a spill, per accident type

Accident type (2002 - 2011)	Annual number	Number of cases resulting in a spill	% of cases resulting in a spill
Collision with vessel	27.5	1.0	3.6%
Collision with object	6.7	0.0	0.0%
Grounding	42.7	0.4	0.9%
Fire	12.3	0.2	1.6%
Sunk other cause	0.9	0.8	88.9%
Hull damage other cause	1.9	0.1	5.3%
Unknown	14.9	0.4	2.7%
Total	106.9	2.9	2.7%

For the reported incidents resulting in a spill the size of the spill and the type of oil has also been analysed. The results are shown in Figure 6-1. Only 5 reported spills were larger than 5000 tonnes.

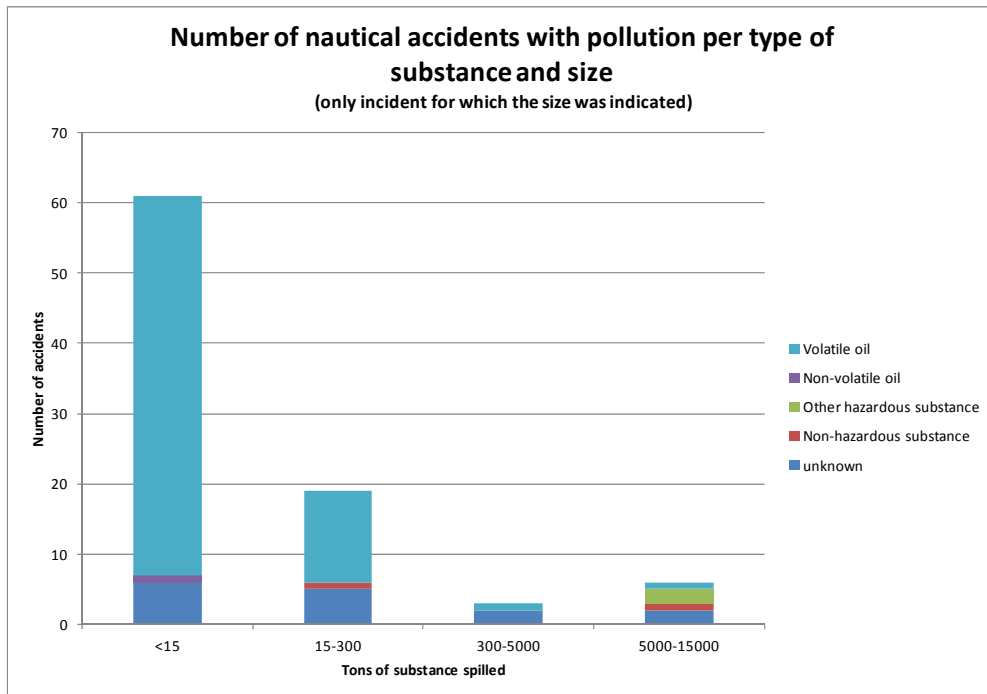


Figure 6-1 Spill sizes per substance

The contribution of “volatile oils” is dominant: they account for 87% of all spills. The second largest group is “unknown”. It is likely that many spills in this category are in fact also related to volatile oils.

Norway and France reported by far most of the accidents of this type. Unfortunately the size of the spills is not expressed in terms of quantities but in spill area. There is no direct relationship between the amount of substance spilled and the area of the spill, as this depends on the substance characteristics and, more importantly, on how long the substance has been in the water.

Spills from offshore activities

The OSPAR data contains data of the Bonn Agreement contracting parties but also of some additional countries. Data from these countries has been removed from the dataset in order to derive representative statistics. An overview of the results is given in Table 6-2.

The number of spills from offshore installations has been decreasing over the period 2000 - 2011 from 722 spills to 485 spills. As the number of platforms has been increasing, this leads to a strong decrease in the average number of spills per platform: this number decreased from 1.5 in 2000 to 0.6 in 2011.

Table 6-2 Oil spill statistics in the OSPAR region

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Number of installations	[-]	489	537	586	592	649	666	677	725	741	743	784	741	641
Number of oil spills	[-]	722	768	801	621	678	655	509	515	491	485	467	454	7166
Oil spills per installation	[-]	1.48	1.43	1.37	1.05	1.04	0.98	0.75	0.71	0.66	0.65	0.60	0.61	0.94
Quantity of oil	[t]	514	605	214	824	199	399	173	3907	305	180	131	63	7320
Quantity per platform	[t]	1.05	1.13	0.37	1.39	0.31	0.60	0.26	5.39	0.41	0.24	0.17	0.09	1.11
Quantity per spill	[t]	0.7	0.8	0.3	1.3	0.3	0.6	0.3	7.6	0.6	0.4	0.3	0.1	1.0

The total quantity that is spilled each year does not show such a clear trend. Especially remarkable is the large amount of oil spilled in 2007: 3907 tonnes; 3815 tonnes of this can be accounted for by a single oil spill. This shows that most spills can be regarded as small and that the effect of a single large spill is significant. Only one such spill was reported during the period 2000 – 2011. This spill happened in the Bonn Agreement area, offshore Norway, during loading operations of a tanker at an offshore loading buoy.