Bonn Agreement Actions to Eliminate Illegal and Accidental Oil Pollution from Ships in the North Sea

Ole Kristian Bjerkemo and Johannes Huisman

Abstract Preventing maritime disasters is very important. Accidental or illegal pollution from ships is a threat to the maritime environment. The Greater North Sea and its wider approaches are one of the busiest and intensively 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; the Bonn Agreement contracting parties decided to establish the BE-AWARE project to undertake 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. Under the International Convention on Marine Pollution from Ships (MARPOL 73/78), the whole of the North Sea area is a 'special area' for oil discharges; any oily discharge that is visible as a sheen on the water is illegal. The number of oil slicks detected shows that there is still work to do to bring to justice the offenders responsible for those slicks. The North Sea Network of Investigators and Prosecutors and the Bonn Agreement work together on enforcement. The contracting parties have also undertaken to conduct surveillance of the area as an aid to detecting and combating pollution and to preventing violation of anti-pollution regulations, known as MARPOL. Satellite surveillance also plays an (still growing) important role in the detection of possible pollution at sea. The contracting parties have developed an Aerial Operations Handbook (AOH).

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Contents

1 Introduction

On the website of the Bonn Agreement, it is stated that international cooperation works in preventing maritime disasters and cleaning up after maritime disasters is very important. This is the lesson that comes from nearly 40 years of scientific, technical and operational work of the Bonn Agreement. Through this cooperation, the BONN parties have developed great expertise in handling these many threats to the marine environment.

The perils of the sea are only too real and ever present. Ever since mankind started using the sea for trade, ships have sunk and been wrecked. Since the time of ancient Greece, traders have insured their cargoes against the perils of the sea. For the last two centuries, shore-based lifeboats have sought to save human life from the perils of the sea, supported now by radar, aeroplanes, helicopters and the most modern satellite technology.

However, it was only when ships began carrying massive quantities of potentially damaging material that it became clear that the perils of the sea could threaten the well-being of sea itself and all who depend on its waters, coasts and produce. Maritime pollution – from shipwrecks, shipping collisions and illegal discharges – became a substantial threat.

In 1967, the tanker *Torrey Canyon* (Fig. 1) was wrecked on the Seven Stones off the Isles of Scilly (south-west of England). It was carrying 117,000 tonnes of crude oil. As this cargo turned into a black tide sweeping east up the English Channel, the

Fig. 1 The Torrey Canyon

need for international cooperation to deal with such problems became clear. Coastal states could not wait until the threat was in their waters: they needed to respond collectively as soon as possible (http://www.bonnagreement.org/eng/html/briefing_document/briefing%20document.htm).

Within 2 years, Belgium, Denmark, France, Germany, the Netherlands, Norway, Sweden and the United Kingdom had set up the 1969 Agreement for Cooperation in Dealing with Pollution of the North Sea by Oil (Bonn Agreement) to meet this need for cooperation. When the agreement was revised in 1983, it was extended to cover pollution from other harmful substances, and the European Community became a contracting party. In 1987, the agreement was extended to cover cooperation in surveillance. In 2010 Ireland joined the Bonn Agreement, and from that time the Bonn Agreement covered the North Sea area, Irish waters and related Norwegian and UK waters [1].

2 What Does the Bonn Agreement Cover?

The actions within the Bonn Agreement to eliminate illegal and accidental oil pollution from ships in the North Sea are based on the contracting parties' implementation of the agreement by:

- Keeping their zones of responsibility under surveillance for threats of marine pollution, including coordinating aerial and satellite surveillance
- Alerting each other to such threats
- Adopting common operational approaches, with the objective to rely on each other to achieve the necessary standards of prevention and clean-up
- Supporting each other (when asked to do so) in response operations
- Sharing research and development
- Carrying out joint exercises
- Carrying out analysis to define risk and propose risk-reducing measures

3 Changes in Traffic Levels and Pollution: The BE-AWARE Project

The Greater North Sea and its wider approaches are one of the busiest and intensively 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 [2].

In this area, there was no overall risk assessment for marine pollution. The risk was mapped with a variety of national risk assessments which are undertaken using differing methodologies, thus reducing comparability between those assessments. Because of this lack of comparability, the Bonn Agreement contracting parties decided to establish the BE-AWARE project to undertake 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 overall objective of BE-AWARE was to gain a better understanding of the regional and subregional risk of accidents and of the potential for marine pollution events in the Greater North Sea and its approaches. This objective was achieved by focusing on the risk of accidents and the potential for spills of oil and hazardous and noxious substances (HNS) from shipping. Risks derived from collisions with offshore installations (both wind farms and oil and gas installations) and from spills from installations themselves were also included. As a discrete task, a regionally specific methodology for environmental and socioeconomic vulnerability analysis was also developed.

The project was a 2-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. In 2014 the Bonn Agreement contracting parties decided to extend the project with a phase II, aiming to describe the impact of oil releases considering sensitivity in the area. The phase II is also co-financed by the European Union.

3.1 Results from Phase I of the BE-AWARE Project

The methodology used was similar to that developed in the BRISK (Subregional risk of spill of oil and hazardous substances in the Baltic Sea) project [3] that had been undertaken in the HELCOM (HELsinki COMmittee) maritime area [4], using a multi-model approach, calculating the risk and magnitude of spills. Analysis was undertaken for both 2011, the baseline year for the project, and 2020, taking into consideration the expected changes in traffic routing and intensities and maritime uses. The methodology included defining the key parameters to be taken into consideration, such as:

- Hazard identification
- Ship traffic

- Classification of oil
- Oil transport model
- Traffic prognosis
- Frequency and quantity of oil spills
- Oil spills related to offshore installations
- Qualitative analysis of HNS risks

The models used a considerable amount of data, including accident statistics, automatic identification system (AIS) data, cargo data, risk-reducing measures, locations of fixed objects, etc. In order to collect a standard set of data for the whole Bonn Agreement area, a Data Collection Note was developed, outlining the data types and formats required from the relevant contracting parties. The data was collected in a central Regional Resource Database by the Bonn Agreement Secretariat, to be used as a future resource for the Bonn Agreement.

The ship traffic model, developed by BE-AWARE, was based on the AIS data. From the intensity of the ship traffic, a route net was developed that described the primary sailing routes and the number of vessels on those routes. This was then used to develop a traffic model that was a database of identified route passages, including direction (see Fig. 2) and vessel characteristics. In that figure, the map of traffic density is based on the counted number of AIS records per cell. Due to the higher sampling rate around Denmark, the coloured scale in that area has been adjusted to match the rest of the BE-AWARE area. The database provided traffic data for the calculation of accident and spill frequencies, which were dependent upon the traffic, its volume and composition.

Using individual vessel information from the World Shipping Encyclopaedia (http://www.ihsfairplay.com/Maritime_data/sample_pages/wsedemocomp.html?product=WSE&i=2), the model was able to estimate the consequences of an accident, based on the vessel characteristics. This was then combined with the cargo model, which described the probability of a certain ship type and ship size sailing on a specific route being loaded with a certain type of cargo. This used information that included ships routes, lists of substances and port data.

The risk of the spill from collisions with offshore gas and oil installations and offshore wind farms was also included. The assessment therefore modelled several types of spills: spills from ships colliding with platforms or renewable energy installations, spills from platforms resulting from collisions with ships and spills from oil platforms from other damage. For oil platforms, risk calculations were related to daily operations and to risks such as blowouts (noting the infrequent occurrence of these) with distinctions made between normal and high-pressure, high-temperature wells.

The ultimate results for risks of spills for 2011 and 2020 scenarios were then obtained by undertaking a further integrated analysis to take into account existing and intended risk reduction measures (RRMs) such as pilotage, surveillance, vessel traffic services (VTS), obligatory routing (TSS), emergency towing, etc. As the long-term aim was to identify the best measures to reduce these risks at a subregional level, the results were then presented for five subregions (Fig. 3): the

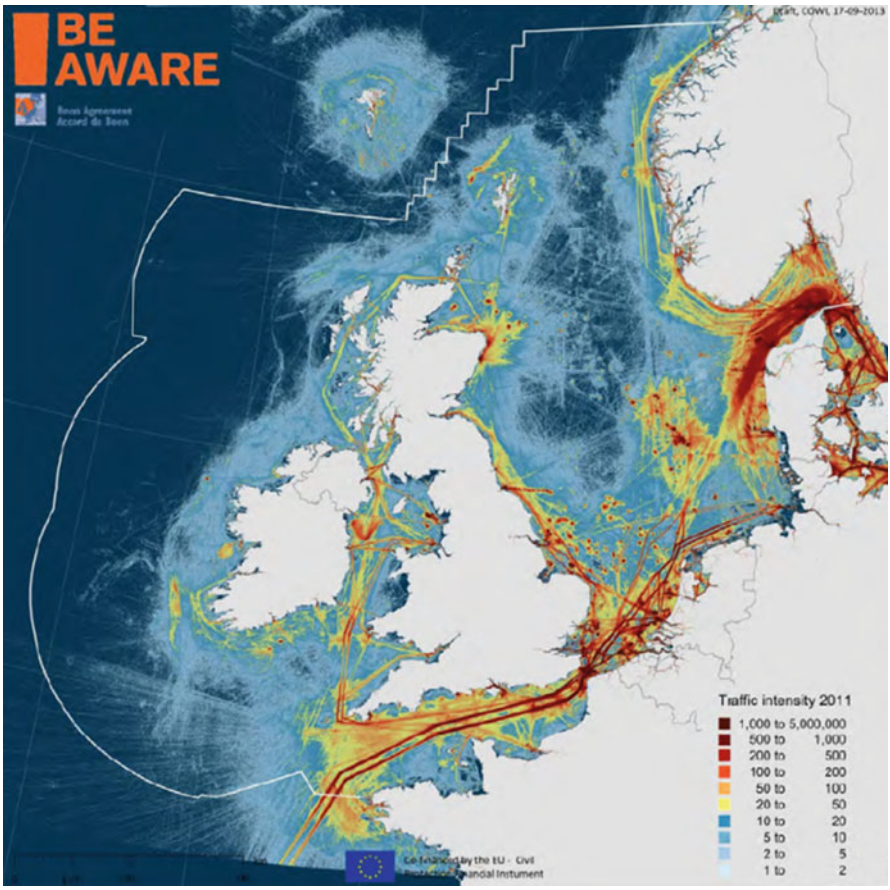

Fig. 2 Map of traffic intensity based on counted number of AIS records per cell. *Source*: BE-AWARE technical sub-report 1: ship traffic (http://beaware.bonnagreement.org/final-report)

Atlantic, the Northern North Sea, the Eastern North Sea, the Southern North Sea and the Channel.

3.1.1 Sensitivity Analysis and Vulnerability Mapping

In addition to the above modelling work, BE-AWARE prepared the ground for later projects developing a simple, qualitative and commonly acceptable environmental and socioeconomic sensitivity analysis methodology. This was done via expert workshops and resulted in a BE-AWARE Environmental and Socioeconomic Sensitivity Mapping approach. The common sensitivity mapping approach contained three distinct steps.

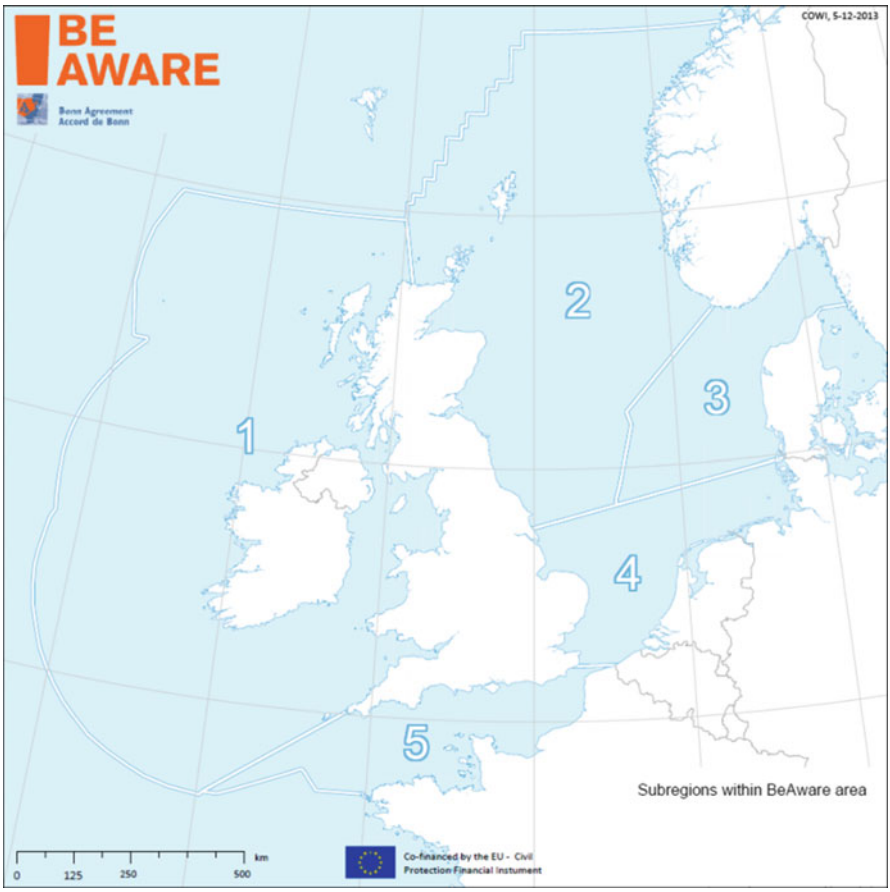

Fig. 3 Subdivision of the area. *Reference*: BONN BE-AWARE project 1. Final reporting (http://beaware.bonnagreement.org/final-report)

3.1.2 Quantitative Analysis of Oil Spill Risk

The main output of the project was the result of the quantitative analysis of oil spill risk, which showed significant regional differences. Within each of the BE-AWARE subregions, the frequency of different accident types was calculated for both the existing situation, 2011 (Fig. 4), and the future 2020 scenario. The frequency for individual spill sizes was also calculated.

In the results, significant regional differences were seen. Accidents caused by collisions were predicted to be most pronounced in areas with high intensity traffic, in combination with narrow straits or areas with crossing traffic or complex traffic patterns. These significant regional differences also showed in the risk of spills, which is presented in Fig. 4 for 2011. In the northern part of the North Sea, there

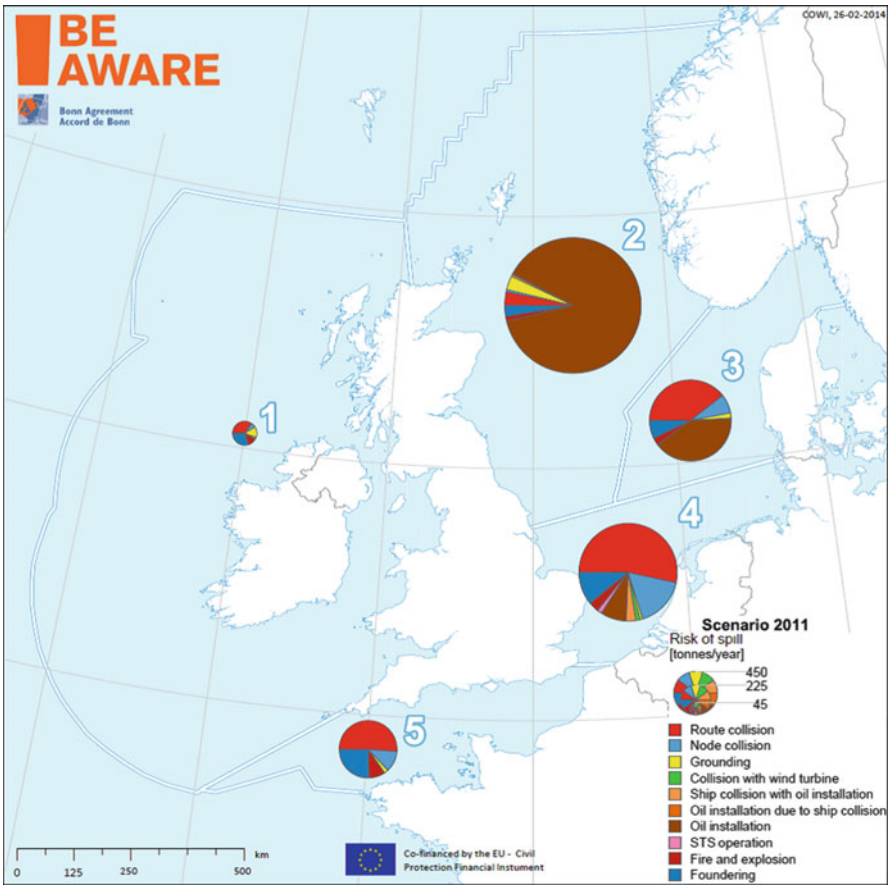

Fig. 4 Relative risk of all spills for the different BE-AWARE subregions in tonnes per year for the 2011 scenario. *Source*: BE-AWARE summary report (http://beaware.bonnagreement.org/final-report)

was limited traffic over a very large area, hence reducing the probability of ship-ship collisions. However, due to the presence of a substantial number of oil platforms, the risks of spills from the platforms were the largest contributors in this area. In high-traffic areas such as along the coast of the Netherlands, Belgium and Germany, the ship-ship collision risks became much more pronounced and constitute the largest contribution to the overall picture.

There were also significant differences overall and on a regional level between the 2011 and the 2020 scenarios. These were related to the changes in the levels of traffic, the development in ship size, the development in risk-reducing measures and the increase in new uses of maritime space. In particular an increased risk was predicted from collisions with wind turbines due to the development of new offshore wind farms to meet renewable targets. These changes were most notable in the Channel and Southern and Eastern North Sea.

Whilst large spills can come from offshore installations, overall, the largest contributor of spills was the outflow of liquid cargo as a result of collisions involving large tankers. Minor and medium-sized spills were typically from accidents where the vessels had only sustained minor damage. Groundings mainly contributed to the risk of minor and medium-sized spills.

3.1.3 Qualitative Analysis of HNS Spill Risk

Another key pollution risk in the Greater North Sea is spills of hazardous and noxious substances (HNS). The project produced a qualitative analysis of this risk. This was because less information was available on the more diverse and complex HNS shipping activity, combined with very different outcomes from spills of different substances into the sea. The analysis focused on categorising the different hazards posed by the substances in terms of how they react when released in an accident, their risk to public health and their risk to the environment. It was nevertheless recognised that there were shortcomings with the modelling, particularly that more local trade patterns of HNS were not captured by the analysis.

The results showed the spread of risk for HNS between those substances carried in bulk and those packed in containers as packed goods. This highlighted that higher levels than expected of HNS are transported as packed goods:

- From the ten collisions that occur every year in the Bonn Agreement area, one collision would involve a vessel that carried substances classified as IMDG 1-9. Approximately 2,200 tonnes of HNS would be involved in the collision.
- Approximately 0.3 collisions (once in 3 years) would include a chemical tanker of class I or II. Per year, approximately 3,000 tonnes of HNS would be involved in a collision.
- Approximately 0.1 collisions (once in 10 years) would include a vessel that carried substances from the Top 20 ARCOPOL (The Atlantic Regions' Coastal Pollution Response) list (http://www.arcopol.eu/p_proyecto.aspx). Per year, approximately 90 tonnes of ARCOPOL HNS would be involved.

For HNS transported as packed goods, the following was concluded:

- It was estimated that there would be 0.8 collisions per year that involved a vessel with HNS on board.
- The total amount of HNS involved in a collision would be 843 tonnes per year, which would include four different HNS shipments.

3.2 Conclusions

In order to undertake the BE-AWARE risk analysis, a significant amount of data was required as input to the models. This data collection was a major challenge for

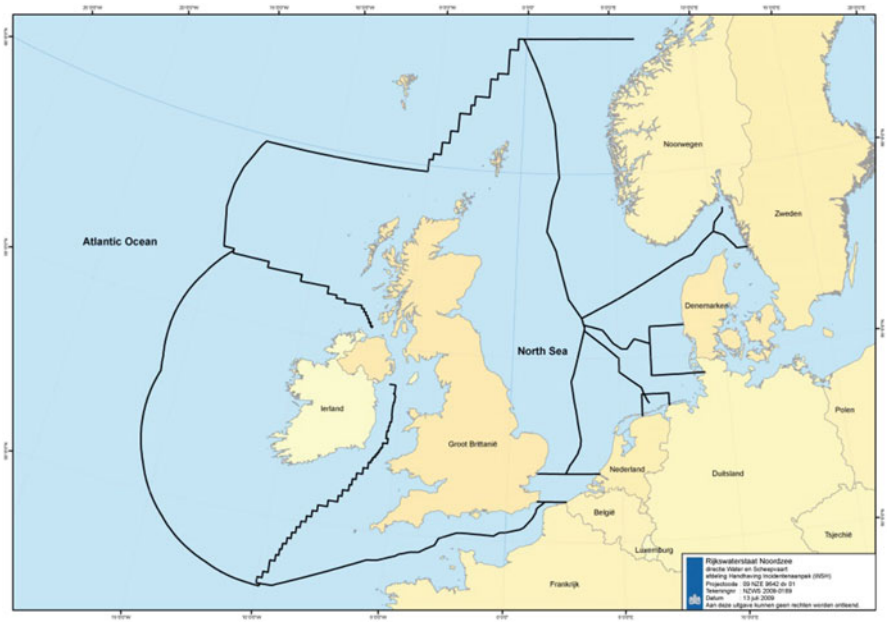

Fig. 5 The wider North Sea and its approaches. *Reference*: www.bonnagreement.org

the project. In future projects better data, for instance, from satellite AIS could give better results and more detailed cargo information from more ports would also be desirable. In this project nevertheless, the data received was relatively sufficient to be able to undertake the analysis with sufficiently reliable results.

The BE-AWARE project successfully modified established models to apply them to the Greater North Sea and its wider approaches (Fig. 5). The inclusion of risk from the offshore oil and gas industry and the expected increase in numbers of offshore wind farms provided useful insight into key risks from spills in the different subregions and the change in risk towards 2020.

The project identified that, overall, the main risk for oil pollution was due to collisions involving ships. Generally the largest contributor to oil spills was the outflow of cargo as a result of collisions involving large tankers, even if the risk frequency for this type of event was very low. Minor and medium-sized spills were typically from accidents where the vessels had only sustained minor damage or had been grounded. The frequency of collision accidents was mainly spread along the areas of the North Sea with the highest amount of traffic: the Channel and the Southern and Eastern North Sea.

For the qualitative risk of HNS, the analysis focused on categorising the different hazards posed by the substances in terms of how they react when released in an accident, their risk to public health and their risk to the environment. The analysis again indicated that the main risks existed in the regions with the highest shipping density.

4 Marine Pollution Offences

4.1 Development of the North Sea Manual on Maritime Oil Pollution Offences

The best of legislation will have no impact on the real world unless it is implemented and enforced. Because of this there is still much room for improvement in the implementation and enforcement of MARPOL (http://www.imo.org/OurWork/Environment/PollutionPrevention/SpecialAreasUnderMARPOL/Pages/Default.aspx).

At the third International Conference on the Protection of the North Sea in The Hague in 1990 [5], the Ministers and EC Commissioner decided that common actions should be taken at national and international levels in order to improve the effectiveness of prosecution for violations of the international rules and standards established by MARPOL and the associated collection of evidence.

As a first step, the Ministers invited the contracting parties to the Bonn Agreement to produce a manual explaining the systems of airborne surveillance and other methods used for identifying offenders and for obtaining evidence. The manual 'Oil Pollution At Sea – Securing Evidence on Discharges from Ships' was published in 1993 by the Bonn Agreement and was disseminated worldwide through the International Maritime Organization. The manual was addressed to authorities in charge of detecting violations, police officers, prosecutors, defence lawyers and courts in order to explain how evidence can be gathered and to indicate the reliability of the methods used. It was intended to facilitate the common understanding of the methods used for those who are not familiar with the technicalities.

The manual has been further developed and today is the *North Sea Manual on Maritime Oil Pollution Offences* which is regularly updated [6]. The intention behind the manual is to assist in this process in the North Sea area the waters covered by the Bonn Agreement (Fig. 5).

(Information at: www.bonnagreement.org)

4.2 Purpose of the Manual

The manual is addressed, in the first place, to the national enforcement agencies concerned with implementing international rules and standards against oil pollution from ships and the national legislation applying them. This refers to the so-called operational discharges also known as MARPOL violations. Daily operations on board vessels may lead to discharges of water containing waste oil particles and in that respect differ from the accidental spills. To achieve their purpose, this legislation must be effectively enforced. It is therefore essential that ships which contravene the legislation by illegally discharging materials are detected, prosecuted and convicted. Shipping is an international business and the North Sea area covers some

of the busiest shipping routes in the world. A pollution incident may affect more than one country. For example, a vessel may discharge an illegal quantity of oil in the exclusive economic zone (or equivalent area of jurisdiction) of one state whilst en route between ports in two other countries. Cooperation between neighbouring states is therefore essential, and effective cooperation requires a common understanding of what is involved.

The manual therefore aims to set out a common understanding of the impacts of oil pollution, how evidence of maritime pollution offences can be gathered and the reliability of the methods used.

The manual is also addressed to those involved in the processes of bringing offenders to justice prosecutors, defence lawyers and magistrates and judges. For them, it is intended to provide an internationally agreed statement of the significance of maritime oil pollution offences and of good practice in assembling, presenting and evaluating evidence on such offences. Since violations of the regulations on maritime pollution offences can cause serious environmental damage and lead to heavy costs for combating the oil spills and clearing up the damage, it is essential that appropriate action is taken against the violators and the manual is intended to support such action.

4.3 Chapters in the Manual

The manual [6] is an extensive document which covers a large area related to Maritime Oil Pollution Offences. Chapters of the Manual include:

Chapter 2: Oil Pollution and Its Significance
: This chapter provides general information on oil spills, their behaviour and effects, including an explanation of the weathering process. It also outlines the operational strategy for dealing with oil pollution at sea and on the coasts.

Chapter 3: International Law
: The chapter sets out the framework within which regional and national arrangements must work. This chapter is subdivided into two main parts. The first part deals with the equipment and discharge regulations in MARPOL. The second part gives an overview of the legal instruments for cooperation in the field of prosecuting illegal maritime pollution.

Draft Chapter 5: Gathering and Presenting Evidence
: The chapter describes the variety of issues that should be brought as possible evidence of a violation of MARPOL. This would concern sensor data and imagery but also oral communication transcripts. All the different information is to be presented in the legal formal way to be admissible as evidence to court.

Chapter 6: Visual Observation
: This chapter deals with direct visual observation as one of the most effective ways of recognising and assessing an oil spill exceeding the legal limits of MARPOL. The approximate volume of the oil contaminating a sea area can be

estimated by assessing the coverage and observing the appearance and colour of the oil.

Chapter 7: Remote Sensing

This chapter deals with airborne remote sensing systems, which are an efficient means of detecting discharges of oil at sea and supplying information for use as evidence. The data collected from all sensors is stored and can be examined either in flight or after landing. Also, stills or frozen images and conventional high-resolution photographic prints annotated with date, time, position and other mission data can be stored or transferred to the ground via an image link.

Chapter 8: Modelling the Behaviour of Spilt Oil

It is possible, using a computer, to run a mathematical model of the behaviour of spilt oil, the direction and speed at which it moves and the way in which it spreads and changes its properties. It is also possible to use these techniques to follow a spillage back to the geographical area whence it originated.

Chapter 9: Sampling and Analysis

When there is doubt as to whether the observation on the sea surface corresponds to oil, sampling of polluted water is one way to remove the doubt. When traces of the oil discharged remain on board the suspected ship, comparisons of samples of oil taken on board the ship and in the spill or contaminated area may assist in the identification. There are several techniques for such comparisons. Combined gas chromatography and mass spectrometry techniques (GC/MS) are one system currently in use. It can provide a very detailed pattern which is characteristic of the oil analysed, a 'fingerprint'. This is discussed further in the chapter by Dahlmann and Kienhuis [7] in this volume.

Chapter 10: Vessel Identification

Automatic identification systems (AIS) for vessels enable both shore-based and airborne observers and other vessels to identify vessels automatically. This has particular uses in linking observed oil slicks to the relevant vessels.

5 Surveillance

5.1 Zones of Responsibility (Control Zones)

For the purpose of the agreement, the North Sea area is divided into zones of responsibility (or control zones), of which the borders are the same as the exclusive economic zones (EEZs). These zones, together with continental shelf boundaries, are indicated on the map on Article 6 of the agreement stating that if the sea in the zone of responsibility of one of the coastal states is polluted or threatened by pollution, by oil or other harmful substances, and there is serious danger to the interests of one or more contracting parties, that coastal state shall make the necessary assessments of the state of the casualty or of the type, quantity and behaviour of the pollution [8].

Article 6A further provides that surveillance shall be carried out, as appropriate, by the contracting parties in their zones of responsibility or joint responsibility and that contracting parties may make agreements or arrangements for cooperation in the organisation of such surveillance. A number of such arrangements and agreements are in force.

The responsible country shall then immediately inform all the other contracting parties through their competent authorities of its assessment and of any action taken.

In the revision of the Bonn Agreement for the accession of Ireland, contracting parties agreed to make the zones of responsibility coincide with the boundaries of the EEZ or equivalent.

5.2 Purpose of Surveillance Flights

The purpose of surveillance flights (Fig. 6) is to routinely monitor the defined sea area and in doing so to detect, investigate, gather evidence and monitor spillage of oil and other harmful substances, whether the spillage is a result of an accident or caused deliberately in contravention of international conventions. The threat posed to the environment and coastlines of the North Sea will dictate the degree of

Fig. 6 A surveillance aircraft

investigation and monitoring carried out. Routine patrolling for the detection of violations also supports the preparation for accidental spills with large volumes of oil.

Bonn Agreement participants have been instrumental in exploring collaborative aerial surveillance and reporting procedures to enhance operational efficiency. There is a free exchange of information on the development of remote sensing and other surveillance systems. The aim of cooperation between Bonn Agreement participants is to ensure balanced surveillance coverage of the North Sea. The purposes of aerial surveillance are also to deter potential polluters from spilling, to detect and track possible spills and, in some cases, to catch polluters red-handed by combined use of aircraft and satellite.

Satellite images are used for surveillance aircraft mission planning and statistics. Through the European Cooperation programme, chaired by EMSA, the CleanSeaNet (http://emsa.europa.eu/operations/cleanseanet.html), all satellite imagery (footprints) can be made available to the member states. Again in Bonn Agreement neighbouring countries explore ways to make efficient use of assets for the validation of satellite detections of possible slicks.

5.3 *Flight Types*

Various flight types have been developed under the auspices of the Bonn Agreement. These have been defined by the Working Group on Operational, Technical and Scientific Questions Concerning Counter Pollution Activities (OTSOPA working group) as follows:

- *National flights*. Flights conducted by an individual country to cover its zone (EEZ).
- *Regional flights*. Flights conducted under bilateral or multilateral agreements between participating countries for the coordination of surveillance and/or assistance in areas of mutual interest.
- *Tour de Horizon flights*. Flights conducted primarily to monitor the oil and gas industries in the North Sea. However, all pollution will be investigated and reported, whether from installations or ships.
- *CEPCO flights*. A Coordinated Extended Pollution Control Operation (CEPCO) can be defined as a continuous sequence of aerial surveillance flights if possible supported by seaborne law enforcement assistance to ensure a permanent presence over a minimum of 24 h in an area with a high likelihood of illegal or operational discharges of oil and/or other harmful noxious substances. CEPCO comes in various concepts. See Part 2, Chapter 3.
- *Aerial surveillance exercise flights*. Flights conducted against known targets to check remote sensing systems and procedures.

5.3.1 National Flights

All contracting parties plan national programmes to conduct aerial surveillance over their individual zones of responsibility or (part) of their exclusive economic zone. These schedules need not be coordinated with neighbouring states.

Reports on spillages detected are normally made to national administrative authorities only. An annual overview on performed flight hours and detected and observed pollution is reported to the Bonn Agreement, OTSOPA working group.

For statistical purposes, navigation points (way points) and/or flight tracks normally remain in force for a number of years.

In case of a detection of pollution in the zone of the neighbouring contracting party, close to the border between the two member states, the observing crew will report the pollution to the authorities of the other state.

5.3.2 Regional Flights

Bilateral and multilateral agreements between contracting parties have been established for mutual assistance in response operations and in aerial surveillance. Examples are the agreements between Denmark, Germany and the Netherlands (DenGerNeth plan) and Norway/United Kingdom (NORBRITPLAN). At the time of writing, these plans were not available online but will be made available through a planned update to the Bonn Agreement website. Such agreements may make more effective use of available resources. Close cooperation in aerial surveillance will require the careful coordination of flight programming and planning. National navigation points are normally utilised during regional flights. However, a few mutual navigation points have been established. For example, there are some joint German/Netherlands navigation points.

5.3.3 Tour de Horizon Flights

Contracting parties have adopted a plan for all coastal states to conduct both periodic and random surveillance flights for the detection of spillages in the offshore oil and gas industry areas in the North Sea. Irrespective of the main aim, all other suspected polluters are also to be identified and reported.

The programme for Tour de Horizon flights is prepared by the lead country for discussion and agreement by the OTSOPA meeting.

5.3.4 Coordinated Extended Pollution Control Operation (CEPCO)

The contracting parties have agreed a programme of Coordinated Extended Pollution Control Operation (CEPCO). Two regional CEPCOs, one in the north and one

in the south, are programmed every year. Those contracting parties in the region will normally take part; however, a general invitation to participate is sent to all contracting parties.

The aim of the operation is to enhance the enforcement of discharge provisions at sea, to optimise prosecution of illegal offenders and to increase the deterrent effect of aerial surveillance activities.

In the OTSOPA meeting, parties may decide to organise a Super CEPCO surveillance period that will last up to 10 days and will cover a specific, extensive, sea area. Additional CEPCOs may be organised by neighbouring countries, on a voluntary basis, covering a limited sea area which is continuously overflown for 24 h or more. During these CEPCOs, participating aircraft will use their normal national operating airports. Detailed guidelines have been agreed for CEPCO missions.

5.3.5 Aerial Surveillance Exercise

Contracting parties agreed to increase cooperation by participating in counter-pollution exercises, and each agreed to collaborate to the best of their abilities. One such exercise is the Aerial Surveillance Exercise. The exercise consists of field trials and a 'workshop' to compare results and exchange operational and technical experience and information to further the development and improvement of remote sensing techniques and procedures.

The organising country is required to set up suitable trials to test remote sensing systems and aircrews and to provide all participants with the opportunity to compare results and experience. Participants collaborate to the best of their ability and provide all collected comparison data to the organising country, which presents a full report to the following OTSOPA working group meeting.

The organising country drafts a report to all participants, and a final report, including the results of the evaluation meeting, is submitted to OTSOPA.

Bonn contracting parties have established a Research, Trial and Training Group with the task to coordinate national exercises and trials for Bonn Agreement contracting parties to participate. The objective of the group is to use every opportunity for concerted action, especially when real mineral oil is released into the marine environment.

5.3.6 National Navigation Points

Participants, with the exception of the United Kingdom, have established navigation points in their zones for the purpose of national flights. Aircraft of other nations may use the same navigation points. This has the benefit of relating observed pollution to specific points for reporting purposes.

Any changes in navigational points are to be notified to the lead country for aerial surveillance so that the Aerial Operations Handbook may be updated.

5.4 Reporting from Surveillance Flights

A surveillance aircraft overflying the North Sea area in its national zone of responsibility may detect and observe a possible violation of MARPOL regulations in the area of the adjacent country. The crew of the detecting aircraft will report an illegal discharge to the national focal point of the coastal state in whose zone of responsibility the violation was observed. The responsibility for initiating prosecution of the suspected polluter lies with another country having jurisdiction over that part of the continental shelf. In the case of an oil slick affecting the two countries, cooperation on response operation may be required, and the aircraft could be asked to stay in the area for further observations and guidance.

There is a standard reporting system within the Bonn Agreement for the reporting of detected pollution. All surveillance flights will be concluded with a standard report, which is forwarded to the responsible national authorities, other contracting parties as appropriate and to the lead country on a monthly basis for collation purposes.

5.4.1 Reporting to Responsible Authorities

During an operational surveillance flight, the system operators/observers will try to contact the appropriate focal point immediately by radio to report a detected pollution.

Completed Standard Pollution Reporting Log is to be forwarded to the national authority under whose responsibility a surveillance flight was performed. The responsible authority will compile the summary data in accordance with the standard reporting format for submission of the data, annually, to the Bonn Agreement Secretariat.

All relevant log sheets, data tapes, imagery, video tapes, photography and radio circuit recordings are made available to national administrative authorities as evidence in prosecution cases and can be made available to another contracting party if the prosecution is to take place within its jurisdiction.

5.5 Surveillance Evidence: The Present

Aircrew must continue to be guided by the unilaterally developed guidelines set by their own countries for the collection and handling of aerial surveillance evidence. There are, however, some basic principles, which seem to transcend the requirements of individual countries. These are as follows:

- It is paramount that full and proper evidence is collected against a suspected polluter who is detected or observed to be discharging oil or other harmful

substance or ship-borne generated waste in contravention of international conventions (MARPOL).

  - The observers have to act to the best of their abilities to provide the responsible authorities with reports and evidence using Standard Pollution Reporting Log
  - Pollution Report on Polluters and Combatable Spills
  - Side Looking Airborne Radar (SLAR)/Infrared (IR)/Ultraviolet (UV)/Forward Looking InfraRed (FLIR) imagery both in tape and hard copy form
  - Photography
  - Video tape
  - Tape recording or transcript of any radio contact
  - Signed official reports or statements
  - Oil samples, in compliance with national legislation
  - Any other type of data that could serve as a part of the evidence

- The official report should contain the essential information recorded on the Pollution Report Form on polluters, and it should cross refer to the imagery and photography hard copy annexed to the official report.
- Where systems with such facilities are fitted, imagery and photographic hard copy should bear data blocks giving date, time and position.
- Photographs should show clearly the name and registration of the suspected polluters as well as the pollution itself. It is important to show that the sea surface ahead of a suspected polluter is clear of pollution. Both oblique angle and downward looking photographs appear to be acceptable as evidence in court.
- There are countries, also Bonn Agreement members, with a judicial system requiring a sample, proving the detected/observed discharge consisted of mineral oil. Oil sample buoys have been developed that can be dropped from aircraft, provided permission is prearranged with civil aviation authorities. A vessel or a helicopter should be directed to the area to pick up the buoy, and then the instrument should be taken to the laboratory for sample analysis. The outcomes can be made available to the authorities initiating proceedings. However, in practice it is not easy to have the full logistics in place, and dropping the buoy successfully during darkness is a challenge. Some countries have experienced that the sampling is counterproductive.

6 Conclusions

Authorities of the coastal states around the North Sea area have since many years recognised the necessity to cooperate in avoiding pollution and if it occurs – in whatever way – take adequate response measures in a comprehensive procedure. Following international legislation, implemented in national law in order to secure effective prosecution, the industry working in the area is monitored. Shipping,

offshore oil and gas, fishery, renewable energy parks and recreation may all be suspected of pollution violating international legislation.

The operational working group under the Bonn Agreement has developed different plans to also cooperate in the execution of the monitoring and response activities.

It is considered a major step forward that Bonn now has a common basis in the analysis of risks, through the BE-AWARE project.

At the same time it should be acknowledged that shipping industry in the past decades, also based on measures taken in the framework of the International Maritime Organization, has achieved to reduce pollution from vessels sailing the oceans. Technical improvements on board vessels (engine room management) and training of crew in environmental awareness contributed to less pollution.

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