Bonn Agreement
Accord de Bonn

Bonn Agreement Aerial Operations Handbook, 2016

Version: 14 September 2016

Record of Amendments made to the Handbook

Section amended	Amendment	Date
Review of the contents of the Handbook	The Netherlands General updates and Update of national chapters. Some chapters pending	April 2016

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Bonn Agreement Aerial Operations Handbook

PART 1: GENERAL INFORMATION

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1 Introduction

The North Sea and its approaches is a sea area of high economic and ecological importance. Pollution of the sea by oil and other harmful substances may threaten the marine environment and the interests of Coastal States. Pollution can come from many sources. In view of the many dense ship traffic routes, and oil and gas installations in the North Sea, any casualty or other incident is of great concern. Also the daily operational discharges from vessels or production water from offshore oil installations are a great concern.

The Bonn Agreement was established (in 1969) to respond to oil pollution of the North Sea by active co-operation and mutual assistance. The Contracting Parties have also undertaken to conduct surveillance of the area as an aid to detecting and responding to pollution and to preventing violation of anti-pollution regulations, known as **MARPOL**.

Aerial surveillance plays an essential role in this task. Aircraft equipped with remote sensing systems have proved to be efficient in detecting and observing oil spills and other pollution as well as natural phonomena. However, it is only one means of detecting discharges of oil and other harmful substance. Satellite surveillance also plays a still growing important role in the detection of possible pollution at sea. Remote Sensing satellites carrying Synthetic Aperture Radar (SAR) have been identified as useful tools for aerial surveillance flight planning and optimisation. Although satellites have proved the technical capabilities to detect potential surface pollution, verification by aircraft or other means is necessary to unambiguously confirm that there is a pollution by mineral oil.

1.2 Aim of the Handbook

The Aerial Operations Handbook is designed to provide management and aircrew with brief but essential information for the planning and conduct of counter-pollution flights within the Bonn Agreement area. It describes not only Remote Sensing techniques and co-operation in flight operation, but specific response support flights are also addressed and obviously the reporting formats.

It is recommended that for detailed technical information on sensors and systems the interested reader should turn to the manufacterer.

2 General

2.1 Participating States

All the states adjacent to the North Sea and its approaches are party to the Bonn Agreement.

- Belgium
- Denmark
- France
- Germany
- Ireland
- The Netherlands
- Norway
- Sweden
- The United Kingdom and Northern Ireland

The European Union is also a Contracting Party to the Bonn Agreement, but does not have the operational assets to conduct Aerial Surveillance Operations. However under EU/EMSA the Clean Sea Net system provides Member States with satellite images and readers are referred to EMSA's web-site and/or their national point of contact for Clean Sea Net.

2.2 The Bonn Agreement Area

For the purpose of this Agreement, the North Sea area means the area of sea comprising:

(a) the North Sea proper, southwards of latitude 63° 38 10 68N;

(b) the Skagerrak, the southern limit of which is determined east of the Skaw by the latitude 57° 44' 43.00" N,

(c) the English Channel and its approaches, bounded on the south and west by the line defined in Part I of the Annex to this Agreement;

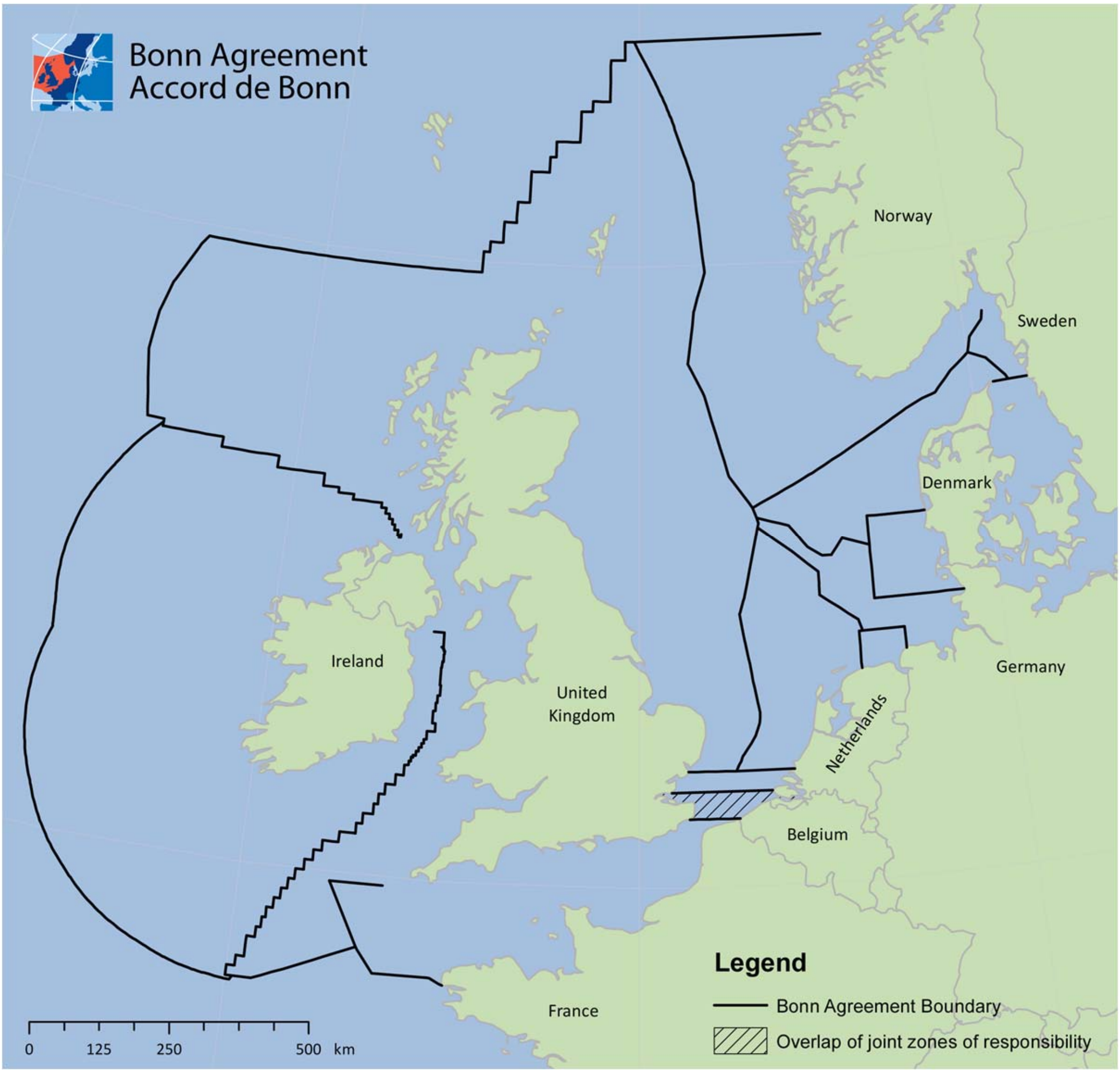
(d) the other waters, comprising the Irish Sea, the Celtic Sea, the Malin Sea, the Great Minch, the Little Minch, part of the Norwegian Sea, and parts of the North East Atlantic, bounded on the west and north by the line defined in Part II of the Annex to this Agreement."

2.3 Zones of Responsibility (Control Zones)

For the purpose of the Agreement, the North Sea area is divided into zones of responsibility. Since the revision of the BONN AGREEMENT in 2002 the boundaries of these zones coincide with the boundaries of the Exclusive Economic Zones of the Contracting Parties.

Article 6 of the Agreement provides 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. 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 co-operation 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. The system of communication is the POLREP system used through Safe Sea Net and CECIS.



2.4 Aerial Surveillance

Article 1 of the Agreement provides that the Agreement also applies to surveillance conducted in the North Sea area as an aid to detecting/observing pollution, including the identification of the source and to preventing violations of anti-pollution regulations.

Responsible Authorities

Member States have appointed organisations responsible for acting within the framework of the Bonn Agreement. Some organisations have only one focal point for all aerial surveillance matters, whilst others may have separate management and operational contact points. Part 4 - National Information contains a list of responsible organisations together with relevant contact data.

Real-time Contact

Exchange of information on in-flight detection of pollution is, if necessary, to be conducted by radio to the appropriate focal point.

Normal Contact

Evaluated or processed data/imagery and photographs/videos may be forwarded either directly to the responsible authority or through the focal point.

2.5 Co-ordination of Aerial Surveillance

There is an annual rotation of Contracting Parties to act as the lead country for aerial surveillance. The lead country for aerial surveillance is responsible for preparing any major additions or new content for the Aerial Operations Handbook as necessary. The lead country will bring proposals on revision of the Handbook to the meeting of OTSOPA. Also the Bonn Agreement Joint Action Programme is prepared by the lead country for discussion and decision in OTSOPA. This program includes the Tour de Horizon flights, (Super) Cepco flight operations or other special events. The aerial surveillance data are summarised by the Contracting Parties themselves and annually presented in report form by the Secretariat. In close cooperation with HELCOM an annual map of all confirmed oil pollution is presented.

2.6 Remote Sensing

When dealing with oil or chemicals spilled at sea, it is essential to be able to “find” the slick and to identify the type of substance and to estimate the volume. The application of remote sensing equipment and techniques is of great value. All Contracting Parties have access to remote sensing facilities and have established an aerial surveillance organisation. A summary of the different types of sensors including a brief description of their application can be found in Part 2, Chapter 1 – Remote Sensing. Remote Sensing data, collected by various sensors in combination with visual observation by trained and skilled operators provide valuable information for the response organisation.

2.7 Aircraft

Details of the Contracting Parties’ marine pollution surveillance aircraft can be found in Part IV “National Information”.

3 Surveillance Flights

3.1 Purpose of Surveillance Flights

The purpose of surveillance flights is 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 investigation and monitoring carried out. Routine patrolling for the detection of violations, also is the preparation of skills required 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 co-operation between Bonn Agreement participants is to ensure a 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 satellite and aircraft. Satellite images are used for surveillance aircraft mission planning and statistics. Through the European Co-operation programme, chaired by EMSA, the Clean Sea Net, all satellite imagery (footprints) can be made available to the Member States. Again Bonn Agreement neighbouring countries explore ways to make efficient use of assets for the validation of satellite detections of possible slicks.

3.2 Flight Types

Various flight types have been developed under the auspices of the Bonn Agreement. These have been defined by the 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 or plans between participating countries for the co-ordination 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. See Part 2, Chapter 2.
- (Super) CEPCO Flights. A Co-ordinated Extended Pollution Control Operation (CEPCO) can be defined as a continuous sequence of aerial surveillance flights if possible supported by sea borne law-enforcement assistance to ensure a permanent presence over a minimum of 24 hours 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. See Part 2, Chapter 4.

3.3 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 co-ordinated with neighbour states. All CPs may have other type of flights in their zone of responsibility e.g. border patrol; smuggling; fishery patrol; yacht patrol. These national flight types are not further explained in this Handbook.

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 the case of a detection of a 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 preferably directly in air.

3.4 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 are recommended to use the same navigation points.

This has the benefit of relating observed pollution to specific points for reporting purposes. National navigation points are listed and shown on charts by country in Part 4 – National Information.

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.

3.5 Regional Flights

Bilateral and multilateral plans between Contracting Parties have been established for mutual assistance in response operations and in aerial surveillance. Examples are the agreements/operational plans between Denmark, Germany and The Netherlands (DenGerNeth-plan) and Norway/United Kingdom (NORBRITPLAN).

Such plans may make more effective use of available resources. Close co-operation in aerial surveillance will require the careful co-ordination 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.

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

An annual report on executed TdH flights is compiled by a lead country and presented to OTSOPA the following year.

3.7 Co-ordinated Extended Pollution Control Operation (CEPCO)

The Contracting Parties have agreed a program of Co-ordinated Extended Pollution Control Operations (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 organize a Super CEPCO surveillance period that will last up to 10 days and will cover a specific sea area. It was agreed with HELCOM that the organisation of a Super-Cepco would rotate between BONN and HELCOM annually.

Additional (smaller) CEPCOs may be organised by neighbouring countries, on a voluntary basis, during which a common area is continuously over flown for 24 hours or more. During these smaller CEPCOs participating aircraft will use their normal national operating airports. The CEPCO Guidelines are at Part 2, Chapter 3.

3.8 Aerial Surveillance Exercise

Contracting Parties agreed to increase co-operation by participating in counter-pollution exercises and each Contracting Party agreed to collaborate to the best of their abilities. However, exercises as such are integrated into (Super) Cepco operations, special seminars. Intercomparision exercises no longer exist. Changes in the program are subjects for discussion at annual OTSOPA meetings.

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 CP have agreed to task an ad-hoc working group to the OTSOPA meeting to coordinate national exercises and trials for Bonn Agreement Contracting Parties to participate. The objective is to use every opportunity for concerted action, especially when real mineral oil is released into the marine environment.

4 Standard Reporting System

4.1 The Need for a Standard Reporting System

A surveillance aircraft over flying 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 illegal pollution 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, co-operation on the 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 called BA-POL within the Bonn Agreement for reporting 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.

4.2 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 and suspected polluter if applicable.

A completed BA Pollution Observation 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 (see Para 4.5 and Annex E to this Chapter) 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. (See North Sea Manual on Martime Oil Pollution Offences by the North Sea Network for Investigators and Prosecutors.)

4.3 Bonn Agreement Pollution Observation Log

The Bonn Agreement Pollution Observation Log (BAPOL) is for recording all detected and observed pollution and it has been agreed that it will be used for all types of flights. It is to be completed as an official record of a surveillance flight even when no pollution was observed. The Log is shown at Annex A to this Chapter.

The agreed guide to the compilation of the BAPOL is at Annex B to this Chapter. Special attention should be paid to the columns indicating coverage and appearance since an estimate of quantity can be made based on the observed dimensions of the pollution together with coverage and appearance.

4.4 Other Reporting Formats

Within the framework of the Bonn Agreement another format is in use as follows:

- Pollution Observation Report on Polluters and Combatable Spills Annex C

4.5 Reporting to the Secretariat

Contracting Parties have agreed to provide all national reports on detected and identified pollution and suspected polluters to the Bonn Agreement for data processing in order to draft the annual overview consisting of:

- Result of all Surveillance Flights, to be sent to the Secretariat to compile the annual report.
- Result of CEPCO Flights, to be sent to the hosting Contracting Party to compile a full report.
- Result of Tour de Horizon Flights, to be sent to the lead country for producing an annual report.

Guidelines for the standard content of the annual reports to the Secretariat on the results of aerial surveillance are contained in Annex E to this chapter.

5 Surveillance Evidence

5.1 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 as follows:
  - Bonn Agreement Pollution Observation Log
  - Pollution Report on Polluters and Combatable Spills
  - SLAR/IR/UV /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 (best taken at bow and poop) 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, whose which judicial systems require 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 pre-arranged 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.

5.2 Surveillance Evidence

BONN, in close co-operation with the North Sea Network of Investigators and Prosecutors have produced a North Sea Manual on Maritime Oil Pollution Offences designed for use by the legal profession. This manual is an integration of the former manual Oil Pollution At Sea – Securing Evidence on Discharges from Ships and the manual Oil Pollution At Sea – Part 2 – Effective Prosecution of offenders – Guidelines on International Co-operation.

6 Diplomatic Clearance

6.1 Diplomatic Clearance

The Bonn Agreement Manual Chapter 28 Article 1.2 states:

> "In cases of joint counter-pollution operations and joint exercises, and in implementing the aerial surveillance programme, Contracting Parties should undertake to facilitate the granting of all clearances and permissions required for the aircraft of other Contracting Parties to carry out their mission in their airspace and over their territory".

At the Bonn Agreement Plenary meeting in Brussels in September 1990, most Contracting Parties agreed to be in favour of recommending block clearance within the Bonn Agreement area for aerial surveillance purposes. It was also noted at that meeting that remote sensing equipment should not be used and photographs should not be taken from an aircraft within the territory or territorial sea of another country without previous agreement in each case.

Whilst some individual countries do operate a block clearance for aerial surveillance for counter-pollution purposes, others do not. It follows that to be on the safe side, it would be prudent to obtain prior clearance, diplomatic or otherwise, before venturing over another country's territorial sea or territory.

In the case of providing assistance by one Contracting Party to another Contracting Party because of a large scale pollution, the Assistance Requesting Country shall take care of administrative requirements for the aircraft to operate in the zone of responsibility. Any Closed Air Space measures should be lifted for the assisting aircraft.

It is essential to follow the procedures set in the EU/ HOST NATION SUPPORT. Although the HNS primarily focusses on the assistance in emergency situation, it is advised to provide training in the procedures where ever possible during exercises.

7 Pollution Response support

7.1 Introduction

When during a routine patrol flight a pollution is observed and the assessment of volume and threat results in advising authorities to prepare for counter pollution activities, the aircraft can be ordered to provide guidance. The observed pollution can be monitored for some time in order to study further developments. Weathering of the oil is the term used for the process of evaporation, dispersion and dissolution of oil into the related compartiment (air, watercolumn)

In order to catch a polluter red-handed it may be necessary to overfly the area for a period of time in order to keep a close eye on the suspected polluter and to monitor the behaviour of the oilslick and the polluting vessel.

7.2 Monitoring oil slick behaviour

After completion of the first assessment of the oil slick the operator will consider the weather forecast to take into account whether rapid changes in the conditions at sea will hamper response measures. If the conditions deteriorate monitoring the behaviour could be the only option in order to establish and record the time required to totally naturally disperse the oil slick.

Communications with the response authorities, or the Coastguard, may lead to the descision to revisit the slick after some hours in order to register the behaviour of the slick. This could be repeated a number of times. Results of the monitoring would preferably be compared with the computer prediction model(s).

Another purpose for revisiting the slick is to observe possible birds in the area and/or passing vessels discharging their bilge because of the presence of oil at sea surface. Also satellite imagery can be compared with the actual situation.

7.3 Guidance to response vessels

If the responsible authority decides to mobilize response unit(s) for the recovery of the oil, the aircraft should be over the area on arrival of the response vessel for proper guidance. Recalling that after some time 90% of the oil is in 10% of the covered surface and recognizing that mechanical recovery is most efficient and effective when deployed in the thicker parts, the aircrew will provide guidance.

It is important to note that after completion of the first observation and assessment, and the ETA of the response vessel(s) is known, the aircraft should revise the flight plan so that the aircraft returns in time for guiding the response unit.

Further technical details on the procedure to provide the guidance should be obtained from the response authorities at national level.

7.4 Manoeuvring

Aircrew need to understand the at sea response operation in order to guide the response vessels in their recovery activities. A single vessel sailing through an oil slick with deployed equipment has a low sailing speed. Guiding the vessel into the thicker parts of the oil – that is the main aim of the recovery - requires patience.

A combination of vessels and oil booms, e.g. a so-called Open-U configuration will only move at a speed of 1 to 1.5 knots and as it is recommended to collect as much oil as possible, at a certain point the configuration may have to turn around. The 180° back track takes time.

Also, especially where a ship is operating side sweeps, the crew will monitor a loss of oil passing under the sweep, which may be due to a too high sailing speed in relation to the current.

7.5 Aerial Dispersant Application

7.5.1 Introduction

For many, mostly smaller, oil spills the best response option is to leave the oil to disperse or degrade naturally. The mechanical action of the sea can break down oil into small droplets, some of which are dispersed and diluted by the movement of the water. Mechanical or chemical dispersion assist this process by reducing the interfacial tension between the oil and water, so creating a larger number of smaller droplets that will stay in the water column and not refloat and coalesce again. These provide a greatly increased surface area that accelerates the degradation of the oil by marine micro-organisms.

The use of dispersants is dependent on the national response strategy. In determining whether dispersant use is appropriate a judgement has to be made between the possible impact of the option and the likely consequences of allowing the oil to disperse naturally. The objective is to take the most appropriate action to minimise the effects on the environment and economic activity, after careful consideration of all the relevant factors. Operational experience over a number of years and incidents has shown that aerial application of dispersant can be a fast, efficient and effective response option when the strategy and procedures have been fully developed and practiced.

This section of the Aerial Operations Handbook outlines the generic requirements of the aerial dispersant application and the operational procedure.

7.5.2 The Oil

Any decisions on whether or not to use chemical dispersant should take into account the type and state of oil involved in the incident. Dispersants can and have been used to successfully treat crude oils, light industrial fuel oils and lubricating oils. However it is unlikely to be fully effective when used on heavy residual fuel oils. It is important to remember that many oils can quickly become resistant to treatment due to weathering. If there is any doubt, a 'test' spray, using a small amount of dispersant, should be carried out to determine and / or confirm the effectiveness of the treatment.

Light oils such as middle distillates (gasoline, kerosene and diesel fuels) should **not** be treated with dispersants. If dispersed into the water column rather than left to evaporate there is a greater likelihood of harm to marine organisms.

The oil slick needs to be in a position to allow safe aerial operations and of sufficient size and quantity to enable efficient targeting by the control aircraft.

7.5.3 Weather and Sea Conditions

Ideal conditions for maximising dispersant effectiveness are a surface wind of 7-12 knots, with scattered, breaking waves, this creates the mechanical motion in the sea needed for the dispersant to work. Application is not recommended when the surface wind is more than 30 knots and a sea state rough to very rough: above these levels the oil will normally be overwhelmed by wave action and the dispersant will be blown away.

For safe, efficient and effective aerial spraying operations under the guidance of surveillance aircraft the horizontal visibility needs to be at least 5 miles and the cloud base 1500 feet.

7.5.4 The Dispersant

The dispersant has to be approved for use by the relevant nation (or international) Licensing Authority. The product must be tested for its effectiveness and any possible toxic effects on marine species: the labelling must correctly indicate how and when the product can be used.

7.5.5. Aerial Dispersant Aircraft / Helicopters

Several types of both helicopters and fixed wing aircraft have been used to deliver oil spill dispersant. They should be capable of operating at low level at relatively low speed (50 – 150 knots) and exhibit good manoeuvrability. Other considerations include weight limitation verses payload requirement and operating range.

The aircrew must be trained, practised and if possible experienced in dispersant application operations.

7.5.6 Aerial Dispersant Spraying Equipment

The typical components of a system include a pump (wind-driven or electrical) that draws dispersant at a controlled rate from one or more tanks to feed spray booms. The dispersant is released through nozzles spaced at intervals along the boom; they generate droplets within the required size range (normally around 600 micrometers to minimise wind drift, possible evaporation and so that they reach the oil / water interface).

The system can be permanently fitted to the aeroplane but are more normally a module, roll-on/roll-off. Most helicopter systems are under-slung from the cargo hooks by wire strops. The capacity of the 'fixed wing' system can vary from 1,000 to 21,000 litres and for helicopter 400 – 3,000 litres.

7.5.7 On Scene' Control / Guidance Aircraft

For aerial dispersant application it is strongly recommended that control / guidance is provided by an aircraft overhead. The aircraft should normally be a marine pollution surveillance aircraft with a full remote sensing and communication suite as described in this handbook. The aircrew must be trained, practised and if possible experienced in dispersant application control operations.

The 'control' aircrew act as the 'on scenes co-ordinator' responsible for the following tasks:

- Provision of advice to the responsible national authority on the establishment of the safe operating area (geographic limits, heights, no-go areas, times, etc),
- Control and surveillance of the safe operating area,
- Maintenance of flight safety and communications for all spray aircraft within the operating area,
- Location of the thickest oil,
- Direction of the spraying aircraft to ensure efficient delivery,
- Determination of dispersant effectiveness,
- Provision of advising on cessation of spraying when sufficient dispersant has been applied (1 tonne of dispersant per 10 tonnes of oil is the initial recommendation but should be adjusted after determination of effectiveness), when the dispersant is no longer effective (due to oil weathering) and when delivery cannot be carried out efficiently (due to the oil breaking out into small windrows that cannot be targeted effectively),
- Communications with the 'control' centre, passing regular situation reports on progress, dispersant used and effectiveness etc.

7.5.8 Flight / Operational Safety

Based on flight safety parameters and the area required for dispersant spraying applications; prior to operations commencing the responsible national authorities should be requested to establish Restrictions of Flying Regulations to prevent unauthorised aircraft entering or operating in the area. Similarly an Exclusion Zone, covering the area of operations, should be requested in order to keep shipping clear of the oil and spray aircraft.

An initial area of 10 miles in radius and 3000 feet in height is recommended, using the centre of the oil slick as a datum. These dimensions will be adjusted, as the slick moves, dispersant spraying operations progress and other factors, such as maintenance of safety zones around a damaged tanker are factored into the equation. Monitoring the development of the slick as a result of natural weathering and the affect of the dispersants is also required.

Surveillance aircrew should conduct detailed surveys of dispersant spraying area(s) before, and during delivery to ensure they are clear of all obstructions. The oil should be clear of land, ideally by 5 miles, offshore installations (oil/gas rigs, wind farms and aerials etc), surface craft (including where possible the casualty and response vessels in or near the oil) and other aircraft / helicopters involved in any response.

7.5.9 Aerial Dispersant Application

Once the surveillance aircraft has confirmed the targeted area is free of all possible obstructions, the operation can start. Normally a test spray would be conducted. Under the direct control of the surveillance aircraft, the spraying aircraft will accurately deliver a small amount of dispersant (1,000 litres) onto the thickest oil.

The surveillance aircrew assess the effectiveness of this initial dispersant application, both visually and by observing changes in sensor imagery. They look for a rapid spread of oil, followed by a plume or cloud of dispersed oil appearing below the slick; as the dispersant may take a while to work, these features become more apparent with time.

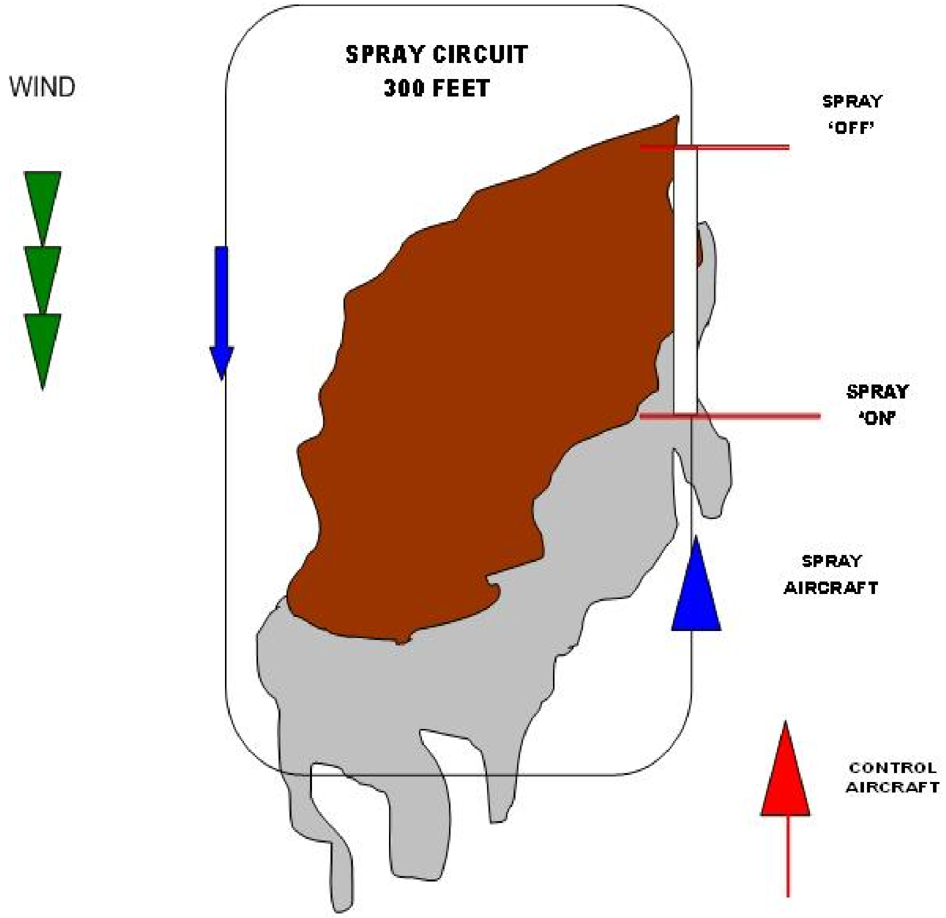
Provided the assessment is positive, indicating that the dispersant is working, a full application of dispersants can commence only when approval is confirmed by the responsible national authority. Spray efforts will be concentrated on the leading edge of the thickest portion of the slick and any thick oil that threatens sensitive areas. The oil is normally targeted *visually* by the control aircraft aircrew; they will also use IR data to confirm the target area.

The most efficient and effective application is achieved by spraying into the wind at low level to maintain the integrity and form of the falling droplets. When flying with the wind the deformation of the spray (by a following wind) can interfere with the desired depositional accuracy. Crosswind application is not recommended because the dispersant can drift too far off target.

During the basic procedure the *spray aircraft* is flown to maintain a 300 foot circuit until it is lined up with the oil (into wind); the aircraft is then descended to 'spray' height at 50 feet and levelled. Minor heading adjustments (which are made with 'flat' turns) and the 'Spray On' and 'Spray Off' instructions are passed by the *control aircraft*. Following the 'Spray Off' instruction the spray aircraft climbs straight ahead to 300 feet before turning left onto the circuit. The second run will be to the left of the first by the width off the spray and so on.

During dispersant application the *control aircraft* crew maintain visual contact with the spray aircraft and the oil at all times; normally by positioning their aircraft above (around 700 feet) and to the right of the *spray aircraft*.

AERIAL DISPERSANT DELIVERY BASIC PROCEDURE



7.5.10 Additional Information

Aerial dispersant application is the primary response to major oil spills in UK waters. The use of dispersants is often a more effective response to oil pollution in the turbulent seas around the UK than ship-borne oil recovery systems which have limitations in such sea conditions.

The UK has successfully used dispersants on a number of occasions notably during the Sea Empress incident when 72,000 tonnes of crude oil was spilt of which 37,000 tonnes (52%) was deemed to have dispersed: 10,000 tonnes naturally and 27,000 tonnes through the aerial application of dispersants.

Further information on the strategy, organisation and procedures can be obtained from the UK Maritime and Coastguard Agency. Contact details are given in the national chapter of this handbook.

8 Flight Safety

8.1 Flight Safety in General

Aircrew are responsible for their own flight safety and for safe navigation. Since flight-plans are filed with the civil aviation authorities, it is assumed that the appropriate responsible authorities will be aware of take-off time, endurance, routing and the number of persons on board.

8.2 Safety in Surveillance Related to Chemical Incidents

Special safety considerations arise where an emergency requires aerial surveillance and that emergency results from the release of chemicals (HNS) to the environment, since these may volatilise and pollute the air over the site of the emergency and its surroundings. Attention is needed to protect aircraft and aircrew in such circumstances.

In establishing such protection, the following points should be considered:

- Where an incident may involve releases of hazardous chemicals to the environment the briefing of the aircrew should include such information as is available on the nature of the risks that may arise;
- Unless and until clear information is available on the nature of the chemical released and its possible impact on aircraft and aircrew, over flying of the site should be restricted. As a general rule, and where appropriate protection is not provided, keeping aircraft upwind of the release will be prudent, unless the wind is more than 15 knots, in which case over flying may be acceptable at an altitude of not less than 1 000 feet. The extent of such restrictions must be made clear to the authorities managing the response to the emergency;
- As soon as clear information is available on the nature of the chemical released and its possible impact on aircraft and aircrew, that information should immediately be given to the air personnel involved;
- Response plans should include arrangements to obtain forecasts of the movement of air volumes that have been contaminated by the release of a hazardous chemical. Scientific advice on the dilution of the air contamination over time will be needed as well as meteorological input;
    - Specialists will provide aircrew with the plume shape and extension from the casualty based on the meteorological input;
    - Response plans should include arrangements to provide appropriate protection for aircrew. Such arrangements could include: advance provision of masks and goggles with air/oxygen supply specifically for the response aircraft. For helicopters, portable oxygen containers will be needed;
- To speed up the acquisition of information on the nature of the chemical released and its possible impact on aircraft and aircrew, response plans could include specific arrangements for liaison between authorities charged with response to chemical emergencies at sea and those responsible for similar emergencies on land.

8.3 Flight Procedures

There are no set Bonn Agreement procedures for the conduct of surveillance flights because aircrew alone are responsible for their own flight safety and safe navigation. Aircrew will normally remain in contact with the appropriate ATC as the flight progresses.

9. Communications

9.1 Communications

Aircrew detecting or observing pollution should pass the information by radio-communication to the appropriate focal point. Criteria for reporting in-flight during a Tour de Horizon have been established formally (See Part 2, Chapter 2). In other cases common sense will dictate whether or not to report by radio. For example, pollution which poses a threat to the environment and is in urgent need of counter pollution activity, or when observing a deliberate and ongoing discharge in violation of MARPOL obviously require an immediate response from the country concerned, therefore the focal point should be informed by radio. Focal points are listed at Part 4 – National Information, and Coastal Stations with frequencies in use are listed at Annex A to this Chapter.

CALLSIGNS, FREQUENCIES AND TELECOMMUNICATIONS

Belgium:

MIK=Maritime Information Crosspoint
Maritime VHF Channel 27
Call Sign: **Ostend Radio**
(procedure: call Ostend Radio on Ch. 27 and ask connection with MIK)

Denmark:

Joint Rescue Coordination Centre (JRCC DENMARK)
HF Day 4703/6651 kHz
Night 4577/3053 kHz
UHF 379.525 MHz
Call Sign: **DANISH RESCUE**
(HF availability is subject to prior coordination on tel: +45 72850450 (0381)

Maritime Operations Centre North
UHF 356.300
Call Sign: **CRYSTAL PURPLE**

Maritime Operations Centre South
UHF 356.300
Call Sign: **CRYSTAL PINK**

Lyngby Radio
Maritime channel 16
Call Sign: **LYNGBY RADIO**
For contact with Duty Officer JRCC,
tel: +45 72850450

France:

Maritime VHF: Channel 16
HF BLU 2182
Call Sign: **CROSS (MRCC)**
GRIS NEZ (northern area) / JOBOURG (central area)
CORSEN (western area)

Federal Republic of Germany:

Maritime VHF Channel 16 for call
Airborne VHF 129.95
Call Sign: **CUXHAVEN MELDEKOPF**

Netherlands:

Maritime VHF channel 73 or 16
Airborne VHF freq.: 123.1
HF freq.: 6550 kHz or 5438 kHz
Call Sign: **COASTGUARD CENTRE**

Norway:

Maritime VHF channel 16 for call.
Call Sign: **Tjoeme Radio**
Rogaland Radio
Floroe Radio
Bodoe Radio

Sweden:

Maritime VHF channel 16 for call,
Call Sign:
Swedish Coast Guard Härnösand (Northern area)
Swedish Coast Guard Stockholm (Estern area)
Swedish Coast Guard Karlskrona (Southern area)
Swedish Coast Guard Gothenburg (Western area)

Direct contact with a Coastguard vessel: Maritime VHF 16 for call.
Call Sign: **Swedish Coast Guard Vessel at Position: XXYY**

Direct contact with a Coastguard Aircraft: Maritime VHF 16 or VHF 122,875 Mhz, AM.
Call Sign: **Swedish Coast Guard Aircraft.**

United Kingdom: Maritime VHF channel 16 for call,
Working channel 10.
Call Sign:

Shetland Coastguard

Aberdeen Coastguard

Forth Coastguard

Humber Coastguard

Yarmouth Coastguard

Thames Coastguard

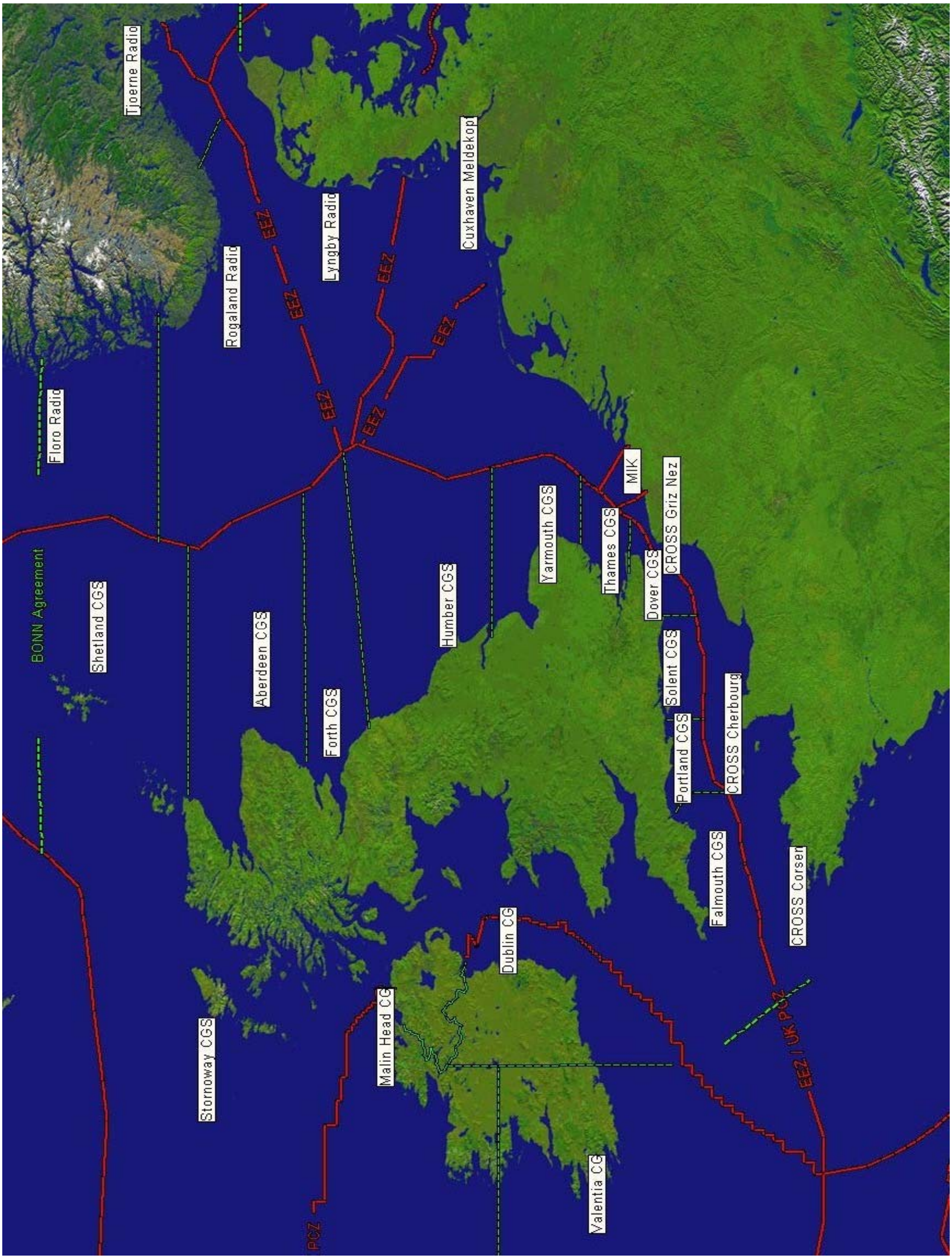
Dover Coastguard

Solent Coastguard

Portland Coastguard

Brixham Coastguard

Falmouth Coastguard


Tjoerne Radio
Cuxhaven Meldekop
Lyngby Radio
Rogaland Radio
EEZ
EEZ
EEZ
EEZ
EEZ
EEZ
Floro Radio
MIK
CROSS Griz Nez
Yarmouth CGS
Thames CGS
Dover CGS
BONN Agreement
Shetland CGS
Aberdeen CGS
Humber CGS
Solent CGS
Forth CGS
Portland CGS
CROSS Cherbourg
Falmouth CGS
CROSS Corsen
Dublin CG
Malin Head CG
Stornoway CGS
EEZ / UK PCZ
Valentia CG
PCZ

☐ **HELCOM** ☐ **BONN AGREEMENT** STANDARD POLLUTION OBSERVATION / DETECTION LOG ☐ **NO POLLUTION DETECTED**

REPORTING AUTHORITY	AIRCRAFT REG	MISSION No	CAPTAIN	CO PILOT	OPERATOR	OBSERVER	DAY	DATE	MONTH	YEAR

FLIGHT TYPE	ROUTE / AREA				TIME OVER THE SEA DAY		TIME OVER THE SEA NIGHT		TOTAL TIME OVER THE SEA	
					hrs	mins	hrs	mins	hrs	mins

No	AREA CODE	TIME UTC	POSITION		DIMENSIONS		AREA COVER	OILED AREA	OIL APPEARANCE COVERAGE (PERCENTAGE - %)						MINIMUM VOLUME	MAXIMUM VOLUME	COMBAT
			LATITUDE 'NORTH'	LONGITUDE 'EAST/WEST'	LENGTH Km	WIDTH Km	%	Km^2	1	2	3	4	5	Oth	m^3	m^3	Y / N

No	POLL TYPE	DETECTION						PHOTO	VIDEO	FLIR	WEATHER							REMARKS
		SLAR	IR	UV	VIS	MW	LF	Y / N	Y / N	Y / N	WIND		CLOUD		VIS	SEA	Wx	
											°			FT				
											°			FT				
											°			FT				
											°			FT				
											°			FT				

No	REMARKS

OIL APPEARANCE TABLE			
No	OIL APPEARANCE DESCRIPTION	MINIMUM VOLUME m^3 / km^2	MAXIMUM VOLUME m^3 / km^2
1	SHEEN	0.04	0.30
2	RAINBOW	0.30	5.00
3	METALLIC	5.00	50.0
4	DISCONTINUOUS TRUE COLOUR	50.0	200
5	TRUE COLOUR	200	>200

ANNEX B

STANDARD POLLUTION REPORTING LOG COMPLETION GUIDE

HELCOM:	Tick HELCOM Box if the flight is in HELCOM Area
BONN AGREEMENT:	Tick BONN AGREEMENT Box if flight is in BA area
NO POLLUTION DETECTED:	Tick NO POLLUTION DETECTED if no pollution is detected
REPORTING AUTHORITY:	National Authority Responsible for Pollution Control.
AIRCRAFT REG:	Aircraft Registration Letters / Numbers.
MISSION No:	Nationally Assigned Mission Number.
FLIGHT TYPE:	National Designation for Flight Type as follows: NAT - National REG - Regional EXER - Exercise OPS - Operational Flight. RIG - Oil Rig Patrol SHIP - Shipping Patrol TDH - Tour de Horizon Flight CEPCO - Co-ordinated Extended Pollution Control Operation
CAPTAIN OF AIRCRAFT:	Name of Captain
CO PILOT:	Name of Co Pilot
OPERATOR:	Name of Operator
OBSERVER:	Name of Observer
DAY:	Number Assigned to the Day of the Week as follows: Monday - 01 Tuesday - 02 Wednesday - 03 Thursday - 04 Friday - 05 Saturday - 06 Sunday - 07
DATE/MONTH/YEAR:	Two number designation for each of date/month/year of Flight
ROUTE / AREA:	Flight Route or Area
TIME OVER THE SEA – DAY:	Time over the Sea during Daylight
TIME OVER THE SEA – NIGHT:	Time over the Sea at Night
TOTAL TIME OVER SEA:	Total time between Coasting Out and Coasting In.
No:	Number allocated to pollution detection.

AREA CODE: The international telephone code for the country (Area) in which the pollution is located:

Bonn Agreement

Belgium	32	Denmark (+ Helcom)	45
France	33	Germany (+ Helcom)	49
Ireland	353	Netherlands	31
Norway	47	Sweden (+ Helcom)	46
United Kingdom	44		

Helcom

Estonia	372	Finland	358
Latvia	371	Lithuania	370
Poland	48	Russia	7

TIME UTC: Time of pollution detection.

POSITION: Latitude and longitude of pollution (degrees, minutes and seconds // WGS / 84 Datum).

DIMENSIONS: Length and width of pollution in kilometres.

AREA COVER %: Observer's assessment of the percentage of the boxed dimensioned area (length x width), covered with pollution.

OILED AREA: Oiled Area covered with pollution; calculated by multiplying length, width and cover %

Example:

<u>Length x Width x Cover %</u>

2 Km x 1 Km x 50%, gives...

[2.0] x [1.0] x [0.5]

= Oiled Area = 1 Km^2

OIL APPEARANCE COVERAGE %: Allocation of Percentage of the `Oiled Area' to the Appearance of the pollution.

Example:

1/2 cover – Rainbow - Column 2 = 50%

1/4 cover - Metallic - Column 3 = 25%

1/4 cover - True Colour - Column 5 = 25%

MINIMUM VOLUME: Minimum Quantity of Oil Pollution in cubic metres.
Calculated as follows:

[Oiled Area] x [Appearance Code Minimum Thickness Value] X [Decimal Percentage of Appearance].

[1 Km^2] x [0.3 m^3/km^2] x [0.50] = 0.15 m^3

[1 Km^2] x [5.0 m^3/km^2] x [0.25] = 1.25 m^3

[1 Km^2] x [200 m^3/km^2] x [0.25] = 50 m^3

Minimum Total Quantity = [0.15] + [1.25] + [50] = 51.4 m^3

MAXIMUM VOLUME: Maximum Quantity of Oil Pollution in cubic metres.

Calculated as follows:

[Oiled Area] x [Appearance Code Maximum Thickness Value]

X [Decimal Percentage of Appearance].

$[1\ Km^2] \times [5.0\ m^3/km^2] \times [0.50] = 2.5\ m^3$

$[1\ Km^2] \times [50\ m^3/km^2] \times [0.25] = 12.5\ m^3$

$[1\ Km^2] \times [>200\ m^3/km^2] \times [0.25] = > 50\ m^3$

Maximum Total Quantity = [2.5] + [12.5] + [>50] = > 65 m^3

No:	The same number as previously allocated to the pollution detection.
POLLUTION TYPE:	Pollution Type as follows:
	OIL - Oil
	CHEM - Chemical
	FISH - Fish Oil or Waste
	VEG - Vegetable Oil or Waste
	OTH - Other (Amplify in Remarks)
	UNK - Unknown
DETECTION:	Detection Sensor.
	SLAR - Radar
	UV - Ultra Violet
	IR - Infrared
	VIS - Visual
	MW - Microwave
	LF - Laser Fluorosensor
PHOTO:	Photographs of pollution
VIDEO	Video of the pollution
FLIR	Forward Looking Infrared of the pollution
WEATHER:	Weather at the time of pollution observation / detection
	Surface Wind: Direction and Speed (knots or beaufort as required by national authorities),
	Cloud: Coverage in Octas or aviation description (scattered / overcast)) and Base in feet,
	Visibility: Nautical Miles or Kilometres
	Sea State: Using the description code given in the Abbreviations
	Weather: Rain, Snow, Haze, Mist etc
REMARKS:	Any Amplifying Remarks.

Note: **For all Detections / Observations Boxes write:**

'Y' Sensor used and pollution detected

'N' Sensor used but pollution not detected

'-' Sensor was not used or not available

ANNEX C

POLLUTION OBSERVATION / DETECTION REPORT ON POLLUTERS AND COMBATABLE SPILLS (IMO)

1. REPORTER:
   a. Reporting State: : ....
   b. Observer (Organization/Aircraft/Platform) : ....Call Sign...............................
   c. Observer(s)(Family Name(s)) : 1......................... ....2...................................

2. DATE AND TIME:
   a. Date (yymmdd) b. Time of Observation (UTC) : Date................................. Time............................UTC

3. LOCATION OF THE POLLUTION:
   a. Position of the Pollution (Lat/Long) : Begin...........................N, ...W/E
   : End............................N, ...W/E
   b. Inside/Outside Territorial Waters : O Inside O Outside

4. DESCRIPTION OF THE POLLUTION:
   a. Type of Substance Discharged : ....
   b. Estimated Quantity : ....m^3
   c. Length (km) d. Width (km) e. Coverage (%) : Length..............km Width..............km Coverage........%
   f. Oiled Area (km^2) : Oiled Area..............(km^2)
   g. Percentage of Oiled Area by Appearance (%) 1:...............% 4:...................%
   1=Sheen 2=Rainbow 3=Metallic 2:...............% 5:...................%
   4=Discontinuous True Colour 5=True Colour 3:...............% Other:..............%

5. METHOD OF DETECTION AND INVESTIGATION:
   a. Detection (Visual, SLAR, IR, UV, Video, MW LFS, Identification Camera, Other) : O Visual O SLAR O IR O UV O Video O MW, O LFS O Video O. Ident.Cam O Other
   b. Discharge Observed c. Photographs Taken : Observed: Yes / No Photos Yes / No
   d. Samples Taken e. Need of Combating : Samples: Yes / No Combat: Yes / No
   f. Other Ships/Platforms in Vicinity (Names) : ....

6. WEATHER AND SEA CONDITIONS:
   a. Wind Direction b. Wind Force c. Visibility : Direction.......Degrees Force........Bft/Kts Vis........kms
   d. Cloud Coverage e. Wave Height : Cloud..........Octa Wave Ht...........m
   f. Current Direction : Current Direction............Degrees

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OBSERVATION OF A DISCHARGE OF HARMFUL SUBSTANCES BY A SHIP UNDER ARTICLE 6(3) OF MARPOL 73/78

7. SHIP INVOLVED:
   a. Name : ....
   b. Callsign c. Flag State : Callsign:............................ Flag State:...............................
   d. Home Port : ....
   e. Type of Ship : ....
   f. Position (Lat/Long) : ....N, ...W/E ....UTC
   : ....N, ...W/E ....UTC
   g. Heading h. Speed : Heading............Degrees Speed.......................kts
   i. Colour of the Hull : ....
   j. Colour of the Funnel and Funnel Mark : ....
   k. Colour / Description of Superstructure : ....
   l. Vessels IMO Number : ....

8. INFORMATION BY RADIO CONTACT:
   a. Radio Contact b. Means of Communication : Contact: Yes / No Means VHF / Teleph, ...Ch / Freq
   c. Last Port of Call : ....
   d. Cargo e. Last Cargo : ....
   f. Next Port of Call, ETA (yymmdd) : ....ETA.........................
   e. Statements of Captain/Officer on Duty : ....

OBSERVATION OF A DISCHARGE OF HARMFUL SUBSTANCS BY AN OFFSHORE INSTALLATION

9. OFFSHORE INSTALLATION INVOLVED:
   a. Platform Name : ....
   b. Position (lat/long) : .... N ....W/E
   c. Type of Platform (Production/Drilling etc) : ....
   d. Company Name : ....

10. INFORMATION BY RADIO CONTACT:
   a. Radio Contact b. Means : Contact Yes / No Means VHF / Teleph, ...Ch / Freq
   c. Contact with (position) : ....
   d. Statements : ....
   : ....

---

11. REMARKS AND ADDITIONAL INFORMATION:
   ....
   ....

Instructions for filling in the joint Bonn Agreement/HELCOM annual reporting format on illegal discharges observed during aerial surveillance

Reporting format

The Contracting Parties will report on their entire annual surveillance activity in the reporting year. This is data obtained during flights over their National Exclusive Economic Zone and outside their responsibility zone e.g. (Super) CEPCO or Tour de Horizon. The following format explanations and data standards should be used to complete the attached MS Excel reporting sheet – meeting the outlined standards is of the utmost importance to ensure inclusion of Contracting Parties data in the Bonn Agreement Aerial Surveillance database.

When reporting the annual data to the Bonn Agreement Secretariat, Table 1 should include only those spills that are inside the reporting Contracting Party's own national EEZ.

Each Contracting Party will send (using Table 6) a compilation of the spills detected in other Contracting Parties' EEZs to the Contracting Party in question at the end of February of the following year. The receiving Contracting Party will compare the data with their annual national data, delete any duplicates and complete their national data where needed. By doing so, all Contracting Parties will be able to obtain a full annual national dataset containing all spills inside their EEZ – inclusive of those detected by other Contracting Parties – and report this dataset (reflected in tables 1, 5 and 6) to the Bonn Agreement Secretariat by the end of March.

Once received by the Secretariat, Aerial Surveillance data will be quality controlled to ensure the data standards have been met- any queries will be forwarded to agreed contact points for resolution before the data is included in the database.

Where applicable, all values are to be presented using a comma as a decimal separator (" , ") and a space as a thousand separator (" "). All coordinates are to be calculated using WGS84 and to be presented as decimal degrees.

Reports deadlines

The deadlines for the submission of aerial surveillance data are:

a. the end of February for reporting data on spills in the EEZs of other Contracting Parties to the Contracting Parties concerned; and

b. the end of March for the submission of full national data sets to the Secretariat.

Please:

do not remove, add or adjust any columns or calculations included in the MS Excel reporting sheet.

only fill out the reporting sheet as it is delivered to you each year, do not use old versions. They may appear to be replicas but subtle variations are present due to the on-going streamlining of the reporting process at the Secretariat.

Table 1. National flights

This data should be completed for flights which were conducted in the EEZ of the reporting Contracting Party

Country	Year	No. of flight hours			No. of detections inside national EEZ			Detections confirmed / observed as mineral oil spills			No. of polluters (mineral oil)				Estimated volume (m^3)	Detections confirmed/observed as other substances	No. of polluters (other substances)				Unknown detections	No. of polluters (unknown detections)				Remarks
		Daylight	Darkness	Total	Daylight	Darkness	Total	Daylight	Darkness	Total	Rigs	Ships	Other	Unknown			Rigs	Ships	Other	Unknown		Rigs	Ships	Other	Unknown	

Column Header	**Format Example**	**Explanation**
Country	Netherlands	Full country name the reported data applies to
Year	2013	The year that the reported data applies to
No. of flight hours – Daylight	136:24	The number of flight hours and minutes carried out in daylight - From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac – shown as a colon separated value. No decimal values
No. of flight hours – Darkness	86:23	The number of flight hours and minutes carried out in darkness - From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac – shown as a colon separated value. No decimal values
No. of flight hours – Total	222:47	= (No. of flight hours - Daylight) + (No. of flight hours – Darkness) – shown as a colon separated value. No decimal values
No. of detections inside national EEZ - Daylight	67	The number of detections in daylight, within the EEZ of the country reporting the data - From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac
No. of detections inside national EEZ – Darkness	23	The number of detections in darkness, within the EEZ of the country reporting the data - From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac
No. of detections inside national EEZ – Total	90	= (No. of detections inside own EEZ – Daylight) + (No. of detections inside own EEZ – Darkness)
Detections confirmed / observed as mineral oil spills –daylight	12	Of the “No. of detections inside own EEZ – Daylight” the total number of those detections observed as mineral oil and confirmed as mineral oil
Detections confirmed / observed as mineral oil spills – Darkness	5	Of the “No. of detections inside national EEZ – Darkness” the total number of those detections observed as mineral oil and confirmed as mineral oil
Detections confirmed / observed as mineral oil spills – Total	17	= (Detections confirmed / observed as mineral oil spills – Daylight) + (Detections confirmed / observed as mineral oil spills – Darkness)
No. of polluters (mineral oil) – Rigs	2	The number of offshore installations positively identified as the source of the oil detection
No. of polluters (mineral oil) – Ships	2	The number of ships positively identified as the source of the oil detection
No. of polluters (mineral oil) – Other	90	The number of oil detections which do not fit into either the “Rigs” or “Ships” category
No. of polluters (mineral oil) – Unknown	86	The number of oil detections which could not be associated with a source
Estimated Volume (m^3)	27,36	Volume of all spills confirmed/observed as mineral oil as calculated using the Bonn Agreement Oil Appearance Code using the lower figure (BAOAC minimum) – presented as a decimal value using a comma as a decimal separator
Detections confirmed/observed as other substances (‘OS’)	3	The number of detections observed as other substances or confirmed as other substances (‘OS’) – independent of the time of day the detection was made
No. of polluters (other substances) – Rigs	2	The number of offshore installations positively identified as the source of the OS detection

No. of polluters (other substances) – Ships	2	The number of ships positively identified as the source of the OS detection
No. of polluters (other substances) – Other	90	The number of OS detections which do not fit into either the "Rigs" or "Ships" category
No. of polluters (other substances) – Unknown	86	The number of OS detections which could not be associated with a source
Unknown ('UNK') detections	70	The number of detections that could not be visually verified as mineral oil or other substances ('unknowns' or 'UNK') (((No. of UNK detections inside national EEZ – Total) – (Detections confirmed / observed as mineral oil spills – Total)) - Detections confirmed/observed as other substances)
No. of polluters (unknown detections) – Rigs	2	The number of offshore installations positively identified as the source of the UNK detection
No. of polluters (unknown detections) – Ships	2	The number of ships positively identified as the source of the UNK detection
No. of polluters (unknown detections) – Other	90	The number of UNK detections which do not fit into either the "Rigs" or "Ships" category
No. of polluters (unknown detections) – Unknown	86	The number of UNK detections which could not be associated with a source
Remarks	Source of rig spills identified as…	Any additional textual information to inform on particular situations

Table 2. Satellite detections

To be completed by NORWAY only (satellite data for the other Bonn Agreement countries will be taken directly from the EMSA CleanSeaNet report)

Country	Year	Detected	Confirmed mineral oil	Confirmed other substances	Confirmed unknown spills	Confirmed natural phenomena	Nothing found

Column Header	Format Example	Explanation
Country	France	Full country name the reported data applies to
Year	2013	The year that the reported data applies to
Detected	215	The number of satellite detections inside national EEZ
Confirmed mineral oil	7	The number of satellite detections confirmed as mineral oil
Confirmed other substances	3	The number of satellite detections confirmed as other substances
Confirmed unknown spills	2	The number of satellite detections which could not be visually verified
Confirmed natural phenomena	1	The number of satellite detections confirmed as natural phenomena
Nothing found	202	The number of verified satellite detections where nothing could be found

Table 3. Coordinated Extended Pollution Control Operations (CEPCO)

Country	Year	No. of flight hours			No. of detections inside CEPCO area			Detections confirmed / observed as mineral oil spills			No. of polluters (mineral oil)				Estimated volume (m^3)	Detections confirmed/observed as other substances	No. of polluters (other substances)				Unknown detections	No. of polluters (unknown detections)				Remarks
		Daylight	Darkness	Total	Daylight	Darkness	Total	Daylight	Darkness	Total	Rigs	Ships	Other	Unknown			Rigs	Ships	Other	Unknown		Rigs	Ships	Other	Unknown	

Column Header	Format Example	Explanation
Country	Netherlands	Full country name the reported data applies to
Year	2013	The year that the reported data applies to
No. of flight hours – Daylight	136:24	The number of flight hours and minutes carried out in daylight - From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac – shown as a colon separated value. No decimal values
No. of flight hours – Darkness	86:23	The number of flight hours and minutes carried out in darkness - From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac – shown as a colon separated value. No decimal values
No. of flight hours – Total	222:47	= (No. of flight hours - Daylight) + (No. of flight hours – Darkness) – shown as a colon separated value. No decimal values
No. of detections inside CEPCO area - Daylight	67	The number of detections in daylight, within the predefined CEPCO area - From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac
No. of detections inside CEPCO area – Darkness	23	The number of detections in darkness, within the predefined CEPCO area - From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac
No. of detections inside CEPCO – Total	90	= (No. of detections inside CEPCO area – Daylight) + (No. of detections inside CEPCO area – Darkness) within the predefined CEPCO area
Detections confirmed / observed as mineral oil spills – Daylight	12	Of the “No. of detections inside CEPCO area – Daylight” the total number of those detections observed as mineral oil and confirmed as mineral oil
Detections confirmed / observed as mineral oil spills – Darkness	5	Of the “No. of detections inside CEPCO area– Darkness” the total number of those detections observed as mineral oil and confirmed as mineral oil
Detections confirmed / observed as mineral oil spills – Total	17	=(Detections confirmed / observed as mineral oil spills – Daylight) + (Detections confirmed / observed as mineral oil spills – Darkness)
No. of polluters (mineral oil) – Rigs	2	The number of offshore installations positively identified as the source of the oil detection
No. of polluters (mineral oil) – Ships	2	The number of ships positively identified as the source of the oil detection
No. of polluters (mineral oil) – Other	90	The number of oil detections which do not fit into either the “Rigs” or “Ships” category
No. of polluters (mineral oil) – Unknown	86	The number of oil detections which could not be associated with a source
Estimated Volume (m3)	27,36	Volume of all spills confirmed/observed as mineral oil as calculated using the Bonn Agreement Oil Appearance Code using the lower figure (BAOAC minimum) – presented as a decimal value using a comma as a decimal separator
Detections confirmed/observed as other substances (‘OS’)	3	The number of detections observed as other substances or confirmed as other substances (OS) – independent of the time of day the detection was made
No. of polluters (other substances) – Rigs	2	The number of offshore installations positively identified as the source of the OS detection
No. of polluters (other substances) – Ships	2	The number of ships positively identified as the source of the OS detection
No. of polluters (other substances) – Other	90	The number of OS detections which do not fit into either the “Rigs” or “Ships”

		category
No. of polluters (other substances) – Unknown	86	The number of OS detections which could not be associated with a source
Unknown ('UNK') detections	70	The number of detections which could not be visually verified as mineral oil or other substances ('unknowns' or 'UNK') (((No. of detections inside CEPCO area – Total) – (Detections confirmed / observed as mineral oil spills – Total)) - Detections confirmed/observed as other substances)
No. of polluters (unknown detections) – Rigs	2	The number of offshore installations positively identified as the source of the UNK detection
No. of polluters (unknown detections) – Ships	2	The number of ships positively identified as the source of the UNK detection
No. of polluters (unknown detections) – Other	90	The number of UNK detections which do not fit into either the "Rigs" or "Ships" category
No. of polluters (unknown detections) – Unknown	86	The number of UNK detections which could not be associated with a source
Remarks	Source of rig spills identified as...	Any additional textual information to inform on particular situations

Table 4. Tour d'horizon flights

Country	Year	No. of flights	No. of flight hours			No. of detections in TdH area			No. of polluters (mineral oil)				Estimated volume (m^3)	Detections confirmed/observed as other substances	No. of polluters (other substances)				Unknown detections	No. of polluters (unknown detections)				Remarks
			Daylight	Darkness	Total	Daylight	Darkness	Total	Rigs	Ships	Other	Unknown			Rigs	Ships	Other	Unknown		Rigs	Ships	Other	Unknown	

Column Header	Format Example	Explanation
Country	Netherlands	Full country name the reported data applies to
Year	2013	The year that the reported data applies to
No. of flights	Number (Int)	The number of flights carried out by all Contracting Parties combined
No. of flight hours – Daylight	136:24	The number of flight hours and minutes carried out in daylight - From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac – shown as a colon separated value. No decimal values
No. of flight hours – Darkness	86:23	The number of flight hours and minutes carried out in darkness - From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac – shown as a colon separated value. No decimal values
No. of flight hours – Total	222:47	= (No. of flight hours - Daylight) + (No. of flight hours – Darkness) – shown as a colon separated value. No decimal values
No. of detections in TdH area- Daylight	67	The number of detections in daylight, during the TdH routing - From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac
No. of detections in TdH area– Darkness	23	The number of detections in darkness, during the TdH routing - From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac
No. of detections in TdH area– Total	90	= (No. of detections during TdH routing - Daylight) + (No. of detections during TdH routing - Darkness)
Detections confirmed / observed as mineral oil spills	12	Of the "No. of detections inside own EEZ – Daylight" the total number of those

– Daylight		detections observed as mineral oil and confirmed as mineral oil
Detections confirmed / observed as mineral oil spills – Darkness	5	Of the “No. of detections inside national EEZ – Darkness” the total number of those detections observed as mineral oil and confirmed as mineral oil
Detections confirmed / observed as mineral oil spills – Total	17	= (Detections confirmed / observed as mineral oil spills – Daylight) + (Detections confirmed / observed as mineral oil spills – Darkness)
No. of polluters (mineral oil) – Rigs	2	The number of offshore installations positively identified as the source of the oil detection
No. of polluters (mineral oil) – Ships	2	The number of ships positively identified as the source of the oil detection
No. of polluters (mineral oil) – Other	90	The number of oil detections which do not fit into either the “Rigs” or “Ships” category
No. of polluters (mineral oil) – Unknown	86	The number of oil detections which could not be associated with a source
Estimated Volume (m^3)	27,36	Volume of all spills confirmed/observed as mineral oil as calculated using the Bonn Agreement Oil Appearance Code using the lower figure (BAOAC minimum) – presented as a decimal value using a comma as a decimal separator
Detections confirmed/observed as other substances (OS)	3	The number of detections observed as other substances or confirmed as other substances (OS) – independent of the time of day the detection was made
No. of polluters (other substances) – Rigs	2	The number of offshore installations positively identified as the source of the OS detection
No. of polluters (other substances) – Ships	2	The number of ships positively identified as the source of the OS detection
No. of polluters (other substances) – Other	90	The number of OS detections which do not fit into either the “Rigs” or “Ships” category
No. of polluters (other substances) – Unknown	86	The number of OS detections which could not be associated with a source
Unknown (UNK) detections	70	The number of detections which could not be visually verified as mineral oil or other substances (‘unknowns’ or ‘UNK’) (((No. of detections during TdH routing – Total) – (Detections confirmed / observed as mineral oil spills – Total)) - Detections confirmed/observed as other substances)
No. of polluters (unknown detections) – Rigs	2	The number of offshore installations positively identified as the source of the UNK detection
No. of polluters (unknown detections) – Ships	2	The number of ships positively identified as the source of the UNK detection
No. of polluters (unknown detections) – Other	90	The number of UNK detections which do not fit into either the “Rigs” or “Ships” category
No. of polluters (unknown detections) – Unknown	86	The number of UNK detections which could not be associated with a source
Remarks	Source of rig spills identified as ..	Any additional textual information to inform on particular situations

Table 5. Spill statistics

Volume category		No. of spills detected	Spill IDs
<0,1m^3	1		
<0,1-1m^3	2		
1-10 m^3	3		
10-100 m^3	4		
>100 m^3	5		

Column Header	Format	Explanation
No. of spills detected	7	The total number of detected or observed mineral oil spills, where the volume was estimated, that fit into each category
Spill IDs	UK-01, UK-02, UK-08, UK-14, UK-21, UK-22, UK-55	The Spill IDs (taken from Table 6 – Observed Spills) of all spills which have been counted towards each category

Table 6. Observed spills

Multiple slicks obviously originating from a single spill should not be reported separately but should be combined and the centre point reported as the location.

Country	Year	Spill ID	Flight Type	Date	Time	Wind speed	Wind direction	Latitude	Longitude	Length	Width	Area	Spill category	Estimated volume	Polluter	Category	Flight type	Casefile	Remarks

Column Header	Format	Explanation
Country	Belgium	Full country name the reported data applies to
Year	2013	The year that the reported data applies to
Spill ID	BE-01	An unique code which will enable each individual spill to be individually identified (*) Note: in case of a spill consisting of several slicks (multiple slicks clearly originating from 1 spill), only 1 spill ID should be added (and not x '(partial) slick' IDs). In this case, the centre point should be reported as location.
Flight Type	N	The type of flight the detection was made during: National = "N" CEPCO = "C" Super CEPCO = "S"
Date	27/03/2013	The date of the individual detection
Time	08:20	The time of the detection

Wind speed	2	The wind speed in m/s at the time of the detection
Wind direction	210	The wind direction in degrees at the time of the detection
Latitude	51,3683	The latitude of the detection in decimal degrees, using WGS84 - See also Note under 'Spill ID' above for spill consisting of several slicks (*)
Longitude	2,6733	The longitude of the detection in decimal degrees, using WGS84 - See also Note under 'Spill ID' above for spill consisting of several slicks (*)
Length	2,3	The length of the detection in kilometres
Width	0,1	The width of the detection in kilometres
Area	0,092	The area of the detection square kilometres^2
Spill category	OIL	The category the detection falls into from: "OIL", "OS", "UNKNOWN"
Estimated volume	0,01564	Volume of the detection confirmed/observed as mineral oil as calculated using the Bonn Agreement Oil Appearance Code using the lower figure (BAOAC minimum) in m^3
Polluter	Other	Enter "rig", "ship", "other" or "unknown"
Category	1	The category (1, 2, 3, 4 or 5) that the detection falls into: $<0,1m^3$ = "1" $<0,1-1m^3$ = "2" 1-10 m^3 = "3" 10-100 m^3 = "4" >100 m3 = "5"
Casefile	BE-0008	The name of the casefile the detection refers to
Remarks	Case pending	Any additional information to inform on particular situations

Table 7. Observed TdH Spills

Each country should report all observations from their Tour d'Horizon mission directly to the Bonn Agreement Secretariat, regardless of the location of the spills, at the same time as reporting their other surveillance data.

Country	Year	Flight Type	Date	Time	Latitude	Longitude	CP Area	Area Cov	Daylight or Darkness?	Detection ID	If Oil: Min Volume	If Oil: Max Volume	Polluter Type	Polluter ID	Is detection a verification of (CSN) Sat alert?	In flight Report?	Post Flight Fax sent?	Post Flight email sent?	Reporting made to?	Remarks

Column Header	Format	Explanation
Country	Belgium	Full country name the reported data applies to
Year	2013	The year that the reported data applies to
Flight Type	TDH	The type of flight the detection was made during: TDH =Tour D'Horizon
Date	27/03/2013	The date of the individual detection
Time	08:20	The time of the detection
Latitude	51,3683	The latitude of the detection in decimal degrees, using WGS84
Longitude	2,6733	The longitude of the detection in decimal degrees, using WGS84

CP Area	Belgium	The Contracting pater EEZ in which the detection was made
Area covered	0,092	The area of the detection in square kilometres[2]
Daylight or Darkness	Daylight	Detection in Daylight or darkness
Detection ID	Oil	The category the detection falls into from: “OIL”, “OS”, “UNKNOWN”
If Oil: Min Volume	0.073	Minimum spill volume in square kilometres
If Oil: Max Volume	0.03	Maximum spill volume in square kilometres
Polluter type	RIG	Type of Polluter either “RIG”, “SHIP” or “UNKNOWN”
Polluter Id	Platform Alpha	The name of the Rig or Ship if identifiable
Is detection a verification of (CSN) Sat alert?	Y	Is detection a verification of (CSN) Sat alert Y or N
In Flight Report	Y	Has an in Flight Report been undertaken Y or N
Post flight Fax sent	N	Has a post flight fax report been sent Y or N
Post flight Email sent	Y	Has a post flight email report been sent Y or N
Reporting made to	National Contact Point	Who has the post flight report been sent to: national focal point or other?
Remarks	Case pending	Any additional information to inform on particular situations

Table 8. TdH Flight Routing

Date	Flight Number	Waypoint Code (Incl. Airports)	Position (only if waypoint not in Aerial Operations Handbook)

Column Header	Format	Explanation
Date	27/03/2013	The date of the start of the flight
Flight Number	NL: 1046, BE: 13046, UK: Endurance 446, Etc.	The number of the TdH Flight
Way Point Code (Including Airports)	T10, T11, T12, EGNT	The Waypoint codes for the flight taken from the Aerial Operations Handbook including Airports
Position	N XX0 XX,XX' E/W XXX0 XX,XX'	The position of the flight route (only if different from the waypoints in the Aerial Operations Handbook)

Bonn Agreement
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PART 2:

REMOTE SENSING AND OPERATIONAL GUIDELINES

1 Remote Sensing

1.1 *Introduction*

Remote sensing in general is the detection and identification of phenomena at a distance from the object of interest using the human capabilities or special sensors. Modern remote sensing instruments are normally based on optical, electronic or, sometimes, chemical techniques. During the last decades, considerable steps forward have been achieved in the development of new sensors but also in the improvement of existing sensors and their application. This is applicable to aircraft but also to satellites and even on board surface vessels.

1.2 *Sensors – General Requirements*

To be of use in dealing with (oil) pollution incidents, remote sensing instruments have to provide the capability to a clear and unambiguous indication of the pollution on sea surface from a reasonable distance under normal conditions. In addition it is desirable to have means to identify the type of pollution and the source the pollution originates from as well as means for estimating the volume. In this respect it is mentioned here that for estimations of oil pollution the observers in Bonn Agreement member states also make use of the Bonn Agreement Oil Appearance Code and for reporting the outcomes of the observation the Bonn standard formats are used as agreed in the BA-OTSOPA working group.

For airborne application, the equipment should fit into the selected type of aircraft being compatible with the aircraft power supplies. It is recommended that all sensors are integrated into one operating system and signals are real-time presented on a display as well as recorded on tape or disc, including data annotation. The recorded data can thus be analysed in a ground processing station if required and easily made available to external organisations e.g. other Contracting Parties.

Sensors fall into broad categories according to their mode of operation. Active sensors emit a signal, and measure some feature of the interaction of the signal and the target – usually by analysing the return echo. *Radar Systems and Laser Fluorimetry* are examples of active sensors used for pollution detection. Passive sensors do not emit a signal, but rely instead on emissions from the target – usually the reflection or transmission of ambient electromagnetic radiation. *Ultra Violet and Infrared* line scanners as well as passive *microwave radiometers* are examples of these types of sensors.

In general, active scanners can operate at any time of day and to some extent can penetrate clouds. Passive sensors will only be functional when there is sufficient ambient radiation, and this usually means during daytime.

1.3 *Side Looking Airborne Radar (SLAR)*

The Side Looking Airborne Radar (further: SLAR) is an active sensor that measures the roughness of the sea surface. Microwaves in the region of three centimetres are transmitted in pulses and the reflection from the surface is used to build up a radar picture on both sides of the aircraft. Capillary waves on the sea surface tension resulting in a dampening of the capillary waves, will show up against the surrounding clear water.

SLAR is the most common device in use at present. Under normal conditions, between wind forces 1 up to 7 Beaufort; the system will cover an area of up to 40 kilometres on either side of the aircraft. When flying undisturbed at an altitude along a straight track the image building up will cover a total area of 80 kilometres in width although there is a gap directly under the aircraft corresponding with 1.5 times the altitude. Within the area covered the presence of, even thin layers, surface pollution can be detected, again provided that there is sufficient roughness at sea surface to detect clutter.

The spatial resolution of SLAR on the average lies around 20 metres, which means that when two objects at the same distance from the antenna should have a separation of at least 20 metres to be detected as two objects. For oil detection the polarisation of the system is Vertical and for ice detection often Horizontal polarisation is used.

The main disadvantage of the SLAR that counts for all radar systems is that it responds to any phenomena that suppress capillary waves. For example certain current patterns, ice and surface slicks associated with biological activity can all produce falls targets. Conclusively it is emphasised that though SLAR is the primary long range detection sensor the only information obtained is an indication that "something" is floating at the surface probably requiring further investigations.

1.4 Synthetic Aperture Radar (SAR)

With respect to the subject, detection of surface pollution, the Synthetic Aperture Radar (SAR) is similar to the SLAR. From a technical point a view there some important differences. Where the SLAR uses a fixed antenna length the SAR system can define the antenna length by sampling echo's over a period of time. The mechanical part of the antenna is very small. The advantage of the SAR is its improved spatial resolution that remains the same over the entire area covered. For special applications multi-polarised SAR can be delivered. Improved resolution is strongly related with the cost involved. Resolution down to one metre is possible, but at relatively high costs.

At this stage of development SAR is used in satellites and in special projects such as terrain height mapping. Operational use of SAR in aircraft with the objective to detect oil is not yet common. As developments continue and expectations of lower costs it might be worthwhile to consider a SAR, especially in those cases that multi-tasking is applicable to the surveillance system.

1.5 Ultra Violet Line Scanners or Camera (UV)

Surface pollution, especially oil, is a good reflector of the ultraviolet component of sunlight. An ultraviolet scanner or camera is a passive device detecting reflected ultraviolet with a wavelength of about 0.3 micrometres. The sensor is mounted vertically in the belly of the aircraft and can build up a continuous image of an entire slick, even the extremely thin areas, as the aircraft passes over the slick. It cannot distinguish between types of pollution or different layer thickness. The application of the sensor is limited to daylight conditions. Contrary to the opinion that a Ultraviolet (UV) sensor is not necessary because of the video-camera in the FLIR, it is emphasized that the operational wavelength of the UV goes beyond the visual light of a video-camera and will therefore "see" more than the video.

1.6 Infrared Line Scanner or Camera (IR)

The Infrared (IR) is very similar in operation to the UV and the two are very often combined in a UV-IR line scanner. The sensor detects infrared radiation with a wavelength in the band of 8-12 micrometres emitted from the oil. These layers of oil radiate more slowly than the surrounding clear sea and shows up as variations in grey levels (or in defined colours). Thicker layers (greater than about 0.5 millimetres) will absorb sunlight more rapidly than the surrounding sea and show white on the display.

The Infrared sensor provides the capability within limits to obtain information on the relative layer thickness of oil slicks on the water surface. The sensor does not penetrate the water. It is not as sensitive to oil as the UV and so comparison of the outputs from the two sensors, especially when presented real time parallel to each other on the display, will show the thicker parts of the slick. In modern systems the IR image will be put on top of the UV image and so a good picture is created of the thicker parts within the total oil slick. This information is essential when combating activities are executed, as the combating vessels should concentrate on these thicker parts. It is obvious that other temperatures-related effects, such as cooling water discharges, can mislead the IR sensor. The IR is used in both daylight and darkness however, it needs clear field of view to the surface pollution. Clouds and fog will hamper the functionality of the sensor.

1.7 Microwave Radiometer (MWR)

The passive sensor Microwave Radiometer (MWR) is rather similar to the UV/IR-LS. It detects microwave radiation with wavelengths between 0.3 and 3 centimetres. Oil appears always to be at higher temperatures than seawater in the microwave region and the temperature depends on the thickness of the oil layer. The relationship is not a simple one, but by careful selection of operating wavelengths and careful analysis of the results the system provides the capability of a relatively accurate account of the volume of oil in the slick.

A minimum layer thickness of 0.1 millimetre of oil is required to make proper use of the system. Recognising that operational discharges according to the MARPOL regulations or even much higher will not result in layer thickness over 0.1 mm.

Manufacturers may deliver a one, two or three channel MWR, each with its own pros and cons.

1.8. Forward Looking InfraRed (FLIR)

Forward Looking Infrared is similar to the IR sensor (1.6) however, it is installed in a gimbal that provides the opportunity to turn around horizontally and has a tilt and pitch function. In the gimbal one finds the gyro stabilized multi sensor imager. Medium-wave Infrared and optional sensors such as High-Definition TV, High-definition Low-light; HD Zoom sensor and Laser Rangefinder.

Most modern systems have the capability to lock on a target. The functionality with regard “detailed detection of oil” is like the scanner, and modern systems are also able to transfer IR/EO directly into a 2D map, were any objects of interest, for example IR hot will be represented in true size and orientation in the map. The IR uses the same spectrum, although the latest generation of EO/IR turret mostly uses spectrum 3 to 5 microns, instead of 8 to 12 microns.

Another advantage of the FLIR is that it can be combined with a video-camera or LLTV in the same gimbal.

The FLIR gives the possibility to stay at a distance, unlike the scanner for which the aircraft needs to pass over the slick.

1.9 Laser Fluorosensor (LFS)

This is an active sensor emitting an intense beam of coherent light, generated by a laser; to the sea surface immediately below the aircraft. The receiving apparatus is designed not to respond to the direct reflection of the beam, but to detect and to analyse the fluorescence of the pollution resulting from the laser strike. Currently laser is in operation in Germany and the producer has been improving the sensor and its capabilities.

1.10 Low Light Level Television Camera (LLLTV)

The LLLTV can be filtered to operate in the ultraviolet region and so provide an ultraviolet analogue to the thermal imager. When used in the visible region, LLLTV can provide the possibility of imaging ship’s names or other identifying features in near darkness.

1.11 Night Identification System

Detection of discharging ships during hours of darkness is possible by the applications provided by the SLAR or SAR. Identification of the ship is a necessity with respect to gathering evidence. There are a number of Night Identification Systems available using a variety of sensors, LLLTV with IR / Laser illumination for example. The main requirement is to be able to read and record the ship’s name in darkness. Pilots are to respect the national legislation and safety procedures with regard to low level operation in darkness.

1.12 Photographic Camera (PHOTO)

Conventional digital photography provides a valuable, simple and readily understood record of the scene of an incident or operational discharge. When vertically mounted in the aircraft the camera contributes to the evidence to an official statement. Oblique photography in general satisfies the public and the Courts as part of the evidence rather than the more complex imagery from the other sensors. It is recommended that cameras are an integrated part of the remote sensing system and that on the photographs data-annotation is printed. In Part 1 some brief instructions are given with regard to collecting evidence. Other information on this issue can be found in the Manual produced by the North Sea Network of Prosecutors and Investigators (NSN).

1.13 Video Camera (VC)

Much the same applies to video recordings as to photography. The advantage of video is that it provides a more instant record and of course a moving picture. After landing the crew can immediately present an overview of the situation at sea, provided required equipment is available.

1.14 Further Sensor Developments and Improvements

Sensor manufacturers presumably will continue, in some cases on request of the user, to develop new sensors or improve the existing ones. Especially with regard the difficulties encountered by the operational users, like ourselves, where it concerns the discrimination between substance discharged and capabilities to estimate volumes in near future proposals are expected.

Worth mentioning is the application of spectral imaging scanners. Remote sensing for the purpose of the detection of oil slicks, in some countries, is slowly shifting towards earth observation in the broadest sense. The objective is to make efficient use of the available means (aircraft) and also to fill gaps in the existing sensor package.

In general it is recommended to closely follow the market and study the new sensors or improvements. Digital photo cameras, improved navigation (DGPS) and others can be very useful tools for the Bonn Agreement members. In the OTSOPA agenda there is a fixed item on sensor developments.

Automatic Identification of ships suspected of violating MARPOL regulations have become available through AIS and are used in combination with the satellite SAR or the SLAR or as a separate sensor.

1.15 Sensor Systems

As stated before sensor operation can be most effective when handled through one integrated sensor system. A one-person operating system provides the capability to switch on/off the sensors and to route the data to storage and presentation. The operator selects all sensors required and depending on the data presentation needed to identify the pollution combines the data from different sensors. Navigational data obtained from the aircraft system is used as input into the operating system and superimposed on the sensor data.

Data handling, for presentation and storage, is important to be able to process the raw data in a ground processing station after landing. Storage on retractable hard disc or other externa storage units are possibilities. Images as presented on the display to the operator can also be stored for quick presentation to authorities.

In addition, as a result of data handling in a digitised form the feature is to transmit the data directly to a ground station. Some systems allow for the direct transmission of imagery from an aircraft using either fast but short-range VHF or slower but long-range HF radio. Recognising that when a ship is caught “red handed” and is bound for a port in the coastal state the advantage of a down link system can be that images or photos are directly sent to the Port State Control Authorities.

1.16 Platforms

Worldwide, most experience with remote sensing has been obtained using small fixed-wing aircraft. In the last years Unmanned Aircraft Systems (UAS) or Remotely Piloted Aircraft Systems(RPAS) have been tested as platforms for sensors. Selecting a type of aircraft for remote sensing operations depends on a list of aspects based on the objectives to be met once having the tool. At national level nowadays it is the number of tasks and required sensors or other tools that define the type of platform. Besides this a short listed here it is worth mentioning size and weight of the instruments to be installed, the area to be covered and the endurance. Selection of the sensor package also depends on the tasks to be fulfilled. Search-and-Rescue normally requires a homing device; border patrol may be difficult without a 360 degree radar. The standard package for pollution patrol flights consists of SLAR, UV/IR–LS, photo-cameras and can be extended with a MWR and/or LSF. If operations during darkness are an option an Identification camera is useful.

A number of different types of aircraft are in use by the Bonn Agreement Parties and can be visited during CEPCOs and Bonn Agreement exercises.

Stabilized systems for vessels is commercial available, but the systems has a limited range due to the sensors’ limited height over sea level. It is still proven to be a good supplement to other sensor when vessel is in recovery/dispersant operation. The sensors her are mainly for supporting combating of oil already found, and not for discovering oil spills.

Developments continue and should be followed. It is recognized that keeping an aircraft in an area for a long period of time is costly and if other means are available at low costs this advisable.

In the event of an actual combat operation captive balloons, lifted from a vessels deck, are useful tools. Mounted on a platform hanging under the balloon or directly connected to the balloon, video cameras and preferably an IR-camera provides details on the oil slick to be combated directly to the master of the vessel. The imagery assists the master to manoeuvre his ship towards and into the oil slick (thicker parts).

1.17 Satellites

The detection of oil and other harmful substance discharges by means of remote sensing systems in aircraft has been described in previous paragraphs. However, since the middle of the nineties the application of satellite SAR has become an asset that regularly provides imagery of a vast sea area. For further information on details the author refers to EMSA Clean Sea Net and the publications on this. Satellite imagery is an integral part of national surveillance.

The synthetic aperture radar (SAR) on board the satellites, as installed in the Envisat and the Radarsat, proved in various international test programmes to be able to detect water surface phenomena even as small as 200 m^2, from an altitude of 900 km. The Low Resolution SAR images (100 metre) are considered to be comparable to SLAR with regard to detectability.

Although the satellite SAR does not discriminate the type of pollution it provides an indication of a possible pollution as well as a clear indication of the location and the dimensions. It is reiterated that the satellite cannot (yet) identify the pollution nor the possible polluter and in that respect has the same qualification as the airborne SLAR or SAR. The detected spot has to be verified, best by aircrew. Other disadvantages compared to airborne surveillance are the inflexibility of the system as a result of fixed orbit and the repeating cycle. AIS information in combination will provide details on the suspected vessel connected to the detected phenomenon.

On the other hand, satellite recordings are independent of weather conditions that are limiting aircraft (like fog or freezing rain). Also the width of the radar coverage path is an advantage.

Satellite data, if received in near real time (within 30 minutes after the satellite pass), is useful as an early warning system in case of compatible spills. The use of near real-time satellite data requires a user community with the capability to verify possible surface pollution (oil slicks) by an aircraft. The combined use of satellite and aerial surveillance may provide a cost-effective solution for countries with certain geographical and climatologically conditions.

It is emphasised that satellite SAR can easily provide an overview on possible floating pollution of relatively large sea areas. An early warning system requires follow-up by airborne surveillance for at least the human eye to verify the detected slick. In many studies a general conclusion is that satellite SAR contributes valuable information but will not replace aerial surveillance.

1.18 Major Pollution Incidents

When dealing with an oil spillage, the initial function of the remote sensing aircraft will be to build up a picture of the extent of the pollution, and to identify the areas of most concern. The aircraft should run across the affected area using SLAR/SAR at an altitude that provides the best overall image of the slick(s). It is recommended to fly a pattern that takes SLAR detections from all four sides of a slick.

The preliminary investigation can then be supplemented by scanning the larger or more threatening parts of the slick(s) using close range sensors, such as infrared, ultraviolet, microwave radiometry and laser. Photographs or video should be taken whenever possible, including some of the casualty causing the pollution. Monitoring the spreading and weathering of the slicks should be continued at regular intervals.

An additional role for the remote sensing aircraft, in some countries is to direct and guide recovery vessels or spraying aircraft. This will require extended periods in the area identifying relatively thicker parts or more threatening patches of oil.

It is particularly important during an incident that the crew of the reconnaissance aircraft reports to the control centre at regular intervals, both to relay the current situation and to check for a change in instructions – the first stages of an incident are always particularly fluid. Regular returns to base will be necessary to provide the hard-copy imagery for the on-scene and overall commanders, unless direct down-link facilities are available to transmit imagery from the aircraft to surface vessels and offices.

1.19 Routine Patrols

The primary objective in routine patrolling is to detect combatable oil slicks in an early stage, and to encounter ships and platforms in the act of discharging oil illegally, and to gather sufficient evidence for a prosecution. Contracting Parties have agreed a co-operative approach to aerial surveillance.

Planning of the pattern of surveillance is important. Baseline information from earlier surveillance or form ad-hoc observations will indicate those areas in which most effort should be concentrated. Statistical techniques can be used to relate surveillance intensity to the probability of intercepting an illegal discharge – this will indicate the level of effort necessary and allow conclusions to be drawn about the incidence of MARPOL contravention.

During a mission the crew will maintain the STANDARD REPORTING LOG, noting all relevant information on mystery slicks and actual polluters observed. A separate form will be used for reporting polluting vessels according IMO regulations. Both formats may be revised or updated in the OTSOPA working group in close cooperation with HELCOM.

Possible offenders should be imaged and photographed. It is important that the photographs and the imagery show that the vessel is the only possible source of the oil. The vessel’s name should be photographed, if possible in a way that identifies it unambiguously as the offender, and recorded in the log. Nowadays the IMO number of the vessel is often found on the ships poop where also the name and the port of registration are found.

Communication should be established to invite the person on the bridge to provide information on last port of call and destination as well as to explain the discharge observed.

On return to base, if not directly from the air, the evidence form the offence should be treated, as evidence to court and all precautions required by the law of the land should be applied in securing it and transferring it to the competent authorities. Of each routine mission the logs should be taken for interpretation and statistical analysis and the results recorded in a database for use in periodic reports and future planning.

2 Tour de Horizon

2.1 Introduction

The Bonn Agreement Contracting Parties have adopted a plan for all coastal states to conduct 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. These surveillance flights are entitled ‘Tour de Horizon Flights’.

The programme for Tour de Horizon flights is prepared by lead country and discussed during the annual Working Group on Operational, Technical and Scientific Questions concerning Counter Pollution Activities (OTSOPA) meeting.

2.2 Tour de Horizon Flight Planning

The country conducting the Tour de Horizon flights is to pass the ‘Tour’ plan to the responsible authorities of the other countries national focal point by PRIORITY message, ideally one month before the planned Tour, and at the latest one week preceding the first flight to avoid any possibility of the flight confliction with a ‘national’ flight. The message is to be treated as confidential until the ‘Tour’ has been completed. The ‘Tour’ Plan should include date(s), times, routing, refuelling and overnight stops. Routing should be described using the Tour de Horizon Routing Points at Annex A.

The flights are to be planned and conducted so that other countries’ territories are not infringed, unless permission has been granted.

2.3 Tour de Horizon Routing Points

The Tour de Horizon routing points are mainly based on the geographic locations of fixed offshore installations, offset for safety reasons. Some points along shipping routes have also been included. It is not practicable to include mobile and exploratory installations; the positions of these rigs may be obtained from national authorities or focal point, energy or helicopter support authorities. The routing points, all prefixed ‘T’, are at Annex A. Both in 2014 and 2015 the Tour points have been updated and checked in operational flights. It is up to any aircrew planning a Tour to prepare a routing taking as large coverage as possible however, it was recognized by OTSOPA that there are large gaps between offshore areas. Therefore one could split up the Tour de Horizon in three sea areas.

2.4 Tour de Horizon Weather Criteria

A Tour de Horizon flight is to be performed under suitable weather conditions as determined by the national authority under taking the ‘Tour’.

2.5 Tour de Horizon Flight Conduct

Tour de Horizon flights are to be conducted in accordance with normal civil aviation regulations. It is recommended that the regulations for operating in the North Sea should be thoroughly checked before commencing the ‘Tour’.

2.6 Detection Investigation

All detections should be treated in the same way regardless of whether they are considered legal or illegal, from whatever the source, known or unknown. Every detection should be investigated and the fullest data set possible collected and recorded using the available remote sensing and photographic equipment.

Details of Discharges from Offshore Installations are at Part 3, Chapter 11, Annex B.

2.7 Detection and observation Reporting

Because of the known problems in linking detections of oil from offshore installations with a breach in the OSPAR recommendation, all detections should be reported so an investigation can be initiated.

In order to initiate an effective investigation, the flight crews should ensure that, as quickly as possible, any detection associated with, or near, an offshore installation is reported to the national pollution control agency under whose jurisdiction the installation operates according to the relevant national rules and regulations or as follows:

- Observations estimated to contain over *$1m^3$* of oil must be reported in flight and at the earliest opportunity. Aircrew should send reports directly to the appropriate reporting agency for prompt relay to the appropriate national authority for pollution control
- All detections associated with, or near, offshore installations must be reported as soon as possible after landing to the national reporting agency for prompt relay to the national authority for pollution control. Observations over $1m^3$ should be reported by telephone and all detections by e-mail or fax.
- All detections associated with, or near, offshore installations should be reported to the installation so that, should it be appropriate, corrective actions can be taken.

On receiving reports, the national pollution control agency under whose jurisdiction the installation operates should then seek from the operator of the offshore installation a report on what discharge operations have been conducted in the 12 hours immediately before the observation. This report should detail the type(s) of discharge, the concentration of oil in those discharges or where appropriate the total volume of oil discharged. On the basis of the information received from the Tour de Horizon and the operator, the national pollution control agencies will take action if appropriate.

In addition to this the Bonn Agreement concluded on a new set of recommendations in 2015 to improve communication between flight crews and national pollution authorities, as follows:

1. Aircrew should systematically contact the appropriate National Focal Point (NFP) by phone for each detection, if possible already in-flight, and as soon as a written report is available send this report with photos and/or sensor images attached, preferably by email, to that coastal station with a request to acknowledge receipt.

2. It is recommended to add the competent authorities as additional recipients to the email (or fax) with the written report.

3. It is also recommended to work with a TdH liaising officer or centre for detection reporting: Since aircrew have regularly reported problems with establishing contact with NFPs during their TdH operations, the detection reporting by aircrew could be facilitated by means of a liaising officer or centre within the country performing the TdH mission, who could then establish the necessary contacts with and forward flight reports to the affected coastal State.

4. In general, aircrew should keep closer contact with NFPs throughout the TdH mission, not only for the purpose of detection reporting, but also for changes in planning or for CSN alert verification efforts/possibilities.

2.8 Detection Data Security

The flight crews should make secure all data relating to detections (including photographic and any other available evidence) and, on request, release them to the appropriate national authority for pollution control under whose jurisdiction the detection was made in the case of requiring the information as evidence.

2.9 National Tour de Horizon Reports

The detailed National Tour de Horizon Report should be sent to the lead nation within one month of the completion of the 'Tour'. Action on individual sightings should already have been taken by authorities based on the immediate reports from crews as above. These monthly reports however can be used by authorities to make a broader assessment on compliance and the effectiveness of discharge controls.

2.10 National Stations / Centres within the Tour de Horizon Area

Details of The National Stations / Centres within the Tour de Horizon Area for 'In Flight' Detection Reporting are at Annex C.

2.11 National Focal Points within the Tour de horizon Area

Details of The National Focal Points within the Tour de Horizon Area for 'Post Flight' Detection Reporting are at Annex D.

2.12 The 4 main Steps of the standard procedure for CSN support:

Step 1: To send an email with TdH flight plan directly to EMSA at least 1 month[1] prior to TdH

As a first step to obtain CSN support, a national TdH-POC (acting on behalf of the flight crew) should send a TdH flight plan to EMSA at least 1 month prior to the TdH start. This request email should at least contain:

- Planned operational dates (period) and time slots (AM/PM) for each planned TdH flight track.
- A schematic overview of the planned TdH route clearly identifying the airports and the overflown TdH waypoints. The format of the flight plan should be:
    - One kml file[2] per flight track, with the approx. flight start & end time;
    - An illustration of the whole TdH operation (also preferably in kml file format).

This CSN support request email should be sent to:

- EMSA's Maritime Support Services (MaritimeSupportServices@emsa.europa.eu) and,
- In copy, to EMSA's Earth Observation Services (EarthObservationServices@emsa.europa.eu).

The Subject of the email should be: 'REQUEST FOR TOP UP IMAGES FOR OPERATION ON <TIME INTERVAL>' (flag the email as important).

Note**:** If a country (TdH-POC) wants to get some pre-information on satellite passes in support of the preparation of a TdH flight plan, it can send an info request to EMSA around 6 weeks before operations. This email should contain an area (again preferably in kml file format) and the planned TdH operational dates. EMSA can then send back the times of the available satellite passes that intersect the area during the planned TdH flight days.

Step 2: SAT image planning process

- When receiving a CSN support request from a country (TdH-POC), EMSA will evaluate the satellite image 'top-up' possibilities and create one kml file per possible top-up SAT image. EMSA then provides a top-up SAT imagery list to the TdH-POC for approval, accompanied by a set of kml files including top-up SAT images, and (if available) the already ordered routine SAT images;

- When receiving the SAT imagery list from EMSA, the TdH-POC evaluates and approves or rejects the top-up SAT images proposed by EMSA, and reports back to EMSA;

- After having received the list of approved top-up SAT images, EMSA will complete the ordering process and will inform the TdH-POC on the final SAT image acquisition list (list of scene ID's).

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1 The sooner EMSA is informed, the higher the probability that EMSA planning can be adapted to top up the operation.

2 A kml file can be rapidly created within a Google Earth user interface. The great advantage of using a kml file format in the SAT imagery planning process, is that it can immediately display the TdH track/route or SAT image contours on a map in Google Earth or GIS. Transforming TdH flight info into a kml file format should not be a problem since it is very easy for Google Earth/GIS users. Moreover, most CPs already use Google Earth or GIS for their national annual TdH reports.

Step 3: Activation and de-activation of the Communication Matrix in CSNv2 during a TdH

- At least *one week* prior to a TdH operation, the appointed 'BA Operational Representative' of the country performing a TdH, updates the list of registered users in the 'BA' Communication Matrix within CSNv2 (= personnel who should gain access to CSN detection alerts during a TdH).
- At least *a few hours* before a TdH starts, the national 'BA Operational Representative' activates the operational users in the 'BA' Communication Matrix within CSNv2 (email and voice/tel.nr.) to ensure that these users (of flight crew; national liaison officer/centre; ...) will get all CSN detection alerts generated by a SAT image in time during the TdH mission.
- After the last TdH flight, the national 'BA Operational Representative' should always de-activate the operational users within the 'BA' Communication Matrix in CSNv2.

Step 4: Feedback

In return for the CSN support, EMSA requests that each country (flight crew or other staff involved):

- Provides as much feedback as possible using the CSN feedback module of the EO-DC during or shortly after a TdH mission;
- Shares with EMSA the national TdH report sent to other BA CPs;
- If not added in the national TdH report, to provide EMSA with all relevant CSN support comments, lessons learnt and results of the CSN support, to improve the service in the future.

2.12 Annex 1

Regional 'BA' configuration in CSN version 2 – (Extracts from BONN 11/3/4-E)

Fig.1: Illustrative GIS map of North Sea with **TdH 'default' alert area**.

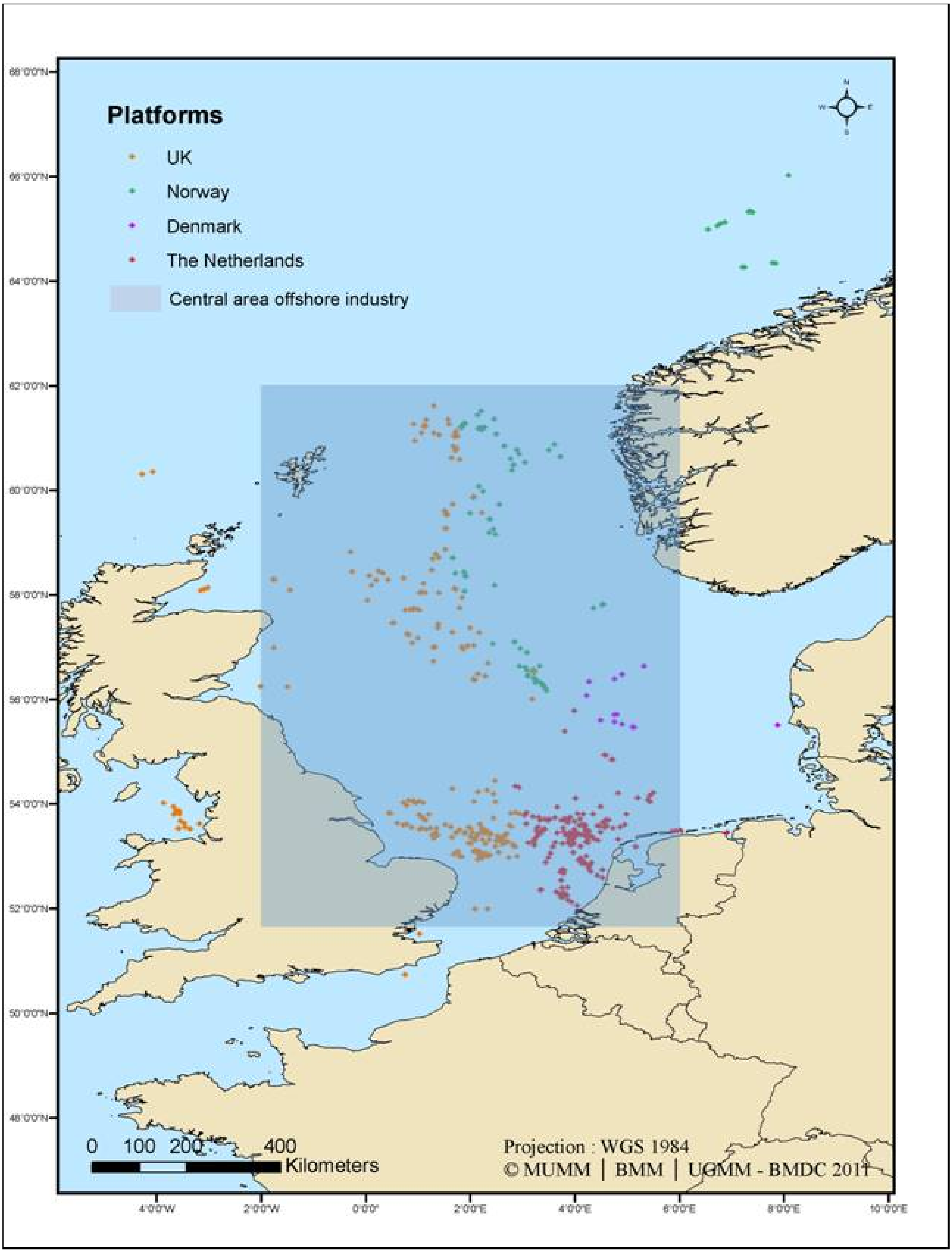


Fig.2: **'Regional Alert Matrix'** for CSN support to TdH, in line with the CSNv2 alert rules.

Culprit	Impact	Likelihood	Alert level
High	***High***	***A***	RED ALERT
High	***High***	***B***	
High	*Medium**	*A*	
High	*Medium**	*B*	
High	***Low***	***A***	
High	***Low***	***B***	
*Medium**	*High*	*A*	
*Medium**	*High*	*B*	
Low	***High***	***A***	
Low	***High***	***B***	
Low	*Medium**	*A*	YELLOW ALERT
*Medium**	*Medium**	*A*	
*Medium**	*Low*	*A*	
Low	***Low***	***A***	
*Medium**	*Medium**	*B*	GREEN ALERT
*Medium**	*Low*	*B*	
Low	*Medium**	*B*	
Low	***Low***	***B***	

- **RED ALERT: If Impact and/or Culprit alert level is HIGH, regardless of likelihood (A/B)**

  - High Culprit alert level defined as:
    - Platform vessel/connect to spill, or
    - Platform(s) in close vicinity of spill (within 5km radius), or
    - Vessel track aligned with spill (shape)

  - High Impact alert level defined as: Polluted surface area of more than 2 km²

- [*'Medium' Impact and Culprit alert level: no alert rules defined]* *
- **YELLOW ALERT: If Impact and Culprit alert level is LOW, and likelihood HIGH (A)**
- **GREEN ALERT: If Impact and Culprit alert level is LOW, and likelihood LOW (B)**

  - Low Culprit alert level: means that no culprit can be linked to spill (no culprit as defined above)

  - Low Impact alert level: defined as polluted surface area of less than 2 km²

* *The CSNv2 Alert Matrix contains 18 different alerting lines based on high, medium and low alert rules for the alert generation factors 'Culprit', 'Impact' and 'Likelihood'. To activate an Alert Matrix for use under CSNv2, all these lines have to be completed. However, since in the suggested Alert Matrix for support to BA (TdH) operations no 'medium' alert rules are defined for Culprit*

or Impact, all the 'medium alert' lines for Culprit and/or Impact are purely artificial and can therefore be considered as 'fictive' Alerts.

Table 1: Standard **set of 'regional Print Parameters'** for CSN support to TdH missions.

Position of detection	Including a schematic map with detections plotted, and an indication of the affected coastal State in which waters a spill was detected (country indication).
Detection Class (A/B)	Giving information on the reliability of a detection (A: high; B: low)
Culprit info	- platform or vessel connected to a detection - platform(s) in close vicinity of spill - vessel track aligned with spill - AIS data on possible suspect(s) - information on platform/traffic density
Impact info	Polluted surface area and distance to shore
Met-Ocean data	Current, sea state, wave height, wind speed/direction.

2.12 Annex 2

List of National 'TdH-POCs' and 'BA Operational Representatives'

(to be completed for activation of new procedure)

BA CP	**TdH-POC** (To liaise with EMSA for SAT image planning process)	**'BA Operational Representative'** (to be activated in 'BA' configuration within CSNv2, with aim to update 'regional Communication Matrix' prior to TdH)
Belgium	Service: **MUMM (Belgian Science Policy)** Gulledelle 100 1200 Brussels Belgium Contact persons: **Ward Van Roy** Tel. 02-773.21.39 Email: w.vanroy@naturalsciences.be Or **Kobe Scheldeman** Tel. 02-773.21.47 Email: k.scheldeman@naturalsciences.be	**Ward Van Roy** SURV Planning Officer MUMM (Belgian Science Policy) Gulledelle 100 1200 Brussels Belgium Tel. 02-773.21.39 Email: w.vanroy@naturalsciences.be
Denmark	Service: Contact persons: *(optional)*	*(person to be identified)*
Germany	Service:	*(person to be identified)*

	Contact persons: *(optional)*	
Netherlands	Service: Contact persons: *(optional)*	*(person to be identified)*

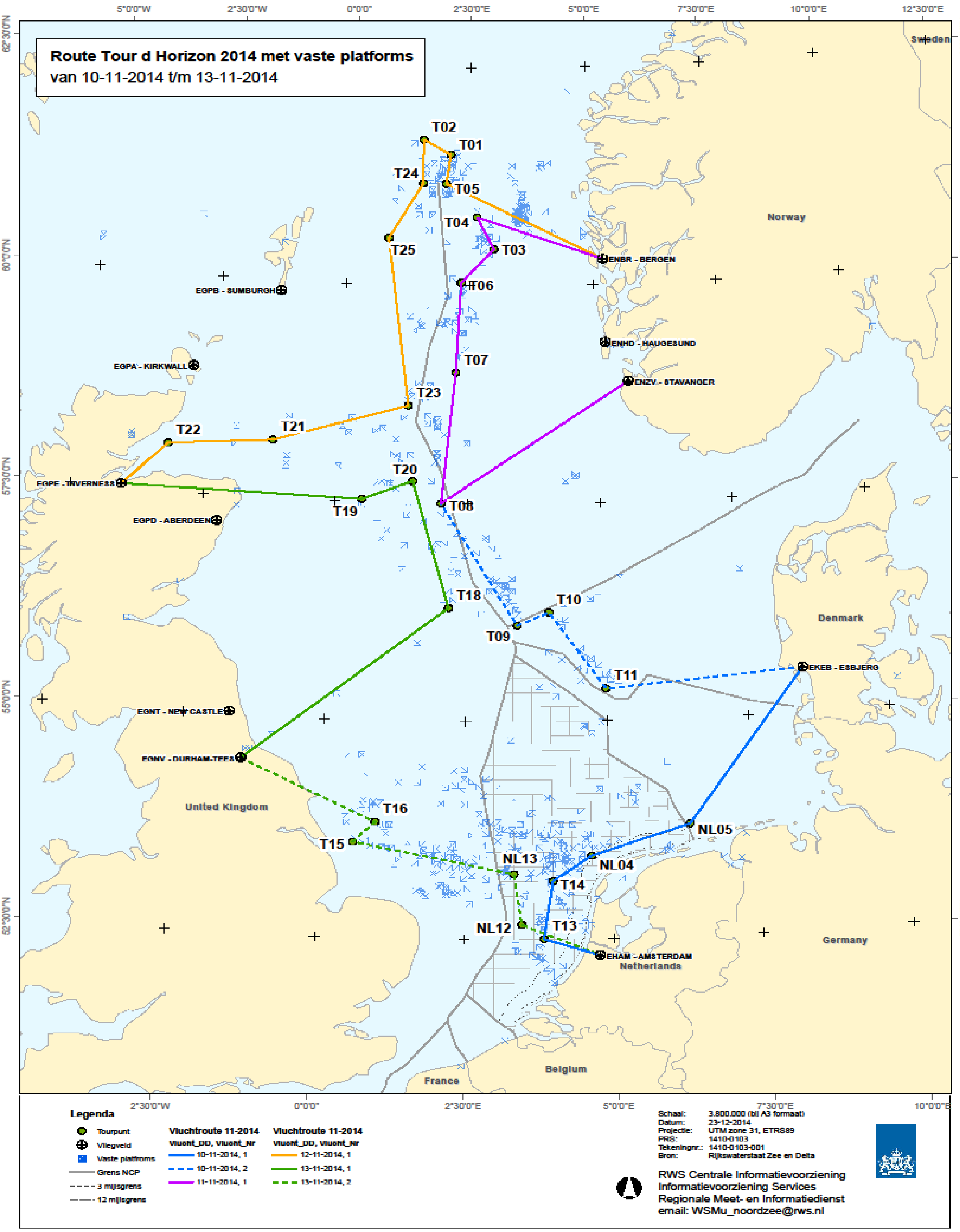
Norway	Service: Contact persons: *(optional)*	*(person to be identified)*
Sweden	Service: Contact persons: *(optional)*	*(person to be identified)*
United Kingdom	Service: Contact persons: *(optional)*	*(person to be identified)*

ANNEX A

TOUR DE HORIZON ROUTING POINTS AND CHART

Nr	Latitude	Longitude
T1	61°30’ N	02°.05’ E
T2	61°40’ N	01°.30’ E
T3	60°.25’ N	03°.00’ E
T4	60°.47’ N	02°.39’ E
T5	61°10’ N	02°.00’ E
T6	60°.02’ N	02°.20’ E
T7	59°.00’ N	02°.15’ E
T8	57°.30’ N	02°.00’ E
T9	56°.06’ N	03°.25’ E
T10	56°.15’ N	04°.00’ E
T11	55°.22’ N	05°.00’ E
T12	52°.05’ N	03°.29’ E
T13	52°.30’ N	03°.50’ E
T14	53°.10’ N	04°.00’ E
T15	53°.36’ N	00°.35’ E
T16	53°.50’ N	00°.57’ E
T17	54°.08’ N	01°.35’ E
T18	56°.18’ N	02°.10’ E
T19	57°.32’ N	00°30’ E
T20	57°.45’ N	01°.27’ E
T21	58°.10’ N	01°15’ W
T22	58°.03’ N	03°.15’E
T23	58°.37’ N	01°.20’ E
T24	61°.10’ N	01°.31’ E
T25	60°.32 N	00°.50’ E

TOUR DE HORIZON ROUTING POINTS CHART
and a possible routing



ANNEX B

AIR TRAFFIC PROCEDURES FOR OPERATIONS WITHIN THE UK OFFSHORE AREA – 2004

Within the UK area of the North Sea, a Radar Advisory, Flight Information and Alerting Service is available from Air Traffic Service Units (ATSU) to enhance flight safety and expedite Search and Rescue. Pilots flying within the UK Offshore Area should establish and maintain contact with the appropriate ATSU. The specific ATSUs are the Radar and Approach services of Anglia, Aberdeen, Sumburgh, and Brent.

The UK Offshore Area is further divided into nine Offshore RTF (Radio Telephony) areas; each area has a traffic frequency, which is used for calls between aircraft and rigs in that area. There is no air traffic controller on the frequency, but there will normally be a response from the rig nominated to give traffic information in the area. Pilots should broadcast their positions and routing, talk to other aircraft to avoid conflicts as necessary, and talk to the individual rigs to give ETAs and other information. Normally a pilot will listen on the ATSU frequency on one box, and on the Offshore RTF frequency on the other. A typical call might be: " Piper Traffic, Atlantic 406, five miles North of the Buchan, northbound at 3000 feet ".

Each platform also has a Helicopter Protected Zone (HPZ). HPZs are established to safeguard helicopters approaching and departing platforms. HPZs consist chiefly of the airspace from sea level to 2000 feet altitude, contained within 1.5 nm radius around each individual platform helideck, and are effectively Aerodrome Traffic Zones. Each rig has an individual logistics (LOG) frequency, which a pilot is required to use when intending to enter the HPZ, if contact has not already been made with the rig in question on the Offshore RTF frequency. Details of the UK Installations can be obtained from the UK Focal Point (Aberdeen MRCC).

To summarise the normal radio procedure is as follows: When entering the North Sea area, pilots will normally be in contact with the appropriate **ATSU**. On entering any of the Offshore RTF areas, a call should be made on the appropriate **Offshore RTF** frequency; and before entering a specific HPZ; contact must be made with the appropriate rig on either the **Offshore RTF** frequency, or the individual **LOG** frequency.

When a pollution detection is made, the surveillance crew should establish contact with the suspected polluting installation using the LOG frequency and request permission to enter the HPZ to investigate the detection. [If no immediate response is obtained on the LOG frequency, the operator may be away from the radio briefly, and a call on the Offshore RTF frequency will normally get someone to answer.]

After completing the investigation the crew should pass the details of the pollution to the rig and request information on any possible cause. The crew should also inform the rig when departing the area.

It is recommended to contact Shetland MRCC when flying north of 59° N.

ANNEX C

NATIONAL STATIONS / CENTRES WITHIN THE TOUR DE HORIZON AREA FOR 'IN FLIGHT' DETECTION REPORTING

Belgium: **Maritime Information Crosspoint**
Maritime VHF: Channel 27; **Call Sign: Ostend Radio**
(ask for operator of Ostend radio to connect with MIK

Denmark: Maritime VHF: Channel 16 (for establishing contact then to a working channel)
HF coordination telephone number: +45 72850450 (0381)
Call Sign: Joint Rescue Co-ordination Centre Aarhus (JRCC)
Via Lyngby Radio

Germany: Maritime VHF channel 16 for call
Callsign: GERMAN MARITIME EMERGENCY COMMAND
Airborne VHF 135.225 MHz
Callsign: HAVARIEKOMMANDO CUXHAVEN

Netherlands: **Netherlands Coastguard**
Maritime VHF: Channel 16 or 73
Airborne VHF: 123.1 MHz
HF: 6550 KHz or 5438 KHz
Call Sign: NETHERLANDS COASTGUARD CENTRE

Norway: Maritime VHF: Channel 16
Call Sign: RADIO
Rogaland Radio // Tjoeme Radio //
Floroe Radio

United Kingdom: **HM Coastguard**
Maritime VHF: Channel 16
Airborne VHF: 132.65 MHz (on request)
Call Sign: **SHETLAND COASTGUARD (Shetland Basin)**
ABERDEEN COASTGUARD (Northern North Sea)
HUMBER COASTGUARD (Central North Sea)
YARMOUTH COASTGUARD (Southern North Sea)
DOVER COASTGUARD (Dover Strait)

ANNEX D

NATIONAL FOCAL POINTS WITHIN THE TOUR DE HORIZON AREA FOR 'POST FLIGHT' DETECTION REPORTING

Belgium: **Maritime Information Crosspoint (MIK)**

Tel: + 32 (0) 50 55 83 24 or – 83 34

Fax: + 32 (0) 50 55 83 19
e-mail: mik@mil.be

Denmark: **Joint Rescue Coordination Centre Denmark (JRCC Denmark)**

Maritime Assistance Service

Tel: +45 72 85 03 71

Fax: +45 72 85 03 84

Email: mas@sok.dk

Germany: **MLZ Cuxhaven**

Tel: + 49 (0) 4721 567 485

Fax: + 49 (0) 4721 554 744 / 45

Email: MLZ@havariekommando.de

Netherlands: **Netherlands Coast Guard Den Helder**

Tel: + 31 (0) 223 542 300

Fax: + 31 (0) 223 658 358

E-mail: ccc@kustwacht.nl

Norway: **Norwegian Coastal Administration**

Tel: + 47 33 03 4800

Fax: + 47 33 03 4949

E-mail: vakt@kystverket.no

United Kingdom: **Aberdeen Maritime Rescue Co-ordination Centre (MRCC)**

Tel: + 44 (0) 1224 59 23 34

Fax: + 44 (0) 1224 57 59 20

3 Co-ordinated Extended Pollution Control Operation (CEPCO)

This chapter is especially subject for discussions in both Bonn Agreement and HELCOM Response for the reason that some Contracting Parties are party to both Regional Agreements. It has been decided that there is only one Super-Cepco annually in either Region.

3.1 Introduction

A CEPCO is a continuous sequence of aerial surveillance flights normally over a 24 hour period. 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.The duration of the programme may be extended up to 10 days in which case the name is SUPER-CEPCO. Based on the experiences gained in Super-Cepco's organizers concluded that a maximum of 6 days is more feasible.

3.2 CEPCO Objectives

The objectives of a CEPCO are as follows:

- To survey continuously, or as continuously as is practical, an area or route where there is a high probability of illegal discharges.
- To investigate fully all detections of oil or harmful substances.
- To identify the source and cause of the pollution.
- To report the detection, investigation and identification details to the appropriate authority for further investigative action.
- To accurately record and document the detection, investigation and identification details for possible legal action.
- To improve co-operation and understanding between Bonn Agreement countries in ways of application of aerial surveillance means; sampling of oil; initiating legal proceedings.
- To plan the operation with as much confidentiality as can be expected.

3.3 Participating Countries

For the purposes of CEPCOs, the North Sea is divided into a northern and a southern zone with a minimum of one CEPCO per year in each zone.

Norway, Sweden, Denmark and Germany belong to the northern zone, while France, Belgium, the Netherlands and the UK are parties to the southern zone. Nevertheless, the participation of a southern country in a northern CEPCO operation (or vice-versa) is possible on a voluntary basis.

If a country cannot participate with an aircraft, it should, if possible, consider the availability of a patrol boat if its own zone of responsibility is part of the CEPCO route. The host country is responsible for the detailed planning and coordination of all operations. Observers from other Contracting Parties or even from EU member states can be invited to attend the operation.

Every second year, a SUPER-CEPCO should replace the regional CEPCOs where all countries take part if possible. In consultation with HELCOM Response it has been decided that there will be a SUPER-CEPCO in either of the areas per annum.

In any year that a Bonn Agreement Exercise is scheduled, any additional CEPCO for that area should not be planned in order to encourage increased participation in the exercise.

3.4 Area of CEPCO

The CEPCO routing should normally cover an area as close as possible to the responsibility area of participating countries, preferably covering routes with dense shipping or offshore activities. The route length should be oriented on the lowest endurance time/distance of the organising country. The chosen airbase should be located close to the chosen area to avoid unnecessary approach times.

3.5 Planning and Operational Conditions of CEPCO Flights

The duration of a CEPCO Flight should be a minimum of 24 hours but may be extended to up to 36 hours. This would increase the operational flying commitment and coverage. The participants should agree the specific length of each CEPCO. An extension can be considered if justified by unforeseeable events. When planning a sequence of individual flight missions, the standard of equipment of participating planes should be taken into account. Planes without remote sensing equipment should be allocated to daylight flights. Weather limitations are determined by the national authority responsible for organising the CEPCO.

If the weather forecast does not comply with these limits, the organising country should agree with participating parties about a postponement, preferably to two days after the originally planned CEPCO date.

3.6. Satellite imagery

Under the Clean-sea-net programme in the European Maritime Safety Agency (EMSA) a centralized procurement of satellite imagery has been established. In preparation of a (SUPER) CEPCO programme the hosting country should contact EMSA to arrange for the delivery of all satellite footprints covering (part) of the area that is surveyed in the CEPCO project.

A (SUPER) CEPCO programme with integrated use of satellite coverage provides an excellent tool for a twofold approach, on one hand the early warning by satellite detection and on the other hand validation / confirmation of detections through aircraft detections and observations.

3.7 Operating Airport / Airbase

The chosen airport/airbase must have all facilities required for such an extended operation, including all necessary services for both the planes and the crews during the entire operation. It should be as close as possible to the chosen operating area.

3.8 Establishment of an Operational Command Centre (CC)

The host country must ensure the availability of a dedicated briefing room, or even establish an operational command centre, with the following tasks:

- to provide the participating planes with all information about the situation and conditions in the chosen area;
- to ascertain the co-operation between the participating ships and planes;
- to assist in coordinating actions by participating ships;
- to gather all evidence on and prosecute illegal discharges.

The host country should also be prepared to integrate into the command centre liaison officers from participating countries, if so wished. A communication line between the CC and the concerned authorities of the participating countries must be ensured.

3.9 Communications

Countries whose responsibility areas are included in the route planning must ensure that there is a permanent communication link to the concerned National Reporting Stations.

These countries should have suitable patrol vessels available at sea in order to complete the securing of evidence on illegal discharges and prosecution of offenders.

Air to Ground frequencies	- primary and secondary
Air to Air frequencies	- primary and secondary
Air to Ship frequencies	- primary and secondary
Ship to Ship frequencies	- primary and secondary
Ship to Shore frequencies	- primary and secondary

See also the Operative Communication Plan for Joint Combating Operations in the Bonn Agreement Counter Pollution Manual Chapter 3 of Vol. I.

3.10 Handover

For safety reasons, exact handover procedures for “continuous” missions must be determined in advance and followed. Participating countries may wish to opt for a “ground” handover with the departing aircraft crews briefing the incoming crews at the airport/air base or specify a “flying” handover with strict horizontal and vertical clearances. Each approach has its own advantages and drawbacks but participating countries will need to modify the procedures for their requirements, to ensure that any “flying” handover can secure or confirm spill and polluter evidence.

3.11 Briefing and Debriefing

Well in advance of the CEPCO start date, all participants should be briefed on the information needed to ensure safe flight operations, such as airport facilities, expected weather in the area concerned, flight restrictions, etc. A map with the expected positions of patrol vessels, their descriptions and frequencies must be handed out to all crews.

All crews are expected to attend the debriefing meeting at the end of the CEPCO operation. The organising country should evaluate results, and the lessons learned. Any improvements to the provisional guidelines should be presented to the Bonn Agreement working group OTSOPA, together with the summary report of the whole mission.

3.12 Evaluation

The hosting Member State, in co-operation with other partners, will conduct an evaluation of the performed (super) Cepco and report to Regional Agreements as well as to EMSA/CTG-MPPR. With regard to lessons learnt on suspected polluters and the related investigation measures a report will be brought to the attention of the North Sea Network for Prosecutors and Investigators. Based on the outcomes of the evaluation and the recommendations from participants, the objectives of the CEPCO structure may be reviewed.

3.13 CECPO coordination guidelines

It is recommended that a CP organising and hosting a (Super)-CEPCO flight operation consult with previous organisers to learn about best approach and lessons-learned. Denmark produced a set of basic principles and these can be found in: BONN-OTSOPA document OTSOPA 15/7/4-E

4 Aerial Surveillance Exercises

4.1 Introduction

Bonn Agreement Contracting Parties have agreed to conduct Aerial Surveillance Exercises with responsibility for scheduling these events rotating amongst the participants. The planning can be found in the annual OTSOPA document on Joint Action Program. The aims are as follows:

- Exchange of results and experience to improve operational efficiency.
- Enhancement of the value of data collected by the different remote sensing systems.
- Creation of standardisation rules and procedures.

4.2 Requirements for Aerial Surveillance Exercises

In order to fulfil the objectives, some basic standards are set out as guidelines for both scheduling countries and participants.

Exercise areas should be designated in the open sea, sufficiently far away from shipping routes, other marine activities and free of geographic obstacles.

Air space with good direct accessibility from the exercise airfield with minimal limitations for flight path and operational altitudes between 200 and 3000 feet.

Target slicks should be of sufficient volume and size, to achieve the aim and objectives of the exercise. If more than one slick is laid then the discharge positions should be separated by a minimum of 1 nautical mile on an axis parallel to wind/current direction in order to avoid mixing of the slicks.

Sufficient vessels/boats should be available to monitor visually the extent, shape and position of discharged slicks and, where practicable, to establish thickness of oil at the leeward edge of the slick.

Arrange tight flight schedules to ensure the state of discharged oil remains reasonably constant for all over flights and taking into account flight safety, different characteristics of aircraft and remote sensing systems, and on-scene weather conditions.

Aerial surveillance exercises should be conducted in suitable weather conditions as determined by the national authority organising the exercise.

During the planning stage both aircrew and ground exploitation staff should be consulted.

Briefing and de-briefing sessions immediately before and directly after Aerial Surveillance missions are essential to ensure fine-tuning of operations and exchange of first results.

Comprehensive record-keeping by aircrew and exploitation (ground-truth) personnel on standard log forms (preferably the Standard Pollution Observation Log) will enable easier comparison of sensor data with ground truth data for the final assessment of results.

The country scheduling the exercise should evaluate all data and present a report to the OTSOPA working group with interpretation of remote sensing results and any recommendations arising from the findings.

4.3 Conclusion

It should be borne in mind that desirable standards for Aerial Surveillance exercises must be linked directly to current, still developing states of existing aircraft and remote sensing systems. It is probably too early to propose detailed operational and remote sensing procedures to be adopted as standard by all participants. It is recommended that the accepted basic principles be adjusted and refined as necessary following each annual exercise.

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PART 3:

GUIDELINES FOR OIL POLLUTION DETECTION, INVESTIGATION AND POST FLIGHT ANALYSIS/ EVALUATION FOR VOLUME ESTIMATION

1 Introduction

1.1 The primary task for marine pollution surveillance aircrew is to detect, observe, investigate, evaluate and report (oil) pollution. Assessing the volume of an oil slick is the result of a calculation using parameters recorded during the detection (remote sensing instruments) and observation (visual) of related circumstances and conditions. The result of the calculation is only an estimation; an indication of quantity. Based on the findings of the aircrew, the response authority will define appropriate counter pollution measures.

1.2 In flight, all detections should be treated in the same way regardless of whether they are considered legal or illegal, from whatever the source, known or unknown. All detections should be investigated and the fullest data set possible collected and recorded using the available remote sensing and photographic equipment together with visual observation. The data should be evaluated and a volume calculated. The estimated quantity of oil provides the basis for the decision to respond together with other essential information such as location and weather (prediction).

1.3 Post flight, an independent and detailed analysis / evaluation of the size and volume of the oil should be made using the recorded data set, visual observation and photographs. The 'post flight' assessment of size and volume should be used for any follow up legal action. In post flight analysis the accuracy of the calculation done in flight should be checked and if possible improved.

1.4 With regard to illicit discharges from vessels aircrews should be familiar with MARPOL 73 / 78 Regulations. The overall conclusion from trials simulating discharges in compliance with MARPOL Regulation was that the first trace of oil could be seen when the oil / water mixture release was only 50 ppm; this implies that when oil is seen in the wake of a vessel it is a violation of the regulations.

1.5 Aircrew should also be aware that certain discharges from offshore installations are permitted. The appearance of the oil and the interpretation of the appearance of discharges from oil rigs are not the same as for ship discharges or isolated slicks where the source is unknown. **However, all detections from or near offshore installations should still be investigated and the fullest data set possible collected and recorded using the available remote sensing and photographic equipment together with visual observation. The data should be evaluated and a volume calculated using the same procedures as for other types of oil detections.** Details of Discharges from Offshore Installations are at Annex C.

1.6 Although most marine pollutions detected/observed are the result of illicit mineral oil discharges by vessels (i.e. above discharge limits set in Annex I of MARPOL 73/78), aerial surveillance crews may also observe spills of other nature, resulting from a (legal or illegal) discharge of a harmful substance other than mineral oil, such as a discharge of a noxious liquid substance carried in bulk (chemical) (MARPOL Annex II discharge) or of a solid cargo residue falling under the category of "garbage" (MARPOL Annex V discharge). Therefore an overview of the relevant discharge regulations under MARPOL Annexes II and V, together with operational procedures for aerial surveillance operators making an observation/detection of this kind, are added at Annex D and E respectively."

1.7 It is essential that all detections be reported as soon as possible to the relevant authorities so that any immediate response or follow up action can be initiated. Through international organisations of Port State Control, authorities may apply for assistance to inspect the suspect vessel on arrival at any harbour of a member state.

2 Detection

2.1 The main detection equipment is radar. Most marine pollution aircraft have Side Looking Airborne Radar (SLAR).

2.2 After the initial detection where possible the aircrew should try to orientate the flight path so that all the oil passes down one side of the aircraft, parallel to the flight path, at a range of between 5 and 10 miles: this positioning optimises the radar performance and avoids the 'radar blind' area directly beneath the aircraft.

2.3 *If time permits a 'radar' box should be flown around the slick at a range of between 5 and 10 miles. This ensures that at some stage the oil and sea will present the best aspect for data collection to the radar. The best SLAR image will normally be available when the surface wind is at 90^0 to the aircraft's flight path.*

3 Investigation - Data Collection

3.1 Following the detection by SLAR, the slick should be thoroughly investigated using the vertical remote sensing instruments; IR, UV and Vertical Camera. The aircraft should be flown directly over the oil to enable the 'plan' view (the most accurate view) of the slick to be recorded.

3.2 The UV sensor may enable an accurate 'oiled' area measurement. UV may also show the areas not covered with oil allowing the oiled area measurement to be 'adjusted'. The vertical camera may provide area and appearance data of the oil. The IR data may give a 'relative' thickness of the slick, which can be used to supplement the UV, and Vertical Camera information.

3.3 *It is suggested that the aircraft is flown 'up' the line of oil towards the 'polluter', ship or rig; this avoids the IR 'flaring out' because of the rapid increase in temperature associated with the vessel (engines) or installation (flare).*

3.4 *It is also suggested that the aircraft is flown at a height that allows as much of the slick as possible to fall within the field of view of the vertical sensors. It may be necessary to 'map' large slicks. On the other hand low clouds may hamper the sensors.*

4 Visual Observation

4.1 Visual observation of the pollution and polluter provides essential information about the size, appearance and coverage of the slick that are used to calculate the initial estimate of volume.

4.2 The visual form of an oil slick may also suggest the probable cause of pollution:

- A long thin slick of oil sheen suggests a possibly illegal discharge of oil from a ship. The cause is obvious if the ship is still discharging, as the slick will be connected to the ship, but the slick may persist for some time after discharge has stopped; it will subsequently be broken up and dispersed by wind and waves.
- A triangular slick with one side aligned with the wind and another aligned with the prevailing current suggests a sub-sea release, such as that from a sub-sea oil pipeline or oil slowly escaping from a sunken wreck.
- Slicks seen some distance 'down current' of oil installations, particularly in calm weather, may be caused by re-surfacing of dispersed oil from permitted discharges of produced water.

- Large areas covered with a homogeneous oil layer are mostly the result of an accident e.g. a leaking storage tank of a tanker. In these cases detailed information would be easily obtained from the captain of the vessel. It is emphasized that also in accidental spills a similar method of collecting information (evidence) should be followed.

4.3 The observation can be influenced by several factors, cloud, sunlight, weather, sea, and angle of view, height, speed and local features as well as the type of oil. The observer should be aware of these factors and try to make adjustments for as many as possible.

4.4 *It is suggested that the ideal height to view the oil will vary from aircraft to aircraft. For example an Islander with its low speed allows observation at a lower level than a Merlin with its higher speed. For an aircraft with a speed of around 150 knots a height of around 700 to 1000 feet is suggested.*

4.5 *It is recommended that the slick should be viewed from all sides by flying a racetrack pattern around the oil. The best position to view the oil is considered to be with the sun behind the observer and the observer looking at the object / subject from an angle of 40^0 to 45^0 to the perpendicular. At the same time the photos should be taken in front of the suspected polluter to prove that the ship is not sailing through an existing oil slick.*

4.6 The oil appearances will generally follow a pattern. The thinner oils, sheen, rainbow and metallic, will normally be at the edges of the thicker oils, discontinuous true colour and true colour. It would be unusual to observe thick oil without the associated thinner oils; however, this can occur if the oil has aged and / or weathered or if the oil is very heavy. Heavy oil will tend to be mainly true colour and have very sharp defined edges.

HEAVY FUEL OIL

4.7 During the observation the aircrew should estimate the areas within the oiled area that have a specific oil appearance. The Bonn Agreement Oil Appearance Code (BAOAC) is detailed at Annex A.

5 Investigation - Photography

5.1 Photographs of the oil slick and polluter are probably the most easily understood data for a non-technical person. It is therefore essential to produce a complete set of pictures showing the required evidence.

5.2 The photographs can also confirm or amend the in-flight visual observation during the post flight analysis. However, photographs should be used with caution when considering the oil appearance as the development of the film may affect the appearance / colour.

5.3 The ideal set of photographs will show an overall, long range, view of the pollution and the polluter and a series of detailed close up shots of the pollution and the polluter. Obviously a photograph showing the name of the vessel, the port of registration (the stern) and the IMO number are important details.

5.4 It is important, where possible, to show clear evidence of a connection between the polluter and the pollution, directly or indirectly, the camera data can provide this as can the IR and UV data.

5.5 The data should also show 'clean' water ahead of the vessel so that the ship's crew cannot claim that the pollution was already there and they were 'just' sailing through it. A vessel passing through a slick will separate the oil and leave a clear wake.

5.6. In cases where the digital photos obtained from a polluter are processed using one of the available enhancement software programmes, the operator should clearly describe in his official report what manipulations he has applied.

6 Volume Estimation - Oiled Area Measurement

6.1 Trials have shown that both oiled area and specific oil appearance area coverage measurement is the main source of error in volume estimation. Therefore observers should take particular care during this part of the volume estimation process.

6.2 Estimating or measuring the oiled area can be done either by:

- Visual estimation
- Measurement of sensor images

6.3 Estimations of oiled slick area based on visual observations are likely to be less accurate than estimates based on measurements made of remote sensing images.

6.4 If possible, the whole slick should be visible in one image for ease of area measurement. Area calculations using accurate measurements of SLAR images will be more appropriate for large oil slicks, while measurements of UV images will be more suitable for smaller slicks.

6.5 Most modern SLAR systems incorporate electronic measuring devices; areas can be measured by drawing a polygon around the detected slick. It is recommended that these devices be used where at all possible as they will provide the most accurate measurement within the confines of the aircraft during flight. Alternatively the overall length and width can be measured electronically and the oiled coverage estimated visually.

6.6 *It should be remembered that because of the resolution of the SLAR (generally 20 metres) small areas of less than 20 metres NOT covered with oil but within the overall area would not show on the SLAR. However, oil patches of less than 20 metres will show up as patches of 20 metres.*

6.7 The recommended procedure for visual observation is to estimate the length and width of the slick by making time and speed calculations. This forms an imaginary rectangle that encloses the slick. The coverage of the oil slick (expressed as a percentage or proportion) within this imaginary rectangle is then used to calculate the oiled area of the slick. Inevitable inaccuracies in dimension estimates and estimated coverage within these dimensions can give rise to high levels of error in area estimation.

6.8 When determining the oiled area coverage it is essential to remember that the main body of an oil slick may have 'areas' of clear water, especially near the trailing edge of the slick. For compact slicks, there may be only a few ‘clear water’ areas but for more diffused oil slicks there could be several which would lower the overall coverage percentage significantly. More accurate assessments of the oiled area can be made by a thorough analysis of the SLAR or UV images.

7 Volume Estimation - Specific Appearance Area Coverage Measurement

7.1 The ‘oiled’ area should be sub-divided into areas that relate to a specific oil appearance (see BAOAC). This can be achieved using the recorded data from the vertical sensors and the noted visual observations.

7.2 This part of the volume estimation is mainly subjective, so great care should be taken in the allocation of coverage to appearance, particularly the appearances that relate to higher thicknesses (**discontinuous true colour and true colour**).

7.3 The vertical camera data (if available in flight) and the visual observations should be compared with the IR data, which will give an indication of the thickest part of the slick.

7.4 Thermal IR images give an indication of the relative thickness of oil layers within a slick. Relatively thin oil layers appear to be cooler than the sea and relatively thick oil layers appear to be warmer than the sea in an IR image. There is no absolute correlation between oil layer thickness and IR image because of the variable heating and cooling effects caused by sun, clouds and air temperature.

7.5 The presence of any area within the slick shown as warm in an IR image indicates that relatively thick oil (Code 4 or 5 in the BAOAC) is present. Since these areas may only be small, but will contain a very high proportion of oil volume compared to the much thinner areas, their presence should be correlated with visual appearance in the BAOAC assessment.

7.6 The Volume Estimation Procedure is illustrated at Annex B.

7.7 It is generally considered that 90% of the oil will be contained within 10% of the overall slick (normally the leading edge (up wind side) of the slick), within a few hours after the release.

8 Post Flight Analysis

8.1 The aim of post-flight analysis / evaluation is to provide a more accurate estimate of spilled oil volume than can be made within the confines of the aircraft during flight. It is based on measured oil slick areas and the estimated oil layer thickness in various parts of the oil slick. It involves integrating the information from several different sources in a systematic way.

8.2 Electronic methods or the use of grid overlays should be used to obtain accurate measurements of overall slick area from the recorded images. Where several images have been obtained during a period of time, the area should be calculated for each one.

8.3 The next stage in post-flight analysis is to calculate oil coverage within the overall area estimated from visual observation or measured from the remote sensing images.

8.4 The photographs and Standard Pollution Observation Log should be re-examined and the proportions of slick area of different BAOAC codes should be re-calculated. Any assessment of the appearance of different areas of oil within a slick will be somewhat subjective. Nevertheless, the BAOAC provides a standard classification system to allow at least semi-quantitative thickness (and subsequently, volume) estimation, particularly at lower oil thickness (Codes 1 to 3).

8.5 It is particularly important that areas of any thick oil (Codes 4 or 5 in the BAOAC) - if present - be confirmed as accurate or correlated with the thicker areas shown on the IR image, since these will have a very large influence on estimated volumes.

8.6 The final stage of post flight analysis is to calculate the estimated volume by totalling the volume contributions of the different areas of the slick.

8.7 Volume estimations made by analysis of different sensors and methods should be compared. Similarly, volume estimates made from data obtained at different times should be compared to ensure that it is consistent; spilled oil volume would not normally change over a short time, so very different estimates obtained only a few minutes apart will be a signal of problems.

9 Oil Volume Estimate Usage

9.1 Using the BAOAC to estimate oil volume gives a maximum and minimum quantity. It is suggested that in general terms the maximum quantity should be used together with other essential information such as location to determine any required response action.

BONN CP agreed that the minimum volume estimate should be used for legal purposes. Reference is made to Bonn Agreement Contracting Parties Meeting Summary Record 2003 Page 5, Para. 2.4 (f) which states "When the BAOAC is used to estimate the quantity of oil released at sea, the lower limit of the range in the code for each coded appearance should be used for estimating the amount of oil present in the slick for enforcement purposes and for statistical reporting". However, it is emphasised that each national authority will determine how to use the BAOAC volume data within its own area.

9.2 It is emphasised that extra caution should be used when applying the BAOAC during major incidents involving large quantities of thick oil and / or heavy oils or when emulsion is present. Aircrews should use all the available information or intelligence; such as oil thickness measurements taken by surface vessels, to estimate the volume.

10. Collecting evidence - the chain of evidence

10.1 Objective

One of the main objectives of aerial surveillance flights performed by most Bonn Agreement Contracting Parties and other Member States of the European Union is to identify the source of pollution. In the case of catching a vessel or offshore installation red-handed, thus whilst discharging, it is essential to gather data that can be used in the process of prosecution.

10.2 Evidence

National criminal law and other regulations describe what data or information is recognized contributing to "evidence". The bottom line is that at first the prosecutor will weigh the evidence and judge the admissibility. However, at the end of the procedure, it is the magistrate (judge) who gives the final verdict on the collected evidence. The procedure is there to prove whether the alleged violation of MARPOL or other Environmental Law really was an illicit discharge.

10.3 Parts of the evidence forming a chain

Identified pieces of information comprising the chain of evidence, without putting a value to the various parts are:

- first message (alert)
- a satellite SAR image e.g. through Clean Sea Net service, showing an indication of a possible pollution connected to a possible source
- AIS data of the possible source
- an aircraft SLAR detection, showing similar information as the satellite SAR
- a visual observation (BAOAC) and volume assessment
- sensor data supporting the SLAR, such as UV; IR or FLIR and or visual observation
- oblique and/or downward looking (still) photographs
- an oral statement by a person on board the source
- a sample of the pollution and the consequent analysis
- the report by the Port State Control authority
- an official statement or witness statement by any other authority or someone from the public.

Obviously, when the captain or platform manager gives a statement confessing that a discharge was made a strong case may result in a conviction. However, in most cases such a statement will not be obtained, and therefore the prosecutor has to make use of the evidence provided by aircrew and other authorities.

It is recognized that attached to all pieces of information, the reporting authority would preferably provide an explanation of the procedures followed in gathering the evidence and the capabilities of the sensors, as well as what information can be found in the various images.

Again, the necessity of gathering specific information depends on national law. For instance, the Netherlands prosecutor (court) does not require samples taken at sea. The official statement prepared by the aircrew is considered to be sufficient. And in the attachment to the statement, reference is made to the report "Visibility limits of bilge oil discharges from ships" which concluded that whenever traces of oil are visible in the wake of a vessel the discharge contains more than 50 ppm.

10.4 Improvements

With regard to ways to improve the strength of the evidence three groups of information in the procedure are discriminated:

a. the sensor data;

b. visual observations;

c. reverse proof.

The sensor packages most Contracting Parties apply are state-of-the-art. From an expert opinion it is well understood what sensors will provide. At this moment there is no sensor available that will confirm exactly what the substance is that has been discharged. The LFS is the only sensor providing an indication with a certain level of confidence.

In the Remote Sensing Seminar organized in April 2015 Parties at EU level and industry agreed that a continued discussion could lead to further improvement of sensor techniques. No sensor exists yet to clearly identify a chemical substance released at sea surface.

Visual observations are tight to good visibility conditions (weather) and day light. In this respect the Bonn Agreement Oil Appearance Code (BAOAC) provides a tool to recognize certain appearances in the discharged substances leading to an oil volume assessment in the case of a discharge of an oil/water mixture.

Combining photographs and InfraRed-UltraViolet imagery after landing could improve the quality of the volume assessment. Moreover the communication with the ship crew and verification of information with the authorities in the last port of call or the owners may clarify certain aspects. It is stressed that a thorough check of the collected data, after landing, is a viable option to improve the observation.

Reversing the burden of proof, making the ship crew prove that there was no violation of MARPOL regulations is an option to discuss. Again the possibility of applying the reverse burden of proof depends on the national law. In consultation with the North Sea Network of Investigators and Prosecutors this reverse burden of proof is studied.

An overall issue might be the ability to quickly respond to first alerts e.g. on receipt of a satellite detection indicating a possible illicit discharge, the time between receipt of the alerting message and the verification by an aircraft should be as short as possible.

It is strongly advised to reflect the entire working method for collecting evidence and a description of the sensors applied in the official statement, that in itself has to be in line with national criminal law. Also the handling and processing of the collected sensor data has to be elucidated.

It is recommended to regularly consult the North Sea Network of Investigators and Prosecutors with regard to the Enforcement Manual as well as relevant international regulations and national law on the collection of evidence.

11 The Bonn Agreement Oil Appearance Code

11.1 The Theory of Oil Slick Appearances

1. The visible spectrum ranges from 400 to 750 nm (0.40 – 0.75 μm). Any visible colour is a mixture of wavelengths within the visible spectrum. White is a mixture of all wavelengths; black is absence of all light.
2. The colour of an oil film depends on the way the light waves of different lengths are reflected off the oil surface, transmitted through the oil (and reflected off the water surface below the oil) and absorbed by the oil. The observed colour is the result of a combination of these factors; it is also dependant on the type of oil spilled.
3. An important parameter is optical density: the ability to block light. Distillate fuels and lubricant oils consist of the lighter fractions of crude oil and will form very thin layers that are almost transparent. Crude oils vary in their optical density; black oils block all the wavelengths to the same degree but even then there are different 'kinds of black', residual fuels can block all light passing through, even in thin layers.

11.2 The Bonn Agreement Oil Appearance Code

4. Since the colour of the oil itself as well as the optic effects are influenced by meteorological conditions, altitude, angle of observation and colour of the sea water, an appearance cannot be characterised purely in terms of apparent colour and therefore an 'appearance' code, using terms independent of specific colour names, has been developed.
5. The Bonn Agreement Oil Appearance Code has been developed as follows:
   - In accordance with scientific literature and previously published scientific papers,
   - Its theoretical basis is supported by small scale laboratory experiments,
   - It is supported by mesoscale outdoor experiments,
   - It is supported by controlled sea trials.
6. Due to slow changes in the continuum of light, overlaps in the different categories were found. However, for operational reasons, the code has been designed without these overlaps.
7. Using thickness intervals provides a biased estimation of oil volumes that can be used both for legal procedures and for response.
8. Again for operational reasons grey and silver have been combined into the generic term 'sheen'.
9. Five levels of oil appearances are distinguished in the code detailed in the following table:

Code	Description - Appearance	Layer Thickness Interval (μm)	Litres per km^2
1	Sheen (silvery/grey)	0.04 to 0.30	40 – 300
2	Rainbow	0.30 to 5.0	300 – 5000
3	Metallic	5.0 to 50	5000 – 50,000
4	Discontinuous True Oil Colour	50 to 200	50,000 – 200,000
5	Continuous True Oil Colour	More than 200	More than 200,000

10. The appearances described cannot be related to one thickness; they are optic effects (codes 1 - 3) or true colours (codes 4 - 5) that appear over a range of layer thickness. There is no sharp delineation between the different codes; one effect becomes more diffuse as the other strengthens. A certain degree of subjective interpretation is necessary when using the code *and any choice for a specific thickness within the layer interval MUST be explained on the Standard Reporting Log*.

11.3 Description of the Appearances

10.3.1 Code 1 – Sheen (0.04 µm – 0.3 µm)

11. The very thin films of oil reflect the incoming white light slightly more effectively than the surrounding water (Figure 1) and will therefore be observed as a silvery or grey sheen. The oil film is too thin for any actual colour to be observed. All oils will appear the same if they are present in these extremely thin layers.

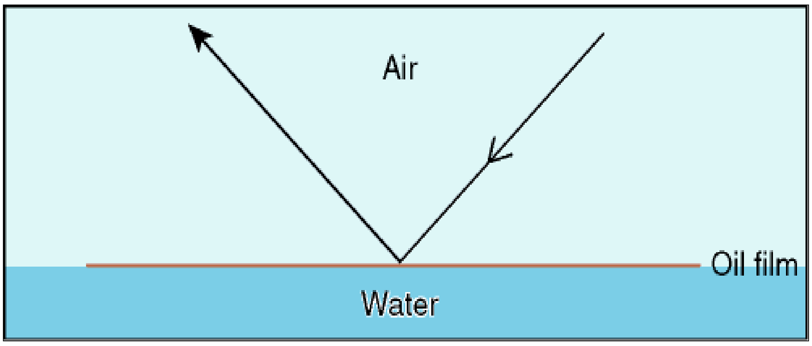


Figure 1. Light Reflecting From Very Thin Oil Films

12. Oil films below approximately 0.04-µm thickness are invisible. In poor viewing conditions even thicker films may not be observed.

13. Above a certain height or angle of view the observed film may disappear.

11.3.2 Code 2 – Rainbow (0.3 µm – 5.0 µm)

14. Rainbow oil appearance represents a range of colours: yellow, pink, purple, green, blue, red, copper and orange; this is caused by constructive and destructive interference between different wavelengths (colours) that make up white light. When white light illuminates a thin film of oil, it is reflected from both the surfaces of the oil and of the water (Figure 2).

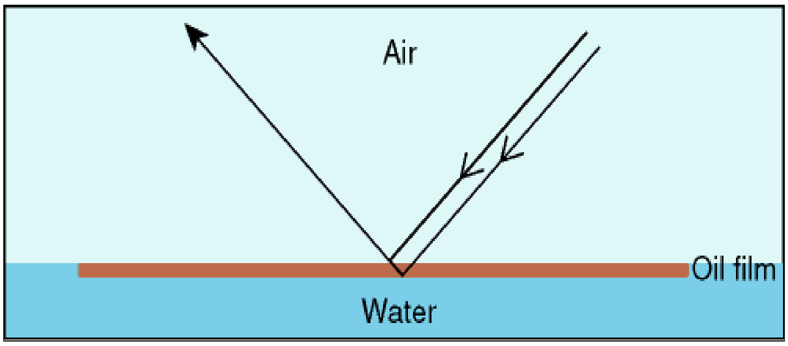


Figure 2. The Rainbow Region

15. Constructive interference occurs when the light that is reflected from the lower (oil / water) surface combines with the light that is reflected from the upper (oil / air) surface. If the light waves reinforce each other the colours will be present and brighter (Figure 3).

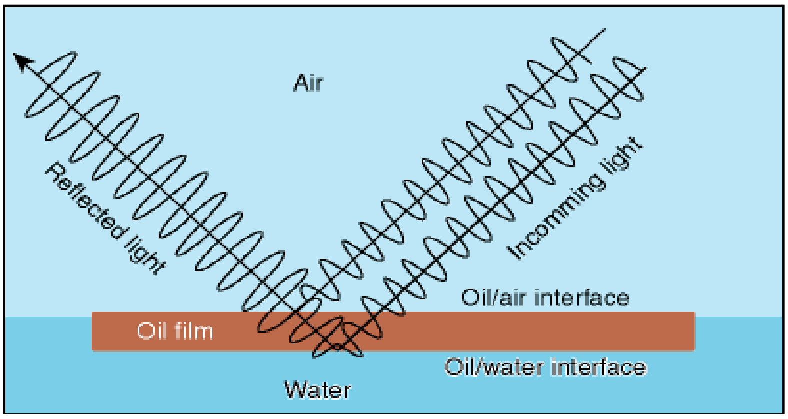


Figure 3. Constructive Interference

16. During destructive interference the light waves cancel each other out and the colour is reduced in the reflected light and appears darker (Figure 4).

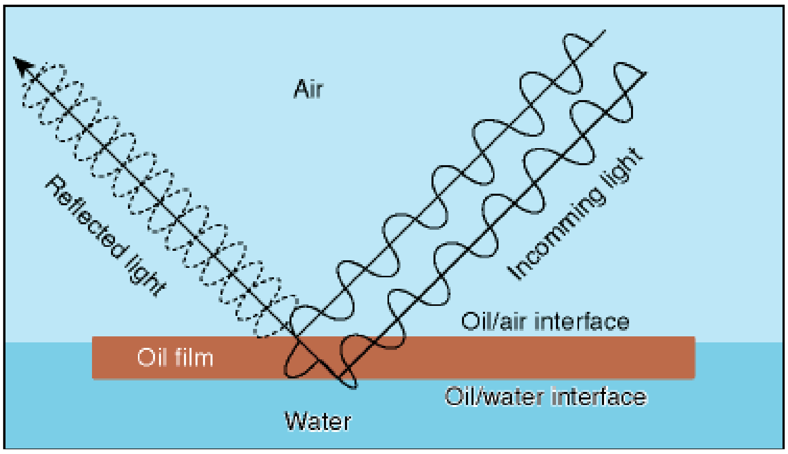


Figure 4. Destructive Interference

17. Oil films with thicknesses near the wavelength of different coloured light, 0.2 µm – 1.5 µm (blue, 400nm or 0.4 µm, through to red, 700nm or 0.7 µm) exhibit the most distinct rainbow effect. This effect will occur up to a layer thickness of 5.0 µm.

18. All oils in films of this thickness range will show a similar tendency to produce the 'rainbow' effect.

19. A level layer of oil in the rainbow region will show different colours through the slick because of the change in angle of view. Therefore if rainbow is present, a range of colours will be visible.

11.3.3 Code 3 – Metallic (5.0µm – 50 µm)

20. The appearance of the oil in this region cannot be described as a general colour. The true colour of the oil will not be present because the oil does not have sufficient optical density to block out all the light. Some of the light will pass through the oil and be

reflected off the water surface. The oil will therefore act as a filter to the light (Figure 5).

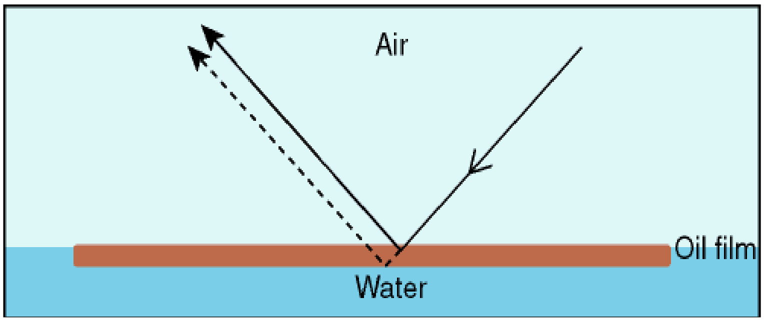
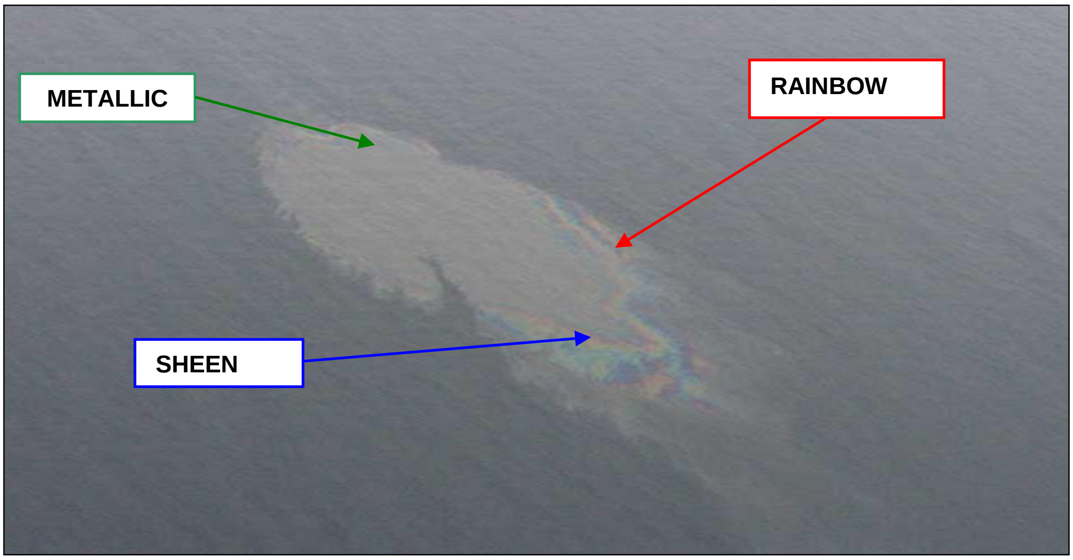


Figure 5. The Metallic Region

21. The extent of filtering will depend on the optical density of the oil and the thickness of the oil film.

22. The oil appearance in this region will depend on oil colour as well as optical density and oil film thickness. Where a range of colours can be observed within a rainbow area, metallic will appear as a quite homogeneous colour that can be blue, brown, purple or another colour. The 'metallic' appearance is the common factor and has been identified as a mirror effect, dependent on light and sky conditions. For example blue can be observed in blue-sky.



11.3.4 Code 4 – Discontinuous True Colours (50 µm – 200 µm)

23. For oil films thicker than 50 µm the light is being reflected from the oil surface rather than the sea surface (Figure 6).

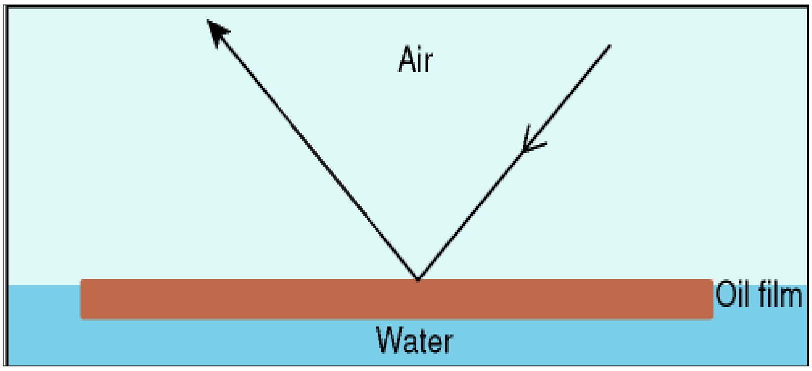


Figure 6. Thick Oil Films

24. The true colour of the oil will gradually dominate the colour that is observed. Brown oils will appear brown, black oils will appear black.

25. In this appearance category the broken nature of the colour, due to thinner areas within the slick, is described as discontinuous. This is caused by the spreading behaviour under the effects of wind and current.

26. 'Discontinuous' should not be mistaken for 'coverage'. Discontinuous implies colour variations and not non-polluted areas.

27. 'Discontinuous true colour' appeared to be a difficult appearance to describe and through imagery it may be possible to get a clearer picture of what is meant. For now the best result of the elaborations is: "**true oil colour against a background of metallic**".

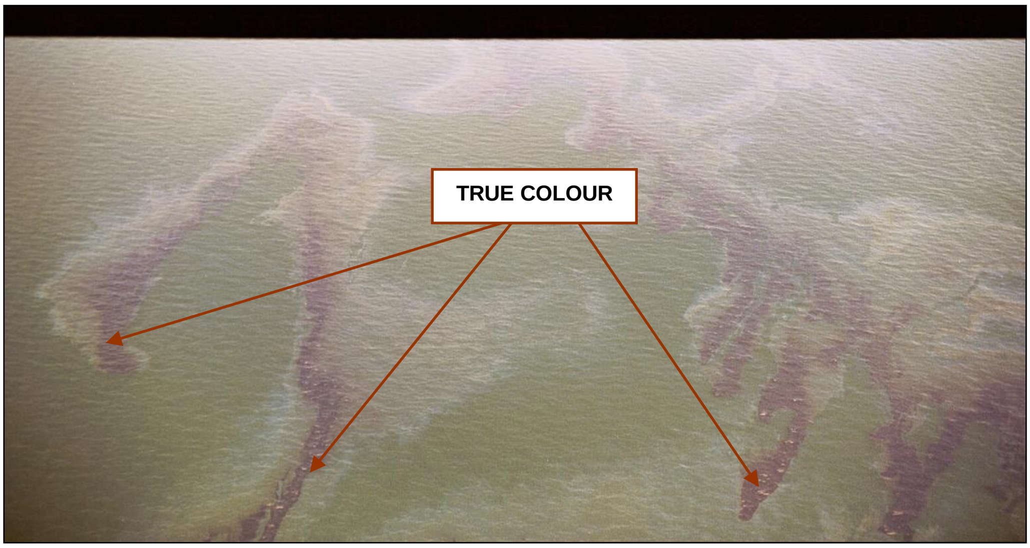
28. When oil is moved by waves, the oil layer obviously is thicker in the wave-trough than on the wave-top. This variation of the "oil appearance" may be understood by indicating "discontinuous".

11.3.5 Code 5 – True Colours (>200 µm)

27. The true colour of the specific oil is the dominant effect in this category.

28. A more homogenous colour can be observed with no discontinuity as described in Code 4.

29. This category is strongly oil type dependent and colours may be more diffuse in overcast conditions.



Note: all documentation on the study can be downloaded from the Bonn Agreement web-site under publications, at: www.bonnagreement.org

ANNEX A

THE VOLUME ESTIMATION PROCEDURE

1. Oiled Area Measurement

SLAR Polygon

Area from SLAR Data	12 km^2

Length and Width (SLAR Image or Time and Distance)

Length – 12 km x Width – 2 km (Imaginary Rectangle)

Area Covered with oil (Coverage) – 50%

Oiled Area 12 x 2 x 50%	12 km^2

2. Appearance Coverage Allocation

Appearance Code 1 (Sheen)	50%
Appearance 2 (Rainbow)	30%
Appearance 3 (Metallic)	15%
Appearance 5 (True Colour)	5%

3. *Thickness Band for Allocated Appearance*

Sheen	0.04 µm – 0.3 µm
Rainbow	0.3 µm – 5.0µm
Metallic	5.0 µm – 50 µm
True Colour	More than 200 µm

4. *Minimum Volume Calculation*

Oiled Area x Area Covered with Specific Appearance x Minimum Thickness

Appearance 1 (Sheen)

12 km^2 x 50% x 0.04 µm = 0.24 m^3

Appearance 2 (Rainbow)

12 km^2 x 30% x 0.3 µm = 1.08 m^3

Appearance 3 (Metallic)

12 km^2 x 15% x 5.0 µm = 9 m^3

Appearance 5 (True Colour)

12 km^2 x 5% x 200 µm = 120.0 m^3

Minimum Volume = 0.24 + 1.08 + 9 + 120 = 130.32 m^3

6. *Maximum Volume Calculation*

Oiled Area x Area Covered with Specific Appearance x Maximum Thickness

Appearance 1 (Sheen)

$12\ km^2$ x 50% x 0.3 µm = $1.8\ m^3$

Appearance 2 (Rainbow)

$12\ km^2$ x 30% x 5 µm = $18\ m^3$

Appearance 3 (Metallic)

$12\ km^2$ x 15% x 50 µm = $90.0\ m^3$

Appearance 5 (True Colour)

$12\ km^2$ x 5% x (more than) > 200 µm = > $120.0\ m^3$

Maximum Volume = 1.8 + 18+ 90.0 + > 120 = > 229.8 m^3

ANNEX B

DISCHARGES FROM OFFSHORE INSTALLATIONS

Permitted Discharges

Produced Water

1. The main discharge associated with an offshore installation is produced water. Produced water comes from the oil reservoir and contains a small amount of oil.

2. OSPAR Recommendation 2001/1 for the Management of Produced Water from Offshore Installations says that no individual offshore installation should exceed a performance standard of 40 mg of dispersed oil per litre (40 ppm) for produced water discharged into the sea. An improved performance standard of 30 mg per litre (30 ppm) is in force since the end of 2006. These discharge limits are based on the total weight of oil discharged per month divided by the total volume of water discharged during the same period. A maximum oil concentration of 100 mg per litre (100 ppm) is generally applied.

3. Contracting Parties with installations exceeding these performance standards report to OIC on the reasons why the standards have not been met together with an evaluation of Best Available Technology (BAT) and Best Environmental Practice (BEP) for the installations concerned. In addition to these performance standards, the Recommendation sets a goal of reducing by 15% the total quantity of oil in produced water discharged into the sea in the year 2006 compared to the equivalent discharge in the year 2000. By 2020, Contracting Parties should achieve a reduction of oil in produced water discharged to the sea to a level that will adequately ensure that each of those discharges will present no harm to the marine environment.

Oil on Cuttings

4. Cuttings produced during the drilling of wells are covered by the OSPAR Decision 2000/3 under which the discharge into the sea of cuttings contaminated with OBF (oil based fluids) at a concentration greater than 1% by weight on dry cutting is prohibited. Cuttings with less than 1% oil can be discharged. Until recently techniques able to reach the 1% target have not been available, and thus OBF contaminated cuttings have normally been transported to land for treatment and disposal or injected into deep layers. In the UK however a new technique has been trialed and approved which reduces the cuttings to a powder before discharge. Although such a discharge might cause some discolouration of the sea, oil sheen would not be expected.

Other permitted operational discharges of oil

5. A number of other processes can give rise to minor discharges of oil. These are considered to be negligible in terms of volumes of oil discharged and hence have not been the subject of OSPAR decisions or recommendations. Contracting parties regulate these discharges in a manner that’s fits with their own regulatory regime. These discharges include but are not limited to small quantities of produced sand that can be contaminated with oil, well clean-up fluids and releases during well abandonment and pipeline decommissioning.

Drains

6. Drainage discharges from areas where oil may be present is covered by the PARCOM Recommendation of a 40 mg per litre Emission Standard for Platforms, 1986. The total volumes of oil discharged are considered negligible and are normally routed via the processing systems and released with the produced water discharge.

Flaring

7. Flaring carried out with high efficiency burners should not result in a fall-out of oil into the sea. If oil from flaring is seen on the sea surface, flaring should cease.
Note: flaring for testing purposes has almost totally be banned in the BONN area.

Non Permitted Releases

8. In addition to permitted operational discharges, spillages may occur where systems fail. The reported amounts released by spillages in 1999 for all the platforms in the OSPAR area was 293 tonnes.

Appearance and Interpretation

9. When an offshore release enters the sea it will concentrate around the discharge point prior to dispersion by the tides, the sea state and the weather. For discharges that take place below the water surface, there may be a distance between the discharge point and the location where oil droplets emerge on the water surface. As the release is either constant or occurs over a period of time, there is a constant feed which can lead to the characteristic 'snail trail' that is often associated with an installation while the release is carried by the currents and dispersed in the water column.

10. There is a large difference between oil producing installations and gas and/or condensate producing installations: normally, the amount of produced water from oil installations is much larger then from gas/condensate installations (1000's of m^3 per day vs. a couple of m^3 per day). Furthermore, as oil fields age, the amount of produced water increases substantially.

11. There is no proven correlation between observations of oil sheen from the air and the concentrations of oil in the discharge, which led to it. Work has been undertaken in relation to ship's discharges but the results cannot be extrapolated to the offshore industry. The reason for this is the fundamental difference in the nature of the discharge whereby ships are in transit which prevents the discharge accumulating in the same manner that it does from an offshore installation which discharges continuously at the same point in space.

12. As a result of this difference, the rule of thumb used for shipping (which implies that if an oil sheen can be seen, the discharges must have contained more than 15 ppm and probably contained more than 100 ppm) cannot be applied to the offshore industry. Discharges have been observed from releases of produced water with concentrations as low as a few ppms' simply because of the volumes of produced water being discharged and the conditions for dispersion at the time of the release i.e. calm seas. Again, volumes of produced water being discharged from oil installations can be as much as 70,000 m^3 per day (70,000 m^3 of produced water with 100 ppm of oil amounts to 7 m^3 of oil per day / at 40 ppm amounts to 2.8 m^3 of oil per day).

13. The OSPAR Recommendation for produced water (as well as those for other discharges described above) does not limit the volume of oil being discharged, only the concentration. While the colour codes can help in quantifying a volume of oil, they do not provide a basis for estimating the concentration of oil in the discharge of produced water. They cannot therefore be used to determine compliance with the OSPAR produced water recommendation or the other controlled releases cited above.

14. Determining compliance with OSPAR recommendations and decisions can only be achieved through investigations with the platform to determine the discharges that have been taking place at the time of the observation and the concentrations at which

they occurred. However, information on the nature and appearance of any oil seen can be a useful indication for further investigation.

ANNEX C

MARPOL 73/78 ANNEX I (POLLUTION BY OIL)

Regulations covering the various sources of ship generated pollution are contained in Annexes of the MARPOL 73/78 Convention as amended. Annex I deals specifically with 'Pollution by Oil'. The regulations detailed below are strictly related to operational discharges.

AIRCREW SHOULD BE AWARE THAT UNDER MARPOL 73/78 *the North West European waters* include the North Sea and its approaches, the Irish Sea and its approaches, the Celtic Sea, the English Channel and its approaches and part of the North East Atlantic immediately to the west of Ireland. These are the SPECIAL AREA.

For OIL TANKERS OF ALL SIZES - Oil discharges from cargo tank areas, including the pump room

Within 'Special' Areas OR outside 'Special' Areas but within 50 nautical miles from the nearest land:

DISCHARGES PROHIBITED, except clean or segregated ballast.

Outside 'Special' Areas, but more than 50 nautical miles from the nearest land:

DISCHARGES PROHIBITED, except clean or segregated ballast, or when:

- The tanker is proceeding en route
- The instantaneous rate of oil does not exceed 30 litres per nautical mile and:
- The total quantity of oil discharge does not exceed :

  For existing tankers 1/15.000

  For new tankers 1/30.000 of the cargo which was last carried, and
- The tanker has in operation an oil discharge monitoring and control system and slop tank arrangement, as per regulation 15.

For OIL TANKERS OF ALL SIZES AND OTHER SHIPS OF 400 GT AND ABOVE – Oil discharge from machinery spaces

Within 'Special' Areas

DISCHARGES PROHIBITED, except when:

- The ship is proceeding *en route*
- Oil in the effluent is less than 15 ppm and
- The ship has in operation oil filtering equipment with an automatic 15 ppm stopping device and
- Bilge water is not mixed with any cargo residue or cargo pump room bilges (on oil tankers)

For OIL TANKERS OF ALL SIZES AND OTHER SHIPS OF 400 GT AND ABOVE – Oil discharge from machinery spaces

Outside 'Special' Areas:

DISCHARGES PROHIBITED, except when the ship is proceeding *en route* and:

- Oil in the effluent is less than 15 ppm and
- The ship has in operation an oil discharge and monitoring and control system, oily water separating or filtering equipment or other installation as required by Regulation 16, and
- Bilge water is not mixed with any cargo residue or cargo pump room bilges (on oil tankers)

For SHIPS OF LESS THAN 400 GT OTHER THAN OIL TANKERS – Oil discharges from machinery spaces

Within 'Special' Areas:

DISCHARGES PROHIBITED, except when oil in effluent without dilution does not exceed 15 ppm

Outside 'Special' Areas:

DISCHARGES PROHIBITED, except when at the judgement of the Flag State, all of the following conditions are satisfied as far as practicable and reasonable:

- The ship is proceeding en route and
- The oil in effluent is less than 15 ppm
- The ship has in operation appropriate equipment or installation, as required by Regulation 16.

ANNEX D

MARPOL 73/78 ANNEX II (POLLUTION BY NOXIOUS LIQUID SUBSTANCES IN BULK)

Following a recent, thorough amendment of Annex II of the MARPOL 73/78 Convention (Annex II of MARPOL 73/78 on Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk), and also the noticeable, continuous increase in volumes of liquid chemicals transported in bulk, an overview is given below of the regulations under MARPOL Annex II related to operational discharges of these substances, as well as recommended operational procedures for aircrew that may observe/detect an Annex II discharge from a vessel during a pollution control flight.

Chemicals carried in bulk

Carriage of chemicals in bulk is covered by regulations in SOLAS Chapter VII - Carriage of dangerous goods and MARPOL Annex II - Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk.

Both Conventions require chemical tankers built after 1 July 1986 to comply with the International Bulk Chemical Code (IBC Code), which sets out the international standards for the safe carriage in bulk by sea of dangerous chemicals and noxious liquid substances. The Code prescribes the design and a construction standard of ships involved in the transport of bulk liquid chemicals and identifies the equipment to be carried to minimize the risks to the ship, its crew and to the environment, with regard to the nature of the products carried.

The IBC Code sets out a list chemicals and their hazards, and identifies both the ship type required to carry that product and the environmental hazard rating.

Chemical tankers constructed before 1 July 1986 should comply with the requirements of the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (BCH Code) – the predecessor of the IBC Code.

MARPOL Annex II - Carriage of noxious liquid substances in bulk

MARPOL Annex II Regulations for the control of pollution by noxious liquid substances in bulk set out a pollution categorization system for noxious and liquid substances. The four categories are:

- Category X: Noxious Liquid Substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a major hazard to either marine resources or human health and, therefore, justify the prohibition of the discharge into the marine environment;
- Category Y: Noxious Liquid Substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a hazard to either marine resources or human health or cause harm to amenities or other legitimate uses of the sea and therefore justify a limitation on the quality and quantity of the discharge into the marine environment;

- Category Z: Noxious Liquid Substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a minor hazard to either marine resources or human health and therefore justify less stringent restrictions on the quality and quantity of the discharge into the marine environment; and
- Other Substances: substances which have been evaluated and found to fall outside Category X, Y or Z because they are considered to present no harm to marine resources, human health, amenities or other legitimate uses of the sea when discharged into the sea from tank cleaning or deballasting operations. The discharge of bilge or ballast water or other residues or mixtures containing these substances are not subject to any requirements of MARPOL Annex II.

The annex also includes a number of other requirements reflecting modern stripping techniques which specify discharge levels for products which have been incorporated into Annex II. For ships constructed on or after 1 January 2007 the maximum permitted residue in the tank and its associated piping left after discharge is set at a maximum of 75 litres for products in categories X, Y and Z (compared with previous limits which set a maximum of 100 or 300 litres, depending on the product category).

For Substances that have not been categorized yet: for those substances the governments involved in the over-seas transport have to establish and agree on a provisional assessment for the proposed operation (provisional tri-partite agreement between port State of loading, unloading port State and flag State).

Ship type requirements are most stringent for substances of Categories X and Y: these can only be transported by chemical tankers with smaller maximum single tank volumes (e.g. Cat. Y: IMO ship type 2). Ship type requirements are less stringent for substances of Cat. Z or OS.

B. HNS DISCHARGE REGULATIONS

DISCHARGES into the sea of residues of noxious liquid substances (HNS) assigned to Category X, Y or Z, or of those provisionally assessed as such, or ballast water, tank washings or other mixtures containing such substances are **PROHIBITED**, **UNLESS** such discharges are made in full compliance with the applicable operational requirements (*discharge standards*) in Annex II, as summarized below.

DISCHARGED PROHIBITED, <u>except when</u>:

***1. General discharge standards*:**

- **The ship is proceeding en route** at a speed of **at least 7 knots** in the case of self-propelled ships (or at least 4 knots in the case of ships which are not self-propelled);
- The discharge is made **below the waterline** through the underwater discharge outlet(s) not exceeding the maximum rate for which the underwater discharge outlet(s) is (are) designed; and
- The discharge is made **at a distance of not less than 12 nautical miles** from the nearest land, in a depth of water of **not less than 25 metres**.

***2. Category-specific discharge standards*:**

- For discharge of residues of **Category X**: Tanks from which substances in Cat. X have been unloaded have to be prewashed before the ship leaves port of unloading. The resulting residues have to be discharged to a reception facility. Any water subsequently introduced into the tank may be discharged into the sea in accordance with the above general discharge standards.
- For discharge of residues of **Category Y or Z**:
  · Discharge is allowed, IF the 3 abovementioned general standards are respected.
  · For *high-viscosity or solidifying substances* in Cat.Y, the residue/water mixture generated during the prewash should be discharged to a reception facility until the tank is empty.
  · *Operational requirements for ballasting and deballasting*: ballast introduced into a cargo tank which has been washed to such an extent that the ballast contains less than 1 ppm of the substance previously carried may be discharged into the sea (a) without regard to the discharge rate, the speed of the vessel and discharge outlet location, but (b) provided that the ship is not less than 12 miles from the nearest land and in water that is not less than 25 metres deep.

- **For substances that are not categorized and provisionally assessed or evaluated**: the discharge of such substances is prohibited.

3. Other relevant discharge standards are:

- **For ships constructed before January 2007** the discharge into the sea of residues of substances in *Category Z* or of those provisionally assessed as such or ballast water, tank washings or other mixtures containing such substances below the waterline (cf. 2nd general discharge standard above) is NOT mandatory.
- **Stripping requirements** before prewash: In general, before any prewash or discharge procedure is carried out the relevant tank *has to be emptied to the maximum extent* in accordance with the amended stripping limits (refers to maximum amounts that may be left in tanks after unloading).
- **If washing using a medium other than water**: If a washing medium other than water, such as mineral oil or chlorinated solvent, is used instead of water to wash a tank, its discharge shall be governed by the *provisions of either Annex I or Annex II* which would apply to that medium.

C. RECOMMENDED OPERATIONAL PROCEDURES FOR AIRCREW

In case of a suspected **MARPOL Annex II** violation (harmful substance other than oil), it is recommended that the aircrew follows to the best extent possible the general guidelines for investigation and documentation of oil pollutions detected/observed at sea, but moreover, and in particular:

- Check whether the discharge is made above the waterline or not
- Check whether the vessel is at anchor or not
- Check the position of the discharging vessel, and its distance from the nearest land (in Territorial Sea or not?)
- Check the water depth at location (> 25 meters or not?)
- Identify the type of vessel (chemical tanker or not?)
- When establishing a radio contact with the suspected vessel, the following specific HNS-related questions can be asked (besides the standard radio-communication questions):
  a. What speed the vessel is sailing at;
  b. The name of the substance that is being discharged, and the IBC Code Category of that substance (X, Y,Z, OS, non-categorized?);
  c. If the vessel is performing a tank cleaning or deballasting operation;

d. In case a Cat.X substance is reported, the vessel may be asked if the prewash residues of the discharged substance have been previously discharged in a port reception facility.
e. In case a Cat.Y substance is reported: vessel may be asked if the discharged substance is a high-viscosity or solidifying substance or not;
f. In case a Cat. Z substance is reported: vessel may be asked what the date of construction of the vessel is.

With those specific points and questions, the aircrew will have collected the most relevant information on the general and category-specific discharge standards as in MARPOL Annex II, which should be sufficient to initiate further legal or administrative follow-up action.

In a situation where a suspected vessel claims that it is performing a legal Annex II discharge, whereas the sheen observed in the wake of the vessel is <u>not an equal</u> (e.g. colourless or greyish) <u>sheen but presents the typical characteristics of mineral oil appearances</u>, it is recommended to document and investigate the discharge as in case of an illegal operational discharge of mineral oil, and to initiate a follow-up as in case of an alleged Annex I infringement.

ANNEX E

MARPOL 73/78 ANNEX V (POLLUTION BY GARBAGE FROM SHIPS)

AIRCREW SHOULD BE AWARE THAT THE NORTH SEA HAS BEEN DESIGNATED AS A SPECIAL AREA UNDER MARPOL ANNEX V

A. DISCHARGE OF CARGO RESIDUES AND OTHER PRODUCTS CATEGORIZED AS GARBAGE UNDER MARPOL ANNEX V

According to the definition of Annex V, garbage means: "all kind of victual, domestic and operational waste excluding fresh fish and parts thereof, generated during the normal operation of the ship and liable to be disposed of continuously or periodically except those substances which are defined or listed in other Annexes to" the MARPOL convention.

Following an amendment to Annex V (cf. Resolution MEPC.116(51)), cargo residues have been explicitly added to the list of products categorized as garbage. Cargo residues in the context of Annex V should be understood as remains of cargo after unloading as long the type of product is not belonging to a category covered by another Annex. This excludes hydrocarbons and liquid substances in bulk which are covered by Annex I and Annex II respectively. Therefore cargo residues in the meaning of Annex V mainly refer to solid substances.

The North Sea area is a "special area" for the purpose of MARPOL Annex V and is defined as follows:

"The *North Sea area* means the North Sea proper including seas therein with the boundary between:

- (i) the North Sea southwards of latitude 62° N and eastwards of longitude 4° W;
- (ii) the Skagerrak, the southern limit of which is determined east of the Skaw by latitude 57°44.8′ N; and
- (iii) the English Channel and its approaches eastwards of longitude 5° W and northwards of latitude 48°30′N."

This area corresponds more approximately to the geographical coverage of the Bonn Agreement. Only the western part of the Bonn Agreement area is not fully covered.

Within a special area, disposal into the sea of garbage, including cargo residues, is prohibited. However this prohibition does not apply for food wastes which have been passed through a comminuter or grinder provided that the discharge is carried out not less than 12 nautical miles from the nearest land. Other exceptions are discharges for the purpose of securing the safety of the ship and escape of garbage resulting from damage to the ship or accidental loss provided that all reasonable precautions have been taken to prevent such loss.

Past incidents have drawn attention to the fact that aircrews can also observe potentially illicit behaviour by ships with respect to the provisions of Annex V.

Part B of this document aims at presenting operational guidelines intended for helping aerial surveillance crews to collect data about possible Annex V offences.

B. RECOMMENDED OPERATIONAL PROCEDURES FOR AIRCREW

What to look for:

- All vessels sailing or at anchor with hatch covers open.
- All vessels sailing or at anchor which are surrounded by or connected to concentrations of drifting debris such as dunnage, packaging, …
- Any signs that something is thrown overboard by a ship.

How to collect data:

In case of a suspected **MARPOL Annex V** violation (discharge of cargo residues or other substance categorized as garbage), it is recommended that the aircrew follows to the best extent possible the general guidelines for investigation and documentation of oil pollutions detected/observed at sea. In addition, special consideration should be given to the following:

- Take as far as practicable detailed pictures of the discharge operation and of the discharged product in order to be able to show the nature of the product and the circumstances of the discharge.
- When activities for cleaning holds are observed on board a vessel, it is important to find out whether the removed product is intended to be stored on board or discharged overboard.
- When establishing radio contact with the suspected vessel it is important to collect the following data:

  a. Last cargo;
  b. Kind of cleaning activities currently carried out by the vessel;
  c. Intentions of the ship concerning the disposal of the recovered cargo residues / garbage;
  d. Awareness of ship's crew about the fact that the North Sea area is a special area for Annex V and that the discharge of garbage, including cargo residues other than processed food wastes is therefore prohibited.

NOTE:

It is recommended to regularly check possible amendments to MARPOL annexes. Through competent authorities representing a State at IMO/MEPC these amendments could be obtained. The Aerial Operations Handbook will be kept as up to date as as possible.

Bonn Agreement
Accord de Bonn

Aerial Operations Handbook

Part 4

NATIONAL INFORMATION

CHAPTER 1

BELGIUM

BRITTEN NORMAN ISLANDER

1 Introduction

MUMM (Management Unit of the Mathematical Model of the North Sea) and the Directorate-general Environment of the Federal Public Service Health, Food Chain Safety and Environment are the two Belgian authorities competent for the aerial surveillance of marine pollution above Belgium's zone of responsibility in the North Sea.

MUMM plans, directs and controls the surveillance missions using a Britten Norman Islander (OO-MMM) aircraft fitted with SLAR, IR/UV and camera systems. The aircraft is operated by MUMM and flying with Belgian military pilots. The remote sensing equipment is handled by an operator from MUMM. During aerial surveillance patrols, the aircraft retains state aircraft status.

The Directorate-general Environment complements MUMM's surveillance activities with a fast response service using private stand-by helicopters certified for a broad range of operations above sea (including hoisting). A helicopter can be scrambled at any time for verifying reported information on possible marine pollution. The helicopter on duty is equipped with a purpose-built portable video system with day and night capabilities. This system is operated by the agent of the Directorate-general Environment leading the mission on board of the helicopter.

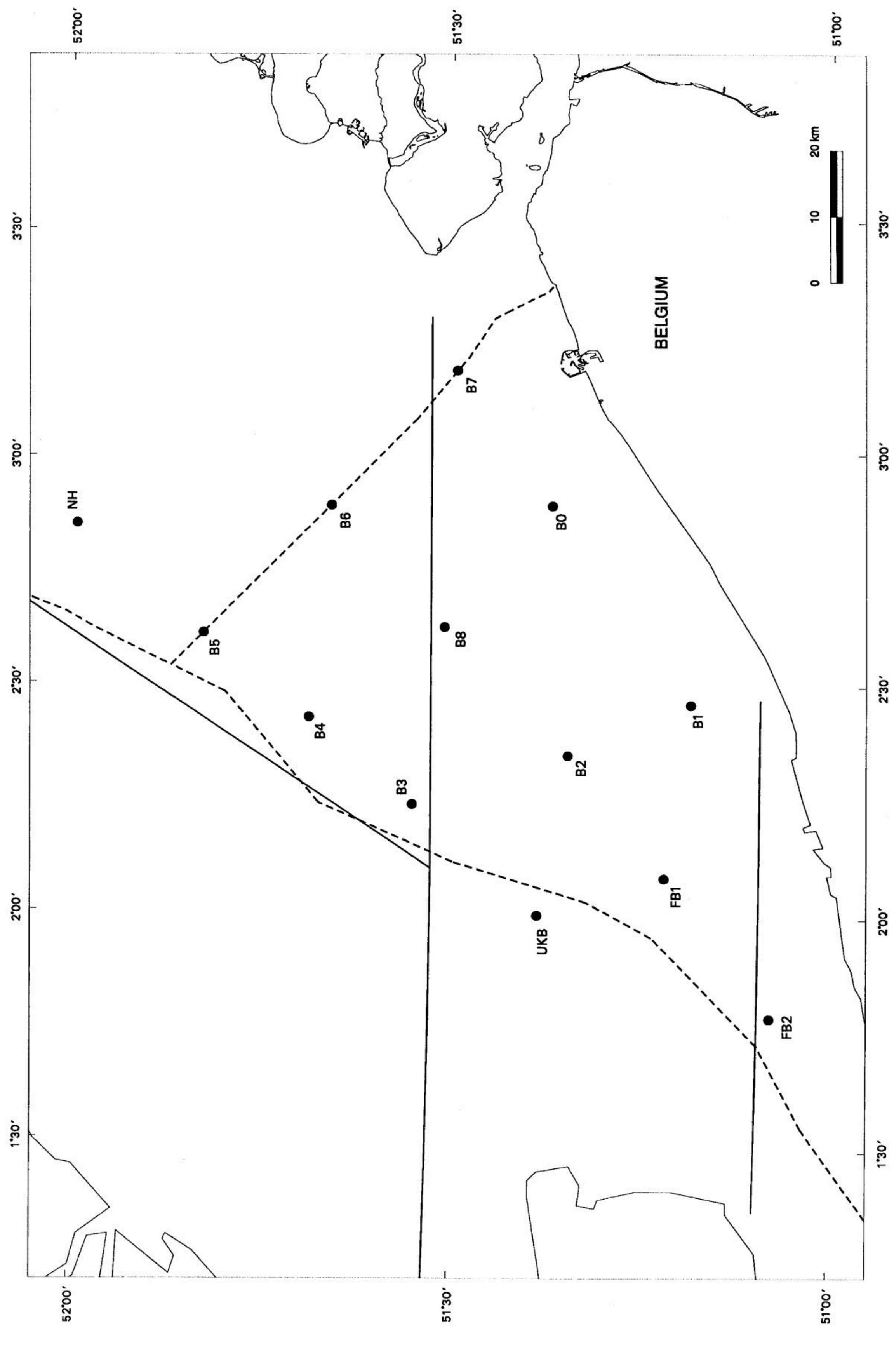
2 National Surveillance Points

B0	51°22,5'	N	002°53,3'	E
B1	51°11,5'	N	002°27,5'	E
B2	51°21,2'	N	002°20,8'	E
B3	51°33,5'	N	002°14,3'	E
B4	51°41,7'	N	002°25,6'	E
B5	51°50,0'	N	002°36,7'	E
B6	51°40,0'	N	002°53,4'	E
B7	51°30,0'	N	003°11,0'	E
B8	51°31,0'	N	002°37,5'	E
FB1	51°13,5'	N	002°05,0'	E
FB2	51°05,0'	N	001°47,0'	E
NH	52°00,0'	N	002°51,0'	E
UKB	51°23,5'	N	002°00,0'	E

3 National Focal Point

Commando Marine Operaties (COMOPSNAV)
Maritime Information Crosspoint (MIK)
Graaf Jansdijk, 1
B-8380 ZEEBRUGGE
Belgium
Tel: OPS ROOM MIK (24/24h) – +32 (0)50/55.83.24 or 83.34
Fax: OPS ROOM MIK (24/24h) - +32 (0)50/55.83.19
E-mail: mik@mil.be

Responsible authority for flight planning, scheduling and operations:
Management Unit of the North Sea Mathematical Models
Gulledelle 100
B-1200 Brussels; Belgium
Tel: +32 2 773 21 11 (office hours)
Fax: +32 2 773 21 12
E-mail: surv@mumm.ac.be



BELGIAN NAVIGATION POINTS

NZ0178F

CHAPTER 2

DENMARK

CHALLENGER

Due to changes in operator this chapter will be updated in due course.

JH 28/1/16

1 Introduction

1.1 The Royal Danish Air Force operates 3 Challenger aircraft which are equipped with SLAR (Terma), IR/UV line scanners, video/photo cameras with annotation of navigational data and a belly mounted retractable FLIR turret. A Synthetic Aperture Radar (SAR) and an AIS installation are planned.

2 National Surveillance Routing Points

VICTOR ROUTE:

V1	56°48′	N	010°42′	E
V2	56°13′	N	011°22′	E
V3	56°45′	N	011°45′	E
V4	57°40′	N	011°10′	E
V5	57°48′	N	010°43′	E
V6	56°51′	N	007°50′	E
V7	55°15′	N	007°50′	E
V8	55°15′	N	007°15′	E
V9	56°42′	N	007°15′	E
V10	56°35′	N	006°40′	E
V11	55°15′	N	006°40′	E
V12	55°15′	N	006°05′	E
V13	56°26′	N	006°05′	E
V14	56°18′	N	005°30′	E
V15	55°15′	N	005°30′	E
V16	55°15′	N	004°52′	E
V17	56°10′	N	004°52′	E
V18	56°04′	N	004°30′	E
V19	55°37′	N	004°19′	E
V20	56°03′	N	003°45′	E
V21	56°55′	N	007°00′	E
V22	57°50′	N	010°00′	E
V23	57°48′	N	010°43′	E
V24	56°48′	N	010°42′	E

SIERRA ROUTE:

S1	56°48′	N	010°42′	E
S2	56°06′	N	012°33′	E
S3	55°20′	N	012°30′	E
S4	54°56′	N	012°50′	E
S5	54°30′	N	012°00′	E
S6	54°43′	N	010°42′	E
S7	55°10′	N	010°56′	E
S8	55°54′	N	010°45′	E
S9	56°45′	N	011°45′	E
S10	57°40′	N	011°10′	E
S11	57°48′	N	010°43′	E
S12	57°58′	N	010°10′	E
S13	57°41′	N	007°12′	E
S14	57°00′	N	006°22′	E
S15	57°00′	N	007°06′	E
S16	57°23′	N	007°35′	E
S17	57°27′	N	008°16′	E
S18	56°30′	N	007°20′	E
S19	55°45′	N	007°20′	E
S20	55°45′	N	007°45′	E
S21	56°30′	N	007°45′	E

S22	57°30′	N	008°40′	E
S23	57°48′	N	010°43′	E
S24	56°48′	N	010°42′	E

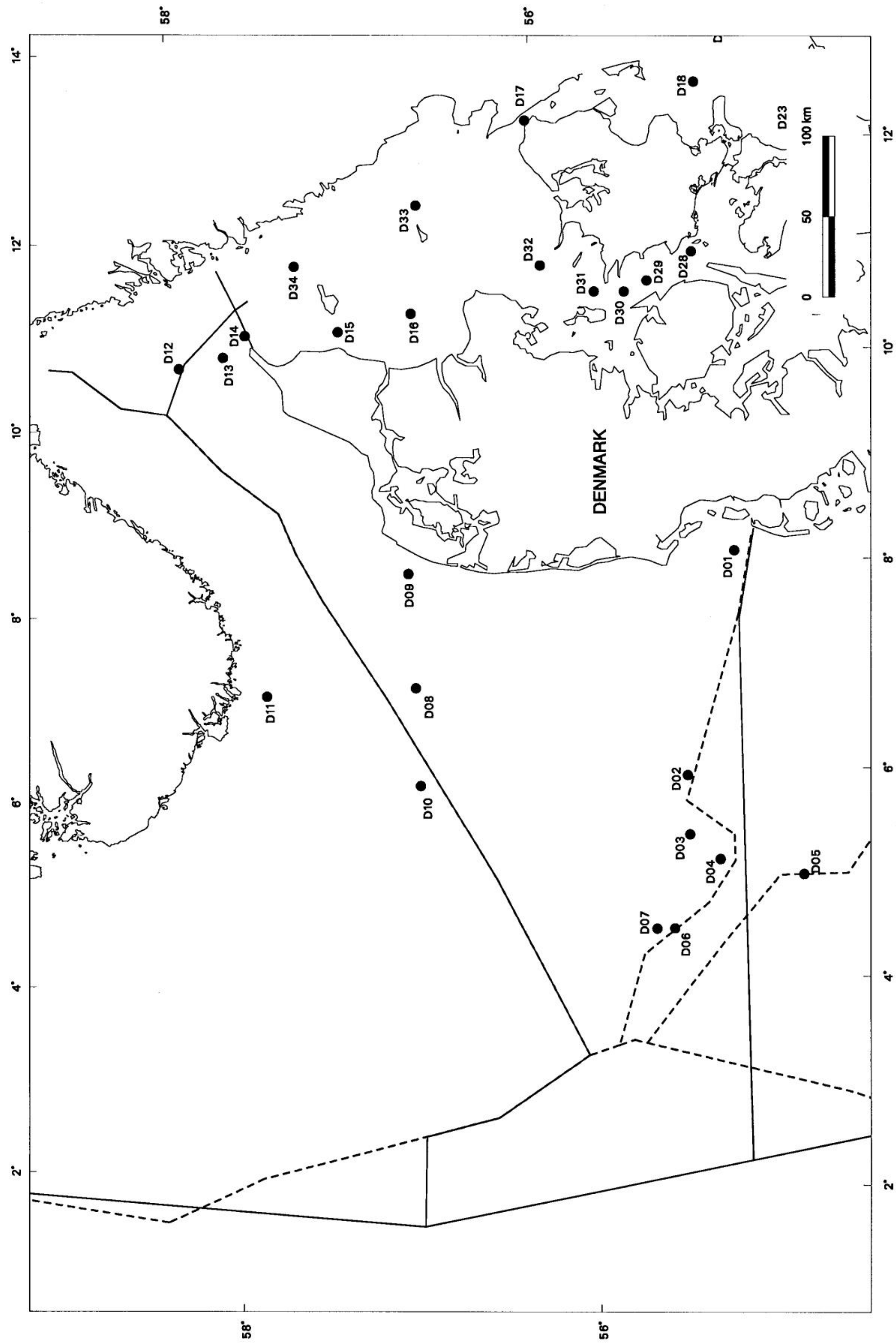
OSCAR ROUTE:

O1	56°48′	N	010°42′	E
O2	56°06′	N	012°33′	E
O3	55°20′	N	012°30′	E
O4	55°07′	N	012°44′	E
O5	55°07′	N	014°00′	E
SDG3	55°15′	N	014°20′	E
O6	55°25′	N	016°00′	E
O7.	55°00′	N	016°00′	E
SDG2	54°55′	N	014°20.7′	E
O8.	54°41′	N	014°00′	E
O9.	54°46′	N	012°50′	E
O10.	54°43′	N	010°42′	E
O12.	55°10′	N	010°56′	E
O13	55°54′	N	010°45′	E
O14	56°45′	N	011°45′	E
O15	57°40′	N	011°10′	E
O16	57°48′	N	010°43′	E
O17	57°10′	N	008°35′	E
O18	56°30′	N	007°45′	E
O19	56°30′	N	007°20′	E
O20	57°30′	N	008°40′	E
O21.	57°48′	N	010°43′	E
O22.	56°48′	N	010°42′	E

3 National Focal Point

HQ's Admiral Danish Fleet Maritime Assistance Service Soedalsparken 20 PO Box 1483 DK-8220 Brabrand Denmark Tel: +45 8943 3211 (24 hours) Fax: +45 8943 3230 Email: mas@sok.dk	HQ's Admiral Danish Fleet, National Operations, Maritime Environment Soedalsparken 20 PO Box 1483 DK-8220 Brabrand Denmark Tel: +45 8943 3405 (Office hours) Fax: +45 8943 3427 Email: pol.con.den@sok.dk

Detected and observed pollution in Danish waters should be reported using a BAPOL format and mailed to: mas@sok.dk and CC to mar-env@fsnaal.dk



DANISH NAVIGATION POINTS

CHAPTER 3

FRANCE

POLMAR 3

POLMAR 2

REIMS AVIATION F406

1 Introduction

1.1 Several aircraft within the customs organisation perform routine flights over the sea and carry out pollution surveillance as well. Two Reims Aviation F406 are equipped with remote sensing systems integrated by LNE. Polmar 2, based in Hyères, and Polmar 3, based in Lorient, are both equipped with SLAR (Terma), IR/UV (Sagem) and FMS. Additionally, the Polmar 2 is equipped with Microwave Radiometer (MWR) and Polmar 3 with a Low Level Light TV, they are both equipped with AIS receiver and SATCOM.

2 National Surveillance Points

EAST CHANNEL

A	49°55 N	002°20	W
B	49°55 N	000°05	E
C	50°30 N	001°10	E
D	50°50 N	001°30	E
E	50°15 N	001°20	E
F	49°40 N	000°00	E/W

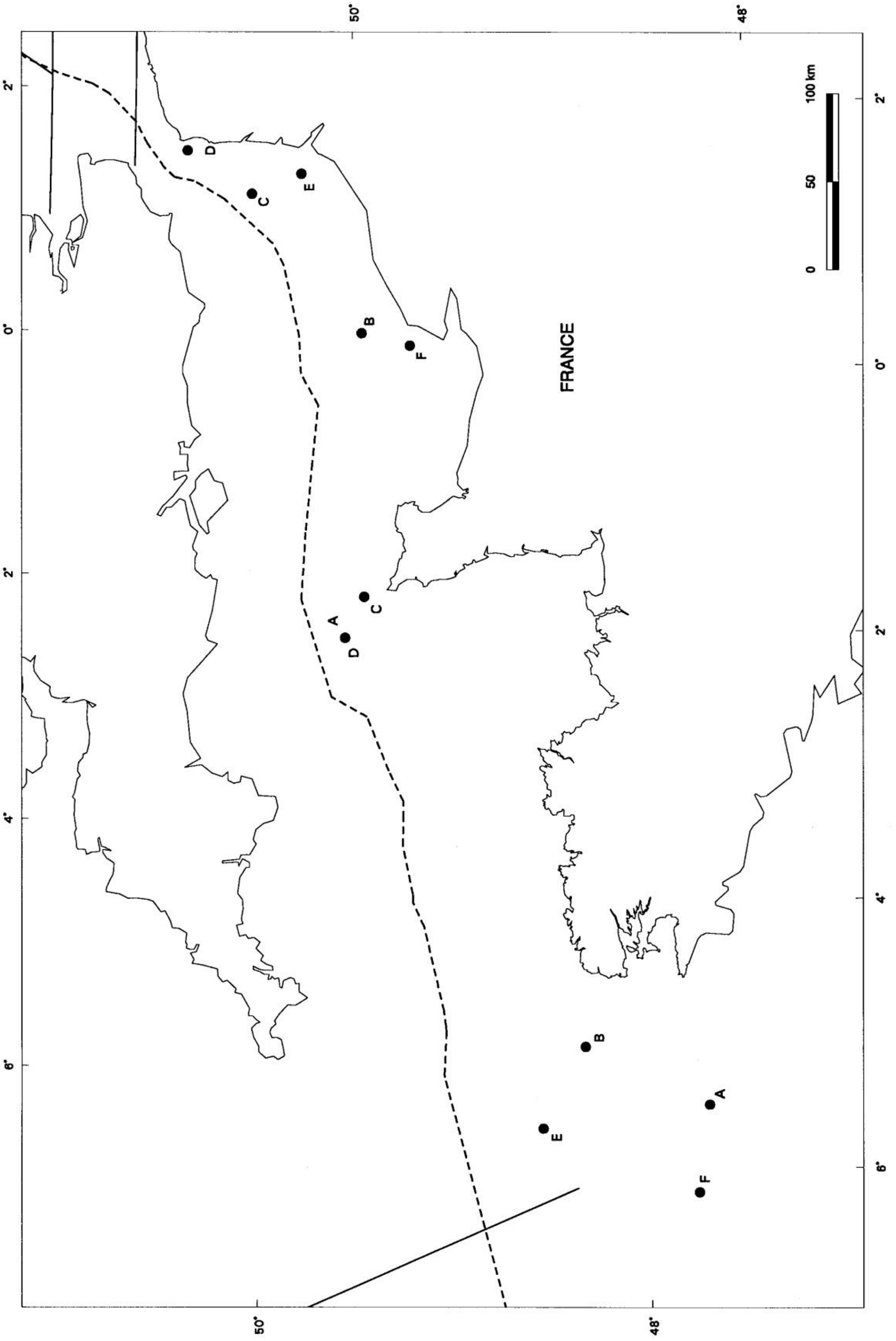
WEST CHANNEL

A	47°50 N	005°40’	W
B	48°30 N	005°20’	W
C	49°50 N	002°00’	W
C	49°50 N	002°00’	W
D	49°55 N	002°20’	W
E	48°40 N	006°00’	W
F	47°50 N	006°20’	W

3 National Focal Point

CROSS JOBOURG
Route d’Auderville
F-50440 JOBOURG
FRANCE
Tel. +33 233 52 72 13
Fax. +33 233 52 71 72
e-mail : jobourg@mrccfr.eu

Aerial Surveillance:
Customs General Directorate
tel : (33) (0)6 64 58 71 23 (H 24)
(33) (0)1 57 53 46 66
Fax : (33) (0)1 57 53 49 76
Email : dg-b2@douane.finances.gouv.fr
christian.cosse@douane.finances.gouv.fr
Direction générale des douanes et des droits indirects
Monsieur le chef du bureau B2
11, rue des deux communes
F-93558 MONTREUIL Cedex France



FRENCH NAVIGATION POINTS

CHAPTER 4

FEDERAL REPUBLIC OF GERMANY

DORNIER 228

1 Introduction

1.1 The Federal Waterways and Shipping Administration owns two Dornier Do 228-212 LM aircraft. The aircraft are operated by the Naval Airwing 3 based in Nordholz. They are equipped with SLAR, IR/UV sensors, a line scanning microwave radiometer (MWR), for quantification, a laser fluoro line scanning sensor (LFS), for qualification purposes and FLIR / CALI system. For documentation purposes, a video system, a nadir camera and photo cameras are on board.

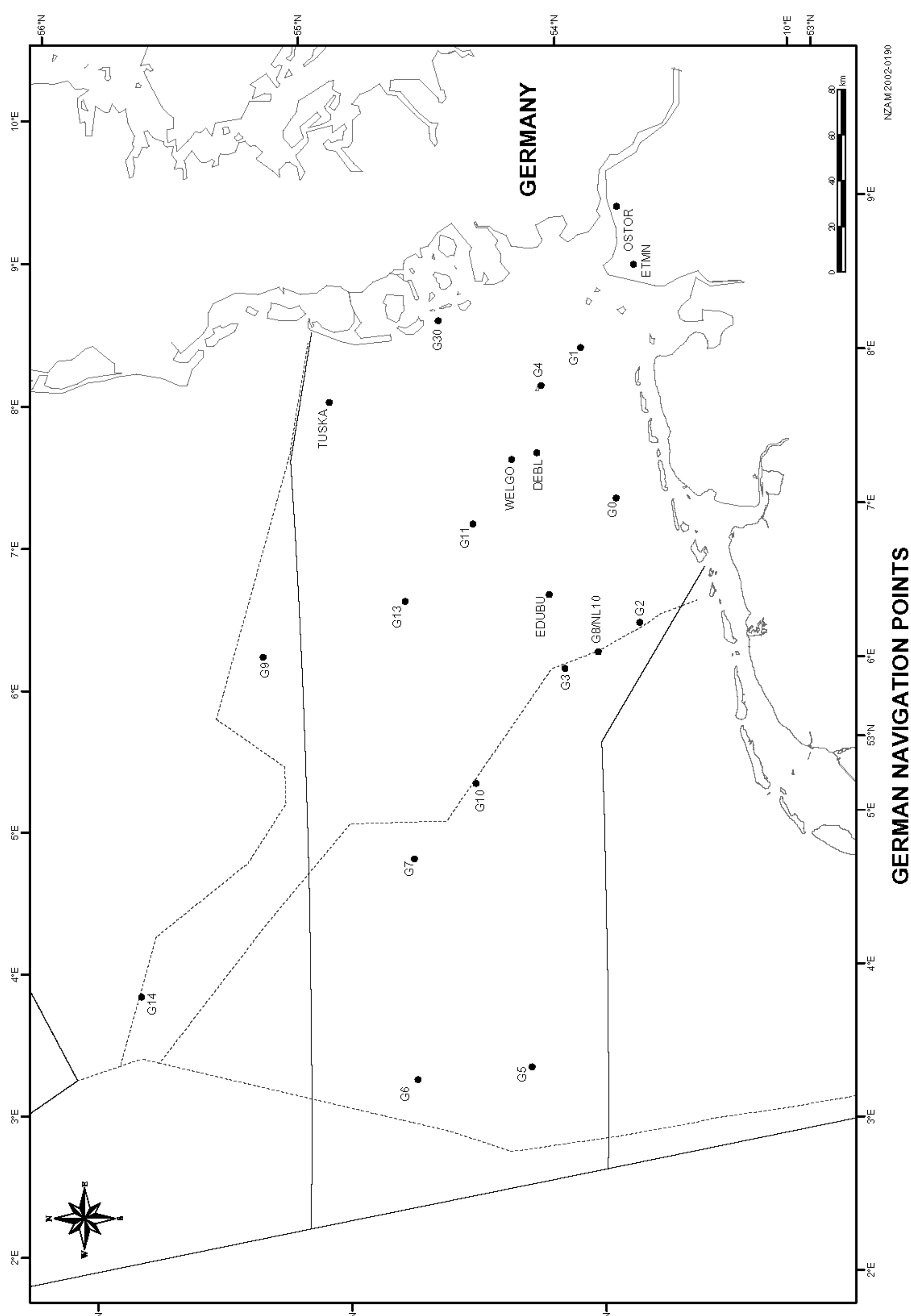
1.2 The Central Command for Maritime Emergencies (CCME), Section 2, Maritime Pollution Control / High Sea plans, directs and controls the aerial surveillance missions.

2 National Surveillance Points

G 0	53° 54.00′ N	007° 07.00′ E	
G 1	54° 00.00′ N	008° 08.00′ E	
G 2	53° 50.00′ N	006° 17.00′ E	
G 3	54° 08.00′ N	006° 00.00′ E	
G 4	54° 10.00′ N	007° 54.00′ E	
G 5	54° 18.00′ N	003° 20.00′ E	
G 6	54° 45.00′ N	003° 15.00′ E	
G 7	54° 45.00′ N	004° 45.00′ E	
G 8	54° 00.00′ N	006° 06.00′ E	(is same as NL10)
G 9	55° 19.00′ N	006° 10.00′ E	
G 10	54° 30.00′ N	005° 15.00′ E	
G 11	54° 28.00′ N	007° 00.00′ E	
G 12	54° 41.00′ N	007° 00.00′ E	
G 13	54° 45.00′ N	006° 30.00′ E	
G 14	55° 50.00′ N	003° 50.00′ E	
G 30	54° 33.00′ N	008° 23.00′ E	
DEBL	54° 12.00′ N	007° 27.00′ E	
OSTOR	53° 49.00′ N	009° 03.00′ E	
EDUBU5	4° 11.00′ N	006° 30.00′ E	
ETMN	53° 46.05′ N	008° 39.52′ E	
WELGO	54° 18.00′ N	007° 25.00′ E	
TUSKA	55° 00.00′ N	007° 53.00′ E	

3 National Focal Point

MLZ Cuxhaven Am Alten Hafen 2 27472 Cuxhaven Federal Republic of Germany Tel: + 49 (0) 4721 567 485 Fax: + 49 (0) 4721 554 744 E-mail: MLZ@havariekommando.de	Havariekommando Central Command for Maritme Emergencies FB 2 “Schadstoffunfallbekämpfung See". Am Alten Hafen 2 27472 Cuxhaven Federal Republic of Germany Tel: + 49 (0) 4721 567 480/1/2/3 Fax: + 49 (0) 4721 567 490 E-mail: FB2@havariekommando.de



GERMAN NAVIGATION POINTS

Chapter 5

Republic of Ireland

Number: Two Casa CN-235MP Based at Casement Aerodrome, crewed 24/7

Principal Role: Maritime Surveillance, Search and Rescue, Air Ambulance, Troop & Logistics Support,

Length: 21.4 m

Wing Span: 25.8 m

Height: 8.2m

Cruise speed: 240Kts, 265 mph (426 km/h)

Range: 3000km (with 2000kg Cargo)

Crew: 6 (2 x Pilots, 2 x Systems & Radar Operators, Signalman, Photographer)

Radar: Telephonics APS-143C/V3 Oceaneye, Airborne Long Range Maritime Surveillance Radar. This is the aircrafts primary sensor with a range of 200nm **Forward Looking Infra-Red (FLIR):** StarSafire III Thermal/Electro-Optic Imaging System in conjunction with the radar augments crew acquisition of targets.

Secure AIS: SAAB Automatic Identification System used to detect AIS equipped marine vessels.

Communications Systems: U/VHF Tactical Radio, 2 Collins ARC 9000 HF, 1 Thrane and Thrane SatCom Aero I, 1 SINCGARRS Tactical VHF, TX/ARQ HF/SatCom Datalink.

CHAPTER 6

NETHERLANDS

DORNIER 228

1 Introduction

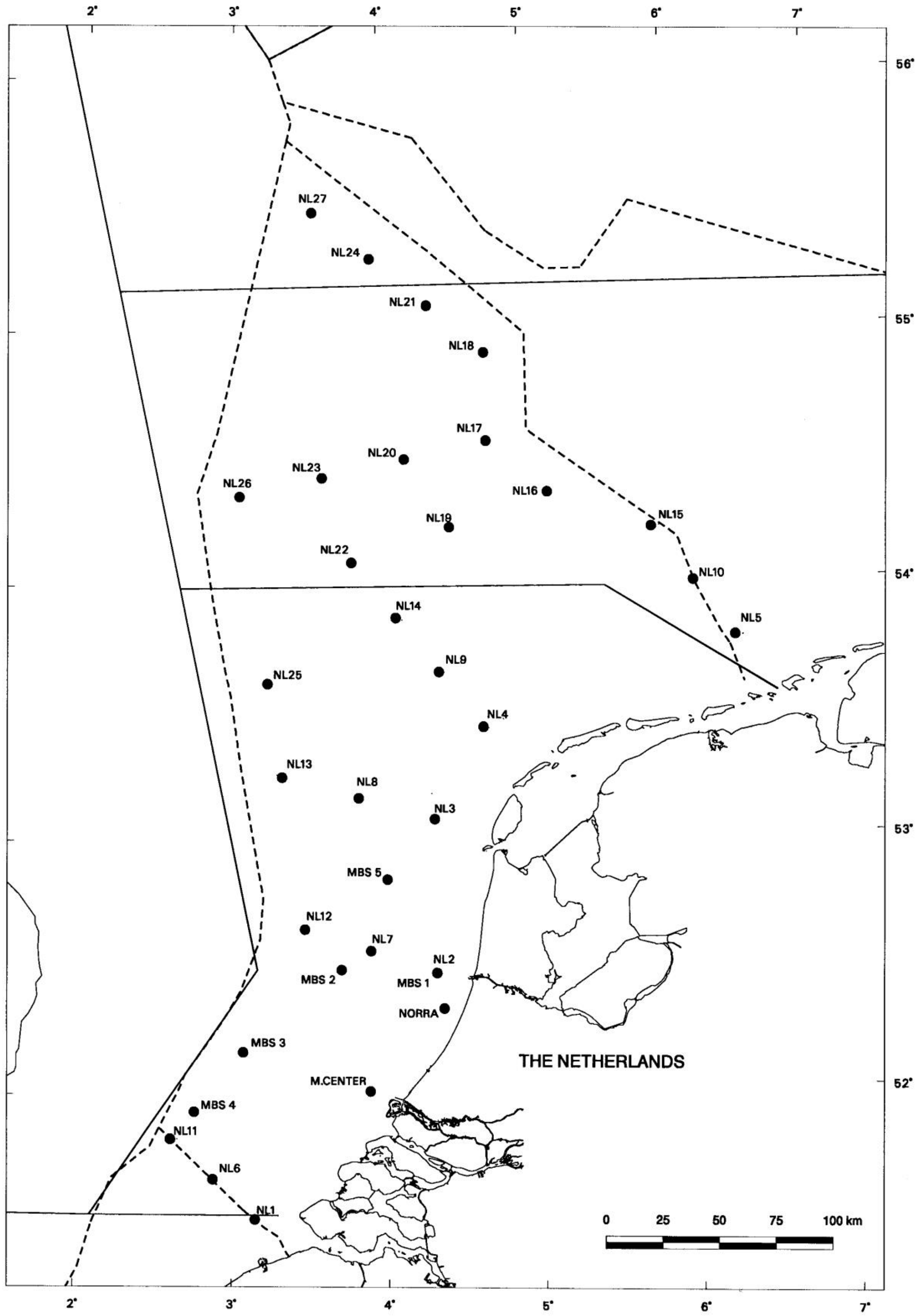
1.1 The Ministry of Defence, represented by the Netherlands Coastguard, operates two Dorniers 228-212. The aircraft are equipped with SLAR (Terma), FLIR, video camera and digital photo cameras. A data downlink is part of the system.

2 National Surveillance Points

NL1	51° 31′ 05" N	003° 09′ 01" E
NL2	52° 29′ 06" N	004° 20′ 00" E
NL3	53° 05′ 30" N	004° 20′ 00" E
NL4	53° 27′ 12" N	004° 40′ 00" E
NL5	53° 47′ 30" N	006° 22′ 00" E
NL6	51° 40′ 32" N	002° 52′ 57" E
NL7	52° 34′ 28" N	003° 54′ 16" E
NL8	53° 10′ 39" N	003° 49′ 59" E
NL9	53° 40′ 16" N	004° 22′ 37" E
NL10	54° 00′ 38" N	006° 05′ 55" E
NL11	51° 49′ 56" N	002° 36′ 41" E
NL12	52° 39′ 38" N	003° 28′ 30" E
NL13	53° 15′ 39" N	003° 19′ 43" E
NL14	53° 53′ 08" N	004° 05′ 30" E
NL15	54° 13′ 42" N	005° 49′ 42" E
NL16	54° 22′ 30" N	005° 07′ 49" E
NL17	54° 34′ 47" N	004° 43′ 17" E
NL18	54° 55′ 32" N	004° 43′ 07" E
NL19	54° 14′ 25" N	004° 27′ 41" E
NL20	54° 30′ 40" N	004° 09′ 39" E
NL21	55° 06′ 45" N	004° 19′ 48" E
NL22	54° 06′ 09" N	003° 47′ 53" E
NL23	54° 26′ 22" N	003° 36′ 09" E
NL24	55° 17′ 54" N	003° 56′ 15" E
NL25	53° 37′ 41" N	003° 14′ 00" E
NL26	54° 21′ 55" N	003° 02′ 47" E
NL27	55° 28′ 58" N	003° 32′ 29" E
NERRA	52° 20′ 42" N	004° 22′ 36" E
MBS1	52° 29′ 06" N	004° 20′ 00" E
MBS2	52° 30′ 00" N	003° 42′ 42" E
MBS3	52° 10′ 35" N	003° 04′ 30" E
MBS4	51° 56′ 21" N	002° 45′ 45" E
MBS5	52° 51′ 18" N	004° 01′ 00" E
Maas C.	52° 01′ 11" N	003° 53′ 33" E

3 National Focal Point

Netherlands Coast Guard Den Helder P.O. Box 10000 1780 CA Den Helder The Netherlands Direct Alert Tel No: + 31 900 0111 Tel: +31 223 542 300 Fax: +31 223 658 358	Ministry of Transport, Public Works and Water Management, Rijkswaterstaat Noordzee P.O. Box 5807 2280 HV Rijswijk The Netherlands Tel: +31 70 336 6600 Fax: +31 70 3951724



NETHERLANDS NAVIGATION POINTS

NZ0178H

CHAPTER 7

NORWAY

NORWAY

1 Introduction

Norway operates one special mission Beech 350ER (extended range) aircraft, fully equipped with a remote sensing capability and a drop tube. Norway also has a backup aircraft equipped with SLAR and foto/video capabilities.

2 National Surveillance Points

N01	59°08,0’ N	010°38,0’ E
N02	58°40,0’ N	010°00,0’ E
N03	58°35,0’ N	009°28,0’ E
N04	58°12,0’ N	008°55,0’ E
N05	57°55,0’ N	008°20,0’ E
N06	57°50,0’ N	007°00,0’ E
N07	58°30,0’ N	005°20,0’ E
N08	60°17,0’ N	004°40,0’ E
N09	61°00,0’ N	004°20,0’ E
N10	61°40,0’ N	004°20,0’ E
N11	62°25,0’ N	005°00,0’ E
N12	63°10,0’ N	007°00,0’ E

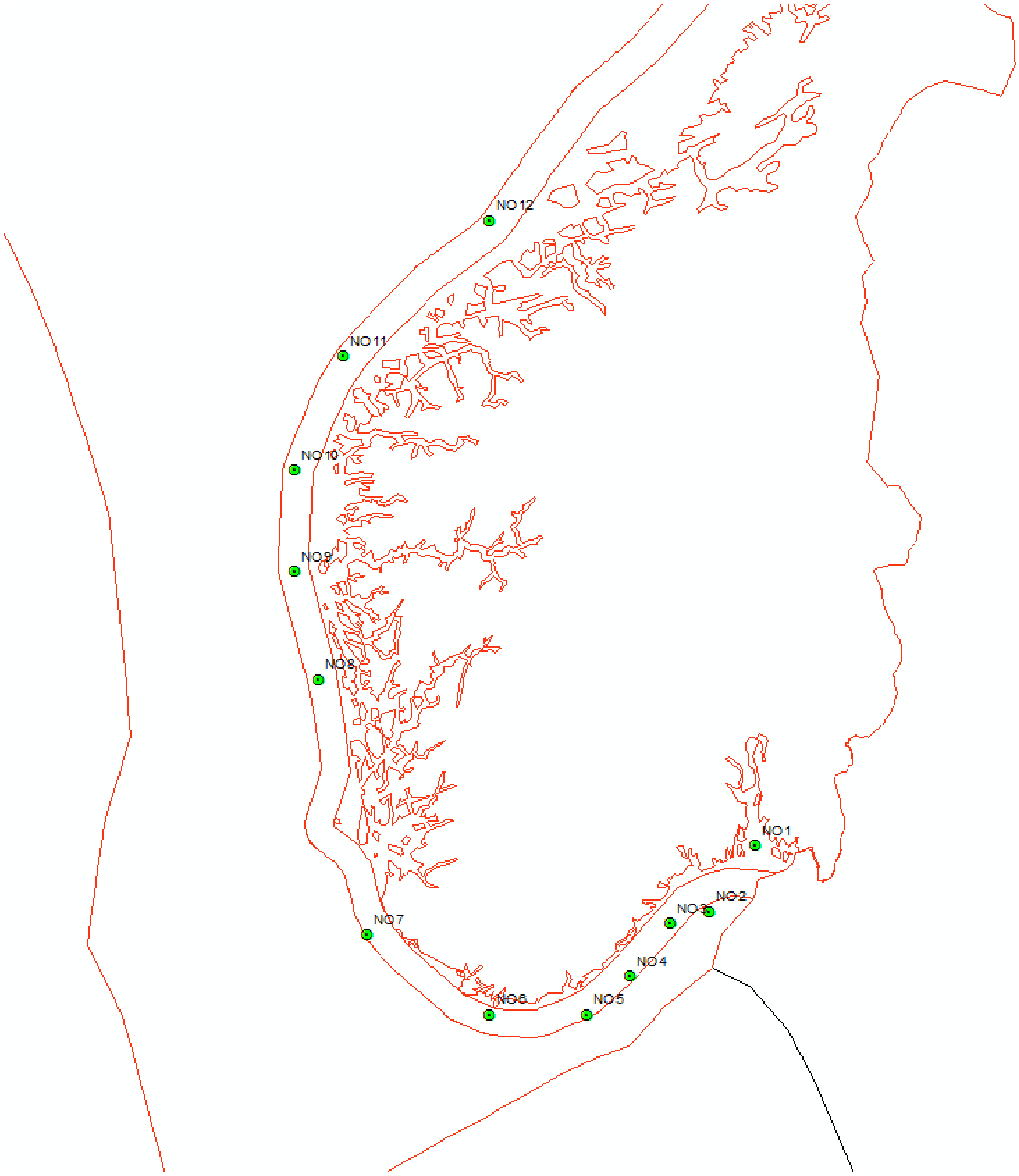
3 National Focal Point

Norwegian Coastal Administration
Centre for Emergency Preparedness
P.O. Box 125
N-3191 Horten, Norway

Duty officer
Tel: +47 33034800 (24 hour)
Fax: +47 33034949
Email: vakt@kystverket.no

Contact Address, Telephone, Fax:
Norwegian Coastal Administration
Centre for Emergency Preparedness
P.O.Box 125
N-3191 Horten, Norway

Tel: +47 33034800
Fax: +47 33034949


NO 12
NO 11
NO 10
NO 9
NO 8
NO 7
NO 6
NO 5
NO 4
NO 3
NO 2
NO 1

CHAPTER 8

SWEDEN

DASH 8 Q-300

1 Introduction

1.1 The Swedish Coastguard operates three Dash 8 Q-300, all fully equipped with remote sensing systems, for routine operations in the Skagerrak and North Sea. The aircraft are based in Nykōping, Skavsta Airport (ESKN).

2 National Surveillance Points

S6	57°40°7'	N	011°10°7'	E
S7	57°54'	N	011°01'	E
S8	58°15°4'	N	010°01°5'	E
S9	58°30°4'	N	010°08°5'	E
S10	58°45°4'	N	010°35°4'	E
S11	58°53°3'	N	010°38°3'	E
S12	58°25'	N	010°35'	E
S13	58°10'	N	010°30'	E

3 National Focal Point

Swedish Coast Guard Headquarters
Stumholmen
S-371 23 Karlskrona
Sweden

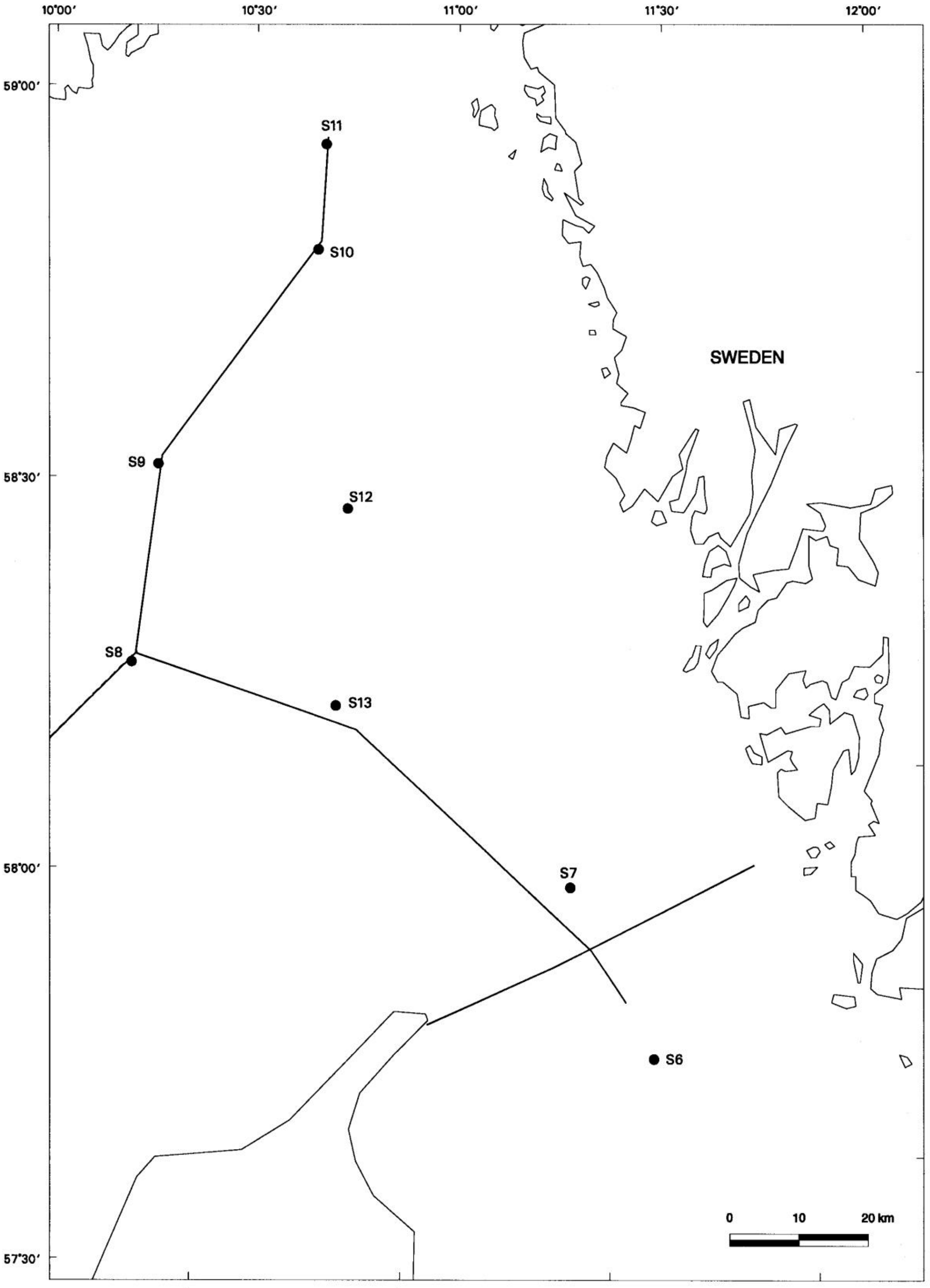
Tel: +46 455 353 535
Fax: +46 455 812 75

Ministry of Defence
S-103 33 Stockholm

Tel: +46 8 405 2611
Fax: +46 8 204 483

Contact Point for POLREPs, Algae Reports, MOU Port State Control and equipment requests to :
Swedish Coast Guard Headquarters
Stumholmen
S-371 23 Karlskrona

Tel: +46 455 35 35 35 / 36
Fax: +46 455 812 75



SWEDISH NAVIGATION POINTS

NZ0178B

CHAPTER 9

UNITED KINGDOM

CESSNA 406

1 Introduction

1.1 The United Kingdom, Maritime and Coastguard Agency (MCA), Counter Pollution Branch, plans, directs and controls regular surveillance flights using two marine pollution surveillance aircraft. The aircraft, a Cessna 404 and a Cessna 406 are equipped with SLAR, IR/UV, Video and digital cameras, night identification equipment and a data transmission system. The UK also participates in the EMSA CleanSeaNet service and receives a number of Synthetic Aperture Radar acquisitions per month which are used in conjunction with routine fixed wing surveillance of the UK Pollution Control Zone.

2 The United Kingdom Pollution Control Zone

2.1 The UK Pollution Control Zone covers more than 300,000 square kilometres of sea. To the north, the zone extends nearly 200 miles north of the Shetland Isles; it then follows the median line through the North Sea to the English Channel. The English Channel is shared with France, along the median line, to the Celtic Sea out to 170 miles south east of the Isle of Scilly. The boundary, shared with the Republic of Ireland, then travels northeast to the Irish Sea. After passing through the Irish Sea and North Channel the zone goes out to 200 miles west of Rockall before moving along the border, shared with Iceland and Faeroe Islands, back to north of the Shetland Isles.

2.2 The UK's 18,000 kilometres of coastline is one of the largest in Europe, and the UK economy relies on shipping for 95 per cent of its visible trade. There are several major commodity ports, London, Milford Haven, Teesport, Grimsby / Immingham, Southampton, Forth, Liverpool, Manchester and Medway. The major oil/gas terminals are Teesport, Sullom Voe, Flotta, Hound Point, Milford Haven and Southampton.

2.3 A large volume of shipping passes through UK waters en route to or from major ports on the European mainland. There are a number of straits for example the Pentland Firth, Little Minch, North Channel and the Dover Strait. The Dover Strait connects the English Channel to the North Sea and is one of the busiest straits used for international navigation, with some 350 through shipping movements per day. Due to this density of shipping, as well as bad weather and strong tidal currents, the risk of collision is ever present.

2.4 The UK has several hundred oil and gas producing fields. The gas fields are predominantly located in the Southern North Sea and in Morecambe Bay in the Irish Sea, whereas the oil fields are located in the Central and Northern North Sea and West of Shetland. Oil and gas production has been carried out since the mid 1960's. Recent new activity include areas to the West of Scotland and on international boundaries between the Faeroes, Norway and the UK.

2.5 The UK has suffered 3 of the world's 20 largest recorded oil spills, Torrey Canyon, Braer and Sea Empress.

2.6 The Maritime and Coastguard Agency (MCA) is responsible for minimising the risk of pollution of the marine environment from ships and, where pollution occurs, minimising its impact on UK waters, coastlines and economic interests. The MCA works closely with the Department of Energy and Climate Change (DECC), which in part is responsible for regulating and licensing offshore installations, including minimising the risk of pollution.

2.7 The MCA aerial surveillance flight programme varies from month to month to avoid becoming predictable so as not to undermine the deterrent effect. Aerial surveillance is generally targeted on the areas posing the greatest risk such as the major shipping routes and around the offshore installations. CleanSeaNet is used to assist this targeting process.

3 National Surveillance Routing

3.1 The United Kingdom Pollution Control Zone is divided into regions/areas. The surveillance flight is programmed by region/area. Within each region/area the patrol aircraft routes along the shipping routes or around offshore installations. The United Kingdom does not specify national navigation points. A chart showing the United Kingdom Marine Aerial Surveillance Regions is on the following page.

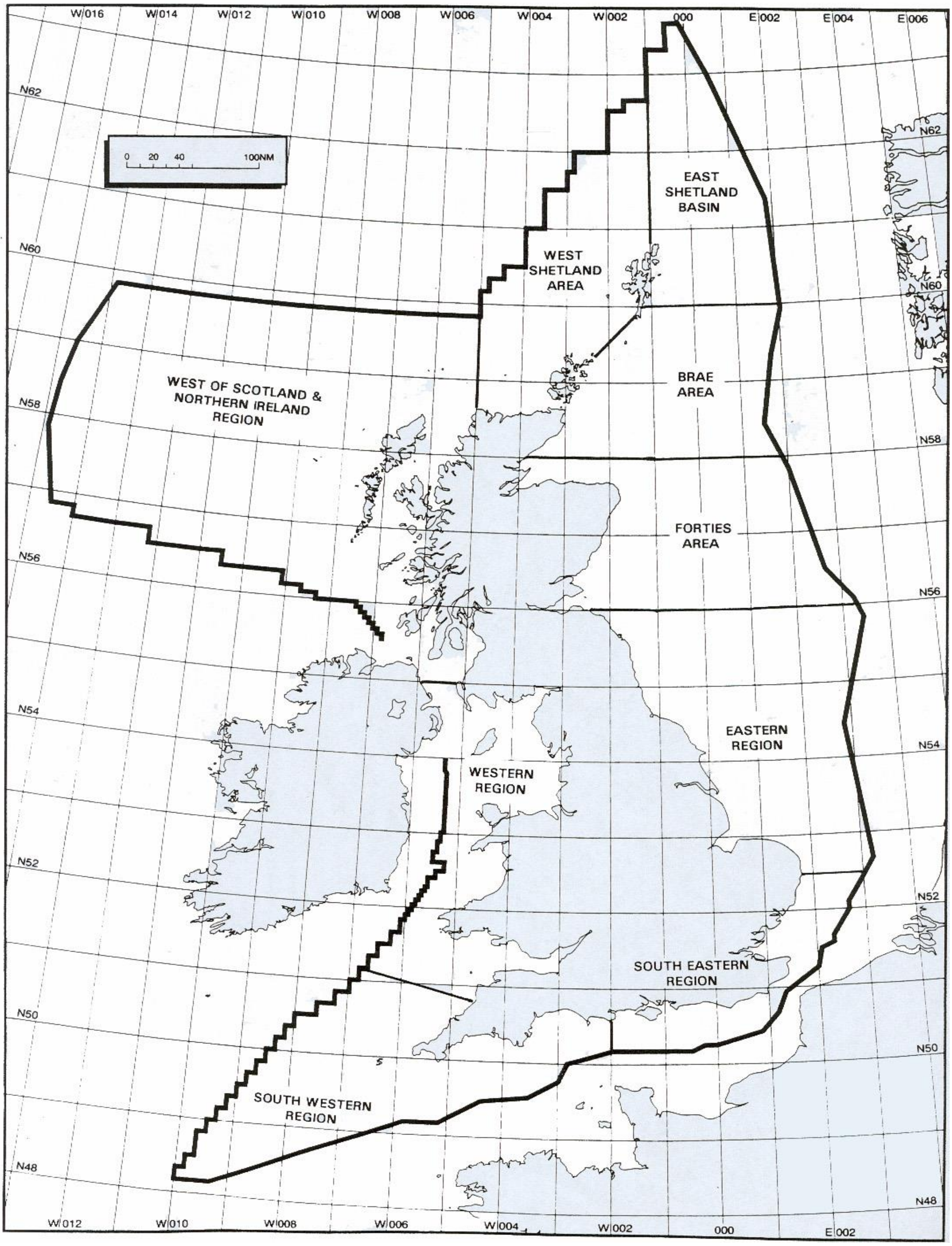
4 National Focal Point

24 hour contact point
Maritime and Coastguard Agency (MCA)
Falmouth Maritime Rescue Co-ordination Centre
Pendennis Point
Castle Drive
Falmouth
Cornwall
TR11 4WZ

Telephone +44 1326 317575
Fax +44 1326 318342

Office hours contact point
Maritime and Coastguard Agency (MCA), Counter Pollution Branch
Spring Place, 105 Commercial Road
SOUTHAMPTON
United Kingdom
SO15 1EG
Telephone +44 1703 329 100 (Switchboard)
Fax +44 1703 329 446 (MEOR)

The contact details for Aberdeen MRCC = Scotland and N.Ireland Region HM Coastguard 4th Floor Marine House Blaikies Quay ABERDEEN AB11 5PB Tel: +44(0)1224 592334 Fax: +44(0)1224 575920	It would not do any harm to include Shetland for reports North of 59deg should the reporting crew fail to contact Aberdeen. Contact details for Shetland MRCC: HM Coastguard The Knab Knab Road LERWICK Shetland ZE1 0AX Tel: 01595 692976 Fax: 01595 694810


0 20 40 100NM
EAST SHETLAND BASIN
WEST SHETLAND AREA
WEST OF SCOTLAND & NORTHERN IRELAND REGION
BRAE AREA
FORTIES AREA
EASTERN REGION
WESTERN REGION
SOUTH EASTERN REGION
SOUTH WESTERN REGION

CHAPTER 10

SPAIN

CASA CN 235-300

1. Introduction

The Spanish Maritime Safety Agency (SASEMAR), the operations branch of the Maritime Authority (General Directorate of the Merchant Marine), controls the marine pollution aerial surveillance missions. SASEMAR owns 3 aircraft CASA CN235-300 fully equipped, one of which patrols the Mediterranean Sea, and the other two the Atlantic Ocean, covering the Spanish North Coast and the Canary Islands respectively.

The aircraft based in Santiago de Compostela, Galicia, patrols the Spanish North Atlantic Coast, and is fitted with specific antipollution sensors: SLAR, IR/UV, MWR, LFS, and with other equipment: FLIR/CALI, video recorder, digital photo camera, AIS and data link, managed by two operators placed in two mission consoles. The data is analyzed in the Mission Support Centre.

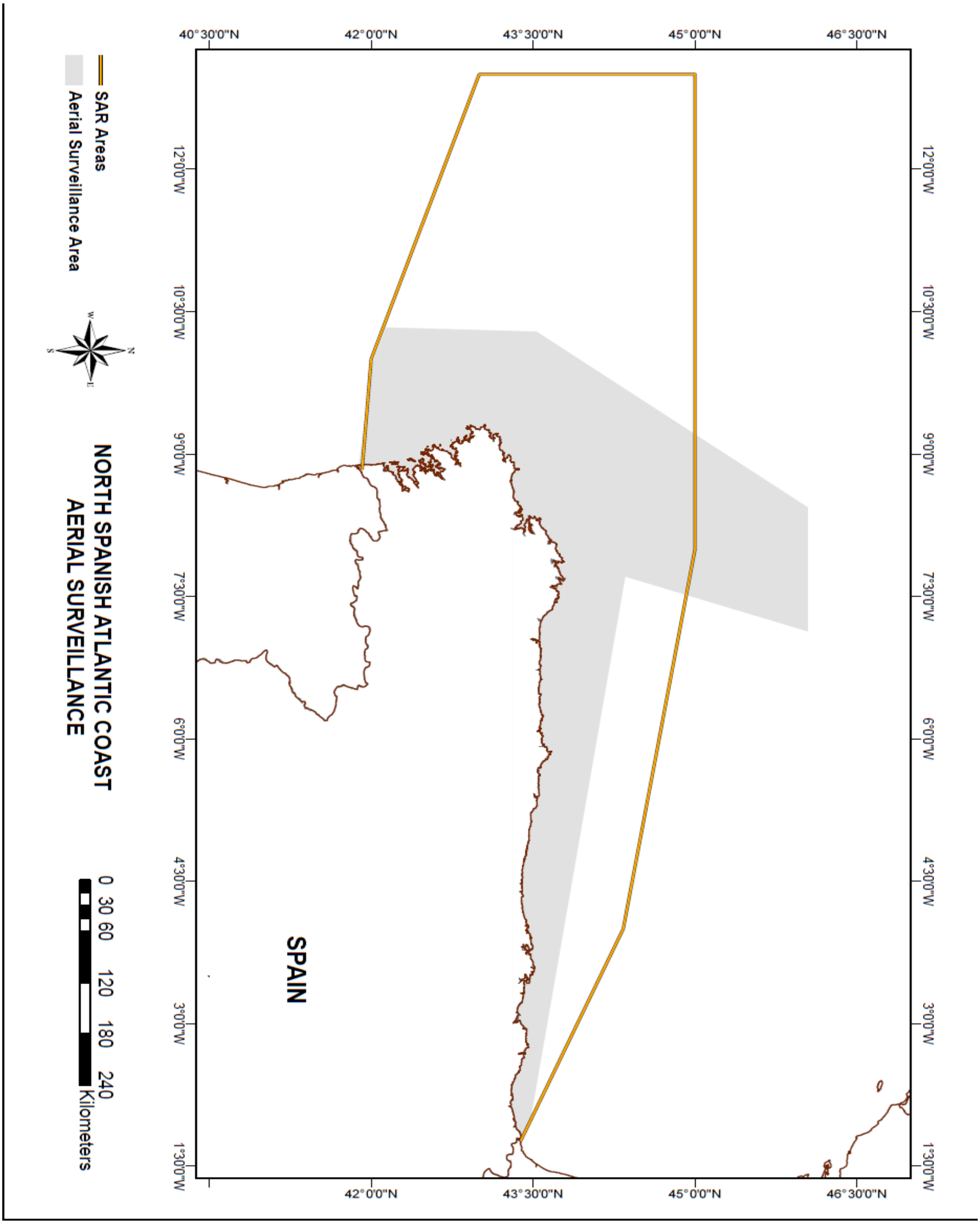
The helicopters can support the marine pollution aerial surveillance, even taking samples from the sea. The Spanish Maritime Safety Agency operates eleven helicopter bases with nine medium size helicopters (three AW139 in the Spanish North Atlantic Coast), and two heavy helicopters (one EC 225 in the Spanish North Atlantic Coast), equipped with FLIR, video recorder and digital photo camera.

2. National Surveillance Points

SASEMAR plans the surveillance routes in the Spanish North Atlantic Coast, taking into account the major shipping routes in the area, the Finisterre Traffic Separation Scheme, the satellite images coverage and pollution information reported. National navigation points are not included in this chapter as the surveillance flight programme varies periodically. The following chart shows the area covered by the routine surveillance flights in the Spanish North Atlantic Coast.

3. National Focal Point

National authority	24 hour contact point
GENERAL DIRECTORATE OF THE MERCHANT MARINE Subdirectorate of Maritime Security, Pollution and Inspection C/ Ruiz de Alarcón 1 28071 MADRID SPAIN Tel 91 597 92 70 Fax 91 597 92 87/35 Mail vjimenez@fomento.es	SPANISH MARITIME SAFETY AGENCY MRCC c/Fruela 3 28011 MADRID SPAIN Tel 91 755 91 32 / 91 755 01 33 Fax 91 526 14 40 Mail cncs@sasemar.es (in case of emergency, please make a previous call)


NORTH SPANISH ATLANTIC COAST
AERIAL SURVEILLANCE
SAR Areas
Aerial Surveillance Area
SPAIN
0 30 60 120 180 240
Kilometers
40°30'0"N
42°0'0"N
43°30'0"N
45°0'0"N
46°30'0"N
12°0'0"W
10°30'0"W
9°0'0"W
7°30'0"W
6°0'0"W
4°30'0"W
3°0'0"W
1°30'0"W