



Bonn Agreement Accord de Bonn

Bonn Agreement Aerial Operations Handbook, 2009

PART 1: GENERAL

PART 2: REMOTE SENSING AND OPERATIONAL GUIDELINES	1
1 Remote Sensing	4
1.1 Introduction	4
1.2 Sensors – General Requirements	4
1.3 Side Looking Airborne Radar (SLAR)	4
1.4 Synthetic Aperture Radar (SAR)	4
1.5 Ultra Violet Line Scanners or Camera (UV)	5
1.6 Infrared Line Scanner or Camera (IR).....	5
1.7 Microwave Radiometer (MWR)	5
1.8. Forward Looking InfraRed (FLIR).....	5
1.9 Laser Fluorosensor (LFS)	5
1.10 Low Light Level Television Camera (LLLTV)	6
1.11 Night Identification System	6
1.12 Photographic Camera (PHOTO).....	6
1.13 Video Camera (VC).....	6
1.14 Further Sensor Developments and Improvements.....	6
1.15 Sensor Systems.....	6
1.16 Platforms	7
1.17 Satellites.....	7
1.18 Major Pollution Incidents	8
1.19 Routine Patrols.....	8
2 Tour de Horizon	9
2.1 Introduction	9
2.2 Tour de Horizon Flight Planning	9
2.3 Tour de Horizon Routing Points.....	9
2.4 Tour de Horizon Weather Criteria.....	9
2.5 Tour de Horizon Flight Conduct.....	9
2.6 Detection Investigation	9
2.7 Detection and observatoin Reporting.....	9
2.8 Detection Data Security	10
2.9 National Tour de Horizon Reports	10
2.10 National Stations / Centres within the Tour de Horizon Area.....	10
2.11 National Focal Points within the Tour de horizon Area.....	10
3 Co-ordinated Extended Pollution Control Operation (CEPCO).	16
3.1 Introduction	16
3.2 CEPCO Objectives	16



Bonn Agreement Accord de Bonn

PART 2:

REMOTE SENSING AND OPERATIONAL GUIDELINES

3.3	Participating Countries.....	16
3.4	Area of CEPCO.....	16
3.5	Planning and Operational Conditions of CEPCO Flights	16
3.7	Operating Airport/Airbase.....	17
3.8	Establishment of an Operational Command Centre (CC).....	17
3.9	Communications.....	17
3.10	Handover.....	17
3.11	Briefing and Debriefing.....	18
4	Aerial Surveillance Exercises.....	19
4.1	Introduction	19
4.2	Requirements for Aerial Surveillance Exercises.....	19
4.3	Conclusion.....	19

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.

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 Standard Pollution Reporting Log is used.

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.

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 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 false 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 SAR is similar to the SLAR. From a technical point a view there are some important differences. Where the SLAR uses a fixed antenna length the SAR system can define the antenna length by sampling echoes 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 micrometers. 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 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 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 micrometers 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. 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 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 the MARPO regulations or even much higher will not result in layer thickness over 0.1 mm.

1.8 Forward Looking InfraRed (FLIR)

Forward Looking Infrared is similar to the IR sensor (1.6) however, it is installed in a gimble that provides the opportunity to turn around horizontally and has a tilt and pitch function. In the gimble 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. 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 gimble.

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 blow 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 operationally tested in Germany and indicated the capability to provide information on the type of pollution. The experience is limited so far.

1.10 Low Light Level Television Camera (LLTV)

The LLTV 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, LLTV 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, LLTV with IR / Laser illumination for example. The main requirement is to be able to read and record the ship's name in darkness.

1.12 Photographic Camera (PHOTO)

Conventional 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 camera are an integrated part of the remote sensing system and that on the photographs data-annotation is printed.

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.

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 combine 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, floppy disc, or tape are possibilities. Images as presented on the display to the operator can also be stored on video tape 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 photo's are directly sent to the Port State Control Authorities.

1.16 Platforms

World wide, most experience with remote sensing has been obtained using small fixed-wing aircraft. 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. 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.

Attempts have been made to use special sensors, such as cameras and thermal imagers, on board vessels. Mounted on the masts sometimes images can be obtained. However, in general it is found that the platforms are not stable and even when mounted in high masts still too low for good use.

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, a video camera 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. Relatively new is remote sensing by means of satellites.

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 m², 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 can not (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. 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.

In order to take advantage of availability of satellite SAR images it is recommended to study the orbits of the satellite and the area covered so that the covered area can be incorporated into the aircraft routing. Furthermore the acquisition schedule of the satellite can be used to adjust the flight program of remote sensing aircraft or even reduce the number of flights by having the aircraft on stand-by if the satellite covers the area of interest. On receipt of the imagery obtained from satellite the aircraft may be diverted to check possible pollution or, on the occasion that no pollution has been detected the aircraft may focus on areas not covered by satellite.

It is emphasised that satellite SAR can easily provide an overview on possible floating pollution of relatively large sea areas. An early warning system requiring a follow-up by airborne surveillance for at least applying 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.

Reference is made to the EU/EMSA Clean Sea Net (CSN) programme for up-dated information on the satellite program and the service within CSN.

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).

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 from 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 to IMO regulations.

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 ship's 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 from 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 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 over night 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.

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'.

The Air Traffic Procedures for Operations within the UK Offshore Area - 2004 are at Annex B.

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 9, Annex C.

2.7 Detection and observatoin 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 1m³ 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 1m³ should be reported by telephone and all detections by 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.

Although no attempt has been made to recommend the method of communicating the detection reports, experience shows that the relay of detection reports through other agencies such as Air Traffic Control and Offshore Installation radio stations cannot be relied on and should not be used.

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 responsible for aerial surveillance 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.

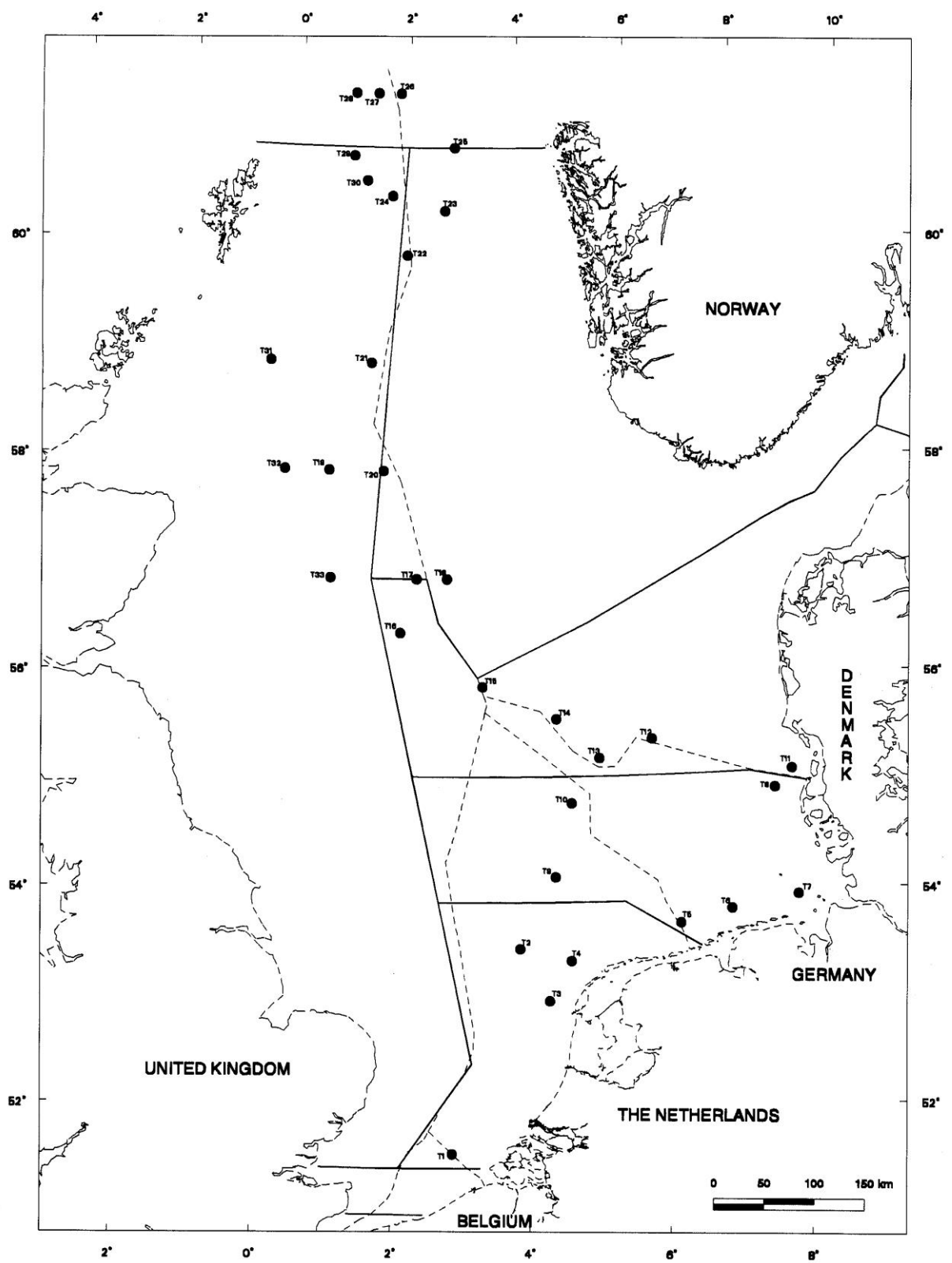
2.11 *National Focal Points within the Tour de horizon Area*

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

ANNEX A

TOUR DE HORIZON ROUTING POINTS AND CHART

Route Point	Latitude	Longitude	Remarks
T1	5140N	00253E	NL6
T2	5234N	00354E	NL7
T3	5305N	00420E	NL3
T4	5327N	00440E	NL4
T5	5347N	00620E	NL5
T6	5354N	00707E	G0
T7	5400N	00808E	G1
T8	5500N	00753E	TUSKA
T9	5414N	00427E	NL19
T10	5455N	00443E	NL18
T11	5510N	00810E	D01
T12	5530N	00600E	D02
T13	5520N	00510E	D04
T14	5542N	00430E	D07
T15	5600N	00320E	
T16	5630N	00200E	
T17	5700N	00215E	
T18	5700N	00245E	
T19	5800N	00045E	
T20	5800N	00140E	
T21	5900N	00125E	
T22	6000N	00200E	
T23	6025N	00240E	
T24	6033N	00143.1E	OSCAR GATE
T25	6100N	00250E	
T26	6130N	00150E	
T27	6130N	00125E	
T28	6130N	00100E	
T29	6055N	00100E	
T30	6041.3N	00115E	MIKE GATE
T31	5900N	00020W	
T32	5800N	00000W	
T33	5700N	00050E	



TOUR D'HORIZON BASIC REPORTING POINTS
TOUR DE HORIZON ROUTING POINTS CHART

NZ01781

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.

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:	National stations / Centres within the Tour De Horizon area for “in flight” detection reporting 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 and UHF availability is subject to prior coordination on tel: +45 8943 3206 (or 3207))
Germany:	Maritime VHF channel 16 for call Airborne VHF 129.95 HF freq.: 2839 kHz Callsign: CUXHAVEN MELDEKOPF
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)

**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:	Maritime Assistance Service Tel: +45 8943 3211 Fax: +45 89 43 3230 e-mail: mas@sok.dk
Germany:	MLZ Cuxhaven Tel: + 49 (0) 4721 567 485 Fax: + 49 (0) 4721 554 744 / 45
Netherlands:	Netherlands Coast Guard Den Helder Tel: + 31 (0) 223 542 300 Fax: + 31 (0) 223 658 358 mail: ccc@kustwacht.nl
Norway:	Norwegian Coastal Administration Tel: + 47 33 03 4808 Fax: + 47 33 03 4949
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.

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 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.

Table of contents

BONN AGREEMENT AERIAL OPERATIONS HANDBOOK, 2008	1
2 GENERAL	4
3 SURVEILLANCE FLIGHTS	7
4 STANDARD REPORTING SYSTEM	9
5 SURVEILLANCE EVIDENCE	10
6 DIPLOMATIC CLEARANCE	11
7 POLLUTION RESPONSE SUPPORT	12
8 FLIGHT SAFETY	17
9. COMMUNICATIONS.....	18

1 *Introduction*

The North Sea is an important economical and ecological area. 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.

The Bonn Agreement was established 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 combating 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 phenomena. However, it is only one means of detecting oil and other harmful substance spills. Satellite surveillance also plays an (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 also specific response support flights are addressed and obviously the reporting formats.

2 General

2.1 Participating States

All the states adjacent to the North Sea and the English Channel are party to the Bonn Agreement.

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

The European Community is also a Contracting Party to the Bonn Agreement, but doesn't have the operational assets as the coastal states .

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° 0' 00.00"N,
- (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)

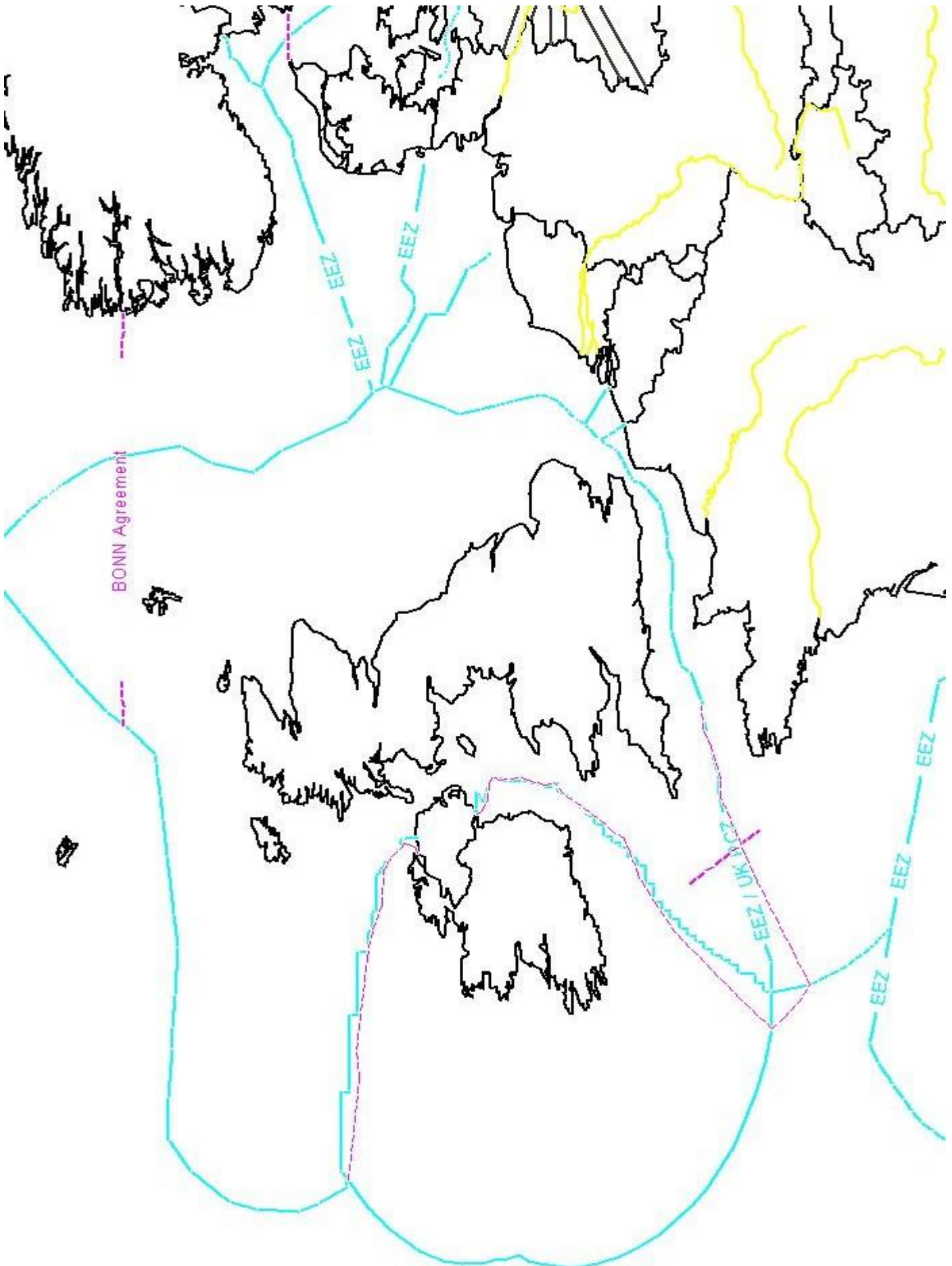
For the purpose of the Agreement, the North Sea area is divided into zones of responsibility (or control zones). These zones, together with continental shelf boundaries, are indicated on the map on Page 8.

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.

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



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 direct 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 Annual Flying Programme is prepared by the lead country for discussion and decision in OTSOPA. The aerial surveillance data are summarised by the Contracting Parties themselves and annually presented in report form by the Secretariat. In close co-operation 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 the separate leaflet on 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 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 aircraft and satellite. 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 in 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 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.
- 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.

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

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

In case of a detection of 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.

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 may 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 a chart lets 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 agreements between Contracting Parties have been established for mutual assistance in response operations and in aerial surveillance. Examples are the agreements between Denmark, Germany and The Netherlands (DenGerNeth) and Norway/United Kingdom (NORBRITPLAN).

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

3.7 Co-ordinated Extended Pollution Control Operation (CEPCO)

The Contracting Parties have agreed a programme 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.

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 agreed to collaborate to the best of their abilities. One such exercise is the Aerial Surveillance Exercise. The exercise consists of field trials and a 'workshop' to compare results, exchange operational and technical experience and information to further the development and improvement of remote sensing techniques and procedures.

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

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

BONN 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 an illegal to the national focal point of the coastal state in who's 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 response operation may be required and the aircraft could be asked to stay in the area for further observations and guidance.

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

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.

Completed Standard Pollution Reporting Log are 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 Bonn Agreement Manual Oil Pollution at Sea – Part 2 – Effective Prosecution of Offenders – Guidelines on International Co-operation).

4.3 Standard Pollution Reporting Log

The Standard Pollution Reporting Log 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 Standard Pollution Reporting Log 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 two other formats are in use as follows:

- Pollution Observation Report on Polluters and Combustible Spills [Annex C](#)
- Algae Observation Report [Annex D](#)

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.
- Result of CEPCO Flights
- Result of Tour de Horizon Flights.

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. The organising country will present the results of the CEPCOS and Aerial Surveillance Exercise separately.

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:
 - Standard Pollution Reporting 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 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, which judicial system requires 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 an 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 for Prosecutors and Investigators have produced a Manual on Evidence to Court 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.

7 Pollution Response support

7.1 Introduction

When during a routine patrol flight a pollution is observed and the assessment of volume and treatment 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 is the term used for the process of evaporation; dispersion and dissolution of oil into the related compartment.

Also in case of catching a polluter red-handed it may be required to overfly the area for a period of time in order to keep a close look at the suspected polluter and to monitor the behaviour of the oil slick.

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, to learn and record the time required to totally disperse the oil slick.

Communications with the response authorities, or the Coastguard, may lead to the decision to revisit the slick after some hours in order to register the behavior 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 this 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.

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 that when the ETA of the response vessel(s) is known, the aircraft should revise the flight plan in a way that the aircraft returns in time for guiding the response unit.

Further technical details on the procedure to provide the guidance should be obtained at 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 1.5 knots and as it is recommended 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 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. Chemical dispersants assist this process by reducing the interfacial tension between the oil and water, so creating a larger number of smaller droplets. 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 dispersant should take into account the type and state of oil involved in the incident. Dispersant can and has 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 knot 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 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 earlier 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 ton 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 aerals 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 sensory 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.

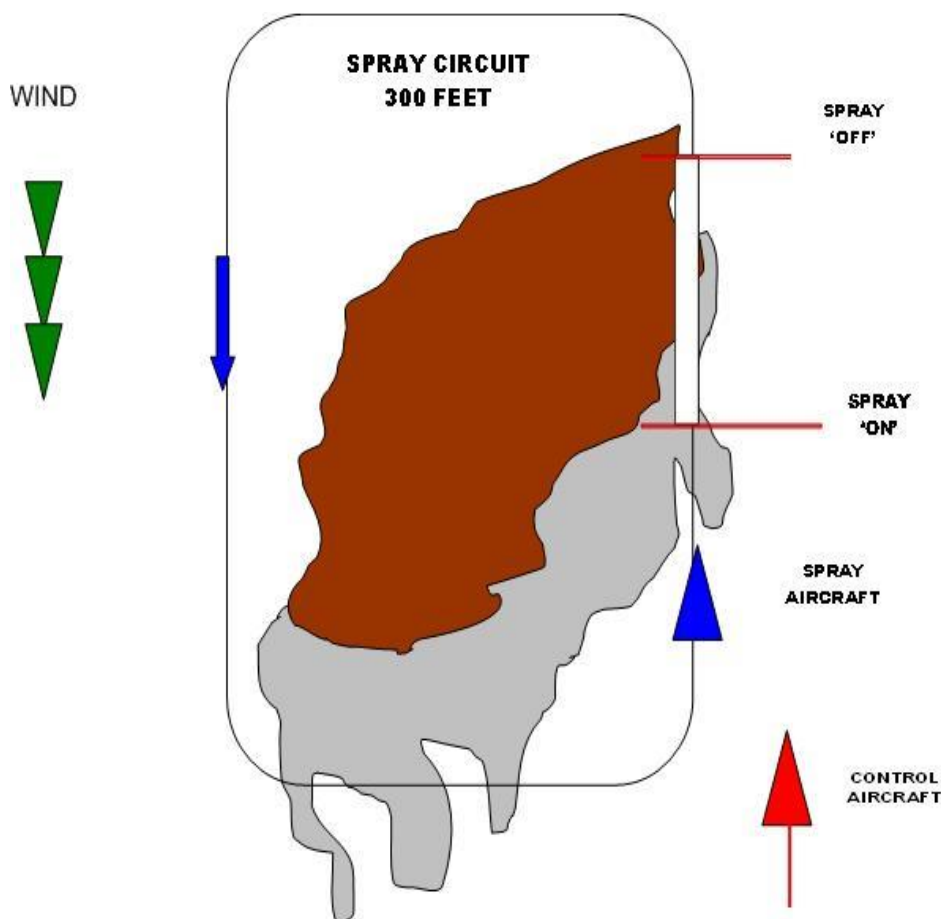
Provided the assessment is positive, indicating that the dispersant is working, a full application off dispersants can commence only when approval is confirmed by the responsible national authority. Spray efforts will be concentrated on the leading edge of the thickest portion of the slick and any thick 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, 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 dispersant on a number of occasions notably during the Sea Empress incident when 72,000 tonnes of crude oil was spilt 37,000 tonnes (52%) was deemed to have dispersed: 10,000 tonnes – naturally and 27,000 tonnes through the aerial application of dispersant.

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 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;
 - 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.

☐ 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		TIME OVER THE SEA		TOTAL	
					DAY		NIGHT		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			1	2	3	4	5	Oth			

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

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
Netherlands	31	Norway	47
Sweden (+ Helcom)	46	United Kingdom	44
Ireland	35		

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:

Length x Width x Cover %

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

[2.0] x [1.0] x [0.5]

= Oiled Area = 1 Km²

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 Km²] x [0.3 m³/km²] x [0.50] = 0.15 m³

[1 Km²] x [5.0 m³/km²] x [0.25] = 1.25 m³

[1 Km²] x [200 m³/km²] x [0.25] = 50 m³

Minimum Total Quantity = [0.15] + [1.25] + [50] =
51.4 m³

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].

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

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

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

Maximum Total Quantity = $[2.5] + [12.5] + [>50] = > 65 \text{ m}^3$

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

Note: For Algae Detection, use the Algae Observation Log.

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

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 : ☐ Inside ☐ Outside
4. DESCRIPTION OF THE POLLUTION:
- a. Type of Substance Discharged :
b. Estimated Quantity :m³
c. Length (km)d. Width (km) e. Coverage (%) : Length.....km Width.....km Coverage.....%
f. Oiled Area (km²) : Oiled Area.....(km²)
g. Percentage of Oiled Area by Appearance (%)
1=Sheen 2=Rainbow 3=Metallic 4:.....%
4=Discontinuous True Colour 5=True Colour 2:.....% 5:.....%
3:.....% Other:.....%
5. METHOD OF DETECTION AND INVESTIGATION:
- a. Detection (Visual, SLAR, IR, UV, Video, MW : ☐ Visual ☐ SLAR ☐ IR ☐ UV ☐ Video ☐ MW,
LFS, Identification Camera, Other) : ☐ LFS ☐ Video ☐ Ident.Cam ☐ 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

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/EUTC
:N,W/EUTC
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 SUBSTANCES BY AN OFFSHORE INSTALLATION

9. OFFSHORE INSTALLATION INVOLVED:
- a. Platform Name :
b. Position (lat/long) : NW/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:

.....
.....

☐ HELCOM ☐ BONN AGREEMENT

STANDARD ALGAE REPORTING LOG

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		TIME OVER THE SEA TOTAL	
					hrs	mins	hrs	mins	hrs	mins

No	AREA CODE	TIME UTC	POSITION		DIMENSIONS		AREA COVER %	AREA COVERED Km ²	ALGAE COLOUR COVERAGE %									DETECTION			
			LATITUDE 'NORTH'	LONGITUDE 'EAST/WEST'	LENGTH Km	WIDTH Km			1	2	3	4	5	6	7	8	9	SLAR	IR	UV	VIS

No	WEATHER				REMARKS	ALGAE COLOUR / APPEARANCE TABLE	
	WIND		WAVE HT	SEA TEMP		No	COLOUR / DESCRIPTION
	°					1	COLOURLESS
	°					2	YELLOW
	°					3	ORANGE
	°					4	RED
	°					5	GREEN
	°					6	BLUE
	°					7	BROWN
	°					8	UNKNOWN
	°					9	OTHER

**Standard Format for Reporting Aerial Surveillance Data
to the Bonn Agreement Secretariat
Oil Pollution Detected in [year] by [country]**

I. General

1. Contracting Parties should report their data on aerial and satellite surveillance of oil spills by filling in Tables 1 to 5 in section III (and, where appropriate, Table 6), taking into account the definitions in section II. Where no CEPCO or Tour de Horizon flights are carried out, there is no need to report under tables 2 or 3.
2. In relation to national maritime pollution surveillance flights, "detections" and "detections confirmed/observed as oil spills" which are made by Contracting Parties in the territorial waters or exclusive economic zones (EEZs) of another Contracting Party should be reported to that Contracting Party, which should report them to the Bonn Agreement Secretariat, indicating the Contracting Party which made the original detection. The collective Annual Report will indicate where Contracting Parties have made detections in the waters of other Contracting Parties.
3. In relation to CEPCO flights and Tour de Horizon flights, all "detections" and "detections confirmed/observed as oil spills" which are made by a Contracting Party in any part of the Bonn Agreement area should be reported to the Bonn Agreement Secretariat, as long as observations are performed by trained observers or operators. For CEPCO flights, the report should be made by the Contracting Party hosting the CEPCO, on behalf of all the Contracting Parties involved, indicating which Contracting Parties have made which detections.
4. Only "detections confirmed/observed as oil spills" are to be shown on the map prepared for the collective Annual Report.

II. Definitions used in the reporting of data from aerial and satellite surveillance

Aerial surveillance

Country	Name of the Contracting Party reporting.
One Flight	Unit of operation between take-off and next landing.
No. of flight hours	Nationally allocated flight hours over the sea carried out by trained observers on behalf of the Contracting Party.
Day (daylight)	From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac.
Night (darkness)	From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac.
Detections	Number of first reports on possible pollutions obtained in aerial operations (raw data) - that is, a "detection" is based on an instrumental approach, where SLAR, IR/UV or other instruments give a first indication that the wave pattern is influenced by some surface phenomenon.
Detections confirmed/observed as oil spills	Number of the total aerial-surveillance detections (first reports) that have been verified and/or identified visually or by means of instruments as oil spills, and are confirmed by a trained operator as pollution.
Estimated volume of a spill	The minimum volume of one spill calculated using the Bonn Agreement Oil Appearance Code (by applying the lower limit of the bracket in the Code).
No. of polluters	Number of sources of pollution identified.
Slick	An area of (possible) pollution.
Spill	A collection of one or more slicks originating from the same source.
Spill ID	A unique reference for each spill. The reference should consist of a letter (or letters) identifying the Contracting Party (B, DK, F, G, NL, N, S, UK), and a number in sequence, beginning with 1 at the beginning of each calendar year - e.g. NL-07.
Remarks	This column should be used to report on particular situations.

At night (darkness), the type of pollution cannot, currently, always be positively determined. However, a detection may be categorised as an oil-slick if, in the opinion of a trained observer/operator, the shape and size of the detection are consistent with those associated with an oil slick. Nevertheless, care should be taken before reaching such a conclusion.

Additional terms related to Satellite Surveillance

Satellite detections	The number of reports (first alerts) within the EEZ of the Contracting Party obtained through satellite detection, including those obtained from other countries (in which case the source country should be identified).
Detections confirmed/observed as oil spills	Number of the total satellite detections (first alerts) that have been verified and/or identified visually or by means of instruments as oil spills, and are confirmed by a trained operator as pollution.

ADDRESSES AND TELECOMMUNICATIONS

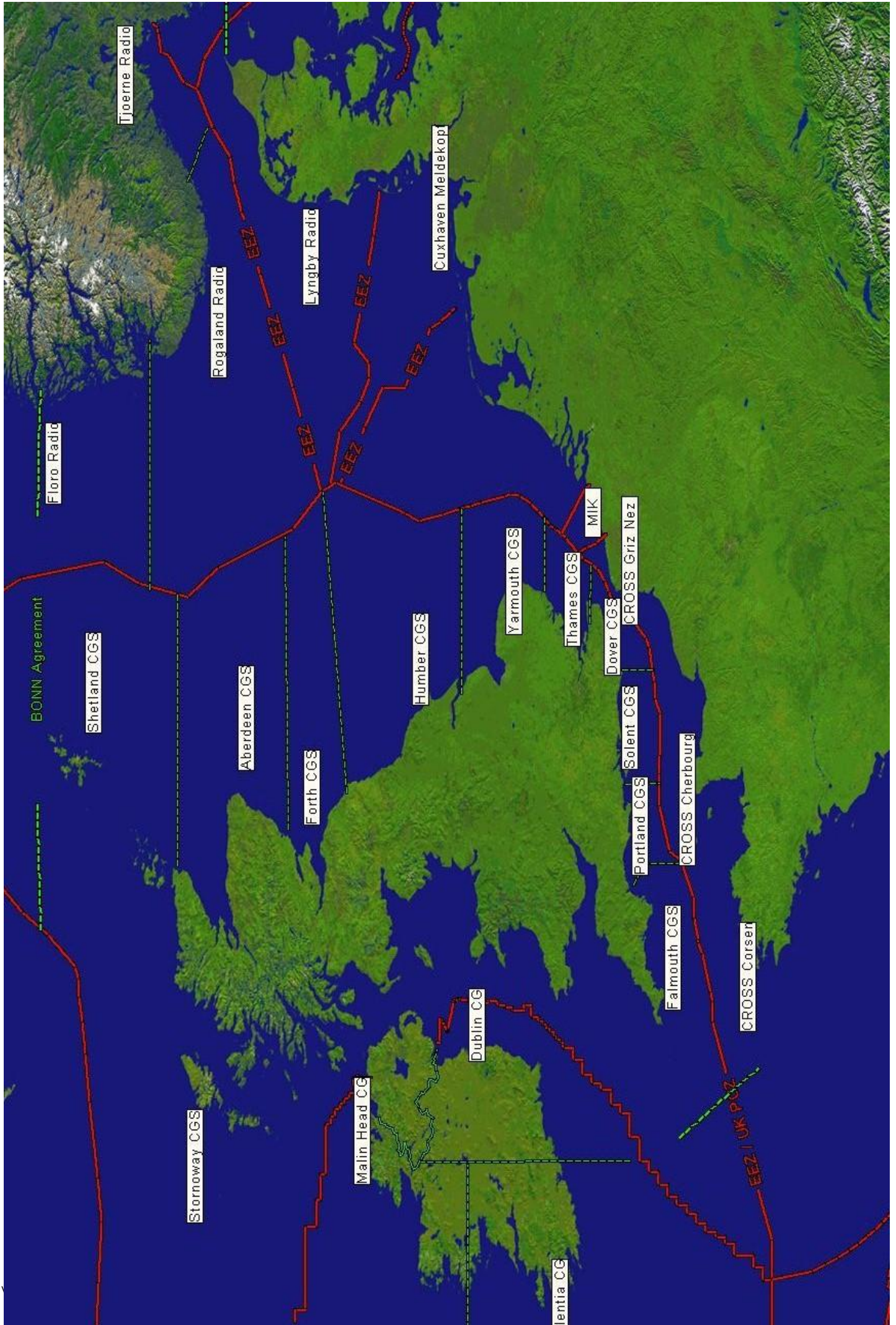
Belgium:	MIK =Maritime Information Crosspoint Maritime VHF Channel 27 Call Sign: Ostend Radio (procedure: call Ostend Radio on Ch. 27 and ask connection with MIK)
Denmark:	Joint Rescue Coordination Centre (JRCC DENMARK) HF Day 4703/6651 kHz Night 4577/3053 kHz UHF 379.525 MHz Call Sign: DANISH RESCUE (HF availability is subject to prior coordination on tel: +45 8943 3206 (or 3207)) 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 HQ's Admiral Danish Fleet through phone patch Tel: +45 8943 3208
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 (Eastern 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





**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

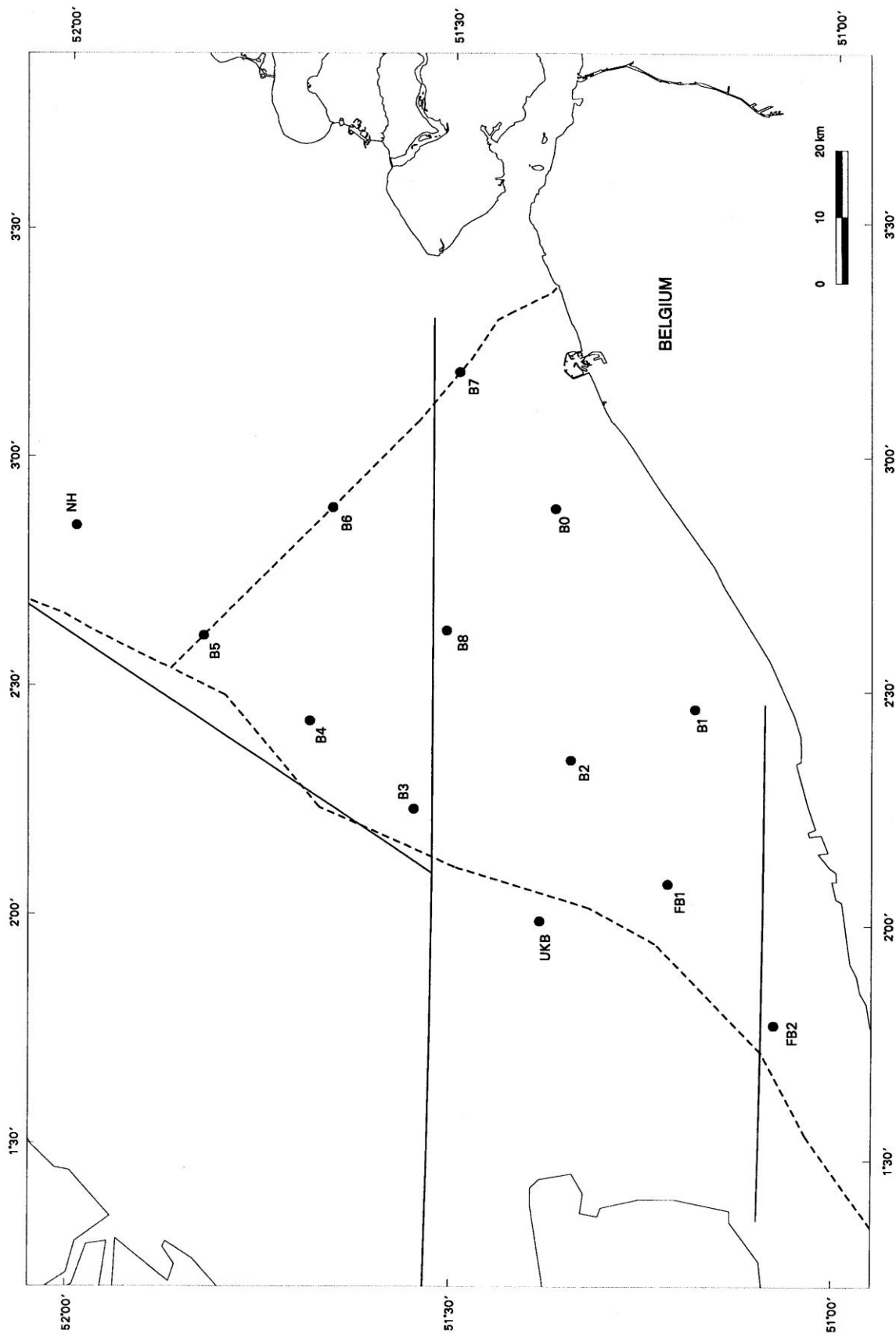
Gulledelle 100

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

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

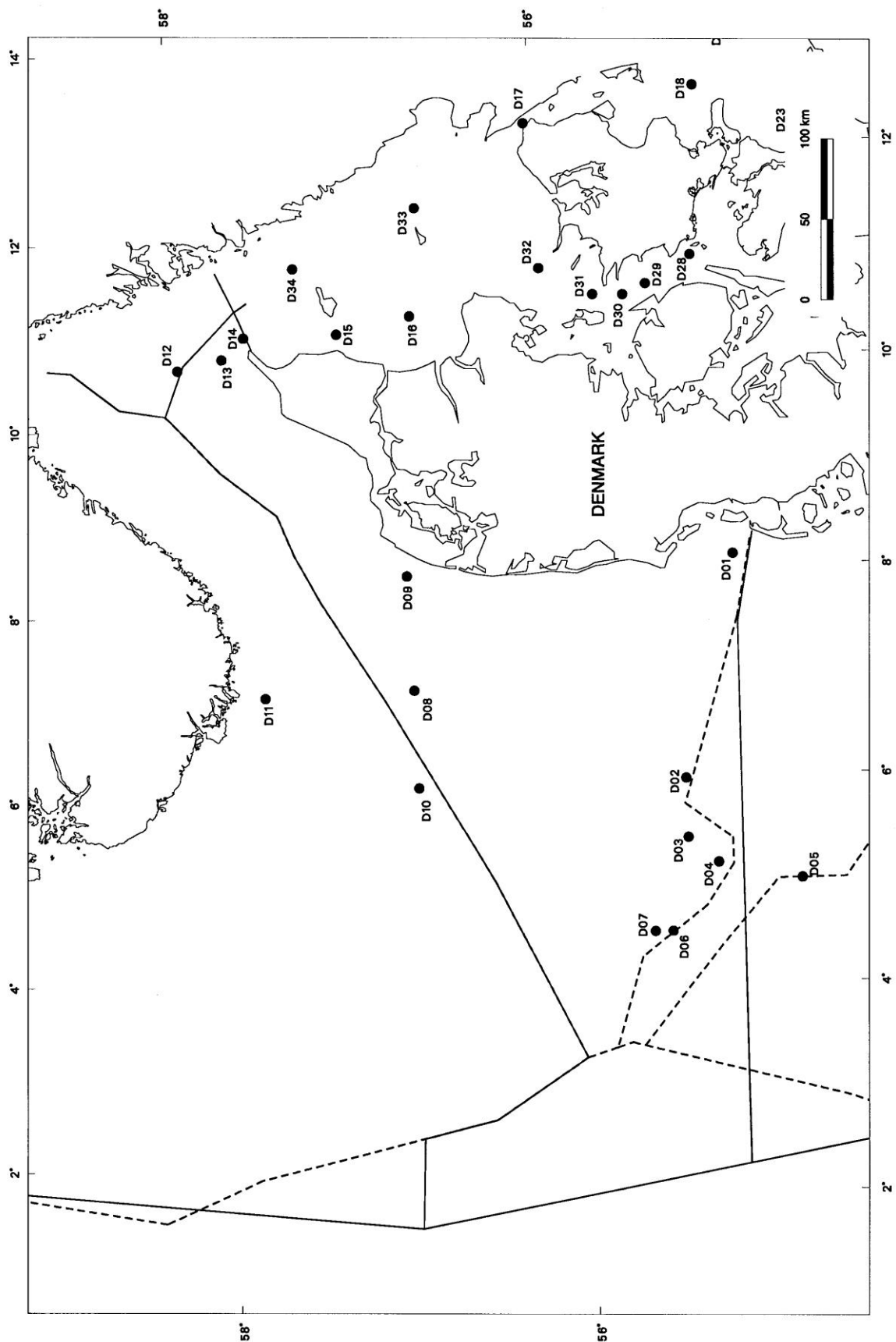
OSCAR ROUTE:

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

NZ0178D

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@mrc CFR.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

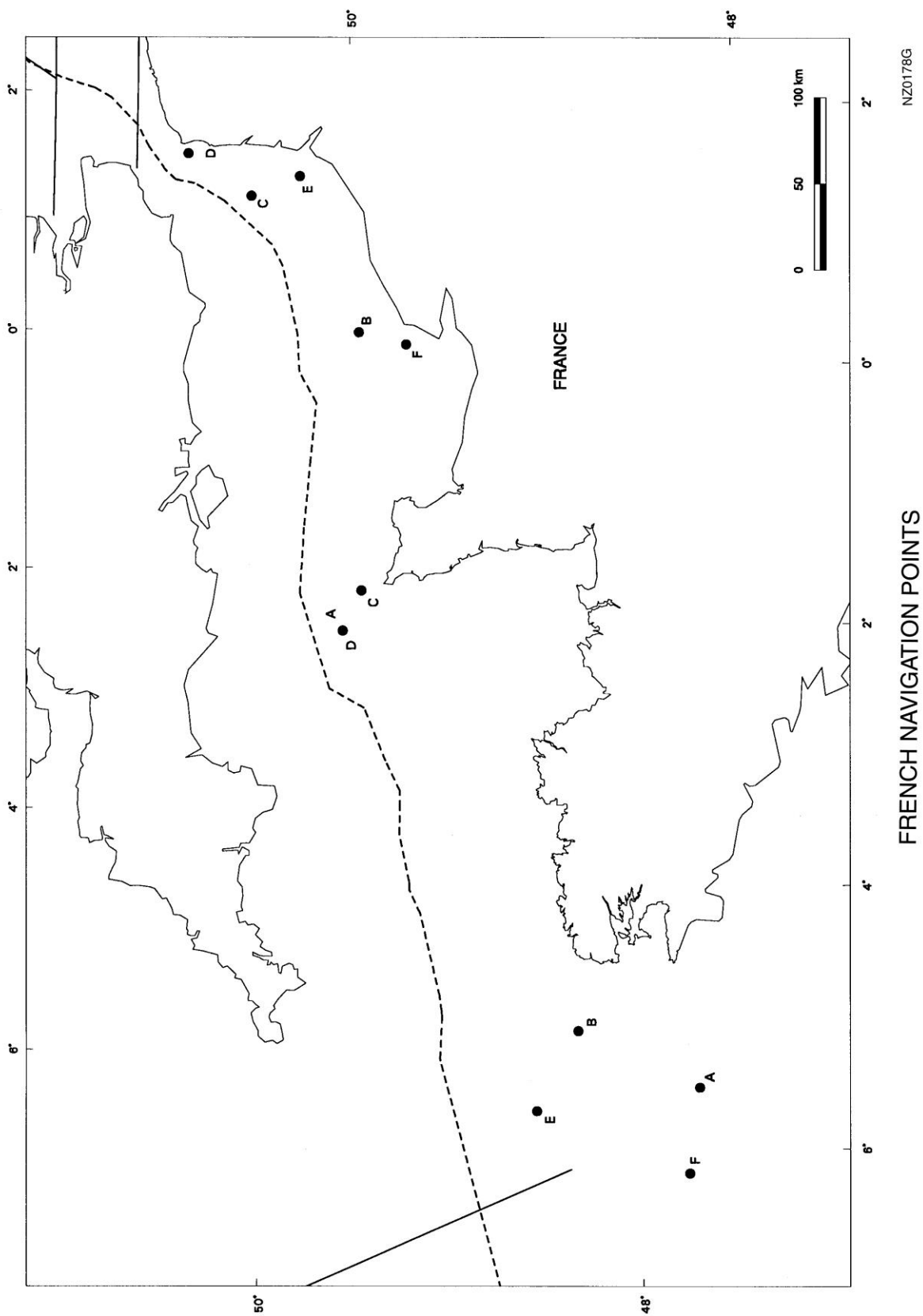
christian.cosse@douane.finances.gouv.fr

Direction générale des douanes et des droits indirects

Monsieur le chef du bureau B2

11, rue des deux communes

F-93558 MONTREUIL Cedex France



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.

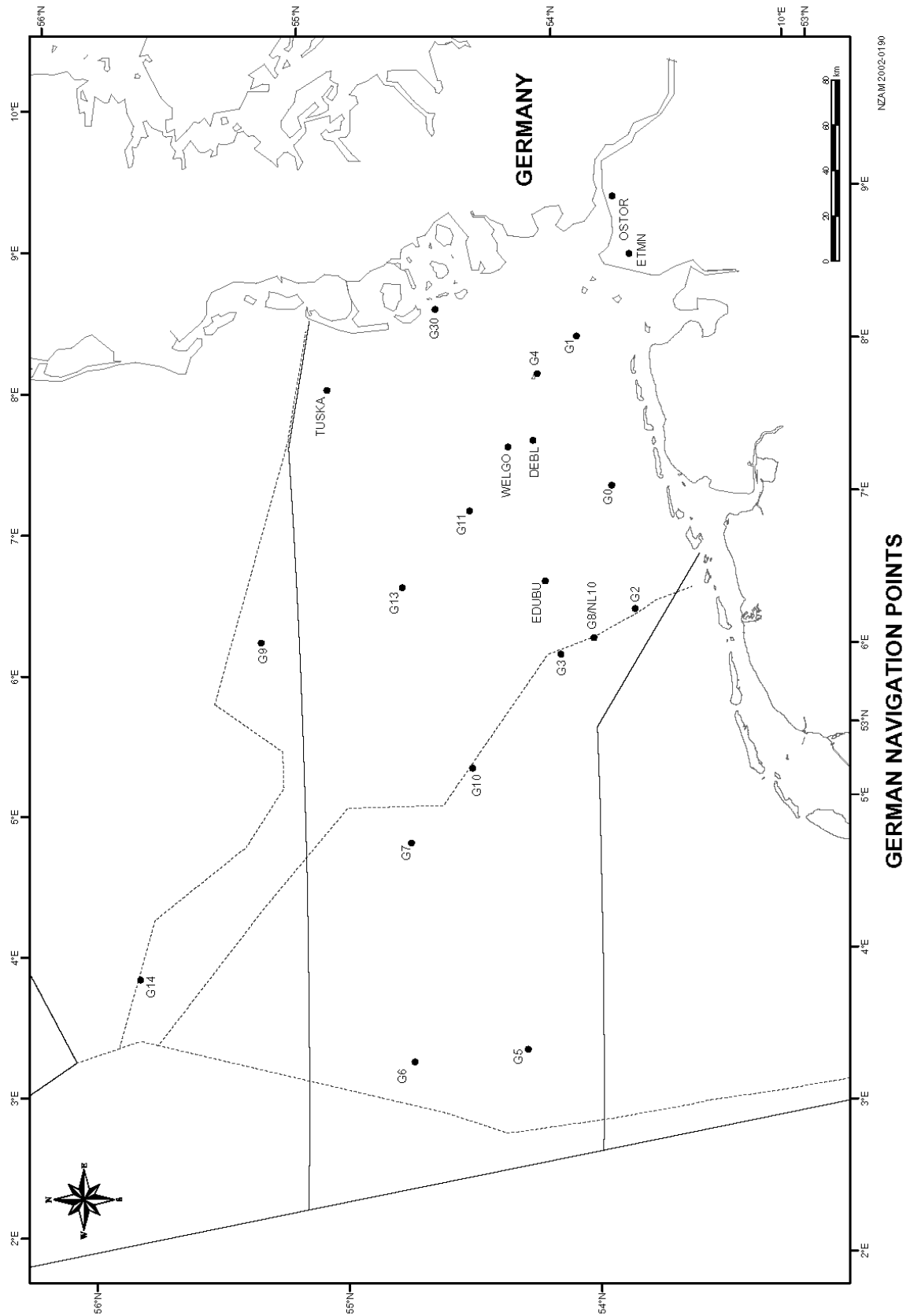
1.2 The Central Command for Maritime Emergencies (CCME), Section 2, Maritime Pollution Control / High Sea plans, directs and controls the aerial surveillance missions.

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 Maritime 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
---	--



NZAM/2002-0190

CHAPTER 5

NETHERLANDS



DORNIER 228

1 Introduction

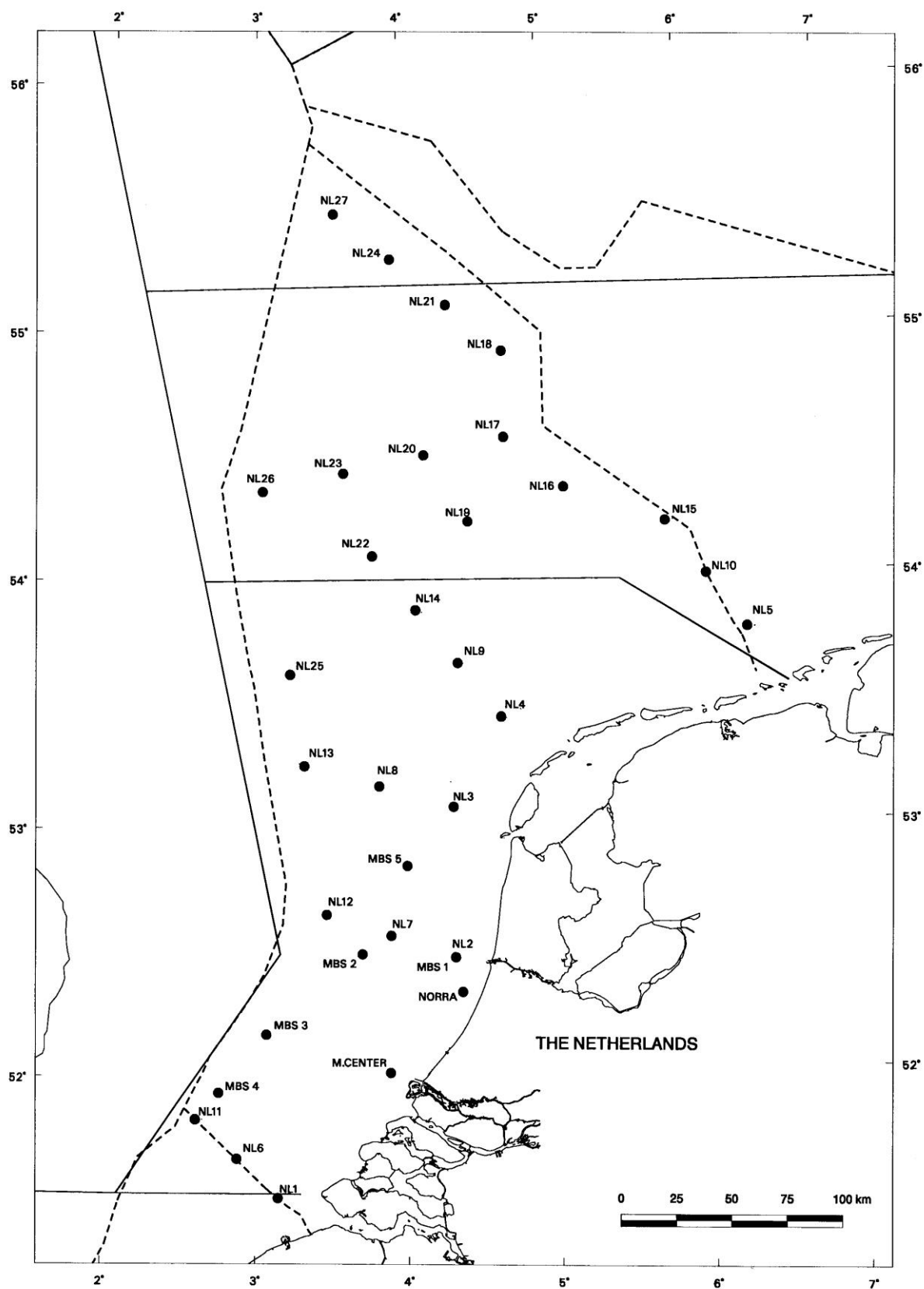
1.1 The Ministry of Defence, represented by the Netherlands Coastguard, operates two Dorniers 228-212. The aircraft are equipped with SLAR (Terma), FLIR, video camera and digital photo cameras. A data downlink is part of the system.

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 6

NORWAY

1 Introduction

Norway is without surveillance aircraft with remote sensing equipment from February 2010. The Norwegian Coastal Administration is working on a new contract, and this will hopefully be implemented in the near future.

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	57°30,0' N	008°00,0' E
N08	58°00,0' N	009°10,0' E
N10	57°40,0' N	008°40,0' E
N11	58°30,0' N	005°20,0' E
N13	60°17,0' N	004°40,0' E

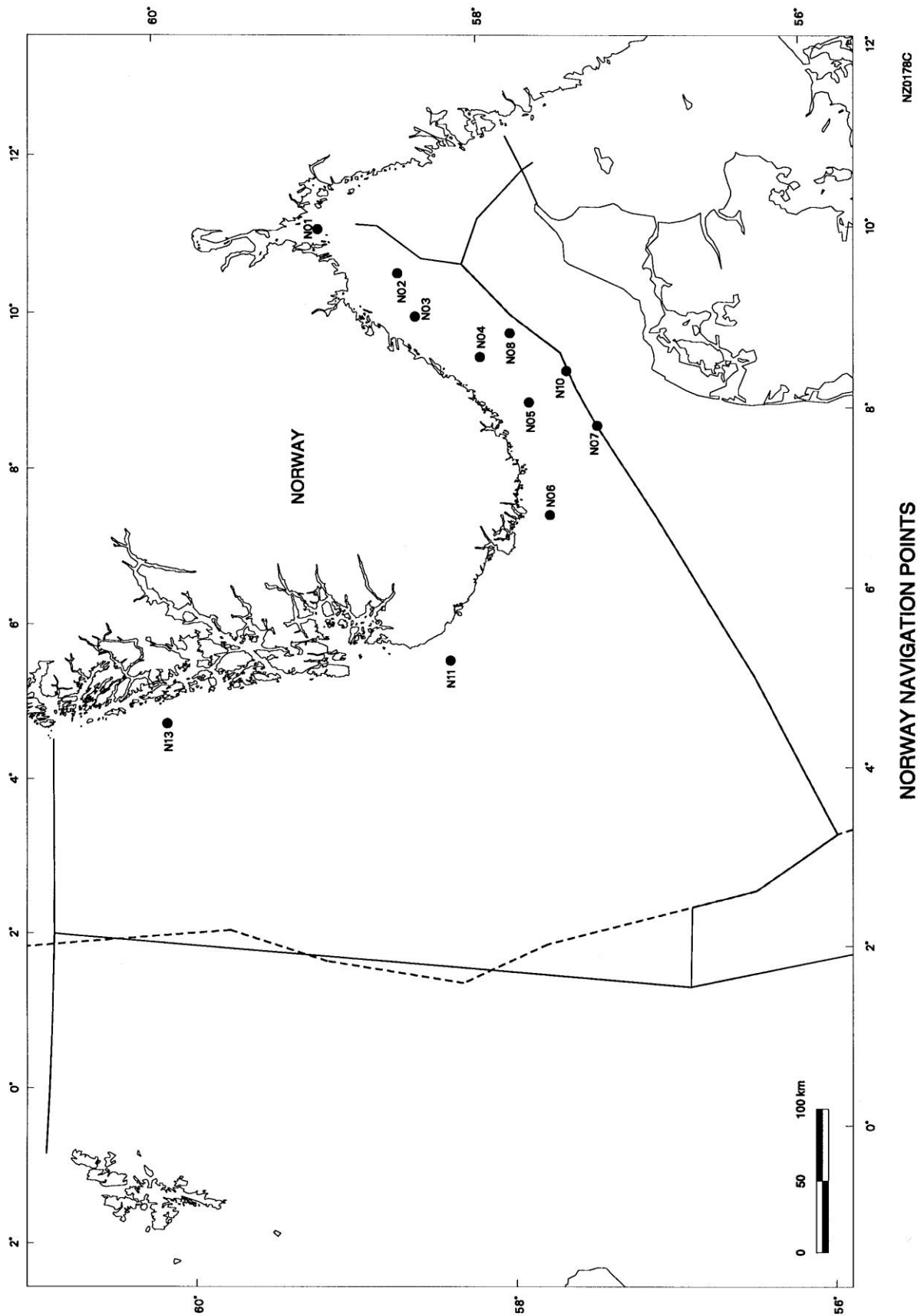
3 National Focal Point

Norwegian Coastal Administration
Department for Emergency Response
P.O. Box 125
N-3191 Horten, Norway
Tel: +47 33034808
Fax: +47 33034949

Contact Address, Telephone, Fax:

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

Tel: +47 33034808
Fax: +47 33034949



CHAPTER 7

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 Nyköping, 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

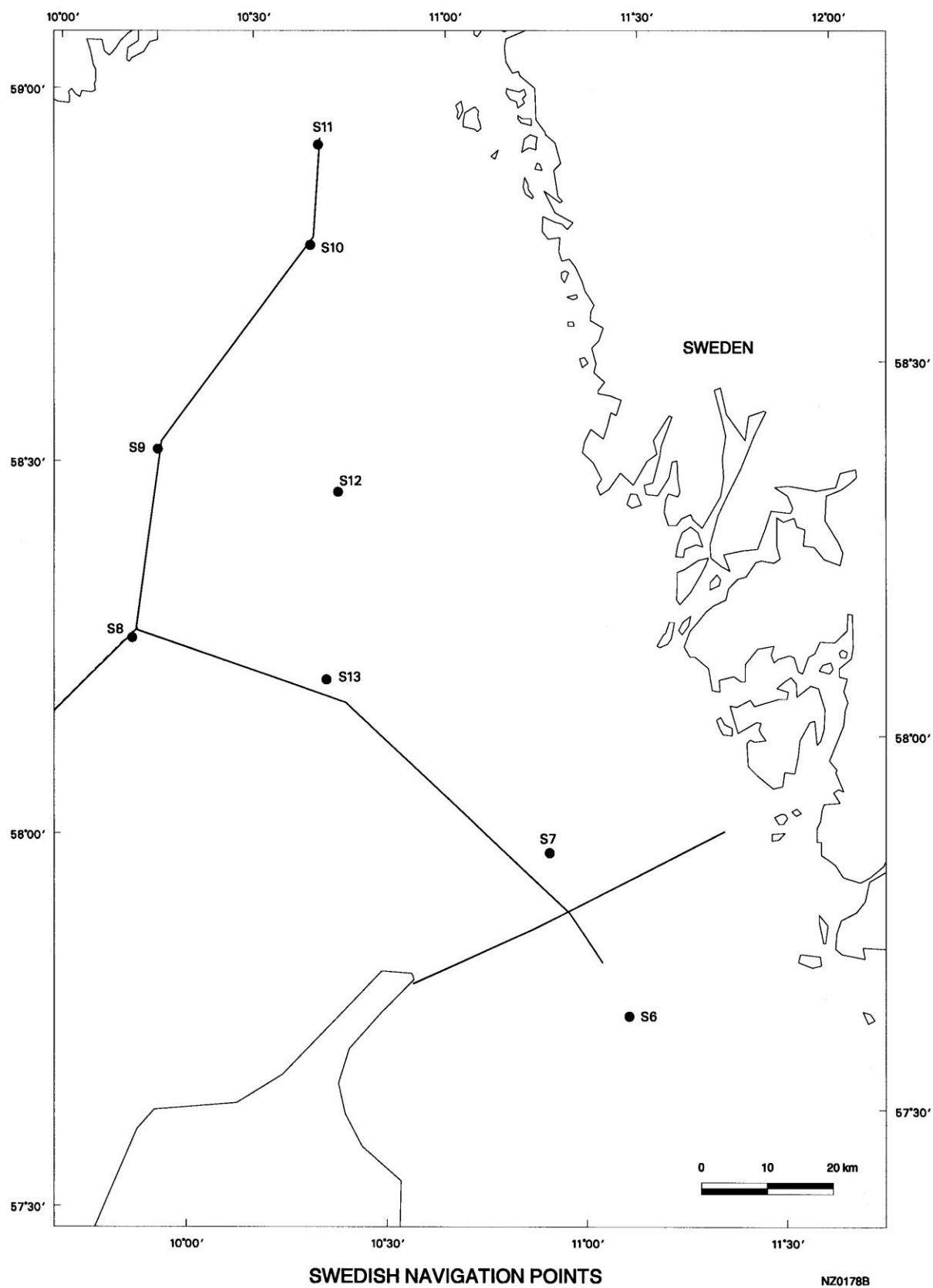
3 National Focal Point

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



CHAPTER 8

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

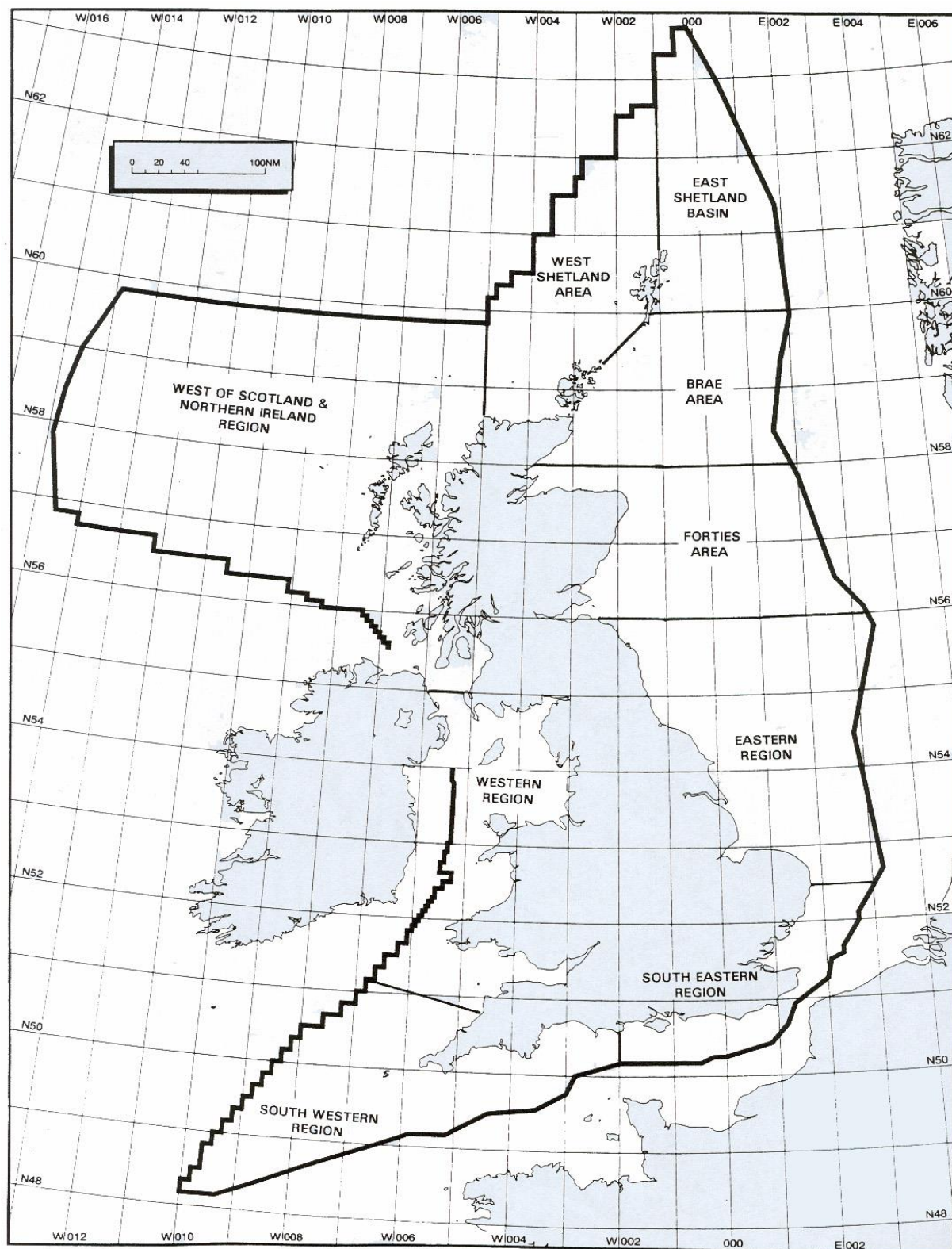
Maritime and Coastguard Agency (MCA)
Falmouth Maritime Rescue Co-ordination Centre
Pendennis Point
Castle Drive
Falmouth
Cornwall
TR11 4WZ

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)

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



CHAPTER 9

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 aerial surveillance missions. SASEMAR owns 3 aircrafts 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. SASEMAR operates a fourth light aircraft Beechcraft B-55 Baron, equipped with digital photo camera, in the Mediterranean Sea.

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 analysed in the Mission Support Centre.

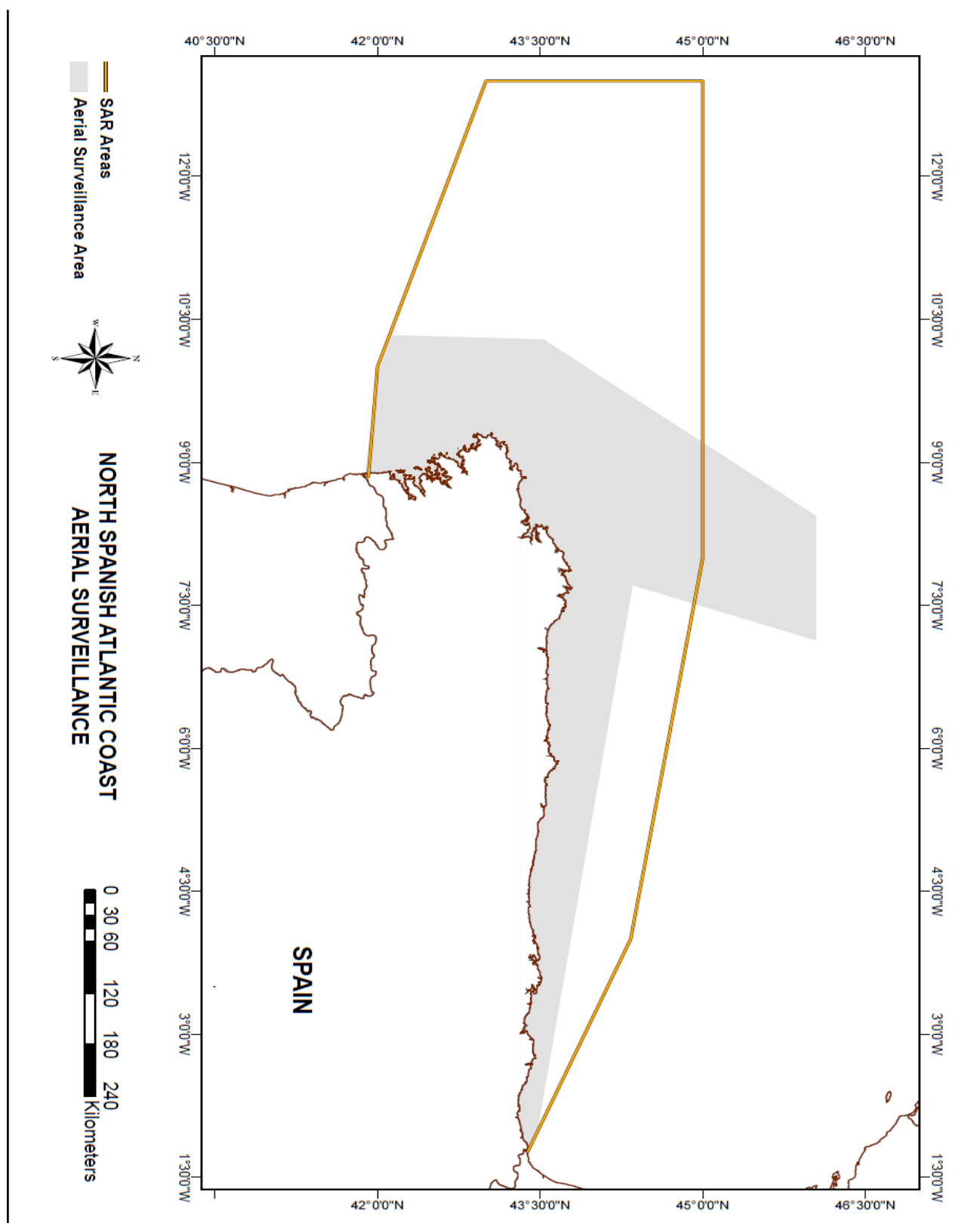
The helicopters can support the marine pollution aerial surveillance, even taking samples from the sea. The Spanish Maritime Safety Agency owns eight helicopters AW139 (three in the Spanish North Atlantic Coast), and operates three S-61N (one in the Spanish North Atlantic Coast), equipped with FLIR, 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 Subdirectorates 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 fframos@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 cnacs@sasemar.es (in case of emergency, please make a previous call)





**Bonn Agreement
Accord de Bonn**

PART 3:

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

1	Introduction	3
2	Detection.....	3
3	Investigation - Data Collection.....	4
4	Visual Observation.....	4
5	Investigation - Photography.....	5
6	Volume Estimation - Oiled Area Measurement	6
7	Volume Estimation - Specific Appearance Area Coverage Measurement.....	6
8	Post Flight Analysis	7
9	Oil Volume Estimate Usage.....	7
10	Collecting evidence - the chain of evidence.....	8
11	The Bonn Agreement Oil Appearance Code	11
	ANNEX A: BA-OAC	
	ANNEX B: Discharges from Offshore Installations	
	ANNEX C: MARPOL Annex 1	
	ANNEX D: MARPOL Annex 2	
	ANNEX E: MARPOL Annex 5	

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 forms the basis for the decision to respond together with other essential information such as location and weather.

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.

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 Aircrews 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 another harmful substance 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° 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 area's 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 spill 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° to 45° to the perpendicular.*

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 case the digital photo's 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 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 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. 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. It is suggested 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 take 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 discharge, 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, 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 provide exactly what the substance is that has been discharged. The LFS is the only sensor providing an indication with a certain level of confidence. Through consultation with suppliers, R&D on the issue could be defined and physical or technical limits of feasibility could be explored.

Visual observations are tight to good visibility conditions (weather) and day light. In this respect the Bonn Agreement Oil Appearance Code 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.

Reverse 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 to apply the reverse burden of proof is depending on the national law.

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 for Prosecutors and Investigators with regard 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 is 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 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 ($0.04\ \mu\text{m}$ – $0.3\ \mu\text{m}$)

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.

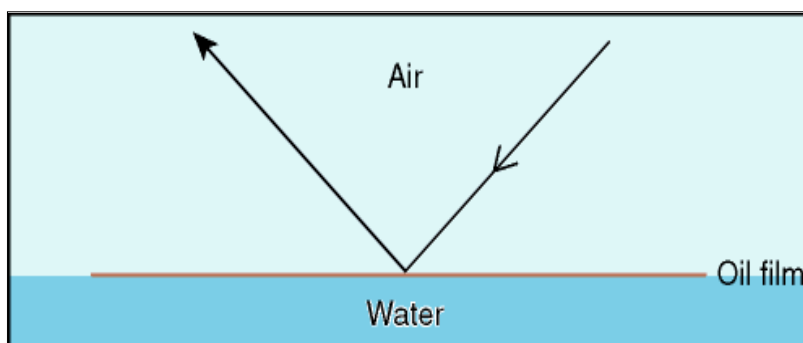


Figure 1. Light Reflecting From Very Thin Oil Films

12. Oil films below approximately $0.04\text{-}\mu\text{m}$ 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 ($0.3\ \mu\text{m}$ – $5.0\ \mu\text{m}$)

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).

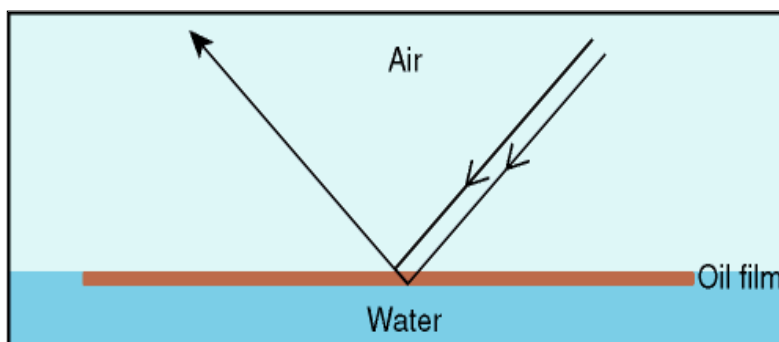


Figure 2. The Rainbow Region

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).

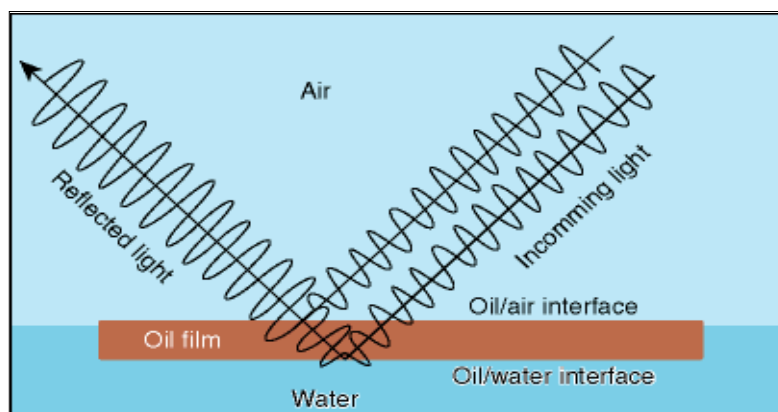


Figure 3. Constructive Interference

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).

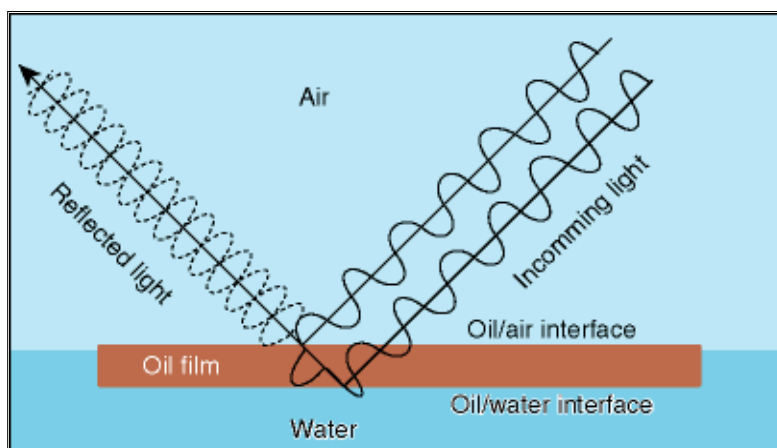


Figure 4. Destructive Interference

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

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 ($5.0\ \mu\text{m}$ – $50\ \mu\text{m}$)

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).

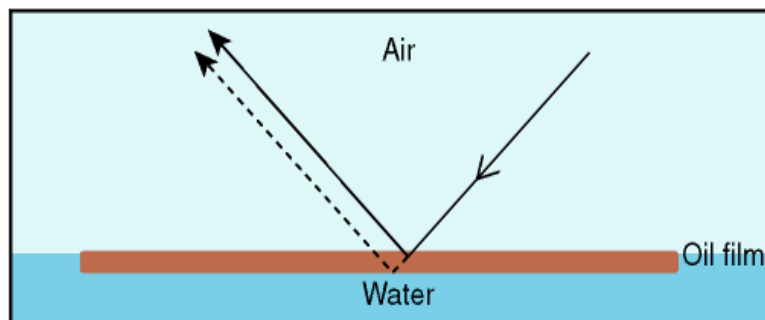
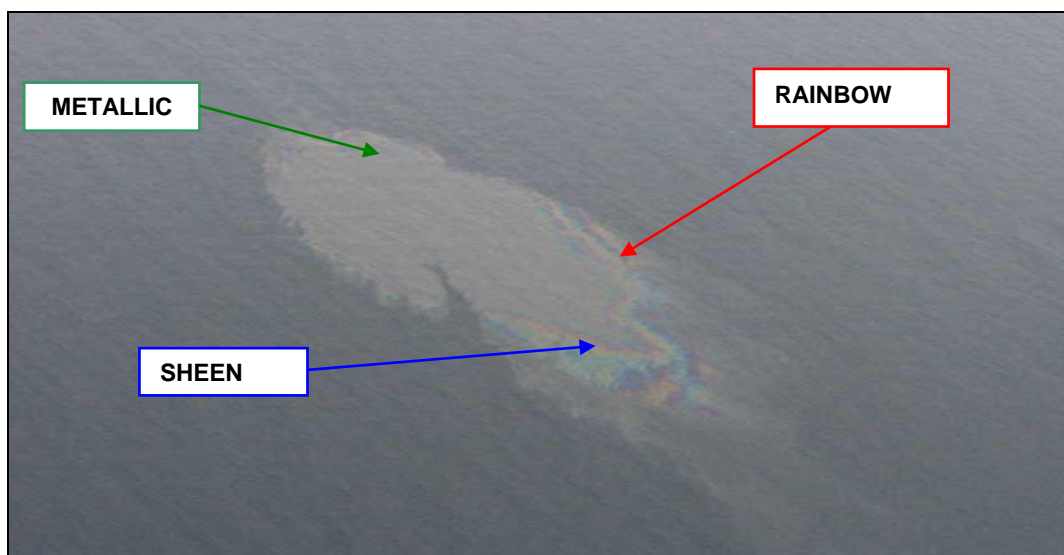


Figure 5. The Metallic Region

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).

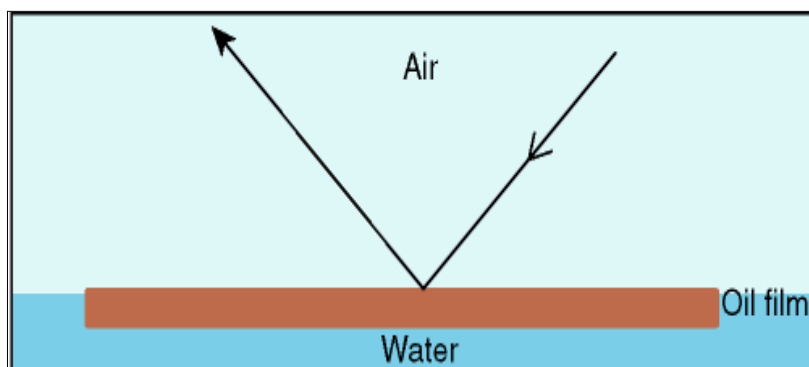
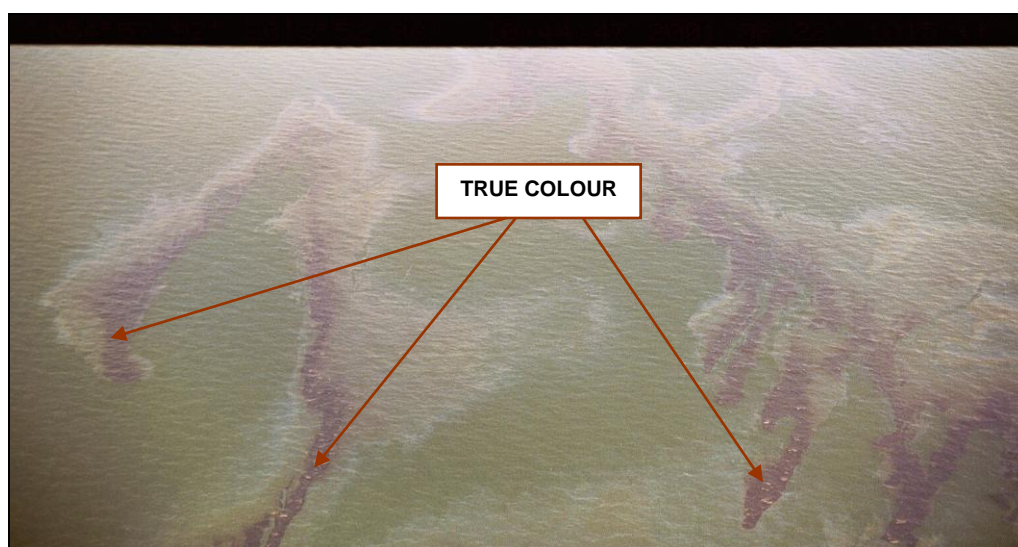


Figure 6. Thick Oil Films

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 continue to get a more clear 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 then 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

THE VOLUME ESTIMATION PROCEDURE

1. Oiled Area Measurement

SLAR Polygon

Area from SLAR Data 12 km²

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 km²

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)

$$12 \text{ km}^2 \times 50\% \times 0.04 \text{ µm} = 0.24 \text{ m}^3$$

Appearance 2 (Rainbow)

$$12 \text{ km}^2 \times 30\% \times 0.3 \text{ µm} = 1.08 \text{ m}^3$$

Appearance 3 (Metallic)

$$12 \text{ km}^2 \times 15\% \times 5.0 \text{ µm} = 9 \text{ m}^3$$

Appearance 5 (True Colour)

$$12 \text{ km}^2 \times 5\% \times 200 \text{ µm} = 120.0 \text{ m}^3$$

$$\text{Minimum Volume} = 0.24 + 1.08 + 9 + 120 = 130.32 \text{ m}^3$$

6. Maximum Volume Calculation

Oiled Area x Area Covered with Specific Appearance x Maximum Thickness

Appearance 1 (Sheen)

$$12 \text{ km}^2 \times 50\% \times 0.3 \text{ } \mu\text{m} = 1.8 \text{ m}^3$$

Appearance 2 (Rainbow)

$$12 \text{ km}^2 \times 30\% \times 5 \text{ } \mu\text{m} = 18 \text{ m}^3$$

Appearance 3 (Metallic)

$$12 \text{ km}^2 \times 15\% \times 50 \text{ } \mu\text{m} = 90.0 \text{ m}^3$$

Appearance 5 (True Colour)

$$12 \text{ km}^2 \times 5\% \times (\text{more than}) > 200 \text{ } \mu\text{m} = > 120.0 \text{ m}^3$$

$$\text{Maximum Volume} = 1.8 + 18 + 90.0 + > 120 = > 229.8 \text{ m}^3$$

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 to apply by 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 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.

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 than from gas/condensate installations (1000's of m³ per day vs. a couple of m³ 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 m³ per day (70,000 m³ of produced water with 100 ppm of oil amounts to 7 m³ of oil per day / at 40 ppm amounts to 2.8 m³ 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. 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 SEA HAS BEEN DESIGNATED TO BE A '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 Regulation for the Control of Pollution by Noxious Liquid Substance in Bulk), and also the noticeable, continuous increase in volume 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.

A. NEW HNS CATEGORISATION SYSTEM

Hazardous and noxious liquid substances (HNS; chemicals transported in bulk) are divided into **4 categories**, according to a new pollution categorization system:

1. **Category X:** substances presenting the most severe hazard and therefore justify the prohibition of the discharge into the sea;
2. **Category Y:** substances which are deemed to present a hazard or cause harm and therefore justify a discharge limitation (includes vegetable oils, biodiesels (fatty acid methyl ethers – FAME), paraffin waxes and animal fats);
3. **Category Z:** substances which are deemed to present a minor hazard and therefore justify less stringent discharge restrictions (includes methanol (a biofuel), MTBE (methyl-tert-butyl-ether), Ethylene Glucols, and UAN (urea/ammonium nitrate solutions)).
4. **Other Substances (OS):** substances in the pollution category of chapter 18 of the IBC Code which have been evaluated and found to fall outside the above categories X/Y/Z, because they are considered to present no harm.

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, except when:

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 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 (other harmful substance 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 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 not an equal (e.g. colourless or greyish) sheen but presents the typical characteristics of mineral oil appearances, 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 lesser 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 the attention on the fact that aircrews can also observe potentially illicit behaviours of 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 a 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.