Bonn Agreement
Accord de Bonn

Bonn Agreement Aerial Surveillance Handbook, 2004

Version: 25 October 2007

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PART 1: GENERAL

1 Introduction

1.1 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 combat 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.

Aerial surveillance plays an essential role in this task. Aircraft equipped with remote sensing systems have proved to be efficient in detecting oil spills. However, it is only one means of detecting oil and other harmful substance spills. Satellite surveillance can also play an 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 oil spills have proved to be detectable by satellites, verification by aircraft or other means is still necessary.

1.2 Aim of the Handbook

The Aerial Surveillance 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.

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

The European Community is also a Contracting Party to the Bonn Agreement. In 2000 Ireland accepted an invitation to accede to the Bonn Agreement.

2.2 *The Bonn Agreement Area*

In accordance with Article 2 of the Agreement the North Sea is defined as follows:

Southwards of latitude 61 North, together with:

(a) the Skagerrak, the southern limit of which is determined east of the Skaw by latitude 57°44'43"N;

(b) the English Channel and its approaches eastward of a line drawn 50 nautical miles to the west of a line joining the Scilly Isles and Ushant.

This area is subject to revision as a result of the accession of Ireland to the Bonn Agreement.

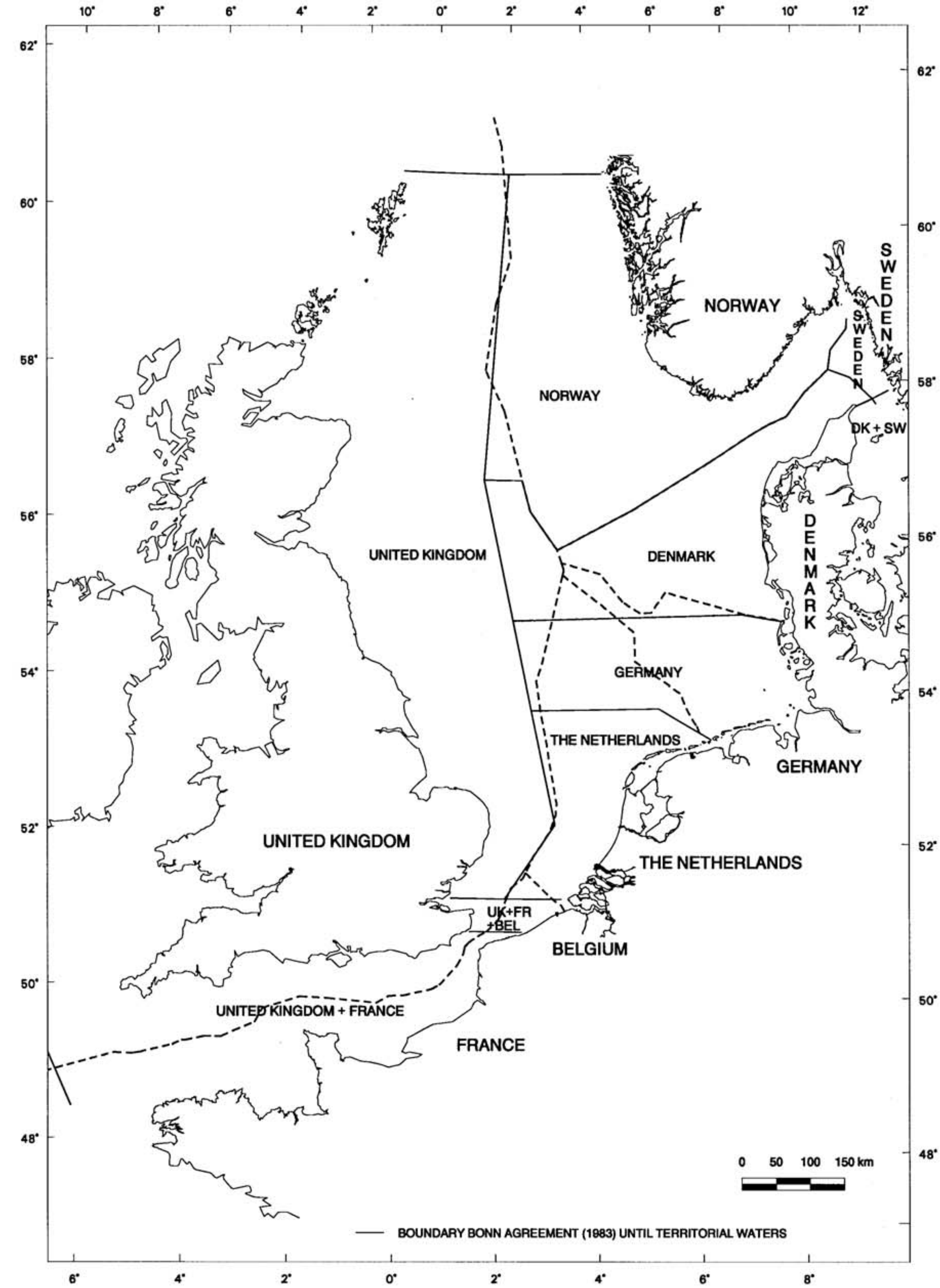
2.3 *Zones of Responsibility (Control Zones)*

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 cooperation in the organisation of such surveillance. A number of such arrangements and agreements are in force.

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

BONN 2000 has recommended that the boundaries of these zones (and associated surveillance activities) be reviewed in order to make the zones coincide with EEZ boundaries (see Annex 5 to the BONN 2000 Summary Record (BONN 00/11/1)).



ZONES BONN AGREEMENT (1983) : NORTH SEA,SKAGERRAK,DOVER STRAIT,ENGLISH CHANNEL

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 and combating pollution and to preventing violations of anti-pollution regulations.

Responsible Authorities

Participating countries 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 addresses and contact numbers.

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 Surveillance Handbook as necessary. OTSOPA normally prepares the Bonn Agreement Annual Flying Programme for adoption by the meeting of Contracting Parties. The aerial surveillance data are summarised by the Contracting Parties themselves and annually presented in report form by the Secretariat.

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.

2.7 Aircraft

Details of the Contracting Parties marine pollution surveillance aircraft can be found in Part 4 – 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.

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 may also be used for surveillance aircraft mission planning and statistics. Satellite surveillance is carried out by individual countries based on national needs, with voluntary information exchange between countries.

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.
- 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. 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 participating countries plan national flying programmes to conduct aerial surveillance over their individual zones of responsibility. These schedules need not be co-ordinated with neighbour states.

Reports on spillages detected are normally made to national administrative authorities only.

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

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 chartlets 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 Surveillance Handbook may be updated.

3.5 Regional Flights

Bilateral and multilateral agreements between participants have been established for mutual assistance in combat operations and in aerial surveillance. Examples are the agreements between Denmark/Germany (DENGER) The Netherlands and Germany (NethGer) 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 normally prepared during the OTSOPA meeting and formally agreed by the Meeting of Contracting Parties.

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. Every third year the regional CEPCOs are replaced with an Extended CEPCO for 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.

Additional (smaller) CEPCOs maybe 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.

4 Standard Reporting System

4.1 The Need for a Standard Reporting System

The current Bonn Agreement zones of responsibility for counter pollution operations and aerial surveillance do not coincide with agreed continental shelf boundaries. It therefore follows that one country may detect and wish to combat an illegal discharge in its Bonn Agreement zone whilst responsibility for initiating prosecution of the suspected polluter lies with another country having jurisdiction over that part of the continental shelf. Both countries involved need to be properly informed.

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 Observation Logs 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 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 Observation Log

The Standard Pollution Observation Log is for recording all detected 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 pollution was not detected or observed. The Log is shown at Annex A to this Chapter.

The agreed guide to the compilation of the Standard Pollution Observation 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 Combatable 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.

ANNEX A

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

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

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

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

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

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

ANNEX B

STANDARD POLLUTION OBSERVATION LOG COMPLETION GUIDE

HELCOM:	Tick HELCOM Box if the flight is in HELCOM Area
BONN AGREEMENT:	Tick BONN AGREEMENT Box if flight is in Bonn Agreement 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 - Exercises 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

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 Km^2

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

Example:

1/2 cover – Rainbow	- Column 2 = 50%
1/4 cover - Metallic	- Column 3 = 25%
1/4 cover - True Colour	- Column 5 = 25%

MINIMUM VOLUME:

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

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

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

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

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

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

MAXIMUM VOLUME:

Maximum Quantity of Oil Pollution in cubic metres.

Calculated as follows:

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

X [Decimal Percentage of Appearance].

[1 Km^2] x [5.0 m^3/km^2] x [0.50] = 2.5 m^3

[1 Km^2] x [50 m^3/km^2] x [0.25] = 12.5 m^3

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

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

No:

The same number as previously allocated to the pollution detection.

POLLUTION TYPE:

Pollution Type as follows:

OIL	- Oil
CHEM	- Chemical
FISH	- Fish Oil or Waste
VEG	- Vegetable Oil or Waste
OTH	- Other (Amplify in Remarks)
UNK	- Unknown

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

ANNEX C

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

1. REPORTER:

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

2. DATE AND TIME:

a. Date (yymmdd) b. Time of Observation (UTC)	: Date.................................. Time.............................UTC

3. LOCATION OF THE POLLUTION:

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

4. DESCRIPTION OF THE POLLUTION:

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

5. METHOD OF DETECTION AND INVESTIGATION:

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

6. WEATHER AND SEA CONDITIONS:

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

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

7. SHIP INVOLVED:

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

8. INFORMATION BY RADIO CONTACT:

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

OBSERVATION OF A DISCHARGE OF HARMFUL SUBSTANCS BY AN OFFSHORE INSTALLATION

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

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

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

ANNEX D

☐ HELCOM ☐ BONN AGREEMENT **STANDARD ALGAE OBSERVATION / DETECTION 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		TOTAL TIME OVER THE SEA	
					hrs	mins	hrs	mins	hrs	mins

No	AREA CODE	TIME UTC	POSITION		DIMENSIONS		AREA COVER	AREA COVERED	ALGAE COLOUR COVERAGE %									DETECTION			
			LATITUDE 'NORTH'	LONGITUDE 'EAST/WEST'	LENGTH Km	WIDTH Km	%	Km^2	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
	o					1	COLOURLESS
	o					2	YELLOW
	o					3	ORANGE
	o					4	RED
	o					5	GREEN
	o					6	BLUE
	o					7	BROWN
	o					8	UNKNOWN
	o					9	OTHER

ANNEX E

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 d'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 d'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.

III. Reporting formats

1. National maritime pollution surveillance flights

Annual overview in columns and rows

Country	No. of flight hours		No. of detections		Detections confirmed/ observed as oil spills		Estimated volume	No. of polluters			Remarks[1]
	Daylight	Darkness	Daylight	Darkness	Daylight	Darkness	m^3	Rigs	Ships	Other/ Unknown	

2. CEPCO flights (to be reported by the host country)

Country	No. of flights	No. of flight hours		No. of detections		Estimated volume	No. of polluters			Remarks[1]
		Daylight	Darkness	Daylight	Darkness	m^3	Rigs	Ships	Other/ Unknown	

3. Tour d'Horizon flights

Country	No. of flights	No. of flight hours		No. of detections		Estimated volume	No. of polluters			Remarks[1]
		Daylight	Darkness	Daylight	Darkness	m^3	Rigs	Ships	Other/ Unknown	

[1] Additional remarks in the cases of accidental spills and their quantities.
Additional remarks on unconfirmed pollution detections.
Additional explanatory notes or national comments can be added on an extra page. This information will be used for the text of the annual report.

4. All flights reported in Tables 1 - 3

	No. of spills detected	Spill IDs (cf. Table 5)
Category I: < 1m³		
Category II: 1-10 m³		
Category III: 10-100 m³		
Category IV: > 100 m³		

5. Information on confirmed/observed oil-spills

Contracting Parties should provide the following table in an electronic format[2] in order to produce the maps:

Spill ID[3]	Date	Time in UTC	Position[4]		Estimated volume	Polluter[5]
			Latitude	Longitude	m³	

6. Satellite surveillance

Country	No. of satellite detections	Detections confirmed/ observed as oil spills	Spill IDs[6]

2 The format should be either a Word document (version Word 2003 or below), an Excel document (Excel 2003 or below) or a “tab delineated text (.txt) file”.

3 When a Contracting Party is confident that a particular spill observed on subsequent flights is actually the same slick, this slick should only be reported once with the most appropriate position (e.g. first observed position).

4 In decimal degrees, i.e. with the minutes and seconds converted to a decimal function of the degree. Longitude west is taken as negative. Latitude and longitude should each occupy a separate cell in a table.

5 Insert "SHIP" or "RIG" as appropriate.

6 Include in this cell the Spill IDs given in table 5 which refer to detections confirmed/ observed as oil spills which were initially detected by satellite observation.

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 in contravention of international conventions.
- The observers have to act to the best of their abilities to provide the responsible authorities with reports and evidence as follows:
  - Standard Pollution Observation Log
  - Pollution Observation Report on Polluters and Combatable Spills
  - SLAR/IR/UV imagery both in tape and hard copy form
  - Photography
  - Video tape
  - Tape recording or transcript of any radio contact
  - Signed official reports or statements.
- The official report should contain the essential information recorded on the Pollution Observation 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.

5.2 Surveillance Evidence - The Way Ahead

BONN tasked a group to produce a Manual on Evidence to Court designed for use by the legal profession. This resulted in the manual Oil Pollution At Sea – Securing Evidence on Discharges from Ships" (1993, reprinted with one amendment to the 'colour code' table in 1996). The next step was to produce a manual designed for use by the collectors of evidence i.e. surveillance aircraft aircrew amongst others. This resulted in the manual Oil Pollution At Sea – Part 2 – Effective Prosecution of offenders – Guidelines on International Co-operation (2000).

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 Flight Safety

7.1 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.

7.2 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.

7.3 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.

8. Communications

8.1 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 combating action, or deliberate and ongoing discharges 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.

ANNEX A

BONN AGREEMENT ADDRESSES AND TELECOMMUNICATIONS

Belgium:
Maritime VHF Channel 2 / Channel 16
Call Sign: **BOSS** = Naval Command Operations

Denmark:
Joint Rescue Coordination Centre
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 3207 (or 3206)

Naval District Kattegat
UHF 356,300
Call Sign: **CRYSTAL PURPLE**

Naval District Bornholm
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 89 43 32 08

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

Federal Republic of Germany:
Maritime VHF Channel 16 for call
Airborne VHF 129.95
Call Sign: **CUXHAVEN MELDEKOPF**

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

Norway:
Maritime VHF channel 16 for call.

Call Sign: **Tjoeme Radio**
Rogaland Radio
Floroe Radio
Bodoe Radio

Sweden: Maritime VHF channel 16 for call,
Call Sign:

Swedish Coast Guard Härnösand (Northern area)

Swedish Coast Guard Stockholm (Estern area)

Swedish Coast Guard Karlskrona (Southern area)

Swedish Coast Guard Gothenburg (Western area)

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

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

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

Shetland Coastguard

Aberdeen Coastguard

Forth Coastguard

Humber Coastguard

Yarmouth Coastguard

Thames Coastguard

Dover Coastguard

Solent Coastguard

Portland Coastguard

Brixham Coastguard

Falmouth Coastguard

PART 2: REMOTE SENSING AND OPERATIONAL GUIDELINES

1 Remote Sensing

1.1 Introduction

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

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 the 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 Standard Pollution Observation Log.

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, betweens 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 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.

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

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

1.4 Synthetic Aperture Radar (SAR)

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

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

1.5 Ultra Violet Line Scanners or Camera (UV)

Surface pollution, especially oil, is a good reflector of the ultraviolet component of sunlight. An ultraviolet scanner or camera is a passive device detecting reflected ultraviolet with a wavelength of about 0.3 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.

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.

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 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.

1.9 Low Light Level Television Camera (LLLTV)

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

1.10 Night Identification System

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

1.11 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.

1.12 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.

1.13 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.

1.14 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.

1.15 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).

1.16 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 Envirsat and the Radarat, proved in various international test programmes to be able to detect water surface phenomena even as small as 200 m^2, from an altitude of 900 km. The Low Resolution SAR images (100 metre) are considered to be comparable to SLAR with regard to detectability.

Although the satellite SAR does not discriminate the type of pollution it provides an indication of a possible pollution as well as a clear indication of the location and the dimensions. It is reiterated that the satellite 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.

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 2 hours 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 prepare an inventory of 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 will not replace aerial surveillance.

1.17 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.

1.18 Routine Patrols

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

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

During a mission the crew will maintain the STANDARD POLLUTION OBSERVATION LOG, noting all relevant information on mystery slicks and actual polluters observed. A separate form will be used for reporting polluting vessels according IMO regulations.

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

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

2 Tour de Horizon

2.1 Introduction

The Bonn Agreement Contracting Parties have adopted a plan for all coastal states to conduct periodic and random surveillance flights for the detection of spillages in the offshore oil and gas industry areas in the North Sea. Irrespective of the main aim, all other suspected polluters are also to be identified and reported. These surveillance flights are entitled ‘Tour de Horizon Flights’.

The programme for Tour de Horizon flights is prepared during the annual Working Group on Operational, Technical and Scientific Questions concerning Counter Pollution Activities (OTSOPA) meeting and formally agreed by the Meeting of Contracting Parties.

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 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:

- Detections estimated to contain over $1m^3$ of oil must be reported in flight and at the earliest opportunity. Aircrew should send reports directly to the appropriate reporting agency for prompt relay to the appropriate national authority for pollution control
- All detections associated with, or near, offshore installations must be reported as soon as possible after landing to the national reporting agency for prompt relay to the national authority for pollution control. Detections over $1m^3$ 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

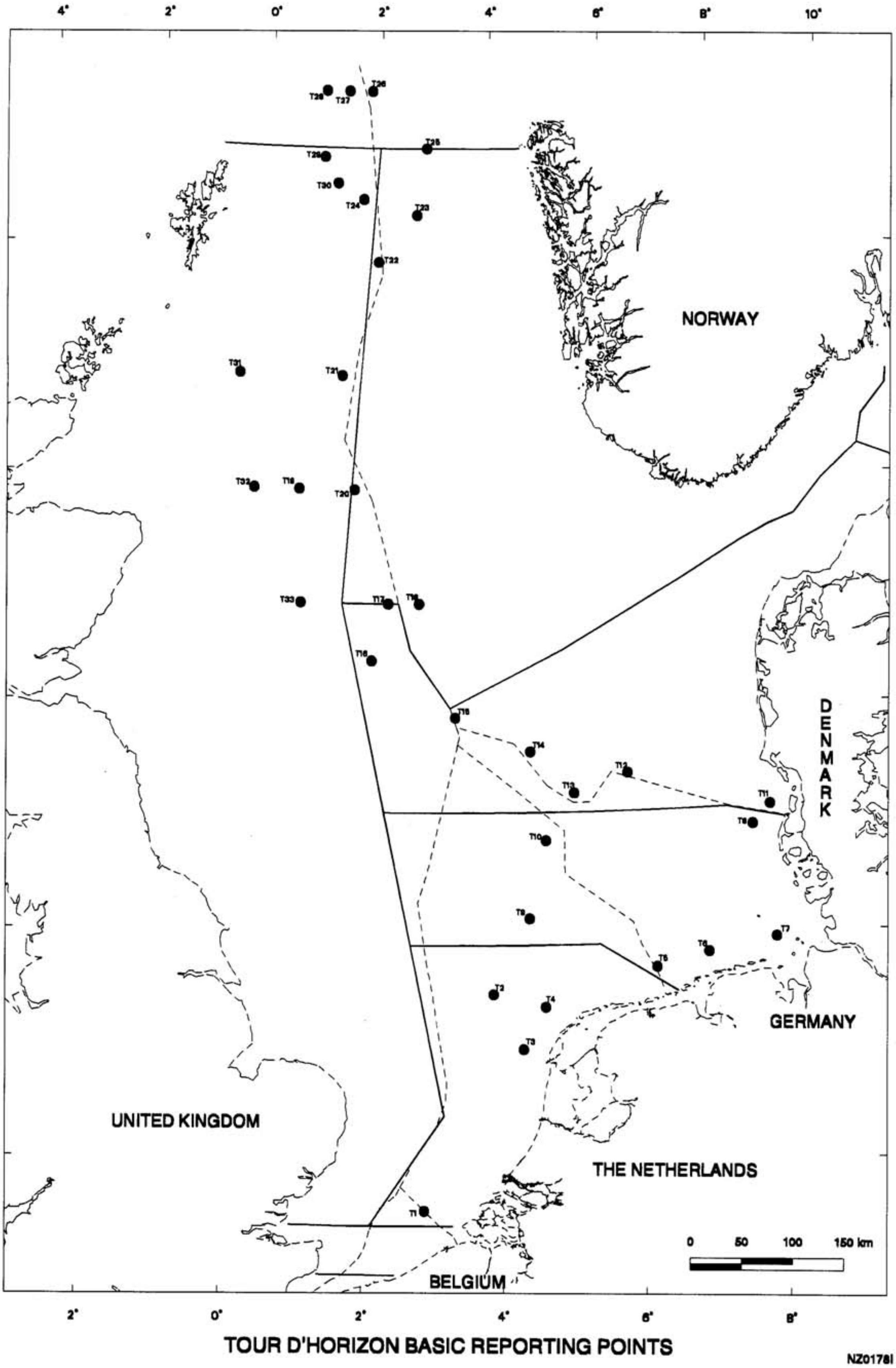
Details of The National Focal Points within the Tour de Horizon Area for ‘Post Flight’ Detection Reporting are at Annex D.

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 DE HORIZON ROUTING POINTS CHART



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.

ANNEX C

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

Belgium: **Naval Command Operations**
Maritime VHF: Channel 16 // 2
Call Sign: BOSS

Denmark: Maritime VHF: Channel 16 (for establishing contact then to a working channel)
Call Sign: RADIO
Blavand 23 // Skagen 4

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: COASTGUARD CENTRE

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

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

ANNEX D

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

Belgium:	**Naval Command Operations (COMPOSNAV)**
	Tel: + 32 (0) 50 55 83 17
	Fax: + 32 (0) 50 55 01 04
Denmark:	**Maritime Rescue Co-ordination Centre Aarhus (MRCC)**
	Tel: + 45 (0) 89 43 3203
	Fax: + 45 (0) 89 43 3230
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
Norway:	**Norweigian Coastal Administration**
	Tel: + 47 33 03 4800
	Fax: + 47 33 03 4949
United Kingdom:	**Aberdeen Maritime Rescue Co-ordination Centre (MRCC)**
	Tel: + 44 (0) 1224 575920
	Fax: + 44 (0) 1224 575920

3 Co-ordinated Extended Pollution Control Operation (CEPCO)

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.

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.
- 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.

Every third year, an extended CEPCO should replace the regional CEPCOs where all countries take part if possible.

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 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.

3.7 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 cooperation between the participating ships and planes;
- to assist in coordinating actions by participating ships;
- to assemble 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.

3.8 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.

3.9 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.

3.10 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.

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.

Bonn Agreement
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PART 3: GUIDELINES FOR OIL POLLUTION DETECTION, INVESTIGATION AND POST FLIGHT ANALYSIS/ EVALUATION FOR VOLUME ESTIMATION

1 Introduction

1.1 The primary task for marine pollution surveillance aircrew is to detect, 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.

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 the location and on-scene 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 When dealing with **a major oil spillage**, the initial task of the surveillance aircraft will be to validate any reports by confirming or otherwise the incident, the source of oil, the continuation or cessation of the discharge; the accurate determination of location of the incident and any vessels or installation involved and their status, the location, size, area coverage, estimated quantity and movement of all the oil slicks together with 'on scene' weather.

1.5 The primary objective of **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.

1.6 With regard to illegal discharges from vessels aircrews should be familiar with MARPOL 73 / 78 Regulations. Trials simulating discharges in compliance with MARPOL Regulation carried out by the Netherlands, and later confirmed by Canadian trials, concluded 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.

1.7 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.

2 Detection

2.1 The main detection equipment is radar and where possible combined with visual look out. Most marine pollution aircraft have Side Looking Airborne Radar (SLAR).

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

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

3 Investigation – Sensor Data Collection

3.1 Following the detection 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, within the overall slick, allowing the oiled area measurement to be 'adjusted'. The vertical camera could provide area and appearance data of the oil. The IR data will 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.*

4 Investigation - 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.

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 With regard to height and speed aircrews, observers, and Operating Authorities should be aware of the limitations of the human eye (visual acuity). Even with perfect eyesight observers in aircraft operating at altitudes of 500 ft, 1500 ft or 2500 ft, will not be able to see small spots (areas) of thick oil (True Colour) in a background of thin oil (Metallic), but should be able to see larger patches of perhaps 0.5 to 1 metre across. Additionally, the human brain needs sufficient time to register and interpret what the eye sees; going lower to solve the height/distance (visual acuity) difficulty will only reduce the time available due to the increase in the relative speed of the aircraft to the object.

4.5 *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.*

4.6 *It is recommended that the slick should be viewed from all sides by flying a racetrack pattern around the oil. The best position to view the oil is considered to be with the sun behind the observer and the observer looking at the object / subject from an angle of* 40^0 *to* 45^0 *to the perpendicular or as near to the vertical (overhead) as possible.*

4.7 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 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). 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

4.8 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 showing the overall situation and oil specifics are probably the most easily understood data and should be used to enhance any verbal or written report. They can also help to 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 or for digital photography manipulation of the images may affect the appearance / colour.

5.2 The ideal set of photographs will show an overall, long range view of the pollution and a series of detailed, close up, shots of the pollution.

5.3 When taking photographs as evidence of illegal pollution in addition to the standard set of shots outlined in paragraph 5.2 above, it is important, where possible; to show a connection between the polluter and the pollution, directly or indirectly. IR and UV data can also show a connection. The images should also include views ahead of the moving vessel, to establish whether pollution was already there or not. A vessel passing through a slick will separate the oil and leave a clear wake.

5.4 Caution should also be exercised when using digital photography, as it may not be admissible as evidence in some countries as the images can be manipulated. Where possible it is suggested that both digital and conventional 35mm photographs should be taken.

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.*

8 Volume Estimation Calculation Procedure

8.1 The Volume Estimation Procedure is illustrated at Annex B.

9 Post Flight Analysis

9.1 Post flight analysis is considered **imperative** to obtaining the **most accurate oil volume estimations** possible. 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.

9.2 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.

9.3 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.

9.4 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).

9.5 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.

9.6 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.

9.7 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.

10 Oil Volume Estimate Usage

10.1 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.

10.2 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.

ANNEX A

THE BONN AGREEMENT OIL APPEARANCE CODE

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.

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	200 to More than 200	200,000 - 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 Pollution Observation Log*.

3. Description of the Appearances

3.1 Code 1 – Sheen (0.04 µm – 0.3 µm)

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

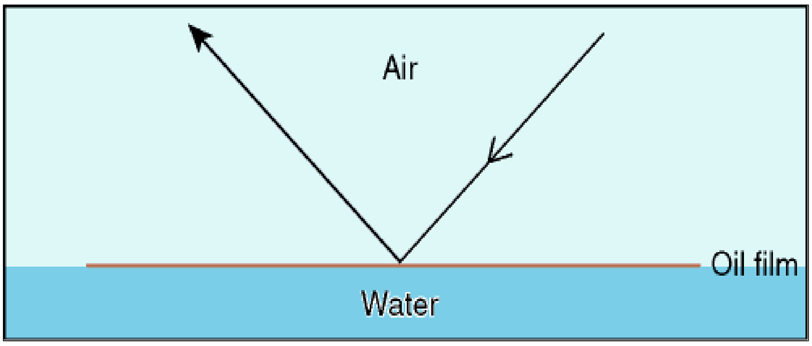


Figure 1. Light Reflecting From Very Thin Oil Films

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

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

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

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

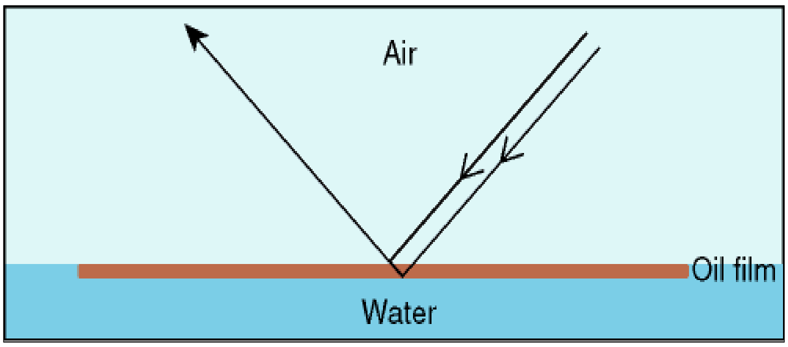


Figure 2. The Rainbow Region

Sheen and Rainbow

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

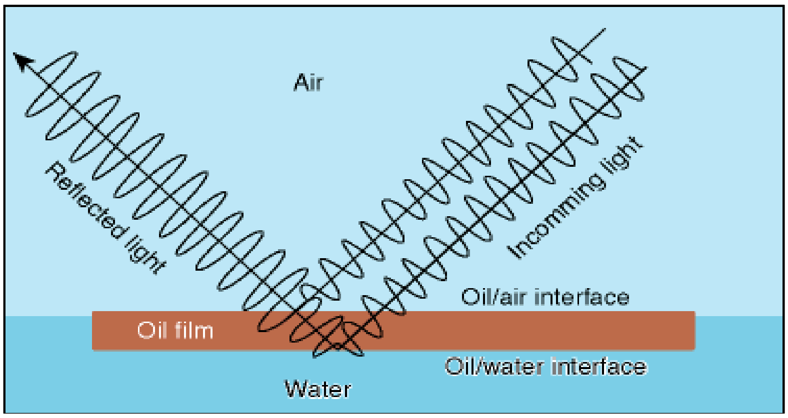


Figure 3. Constructive Interference

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

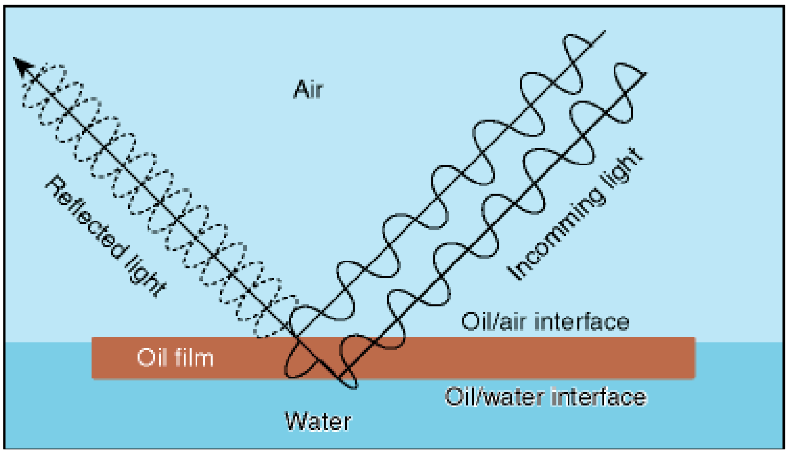


Figure 4. Destructive Interference

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

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

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

3.3 Code 3 – Metallic (5.0µm – 50 µm)

20. The appearance of the oil in this region cannot be described as a general colour. The true colour of the oil will not be present because the oil does not have sufficient optical density to block out all the light. Some of the light will pass through the oil and be reflected off the water surface. The oil will therefore act as a filter to the light (Figure 5).

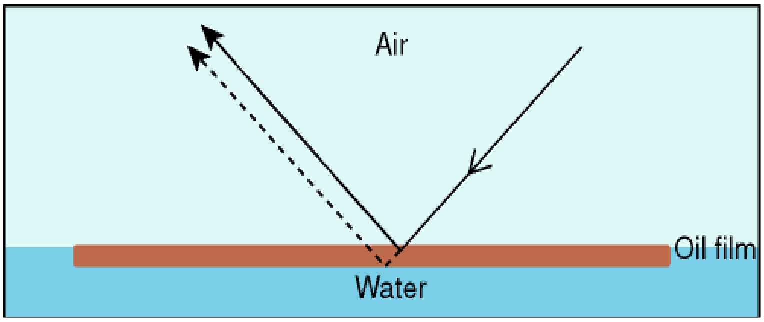


Figure 5. The Metallic Region

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

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

Metallic, with Sheen and Rainbow

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

23. Code 4 is intermediate between Code 3 and Code 5, and consists of small areas, or patches, of Code 5, Continuous True Oil Colour in a background of Code 3, Metallic. This is an accurate description of the behaviour of the oil layer – it does not spread as an even thickness layer, but consists of thicker patches in a thinner layer.

Observation of Code 4

24. On a number of occasions aircrews have reported difficulty seeing DCTC both in field trials, Bonnex 2002, and operationally. The following explanation with regard to the problem is an extract from a recent report by Alun Lewis:

25. 'Code 4 is intermediate between Code 3 and Code 5; it is a hybrid of Codes 3 and 5. "Discontinuous" refers to the Code being used to describe patches of Code 5 - Continuous True Oil Colour against a background of Code 3 - Metallic. The size of the thicker oil (Code 5 - Continuous True Oil Colour) patches that can be seen will depend on the distance from which they are observed and the visual acuity of the observer.

26. Visual acuity refers to the clarity or clearness of one's vision, a measure of how well a person sees. The word "acuity" comes from the Latin "acuitas," which means sharpness. A person with normal, or average, visual acuity can correctly identify a 9 mm high black letter on a white background on a standard Snellen eye chart that subtends 5 minutes of arc (0.04167°) at a distance of 6 metres (the standard distance for eye tests). They can discriminate the shape of the letter and can therefore easily see a black line or dot that subtends half this angle, 2.5 minutes of arc (0.0208º). A person with normal visual acuity would therefore have no difficulty in seeing individual 4 mm diameter black dots on a white background from a distance of 6 metres.

27. As was demonstrated at the BONNEX 2002 and NOFO 2006 Oil on Water Exercise, observers in small boats, who looked at the spilled oil from a distance of a metre or so, were able to easily see small patches of Code 5 in a background of Code 3 and reported this as Code 4 - Discontinuous True Oil Colour.

28. Surveillance aircraft conducting visual observations of oil slicks on the sea surface normally operate at altitudes of approximately 500 ft, 1500 ft or 2500 ft. The equivalent sizes of a black dot that could be seen on a white background by a person with normal acuity vision would be 110 mm, 330 mm and 550 mm from these altitudes. In addition, the contrast between black and white will normally be a lot more than the contrast between the true colour of an oil (black or brown) and the metallic, almost mirror-like effect and appearance of oil of the Code 3 thickness. Observers in aircraft will not be able to see small patches of Code 5 in a background of Code 3, but should be able to see much larger patches of Code 5, perhaps 0.5 to 1 metre across, in a background of Code 3.

29. From an aircraft, the appearance of a slick containing a large area of Code 4 - Discontinuous True Oil Colour – composed of individually small areas of Code 5 - Continuous True Oil Colour against a background of Code 3 – Metallic - will therefore be a function of the concentration of the Code 5 patches. At low concentrations (5 to 10% of the total area) they will probably be invisible and the area will be observed as Code 3 – Metallic. At some increased concentration (perhaps 40 or 50% of the total area), the appearance of that area of the slick will probably 'flip' from being all Code 3 – Metallic to being all Code 5 - Continuous True Oil Colour.'

30. In addition, to the issue of visual acuity, the human brain needs sufficient time to register and interpret what the eye sees; going lower to solve the height/distance (visual acuity) difficulty will only reduce the time available due to the increase in the relative speed of the aircraft to the object.

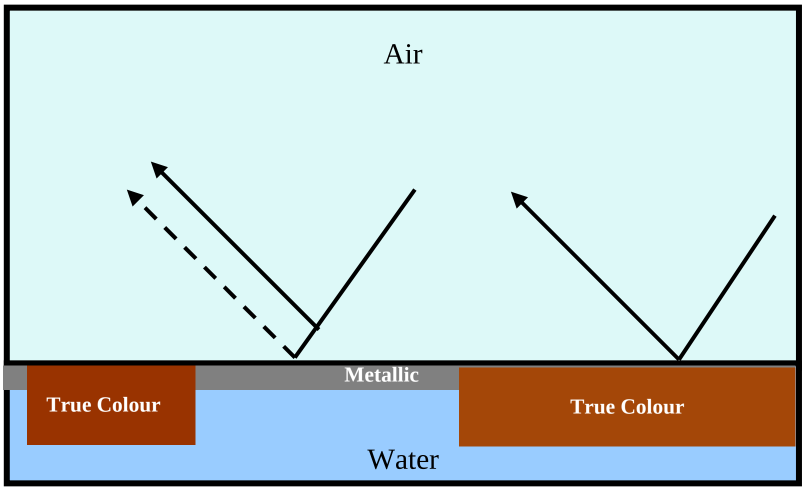
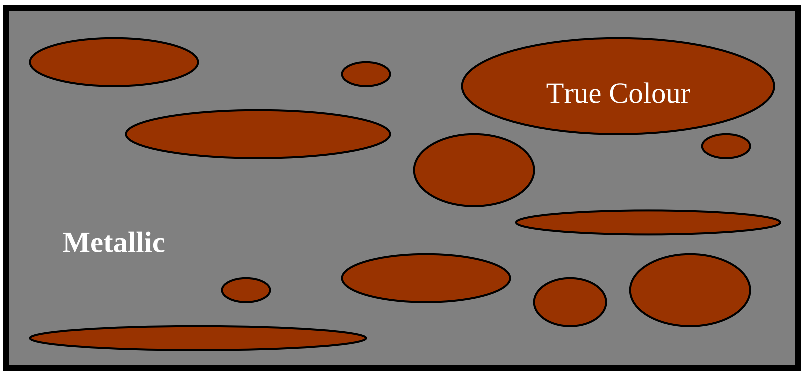


Figure 6a. The Discontinuous True Colour Region



Plan (Overhead) View

Figure 6b. The Discontinuous True Colour Region

31. For oil thicker than 50 µm the light is being reflected from the oil surface rather than the sea surface (Figure 7). The true colour of the oil will gradually dominate the colour that is observed. Brown oils will appear brown, black oils will appear black.

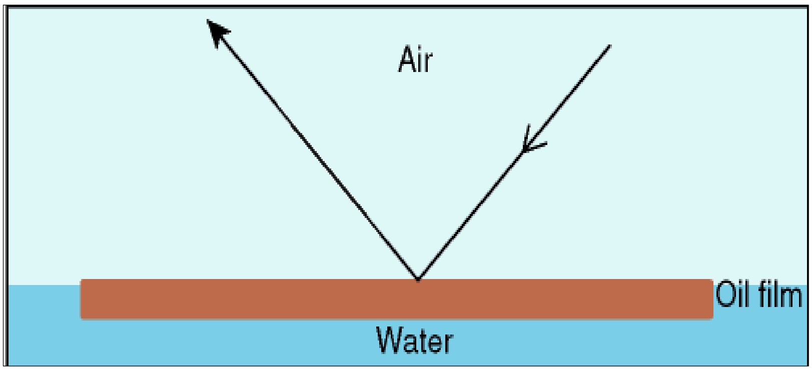


Figure 7. Thick Oil Films

3.5 Code 5 – True Colours (>200 µm)

32. The true colour of the specific oil is the dominant effect in this category and the area will be generally homogenous (continuous). It is strongly oil type dependent and colours may be more diffuse in overcast conditions.

33. There is no maximum thickness value for True Colours since it is not possible by visual observation from above to estimate the thickness of oil layers above 200 microns. A spilled oil layer on water that is 0.5 mm thick will look, from the top, exactly the same as an oil layer that is several millimetres thick. The light is reflected from the top surface of the oil; this gives information about the colour and texture of the surface of the oil, but cannot give any direct information about the thickness of the oil layer.

True colour

4. Local Variation of Oil Film Thickness at Sea

34. When observing oil in wave conditions on the sea the thickness of a layer of oil on water at a particular location will not remain constant. The sea surface is not static and is often a dynamic environment.

35. As a non-breaking wave passes underneath the oil slick, the oil layer will be:

- Stretched and thinned on the wave crest
- Compressed and thickened in the wave trough

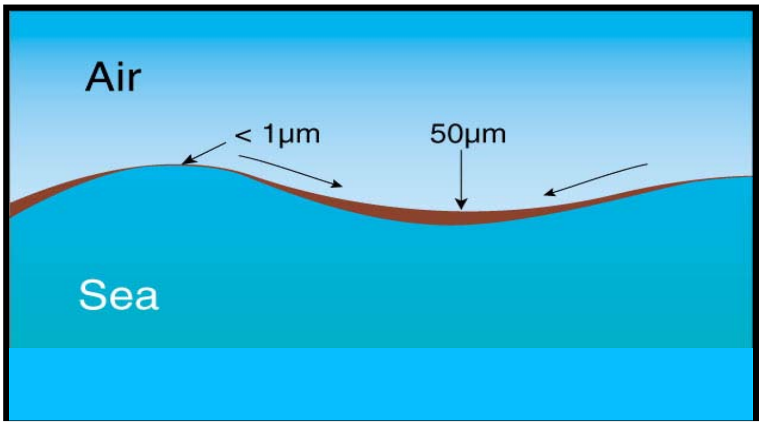


Figure 8 Local Variations of Oil Film Thickness at Sea

36. An area of oil that is of a thickness that is close to the minimum or maximum thickness of a particular BAOAC Code may therefore appear to alternate between two BAOAC Codes.

37. If there are breaking waves, the situation is more extreme. As the breaking wave passes through the oil slick, the area of oil affected by the wave will be temporarily dispersed below the surface as large oil droplets. The area of water surface will be temporarily cleared of oil. The large oil droplets will then rapidly re-surface and, as they reach the water surface, will rapidly spread out to form a layer of oil of rapidly diminishing thickness.

38. **The oil layer thickness, and the BAOAC Codes associated with the particular thickness, will therefore not be constant when waves are present.**

5. Emulsion

39. Spills of crude oil and some fuel oil are frequently attended by the rapid formation of water-in-oil emulsions (mousse) which are often characterised by a brown / orange colouration and a cohesive appearance. The Appearance Code SHOULD NOT be used to quantify areas of emulsion.

40. Reliable estimates of water content in an 'emulsion' are not possible with out laboratory analysis, but accepting that figures of 50% to 80% are typical, approximate calculations of oil quantity can be made, given that most floating emulsions are 1 mm or more thick.

6. Supplementary Oil Thickness Data

41. As there is no maximum thickness value for Code 5, True Colour, since it is not possible by visual observation from aircraft to estimate the thickness of oil layers above 200 µm, the overall estimated maximum oil volume will **'always' be prefixed as being 'more than' or 'at least' so many metric tonnes.** To improve the estimated maximum value it is recommended that 'supplementary oil thickness data' or 'ground truth' on the 'true colour' areas should be used to calculate volumes.

ANNEX B

THE VOLUME ESTIMATION CALCULATION PROCEDURE

1. Oiled Area Measurement

SLAR Polygon

Area from SLAR Data	12 km^2
Length and Width (SLAR Image or Time and Distance)	
Length – 12 km x Width – 2 km (Imaginary Rectangle)	
Area Covered with oil (Coverage) – 50%	
Oiled Area 12 x 2 x 50%	12 km^2

2. Appearance Coverage Allocation

Appearance Code 1 (Sheen)	42%
Appearance 2 (Rainbow)	32%
Appearance 3 (Metallic)	18%
Appearance 4 (Discontinuous True Colour)	05%
Appearance 5 (Continuous True Colour)	03%

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
Discontinuous True Colour	50 µm – 200 µm
Continuous True Colour	200µm – more than 200 µm

4. *Minimum Volume Calculation*

Oiled Area x Area Covered with Specific Appearance x Minimum Thickness

Appearance 1 (Sheen)

12 km^2 x 42% x 0.04 µm = 0.20 m^3

Appearance 2 (Rainbow)

12 km^2 x 32% x 0.3 µm = 1.15 m^3

Appearance 3 (Metallic)

12 km^2 x 18% x 5.0 µm = 10.8 m^3

Appearance 4 (Discontinuous True Colour)

12 km^2 x 5% x 50 µm = 30.0 m^3

Appearance 5 (True Colour)

12 km^2 x 3% x 200 µm = 72.0 m^3

Minimum Volume = 0.20 + 1.15 + 10.80 + 30.00 + 72.00 = 114.15 m^3

5. ***Maximum Volume Calculation***

Oiled Area x Area Covered with Specific Appearance x Maximum Thickness

Appearance 1 (Sheen)

12 km^2 x 42% x 0.3 µm = 1.51 m^3

Appearance 2 (Rainbow)

12 km^2 x 32% x 5 µm = 19.20 m^3

Appearance 3 (Metallic)

12 km^2 x 18% x 50 µm = 108.00 m^3

Appearance 4 (Discontinuous True Colour)

12 km^2 x 5% x 200 µm = 120.0 m^3

Appearance 5 (True Colour)

12 km^2 x 3% x (more than) > 200 µm = > 72.0 m^3

Maximum Volume = 1.51 + 19.20 + 108.00 + 120.00 + >72 = > 320.71m^3

ANNEX C

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 trialled and approved which reduces the cuttings to a powder before discharge. Although such a discharge might cause some discolouration of the sea, oil sheen would not be expected.

Other permitted operational discharges of oil

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

Drains

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

Flaring

7. Flaring carried out with high efficiency burners should not result in a fall-out of oil into the sea. If oil from flaring is seen on the sea surface, flaring should cease.

Non Permitted Releases

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

Appearance and Interpretation

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

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

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

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

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

14. Determining compliance with OSPAR recommendations and decisions can only be achieved through investigations with the platform to determine the discharges that have been taking place at the time of the observation and the concentrations at which they occurred. However, information on the nature and appearance of any oil seen can be a useful indication for further investigation.

ANNEX D

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.

Bonn Agreement
Accord de Bonn

PART 4: NATIONAL INFORMATION

CHAPTER 1

BELGIUM

BRITTEN NORMAN ISLANDER

1 Introduction

1.1 The Belgium Ministry of Environment (MUMM) plans, directs and controls the aerial surveillance missions using a Britten Norman Islander (B-02) aircraft fitted with SLAR, IR/UV and camera systems. The aircraft is provided and operated under contract from the Ministry of Defence (School of Light Aviation). The remote sensing equipment is owned and operated by MUMM. During aerial surveillance patrols, the aircraft retains military status.

2 National Surveillance Points

B0	51°22,5’	N	002°53,3’	E
B1	51°11,5’	N	00227,5’	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	003°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

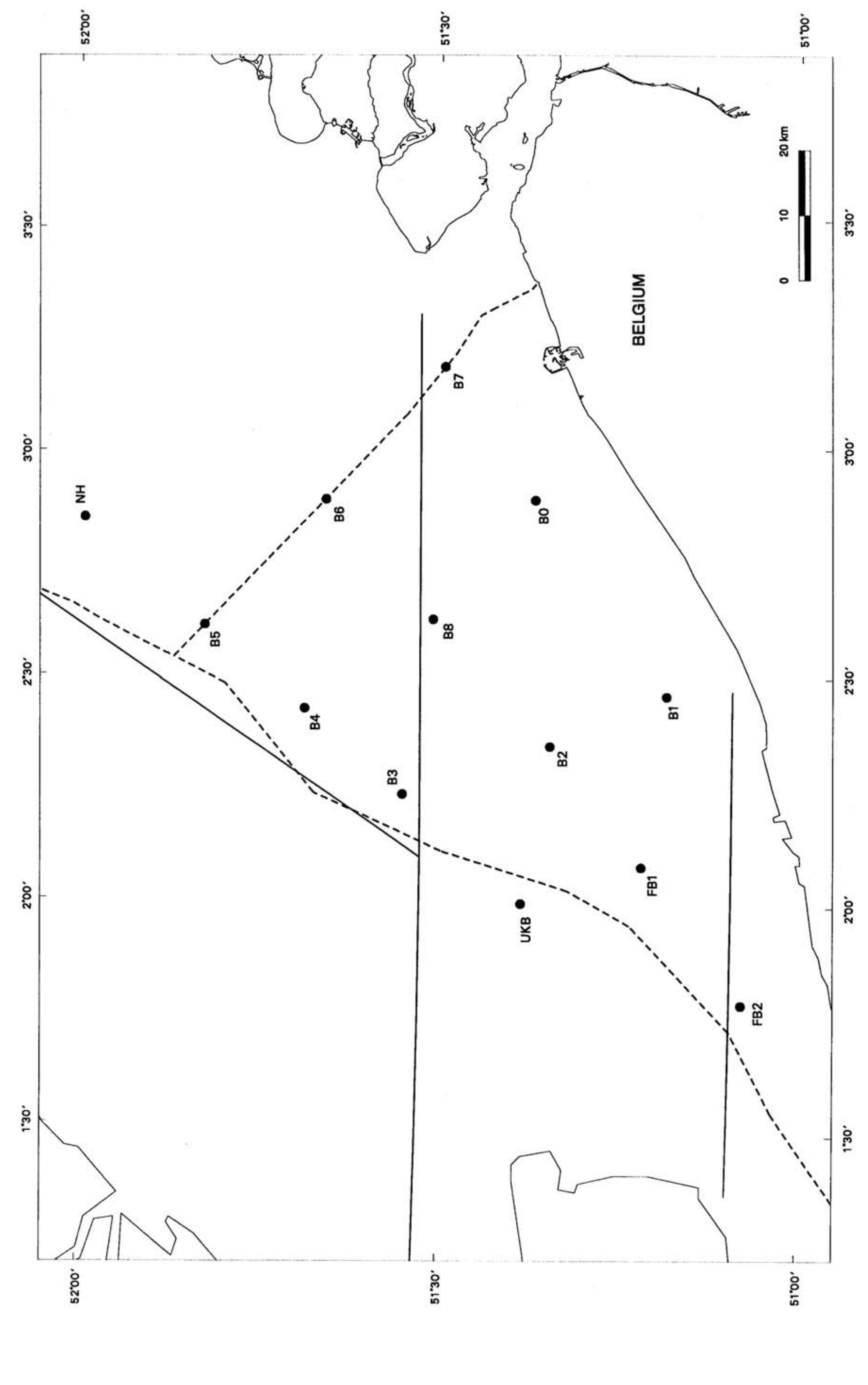
Maritime Command (COMOPSNAV)
Marinebasis Zeebrugge
Graaf Jansdijk, 1
B-8380 ZEEBRUGGE
Belgium

Tel: +32 50 55 83 17 (24/24hrs)
Fax: +32 50 55 01 04
E-mail: permoff.permoff@mil.be (not for urgent messages)

Responsible Authority for flight schedule, planning:

Management Unit of the North Sea Mathematical Models
Gulledelle 100
B-1200 Brussels
Belgium

Tel: +32 2 773 21 11 (office hours)
Fax: +32 2 770 69 72
E-mail: info@mumm.ac.be (not for urgent messages)



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BELGIAN NAVIGATION POINTS

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

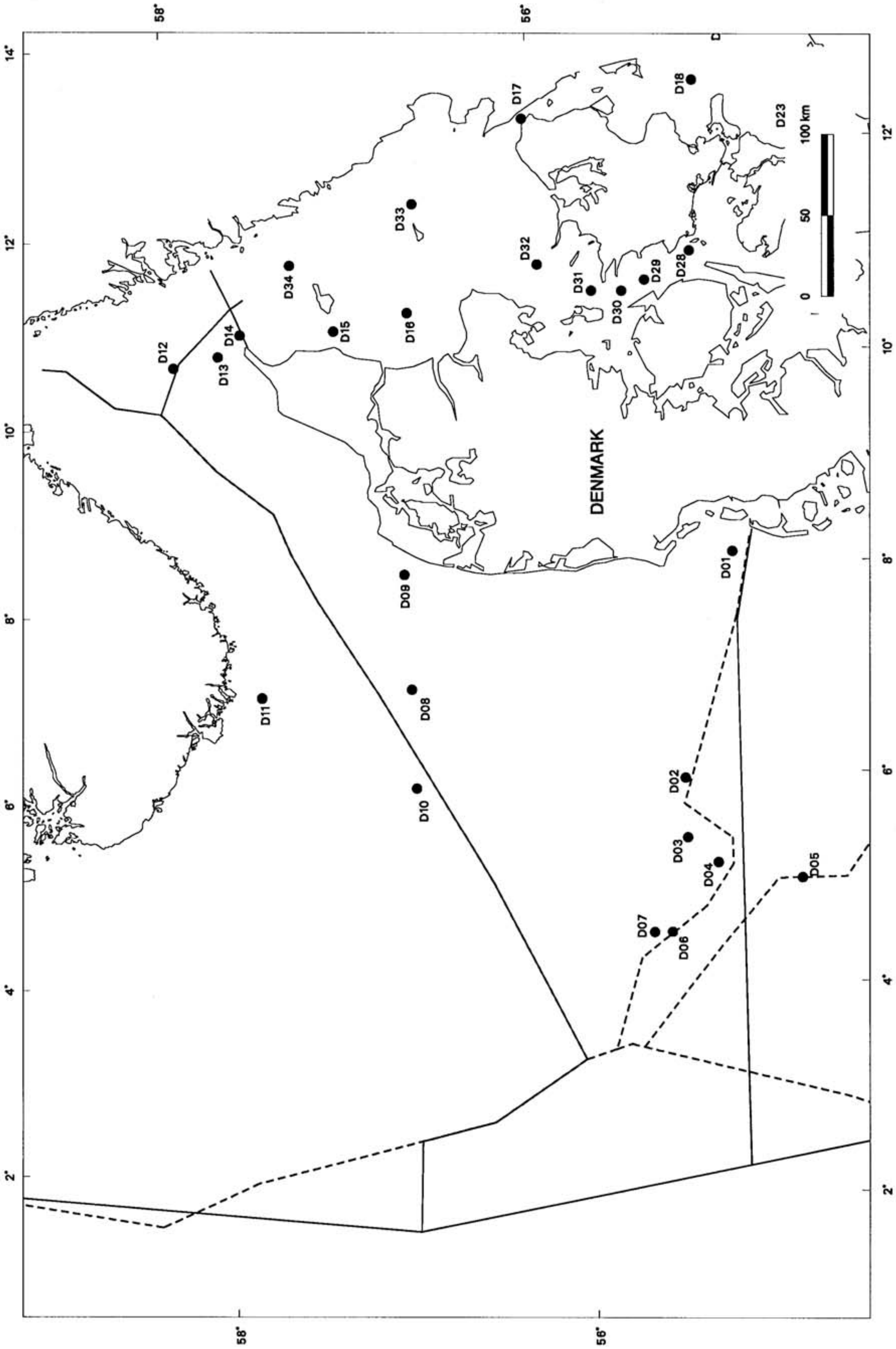
3 National Focal Point

Maritime Assistance Service
PO Box 483
DK-8100 AARHUS C
Denmark

Tel: +45 89 43 32 08 (24 hours)
Fax: +45 89 43 32 30
Email: eu-celle@sok.dk

Admiral Danish fleet
Environment Section
PO Box 483
DK-8100 Aarhus C
Denmark

Tel: +45 89 43 33 81 (office hours)
Fax: +45 89 43 33 88
Email : pol.con.den@sok.dk



DANISH NAVIGATION POINTS

NZ0178D

CHAPTER 3

FRANCE

POLMAR 1

POLMAR 2

CESSNA 406

1 Introduction

1.1 Several aircraft within the customs organisation perform routine flights over the sea and carry out pollution surveillance as well. Two Cessna 406 are equipped with remote sensing systems. Polmar I, based in Bordeaux, and Polmar II, based in Hyeres, are both equipped with SLAR (Terma), IR/UV (Sagem) and FMS. Additionally, the Polmar II is equipped with Microwave Radiometer (MWR)

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

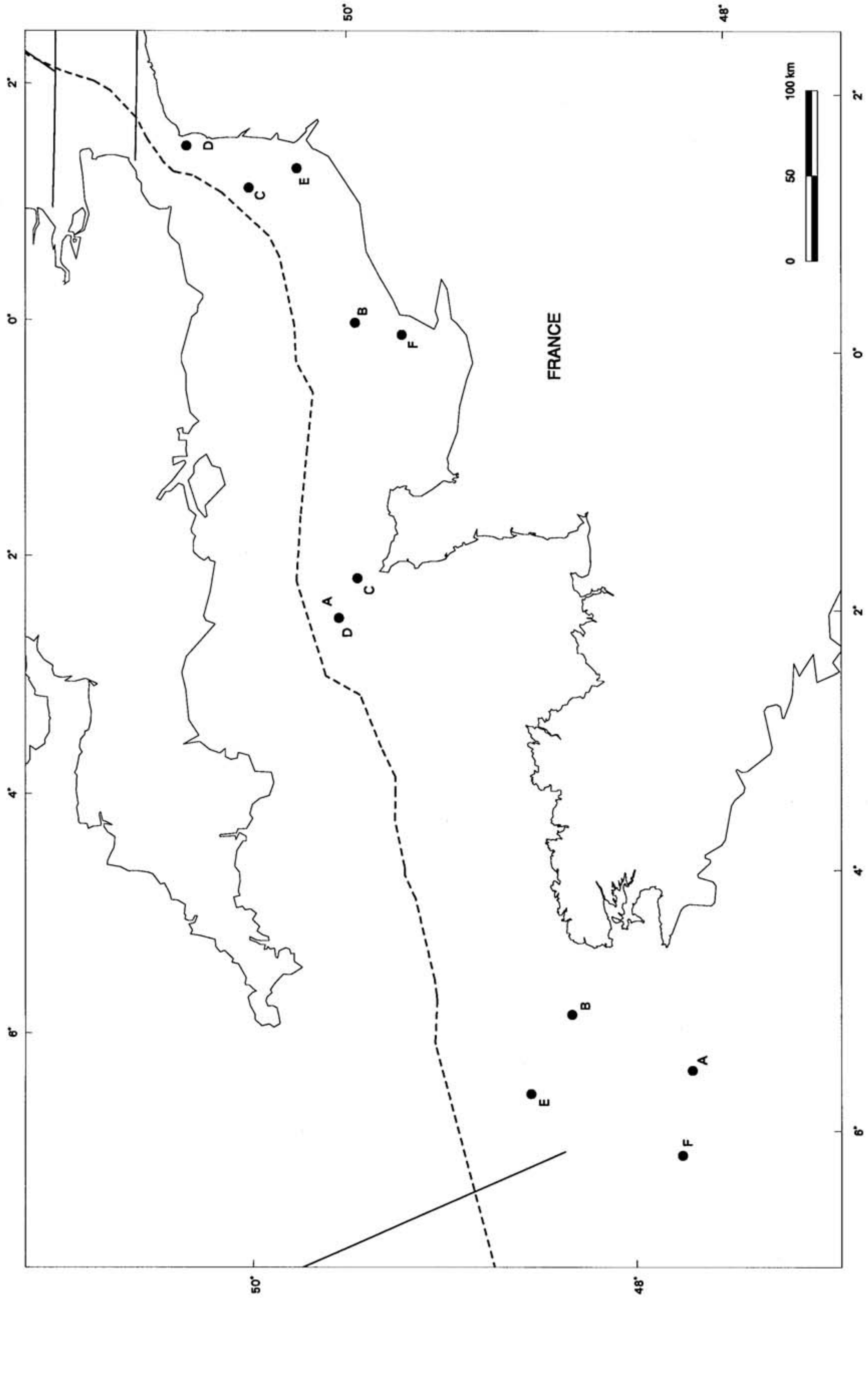
Cross Jobourg
BP n° 5
F-50440 Beaumont Hague
France

Tel. +33 233 52 72 13
Fax. +33 233 52 71 72

A) **Customs General Directorate**

Tel + 33 1 44 74 44 49
+ 33 1 44 74 44 52
Fax + 33 1 55 04 65 94

Direction Generale des Douanes
Monsieur le chef du Bureau B/2
23 bis Rue de l’UNIVERSITE
75700 PARIS 07 SP
France



NZ0178G

FRENCH NAVIGATION POINTS

CHAPTER 4

FEDERAL REPUBLIC OF GERMANY

DORNIER 228

1 Introduction

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

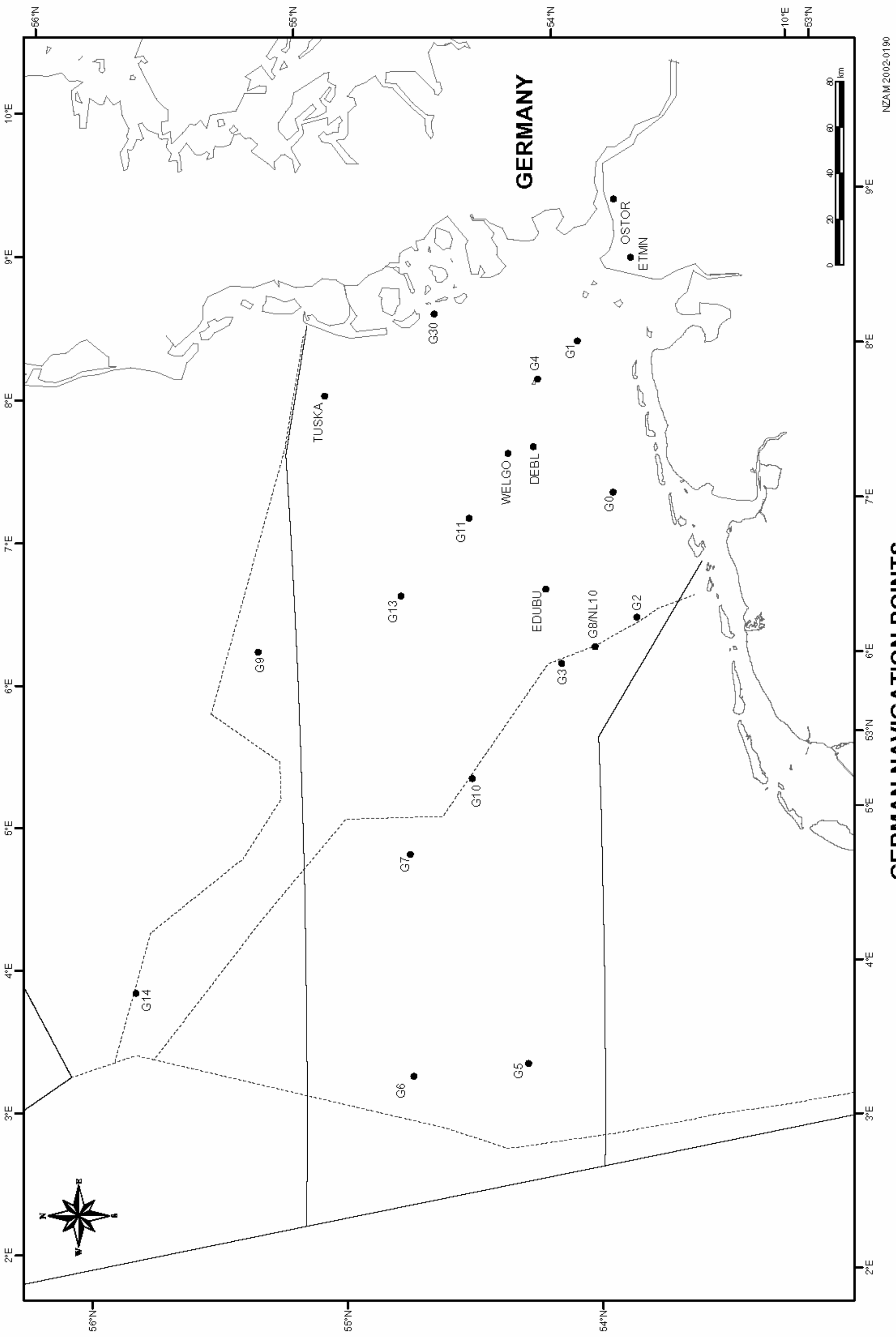
1.2 The Central Command for Maritime Emergencies (CCME), Section 2, Maritime Pollution Control / High Sea plans, directs and controls the aerial surveillance missions.

2 National Surveillance Points

G 0	53° 54.00’ N	007° 07.00’ E
G 1	54° 00.00’ N	008° 08.00’ E
G 2	53° 50.00’ N	006° 17.00’ E
G 3	54° 08.00’ N	006° 00.00’ E
G 4	54° 10.00’ N	007° 54.00’ E
G 5	54° 18.00’ N	003° 20.00’ E
G 6	54° 45.00’ N	003° 15.00’ E
G 7	54° 45.00’ N	004° 45.00’ E
G 8 / NL 10	54° 00.00’ N	006° 06.00’ E
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
EDUBU	54° 11.00’ N	006° 30.00’ E
ETMN	53° 46.05’ N	008° 39.52’ E
WELGO	54° 18.00’ N	007° 25.00’ E
TUSKA	55° 00.00’ N	007° 53.00’ E

3 National Focal Point

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


GERMANY
GERMAN NAVIGATION POINTS
OSTOR
ETMN
G30
G1
G4
TUSKA
WELGO
DEBL
G0
G11
G13
EDUBU
G8/NL10
G2
G9
G3
G10
G7
G14
G6
G5
NZAM 2002-0190
km

CHAPTER 5

NETHERLANDS

DORNIER 228

1 Introduction

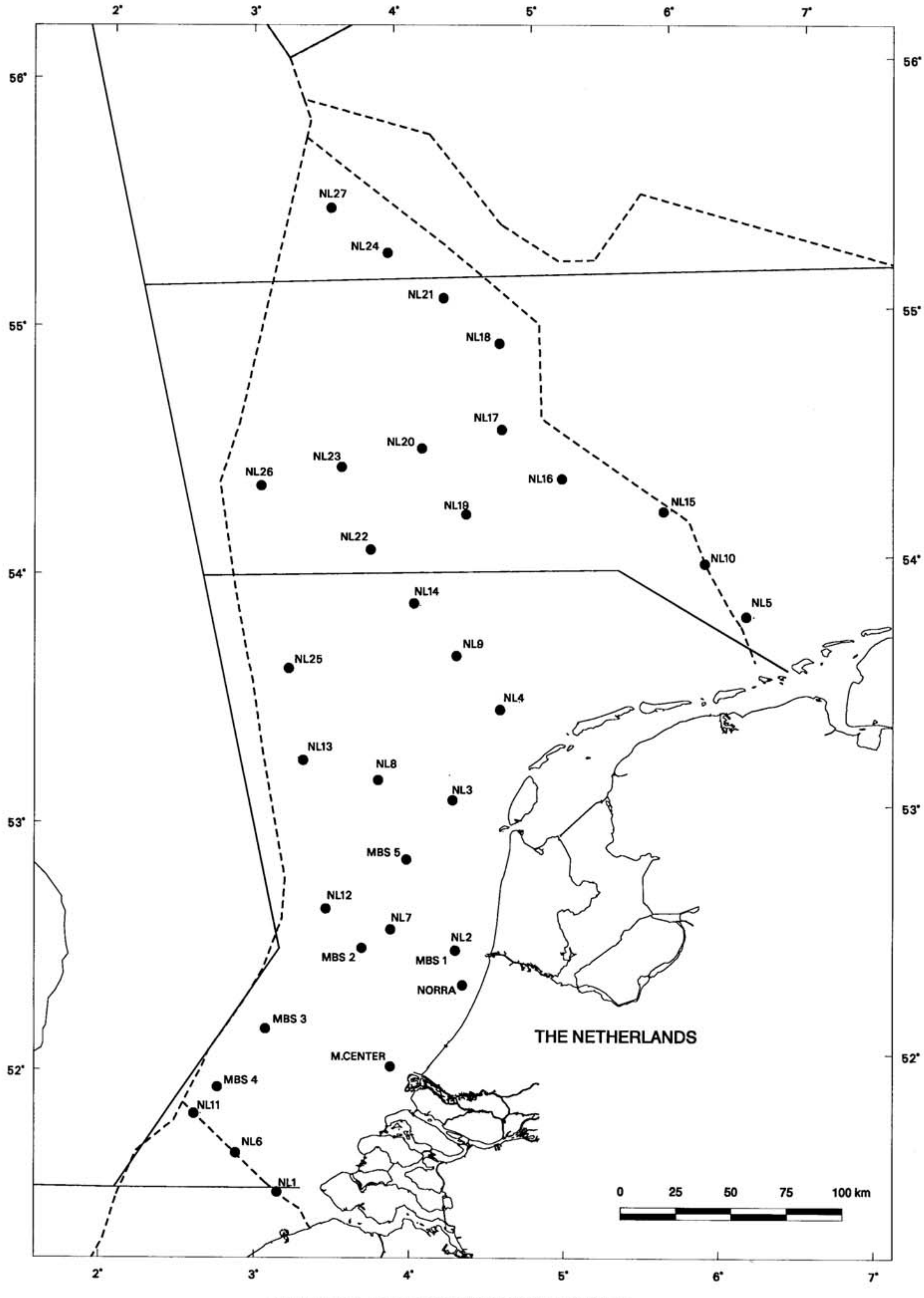
1.1 Rijkswaterstaat, North Sea Directorate, leases a Dornier 228-212. The aircraft is equipped with SLAR (Terma), IR camera, identification camera (Astromed), video camera and photo cameras. The surveillance system is state owned. The Royal Netherlands Navy provides the pilots.

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 North Sea Directorate P.O. Box 5807 2280 HV Rijswijk The Netherlands Tel: +31 70 336 6600 Fax: +31 70 390 0691



NETHERLANDS NAVIGATION POINTS

CHAPTER 6

NORWAY

FAIRCHILD MERLIN B3

1 Introduction

1.1 Norway leases a Fairchild Merlin 3B/LF-SFT from Helitrans. It is equipped with a MSS5000 remote sensing system incl. a SLAR (Ericsson), IR/UV Linescanner (Daedalus), photo cameras, a video system and a real-time moving map system. The aircraft is considered to be state owned during missions on behalf of the Norwegian Coastal Administration.

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

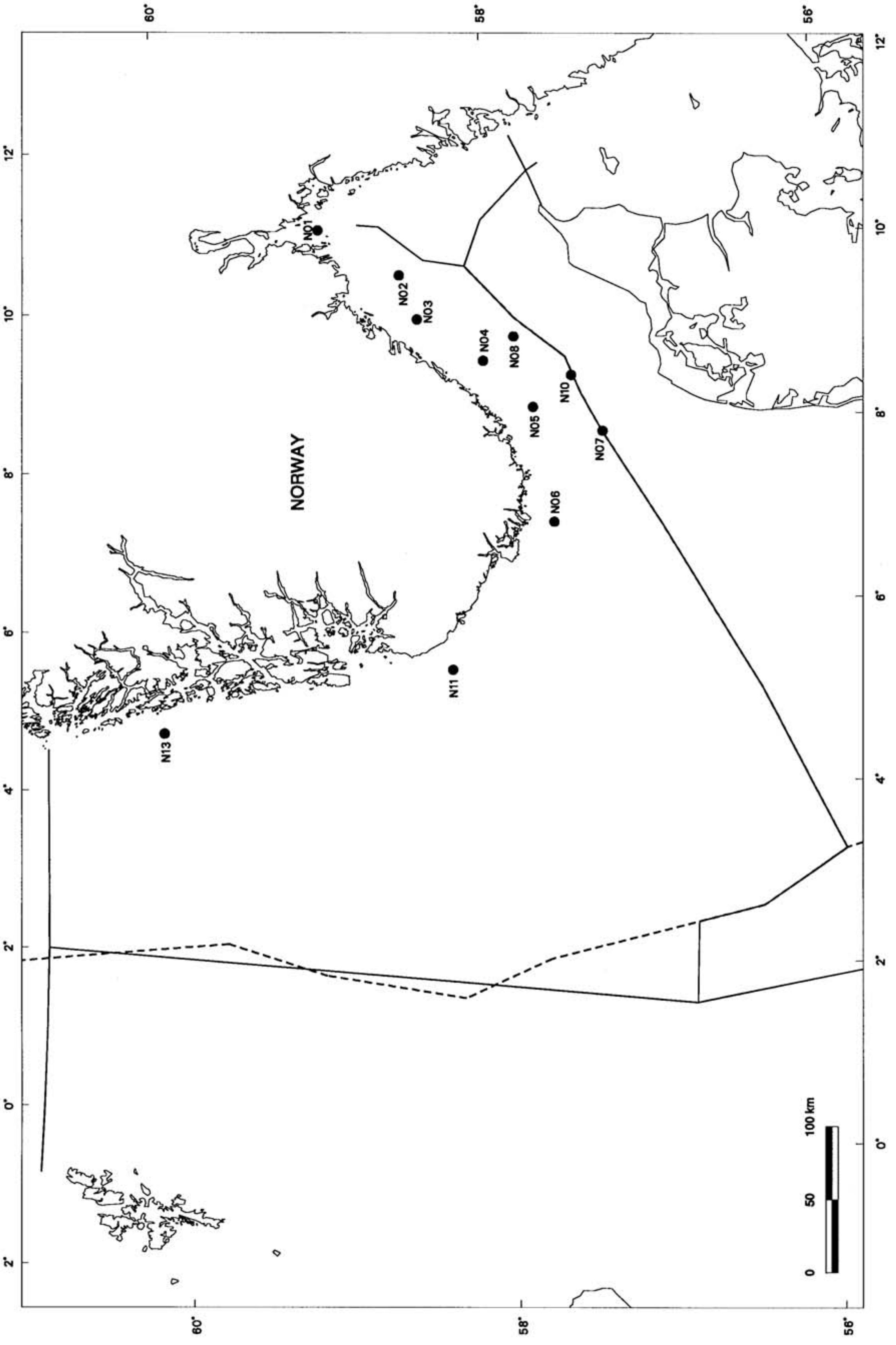
3 National Focal Point

Norwegian Coastal Administration
Department for Emergency Response
P.O. Box 125
N-3191 Horten, Norway
Tel: +47 33 03 48 00
Fax: +47 33 03 49 49

Contact Address, Telephone, Fax:

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

Tel: +47 33 03 48 00
Fax: +47 33 03 49 49



NORWAY NAVIGATION POINTS

CHAPTER 7

SWEDEN

CASA 212

1 Introduction

1.1 The Swedish Coastguard operates three CASA 212, all fully equipped with remote sensing systems, for routine operations in the Skagerrak and North Sea. The aircraft are based in Nykōping, Skavsta Airport (ESKN).

2 National Surveillance Points

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

3 National Focal Point

Swedish Coast Guard Headquarters
Stumholmen
S-371 23 Karlskrona
Sweden

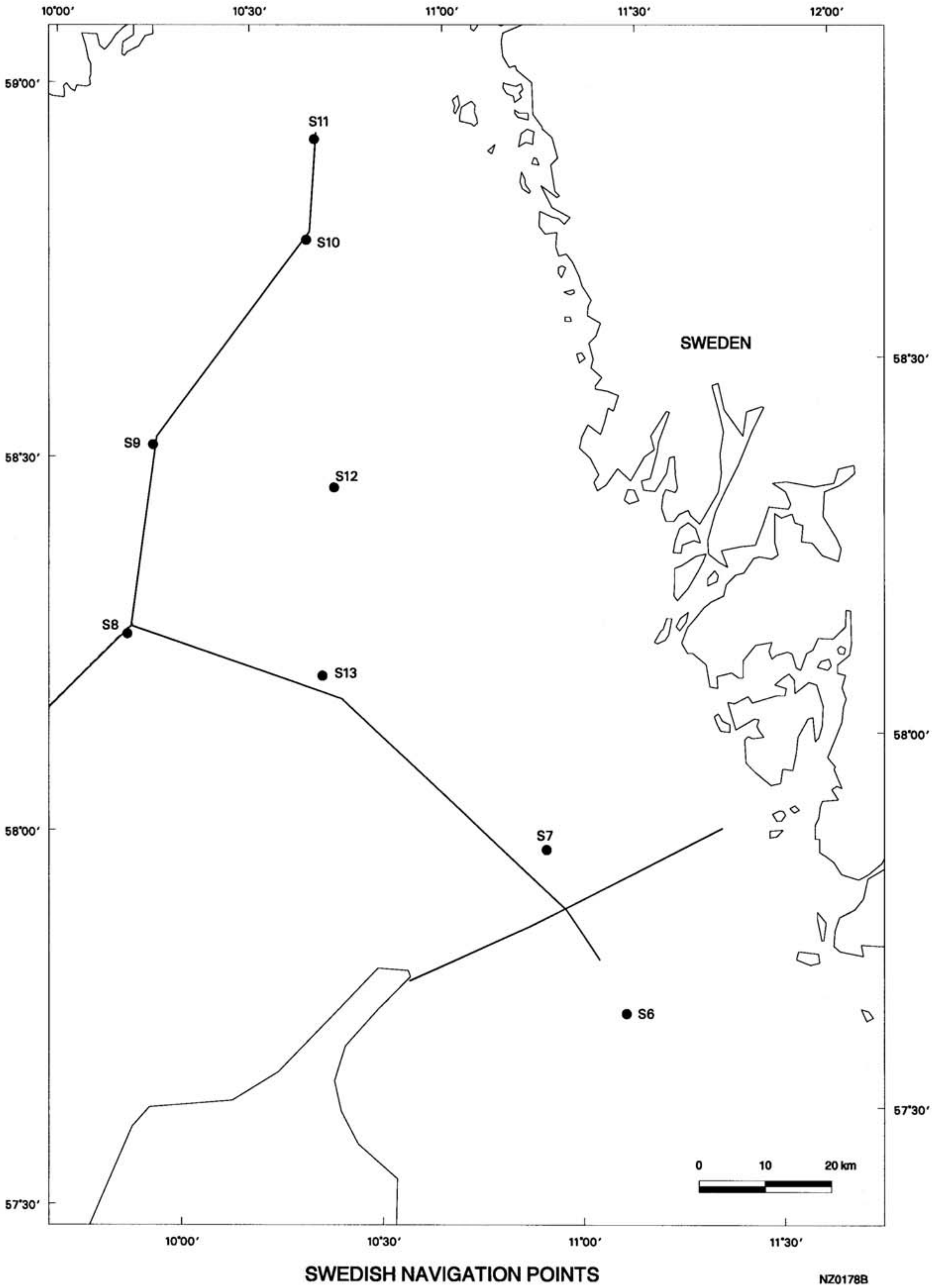
Tel: +46 455 353 535
Fax:+46 455 812 75

Ministry of Defence
S-103 33 Stockholm

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

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

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



SWEDISH NAVIGATION POINTS

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.

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 terminals are Teesport, Sullom Voe, Flotta and Hound Point.

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 the busiest of all 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 255 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. Since that time around 31 billion barrels of oil equivalent have been produced from the area. In the beginning of 2002 the remaining reserves were estimated to be between 24 – 32 billion barrels of oil equivalent and in 2003 a total of 30 new exploration and appraisal wells were drilled. Production rates in 2002 were around 4.2 million barrels of oil equivalent per day and figures indicate some 265,000 jobs were supported by the offshore industry in 2001.

2.5 The UK has suffered 3 of the world's 20 largest recorded oil spills, Torry 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 Trade and Industry, which 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.

3 National Surveillance Routing

3.1 The United Kingdom Pollution Control Zone is divided into regions/areas that correspond approximately with HM Coastguard Regions. 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

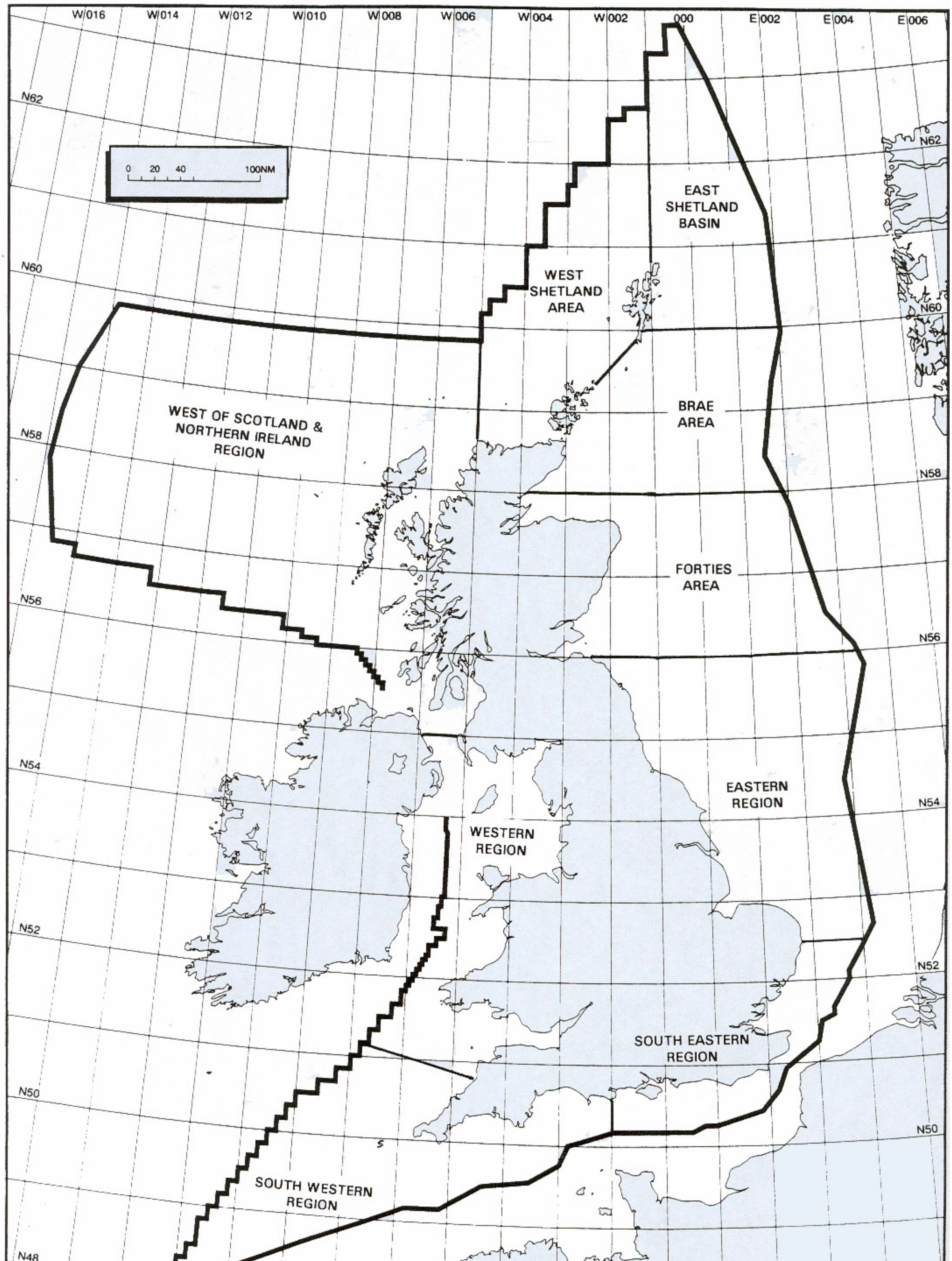
Maritime and Coastguard Agency (MCA)
Aberdeen Maritime Rescue Co-ordination
4th Floor, Marine House, Blaikies Quay
Aberdeen, United Kingdom
AB11 5PB

Tel. +44 (0)1224 592334
Fax.+44 (0)1224 575920

Contact Address, Telephone, Fax:

Maritime and Coastguard Agency (MCA)
Spring Place, 105 Commercial Road
SOUTHAMPTON
United Kingdom. SO15 1EG

Tel: +44 1703 329 100 (Switchboard)
Tel :+44 1703 329 415 (Emergency Hot Line)
Tel: +44 1703 329 445 (Marine Emergency Operations Room)
Fax:+44 1703 329 446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W 014
W 012
W 010
W 008
W 006
W 004
W 002
000
E 002
E 004
E 006
N62
N60
N58
N56
N54
N52
N50
N48
0 20 40 100NM
EAST SHETLAND BASIN
WEST SHETLAND AREA
WEST OF SCOTLAND & NORTHERN IRELAND REGION
BRAE AREA
FORTIES AREA
EASTERN REGION
WESTERN REGION
SOUTH EASTERN REGION
SOUTH WESTERN REGION

Record of Amendments made to the Handbook

Section amended	Amendment	Date
Part 1, Chapter 8, Annex A: Bonn Agreement addresses and telecommunications	The information for Denmark was updated	20 July 2005
Part 1, Chapter 8, Annex A: Bonn Agreement addresses and telecommunications **Part 4, National Information:** Denmark	The information for Denmark was updated	2 May 2006
Part 3, Guidance for Oil Pollution Detection, Investigation and post flight analysis/evaluation for volume estimation	Amendments throughout	September 2007