Bonn Agreement
Accord de Bonn

PART 2:

REMOTE SENSING AND OPERATIONAL GUIDELINES

1 Remote Sensing

1.1 Introduction

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

1.2 Sensors – General Requirements

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

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

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

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

1.3 Side Looking Airborne Radar (SLAR)

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

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

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

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

1.4 Synthetic Aperture Radar (SAR)

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

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

1.5 Ultra Violet Line Scanners or Camera (UV)

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

1.6 Infrared Line Scanner or Camera (IR)

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

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

1.7 Microwave Radiometer (MWR)

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

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

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

1.8. Forward Looking InfraRed (FLIR)

Forward Looking Infrared is similar to the IR sensor (1.6) however, it is installed in a gimbal that provides the opportunity to turn around horizontally and has a tilt and pitch function. In the gimbal one finds the gyro stabilized multi sensor imager. Medium-wave Infrared and optional sensors such as High-Definition TV, High-definition Low-light; HD Zoom sensor and Laser Rangefinder.
Most modern systems have the capability to lock on a target. The functionality with regard "detailed detection of oil" is like the scanner, and modern systems are also able to transfer IR/EO directly into a 2D

map, were any objects of interest, for example IR hot will be represented in true size and orientation in the map. The IR uses the same spectrum, although the latest generation of EO/IR turret mostly uses spectrum 3 to 5 microns, instead of 8 to 12 microns .
Another advantage of the FLIR is that it can be combined with a video-camera or LLTV in the same gimbal.
The FLIR gives the possibility to stay at a distance, unlike the scanner for which the aircraft needs to pass over the slick.

1.9 Laser Fluorosensor (LFS)

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

1.10 Low Light Level Television Camera (LLLTV)

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

1.11 Night Identification System

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

1.12 Photographic Camera (PHOTO)

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

1.13 Video Camera (VC)

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

1.14 Further Sensor Developments and Improvements

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

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

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

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

1.15 Sensor Systems

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

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

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

1.16 Platforms

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

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

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

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

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

1.17 Satellites

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

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

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

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

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

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

1.18 Major Pollution Incidents

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

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

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

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

1.19 Routine Patrols

<u>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.</u>

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

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

Possible offenders should be imaged and photographed. It is important that the photographs and the imagery show that the vessel is the only possible source of the oil. The vessel’s name should be photographed, if possible in a way that identifies it unambiguously as the offender, and recorded in the log. Nowadays the IMO number of the vessel is often found on the ships poop where also the name and the port of registration are found.
Communication should be established to invite the person on the bridge to provide information on last port of call and destination as well as to explain the discharge observed.

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

2 Tour de Horizon

2.1 Introduction

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

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

2.2 Tour de Horizon Flight Planning

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

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

With regard to the Tour de Horizon Flight Planning, the procedures to obtain CSN support have to be started up at least one month prior to the start of a TdH mission. These CSN support procedures are added in Annex D.

2.3 Tour de Horizon Routing Points

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

2.4 Tour de Horizon Weather Criteria

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

2.5 Tour de Horizon Flight Conduct

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

2.6 Detection Investigation

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

It is important to thoroughly document major oil detections (>1m^3), with special focus on the thicker parts, in particular the observed (dis)continuous true oil colours.

Details of Discharges from Offshore Installations are at Part 3, Chapter 9, Annex C.

2.7 Detection and observation Reporting

Because of the known problems in linking detections of oil from offshore installations with a breach in the OSPAR recommendation, all detections should be reported, preferably in flight, so an investigation can be initiated without delay. Recognizing that quick and effective pollution detection reporting during TdH missions is of key importance in order to allow for an effective follow-up by the competent authorities of an affected coastal State, and with the aim to minimize recurring reporting problems during future TdH missions, the Bonn Agreement Contracting Parties have defined that:

- For each detection, aircrew should systematically contact the appropriate National Focal Point (NFP) by phone, if possible already in-flight (and if not then post-flight). This is most important in case of major spills, i.e. those estimated to contain over 1 m^3 of oil, which must be reported to the appropriate NFP at the earliest opportunity. As soon as a written report is available this report, with photos and/or sensor images attached, should be sent preferably by mail to that NFP with request to acknowledge receipt.
- It is recommended to add the competent offshore inspectorate services as additional recipients to the email (or fax) of the written report.
- It is also recommended that aircrew work with a TdH liaising officer or liaising centre for detection reporting (e.g. national reporting agency). Since aircrew have regularly reported problems to establish contact with NFPs during their TdH operations, the detection reporting could be facilitated by means of a liaising officer or centre within the country performing the TdH mission, who could then establish the necessary contacts (phone/mail/fax) with the affected coastal State (NFP, competent offshore inspectorate services) and forward flight reports to that State.
- In general, aircrew should keep closer contact with NFPs throughout the TdH mission, not only for the purpose of detection reporting, but also for changes in planning or for CSN alert verification efforts/possibilities.
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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 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 Focal points for reporting Tour de Horizon

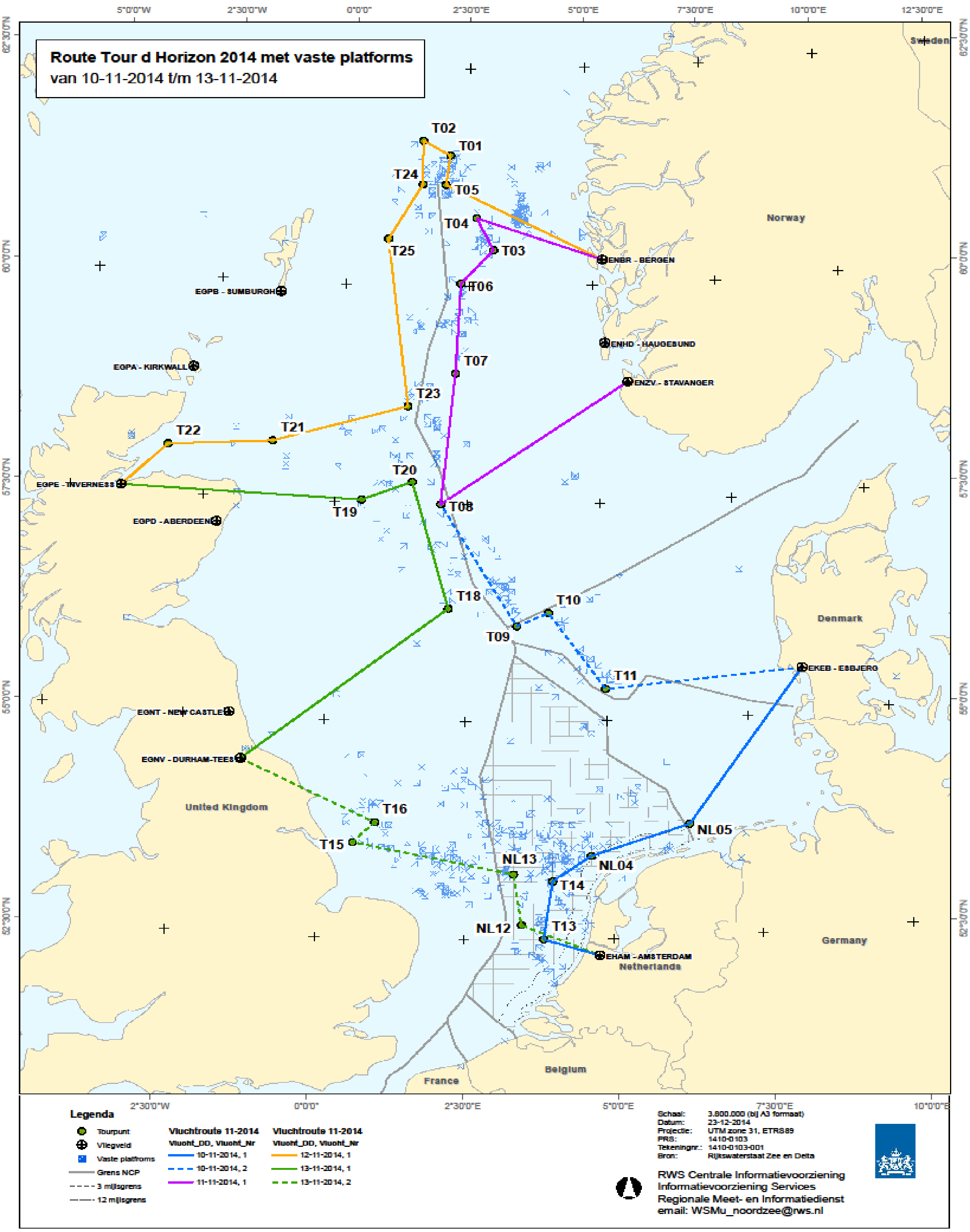
Details for reporting in flight and post flight are listed in ANNEX C

ANNEX A

TOUR DE HORIZON ROUTING POINTS AND CHART

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

TOUR DE HORIZON ROUTING POINTS CHART
and a possible routing



ANNEX B

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

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

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

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

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

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

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

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

ANNEX C

REPORTING FOCAL POINTS IN FLIGHT/POST FLIGHT

Always download latest version at Bonn Agreement webpage, under Activities and operations.

Country	IN/POST FLIGHT	Organisation (*)	Call Sign	Maritime VHF	Air VHF (Mhz)	Phone	FAX	Email	Contact Person	Address
BELGIUM	INFLIGHT POST FLIGHT	**MaritimeSecurity Centre (MIK)**	via **OSTEND RADIO** ask to connect with MIK	27		+ 32 (0)2 44 30350	+ 32 (0) 2 44 3965	mik@mil.be		
DENMARK	INFLIGHT	Defence Command Denmark Maritime Assistance Service **Joint Rescue Coordination Center**	**DANISH RESCUE**			+45 72 85 03 71	+45 72 85 04 63	mas@sok.dk		
DENMARK	POSTFLIGHT	**Defence Command Denmark** **Maritime Assistance Service**						**To:** mas@sok.dk **Cc:** mar-env@fsnaal.dk		
DENMARK	POSTFLIGHT	**Environmental Protection Agency**				+45 72 54 40 00		**To:** mipma@mst.dk **Cc:** chihl@mst.dk	Mikael Malinovsky (Christina Ihlemann)	Haraldsgade 53, 2100 København Ø DENMARK
GERMANY	INFLIGHT	**Central Cmd for Maritime Emergencies (CCME)**	Haveriekommando CUXHAVEN		135.255	+ 49 30 185 420 1400	+49 30 185 420 2009			
GERMANY	POST FLIGHT	**Maritimes Lagezentrum Cuxhaven (MLZ)**						mlz@havariekommando.de		
NETHERLANDS	INFLIGHT	**Netherlands Coastguard**	NETHERLANDS COASTGUARD	16 or 73	123.1	+ 31 223 542 300				
NETHERLANDS	POST FLIGHT	**Netherlands Coast Guard Den Helder**					+ 31 223 658 358	ccc@kustwacht.nl		
NETHERLANDS	POST FLIGHT	**Staatstoezicht op de Mijnen** *(National Mines Monitoring)* **Afdeling Operaties** *(Operations Dpt)*				+31 70 379 84 27 +31 70 379 84 55		s.a.vanniekerk@minez.nl	Sjoerd van Niekerk	Henri Faasdreef 312 - 2492 JP Den Haag THE NETHERLANDS
NORWAY	INFLIGHT	**Kystverket / Norwegian Coastal Administration** **Centre for Emergency Response**	Rogaland Radio Floroe Radio	16		+47 33 03 4800				
NORWAY	POST FLIGHT	**Norwegian Coastal Administration**				+47 33 03 4800	+ 47 33 03 4949	vakt@kystverket.no		
NORWAY	POST FLIGHT	**Norwegian Environment Agency**				+47 73 58 05 00	+47 73 58 05 01	akutt@miljodir.no	Section for oil and gas industry	Postbox 5672 Sluppen, 7485 Trondheim, NORWAY
UNITED KINGDOM	INFLIGHT	**Maritime and Coastguard Agency**	SHETLAND COASTGUARD (Shetland Basin)	16 working channel 10	132.65 (on request)	+44 1595 69 29 76	+44 1595 69 48 10	oilandgas@hmcg.gov.uk		
UNITED KINGDOM	INFLIGHT	**Maritime and Coastguard Agency**	ABERDEEN COASTGUARD (Northern North Sea)	16 working channel 10	132.65 (on request)	+ 44 1224 59 23 34	+44 1224 57 59 20	oilandgas@hmcg.gov.uk, WM.Aberdeen@mcga.gov.uk		
UNITED KINGDOM	INFLIGHT	**Maritime and Coastguard Agency**	HUMBER COASTGUARD (Central North Sea)	16 working channel 10	132.65 (on request)	+44 1262 67 23 17	0044 1262 400779	WM.humber@mcga.gov.uk		
UNITED KINGDOM	INFLIGHT	**Maritime and Coastguard Agency**	DOVER COASTGUARD (Dover Strait)	16 working channel 10	132.65 (on request)	+ 44 1304 21 00 08	+44 1304 21 03 02	WM.Dover@mcga.gov.uk		
UNITED KINGDOM	POST FLIGHT	**Aberdeen Maritime Rescue Co-ordination Centre (MRCC)**				+ 44 1224 59 23 34	+ 44 1224 57 59 20	oilandgas@hmcg.gov.uk, WM.Aberdeen@mcga.gov.uk		
UNITED KINGDOM	POST FLIGHT	**Offshore Oil and Gas Environmental Unit - Department of Energy and Climate Change (DECC)**				+44 1224 25 41 38 '+44 1224 25 40 58 (Oil Spill reports)		offshore.inspectorate@beis.gov.uk	Moira Langmuir	Energy Development Unit, Offshore Petroleum Regulator for Environment and Decommissioning, BEIS 2nd/3rd Floor, AB1 Building (Wing C), Crimon Place, Aberdeen. AB10 1BJ

(*) = in red: national 'offshore regulator' competent authority

CSN SUPPORT PROCEDURES FOR TDH MISSIONS

The standard procedure to obtain CSN support consists of 4 Steps:

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

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

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

This CSN support request email should be sent to:

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

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

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

Step 2: SAT image planning process

- When receiving a CSN support request from a country (TdH-POC), EMSA will evaluate the satellite image 'top-up' possibilities and create one kml file per possible top-up SAT image. EMSA then provides a top-up SAT imagery list to the TdH-POC for approval, with a set of kml files including top-up SAT images, and (if available) the already ordered routine SAT images;
- When receiving the SAT imagery list from EMSA, the TdH-POC evaluates and approves or rejects the top-up SAT images proposed by EMSA, and reports back to EMSA;
- When receiving the list of approved top-up SAT images, EMSA will complete the ordering process and informs the TdH-POC on the final SAT image acquisition list (list of scene IDs).

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

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

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

[2] A kml file can be rapidly created within a Google Earth user interface. The advantage of using a kml file format in this planning process is that it can immediately display the TdH track/route or SAT image contours on a map in Google Earth or GIS. Transforming TdH flight info into a kml file format is very easy for Google Earth/GIS users.

- After the last TdH flight, the national 'BA Operational Representative' should always de-activate the operational users within the 'BA' Communication Matrix in CSNv2.

Step 4: Feedback

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

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

3 Co-ordinated Extended Pollution Control Operation (CEPCO)

This chapter is especially subject for discussions in both Bonn Agreement and HELCOM Response for the reason that some Contracting Parties are party to both Regional Agreements. It has been decided that there is only one Super-Cepco every second year in either Region (Baltic Sea/North sea).

3.1 Introduction

A CEPCO is a continuous sequence of aerial surveillance flights normally over a 24 hour period. The aim of the operation is to enhance the enforcement of discharge provisions at sea, to optimise prosecution of illegal offenders and to increase the deterrent effect of aerial surveillance activities. The duration of the programme may be extended up to 10 days in which case the name is SUPER-CEPCO. Based on the experiences gained in Super-Cepco's organizers concluded that a maximum of 6 days is more feasible.

3.2 CEPCO Objectives

The objectives of a CEPCO are as follows:

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

3.3 Participating Countries

For the purposes of CEPCOs, the North Sea is divided into a northern and a southern zone with a minimum of one CEPCO per year in each zone.
Norway, Sweden, Denmark and Germany belong to the northern zone, while France, Belgium, the Netherlands and the UK are parties to the southern zone. Nevertheless, the participation of a southern country in a northern CEPCO operation (or vice-versa) is possible on a voluntary basis.

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

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

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

3.4 Area of CEPCO

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

3.5 Planning and Operational Conditions of CEPCO Flights

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

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

3.6. Satellite imagery

Under the Clean-sea-net programme in the European Maritime Safety Agency (EMSA) a centralized procurement of satellite imagery has been established. In preparation of a (SUPER) CEPCO programme the hosting country should contact EMSA to arrange for the delivery of all satellite footprints covering (part) of the area that is surveyed in the CEPCO project.
A (SUPER) CEPCO programme with integrated use of satellite coverage provides an excellent tool for a twofold approach, on one hand the early warning by satellite detection and on the other hand validation / confirmation of detections through aircraft detections and observations.

3.7 Operating Airport/Airbase

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

3.8 Establishment of an Operational Command Centre (CC)

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

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

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

3.9 Communications

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

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

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

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

3.10 Handover

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

3.11 Briefing and Debriefing

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

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

3.12 Evaluation

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

3.13 CECPO coordination guidelines

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

4 Aerial Surveillance Exercises

4.1 Introduction

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

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

4.2 Requirements for Aerial Surveillance Exercises

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

Exercise areas should be designated in the open sea, sufficiently far away from shipping routes, other marine activities and free of geographic obstacles.
Air space with good direct accessibility from the exercise airfield with minimal limitations for flight path and operational altitudes between 200 and 3000 feet.

Target slicks should be of sufficient volume and size, to achieve the aim and objectives of the exercise. If more than one slick is laid then the discharge positions should be separated by a minimum of 1 nautical mile on an axis parallel to wind/current direction in order to avoid mixing of the slicks.
Sufficient vessels/boats should be available to monitor visually the extent, shape and position of discharged slicks and, where practicable, to establish thickness of oil at the leeward edge of the slick.

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

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

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

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

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

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

4.3 Conclusion

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