

## Annex

# Proposal for a mandatory ships' routing system in northern Norway

## Summary

The Government of Norway proposes to establish a traffic separation scheme off the coast of Norway from Vardø to Røst. The routing measure, as described in Appendixes 1 and 2, is proposed as a mandatory traffic separation scheme for tankers of all sizes, including gas and chemical tankers, and all other cargo ships of 5000 gross tonnage and upwards, in transit or on international voyages to or from Norwegian ports. This will in general include ships with a bunker capacity of more than 300 m<sup>3</sup>.

Due to the increasing transport of oil along the northern coast of Norway the Norwegian Government's White Paper to the Parliament on Safety at Sea and Oil Pollution Preparedness (White Paper no. 14 (2004-2005) presented 21 January 2005) emphasised the importance of establishing a safe transport route for oil along the coast.

Several risk reducing measures are already operational and others will be operational in the near future, including i.a. a land based AIS monitoring network, Ship Reporting system according to European Union Directive (2002/59/EC), Vardø VTS (operational 2007) and an emergency towing preparedness. In order to establish an overall system for safe oil transport along the northern coast of Norway the White Paper proposed to apply to IMO for a mandatory ships' routing system including a traffic separation scheme for tankers and other cargo ships off the coast of Northern Norway from Vardø to Røst.

In 2005 a proposal for mandatory ship routing and traffic separation scheme in the area was submitted to the shipping community, the fishing community and others for comments. On this background the Government's White Paper to the Parliament on an Integrated Management Plan for the Barents Sea and the sea areas off Lofoten (White paper no. 8 (2005 - 2006) presented 30 March 2006), concludes that an application is to be submitted to IMO for establishment of a mandatory ships' routing system and traffic separation scheme for oil tankers and other cargo ships off the coast of Northern Norway from Vardø to Røst.

The objective is to address concerns relating to the safety for ships in transit, the fisheries, the offshore petroleum exploration and production and reducing risk for pollution of the marine environment.

Ships sailing to and from Northwest Russia and Northern Norway pass through the waters off the coast of Norway from Vardø to Røst. The number of tankers passing has increased in recent years, and is expected to increase considerably in the near future. In 2004 and 2005 a number of incidents on the Norwegian coast with ships losing propulsion were reported, of which 9 ships were above 5000 dwt.

The proposed mandatory separation scheme is designed to increase the safety for ships in transit, the fisheries and the offshore petroleum exploration and production and to mitigate environmental risk, especially taking into account the predicted future tanker traffic.

The proposed measure implies moving the tankers and other cargo ships routes out from the coast to minimize risk of grounding and to separate north and southbound traffic to avoid collisions. The traffic will be monitored from Vardø VTS (operational in 2007), and moving the ships further out from the coast than today's average route for passage will give sufficient time to handle a situation by i.a. the towing contingency which is already established.

The westbound (outer) traffic lane of the proposed scheme is at a distance from land where; (1) the fishing activity is limited, and (2) it is in general clear of offshore oil and gas exploration and production activity. The eastbound (inner) traffic lane is closer to land, and located such that; (1) most fisheries are not affected and (2) it is in general clear of offshore oil and gas exploration and production activity. The detailed proposal is set out in Appendixes 1 and 2.

Offshore petroleum exploration and production is expected to take place outside of the traffic separation scheme or within the traffic separation zone.

An assessment of risks and mitigation measures has been conducted by Det norske Veritas (DnV) according to the Formal Safety Assessment (FSA) methodology approved by IMO. The assessment clearly shows that the proposed measure in combination with the other risk reducing measures that Norway has established (towing contingency, monitoring of the traffic by using AIS) and is establishing (VTS, Electronic Charts) will reduce the risk of pollution or other damage to the marine environment.

The traffic separation scheme is not likely to cause a disproportionate burden to the shipping industry.

## **Description of the Area**

The proposed mandatory traffic separation scheme is in international waters off the coast of Norway from Vardø to Røst in the Lofoten islands. A map of the area with the proposed scheme is shown in Appendix 2.

## **Co-operation between States**

A dialog with Russia on the proposal for a mandatory traffic separation scheme is established.

## **Traffic Considerations**

The proposed mandatory separation scheme is designed to increase the safety for ships in transit, the fisheries and the offshore petroleum exploration and production and to mitigate environmental risk, especially taking into account the predicted future tanker traffic. Offshore petroleum exploration and production is expected to take place outside of the traffic separation scheme or within the traffic separation zone.

Several risk reducing measures are already operational and others will be operational in the near future, including i.a. a land based AIS monitoring network, Ship Reporting system according to European Union Directive, Vardø VTS (operational 2007) and an emergency towing preparedness. In order to establish an overall system for safe oil transport along the northern coast of Norway it is important to establish a mandatory ship routing and traffic separation scheme for tankers and other cargo ships further off the coast of Northern Norway from Vardø to Røst.

The distance off the coast has an impact on the nautical and environmental risk related to a passage.

Firstly the distance influences on the probability that an incident shall occur, such as:

- ships sailing at some distance off the coast can still pass clear of the coast even if a navigational error leads to an unsafe course, and
- there will be less interaction with fishing vessels operating near to the coast.

Secondly it influences on the consequences of an incident because there will be more time for provision of contingency services, such as:

- tugs for a ship that is in need of assistance due to on-board defects such as loss of propulsion or steering etc., and
- equipment for emergency unloading of bunker or cargo, and other measures to prevent environmental damage.

The westbound (outer) traffic lane of the proposed scheme is at a distance from land where; (1) the fishing activity is limited, and (2) it is in general clear of offshore exploration and production activity. The eastbound (inner) traffic lane is nearer to land, and located such that; (1) most fisheries are not affected and (2) it is in general clear of offshore exploration and production activity.

An assessment of risks and mitigation measures has been conducted by Det norske Veritas (DnV) according to the Formal Safety Assessment (FSA) methodology approved by IMO. The assessment clearly shows that the proposed measure in combination with the other risk reducing measures that Norway has established (towing contingency, monitoring of the traffic by using AIS) and is establishing (VTS, Electronic Charts) will reduce the risk of pollution or other damage to the marine environment.

The proposed mandatory traffic separation scheme compared with alternative routes:

Route	Distance (nautical mile)
Route based on the former 4 nautical mile territorial sea limit	525
Route based on the 12 nautical mile territorial sea limit	539
Proposed new route – eastbound (inner) traffic lane	558
Proposed new route – westbound (outer) traffic lane	567
Average route used by tankers as of early 2004	≈ 560

The eastbound traffic lane of the proposed mandatory traffic separation scheme is not longer than for the present average route, while the westbound route is marginally longer. When taking into account the ocean currents in the area, this is expected to give a negligible additional passage time for westbound ships.

Passage time and fuel consumption for a round trip following the proposed mandatory traffic separation scheme is consequently expected to be equal or less than for the present used route.

The coastal fishing vessels (below 24 meters in length) normally operate on the fishing grounds extending up to 20 - 25 nautical mile off the coast, whilst the larger fishing vessels also operate on the fishing grounds in the Norwegian and Barents Seas.

Based on figures from 2001 it is estimated that there are about 15 000 annual fishing vessel voyages in the area. In February 2003 360 fishing vessels of 24 metres or more were operating in

the area. This data is based on vessel dependent tracking by the Norwegian Directorate of Fisheries.

General cargo ships have traditionally made their passage near to the former 4 nautical mile territorial sea limit.

The tankers do in general pass outside of the 12 nautical mile territorial sea limit, and traffic monitoring data shows a distribution of ships between 12 and 24 nautical mile off the coast.

In the years 2002 to 2005 the number of tankers and quantity of cargo amounted to the following:

Year	Ships	cargo*
2002	160	4 266 700 000
2003	250	8 084 500 000
2004	295	11 751 906 000
2005	278	9 577 569 000

\* Crude oil, gas oil, condensate, naphtha, kerosene, bunker oil etc. in tons.

Tanker sizes are typically from 20 000 dwt to 100 000 dwt.

The number and size of tankers, hence also the transported quantity of oil, are expected to increase considerably. An estimate for 2015 of 884 ships and 150 000 000 000 tons cargo is the basis for Norway's work on safety at sea in the region.

## **Marine Environmental Considerations**

### **Oceanography**

#### *Wind, waves and polar nights*

A particular phenomenon in the Barents Sea is the rapid rise of small scale polar low pressures, between 5 and 15 annually. These strong wind centres are difficult to predict, and can result in dangerous situations.

Significant wave height normally increases with force, fetch and duration of the wind. In general fewer large waves can be found closer to the coast and in the eastern part of the area. Complex and dangerous waves can occur close to the coast in some places.

During the winter season the combination of strong winds (in general from west to east), rapid rise of polar low pressures, low temperatures and polar nights, makes both navigating and oil spill combating challenging.

#### *Ocean currents and tidal streams*

The prevailing ocean current by water flowing in from the Atlantic Ocean, going from west to east, is stronger near to the coast. This current is modulated by the steep continental shelf, and can therefore have a considerable strength on parts of the coast.

Tidal currents can be strong near to the coast, especially in the Lofoten - Vesterålen area.

#### *Ice*

Icing is rarely critical for larger ships with relatively high freeboard, i.e. ships comprised by the proposed routing system. No sea ice, icebergs or growlers can be expected in the area.

## **Ecology**

### *Uniqueness or rarity*

The biological production is higher and the animal life is richer in the Barents Sea area compared to other sea areas at the same latitude. This is due to the favourable combination of climate, current system and topographic variation. There are large fish stocks and seabird and marine mammals in large numbers.

### *Representativeness*

The Barents Sea is especially representative regarding seabird societies and is one of the most important seabirds regions in the world. The region is regarded as a seabird breeding and wintering area of international importance considering both number of individuals and value of conservation. About 3-4 million pairs of seabirds breed in Norway and the majority breeds within the northern part of the country and the area consist of some of Norway's largest bird cliffs.

### *Productivity*

The ecosystems of the Barents Sea are among the most productive in the world due to the shallow areas and influx of warm water from the south and nutrient rich water from the north. Fish, seabirds and marine mammals are represented in high numbers within the Barents Sea. More than half of the primary production in the area is "new production". This is possible because of the light condition in the area during summer and the nutrient rich water. The primary production forms the basis of the marine food chain in the Barents Sea.

### *Spawning and breeding grounds*

The Barents Sea has a relatively low number of fish species, but among these are some of the world's largest fish stocks. The stocks of capelin, north-east Arctic cod, Atlantic-Scandinavian herring and haddock are the largest and most important stocks ecologically and economically. The main spawning grounds and nursing areas of these species are found along the Norwegian coast in the Norwegian Sea and the Barents Sea. Many species that spawn along the Norwegian coast spend parts of the lifecycle in the Barents Sea. The current system results in northward transport of spawning products into fjords and the Barents Sea, giving the juveniles favourable feeding conditions.

### *Naturalness*

The Barents Sea is characterised by having the largest areas of near-pristine wilderness in Europe. Most of the marine and substantial parts of the terrestrial ecosystems are intact.

### *Integrity*

The ecosystem in the Barents Sea is driven by ecological processes which are dependent on single components functional place in the system. The Barents Sea has a large ecological integrity.

### *Bio-geographic importance*

The continental shelves and the inner waters of the northern North Sea is a part of the northeast Atlantic Boreal Region. No other Boreal Region goes so far north. The southern part of the Barents Sea has common border with the Arctic Bio-geographic Region. In the border between different bio-geographic regions, it is in general expected a higher number of species because of the overlap between geographical extremity for species from both regions.

## **Social, cultural and economic importance**

### *Fishing and Aquaculture*

The value of fish delivered from the Barents Sea to ports in the three northernmost counties in Norway was in 2005 around 4.3 billion NOK. The aquaculture industry is of great importance in Norway and is still an increasing industry. The value of farmed fish in the three northernmost counties in 2004 was 3.9 billion NOK.

### *Recreation*

The tourism activity in the Norwegian part of the Barents Sea takes mainly place along the Norwegian northwest coast and towards Svalbard. In the summer season several cruise vessels of different nationalities sail along the Norwegian coast and towards Svalbard. Tourism/Cruise is a well established industry in the northern areas and has steadily increased the last 10-15 years.

### *Human dependency*

The employment along the coast has always been and is still related to the fishing industry. In 2004 about 11700 individuals living in the three northernmost counties (Nordland, Troms and Finnmark) were employed in the fishing and aquaculture industry. The fishermen in these counties constituted more than 50% of all fishermen in Norway. Further growth of aquaculture farming is also an important basis for the development along the coast in the northern part of Norway.

## **Scientific and educational importance**

The Barents Sea area is valuable as scientific and environmental reference area and comprises important indicators of globally important climatic changes (atmosphere-sea-ice-ocean). Several research institutions have substantial activity in area and some have the Barents Sea as their main research area.

In the Governments White Paper to the Parliament on an Integrated Management Plan for the Barents Sea and the sea areas off Lofoten (White paper no. 8 (2005 - 2006) presented 30 March 2006), the following areas of the northern part of the Norwegian Sea and the Barents Sea are considered valuable and sensitive:

- 1) Lofoten – Røstbanken – Vesterålen (along the coast of Nordland and Troms County)
- 2) Tromsøflaket (extending along the coast of Troms and into the transition zone between the Norwegian Sea and the Barents Sea)
- 3) The sea areas along the coast from Tromsøflaket to the border between Norway and Russia.

- 4) The Polar front (north in the western part of the Barents Sea south of Svalbard)
- 5) The ice edge (north in the western part of the Barents Sea south of Svalbard)
- 6) The sea areas around Svalbard and Bjørnøya.

## **Mandatory Routeing Systems**

Establishing of the proposed routing measure will, in combination with the other risk reducing measures that are already established or to be established in the near future, contribute to a safe transport of oil along the northern coast of Norway and thereby protecting the environment in the Norwegian Sea and the Barents Sea, particularly the areas described in 1), 2) and 3) above.

The routeing measure, as described in Appendix 1, is proposed as a mandatory traffic separation scheme for tankers of all sizes, including gas and chemical tankers, and all other cargo ships of 5000 gross tonnage and upwards, in transit or on international voyages to or from Norwegian ports. This will in general include ships with a bunker capacity of more than 300 m<sup>3</sup>.

An assessment of risks and mitigation measures has been conducted by Det norske Veritas (DnV) according to the Formal Safety Assessment (FSA) methodology approved by IMO. The assessment clearly shows that the proposed measure in combination with the other risk mitigation measures that Norway has established (towing contingency, monitoring of the traffic by using AIS) and is establishing (VTS, Electronic Charts) will reduce the risk of pollution or other damage to the marine environment.

Making the system mandatory is important to achieve the maximum risk reducing effect of the above mentioned combination of measures. The measure is limited to what is essential in the interest of safety of navigation and protection of the marine environment.

## **Position-fixing in relation to the routeing system**

### *Coastal waters aids to navigation*

The coastal waters are well marked with aids to navigation including lights and radar beacons. These aids will in general be of use for position fixing on ranges up to 12 nautical miles off the coast.

### *GPS*

Global Navigation Satellite Systems (GNSS), at present in practice the Global Positioning System (GPS) alone or in combination with GLONASS, will provide navigational guidance in accordance with operational requirements for navigation in ocean waters as stated in IMO Resolution A.953(23) WORLD-WIDE RADIO NAVIGATION SYSTEM or better.

### *DGPS*

Five stations are transmitting differential GPS corrections and integrity data for the area in accordance with IALA standards. Users will be warned of system non-availability or discontinuity either by this system or by the International Maritime Safety Information service.

### *Radar*

Ships' radar will mainly have to be used for traffic navigation, as the actual distance from land normally will not allow for position fixing.

### *Navigational charts*

Navigational charts, at appropriate scales, are published by the Norwegian Hydrographic Service.

In addition to paper charts there are electronic navigational charts (ENCs) for part of the Norwegian coast inside of the proposed mandatory traffic separation scheme. Additional ENCs, including the coast off Northern Norway, will be published from 2006.

## **Miscellaneous Information**

The continental shelf off the coast of Norway from Vardø to Røst is promising with regard to petroleum resources. Production from the Snøhvit field will commence in 2007. Other fields, such as Goliat; are expected to be developed in the near future. Petroleum production is likely to be developed with sub sea infrastructure. This means that there will either be pipelines to onshore production facilities, as for the Snøhvit field, or a Floating Production, Storage and Offshore Loading (FPSO) unit at the actual field.

Coastal fishing vessels (below 24 meters in length) normally operate on fishing grounds extending up to 20 - 25 nautical miles off the coast in most of the area, whilst the larger fishing vessels also operate on the fishing grounds in the Norwegian and Barents Seas

### **Territorial sea**

The Norwegian territorial sea limit is 12 nautical mile.

### **National traffic separation system**

From Vardø to North Cape there is a national traffic separation system within the territorial sea. Ships carrying pollutant cargoes as given in MARPOL 73/78 Annex 1, 2 and 3 and ships with a bunker oil capacity of more than 300 m<sup>3</sup> are required to use the system. Fishing vessels, Norwegian and foreign military vessels and ships in a regular schedule with passengers or goods between Norwegian ports are exempted from using the system.

This system will be revoked upon IMO adoption of the proposed mandatory traffic separation scheme.

### **Consultations**

The proposal for a mandatory traffic separation scheme has been submitted to the fishing and shipping community, the offshore oil and gas industry, environmentalist organisations, various state and local government agencies etc. in Norway for comments. Comments received, especially regarding the interests of the fishing community and the industry concerned with offshore exploration and production, have been taken into account in the design of the present proposal.

A dialog with Russia on the proposal for a mandatory traffic separation scheme is established.

## **A summary of other measures taken in the area of the proposed system**

### *Communications*

#### VHF and MF radiotelephone

Adequate VHF radiotelephone coverage can be expected up to 40 n miles from the coast for regular merchant vessels.

The MF radiotelephone coverage extends outside of the proposed mandatory traffic separation scheme by a considerable margin.

#### *Geostationary satellites*

Communications by geostationary satellites is possible up to approximately 75 degrees north latitude.

#### *NAVTEX*

The proposed mandatory traffic separation scheme is covered by NAVTEX.

#### *Automatic Identification System (AIS)*

The Norwegian AIS network is predicted to cover the proposed mandatory traffic separation scheme with signal strength of - 107 dB, except off Røst due to the distance from land. The onboard antenna has to be 20 meter or more above sea level.

It is being considered to expand the AIS network, which at present comprises 18 base stations from Vardø to Røst,

#### *Ship reporting - Safe Sea Net*

In accordance with Directive 2002/59/EC of the European Parliament and of the Council of 27 June 2002 it is established an electronic ship reporting system for ships calling at ports in Norway (Norwegian Safe Sea Net). The system aims amongst others to provide for better detection of potential risk situations, better reaction in case of threat to maritime safety and the environment and improved emergency response in case of incidents or pollution at sea.

#### *Vessel Traffic Services*

A new VTS for Northern Norway, with the VTS Centre in Vardø, shall be in operation as of 2007. The VTS will maintain a traffic image for the proposed mandatory traffic separation scheme.

#### *Emergency towing preparedness*

Emergency towing preparedness is established in Northern Norway from the Varanger fjord to the Lofoten islands. In the winter season (October 1 – March 31) there shall be three towing vessels and in the summer season (April 1 – September 30) there shall be two towing vessels in contingency.

At all times there shall be a towing vessel available so that the potential threat to the safety of navigation and the marine environment of a drifting ship in need of assistance can be mitigated.

**APPENDIX 1**  
**DRAFT**  
**MANDATORY TRAFFIC SEPARATION SCHEME**  
**OFF THE COAST OF NORWAY FROM VARDØ TO RØST**

**Categories of ships required to follow the mandatory traffic separation scheme**

Tankers of all sizes, including gas and chemical tankers, and all other cargo ships of 5000 gross tonnage and upwards, in transit or on international voyages to or from Norwegian ports are required to follow the mandatory traffic separation scheme off the coast of Norway from Vardø to Røst.

**Reference charts**

- (1) Any Electronic Navigational Chart (ENC) covering the area.
- (2) Norwegian Hydrographic Service charts:

No.	Title	Published
319	Træna – Lofotodden	1971
320	Lofoten og Vesterålen	1966
321	Fra Andenes til Grøtsund	1936
322	Fugløybanken – LoppHAVet	1960
323	Fra Sørøya til Nordkapp	1925
324	Fra Nordkapp til Kjølnes	1959
325	Fra Sletnes til Grense-Jakobselv	1929

Note: The charts are based on the European Datum.

Position coordinates referred to the WGS 84 datum, can be adjusted to the ED 50 datum of the Norwegian Hydrographic Service charts by the following values:

Position in WGS 84 datum to ED 50 datum

No.	N	E
319	+ 0.01'	+ 0.10'
320	0.00'	+ 0.10'
321	0.00'	+ 0.10'
322	- 0.01'	+ 0.09'
323	- 0.01'	+ 0.08'
324	- 0.01'	+ 0.07'
325	- 0.01'	+ 0.06'

## Description of the proposed mandatory traffic separation scheme

(a) A separation zone is bounded by a line connecting the following geographical positions:

- |                                |                                 |
|--------------------------------|---------------------------------|
| (1) 70° 42.56' N 031° 52.62' E | (9) 67° 30.88' N 009° 09.34' E  |
| (2) 71° 11.64' N 029° 53.32' E | (10) 68° 09.00' N 010° 00.00' E |
| (3) 71° 26.50' N 028° 26.00' E | (11) 70° 58.28' N 019° 03.18' E |
| (4) 71° 32.00' N 025° 50.00' E | (12) 71° 24.09' N 022° 24.77' E |
| (5) 71° 14.00' N 022° 23.00' E | (13) 71° 36.99' N 025° 50.12' E |
| (6) 70° 47.00' N 019° 00.00' E | (14) 71° 29.59' N 028° 23.94' E |
| (7) 68° 07.76' N 010° 05.00' E | (15) 71° 13.32' N 029° 56.66' E |
| (8) 67° 30.00' N 009° 14.30' E | (16) 70° 44.14' N 031° 56.31' E |

(b) A traffic lane for westbound traffic is established between the separation zone described in paragraph (a) and a line connecting the following geographical positions:

- |                                 |                                 |
|---------------------------------|---------------------------------|
| (17) 70° 45.71' N 032° 00.00' E | (21) 71° 26.00' N 022° 23.00' E |
| (18) 71° 15.00' N 030° 00.00' E | (22) 71° 00.01' N 019° 00.07' E |
| (19) 71° 31.50' N 028° 26.00' E | (23) 68° 10.17' N 009° 55.60' E |
| (20) 71° 39.00' N 025° 50.00' E | (24) 67° 31.80' N 009° 04.72' E |

(c) A traffic lane for eastbound traffic is established between the separation zone described in paragraph (a) and a line connecting the following geographical positions:

- |                                 |                                 |
|---------------------------------|---------------------------------|
| (25) 70° 40.99' N 031° 48.95' E | (29) 71° 12.11' N 022° 24.99' E |
| (26) 71° 09.95' N 029° 50.03' E | (30) 70° 45.27' N 019° 03.03' E |
| (27) 71° 24.57' N 028° 24.10' E | (31) 68° 06.56' N 010° 09.35' E |
| (28) 71° 29.99' N 025° 50.47' E | (32) 67° 29.06' N 009° 18.88' E |

The geographical positions are given in terms of the WGS 84 datum.

## International voyages to or from ports in Norway from Vardø to Røst

Ships on international voyages to or from ports in Norway from Vardø to Røst shall follow the mandatory traffic separation scheme until a course to port can be clearly set. This also applies to ships calling at Norwegian ports for supplies or service.

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## APPENDIX 2

