European Maritime Safety Agency

Action Plan for HNS Pollution Preparedness and Response

European Maritime Safety Agency

HNS Action Plan

Action Plan for Hazardous and Noxious Substances
Pollution Preparedness and Response

As adopted by EMSA's Administrative Board at its 18th Meeting
held in Lisbon on 12th and 13th June 2007

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Executive Summary

As of 19 May 2004, with the entering into force of Regulation 724/2004, the European Maritime Safety Agency (EMSA) has a legal obligation in the field of response to ship-sourced pollution within European Union waters. The Agency was tasked to provide a framework for developing pollution response actions at European level, and more specifically:

- "To provide Member States and the Commission with technical and scientific assistance in the field of ship-sourced pollution", and
- "To support on request with additional means the pollution response mechanisms of Member States in a cost efficient way".

Initially, the Agency focused its tasks in the field of oil pollution through developing its Action Plan for Oil Pollution Preparedness and Response (Oil Action Plan). In this document the Agency recognised early on that a risk assessment and further actions are necessary to also address marine pollution caused by hazardous and noxious substances (HNS), other than oil. Actions in the field of HNS pollution preparedness and response would be phased in gradually, parallel to the Agency's growth, and would be further defined via EMSA's subsequent Work Programmes (WP 2006, WP 2007).

Accordingly, without dedicated resources in 2006, the Agency undertook preparatory work, reviewing and analysing relevant existing studies and available information sources in the field of HNS pollution preparedness and response, and holding its 1st HNS Workshop with experts from the Member States and the Commission (Brussels, February 2006).

As of 2007, the Agency aims to develop its role in offering assistance to the Member States and the Commission and to strengthen existing response capabilities regarding HNS marine pollution. To this effect it has developed this **Action Plan for HNS Pollution Preparedness and Response** (HNS Action Plan).

Scope of the HNS Action Plan

For the purposes of this Action Plan, HNS are defined as *"any substance other than oil which, if introduced into the marine environment, is likely to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the Sea"*, in accordance with the OPRC-HNS Protocol (2000)[1].

The Agency's activities are focused on ship-sourced pollution involving the release or the threat of release into the marine environment of HNS transported in bulk. Reported incident statistics suggest that EMSA's initial activities should primarily concentrate on issues related to bulk cargoes of HNS. Actions regarding the response to pollution from HNS transported as packaged goods may be developed by the Agency at a later stage, as appropriate.

[1] *OPRC-HNS Protocol: Protocol on Preparedness, Response and Cooperation to Pollution Incidents by Hazardous and Noxious Substances, 2000*

The bulk carrier Fu Shan Hai *sank after colliding with the freighter Gdynia in the western Baltic Sea in 2003. The* Fu Shan Hai *carried 66.000 tons of carbonate of potash, 1680 tons of heavy fuel oil, 110 tons of diesel oil and 35 tons of lubricating oil.*

The EMSA HNS Action Plan provides:

- A concise overview of existing available information in the field of preparedness and response to HNS marine pollution, including information on: seaborne transportation of HNS, past HNS incidents, challenges and impacts of HNS marine pollution, existing HNS pollution preparedness and response mechanisms, and options and limitations of response methods to such incidents; and
- A framework document defining the Agency's role and activities in this field in order to make an "added value" contribution at European level and strengthen existing preparedness and response capabilities.

The Action Plan covers the following areas:

1) Existing structures for HNS pollution preparedness and response at international, regional, national (Member States) and European Community level;
2) Indication of HNS trade and seaborne transportation in European waters;
3) Potential hazards, risks and impacts linked to HNS marine pollution;
4) Past HNS incidents and case studies;
5) HNS pollution response options;
6) The framework for the development of EMSA's HNS-related activities.

It is important to note that published information concerning HNS trade and seaborne transportation in EU waters is limited, making it difficult to obtain an overview of the amount and routes of transported HNS in European waters.

EMSA's actions should be developed therefore to assist Member States in their efforts to obtain up-to-date information concerning hazardous and noxious substances transported in bulk within their waters. These actions will provide the Member States and the Commission with valuable information on which to base risk assessments and set priorities for contingency planning covering HNS marine pollution. To this effect, the Agency will focus its efforts in establishing close cooperation with the chemical industry, chemical tanker operators and port authorities.

Marine pollution caused by HNS differs from oil pollution in having a range of potential fate and behaviour once released into the marine environment. Responder and public safety risks and impacts associated with HNS can be potentially more severe than with oil. The selection of the appropriate response option(s) to an HNS incident requires detailed knowledge of the involved substance's physical and chemical properties. Compared to oil, different specialised knowledge and operational expertise are required for an effective response to HNS marine pollution. EMSA actions will be developed to ensure Member States receive, when dealing with an HNS incident, specialised information about the substances' potential fate and behaviour, associated hazards and impacts, and possible response options.

Statistics have been developed by EMSA based on available reported information concerning HNS incidents in EU waters, indicating that incidents involving the release of HNS or the threat thereof have occurred in all EU regional seas. Reviewed case studies indicate that two general response options can be adopted by the affected country during an HNS incident: *onboard* and *risk area* response actions.

- The operational response with *onboard* actions is designed to prevent, stop or contain an HNS release incident. It will require the affected Member State(s) to decide which specialised and experienced personnel and equipment it will deploy, usually from the competent national authorities in charge for marine pollution (operational responders).

- The response within the *risk area*[2] requires detailed procedures to be in place to safeguard responders and the public, when an HNS incident poses a risk but cannot be prevented, stopped or contained; such actions touch upon civil safety issues and it is up to the affected Member State to decide how to proceed with implementing the appropriate actions.

Response actions undertaken either onboard a vessel or within the surrounding risk area are operational decisions and tasks under the sole responsibility of the Member State(s). Consequently, the proposed activities carried out by or through EMSA should strictly be non-operational and are only designed to provide additional support, matching the top-up philosophy of EMSA.

The risk assessment which needs to be carried out by each Member State should consider the HNS material involved, its fate, behaviour and impact, the identification of appropriate response techniques and the available response resources (personnel and equipment). This requires specialist knowledge of HNS characteristics and potential response options. EMSA actions should be developed to assist Member States undertake a convergent and effective risk assessment methodology, and ensure that Member States have timely access to HNS specialist knowledge, expertise and information concerning techniques and response resources across the EU.

EMSA's actions aim to top-up and complement response capabilities already in place at national level and not to create new response structures. Based on information available to EMSA, there are significant variations in the level of preparedness and operational response capacity to HNS incidents among the EU Member States. In order to provide a more detailed overview of existing Member States' operational response capacities, the Agency will publish an Inventory on Member States' policies and operational response capacities to HNS marine pollution, including private response resources.

[2] *Risk area covers the geographical scale and/or area around the vessel that could be affected following an HNS incident, if a pollution risk is not successfully responded to (for example the area around the vessel where explosion damage could extend to). See section 4 of this Action Plan.*

In addition, in view of the entry into force of the OPRC-HNS Protocol on 14 June 2007 and in order to strengthen HNS response capacity building amongst Member States, EMSA will identify and disseminate information concerning best practice in the development of HNS contingency arrangements and response mechanisms in the Member States.

EMSA's proposed activities

As already established with the Agency's Oil Action Plan, the HNS Action Plan uses generally the same framework of developing EMSA's role and activities along three distinct lines:

I) Information
II) Cooperation and Coordination
III) Operational Assistance

The Agency's proposed activities, which are described in detail in section 7 of this Action Plan, are the following:

I) Activities proposed under the '**information**' theme aim to address and understand the HNS marine pollution thematic, and provide the Commission and the Member States with HNS specialised technical, scientific and operational information.

More specifically, the following actions are being proposed to be undertaken by the Agency:

a) Analyse and disseminate statistical information regarding seaborne transportation of HNS in European waters.
Given the importance of such data for risk assessment purposes, this is a priority action for the Agency. Taking into account the difficulty of obtaining HNS-related statistical information, the Agency aims to work closely with the Member States and the relevant industry sources, such as the chemical industry, chemical tanker operators and port authorities, in implementing this task.
b) Publish an inventory of Member States policies and operational response capacities to HNS marine pollution, covering both public and private/industry resources.
This action aims to provide a better overview of the existing HNS marine pollution preparedness and response mechanisms in the European Union. This will facilitate the dissemination of Member State best practice by the Agency and the identification of gaps and needs in this field.
c) Further build-up specialised knowledge of HNS within EMSA and disseminate this knowledge via the Agency's Centre of Knowledge, while stimulating R&D and innovation in the field of HNS marine pollution preparedness and response.

II) Activities proposed under the **'cooperation and coordination'** theme aim to build upon and expand the scope of cooperation links already established by the Agency with the Regional Agreements and other international key actors under the Oil Action Plan, in order to also cover HNS marine pollution preparedness and response.

More specifically, the following actions are being proposed to be undertaken by the Agency:

a) Combine existing operational HNS response manuals into one guiding document/manual, in close cooperation with the Regional Agreements and other response organisations.

This activity aims to gather and collate available information on how to respond to marine pollution incidents involving HNS, into one comprehensive guiding document. HNS pollution response manuals have been already developed at regional (e.g. within the Regional Agreements) and national levels (e.g. the CEDRE chemical response guides), and EMSA wishes to coordinate and cooperate closely with these organisations in identifying the need and the way forward for developing one HNS response guiding document.

b) Identify the best centres of knowledge and expertise in the field of HNS pollution preparedness and response and facilitate the exchange of this knowledge within the EU. This activity will be implemented by EMSA in close cooperation with the identified centres of knowledge in the EU and worldwide (e.g. US Coast Guard), through organising and participating in specialised workshops, desktop and operational response exercises, and trainings in the field of HNS marine pollution preparedness and response.

c) Provide technical assistance and advice to the Commission and the Member States regarding the implementation of the OPRC-HNS Protocol 2000, in light of its entry into force on 14 June 2007.
The OPRC-HNS Protocol 2000 provides the global framework for international cooperation in responding to major incidents or threats of HNS marine pollution. EMSA, in close cooperation with the Commission, the Member States and the industry, could provide the forum at EU level to address, discuss and advise on issues regulated under the OPRC-HNS Protocol 2000, such as: the development of national/regional HNS contingency planning, the harmonisation of HNS incident reporting procedures and the strengthening of international cooperation in HNS pollution response.

III) The activities proposed under the **'operational assistance'** theme consider the existing contingency requirements and operational response capacities of Member States, aiming to top-up existing response mechanisms and support Member States with the appropriate means during their own decision-making when dealing with HNS marine pollution.

<u>More specifically, the following actions are being proposed to be undertaken by the Agency:</u>

a) Establish and maintain a pool/network of specialised HNS experts who can advise and support the Member States and the Commission during the response to an HNS incident.
Some Member States have concluded individual arrangements and agreements with the chemical industry and/or private response organisations, at national or regional level, to provide them with initial information and advice on the substance(s) involved in an HNS incident and on the appropriate response options. EMSA could facilitate the setting-up of such a network of HNS experts at a European level, in close cooperation with the Commission, the Member States and the chemical industry (CEFIC).

b) Facilitate and support the decision-making process during HNS incidents, through the development of a specialised HNS information support tool.

EMSA, in close cooperation with the Member States and the Regional Agreements, should develop an HNS-incident decision support tool, which combines existing available information on HNS, their behavior and fate in the marine environment, health and safety associated issues, hazards and impacts, past incidents and pollution response options, into one coherent source of information (software tool). This software tool should link similar existing information tools and build on their example (e.g. the MIDSIS TROCS software tool developed by REMPEC, or the CHRIS database developed in the US), focusing on providing practical information in a user-friendly way and supporting the Member States' decision-making process.

At a second phase, and if the Member States identify the need for and support these activities, the following two actions can be undertaken by the Agency:

c) Develop a study setting out the minimum technical requirements for a "safe platform" which has the capability of entering a risk area for monitoring and recovery operations, whilst protecting its crew and preventing escalation of the HNS incident. This activity will be implemented in close cooperation with classification societies and other specialised bodies.

d) Develop a feasibility study regarding HNS-release monitoring equipment. One of the most important elements of the response to an HNS incident is the water and air borne monitoring of the HNS release. It is of vital importance to know the spreading of the chemical in the environment (in the air, on the sea surface, in the water column and on the bottom of the sea). EMSA could consider developing actions in order to support and top-up existing capabilities in the monitoring field.

   Possible future actions could be for example:

- To develop a technical study regarding the at-sea air and water quality monitoring equipment necessary for effective HNS pollution monitoring;
- To develop an inventory of the HNS monitoring equipment currently available in Europe;
- To develop a feasibility study regarding the establishment of a network of at-sea air and water quality monitoring systems in key areas around Europe.

This Action Plan has been put forward with the intention of strengthening European preparedness and response to HNS pollution. The actions proposed cover a wide range of activities, mainly focusing on the provision of HNS-related technical, scientific and operational information and expertise which can be used by the responders when dealing with HNS marine pollution.

This Action Plan provides an initial framework of the Agency's role in this field and will be implemented and further defined via the Agency's subsequent Work Programmes. The extent to which this HNS Action Plan can be implemented is dependant upon the resources available to EMSA and the willingness of Member States to support and participate in the Agency's activities.

1 Introduction

1.1 ACTION PLAN FOR OIL POLLUTION PREPAREDNESS AND RESPONSE

Following the accident of the oil tanker *Erika* in 1999, the Commission, the European Parliament and the Council adopted Regulation 1406/2002, which established the European Maritime Safety Agency (EMSA). The role of EMSA is to ensure a high quality, uniform and effective level of maritime safety and prevention of pollution by ships. EMSA is a technical body which supports the Community to act effectively with respect to maritime safety issues. It assists the Commission in updating and developing Community legislation, it monitors and ensures convergent and effective implementation of existing legislation, and undertakes tasks assigned to it in close cooperation with the Commission and the Member States.

In the aftermath of the accident of the *Prestige* oil tanker in 2002, the Agency was tasked with additional obligations in the field of pollution response, under the adoption of the amended Regulation 724/2004. The Agency was tasked to provide a framework for developing pollution response actions at a European level, specifically:

- "To provide Member States and the Commission with technical and scientific assistance in the field of ship-sourced pollution", and
- "To support on request with additional means in a cost efficient way the pollution response mechanisms of Member States".

This led, initially, to focusing the Agency's pollution response work upon developing an *Action Plan for Oil Pollution Preparedness and Response*, which was adopted by the Agency's Administrative Board in 2004. The Action Plan (hereinafter referred to as Oil Action Plan) identified specific activities for the Agency in the field of oil pollution preparedness and response within the context of the amended Regulation.

In the Oil Action Plan the Agency recognised that a risk assessment and response actions are necessary also in the case of releases of Hazardous and Noxious Substances (HNS) in the marine environment. Actions in the HNS field would be phased in gradually, parallel to the Agency's growth:

"It is important to note that whilst oil spills have a certain generic nature, hazardous and noxious substances (HNS) cover an exceptionally broad range of materials and in turn their behaviour in the marine environment. Vegetable oils need to be considered as well. Consequently, a prioritisation is needed which would form a useful base for determining whether additional action is needed and what that might entail. This prioritisation would take existing and ongoing studies into account with the aim of identifying operational recommendations that would be relevant to the Member States and the Regional Agreements. With this in mind, an assessment is needed to evaluate the level of seaborne trade and the potential risk posed by incidents involving hazardous and noxious substances. This issue was highlighted (by

several of the participants) at the "Oil Pollution Response in the European Union" Workshop (23rd and 24th June 2004) organised by EMSA" (Oil Action Plan, pp 64).

1.2 ACTION PLAN FOR HNS POLLUTION PREPAREDNESS AND RESPONSE

Consequently, in 2006 the Agency commenced its preparatory actions in the field of ship-sourced pollution caused by HNS releases in the marine environment, through studying the existing preparedness and response framework and identifying potential gaps and future actions at the European level. A workshop on this subject was held in Brussels on 22-23 February 2006: "*EMSA Workshop on ship-sourced chemical pollution: Risk, preparedness and response in Europe*", in order to discuss this issue with the Member States and the Commission.

EMSA has now taken this work forward by developing the Action Plan for HNS Pollution Preparedness and Response (hereinafter referred to as HNS Action Plan), which is structured around seven sections, and adopts a similar format to that of the Oil Action Plan:

- Section 1 introduces the concept of the HNS Action Plan and outlines its development background;
- Section 2 describes the existing structures and regulatory framework for HNS pollution preparedness and response at international, regional and EU levels;
- Section 3 addresses HNS trade in European waters;
- Section 4 reviews the potential impacts from HNS pollution releases;
- Section 5 describes past HNS incidents, case studies and identifies response options;
- Section 6 provides information concerning the level of preparedness and operational response capacity at Member State level, and;
- Section 7 outlines EMSA's proposed actions with regard to HNS pollution preparedness and response.

Sections 1-6 cover a wide range of information aiming to provide a concise overview of the HNS marine pollution thematic, including information on: seaborne transportation of HNS, past HNS incidents, challenges and impacts of HNS marine pollution, existing HNS pollution preparedness and response mechanisms, and options and limitations of response methods to such incidents.

Section 7 provides a framework for the Agency's role and activities in this field, mainly focusing on the provision of technical, scientific and operational information and assistance to Member States, in order to make an added value contribution at European level and strengthen existing preparedness and response capabilities.

It should be noted that the pollution response work of EMSA is based upon the principle of improving knowledge and expertise by providing the means for Member States to easily access HNS-specialised

HNS responders in their protective gear

information and to top-up their existing preparedness and response capabilities. The actions outlined within this Action Plan have been developed to strengthen the efforts of Member States and assist the ongoing work of the Regional Agreements in this field.

The Agency's activities are focused on ship-sourced pollution involving the release or the threat of release into the marine environment of HNS transported in bulk. Reported incident statistics suggest that EMSA's initial activities should primarily concentrate on issues related to bulk cargoes of HNS. Actions regarding the response to pollution from HNS transported as packaged goods may be developed by the Agency at a later stage, as appropriate.

At an international level, the structure for HNS pollution response is provided by the OPRC-HNS Protocol of 2000 (entry into force 14 June 2007 - see section 2). This defines HNS as "*any substance other than oil which, if introduced into the marine environment, is likely to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the Sea*". For the purposes of this Action Plan, the same definition of HNS is adopted.

When developing preparedness and response actions it is important to realise that incidents involving HNS differ from oil spills, particularly with regard to the type and range of hazards, the need for appropriate protection to responders, the available response options and the fundamental requirement to safeguard the general public. HNS has a wide spectrum of physical properties which may impact upon the environment. Whilst some materials behave in a similar way to oil spills (not least because a number are derived from petroleum products) by forming surface or subsurface slicks, others can behave in a radically different manner, for example forming gases, evaporating into the atmosphere, dissolving into sea water, igniting, etc.

It is therefore more helpful to think of an HNS incident as having the potential to 'release' a substance into the environment rather than 'spill' in the same way as oil. Depending on the substance involved, each release has its own characteristics, behavior, impact, hazards and associated risks. One principle difference to an oil spill is that recovery of released HNS is often not appropriate using commonly available tools and techniques.

The Action Plan aims at identifying these challenges and providing a concise overview of existing available information in the field of HNS pollution preparedness and response, whilst defining the framework for the development of the Agency's activities in this field.

2 *Existing Structures for HNS Pollution Response*

2.1 INTERNATIONAL FRAMEWORK

The international framework regulating the transport of HNS at sea is derived from the following legal instruments, which have been developed within the framework of the International Maritime Organisation (IMO).

2.1.1 International Conventions governing the carriage of chemicals by ship

International Convention for the Safety of Life at Sea (SOLAS, 1974), as amended

Chapter VII of SOLAS covers the carriage of dangerous goods, and more specifically the carriage of dangerous goods in:

a) Packaged form (part A). This part includes provisions for the classification, packing, marking, labelling and placarding, documentation and stowage of dangerous goods. This chapter makes mandatory the International Maritime Dangerous Goods (IMDG) Code, developed by IMO, which is constantly updated to accommodate new dangerous goods and to supplement or revise existing provisions.
b) Solid form in bulk (part A1). This part covers the documentation, stowage and segregation requirements for these goods and requires reporting of incidents involving such goods.

International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 related thereto (MARPOL 73/78)

The MARPOL Convention is the main International convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. It is a combination of two treaties adopted in 1973 and 1978 respectively and updated by amendments through the years.

a) MARPOL Annex II includes regulations for the control of pollution by noxious liquid substances in bulk. This mandatory technical annex details the discharge criteria and measures for the control of pollution by noxious liquid substances carried in bulk. MARPOL Annex II grades these substances into categories graded according to the hazard they present to marine resources, human health or amenities.

   According to the revised MARPOL Annex II (which entered into force on 1 January 2007) the new four-category categorisation system for noxious and liquid substances carried in bulk is as follows:

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

Table 2.1 - MARPOL Annex II: the new four-category categorisation system for noxious liquid substances carried in bulk

Alongside the revision of Annex II, the marine pollution hazards of thousands of chemicals have been evaluated by the IMO's Evaluation of Hazardous Substances Working Group (GESAMP), giving a resultant new GESAMP Hazard Profiles List, which indexes the substance according to its bio-accumulation; bio-degradation; acute toxicity; chronic toxicity; long-term health effects; and effects on marine wildlife and on benthic habitats.

b) MARPOL Annex III covers the prevention of pollution by harmful substances in packaged form. This optional technical annex contains general requirements for the issuing of detailed standards on packing, marking, labelling, documentation, stowage, quantity limitations, exceptions and notifications for preventing pollution by harmful substances.

2.1.2 IMO International Codes covering the carriage, design, construction, equipment and operation of ships carrying chemicals in bulk and/or packaged form

The purpose of these codes is to provide an international standard for the safe transport by sea of certain hazardous and noxious substances, by prescribing the design and construction standards of ships involved in such transport and the equipment they should carry so as to minimise the risk to the ship, its crew and to the environment, having regard to the nature of the products involved. The basic philosophy is one of ship types related to the hazards of the products covered by these codes, each of which may have one or more hazard properties. Severe maritime incidents could lead to cargo tank damage and uncontrolled release of the product. The requirements in the codes are intended to minimise these risks as far as is practicable, based upon present knowledge and technology.

The Hanjin Pennsylvania was built in 2002 and equipped with modern safety equipment. Nevertheless it experienced a fire in November 2002 that led to several explosions; the largest one is shown in this photograph.

International Code for the Construction of Equipment of Ships carrying Dangerous Chemicals in Bulk (IBC Code)

The IBC Code gives international standards for the safe transport by sea in bulk of liquid dangerous chemicals, by prescribing the design and construction standards of ships involved in such transport and the equipment they should carry so as to minimise the risks to the ship, its crew and to the environment, having regard to the nature of the products carried. The IBC Code lists chemicals and their hazards and gives both the ship type required to carry that product as well as the environmental hazard rating. Each of the products may have one or more hazard properties which include flammability, toxicity, corrosivity and reactivity.

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

International Maritime Dangerous Goods Code (IMDG Code)

The IMDG Code was developed as a uniform international code for the transport of dangerous packaged goods by sea covering such matters as packing, container traffic and stowage, with particular reference to the segregation of incompatible substances. The IMDG Code contains regulations for dangerous goods and marine pollutants.

International Code for the Construction of Equipment of Ships carrying Liquefied Gases in Bulk (IGC Code)

The IGC Code applies to gas carriers constructed on or after 1 July 1986. Gas carriers constructed before 1 July 1986 have to comply with the requirements of the Code for the Construction and Equipment of Ships carrying Liquefied Gases in Bulk (GC Code) or Code for Existing Ships carrying Liquefied Gases in Bulk (EGC Code). The IGC Code is kept under review, taking into account experience and technological development.

2.1.3 IMO regulatory framework covering the preparedness and response to marine pollution incidents involving HNS

Protocol on Preparedness, Response and Cooperation to Pollution Incidents by Hazardous and Noxious Substances, 2000 (OPRC-HNS Protocol)

This IMO Protocol (OPRC-HNS Protocol) is based on the International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC, 1990), which is designed to help Governments respond to major oil pollution incidents. The OPRC Convention and the OPRC-HNS Protocol are designed to facilitate international cooperation and mutual assistance in preparing for and responding to a major pollution incident and to encourage contracting States to develop and maintain an adequate capability to deal with pollution emergencies.

The OPRC-HNS Protocol 2000 enters into force on 14 June 2007 and deals specifically with preparedness and response to marine pollution at coastal state level. Like the 1990 OPRC Convention for oil, it aims to provide a global framework for international cooperation in responding to major incidents or threats of marine pollution. It expands the scope of the OPRC Convention to apply in whole or in part, to pollution incidents by hazardous and noxious substances other than oil.

The OPRC-HNS Protocol 2000 defines HNS as "*any substance other than oil which, if introduced into the marine environment, is likely to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the Sea*".

Parties to the OPR-HNS Protocol 2000 are required to establish measures for dealing with pollution incidents by HNS and more specifically the following is required from them:

- National and regional systems for preparedness and response: Parties are required to establish national systems for responding effectively to pollution incidents and to establish a national contingency plan for preparedness and response. In addition, parties are required, either individually or through cooperation, to establish equipment stockpiles, training and response exercise programmes and to cooperate in the field of information exchange;
- Emergency plans and reporting: Ships carrying hazardous and noxious liquid substances are required to carry a shipboard pollution emergency plan to deal specifically with incidents involving HNS;
- Enhancement of international cooperation in pollution response, technical cooperation and assistance, cooperation in R&D and information services.

As of May 2007, seven EU coastal Member States have ratified the OPRC-HNS Protocol 2000. Table 2.2 below shows the ratification status of the EU Member States and the EFTA countries regarding the OPRC Convention 1990 and the OPRC-HNS Protocol 2000.

Ratification of OPRC Convention 1990 and OPRC-HNS Protocol 2000		
Country	OPRC 1990	OPRC-HNS 2000
Belgium		
Bulgaria	•	
Cyprus		
Denmark	•	
Estonia		
Finland	•	
France	•	
Germany	•	
Greece	•	•
Ireland	•	
Italy	•	
Latvia	•	
Lithuania	•	
Malta	•	•
The Netherlands	•	•
Poland	•	•
Portugal	•	•
Romania	•	
Slovenia	•	
Spain	•	•
Sweden	•	•
United Kingdom	•	
Iceland (EFTA)	•	
Norway (EFTA)	•	

Table 2.2[3] - Ratification status of the EU Member States and the EFTA countries regarding the OPRC Convention 1990 and the OPRC-HNS Protocol 2000

The OPRC Convention has been ratified by almost all the EU coastal Member States, whereas the OPRC-HNS Protocol has had so far very poor ratification. It's entry into force will improve the international cooperation in the field of HNS pollution preparedness and response, and will consequently facilitate and guide the Member States to further develop their own response policies and structures in this field. EMSA will encourage and closely follow such developments.

<u>IMO Manual on Chemical Pollution</u>

Furthermore, IMO developed early on a Manual on Chemical Pollution which currently consists of two sections, in order to provide guidance to governments in the field of chemical pollution response:

a) Section 1 - Problem Assessment and Response Arrangements (1999): It aims to provide guidance to governments on how to assess the hazards associated with a <u>spill of HNS</u> (other than oil) and on ways of setting up response organisations, and

b) Section 2 - Search and Recovery of Packaged Goods Lost at Sea (1991): It aims to assist governments during decision-making regarding search and recovery of <u>packaged goods</u> lost at sea, so that an appropriate and safe response can be made. Section 2 of the IMO Chemical Pollution Manual should be read in conjunction with section 1.

MSC Napoli *suffered flooding to the engine room during heavy weather 40 miles south of Cornwall in January 2007. A number of containers were lost at sea and their content, including HNS, was not immediately known.*

[3] *Status as stands on the IMO website in May 2007 (http://www.imo.org)*
Note: Non-littoral States in the EU and EFTA have not been listed

2.1.4 Liability and compensation regarding marine pollution incidents involving HNS

International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS Convention, 1996)
Compensation for the impact from an HNS incident may become available via the International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances (HNS) by Sea 1996. The HNS Convention is based upon the two-tier systems developed for oil pollution compensation under the CLC and Fund Conventions. However, given the nature of impacts from an HNS pollution incident (outlined in section 4 below), the HNS Convention goes further by not only covering pollution damage, but also risks of fire and explosion, including loss of life or personal injury as well as loss of or damage to property outside of the ship. It also covers loss or damage by contamination of the environment, costs of preventative measures and further loss or damage caused by them.

The HNS Convention has not yet entered into force.

2.2 REGIONAL AGREEMENTS

A number of EU/EFTA coastal Member States have concurred cooperation agreements at a sub-regional or regional level, so called "Regional Agreements" in order to provide mutual assistance in responding to marine pollution or the threat thereof. The European Community is also a contracting party to the major Regional Agreements and EMSA has close cooperation and coordination with them on various common issues.

The major Regional Agreements within Europe that are active in the field of marine pollution preparedness and response (involving both oil and HNS) and their existing structures regarding specifically HNS marine pollution, are described below. All Member States are contracting parties to one or more of these Regional Agreements and, as a group these structures have made a contribution to defining and addressing the HNS issue.

2.2.1 Helsinki Convention: The Convention of 1974 and 1992 on the protection of the marine environment of the Baltic Sea area

In 1974, all the sources of pollution around the Baltic Sea were made subject to a single convention, signed by the then seven Baltic Sea coastal states. The Convention on the Protection of the Marine Environment of the Baltic Sea Area (Helsinki Convention) was adopted in 1974 and entered into force in 1980. In the light of political changes and international developments a new convention was signed in 1992 by all the countries bordering the Baltic Sea (Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden) and the European Community. Amongst those with observer status are Belarus, Ukraine and the Bonn Agreement. This Convention, which entered into force in 2000, covers the entire Baltic Sea area, including the sea and inland waters, as well as the sea bed.

The governing body of the Convention is the Helsinki Commission – Baltic Marine Environment Protection Commission (HELCOM) whose main goal is to protect the marine environment of the Baltic Sea from all sources of pollution through intergovernmental cooperation between all contracting parties. The working structure of HELCOM, supported by a secretariat, consists of the annual meetings of the Helsinki Commission, the contracting parties' heads of delegation meetings, and the meetings of five technical working groups[4]. The most relevant group is HELCOM Response which addresses different aspects of HELCOM's work in preventing pollution and protecting the Baltic Sea marine environment.

In the field of pollution response, HELCOM has developed a *Manual on Cooperation in Response to Marine Pollution* (HELCOM Response Manual) within the framework of the Helsinki Convention, which covers response to marine pollution from oil (Vol.1) and chemicals (Vol.2). This manual can be used by the Baltic Sea States in operational cooperation, surveillance activities and combating exercises.

Specifically regarding HNS, HELCOM developed in 2002 the 2nd Volume of the HELCOM Response Manual, which deals with: "Response to accidents at sea involving spills of hazardous substances and loss of packaged dangerous goods".

This response manual provides operational information as to response strategies and arrangements for assistance and cooperation between contracting parties regarding marine pollution incidents involving HNS. More specifically, it provides information on the behaviour of chemical substances once released in the marine environment, chemical spill monitoring, sampling, personal protection equipment, response actions and techniques both for bulk HNS releases and packaged goods lost in the marine environment and contains case histories of HNS incidents and classification of spills. This manual is updated on an ongoing basis.

Furthermore, the Helsinki Commission unanimously adopts recommendations for the protection of the marine environment, which the governments of the contracting parties must act on in their respective national programmes and legislation. Within the HELCOM Response Group, the following recommendations have been identified to have relevance to HNS marine pollution, as indicated in table 2.3 below:

HNS-related HELCOM Recommendations	
Recommendation	**Topic**
11/13 (1990) (and Guidelines for applying HELCOM Recommendation 11/13)	"Development of national ability to respond to spillages of oil and other harmful substances"
12/7 (1991)	"Special cooperation in case of a chemical tanker accident in the Baltic Sea"

Table 2.3 – HELCOM Recommendations related to HNS marine pollution

[4] The five HELCOM Working Groups are: HELCOM MONAS (Monitoring and Assessment Group), HELCOM LAND (Land-based Pollution Group), HELCOM HABITAT (Nature Protection and Biodiversity Group), HELCOM MARITIME (Maritime Group) and HELCOM RESPONSE (Response Group)

In addition, under the framework of the Helsinki Convention, varied types of joint response exercises are held regularly by the coastal states:

A) Paper exercises (BALEX ALPHA),
B) Alarm exercises (BALEX BRAVO),
C) Equipment deployment exercises (BALEX CHARLIE),
D) Operational exercises (BALEX DELTA), and
E) State-of-the-art exercises (BALEX ECHO).

The value of such exercises lies in improving the alarm procedures, response capability, communication, cooperation and readiness of the countries around the Baltic Sea to jointly respond to at-sea pollution. These exercises primarily cover response to oil spills.

Two joint operational response exercises (BALEX DELTA) have been organised within HELCOM regarding HNS:

- 1996 in Sweden: Exercise on HNS (packaged dangerous goods)
- 1998 in Poland: Exercise on HNS (bulk)

Various projects and studies regarding risk assessment and sea-born transportation of HNS have been undertaken within the HELCOM framework at regional and at individual Member State levels (e.g. Sweden, Finland, Denmark). A common conclusion of such efforts is that the collection of information from ports regarding HNS cargoes and transportation volumes is very difficult, due to insufficient data. Some useful statistical information is available from these studies regarding the transportation of bulk HNS in the Baltic Sea.

2.2.2 Bonn Agreement: The Agreement of 1983 for cooperation in dealing with pollution of the North Sea by oil and other harmful substances

The first Bonn Agreement was agreed in 1969 following major oil spills, to encourage the North Sea states to jointly improve their basic capacity for responding to oil pollution. The current Bonn Agreement from 1983 is focused on responding to marine pollution of the North Sea, by encouraging the bordering states together with the European Community to:

- Offer mutual assistance and cooperation in responding to pollution
- Execute surveillance as an aid to detecting and combating pollution and to prevent violations of anti-pollution regulations

Contracting parties to the Bonn Agreement are: Belgium, Denmark, France, Germany, the Netherlands, Norway, Sweden, United Kingdom and the European Community. Amongst those with observer status are Ireland (which is currently in the process of becoming a full member), Spain, HELCOM and REMPEC.

The working structure of the Bonn Agreement, supported by a secretariat, consists of the contracting parties' heads of delegation meetings (BONN) and a working group on Operational, Technical and Scientific questions concerning counter-pollution activities (OTSOPA), which was established to promote the exchange of technical ideas. Both meetings occur once a year.

The Bonn Agreement has developed a *Counter Pollution Manual*, which is continually updated, with the aim of providing guidelines and practical information for the provision of assistance from one contracting party to another, in the form of vessels, personnel, recovery and storage equipment during a multinational marine pollution combating operation.

Chapter 26 – "Hazardous Materials" of this manual refers specifically to HNS and provides practical information on the categorisation of HNS, initial response measures following an HNS incident, risk assessment, decision making procedures and incident response actions. The Bonn Agreement website has also available a list of case studies of past chemical spills.

Like HELCOM, the Bonn Agreement also undertakes different types of joint exercises in cooperation in responding to spills with in the North Sea area (BONNEX exercises). The following types of BONNEX exercises have been agreed upon and are held on a regular basis:

- Alarm exercises (BONNEX BRAVO),
- Equipment exercises (BONNEX CHARLIE),
- Operational exercises (BONNEX DELTA).

These joint exercises have been focusing on oil spill response and aerial surveillance

The chemical tanker Ece *collided with the Maltese bulk carrier* General Grot-Rowecki *in the English Channel in January 2006. A French rescue team was attempting to tow the tanker to Le Havre, but it sank with its cargo of 10,000 tons of phosphoric acid about 50 nautical miles (90 km) west of Cherbourg*

issues, involving the deployment of aircraft and vessels. Pollution involving HNS has not been addressed to date but could be in the future. Additional exercises are organised on a bilateral or multilateral basis under the Bonn Agreement umbrella.

2.2.3 Barcelona Convention: The Convention of 1976 for the protection of the Mediterranean Sea against pollution

The Mediterranean Action Plan (MAP) was created under the United Nations Environment Programme (UNEP) umbrella in 1975, and is a regional cooperative effort involving the countries bordering the Mediterranean Sea and the European Community, in order to address the challenge of safeguarding the Mediterranean Sea from pollution. This led to the adoption, one year later, of the Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention) which entered into force in 1978, was amended in 1995, and has 22 contracting parties[5]. In 1995, the Action Plan for the Protection of the Marine Environment and the Sustainable Development of the Coastal Areas of the Mediterranean (MAP Phase II) was adopted, replacing the Mediterranean Action Plan of 1975.

The Barcelona Convention has given rise to six Protocols addressing different aspects of the Mediterranean marine environment and its conservation, which have been progressively adopted, but not all yet ratified.

Those relating to pollution from oil and hazardous material (HNS) are:

- Emergency Protocol: Protocol Concerning Cooperation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency, which was adopted in 1976 and entered into force in 1978. This Protocol has been replaced by the one below;
- Prevention and Emergency Protocol: Protocol Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea, which was adopted in 2002 and entered into force in 2004. It has seven parties and replaces the Emergency Protocol of 1976.

The Emergency Protocol (1976) focused on cooperation for preparedness and response, whilst the Prevention and Emergency Protocol (2002) expands its scope to the prevention of pollution from ships. It encourages its parties to cooperate and to develop national plans in order to prevent, reduce and control ship-sourced pollution of the marine environment and to cooperate in responding to pollution incidents.

Within the MAP framework, the contracting parties decided to set up in 1976 the Regional Oil Combating Centre for the Mediterranean Sea (ROCC), established in Malta, in order to assist the implementation of the Emergency Protocol. The mandate of ROCC was extended in 1987 to include hazardous substances other than oil, and in 1989 the contracting parties approved the new objectives and functions of the Centre and changed its name to the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC). REMPEC's objectives and functions were further modified in 2001, in order to reflect the Centre's new role following the adoption of the new Prevention and Emergency Protocol.

REMPEC is a UN regional centre based in Malta, administered by IMO and forms part of the Regional Seas network of UNEP. Its objectives, functions and work programme are defined by the contracting parties to the Barcelona Convention. Every two years these issues are discussed at the meetings of the REMPEC Focal Points and

[5] *Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Monaco, Morocco, Serbia and Montenegro, Slovenia, Spain, Syria, Tunisia, Turkey and the European Community.*

subsequently submitted for approval and adoption to the meetings of the contracting parties.

With a view to consistently providing contracting parties to the prevention and Emergency Protocol with practical information and operational assistance required for dealing with marine pollution incidents, the main achievements of REMPEC are:

- Publication of a large number of technical papers, studies, reports and training material;
- Development of recommendations and guidelines related to preparedness and response to accidental marine pollution;
- Conducting trainings to oil spill responders;
- Conducting multinational operational exercises involving personnel, equipment, vessels and aircraft;
- Offering assistance to the Mediterranean coastal states in the development of their national preparedness and response systems, and offering them technical assistance in the case of a pollution emergency;
- Developing (and regularly updating) the Regional Information System (RIS), which contains technical documents, directories and inventories, databases, operational guides and information services.

Among this technical information and material regarding marine pollution preparedness and response, there are documents, manuals and databases specifically addressing HNS marine pollution issues and REMPEC is currently developing additional studies in this field.

2.2.4 Lisbon Agreement: The Cooperation Agreement signed in 1990 for the protection of the coasts and waters of the Northeast Atlantic against pollution

The Lisbon Agreement (1990) is an international framework for cooperation in responding to accidental marine pollution, aimed at promoting mutual assistance between France, Portugal, Spain and Morocco. Unfortunately, this Agreement has not entered yet into force. The European Community is also contracting party to the Lisbon Agreement, which aims to improve the level of preparedness and cooperation among its members, when dealing with an incident of pollution at sea, by oil or other harmful substances.

The International Centre for Pollution Response in the North East Atlantic (CILPAN) has been established in Lisbon as part of the Lisbon Agreement, in order to coordinate response between the Agreement's Member States during a marine pollution incident. The functioning of this Centre is assured by the Portuguese government under the Ministry of the Environment and Planning. However, the actions of this Centre are very limited due to the non-ratification of the Agreement.

2.2.5 Bucharest Convention: Convention on the protection of the Black Sea against pollution 1992

As of 1 January 2007, Bulgaria and Romania have become Member States of the European Union. One result of this new accession is that now two EU Member States are coastal states of the Black Sea, thus extending the Agency's mandate to the Black Sea.

The main governing instrument covering the protection of the Black Sea against pollution is the "Convention on the Protection of the Black Sea Against Pollution" (also known as the Bucharest Convention) which was adopted in 1992 and entered into force in 1994. The contracting parties to the Convention are Bulgaria, Romania, the Russian Federation, Georgia, Turkey and Ukraine. Unlike the other Regional Agreements mentioned above, the European Community is not yet party to the Bucharest Convention.

Among the main objectives of this Convention are:

- To prevent pollution by hazardous substances;
- To prevent, reduce and control pollution of the marine environment from vessels;
- To prevent, reduce and control the pollution of the marine environment resulting from emergency situations;
- To provide the framework for scientific and technical cooperation and monitoring activities.

The contracting parties are obliged by this Convention to prevent, reduce and control the pollution in the Black Sea in order to protect and preserve the marine environment; the Convention provides the legal framework for cooperation and concerted actions to fulfil this obligation.

The Convention includes a basic framework Agreement and three specific Protocols, which cover:

1) The control of land-based sources of pollution;
2) The dumping of waste; and
3) Joint action in the case of accidents (such as oil spills).

Specifically regarding marine pollution response, the Protocol on Cooperation in Combating Pollution of the Black Sea Marine Environment by Oil and Other Harmful Substances in Emergency Situations (Emergency Protocol, 1992) has been adopted, which includes the following main requirements for its contracting parties:

- To cooperate in case of an emergency due to an oil or HNS spill;
- To maintain and promote contingency plans (individually, bilaterally or multilaterally) for responding to pollution of the sea by oil and other harmful substances;
- To report and notify other parties of the pollution incident.

Both the Bucharest Convention and its Emergency Protocol provide the legal institutional framework for actions concerning regional cooperation in responding to marine pollution incidents.

The implementation of the Bucharest Convention is managed by the Commission for the Protection of the Black Sea Against Pollution (referred to as the Istanbul Commission or Black Sea Commission) with its Permanent Secretariat in Istanbul, Turkey. Among its many tasks, the Black Sea Commission (BSC) coordinates intergovernmental meetings on environmental issues related to the safety of shipping. The BSC also implements the Black Sea Strategic Action Plan for the Rehabilitation and Protection of the Black Sea (BS SAP) which was developed in 1996 to provide concrete actions to implement the Bucharest Convention. Advisory Groups, including experts from all Black Sea states, have also been created to provide sources of expertise, information and support to the BSC in implementing the BS SAP.

The Advisory Group on the Environmental Safety Aspects of Shipping (ESAS): "coordinates the regional approach to emergency response, particularly the international response to accidents involving the extraction, maritime transport, handling and storage of oil and, where relevant hazardous chemicals."

One of the most important achievements of the Black Sea Commission has been to develop the Black Sea Contingency Plan (BSCP) for responding promptly and effectively to marine pollution incidents affecting or likely to affect the Black Sea environment, which is in accordance with the Emergency Protocol to the Bucharest Convention. This plan brings together the national contingency plans of the six states facilitating the cooperation and exchange necessary to respond to spills of regional significance. The plan is also aimed at making the national contingency plans more compatible with each other.
The *Black Sea Contingency Plan* includes two volumes as follows:

- Volume 1 "Response to Oil Spills" and
- Volume 2 "Response to Harmful Substances Other than Oil".

According to the Black Sea Commission, the transportation of harmful substances other than oil in the Black Sea Area is limited even if an increase has been registered during the last few years. Until Volume 2 of the Black Sea Contingency Plan is prepared (in accordance with the OPRC-HNS Protocol 2000) and adopted, the contracting parties have agreed to apply the requirements for exchange of information between them according to the principles set out in Volume 1 of the Black Sea Contingency Plan for oil pollution response.

Furthermore, similar to the practices of the other regional seas, the Black Sea coastal states hold regular pollution response operational exercises, including the deployment of antipollution vessels and equipment.

As of 2007, the Agency intends to extend its marine pollution preparedness and response activities and operational capabilities, for both oil and HNS, to cover the Black Sea area.

2.3 EUROPEAN MECHANISMS

At Community level, the main legal instruments which relate to marine pollution preparedness and response are:

- Decision[6] 2850/2000/EC of the European Parliament and Council of 20 December 2000, which sets up a Community Framework for cooperation in the field of accidental or deliberate marine pollution, for the period from 1 January 2000 to 31 December 2006.
- Council Decision 2001/792/EC, Euratom establishing a Community mechanism to facilitate reinforced cooperation in civil protection assistance interventions.

2.3.1 Community Framework for co-operation in the field of accidental or deliberate marine pollution

The main Community level legal instrument which relates to marine pollution preparedness and response is Decision 2850/2000/EC of the European Parliament and Council of 20 December 2000, which sets up a Community Framework for cooperation in the field of accidental or deliberate marine pollution, for the period from 1 January 2000 to 31 December 2006. This framework has been running since 2000 and aims at covering preparedness actions in the field of accidental or deliberate marine pollution, through supporting and supplementing Member States' efforts, improving their response capacities and facilitating and promoting mutual assistance and cooperation in this field.

Within the Community Framework for Co-operation, the Community Information System (CIS) was developed and is managed by the Commission. The CIS includes a web interface with national web-pages of information, prepared and updated directly by the Member States, regarding their policies, structures and operational response capabilities for pollution response mainly from oil, but also covering pollution from other harmful substances. The Agency's operational pollution response means (stand-by oil recovery vessels) are also included in the CIS web-interface.

To date the Community Framework for Cooperation has been administered by the European Commission, specifically DG Environment, assisted by a Management Committee on Marine Pollution (MCMP) consisting of Member States experts and acting as a forum to exchange views and best practices in this field. The role of the MCMP has been to express opinion on the Framework's annual action plan and to define current and future priorities in the field of preparedness for and response to marine pollution.

[6] *Decisions are part of the Community secondary legislation and they are fully binding on those to whom they are addressed.*

Actions which have been undertaken so far under the Community Framework for Cooperation include training courses, workshops, exchange of experts, exercises, pilot projects and others. Some of these actions have dealt specifically with HNS (e.g. pilot project HASREP) and other are related to HNS (e.g. workshops regarding contingency planning). The MCMP has encouraged HNS-related projects when adopting the Community Framework's priorities, as reflected in the table below:

Year	Priority set	Actions
2004	Response to harmful substances	Training courses, workshops, pilot projects, exchange of experts, exercises, conferences and events
2005	Response to chemical pollution (HNS)	
2006	Response to chemical pollution	

Table 2.4 – HNS related priorities of the Community Framework for Cooperation

This Community Framework for Cooperation expired at the end of 2006 and will not be renewed as such by the European Commission. EMSA will continue to develop similar pollution preparedness activities as of 2007 within the framework of its mandate as defined by the amended EMSA Regulation 724/2004. As of 2007 and within it's the framework of its remit, the Agency will complement some of the MCMP activities and other preparedness actions of the Community Framework of Cooperation.

More specifically, the Agency has established a Consultative Technical Group (CTG), composed of experts from Member States, to act in support of these specific preparedness activities. EMSA hosts and chairs the CTG meetings and provides the group's Secretariat.

2.3.2 Community mechanism to facilitate reinforced cooperation in civil protection assistance interventions

The Council Decision 2001/792/EC, established a Community Mechanism to facilitate reinforced cooperation in civil protection assistance interventions. This instrument covers civil protection assistance intervention, including emergency response to marine pollution incidents and aims to facilitate and improve reinforced cooperation and coordination between the Community and the Member States in the event of major emergencies.

More specifically it provides for the following:

- The establishment and management of a Monitoring and Information Centre (MIC) which is operational on a continuous basis and through which the requests for assistance are channeled;
- The identification of intervention teams (and other intervention support), and the establishment and, as needed, dispatch of assessment and/or coordination teams in the event of emergencies;
- The setting up and implementation of a training programme for intervention teams, assessment experts and/or coordination teams;

- The establishment and management of a common emergency communication and information system;
- Other support actions such as measures to facilitate the transport of resources for assistance intervention.

The Community Mechanism continues to be the reference tool as regards response to marine pollution accidents, involving oil and/or HNS.

2.3.3 The Agency's activities in the field of HNS marine pollution

In 2004, with the adoption of Regulation 724/2004, the Agency was assigned the following tasks in the field of marine pollution preparedness and response:

- To provide the Member States and the Commission with technical and scientific assistance in the field of ship sourced accidental and deliberate pollution;
- To support, on request, with additional means in a cost-efficient way the Member States' pollution response mechanisms.

In order to further determine the framework for its pollution response activities, EMSA developed its Action Plan for Oil Pollution Preparedness and Response (Oil Action Plan), which was approved and adopted by the Agency's Administrative Board at its 9th Meeting in Lisbon on 21 and 22 October 2004. This Oil Action Plan is being implemented and updated accordingly to the Agency's annual Work Programmes.

The main focus of the Oil Action Plan is that the Agency assists Member States in dealing with large spills of highly viscous oil. Accordingly, in 2005, the Agency started putting in place a network of at-sea oil recovery vessels for pollution response operations covering the Baltic Sea, the Atlantic coast and the Western approaches to the Channel, and the Mediterranean Sea. In 2006 and 2007 the Agency's objectives have been to strengthen this network of stand-by oil recovery vessels; the final phase of establishing this network has identified the Atlantic, Mediterranean and Black Sea areas.

In addition, and in accordance to its task with respect to supporting Member States activities in the field of monitoring marine oil spills [7], the Agency has developed the CleanSeaNet service, a satellite based monitoring system for marine oil spill detection and surveillance in European waters. The service provides a range of detailed information including oil spill alerts to Member States, rapid delivery of available satellite images and oil slick position.

The Agency's initial main priority was to build up its operational activities regarding preparedness and response to oil spills. However, as approved in the original Oil Action Plan and consequent Work Programmes, and in order to comply with its establishing Regulation as amended, EMSA has broadened its scope of activities to cover HNS, other than oil.

[7] *The European Directive 2005/35/EC of the European Parliament and of the Council on ship-source pollution and on the introduction of penalties and infringements, which entered into force in September 2005, elaborated the Agency's task with respect to supporting Member States activities in the field of monitoring marine oil spills.*

Accordingly, in 2006, the Agency undertook some preparatory actions in the field, such as gathering and reviewing HNS-related information (including past studies, information on the sea-borne transportation of HNS and past incidents involving HNS within Europe) and hosting a Workshop with Member State experts on ship-sourced chemical pollution (Brussels, 22-23 February 2006), which focused on the existing risks, preparedness and response options in Europe regarding HNS pollution incidents.

In 2007, the Agency aims to offer operational assistance in the field of HNS pollution preparedness and response and to this effect it has developed this HNS Action Plan, which should act as:

- A concise overview of existing available information in the field of preparedness and response to HNS marine pollution, including information on: seaborne transportation of HNS, past HNS incidents, challenges and impacts of HNS marine pollution, existing HNS pollution preparedness and response mechanisms across Europe, and options and limitations of response methods to such incidents; and
- A framework document defining the Agency's role and activities in this field in order to make an added value contribution at European level and strengthen existing national preparedness and response capabilities.

Section 7 of this Action Plan details EMSA's framework actions in this field.

3 *HNS Trade in European Waters*

3.1 INTRODUCTION

In order to determine the contribution at European level that EMSA can make to fulfill its legal obligations, it is necessary to evaluate the nature and scale of the risk posed by an HNS release from a shipping incident in EU Waters.

As part of the Agency's Work Programme 2006, activities were undertaken with the aim of "*broadening the scope of EMSA's operational assistance to other pollutants*"[8]. As a result, preparatory actions were identified (e.g. to review existing studies, identify transported substances in EU waters, etc). The Agency undertook a review of existing studies in the field of HNS and has identified a list of information sources with regard to HNS transport within EU waters, past incidents and response manuals, all related to HNS ship-sourced pollution preparedness and response.

3.2 TRANSPORTED SUBSTANCES

Although these studies and information sources provide lists of HNS transported, they are restricted to specific geographical areas (primarily the Baltic Sea, Channel or Western Mediterranean Sea). They do not provide a complete picture of HNS transport in EU waters and none fully answers the question of what are the 20-50-100 most transported hazardous and noxious substances? Review of these reports also identified some potential flaws in the studies. These relate to lack of data and to the misidentification of chemicals due to misspelling, redundant chemical names or errors in translation. Given the wide variety of HNS material, particularly the complex naming system for organic chemical compounds, such problems are inevitable.

In addition to these studies, EMSA has also reviewed the HELCOM and Bonn Agreement Response Manuals dealing with HNS, together with the REMPEC/RIS operational guides and technical documents, the MIDSIS TROCS database and the CEDRE operational response guides on HNS. These have been designed to assist responders identify potential hazards derived from substances involved in HNS incidents. The selection of substances for inclusion in the technical documents, response manuals and databases reflects the conclusions of expert groups, who took into account jointly the possible quantities transported, incident records and potential risks.

Taking into account the fact that the existing studies, lists of HNS substances and databases are derived from either:

- The identification of HNS within a restricted geographical area,
- HNS which have previously been involved in an incident in European waters or
- HNS which are indicated of being transported within the EU,

[8] *Section 2.1.4 of the EMSA Work Programme 2006 (pp 17)*

Collision of the container ship Ever Decent *and the passenger ship* Norwegian Dream *in August 1999. The* Ever Decent *carried among its cargo paint, paint hardener and cyanide. Some containers were thrown onto the* Norwegian Dream *during the collision.*

EMSA has developed a combined extended draft list of HNS which could be present and/ or transported in European waters, from this range of sources. The Agency has the intention to continue its work on further defining this list of substances.

Probably the most complete database of HNS material is provided by the IMO's Evaluation of Hazardous Substances Working Group (GESAMP), which evaluated the marine pollution hazards of thousands of chemicals and thus developed a new GESAMP Hazard Profiles List. However, it should be noted that this list has been compiled at an international level based upon the risk posed by a specific substance, and does not provide regional information for European waters.

Given the limitations of the existing studies, manuals and databases in defining the nature and extent of HNS transport in European waters, EMSA has undertaken three additional preparatory actions for the development of this Action Plan[9]:

- Analysis of fleet composition of vessels which potentially carry HNS in European waters;
- Analysis of vessel port calls to determine which areas of European waters have a high volume of vessel traffic potentially carrying HNS, and
- Identification and analysis of shipping incidents and casualties involving HNS within European waters (see section 5);

The Agency will continue the review and analysis of available information sources and raw data in order to determine the need for additional work to identify the nature and extent of HNS transport in EU waters as part of this Action Plan.

3.3 FLEET COMPOSITION

EMSA undertook a statistical analysis of the fleet composition for vessels which potentially could carry HNS cargoes. Figures, obtained for 2004 (from Lloyds Maritime Intelligence Unit) indicate an estimated fleet size of a little over 1,000 vessels, with a total cargo capacity of approximately 25,7 million DWT.

Figure 3.1 shows the division of the fleet between chemical/ oil carriers (58%), chemical tankers (41%) and acid tankers (1%).

Number of ships, by type - 2004

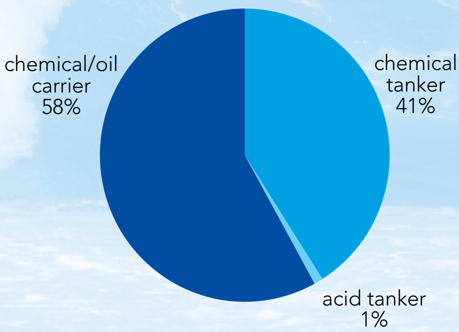


Figure 3.1 - Fleet composition for vessels which potentially could carry HNS cargoes (2004)

Analysis of cargo capacity (figure 3.2) indicates that the majority of the cargo tonnage is carried

[9] *Based upon data contained in the studies and reports that are presently accessible to EMSA*

by chemical/ oil tankers (69%), with chemical tankers next (30%) and then acid tankers (1%).

Cargo capacity of the fleet (in tons) - 2004

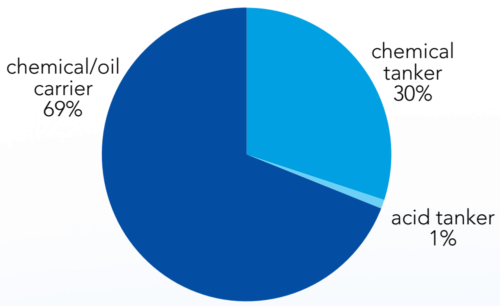


Figure 3.2 – Analysis of fleet cargo capacity (2004)

3.4 TRADE PATTERN TO AND FROM EUROPEAN PORTS

Following analysis of existing studies and statistical information from Eurostat[10] and other available information sources, it is only possible to present an indicative overview of maritime transportation of HNS in bulk form, to and from European ports. Transportation of hazardous and noxious substances is a very sensitive area to seek and receive information about and such data may not be available from all ports that handle, import and/or export HNS.

HNS in bulk form is carried either as liquid bulk or dry bulk goods.

According to Eurostat statistics:

- Liquid bulk includes liquefied gas, crude oil, oil products and other liquid bulk goods;
- Dry bulk includes ores, coal, agricultural products (fertilisers, grain, soya etc) and other dry bulk goods;
- In most EU countries, liquid bulk goods (which include petroleum products) had in 2004 the highest share in total tonnes of cargo/goods handled (42%).
- Dry bulk goods followed with 26%. The amount of HNS carried within those goods can not be estimated with certainty, but these figures give an estimation of liquid bulk and dry bulk goods handled in main EU ports in 2004 by type of cargo.

From the limited information available regarding trade of HNS in European waters, it can be indicated that all the regional seas of the EU have a relative high share of seaborne transportation of bulk liquid and dry goods (which probably include a substantial amount of HNS): the North Sea (UK, the Netherlands, Belgium, Norway), the Channel and Atlantic Coast (France, UK, Portugal), the Baltic Sea (Germany, Estonia, Poland), the Mediterranean (Italy, Slovenia, France, Spain), and the Black Sea (Romania). In addition, the European Community's chemical industry is one of the world's largest chemical producers (its products include a wide range of HNS substances), which affects the level of external trade in this sector.

Further collection, analysis and dissemination of existing information and statistical data on HNS sea-borne transportation needs to be undertaken. As part of the current review, the Agency identified sources of raw data on

[10] *Maritime transport of goods and passengers 1997-2004*

shipping movements, port calls of HNS carrying vessels and customs information regarding specifically HNS, information which, when further analysed, will provide a clearer picture to the Commission and the Member States of the situation regarding HNS sea-borne transportation in European waters.

3.5 EUROPEAN HNS TRADE AND EMSA ACTIVITIES

From the above information it becomes evident that there is not enough reliable information sources available regarding seaborne transportation of HNS within EU waters. All available information is indicative and shows that HNS are being transported to and from EU ports, but it is very difficult to estimate the amounts, exact substances and patterns of HNS transportation. A more thorough and comprehensive study and analysis of statistical information is needed, in order to obtain a better understanding of the maritime transportation of HNS in European waters.

The following issues could influence the Agency's future activities:

- Published information concerning HNS transport in EU waters is limited. There is little information concerning the analysis of trade routes and substances carried for the entire area of EU waters;
- There are a number of databases which provide information on lists of HNS substances and associated characteristics, and
- Statistical information has been developed by EMSA concerning the chemical tanker fleet operating in EU waters.

EMSA's actions could be developed to assist Member States by ensuring they have up to date information concerning HNS transport within their waters[11]. Member States could also be assisted by ensuring all available information concerning HNS material movement is contained within one coherent EU database or report on vessel transport routes and substances carried. These actions will assist the Member States and the Commission by providing valuable information on which to base risk assessments and set priorities for contingency planning regarding HNS marine pollution.

Additional work needs to be undertaken in order to:

- Determine HNS trade routes and obtain further information on the geographical variation in HNS cargoes for specific European sea areas;
- Collect information on the mode of transportation (bulk/packaged goods);
- Collect information on the actual substances that are being carried as HNS cargoes.

Taking into account the difficulty of obtaining HNS-related statistical information, the Agency aims to work closely with the Member States and the relevant industry sources, to develop its activities in this area.

[11] *SafeSeaNet could play an important role in such a development if the existing HAZMAT message would be enriched by new elements such as "the port of discharge". To this end a relevant amendment would have to be introduced to the Directive 2002/59*

4 Potential Impacts from HNS Pollution

4.1 INTRODUCTION

In general terms, HNS material consists of the building blocks of everyday life. It can comprise of inorganic or organic chemical compounds, minerals, etc for use within or derived from the manufacturing, petrochemical, textile, pharmaceutical, food and agrichemical industries.

When dealing with an HNS incident one of the priority requirements is the identification of the hazards and assessment of the risk posed by a stricken vessel and its cargo to public and responder safety, the environment and socioeconomic assets that the Member State coastal communities depend upon.

4.2 THE FATE OF RELEASED HNS

The initial response, primarily by a Member State, to an HNS incident is to prevent a release. The risks at this stage are likely to be related to health and safety of emergency personnel and/or salvors related to materials handling and containment. If there is insufficient time to react to an incident or escalation impedes a preventative response, a HNS release to the wider environment will occur. The primary factors which then determine the safety, environmental and socioeconomic impact of the released HNS material(s) relate to the chemical and physical properties of the material and its physical fate in the marine environment.

The fire on board the Hyundai Fortune *may have been caused by fireworks in its cargo (March 2006).*

Properties of HNS which can impact on safety, environmental assets and socioeconomic activity include the substances' flammable, reactive, toxic, explosive, corrosive, etc. potential. However, it is the physical fate of the HNS once it is released into the wider environment which determines if these properties will have an impact. The fate also determines if it is possible to deploy counter-pollution response techniques, and which options should be chosen.

The fate of HNS material is the behaviour of the material once released into the wider environment. This is determined by the physical properties of volatility, density and solubility of the released substance. As a result, HNS can be grouped by its behaviour once released. Grouping HNS substances has the advantage of focusing attention on those aspects of the release that relate to potential impact and problems of response, as follows[12]:

- **Evaporators:** Comprises all volatile liquids which are less dense than sea water;
- **Floaters:** Comprises all non-volatile liquids which are less dense than sea water;
- **Sinkers:** Comprises all products which are more dense than sea water, and;
- **Dissolvers:** Comprises all products which are soluble in sea water.

The behaviour of HNS is determined by such factors as state of compression/aggregation, the density, solubility and vapour pressure[13]. The Regional Agreements HELCOM, Bonn Agreement, and REMPEC have developed their respective response manuals and information based upon this approach. They group the behaviour of HNS releases as:

Behaviour Classes		Density	Vapour Pressure	Solubility		
		kg/m^3	Pascal	Gas	Liquid	Solid
Gases Evaporators	Evaporator	<1023	>3000	≤10	≤1	-
	Evaporator/Dissolver			>10	>1	
Floaters	Floater		<300	-	≤0,1	<10
	Floater/Evaporator		300-3000			-
	Floater/Evaporator/Dissolver				0.1-5	
	Floater/Dissolver		<300			10-99
Dissolvers	Dissolver		≤10000		>5	>99
	Dissolver/ Evaporator		>10000			-
Sinkers	Sinker	>1023	-		≤0.1	<10
	Sinker/Dissolver				>0.1	10-99

Figure 4.1 - Categories of HNS behaviour and the physico-chemical characteristics (density, vapour pressure and solubility) on which the categorisation is based (the density is specified as 1023 kg/m^3; this might vary in different locations depending on the salinity)[14].

[12] *Cormack, D. 1983, Response to Oil and Chemical Marine Pollution, Applied Science Publishers (ISBN 0-85334-182-6).*
[13] *Bonn Agreement Counter Pollution Manual, Chapter 26: Hazardous Material Spills*
[14] *Bonn Agreement Counter Pollution Manual, Chapter 26: Hazardous Material Spills*

It should be noted that this has further refined the grouping of HNS, with the realization that substances can have more than one physical fate in the marine environment e.g. sinker/dissolver, dissolver/evaporator, floater/dissolver, etc. HELCOM, Bonn Agreement and REMPEC have provided examples of different chemical behavior when released, as indicated in the table below:

Fate	Group	Properties	Examples of Behaviour Groups
Evaporate immediately (Gases)	G	evaporate immediately	propane, butane, vinyl chloride
	GD	evaporate immediately, dissolve	ammonia
Evaporate rapidly	E	float, evaporate rapidly	benzene, hexane cyclohexane
	ED	evaporate rapidly, dissolve	methyl-t-butyl ether vinyl acetate
Float	FE	float, evaporate	heptane, turpentine toluene, xylene
	FED	float, evaporate, dissolve	butyl acetate, isobutanol, ethyl acrylate
	F	float	phthalates, vegetable oils, animal oils, dipentene, isodecanol
	FD	float, dissolve	butanol, butyl acrylate
Dissolve	DE	dissolve rapidly, evaporate	acetone, monoethylamine, propylene oxide
	D	dissolve rapidly	some acids and bases, some alcohols, glycols, some amines, methyl ethyl ketone
Sink	SD	sink, dissolve	dichloromethane 1,2-dichloroethane
	S	sink	butyl benzyl phthalate, chlorobenzene creosote, coal tar, tetra ethyl lead, tetramethyl lead

Source: HELCOM Manual on Cooperation in Response to Marine Pollution

Table 4.2 – Refined grouping of HNS behaviour categories, once released in the marine environment

The types of physical fate behaviour for gas, liquids and solids can be defined under the following 12 groups:

Sinkers:

When the density of a liquid is higher than that of sea-water, then the solubility is considered to differentiate between a sinker (S) and a sinker/ dissolver (SD):

(S) a sinking substance which is not soluble has a solubility of <0.1%

(SD) a substance which sinks and then dissolves has a solubility >0.1%

When the density is lower than that of seawater, both the vapour pressure and solubility are considered to differentiate between different behaviour sub groups of evaporators, floaters and dissolvers.

Evaporators:

(E) a substance with a high vapour pressure (>3k Pa) and low solubility (<1%). The vapour cloud formed behaves the same way as that of a gas (G). Such a liquid substance is also termed a "fast evaporator";

(ED) a liquid which rapidly forms a vapour substance (>3 kPa) and dissolves in water (>1%). Although dissolving, such substances may form flammable vapours over the water surface.

Floaters:

(F) a floating substance which does not significantly evaporate (<0.3 kPa) and dissolves (<0.1%);

(FD) a floating substance which does not significantly evaporate (<0.3 kPa) but slowly dissolves in water (0.1-5%);

(FE) a floating substance which slowly evaporates (0.3-3 kPa) without dissolving (<0.1 kPa);

(FED) a floating substance which slowly evaporates (0.3-3 kPa) and dissolves (0.1-5%); the extent of solubility will determine whether toxic concentrations might occur in water. This type of product will completely disappear in time.

Dissolvers:

(D) a substance which dissolves in water (>5%) and does not rapidly evaporate. The degree of solubility of the substance and the turbulence in the water column will determine whether toxic concentrations in the water column will occur;

(DE) a substance which dissolves in water (>5%) and rapidly evaporates (>10 kPA).

4.3 FACTORS DETERMINING THE SAFETY, ENVIRONMENTAL AND SOCIOECONOMIC IMPACT OF HNS INCIDENTS

The term "**risk**" can be confused with "**hazard**", as the difference between hazards and risk is often not well understood. Therefore, the following explanation may help to clarify and to enhance a better understanding of these terms.

Generally it could be said that risk is the product of hazards, probability and consequences or in a mathematical formula:

Risk =
Hazard x Probability x Consequences

Hazard generally refers to the physical and chemical properties of a material or substance and is therefore always the same at any place of the world.

Probability can be derived from statistics/incidents reports which show the frequency of incidents.

Consequences are depending on the vulnerability of the incident site or the vessel. It differs definitely from location/vessel to location/vessel as well as the means of technical equipment and response resources available.

Recalling the above-mentioned definitions, it's obvious, that the risk level is variable and changeable from incident to incident. Factors which influence the level of risk include:

- Hazardous nature of the material/substance involved;
- Quantity of the material/substances involved;
- Containment system and type of stress affect to the tanks/vessel; and
- Level of safety standard of the vessel, qualification of the crews and response resources available.

Taking these facts into account it is apparent that only the probability and the consequences could be changed since the hazard will remain always the same. Thus, HNS is a group of hazardous materials, because they can be flammable, explosive, toxic, reactive, corrosive etc. Only in case of dilution or dispersion this may change.

Therefore, all efforts must be done to reduce the probability e.g. by state-of-art equipment which fulfils the necessary safety standards, or to limit the consequences by providing sufficient response capabilities (onboard and externally) to cope with and prevent any HNS incidents.

Accordingly it is obvious that hazards are something that little can be done about. The hazards posed by a toxic or an explosive substance are the intrinsic properties of that HNS material. The risks they pose during an incident can, however, be minimised by initially preparing a suitable risk assessment (figure 4.3), and then by following the response options identified in that assessment:

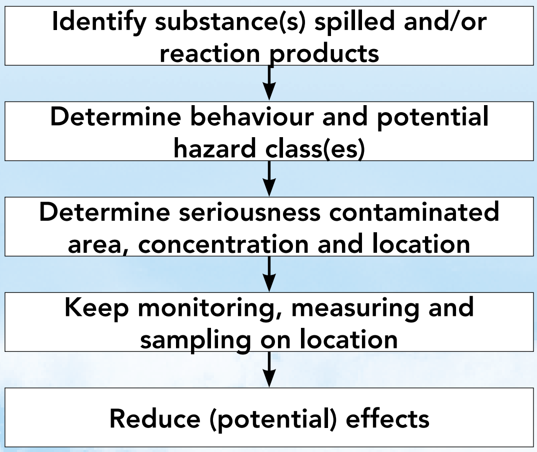


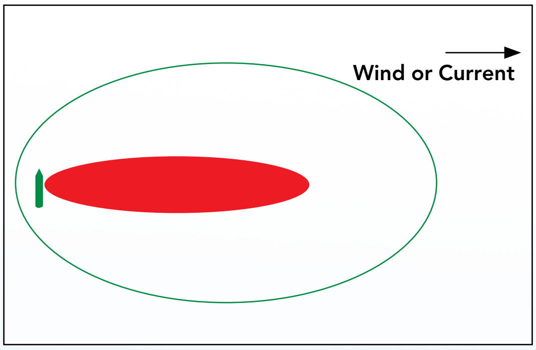
Figure 4.3 Flow diagram of general approach to spills involving HNS[15]

In undertaking a risk assessment it is also advisable to know the geographical scale or "risk area" that could be affected if a risk is not successfully responded to; for example the area around a vessel where explosion damage could extend to. In defining the risk area it should be noted that in some cases the risk area will move either with the vessel or, in the case of a release to air or water, with the direction and extent of a toxic HNS plume.

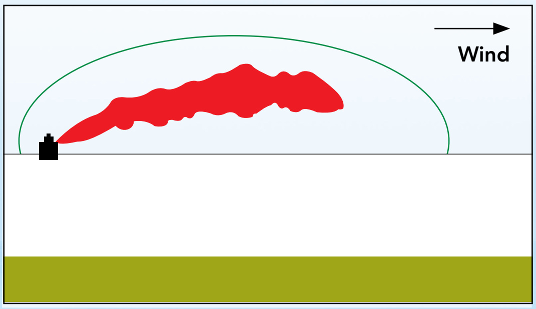
[15] *Bonn Agreement Counter Pollution Manual, Chapter 26: Hazardous Material Spills*

Wind, current and tide changes should be considered accordingly.

- HNS release to air/water (plan view)



- HNS release to air (side view)



- HNS release to water (side view)

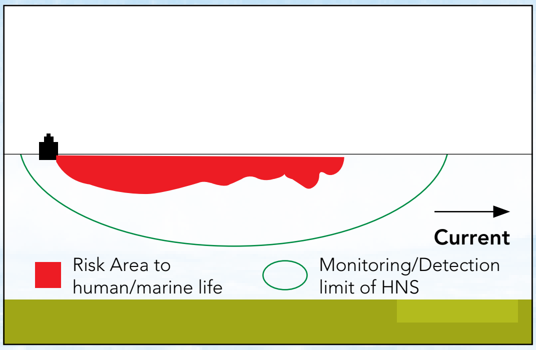


Figure 4.4 – Risk area with regard to an HNS release to air/water (See also HELCOM Response Manual, Volume 2 and REMPEC/RIS "Practical Guide for Marine Chemical Spills")

As part of the Agency's review of existing studies, manuals and databases regarding HNS transport in European waters, hazardous and noxious substances have been identified. Each of these substances will have specific hazards. If the OPRC-HNS Protocol 2000 definition[16] is taken as a starting point, HNS material can comprise:

- Refined products derived from oil,
- Other noxious or dangerous liquid substances,
- Liquefied gases,
- Gases,
- Solid bulk materials with chemical hazards,
- Liquids with flash points not exceeding 60°C, and
- Packaged dangerous, harmful and hazardous material.

From a response perspective, this list can be simplified to gas, liquid or solid released in bulk and/or released as packaged goods:

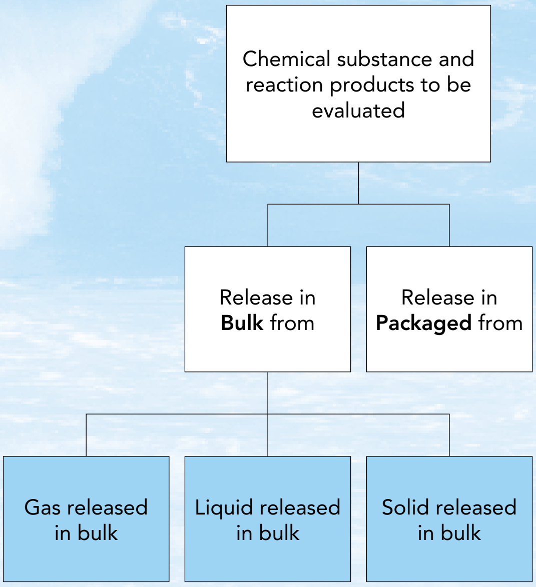


Figure 4.5 - Primary release forms of hazardous and noxious substances spilled in the marine environment[17]

[16] *A hazardous and noxious substance is defined as any substance other than oil which, if introduced into the marine environment is likely to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the Sea*

[17] *Bonn Agreement Counter Pollution Manual, Chapter 26: Hazardous Material Spills*

The Bonn Agreement has identified nine potential hazards that can occur when a substance enters the marine environment:

Potential hazards for humans and the marine environment	Behaviour category of HNS-release*	Human health	Marine enviroment
Toxicity by inhalation	G/E/F	X	
Explosiveness	G/E	X	
Flammability	G/E/F	X	
Radioactivity	G/E/F/D/S	X	X
Corrosiveness	G/E/F/D/S	X	X
Carcinogenicity	G/E/F/D/S	X	X
Aquatic toxicity	D/S		X
Bioaccumulation	D/S		X
Persistence	D/S		X

Table 4.6 - Potential hazards that can occur when an HNS enters the marine environment
(* Behaviour category: G = Gases; E = Evaporators; F = Floaters; D = Dissolvers and S = Sinkers)

4.4 SAFETY IMPACT

The physical fate can therefore determine the hazards posed by an HNS release. In the example of gases/evaporators with toxic (inhalation), flammable or explosive characteristics, the rate of evaporation combined with the total quantity evaporated and atmospheric dilution provides the resultant atmospheric concentration. This concentration relates to the potential toxicity of the substance, the concentration where there is an explosion hazard and/or flash point for flammability.

Similarly with those substances that act as dissolvers in sea water and have toxic properties (aquatic), hazards will be determined by the rate of dissolution, the total quantity dissolved and dilution by seawater with the resulting concentration determining the level of toxicity a substance has. The transition in concentration due to dilution from explosive, flammable and/or toxic to non-explosive, inflammable and non-toxic limits can therefore be used to determine the risk area around a vessel.

It should be noted that HNS can have a number of other potential safety hazards such as radiation, carcinogens, etc. Persistence in the marine environment can also play a factor, particularly in the case of sinkers and floaters, by greatly increasing a potential risk area when dilution has little or no effect in reducing the concentration. HNS incidents should also not be considered in isolation. The risk area due to fire, explosion or toxicity will determine the need for other response activities by Member States (e.g. evacuation of coastal populations, public warnings to seek shelter, etc.)[18]. Response organisations should also consider the potential for 'domino effects' i.e. where an HNS release could initiate another incident, such as a ship fire or explosion could damage and ignite a neighboring vessel, port facility, storage depot, refinery, etc.

4.5 ENVIRONMENTAL IMPACT

In addition to the toxicity hazards to humans, HNS material can have lethal effects on marine organisms. The toxicity of a substance is dependant on how large a dose is required to

[18] *REMPEC/Regional Information System, Part D - Operational Guides and Technical Manuals-Section 12, Practical Guide for Marine Chemical Spills, January 2000 (Section 2)*

Some containers lost at sea from the MSC Napoli *were washed ashore (January 2007).*

kill an organism, the more toxic a substance the smaller the dose required.

Incidents involving releases to marine waters have the benefit of sea and air dilution, to reduce the concentration of a substance to below a lethal dose. However, it should be remembered that lower doses can produce sublethal effects to marine organisms over a wider area. Sublethal effects may produce some form of impairment which may be detrimental to individual organisms, species, populations or marine communities over a longer term, depending upon the persistence of the released HNS in the marine environment. The stress induced by sublethal effects will reduce the ability of marine organisms to survive. Such effects include damage to fins, pre-cancerous growths, damage to internal organs, skeletal deformities and/or reduction in reproductive success. Effects may not be readily detectible in individuals but could cause changes in the community structure of a marine area impacted by an HNS incident.

Where not directly toxic some forms of HNS material can damage the marine ecosystems by causing changes in the environment. Such changes include variation in salinity and pH, together with deoxygenation when material is broken down or used biologically in the marine environment (e.g. palm oil, fertilisers, etc). Changes in environmental conditions can induce lethal effects in marine ecosystems. However, it should be noted firstly, that such effects can be limited to the wreck site and immediate dilution area. Secondly, the significance of such effects is dependant on the location of the incident; for example, changes in salinity and oxygen content in an estuarine or already polluted area may have little impact due to the natural tolerance of the resident marine community, whereas there may be a greater effect on pristine reef communities.

Biologically inert material which does not have a toxic or environmental effect may have an impact due to smothering or by changing the physical nature of an area (e.g. a sinker settling over a bottom, resulting in a change to the habitat of the benthic ecosystem). This is also likely to be limited to the immediate area of the incident site, although currents can redistribute HNS material.

As stated, the toxicity of a substance can be mitigated by dilution, with impacts to marine communities limited to a specific area. However, the characteristics of some HNS material, particularly some metals and organic chemical compounds, can result in its incorporation into biological pathways, resulting in detrimental impacts over a much wider area, even to a global scale. Such material is known as a 'conservative pollutant', a substance that cannot be broken down by bacterial processes and is effectively a permanent addition to the marine environment.

These impacts are dependant on if a substance can be readily taken up by an organism through direct exposure or ingestion of contaminated food, i.e. is the substance bioavailable. If the pollutant cannot be readily excreted, it will simply be added to over the life span of the organism (it bioaccumulates). The accumulated dose can induce sublethal and lethal effects within contaminated organisms leading to species and community declines. However, the bioavailable nature of the pollutant means that animals which feed on bioaccumulating species may in turn acquire an even greater body burden. This is known as biomagnifications, and sublethal and lethal effects of this process can be detected in the top predators of marine communities, such as fish, birds, marine mammals and, significantly, humans.

4.6 SOCIOECONOMIC IMPACT

Sublethal effects can reduce the commercial value of marine resources, e.g. fin erosion, skeletal deformities, growths, etc. on marketed fish. There may also be tainting issues similar to oil pollution.

Contamination of an area may reduce its amenity value for economic drivers such as tourism, for example through the pollution of amenity beaches and bathing/recreation waters.

Toxicity, particularly with respect to contamination of commercial fish and shellfish by a bioaccumulating substance may lead to the closure of fishing and aquaculture areas.

There is also the impact of 'public perception', whereby the impact of an incident can be magnified if public opinion considers the area is not safe to visit or consumer products (e.g. fish, shellfish, etc) from the location are polluted.

4.7 HNS CHARACTERISTICS AND MONITORING

The impact an HNS incident can have on safety, the environment and socioeconomic resources is dependent upon the characteristics of the substance which determine its

Fire broke out on board the containership Ever Decent *after the collision with the passenger ship* Norwegian Dream *in August 1999. The* Ever Decent *was carrying paint, paint hardeners and cyanide among its cargo.*

behaviour in the marine environment. Extensive work has been undertaken for the international conventions to identify the hazards associated with HNS material and classify the potential safety, health and environmental risks, notably the work of GESAMP. The revised Hazard Evaluation Procedure, developed by GESAMP[19] (see table 4.7 below), provides a set of criteria for evaluating the hazards of chemical substances which enter the marine environment through operational discharges, accidental spillages or loss overboard from vessels. The hazard evaluation procedure is linked to the implementation of UECD, Agenda 21, Chapter 29, "Environmentally Sound Management of Toxic Chemicals and Annex II of MARPOL concerning the transport of bulk liquid substances by ship".

The hazard evaluation procedure provides an assessment of the chemical carried by ship with relation to the protection of the marine environment, and safeguarding personnel at sea and people using coastal amenities. A substance will be rated in 13 different categories (A1 - E3). Each category represents an environmental or human health effect, as described in table 4.7.

[19] *The Revised GESAMP Hazard Evaluation Procedure for Chemical Substances Carried by Ships, IMO/FAO/UNESCO±IOC/WMO/WHO/IAEA/UN/UNEP, Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), GESAMP Reports and Studies No. 64*

The Revised GESAMP hazard evaluation procedure

Columns A & B — Aquatic environment					
Numerical Rating	**A** **Bioaccumulation and Biodegradation**			**B** **Aquatic Toxicity**	
	A 1 Bioaccumulation		**A 2** Biodegradation	**B 1** Acute Toxicity	**B 2** Chronic Toxicity
	log Pow	BCF		$LC/EC/IC_{50}$ (mg/l)	NOEC (mg/l)
0	<1 or > ca. 7	not measurable	**R**: readily biodegradable **NR**: not readily biodegradable	>1000	>1
1	≥1 - <2	≥1 - <10		>100 - ≤1000	>0.1 - ≤1
2	≥2 - <3	≥10 - <100		>10 - ≤100	>0.01 - ≤0.1
3	≥3 - <4	≥100 - <500		>1 - ≤10	>0.001 - ≤0.01
4	≥4 -<5	≥500 - <4000		>0.1 - ≤1	<0.001
5	≥5	≥4000		>0.01 - ≤0.1	
6				<0.01	

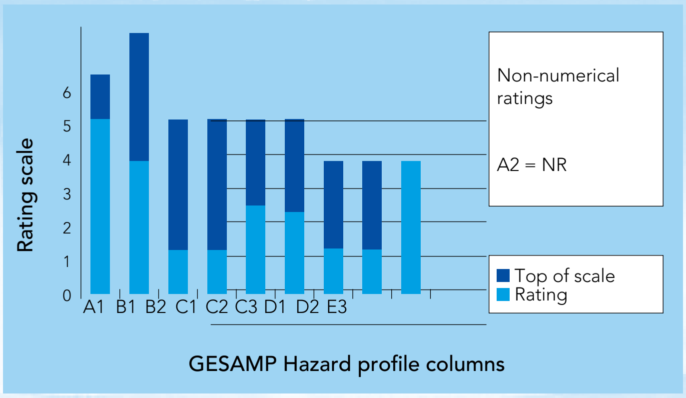
Columns C & D — Human Health (Toxic Effects to Mammals)						
Numerical Rating	**C** **Acute Mammalian Toxicity**			**D** **Irritation, Corrosion & Long term health effects**		
	C 1 Oral Toxicity LD_{50} (mg/kg)	**C 2** Dermal Toxicity LD_{50} (mg/kg)	**C 3** Inhalation Toxicity LC_{50} (mg/l)	**D 1** Skin irritation & corrosion	**D 2** Eye irritation & corrosion	**D3** Long-term health effects
0	>2000	>2000	>20	not irritating	not irritating	**C** – Carcinogen **M** – Mutagenic **R** – Reprotoxic **S** – Sensitising **A** – Aspiration haz. **T** – Target organ systemic toxicity **L** – Lung injury **N** – Neurotoxic **I** – Immunotoxic
1	>300 - ≤2000	>1000 - ≤2000	>10 - ≤20	mildly irritating	mildly irritating	
2	>50 - ≤300	>200 - ≤1000	>2 - ≤10	irritating	irritating	
3	>5 - ≤50	>50 - ≤200	>0.5 - ≤2	severely irritating or corrosive **3A** Corr. (≤4hr) **3B** Corr. (≤1hr) **3C** Corr. (≤3m)	severely irritating	
4	≤5	≤50	≤0.5			

Column E — Interference with other uses of the sea			
E 1 Tainting	**E 2** Physical effects on Wildlife & benthic habitats	**Numerical rating**	**E 3** Interference with Coastal Amenities
NT: not tainting (tested) **T**: tainting test positive	Fp: Persistent Floater F: Floater S: Sinking Substances	**0**	no interference ***no warning***
		1	slightly objectionable ***warning, no closure of amenity***
		2	moderately objectionable ***possible closure of amenity***
		3	highly objectionable ***closure of amenity***

Table 4.7 – The revised GESAMP hazard evaluation procedure

A hazard profile for a given substance X is illustrated in figure 4.8, where the rating within each category shows that the substance in question:

- has a high potential to bioaccumulate in aquatic organisms (A1);
- is not readily biodegradable (A2);
- has a moderate acute and a low chronic aquatic toxicity (B1 & B2);
- has a low oral, moderate dermal and a moderate inhalation toxicity to mammals (C1 - C3);
- is mildly irritating to skin and eye (D1 & D2);
- is potentially carcinogenic (D3);
- is not liable to taint seafood (E1);
- is a floating substance liable to form persistent slicks on the water surface (E2);
- forms a significant physical hazard to onshore and offshore amenities (E3).



A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3
4	NR	3	1	1	2	2	1	1	C	0	Fp	3

Figure 4.8 - Graphical and tabular illustrations of a GESAMP hazard profile for a given substance X.

Monitoring of HNS incidents can be developed to meet short term response requirements and long term public health and environmental assessments. It is important to have detailed understanding of the HNS material involved in an incident when developing an appropriate monitoring regime. For example materials which have a direct, toxic and flammable or explosion risk dependant on the substances concentration in air or water could be monitored during an incident, through air and water sampling.

Materials with bioaccumulative characteristics or persistent toxic effects in marine ecosystems, particularly at low concentrations may require long term monitoring regimes based upon sampling of marine sediments and sentinel organisms (e.g. marine invertebrates-worms, shellfish, etc), similar to studies undertaken by Member States following oil spills.

4.8 POTENTIAL HNS POLLUTION IMPACTS AND EMSA ACTIVITIES

Section 4 has reviewed existing information concerning factors determining the impact of HNS on safety, the environment and socioeconomic resources. The following issues could influence the Agency's future activities:

- HNS differs from oil pollution in having a range of potential pathways or fate once released into the marine environment;
- Responder and public safety risks associated with HNS can be potentially more

severe than with oil;

- Selection of the appropriate response option requires detailed knowledge of HNS hazards, HNS characteristics, how HNS reacts following its release and a substances' eventual behaviour in the marine environment, and;
- In order to provide a clear picture of how HNS moves through the environment following a release and its potential safety, socioeconomic and environmental implications, monitoring and modelling tools can be used to assist responders and decision makers.

EMSA actions could be developed to ensure Member States receive information, when required, about the potential fate and associated impacts if HNS is released to the marine environment by an incident.

HNS response training exercise.

5 Past Incidents, Response Options and Case Studies

5.1 PAST INCIDENTS INVOLVING HNS

As part of EMSA's preparatory activities for this Action Plan, existing sources of information[20] were reviewed to develop statistics concerning HNS incidents in European waters. Approximately one hundred incidents were identified from 1987 to 2006. These incidents in European waters include those that resulted in an HNS release to the marine environment and those that did not. Caution should be applied to the statistics concerning total incidents due to the variability in reporting incidents across Europe which did not result in an HNS release.

Figure 5.1 shows the principle cause of release/non-release incidents involving vessels carrying HNS in European waters, however, it should be noted that there may be a number of unrecorded incidents.

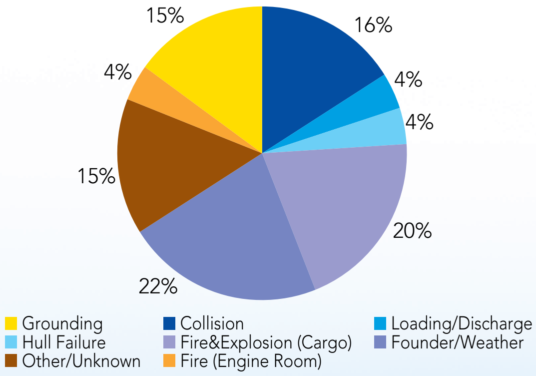


Figure 5.1 – Causes of HNS incidents

This indicates that the principle causes of release and non-release incidents involve foundering and weather (e.g. damage to ship, vessel sinking or loss of cargo overboard) (22%), fire or explosion in cargo areas (20%), collision (16%) and grounding (15%). Figures 5.2 and 5.3 show that the majority of release and non-release incidents involved single cargos (74%) of material carried in bulk form (63%).

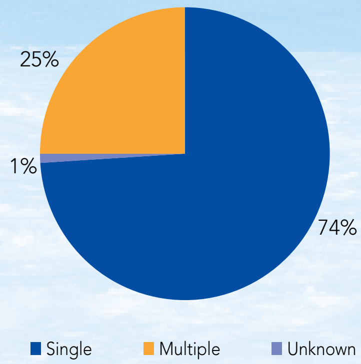


Figure 5.2 - Single or multiple cargoes involved in incidents

[20]*Casualty information sources:*
- *REMPEC (RIS-Regional Information System): Part C – Section 2: "List of alerts and accidents in the Mediterranean", List B: "Accidents reported to REMPEC between 1988-2003, which caused or might have caused pollution of the Mediterranean Sea by hazardous and noxious substances (HNS) other than oil, where a HNS is a substance that has the probability and the potential to cause damage or injury to human life and/or the environment" (http://www.rempec.org/ris.asp)*
- *HELCOM Response Manual Vol.2: "Response to accidents at sea involving spills of hazardous substances and loss of packaged dangerous goods" - Annex 3: "Case histories of marine chemical accidents" (http://www.coastguard.se/ra/volume2/annexes/annex3.htm)*
- *Bonn Agreement website: "Chemical spills at sea- case studies" (http://www.bonnagreement.org/eng/html/recent-incidents/chemical_spills.htm)*
- *CEDRE website: Database of chemical spills (http://www.cedre.fr)*
- *Report on incidents involving HNS (submitted by the UK for the 85th session of the IMO Legal Committee): "Monitoring implementation of the HNS Convention: Report on incidents involving HNS" (http://folk.uio.no/erikro/WWW/HNS/INF-2.pdf)*
- *Lloyds List Casualties Reports (via the EMSA daily news updates 2005-2006)*
- *Investigation reports from the UK Marine Accident Investigation Branch (MAIB) website (http://www.maib.gov.uk/publications/investigation_reports.cfm)*

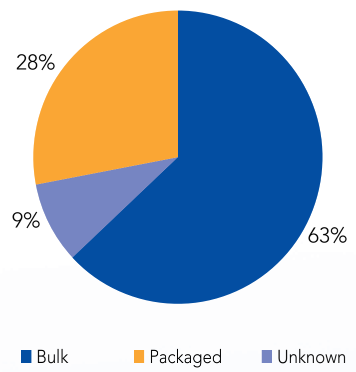


Figure 5.3 - Types of HNS cargo involved in incidents

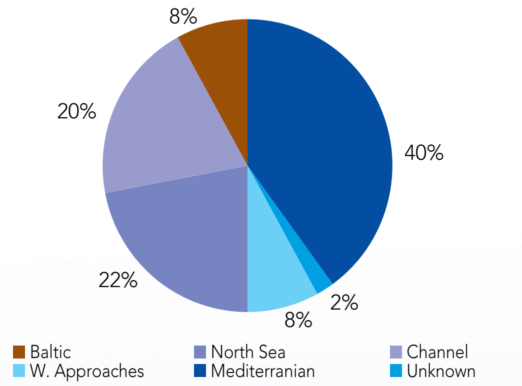


Figure 5.5 - Regions where HNS incidents that led to releases took place

From the incidents identified, almost half of these resulted in an HNS release (figure 5.4).

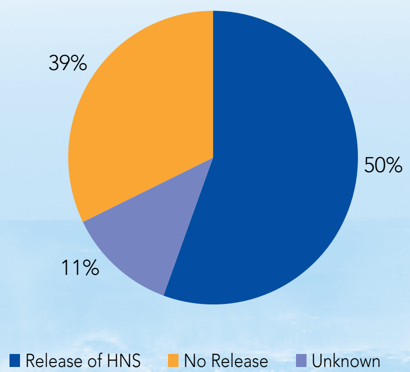


Figure 5.4 – Part of HNS incidents that led to a release

There is more confidence with regard to statistics concerning incidents which resulted in HNS release, due to better recording of information. Of the incidents which resulted in a release, the majority were in the Mediterranean Sea (40%), North Sea (22%) and Channel (20%) areas. It should, however, be noted that all European waters have an underlying rate of incidents (i.e. Baltic Sea 8% and Western Approaches to the Channel also at 8%), as indicated in figure 5.5.

The cause of the incident which led to the HNS release is detailed in figure 5.6. Once again foundering and weather appear to be the principle cause of incidents resulting in HNS releases (34%), with fire or explosion in cargo areas (18%), collision (14%) and grounding (10%) being the main identified causes. However, unknown factors (14%) are recorded and there may be a need for further research to identify the causes of these incidents and associated HNS releases.

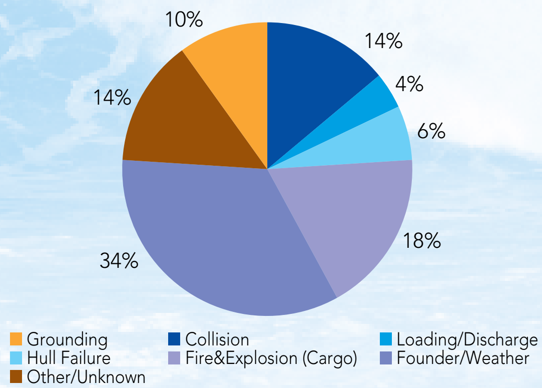


Figure 5.6 – Causes of the HNS incidents that led to a release

Figures 5.7 and 5.8 show that the majority of incidents which resulted in an HNS release involved single cargos (78%) of materials in bulk form (61%)

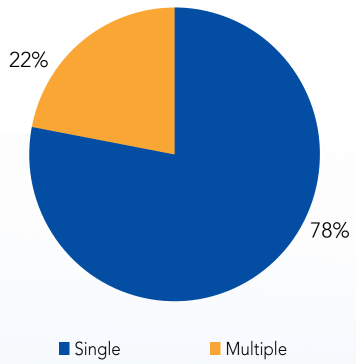


Figure 5.7 - Single or multiple cargoes involved in incidents that led to a release

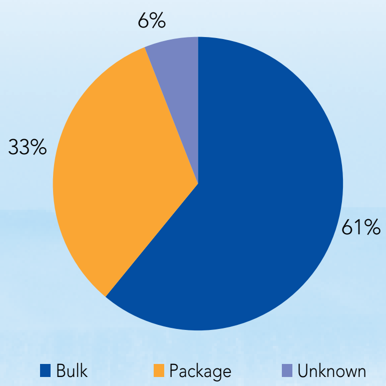


Figure 5.8 - Types of HNS cargo involved in incidents that led to a release

From the analysis of statistics for HNS incidents, the following conclusions can be made:

- HNS incidents have occurred in all European waters;
- The majority of incidents have occurred within the North Sea, Channel and Mediterranean Sea, probably as a reflection of the volume of HNS trade in these areas;
- The principle causes of HNS incidents have been foundering and weather, fire and explosion in cargo areas, collision and grounding, and;
- The majority of HNS incidents involve single consignments of cargo carried in bulk form.

5.2 HNS RELEASE RESPONSE OPTIONS

Marine pollution caused by HNS differs from oil pollution in having a range of potential fate and behaviour once released into the marine environment. Responder and public safety risks and impacts associated with HNS can be potentially more severe than with oil. The selection of the appropriate response option(s) to an HNS incident requires detailed knowledge of the involved substance's physical and chemical properties. Compared to oil, different specialised knowledge and operational expertise are required for an effective response to HNS marine pollution.

HNS incidents, in common with all marine incidents, require that human safety should have the highest priority. However, this requirement is not only restricted to SAR (Search and Rescue) operations for the crew of a marine casualty. The risks posed by some HNS can also imperil responders and the public. It is therefore strongly recommended that, apart from isolating the vessel, no other response action should be undertaken until a risk assessment has been carried out. The environmental impact and damage to socio-economic resources (fisheries, aquaculture, tourism, etc.) with some substances can also be more far reaching than with oil. Therefore, risk assessment should consider these issues.

In general, response options can be grouped into two categories.

- Firstly, *onboard actions*, to safeguard the crew, vessel and cargo. This can involve salvage activity to contain the HNS, controlled releases, using knockdown/sprinkler systems, etc. The operational response with onboard actions is designed to prevent, stop or contain an HNS release incident. It will require the affected Member State(s) to decide which specialised and experienced personnel and equipment it will deploy, usually from the competent national authorities in charge for marine pollution (operational responders);
- Secondly, *off ship risk area actions* to safeguard responders, the public, resources, facilities etc., within the area that may be impacted by an HNS release. Risk area actions include: public evacuation, closure of recreational areas, fishing restrictions, etc. The response within the risk area requires detailed procedures to be in place when an HNS incident poses a risk but cannot be prevented, stopped or contained; such actions touch upon civil safety issues and it is up to the affected Member State to decide how to proceed with implementing the appropriate actions.

HNS response to vessel incidents can have one advantage to similar industrial incidents onshore. That is the ability (provided the vessel is not grounded or sunk), to tow a marine casualty carrying HNS to a less vulnerable area away from centers of population, other vessels, onshore facilities or sensitive ecosystems and resources.

Within the Regional Agreement framework (Bonn Agreement, HELCOM and REMPEC) significant work has been undertaken in identifying appropriate response options. Each has produced a manual for responders, which are valuable source documents concerning not only response options but the process which should be adopted during contingency planning and operational phases of HNS response. In addition, IPIECA will publish a guidance document concerning *Planning and Response to Chemical Releases in the Marine Environment.*

The follwing table provides examples of HNS response options.

Examples of HNS Release Response Options

Response Option	HNS Type	Description
Changing position of vessel	Toxic gas or smoke plume	Change vessel position with regard to wind direction so that plume moves away from windward areas, e.g. boarding area for response crew
Towing vessel to less vulnerable area	HNS has risk area capable of wide area impact	Due to explosion or toxic cloud risk near centre of population or if cargo is a marine pollutant within/ or adjacent to a sensitive site, the vessel is towed to remove centre of population & environmental resources from potential risk area, depending on HNS type
Ship to Ship Transfer (Packaged)	Packaged goods	Packaged cargo removed from casualty; requires vessel equipped with lifting gear derricks etc, or third specialist salvage platform with similar capability
Ship to Ship Transfer (Bulk)	Normally bulk liquid cargoes	Bulk cargo removed from casualty into vessel alongside, in-line with OCIMF guidance
Controlled release with dilution	Gas, evaporator or dissolver which is not an environmental pollutant	Intentional release of ship's cargo to reduce risk of loosing vessel or entire cargo (e.g. refloating, reducing list, reducing pressure in damaged cargo tanks, fire prevention, etc). HNS is diluted by air (gas/ evaporator) or water (dissolver)
Controlled release with sprinkler system (knockdown)	Gas	As above, with incorporation of a sprinkler system to produce water air combination that reduces concentration and scrubs material from air due to entrapment of material in water droplets
Destruction of ship and/or cargo	Evaporators, gas, dissolvers. (Floaters or sinkers, only if can be destroyed by action)	By destroying the source of risk, the problem may be removed; however, a careful assessment of risk is required to ensure this action does not lead to more serious risks to human health or the environment. This response option should only be used if absolutely necessary
Monitoring, survey and inspection	Floaters, floating packages, sinkers and wreck/ casualty	Floating packages and bulk floaters may be observed using aerial surveillance; remote sensing systems used for oil spills may also be able to detect floating HNS spills. Drifter buoys with transponders can be deployed within surface spill to mark drift pattern. Remote Operated Vehicles (ROVs) and diver skilled eyed surveys (where safe to do so) can be used to monitor wreck sites or sunken packaged HNS (containers, etc)
Use of oil spill response techniques	Floaters	Equipment commonly deployed for oil spills may be useful for HNS with similar properties to oil, allowing the deployment of booms, skimmers, etc. However, care should be taken to undertake a risk assessment due to the potentially more hazardous nature of HNS when compared with oil
Neutralisation	Acids or bases	Apply acid or base to a spill to form a neutral base, although care should be taken not to overdose, leading to a substance more acidic (low pH) or alkaline (high pH) than the original spill
Airlift dredge	Sinkers	Pneumatic dredge used to remove sinker/ contaminated sediment; material must be capable of transport through pipe work. Some dredges can be operated by diver however care must be taken not to expose the diver to contamination
Capping	Sinkers	Use of inert material, i.e. clean sediment, to overlay contaminated material/sinkers; HNS is then sealed and not available to environment

Table 5.9 – Examples of response options to HNS releases

5.3 CASE STUDIES

The following case studies[21] have been identified as providing examples of HNS incidents and potential response options. Where possible, these have been grouped according to HNS type.

Evaporators/Gases: *Val Rosandra*

The gas carrier *Val Rosandra* was discharging propylene at the port of Brindisi (Italy) on the night of 28 April 1990, when a fire was discovered between the compressor and no. 3 cargo tank. Attempts to extinguish the fire by the ship's crew were unsuccessful, and it was decided to tow the vessel 10 km off shore for safety reasons. Fire vessels doused the *Val Rosandra* from a distance of 300 meters. Salvage attempts were undertaken for the next three weeks. It was then decided that the safest course of action was to undertake a controlled rupture of the cargo tanks and burn off the propylene.

On 15 May 1990, the vessel was towed approximately 50 km off shore and a maritime safety zone of 12 mile radius and 6,000 meters height was established. Four intact cargo tanks with 1,800 tonnes of propylene were ruptured and burned off using explosives. Later, the bunker was also ruptured and burnt off. No injury or environmental damage was reported.

Floaters: *Allegra*

Following a collision, the tanker *Allegra* spilled 900 tonnes of palm oil in the English Channel on 1 October 1997. Following the accident, the spilled oil quickly solidified to form a slick 800 by 400 metres. This then spread over an area of 20 km by 4 km. The slick came ashore in 5 to 50 cm diameter margarine-like balls in the Channel Islands and on the Cotentin Peninsula (Normandy, France).

Whilst at sea, it was possible to track the slick using aircraft equipped with Sideways Looking Airborne Radar (SLAR), a technique commonly employed for oil slick tracking. The palm oil slick was assessed as not being a risk to the marine environment, but could have an adverse impact upon recreational areas and bathing beaches.

Dissolvers: *Alessandro Primo*

On 1 February 1991, the chemical carrier *Alessandro Primo* sank 16 km of the Adriatic coast of Italy at a depth of 110 metres. Onboard was a cargo of acrylonitrile and ethylene dichloride. Both chemicals are flammable and toxic marine pollutants with dissolving characteristics.

Initially, an *off ship risk area* response was adopted, with a ten mile radius exclusion zone established and monitoring of water samples from around the wreck. A week following the incident traces of acrylonitrile were detected and survey of the wreck by ROV confirmed evidence of a leak from the wreck.

[21] *See previous footnote Nr. 20 for the sources of information used for these case studies*

It was decided to stop the leak and recover the cargo from the vessel. The leak was stopped by the end of February, and recovery operations began in April. Most of the remaining cargo was removed from the wreck using a pontoon and depot ship.

Dissolvers: *Frank Michael*

The *Frank Michael*, a dry bulk carrier, ran aground north of the island of Gotland in the Baltic Sea on 10 October 1993. The vessel was carrying 1,100 tonnes of monoammonium phosphate, a non-toxic solid fertiliser, but with the potential to cause deoxygenation of marine waters as it acts as a nutrient for algae.

Responsible agencies discussed the risks posed by the vessel in order to determine an appropriate response. It was decided that: since the Baltic Sea already received inputs of similar chemicals in higher orders of magnitude, the time of year was not suitable for algal blooms and water turnover would dilute and disperse any spilled cargo, an off ship risk area response was adopted. This involved monitoring the release of the phosphate into the sea.

Multiple HNS: *Ievoli Sun*

On 31 October 2001, the chemical tanker *Ievoli Sun* sank in the English Channel. Prior to the sinking the crew of 14 were successfully evacuated by helicopter. Onboard the vessel was a cargo of styrene, isopropyl alcohol (IPA) and methyl ethyl ketone (MEK). In addition, the vessel also had a quantity of intermediate fuel oil, gas oil and lubricants onboard.

The 2001 sinking of the Ievoli Sun *in the Channel Islands, UK, after taking on water in heavy weather. The vessel was carrying styrene, isopropyl alcohol, and methyl ethyl ketone as well as intermediate fuel oil, gas oil, and lubricants.*

Pollution response to the incident was co-ordinated by the French authorities, with assistance from the UK. It was assessed by scientists from both countries that the MEK and IPA posed no threat to the marine environment. In the case of styrene, however, it was assessed that the substance, a known carcinogen, posed a threat to the environment. The intermediate fuel and gas oils onboard also posed a pollution risk.

The authorities enacted a pollution response comprising daily surveillance flights to monitor slicks from the vessel. Counter pollution vessels from France, Germany and the UK were also deployed. A salvage operation took place, involving ROVs to penetrate both the outer and inner hulls of the wreck to allow the removal of the chemicals. This operation was hampered by bad weather.

The MEK and IPA were removed by a controlled release from the wreck, the chemicals dispersing into the water column. The styrene and oil were removed to the salvage vessel. Salvage operations were undertaken over a prolonged period, finishing in June 2002.

Public evacuation: *Multitank Ascania*

Fire broke out in the boiler room of the chemical tanker *Multitank Ascania* as she passed through the Pentland Firth, between Scotland and Orkney in the northern North Sea (19 March 1999). The vessel's engine was stopped whilst the crew attempted to extinguish the fire. The vessel began to drift in severe weather conditions, with wind blowing to gale force winds and rough seas.

Onboard, the vessel carried 70 tonnes of heavy fuel oil and 20 tonnes of diesel oil, with a cargo of 1,750 tonnes of vinyl acetate. The UK authorities were notified and immediately coordinated a search and rescue effort consisting of an RAF helicopter, local lifeboats, a coastguard rescue helicopter, a harbour tug and a coastguard emergency towing vessel. All crew except the master were airlifted to safety. The UK's MCA were alerted to a pollution risk from the vessel's cargo, together with fuel oil and diesel which was onboard. An eight person chemical strike team was formed and flew to the area, with a second aircraft being chartered to fly response equipment to the scene.

The main risk posed by the incident was that of explosion due to the fire igniting the vinyl acetate cargo, and any ensuing pollution. Chemical spill modelling was used to predict the extent of a risk area, in the event that the chemical be released into the atmosphere. A decision was taken to implement a 5 km exclusion zone around the vessel. The local police force also considered it necessary to evacuate 600 local residents from their homes.

The master was able to release one anchor before being lifted to safety. This prevented the vessel from grounding. Thermal imaging from cameras onboard the coastguard helicopter were also used to monitor the intensity of the heat and once it was considered safe for salvors to board the vessel, the vessel was towed to Scapa Flow, Orkney. An assessment of damage was made and the chemical tanker lightened off its cargo to another vessel[22].

Long term risk: *Richard Montgomery*

The SS *Richard Montgomery* was an American Liberty ship built during World War II. The vessel was wrecked off in the Thames estuary, UK in 1944 whilst carrying 6,127 tonnes of munitions. These included general purpose 250 lb (113 kg) bombs, fragmenting bombs, semi-armour-piercing bombs, fuses, phosphorus bombs, 100 lb (45 kg) demolition bombs and small arms ammunition. Following salvage operations, it is thought that around 1,500 tonnes of explosives remain on board. These continue to pose a risk to the area. Concerns about the risk the wreck poses, stem from incidents such as the explosion on the wreck of the Kielce in July 1967 during salvage operations to neutralise on board ordinance.

Although not strictly HNS, the wreck provides an example of a long term risk with an extensive potential risk area. The wreck has an exclusion area around it monitored by radar. The UK Maritime and Coastguard Agency (MCA) and its contractors monitor the wreck site. The MCA have indicated that no explosions occurred when the ship grounded or during the subsequent salvage operation and none have occurred since. It is probable that some of the munitions remaining on board are still capable of detonation but the likelihood of a major explosion is remote. Experts have consistently advised that the best way to keep the risk to an absolute minimum is to leave the wreck alone. The site is therefore designated a prohibited area under the Protection of Wrecks Act 1973. Whilst the risk of a major explosion is remote, it is considered prudent to monitor regularly the condition of the wreck. Therefore routine surveys have been undertaken to assess the condition of the wreck and to check for any new signs of possible danger[23].

5.4 CASE STUDIES, RESPONSE OPTIONS AND EMSA ACTIVITIES

Section 5 has reviewed case studies and possible response options to HNS incidents. The following issues could influence the Agency's future activities:

- Casualty statistics have been developed by EMSA, based on the available and reported information, concerning incidents involving HNS in EU waters. This demonstrates that the majority of incidents involve the bulk transport of HNS;
- HNS incidents have occurred in all EU maritime regions, with the highest concentrations in the Mediterranean Sea,

[22] *Report on incidents involving the carriage of hazardous and noxious substances (HNS) by sea, UK Department of Transport, August 2002*
[23] *A Survey Of The Wreck Of The SS Richard Montgomery, A SUMMARY REPORT, The Maritime and Coastguard Agency, June 1998*

North Sea and Channel;

- Case studies indicate that two general options for HNS incident response can be adopted, *onboard* and *risk area* actions. The selection of the appropriate response by the affected Member State should be based on a risk assessment of the incident;
- The operational response with onboard actions is designed to prevent, stop or contain an incident. It will require the deployment of trained responders and specialist equipment;
- The response within the risk area requires detailed procedures to be in place to safeguard responders and the public, if an incident poses a risk but cannot be prevented, stopped or contained, and;
- Actions undertaken either onboard a vessel or within the surrounding risk area are operational decisions and tasks under the sole responsibility of the affected Member State(s) and should be based upon a risk assessment which considers the HNS material involved, identification of appropriate response techniques and available resources. It requires specialist knowledge of HNS characteristics and potential response options.

EMSA actions should be developed to assist Member States undertake a convergent and effective implementation of risk assessment methodology, and ensure that Member States have timely access to HNS specialist knowledge, expertise and information concerning response techniques and resources across the EU.

More specifically:

- Risk assessment and selection of appropriate response options falls within the remit of the Member State. EMSA could assist Member States by providing information to support the initial risk assessment (i.e. the properties of different HNS) linked to a list of response options, consolidating existing information from the Regional Agreements and other sources into one manual/guiding document.
- Casualty statistics indicate that there are specific areas of maritime safety which could provide focus to EMSA actions.
- Several databases of varying quality concerning the characteristics of HNS exist at different levels and in different languages. Member State risk assessment and resulting response options could be greatly aided by access to one central coherent database and decision-support system.
- Modelling and monitoring support tools linked to a coherent database could prove a valuable asset to helping Member States during incidents.

6 Member States Activities

6.1 INTRODUCTION

World maritime transport of hazardous and noxious substances has increased significantly in the last few decades, including transportation to, from and within European waters. There is a growing awareness within EU Member States of the need to respond safely and effectively to marine pollution incidents involving the release of HNS.

As demonstrated in the previous section, incidents involving the threat of or the actual release of HNS into the marine environment have happened in all European waters. Such incidents are challenging from an operational perspective due to the broad range of materials that could be released in the marine environment, their fate and the technically limited options available to intervene and respond to such releases. Response to HNS incidents requires specialised and trained personnel and equipment. Appropriately, the primary concern in such incidents is to safeguard the public and the health and safety of the responders and marine environmental protection.

Continuous work is being done in Europe to improve safety, preparedness and response structures in the field of HNS marine pollution. The existing pollution response structures and contingency plans at national and regional levels are well developed to respond to oil spills, but further work needs to be undertaken regarding HNS incidents. Part(s) of those existing national structures for oil spills are also used for responding to HNS incidents, as certain organisational/administrative procedures are the same. The main differences in responding to HNS incidents, compared to oil spills, are the associated hazards and risks for the responders (specialised, experienced personnel are needed) and general public (health hazards), the behaviour and fate of the HNS when released in the marine environment, as well as the possible and available detection, monitoring and response/recovery options and techniques.

The OPRC-HNS Protocol 2000 will require from the countries which will have ratified it to establish measures for dealing with pollution incidents, either nationally or in cooperation with other countries. This new international framework is expected to affect and/or encourage future developments within the Member States regarding their policies and their operational response capacity to HNS marine pollution.

In the countries with HNS pollution response capacity and structures already in place, response to marine incidents involving HNS is usually dealt with by the relevant maritime administrations or the coastguard, in cooperation with the civil protection units. These include specially trained fire brigade departments with protective clothing and HNS intervention equipment and devices. Other actors that may be involved at Member State level in responding to an HNS release incident at sea may include the Navy, Search and Rescue Teams, the Military and private resources or specialised contracted response personnel (salvage companies).

Based on the Agency's existing available information[24] at the time of writing, the situation regarding HNS pollution preparedness and response varies among the EU Member States as follows:

- In many Member States, the established national contingency plans cover marine pollution both from oil and HNS. Similar administrative and operational structures and arrangements are in place for both types of marine pollution;

- The tiered emergency levels of marine pollution response (tier 1, tier 2, tier 3 response levels) apply for both oil and HNS incidents;

- The level of preparedness to a significant HNS incident varies widely among the Member States, and many countries do not consider themselves operationally ready to adequately respond to such an HNS incident;

- The operational response capacity (specialised equipment and vessels) to HNS incidents varies among the Member States as follows:

➢ No response capacity - Some Member States do not have any means or equipment to respond to marine HNS incidents and would therefore seek the assistance of neighbouring countries, regional assistance or contract private experts and specialised resources;

➢ Limited response capacity – Some Member States have limited pollution response capacity only for recovery of undamaged packaged goods (drums and containers) or for HNS releases with chemical and physical properties similar to oil (floating pollutants which are compatible with existing oil pollution response equipment);

➢ Specialised capacity: Few Member States have specialised vessels with the technical specifications required and the equipment on board or in stockpiles to respond to releases of HNS in the marine environment. Examples of such vessels are gas-tight multipurpose vessels/tugs and border guard vessels. Such specialised vessels are usually capable to operate in hazardous atmosphere (have gas detection sensors, special airfilters, airproof/overpressure capability), and can be used for the lightering of bulk chemicals or for discharging/recovering packaged chemicals and/or firefighting. They may also have onboard HNS monitoring, detection, recovery and storage devices or other specialised equipment (such as protective suits for intervention in

[24] *Information sources include: European Commission CIS website, Member States presentations to the "EMSA Workshop on Ship Sourced Chemical Pollution" (Brussels, 2006), Member States answers to the "EMSA Questionnaire on Contingency Planning" (2005)*

toxic atmosphere, containers for leaking barrels), or can easily deploy such equipment from pre-defined national stockpiles.

- Most Member States have limited experience in dealing with HNS incidents. They do not possess the required incident related experience or knowledge of the behaviour of HNS in the marine environment to respond to significant and/or complex (multiple cargo) HNS incidents;

- Few Member States undertake regular training sessions and hold operational exercises specifically on HNS marine pollution response, and when done, this is mainly within a regional or sub-regional framework.

6.2 EMSA INVENTORY OF MEMBER STATES HNS POLLUTION RESPONSE CAPACITY

As mentioned above, only few Member States currently have the operational capacity (specialised equipment, trained and experienced personnel and specialised vessels) to respond to releases and/or spillages of HNS in the marine environment. In addition, the level of preparedness and response to HNS marine incidents greatly varies among the individual countries.

According to the Agency's Work Programme 2006 and in order to have a more comprehensive and complete overview of the current situation within the EU and to easier identify the Member States' needs in this field, EMSA has the intention to publish an "Inventory of EU Member States policies and operational response capacity to HNS marine pollution".

This inventory, following the example of the Agency's other inventories on marine pollution response issues, will assist the dissemination of information regarding the existing policies, operational response capacity and future developments at Member State level in the field of HNS marine pollution preparedness and response.

6.3 INDUSTRY RESOURCES

Private response resources to HNS incidents are well developed and regularly used in some Member States when responding to HNS incidents. Such response operations are usually undertaken by salvage companies and other experienced companies with trained personnel and specialised equipment. EMSA will work closely with industry sources to provide a detailed overview of industry/private resources and response capabilities to HNS incidents in Member States within the framework of the above mentioned EMSA inventory.

6.4 MEMBER STATES AND EMSA ACTIVITIES

Section 6 has reviewed the EU Member States' operational capacity for responding to HNS incidents. The Agency aims to develop and publish an Inventory on the Member States' policies and operational response capacities to HNS marine pollution, in order to provide a clearer overview of the existing structures and available resources across the EU.

In addition, the following could influence the Agency's future activities:

- The OPRC-HNS Protocol 2000 enters into force on 14 June 2007. Currently few Member States have sufficient operational capacity or structures in place for its implementation.
- Those Member States with HNS operational response capacity could provide a valuable source of information and examples of best practice, and;
- Private response resources are available within the EU, to assist Member States in responding to an HNS incident.

In view of the entry into force of the OPRC-HNS Protocol 2000 and in order to assist capacity building amongst Member States, EMSA should identify and disseminate information concerning Member State best practice in the development of contingency arrangements and response mechanisms, in the field of HNS pollution preparedness and response.

In order to better address this issue, the Agency will hold in 2007 its second HNS Workshop on preparedness and response to marine pollution involving HNS, with the participation of Member States and industry experts.

7 EMSA's HNS Pollution Response Activities

7.1 INTRODUCTION

This section defines the overall framework, the subsequent benefits and implications, and associated proposed activities that the Agency should take in the field of HNS pollution preparedness and response. Response to an HNS incident is primarily the responsibility of the impacted Member State. EMSA's actions can only be complimentary to strengthen and top-up existing capabilities. The situation is complicated by the fact that most Member States have not developed HNS preparedness and response capabilities to the same satisfactory level across the EU. EMSA will help address this problem by providing activities together with information to enable and assist uniform HNS response capacity building by Member States. This process forms the basis for EMSA's proposed actions. Incident statistics (see section 5) suggest that EMSA's initial HNS activity should concentrate on issues related to bulk cargoes of HNS.

7.2 OVERALL FRAMEWORK

Before describing the activities the Agency should undertake to fulfill its legal obligations, the framework for HNS response is outlined based upon the findings of the previous sections of this Action Plan.

The overall context for EMSA's activities consists of the following elements:

Existing Framework

- Having reviewed, based on existing information, the approaches of Member States to HNS marine pollution preparedness and response, EMSA should provide assistance and support, in the same spirit of cooperation as developed in the Oil Action Plan. This should be done by assisting the development of the Member States' preparedness and response structures and by strengthening resources and structures already in place;

- The OPRC- HNS Protocol 2000 provides the basis for this approach to HNS preparedness and response. It should be noted that there is no comparable EU legislation in place with regard to HNS marine pollution preparedness and response. The HNS-OPRC Protocol 2000 comes into force on 14 June 2007. At this time, there are large variations within Member States in the degree of ratification and/or implementation of this instrument. Overall, Member States remain significantly less developed operationally compared to oil spill response;

- All Member States are contracting parties to one or more of the Regional Agreements and, as a group, these structures have made a significant contribution to defining the HNS issue and developing support tools, guiding documents, joint procedures and response methodologies in Member States. There is a wide disparity in the level of activity of these Agreements, highlighted by the fact that one has yet to come into force. With regard to those in force, there is variation in the activities implemented, although most activity relates to defining the HNS issue, developing response methodologies, reporting past HNS incidents and/or establishing databases of substances potentially carried at sea. This activity of the Regional Agreements, if linked to the GESAMP work[25], provides information on possible environmental, health and safety implications of an HNS release. This work, whilst a fundamental building block to developing HNS response, demonstrates the potential for duplication of effort.

The Agency will build on these existing structures and closely cooperate with them to improve existing knowledge and further develop available preparedness and response methodologies.

Top-up Philosophy

- As established by EMSA's Administrative Board for the Oil Action Plan, the Agency's HNS operational tasks should be a logical part of the existing response mechanisms for coastal states requesting support; therefore the Agency's HNS activities should top-up the existing efforts and structures of coastal states;

- EMSA should not undermine the prime responsibility of Member States for operational control and decision-making during marine pollution incidents. The Agency should not replace existing capacity of coastal states. As with the Oil Action Plan, the Agency feels strongly that Member States have their own responsibilities regarding response to HNS incidents;

- EMSA's activities should respect and build upon existing cooperational frameworks and Regional Agreements. In addition, EMSA should strengthen existing arrangements and should create coherence within the European Union. The Agency's activities should be coordinated with those that are already underway as part of the Oil Action Plan.

Technical Considerations

Within the context of responding to incidents involving a significant or multiple release of HNS material in the marine environment or with the potential or threat for such a release, the following technical points should be taken into account:

[25] *IMO's Evaluation of Hazardous Substances Working Group (GESAMP) – see footnote Nr. 19*

- Given the difficulty in containing HNS material once storage integrity has been lost, (e.g. ability to readily disperse to air or water, toxicity, flammable and/or explosion risk), Member States activities should focus primarily in preventing a shipping incident escalating to an actual HNS release;

- Analysis of existing information sources indicates that there is a considerable diversity in the type and nature of HNS material carried within EU waters. Importantly there is also a huge variation in the type of release that could occur during an incident, the reaction of the substance when it enters the marine environment and the potential resulting impacts due to the variety of HNS material carried. Therefore, the Agency's activities need to cover a wide variety of substances;

- It is considered that the existing studies reviewed by EMSA in 2006, whilst providing a limited picture, do not contain sufficient information on the extent of HNS transport within EU waters. There is a requirement to undertake further work to identify the nature and extent of HNS sea transport within the EU waters. Given this lack of information other approaches have been adopted to identify the possible range of HNS transported within EU waters. For example, such information sources may include the type of chemical carrying vessels (specifically tank linings) present in an area, or the HNS involved in past incidents in that area. Review by EMSA indicates there is a vital need for statistical information on which to base risk assessments and resulting contingency planning by Member States;

- Where HNS release has occurred the Agency could assist the Member States with:
  1) access to specialised information on the behaviour and fate of HNS carried in European waters, once released in the marine environment,
  2) identifying expertise and equipment to prevent and/or respond to an HNS release;
  3) identifying detection and monitoring equipment, in order to allow the appropriate response which minimises risks to public safety, environmental resources and socioeconomic assets[26] ;

- The Regional Agreements and Member States have identified a number of potential response actions to HNS material. It is important to know when and where these responses can be initiated. In serious HNS incidents, particularly where a release has occurred and where responders may be in danger, it

[26] It may not always be possible to implement a proactive response to an incident due to the nature of the HNS involved. In situations involving fire/explosion, airborne toxic plumes and/or the contamination of marine foodchains/fisheries, the Member States could adopt a "safeguarding response". This may involve response actions by the Member State such as:
• Public warnings to seek shelter, where evacuation is not possible;
• Evacuation of communities to places outside the hazard area;
• Closure of contaminated recreational waters and beaches, and;
• Closure of fishing areas or aquaculture to prevent contamination of human food chains.
These actions should be implemented in conjunction with monitoring activities to determine the extent and concentration of contamination, together with an assessment of the potential impacts over the short and long term.

may be impractical for an intervention response by a Member State. In such cases, monitoring and advice on a risk area response may be the only response option available;

- Analysis of incident case studies has shown that potentially the most complex response involves vessels carrying multiple types of HNS material which may require a range of response options and can react antagonistically to each other substantially increasing the potential impact of an incident;

- Marine pollution caused by HNS differs from oil pollution in having a range of potential fate and behaviour once released into the marine environment. Responder and public safety risks and impacts associated with HNS can be potentially more severe than with oil. The selection of the appropriate response option(s) to an HNS incident requires detailed knowledge of the involved substance's physical and chemical properties. Compared to oil, different specialised knowledge and operational expertise are required for an effective response to HNS marine pollution. EMSA actions should be developed to ensure Member States receive, when dealing with an HNS incident, specialised information about the substances' potential fate and behaviour, associated hazards and impacts, and possible response options, and;

- The Agency believes that the exchange of knowledge and expertise through specialised trainings, exercises and workshops, are important in strengthening the response capacity of a Member State in the event of an HNS incident. The Agency should coorganise and/or participate with its resources in such activities.

Areas of Priority for EMSA Assistance

To determine the scope of its assistance in the start-up phase, EMSA will build upon preparatory work initiated as part of the 2006 Work Programme. Work already undertaken includes analysis of existing studies in the field of transportation of HNS and preparedness and response to marine pollution from HNS. However, given the limited number of existing studies, it will be necessary for EMSA to develop its own work to define the nature and extent of HNS seaborne transport.

Based upon information contained within the existing studies and EMSA's analysis of statistics for vessels with the potential to carry HNS, it is apparent that HNS trade is undertaken throughout EU waters. Past incidents have occurred within all areas. Two intensive areas of activity both in terms of trade and previous incidents have been identified:

- Southern North Sea and Channel/Benelux approaches to adjacent ports, and
- Mediterranean Sea and approaches to Western Mediterranean Sea, Adriatic Sea and Italy.

As with the Oil Action Plan, it must be stressed that the resources of EMSA are at the disposal of every requesting EU coastal Member State to assist in cases of significant HNS incidents anywhere in European waters. Therefore, the assistance provided by EMSA will not be restricted to the two indicated areas.

7.3 EMSA'S HNS ACTIVITIES

EMSA's activities in the field of HNS marine pollution preparedness and response are focused on ship-sourced pollution involving the release or the threat of release of hazardous and noxious substances, as considered in the OPRC-HNS Protocol 2000. Reported incident statistics (see section 5) suggest that EMSA's initial activities should primarily concentrate on issues related to bulk cargoes of HNS. Actions regarding packaged goods may be developed by the Agency at a later stage as appropriate; however in exceptional cases incidents involving dangerous goods in packaged form could also be considered.

As already developed under the Agency's Action Plan for Oil Pollution Preparedness and Response, EMSA would like to develop its role and activities along three distinct lines:

I) Information
II) Cooperation and Coordination
III) Operational Assistance

Taking into account the technical considerations regarding HNS pollution as described above, it should be stressed that the focus of the Agency's activities will be to provide specialised information and assistance to the Member States to build upon their existing knowledge and response capacities in the field of HNS response. The initial actions when responding to HNS incidents are particularly important and generally fall under the Member States' responsibilities.

With the actions suggested in this section, EMSA aims at addressing all aspects of HNS marine pollution preparedness and response, namely:

- Information on existing preparedness and response framework;
- Identification of gaps and needs in this field;
- Assistance in risk assessment;
- Means to support strengthen and improve existing response mechanisms.

EMSA's proposed actions are prioritised below in hierarchical order within each distinct line.

I) Information

As already highlighted throughout this Action Plan, more knowledge is needed regarding HNS marine pollution preparedness and response, including information on HNS transported in European waters, their behaviour and fate in the marine environment, their hazards and impacts, and possible response options.

Activities proposed under the **information** theme aim to address and better understand the HNS marine pollution thematic, and provide the Commission and the Member States with specialised technical, scientific and operational information.

More specifically, the following actions are being proposed to be undertaken by the Agency:

a) **Analysis and dissemination of statistical information regarding seaborne transportation of HNS in European waters.**

Given the importance of such data for risk assessment purposes, this is a priority action for the Agency. During 2007/2008, EMSA should collect, analyse and disseminate existing information on HNS seaborne transport and present the results to Member States. As highlighted in section 3, following the 2006 review of existing HNS studies further work needs to be undertaken regarding the analysis of statistical data available on the transportation of HNS. As part of that review, the Agency identified sources of raw data on shipping movements, port calls of HNS carrying vessels and customs information regarding specifically HNS. Further analysis of this information will provide a clearer picture of the current situation. This action will assist the Member States by providing valuable information on which to base risk assessments and set priorities for contingency planning regarding HNS marine pollution.

Taking into account the difficulty of obtaining HNS-related statistical information on transport and trade routes, the Agency aims to work closely with the Member States and the relevant industry sources, such as the chemical industry, chemical tanker operators and port authorities, in implementing this activity.

Particular emphasis should be placed upon:

- Determining HNS trade routes and obtaining further information on the geographical variation in HNS cargoes for specific European sea areas e.g. the Baltic Sea, the Atlantic, North Sea and Channel, the Mediterranean Sea and the Black Sea;
- Collecting information on the mode of transportation (bulk/packaged goods);
- Collecting information on the actual substances that are being carried as HNS cargoes; this information could lead to the creation of a priority list of substances that are being carried in European waters.

A future step toward this direction could be EMSA's assistance to the Commission and the Member States in developing an EU database or a harmonised reporting system for data and information collection regarding HNS transport routes, modes of transportation and substances carried.

b) **Inventory of EU Member States policies and operational response capacities to HNS marine pollution (including pri-**

vate/industry resources).

As mentioned in section 6, Member States' preparedness and response levels vary widely in the field of HNS marine pollution. In order to provide a better overview of the existing HNS marine pollution preparedness and response mechanisms in the European Union, EMSA should develop and publish an inventory of the existing policies and operational response capacities of the Member States to HNS marine pollution. This inventory will include Member States' and private operational resources currently available and future developments at national level.

This inventory which will be updated on a bi-annual basis in order to always contain accurate and up-to-date information, will facilitate the identification by the Agency of gaps and needs, and the dissemination of Member State best practice in this field.

c) **Further build-up specialised knowledge of HNS within EMSA and disseminate this knowledge via the Agency's Centre of Knowledge, while stimulating R&D and innovation in the field of HNS marine pollution preparedness and response.**

HNS-related information deriving from EMSA's activities will be disseminated to Member States, the Commission and others through the Agency's Centre of Knowledge. This is a collection of procedures designed to ensure maritime stakeholders have access to up-to-date, concise information. The Centre of Knowledge should be used to collect and disseminate the information produced by all the Agency's HNS related activities, as mentioned in this Action Plan.

The Centre of Knowledge should include:

- Documentation of HNS-specific meetings, seminars and workshops;
- Access to HNS-specific web pages and information sources;
- Development and publication of reports and leaflets on HNS issues;
- Data on past HNS incidents, including experiences gained and lessons learnt;
- Information on existing decision-support tools and guidance documents on HNS issues.

In addition EMSA should encourage and support the development of R&D and innovation in the field of HNS marine pollution response (e.g. regarding HNS trajectory modeling software, in order to augment the HNS monitoring capability). EMSA's role should be to closely monitor R&D and innovation developments related to HNS marine pollution and stimulate such developments across Europe.

II) Cooperation and Coordination

Activities proposed under the **cooperation and coordination** theme aim to build upon and expand the scope of cooperation links already established by the Agency with the Regional Agreements and other international key actors under the Oil Action Plan, in order to also cover HNS marine pollution preparedness and response.The

Agency aims to work closely together with the Member States and other international actors to better define the HNS issue at a practical, operational and technical level.

More specifically, the following actions are being proposed to be undertaken by the Agency:

a) Combine existing operational HNS response manuals into one guiding document/manual, in close cooperation with the Regional Agreements and other response organisations.

As shown in section 5, consolidating existing information regarding HNS response options into one manual or guiding document could be useful at a European level to ensure coherent response capacity building across the EU. EMSA should play an active role in collecting, collating and disseminating available information on how to respond to marine pollution incidents involving HNS.

HNS pollution response manuals have been already developed at regional (e.g. within the Regional Agreements) and national levels (e.g. the CEDRE chemical response guides), and EMSA wishes to coordinate and cooperate closely with these organisations in identifying the need and the way forward for developing one HNS-response guiding document.

This manual/guiding document could cover:

- Response to groups of substances categorised by their behaviour and fate in the marine environment and on their possible response options (e.g. response to floaters, sinkers, dissolvers, evaporators); and/or
- Response to individual substances.

b) Identify the best centres of knowledge and expertise in the field of HNS pollution preparedness and response and facilitate the exchange of this knowledge within the European Union.

This activity will be implemented by EMSA in close cooperation with the identified centres of HNS knowledge and expertise within the European Union and worldwide (e.g. US Coast Guard). EMSA should supplement and strengthen Member States' preparedness and response capacity through organising and participating in specialised workshops, trainings, desktop and operational response exercises in the field of HNS marine pollution preparedness and response. Through these activities the Agency will play an active role in the exchange of HNS-specialised expertise and knowledge across Europe.

c) Provide technical assistance and advice to the Commission and the Member States regarding the implementation of the OPRC-HNS Protocol 2000.

The OPRC-HNS Protocol 2000 provides the global framework for international cooperation in responding to major incidents or threats of HNS marine pollution. EMSA, in close cooperation with the Commission, the Member States and the industry, could provide the forum at EU level to address, discuss and advise on issues regulated under the OPRC-HNS Protocol 2000, such as the:

- development of national/regional HNS contingency planning;
- harmonisation of HNS incident reporting procedures; and
- strengthening of international co-operation in HNS pollution response.

III) Operational Assistance

Activities proposed under the **operational assistance** theme consider the existing contingency requirements and operational response capacities of Member States, aiming to top-up existing response mechanisms and support Member States with the appropriate means during their own decision-making when dealing with HNS marine pollution.

<u>More specifically, the following actions are being proposed to be undertaken by the Agency:</u>

a) Establish and maintain a pool/network of specialised HNS experts who can advise and support the Member States and the Commission during the response to an HNS incident.

EMSA should undertake the setting up of a pool/network of HNS experts that can be contacted and/or mobilised by a Member State directly, providing the requesting Member State with timely information on scientific, technical and operational aspects in the case of an HNS incident. Some Member States have already concluded individual arrangements and agreements with the chemical industry and/or private response organisations at national or regional level, to provide them with initial information and advice on the substance(s) involved in an HNS incident and on the appropriate response options.

EMSA could facilitate the setting-up of such a network of HNS experts at a European level, in close cooperation with the Commission, the Member States and the chemical industry. This network of experts would consist of experts with specialised chemical and pollution response experience (e.g. CEFIC, CEDRE etc) in the field of HNS preparedness and response and could be nominated in close cooperation with the Commission, the Member States administrations and the industry.

b) Facilitate and support the decision-making process during HNS incidents, through the development of a specialised HNS information support tool.

As indicated in sections 4 and 5, EMSA actions should be developed to ensure Member States receive specialised information, when required, about HNS marine pollution in order to support their own decision-making process. EMSA, in close cooperation with the Member States and the Regional Agreements, should develop an HNS-incident decision support tool, which combines existing available information on HNS, their behaviour and fate in the marine environment, health and safety associated issues, hazards and impacts, past incidents and pollution response options, into one coherent source of information (software tool/database).

This software tool should link similar existing information tools and build on their example (e.g. the MIDSIS TROCS software tool developed by REMPEC, or the CHRIS database developed in the US), focusing on providing practical information in a user-friendly way and on supporting the Member States' decision-making process. EMSA could have consultations with Member States, Regional Agreements and the chemical industry in order to define the best way forward to develop such a decision-support tool.

At a second phase, and if the Member States identify the need for and support these activities, the following two actions can be undertaken by the Agency:

c) **Develop a study setting out the minimum technical requirements for a "safe platform" which has the capability of entering a risk area for monitoring and recovery operations, whilst protecting its crew and preventing escalation of the HNS incident.**

HNS experts and other specialised personnel who could respond to an HNS incident would need a "safe platform" from which they could safely work and evaluate the incident. EMSA could develop a technical study to determine the basic/minimum technical requirements for a safe platform which has the capability of entering a risk area for monitoring and recovery operations, whilst protecting its crew and preventing escalation of the incident.

This activity will be implemented in close cooperation with classification societies and other specialised bodies. These technical minimum requirements of a "safe platform" will be published and circulated to the Member States, which may use the results of this study according to their national needs and operational developments.

d) **Develop a feasibility study regarding HNS-release monitoring equipment.**

One of the most important elements of the response to an HNS incident is the water and airborne monitoring of the HNS release. It is of vital importance to know the spreading of the chemical in the environment (in the air, on the sea surface, in the water column and on the bottom of the sea). EMSA could consider developing actions in order to support and top-up existing capabilities in the monitoring field.

Possible future actions could be for example:

- To develop a technical study regarding the at-sea air and water quality monitoring equipment necessary for effective HNS pollution monitoring;
- To develop an inventory of the HNS monitoring equipment currently available in Europe;
- To develop a feasibility study regarding the establishment of a network of at-sea air and water quality monitoring systems

in key areas around Europe. Such systems could be containerised and deployed in the incident area from "safe platforms". Presently the availability of this type of response tool is severely limited around the European coastline. Member States would be responsible for using the monitoring equipment and for deciding how the information is used, but this may prove useful for assisting counter pollution, salvage and civil protection decisions.

7.4 CLOSING REMARKS

This Action Plan has been put forward with the intention of strengthening European preparedness and response to HNS incidents and resulting impacts. Improving preparedness and response to HNS marine pollution has been identified in the Agency's establishing Regulation as amended, in the earlier Oil Action Plan and in the Agency's subsequent Work Programmes; accordingly, actions have been undertaken by EMSA in implementing this task.

The actions proposed to be undertaken by the Agency cover a wide range of activities, mainly focusing on the provision of HNS-related technical, scientific and operational information and expertise which can be used by the responders when dealing with HNS marine pollution.

This Action Plan provides an initial framework of the Agency's role in this field and will be implemented and further defined via the Agency's subsequent Work Programmes. The extent to which this HNS Action Plan can be implemented is dependant upon the resources available to EMSA and the willingness of Member States to support and participate in the Agency's activities.

As has been indicated, the future implementation by Member States of the OPRC-HNS Protocol 2000 will produce an evolving situation where EMSA can work in partnership with Member States to ensure effective implementation of HNS preparedness and response across the EU and in collaboration with our neighbours.

Photo credit:

- Central Command for Maritime Emergencies, Germany: Cover picture insert; Page 12.
- Maritime and Coastguard Agency, United Kingdom; Pages: 17, 21, 31, 41, 43, 46, 53.
- Swedish Coast Guard, Sweden; Page 5.
- www.containershipping.nl/casualties; Pages: 15, 34.

European Maritime Safety Agency (EMSA)
Av. Dom João II, Lote 1.06.2.5
1998-001 Lisbon, Portugal
website: http://www.emsa.europa.eu