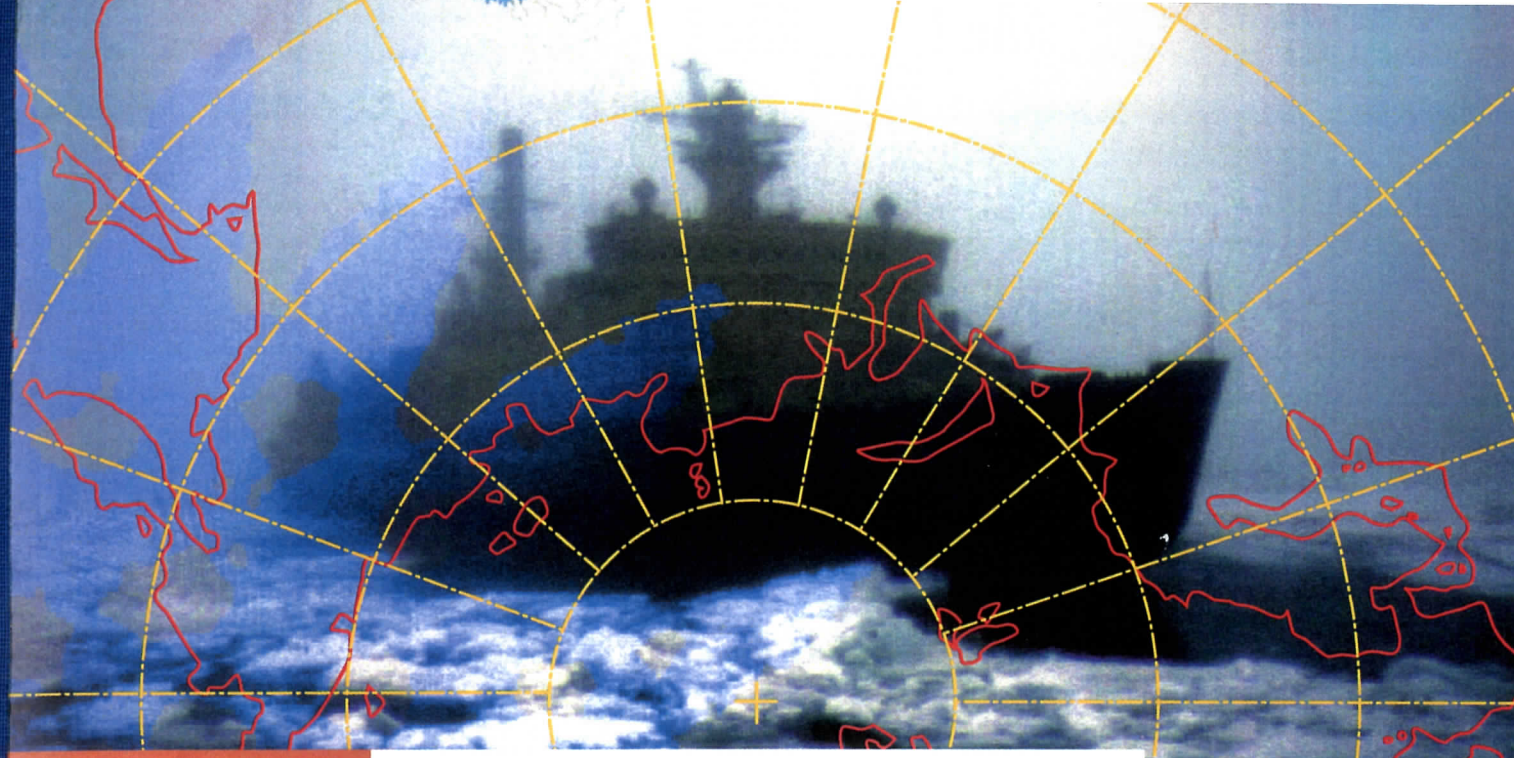
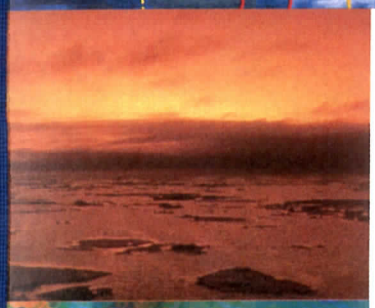
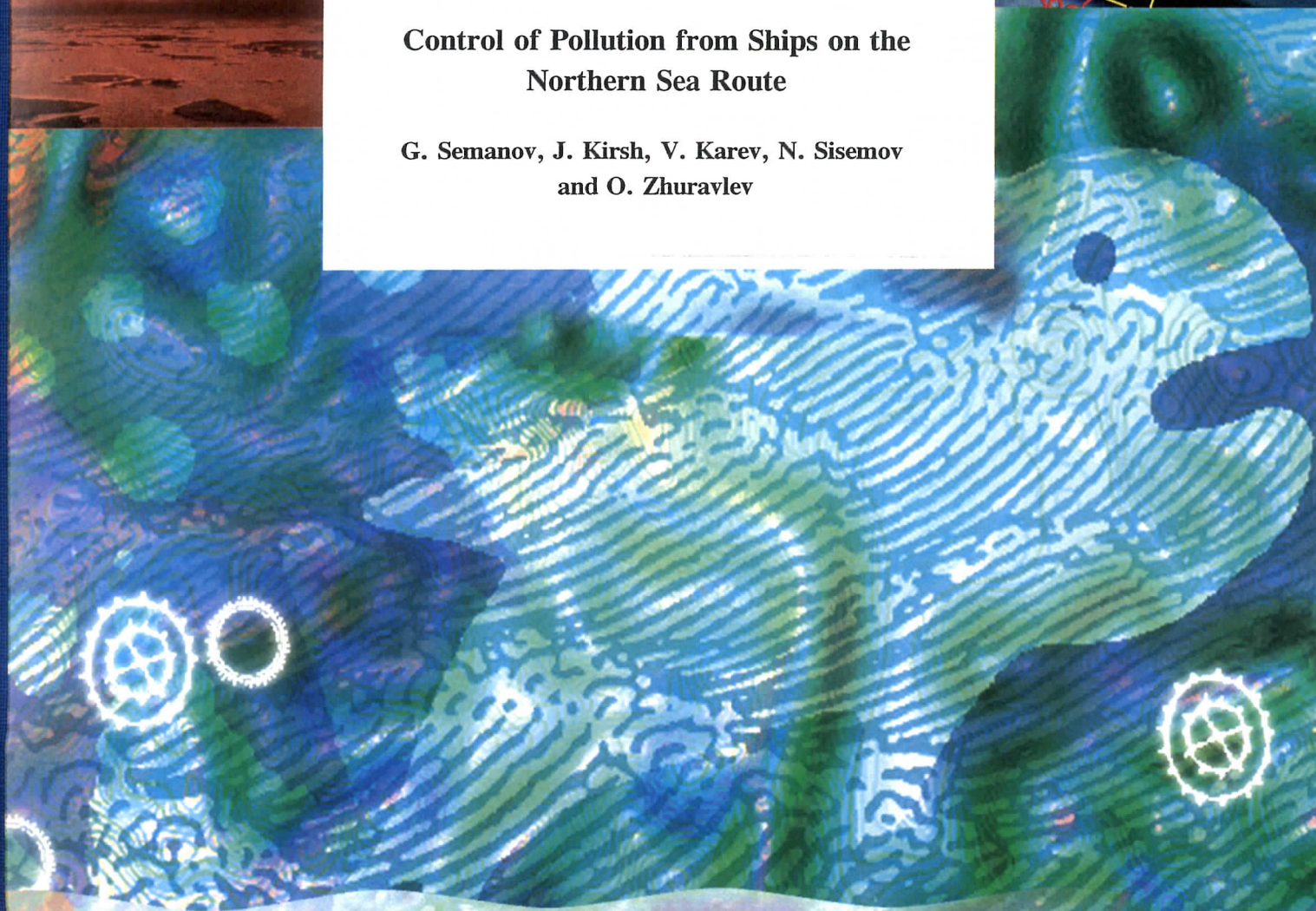




INSROP WORKING PAPER
NO. 63 - 1996, II.6.1

Control of Pollution from Ships on the Northern Sea Route

G. Semanov, J. Kirsh, V. Karev, N. Sisemov
and O. Zhuravlev



INSROP International Northern Sea Route Programme

Central Marine Research & Design Institute, Russia

The Fridtjof Nansen Institute, Norway

Ship and Ocean Foundation, Japan

International Northern Sea Route Programme (INSROP)

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Supervisor:	Gennady Semanov
Title:	**Control of Pollution from Ships on the Northern Sea Route**
Authors:	G. Semanov (1), J. Kirsh (1), V. Karev (2), N. Sisemov (3) and O. Zhuravlev (1)
Addresses:	(1): Central Marine Research and Design Institute (CNIIMF),Kavalergardskaya Street 6, 193015 St.Petersburg, Russia. (2): Marine Pollution Control and Sulvege Administration (MPCSA), 1/4 Rozhdestvenka st, Moscow 103759, Russia. (3): Northern Shipping Company (NSCo), 36 Dwinskaya Embankment, Archangel 163061, Russia.
Date:	14 October 1996
Reviewed by:	Victor Santos-Pedro, Canadian Coastguard, Ottawa, Ontario, Canada. Kimmo Juurma, Kværner Masa-Yards Inc., Helsinki, Finland.

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This publication forms part of a Working Paper series from the **International Northern Sea Route Programme - INSROP**. This Working Paper has been evaluated by a reviewer and can be circulated for comments both within and outside the INSROP team, as well as be published in parallel by the researching institution. A Working Paper will in some cases be the final documentation of a technical part of a project, and it can also sometimes be published as part of a more comprehensive INSROP Report. For any comments, please contact the authors of this Working Paper.

FOREWORD - INSROP WORKING PAPER

INSROP is a five-year multidisciplinary and multilateral research programme, the main phase of which commenced in June 1993. The three principal cooperating partners are **Central Marine Research & Design Institute (CNIIMF)**, St. Petersburg, Russia; **Ship and Ocean Foundation (SOF)**, Tokyo, Japan; and **Fridtjof Nansen Institute (FNI)**, Lysaker, Norway. The INSROP Secretariat is shared between CNIIMF and FNI and is located at FNI.

INSROP is split into four main projects: 1) Natural Conditions and Ice Navigation; 2) Environmental Factors; 3) Trade and Commercial Shipping Aspects of the NSR; and 4) Political, Legal and Strategic Factors. The aim of INSROP is to build up a knowledge base adequate to provide a foundation for long-term planning and decision-making by state agencies as well as private companies etc., for purposes of promoting rational decisionmaking concerning the use of the Northern Sea Route for transit and regional development.

INSROP is a direct result of the normalization of the international situation and the Murmansk initiatives of the former Soviet Union in 1987, when the readiness of the USSR to open the NSR for international shipping was officially declared. The Murmansk Initiatives enabled the continuation, expansion and intensification of traditional collaboration between the states in the Arctic, including safety and efficiency of shipping. Russia, being the successor state to the USSR, supports the Murmansk Initiatives. The initiatives stimulated contact and cooperation between CNIIMF and FNI in 1988 and resulted in a pilot study of the NSR in 1991. In 1992 SOF entered INSROP as a third partner on an equal basis with CNIIMF and FNI.

The complete series of publications may be obtained from the Fridtjof Nansen Institute.

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- ARTEC, Norway
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- SINTEF (Foundation for Scientific and Industrial Research - Civil and Environmental Engineering), Norway.

PROGRAMME COORDINATORS

- **Yury Ivanov, CNIIMF**
  Kavalergardskaya Str.6
  St. Petersburg 193015, Russia
  Tel: 7 812 271 5633
  Fax: 7 812 274 3864
  Telex: 12 14 58 CNIMF SU
- **Willy Østreng, FNI**
  P.O. Box 326
  N-1324 Lysaker, Norway
  Tel: 47 67 11 19 00
  Fax: 47 67 11 19 10
  E-mail: sentralbord@fni.no
- **Ken-ichi Maruyama, SOF**
  Senpaku Shinko Building
  15-16 Toranomon 1-chome
  Minato-ku, Tokyo 105, Japan
  Tel: 81 3 3502 2371
  Fax: 81 3 3502 2033
  Telex: J 23704

International Northern Sea Route Programme (INSROP)

Central Marine Research & Design Institute, Russia

The Fridtjof Nansen Institute, Norway

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SUB-PROGRAM II. Environmental Factors.

II-6. Environmental Safety of Navigation.

II.6.1. Control of Pollution from Ships on the NSR.

INSROP Working Paper

Submitted to
The Joint Research Committee
and
The Steering Committee of Sponsors

Supervisor Dr. Gennady Semanov,
CNIIMF

St.-Petersburg
1995

Project Team

The Project team consisted of the following:

Dr. G.Semanov	leader of Project, CNIIMF
J.Kirsh	CNIIMF
Dr. V.Karev	MPCSA
Ing. N.Sisemov	NSCo
Ing. O.Zhuravlev	CNIIMF

Summary

The problem of preventing sea pollution from waterborne traffic is of international character, and its solution is of especial value for the sensitive Arctic seas. Implementation of control over discharges from ships on the NSR is the focus of project INSROP II.6.1 "Control of pollution from ships sailing by the NSR". For the project were presented the INSROP report 1994 (Part I) and the INSROP Report of 1995 (Part II).

The aim of the first part of the project was clear sources of the pollution and causes of the pollutant discharges to the Arctic seas. The main sources of the sea pollution from ships are operational discharges and accidental discharges associated with faults of the on board environmental equipment, improper use of the equipment or erroneous action of operators. Illegal discharges of pollutants from ships to the sea are rare and caused mostly by a dearth of the shore reception facilities. In the project are reviewed international and national requirements of Canada and Russia for handling ship wastes. With a view to proper implementation of the requirements of the International Convention for the prevention of pollution from ships of 1973, amended by the Protocol of 1978 (MARPOL 73/78), as well as of national legislation of Russia on water quality preservation, "Guidelines for the control of pollution from ships sailing by the Northern Sea Route" have been developed in the second part of the study.

The Guidelines contain the water quality standards required by the rules for preservation of the Russian coastal sea waters, as well as the MARPOL 73/78 standards on discharge of pollutants from ships.

The Guidelines were developed with a view to reducing the quantities of pollutants introduced from ships to the sea environment. It includes organizational and technical measures to be carried out on ships sailing by the NSR for implementing the discharge standards set up by both the MARPOL 73/78 and authorized control bodies of Russia. The document provides also recommendations for the ship personnel on how to reduce quantities of operational ship wastes and to treat them rationally.

The Guidelines consists of five sections. The first section considers matters of the prevention of sea pollution by oil, the second - by harmful bulk liquid substances, the third - by packed or bulk solid substances, the fourth - by sewage waters, and the fifth - by garbage.

In the first section recommendations are given on organizational and technical measures that should be carried out on any ship sailing by the NSR to prevent oil pollution of the sea and the port areas. Some specific recommendations on preventing sea pollution from tankers are given. Attention is given to ecologically safe operation of tankers in the ice.

The second section considers problems of prevention of sea pollution by harmful liquid substances carried in bulk. Quality standards of the discharge of chemical products are given. It is prohibited to carry and discharge unevaluated substances.

The third section is devoted to prevention of sea pollution by packed or bulk solid substances. These include non-ferrous ores and products of the Norilsk combinate. Organizational and technical measures which should be carried out on ships sailing by the NSR are considered, to prevent sea pollution. They include methods of handling the cargoes and cleaning the cargo holds of cargo residues.

The fourth section considers problems of prevention of sea pollution by sewage waters. The quality standards of the effluents, which should be observed when discharging to the sea are given. The sewage waters are recommended to be treated on board as carefully as possible so as to avoid their disposal at the shore reception facilities which are usually not fitted for these purposes on the NSR.

Similar recommendations are given in the fifth section concerning collection and disposal of garbage. A recommendation is made to supply ships with expendable products and materials in such package that either gives minimal waste quantities or is easily utilized. It is recommended that synthetic materials and plastics be avoided.

Each section of the Guidelines contains a list of documents which should be available on any ship either to support facts of observation of the environmental rules by the ship or to help in adhering to the rules. The procedure of drawing up the documents is given.

The implementation of recommendations provided in the Guidelines will permit:

1. To minimize quantities of pollutants discharged to the Arctic seas;
2. To reduce the operational ship waste quantities and thereby reduce the burden on the shore reception facilities of the NSR.
3. Assist the ship personnel in observing the requirements of the control authorities and thus avoid undue delays of ships or large penalties.

Control of Pollution from Ships on the NSR, Part I.

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Introduction.

In the last few years, in view of depletion of the basic mineral deposits in the easily accessible European part of Russia, changes in cargo movements resulting from the breakdown of the USSR, the interest expressed in exploitation of Arctic waters, continental shelf and offshore zones in Russian possession, has been considerably enhanced. While in the past, the basic freight traffic comprised goods brought to the Arctic, we now register a increase in exports from the Arctic, a trend that shows every sign of continuing far into the future. At the same time it is very likely that major goods traffic will be established from the Asian Basin to West-European regions and vice versa. As a result, one can forecast a substantial increase in intensity of navigation along the NSR and growth of an anthropogenic load on the Northern seas, an area extremely sensitive from the environmental standpoint.

In this connection there is a need arising to identify sources from which pollutants can enter the sea, analyze the existing legislation for Arctic waters pollution prevention and work out on this basis a Manual for the Ship Owners and Masters.

The Manual should include organizational and technical arrangements to be set in motion on board ships to minimize sea pollution and reduce the likelihood of inadvertent discharge of pollutants.

The purpose of this study is to identify potential sources of pollution on board the ships sailing along the NSR, causes of sea pollution and existing legislation for Arctic marine environment protection (USA, Canada and Russia). Subsequently, based on these materials, a NSR Pollution Control Manual will be made.

1. Arctic Shipping Pollution Prevention Regulations.

1.1. International Regulations.

There are as yet no international regulations concerned to protection of the Arctic seas from ship pollution. At the ministerial meeting held in Rovaniemi, Finland in 1991, the Arctic countries adopted the Arctic Environmental Protection Strategy (AEPS).

In AEPS the said countries agree amongst other things to: "Undertake joint actions in relevant international fora to further strengthen recognition of the particularly sensitive character of ice-covered parts of the Arctic Ocean".

At the second ministerial meeting in Nuuk, the Arctic countries established a working group on protection of the marine environment of the Arctic which was given the following terms of reference: "To assess the need, taking into consideration the nature of the threats, for further action or instruments on the international and/or national level to prevent pollution of the Arctic marine environment;

To coordinate work with the Arctic Monitoring and Assessment Program (AMAP) and Conservation of Arctic Flora and Fauna (CAFF) working groups in addressing the Arctic marine environment.

To evaluate the need for coordinated action in appropriate international fora to obtain international recognition of the particularly sensitive character of the ice-covered sea areas of the Arctic".

The working group is led by Norway and shall report its findings and recommendations at the next ministerial meeting in 1995. Norway initiated informal discussions during MEPC 35 in March 1994 in London on how MARPOL/MEPC could provide special protection and recognition of the particularly sensitive character of ice-covered sea areas of the Arctic, and indicated that the reason for arranging the meeting was to discuss the different protection measures available within the IMO framework as outlined in the background paper "Protection of the Arctic marine environment".

Representatives from the Arctic countries to MEPC 35 gathered for informal meetings on the 8th and 10th of March 1994, to discuss protection of the Arctic marine environment within the IMO/MEPC framework.

Representatives from Canada, Denmark, Finland, Iceland, Russia, Sweden, USA and Norway attended the meeting. After discussion the participants of the meeting agreed on the need for coordination actions to reduce the pollution of Arctic seas from ships.

As to protection of ice covered seas from ship wastes there is only international agreement on the Antarctic. In 1991 IMO adopted a resolution which became effective March 17, 1992, to declaring the Antarctic to be a special area. This decision was based on the USA proposal to make amendments to Annex I and V to MARPOL 73/78 and declare the Antarctic to be a special area. USA invited IMO to note that because of the ecological significance of the region the proposal did not stipulate provision of wastes reception facilities within the special area as prescribed in Annex I and V for the special areas. It was also recommended that the Parties to the Antarctic Agreement would seek to dispose of all the wastes, where possible from the agreed area.

As a result, the following decision (Regulation 10(1)(g)2(b), 8 of Annex I to MARPOL 73/78) has been adopted.

1. Any discharge into sea of oil or oily mixture from any ship shall be prohibited, while in the Antarctic.

2. The government of each Party to the Convention which ports are being left and entered by ships being bound for and arriving from the Antarctic, undertakes to ensure that as soon as practicable, appropriate facilities are provided to receive wastes, dirty ballast, tank washing water and other oily residues and mixtures from all ships.

3. The government of each Party to the Convention undertakes that all ships entitled to fly its flag, before entering the Antarctic area, should be provided with a tank or tanks of adequate capacity to receive all the sludges, dirty ballast, tank washing water and other oily residues and mixtures produced while in this area, and have agreements for discharge of such oily residues to reception facilities after leaving this area.

Similar amendments concerning garbage have been made to Regulation 5(1)(g), 5 0f Annex V to MARPOL 73/78.

Considering that the Arctic waters are not less environmentally sensitive than the Antarctic, it is likely that in the near future the Northern Arctic Waters will be declared to be a special area and be subject to relevant requirements of Annex I and Annex V of MARPOL 73/78.

1.2. US and Canadian Arctic Waters Pollution Prevention Regulations.

Legislation of the USA for water pollution prevention is similar to International Regulations and based on the following documents:

1. Oil Pollution Act of 1990 (OPA-90);
2. Federal Water Pollution Control Act (FWPA).

There are no special documents concerning pollution prevention regulations of arctic seas.

Legislation of Canada for Arctic seas pollution prevention is based on the following documents:

1. Arctic Waters Pollution Prevention Act (AWPPA):
    - 1.1. Arctic Shipping Pollution Prevention Regulations (ASPPR);
    - 1.2. Arctic Waters Pollution Prevention Regulations (AWPPR).
2. Canada Shipping Act (CSA):
    - 2.1. Oil Pollution Prevention Regulations.
3. Canadian Environmental Protection Act - Part VI - Ocean Dumping:
    - 3.1. Ocean Dumping Regulations, 1988 (ODR).

4. Canada Oil and Gas Operating Act (COGOA):
    4.1. Canada Oil and Gas Drilling Regulations (COGDR).
5. Federal Real Property Act.
6 Fisheries Act.

In 1970 the Canadian Parliament adopted the AWPPA which provides for the prevention of pollution of Arctic waters by regulating the deposit of waste from shipping and non-shipping activities, including coastal installations. In this Act "arctic waters" means the waters adjacent to the mainland and islands of the Canadian arctic within the area enclosed by the sixtieth parallel of north latitude, the one hundred and forty-first meridian of west longitude and a line measured seaward from the nearest Canadian land a distance of one hundred nautical miles, except that in the area between the islands of the Canadian arctic and Greenland, where the line of equidistance between the islands of the Canadian arctic and Greenland is less than one hundred nautical miles from the nearest Canadian land, that line shall be substituted for the line measured seaward one hundred nautical miles from the nearest Canadian land. Deposits of waste must be authorized by the Regulations and a liability and compensation regime covering actual damages and cleanup costs is established for unauthorized deposits. On the shipping side, construction and crew qualification standards and shipping safety control zones are established by the Regulations whereby a ship wishing to enter a safety control zone at a given time of the year must meet specified design and navigation control requirements. The application of the Act is limited to a distance of 100 nautical miles for most activities but for those associated with the exploration, development or exploitation of seabed resources it extends to the limit of Canada's jurisdiction to explore for, develop or exploit those resources. It is administered by three federal departments - Department of Transport for shipping activities; Department of Natural Resources for non-shipping activities in Hudson Bay and Hudson Strait; and, Department of Indian Affairs and Northern Development (DIAND) for non-shipping activities other than in Hudson Bay and Hudson Strait.

In 1972 further to this Act there have been adopted the Arctic Shipping Pollution Prevention Regulations" (ASPPR) which have established an operational procedure for ships in the Canadian Arctic, requirements for construction, equipment and operation of ships.

According to Reg. 28 and 29 of ASPPR:

1). Discharge of any oily wastes is forbidden. Separated oil and purifier sludge may be burnt in boilers or incinerators.

2). Discharge of garbage in the Arctic is forbidden. It may be separated into burnable and non-burnable types; the former may be burnt while the latter must be retained on board.

3). Discharge of treated sewage is permitted by the Regulations, however sludge from the sewage treatment plants must be burnt or retained on board.

Primary emphasis in the pollution prevention regulations is placed upon construction, equipment and navigational conditions of ships. Navigation in the Arctic is permitted in various zones for specified ship types assigned ice class. In this study these requirements are not considered because they are dealt with in detail in Project II.6.2 Environmental Safety of Ships" and Project II.6.4 "Shipboard oil Pollution Emergency Plan".

Canada Shipping Act and Oil Pollution Prevention Regulations

Provide for the regulation of all facets of shipping including safety of navigation, the operation of ships, their construction and equipment, the prevention and control of ship-source pollution and the limits of liability for spills. The Act applies to all ships in Canada's internal waters and in its territorial sea, and to Canadian ships in all other waters. The pollution prevention and control provisions as well as those relating to the safe operation of ships apply out to the 200 nautical mile limit except where the Arctic Waters Pollution Prevention Act applies. The Department of Transport administers this legislation.

Canada Oil and Gas Operations Act

Provides for the regulation of the exploration, development and production of oil and gas resources in a manner that promotes safety, environmental protection and conservation of the resources. A liability and compensation regime for unauthorized spills is established covering damages, cleanup costs and loss of income. Various regulations under the Act regulate specific activities including pollution prevention, specific activities including pollution prevention, contingency planning and waste disposal. The Act applies in the Yukon and the Northwest Territories, on Sable Island, and, in the offshore, to all submarine areas not within a province from the coast to the outer edge of the continental margin or a distance of 200 nautical miles, whichever is greater. In the Arctic, the Act is administered by the National Energy Board.

1.3. Russian Water Pollution Prevention Regulations.

The basic Act which specifies environmental safety of Russia is the RSFSR (Russian Federation) Act "On Environmental Protection" adopted in 1992. Under Article 7 of the Act, state supervision over utilization and protection of the surface water has been entrusted to the State Environmental Protection Authorities of Russia, specially empowered to do this. In relation to the Arctic waters such authorities are: Ministry of Nature, State Committee for Sanitary and Epidemiological Inspection, Committee for Fishing, NSR Administration of Sea Transport Department of Ministry of Transport of the Russian Federation.

Requirement concerning prevention and elimination of coastal waters pollution; creation of favorable conditions for habitation and restoration of fish stocks, sea mammals and plants; protection of the coastal waters with the aim to secure human health etc. are determined in the "Coastal Waters Pollution Protection Regulations" and "Sanitary Regulations and Standards for Surface Water Pollution Protection".

The Regulations cover territorial waters (seas), inland sea waters, mouth areas of rivers flowing into the sea and continental shelf of Russia as well as an adjoining belt of land 2 km wide.

According to the "Regulations..., "any discharge into the coastal water of harmful substances (pollutants) both in the pure state and in mixture with other substances is regulated by a relevant list of substances harmful to human health and living marine resources and by the standards for the maximum permissible concentration of these substances in mixtures that may be discharged. At the same time only those substances or their mixtures for which the maximum permissible concentrations are defined, may be discharged into the Arctic waters.

Conditions of discharge of pollutants from ships.

1. Within the Russian territorial Arctic waters oily mixtures and clean ballast may be discharged from ships provided that the ship is proceeding en route and **the oil content** of the effluent without **dilution does not exceed 15 parts per million.**

2. **Discharge** from the fixed offshore platforms **is prohibited.**

3. **Discharge of untreated sewage is prohibited** except when the sewage is discharged at a distance of more than 4 nautical miles from the nearest land from fishing vessels with a crew not exceeding 40 persons provided that the discharge is made when the ship is proceeding at not less than 4 knots and the effluent shall not produce visible floating solids in, nor cause discoloration of, the surrounding water.

4 **Discharge** of treated and disinfected sewage **is permitted** provided than the **coliform - index does not exceed 1000** and the ship is proceeding at not less then **4 knots.**

5. Discharge of **garbage** into the Russian coastal waters **is prohibited.**

Corresponding to the US and Canadian Regulations Russia has laid down special requirements for the types and constructions of ships permitted to navigate in Arctic waters as well as navigational and organizational requirements defined in the "Register of Shipping Regulations for Marine Pollution Prevention" and "Regulations for Navigation along the WSR". As they are set forth in Sub-Program I and Project II.6.2 "Environmental Safety of Ships", they are not dealt with in the present report.

Table 1 gives a short summary of discharge criteria under MARPOL 73/78 (within special area), Canada and Russia Pollution Prevention Regulations. **It can be seen that these criteria are rafher similar for ship sewage and garbage. As to oil the Canadian rules are more strengent than the correspondent Russian rules.**

2. Characteristics of Ships Navigating along the Northern Sea Route.

The freight traffic routes in the Russian Arctic (from Kara Strait to Bering Strait) are divided into two basic parts:

- western traffic routes, between the ports of Barents and White Seas and ports (terminals) of the western and, more rarely, eastern sector of the Arctic;
- eastern traffic routes, between the Far-Eastern ports and ports (terminals) of the Eastern and, episodically, western sector of the Arctic.

Most goods in this traffic are transported by ships falling into types involved permanently(every year) in arctic operations. However, besides these ships, contribution to the Arctic freight traffic (in summer, as a rule) is made also by ships of other types which operate in the Arctic only episodically (not every year), each making 1 or 2 voyages.

In the last few years, permanent use of the western Arctic traffic routes is made by ships owned by the Murmansk Shipping Company and Northern Shipping Company and oil tankers owned by the Primorsk Shipping Company with ice strengthening of UL category.

Shallow-drafted ships of restricted area of navigation operate in the Arctic within the fleets of the Arctic Shipping Company and Sakhalin Shipping Company and transport mainly goods from Tiksi to the ports and terminals of the water areas of the East-Siberian rivers in summer.

Table 1.

Control of Discharge under MARPOL 73/78,
Canadian and Russian Regulations for ships ≥ 400 GRT
and oil Tankers.

Pollutants	MARPOL 73/78 within special area	Canada Reg.	Russia Reg.
Discharge of machinery space bilges	No Discharge Except: 1. Bilge is not mixed with cargo pump room bilge or cargo residues 2 Ship is en route 3. Oil content of effluent ≤ 15 ppm 4. Has oil alarm and autostopping device	No Discharge	Discharge crite ria are same a: MARPOL 73/7 for the specia area
Discharge of sewage	Discharge is prohibited, except when: - sewage is comminuted and disinfected using system 3(1)(a) at a distance of more than 4 n.m. from nearest land - sewage is not comminuted or disinfected at a distance of more than 12 n.m. from n.l. - ship is en route and proceeding at not less than 4 knots	Reg 28 ASPPR Any ship and any person on a ship may deposit in the arctic waters sewage as may be generated on board that ship	No Discharg except afte treatment whe coli form - in dex does no exceed 1000 pe l and ship is o route and pro ceeding at no less than knots
Discharge of garbage	Discharge is prohibited except food waste at a distance of more than 12 n.m. from n.l.	No Discharge Garbage may be burned on boar of ship	

Lists of ships involved permanently in Arctic operations are given in Table 2 and Table 3.

The above mentioned ship types operating permanently both on the western and eastern Arctic traffic routes can be subdivided conventionally (from the environmental protection standpoint) into "new ships" built after MARPOL 73/78 came into force or designed after it entered into force or designed after it was adopted (1973) and "old ships" designed earlier.

When the "new ships" were designed provision has been in general, made for equipping them with all the recommended pollution protection facilities. Exceptions are made for ships designed before MARPOL 73/78 came into force, which designs have not stipulated provision of the mentioned facilities to full extent.

The pollution prevention facilities provided on board the "new ships" operating in the Arctic are shown in Tables 4 - 8.

When the "old ships" were designed the modern requirements for pollution prevention were quite naturally neglected and because of this fact they have been originally fitted only with bilge water separators.

Subsequently, most of these designed to operate in the Arctic have been modified as required by MARPOL 73/78.

Table 2.

List of ship Types Engaged Permanently in Operations on the Eastern Arctic Traffic Routes.

Primary purpose	Name of prototype and series ships	Deadweight capacity, ths.t.	Building year
Icebreaking cargo ship	Norilsk and Anatoly Kolesnichenko	abt.20	1982-1987
Icebreaking cargo ship	Vitus Bering	10.7	1986-1989
Icebreaking cargo ship	Amguema	9.4	1967-1971
Bulk and container carrier	Dmitry Donskoy	abt.20	1977-1981
Container carrier	Kapitan Sakharov	5.7	1979-1981
Multipurpose ship	Pioner	4.7	1968-1972
Packeted-timber carrier	Nikolay Novikov and Vlas Nichkov	abt.14	1973-1977
Packeted-timber carrier	Igor Ilyinsky	8.3	1990-1991
Packeted-timber carrier	Pioner Moskvy	6.8	1974-1980
Timber carrier	Sibirles and Krymsk	4.2	1967-1970
Multipurpose ships of restricted service	Vitaly Diakonov Vasily Shukshin Sovetskaya Yakutia Kishinev	5 5.6 4 4.2	1983-1988 1979-1980 1973-1975 1968-1976
Oil tanker	Samotlor	16.8	1975-1977
Oil tanker	Ventspils	6.3	1985-1986
Oil tanker	Partizansk	2.9	1988-1990
Reefer ship	Posiet	3.7	1988-1990

Table 3

List of Ship Types Engaged Permanently in Operations on the Western Arctic Traffic Routes

Primary purpose	Name of prototype and series ships	Deadweight capacity, ths.t.	Building year
Icebreaking cargo ship	Norilsk and Anatoly Kolesnichenko	abt.20	1982-1987
Icebreaking cargo ship	Ivan Papanin	10.5	1990
Icebreaking cargo ship	Amguema	9.4	1967-1971
Barge carrier	Sevmorput	34	1988
Bulk and container carrier	Dmitry Donskoy and Mikh.Strekalovsky	abt.20	1977-1981
Container carrier	Kapitan Sakharov	5.7	1979-1981
Multipurpose ship	Pioner	4.7	1968-1972
Packeted-timber carrier	Nikolay Novikov and Vlas Nichkov	abt.14	1973-1977
Packeted-timber carrier	Pavlin Vinogradov	7.8	1987-1991
Packeted-timber carrier	Igor Grabar	4.5	1973-1974
Packeted-timber carrier	Mekhanik Yartsev	2.6	1990-1992
Packeted-timber carrier	Pioner Moskvy	6.8	1974-1980
Timber carrier	Vytegrales and Petrozavodsk	abt.6.5	1965-1971
Timber carrier	Sovetsky Voin	2.5	1968-1971
Oil tanker	Samotlor	16.8	1975-1977
Oil tanker	Ventspils	6.3	1985-1986
Oil tanker	Partizansk	2.3	1988-1990

Table 4

Characteristics of Icebreaking Cargo Ships

Name of prototype ship	"Norilsk"	"Anatoly Kolesnichenko"	"Vitus Bering"	"Ivan Papanin"
Deadweight capacity, t	19943	19550	10700	10500
Ice category	ULA	ULA	ULA	ULA
Number of ships, MSCo in shipcompany FESCo SahSCo	7 5 2	2 3 -	- 5 -	1 - -
Power, kwt	2x7730	2x7730	2x5740	1x13200
Certified number of persons carried	57	57	57	55
Oil-water separator: type productivity, m^3/h	SPS-25B 1x5	SPS-25B 1x5	GeDe010/AP 1x10	SK-4M 1x4
Volume of bilge water storage tank, m^3	23	23	60	60
Sewage cleaning device: type productivity, m^3/day	ST-6L 1x4.55	ST-6L 1x4.55	EOS-15 1x15	EOS-15 1x15
Volume of sewage tank, m^3	5	5	5	1x10, 1x3
Incinerator: type productivity, kg/h for garbage l/h for oil	OG-400 50 80	OG-400 50 80	SP-50 50 50	SP-50 50 50
Garbage containers, m^3			is	3x0.75

Table 5

Characteristics of Borge and Container carrier Ships

Primary purpose	Container carrier	Bulk-container carrier		Barge carrier
Name of prototype ship	"Kapitan Sakharov"	"Mikh. Strekalovsky"	"Dmitry Donskoy"	"Sevmorput"
Deadweight capacity, t	5720	19355	19885	33980
Ice category	UL	UL	UL	UL
Number of ships, MSCo in shipcompany FESCo NSCo	- 3 2	14 - -	11 2 -	1 - -
Power, kwt	1x4490	1x8240	1x8240	1x29420
Certified number of persons carried	35	41	41	77
Oil-water separator: type productivity, m^3/h	SK-2.5M 2.5	TE10iFo 10	TE25-2 10	SK-10 10
Volume of bilge water storage tank, m^3	23	23	60	60
Sewage cleaning device: type productivity, m^3/day	LK-50 3.25	KA-MR 1.5 5	KA-MR 1.5 5	LK-50 3.25
Volume of sewage tank, m^3	3.5	45.7	16	10
Incinerator: type productivity, kg/h for garbage l/h for oil		SAVA-50 50	SAVA-50 50	SP-10 10 -
Garbage containers, m^3		1x1	1x1	

Table 6

Characteristics of Packeted-timber carrier Ships

Name of prototype ship	"Igor Ilyinsky"	"Pavlin Vinogradov"	"Mekhanik Yartsev"
Deadweight capacity, t	8257	19550	10700
Ice category	UL	UL	UL
Number of ships, NSCo in shipcompany FESCo	- 5	8 -	10 -
Power, kwt	1x5100	1x4690	1x2074
Certified number of persons carried	38	35	21
Oil-water separator: type productivity, m^3/h	SK-2.5M 2.5	NEPTUN SAL 1x5	SPS5B ModI 1x1
Volume of bilge water storage tank, m^3	39	68	26
Sewage cleaning device: type productivity, m^3/day	Fiz-Chem.	LK-50 3.25	SP-10
Volume of sewage tank, m^3	8	8	6
Incinerator: type productivity, kg/h for garbage l/h for oil	SP-50 50 50	S01 50 30	SP-10 10 -
Garbage containers, m^3	1x8		is

Table 7

Characteristics of Oil Tankers

Name of prototype ship	"Samotlor"	"Ventspils"	"Partizansk"
Deadweight capacity, t	16770	6297	2853
Ice category	UL	UL	UL
Number of ships, NSCo in shipcompany FESCo	- 12	- 5	1 9
Power, kwt	1x8538	1x4350	1x2870
Certified number of persons carried	46	36	23
Volume of segregeted ballast tanks m^3	6500	3553	1338
Oil-water separator: type productivity, m^3/h	TE-200;TE-10 1x200; 1x10	GEDE-2.5 2.5	SKIT-1.55 1.5
Volume of bilge water storage tank, m^3	2x22.3	12	109
Sewage cleaning device: type productivity, m^3/day	EOS-5 5	UNEX-B1040 2.8	EOS-5 5
Volume of sewage tank, m^3	84	7	5
Incinerator: type productivity, kg/h for garbage l/h for oil	SP-10 10 -	UNEX-F1 10-30 15-25	-
Garbage containers, m^3	1x0.6		BP30M

Table 8

Characteristics of Multipurpose Ships of restricted service and Reefer Ships

Name of prototype ship	Multypurpose ships"		Reefer ships
Name of prototype ship	"Vitaly. Diakonov"	"Vasily Shuksin"	"Posiet"
Deadweight capacity, t	5020	5590	3657
Ice category	L1	L2	L1
Number of ships, ArcSCo in shipcompany FESCo SahSCo KSCo	2 2 6 1	2 - 2 1	- 4 - -
Power, kwt	2x1100	2x1100	1x7500
Certified number of persons carried	31	31	31
Oil-water separator: type productivity, m^3/h	SK-2.5 2.5	SK-2.5 2.5	SK-2.5 2.5
Volume of bilge water storage tank, m^3	80	80	11x3
Sewage cleaning device: type productivity, m^3/day	EOS-15 1x15	LK-50 3.25	MOC-12 12
Volume of sewage tank, m^3	2x6.5	2x6.5	10
Incinerator: type productivity, kg/h for garbage l/h for oil	SP-10 10 -	SP-10 10 -	OG-400 50 80
Garbage containers, m^3	1x1.5	20	

3. Characteristics of Ship Pollutants.

As is generally known, the following pollutants are produced during the normal operation of ship: oily water, sewage and garbage.

Given below are their brief quantitative and qualitative characteristics.

3.1. Oily Water.

Oily water produced on board may be subdivided into the following groups according to the source from which it is originated:

- engine room bilge water,
- dirty ballast of oil tankers,
- washing water produced after the cargo oil and fuel oil tanks are washed.

The bilge water is the major marine pollutant because it is produced on board at all times while the ballast and washing water are generated periodically and, as a rule, disposed of to shore reception facilities.

The major sources from which bilge water is originated:

1. Condensation of water vapor on the internal surfaces of hull, snow and ice thawing.
2. Water leakages from pipes and fittings.

3. Hull leakages.

4. Water and vapor leakages from the fittings of steam auxiliaries (pumps, fresh water generators, boilers).

5. Engine room bulkhead and plating washing water.

6. Oil leakages from pipes and fittings.

7. Drainage of oily water mixture from the fuel and lubricating oil settling tanks.

8. Fuel and lubricating oil leakage throughout the pump seals.

9. Drainage of water from the cooling systems of engines, fresh-water generators, refrigerators etc.

10. Oily mixture produced through washing of the crankcases, shipboard engine and machinery components.

11. Improper operation resulting in tank overflow.

Frequently the bilge water contains cleaning agents e.g. detergents, boiler additives or additives for cooling water to prevent corrosion as well as drainage from the hand basins situated in the engine room

Quantity and composition of the bilge water can vary greatly even on ships of the same series. The basic factors responsible for this are condition of the ship and qualification of the personnel.

Based on the statistical treatments of data on actual accumulation of oily bilge water it has been found that ship displacement and after repair operation time may be considered to be the factors responsible for accumulation intensity. Graphic representation of the relationship between bilge water quantity and ship deadweight capacity is shown in Fig.1.

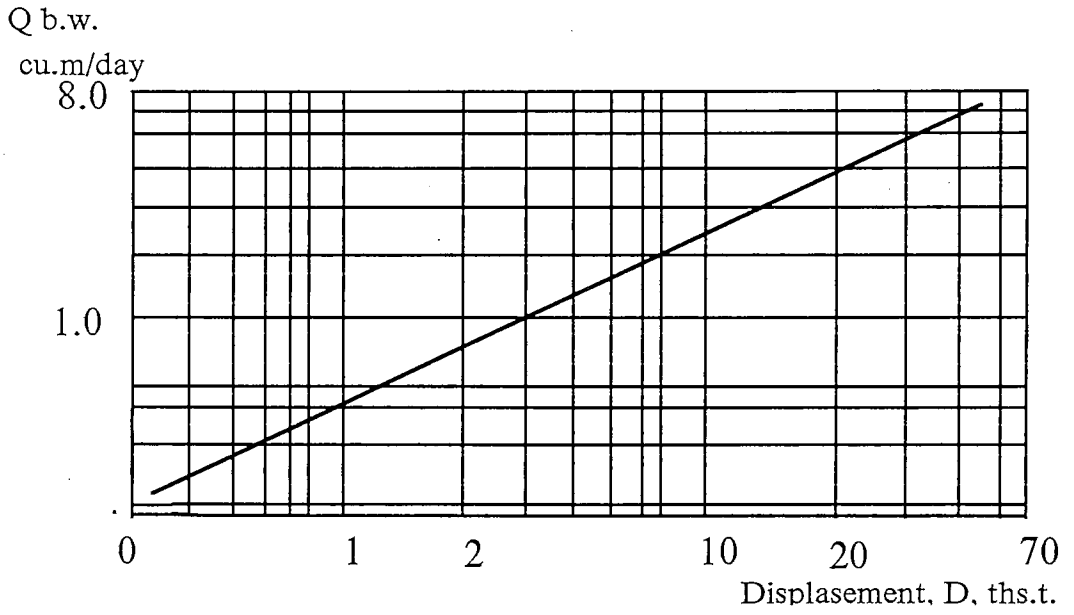

Fig. 1. Relationship between the daily amount of bilge water accumulation and displacement for diesel-engine ships.

Results obtained during the ship surveys show that for the diesel-engine ships, when underway, oil content of the bilge water is 2.5 to 20.8 g/l and when at standstill, 0.8 to 16.5 g/l.

Oil products contained in the bilge water are a mixture of heavy and light fuel and lubricating oils with density of 0.85 to 0.97 g/cm^3, viscosity of 4.5 to 9.0 reference de-

grees at 50°C, pH = 5.9 to 7.1., mechanical impurities - 0.006%, water content of oil collected after separation - 0.8-40%.

3.2. Sewage.

Sewage means:

1. drainage and other wastes from any form of toilets, units, pans and scuppers located in public wc.
2. drainage from wash basins, wash tubes, showers and scuppers located in medical premises (dispensary, sick bay).
3. drainage from spaces containing living animals.
4. excluded from sewage is domestic, "gray water" (drainage from wash basins, saunas, showers, laundries, sinks and galley equipment and other spaces of the food service area) when not mixed with the drainages defined above in 1, 2 and 3.

Surveys of ships sailing along the NSR, have shown that about 100 L sewage and 150 L "grey water" per crew member a day are generated on board. This sewage on the "new ships", before being discharged into the sea is subjected to treatment and disinfection in the shipboard sewage treatment plants, while on the "old ships" it is collected in storage tanks and discharged in the permitted sea areas or disposed of to shore reception facilities. "Gray water" is discharged into the sea without being treated.

3.3. Garbage.

Garbage means all kinds of victual, domestic and operational waste excluding waste mixed with oil and other harmful substances.

Ship-generated garbage or solid waste is classified as

- domestic solid waste,
- maintenance waste,
- cargo-associated waste.

Garbage from living quarters may include:

- paper products, textiles, glass, rags, bottles, plastics, batteries.

Garbage from the galley and dining rooms may include:

- food waste and all materials contaminated by such waste, wrapping material, rags, broken dishes and crockeries, sweepings etc..

Garbage from medical spaces may include:

- lining and packing material, medicines, rags, sweepings etc..

Food waste and some sanitary residues are wet garbage and is collected separately. However batteries and medicines are special waste. All other waste is collected as dry garbage.

Maintenance waste is material collected by the engine and deck department while maintaining and operating the vessel, such as:

- soot, machinery deposits,
- paint scraping waste, deck sweepings,
- wiping wastes, rags etc..

It has been found during the ship surveys that, on the average, the amount of daily generation of garbage is: domestic waste per person and day - wet garbage 1.0-2.0 kg, dry garbage 0.5-1.5 kg (total - 1.5-3.5 kg). Maintainance waste per day on medium sized ship: soot and machinery deposits 4 kg, paint scraping waste 3 kg, wiping wastes and rags 3 kg, sweepings 1 kg (total about 10-15 kg).

The dry garbage is composed of the following components: cardboard and paper - 43 per cent; metal - 16 per cent; plastics - 20 per cent; glass - 10 per cent; rags - 8 per cent; wool - 3 per cent.

The basic methods of salvaging same on the NSR are collection and separation of the garbage, disposal of the food waste into the sea in permitted areas, burning of the burnable components of the garbage in incinerators, collection of the non-burnable waste in containers with subsequent disposal thereof ashore.

Solid waste due to general cargo operations is the largest source of shipboard solid waste both in volume and weight.

Such waste includes:

- dunnage, shoring, plywood, pallets;
- paper cardboard, wire, steel stapping;
- spoiled cargo, sweepings.

With the increase in containerization of marine transport, the amount of cargo-associated solid waste has been greatly reduced.

After unloading dry bulk cargoes, small amounts (approx. 0.1% - 0.2%) of cargo remain in the holds and on deck. If the holds are washed down the water used is contaminated with these remains in a solid, and also in a diluted way.

Quantities of cargo-associated waste is:

- general cargo waste 1 t per 200 t of cargo;
- containers cargo waste 1 t per 25,000 t of cargo;
- dry bulk cargo waste 1 t per 10,000 t of cargo.

The main part of the cargo - associated solid waste is originating during loading and unloading procedures thus they are collected and utilized in port.

Summary data on the quantity of pollutants produced on board the arctic ships is given in Table 9.

Table 9.

Quantities of waste produced on board.

Ship type	Number of ships	DWT, ths.t	Certified number of persons carried on board	Quantities of pollutants produced on board			
				Oil content water		Sewage m^3/day	Dry Garbage kg/day
				Quantity of water, m^3/day	Quantity of oil, kg/day		
Container carriers	3	5.7 20 20	35 41 41	1.5 4.0 4.0	30 80 80	3.4 4.1 4.1	30 40 40
Timber carriers	84	10 8 4	21 38 21	2.5 2.0 1.3	50 40 25	2.1 3.8 2.1	20 35 20
Barge carriers	2	34	77	6.0	120	7.7	70
Bulk carriers	27	20	41	4.0	80	4.1	40
Reefer ships	3	3 17	31 46	1.3 3.6	25 70	3.1 4.6	30 45
Oil tankers	20	6	36	1.9	40	3.6	35
Multipurpose ships	46	5.0 10 20	31 57 57	1.5 2.5 4.0	30 50 80	3.1 5.7 5.7	30 55 55

All-the-year-round navigation along the NSR prevails in the western parts of the Arctic between Murmansk, Arkhangelsk, Kandalaksha and Dudinka while the duration of navigation between the other NSR ports is, on average, 100 to 150 days/year.

Considering that the duration of a voyage in the western part of the Arctic averages 5 days in summer and 10 days in winter while that in the Eastern part of the Arctic is 8 and 16 days respectively, the total quantity of the pollutants produced on board and that of the oil discharged legally into the sea have been determined (Table 9).

Based on these data (Table 8) it is possible to calculate also sizes of the tanks and containers to receive pollutants, which must be available on board if the ship is within the areas where any discharge is prohibited, for example, in the ecological reserves.

Table 10

Averaged Quantities of Oil Discharged Legally from Ships

Ship type	**Number of ships**	**Average duration of navigation, days/year**	**Quantity of oil discharge into the sea, kg/year**
Container carriers	2	300	40
Timber carriers	84	200	490
Barge carriers	2	100-150	25
Bulk carriers	27	300	480
Reefer ships	3	100-150	16
Oil tankers	20	100-120	57
Multipurpose ships	46	100-150	290
		Total	1400

4. Sources of Marine Pollution on the NSR.

To identify potential sources from which oil, sewage and garbage can enter the sea information on ships sailing along the NSR has been collected and survey of 5 ships of various types owned by the Murmansk and Northern Shipping Companies, carried out. For this purpose a questionnaire including the following sections has been worked out:

- ship characteristics;
- quantity of waste produced and treated on board during the normal operation (oil, oily water, sewage, domestic water, garbage being separated into types).

The above questionnaire has been answered by Chief Engineers. Analysis of the information so obtained has corroborated the data given in Table 9 and shown that the ships operating in the Arctic are provided with oily-water separating equipment and oil filtering equipment, tanks used for the collection and storage of domestic and fecal sewage and containers used for the collection of garbage. All the "new ships" engaged in the Arctic voyages are provided with sewage treatment plants. On the whole, the level of technical equipment on board the ships complies with the requirements of MARPOL 73/78 and makes it possible to prevent sea pollution.

Oil residues, sewage and garbage accumulated on board are disposed of to reception facilities or bilge and sewage water collecting vessels.

At the same time answers to the questionnaire have shown that in spite of the measures taken inadvertent marine pollution occurs sometimes, and the following are the main causes responsible for such pollution:

4.1. Pollution by Oil.

- discharge of unseparated bilge water due to human error;
- oil spillage during bunkering operations at low temperature due to damaged hoses and leaky flanges;
- escape of oil when transferred within a ship due to valve leakage caused by freezing;
- pipe and valve freezing;
- damage to cargo oil tanks resulting in penetration of oil into the segregated ballast tanks;

- disregard of washing procedures for the cargo oil tanks on oil tankers and fuel oil tanks on other ships;
- failure of limiting oil content (of effluent) alarm;
- inadequate coordination between actions taken by the ship crew and shore personnel during bunkering and cargo oil loading.

4.2. Pollution by noxious substances.

The noxious liquid substances are not carried in bulk in the Arctic. An exception to this are solid substances among which are ore concentrates including heavy metals, sulphur, tin. The principal source from which they can enter into the sea is disregard of loading and unloading procedures and procedures for removing ore residues from holds in port. Thus, during the carriage of ore only the harbor areas are generally polluted; cases of sea pollution have not been recorded.

4.3. Pollution by sewage.

The main cause of pollution by sewage is absence or failure of the sewage treatment plants on some "old ships" as well as overfilling of their storage tanks due to navigational conditions. As a result, ship has to discharge untreated sewage in the areas permitted by MARPOL 73/78.

4.4. Contravention of Marine Pollution Prevention Regulations.

In 1992 115 out of 184 ships engaged in the Arctic navigation have been subjected to inspection supervision by the Environmental Protection Agencies.

The inspection supervision has revealed 122 cases of contravention of the "Coastal Water Pollution Prevention Regulations". The major cases are listed below:

1. Illegal oil discharge ..... 2 ships
2. Improperly drawn up documentation ..... 5 ships
3. Disregard of the hose handling regulations ..... 3 ships
4. Disregard of the sealing procedures ..... 19 ships
5. Disregard of the environmental equipment operation regulations ..... 1 ship
6. No information about instruction of ship crews on the marine pollution prevention regulations ..... 6 ships
7. No shipowner's documents concerning checkup of the pollution control equipment and facilities ..... 46 ships

In the process of aircraft observation of the sea surface condition 73 ships have been surveyed. During the observation oil patches and films have been detected on water surface in Yenisey Gulf and Dikson Bay. The likely sources of these are wrecks of a river vessel and a fishing vessel.

5. Proposals for the Reduction of the Marine Pollution from ships on the NSR.

Analysis of the information given in Section 4, results of questioning of the ship crews and inspection services has shown that to lower the level of marine pollution from ship a document has to be worked out to cover organizational and technical arrangements aimed at avoiding sea pollution, environmentally safe equipment operation regulations, standards and regulations for permitted discharge of pollutants from ships. The Chief Engineers questioned were of the opinion that a "Shipping Pollution Control Manual" has to be drawn up to include the following sections:

1. Prevention of pollution by oil.

1.1. Requirements for all ships.
1.2. Requirements for oil tankers.
1.3. Disposal of oil residues from ships.
1.4. Action to be taken in an emergency.
2. Prevention of pollution by harmful substances carried by sea in packaged forms.
2.1. Cargo handling operations.
2.3. Cleanout of cargo spaces and removal of residues.
2.4. Action to be taken in an emergency.
3. Prevention of pollution by sewage and garbage.
3.1. Special cases of sewage and garbage discharge.
3.2. Reduction of sewage and garbage generation.
3.3. Operation of sewage and garbage treatment equipment.
3.4. Treatment, storage and disposal of sewage and garbage.

Conclusion.

1. Analysis of the information obtained shows that the sources of marine pollution on the NSR are both the operational discharges of pollutants and discharges through unforeseen circumstances caused by failures and improper operation of the equipment, insufficient knowledge of the marine pollution protection regulations by ship crews.

2. There is no document available on board ships, which would contain modern requirements for marine environment protection, organizational and technical requirements and arrangements to be fulfilled and implemented in order to avoid inadvertent marine pollution.

3. To reduce the cases of inadvertent marine pollution, develop competence of ship crews responsible for operation of the environmental protection facilities a "Shipping Pollution Control Manual" has to be worked out.

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Introduction

Natural complexes of the Arctic and North due to their extreme climatic and geophysical conditions are characterized by special vulnerability, weak resistance to external impact, lower capability of restoration and self-cleaning. Degradation of the environment of Northern Russia involves the danger of disbalancing of global climatic, geochemical and biological processes.

In the nearest future it is planned to expand economic activity in the Arctic basin which will lead to increase in the freight traffic along the Northern Sea Route (NSR). This, in turn, may result in deterioration of the quality of the environment of Arctic seas unless appropriate measures are taken.

The NSR principally runs through territorial waters of Russia and all national rules of the protection of the environment of the Arctic and of the North of Russia apply to it.

Perspective growth of the intensity of navigation along the NSR will require ecological examination in the course of which it will be necessary to produce a set of documents providing evidence and or ensuring the fulfillment by ships of standards on the protection of the marine environment against pollution. One of such documents is "Guidelines for the control of oil pollution from ships sailing along the NSR"(herein after called "Guide"). The Guide should incorporate a number of organizational and technical measures to be taken on ships to ensure the fulfillment of the requirements of "Regulations of the protection of coastal waters against pollution", "Sanitary standards and regulations of the protection of sea coastal waters from pollution in places of the water consumption of population SanPin№4631-88" and MARPOL 73/78.

Bearing in mind that on the NSR the reception and processing of ship's wastes at shore sewage purification works are very restricted because of the poor development of the system of giving up and removal of wastes in the Arctic ports the fulfillment of Guide provisions will permit to cut the amount of wastes on ship and to provide for their maximum possible utilization aboard.

1. Structure and content of the "Guide"

The Guide (Annex A) has been developed on the basis of earlier investigations and analysis of reasons and sources of the pollution (see the report for 1993 on project II.6.1. of the INSROP program) of sea from ships sailing along the NSR and is based on the experience of navigation of Russian ships in Arctic seas.

Structure of the "Guide" corresponds to that of the International Convention for the Prevention of Pollution of the Sea from Ships, 1973, modified by the Protocol of 1978 (MARPOL 73/78). The Guide incorporates measures to be taken on ship in order to prevent pollution of sea by oil, hazardous chemical substances carried as liquids in bulk and packed, sewage water and garbage.

The first section deals with measures for the prevention of pollution of sea from ships. Measures are specified which have to be taken both on all transport ships and on tankers. At present tankers are used only to deliver oil products to Arctic towns, therefore the ballast transit is made from the Arctic to adjacent areas of Murmansk, Arkhangelsk, Nakhodka, Providence, where the ballast is discharged into sea or given up to reception facilities, if it does not comply with "clean" or "segregated" categories.

In the future it is planned to organize export of oil and gas of Arctic deposits, therefore the document specifies measures for environmental protection to be taken during this traffic.

Special attention is paid to the preparation and organization of the sailing of ships under ice conditions to avoid potential accidents and oil spillage.

Second and third sections are dedicated to problems of the prevention of sea pollution by hazardous chemical substances carried as liquids in bulk and packed. Though at present chemical substances are transported along the NSR only in bulk (ores) and in packing, the Guide considers questions of the prevention of sea pollution by hazardous substances carried as liquid in bulk because such trades possibly will be organized in the nearest future.

The fourth section of the Guide considers measures to be taken for the prevention of sea pollution by sewage water and the fifth section concerns the same but in case of sea pollution by garbage.

The Guide principally uses vocabulary adopted by MARPOL 73/78. However in certain sections of the report while citing standard documents of specially authorized control bodies the terminology of these documents is used which differs from the international one. So, for instance, there are differences in the definition of sewage waters. According to Russian standards on the quality of water, sewage water is divided into two categories:

1. Domestic and feces waste water (black water) corresponding to the concept of waste water adopted by MARPOL 73/78.

2. Domestic waste water (gray water).

This is waste water the discharge of which is not regulated by MARPOL 73/78.

The Guide uses the term MPC (maximum permissible concentration) of a certain substance in water. This is such a concentration of a noxious substance in water which has no appreciable detrimental effect. There is a fishing MPC, that is concentration without any perceptible adverse influence upon marine living organisms during there entire life (fish, shell-fish, mammals etc.) and a sanitary-domestic MPC in water without any appreciable influence upon human beings. As a rule, fishing MPC is noticeably lower than sanitary-domestic MPC. For instance, for oil the first one is 0.05 mg/l and the second one - 0.3 mg/l (0.1 mg/l for sulphurous oil).

The Guide for the control of pollution from ships sailing along the NSR has been approved by specially authorized control bodies of the Russian Federation and is binding for all ships sailing along the Northern Sea Route with the exception of naval vessels.

Annex A

Guidelines for control of pollution from ships on the NSR

St.-Petersburg
1995

GUIDE FOR CONTROL OF OIL POLLUTION FROM SHIPS SAILING ALONG THE NORTHERN SEA ROUTE

APPLICATION

The present Guide stipulates general requirements and technical measures aimed at prevention of pollution from ships sailing along the Northern Sea Route /NSR/.

The Guide is applied to the Russian territorial waters /territorial seas/, inland sea waters of Russia and estuary waters of rivers along the NSR.

The Guide requirements are obligatory for ships sailing along the NSR.

I. GENERAL

I.I. Responsibility and Control

I.I.I. **The master of any ship is responsible for fulfilling the whole complex of measures aimed at prevention of pollution from ships.**

He is responsible for:
- implementation of the ship owner policy on providing safety and environment protection based on international conventions, codes and national legislation;
- impelling the crew to implement this policy;
- issuing corresponding orders and regulations in a simple and clear form;
- controlling procedures on providing safety and preventing pollution;
- in matters of safety and prevention of pollution. the Master is vested with all the powers to exercise any actions which in his opinion are suitable to passenger's and crew interests, the ship and sea environment safety;
- the master should inform the ship owner about such faults and other problems which may influence the safe exploitation of the ship or may bring about pollution and which ask for cooperation with the ship owner to be eliminated.

The ship personnel must act according to the ship owner policy on providing safety and environment protection, and to master's orders and directions to this end; display responsibility in matters of preventing any traumas and damages and any pollution of sea environment.

I.I.2. The present Guide incorporates the requirements of the Russian Federation legislation, rules of federal control bodies and international agreements concluded by Russia on environmental protection.

I.I.3. **In relation to the ships sailing along the NSR the State control over use and protection of waters is exercised by the NSR. Administration and specially authorized State bodies of the Russian Federation responsible for environment (Minprirody) protection, and fishery protection bodies of the Russian Fishery Committee (Rosrybvod) and Russian Sanitary-Epidemic Supervision Committee (Glavsanepidnadzor).**

I.I.4. **The part of the State sanitary supervision of ships concerning, in particular, prevention of pollution from ships, is exercised at the site by representatives of the State sanitary-epidemic supervision basin centers.**

I.I.5. **The part of engineering supervision concerning prevention of pollution from ships, is exercised by the Maritime Shipping Register or other classification society participating in IACS /International Association of Classification Societies/.**

I.I.6. In accordance with general conditions of supervision activities the functions of the Maritime Shipping Register include the following actions:

- supervision over designing, manufacturing, testing and exploitation of ship equipment used for preventing pollution of the sea;
- issue of the Maritime Shipping Register certificates, type test certificates and approvals required by MEPC resolutions for equipment designed for preventing pollution of the sea;
- supervision over construction and conversion of ships in accordance with the requirements of the MARPOL 73/78 Convention;
- issue of international oil pollution prevention certificates (IOPP) required by the MARPOL 73/78 Convention and the Maritime Shipping Register Rules to ships.

I.I.7. The following is liable to supervision of the Maritime Shipping Register:

- oil separating equipment providing for oil content not exceeding I00 parts per million (I00 ppm);
- oil filtering equipment providing for oil content not exceeding I5 ppm;
- systems of automatic measuring, recording and oil discharge monitoring;
- oil-water interface detectors;
- standard discharge connection for delivery of oily water;
- system of washing tanks by crude oil;
- slop tanks on tankers;
- system of transferring, giving up and discharge of oily water, including slop tanks;
- equipment for emulgation, homogenization, ventilation and washing of tanks on chemical carriers;
- system of eliminating residues of hazardous liquids;
- installations for processing and disinfection of sewage, including slop tanks;
- standard discharge connection for delivery of sewage;
- installation for processing and incineration of garbage;
- garbage collectors.

I.I.8. Order and intervals between surveys of equipment, systems, devices and instruments designed for prevention of pollution from ships are established by the Maritime Shipping Register.

Ship Administration should adhere to survey time sheet and prepare the ship, its equipment, systems, devices designed for prevention of pollution to survey in advance, and to report to the Maritime Shipping Register about all accidents and failures having occurred during the period between the surveys of above mentioned equipment, systems, and devices.

I.I.9. In case of variant reading of the present Guide propositions with technical requirements of the "Register Rules on Prevention of Pollution from Ships" preference is given to the latter.

I.I.I0. Terms and definitions used in this Guide are given in Annex 1.

I.I.II. List of standard documents used in the process of preparation of this Guide is given in Annex 4.

I.2. Use of international conventions and Russian national rules provisions in prevention or pollution from ships.

I.2.I. In general the main part of the NSR is situated within the territorial waters of Russia and partly in waters of the economic area of Russia. **Ships sailing along the NSR must be guided by "Regulation for navigation on the sea ways on the Northern Sea Route".**

I.2.2. **While being in territorial or inland sea waters, as well as in waters of exclusive economic zone (EEZ) of Russia every ship must comply with national rules of Russia requirements concerning prevention of pollution from ships.**

I.2.3. With the object of protecting water consumption areas against pollution, ensuring safety of their use for recreation, medical and sanitation, domestic and drinking needs of population and creating safe conditions for the production of aquatic plants, protected areas of sea water consumption, zones of their sanitary protection as well as a protected coastal land belt are defined.

I.2.4. Boundaries of water consumption areas of sea coastal waters protected against pollution are specified by territory, regional or town municipal councils on the submission of local bodies and organizations of Goskomsanepidnadzor of the Russian Federation.

I.2.5. Boundaries for the coastal area of sea water consumption is defined with the distance seaward not less than two miles from the water edge (3.9 km).

Depending on particular sanitary, hydrophysical, topographic and hydrological features as well as on the conditions of national-economic use of the sea coast the coastal area of sea water consumption may be extended seaward on the demand of sanitary and epidemiological service of Goskomsanepidnadzor of the Russian Federation and agreed with local territorial administrative bodies.

Boundary of the zone of sanitary protection of the area of water consumption of population is defined seaward by the boundaries of territorial waters and towards both sides of the area of water consumption by the water edge line at a distance of 10 km.

Scheme of the protected area of sea water consumption see on the Fig.1.

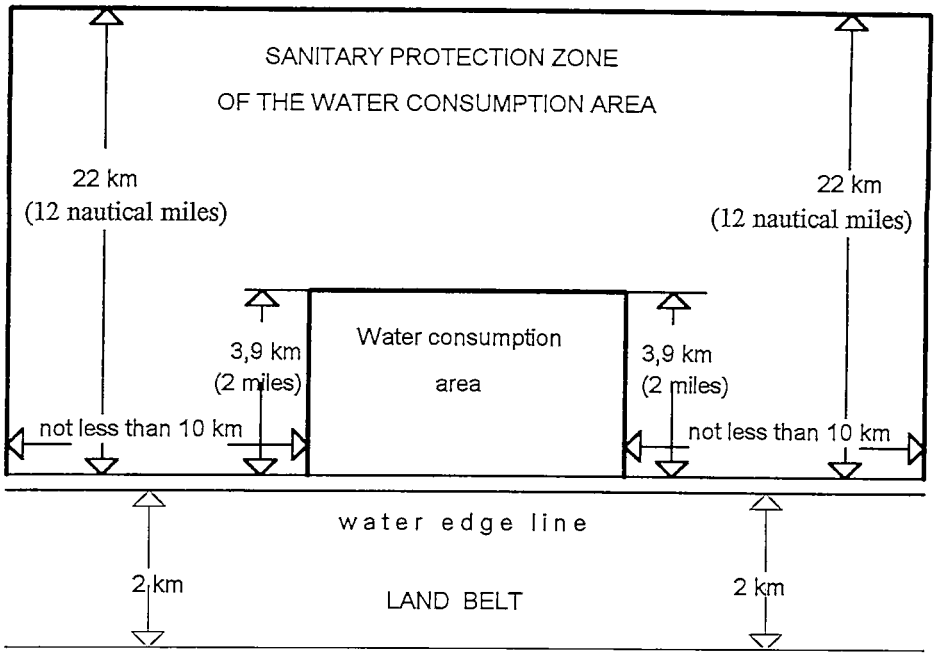


Fig.1. Scheme of the protected area of sea water consumption

1.2.6. **Discharge of non-processed and processed sewage is forbidden in the breeding areas of mammals and fish. Discharge of sewage near such places can be permitted only by control agencies.**

I.2.7. **Discharge of any non-processed industrial, domestic and other wastes and garbage is forbidden.** It is also prohibited to store garbage and other wastes on ice and coast in places not agreed with bodies responsible for control of using and protection of waters in the system of the Russian Federation Ministry of Nature, and bodies exercising State sanitary supervision and protection of fish reserves.

I.2.8. **Treatment of spilled oil or any other dangerous substance by any chemical agents in Russian sea water is prohibited**, with the exception when such treatment is carried out by special detachments acting on the base of permission granted in established order by the Ministry of Nature, State Sanitary-Epidemic Supervision Committee and Fishery Committee of the Russian Federation mutually.

I.2.9. **Ships sailing along the NSR should comply with all applicable provisions of current international conventions on prevention of pollution, participated by Russia.** Allowable norms and conditions of discharge of dangerous substances from ships therewith are determined by international conventions, depending on different parameters characterizing the ship and its position respective the nearest land.

International convention on prevention of pollution from ships adopted in I973 and modified by the Protocol of I978 (MARPOL 73/78) came into force in October I983 together with Annex I (Regulations for the Prevention of Pollution by Oil). Then Annex II (Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk), Annex III (Regulations for the Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form), and Annex V (Regulations for the Prevention of Pollution by Garbage from Ships) also came into force (as of I September, I994).
Annex IV of MARPOL 73/78 (Regulations for the Prevention of Pollution by Sewage from Ships) was adopted by the Council of Ministers of the USSR as of 6 July, I987.

By the order of Merchant Marine Minister No I6I-np as of October 8, I987, issued in lieu of the above decision of the Council of Ministers of the USSR, indisputable compliance with the requirements of Annex IV of MARPOL 73/78 becomes the duty of the Responsible Persons.

I.2.I0. Taking the above mentioned into consideration, **sailing along all the length of the NSR falls into category of sailing in "special area", and all the corresponding regulations of MARPOL 73/78 on the prevention of pollution of the sea by oil are obligatory.**

2 . PREVENTION OF POLLUTION BY OIL

2.I. REQUIREMENTS FOR ALL SHIPS

2.I.I. General

2.I.I.I. Oil record book

2.I.I.I.I. **Any oil tanker of I50 tons gross tonnage or above and every ship of 400 tons gross tonnage and above, other than an oil tanker, must be provided with Oil Record Book (ORB), Part I. In ORB, Part I the full list of operations in the engine room, liable to recording in ORB in compliance with Rule 20 of Annex I of MARPOL 73/78 should be presented.**

2.I.I.I.2. **Any oil tanker of I50 tons gross tonnage or above in addition to ORB, Part I must be provided by ORB, Part II for recording corresponding loading and ballast operations. In ORB, Part II the full list of loading and ballast operations liable to recording in ORB in compliance wit Rule 20 of Annex I of MARPOL 73/78 should be presented.**

2.I.I.I.3. ORB is a ship document and designed accordingly, i.e. it should be stringed through, entered into the Register of Ship Documents and certified by Captain of the port where the ORB was obtained. Every entry into the ORB should be signed and dated by the Responsible Person. Beside the signature the post, name and initials of the Responsible Person should be stated in brackets. Every filled page should be signed by the Master of the ship.

2.I.I.2. Oil filtering equipment

2.I.I.2.I. Oil filtering equipment is any combination of a separator and a filter or coalescer which is designed to produce effluent containing not more than I5 ppm of oil.

2.I.I.2.I.I. **Any ship of 400 tons gross tonnage and above shall be fitted with oil filtering equipment.**

2.I.I.2.I.2. **Any ship of I0,000 tons gross tonnage and above shall be fitted with an alarm and arrangement for automatically stopping any discharge of oily mixture when the oil content exceeds I5 parts per million.**

2.I.I.2.I.3. **Ships delivered before 6 July I993 (Date of construction termination) may use oily-water separating equipment in lieu of oil filtering equipment until 6 July I998.**
2.I.I.2.2. Operating procedures for the above equipment are carried out according to manufacturers' instructions which should be readily available on board and should be strictly observed. The equipment should always be in good working order.

2.I.I.2.3. Any oil-water cleaning installation should have a certificate about type test of the oil filtering equipment, issued by the Maritime Shipping Register, in which it is confirmed that the equipment and systems were tested according to IMO norms and acknowledged conforming to these norms, as well as an International Oil Pollution Prevention certificate (IOPP) with

Appendix A, delivered at regular or primary survey, with the entry about the results of the survey.

If, according to stipulations of MARPOL 73/78 the ship is relieved of the necessity of oil filtering equipment, and if slop tanks and systems for delivering oily water to reception facilities (on tankers slop tanks may be used to this aim are installed on board, the Maritime Shipping Register makes a corresponding entry into the ship's IOPP available on board the ship.

2.I.I.2.4. Even if there is a certificate of the Maritime Shipping Register about type test of oil filtering equipment, the ship is not relieved of the responsibility in case actual oil pollution of the sea takes place at the discharge of oily water through the oil filtering system. In such case any discharge of oily water through such equipment should be carried out under the control of alarm (see 2.I.6.), if the latter is available, and besides it is necessary to keep observation of sea surface in the area of discharge of separated water through outboard hole.

2.I.I.2.5 At the failure of the ODMCS or alarm and until they are restored, control of the oil content in effluents is permitted by means of different non-automatic stationary and portable instruments. In all these cases constant visual control is obligatory. In case of failure of the ODMCS or alarm a corresponding entry is made into the ORB.

2.I.I.2.6. **If in the discharged oily water or at the sea surface oil traces are detected, the discharge should be terminated immediately independent of readings of the oil content instrument, because it presents a violation of condition of discharge.**

2.I.I.2.7. Detergents not approved by Administration and not corresponding to a "quick separating" type (See Resolution of MEPC 36 as of 05.II.94) should not be used to clean bilge and/or fuel oil tanks, if the washing water is to be discharged through oily-water separating equipment or oil filtering equipment.

2.I.I.2.8. When oil-contaminated water is passed through an oily-water separator or oil filtering equipment, the recovered **oil residues should be retained and transferred to the storage tanks** until they can be disposed of to reception facilities, burnt in boilers or incinerated.

2.I.I.2.9. Oil filtering equipment manufactured, tested and installed on board the ship under supervision of the Maritime Shipping Register should be presented to the latter for reexamination in the time intervals specified in the IOPP Certificate, with the aim of confirming suitability to requirements and prolongation of the IOPP Certificate validity.

2.I.I.2.I0. If the ship oil filtering equipment installed on board, by its technical characteristics or in consequence of failure, is not able to decrease oil contents in effluent up to allowable level, the valves separating the equipment from outboard must be closed, pressed and sealed in accordance with recommendations given in 2.I.I.4.; it is necessary therewith to collect oily water and dispose of it to reception facilities thereafter.

2.I.I.3. General requirements for ship operations.

When loading or transferring oil, bunkering or discharging oily mixtures, the following precautions should be observed.

1. When at a berth or jetty, the ship must be securely moored by means of ropes and/or wires which are in good condition and sized for the load they are likely to take. Mooring lines should be regularly inspected and tended to ensure that they are kept properly tensioned,

thereby minimizing any movement of the ship away from or along the berth, especially when there is a considerable rise and fall of the tide.

2. At load operations between two ships on the road or in the open sea, it is necessary to use soft pneumatic fenders with the aim to prevent damages of ships at mooring or moving on waves. Loading hoses therewith should be suspended in such a way, as to prevent the possibility of their damage between the ships' boards.
3. **For any operation involving oil or oily mixtures, prior to commencement of operations, all valves through which oil could be discharged to the sea should be inspected to ensure that they are closed and, if not used in the operation, should be secured to ensure that they are not opened.**
4. **All scupper holes to which oil would have access in the event of a spillage should be plugged liquid tight for the duration of the operations. Accumulations of water should be periodically drained off the deck, and the scupper plugs replaced immediately after the water has been cleared.**
5. Containment arrangements of sufficient size should be placed under the hose couplings, flanges and the corresponding tanks' air pipes before and during the operations. These containment arrangements are to be drained or emptied as necessary. Where no facilities exist for proper drainage of hoses and pipelines, the couplings should be suitably blanked immediately on being disconnected.
6. A dry material, such as sand, or an oil absorbent should be available at all times to deal with any small spill which may occur. Any oil spilled on deck should be immediately cleaned up and contained for subsequent disposal. Spilled oil should not be washed overboard.
7. A positive means of communication should be continuously maintained throughout oil transfer operations between ship and shore (bunkering vessel, sea terminal). Communication should be checked and all signals used should be thoroughly understood by both parties before commencing operations.
8. The hoses (see 2.2.4.2.3.) and other equipment in use should be inspected prior to commencement of operations, and at regular intervals during use, to ensure early detection of leakage or damage. During operations, hoses should be properly connected and supported, particular care being taken to avoid possibility of their being crushed between the ship(s) and the quay, or between the ship's bottom and the seabed at offshore berths having underwater pipelines.
9. Hoses should be of sufficient length to allow for normal movement of the ship(s), and should not be bent to a radius less than that for which they have been designed.
10. Before attempting to lift any hose on board, the Master or any other responsible officer should check that the total weight involved is within the capacity of the ship's derrick or crane intended to be used.

11. **Where the ambient temperature is below freezing point, pipe joints should not be made with moisture absorbing gasket materials, as these may leak if the pipeline temperature rises during transferred warm liquids.**
12. Where they exist, all side doors to the bunkering stations of a ship should be closed and secured when not in use, and as soon as possible after use.
13. Advance notice should be sent to any port requested to provide reception facilities by any ship which has oily water and oil residues to discharge. In the event that ship-masters experience difficulties in disposal of oily residues due to non-availability of reception facilities, reports to that effect should be made to the Flag Administration.
14. If it is revealed that shore facilities and terminals do not correspond to their designation, are in unsatisfactory condition, poorly serviced by shore personnel, which may result in spilling noxious liquid substance, the ship's officer responsible for operation must call the shore personnel's attention to this fact. If the shore personnel does not provide for safe operation of hoses, the Master must inform the Captain of the port. In any case such events must be duly recorded in the ship's logbook.
15. **Check lists should always be used, see Appendix 2.**

2.I.I.4. Sealing valves on the ship.

2.I.I.4.I. Prior to entering the ship into the zone, where the discharge into the sea of noxious liquid substances is prohibited, all the valves, gate valves and other isolating devices at the side where noxious liquid substances are discharged overboard should be closed and sealed. Sealing must be done with ship's sealing pliers by ship's crew. During stay in the port or sailing in a special area officers relieving the watch must check the condition and preservation of seals.

2.I.I.4.2. Sealing is carried out by the Master or the person authorized by the Master, personally. Officers responsible for technical exploitation of ship systems and devices, through which pollution of the sea may occur may be granted such authorization.

2.I.I.4.3. Any sealed valve (or other isolating device) should remain in the position held at the moment of sealing; any manipulation of this valve, except in emergency situations, is strictly forbidden until the permission of the Master or the authorized person is obtained.

2.I.I.4.4. The sealing pliers are constantly kept by the Master (in his absence - by an officer designated by the Master and made official by order) and given over to those authorized to carry out sealing. The sealing pliers shall be returned to the person responsible for their keeping, immediately on completion of the sealing operation.

2.I.I.4.5. The ship hull number or other distinguishing sign made officially by order should be seen clearly, on the seal impression.

2.I.I.4.6. Each case of sealing performed with the aim of prevention of pollution of the sea from ships should be recorded in the ship's or engine-room logbook (dependent on which crew member is performing the sealing). The entry should include the precise:

- date and time of seal imposition;
- geographic coordinates or other data clearly defining the ship's position at the moment of seal imposition;
- the post and name of the person having carried out sealing;
- designation of the sealed valve (or other isolating device);
- working condition (opened, closed, pressed up etc.), at which the valve was sealed;
- distinguishing characteristic of the seal.

2.I.I.4.7. In cases when according to a port rule requirements sealing of certain ship's valves is carried out by a representative from the shore, the name with his or her initials and post are entered into the logbook together with the data listed in 2.I.I.4.6.

2.I.I.4.8. The valve (or other isolating device) that shall be sealed should be specially fitted for the purpose. After imposing sealing any possibility to bring the valve out from the position fixed at the moment of sealing, should be excluded. At the same time the possibility of by-passing the seal at the expense of loosening a thread connection or any other connections should be excluded too.

2.I.I.4.9. When the change of the valve position may be exercised not only locally by hand, but remotely too, seals must be made in two places: directly at the hand drive and at the remote control station.

2.1.I.4.I0. After the valve is sealed a signplate clearly stating for instance: **"Sealed! Not to be opened!", "Valve sealed! Not to be opened!", "Attention!' Sealed, not to be opened"** etc. should be fixed (hung) at the valve.

2.I.I.4.II. On the ship diagrams showing the valves to be closed and sealed during sailing through sea zones or stay in the port where discharge of noxious liquid substances or their mixtures is prohibited, should be displayed prominently. Each such valve shall be given a distinguishing sign.

2.I.I.4.I2. When the valves can be controlled remotely, location of remote control stations shall appear on the diagrams.

2.I.I.4.I3. There should be a separate diagram of valves (or other isolating devices) liable to sealing for each ship's system (including garbage collecting device), used for handling noxious substances. One copy of these diagrams should be kept together with the logbook of operations with corresponding noxious substances.

2.I.I.4.I4. Unsealing is permitted after leaving the forbidden zones for discharge. In this case the allowable discharge of noxious liquid substances should be exercised as far as possible from the zones boundaries. The act of unsealing shall be simultaneously entered in the appropriate logbook stating precisely:

- date and exact time of unsealing;
- geographic coordinates or other data clearly defining the ship's position at the moment of unsealing;
- unsealed valve or other isolating device;
- post and name of the person who executed unsealing.

If the seal is removed before leaving zones mentioned in 2.I.I.4.I., an entry explaining the reason of this removal and the name of the person who arrived at such decision shall be entered in the logbook.

2.I.I.4.I5. Cases of inadvertent or casual unsealing shall be immediately reported to the Master or his substitute, and the valve resealed immediately. If the sealing was executed by the shore representative, the following actions should be exercised in accordance with the order established for such cases by the port rules.

2.I.I.4.I6. Corresponding entries about unsealing and subsequent resealing shall be duly entered in the deck or machine-room logbook, as appropriate.

2.I.I.4.I7. The valves on open deck pipeline terminals, specially designed for delivery of noxious liquid substances to reception facilities from the ship, are not sealed. The end flanges of such pipes are plugged, and the plugs are removed only when the ship's pipeline is connected to the pipeline of the reception facility.

2.I.2. Bunkering operations

2.I.2.I. Any bunkering operation (loading of fuel oil and oil in bulk) i.e. its planning, execution and termination, as well as measures designed to prevent pollution of the sea during the bunkering operation, must be carried out under direct supervision of the Responsible Person (specially trained member of the crew, preferably an officer) who must personally supervise all the bunkering operations on the ship. The supplier should appoint a similar individual.

Throughout the entire bunkering operation the ship's and the supplier's Responsible Persons must maintain close cooperation and continuous communication.

Upon receiving sailing orders the person responsible for oil loading draws up a process chart of bunkering. The process chart is approved by the Master of the ship.

2.I.2.2. **Manual for performing bunkering operations specifying duties of the crew members participating in the operation shall he found on each ship.**

2.I.2.3. Such manual must include:

1. description of pipe systems, equipment and devices intended for carrying out bunkering operations on the ship, with indication of:
   - scheme of pipeline and its elements such as valves, pumps, instruments, control and monitoring means, ventilation, gas discharging and overflow pipes etc.;
   - position of the valve or other device intended for emergency stopping of the operation, for isolation of different parts of the pipeline and procedure of their use.
2. duties of the Responsible Person;
3. staff engaged in bunkering operations and their duties during bunkering;
4. duties of every member of the crew enlistened in work during operations beside the staff;
5. order of preparing the ship, her systems, equipment and devices to coming bunkering operations, taking into consideration measures for preventing pollution;
6. order of beginning, execution and terminating of the measures;
7. description and order of using means of localization of spills occurring during bunkering operation;
8. order of warning about pollution of harbor waters by oil;
9. other information, directions, recommendations providing for prevention of pollution of the sea during bunkering operations.

2.I.2.4. To avoid possible oil spillage it is forbidden to carry out bunkering operations at the roads during unfavorable weather conditions (heavy sea and wind). In any case the port administration permission must be obtained to carry out such bunkering operations. The possibility of carrying out bunkering operations is decided by the Masters of bunkering and supplying ships.

2.I.2.5. Before bunkering.

2.I.2.5.I. The Responsible Person should ensure that all staff engaged in bunkering operations are thoroughly familiar with the ship's fuel system, including the position of overflow and air vent pipes, the overflow tank, the sounding pipes, level indicators and the procedure for stopping oil flow in an emergency.

2.I.2.5.2. The Responsible Person shall consult with the shore staff or barge crew about the maximum allowable rate and the maximum working pressure on the fuel oil filling lines. The Responsible Person shall be aware of the number of tanks which he can fill simultaneously, with satisfactory stability conditions being maintained. He should know the maximum number of tanks over which he and his staff can exercise proper control and all persons involved in the operation should know the sequence in which the tanks are to be filled.

2.I.2.5.3. The Responsible Person should satisfy himself that the air vent pipes have been inspected to ensure that displaced air and gases escape freely and safely. Scuppers must be plugged and the deck periodically drained of any accumulated water. All vents and connections

must have receptacles located so as to catch any drips. For bolted connections, ensure all bolts are used and all bolts are tight.

2.I.2.5.4. The Responsible Person should ensure that accurate soundings of ullages of the oil tanks are taken to determine the quantity of oil already on board and satisfy himself that the expected amount of oil to be delivered can be safely accommodated. The Responsible Person should also ascertain from the suppliers that they also make the measurements of delivered liquid. If the fuel is to be heated, the temperature and its effect on the oil volume should be carefully considered.

2.I.2.5.5. It is essential that the overflow tank, if fitted, or the oil tank set aside as an overflow tank, is the last to be filled. The filling valve to this tank should, therefore, be closed until the tank is required at the end of bunkering. A check should be made that all necessary valves in the filling line are open.

2.I.2.5.6. Although over-filling of tanks is the main cause of oil spill during bunkering operations, damaged flexible hoses are another important cause. Flexible hoses should be inspected, tested and maintained in accordance with manufacturer's specifications and any appropriate regulations.

2.I.2.5.7. On ships equipped with a united system of overflow pipes it is necessary to switch on and keep in working condition the overflow alarm system, to check its functioning and make entries in the machine-room logbook about the checks. In this case pans should be placed only under or around air pipe exit from the overflow tank, and under (or around) the reception connection of filling oil (fuel oil) pipe.

2.I.2.6. During bunkering.

2.I.2.6.I. Bunkering should commence at the minimum pumping rate so that the supply of fuel can be readily stopped in the event of mishap. After ascertaining that oil (fuel oil) arrives at the expected tanks and that there are no leakages in hose connections the rate can be increased to nominal. The pressure in the supply lines should be observed regularly to ensure that the maximum working pressure is not exceeded.

2.I.2.6.2. Frequent soundings of ullages of the tanks should be taken. The filling valves of the next tanks in the sequence of filling should be opened before the valves on the tanks being filled are closed. During "topping up" of the tanks the delivery rate should be slowed down, and ample warning should be given to the suppliers of the need to reduce the rate of delivery during these operations. The filling valves on the ship's oil lines shall not be closed until after the supply has been stopped and the hoses drained.

2.I.2.6.3. I0 - I5 minutes after a tank is filled and the valves are closed it is necessary to check the oil (fuel oil) level in the tank. A rise in the level means that delivery is going on in spite of the fact that the valves have been closed. Measures must then be taken to prevent overflow.

2.I.2.6.4. When bunkering big ships where bunkering is carried out with high intensity, it is recommended to protect the bunkering ship and the barge by a boom supplied on request from the barge skipper.

2.I.2.7. On completion.

2.I.2.7.I. Before completion it is necessary to decrease the delivery rate, and the bunkering organization should be warned about it in advance. Double bottom oil tanks should be

"topped up" by gravity from deep tanks, whenever possible. The end deck valves of the receiving oil pipeline should be closed only after the delivery pump is stopped and hoses drained.

2.I.2 7.2. The hoses can be disconnected after the oil reception completion, only after control checks in tanks have been made, intake oil valves closed, hoses drained, pans under the receiving connections drained and removed.

2.I.2.7.3. On completion of the bunkering operations, the hoses flanges should be separated and a fully bolted blank flange fitted on the end of the ship's oil filling line and on the hose. These flanges should be fitted while over the containment arrangement. All fuel line and tank filling valves should be securely closed. The sounding arrangements in the tanks should be the last to be closed.

2.I.2.7.4. The entry about the commencement and completion times of the oil delivery should be made into the ORB, Part I.

2.I.3. Transferring fuel oil within a ship

2.I.3.I When transferring fuel oil within a ship, such as from bunker tanks to settling tanks, care should be taken to ensure that any piping route that could result in an overboard discharge is properly closed and secured against accidental opening. Where practical, blank flanges should also be fitted in any piping route that leads overboard.
2.I.3.2. The Responsible Person should satisfy himself that the air vent pipes and overflow pipes, where fitted, are clear and in order. The tank sounding arrangements and/or the oil level indicators on the settling tanks should not allow the escape of oil in the event of an accidental over-filling of the settling tanks.

2.I.4. Ballasting and deballasting of tanks used alternately for fuel oil and water ballast

2.I.4.I. **New ships of 4,000 tons gross tonnage and above, other than oil tankers, and new oil tankers of I50 tons gross tonnage and above, are so constructed that no ballast water will normally be carried in any fuel oil tank.** Where abnormal conditions or the need to carry large quantities of fuel oil render it necessary to carry ballast water in any fuel oil tank, such ballast water is to be discharged to reception facilities. All other ships are required as far as reasonable and practicable, not to carry ballast water in fuel oil tanks.

2.I.4.2. During ballasting of dual purpose tanks every precaution must be taken to prevent oil flowing back from the pipeline into the sea. The pump used for filling should be started before the sea suction valve is opened and all relevant master valves along the ballast line including the tank receiving valve should be opened. It is necessary to check water delivery into the tank, intended for ballast reception.

2.I.4.3. Soundings of all tanks should be frequently taken to ensure that only those tanks which are intended as ballast tanks are receiving water. If any water overflows from those tanks it will almost certainly be contaminated by oil and be capable of causing pollution. Therefore as much care must be taken in ballasting tanks which have contained oil as is taken in "topping up" tanks when bunkering. After the tanks are full, the ballast filling valves on the tanks should be closed before centrifugal pump is stopped to ensure no flow back into the ballast lines.

2.I.4.4. **Deballasting of dual purpose tanks may take place only outside special areas. So during sailing along the NSR, all ballast water contaminated by oil should be preserved on board the ship for consequent discharge to the shore reception facilities.**

2.I.5. Machinery space bilges

2.I.5.I. Machinery space precautions.

2.I.5.I.I. Every ship should have means of preventing any fuel oil from escaping into the machinery space bilges. This may be achieved by means of special oily bilges, gutterways and trays beneath oil pumps, heaters, etc. These arrangements should be regularly inspected and any accumulation of oil should be transferred to a storage tank before the risk of overflow to the ordinary bilges arises. In case of trays under pumps which do not drain into the oily bilges, these should be kept clean so that any leakage will be immediately apparent and can be dealt with before it can overflow into the ordinary bilges.
2.I.5.I.2. Care should also be taken to prevent the ordinary machinery space bilges from overflowing into the oily bilges and gutterways.

2.I.5.I.3. All oil pressure pipes and fuel oil pipes and fittings should be inspected regularly to ensure that any leak which could result in contamination is detected at an early stage and can be dealt with.

2.I.5.2. Discharge from machinery space bilges.

2.I.5.2.I. **Oil-contaminated bilge water shall not be discharged overboard either directly or through an oily-water separator, unless it contains less than I5 ppm of oil and is in compliance with MARPOL 73/78 and local regulations.** Any oil-contaminated water which has accumulated in the machinery space bilges prior to arrival and whilst a vessel is in port should, if possible, be disposed of to shore facilities before the vessel sails. A standard discharge connection in accordance with the requirements of Regulation I9 of Annex I of MARPOL 73/78 should be provided to facilitate the disposal to reception facilities of any accumulation of oily bilge water.

2.I.5.2.2. If no shore reception facilities exist, the bilges should be pumped into a suitable storage tank, for subsequent disposal, through the oily-water separator (oil filtering equipment) in accordance with the requirements of relevant Regulations as described below as appropriate and in Appendix 3.

1. **Any discharge into the sea of oil or oily mixture from any oil tanker and any ship, other than an oil tanker, of 400 tons gross tonnage and above shall be prohibited in the area of the NSR**, except provided all the following conditions apply:
   - the bilge water does not mix with water from cargo pump room bilges;
   - the bilge water is not mixed with oil cargo residues;
   - the ship is proceeding "en route";
   - the oil content of the undiluted effluent does not exceed I5 ppm; and
   - oil filtering equipment, approved by the Administration, with alarms and automatic discharge cut-off, is in use.
2. **Any discharge into the sea of oil or oily mixture from a ship, other than an oil tanker, or less than 400 tons gross tonnage, shall be prohibited**, except when the oil content of the effluent without dilution does not exceed I5 ppm.

2.I.5.2.3. The discharge of clean ballast (except as mentioned in 2.I.5.2.4.) and segregated ballast in area of NSR is allowed only if the ship is proceeding "en route".

2.I.5.2.4. **The discharge of any oil-containing mixtures, including clean water ballast, from ships into the sea is prohibited in inland waters of Russia in the areas of water consumption, aquatory of**

Russian ports, areas of sanitary protection under the Jurisdiction of Russia, and fishery areas. All the accumulated on board the ship oil-containing mixtures and clean water ballast should be discharged to reception facilities. In the absence of any reception facilities in the port, the oil-containing mixtures, including clean water ballast should be kept on board the ship until leaving from the above mentioned areas.

2.I.6. Oil discharge monitoring and control systems (ODMCS)

2.I.6.I. The system for automatic measuring, monitoring and control of oil discharge ODMCS) is designed for continuous measuring of oil contents in the ballast and wash water of tankers discharged overboard.

With the aim of control of the ballast and wash water discharge on tankers the ODMCS exercises automatic recording of instant rate of oil discharge and its common discharged quantity, or oil content in effluent and effluent discharge rate. If the allowable parameters are exceeded the system generates a signal to actuator, terminating the discharge. ODMCS are not in use in the area of NSR, as the discharge of washing and ballast waters is prohibited. ODMCS operates only outside the NSR area, for example in the Barents and Bering seas.

Proper description of the ODMCS design and functions is given in the manual supplied to each ship equipped with the ODMCS

2.I.6.2. The ODMCS should be switched on every time any oily-water mixture is discharged overboard, when this discharge is exercised from cargo spaces where, in accordance with their designation, oil may be found.

2.I.6.3. Persons appointed as responsible for carrying out the discharge of oily-water mixtures overboard, must know in detail the ODMCS manual, be able to switch it on and off, to regulate and tune it, and to repair it in the scope envisaged by the manual. Such person should be able to switch the ODMCS from automatic into manual regime and control it manually in correspondence with the system's possibilities after some failure.

2.I.6.4. Having switched on the ODMCS before discharge of oily-water mixtures into the sea the Responsible Person must make the mark on the recorder tape about the date and time of the system work commencement, if automatic recording of these data is not provided.

2.I.6.5. The ODMCS recorded tapes should be kept and preserved after the time of the last recording:

- on overseas ship - for three years;
- on coastal ship - for one year.

2.I.6.6. In the case of ODMCS failure an entry into the ORB Part 2 with indication of date and time of the system failure should be made. After restoring its working condition the time of its restart should be recorded and causes of the failure explained.

2.I.6.7. It is recommended that the failed unit of the ODMCS, working in the line of discharge of any oil-containing mixtures overboard, the mixture containing oil transported as cargo or used as fuel or lubricant (dirty ballast, clean ballast, cargo pump room and machinery space bilge water, settled water from slip tanks, wash water from cargo tanks), should be made serviceable again before the following sailing in ballast begins. If the failure has occurred during the voyage from the port of unloading to the port of repair - to the end of repairs. The voyage

in ballast with the following voyage in cargo to the port of repair is allowed, if control is exercised manually, documentation about discharges presented, and the port of unloading informed of the faulty device and every reasonable attempt taken to repair the faulty unit.

2.I.6.8. After the ODMCS is repaired and made serviceable, it is necessary to make entry into the ORB about the date and time of the system work resumption. In the entry the reasons of failure revealed during repairs should be stated.

2.I.6.9. If the ODMCS, during the operations of oily-water mixture discharge overboard, was put out of action in connection with circumstances which may be deemed as a breakdown or failure, the entry stating the date and time of putting out and into action, and causes which prompted the crew to do so, should be also made into the ORB.

2.I.6.I0. The automatic alarm is designed for continuous control of oil content in the machinery space bilge water discharged overboard, which should not be in excess of I5 ppm.

In excess of said oil content the alarm gives a signal, according to which it is necessary to stop the discharge immediately and find the causes of such excess. The discharge can be resumed only after causes which brought about the signal are eliminated.

2.1.6.11. The installation of the ODMCS and automatic alarm on board the ship and their tests are performed under the Maritime Shipping Register supervision. The certificate of their compliance with the requirements of MARPOL 73/78 is issued.

The systems and instruments should be inspected over time periods stated in the International Pollution Prevention Certificate. The ship administration is responsible for presentation of the systems and instruments to inspection.

2.I.6.I2. In case of absence or failure of the ODMCS on board the ship, it is allowed to use portable instruments for measuring oil content in the discharged mixture by individual samples taken in a special sampler. The latter should also be approved by the Maritime Shipping Register and provided by the Certificate. They are presented to the Maritime Shipping Register for inspection over time periods stated in the Certificate.

2.I.6.I3. If, according to the manual of the ODMCS or alarm, it is necessary to seal instruments or separate blocks of the system to prevent access of the crew to them, such sealing should be exercised by specially authorized persons. The crew must provide for safety of the seals and present the seals for inspection on demand.

2.I.6.I4. In case of failure in the sealed instrument or block of the ODMCS or alarm it is necessary to follow the manuals of these installations.

2.I.7. Fuel and lubricating oil purification

2.I.7.I. **Every ship of 400 tons gross tonnage and above shall be provided with sludge tank(s) to receive oil residues (sludge) such as those resulting from the purification of fuel and lubricating oils.**

2.I.8. Check lists

2.I.8.I. Check lists should be prepared and used for each operation including:

– bunkering;

- loading;
- discharging;
- transfer of cargo oil;
- lightening;
- ballasting/deballasting

2.I.8.2. If printed check lists are used they must be ticked off prior to the commencement of and during operations shown above. Examples of check lists for operations at terminals are shown in Appendix 2.

2.2. REQUIREMENTS FOR ALL TANKERS.

2.2.I. Information and manuals concerning prevention of oil pollution by cargo oil

2.2.I.I. **On board each ship there should be documents regulating ship operation without pollution of the sea by oil, allowing quick evaluation of arising circumstances in emergency, arriving at right decisions and performing the most efficient actions on prevention of oil pollution.**

These documents include:

1. documents required by MARPOL 73/78 and approved by the Maritime Shipping Register or other classification society, participating in IACS: information for the Master on loading and unloading;
   - information for the Master on the ship's stability and strength, containing data on the tanker's ability to satisfy the emergency stability criteria;
   - manual of the crude oil washing system, if available on board;
   - manual of the oil discharge monitoring and control system (ODMCS);
   - the Shipboard Oil Pollution emergency Plan.
2. documents, approved by the ship owner:
   - instruction for carrying out cargo operations with specification of duties of the crew participating in them;
   - instruction for carrying out bunkering operations;
   - instruction for washing of cargo tanks by water with specification of duties of the crew participating in it;
   - instruction for the tanker ballasting with specification of duties of the crew participating in it;
   - instruction for sealing valves.

2.2.I.2. Each tanker's official and member of the crew must strictly observe relevant directions of manuals and instructions.

2.2.2. Requirements to persons responsible for carrying out loading and ballasting operations and tank washing

2.2.2.I. The person, responsible for carrying out loading and ballasting operations and tank washing, should be selected from the tanker's officers.

2.2.2.2. According to IMO resolution A.446(XI), during washing of cargo tanks by crude oil at the time of the tanker unloading, the Responsible Person should have the appropriate document investing him with power to supervise such operations.

2.2.2.3. The Responsible Person and his subordinates participating in operations, where oil pollution is possible, must be taught the methods and ways of prevention of pollution and oil spillage control. Knowledge and skill on these problems should be gained during planned exercises, carried out according to the Shipboard Oil Pollution emergency Plan.

2.2.2.4. During the tanker's operation its administration must provide for strict adhering to inspections and repairs scheme as of equipment and systems, in which any failure may result in pollution of the sea by oil.

2.2.2.5. Responsibilities of the Responsible Person include the check of the tanker, its equipment, machinery and systems readiness, completeness and readiness of personnel to cargo and ballasting operations and tank washing.
Cargo and ballasting operations and tank washing may be commenced only upon the command of the Responsible Person.

2.2.2.6. The officer on watch, before performing his duties should receive all necessary information about the planned sequence of operational procedure and actual implementation of the plan, any additional directions and decisions on the following fulfillment of the operation, posting of the crew members participating in the operation and the scope of briefing, and methods of maintaining communication with the Responsible Persons of oil delivering or oil receiving object, with stations of emergency terminating the operation, etc.

2.2.2.7. In the course of performing cargo and ballasting operations and tank washing the Responsible Person should take measures lest the number of equipment and valves engaged in operation (opened valves, gate valves, tanks under filling, acting instruments, washing machines, control means, communication means, etc.) and used by his subordinates, participating in the operation, would exceed the possibilities of those people to exercise full-value observation over running operation and carry out corresponding necessary emergency actions on localizing situations tending to transform into emergency ones.

2.2.2.8. In case of oil spill from the tanker the Responsible Person is obliged to stop immediately operations, in the course of which spill has occurred, and dependent on ship's position at the moment of spill to report about it to the shore Responsible Person, ship owner, Captain of the port and ship agent. The operations may be resumed only after causes of the spill are eliminated and upon permission given by the authorized Administration.

The procedure of reporting about the spill is envisaged by the Shipboard Oil Pollution emergency Plan.

2.2.2.9. When on a tanker with segregated ballast the discharge of segregated ballast through the connection of the ballast pipeline to the cargo pump with the help of a removable connection is envisaged, a signboard indicating the restricted use of the connection should be displayed prominently.

2.2.2.I0. Placards related to operation under way, the tenor of which is given later, at the description of corresponding operations, should be placed at appropriate places on the tanker.

2.2.3. Oil tanker operations

2.2.3.I. Ballast operations.

2.2.3.I.I. Ballast operations include loading, discharge and transferring ballast operations on tankers.

2.2.3.I.2. Ballast operations are carried out under personal supervision of one or several alternating Responsible Persons appointed by the Master.

2.2.3.I.3. The members of the tanker's crew involved in ballast operations must have enough experience in carrying out such operations on this tanker, know the systems and equipment used in ballast operations and be capable of using it.

2.2.3.I.4. To provide for the selection of the optimal scheme of ballasting and the most rational technology of operations, as well as to prevent unforeseen expenses and inactivity of tanker, the Master should get in advance the fullest possible information about the conditions and regulations in the tanker's ports of call in coming voyage.

2.2.3.I.5. Before loading ballast the Responsible Person, appointed by the Master, being guided by the direction of the Master, information on the tanker's stability and recommended by the tanker's manufacturer ballasting scheme, should draw up the plan of ballasting and submit it to the Master for approval.

2.2 3.I.6. Prior to ballast operations carried out on the berth, the Master (or the Responsible Person appointed by him) should agree in advance with the shore responsible person about the operation.

2.2.3.I.7. The loading of ballast into tanks of segregated ballast may be exercised in agreement with the shore responsible person during carrying out of cargo operations.

2.2.3.I.8. The loading of ballast into cargo tanks should be carried out after loading operations are finished, tanks are submitted to a cargo receiver's representative, and documents on cargo delivery are drawn up.

2.2.3.I.9 Prior to loading ballast into cargo tanks it is necessary to wash through ballast and stripping pipelines and pumps. The washing need not be carried out, if ballast loaded into dirty tanks will be discharged to reception facilities before next loading.

2.2.3.I.I0. The washing of cargo lines is performed by delivering sea water by the cargo pump for a short time (3 - 5 min.) into each cargo tank. The deck lines, including deck receiving connections, should be washed through too. The water from cargo tanks is then stripped by pumps into a slop tank.

2.2.3.I.II. The washing of cargo lines is recommended to begin from the cargo tank furthest from the pump room.

2.2.3.I.I2. While washing cargo lines it is necessary to wash through all cargo pumps intended to be used in the process of discharging ballast.

2.2.3.I.I3. To provide for washing of deck lines, the end receiving/discharge connections and gate valves it is necessary to mount temporary connectors or hose lines with the aim of draining wash water into cargo or slop tanks.

2.2.3.I.I4. It is allowed to wash through only separate sections of cargo lines, which are intended for the following use in ballast operations, provided that by the design it is possible to securely separate these sections from the rest pipeline. In doing so, it is necessary:

1. to select and prepare the lines so that the possibility of forming "pockets" (sections of line, not washed by the water stream) where oil may stay, should be excluded;
2. to separate the sections designated for washing from those not to be used in ballast operations. The gate valves separating the opened sections from the rest cargo lines should not be opened until the discharge of ballast in the port of loading is finished.

2.2.3.I.I5. On a passage along the NSR where it is intended to arrive at a loading port with clean ballast, the following sequence of procedures should be observed:

1. on completion of discharge thoroughly drain cargo tanks and lines;
2. wash cargo tanks and collect oily wash water in the slop tank;
3. flush cargo lines where necessary;
4. deliver oily wash water to shore reception facilities;
5. on completion of discharging oily wash water and residues to reception facilities, it is necessary to make a corresponding entry into ORB, Part II;
6. take on clean ballast into tanks;
7. upon arrival: discharge clean ballast (according to 2.1.5.2.3, 2.1.5.2.4 and 2.2.3.7) or to shore reception facilities.

2.2.3.I.I6. The Master of the ship should receive a receipt or another document, where the volume of pumped wash water, dirty ballast, residues or oily-water mixtures, as well as the time and date of the transferring are stated, from the operator of reception facilities, including barges and road wagons. Such document attached to ORB, may be helpful in affirmation of the fact that the ship had not been involved in an incident resulting in pollution. The document should be kept together with ORB.

2.2.3.2. Line draining and taking on dirty ballast.

2.2.3.2.I. All lines containing cargo residues should be pumped to shore on completion of discharge. This includes opening pump by-pass lines and cross connections between cargo and stripping lines. Any remaining cargo in the lines which cannot be pumped ashore should be drained into a separate tank or into the slop tank, or to shore line, using a special pipe (of small diameter, as a rule), before ballasting begins. Before taking on ballast into cargo tanks it is necessary to flush cargo and stripping lines and pumps, discharging water into a corresponding cargo tank, with following stripping of water into a slop tank. To prevent oil from leaking overboard by way of the sea suction when commencing to take on ballast, pump room, line and tank valves are to be properly set, and taking on ballast should be commenced into all tanks liable to ballasting simultaneously at a decreased rate of cargo pumps. The pumps are to be running with a vacuum established on the sea line before the sea valves are opened. In order to establish this initial vacuum on the sea line, it may be necessary to take a special effort such as bleeding gas from the pump housing and utilizing stripping pumps or vacuum systems on the vapour line where such are available. After making certain that ballast is taken on in a proper way the pumps rate is increased to nominal.

2.2.3.2.2. Upon termination of taking on ballast corresponding entries should be made into ORB, Part II.

2.2.3.2.3. It is recommended to pump out water from each ballasted tank into the slop tank by the cargo pump for a short time (not more than 5 min.), after taking on ballast is finished.

2.2.3.3. Disposal of dirty ballast.

2.2.3.3.1. **Disposal of dirty ballast is prohibited all along the NSR, All the dirty ballast is kept on board until its discharge to shore reception facilities.**

2.2.3.4. Tank washing.

2.2.3.4.1. General.

2.2.3.4.1.1. During a ballast voyage along the NSR, cargo tanks should be washed as required and washings continuously stripped to the slop tank. Care should be taken to ensure that wash water does not build up in the cargo tank. It should be understood that the quantity of oil eventually discharged to the sea can be minimized by decreasing unnecessary washing, thus reducing the quantity of water brought into contact with oil within the tanker.

On the NSR the clean ballast may be discharged into the sea (see 2.1.5.2.3, 2.1.5.2.4 and 2.2.3.7), but it is imperative that the tanks in which it is carried are sufficiently clean to ensure that the oil content of the effluent does not exceed I5 ppm.

Tanks which have been crude oil washed must additionally be given water rinse following the specified procedure before they are acceptable for the carriage of clean arrival ballast.

2.2.3.4.1.2. Washing of cargo tanks should be exercised in correspondence with the developed for each tanker instruction, using allowable on board the ship special systems and equipment approved by the Maritime Shipping Register in the established order.

2.2.3.4.1.3. Washing of cargo tanks may be done by water (washing with water) or by solvent (unwater washing process). In washing with water cold or hot sea water, or a detergent water solution approved by Administration, are used.
In unwater washing process crude oil or other solvent approved by Administration are used.

2.2.3.4.1.4. Washing of cargo tanks may be carried out by single (by open cycle) or multiple (by closed cycle) use of washing water. During voyage along the NSR only washing by closed cycle may be carried out.

Washing of tanks by closed cycle may be done by one-step (using one slop tank) or two-step (using two slop tanks) scheme.

Washing of tanks by solvents and detergent water solutions should be exercised only by closed cycle.

Only detergents approved for use on ships by Administration and approved in general by bodies of sanitary control, Fishery Committee and ministry of Nature of the Russian Federation may be used as washing detergents.

2.2.3.4.1.5. To prevent oil from leaking overboard during water washing, it is necessary:

1. when preparing for water washing:
   - all the bottom and board sea armature of cargo, stripping and washing lines in the pump room which are not to be used in tanks washing, should be closed and pressed up;
   - scuppers on the main deck should be plugged;

- flush the washing line; to do this, connect the hose from the washing pump to the washing valve furthest from the pump room and pump the line with water for I0 - I5 min., discharging the water into a cargo tank;
- flush cargo and stripping lines in accordance with recommendations of 2.2.3.I.
- check condition of washing hoses and connections; the leaking hoses and connections should not be used for washing tanks.

2. during tank washing:
   - close access holes of tanks to be washed;
   - when using washing machines in tanks, the holes for the machines should be covered by brackets or canvas to prevent water from spraying onto the deck. Washing water occurring on the deck should be drained into a slop tank.

2.2.3.4.1.6. The washed out and settled in the slop tank oil is to be given up ashore or used on board through including it into the ship cargo. The latter is possible only by permission of the cargo receiver.

2.2.3.4.1.7. Washing of slop tanks (tank) or cargo tanks used as slop tanks, should be done with subsequent discharging of wash water to reception facilities.

2.2.3.4.1.8. Discharge of wash water from a slop tank overboard during voyage along the NSR is not allowed. The wash water should be discharged to reception facilities.

2.2.3.4.1.9. On completion of tank washing the entry should be done into ORB, Part II.

2.2.3.4.2. Tank washing by closed cycle.

2.2.3.4.2.1. During tank washing by closed cycle the washing or cargo pump used with this aim, receives the washing liquid from the slop tank and delivers it through a heater (or bypassing it) to the washing machines. Stripping pumps pump out emulsion from the tanks being washed and deliver it to slop tank (tanks).

2.2.3.4.2.2. It is recommended to take on such volume of sea water into the slop tank, which is needed as required by the instruction for each type of washing.

2.2.3.4.2.3. Filling up of slop tank (tanks) by the sea water is executed by a pump (washing, stripping or cargo), or by gravity through a Kingston valve. After topping up the tank (tanks) the Kingston valve should be closed and pressed up.

2.2.3.4.2.4. After filling up the slop tank (tanks) by the sea water it is recommended to sound its level to make possible to evaluate approximately the volume of the washed out oil, collected in the slop tank (tanks),after the washing is finished.

2.2.3.4.2.5. If in the process of tank washing a slop tank (tanks) is being filled with water, the water washing machines is taken from the sea, and from the tank being washed it is pumped up by the stripping pump and delivered into the slop tank. After filling the slop tank up to a marked level the washing pump is switched over to receiving from the slop tank.

2.2.3.4.2.6. In the process of tank washing it is necessary to watch the water level in the slop tank (tanks). At a sharp increase of the level it is necessary to point out the cause and take measures to prevent overflow of water on the deck.

At a sharp decrease of the level it is necessary to check whether there is a leak of wash water from the slop tank overboard.

2.2.3.4.2.7. In the process of tank washing, to increase the effectiveness of settling, it is recommended to maintain the temperature of wash water in the slop tank (tanks) in the range of 40 - 60 ^{O}C.

2.2.3.4.3. Tank washing using crude oil.

2.2.3.4.3.1. A crude oil tanker fitted with fixed washing equipment in the tanks directly connected to the cargo pumping system can use crude oil instead of water as a washing medium. This system, which is often referred to as "COW" is fully discussed in the IMO publication "Crude Oil Washing Systems" (IMO-617). Every crude oil tanker operating with a crude oil washing system in accordance with Regulation I3B must be provided with a Crude Oil Washing Operations and Equipment Manual detailing the procedures to be followed in operating the tanker with COW, developed particularly for the tanker and approved by the Administration. The COW operation is usually carried out while the tanker is discharging cargo and occasionally during sea passage after partial cargo discharge. The crude oil, when used as a washing medium, dissolves the oil cling age and deposits in the cargo tanks so that these residues may be discharged with the cargo.

2.2.3.4.3.2. The Master of the tanker must be familiar with the requirements to performing crude oil washing in the port of discharge and stick to them fully. Prior to tank washing with crude oil it is necessary to get the formal permission of the cargo receiver representative and the port administration. Such crude oil washing may be subject to in-port inspection in accordance with the "Guidelines for In-Port Inspection of Crude Oil Washing Procedures". If, for any reason, permission to crude oil wash is refused, this should be reported to the Flag Administration for onward transmission to IMO and the oil tanker should take such alternative measures as prescribed by the Port Administration.

2.2.3.4.3.3. Prior to the arrival in port where the crude oil washing is to be carried out it is necessary to make sure that valves in all washing machines are closed. Crude oil tank washing system should be tested at pressure and checked for leakage. In the process of washing continuous supervision of the system is to be made and in the case of the detection of any leakage immediate appropriate measures for its elimination should be taken. On the completion of washing the crude oil washing system should be thoroughly drained of oil.

2.2.3.4.3.4. No part of the crude oil washing system shall enter the machinery spaces. Where the tank washing system is fitted with a steam heater for use when water washing, the heater must be effectively isolated during crude oil washing by double shut-off valves or by clearly identifiable blanks.

2.2.3.4.3.5. To avoid forming excessive electrostatic charges due to presence of water settled from crude oil used in washing, the oil level in each tank, intended for use as the source of washing oil, should be decreased by I m, before it is used for this purpose.

2.2.3.4.3.6. To prevent pollution of the sea during tank washing by crude oil it is prohibited to use flexible hoses for hydromonitors.

2.2.3.4.3.7. When cargo oils tanks after being washed by crude oil are additionally washed by water, the wash water is recommended to be collected into slop tanks and discharged to reception facilities.

2.2.3.4.3.8. The number of tanks washed by crude oil should be such that the water ballast taken on during ballast voyage would provide for the required draft and trim at every stage of the ballast voyage. Besides, it is advisable, taking into consideration the oncoming voyage characteristics, to wash by crude oil some additional tanks in case of forced taking on ballast in bad weather.

2.2.3.4.3.9. The other cargo tanks should be washed on the principle of rotation with the aim of eliminating deposits. It is not necessary to wash them by crude oil more often than once in four months.

2.2.3.4.3.10. The washing of tanks intended for taking on additional ballast, by crude oil, should be carried out in such a way that the ballast taken on was clean, i.e. they always should be rinsed by water. The water received into the tank which have been washed by crude oil, but not rinsed by water, should be considered as dirty ballast.

2.2.3.4.3.11. During crude oil washing hydrocarbon gas is generated within the tanks. With the aim to prevent explosion and fire, cargo tanks must be inerted prior to and during crude oil washing operations. Creating, maintaining and control of dangerously explosive atmosphere in cargo tanks should be exercised in correspondence with the inert gas system manual developed for the tanker. The entry of inert gas should be controlled so that a positive pressure is maintained slightly below the level at which the pressure/vacuum relief valves operate. By this means both the venting of hydrocarbon gas from the tank and the entry of air from outside the tanks are prevented.

2.2.3.4.3.12. A placard should be displayed in the cargo and engine control rooms, on the bridge and on notice boards of oil tankers which use crude oil washing. The following wording is suggested:

ON NO ACCOUNT ARE VALVES ON THESE LINES TO BE OPENED BY UNAUTHORIZED PERSONNEL

2.2.3.4.3.13. All crude oil washing operations should be entered in the ORB, Part II.

2.2.3.4.4. Washing of fuel oil tanks.

2.2.3.4.4.1. Washing of fuel oil tanks may be carried out by closed cycle through the slop tanks of the cargo tanks washing system only.

2.2.3.4.4.2. The process of fuel oil tanks washing, scheme and order of setting temporary connections in the process of stripping of tanks being washed, and discharging wash liquid into the slop tank, as well as the measures on prevention of pollution of the sea by oil during the washing are stipulated by special manuals, developed for each tanker.

2.2.3.4.4.3. It is prohibited to carry out fuel oil transferring operations within the tanker during the process of fuel oil tanks washing.

2.2.3.4.4.4. To prevent wash liquid from entering in fuel oil it is necessary to securely plug (to the extent of putting plugs) the pipe used for wash water from those with fuel oil. After tanks have been washed, the line used for wash and rinse water should be drained.

2.2.3.4.4.5. The fuel oil tanks washing operations should be entered in the ORB, Part II.

2.2.3.5 Discharge of water from slop tanks.

2.2.3.5.1. **Discharge of water from slop tanks is prohibited all along the NSR. The water from slop tanks should be discharged to shore reception facilities.**

2.2.3.6. Final line and pump flush.

2.2.3.6.1. After the discharge to reception facilities have been completed the lines and pumps used will contain traces of oil. The latter should be flushed and the flush water should be also discharged to shore reception facilities.

2.2.3.7. Discharge of clean and segregated ballast.

2.2.3.7.1. Along the NSR clean or segregated ballast may be discharged into the sea only en route in areas not included in list below.

It is prohibited to discharge clean ballast into the sea from ships in inland sea waters of Russia, in the areas of sanitary protection, in the aquatoria of the ports and in the areas of fishery. In these cases clean water ballast should be discharged to reception facilities.
In the absence of reception facilities in a port it is necessary to keep the clean water ballast on board the ship until leaving above areas.

Before discharging clean and segregated ballast it is necessary to make sure that local regulations of a certain area do not prohibit such discharge.

2.2.3.7.2. Immediately before the discharge it is recommended to check the surface of clean ballast in the tank to ensure that oil pollution has not occurred.

2.2.3.7.3. It is not necessary to control clean ballast during the discharge with the ODMCS, but recommended to switch on the ODMCS discharge of clean ballast.

2.2.3.7.4. Although the ODMCS is in operation, the ballast outlet should be watched, particularly when draining a tank bottom, as this is the most likely time for oil to be picked up. If traces of oil become visible in the discharge, the operation must be stopped immediately.

2.2.3.7.5. Ballast water discharged from segregated ballast tanks should be visually checked prior to and during discharge for the presence of any oil. If the traces of any oil are detected, the discharge should be stopped, and the ballast regarded as "dirty". The entry about this should be made in the ORB.

2.2.3.7.6. The discharge of clean ballast should be entered in the ORB, Part II.

2.2.3.8. Combining ballast and cargo operations.

2.2.3.8.1. It is allowed to combine ballast and cargo operations (to discharge ballast from cargo tanks to shore reception facilities simultaneously with cargo loading, and to load ballast into cargo tanks simultaneously with discharging cargo oil) only with the availability of the manual for these operation on board the ship, developed for each tanker and agreed with the Maritime Shipping Register, and after the order of operations is agreed with the Port Administration, and Merchants' representatives.

2.2.3.8.2. It is allowed to combine and cargo operations only in the certainty that the ship's systems designated for these operations are in good technical condition and comply with the

requirements of separation of ballast lines from cargo oil lines by not less than two closed gate valves.

2.2.3.8.3. On completion of operations entries should be made in the ORB, Part II, separately for cargo and ballast operations.

2.2.3.9. Disposal of slop residues.

2.2.3.9.1. Before reaching the loading port the Master should advise his owners or charterers of the amount of retained residues on board. These may then be handled in one of the following ways:

1. by pumping the residues ashore at the loading terminal;
2. by retaining the residues on board and loading the new cargo on top of them; or
3. by retaining the residues on board, but segregated from the new cargo. If this is done, it may be possible to pump them ashore at the unloading terminal, if reception facilities are available. It may, however, be necessary to retain the residues for more than one voyage.

2.2.3.10. Transfer of cargo oil.

2.2.3.10.1. **As a rule the transfer of cargo oil during voyage is not allowed.**

2.2.3.10.2. In the event of the need to transfer cargo oil at sea, every precaution should be taken to ensure that there is no spillage of oil;

1. all the Kingston and gate valves due to be closed during voyage according the manual should be checked if they are closed tightly;
2. sea discharge and isolating gate valves between cargo line and Kingston line should be closed tightly;
3. if the deck cargo line is not used for transfer of cargo oil, its receiving/discharge connections should be plugged, and gate valves closed tightly;
4. hand wheels of gate valves mentioned in .2. and .3. should be fitted by cautionary notices saying "Not to be opened" during transfer of cargo oil;
5. all deck scuppers should be effectively plugged to prevent any spilled oil escaping overboard;
6. prior to transfer of cargo oil the gate valves on the suction of cargo and stripping lines in tanks, not included into the process of transfer, should be closed tightly;
7. the transfer should be started slowly, and, after checking that the oil is being taken from and being pumped into the correct tanks, the rate of transfer may be increased to nominal;
8. breathing valves (pressure/vacuum) should be kept opened during the transfer; in case the cargo level in tanks is decided by ullage measurements, the inspection holes should be opened too;
9. constant check of cargo level in tanks being filled should be maintained;
10. during the transfer regular inspection of the sea surface around the tanker and in the ship's wake should be made.

2.2.3.10.3. If transfer of cargo oil is made by one single pump into several tanks simultaneously, it should be kept in mind that they are not filled uniformly (rate of filling is higher in tanks which are nearer to the cargo pump) and that their overflow should not be allowed. It should also be borne in mind that the transfer of cargo oil in a tanker could alter the trim of the vessel and consequently cause some of the loaded tanks to overflow, thus causing pollution, which should be prevented.

2.2.3.10.4. The transfer of cargo oil should be carried out under supervision of the Responsible Person. The necessary number of the crew should be assigned for control of the cargo oil level in tanks and traces of oil around the tanker during the transfer.

2.2.3.10.5. The transfer of cargo oil should be entered in the ORB, Part II.

2.2.4. Cargo operations.

2.2.4.I. General.

2.2.4.I.I. The loading or discharging of an oil tanker is conducted by connecting hoses, or loading arms, between the fixed end of the facility pipeline and the cargo manifold on board the oil tanker. The operation should always be controlled so as to prevent any escape or spillage of oil.

2.2.4.I.2. The transfer of oil, by its nature, involves a potential for pollution and there are many factors which may result in pollution including:
- equipment failure;
- operation technology faults;
- human errors;
- inadequate training.

To prevent pollution, every practicable precaution regarding the operation should be taken and a contingency plan should be prepared to deal with emergencies which may occur. This contingency plan should be tested at regular intervals by means of exercises which should highlight any weaknesses.

2.2.4.I.3. The following basic principles should be applied if pollution is to be avoided:

1. all personnel on the oil tanker and berth associated with the loading or discharge of oil should be fully aware of the need to prevent pollution;
2. a detailed, written oil transfer plan should be reviewed and signed by the Responsible Persons on the tanker and at the berth (see the publications in Annex 2);
3. all personnel should adhere strictly to the oil transfer plan;
4. the Responsible Persons on the oil tanker and at the berth should check the items listed in 2.2.4 3.2. before the oil actually flows;
5. all personnel involved should be aware of the immediate measures and the response necessary in the event of an escape of oil; and
6. all equipment, the failure of which might result in an escape of oil, should be inspected and tested regularly.

2.2.4.2. Requirements for facilities.

2.2.4.2.I. General.

2.2.4.2.I.I. Each loading arm or hose should be equipped with a means to drain or an arrangement for preventing oil spillage prior to connecting or when disconnecting the loading arm or hose.

2.2.4.2.I.2. Loading arms with their valves and couplings must be hydraulically tested and hoses subjected to hydraulic, elongation and vacuum tests, keeping in mind Arctic meteorological

conditions, at the intervals recommended by the manufacturers. During these periodical tests pressure should be applied in accordance with manufacturer's specifications.

2.2.4.2 2. Loading arms.

2.2.4.2.2.I. The material and design of the loading arms should be compatible with the cargo to be transferred, suitable for local meteorological conditions and possess a sufficient safety margin to allow for the dynamic load exerted by the oil tanker. The loading arms should meet the design and construction requirements for oil transfer systems approved by the appropriate authorities.

2.2.4.2.2.2. The design of the loading arms should enable free movement of the oil tanker on the berth to accommodate:

1. changes in vertical position due to changes in tanker draught and tide;
2. changes in horizontal position due to tanker thwart ship drift and surge;
3. differences in the setback and elevation above deck of the vessel's manifold.

2.2.4.2.2.3. In case of excessive oil tanker movement there should be a limit-alarm arrangement fitted to the loading arm to provide early indication that design parameters are being approached. This will enable personnel to stop the flow of oil and disconnect the loading arm from the oil tanker's manifold before an accident occurs.

2 2.4.2.3. Hoses.

2.2.4.2.3.I. Special jibs, winches or cranes should be used to support hoses during operations.

2.2.4.2.3.2. Hoses should not be bent to a radius smaller than that recommended by the manufacturer.
2.2.4.2.3.3. Measures should be taken to prevent hose breakage due to vibration, pulsation or rubbing with the deck edge or ship's rail or impact against the deck, etc.; for example, by laying and supporting hoses using special lifting bridles and saddles.

2.2.4.2.3.4. Any hose or set of hoses with an inside diameter larger than 75 mm (3 inches), which is used for the transfer of oil, dirty ballast or bunkering and the coupling arrangements, should meet the following requirements:

1. the minimum bursting pressure, as defined by the manufacturer, should exceed by 4 times the pressure for which the safety valve has been set (or exceed by 4 times the maximum pressure developed by the pumps, if there is no safety valve in the system), plus the value of static head in the oil transfer system at the point of hose coupling; and
2. the minimum value of collapsing pressure is established in accordance with accepted standards.

2.2.4.2.3.5. Each hose should bear the following durable indelible markings:

- "For Oil"
- date of manufacture
- bursting pressure
- working pressure
- dates of last testing
- pressure applied under testing

– date of next testing (or service life)

Test data with respect to each hose may also be entered into a special document in which case the hose should bear a corresponding index of the said document.

2.2.4.2.3.6. Depending on their design, the elements of each hose set should meet the following requirements:

1. flanged joints should meet the requirements of international standards for connecting sizes, and their material and design should correspond to accepted standards; and
2. quick release couplings should meet the requirements of international standards for connecting sizes. Their material and design should correspond to accepted standards.

Standard dimensions of discharge pipelines' joints flanges.

Element	Dimension
Outside diameter	2I5 mm
Inside diameter	According to the outside diameter of pipe
Bolt pitch circle diameter	I83 mm
Flange cuts	6 holes 22 mm in diameter equispaced on said pitch circle, with cuts up to outside diameter of the flange. Cuts' width is 22mm
Flange thickness	20 mm
Bolts and nuts: number, diameter	6, each 20 mm in diameter and of appropriate length
The flange is designated for pipes with inside diameter of up to I25 mm, is made of steel or other equivalent material, with flat end surface. The flange combined with a washer made of oil resisting material is calculated for a working pressure of 6 kg/cm^2	

2.2.4.2.3.7. The responsibility for hoses' condition and their fitting out in operation, performance of corresponding surveys and tests, delivering on board the ship, securing with the ship's pipelines and observation during their work is taken by the Party, which directly owns and uses the hoses. Administration of the ship is responsible for the ship's hoses.

2.2.4.2.3.8. If an operation with the use of hoses belonging to the ship is going to be carried out, the Master of the ship must ensure in advance that the hoses are subjected to due surveys and hydraulic tests before beginning of the voyage or prior to the operation. The fact of the test carried out, the time and test pressure must be recorded in the machine room logbook.

2.2.4.2.3.9. The Master of the ship has a right to reject taking on hoses, if they are not accompanied by a test certificate, if the validity of the certificate expires before the planned use of the hoses or before arriving at a port, where corresponding test may be carried out.

2.2.4.2.4. Control and communications.

2.2.4.2.4.I. The control center for the operation should be equipped with all means to control the operations including means for emergency stopping of the oil flow.

2.2.4.2.4.2. In the area of each facility there should be a post for control of the operations on the berth, which meets the following requirements:

1. secure protection of equipment and personnel from rain, snow and water spray during rough seas and wind, and protection from oil in case of failure of loading arms and hoses; and
2. good view of the berth, the position of the loading arms and/or hoses and the movements of the oil tanker.

2.2.4.2.4.3. Each facility should be equipped with a radio and/or telephone ensuring reliable two-way communications by voice between the Responsible Person on the berth and the Responsible Person on the oil tanker. The communications shall be in an agreed language, understood by both persons.

2.2.4.2.4.4. Each facility should be equipped with a reliable means of two-way communication with the operator(s) at the storage tanks in use. This communication link should allow for operational parameters to be changed quickly and efficiently and for immediate pump shut-off in case of emergency.

2.2.4.2.5. Shut-off devices.

2.2.4.2.5.I. Each facility should be equipped with a suitably identified shut-off device capable of stopping the transfer of oil. The shut-off switch for this device should be located in a place readily accessible to shore and oil tanker personnel, easily visible and illuminated during periods of darkness.

2.2.4.2.5.2. The oil tanker should also be equipped with a similar shut-off switch enabling the Responsible Person on board to stop the flow of oil. This shut-off switch, if fitted, should be connected with the shore facility electrically, pneumatically or mechanically. The communication system described in 2.2.4.2.4.30 may also be used to stop the oil flow.

2.2.4.2.6. Illumination.

2.2.4.2.6.I. For working during darkness the berth should have a permanently installed illuminating system ensuring proper lighting of:

1. each coupling of loading arms or hoses with the shore piping systems and oil tanker manifolds;
2. each area of the facility, within which oil transfer operations are performed;
3. valves for control of the piping systems;
4. moorings on the berth;
5. gangways between berth and oil tanker; and
6. shut-off switches for emergency stopping of operations.

2.2.4.2.6.2. Intensity of illumination of the places listed should be established in accordance with accepted standards.

2.2.4.3. Preparation and carry out of operations.

2.2.4.3.I. The Master of an oil tanker should be fully advised of the availability of icebreaker tugs and mooring craft and of any particular features of the berth. He should also be advised regarding any local regulations regarding pollution.

2.2.4.3.2. A joint plan of operation should be developed on the basis of information exchanged between the oil tanker and the facility. This plan should be in writing and signed by the Responsible Person of the ship and the facility. It should address, inter alia, the following in the form of a checklist:

1. sufficient berth and tanker personnel to safely perform the transfer operation;
2. mooring arrangements;
3. maximum draught and freeboard anticipated during operation;
4. availability of safe and convenient access from the berth to the facility;

5. sequence of loading (discharging) of tanks;
6. a check for the proper condition and position of loading arms or hoses, hose saddles, supports and guy ropes;
7. availability of reliable communication between the facility and tanker Responsible Persons;
8. a clear set of commands and signals are agreed upon by the Responsible Persons on the tanker and the facility;
9. disposition and quantity of ballast and slops and disposal, if applicable;
10. determination of pipelines, through which the loading (discharging) of oil should be performed;
11. ensure proper coupling and securing of loading arms, hoses and flanges;
12. ensure proper illumination of all working places and oil transfer equipment;
13. pressing up and sealing of Kingston valves, sea valves and isolating gate valves between cargo pipeline and Kingston pipeline in the cargo pump room;
14. making operative the control device, showing the degree of pressing up of gate valves (if present between double isolating gate valves, dividing oil cargo from sea);
15. fixing of the fact of sealing gate valves and sea discharge valves of cargo pump room in the ship's logbook;
16. quantities and characteristics of the cargo(es) to be loaded (discharged);
17. indication of permissible pressure in loading arms or hoses;
18. rate of oil transfer operations (initial, maximum, during switch over to another pipeline, final);
19. time check of the ship's and berth watches;
20. the time required by the facility for starting, stopping and changing rate of delivery during cargo operations in tanks;
21. the volume of cargo delivered to the ship during the time necessary to shore facility to close shore gate valve;
22. the length and diameter of the pipeline from oil bulk plant to the ship;
23. necessity of informing the ship about all cases of switching on and off shore pumps and switching over from one shore tank to another;
24. details of crude oil washing, if applicable;
25. details of proposed method of venting or inerting cargo tanks;
26. sequence of actions in case of spillage of oil;
27. procedures for rapidly stopping oil transfer under emergency conditions;
28. ensure all containment arrangements are properly located and empty;
29. materials are immediately available to clean-up minor spills.
30. over-pressure alarms and shut-off are operating properly;
31. closing of scupper holes on the cargo deck, through which oil can leak into the sea, by plugs (accumulations of water should be periodically drained off the deck, and the scupper plugs replaced immediately after the water has been cleared);
32. plugging of cargo and stripping lines connection not being used in cargo operations;

33. readiness to cargo operations of cargo and stripping lines, gas-extraction system (pressure/vacuum), remote controlled systems of valves and cargo level measuring devices control;
34. proper open or closed state of valves in cargo pump room, on deck and cargo tanks;
35. isolation by means of closing valves of sections of cargo and stripping lines not used in cargo operations, and fitting cautionary notices reading: "Not to be opened" at their hand wheels;
36. persons, responsible for carrying out cargo operations on board the tanker and berth and their residence during cargo operations.

2.2.4.3.3. Loading arms should be aligned with oil tanker pipelines and the Responsible Person(s) advised of any constraints on ship movement imposed by their use.

2.2.4.3.4. Hoses should be suspended in such a way that the possibility of twisting and pinching between the berth and the oil tanker, bending to a radius less than that recommended by the manufacturer, and rubbing with berth or ship's structure elements should be precluded.

2.2.4.3.5. Before commencing of operations, the Responsible Persons on the berth and on the oil tanker should review the checklist described in 2.2.4.3.2.

2.2.4.3.6. The operation may be started only after the Responsible Person on the oil tanker and the Responsible Person on the berth have agreed to do so. This agreement should be in writing.

2.2.4.4. Performance of loading operations.

2.2.4.4.I. The operation should be started at a slow rate in order to ensure that all connections, loading arms or hoses do not leak, that oil is being transferred into intended pipelines and tanks, that no excessive pressure is being built up on the hoses and the pipelines. Only after being satisfied by positive results of these checks, may the rate of transfer be increased up to the maximum indicated in the plan of operation.

2.2.4.4.2. The Responsible Person on the berth and on the oil tanker should periodically check:

1. if there is any leakage from the equipment and systems and if there is any indication of oil on the water surface around the tanker and her plating, especially at the area of cargo pump room Kingston valves;
2. if there is any leakage from the sea valves;
3. that there is no leakage of oil into pump rooms, cofferdams or tanks not scheduled to be loaded;
4. if there is any excessive pressure in piping and hoses;
5. the security of the moorings;
6. position of loading arms and hoses;
7. tank ullages and quantities which should be cross-checked with terminal figures; and
8. the communication system, and, if required, take necessary remedial measures.

2.2.4.4.3. It is essential that great care is taken to prevent surge pressures when changeover of tanks is made on the oil tanker. The filling valves of the next tanks in sequence should be opened or cargo delivery from the shore stopped, before the valves on the tanks being filled are closed.

2.2.4.5. Completion of operations.

2.2.4.5.I. It should be ensured that adequate ullage space is left in each tank being filled, to permit cargo volume expansion at possible increase of temperature during voyage. When it is required to stop cargo transfer operations, the Responsible Person should advise the facility in ample time. In the event that non-return valves are not fitted, all necessary precautions should be taken against oil flowing back.

2.2.4.5.2. 10-15 minutes after a tank is filled it is necessary to check cargo level in it to ensure that gate valves are closed tightly and cargo does not enter into the tank.

2.2.4.5.3. All main cargo lines should be drained and pumped ashore through the small diameter line provided for that purpose in COW tankers.

2.2.4.5.4. Before disconnecting loading arms or hoses, it should be ensured that they have been drained, and that there is sufficient room in the containment arrangements on the oil tanker to receive any remaining oil which may escape from the disconnected loading arms or hoses. The hose end should then be blanked or the coupling end of the loading arm sealed.

2.2.4.5.5. As soon as practicable after the operation has been completed, the Responsible Person should ensure that all the valves in the cargo and stripping systems are closed, and that all the cargo tank openings are closed and secured for sea.

2.2.4.6. Suspension of cargo operations.

2.2.4.6.I. **Operations should be suspended when:**

1. the ship's movement exceeds the berth's operating parameters;
2. high wind conditions are imminent;
3. there is failure of the main communication system between berth and shore facility or berth and oil tanker, and there are no adequate standby communications;
4. oil is detected in the water;
5. fire or the risk of fire is discovered;
6. there is a failure of illumination or poor visibility at the berth;
7. oil leakage is discovered from hoses, couplings, loading arms, pipelines of facility or the oil tanker deck piping;
8. inexplicable large difference in discharged and received volumes of oil is detected;
9. there is an unexplained pressure drop in the cargo system.
10. oil overflow on the oil tanker deck caused by over-filling of tanks occurs;
11. faults or damage threatening the escape of oil are discovered;
12. at storm discharge.

2.2.4.6.2. Operations may be resumed only after appropriate remedial actions have been taken.

2.2.4.7. Discharge of oil cargo.

2.2.4.7.I. The preparation of the tanker to discharging oil cargo should be carried out in correspondence with recommendations given in 2.2.4.3.

2.2.4.7.2. Before discharging oil cargo it is necessary to check relief valves on cargo and stripping pumps and to adjust the pressure in them so that it is 0.I MPa more than the

maximum working pressure, reported by shore personnel for discharging oil cargo. The entry about this should be made in the machine room logbook.

2.2.4.7.3. The oil cargo discharge should be started only after a notice from shore personnel about the readiness of shore pipelines to receiving oil is obtained.

2.2.4.7.4. During oil cargo discharge it is necessary:

1. to open gate valves of cargo tanks intended for discharging cargo oil first of all immediately before starting cargo pumps on the load;
2. during the discharge to follow recommendations of item 2.2.4.4.
3. to stop cargo pumps immediately at sharp decline of set pressure. The discharge can be resumed only after appropriate remedial action on reinstalling pressure has been taken;
4. to measure level in cargo tanks at definite regular intervals and to compare measurements in the tanker's tanks with those on shore. In case of big discrepancy of the measurements the discharge is to be stopped. It can be resumed only after causes of discrepancy have been found and corresponding remedial action taken.
5. with the aim to avoid overflow, to carry out constant control of level in cargo tanks where the discharge is from stripping pumps emptying these tanks; oil from these tanks should be periodically discharged by cargo pump onshore.

2.2.4.7.5. The tanker's personnel should be in readiness to immediately stop cargo pumps upon receiving a stated signal from the shore.

2.2.4.7.6. At considerable back pressure in the shore pipeline and imminent backward flow of oil after stopping ship's cargo pumps, it is necessary to provide for quick closing of gate valves on the deck cargo line after the discharge of cargo oil is terminated. As an alternative it may be recommended to partly close the gate valve on the deck cargo line at decreased rate of ship's pumps.

2.2.4.7.7. If tank washing using crude oil is going to be exercised during cargo discharge, the Port Authorities and shore personnel participating in receiving cargo should be informed about it. Tank washing using cargo crude oil should be carried out in accordance with 2.2.3.4.3.

2.2.4.7.8. Unloading of the oil tanker is terminated by draining of cargo and stripping pipelines by draining oil under gravity or by pumping it by a pump into a cargo or slop tank through a special pipeline (of small diameter, as a rule) to the shore line.
2.2.4.7.9. Upon completion of cargo operations an entry about them should be made in the ORB, Part II.

2.2.4.8. Cautionary notices.

2.2.4.8.I. Cautionary notices, warning of local regulations relating to oil pollution, should be installed on the berth and oil tanker in readily visible places.

2.3. DISCHARGE OF OIL-CONTAINING RESIDUES (SLUDGE) FROM SHIPS

2.3.I. **It is prohibited to discharge into the sea oil-containing residues:**

1. extracted from:
   - oil-polluted bilge, ballast and wash waters, other oil-water mixtures in the process of separation or/and filtration before their discharge from the ship into the sea;
   - fuel oils and lubricating oils during their preparation (separation, filtration) to using in ship's machinery and arrangements;
   - cargo pipeline after operations with oil or dirty ballast are finished;
   - fuel oil and lubricating oil systems at their draining and airing;
   - different machinery and arrangements during the change or removal of lubricating oil;
2. formed as a result of:
   - oil leaks through loose joints in machinery, systems and arrangements;
   - collection of oil spilled during cargo, ballast and bunkering operations;
3. remaining and accumulating in:
   - cargo and slop tanks, fuel oil and lubricating oil tanks after cleaning these tanks.

2.3.2. **Oil-containing residues should be stored on board in a specially designated space and discharged to reception facilities upon arriving at a port, or, as far as it is allowable and expedient, include into the cargo, use as a fuel or incinerate in special installations, approved by the Maritime Shipping Register.**

2.3.3. Each case of the discharge of oil-containing residues to reception facilities, their utilization or elimination on board the ship should be accompanied by an entry in the ORB. If the discharge, utilization or elimination of residues are not connected with conditions or actions not liable to be registrated in any ORB column, the entry should be made in the ship's logbook.

The Master of the ship should receive a receipt or another document, where the volume of pumped wash water, dirty ballast, residues or oily-water mixtures, as well as the time and date of the transferring are stated, from the operator of the reception facilities, including barges and road wagons. Such document attached to ORB, may be helpful in affirmation of the fact that the ship had not been involved in an accident resulting in pollution. The document should be kept together with the ORB.

2.4. PREVENTION OF POLLUTION OF THE SEA DURING SAILING IN ICE CONDITIONS

2.4.I. Preparation of the ship to sailing in ice conditions.

2.4.I.I. **For sailing in ice conditions where the danger of meeting heavy ice and hull damage constantly exists, and with the aim to decrease the possibility of oil pollution, it is necessary to use ice-strengthened ships (tankers with side segregated ballast tanks) which are in full compliance with the requirements of MARPOL 73/78 and "Regulations for Navigation on the Seaways on the Northern Sea Route", published in the Notices to Mariners.**

2.4.I.2. **The ship, intended for sailing in ice, must have a corresponding certificate of fitness to sail in ice conditions.**

2.4.I.3. In the absence of a certificate of fitness to sail in ice conditions the Master of the ship timely informs a representative of Administration (the Sea Operations Staff) about it.

Possibility of including such ship into the convoy for ice conduct is decided by the Sea Operations Staff.

2.4.I.4. Before entering of the ship, especially a tanker, into ice, all the holes in forepeak, afterpeak, double bottom, fuel oil and cargo tanks should be properly closed, and fasteners on the watertight doors pressed up.

A11 the watertight compartments should be kept closed during the entire time of the ship being in ice, as in the event of damage to ship's hull, the hermetically sealed compartments may preserve the ship's buoyancy, and thus prevent or diminish oil spill.

2.4.1.5. It is desirable, during sailing in ice, to have in store a sufficient ullage in cargo tanks, so that in case of ice damage it could be possible to pump cargo (or its part) from the damaged tank to other cargo or ballast tanks.

This recommendation does not cover tankers with double hull.

2.4.I.6. It is recommended to have on board the ship several hoses and a submersible pump in the event of emergency transferring part of cargo from the damaged tanks into other tanks or to other ship.

2.4.I.7. Before entering of the ship into ice it is recommended, if possible, to transfer fuel oil from fore tanks, which are more often damaged during sailing in ice, into the middle and aft fuel oil tanks.

2.4.I.8. It is recommended, before sailing in ice conditions, to carry out drills according to the Shipboard Oil Pollution emergency Plan closing of possible holes, repair of oil leaks into the sea from cargo or fuel oil tanks. The ship's officers must learn thoroughly and know firmly basic provisions of their ship survivability. They should particularly know, from what tanks, how much and how it is possible to pump out cargo or fuel oil in case of damage in one or other part of the ship, so as to prevent sinking of the ship or big oil spill.

2.4.2. Sailing in ice.

2.4.2.I. **The Master of the ship, sailing along the NSR or adjacent areas, must maintain contact with the Sea Operations Staff in the area and act in strict compliance with their recommendations.**

2.4.2.2. **Entering of the ship into ice and movement in ice is allowed only by permission of the Captain of the port, in which zone the ship is sailing, or by permission of the person responsible for ice operations in the area. When sailing along the NSR and adjacent areas it is strictly forbidden to enter into ice without the permission of this person.**

2.4.2.3. In the absence of conditions providing the safe entering of a ship, and especially a loaded tanker, into ice field edge (particularly during stormy weather) from the open sea, it is prohibited to enter into ice; the Master should wait for improvement of conditions at a safe distance from the ice field edge, and report simultaneously to the Captain of the port or the person responsible for ice operations in the area.

2.4.2.4. Before approaching the ice field edge it is advised to overcome the ship's inertia up to "very slow". The speed of the ship in ice is selected with taking into consideration the ship's hull

strength, cargo characteristics and ice condition, so that to avoid breaking of hermetic state of the hull and possible leak of oil overboard.

2.4.2.5. When at entering into ice, impacts with thick pieces of ice are unavoidable, the ship must be put into a position, at which the impact is taken not by the bilge part of the hull where the fuel oil deep-tank is usually found, but by the strongest part of the hull - the stem.

2.4.2.6. When moving in ice the ship should avoid sharp turns, at which impacts against bow and stern parts of the hull, where fuel oil tanks are usually placed, may occur from ice piece edges and submerged ice rams.

2.4.2.7. Throughout the whole time of sailing in ice it is necessary to keep in readiness cargo and stripping pumps, and fuel oil transfer pump, as well as water discharging means, and emergency fighting equipment, in case of hull damage and the necessity of quick liquidation of oil leak overboard.

2.4.2.8. **When moving in ice the level of oil in cargo and fuel oil tanks should be under strict control.**

The level having changed, it is necessary to find out the causes and take corresponding measures for preventing possible leak of oil overboard.

The sea surface outside the board and in the wake should also be constantly observed. An oil leak may be detected by oil traces on the sea surface.

2.4.2.9. At the first signs of ice compression every attempt should be made to bring the ship out of compact ice or grounded ice hummocks, where the hull is more likely to suffer damage than in broken ice. In the face of imminent danger of damage in the area of tanks containing oil, all possible measures should be taken to eliminate oil spill.

2.4.2.I0. In every case of oil spill the Master of the ship in emergency must act according to the Shipboard Oil Pollution emergency Plan and report to the NSR Administration and the Captain of the nearest icebreaker, ship and port, taking all the possible measures to half termination of oil spill into the sea and elimination of spillage.

2.5. ACTIONS IN EMERGENCY.

2.5.I. **According to Regulation 26 of Annex I of MARPOL 73/78, a "Shipboard Oil Pollution emergency Plan" is must be on board every ship.**

It must comprise the following parts:

1. actions in correspondence with provisions of Article 8 of MARPOL 73/78, which the Master of the ship or other persons responsible for the ship must take, as to reporting about the incident, causing oil pollution;
2. list of organizations or persons, with whom communication should be established;
3. detailed description of actions, which the ship's crew should take immediately to diminish oil spill; and
4. communication posts on board the ship and procedures of communication with local authorities with the aim of coordination of actions in pollution elimination.

3. CONTROL OF POLLUTION BY NOXIOUS LIQUID SUBSTANCES IN BULK, OTHER THAN OIL

3.I. General

3.I I. **At present transporting of noxious liquid substance, other than oil, in bulk along the NSR is not exercised. The present part is to be valid in the case of carrying out such transporting in future.**

3.I.2. In accordance with MARPOL 73/78 (Annex II), noxious liquid substances, other than oil, transported on chemical tankers in bulk, shall be divided into four categories as follows:

3.I.2.I. Category A:

Noxious liquid substances which, if discharged into the sea from tank cleaning or deballasting operations, would present a major hazard to either marine resources or human health or cause serious harm to amenities or other legitimate uses of the sea and therefore justify the application of stringent anti-pollution measures.

3.I.2.2. Category B:

Noxious liquid substances which, if discharged into the sea from tank cleaning or deballasting operations, would 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 the application of special anti-pollution measures.

3.I.2.3. Category C:

Noxious liquid substances which, if discharged into the sea from tank cleaning or deballasting operations, would present a minor hazard to either marine resources or human health or cause minor harm to amenities or other legitimate uses of the sea and therefore require special operational conditions.

3.I.2.4. Category D:

Noxious liquid substances which, if discharged into the sea from tank cleaning or deballasting operations would present a recognizable hazard to either marine resources or human health or cause minimal harm to amenities or other legitimate uses of the sea and therefore require some attention in operational conditions.

3.I.2.5. Category III:

Substances defined as not belonging to categories A, B, C and D and not corresponding to provisions of Annex II of MARPOL 73/78.

3.I.3. **The list of noxious substances carried in bulk and categorized above is set in Chapters I7 and I8 of the International Bulk Chemical Code.**

3.I.4. **The analogous document in Russia is the List of substances presenting a hazard to human health or living marine resources, discharging of which is prohibited, and norms of maximum permissible concentrations of these substances in discharged mixtures (Annex 5 of Regulations for protection against pollution of sea coastal waters, approved by the Ministry of Water Industry of the USSR, Ministry of Fishery of the USSR and Ministry of Public Health of the USSR, Moscow, I984).**

3.I.5. **It is allowed to transport on chemical tankers only those noxious liquid substances, which are listed in the International Bulk Chemical Code, or which are agreed by countries participating in their transporting, and in their agreement, temporary evaluation of the category of harmfulness of these substances according to Annexes of MARPOL 73/78 is given.**

3.I.6. Members of the crew participating regularly or occasionally in cargo and ballast operations on chemical tankers, as well as those exercising control of transported noxious liquid substances during voyage, must know:

- arrangement of cargo tanks;
- arrangement of cargo and stripping systems;
- layout of bow compartments, cofferdams, and pipe tunnels;
- arrangement of bow compartment, ventilation, including using the system under normal and emergency conditions;
- location of gas-extraction system valves and their use during cargo and ballast operations and sea voyage of the chemical tanker.
- location of measuring devices and their use for determining cargo level in tanks;
- location of instruments producing signals at the appearance of gases (vapour), overcoming the norm of noxious substances gases (vapour) on decks and within ship's compartments, and actions after the instruments have been actuated.

3.I.7. **Compliance of a chemical tanker with the requirements of MARPOL 73/78 (Annex II) is determined by the IBC Code for construction and equipment of ships carrying dangerous chemicals in bulk and should be approved by the International Pollution Prevention Certificate for Carriage of Noxious Liquid Substances in Bulk, issued by the Maritime Shipping Register after corresponding survey of the ship is carried out.**

3.I.8. Order and time intervals of the surveys of the equipment designed for prevention of pollution of the sea by noxious liquid substances in bulk from ship carried out by the Maritime Shipping Register are determined by the Regulations for the control of pollution from ships (construction and equipment) and the Manual for technical supervision of ships in service by the Maritime Shipping Register.

3.2. Cargo operations.

3.2.I. General

3.2.I.I. **Preparation of a chemical tanker to cargo operations as to prevention of noxious liquid substances spill on deck and overboard, connection and disconnection of loading arms, and carrying out cargo and ballast operations, should be in compliance with provisions of items 2.I.I.3, 2.I.I.4, 2.2.2, 2.2.3, 2.2.4 applied to chemical tankers.**

If, in connection with specific properties of cargo hoses and packing materials highly resistant to the pumped noxious substances, special technological methods of loading and discharging, special couplings for of connecting the ship's piping to the shore one and special materials for neutralization of leaks or spills of noxious substance are required, it is necessary to follow special instructions, which should be supplied for the tanker, so that before the commencement of cargo operations all the personnel participating in cargo operations have been familiarized with the instructions.

3.2.I.2. For transferring any specific noxious liquid substance it is necessary to use only hoses designed for pumping this substance, which should be stated in the certificate issued by the hose manufacturer.

3.2.2. Loading.

3.2 2.I. Prior to beginning of loading the Master of the chemical tanker must receive from the consignor information about the noxious substance intended to be transported as a cargo: name, density, flash point, limits of explosive and category of harmfulness of the substance to human health or marine resources.

3.2.2.2. **Loading of cargo is exercised according to the process sheet of transportation, approved by the Master of the ship. The loading plan is worked out according to 2.2.4.3.2 as applied to chemical tankers. It is necessary to state in the process sheet, what pipelines will be used in loading cargo, in what sequence valves on cargo line will be opened and closed, what ullages are to be left in cargo tanks, etc., in compliance with RD 3I.II.37-82 "Regulation for carriage of chemical cargo in bulk by sea". The ship's personnel participating personally in the loading operations should be familiarized with the process sheet.**

3.2.2.3. All the crew should be instructed about qualities of noxious substance due to be transported and taught the methods and practice of rendering advance first aid before arrival of a doctor. Brief information about the noxious substance should be placed on board the ship where every member of the crew may read it at all times.

3.2.2.4 In the process of loading; there should be no escape of noxious substances vapour onto loading deck through openings of cargo tanks, inspection windows, and holes for washing machines.

If a chemical tanker is equipped with automatic valves of gas-extraction system, the operation of valves should be regularly checked.

3.2.2.5. When loading some noxious substances in bulk, such as acrylonitrile, nitrobenzene, phenol, acetonic cyanohydride, etc., with the aim of prevention of environment pollution, tanker berths are usually equipped with a special pipeline for eliminating vapour of these substances from cargo tanks of the ship to the shore facilities. In this case it is necessary to check whether there is an automatic isolating valve on this line, designed to prevent cargo vapour from coming back from shore facilities to cargo tanks in the case of their depressurization.

3.2.2.6. When loading incompatible noxious substances entering with each other into a dangerous reaction, cargo tanks for each of these substances should be divided from each other by means of cofferdam or a cargo tank, filled with a "neutral substance".

3.2.2.7. After completion of loading of the chemical tanker is finished it is necessary to make an entry in the Cargo Record Book for Ships Carrying Noxious Liquid Substances Bulk (CRB) The (CRB) pattern and its filling in practice are given in RD 3I.04.I7-94 "Regulations for recording operations involving oil, oil products and other substances presenting a hazard to either human health or marine living resources, and their mixtures produced on board the ships and other craft".

3.2.3. Sea voyage.

3.2.3.I. When carrying noxious liquid substances of density above I000 kg/m^3 in bulk, it is not recommended to have considerable ullages in tanks. Waves forming in tanks with such ullages may produce impacts resulting in damage to ship's structure.

3.2.3.2. In emergency, when a chemical tanker fully loaded with noxious liquid substance with density above I000 kg/m^3 suffers damage to an empty side tank, dangerous list of the ship, with imminent danger of capsizing and noxious substance spill, may arise. Because of this the ship's officers must know well the Manual on stability and to make out a plan of activities for maintaining the ship's stability in this situation in advance.

3.2.3.3. If it becomes necessary to transfer noxious cargo from some tanks into others, it is advisable, with the aim of preventing pollution, to follow provisions of 2.2.3.10, as applicable to chemical cargo. In each such case recommendations and directions of Regulations, technical requirements and process sheets for carrying chemical cargoes in bulk, as well as design features of the chemical tanker, should be taken into consideration.

3.2.3.4. After completion of transfer of noxious liquid cargo is finished an entry should be made in the CRB.

3 2.4. Discharge.

3.2.4.I. Measures on prevention of pollution during the discharge of a chemical tanker are, by and large, similar to those of an oil tanker; so those measures should be carried out in correspondence with recommendations of 2.2.4.7. It is also advisable to follow recommendation and directions provided in the process sheets for a given noxious substance.

3.2.4 2. After completion of the discharge of noxious substance is finished an entry should be made in the CRB.

3.3. Conditions for discharge of noxious liquid substances in bulk

3.3.I. General

3.3.I.I. **Noxious liquid substances not included or not related to any category listed in 3.1.2.1 - 3.1.2.5 and not subjected to evaluation as to their hazard degree, are not permitted to be carried by marine transport.**

3.3.I.2. The complete discharge of noxious liquid substances, other than oil, and various mixtures containing such substances, is the most effective means of prevention of sea pollution by such substances.

3.3.I.3 The Master of any chemical tanker should possess complete information about ports, where discharge to shore facilities of noxious liquid substances, water ballast, wash water, other mixtures and residues containing such substances, is possible, as well as conditions for such discharge.

3.3.I.4. Before arrival of the chemical tanker in a port the Master should get confirmation from the port authorities of the possibility of discharge from the tanker of dirty ballast, wash water, other residues and mixtures containing noxious substances carried as cargo, needed to be discharged from the tanker.

3.3.I.5. When the occasion requires to carry out tank washing after the carriage of noxious substances with the aim of cleaning tanks prior to taking on additional ballast, which is to be discharged to reception facilities afterwards, the washing should be carried out in correspondence with Regulation 8 of Annex II of MARPOL 73/78.

3.3.2. Discharge of noxious liquid substances along the NSR.

3.3.2.I. **The discharge into the sea of noxious liquid substances along the NSR may be carried out according to the "Regulations for protection of sea coastal waters from pollution" (USSR, Moscow, 1984). It is permitted to discharge only the substances, for which a maximum permissible concentration (MPC) in sea basins is determined, and only in the case when the concentration of a noxious substance in effluent does not exceed the MPC. The list of hazardous for human health and living marine resources, the discharge of which both in the pure state and in the mixtures with water and other substances is prohibited, as well as the MPC norms in the discharged mixtures of substances permitted to discharge noxious, are presented in Annexes 2, 4 and 5 of the Regulation and in the approved additional lists of MPC of noxious substances attached to corresponding Annexes.**

3.3.2.2. **The discharge into the sea of harmful substances in category A, and other residues and mixtures containing such substances, including ballast and bilge water, pumped out from the holds through the drain system, is strictly forbidden**, with the exception of cases when the discharge of a harmful substance is performed with the aim of securing the ship's safety or life saving.

3.3.2.3. **On the NSR discharge into the sea of substances in category B, and ballast water, tank washings or other mixtures containing such substances shall be prohibited** except when all the following conditions are satisfied:

- the ship is proceeding "en route" at a speed of at least 7 knots in the case of self-propelled ships or at least 4 knots in the case of ships which are not self-propelled;
- the discharge is made at a distance not less than I2 nautical miles from the nearest land and in a depth of water of not less than 25 meters;
- the discharge is made below the waterline, so that the discharged effluent is not sucked into the sea water intakes, but guided into the wake, the concentration of the substance in the effluent being not in excess of its MPC;
- the portion of harmful substances, having spilled or scattered on board the ship as a result of damaged packages, as well as all the residues, should be placed in special arrangement for lowering concentration and processed by sea water, so that concentration of harmful substance in dirty water intended for discharge is not in excess of the maximum permissible concentration.

3.3.2.4. **On the NSR discharge into the sea of substances in category C and ballast water, tank washings or other mixtures containing such substances shall be prohibited** except when all the conditions mentioned in 3.3.2.3. are satisfied.

3.3.2.5. **On the NSR discharge into the sea of substances in category D, and ballast water, tank washings and other mixtures containing such substances shall be prohibited** except when all the following conditions are satisfied:

- such mixtures are of a concentration not greater than one part of the substance in ten parts of water;
- the ship is proceeding "en route" at a speed of at least 7 knots;
- the discharge is made at a distance of not less than I2 nautical miles from the nearest land.

3.4. Disposal of residues of noxious substances along the NSR

3.4.I. Procedure of calculating water volume, in which a noxious substance should be dissolved before discharging overboard in the open sea.

3.4.I.I. Water volume, in which a noxious substance should be dissolved before discharging overboard, is determined by the formula:

$$V = \frac{C}{MPC_c} \quad , \quad (1)$$

where

V - water volume, in which a noxious substance is to be dissolved before discharging, m^3;

C - total mass of noxious substance liable to discharge, kg; it is calculated according to IMO procedures;

MPC_c - maximum permissible concentration of the noxious substance immediately before the discharge from the ship, kg/m^3 (mg/l).

3.4.2. Preliminary lowering of noxious substances concentration on board the ship before discharging with the help of special arrangements.

3.4.2.I. For dissolving noxious substances of categories B and C by sea water to the desired concentration before discharging them into the wake, special arrangements in compliance with 3.4.3 should be installed on board the ship.

3.4.2.2. On existing ships the arrangements mentioned in 3.4.3. should be installed during reequipment and may be of portable and stationary type. For new ships these arrangements should be envisaged by the design and be stationary. The arrangement, should be approved by the Maritime Shipping Register.

3.4.2.3. The discharge of noxious substances from ships is prohibited in the absence on board the ship of an arrangement mentioned in 3.4.3, and these ships cannot use the recommendations given in Section 3.3, with the exception of cases where the discharge is performed with the aim of providing the ship's safety or life saving at the sea.

3.4.3. Requirements to special arrangements for preliminary lowering of noxious substances concentration before discharging them from ships.

3.4.3.I. Any arrangement used on board the ship for processing noxious substances must be kept in good order and satisfy the present requirements.

3.4.3.2. The arrangement should provide for producing, stable solutions (for liquid and solid substances soluble in water), emulsions (for liquid substances non-soluble in water with density higher or lower than water), and suspensions (for solid matters non-soluble in water with density higher or lower than water) of desired concentrations.

3.4.3.3. The arrangements should be made of materials or be covered by materials excluding dangerous interaction with the processed substances.

3.4.3.4. Free access for cleaning, degassing or remedy of faults should he provided.

3.4.3.5 The arrangement should provide for one-time preparation of not less than I0 m^3 of mixture for the discharge.

3.4.3.6. Filling, providing the necessary concentration and output of the arrangement should be controlled constantly with the help of corresponding instruments.

3.4.3.7. Complete tightness of the arrangement and its systems should be provided in the case of processing substances giving off highly inflammable or noxious vapors and gases.

3.4.3.8. The arrangement systems should provide for safe transfer of cargo residues intended for discharge from the place of their location (deck, tank, hold, bilge, etc.) to the arrangement for dissolving.

3.4.3.9. The arrangement should provide for discharge of dissolved noxious substances by sea water into the wake below the actual waterline.

3.4.3.I0. The discharge system should prevent the possibility of noxious substances mixtures penetrating into other sea outlets designed for taking on sea water.
3.4.3.II. The system of pumps and pipes providing for the operation of the arrangement, should be independent.

3.4.3.I2. Laying of pipes through the fuel oil, lubricating oil and fresh water tanks is allowed only in oil-tight tunnels comprising part of the tank construction.

Laying of pipes directly through the tank without a tunnel is allowed provided seamless pipes are used without intermediate separable joints.

3.4.3.I3. If design features of the ship do not allow for independence of the system of pumps and pipes, it is permitted to use other ships' systems or their parts, fitted with non-return valves and complying with requirements of 3.4.3.I2.

3.4 4. Precautions to be taken when processing noxious substances.

3.4.4.I. **When processing noxious substances the requirements of safety and industrial sanitation, stipulated by Regulations for accident prevention on ships, as well as regulations, technical requirements and process sheets for carriage of chemical cargoes in bulk, should be complied with.**

3.4.4.2. When working with residues of noxious substances, giving off vapour and gases, the crew must exercise constant control of air contents in the room's atmosphere.

3.4.4.3. Immediately after the discharge of processed noxious substance, stripping and, if necessary, degassing and remedy of faults in the arrangement and the system of discharge should be made.

3.4.4.4. Persons bringing the arrangement into the initial condition after the discharge of noxious substances is finished, must use individual protective equipment, stipulated by corresponding regulations, technical requirements and process sheets for carriage of chemical cargoes in bulk.

3.4.4.5. Other ship's systems used in processing noxious substances may be used for initial functioning only after their thorough cleaning and, if necessary, degassing.

3.5. Emergency and other exceptional cases of discharge.

3.5.I. Emergency discharge.

3.5.I.I. Upon detection of leak of noxious substance from the ship into the sea, the Master of the ship is obliged to take measures for elimination of the leak in the shortest possible time.

3.5.2. Emergency discharge notice.

3.5.2.I. Upon noxious substance leakage occurring the Master of the ship is obliged to report to the NSR Administration about the emergency discharge of noxious substance without any delay, in case the discharge had been made with infringement of conditions stated in 3.3, while mentioning in the report full characteristics of the discharge and measures taken for its prevention

3.5.2.2. Such reports should include:

ship identification; date and time of emergency discharge; ship's coordinates at the moment of discharge; direction and speed of current; data about the ship and crew condition; presence of other ships in the area of discharge; exact industrial name and basic properties of noxious substance; its category of harmfulness; type of packing and marking; quantity of the substance discharged or possibly to be discharged into the sea in unfavorable situation; name of the manufacturer of noxious substance; the complete list of other noxious substances on board the ship and places of their storing; any other information, which the Master deems necessary to report, including measures taken and help required.

3.5.2.3. The Master of the ship is obliged, as it becomes possible:

- to supplement the initial report with data about subsequent events;
- to satisfy the requirements of interested States in rendering data concerning the emergency discharge.

3.5.2.4. In the presence of ships, especially of catching vessels, in the area of noxious substances discharge the Master of the ship must send the warning by radio in plain language on the International calling frequency with confirmation recorded on the tape-recorder and hoist corresponding signals using International Code of Signals.

3.5.2.5. In case of emergency discharge or in other exceptional cases it is recommended, with the aim of lowering concentration of noxious substances in effluent, to follow the recommendations of Section 2.5. applicable to chemical cargo.

4. PREVENTION OF POLLUTION BY HARMFUL SUBSTANCES CARRIED BY SEA IN PACKAGED FORM

4.I. General.

4.I.I. Classification of harmful substances carried by sea in packaged form and in bulk.

4.I.I.I. Classification of harmful substances carried by sea in packaged form and in bulk, must correspond to classification of noxious liquid substances carried in bulk presented in Section 3 of this document.

4.I.I.2. The list of substances presenting a hazard to human health or marine living resources prohibited for discharging, and norms of the MPC of these substances in mixtures with water are given in Annexes 2 and 5 of "Regulations for Protection of Sea Coastal Waters from Pollution", approved by the Ministry of Water Industry, Ministry of Fishery and Ministry of Public Health of the USSR, Moscow, I984.

4.I.I.3. Category of harmfulness of substances carried as a cargo in packaged form and in bulk is given in International Maritime Dangerous Goods Code (IMDG Code).

4.I.2. Application.

4.I.2.I. Provisions of this Section are applied to all ships carrying harmful substances in packaged form or in freight containers, portable tanks in bulk or in road and rail wagons.

4.I.2.2. Harmful substances, not mentioned in the "List of substances presenting a hazard to human health or marine living resources prohibited for discharging" and in Chapters I7 and I8 of IBC Code and for which the norms of the MPC in effluent are not established, are not allowed to be carried by sea.

4.I.3. Requirements to packing and marking.

4.I.3.I. Empty vessels, freight containers, portable tanks, etc., previously used for carrying harmful substances, are to be considered as sources of pollution, if proper precautions, providing for the absence of any residues presenting a hazard for the sea environment, had not been taken.

4.I.3.2. Taking into consideration conditions of carriage and properties of contained harmful substance the packing must eliminate the danger of sea environment during the carriage and in cargo operations in ports.

4.I.3.3. Each package containing harmful substance must have a marking, where the name of the harmful substance and distinguishing label, depicting harmful properties of contained substance should be presented. The marking should be applied with a paint stable to exposure the sea environment for three months as a minimum and correspond to requirements of MARPOL 73/78, or GOST I4I92-77 "Marking of cargoes".

4.2. Cargo operations.

4.2.I. The owners and carriers of cargoes, carried by sea in bulk, in packaged form, in freight containers, portable tanks or in road or rail wagons should develop and approve regulations for prevention of pollution of the sea during cargo operations with this cargo, in coordination with the Rosrybvod, Glavsanepidnadsor and Minprirody Russian Federation and companies-carriers, taking into consideration the distinguishing features of the cargo in question.

4.2.2. **The Master of the ship or his mate, before loading harmful substances in packaged form or in bulk, must advise the crew about the properties of these substances and the degree of their hazard for human life and marine living resources.**

4.2.3. Loading of packaged harmful substances into ship's holds or unloading them out of the holds should be carried out under strict supervision of the Responsible Person, specially appointed for this purpose by the .Master of the ship.

4.2.4. Harmful substances in packaged form or in bulk during the voyage by sea should be placed so that their occasional ingress into the sea could be prevented.

4.2.5. Cargo operations with harmful substances should be carried out in sea ports at specially equipped transshipment complexes or universal transshipment complexes, provided special requirements in the process of transshipment works are satisfied.

Loading, unloading and sorting of harmful substances is carried out in the presence of a competent representative of the port.

4.2.6. Loading and unloading of harmful substances should be carried out according to working process sheets, developed by the port in correspondence with characteristics and properties of these substances.

The process sheets should be agreed with bodies of Sanitary Inspection, port fire brigade, port environment protection body and other bodies, envisaged by RTM 31.00.07-76 "ESTPP. Regulations for drawing up working process sheets in marine ports"

4.2.7. Cargo pieces with harmful substances placed during carriage on the ship's deck should be properly stowed and secured to eliminate the possibility of their shifting on deck and falling into the sea under unfavorable hydrometeorological conditions of sailing. Cargo pieces with harmful substances should be well protected against sea water and weather.

4.2.8. During cargo operations with harmful substances in packaged form measures precluding tare damage and consequent pollution of the sea should be taken.

4.2.9. It is allowed to enter a hold, loaded with harmful substances in packaged form or in bulk and perform different works there only on condition that concentration of harmful substances vapour and gases does not exceed prescribed safe norms. To provide for safety these compartments should be aired or ventilated thoroughly. In emergency entry into a hold where dangerous concentration of vapour and gases exists is allowed provided special precautions are observing. Regulations for carrying out cargo works in holds loaded with harmful substances, which are simultaneously hazardous, are stipulated by the IMDG Code.

4.2.I0. Prior to commencement of work with harmful substances it is necessary to ensure that tare is not damaged and there is no scattering or spill of the substance.

4.2.II. After the end of loading, stowing of harmful substances on the ship should be clearly shown on the executive cargo plan. A copy of the cargo plan should be kept in the port, until these harmful substances are unloaded in the port of discharge.

4.3. Carriage.

4.3.I. **The Master of the ship carrying harmful substance in packaged form or in bulk must provide for control of the condition of package, stowing and securing of the cargo, gas contents and**

temperature in the compartment (if the substance possesses properties of spontaneous heating and forming dangerous concentrations of gases and vapour), for the duration of the presence of the above substance on board the ship.

4.3.2. During voyage harmful substances carried in packaged form on deck should be given special attention. In case of package damage measures precluding discharge of harmful substance into the sea should be taken. For this purpose the deck scuppers should be closed immediately and work of removing the scattered or spilled harmful substance started. The tare, decks, bulkheads and other surfaces contaminated by the harmful substance should be cleared of it by methods and means stipulated by the instruction, which should have been passed to the ship by the shipper before loading of harmful substance.

4.3.3. Suction valves in holds, where harmful substances are stowed, should be closed, pressed up and sealed.

4.3.4. Every discharge of bilge water from the cargo holds where harmful substances are stowed, should be carried out with knowledge and consent of the Master, after the analysis for the absence of harmful substance in bilge water is carried out.

Sampling methods and bilge water analysis for the absence of harmful substance in bilge water technique for carrying out on board a ship, as well as necessary equipment and preparations, should be passed to the Master of the ship in the port of loading by the shipper and at his expense.

4.3.5. Every case of sealing suction valves in holds, where harmful substances are stowed in package form or in bulk, and every case of discharging bilge water from them should be entered into the Logbook of Operations with Harmful Substances, Carried by Sea in Packaged Form, Freight Containers, Portable Tanks, in Bulk or in Road and Rail Wagons (Annex D of RD 3I.04.I7-94 "Regulations for registration of operations with oil, oil products and other substances, presenting a hazard to human health or marine living resources, and with their mixtures, generated on board the ships and other crafts").

4.4. Stripping of cargo compartments.

4.4.I. After the end of cargo operations with harmful substances, having been carried on board in packaged form or in bulk, the ship's holds and decks should be cleared thoroughly of the remnants and residues of harmful substances and degassed if necessary.

4.4.2. Harmful substances in small quantities which were scattered or spilled in a hold or after dry cleaning following carriage in bulk, should be collected into a separate receptacle, while the remnants or residues should be washed off into bilges or wells with the consequent discharge to the slop tank or other arrangement for previous lowering of harmful substance concentration before discharge (see items 3.4.2 - 3.4.4).

4.4.3. Slop tank is allowed to be used only for dissolving of readily water soluble liquids or solid substances, not reacting with the tank material.

4.4.4. Automatic system providing for transferring the solution from bilges or wells to the slop tank or other receptacle and its discharging overboard under above conditions, should be envisaged.

4.4.5. It is allowed to use a system, isolated from all other systems by non-return valves.

4.4.6. A continuous control of solution concentration in the slop tank should be exercised.

As the method of measuring solution concentration in the slop tank suffers considerable errors, concentration of harmful substance in bilge water should be taken I00% (independent of actual contents of substance in solution).

4.4.7. With the aim of discharge rate control a variable-displacement pump should be used.

4.4.8. It is forbidden to use a slop tank for dissolving harmful substances, evolving harmful or readily inflammable gases or vapour, if their air or sounding pipes go out into the area of living or service rooms.

4.4.9. The pumps, air vents, holes for taking samples, intended for work with highly harmful substances, should be fitted with cautionary notices, reading: **"Dangerous", "Poison",** etc.

4.4.I0 Immediately after the processing of harmful substance is finished, the slop tank, pipe system, pumps and other arrangements should be flushed out, and degassed if necessary.

4.5. Elimination of residues harmful substances.

4.5.I. The method of calculation of water volume, in which the harmful substance should be dissolved prior to discharging overboard, previous lowering of the harmful substance concentration on board the ship before its discharge with the help of special arrangements, requirements to these arrangements and precautions during processing the harmful substances shall be carried out in according to 3.4.

4.6. Prevention of pollution at calculated discharge of harmful substances from ships.

4.6.I. **The discharge into the sea of harmful substances in category A, and other residues and mixtures containing such substances, including ballast and bilge water, pumped out from the holds through the drain system, is strictly forbidden**, except in cases when the discharge of a harmful substance is performed with the aim or securing the ship's safety of life saving.

4.6.2. **On the NSR discharge into the sea of substances in category B, and ballast water, tank washings or other mixtures containing such substances shall be prohibited** except when all the following conditions are satisfied:

- the ship is proceeding "en route" at a speed of at least 7 knots in the case of self-propelled ships or at least 4 knots in the case of ships which are not self-propelled;
- the discharge is made at a distance not less than I2 nautical miles from the nearest land and in a depth of water of not less than 25 meters;
- the discharge is made below the waterline, so that the discharged effluent is not sucked into the sea water intakes, but guided into the wake, the concentration of the substance in the effluent being not in excess of its MPC;
- the portion of harmful substances, having spilled or scattered on board the ship as a result of damaged packages, as well as all the residues, should be placed in special arrangement for dilution and processed by sea water, so that concentration of harmful substance in dirty water intended for discharge is not in excess of the maximum permissible concentration.

4.6.3. **On the NSR discharge into the sea of substances in category C and ballast water, tank washings or other mixtures containing such substances shall be prohibited** except when all the conditions mentioned in 4.6.2 are satisfied.

4.6.4. **On the NSR discharge into the sea of substances in category D, and ballast water, tank washings and other mixtures containing such substances shall be prohibited** except when all the following conditions are satisfied:

- such mixtures are of a concentration not greater than one part of the substance in ten parts of water;
- the ship is proceeding "en route" at a speed of at least 7 knots;
- the discharge is made at a distance of not less than I2 nautical miles from the nearest land.

4.6.5. In cases when, due to package damage, spill or scattering of a harmful substance in category A, as well as in categories B, C and D occurs, and the conditions, stated in items 4.6.2 - 4.6.4, cannot be satisfied, spilled or scattered portion and all the remnants or residues of the substance should be collected thoroughly and put into receptacles specially designated for collecting remnants or residues containing harmful substances of all kinds.

A contaminated area should be flushed thoroughly, then wash water and sewage should be collected and transferred to above receptacles. In collecting remnants and residues and mixtures with harmful substances, as well as ballast and wash water, containing such substances, into any receptacles, it should be kept in mind that the substances may react with each other and with the receptacle material.

4.6.6. All the remnants and residues of harmful substances, wash and ballast water from slop tanks, containing such substances, should be unloaded or discharged to reception facilities in ports. The ports must provide for reception of harmful substances or mixtures containing such substances from ships.

4.7. Emergency and other exceptional cases of discharge.

4.7.I. Any emergency discharge and notice about such discharge is carried out in according to 3.5.

4.8. Registration of operations with harmful substances carried in packaged form or in bulk.

4.8.I. Every ship, for which the requirements of MARPOL 73/78 are valid, must have on board the Logbook of Operations with Harmful Substances, Carried by Sea in Packaged Form, Freight Containers, Portable Tanks, in Bulk or in Road and Rail Wagons. The Logbook pattern and hints on its keeping are given in Annex D of RD 3I.04.I7-94 "Regulations for registration of operations with oil, oil products and other substances, presenting a hazard to human health or marine living resources, and with their mixtures, generated on board the ships and other craft.

4.9. Responsibility for maintaining and supervision of fulfillment of provisions on prevention of pollution of the sea from ships by harmful substances, carried in packaged form or in bulk.

4.9.I. The shipper is responsible for timely issuing of certificates of harmful substances, carried in packaged form or in bulk, with proper designation of their category of harmfulness. He should also hand over to the carrier the instruction on taking samples and analysis of bilge water in cargo holds, as well as the necessary equipment and preparations if they are absent on board the ship.

4.9.2 The shipper must present to the carrier a certificate or statement to the effect that the packaging of harmful substances satisfies the requirements of the IMDG Code or State standards for sea transfer with prevention of package contents from leakage or scattering.

4.9.3. Administration of the port of loading (discharge) must provide to the ship tare for removing wash water from the ship.

4.9.4. The Responsible Person, appointed by the Master for supervising cargo operations with harmful substances, carried in packaged form or in bulk, is responsible for proper stowing, securing and special covering of the cargo, loaded on deck and into holds, for compliance with conditions of mutual loading of varions harmful substances, and for to precautionary measures during loading/unloading operations.

4.9.5 The discharge overboard of harmful substances, all the remnants and residues, containing mixtures of such substances, as well as sewage, wash and ballast water, must be carried out in the presence and under the supervision of the Master or his Mate and in compliance with all the provisions of 4.6.

5. PREVENTION OF POLLUTION BY SEWAGE

5.I General.

5.I.I. **The discharge of sewage from ships in the open sea is stipulated by Annex IV of MARPOL 73/78, and during sailing in inland sea and territorial waters of Russia - by the Regulations for protection of sea coastal waters from pollution, Moscow, 1984.**

The discharge of any sewage, including treated sewage, is prohibited in the sea areas or their sections perspective for fishery, for maintaining or reproducing of valuable species of fish and other objects of sea catch in areas of mass fish spawn and pasturing, wintering pits, and on the routes of fish migration.

5.1.2. **In the areas of water consumption of human population if is prohibited to discharge sewage water from ships.**

In the zone of sanitary protection it is prohibited to discharge untreated and undisinfected sewage

5.1.3. The discharge is permitted into the sea of treated and disinfected sewage water in ports and in the limits of the area of sanitary protection zones in the inland sea and territorial waters of Russia, provided the following conditions are satisfied:

- an arrangement, approved by the Maritime Shipping Register or other classification society participating in IACS, is in operation on board the ship, the capacity of purification and desinfection of which corresponds to norms: not more than 2500 - by e-coli count, not more than 50 mg/l - by BOD count, and not more than I00mg/l - by suspended solid matters in the wash water in excess of that contents in wash water itself;
- the discharge is performed when the ship is proceeding at a speed of at least 4 knots and does not result in the appearance of visible floating particles and change in the color of surrounding water;
- the discharge cannot be referred to a "salvo" discharge;
- the ship has International Sewage Pollution Prevention Certificate.

In the case of degradation of sanitary or ecological state of sea coastal waters, specially authorized State bodies of the Russian Federation in the field of the environment protection and their territorial divisions, as well as the fishery protection bodies of the Rosrybvod and the Glavsanepidnadsor of Russia, are entitled, with taking into consideration local conditions, to introduce temporarily, until the situation improves, stricter regulations concerning the discharge of non-processed and non-disinfected sewage water, and to decide about total ban of discharging sewage from ships.

5.1.4. **It is permitted to discharge non-processed sewage water in territorial waters from the ships, when the total number of crew, special personnel and passengers does not exceed I0 persons.**

5.1.5. **The discharge of domestic waste water is not regulated by International conventions and the Regulations for protection of coastal sea waters from pollution.**

5.1.6. In the aquatories and roads of the ports of the Arctic and Dalnevostochny basins the discharge from ships of processed and disinfected sewage, provided the following conditions are satisfied:

- an arrangement for processing and disinfection of sewage, approved by the Maritime Shipping Register or other classification society participating in IACS, is in operation on board the ship, and the degree of their purification provides for their consequent disinfection up to the value of I000 per liter by e-coli count; if disinfection is effected by means of chlorire the discharge of chlorire concentration up to I6 mg/l is allowed; the discharge does not result in the appearance of visible floating particles and change in the color of surrounding water.

5.2. Special cases of discharge of sewage.

5.2.I. **Limitations for sewage discharge are not applicable to:**

a) the discharge of sewage from the ship with the aim of providing the security of the ship and the people on board of the ship, or life saving at sea;
b) the discharge of sewage as the result of damage to the ship or her equipment, provided that all reasonable measures for preventing or minimizing such discharge had been taken.

5.2.2. In cases when the discharge of sewage in the inland sea and territorial waters of Russia is prohibited, but has occurred incidentally or due to reasons pointed out in 5.2.I, all possible measures to minimize this discharge shall be taken, a message about the fact of discharge shall be dispatched to the NSR Administration and Captain of the nearest icebreaker and port, taking all possible measures to terminatie sewage spill into the sea and elimination of spillage, and registration of the fact in the Logbook of operations with sewage and garbage made (see Annex G of the RD 31.04.17-94).

5.2.3. **The discharge of sewage water outside the distance of 4 nautical miles from the nearest land is permitted from fishing vessels, where the crew, special personnel and passengers do not in total exceed 40 persons, on the condition that such a discharge is carried out only during the fishery process, and that the discharge is performed gradually at the speed of at least 4 knots and does not result in the appearance of visible floating particles and change in the color of surrounding water.**

In the 4-mile zone the discharge of sewage water from fishing vessels, numbering the crew, special personnel and passengers more than I0 persons, is prohibited.

5.2.4. **The discharge of sewage water into territorial waters from the ships, numbering not more than I0 crew, special personnel and passengers, is permitted.**

5.2.5. **Until the construction of the town sewage works is completed, the discharge of sewage water is allowed in the ports along the NSR:**

- in Arctic seas, including the White Sea, its gulfs and bays (except Chupinskaya, Kandalakshskaya, Obskaya and Tazovskaya bays and Mezensky and Onjezhsky gulfs with Solovetsky islands) outside the distance of 4 nautical miles from the nearest land, in places and on conditions agreed in advance with local supervisory bodies for water, fishery and sanitation, and provided that the discharge is performed gradually: from supply vessels during the loading/unloading operations and from hydrographic vessels "en route" proceeding at a speed of at least 4 knots;
- in the areas from the ports Igarka, Khatanga, Zelyony Mys up to Mys Shaitansky, Mys Kosysty and Mys Medvezhy, and in the downstream of the rivers Yenisey, Khatanga, Kolyma, from hydrographic and other auxiliary vessels not less than 70 m long, provided that the discharge is made during loading/unloading operations, hydrographic and other works, and that sewage water is discharged gradually during ebb tide;

5.3. Sewage system.

5.3.I. In running the sewage system the requirements of the sewage system manual should be complied with.

5.3.2. Discharge of sewage water to the shore reception facilities should be exercised by the pipelines, specially designed for this purpose via standard discharge connections.

5.3.3. Prior to discharge of sewage water the contents of the slop tank should be intermixed (broken up).

5.3.4. Before discharging of sewage water to reception facilities it is necessary to check the system readiness. During dark hours sufficient lighting should be provided in the area of the operation.

5.3.5. **In the areas where the discharge of sewage water is prohibited in correspondence with provisions of 5.I, the isolating armature of the outboard line of the sewage system should be sealed in closed position, and automatic means of starting and stopping pumps, intended for emptying of slop tanks, should be switched over to manual control.**

5.3.6. The discharge of sewage water to reception facilities and into the sea water outside the boundaries of areas prohibited for discharge should be recorded in the Logbook of operations with sewage water and garbage.

5.3.7. Upon completing discharge of sewage water the slop tank and sewage lines should be flushed by sea water with consequent discharge of the wash water to reception facilities or overboard, if the latter is allowed.

5.4 Equipment for processing sewage water.

5.4.I. The arrangement for processing sewage water should provide for the following degree of purification of the sewage waters discharged into the Arctic seas:

e-coli count	not more than I000
number of suspended particles	not more than 50 mg/l (at stand) I00 mg/l in excess of suspended particles contents in the wash water on board the ship
BOD count	not more than 50 mg/l

5.4.2. The arrangement should be supplied with the Type Test Certificate issued by the Maritime Shipping Register or a Classification Society participating in the IACS.

5.4.3. Three types of installations: biological, physicochemical, and electrochemical are basically used on ships.

5.4.4. The installations of biological type should be in operation both in the areas where the discharge of unprocessed water is prohibited and upon leaving these areas. It is connected with the necessity of maintaining microbes activity, providing for purification of processed water. Death of microbes results in the loss of purification ability, and restoration of a normal working process will take much time (I0 - I5 days). The process of putting the installation into the normal mode of operation may be accelerated through the use of the dry microorganism preparation, or the active sludge from other working installation. When working outside the banned areas the disinfecting system may be switched off.

5.4.5. The installations of physicochemical and electrochemical type are put into operation before entering of the ship into the area where the discharge of unprocessed sewage water is prohibited.

5.4.6. Sufficient stocks of chemical preparations and spare parts necessary for normal operation of the installations should be always present on board the ship.

5.4.7. In storage and operation with aggressive chemicals it is necessary to follow strictly manufacturers' instructions and safety rules.

6. PREVENTION OF POLLUTION BY GARBAGE.

6.I. General.

6.I.I. **The discharge of garbage from ships in the open sea is regulated by Annex V of MARPOL 73/78 and during sailing in inland sea and territorial waters of Russia - by the Regulations for protection of sea coastal waters from pollution, Moscow, 1984.**
The discharge of any non-processed industrial, domestic and other kinds of garbage and wastes into the coastal sea waters along the NSR is prohibited.

In the areas of water consumption of population it is prohibited to discharge garbage and any kind of wastes.

It is also prohibited to stockpile on ice or on the coast garbage or other kind of wastes in places not agreed with specially authorized persons of State bodies of the Russian Federation in the field of the environment protection and their territorial divisions, as well as the fishery protection bodies of the Rosrybvod and the Glavkomsanepidnadsor of Russia.

6.I.2. Explanatory work on garbage discharge prohibition should be constantly carried out on the ship. Placards of the size I2.5 x 20 cm, reminding of such prohibition should be hang in readily visible places in food store, mess room, dining-room, navigating bridge, main deck and other parts of the ship.

6.1.3. The discharge of garbage to reception facilities and incinerating garbage should be fixed in the Logbook of operations with sewage water and garbage.

6.2. Special cases of garbage discharge.

6.2.I. The prohibition to discharge garbage is not valid in any area of the sea in the cases:

- ofensuring the safety of ship and crew or lifesaving;
- of damage to ship or her equipment, provided all reasonable precautions for preventing or minimizing such discharge had been taken.

6.2.2. In cases when the discharge of garbage in the inland seas and territorial waters of Russia is prohibited, but has occurred incidentally or due to reasons pointed out in 6.2.I, act to 5.2.2.

6 3. Decrease of garbage forming on board the ship.

6.3.I. The quantity of garbage forming on board the ship may be decreased by the reuse of tare.

6.3.2. Given the possibility of choosing, the ship's supplies should be packaged in materials other than utilized plastic.

6.3.3. Expendable materials should be used rationally, taking into consideration their storage life after opening their package

6.3.4. Forming operational wastes may be decreased by:
- replacing one-time plastic lining of cargo pieces with a lining capable to endure multiple use;
- rational stowing cargo with multiple use of packages, separators, fixtures, covering and coating materials;
- discharging to reception facilities of separating, covering and packing materials, remaining after cargo unloading.

6.3.5. Cargo losses are minimised by effective performance of cargo operations. Cargo losses during discharging operations should be controlled thoroughly both on board and berth. The remnants of cargo should be collected thoroughly and included into cargo or given up to the shore.

6.4. Collection of garbage.

6 4.I. **Garbage forming on board is liable to be collected into specially designed devices (portable or built in). The collected garbage is kept up to the time of its discharge to reception facilities, its annihilation on board the ship or discharge into the sea shall take place pursuant to the conditions of 6.I.**

6.4.2. The use of separate marked receptacles is recommended for collecting garbage. In these receptacles (cans, barrels, bags, containers, buckets) there should be collected separately:

– products of plastic, clean or mixed with non-plastic garbage;
– food wastes;
– garbage, that may be discharged into the sea.

The members of the crew should be informed which garbage should be disposed of into which receptacles.

6.4.2.I. **Plastic garbage should be kept on board the ship until discharged to port reception facilities. Ashes forming at incineration of plastic may content wastes of heavy metals, as well as toxic wastes, the discharge of which into the sea is prohibited. Such ashes should be kept on board the ship and transferred to reception facilities.**

6.4.2.2. **Food wastes are collected into waste receptacles. It is strictly forbidden to mix food wastes with domestic and oil-containing wastes, including oil-permeated cloth.**

6.4.3. On the ships constructed after 1 October I993, and also on ships in service, it is recommended to have, as possible, the following minimal receptacles for keeping garbage:*)

	Full tonnage						
	up to 400		from 400 to I600	from I600 to 4000	from 4000 to I0000	from I0000 and more	Ships carrying more than 50 people
	up to 10 people	up to 50 people					
Minimal total volume of receptacles for keeping garbage, cubic meters	0,1	0,5	0,4	1,2	2,5	5,0	I,0 m^3 per I00 people per day

*) - volumes shown in the table are given for total volume of the receptacles for garbage, food wastes and plastics.

There should be three garbage receptacles in agreement with three categories, mentioned in 6.4.2. The garbage supposedly may include 50% of glass, cardboard, etc., 25% of plastic products and 25% or food wastes. The volume of receptacles for keeping garbage may be decreased for ships, making regular voyages between any two ports or short voyages.

In the presence on board the ship of incinerators, devices for comminuting and pressing garbage, the volume of receptacles for collecting garbage may be diminished.

6.4.4. **At the approach of the ship to a NSR area where the discharge of non-processed garbage is prohibited, all the receptacles for collecting garbage must be emptied in advance, according to the requirements of Annex V of MARPOL 73/78, and prepared for reception of garbage.**

6.4.5. **Upon entering into a NSR area the ship administration should inform the crew about this fact and issue corresponding orders as to collection and keeping garbage on board the ship.**

6.4.6. The places of disposition of dismountable devices for collecting and keeping garbage should be determined by the ship administration. The dismountable devices should be, as far as possible, placed beside main sources of forming garbage and within the reach of loading facilities.

6.4.7. After each emptying of a garbage receptacle it should be flushed out.

6.5. Processing of garbage.

6.5.I. With the aim of processing of garbage, incinerators, and devices for comminuting and pressing garbage may be mounted on board the ship.

6.5.2. The use of equipment for garbage processing allows for the discharge of a portion of garbage into the sea in areas where the discharge of non-processed garbage is prohibited; it allows to decrease the level of requirements to rooms for keeping garbage; it makes it easier discharging garbage in a port and provides for better assimilation of garbage by sea environment.

6.5.3. The garbage comminutor must provide for comminution into particles not greater than 25 mm, which allows to discharge the garbage, processed in the comminutor, outside the special areas of water consumption.

Although it is permitted to discharge non-processed food wastes outside the area of the I2-mile zone, it is recommended even in this case to comminute garbage, if a comminutor is found on board the ship. It will promote to better assimilation to release lesser particles into the sea environment.

6.5.4. When the ship is positioned in an area of water consumption it is recommended to collect comminuted food wastes in slop tanks.

6.5.5. Most garbage may be subjected to pressing. Exception should be made for non-comminuted plastic sheets, fiberboard, cardboard, receptacles for liquid and bulk substances and thick-walled metallic items. In view of possible explosion; hermetically sealed receptacles should not be pressed.

6.5.6. Garbage pressing results in decreasing its volume and facilitating storage and discharging.

6.5.7. The arrangement for garbage incineration (incinerator) should be supplied with a certificate of the Maritime Shipping Register or other Classification Society participating in the IACS.

6.5.8. The incinerators used on ships are designated for incinerating only garbage or garbage and oil wastes.

6.5.9. With the aim of lowering fuel oil consumption it is advisable to incinerate garbage and oil wastes simultaneously.

6.5.I0. When incinerating oil wastes, the latter should be prepared thoroughly with the help of the arrangement for preparation of oil wastes to incineration. The contents of oil products in oil wastes should be noteworthy, it should not be less than that indicated in the manual.

6.5.II. During incineration of garbage it is forbidden to charge the incinerator with great amount of oil-permeated cloth and plastic, because it may lead to sharp rise in temperature in the reactor and in smoke in waste gases.

6.5.I2. The use of the incinerator in ports should be restricted as this may result in pollution of atmosphere. In some ports permission of port authorities for the use of incinerator may be necessary.

6.6. Storing of garbage.

6.6.I. Garbage should be kept on the ship during all the time of sailing in areas, where the discharge of garbage is prohibited.

6.6.2. Food wastes and garbage intermixed with each other, which may serve as the source of infections and liable to the discharge to shore, must be kept separately in tightly closed containers.

6.6.3. It is necessary to take control and preventive measures regularly for prevention of infection in zones of keeping garbage onboard.

6.7. Elimination of garbage.

6.7.I. Despite having permission to discharge some kind of processed garbage into the sea along the NSR, as regulated by the above mentioned provisions, the major means of eliminating garbage forming on board the ship should be transfer to shore reception facilities and annihilation on board.

6.7.2. In presence on board of facilities for comminution and pressing garbage, elimination of garbage after processing (in these arrangements) should be done in deep waters (not less than 50 m).

6.7.3. Cargo package wastes are formed, as a rule, during loading/unloading operations in port. It is recommended to take all possible measures for elimination of these wastes to shore reception facilities before leaving the port.

6.7.4. If garbage is contaminated with such substances as oil or toxic chemicals, the ban of which is regulated, more strict requirements become of higher priority.

6.7.5. The discharge of garbage from the ship must be carried out to reception facilities. The port, upon receiving an advance notice, is to receive garbage or provide for reception of loaded dismountable devices and delivering of the empty ones, suitable for reception and storage of garbage.

6.7.6. If a berth or garbage vessel is not equipped with sufficient hoisting gear for reception and delivery of garbage containers, the ship is to carry out these operations by her own means.

6.7.7. It should be taken into account that due to possible differences in technique of reception of different kinds of garbage, the reception facility may require to divide, directly on board the ship, from each other:

a) food wastes;
b) wastes connected with transporting cargo;
c) domestic and maintenance wastes.

Annex I

GLOSSARY

ADMINISTRATION	The government of the State which has granted the ship permission to sail under its flag.
ADMINISTRATION NORTHERN SEA ROUTE	Northern Sea Route Administration of the Merchant Marine For ships sailing along the NSR, the Administration of the Russian Federation is represented by the Department of the Ministry of Transport of Russia.
ADMINISTRATION REPRESENTATIVE	Head, Deputy Head, Chief State and State Inspectors of Administration, as well as the Sea Operations Staff officers and other persons, authorized by the Administration to perform individual functions under the jurisdiction of the administration.
AREA OF WATER CONSUMPTION	a sea coast area used presently or intended to be used in future for bases for long and short-term rest, as well as ater intake premises for drinking and industrial water supply plants, swimming pools, hydropathic establishments, baths and other balneologic constructions using sea water with the aim of sanitation and medical treatment, 2 miles wide seaward from coast line.
BERTH	piers, jetties, mooring buoys, or similar installations to which the facilities are affixed, serving for the mooring of ships and for the conduct of oil transfer and ancillary operations.
CARGO-ASSOCIATED SOLID WASTE	solid waste due to general cargo operations is the largest source of shipboard solid waste both in volume and weight. Such waste includes dunnage, shorning, plywood, pallets, paper, cardboard, wire, steel strapping, spoiled cargo, sweepings.
CARGO WASTES	all the materials which become wastes in the course of keeping and handling cargo on board the ship. Cargo wastes include, but are not limited to, separating partitions, trays ,covering and package materials, plywood, paper, cardboard, wire and steel binding.
CHEMICAL TANKER	a ship constructed or adapted primarily to carry a cargo of noxious liquid substances in bulk and includes an "oil tanker" as defined in Annex I of the MARPOL 73/78 when carrying a cargo or part of noxious liquid substances in bulk.
CLEAN BALLAST	the ballast in a tank which since oil was last carried therein, has been so cleaned that effluent therefrom if it were discharged from a ship which is stationary into clean calm water on a clear day would not produce visible traces of oil on the surface of the water or on adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines. If the ballast is discharged through an oil discharge monitoring and control system approved by the Administration, evidence based on such a system to the effect that the oil content of the effluent did not exceed 15 parts per million shall be determinative that the ballast

was clean, notwithstanding the presence of visible traces.

CONTINENTAL SHELF OF RUSSIA	sea bed and natural resources of areas beyond the boundaries of the territorial waters of Russia along the whole length of natural continuation of the continental territory of Russia up to the outer boundary of the underwater edge of the continent, or at the distance of 200 nautical miles from the initial lines, from which the territorial waters of Russia are calculated from, when the outer boundary of the underwater edge of the continent is not spread so far. In the case when the underwater edge of the continent is spread more than 200 nautical miles from the initial lines, the outer boundary of the continental shelf is at least 350 nautical miles from initial lines, denoting the width of territorial waters of Russia, or at least I00 nautical miles from the 2500 m isobath.
CRUDE OIL	any liquid hydrocarbon mixture occurring naturally in the earth whether or not treated to render it suitable for transportation and includes: a) crude oil from which certain distillate fractions may have been removed; and b) crude oil to which certain distillate fractions may have been added.
CRUDE OIL TANKER	an oil tanker engaged in the trade of carrying crude oil.
DEADWEIGHT (DW)	difference in metric tons between the displacement of a ship in water of a specify gravity of 1.025 at the load waterline corresponding to the assigned summer freeboard and the lightweight of the ship.
DIRTY BALLAST	oil contaminated ballast water originated from dirty oil tanks
DISCHARGE	in relation to harmful substances or drainage containing such substances, means any release howsoever caused from a ship and includes any escape, disposal, spilling, leaking, pumping, emitting or emptying.
DOMESTIC WASTE	all kinds of food waste and waste of living quarters, galley and dining rooms.
DOMESTIC WASTE WATER	drains from sanitary-hygienic rooms: washrooms, shower baths, baths, bathrooms, cabin basins, laundries, etc.; drains from galley washbasins and equipment and other food-processing rooms.
E-COLI COUNT	a quantitative characteristic of feces contamination of water or food products. It is determined by the number of microbes, normally living in human intestines, contained in 1 l or 1 kg of substrate.
EXISTING SHIP	existing ship and existing oil tanker means a ship is not a new ship.
FILTERING EQUIPMENT	separators and filters (or a combination of the two) which are designed to produce an effluent with a maximum oil content of 15ppm.

FUEL BALLAST TANK	fuel oil tank, which may be used systematically as a ballast tank.
GARBAGE	all kinds of victual, domestic and operational waste excluding fresh fish and parts thereof, generated during the normal operation of the ship and liable to be disposed of continuously or periodically.
HARMFUL SUBSTANCE	any substance which, if introduced into the sea, is liable 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.
HOSE	a flexible pipe with arrangements for connecting to facility and ship.
IACS	International Association of Classification Societies.
IBC Code	International Code for Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk
INLAND SEA WATERS OF RUSSIA	a) Sea waters shoreward from initial straight lines, assumed for counting the width of territorial waters (territorial seas of Russia); b) Waters of ports of Russia, enclosed by a line passing through the most seaward hydrotechnic and other port constructions; c) Gulf, bay or estuary waters whose shores belong solely to Russia, up to a straight line connecting the opposite shores in the place where from the sea side for the first time one or several passages are formed, provided the width of each is not in excess of 24 nautical miles. d) Sea, gulf, bay, estuary and strait waters historically belonging to Russia.
INSTANTANEOUS RATE OF DISCHARGE OF OIL CONTENT	rate of discharge of oil in liters per hour at any instant divided by the speed of the ship in knots at the same instant.
LOADING ARM	part of the facility, consisting of hinged pipes and arrangements for their connection to tanker manifolds. The design of the loading arm may incorporate a permanently connected hose.
MAINTENANCE WASTES	materials collected in machinery spaces and on decks in the process of the ship's exploitation and servicing, such as soot, deposits, scraped paint, deck litter, cleaning wastes and cloth, etc.
MARPOL 73/78	International Convention for Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 Relating Thereto.
NEW SHIP	new ship and new oil tanker is the ship whose definitions appear contain in Regulation 1 (6) of the Annex I MARPOL 73/78.
NEAREST LAND	the baseline from which the territorial sea of the territory in question is established in accordance with international law.

NORTHERN SEA ROUTE	the national transport communication of Russia positioned over inland sea waters, territorial sea (territorial waters) or economic zone of Russia, adjacent to the Northern coast of Russia, including routes suitable for ice pilotage, their extreme points being limited in the west by the WESTERN entrances into the Novozemelskiye Straits and the meridian passing to the North from the Mys Zhelaniya, and in the east, in the Bering Strait - by latitude 66^0 N and longitude $I68^0$,58' 37" W.
ODMCS	oil discharge monitoring and control system.
OIL	Petroleum in any form including crude oil, fuel oil, sludge, oil refuse and refined products (other than petrochemicals which are subject to the provisions of Annex II of the MARPOL 73/78) and, without limiting the range generality of the foregoing, includes the substances listed in appendix I to the MARPOL 73/78.
OIL FUEL	oil used as fuel in connection with the propulsion and auxiliary machinery of the ship in which such oil is carried.
OIL REFUSE	part of the oil which can not be pumped or washed without special means or equipment.
OIL SLUDGE	any sludge with oil content.
OIL TANKER	ship constructed or adapted primarily to carry oil in bulk in its cargo spaces and includes combination carriers and any "chemical tanker when it carrying a cargo or part cargo of oil in bulk.
OIL-CONTAMINA-TED CLOTH	cloth, contaminated by oil or oil product.
OIL/WATER CLEAN EQUIPMENT	separators and filters may be fitted to process oil-contaminated water and they should be capable of throughputs adequate for their purpose.
OILY MIXTURE	mixture with any oil content.
OPEN SEA	aquatory of the World Ocean beyond the boundaries of inland and territorial waters of States.
OPERATIONAL WASTES	all the wastes related to cargo and cargo handling, and cargo remnants presenting a litter.
ORB	Oil Record Book.
PROTECTED SEA COASTAL WATERS	sea aquatories and land territories within the boundaries of actual and prospective areas of water consumption and area of sanitary protection this zone.
RECEPTION FACILITY	a shore, or floating construction or their combination in a united technological system, designated for reception from ships of harmful

	substances or mixtures containing such substances, which may be accumulated in the process of normal operation of the ship, but cannot be discharged from ships into the sea in correspondence with international conventions presently in force or national regulations of States, in waters in which the ships are sailing.
RESPONSIBLE PERSON(S)	a person responsible for carrying out operations on board the ship or on the shore.
SEA COASTAL WATERS	territorial and inland sea waters and river estuaries of Russia, which are derived in the entries INLAND SEA WATERS OF RUSSIA, TERRITORIAL WATERS (TERRITORIAL SEA) OF RUSSIA and RIVER ESTUARIES of the present Annex.
RIVER ESTUARIES	the transition region from the river to the sea characterized by interaction and mixing of the river and sea waters and forming deltas. The river estuary includes the Mouth part of the river, the part of its basin and coast adjacent to the estuary.
SANITARY PROTECTION ZONE	territory and water area where a special sanitary and anti-epidemic regime is established to prevent from the deterioration of water quality
SEA OPERATIONS STAFF	special navigational services of the Murmansk and Dalnevostochny Shipping Companies immediately controlling sea ice operations along the NSR, coordinated generally by the Administration. Addresses of the Sea Operations Staffs are given in the Guide for sailing ships along the NSR.
SEGREGATED BALLAST	ballast water introduced into a tank is completely separated from the cargo oil and oil fuel system and which is permanently allocated to the carriage of ballast or to the carriage of ballast of cargoes other than oil or noxious substances.
SEPARATING EQUIPMENT	separators and filters (or a combination of the two) which are designed to produce an effluent with a maximum oil content of 100ppm.
SEWAGE	the drained water and other wastes from all types of toilets, urinals and also from scuppers in lavatories; – water drain from washbasins, bathrooms, shower baths and scuppers in medical rooms (dispensaries, sick bays); – water drain from compartments, where animals are kept; – other water drain when mixed with the above mentioned.
SHORE RECEPTION FACILITIES	complex of stationary equipment and systems at a berth or connected with it, designated for transferring oil, loading and discharging tankers, reception of dirty ballast and oil residues, and bunkering.
SLOP TANK	a tank specifically designated for the collecting of tank draining, tank washings and other oily mixtures.

SPECIAL AREA	a sea area where for recognized technical reasons in relation to its oceanographic and ecological condition and the particular character of its traffic the adoption of special mandatory methods for the prevention of sea pollution by oil is required. Special areas shall include those listed in Regulation 10 of Annex I and in Regulation 5 of Annex V MARPOL 73/78.
TANK	an enclosed space which is formed by the permanent structure of a ship and which is designed for the carriage of liquid in bulk.
TERRITORIAL WATERS (TERRITORIAL SEA) OF RUSSIA	sea coastal waters I2 miles wide, counted off from the line of maximum ebb tide on both the continent and islands belonging to Russia, or from the initial straight lines connecting corresponding points. Geographical coordinates of these points are approved in the order stipulated by the Council of Ministers of the Russian Federation. In specific cases another width of territorial waters (territorial sea) of Russia may be established by international treaties of Russia, or, in the absence of the latter - in accordance with generally acknowledged principles and norms of international law.
WATER CONSUMPTION AREA	water area of recreational, medical and sanitation, domestic and drinking water consumption of population
WATER CONSUMPTION OF POPULATION	use of sea water for swimming, water sport, water intake for hydropathic establishments and swimming pools, for domestic and drinking purposes after freshening and also within the precincts of settlements

ANNEX 2

CHECKLISTS

Below are items to be checked at different stages or operations. It is advisable to make a copy of the checklist and mark the fulfillment of stipulated requirements in the copy. The checklist should be signed by the Responsible Person before the start of an operation after the check has been finished.

I. Before discharging, make sure that:

- all the Kingston valves and discharge sea valves of cargo system, preventing the discharge overboard, are closed;
- cargo isolating valves are closed;
- system of draining manifolds on deck and in pump room(s) is closed;
- non-used valves of cargo line are closed;
- plugs into non-used intake connections are installed and duly pressed;
- all the non-used pipe connections are plugged;
- valves of each tank being emptied are opened in correspondence with cargo level and the ship's list, so that any cargo displacement and possibility of spill could be avoided;
- all the deck scuppers are plugged;
- all the pumps are ready for operation;
- stripping system is ready for discharging bilges of pump room in emergency;
- alarm system is checked;
- cargo system and valves used during the discharge are properly handled and ready for discharging oil product;
- valves in machine and pump rooms are made ready for delivery of oil product;
- briefing of all the participants of cargo operations is carried out;
- mates and deck crew are familiarized with the procedure of the emergency stopping the pumps;
- mates are familiarized with the procedure of discharge finishing;
- with the availability of a boom - they are ready for quick spreading out in case of oil spill;
- receptacles of sufficient volume are installed under all pipeline joints; sufficient quantity of dry material for collection of spilled oil is available;
- inert gas system, if available, is thoroughly cleaned and dried;
- before opening discharge valves make sure that centrifugal cargo pumps are started and isolated, where possible, from their discharge lines and work properly. It is of great importance that, in the absence of non-return valves on the shore and with high position of shore reservoirs oil could not reverse to oil tanker, overfilling her tanks.

2. Before ballasting through the cargo system make sure that:

- valves of the non-used portion of cargo line are closed and connections plugged;
- cargo pumps are started before sea valves are opened, so that vacuum is created in the water suction and possible discharge of oil, which may be accumulated in the pipe portion between the valve and the pump, is prevented into the sea;
- all the side scuppers are properly closed;
- when the intake of clean ballast is carried out, before this operation is started make sure that main cargo pumps and pipelines going to be used are clean and that the used wash water is transferred into the dirty ballast or slop tank;

3. Before the end of ballasting make sure that:

- at the end of a tank ballasting the pump rate is sufficiently decreased to prevent overflow;
- after the end or ballasting a sufficient ullage is in the tank;

4. Before the discharge of ballast to the shore make sure that:
- valves of the cargo and stripping lines not used at deballasting are closed tightly;
- deck scuppers are properly plugged;
- intake valves of each tank are opened in correspondence with the ballast level and the ship's list, so that any displacement of the ballast and possibility of spill could be prevented;
- cargo pumps are prepared properly;
- alarm system is checked;
- emergency switch off of cargo pumps is checked;
- pump room is checked for the absence of fuel oil/water;
- drain valves of cargo line are closed;
- plugs into non-used intake connections are installed and duly pressed;
- inert gas system, if available on board, is ready to operation;
- briefing of all those participating in operations is carried out;
- mates and deck crew are familiarized with the procedure of stopping pumps in emergency;

5. Before bunkering or loading make sure that:
- all the tanks are duly prepared (cleaned and dry thoroughly);
- the system of signals, worked out for loading, decreasing the rate of loading, end of loading and emergency stop, is understood and agreed between the ship and berth;
- all the Kingston valves and sea discharge valves of lines, connected with bunkering system, are closed;
- valves of non-used lines are closed;
- bunkering/cargo connections of lines non-used during the operations, are plugged securely;
- all the deck scuppers are plugged securely;
- stripping system is ready for discharging bilges of pump room in emergency;
- cargo system and valves to be used during the discharge are properly handled;
- briefing of all those participating in loading operations is carried out;
- mates and deck crew are familiarized with the procedure of stopping cargo delivery;
- with the availability of a boom - they are ready for quick spreading out in case of oil spill;
- receptacles of sufficient volume are installed under all joints of bunkering/cargo lines and air vents of corresponding tanks;
- bunkering/cargo hoses are in working condition, connected and secured properly;
- sufficient quantity of dry material for collection of spilled oil is available;
- valves of tanks, designated to be first filled with fuel oil, are opened, and the system of filling tanks is acting properly;

6. During filling a bunker or loading cargo make sure that:
- filled tanks are closed securely and, while other tanks are being filled, sufficient ullage is left in the filled tanks;
- bunkering/cargo hoses, cargo equipment and joints are not leaking;
- inert gas system, if available, is thoroughly cleaned and dried;
- all the participating personnel is briefed about the ban to close intake valve during bunkering/loading until corresponding command and shore facility permission is obtained;
- before the end of filling tank - pressure is decreased either by decreasing the rate of oil delivery or by controlled opening of intake valves of the following tank to be filled;
- a clear signal of decreasing oil delivery rate is given at the final stage of cargo operations, and your own signal before the final stop of delivery;
- sufficient ullage in the last filled tank is left for reception of oil draining from hoses and compensation of possible air bubble in the line;

7. Upon the end of bunkering/loading operation make sure that:
- mates and deck crew are familiarized with stop of cargo delivery procedure in emergency;
- mates are familiarized with the procedure of loading finish;
- pipelines' valves are closed;
- hoses are drained before their disconnection;
- after disconnection plugs are put into hoses flanges before hoses' are given up to shore;
- intake connections of the ship's pipelines are plugged immediately after hoses are disconnected;
- valves of bunkering/loading system, covers of access holes and inspection doors, as well as plugs of sounding pipes of tanks filled with cargo, are closed, pressed tightly and safe for sea.

ANNEX 3

CONDITIONS OF DISCHARGE OIL WATER ALONG THE NSR

Area of the sea	Discharge from machinery rooms bilges		Discharge of ballast from oil tanker
	Ship type and dimensions	Discharge criteria	Discharge criteria
The NSR	Any ship other than oil tanker of up to 400 tons gross tonnage	Undiluted effluent containing not more than I5 ppm of oil	Discharge is prohibited with the exception of clean or segregated ballast*
	Any oil tanker and any ship of 400 tons gross tonnage and above	Discharge is prohibited with the exception, when: 1) bilge water is not mixed with bilge waterof cargo pump room or cargo residues; 2) the ship is "en route"; 3) oil content in the effluent is I5 ppm; 4) equipment in correspondence with, Regulation I6(5) of the Annex I MARPOL 73/78 is available	

Note:

* - Proper consideration should be given to local Rules and provisions of MEPC Resolution 50 (3I).

CONDITIONS OF NOXIOUS LIQUID SUBSTANCES DISCHARGE ALONG THE NSR

Discharge conditions	Substances			
	Category A	Category B	Category C	Category D
Maximum concentration of sub- stance during discharge	Discharge prohibited	Contents of noxious substance in effluent does not exceed MPC		I part of substance in 10 parts of water in effluent
Maximum volume of cargo discharged from each tank	Practically none. Tank is flushed and residues are given up to shore facility		I m^3 or I/3000 of tank volume	Not restricted
Discharge area		Below waterline		
Minimum sea depth		25	25	Not restricted
Minimum distance from shore		12 miles		
Ship maximum speed at discharge: self-propelled not selfpropelled		7 knots 4 knots		

CONDITIONS OF SEWAGE WATER DISCHARGE ALONG THE NSR

Sewage type	Area of water consum-ption	Area of fish consum-ption	Sanitary protection zone	Within 4 miles from land*	Between 4 and I2 miles from land	More than I2 miles from land
Non-processed sewage water *	Discharge is prohibited					Carried ou when the ship i moving at nc less than 4 knot
Processed sewage water	Discharge is prohibited		Discharge is prohibited except discharge after processing in approved installations in accor-dance with to condi-tions of Regulation 3 (I)(a)(i) and Regulation 8 (I)(b) of the Annex IV MAR-POL 73/78**		Discharge is prohibited except discharge after processing: 1. in approved installations in accordance with conditions of Regulation 3 (I)(a)(i) and Regulation 8 (I)(b) of the Annex IV MARPOL 73/78. 2. in approved systems for commu-nication and desinfection of sewage water, in accordance with conditions of Regulation 3 (I)(a)(ii) and Regulation 8 (I)(a) of the Annex IV MAR-POL 73/78	Not restricted
Domestic waste water	Not restricted					

Note:

* - It is permitted to discharge non-processed sewage water in territorial waters from the ships, whan the number of crew special personnel and passengers does not exceed I0 persons.

** - In the aquatories and roads of the ports of the Arctic and Dalnevostochny basins the discharge from ships of the processed and disinfected sewage, provided the following conditions are satisfied:

- an arrangement for processing and disinfection of sewage, is in operation on board the ship, and the degree of its purification provides for its consequent disinfection up to the value of I000 per liter by e-coli count; if disinfection is effected by means of chlorire the discharge of chlorire concentration up to I6 mg/l is allowed; the discharge does not result in the appearance of visible floating particles and change in the color of the surrounding water.

CONDITIONS OF GARBAGE DISCHARGE ALONG THE NSR

Garbage type	Area of water consumption	All other areas of NSR
Non-processed garbage of all kinds	Discharge prohibited	Discharge prohibited. Transferred to reception facilities
Comminuted and pressed plastic sheets, synthetic ropes, nets and products of plastic or their ashes	Discharge prohibited	Discharge prohibited. Transferred to reception facilities
Garbage which is prohibited comminuted and pressed: fiberboard, cardboard, receptacles for liquid and bulk substances, thick-walled metallic items and hermetically sealed receptacles.	Discharge prohibited	Discharge prohibited. Transferred to reception facilities or incinerated (if they burn up)*
Comminuted and pressed floating separating material, fixing and packing materials	Discharge prohibited	Discharge in deep waters (not less than 50 m) not less than 25 miles from land or incinerated (if they burn up)*
Comminuted and pressed Paper, rags, glass, metal, bottles, containers, and other wastes	Discharge prohibited	Discharge in deep waters (not less than 50 m) not less than 12 miles from land or incinerated (if they burn up)*
Food wastes non-comminuted	Discharge prohibited	Discharge at 12 miles from land or above
Food wastes comminuted	Recommended collect in slop tanks.	Discharge at 12 miles from land or above

Note:

* - The use of the incinerator in ports should be restricted as this may result in pollution of atmosphere. In some ports permission of port authorities for the use of incinerator may be necessary.

Annex 4

References

1. MARPOL 73/78, IMO-520E
2. International convention relating to intervention on the high seas in cases of oil pollution casualties (Intervention), 1969, IMO-402E
3. International convention on civil liability for oil pollution damage (CLC), 1969 IMO-410E
4. Official records of the conference on the establishment of an international compensation fund for oil pollution damage, 1971, IMO-423E
5. Inter-governmental conference on the convention on the dumping of wastes at sea, 1972, IMO-532.82.03E
6. International convention on oil pollution preparedness, response and cooperation (OPRC), 1990, IMO-550E
7. Manual on chemical pollution
   Section 1 - Problem Assessment and Response Arrangements, IMO-630E
   Section 2 - Search and recovery of packaged goods lost at sea, IMO-633E
8. Guidelines for surveys under Annex I of MARPOL 73/78, IMO-526E
9. Guidelines on the provision of adequate reception facilities in ports, IMO-580E, 582E, 520E
10. Control of ships and discharges, IMO-601E
11. Crude oil washing system, IMO-617E
12. Dedicated clean ballast tanks, IMO-619E
13. Inert gas systems, IMO-860E
14. Regulations for the control of pollution by noxious liquid substances in bulk (Annex II, MARPOL 73/78), IMO-514R
15. Provisions concerning the reporting of incidents involving harmful substances under MARPOL 73/78, IMO-516E
16. International maritime dangerous code (IMDG Code), IMO-200E
17. IMDG code supplement, IMO-210E
18. Code of safe practice for solid bulk cargoes (BC Code), IMO-260E
19. IMO/ILO guidelines for packing cargo in freight containers or vehicles, IMO-284E
20. Code of safe practice for cargo stowage and securing, IMO-292E
21. International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code) IMO-100E, 102R
22. Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (BCH Code), IMO-772E
23. "Register Rules on Prevention of Pollution from Ships"
24. "Regulation for navigation on the sea ways on the Northern Sea Route".
25. Resolution of MEPC 36 as of 05.II.94
26. IMO resolution A.446(XI)
27. RTM 31.00.07-76 "ESTPP. Regulations for drawing up working process sheets in marine ports"
28. GOST I4I92-77 "Marking of cargoes".
29. Regulations for protection against pollution of sea coastal waters, approved by the Ministry of Water Industry of the USSR, Ministry of Fishery of the USSR and Ministry of Public Health of the USSR, Moscow, I984
30. RD 3I.04.I7-94 "Regulations for recording operations involving oil, oil products and other substances presenting a hazard to either human health or marine living resources, and their mixtures produced on board the ships and other craft".

Authors Addresses

Project II.6.1. Control of pollution from Ships, Part I,II

Dr. Gennady Semanov Tel. 7812 271 10 15	Central Marine Research and Design Institute (CNIIMF) 6, Kavalergardskaja st, St.Petersburg, 193015 Russia
Jury Kirsh Tel. 7812 271 10 15	CNIIMF
Oleg Zhuravlov Tel. 7812 271 11 77	CNIIMF
Dr. Vladimir Karev Tel. 7095 926 94 74	Marine Pollution Control and Sulvege Administration (MPCSA) 1/4,Rozhdestvenka st, Moscow, 103759 Russia
Nikolay Sisemov Tel. 7818 224 75 38	Northern Shipping Company (NSCo) 36, Dwinskaya Embankment, Archangel, 163061

Appendix A

Comments on Project II.6.1: Control of Pollution from Ships on the NSR, Part I.

Review and Comment
on INSROP Report: August 1994

II.6.1. Control of Pollution from Ships, Part I

Authors:	Dr. G. Semanov	CNIIMF (supervisor)
	J. Kirsh	CNIIMF
	Ing. O. Zhuravlov	CNIIMF
	Dr. V. Karev	MPCSA
	Ing. N.Sisemov	NSCo

The authors are to be congratulated for their attempt to address the very delicate and complex topic of the environmental protection of the NSR. The report together with reports II.6.3 and II.6.4 show that there is a lot of work to be done in order to be able to provide environmentally sound traffic on the NSR.

The first chapter gives a brief description of international and Russian regulations, that apply to Arctic shipping. The authors predict that the Arctic waters in the near future will be declared a particular area, just like the Antarctic waters, and will be subjected to the requirements of MARPOL 73/78. In view of this, the report would have benefited from a closer comparison between MARPOL 73/78 and other international and national regulations.

The reader gets the impression that the Russian rules are less stringent than the corresponding US/Canadian rules.

In general it can be said that the report gives a picture of the present situation. When the report is compared to the "Project description" in the INSROP PROJECT CATALOGUE 1993 it becomes evident that the scope of the report does not match that of the initial project.

None of the requirements mentioned in the "Project description" is presented, which means that this document can hardly serve as basis for the proposed "Pollution Control Guide".

Reviewer:
Kimmo Juurma

Appendix B

Comments on Project II.6.1: Control of Pollution from Ships on the NSR, Part I and Part II.

Review and Comment
on INSROP Report: April 1996

II.6.1. Control of Pollution from Ships, Part I and Part II

The first part of the report gives a brief overview of Arctic national regulatory regimes and of some international provisions with potential for application in semienclosed sea areas. The summary of NSR ship traffic and lists of pollutants aboard are useful, although very few conclusions are reached to form the basis for the proposed "Shipping Pollution Prevention Manual".

The Particularly Sensitive Sea Area (PSSA) and Special Area designation seem to be used interchangebly. The Antarctic Ocean south of 60^0 latitude was declared a Special Area with zero discharge, given the nature of the Antarctic Treaty which would not permit commercial developments. The Arctic Ocean, a semienclosed area, could be treated as a Special Area with established commercial shipping and potential new projects based on sustainable development. (Note NSR Administration allows discharges of not more than 15 PPM inside of 200 miles (EEZ) in line with MARPOL Special Area designation. The PSSA designation is less understod in shipping terms and has only been applied to protect the well defined Great Barrier Reef, contiguous to Australia alone.

The authors took a very practical approach in developing the guidelines. The constraints for the area are considered and guidance given; more emphasis could be put on the Arctic specific provisions, such as oil transfers using long pipes or hoses in ice covered waters.

Up to section 4., pretty well everything is based on standard practices and procedures. The procedures suggested in 4.5 and 4.6, using Annex II discharge provisions for chemical tankers and applying them to all ships packaged dangerous goods may be too onerous as ordinary vessels would not have pre-approved procedures and fittings which would be difficult for ship's crew to ensure any discharge does not exceed the MPC. Residues from packaged goods would be very small or nil compared to carriage in bulk by chemical tankers.

The guidelines based on IMO established procedures are comprehensive with sufficient additions for Arctic particulars to be of use to Masters using the NSR. The format could be improved by better spacing and highlighting significant passages.

Reviewer:
V.M. Santos-Pedro

Appendix C

Comments on INSROP's Reviewes

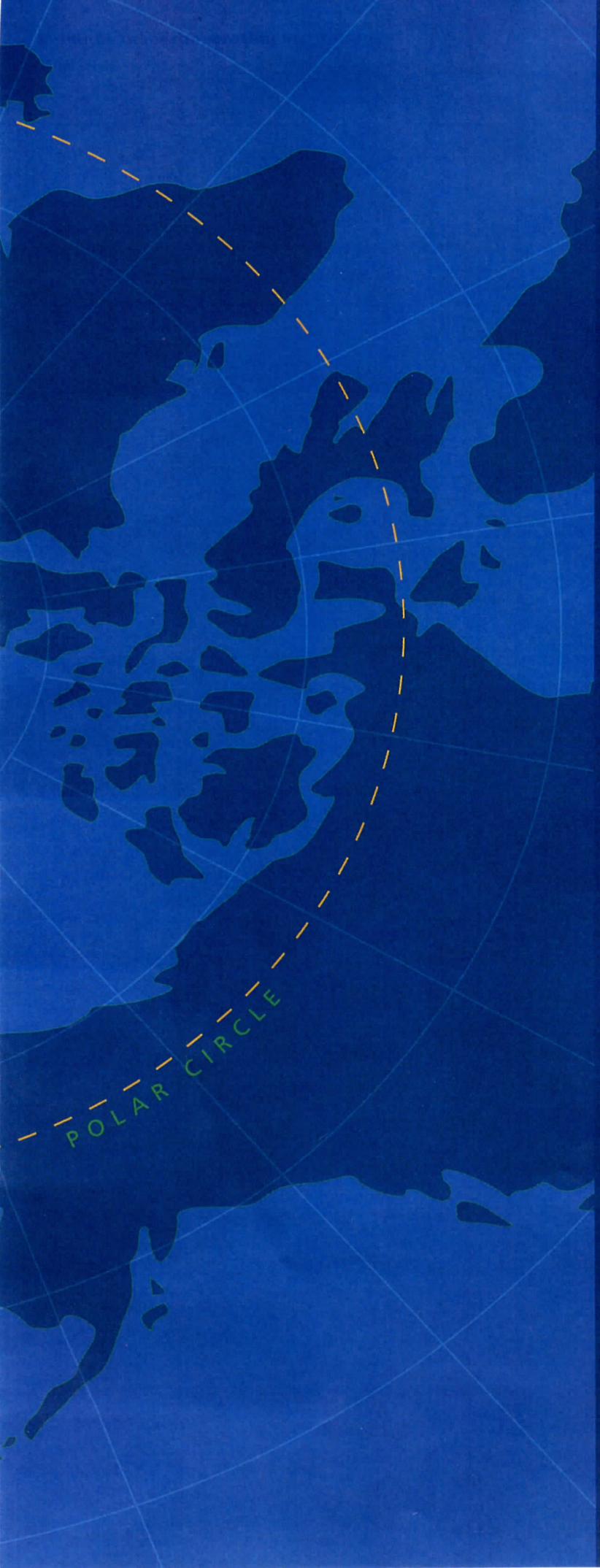
II.6.1. Control of Pollution from Ships on the NSR, Part I and Part II.

The authors thank the reviewers for the comments on INSROP Reports on the project II.6.1 "Control of Pollution from Ships on the NSR".

The reports were revised according to the comments and they contain the following amendments:

1. Chapter 1, Part I is revised and supplemented with a table which contains the data concerning Canadian, Russian and MARPOL 73/78 requirements on prevention of the pollution of seas from ships.
2. The 1994 report is the first part of the project II.6.1 and doesn't include all the issues dealing with control of pollution from ships. The lacking information was inserted in the final 1994 report on the project II.6.1.
3. The spacing of the final version was changed and significant passages were high-lighted.

Supervisor of the project II.6.1
G.Semanov



The three main cooperating institutions of INSROP

Ship & Ocean Foundation (SOF), Tokyo, Japan.
SOF was established in 1975 as a non-profit organization to advance modernization and rationalization of Japan's shipbuilding and related industries, and to give assistance to non-profit organizations associated with these industries. SOF is provided with operation funds by the Sasakawa Foundation, the world's largest foundation operated with revenue from motorboat racing. An integral part of SOF, the Tsukuba Institute, carries out experimental research into ocean environment protection and ocean development.

Central Marine Research & Design Institute (CNIIMF), St. Petersburg, Russia.
CNIIMF was founded in 1929. The institute's research focus is applied and technological with four main goals: the improvment of merchant fleet efficiency; shipping safety; technical development of the merchant fleet; and design support for future fleet development. CNIIMF was a Russian state institution up to 1993, when it was converted into a stock-holding company.

The Fridtjof Nansen Institute (FNI), Lysaker, Norway.
FNI was founded in 1958 and is based at Polhøgda, the home of Fridtjof Nansen, famous Norwegian polar explorer, scientist, humanist and statesman. The institute spesializes in applied social science research, with special focus on international resource and environmental management. In addition to INSROP, the research is organized in six integrated programmes. Typical of FNI research is a multi-disciplinary approach, entailing extensive cooperation with other research institutions both at home and abroad. The INSROP Secretariat is located at FNI.