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PASSAGE PLANNING FOR SHIPS INVOLVED IN AN INCIDENT AND SEEKING A PLACE OF REFUGE

ABSTRACT

This article defines the types of incidents suffered by ships which need to transit to an appropriate place of safety in order to improve their technical condition. It presents some information concerning the passage planning of ships involved in an incident and data used to assess the risk of such transit. Annex 2 presents a set of conventions concerning passage to a place of refuge.

Key words:
passage planning, places of refuge ships.

INTRODUCTION

It follows from analyses of incidents suffered by seagoing ships that assistance provided in good time from an external source for a ship involved in an incident could have reduced or prevented serious effects of the incident, and helped protect marine environment.

Preventive measures taken by IMO with regard to environment protection have resulted in introducing procedures for designating regions of refuge for ships involved in an incident.

The existing IMO resolutions provide guidelines to follow in requesting access to places of refuge in the water regions of the world which are designated for ships

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in an incident. The resolutions also refer to procedures used to report incidents and request assistance to a place of refuge.

Planning passage for a ship involved in an incident requires the master to make decisions concerned with safe transit of the ship (usually without propulsion) to a port/place of refuge. A disable, drifting ship renders poses a hazard to shipping and the marine environment (oil pollution).

There can be various causalties, e.g.:

1. Fire onboard ship e.g in the cargo hold.
2. Explosion (in the engine room, in the hold).
3. Damage to the steering system, propulsion system or others.
4. Collision with another ship or a solid object.
5. Pollution of the environment with toxic substances.
6. Limitation or loss of visibility.
7. Going aground — consequences as in points 3, 5 and 6.

The passage plan of a ship involved in an incident requires selecting a place/port of refuge and information on:

- ship's condition following the incident (assessment of type and scope of damage);
- current environment condition;
- current weather;
- a few-days ahead forecast of hydro-meteorological conditions in the area of incident.

ASSESSMENT OF A PLACE OF REFUGE FOR A SEAGOING SHIP INVOLVED IN AN INCIDENT

A passage plan for a ship involved in an incident from the area of the incident to a place/port of refuge consists of three elements:

1. Assistance for the ship involved in an incident.
2. Planning a method for transit of the ship from the area of the incident to the place/port of refuge.
3. Establishing communication between the master of the ship and on-shore services in charge of transit operations to the place/port of refuge.

- A ship in need of assistance

  A ship involved in an incident in need of assistance does not require a rescue operation as is the case in conditions of possible loss of the ship. Actions are taken to increase safety of navigation and protect the environment.
- A place of refuge

  A place of refuge is a place where a ship in need of assistance can take action to enable it to stabilize its condition and reduce the hazard to navigation and also prevent environment pollution.
- Maritime Assistance Service

  Its activity is defined in IMO resolution A.950 (23). The service is responsible for maintaining continuous communication between the master of the ship involved in an incident and on-shore services in charge of transit operations to a place/ port of refuge.

It follows from the definition of *place of refuge* that the notion of *assistance* differs from the notion of *ship in distress*. According to the source [3] assistance for a ship in distress is assistance in removing technical problems by repairing damaged shipboard systems, or preventing loads or fuel from displacing.

In the course of transit of the ship involved in an incident to a place/port of refuge there occur protests of environmentalists from a coastal state she passes. Authorities of such states, after making appraisal of the type of damage, technical condition of the ship, its load and absence of possibility to remove the technical problems aboard away from a place of refuge and eventual danger of extension of the technical problems, grant permission for transit for such a ship.

PASSAGE PLANNING OF A SHIP INVOLVED IN AN INCIDENT

When requesting access to a place of rescue it is necessary to take into account not only the distance between the ship's position and the port but also its technical facilities. Therefore it is necessary that information be exchanged between the master of the ship involved in an incident and the port authorities with regard to the type and scope of the problems and onshore capabilities to render the relevant assistance. After making the arrangements with the shore services and receiving permission to enter the port a plan for further action must be developed, i.e.:

– assessment of risk related to receiving a ship involved in an accident;

– drawing up a plan for entering the port;
– drawing up a plan by the port authorities for receiving the ship.

The main rules and procedures used to plan transit for a ship involved in an incident do not differ from those applicable to a seaworthy ship. The type and scope of technical problems of the ship seeking a place of refuge may limit maneuvering capabilities caused, among others, by external interference.

Planning transit for a ship involved in an incident to a place/port of refuge must start with considering a few aspects:
– independent transit to a place/port of refuge (with some limitations);
– approach to a place/port of refuge with assistance (of another ship, tug, icebreaker, fireboat, etc.);
– approach to a place of refuge on towage or with assistance rendered by a tug or with a tug moored alongside the ship;
– leaving the ship in free drift, waiting for the weather to improve on the transit route or in the place of refuge.

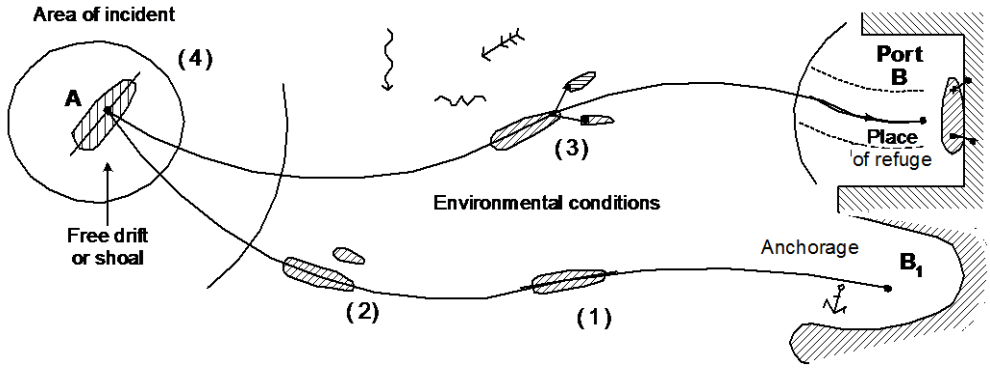

Fig. 1. Conditions for transit of a ship involved in an incident to a place of refuge [own work]

COLLECTING DATA NECESSARY FOR THE PLAN OF ENTERING A PORT OF REFUGE

Actions required by the master of a ship involved in an incident include not only actions relating to planning transit to a place of refuge but also the participation of other ships in assisting it in the course of transit. The plan should also take into account the possible occurrence of previously unexpected situations.

Actions required in connection with planning transit to a place of refuge include, among others, collecting data indispensable for drawing up such a plan.

Analysis of the technical condition of a ship and the causes of the incident

Thorough appraisal of the technical condition of the ship after the incident is the basis for selecting the transit route. The master is responsible for providing reliable information on the scope of the problems and ship's capability to navigate along the route to the place of refuge. In this connection the master should identify:

- the scope of damage;
- eventual effects of the damage, possibility of reducing the effects of the damage;
- damage symptoms;
- types of damage and their possible consequences for the ship in motion;
- time needed to repair the damage or remove it;
- the effect on environment.

The effect of environmental conditions

- bathymetry in the area of the ship's transit;
- parameters relating to change in sea level (tides, seasonal changes, etc.);
- values of currents (tidal, constant, wind-related, etc.);
- icing conditions (sea and air temperature).

Social and infrastructure-related factors in the area transit

- safety of crew (personnel) aboard the ship;
- analysis of hazards to public safety in the area of the port;
- analysis of protected environment areas;
- fishing areas;
- location of leisure areas;
- logistical and technical support capabilities of the port.

Analysis of changes in the technical condition of the ship after the incident

The assumptions to the plan of action if the effects of the incident magnify, include:

- tasks and responsibility of authorities and administration of the port of refuge;
- arrangements to prepare equipment necessary to limit or remove the effects of the incident;
- work methods and techniques in case hazards connected with the incident effects increase;
- need for international cooperation.

In addition, a wide scope of information is needed in connection with international and local laws.

Planning ship's speed on the transit route

When planning speed for a ship involved in an incident, proceeding under its own propulsion, it is necessary to take into account additional factors, such as: currents and winds which strongly affect ships proceeding at a low speed. Similarly, it is necessary to analyze the width of the transit lane when the ship is being hauled. A team of tugboats, maneuvering in a constrained region constitutes additional difficulty under some weather conditions.

Additional information indispensable to drawing up a plan of transit

The plan should also take into account several issues relating to the berthing operation carried out by an immobilized ship. This is connected with the necessity to take into account maneuvering parameters and safety under the keel clearance for ships with listing. It is also necessary to take into account several additional factors connected with deteriorating technical condition of the ship involved in an incident when in motion.

Drawing up such a plan for a ship which is not in good technical condition causes a serious problem for the master of the ship, ship-owner, or chartering party. In this case assistance is required from experts on shore who can provide advice relating to legal and technical-exploitation actions to be taken in order that the right port of refuge is chosen for the ship. This is connected with the necessity to plan and organize communication with the assisting ships as well as with SAR, VIS or VTMS centers in the port of refuge (Communication Plan in fig. 2).

Figure 2 presents a communication diagram for a ship in need of assistance, proceeding to a place of refuge.

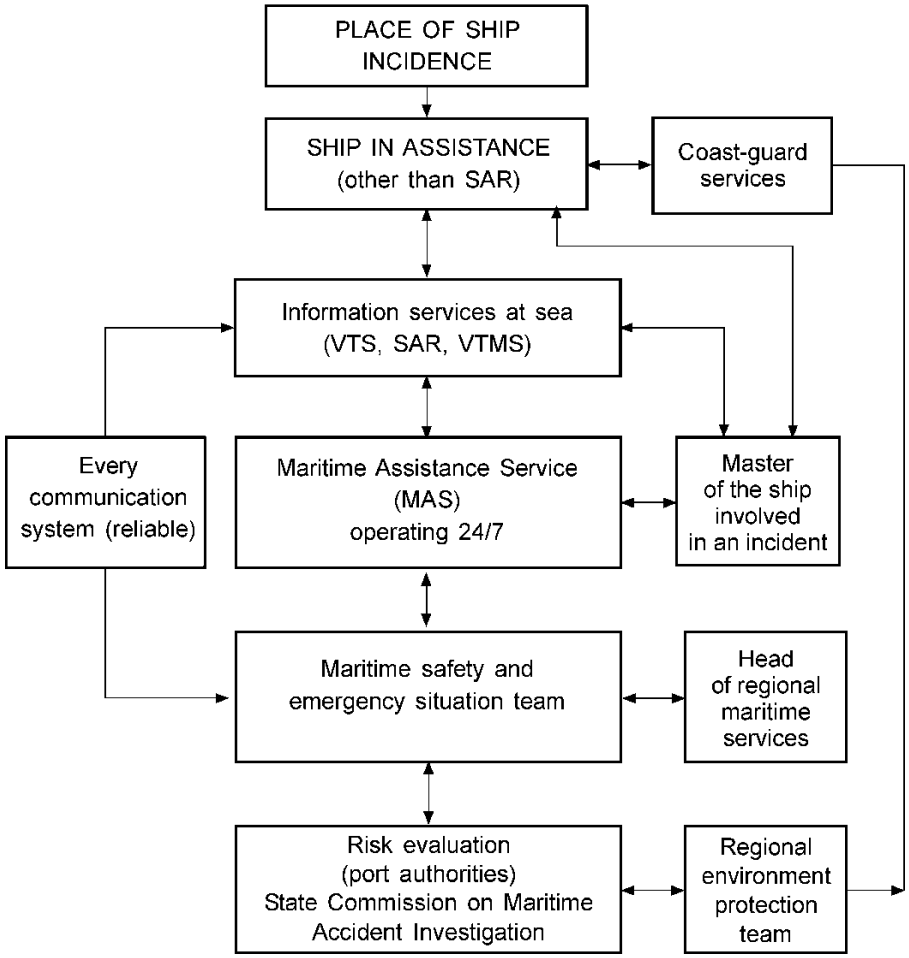

Fig. 2. Diagram for information dissemination in the process of seeking a place of refuge

Source: developed by the author, based on [11].

ROLE OF MASTER OF THE SHIP INVOLVED IN AN INCIDENT

In order to make a decision concerned with removing damage in a place of refuge, the master and crewmembers of the damaged ship are required to identify and appraise the effects of the damage through:

1. Identification of hazard and risk analysis following the incident.
2. Establishing the scope of required action — drawing up a plan of action.
3. Establishing contacts with local administration authorities in the place of refuge.

4. Establishing responsibility and the method for communication with the parties involved in rendering assistance to a ship entering a port of refuge.
5. Commencing the operations in cooperation with the administration of the port of refuge.
6. Implementing procedures for data recording.

Additionally, in the course of the operation, the ship is required to take actions aimed at:

1. Confirming the decision concerned with necessity of assistance.
2. Predicting consequences of the decision to take actions such as:
   - staying in the incident area motionless,
   - continuing to proceed to a place of refuge,
   - entering an area of refuge (Anchorage or port),
   - staying at sea in free drift.
3. Reporting a necessity of assistance to be rendered by port authorities in order to avoid a hazardous situation.
4. Notifying port of refuge authorities of readiness to enter port.
5. Undertaking to comply with requirements set by the port authorities relating to entering the place of refuge.

TYPE OF INFORMATION USED TO IDENTIFY RISK OF BRINGING A SHIP INVOLVED IN INCIDENT INTO A PLACE OF REFUGE

Before a plan for bringing a ship involved in incident into a place of refuge an expert analysis must be carried out to analyze the risk of this maneuver. Local authorities make a comparison of the risk of leaving the ship involved in incident at sea with the risk of bringing it into the port/place of refuge.

Such comparison is based on collected data relating to:

1. Seaworthiness of the ship and its current technical condition, such as:
   - buoyancy,
   - stability,
   - motion capability,
   - engine power sufficient for berthing.
2. Type of load, fuel, stocks and hazardous loads.
3. Distance and time needed to pass from the incident area to the place of refuge.
4. If the master is on board.

5. Number of crewmembers, rescuers or other persons aboard.
6. Mental and physical condition of crewmembers.
7. Nationality of ship — flag.
8. Type of ship insurance and liability insurance coverage.
9. Insurance Company.
10. Solvency range of the insurance.
11. Rescue agreement signed by the master or ship-owner.
12. Information on master's or rescuer's intentions.
13. Information if risk evaluation has been carried out or other measures have been taken.

ASSESSING OF RISK INVOLVED IN CHOOSING A PLACE OF REFUGE FOR SEAGOING SHIPS

Assessing places of refuge for ships involved in incident requires profound and detailed analysis with regard to safety of ships being brought into them as well as to their effect on marine environment:

Main data necessary to evaluate the risk include:

1. Type of ship damage.
2. Evaluation of social factors concerning crews and marine environment.
3. Natural conditions of the area.
4. Infrastructure in the place of refuge.
5. Cooperation of the parties (ship-port authorities).
6. Consequences for the environment in case of ecological disaster.

A few conditions, necessary to provide safety for ships involved in an incident, are decisive in establishing a place of refuge. Main attributes are:

1. Natural protection against unfavorable weather conditions.
2. Absence of navigational hazards in this region.
3. There exist good bathymetric conditions.
4. Easy access to port infrastructure and repair services of damaged shipboard systems [8].

Use of a place of refuge by a ship involved in incident is expected to:

1. Protect and save human life.
2. Secure safety for the crew of a ship involved in an incident.

3. Make repairs of damage caused by an incident.
4. Minimize risk of polluting environment in the area of incident.

Annex 2 presents an algorithm for assessing a place of refuge chosen by a decision of the parties involved.

CONCLUSIONS

1. Direct causes of marine incidents may include:
   - human error (crewmembers, technical services),
   - violating exploitation rules such as negligence of procedures, regulations, technical standards,
   - technical errors relating to maintenance and repairs,
   - errors in technical exploitation,
   - pursuit of profit — failing to comply with provisions of international conventions by ship-owners.
2. The key element in successfully conducting a ship involved in an incident into a place of refuge is coordination of actions carried out by the master (ship-owner) and administrators of the place of refuge.
3. Making the right decision concerning the choice of time for transit of the ship. Due to weather conditions time is the main factor behind the success of the operation.
4. Predicting possible scenarios which may occur in the course of conducting the ship into a place of refuge.
5. Ensuring reliable, continuous communication between the master and relevant services responsible for the safety of the ship.
6. Prior to ship's transit to a place of refuge hazards must be identified and the risk of operation thoroughly assessed.

ANNEX 1

PLANNING PERFORMACE OF IMMOBILIZED SHIP IN DRIFT CAUSED BY WIND AND TIDAL CURRENT

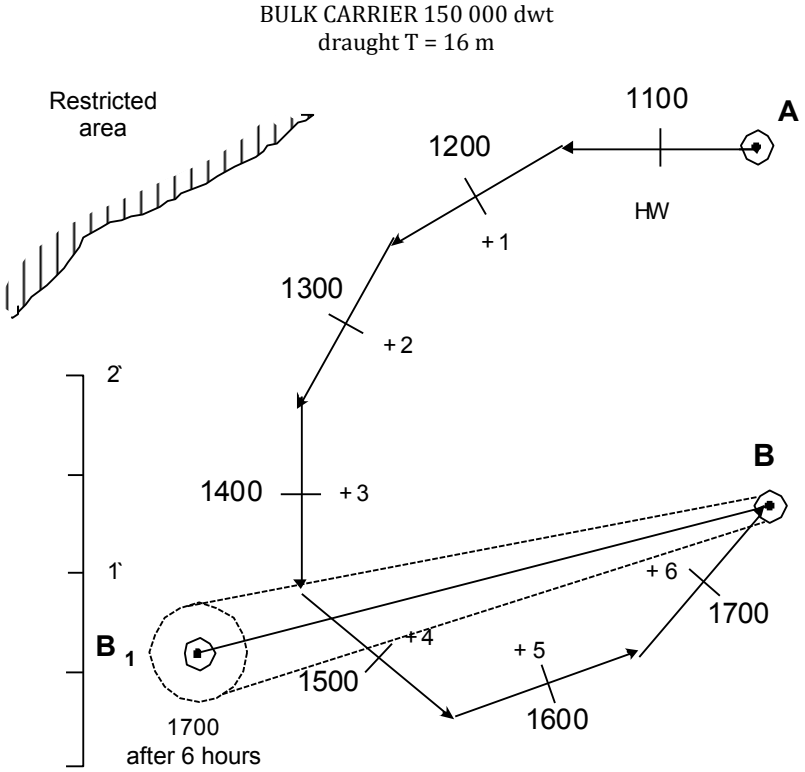

Fig. 1. The drifting ship analysis [own work]

Table 1. Tide data

Moment [h]	**Po HW [h]**	**K_p [°]**	**V_p [w]**
1100	HW	270	1.0
1200	+1	235	0.8
1300	+2	215	0.7
1400	+3	180	0.7
1500	+4	155	0.8
1600	+5	075	0.7
1700	+6	025	0.8

Source: data interpolated from the table on the chart from tide tables.

Navigation procedures in a drifting ship include, among others, checking ship's position at specified frequency, depending on the distance to navigational dangers.

The incident position in point A. Wind direction NE causing the ship to drift at 0.4 knot. The ship is affected by tidal current. Data on drift are drawn from the moment of high water at 1100 hrs LMT. In accordance with the plan the ship will reach position B_1 in 6 hrs (fig. 1).

Motion of the ship affected by wind and current is assumed with approximation. A loaded ship responds to wind more whereas an emerged ship to wind action.

Theoretically, after 6 hours of free motion the ship should be at position B_1. However, changes in strength or direction of wind can disturb the process of free motion.

ANNEX 2

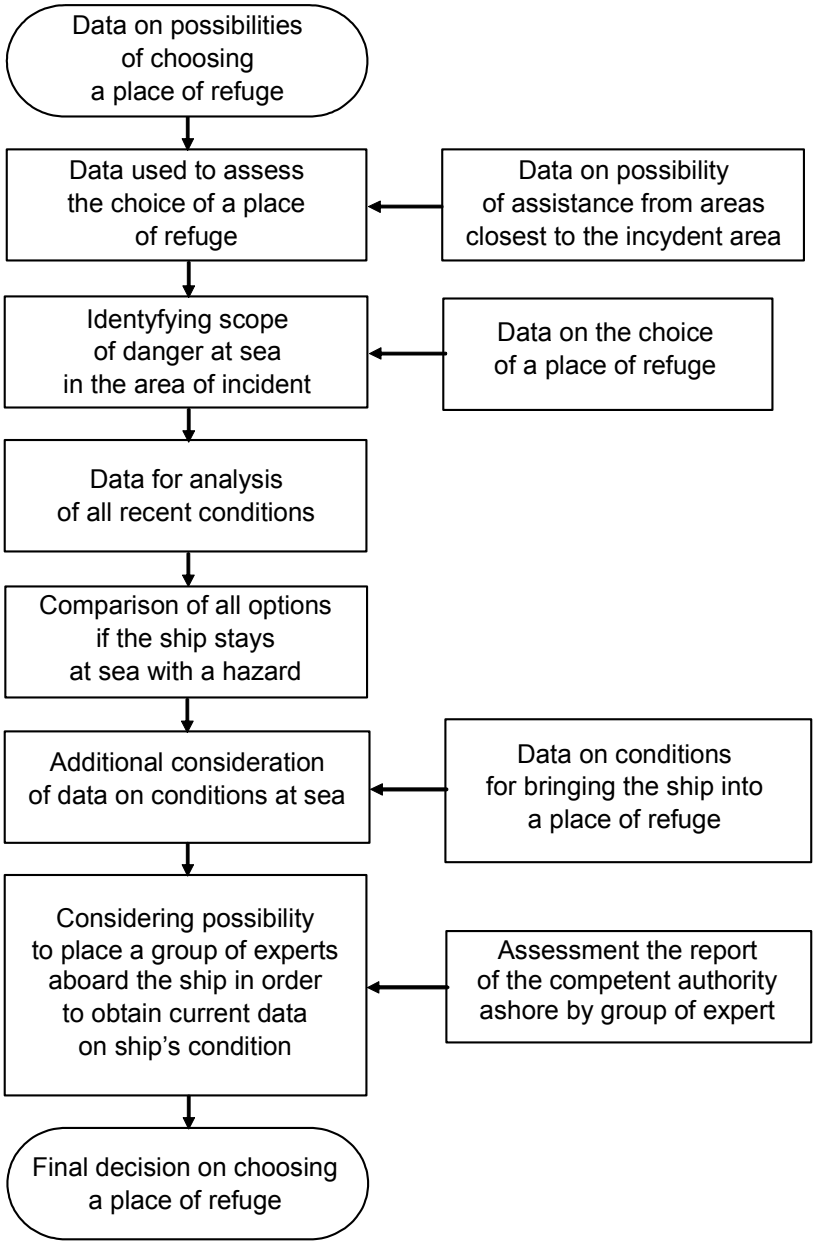

Fig. 1. Procedures used to deciding on Request for Access to a Place of Refuge [1–3]

ANNEX 3

INTERNATIONAL CONVENTIONS REGARDING REQUESTS FOR ACCESS
TO A PLACE OF REFUGE FOR SEAGOING SHIPS INVOLVED IN AN INCIDENT

United Nations Convention on the Law of the Sea (UNCLOS), in particular article 221 thereof.

International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (the Intervention Convention), 1969, as amended.

Protocol relating to Intervention on the High Seas Cases of Pollution by substances other than Oil, 1973.

International Convention for the Safety of Life at Sea, 1974 (SOLAS 1974), as amended, in particular chapter V thereof.

International Convention on Salvage, 1989 (the Salvage Convention).

International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (the OPRC Convention).

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

International Convention on Maritime Search and Rescue, 1979 (SAR 1979), as amended.

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972.

Convention Relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material, 1971.

Convention on Limitation of Liability for Maritime Claims (LLMC), 1976.

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PLANOWANIE PODRÓŻY USZKODZONYCH STATKÓW SZUKAJĄCYCH MIEJSCA SCHRONIENIA

STRESZCZENIE

W artykule zdefiniowano rodzaje awarii statków potrzebujących przejścia do odpowiedniego miejsca schronienia celem polepszenia stanu technicznego. Przedstawiono informacje do planowania podróży uszkodzonych statków oraz podstawy do oceny ryzyka takiego przemieszczenia.

W załączniku 2. przedstawiono zakres konwencji związanych z operacją przejścia do miejsca schronienia.

Słowa kluczowe:
planowanie podróży, miejsca schronienia statków.