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## **Indonesian Legal Perspectives on International Maritime Transport of Ultrahazardous Radioactive Materials at Sea**

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### **Abstract**

*In 1992, the voyage of the Akatsuki Maru from France to Japan showed the practice in the sea transport of ultrahazardous radioactive materials. The voyage route was nearly around one-half of the planet earth and passed through many countries. Although many countries have openly protested, the vessel has continued because the ship has international navigational rights under UNCLOS 1982. This paper attempts to research international regulations concerning the legal regime governing safety in the sea transport of ultrahazardous radioactive materials in UNCLOS 1982, MARPOL 73/78, SOLAS 1974, PPNM 1980, SCTW 1978, and Indonesia's national laws and regulations concerning this matter. This research uses normative approach and analysis descriptive methods that is based on international conventions, Indonesia's national laws and regulations related to the safety of ultrahazardous radioactive materials shipment. The result of this research shows that the legal regime governing safety in the sea transport of ultrahazardous radioactive materials is not yet adequate, because it is partially regulated. However, Indonesia has attempted to harmonize international regulations and Indonesia's national laws concerning the safety navigation of transport of ultrahazardous radioactive materials.*

**Keywords:** *Shipment, Ultrahazardous Radioactive Materials, UNCLOS 1982, MARPOL 73/78, SOLAS 1974, PPNM 1980, and SCTW 1978*

### **Rezim Hukum Indonesia atas Pengangkutan Bahan Radioaktif yang Sangat Berbahaya di Laut**

#### **Abstrak**

Pelayaran Kapal Akatsuki Maru dari Eropa ke Jepang pada tahun 1992 merupakan contoh praktik pelayaran kapal bermuatan bahan radioaktif yang sangat berbahaya. Rute pelayaran kapal ini melewati hampir separuh planet bumi dan melalui berbagai negara pantai. Walaupun menuai protes dari berbagai negara, pelayaran ini tetap dilaksanakan karena kapal tersebut memiliki hak lintas pelayaran internasional yang sah berdasarkan UNCLOS 1982. Tulisan ini mengkaji pengaturan hukum internasional tentang keselamatan pelayaran kapal bermuatan bahan radioaktif yang sangat berbahaya yaitu dalam UNCLOS 1982, Konvensi MARPOL 73/78, Konvensi SOLAS 1974, Konvensi PPNM 1980, Konvensi SCTW

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1978 serta peraturan perundang-undangan Indonesia terkait dengan pengaturan keselamatan pelayaran kapal jenis ini. Penelitian dilakukan dengan pendekatan yuridis normatif dan metode analisis deskriptif, dengan bertitik tolak pada konvensi-konvensi internasional dan peraturan perundangan-undangan Indonesia yang berkaitan dengan pengaturan keselamatan pelayaran kapal bermuatan bahan radioaktif yang sangat berbahaya. Hasil dari penelitian ini menunjukkan bahwa pengaturan keselamatan pelayaran kapal bermuatan bahan radioaktif yang sangat berbahaya di Indonesia belum memadai karena baru mengatur sebagian, belum menyeluruh. Walaupun demikian, Indonesia telah berupaya untuk mensinergikan ketentuan hukum internasional dan peraturan perundang-undangan nasional terkait dengan keselamatan pelayaran kapal bermuatan bahan radioaktif yang sangat berbahaya.

**Kata Kunci:** Pelayaran, Bahan Radioaktif Yang Sangat Berbahaya, UNCLOS 1982, MARPOL 73/78, SOLAS 1974, PPNM 1980, dan SCTW 1978.

## A. INTRODUCTION

The voyage of the Akatsuki Maru in 1992 is a practice of sailing a ship loaded with ultrahazardous radioactive materials. This Japanese-flagged ship made a voyage carrying 1,7 tons of plutonium from France to Japan.<sup>3</sup> Shipping routes cover almost half the planet earth and through the waters of various coastal countries. Despite the protests from many countries, this voyage has continued. Under the provisions of The United Nations Convention on the Law of the Sea 1982 (UNCLOS 1982), the ship has the right of shipping passage in the form of the right of innocent passage, the right of transit passage, and the right archipelagic sea lanes passage.<sup>4</sup>

The number of vessels' transportation of ultrahazardous radioactive materials from England to Japan has been shipped several times. Many countries such as South Africa, Chile, Antigua-Barbuda, Colombia, Dominican Republic, Puerto Rico, Uruguay, Martinique, Indonesia, Malaysia, Singapura, Brazil, Argentina, Nauru-Kiribati, New Zealand, Mauritius, and Korea<sup>5</sup>

suspend the shipping passage because the shipping is deemed endanger the safety of the coastal state.

Many coastal states are afraid because the accidents of vessels' transportation of ultrahazardous radioactive materials are very hazardous, among other things, caused by pirate attacks, ship damage, or sinking, can cause extraordinary disasters to the coastal state environment. The accidents will bring deterrent effect to the coastal state's economy, damage marine natural resources, and cause health and welfare problems for the inhabitants of coastal countries.

UNCLOS does not address security challenges in any meaningful way. It nearly entirely avoids discussing dangers from transporting ultrahazardous material, and allusions to security issues are scattered throughout the document. The history also did not show concern of the aforementioned concern both in continental shelf, Exclusive Economic Zones, or other regimes.<sup>6</sup> Therefore, regarding the shipping safety for hazardous materials, UNCLOS 1982 refers to certain conventions. The safety shipping standard of radioactive hazardous materials are

<sup>3</sup> Dixon, David B. "Transnational shipments of nuclear materials by sea: do current safeguards provide coastal states a right to deny innocent passage" *Journal of Transnational Law. & Policy* Vol. 16, No. 73, 2006, p.6.

<sup>4</sup> Article 53 The United Nations Convention on the Law of the Sea 1982 .

<sup>5</sup> Dyke, Jon M. Van. "The legal regime governing sea transport of ultrahazardous radioactive

materials." *Ocean Development & International Law* Vol. 33 No.1, 2002, pp.77-108, pp.3-4.

<sup>6</sup> See R.R. Churchill and A.V. Lowe, *The Law of the Sea*, University of Manchester Press, Manchester, 1999; and Colombos C.J., *The International Law of the Sea*, Longman, London, 1967.

governed by International Maritime Organization (IMO) and the International Atomic Energy Agency (IAEA). IMO issued The International Convention for the Prevention of Pollution from Ships 1973 supplemented the Protocol of 1978 (MARPOL 73/78), The International Convention for the Safety of Life at Sea 1974 as amended (SOLAS 1974), International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978 (SCTW 1978), The International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Waste on Board Ship 2001 (INF Code), and The International Maritime Dangerous Goods Code (IMDG Code). IAEA issued the Convention on The Physical Protection of Nuclear Materials 1980 (PPNM 1980) and The IAEA Regulations for the Safe Transport of Radioactive Materials (IAEA Safety regulation).

Although, the issuing regulation from IAEA and IMO do not contradict with UNCLOS 1982 as stipulated under Article 311 paragraph 2 of UNCLOS 1982, *“This Convention shall not alter the rights and obligations of States Parties which arise from other agreements compatible with this Convention and which do not affect the enjoyment by other States Parties of their rights or the performance of their obligations under this Convention”*, the focus of this article is to scrutinize the existing international regime regulating the transport of the ultrahazardous materials via Indonesian waters, regardless its regime under the UNCLOS 1982.

To gain a full analysis for the matters, this paper would first deals with the International Regulation from IMO, including SOLAS 1974 instruments and SCTW 1978, then move towards Legal Regime under in Indonesian Law. By presenting a rather descriptive yet critical analysis, this article is intended for practitioners and academia who deals with

safety regulations and environmental concerns at sea.

## **B. THE INTERNATIONAL REGULATION FOR ULTRAHAZARDOUS RADIOACTIVE MATERIALS TRANSPORTATION**

The existence and transport of radioactive materials has been a concern for states since it can harm the inhabitants of a territory.<sup>7</sup> There was a given rise to frequently emotional debates about safety of maritime transport of material concerned here.<sup>8</sup> States in a difficult position since they cannot simply close their waters, in line with the ‘*Mere Liberum*’, entirely restrict maritime transport. The assertion of the concept is come from Hug Grotius by producing his seminal work, claiming that states could not appropriate the waters and that ships from any country could travel anywhere on the world's oceans.<sup>9</sup>

It is one of the reasons why IMO issued SOLAS 1974 that governs minimum standards for ship safety. It is the responsibility of the contracting states to comply with the ship safety requirements as regulated under SOLAS 1974. The certain rules for the radioactive hazardous shipping materials are stipulated under Chapter VII (Carriage of Dangerous Goods) of SOLAS 1974. Based on this provision, the carriage of dangerous goods shall comply with packaged form, including provisions for the classification, packing, marking, labelling, and placarding, documentation and stowage of dangerous goods as stipulated under INF Code and IMDG Code.

IMDG Code is adopted by Maritime Safety Committee of the IMO with resolution MSC.122 (75) dated 22 May

<sup>7</sup> Caron David D., Scheiber Harry N., *The Oceans in the Nuclear Age: Legacies and Risks: Expanded Edition*, Brill, Netherlands, 2014, p.57.

<sup>8</sup> Roach J. Ashley, McCreath Millicent, Beckman Robert C., Sun Zhen, *High Seas Governance: Gaps and Challenges*, Brill, Netherlands, 2018, p.205.

<sup>9</sup> See Grotius, Hugo, *The Freedom of the Seas*, Carnegie Endowment for International Peace, New York (reprinted) 1952.

2002. IMDG Code is binding and effective since 1 January 2004 as amended by Chapter VII of SOLAS 1974 about carriage of dangerous goods. Under SOLAS 1974, the carriage of radioactive materials is governed under Regulation 1 to Regulation 4 Part A about Carriage of Dangerous Goods in Packaged Form.

The definition and scope of IMDG Code is governed under Regulation I Part A Carriage of Dangerous Goods in Packaged Form, Chapter VII Carriage of Dangerous Goods of SOLAS 1974:

*"1. IMDG Code means the International Maritime Dangerous Goods (IMDG) Code adopted by the Maritime Safety Committee of the Organization by Resolution MSC.122 (75), as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of Article VIII of the present Convention concerning the amendment procedures applicable to the Annex other than Chapter I.*

*2. Dangerous goods mean the substances, materials and articles covered by the IMDG Code.*

*3. Packaged form means the form of containment specified in the IMDG Code."*

The adoption of IMDG Code by IMO makes the IMDG Code is binding for the contracting parties. This is in line with the needs because Intermodal transportation has risen substantially in the last 40 years, and this tendency will accelerate in this century.<sup>10</sup> The International Maritime

Organization is a key player in promoting maritime safety and preventing ship-related marine pollution. The organization is involved in the transportation of risky products.<sup>11</sup>

In the event that ultrahazardous radioactive materials transportation does not comply with the IMDG Code, the shipment of Dangerous Goods is not allowed to carriage the dangerous goods. Further, under Regulation 2 Part A Carriage of Dangerous Goods in Packaged Form, Chapter VII Carriage of Dangerous Goods of SOLAS 1974:

*"1. Unless expressly provided otherwise, this part applies to the carriage of dangerous goods in packaged form in all ships to which the present regulations apply and in cargo ships of less than 500 gross tonnage.*

*2. The provisions of this part do not apply to ships' stores and equipment.*

*3. The carriage of dangerous goods in packaged form is prohibited except in accordance with the provisions of this part.*

*4. To supplement the provisions of this part, each Contracting Government shall issue, or cause to be issued, detailed instructions on emergency response and medical first aid relevant to incidents involving dangerous goods in packaged form, taking into account the guidelines developed by the Organization."*

Therefore, unless governed otherwise, IMDG Code is applicable for any shipping that carriage dangerous goods regardless

<sup>10</sup> Galierikova, Andrea, and Jarmila Sosedova. "Intermodal transportation of dangerous goods." *NAŠE MORE: znanstveni časopis za more i pomorstvo* Vol. 65, No. 3 Supplement, 2018, p. 8.

<sup>11</sup> Popek, M., and M. Bogalecka. "The IMO instruments for ensure safety transportation of dangerous goods." *TransNav, International Journal on Marine Navigation and Safety of Sea Transportation*, Vol. 1, No. 2, 2007, p.207.

the date of construction and size, including the ship less than 500 gross tonnage. Moreover, IMDG Code is not applicable to ship equipment and store.

The dangerous goods package shall comply with the provisions as governed under the IMDG Code as strictly regulated under Regulation 3 Part A Carriage of Dangerous Goods in Packaged Form, Chapter VII Carriage of Dangerous Goods of SOLAS 1974, *"The carriage of dangerous goods in packaged form shall comply with the relevant provisions of the IMDG Code."*

However, regarding the documents that shall be carried by ships loaded with dangerous goods, it is regulated under Regulation 4 Part A Carriage of Dangerous Goods in Packaged Form Chapter VII Carriage of Dangerous Goods of SOLAS 1974:

*"1. In all documents relating to the carriage of dangerous goods in packaged form by sea, the Proper Shipping Name of the goods shall be used (trade names alone shall not be used) and the correct description given in accordance with the classification set out in the IMDG Code.*

*2. The transport documents prepared by the shipper shall include, or be accompanied by, a signed certificate or a declaration that the consignment, as offered for carriage, is properly packaged, marked, labelled or placard, as appropriate, and in proper condition for carriage.*

*3. The person(s) responsible for the packing/loading of dangerous goods in a cargo transport unit shall provide a signed container/vehicle packing certificate stating that the cargo in the unit has been properly packed and secured and that all applicable*

*transport requirements have been met. Such a certificate may be combined with the document referred to in paragraph 2.*

*4. Where there is due cause to suspect that a cargo transport unit in which dangerous goods are packed is not in compliance with the requirements of paragraph 2 or 3, or where a container/vehicle packing certificate is not available, the cargo transport unit shall not be accepted for carriage.*

*5. Each ship carrying dangerous goods in packaged form shall have a special list or manifest setting forth, in accordance with the classification set out in the IMDG Code, the dangerous goods on board and the location thereof. A detailed stowage plan, which identifies by class and sets out the location of all dangerous goods on board, may be used in place of such a special list or manifest. A copy of one of these documents shall be made available before departure to the person or organization designated by the port State authority."*

All the required documents related with the carriage of dangerous goods shall mention the name of goods and description as classified under IMDG Code. The shipping document is prepared by the consignor<sup>12</sup>, and it shall contain or be accompanied by a signed certificate or statement that the goods being transported have been adequately packaged, properly marked, and placed, and in accordance with the conditions of carriage for dangerous goods. Furthermore,

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<sup>12</sup> See Voudouris, Ioannis, and Evi Plomaritou. "Documents of the Shipping Transport: Historical Origins, Legal Validity & Commercial Practice." *Journal of Shipping and Ocean Engineering*, Vol.10, 2020, p.47.

the person responsible for packaging/loading in the shipment of dangerous goods must prepare a certificate stating that the cargo has been properly and safely packed and all requirements for the transportation of dangerous goods have been met.

The document must be submitted to the harbormaster or designated state authority before the ship carrying special goods and/or dangerous goods arrives at the port. If it is suspected that the packaging of the packaged dangerous goods does not meet the document requirements for the transport of dangerous goods, the goods cannot be accepted for transport.

Arrangements for packaging of highly dangerous radioactive materials are regulated under Class 7 of IMDG Code. The arrangements for radioactive materials are based on the IAEA Regulations concerning the safety of transporting radioactive materials as stated in Article 1.5.1.1 Chapter 1.5 IMDG Code: *"The provisions of this Code establish standards of safety which provide an acceptable level of control of the radiation, criticality and thermal hazards to persons, property and the environment that are associated with the transport of radioactive material. These provisions are based on the IAEA Regulations for the Safe Transport of Radioactive Materials (2009)."*

Transport packaging by sea for highly hazardous radioactive materials must comply with the packaging standards in the Type B Standard of The IAEA Safety regulation.<sup>13</sup> The Type B Standard Packing

Requirements must ensure that the packaging of goods containing highly hazardous radioactive materials is safe for transportation, either under normal conditions or in accidental conditions, such as drowning or burning. In the event of a ship accident, it is hoped that the packaging will not be damaged and pollute the surrounding environment.

The INF Code is a safe transport arrangement for radioactive materials. The INF Code was adopted as a "voluntary code" by the IMO at its 18<sup>th</sup> meeting in November 1993. The INF Code was adopted by IMO by Resolution MSC.88 (71) on 27 May 1999. The INF Code has become binding on 1 January 2001 through Amendments adopted to Chapter VII on the Carriage of Dangerous Goods of the SOLAS 1974.

*Regulation Article 14 (1) and (2) stated that:<sup>14</sup> "INF Code means the International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on Board Ships, adopted by the Maritime Safety Committee of the Organization by Resolution MSC. 88 (71), as may be amended by the Organization, provided that such Amendments are adopted, brought into force and take effect in accordance with the provisions of Article VIII of the present Convention concerning the amendment procedures applicable to the Annex other than Chapter I. INF cargo means packaged irradiated nuclear fuel, plutonium and high-level radioactive*

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*Radioactive Materials Transport* Vol. 8, No. 1, 1997, pp.2-4.

<sup>13</sup> See, Price, M. S. T. "IAEA Safety Standards Series, STI-1: Regulations for the Safe Transport of Radioactive Material-1996 Edition (STI/PUB/998)." *International Journal of*

<sup>14</sup> Part D Special Requirements for The Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on Board Ships from Bab VII Carriage of Dangerous Goods of SOLAS 1974.

*wastes carried as cargo in accordance with Class 7 of the IMDG Code.”*

INF Code specifically regulates the transportation of radioactive materials, including the specifications for the ships carrying them. In the INF Code, there are additional requirements relating to ship stability, fire protection, shipload temperature monitoring, ship construction considerations, cargo security, electricity supply, radiation protection equipment, and management, training and emergency plans on board.<sup>15</sup>

INF Code applies to all types of carriers regardless of construction date and size, including carriers of less than 500 gross tonnage, it is subject to arrangements under the INF Code. The INF Code does not apply to warships, naval ships or other ships used by the government for non-commercial shipping purposes. This regulation provides recommendations on the construction and shape of ships carrying radioactive materials, ship stability, and protection from fire hazards.

Moving on to another aspect, regarding ‘safe manning’ which is regulated under Regulation 14 Chapter V regarding safety of navigation of the SOLAS 1974:

*“1. Contracting Governments undertake, each for its national ships, to maintain, or, if it is necessary, to adopt, measures for the purpose of ensuring that, from the point of view of safety of life at sea, all ships shall be sufficiently and efficiently manned.*

*2. Every ship to which chapter I applies shall be provided with an appropriate minimum safe manning document or equivalent issued by the*

*Administration as evidence of the minimum safe manning considered necessary to comply with the provisions of paragraph 1.*

*3. ....”*

The flag state of the ship must ensure that the crew of the sailing vessel complies with the requirements regarding navigational safety which refer to Principles of Safe Manning Adopted by the Organization by Resolution A. 890(21), as amended by Resolution A.955(23), which was subsequently revoked by the current Principles of minimum safe manning under resolution A.1047(27), adopted in 2011. Every sailing ship must meet the minimum standards of safe manning, as evidenced by a document or letter from the authorized official. The crew of the ship must prevent environmental pollution from operating the ship and take all necessary actions to minimize the risk.

The purpose of determining the minimum level of safe manning is to ensure that the functions and levels of responsibility of the crew meets the safe manning standards, number of people required for safe ship operation, ship safety and to protect the marine environment. At the same time, a minimum level of safe manning of ships must be established with consider any relevant factors such as ship size and type, number, size and type of ship propulsion, ship construction and equipment, maintenance methods used, and cargo carried.

Determination of the minimum level of safe crewing of ships is based on the function and level of responsibility as stipulated in the STCW 1978 including loading and storing goods on ships during transportation and when loading and

<sup>15</sup> See. Booker, P. A. *Development of the INF Code and its relationship to the Ships of the Pacific Nuclear Transport Fleet*. No. IAEA-CN--101. 2003.

unloading. In addition, the safe manning is also intended to ensure the protection of the marine environment.

The SCTW 1978 sets minimum standards relating to training, certification, and watchkeeping for seafarers who must meet the standards referred to SCTW 1978 including its Annex and code. Its Annex are an inseparable part of the SCTW 1978 as clearly stated under Article 1 paragraph 1 of SCTW 1978:

*“The Parties undertake to give effect to the provisions of the Convention and the annex thereto, which shall constitute an integral part of the Convention. Every reference to the Convention constitutes at the same time a reference to the annex.”*

The SCTW 1978 does not apply to warships, naval vessels or other vessels used by the government for the purpose of non-commercial shipping, fishing vessels, cruise ships, and traditional wooden vessels. The application of this convention is governed under Article 3 of SCTW 1978 which stipulates that:

*“The Convention shall apply to seafarers serving on board seagoing ships entitled to fly the flag of a Party, except to those serving on board:*

*(a). warships, naval auxiliaries or other ships owned or operated by a State and engaged only on governmental non-commercial service; however, each Party shall ensure, by the adoption of appropriate measures not impairing the operations or operational capabilities of such ships owned or operated by it, that the persons serving on board such ships meet the requirements of the Convention so far as is reasonable and practicable;*

*(b). fishing vessels;*

*(c). pleasure yachts not engaged in trade; or*

*(d). wooden ships of primitive build.*

“

However, the arrangement regarding the certificate of the crew is regulated in Article 4 of the SCTW 1978:

*“(1) Certificates for masters, officers or ratings shall be issued to those candidates who, to the satisfaction of the Administration, meet the requirements for service, age, medical fitness, training, qualification and examinations in accordance with the appropriate provisions of the annex to the Convention.*

*(2) ....”*

Under this arrangement, certificates for the captain and crew of the ship are granted if the person has met the necessary requirements for the service, age, training, health, qualifications and testing as provided for in the provisions of the Annex to the SCTW Convention.

Another Instruments significantly playing roles on the transport of ultrahazardous materials is MARPOL 73/78. This is an international convention for the prevention of pollution of the marine environment originating from ships. MARPOL 73/78 aims to prevent and minimize pollution from ships, either due to accidents or from shipping.

MARPOL 73/78 does not only regulate pollution by oil, but also from chemicals, other hazardous materials, garbage, and waste. If there is pollution originating from the ship, it must be notified under this arrangement as stipulated under Article 8 of the MARPOL 73/78:

*“(1). A report of an incident shall be made without delay to the fullest extent possible in accordance with the*

provisions of Protocol I to the present Convention.

(2). Each Party to the Convention shall:

- a. makes all arrangements necessary for an appropriate officer or agency to receive and process all reports on incidents; and
- b. notifies the Organization with complete details of such arrangements for circulation to other Parties and Member States of the Organization.

(3). Whenever a Party receives a report under the provisions of the present article, that Party shall relay the report without delay to:

- a. the Administration of the ship involved; and
- b. any other State which may be affected.

(4). Each Party to the Convention undertakes to issue instructions to its maritime inspection vessels and aircraft and to other appropriate services, to report to its authorities any incident referred to in Protocol I to the present Convention. That Party shall, if it considers it appropriate, report accordingly to the Organization and to any other Party concerned."

Regulations regarding transport ships loaded with highly dangerous radioactive materials are regulated in Annex III concerning Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form of MARPOL 73/78. Annex III stipulates requirements on packaging standards, marking, naming, documentation, storage of goods and quantity limitations, exceptions and

notices to prevent contamination by hazardous substances, the arrangement refers to the provisions contained in the IMDG Code as stipulated in Regulation 1 paragraph 3 of Annex III concerning Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form of MARPOL 73/78.

State has also pay attention to PPNM 1980 which regulated the physical protection of nuclear materials. This convention regulates the prevention, detection, and punishment of violations related to nuclear materials. This convention obliges the participating countries to ensure the protection of nuclear material while passing through its territory or ships carrying radioactive materials sailing under the flag state of the ship that ratifies this Convention.

Annex II of the PPNM 1980 contains the classification of nuclear material categories, as can be seen in the table below:

**Table 3: Nuclear Material Category<sup>16</sup>**

Material	Form	Category		
		I	II	III <sup>2/</sup>
1. Plutonium <sup>2/</sup>	Unirradiated <sup>2/</sup>	2 kg or more	Less than 2 kg but more than 500 g	500 g or less but more than 15 g
2. Uranium <sup>235</sup>	Unirradiated <sup>2/</sup> * uranium enriched to 20% <sup>235</sup> U or more  * uranium enriched to 10% <sup>235</sup> U but less than 20%  * uranium enriched above natural, but less than 10% <sup>235</sup> U	5 kg or more	Less than 5 kg but more than 1 kg	1 kg or less but more than 15 g
			10 kg or more	Less than 10 kg but more than 1 kg
				10 kg or more
3. Uranium <sup>233</sup>	Unirradiated <sup>2/</sup>	2 kg or more	Less than 2 kg but more than 500 g	500 g or less but more than 15 g
4. Irradiated fuel			Depleted or natural uranium, thorium or low-enriched fuel (less than 10% fossil content) <sup>6/2/</sup>	

Remarks:

a/ All plutonium except that with isotopic concentration exceeding 80% in plutonium-238.

b/ Material not irradiated in a reactor or material irradiated in a reactor but with a radiation level equal to or less than 100 rads/hour at one meter unshielded.

c/ Quantities not falling in Category III and natural uranium should be protected in accordance with prudent management practice.

<sup>16</sup> Annex II of PPNM 1980.

*d/ Although this level of protection is recommended, it would be open to States, upon evaluation of the specific circumstances, to assign a different category of physical protection.*

*e/Other fuel which by virtue of its original fissile material content is classified as Category I and II before irradiation may be reduced one category level while the radiation level from the fuel exceeds 100 rads/hour at one meter unshielded.*

*Uranium enriched in the isotope 235 or 233 means uranium containing the isotope 235 or 233 or both in an amount such that the abundance ratio of the sum of these isotopes to the isotope 238 is greater than the ratio of the isotope 235 to the isotope 238 occurring in nature.*

Regulations regarding the level of protection for nuclear material during storage are regulated in Article 1, Annex I of the PPNM 1980 which stipulates that:

*“Levels of physical protection for nuclear material during storage incidental to international nuclear transport include:*

*a. For Category III materials, storage within an area to which access is controlled;*

*b. For Category II materials, storage within an area under constant surveillance by guards or electronic devices, surrounded by a physical barrier with a limited number of points of entry under appropriate control or any area with an equivalent level of physical protection;*

*c. For Category I material, storage within a protected area as defined for Category II above, to which, in addition, access is restricted to persons whose trustworthiness has been determined, and which is under surveillance by guards who are in close communication with appropriate response forces. Specific measures taken in this context should have as their object the detection and prevention of any assault,*

*unauthorized access or unauthorized removal of material.”*

The arrangements related to the level of protection of nuclear material during transportation are regulated in Article 2, Annex I of the PPNM 1980 which stipulates that:

*“Levels of physical protection for nuclear material during international transport include:*

*a. For Category II and III materials, transportation shall take place under special precautions including prior arrangements among sender, receiver, and carrier, and prior agreement between natural or legal persons subject to the jurisdiction and regulation of exporting and importing States, specifying time, place and procedures for transferring transport responsibility;*

*b. For Category I materials, transportation shall take place under special precautions identified above for transportation of Category II and III materials, and in addition, under constant surveillance by escorts and under conditions which assure close communication with appropriate response forces;*

*c. For natural uranium other than in the form of ore or ore-residue; transportation protection for quantities exceeding 500 kilograms uranium shall include advance notification of shipment specifying mode of transport, expected time of arrival and confirmation of receipt of shipment.”*

Classification is very important because it relates to the level of protection applied to ships carrying nuclear materials. Under UNCLOS 1982, the foreign ships passing

through the waters of a coastal state can enjoy the right of international shipping passage in the form of the right of innocent passage through the territorial sea, the right of archipelagic sea lane passage and the right of innocent passage through archipelagic waters, as well as the right of transit passage and the right of innocent passage through the strait that used for international ships.

The regulation of shipping safety for ships exercising the right of innocent passage is regulated under Article 21 subparagraph (1) (a) and paragraph (2) of UNCLOS 1982 which stipulates, among other things, that:

*“1. The coastal State may adopt laws and regulations, in conformity with the provisions of this Convention and other rules of international law, relating to innocent passage through the territorial sea, in respect of all or any of the following:*

- (a). the safety of navigation and the regulation of maritime traffic;*
- (b). ...*

*2. Such laws and regulations shall not apply to the design, construction, manning or equipment of foreign ships unless they are giving effect to generally accepted international rules or standards.”*

In relation to shipping safety and sea traffic regulation, the coastal state can establish laws and regulations in accordance with the provisions of UNCLOS 1982 and other international regulations. In the meantime, these legal provisions do not apply to ship construction, crew or equipment in foreign ships, unless the provisions of the national law is generally

accepted under international regulations or standards. However, Article 24 paragraph (1) of UNCLOS 1982, it is stipulated that the coastal state shall not hamper innocent passage of foreign ships through the territorial sea, except under the provisions of UNCLOS 1982. The coastal states oblige to apply the provisions in UNCLOS 1982 or any statutory regulations that they are not allowed to:

- “1) Determine requirements for foreign ships which practically result in the denial or reduction of the right of innocent passage, or*
- 2) Conduct formal discrimination or actual discrimination against ships of any country or against ships carrying cargo to, from or on behalf of any country.”*

Furthermore, Article 23 of UNCLOS 1982 stipulates that: *“Foreign nuclear-powered ships and ships carrying nuclear or other inherently dangerous or noxious substances shall, when exercising the right of innocent passage through the territorial sea, carry documents and observe special precautionary measures established for such ships by international agreements.”*

The Ships loaded with radioactive materials are very dangerous. Therefore, especially for such ships when exercising the right of innocent passage through the territorial sea, they are required to carry documents and comply with special precautions as stipulated in the SOLAS 1974, PPNM 1980, MARPOL 73/78, and SCTW 1978.

The regulation of shipping safety for ships exercising the right of transit passage is regulated in Article 42 subparagraph (1) (a) of UNCLOS 1982 which stipulates that: *“Subject to the provisions of this section, States bordering straits may adopt laws*

*and regulations relating to transit passage through straits, in respect of all or any of the following: ... the safety of navigation and the regulation of maritime traffic, as provided in article 41...*" As is the case in the implementation of innocent passage through the territorial sea, for the exercise of the right of transit passage, Article 42 paragraph (2) of UNCLOS 1982 stipulates that the laws and regulations made by the coastal state related to shipping safety may not conduct formal discrimination or real discrimination among foreign ships or in its implementation which has the practical effect of refusing, hindering or reducing the exercise of the right of transit passage.

Furthermore, Article 42 paragraph (4) of UNCLOS 1982 stipulates that the foreign ships exercising the right of transit passage must comply with the laws and regulations of the coastal state. Based on the provisions of Article 54 of UNCLOS 1982, Article 42 applies *mutatis mutandis* to the passage of archipelagic sea lanes.

### C. LEGAL REGIME UNDER INDONESIAN LAW

Indonesia location has higher opportunity to be passed by ultrahazardous radioactive materials ships. However, until now there is no official voyage of the ultrahazardous radioactive materials cargo that has been passed through Indonesia territorial.

Regarding the shipping safety for the ultrahazardous materials, Indonesia is parties for the conventions as follows:

1. UNCLOS 1982 as ratified by Law Number 17 of 1985;
2. SOLAS 1974 as ratified by Presidential Decree Number 65 Year 1980;

3. PPNM 1980 as ratified by Presidential Decree Number 49 Year 1986;
4. SCTW 1978 as ratified by Presidential Decree Number 60 Year 1986;
5. MARPOL Convention 73/78 as ratified by Presidential Decree Number 46 Year 1986 including its annexes with detailed as follows:
  - a. Annex I Regulations for the Prevention of Pollution by Oil (entered into force 2 October 1983);
  - b. Annex II Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (entered into force 2 October 1983);
  - c. Annex III Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form (entered into force 1 July 1992);
  - d. Annex IV Prevention of Pollution by Sewage from Ships (entered into force 27 September 2003);
  - e. Annex V Prevention of Pollution by Garbage from Ships (entered into force 31 December 1988);
  - f. Annex VI Prevention of Air Pollution from Ships (entered into force 19 May 2005).

The certain regulation in MARPOL 73/78 that governed about hazardous radioactive materials has been governed under Annex III Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form (entered into force 1 July 1992) that has been ratified under

Presidential Decree Number 29 Year 2012 regarding ratification of Annex III, Annex IV, Annex V, and Annex VI of The International Convention for The Prevention of Pollution From Ships 1973 as Modified by The Protocol of 1978 Relating Thereto.

The contracting countries that have ratified the international treaties are required to implement the legal provisions in their national law. According to Boer Mauna, this is very important because without national regulation that governed the certain provisions contained in these treaties, the treaties cannot be implemented and is useless.<sup>17</sup> Therefore, to implement the safety of the sea transport, Indonesia has regulated under Law Number 17 Year 2008 as amended by Law Number 11 Year 2020 regarding shipping (Law 17/2008). As defined under Article 4 Law 17/2008, the Law 17/2008 is applicable for all transportation activities on water, harbor-affairs, safety and security, and marine environment protection on Indonesian waters, all foreign ships sailing in Indonesia waters, and all Indonesia flag carriers outside of Indonesia waters.

Indonesia has governed about shipping safety under Law 17/2008 and its implementing regulations, namely Government Regulation No. 7 Year 2000 regarding Marine (GR 7/2000), Government Regulation Number 31 Year 2021 regarding Implementation of the Shipping Sector (GR 31/2021), and Government Regulation Number 21 Year 2010 regarding Marine Protection (GR 21/2010). Meanwhile, technical arrangements related to the handling of

dangerous goods are regulated under the Regulation of Minister of Transportation Number 17 year 2000 as amended by the Regulation of the Minister of Transportation Number 2 of 2010 concerning Guidelines for Handling Dangerous Materials/Goods in Shipping Activities in Indonesia (MOT 2/2010), the Regulation of Minister of Transportation Number 70 year 2013 as amended by the Regulation of Minister of Transportation Number by 140 of 2016 concerning Education and Training, Certification and Service for Watching Seafarers (MOT 140/2016), and the Minister of Transportation Number 29 of 2014 concerning Pollution Prevention from Ships (MOT 29/2014). The above laws and regulations can be considered as the implementation of international legal provisions related to shipping safety in general.

Under Article 1 paragraph 32 of Law 17/2008 it is mentioned that: *“Shipping safety and security is a condition meeting the requirements on safety and security aspects concerning transportation on land, port affairs and marine environment.”* Moreover, under Article 44 of Law 17/2008, it is stipulated that for the transportation of radioactive materials must be carried out in accordance with provisions of statutory regulations.

Under article 45 subparagraph (3) (g) of Law 17/2008, ships loaded with highly dangerous radioactive materials can be categorized as dangerous goods that can be formed in the form of liquids, solids, and gases.

Based on the provisions in Article 1 of MOT 2/2010, the procedure for the transportation of dangerous goods by foreign ships sailing in the waters in

<sup>17</sup> Mauna, Boer, *Hukum Internasional Pengertian, Peranan, dan Fungsi dalam Era Dinamika Global*, Alumni, Bandung, 2008, p. 145.

Indonesia must comply with the provisions of the IMDG Code and its supplements as guidelines for handling hazardous materials/goods in shipping activities in Indonesia. The ship's disobedience in complying with the provisions in the IMDG Code will result in the ship is not allowed to carry dangerous goods.<sup>18</sup>

However, Indonesia has not been able to fully implement the provisions in the IMDG Code because Indonesian shipping equipment and technology has not been able to meet all IMDG Code standards. Therefore, a transition period is needed in preparation to be able to meet the IMDG Code standards. In relation to the granting of this concession, the Director General of Sea Transportation is authorized to grant certain exceptions to the requirements of the IMDG Code as defined under Article 1 A subparagraph 2 of MOT 2/2010.<sup>19</sup>

Under Article 1 A subparagraph 2 of MOT 2/2010, it is stipulated that the Director General of Sea Transportation is authorized as follows:

- "a. organizes and establish training requirements for handling dangerous goods.*
- b. determines the classification of dangerous goods;*
- c. certifies the packaging of dangerous goods;*
- d. provides endorsement of certain requirements of the IMDG Code 2008*
- e. provides exemptions from the requirements of the 2008 IMDG Code."*

Ships carrying dangerous goods if they have not been able to meet the IMDG Code

standards, they can request exceptions from the Director General of Sea Transportation related to the packaging standards for dangerous goods in accordance with the IMDG Code. However, there is no regulation regarding the implementing instructions regarding the mechanism to approve such exception. Therefore, the Director General of Sea Transportation has sole authority to grant such request.

However, regulations regarding ships loaded with radioactive materials are not only regulated in the IMDG Code but also in the INF Code. Therefore, in the absence of the INF Code under Indonesian laws, the governing law has not been adequate for shipping safety.

The transportation of ships loaded with radioactive materials are not only related to packaging of the goods, but also related to the specifications of the transport ship, ship stability, fire hazard protection, ship cargo temperature monitoring, ship construction, cargo security, electricity supply, protective equipment radiation and management, training, and plans for handling emergencies on board the ship as regulated in the INF Code. With the INF Code has not yet included in the Indonesian laws and regulations, this provision cannot be enforced in Indonesia territory.

Each ship has different standards depending on the type of goods transported. The non-enactment of the INF Code on ships carrying radioactive materials may give rise to the possibility that the ship does not meet the standards of a carrier ship and is not allowed to sail. Indonesia has a strategic geographical location and is one of the international shipping lanes can be harmed by not yet

<sup>18</sup> Regulation 4 (3) Annex III about Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form of MARPOL Convention 73/78.

<sup>19</sup> Article 1A Subparagraph (2) (e) of MOT 2/2010.

enacting the provisions in INF Code. Therefore, Indonesia needs to incorporate the provisions of the INF Code into its national laws and regulations, so that the provisions of this code can be valid and binding.

The legal regime is also related to Safe Manning. The shipping safety for ultrahazardous radioactive materials is not only related to the procedures for the transportation of dangerous goods but also to safe manning and the protection of the maritime environment. Safety, along with the subject of security, is the most significant and vital issue confronting any community or nation.<sup>20</sup> Article 117 of Law 17/2008 stipulated that:

- 1) *Safety and security of shipping is a condition where the following requirements are fulfilled:*
  - a. *Ship sea-worthiness; and*
  - b. *Navigation.*
- 2) *Ship sea-worthiness referred to in sub-article (1) letter a must be fulfilled by every ship according to its area of sailing, covering:*
  - a. *Ship's safety;*
  - b. *Prevention of pollution from ships;*
  - c. **Ship manning;**
  - d. ...
- 3) *The fulfilment of each requirement of ship sea-worthiness referred to in sub-article (1) shall be proved with certificate and ship documents.*

The regulation regarding ship manning is regulated under Chapter V (Safety of Navigation) of SOLAS 1974 and SCTW 1978. Indonesia has implemented this principle under Indonesian Law. As defined under Article 135 of Law 17/2008, every ship must be manned by crews who meet qualifications and competence requirements in accordance with National and International provisions with further provisions on certification, manning of ships, and sailor documents shall be regulated with a minister regulation.<sup>21</sup> In 2013, Minister transportation issued technical ship manning qualifications and competence under MOT 140/2016 that adopts SCTW 1978.

For Prevention and Control of Pollution, as stipulated under Article 1 paragraph 57 of Law 17/2008 that: *"Marine environment protection is any effort to prevent and tackle water environment pollution originating from activities related with shipping."*

Moreover, as defined under Article 123 of Law 17/2008, definition about environment protection is a condition fulfilling the procedure and requirements on prevention and control of pollution from:

1. port affairs;
2. the operating ships;
3. transportation of waste, hazardous and toxic substance on waters;
4. disposal of waste in waters; and
5. scrapping of ship.

The prevention and control of pollution originating from their ship becomes obligation of every ship crew as defined under Article 227 of Law 17/2008. Further

<sup>20</sup> Formela, K., A. Weintrit, and T. Neumann. "Overview of definitions of maritime safety, safety at sea, navigational safety and safety in general." *TransNav: International Journal on Marine Navigation and Safety of Sea Transportation*, Vol. 13, No. 2, 2019, p.285.

<sup>21</sup> Article 146 of Law 17/2008.

in the event of pollution, Article 230 of Law 17/2008 stipulates that: *“1) Every captain or responsible party of other activity units on waters shall be responsible to tackle pollution originating from his ships and/or activities. 2) Every captain or responsible party of other activity units on waters must immediately report to the nearest Harbor-master and/or nearest other governments elements on the event of pollution of waters caused by his ships or his activities, if he knows the pollution from his ships and/or other activities on the waters. 3) The other government elements who received the information referred to in sub-article (2) should forward the report on the occurrence of the water pollution to the nearest Harbor-master or to authorized agencies. 4) the nearest harbor-master shall forward the report referred to in sub-article (3) to authorized agencies for further actions. “*

Further regulation on prevention and control of pollution due to ship operations is regulated under GR 21/2010 as the implementing regulation of Article 232 of Law 17/2008. With regard to prevention and control of pollution due to ship operations, Article 3 of GR 21/2010 stipulates that:

*“1) Any ship crew member shall prevent and control the occurrence of environmental pollution caused by their ship.*

*2) The Environmental pollution caused by their ship as referred to in paragraph (1) can come in the form of:*

- a. Oil*
- b. Toxic liquid;*
- c. Dangerous cargoes in containers;*
- d. Sewage;*
- e. Garbage;*

*f. Air;*

*g. Ballast water; and/or*

*h. Goods and materials hazardous to the environment in the ship.”*

As defined under Article 4 subparagraph (1) (g) of GR 21/2010 regarding the prevention of pollution, it is stipulated that each ship crew members shall, according to their position contained in the certificate book in the ship of certain type and size, especially for hazardous radioactive materials make sure the availability of good packing, labelling, documenting and loading system according to the mechanism and procedure for ships carrying hazardous materials in containers.

As previously described, shipping safety is also concerned with protecting the marine environment. Marine environmental protection is an effort to prevent and overcome pollution of the aquatic environment originating from activities related to shipping.<sup>22</sup>

One element of the protection of the marine environment is the fulfilment of procedures and requirements for the prevention and control of pollution from ship operations and transportation of waste, hazardous and toxic materials in the waters.<sup>23</sup> The regulation regarding the prevention of pollution of the marine environment originating from ships is regulated in Article 226 paragraph (2) of Law 17/2008. This setting specifies that:

*“The operations of marine environment protection are exercised by the Government through:*

- a) Prevention and tackling of pollution from ships operations; and*

<sup>22</sup> Article 1 paragraph 57 of Law 17/2008.

<sup>23</sup> Article 123 of Law 17/2008.

b) ....”

Every crew member is obliged to prevent and overcome environmental pollution originating from ships.<sup>24</sup> In the event of pollution, Article 230 of Law 17/2008 stipulates that:

*“(1) Every captain or responsibility party of the other activity units on waters shall be responsible to tackle pollution originating from his ships and/or activities.*

*(2) Every captain or responsible party of other activity units on waters must immediately report to the nearest harbor-master and/or the nearest other government elements on the event of pollution of waters caused by his ships or his activities, if he knows the pollution from his ships and/or other activities on the waters.*

*(3) the other Government elements who received the information referred to in sub-article (2) should forward the report on the occurrence of the water pollution to the nearest harbor-master or to authorized agencies.*

*(4) the nearest harbor-master shall forward the report referred to in sub-article (3) to authorized agencies for further actions.”*

Moreover, under Article 20 of MOT 29/2014, it is stipulated that any ship including foreign ships that carrying ultrahazardous radioactive materials shall comply with requirement as governed under Annex III MARPOL 73/78 and IMDG Code. However, until now there is no

regulation on technical actions that must be carried out as a guide on what steps should be taken in the event of pollution of the marine environment originating from highly dangerous radioactive materials.

#### D. CONCLUSION

The principal hardship in governing maritime transport of ultrahazardous material at sea is an interplay tension between marine protection and the inherent rights of the freedom of navigations.<sup>25</sup> The main international arrangements related to the safe passage of ships loaded with highly hazardous radioactive materials are regulated under UNCLOS 1982. Ships carrying highly hazardous radioactive materials carrying out the right of innocent passage are required to carry documents and comply with special precautions as stipulated in international treaties for such a ship. This provision can be seen in the SOLAS 1974, MARPOL 73/78, SCTW 1978, and PPNM 1980.

Under UNCLOS 1982, the vessels carrying radioactive material, in exercising innocent passage through the territorial sea, shall provide adequate documents and comply with precautions measures as defined under international treaties for such a ship. These prevailing regulations are SOLAS 1974, MARPOL 73/78, SCTW 1978, and PPNM 1980. At the same time, for the vessels exercising the right of transit passage and the Archipelagic Sea lanes passage, the coastal state can make

<sup>24</sup> Article 227 of Law 17/2008.

<sup>25</sup> Currie, Duncan EJ, and Jon M. Van Dyke. "The shipment of ultrahazardous nuclear materials in international law." *Rev. European Comparative & International Environmental Law*, vol. 8, 1999, p.113.

regulations about shipping safety. However, this provision shall not result in formal or actual discrimination for foreign ships, and its implementation may hinder or reduce the exercise of the right of transit passage.

Indonesia is a party to the international convention on ships' safety. However, the ships' safety is partially regulated. Indonesian regulation has not yet regulated technical guidelines regulations on pollution prevention and control in the event of pollution of the marine environment caused by hazardous materials, especially on sea transport of ultrahazardous radioactive materials, and there are no provisions under Indonesian law that makes the INF Code as a mandatory obligation.

Indonesia has made efforts to harmonize the provisions in its laws and regulations by implementing international provisions into its national laws and regulations related to safety for the transportation of ultrahazardous radioactive materials. However, in the implementation, there is no specific prevailing laws that governed about shipment of ultrahazardous radioactive materials. There is no certain regulation for each hazardous materials shipment. Therefore, it is necessary to issue technical regulations on shipping safety, especially for the safety of ultrahazardous radioactive materials shipment.

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