AIR POLLUTION FROM SHIPS - THE NEW MARPOL, ANNEX V1

BY

DREW JAMES
NORTON WHITE

Air Pollution from Ships – The New MARPOL Annex VI

Drew James
Norton White, Sydney

MARPOL 73/78

The *International Convention for the Prevention of Pollution from Ships 1973*, as amended by the Protocol of 1978[i] is said to be the most ambitious international treaty covering marine pollution ever adopted. This Convention is commonly known as MARPOL 73/78. The factors which lead to the creation of MARPOL included the enormous growth in the maritime transport of oil and the size of tankers, the increased amounts of chemicals being carried by sea and a growing concern for the world's environment as a whole. By 1969 many considered that the 1954 OILPOL Convention[ii] was no longer adequate and so the International Maritime Organisation (IMO) Assembly organised an international conference which met in London to discuss a completely new convention. The Convention which resulted deals not only with oil but with all forms of marine pollution from ships except the disposal of land-generated waste into the sea by dumping.

The MARPOL Convention includes six technical Annexes. Annexes I and II, dealing with oil and bulk noxious liquid substances respectively, are mandatory, in the sense that ratification of the Convention is impossible without ratification of these Annexes. Annexes III, IV, V and VI, dealing respectively with harmful substances in packaged forms, sewage, garbage, and air pollution, are optional.

Australia is a party to the MARPOL Convention, and the Convention and a number of its Annexes[iii] have been adopted both federally by the Commonwealth *Protection of the Sea (Prevention of Pollution from Ships) Act 1983* and the *Navigation Act 1912* and at State levels such as for instance the *Marine Pollution Act 1987 (NSW).*

New Annex VI of MARPOL 73/78

On 26 September 1997, after six years of deliberation, the IMO adopted the Protocol of 1997 to MARPOL 73/78 which sets out in its annex the new Annex VI, *Regulations for the Prevention of Air Pollution from Ships*, and eight Conference resolutions including the

Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines (NO_x Technical Code).

Annex VI will enter into force twelve months after the date on which not less than fifteen States, the combined tonnage of which shall be not less than 50% of the gross tonnage of the world's merchant shipping fleet, have become parties to the Protocol of 1997. As at September 1999, only 2 contracting states have adopted the Protocol, these being Norway and Sweden.[iv] Australia is currently considering its position on possible ratification of the Protocol. It is highly likely that the Protocol will be adopted leading to Federal and State legislation giving effect to the new Annex IV. Enforcement of that legislation would principally be left to the Australian Maritime Safety Authority.

The new Annex IV sets limits on sulphur oxide and nitrogen emissions from ship exhausts and prohibit deliberate emissions of ozone depleting substances. It includes a global cap of 4.5% m/m on the sulphur content of fuel oil and calls on the IMO to monitor the worldwide average sulphur content of fuel once the Protocol comes into force.

Annex VI also contains provisions allowing for special "SO_x Emission Control Areas" to be established with more stringent control on sulphur emissions. In these areas, the sulphur content of fuel oil used on board ships must not exceed 1.5% m/m. Alternatively, ships must fit an exhaust gas cleaning system or use any other technological method to limit SO_x emissions. The Baltic Sea is designated as a SO_x Emission Control area in the Annex.

Annex VI prohibits deliberate emission of ozone depleting substances, which include halons and chlorofluorocarbons (CFCs). New installations containing ozone depleting substances are prohibited on all ships. But new installations containing hydro-chlorofluorocarbons (HCFCs) are permitted until 1 January 2020.

The requirements of the Protocol of 1997 are in accordance with the Montreal Protocol of 1987, as amended in London in 1990. The Montreal Protocol is an international environmentally treaty, drawn up under the auspices of the Untied Nations, under which nations agreed to cut CFC consumption and production in order to protect the ozone layer.

Annex VI sets limits on emission of nitrogen oxides (NO_x) from diesel engines. The NO_x Technical Code, developed by IMO, defines how this is to be done.

The Annex also prohibits the incineration on board ship of certain products, such as contaminated packaging material and polychlorinated biphenyls (PCBs).

The Marine Environment Protection Committee

The Marine Environment Protection Committee (MEPC) of the IMO first met to consider the issue of air pollution in 1988 at the instigation of Norway. The IMO Assembly at its 17th session in October/November 1991 adopted resolution A.719(17) on prevention of air pollution from ships which, inter alia, instructed the MEPC in co-operation with other bodies of the IMO to develop requirements for reducing air pollution from ships. The MEPC has met several times since 1991 in order to discuss the new Annex VI.

At the 41st session of the MEPC in March/April 1998, the MEPC instructed the Sub-Committee on Ship Design and Equipment (DE) to develop guidelines relevant to implementation of the Annex VI, including, as a high priority, guidelines on sampling of fuel delivered for use onboard ships and guidelines for onboard nitrogen oxide monitoring and recording devices.

At the same session, the Sub Committee on Fire Protection (FP) was instructed to review the use of perfluorocarbons (PFCs) in shipboard fire-extinguishing systems, in line with a conference resolution calling on their use to be prohibited. The FP Sub-Committee is also seeking to identify what uses of PFCs, if any, are essential for fire-extinguishing systems on commercial surface vessels, commercial submersibles and offshore platforms.

At the 42nd session of the MEPC in November 1998, the MEPC agreed to begin a programme to monitor the average sulphur content of residual fuels world wide, as part of a program of action towards implementation of Annex VI. The monitoring scheme will be based on guidelines which were approved at the 41st session. The guidelines set out a formula for calculating the yearly average sulphur content, based on sampling and testing of residual fuel. Currently, average world wide sulphur contents are in the order of 3% mass by mass – while Annex VI sets a cap of 4.5% m/m. The aim of the monitoring program is to ensure action can be taken if the average sulphur content is seen to be rising.

At the 43rd session of the MEPC in June/July of this year, the MEPC adopted an MEPC resolution on *Guidelines For Monitoring The World Wide Average Sulphur Content of Residual Fuel Oil Supplied For Use On Board Ships*.

The guidelines are intended to establish an agreed method to monitor the average sulphur content of residual fuel oils supplied for use on board ships. MEPC will at future sessions further discuss measures to reduce SO_x emissions from ships, should the average sulphur level in fuels, calculated on the basis of these guidelines, show a sustained increase.

Overview of New Annex VI

The new Annex VI consists of three Chapters and a number of Appendices:

- Chapter I – General
- Chapter II – Survey, Certification and Means of Control
- Chapter III – Requirements for Control of Emissions from Ships
- Appendices including:
    - the form of the International Air Pollution Prevention Certificate;
    - criteria and procedures for designation of SO_x emission control areas
    - information for inclusion in the bunker delivery note;
    - approval and operating limits for shipboard incinerators;
    - test cycles and weighting factors for verification of compliance of marine diesel engines with the NO_x limits; and
    - details of surveys and inspections to be carried out.

Chapter I - General

Regulation 3 is a general exception. It provides that the Annex does not apply to:

(a) any emission necessary for the purpose of securing the safety of a ship or saving life at sea; or

(b) or any emission resulting from damage to a ship:

(1) provided that all reasonable precautions were taken following the damage to prevent or minimise the emission; and

(2) except if the owner or master acted either with intent to cause damage, or recklessly and with knowledge that damage would probably result.

Unless expressly provided otherwise the Annex applies to all ships (regulation 1).

Chapter II - Survey, certification and means of control

Regulations 5 to 11 are concerned with survey, certification and means of control. Regulation 5 provides that every ship of 400 gross tonnage shall be surveyed before being placed into service, at periodical intervals not exceeding 5 years and undergo at least one intermediate survey during the validity of its International Air Pollution Prevention Certificate. In addition, local administrations (in Australia's case, AMSA) are required to undertake unscheduled inspections.

Regulation 6 provides for the issue of an International Air Pollution Prevention Certificate which, according to regulation 9 shall be valid for a period not exceeding 5 years. The form of the certificate is given in appendix I to the Annex (regulation 8).

Regulation 10 deals with Port State control and permits inspection by officers duly authorised and the detentions of ships until the ship has been brought to order in accordance with the requirements of the Annex.

Chapter III – Requirements for control of emissions from ships

Regulations 12 to 18 set down requirements for the control of air pollution. Regulation 12 is concerned with ozone depleting substances, regulation 13 with the emission of nitrogen oxides (NO_x), regulation 14 with the emission of sulphur oxides (SO_x), regulation 15 with the emission of volatile organic compounds, regulation 16 with ship board incinerators, regulation 17 with the provision of adequate reception facilities and regulation 18 with fuel oil quality.

Regulation 12 provides for the prohibition of deliberate emission of ozone depleting substances. New installations which contain ozone depleting substances shall be prohibited on all ships except that new installations containing hydro-chlorofluorocarbons (HCFCs) are permitted to 1 January 2020. "Ozone depleting substances" is defined in regulation 2.

Regulation 13 is concerned with the emission of nitrogen oxides. It applies to diesel engines with a power output of more than 130Kw which engine is either installed on a ship

constructed after 1 January, 2000 or which engine undergoes a major conversation on or after that date. Paragraph 3 prohibits the operation of such a diesel engine unless the emission of nitrogen oxides is within the following specified limits:

i.	17.0g/k Wh	when n is less than 130 rpm
ii.	$45.0 \times n^{(-0.2)}$ g/kW h	when n is 130 or more but less than 2000 rpm
iii.	9.8g/k W h	when n is 2000 rpm or more

where n = rated engine speed (crankshaft revolutions per minute).

The operation of a diesel engine will however be permitted if an approved exhaust gas cleaning system is applied to the engine to reduce the emission of nitrogen oxides to within the specified limits.

Regulation 14 is concerned with the emission of sulphur oxides. Paragraph 1 imposes a global limit for the sulphur content of any fuel oil used on board ships. The limit is 4.5% m/m. There was much discussion about this with a large group of countries with the support of the oil industry, wanting a limit of 4% to 5% whilst a smaller group had focused on a limit of 3% to 3.5%. It is not hard to work out who won.

The global capping is reduced to 1.5%m/m for vessels within designated SO_x Emission Control Areas, that is to say "environmentally sensitive areas".

"SO_x Emission Control Area" is defined in regulation 2 as follows:

> ***"SO_x Emission Control Area"*** *means an area where the adoption of special mandatory measures for SO_x emissions from ships is required to prevent, reduce and control air pollution from SO_x and its attendant adverse impacts on land and sea areas. SO_x emission control areas shall include those listed in regulation 14 of this Annex".*

The 1.5% m/m limit for the sulphur content of fuel oil does not apply if the vessel is fitted with an approved exhaust gas cleaning system applied to reduce the total emission of sulphur oxides to 6.0 SO_x /kW h or less calculated as the total weight of sulphur dioxide emissions.

Regulation 15 is concerned with volatile organic compounds (VOCs) from tankers. "Tankers" means an oil tanker as defined in regulation 1(4) of Annex 1 or a chemical tanker as defined in regulation 1(1) of Annex 2 of MARPOL 73/78.

Regulation 16 is concerned with ship board incinerators and provides that all incinerators installed on board ships on or after 1 January, 2000 are to comply with standards developed by the IMO and set out in appendix IV to the Annex. The incineration of certain substances anywhere is prohibited. Those substances are:

a) Annex II and Annex II cargo residues and related contaminated packing materials;

b) polychlorinated biphenyls (PCBs);

c) garbage containing more than traces of heavy metals; and

d) refined petroleum products containing halogen compounds.

Regulation 17 imposes on the government of each party to the protocol an obligation to ensure that there are adequate facilities to, without causing undue delay, meet the needs of ships using its ports etc. for the reception of ozone depleting substances and equipment containing such substances when renewed from ships, exhaust gas cleaning resides and fuel oil not meeting the sulphur requirements of regulation 14.

Regulation 18 requires fuel oil to meet certain requirements. They are:

a) that the fuel oil shall be blends of hydrocarbons derived from petroleum refining. This shall not preclude the incorporation of small amounts of additives intended to improve some aspects of performance.

b) that the fuel oil shall be free from inorganic acids; and

c) that the fuel oil shall not include any added substance or chemical waste which either:

   i. jeopardises the safety of ships or adversely affects the performance of the machinery; or

   ii. is harmful to personnel; or

   iii. contributes overall to additional air pollution.

Details of fuel oil delivered to and used on board a ship shall be recorded by means of a bunker note which note is required to contain at least the information specified in appendix V of the Annex.

Resolutions of the 1997 MARPOL Conference

In addition to adopting the Protocol of 1997 the Assembly passed eight resolutions, including resolution 2, which provides for the Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines (NO_x Technical Code).

Resolution 1 – Review of the 1997 Protocol

This resolution urges Member States of the IMO to take the steps necessary to consent to be bound by the 1997 Protocol no later than 31 December 2002. If the conditions for entry into force of the 1997 Protocol have not been meet by 31 December 2002, the MEPC, at its first meeting thereafter, is invited to initiate, as a matter of urgency, a review to identify the impediments to entry into force of the Protocol and any necessary measures to alleviate those impediments.

Resolution 2 – Technical Code on Control of Emission of Nitrogen Oxides from Marine Diesel Engines

This is will be discussed separately below

Resolution 3 – Review of nitrogen oxides emission limitations

This resolution recognised that concern had been expressed by a number of delegations that the emission limits provides for in Annex IV may not be sufficient to achieve the desired reduction in nitrogen oxide emissions. The resolution invited the MEPC, as a matter of urgency, to review the nitrogen oxide emission limits at a minimum of five year intervals after entry into force of the 1997 Protocol.

Resolution 4 – Monitoring the world–wide average sulphur content of residual fuel oil supplied for use on board ships

In this resolution the Assembly invited the MEPC, in co-operation with interested organisations, to develop guidelines for monitoring the world-wide average sulphur content of residual fuel oil supplied for use on board ships.

Resolution 5 – Consideration of measures to address sulphur deposition in north-west Europe

A number of States expressed concern regarding the contribution to sulphur deposition by shipping particularly in the North Sea and the damaging effects of that deposition. As a result the Assembly, in this resolution, invited the MEPC to consider a proposal for the North Sea to be designated a SO_x Emission Control Area.

Resolution 6 – Introduction of the harmonized system of survey and certification in Annex VI

In this resolution the Assembly invited the MEPC to develop a harmonized system of survey and certification to replace the existing regulations 5 and 6 of Annex VI. This resolution flowed from the fact that the MEPC at its 29th session adopted the amendments to Annexes I and II of MARPOL 73/78 introducing a harmonized system of survey and certification, which will enter into force on the date on which the 1998 SOLAS and Load Line Protocols enter into force.

Resolution 7 – Restriction on the use of perfluorocarbons on board ships

This resolution arose from concerns by some delegates that regulation 12 of Annex VI would result in one environmental problem being replaced by another. That is to say regulation 12 prohibits new installations containing ozone-depleting substances (including halons). This will require substitutes for use in shipboard fire–extinguishing equipment, and in that regard perfluorocarbons (PFCs) are one of the potential substitutes that may replace halons in shipboard fire–extinguishing systems.

Accordingly, the resolution invited the MEPC and the Maritime Safety Committee, to consider as a matter of urgency, any appropriate measures including an immediate moratorium and adoption of amendments to the relevant instrument concerning the prohibition of the use of PFCs in shipboard fire-extinguishing systems.

Resolution 8 – CO_2 emissions from ships

CO_2 emissions, being greenhouse gases, have an adverse effect on the environment but Annex VI does not address such emissions from ships. This resolution invited the IMO to undertake a study of CO_2 emissions from ships for the purpose of establishing the amount and relative percentage of CO_2 from ships as part of the global inventory of CO_2 emissions.

In that regard the resolution also invited the MEPC to consider what CO_2 reductions strategies may be feasible in light of the relationship between CO_2 and other atmospheric and marine pollutants, especially NO_x since NO_x emissions may exhibit an inverse relationship to CO_2 reduction.

NO_x Technical Code

Under the provisions of Annex VI and subsequent to the entry into force of Annex VI, each marine diesel engine to which regulation 13 of that annex applies, must comply with the provisions of the NO_x Technical Code.

By way of background, the precursors to the formation of nitrogen oxides during the combustion process are nitrogen and oxygen. Together these compounds comprise 99% of the engine intake air. Oxygen will be consumed during the combustion process, with the amount of excess oxygen available being a function of the air/fuel ratio which the engine is operating under. The nitrogen remains largely unreacted in the combustion process, however a small percentage will be oxidized to form various oxides of nitrogen. The nitrogen oxides (NO_x) which can be formed include No and No_2, while the amounts are primarily a function of flame or combustion temperature and, if present, the amount of organic nitrogen available from the fuel. It is also a function of the time the nitrogen and the excess oxygen are exposed to the high temperatures associated with the diesel engine's combustion process. In other words, the higher the combustion temperature (e.g. high peak pressure, high compression ratio, high rate of fuel delivery, etc), the greater the amount of NO_x formation. A low-speed diesel engine, in general, tends to have more NO_x formation than a high-speed engine.

NO_x has an adverse effect on the environment, causing acidification, formation of ozone, nutrient enrichment, and contributes to adverse health effects globally.

The purpose of this Code is to establish mandatory procedures for the testing, survey and certification of marine diesel engines which will enable engine manufacturers, shipowners and Administrations to ensure that all applicable marine diesel engines comply with the relevant limiting emission values of NO_x as specified within regulation 13 of Annex VI to MARPOL 73/78. The difficulties of establishing with precision, the actual weighted average NO_x emission of marine diesel engines in service on vessels have been recognised in formulating a practical set of requirements in which the means to ensure compliance with the allowable NO_x emissions, are defined.

[i] This instrument is a combination of two treaties adopted in 1973 and 1978 respectively. Although it is now one instrument it is described under two headings to show how it evolved.

[ii] The *International Convention for the Prevention of Pollution of the Sea by Oil* entered into force internationally on 26 July 1958, and imposed obligations on shipowners and masters to operate their ships to minimise accidental and operational pollution. The Convention operated in Australia from 29 November 1962 to 14 January 1988, when the MARPOL 73/78 Convention commenced operation in Australia.

[iii] Australia has so far adopted Annexes I, II, III and V.

[iv] See attached Summary of Status of Conventions.

STATUS OF CONVENTIONS

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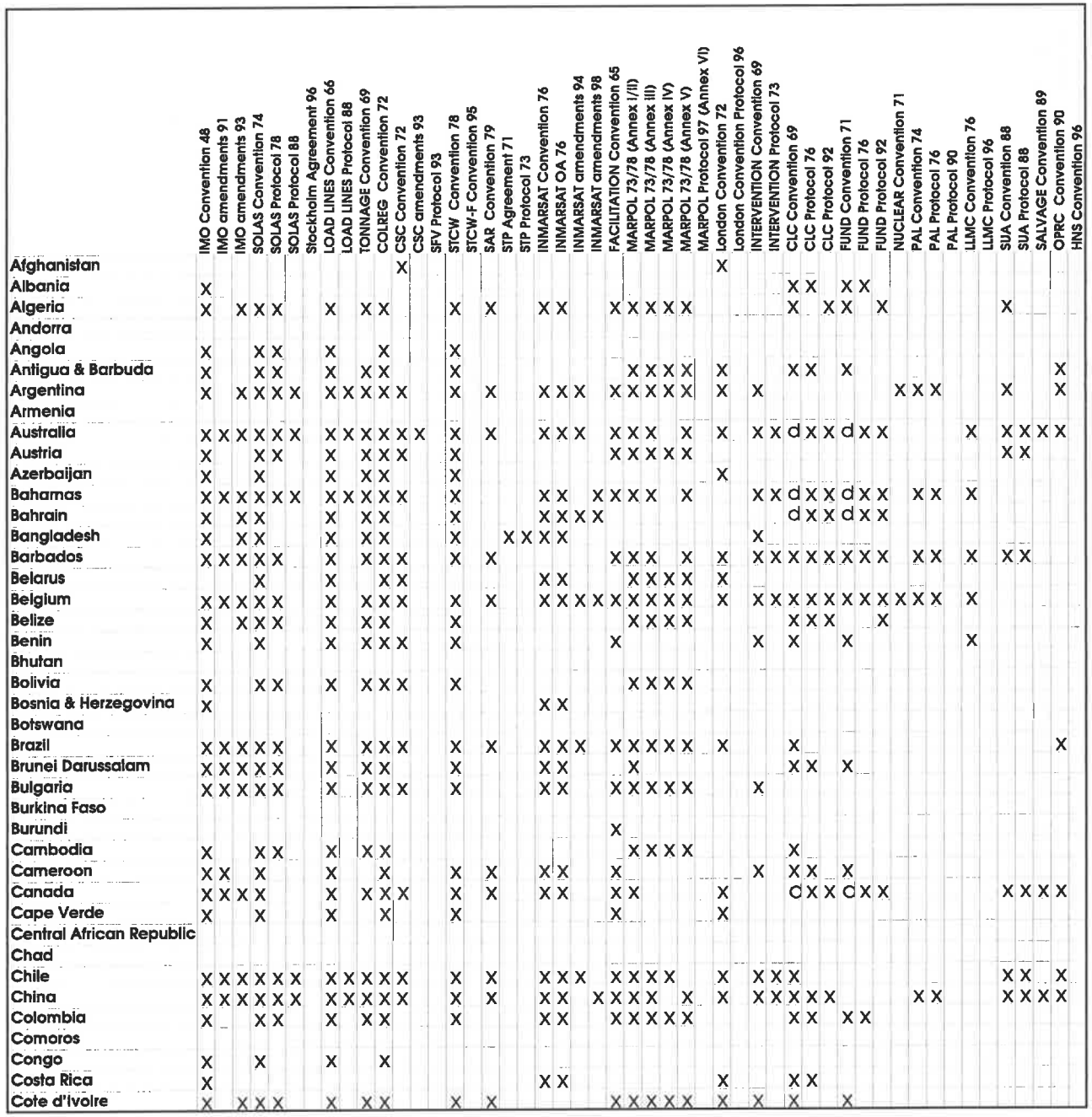

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Bangladesh	X		X	X				X		X	X				X			X	X	X	X											X															
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x = ratification/acceptance/approval/accession

d = denunciation effective

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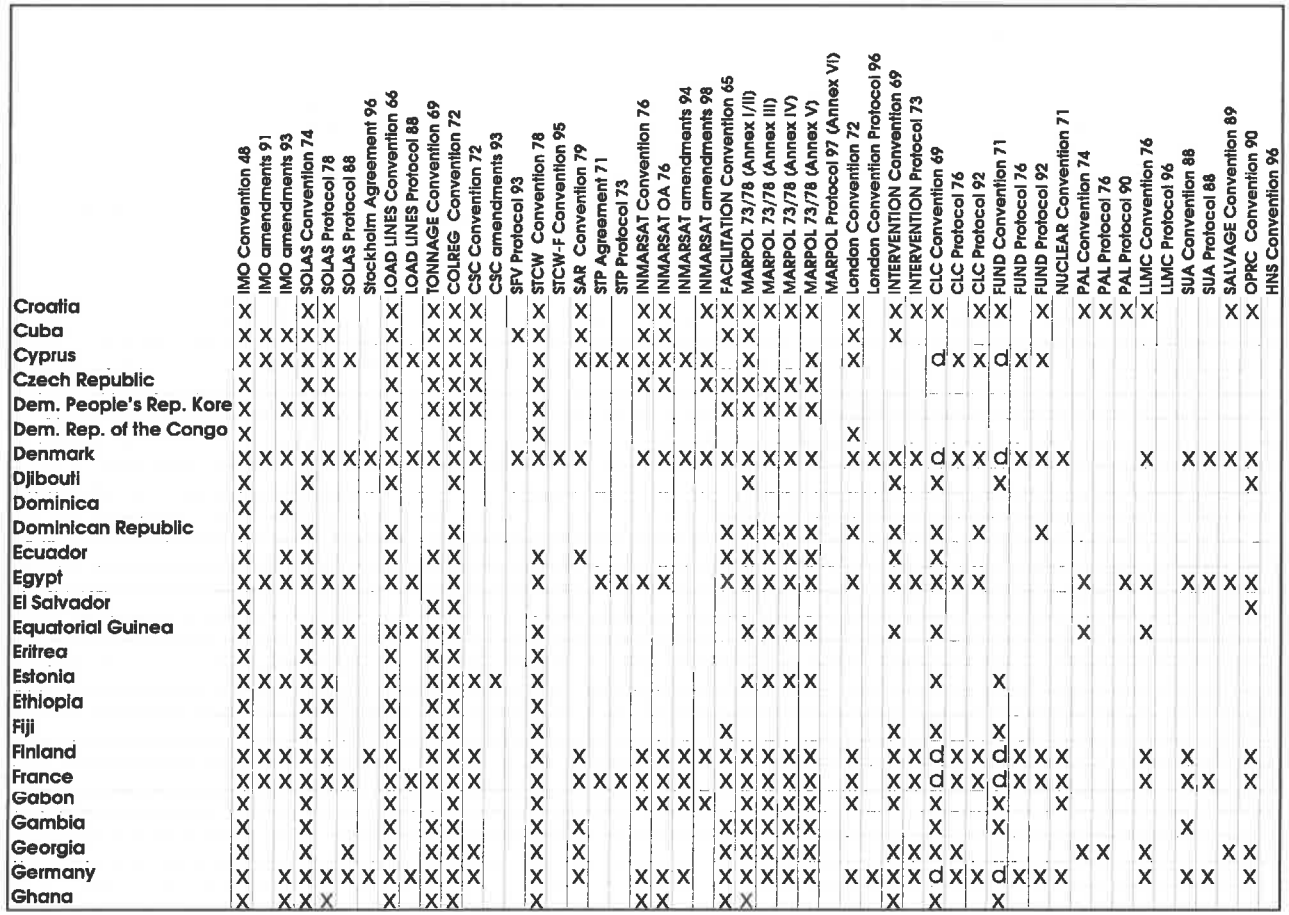
STATUS OF CONVENTIONS



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Croatia	X			X	X			X		X	X	X			X		X			X	X		X	X	X	X	X	X		X			X	X	X			X			X	X	X	X		
Cuba	X	X	X	X	X			X		X	X	X		X	X		X			X	X			X	X				X			X						X			X	X				
Cyprus	X	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X	X	X	X		X			X		X			d	X	X	d	X	X								
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Dem. Rep. of the Congo	X							X			X				X														X																		
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Fiji	X			X				X			X	X			X									X							X		X			X											
Finland	X	X	X	X	X		X	X			X	X	X		X		X			X	X	X	X	X	X	X	X	X		X		X	X	d	X	X	d	X	X	X		X		X		X	X
France	X	X	X	X	X	X	X		X	X	X	X	X		X		X	X	X	X	X	X		X	X	X	X	X		X		X	X	d	X	X	d	X	X	X		X		X	X	X	X
Gabon	X			X				X			X				X					X	X	X	X	X	X	X	X	X		X		X		X		X			X			X				
Gambia	X			X				X			X	X			X		X							X	X	X	X	X					X			X								X			
Georgia	X			X		X		X			X	X	X		X		X							X	X	X	X	X					X	X	X	X								X	X		
Germany	X		X	X	X	X	X	X	X	X	X	X	X		X		X			X	X	X		X	X	X	X	X		X	X	X	d	X	X	d	X	X	X		X		X	X		X	
Ghana	X		X	X	X			X			X	X			X					X	X			X	X						X		X			X											

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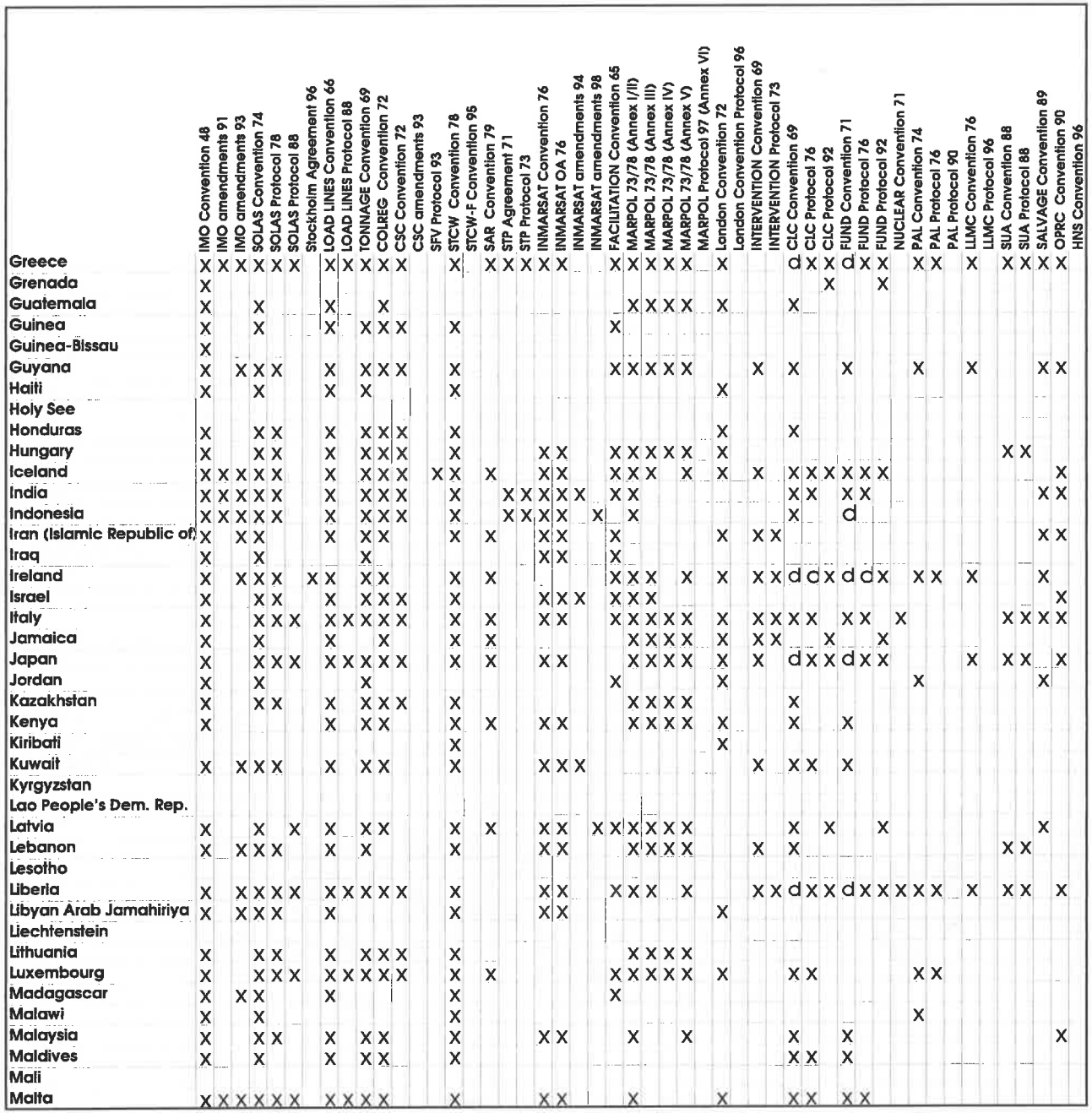
STATUS OF CONVENTIONS



	IMO Convention 48	IMO amendments 91	IMO amendments 93	SOLAS Convention 74	SOLAS Protocol 78	SOLAS Protocol 88	Stockholm Agreement 96	LOAD LINES Convention 66	LOAD LINES Protocol 88	TONNAGE Convention 69	COLREG Convention 72	CSC Convention 72	CSC amendments 93	SFV Protocol 93	STCW Convention 78	STCW-F Convention 95	SAR Convention 79	STP Agreement 71	STP Protocol 73	INMARSAT Convention 76	INMARSAT OA 76	INMARSAT amendments 94	INMARSAT amendments 98	FACILITATION Convention 65	MARPOL 73/78 (Annex I/II)	MARPOL 73/78 (Annex III)	MARPOL 73/78 (Annex IV)	MARPOL 73/78 (Annex V)	MARPOL Protocol 97 (Annex VI)	London Convention 72	London Convention Protocol 96	INTERVENTION Convention 69	INTERVENTION Protocol 73	CLC Convention 69	CLC Protocol 76	CLC Protocol 92	FUND Convention 71	FUND Protocol 76	FUND Protocol 92	NUCLEAR Convention 71	PAL Convention 74	PAL Protocol 76	PAL Protocol 90	LLMC Convention 76	LLMC Protocol 96	SUA Convention 88	SUA Protocol 88	SALVAGE Convention 89	OPRC Convention 90	HNS Convention 96
Greece	X	X	X	X	X	X		X	X	X	X	X			X		X	X	X	X	X			X	X	X	X	X	X		X			d	X	X	d	X	X		X	X		X	X	X	
Grenada	X																																				X											
Guatemala	X			X				X			X														X	X	X	X	X					X				X									
Guinea	X			X				X		X	X	X			X									X																							
Guinea-Bissau	X																																														
Guyana	X		X	X	X			X		X	X	X			X									X	X	X	X	X			X		X			X				X			X		X	X	
Haiti	X			X				X		X					X														X																	
Holy See																																															
Honduras	X			X	X			X		X	X	X			X									X	X	X	X	X					X													
Hungary	X			X	X			X		X	X	X			X					X	X			X	X	X	X	X																		
Iceland	X	X	X	X	X			X		X	X	X		X	X		X			X	X			X	X	X		X			X		X	X	X	X	X	X						X	
India	X	X	X	X	X			X		X	X	X			X			X	X	X	X			X	X								X	X		X	X						X	X	
Indonesia	X	X	X	X	X			X		X	X	X			X			X	X	X	X		X		X								X		d									X	X	
Iran (Islamic Republic of)	X		X	X				X		X	X				X		X			X	X			X								X	X										X	X	
Iraq	X			X						X										X	X			X																					
Ireland	X		X	X	X		X	X		X	X				X		X				X	X	X				X		X	X	X	d	d	X			X	X		X			X		
Israel	X			X	X			X		X	X	X			X					X	X	X		X	X	X																		X	
Italy	X			X	X	X		X	X	X	X	X			X		X			X	X			X	X	X	X	X			X	X	X	X		X	X		X			X	X	X	X	
Jamaica	X			X				X			X				X		X								X	X	X	X			X	X	X			X		X					X	X	X	
Japan	X			X	X	X		X	X	X	X	X			X		X			X	X				X	X	X	X			X	X	d	X	X	d	X	X		X			X	X		X	
Jordan	X			X							X				X									X							X									X					X		
Kazakhstan	X			X	X			X			X	X			X										X	X	X	X				X														
Kenya	X							X			X	X			X		X			X	X				X	X	X	X				X			X											
Kiribati															X																X																
Kuwait	X		X	X	X			X		X	X	X			X					X	X	X									X		X	X		X											
Kyrgyzstan																																															
Lao People's Dem. Rep.																																															
Latvia	X			X		X		X		X	X	X			X		X			X	X		X	X	X	X	X	X					X		X			X						X		
Lebanon	X		X	X	X			X		X					X					X	X				X	X	X	X			X		X					X					X	X		
Lesotho																																															
Liberia	X		X	X	X	X		X	X	X	X	X			X					X	X			X	X	X		X			X	X	d	X	X	d	X	X	X	X	X		X		X	
Libyan Arab Jamahiriya	X		X	X	X			X							X					X	X									X																
Liechtenstein																																															
Lithuania	X			X	X			X		X	X	X			X										X	X	X	X																		
Luxembourg	X			X	X	X		X	X	X	X	X			X		X							X	X	X	X	X			X		X						X	X						
Madagascar	X		X	X				X							X									X																						
Malawi	X			X											X																									X							
Malaysia	X			X	X			X		X	X				X					X	X				X			X				X													X	
Maldives	X			X				X		X	X				X																X	X		X											
Mali																																															
Malta	X	X	X	X	X	X		X	X	X	X				X					X	X				X							X			X	X										

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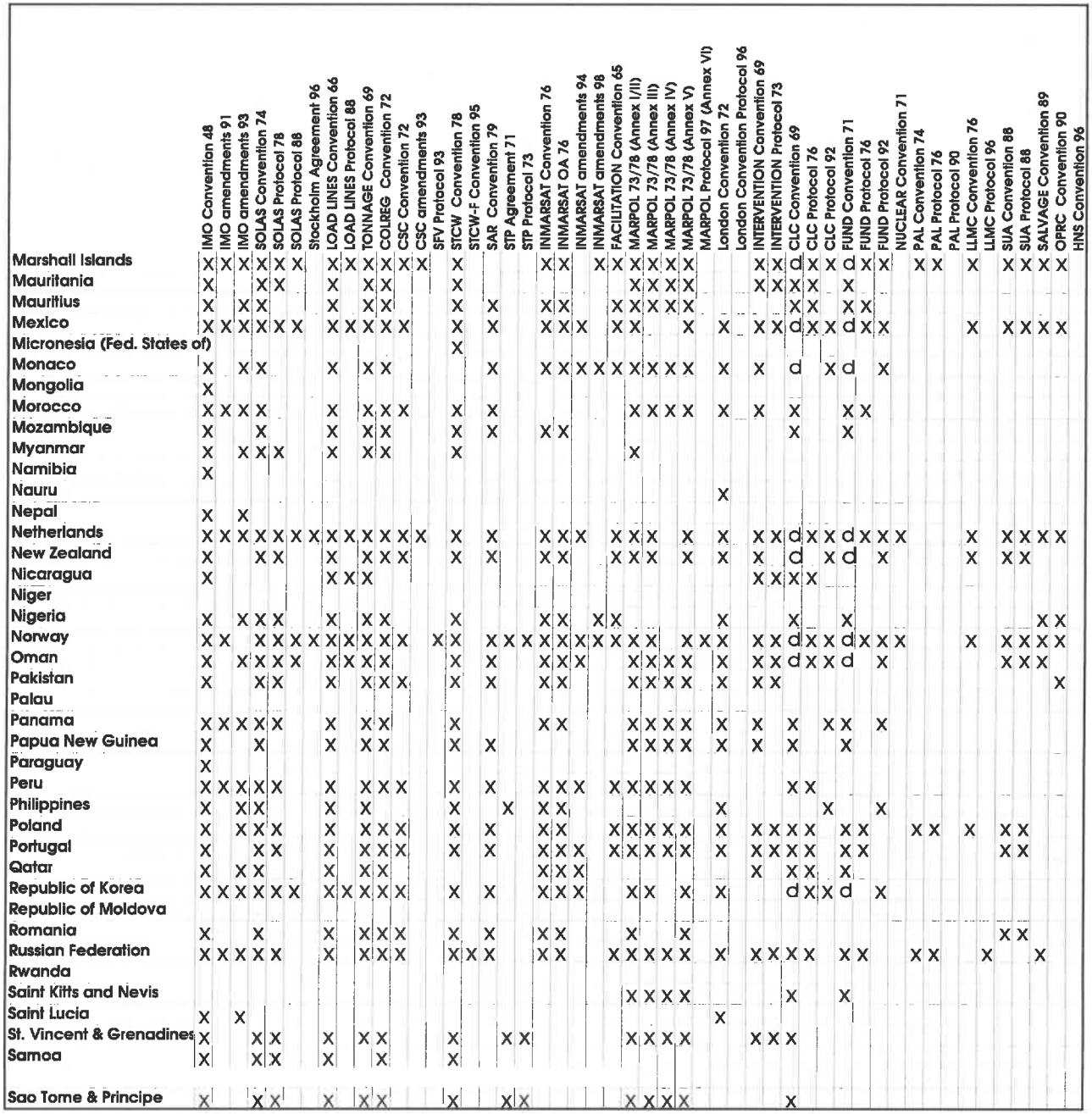

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Marshall Islands	X	X	X	X	X	X		X	X	X	X	X	X		X					X	X			X	X	X	X	X				X	X	d	X	X				X		X		X	X	X	X	
Mauritania	X				X	X		X		X	X				X									X	X	X	X				X	X	X	X		X											
Mauritius	X		X	X				X		X	X				X		X			X	X			X	X	X	X						X	X		X	X										
Mexico	X	X	X	X	X	X		X	X	X	X	X			X		X			X	X	X		X	X			X		X		X	X	d	X	X	X			X		X	X	X	X	
Micronesia (Fed. States of)															X																																	
Monaco	X		X	X				X		X	X				X		X			X	X	X	X	X	X	X	X		X		X		d		X	d		X								
Mongolia	X																																														
Morocco	X	X	X	X				X		X	X	X			X		X								X	X	X	X		X		X		X		X	X									
Mozambique	X			X				X		X	X				X		X			X	X												X			X											
Myanmar	X		X	X	X			X		X	X				X										X								X													
Namibia	X																																														
Nauru																													X																		
Nepal	X		X																																												
Netherlands	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X			X	X	X		X	X	X		X		X		X	X	d	X	X	d	X	X	X		X		X	X	X	X	
New Zealand	X			X	X			X		X	X	X			X		X			X	X			X	X	X		X		X		X	X	d		X	d		X			X		X	X		
Nicaragua	X							X	X	X																							X	X	X	X											
Niger																																																
Nigeria	X		X	X	X			X		X	X				X					X	X		X	X						X			X			X								X	X	
Norway	X	X		X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X			X	X	X	X	X	d	X	X	d	X	X	X		X		X	X	X	X	
Oman	X		X	X	X	X		X	X	X	X				X		X			X	X	X			X	X	X	X		X		X	X	d	X	X	d		X				X	X	X	
Pakistan	X			X	X			X		X	X	X			X		X			X	X				X	X	X	X		X		X	X					X							X	
Palau																																																
Panama	X	X	X	X	X	X		X		X	X				X					X	X				X	X	X	X		X		X		X		X	X		X								
Papua New Guinea	X			X				X		X	X				X		X								X	X	X	X		X		X		X			X									
Paraguay	X																																														
Peru	X	X	X	X	X	X		X		X	X	X			X		X			X	X	X		X	X	X	X	X						X	X											
Philippines	X		X	X				X		X					X			X		X	X									X					X			X									
Poland	X		X	X	X			X		X	X	X			X		X			X	X			X	X	X	X	X		X		X	X	X	X		X	X			X		X	X			
Portugal	X			X	X			X		X	X	X			X		X			X	X	X		X	X	X	X	X		X		X	X	X	X		X	X						X	X		
Qatar	X		X	X				X		X	X									X	X	X								X			X	X		X											
Republic of Korea	X	X	X	X	X	X		X	X	X	X	X			X		X			X	X	X			X	X		X		X			d	X	X	d		X								
Republic of Moldova																																																
Romania	X			X				X		X	X	X			X		X			X	X				X			X																				
Russian Federation	X	X	X	X	X			X		X	X	X			X	X	X			X	X			X	X	X	X	X		X		X	X	X	X		X	X			X	X		X			
Rwanda																																																
Saint Kitts and Nevis																								X	X	X	X						X		X												
Saint Lucia	X		X																										X																		
St. Vincent & Grenadines	X			X	X			X		X	X				X			X	X					X	X	X	X				X	X	X													
Samoa	X			X	X			X			X				X																																
Sao Tome & Principe	X			X	X			X		X	X				X			X	X					X	X	X	X						X														

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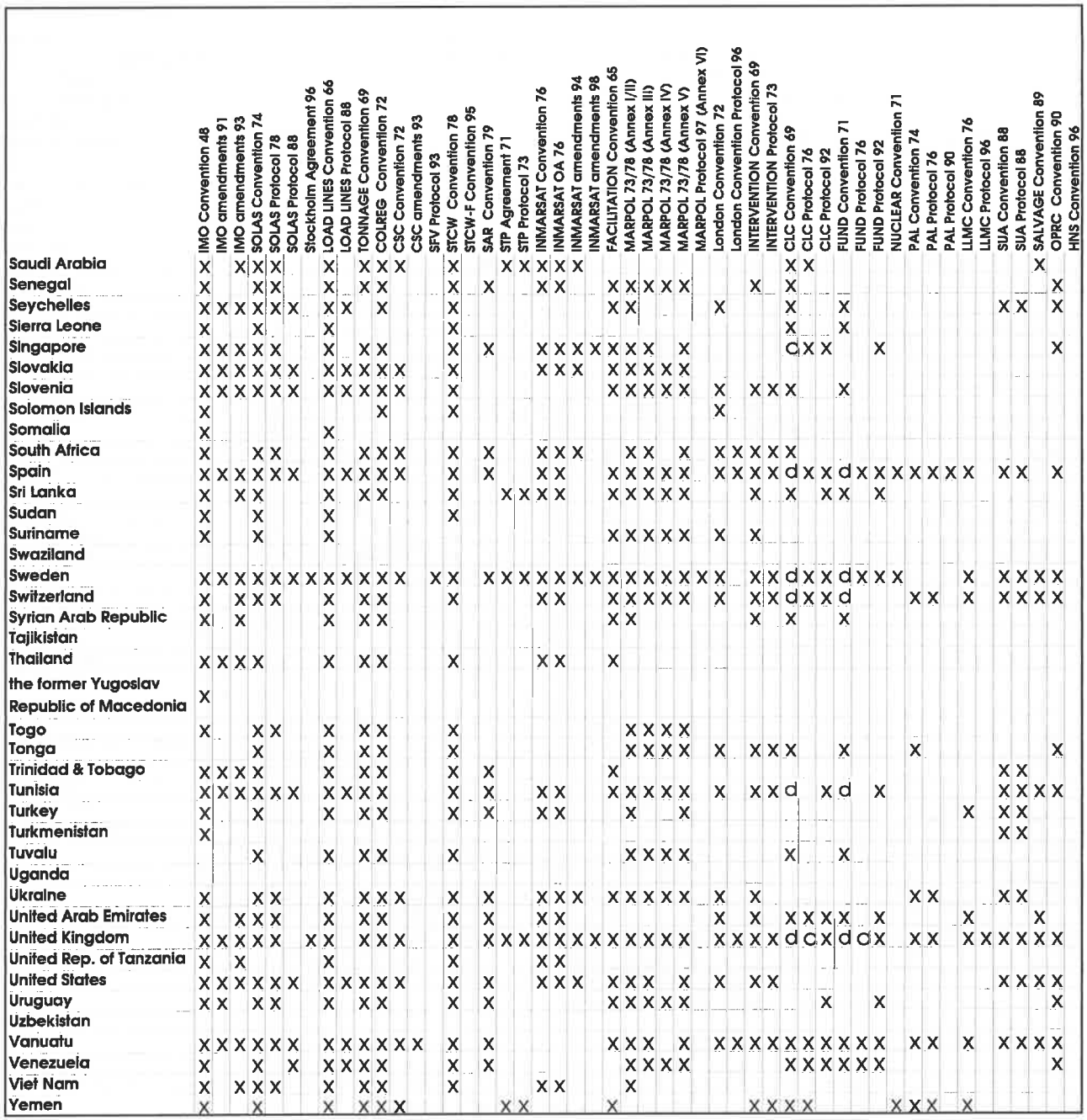

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Saudi Arabia	X		X	X	X			X		X	X	X			X			X	X	X	X												X	X										X	
Senegal	X			X	X			X		X	X				X		X			X	X			X	X	X	X	X			X		X											X	
Seychelles	X	X	X	X	X	X		X	X		X				X					X	X				X	X				X			X			X						X	X		X	
Sierra Leone	X			X				X							X																		X			X									
Singapore	X	X	X	X	X			X		X	X				X		X			X	X	X	X	X	X	X		X					X	X	X		X							X	
Slovakia	X	X	X	X	X	X		X	X	X	X	X			X					X	X	X			X	X	X	X																	
Slovenia	X	X	X	X	X	X		X	X	X	X	X			X										X	X	X	X		X		X	X	X		X									
Solomon Islands	X										X				X															X															
Somalia	X							X																																						
South Africa	X			X	X			X		X	X	X			X		X			X	X	X			X	X		X		X	X	X	X	X												
Spain	X	X	X	X	X	X		X	X	X	X	X			X		X			X	X			X	X	X	X	X		X	X	X	X	d	X	X	d	X	X	X	X	X		X	
Sri Lanka	X		X	X				X		X	X				X			X	X	X	X			X	X	X	X			X			X		X	X		X							
Sudan	X			X				X							X																														
Suriname	X			X				X																	X	X	X	X	X		X		X													
Swaziland																																															
Sweden	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	d	X	X	d	X	X	X			X	X	X	X	X
Switzerland	X		X	X	X			X		X	X				X				X	X			X	X	X	X	X		X		X	X	d	X	X	d			X	X		X	X	X	X	X
Syrian Arab Republic	X		X					X		X	X												X	X							X		X			X										
Tajikistan																																															
Thailand	X	X	X	X				X		X	X				X					X	X			X																						
the former Yugoslav Republic of Macedonia	X																																													
Togo	X			X	X			X		X	X				X									X	X	X	X																			
Tonga				X				X		X	X				X									X	X	X	X		X		X	X	X	X		X			X						X	
Trinidad & Tobago	X	X	X	X				X		X	X				X		X							X						X		X	X									X	X			
Tunisia	X	X	X	X	X	X		X	X	X	X				X		X			X	X			X	X	X	X	X		X		X	X	d		X	d		X			X	X	X	X	X
Turkey	X			X				X		X	X				X		X			X	X				X			X														X		X	X		
Turkmenistan	X																																										X	X			
Tuvalu				X				X		X	X				X									X	X	X	X						X			X										
Uganda																																															
Ukraine	X			X	X			X		X	X	X			X		X			X	X	X		X	X	X	X	X		X		X									X	X			
United Arab Emirates	X		X	X	X			X		X	X				X		X			X	X				X					X		X				X						X		X		
United Kingdom	X	X	X	X	X		X	X		X	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	d	C	X	d	C	X		X	X		X	X	X	X	X
United Rep. of Tanzania	X		X					X							X					X	X																										
United States	X	X	X	X	X	X		X	X	X	X	X			X		X			X	X	X		X	X	X		X		X		X	X									X	X	X	X	X
Uruguay	X	X		X	X			X		X	X				X		X							X	X	X	X	X							X			X								X	
Uzbekistan																																															
Vanuatu	X	X	X	X	X	X		X	X	X	X	X	X		X		X							X	X	X		X		X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X
Venezuela	X			X		X		X	X	X	X				X		X								X	X	X	X					X	X	X	X	X	X							X	
Viet Nam	X		X	X	X			X		X	X				X					X	X				X																						
Yemen	X			X				X		X	X	X						X	X					X															X	X	X		X				

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Yugoslavia	X			X	X			X		X	X	X			X					X	X			X	X	X	X	X		X		X	X			X										
Zambia								X																X																								
Zimbabwe																																																
Hong Kong, China (Associate Member)	X			X	X			X		X	X	X			X		X	X	X	X				X	X	X		X		X		X	X	X	X	X	X	X	X		X	X		X		X

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