ROLE OF ISO 14001 IN MARPOL CONVENTION FOR THE ASSURANCE OF CONTINUAL ENVIRONMENTAL MANAGEMENT

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ABSTRACT

Ship Management Companies are responsible for the prevention of environmental pollution caused by their managed vessels. When they are initiating to implement all compulsory requirements that are defined in MARPOL, STCW Convention and separate Port State Control requirements, they are confronting some hesitations or confusions that could result an environmental deficiency. Misunderstanding or lack of environmental management philosophy directly causes the hesitations or confusions at Ship Management Companies. Taking into account, the requirements of ISO 14001 and the international marine pollution prevention rules, Management Cover Up Cycle Model is proposed in this study for internationally trading shipping companies.

Management Cover-Up Cycle Model is a backward and forward data-driven process. It means the actions will be taken step by step. The steps are to identify the environmental aspects, analyse the impacts, measure the significant impacts, and then tailor a solution that could be named as target. When the target is initiated to implement, its effectiveness is measured. If needed, the approach for reaching the target is adjusted for effectiveness. When success is achieved, the set of process actions is closed. Long term monitoring usually follows to ensure that the environmental hazardous occurrence does not arise again. As well as that this model enables to upgrade the management staff and the crew members know-how for ensuring an effective Environmental Management System.

KEY WORDS: Application of ISO 14001 for ships, Management Model, Marine Environmental Pollution

1. Introduction

A number of administrations and authorities have seen fit to introduce their own rules or legislations to cover pollution prevention caused by the ships, considered as PSC (Port State Control) requirements. The existing rules and regulations which are described in MARPOL (Marine Pollution) Convention states only the prevention for the occurence of oil spill or leakage, garbage disposal limits, handling of garbage and sludge to shore-based facilities, the specifications and the operational condition of sewage threatment units, ballasting and deballating operations etc. It is difficult in an international environment to refer to a single specific piece of rules as it may not apply to all shipping companies and multinational shipboard activities caused by different cultural management knowhow or the background.

The only defined management rule for preveting the shipboard pollution is directly coupled with ensuring safe operational conditions, called as ISM (International Safety Management) Code (Er and Sogut, 1999). Hence the ISM Code indicates some countermeasures for pollution prevetion, its main concept defines occupational health and safety conditions of vessel's equipment, cargo of ship and crew members. For this reason, the ISM Code was made mandatory under the new chapter IX of the SOLAS (Safety of Life at Sea) Convention (Traves 1997). Besides the ISM Code that is only compulsory international ship management standard in shipping business, defines what to do but does not make any clear explanations on how to do.

Taking into account the above mentioned considerations, Management Cover Up Cyle (MCUC) model is presented in this study by utilising ISO 14001 Environmental Management Standard, with in the parallel view of

compulsory existing shipping rules that are established by IMO (International Maritime Organisation) to compensate the weak points of pollution prevention activities on board the ships.

2. Overview of Management Standards and Rules

2.1 ISM CODE

The International Management Code for the safe operation of ships and pollution prevention (ISM Code) was adopted by the IMO General Assembly with the resolution A.741(18) on its eighteenth session in November 1993 (IACS, 1996). The ISM Code aims at contributing to safer shipping and pollution prevetion by laying down requirements for a clear link between shore and sea staff of a company and for a designated person to strengthen that link. A key aspect of the ISM Code is that companies must have a verifiable SMS (Safety Management System) in place. For the system to be effectively implemented there must be commitment form the top, responsibilities assigned and measures in place to remedy the deficiencies. It has today become very split the management of a vessel into several distinct management departments. These may in certain circumstances, work independently of each other or even be separate companies. These can be narrowed down to: crew management, technical management, operational management, commercial management and insurance management. In relation to the Code, the relevant "management" is the one which has responsibility for the actual technical and operational management of the ships.

2.2 MARPOL CONVENTION

Marpol Convention covers all the technical aspects of pollution form ships, except the disposal of waste into the sea by dumping and applies to ships of all types, although it does not apply to pollution arising out of the exploration and exploitation of sea-bed mineral resources. The convention has two protocols dealing respectively with reports on incidents involving harmful substances and arbitration five annexes that contain regulations for the prevention of various forms of pollution as follows:

Annex I : Prevention of pollution by oil
Annex II : Control of pollution by noxious liquid substances
Annex III : Prevention of pollution by harmful substances carried in packaged form or in freight containers or portable tanks or road and rail tank wagons
Annex IV : Prevention of pollution by sewage
Annex V : Garbage management plan

and the protocol of 1997 (Annex VI on regulations for the prevention of air pollution form ships) (Wright, 1999).

2.3 STCW CONVENTION

The IMO Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978 was substantially revised in July 1995. The convention as amended has become known as STCW 95 (IMO, 1995). This will improve the standard of seamen's qualifications and it will help to save lives, ships and cargo and improve environmental protection. The main goals of STCW 95 are:

- To transfer all detailed technical requirements to an associated Code.
- To clarify the skills and competence required and to take account of modern training methods.
- To require Flag State Administrations to maintain direct control over the qualifications of those masters, officers that they authorise to serve on their ships by an endorsement procedure.
- To make parties to the Convention accountable to each other, through IMO, for their proper implementation of the Convention and the quality of their training and certification activities

The system to ensure a uniform standard of competence can be called the core of the revised STCW Convention. For the first time, the standards for seafarer competence are based not only on knowledge requirements but are directly linked to the seafarer's ability to perform their tasks safely and effectively.

In the process of qualification for a professional certificate the weight has shifted form examinations by the maritime school or Administration's examination board to the ability to demonstrate safe and efficient structured

and controlled on board training and performance evaluation. This system is based on the following key concepts as functions, level of responsibility, seagoing service and specification of competence standards.

2.4 ISO 14001 STANDARD

ISO 14000 series of standards contains requirements and guidelines for establishing and maintaining an organisation's environmental management system. Environmental Management System is the structure of policies, procedures, documentation, etc and it has in place to control the impact of its products, services, and processes on the environment. The only standard that contains requirements and thus the only standard those organisations can actually be registered to be ISO 14001. ISO 14001 requires a documented system for controlling the environmental effects of the processes that the organisation uses to develop and produce products or services (ISO, 1996). The basic premise behind ISO 14001 is that there are certain elements every management system must have in place in order to ensure that organisation's negative effects on the environment are minimised.

4. THE INTERRELATIONSHIP BETWEEN THE ISM CODE, THE STCW CONVENTION, MARPOL CONVENTION AND ISO 14001 STANDARD

The ISM Code covers safety and prevention risks while the STCW Convention covers the competence of shipboard personnel, the ISO 14001 covers the specified requirements for an environmental management system, to enable an organization to formulate a policy and objectives tasking into account legislative requirements and information about significant environmental impacts (ISO, 1996).

There are many links between the ISM Code and ISO 14001 standard. Management Responsibility is defined in ISO 14001, as structures and responsibility (clause 4.4.1) and environmental management program (clause 4.3.4). The authors of the ISM Code found it more practical to define such responsibilities in separate sections like safety and environmental protection policy (clause 2), company responsibility and authority (clause 3), designated person(s) (clause 4), master's responsibility and authority (clause 5), resources and personnel (clause 6), verification review and evaluation (clause 12). Clause 7 of the ISM Code correspond the following clauses of ISO 14001 such as the whole requirements of planning (clause 4.3), training, awareness and competency (clause 4.4.2) and operational control (clause 4.4.6). Clause 8 of the ISM Code corresponds directly to emergency preparedness and response (clause 4.4.7) in ISO 14001. Clause 9 of the ISM Code, although it covers a wider field than ISO 14001, covers the non conformance, corrective and preventive action (clause 4.5.2) in ISO 14001. The concerns of clause 10 of the ISM Code are divided the following paragraphs as monitoring and measurement (clause 4.5.1) and operational control (clause 4.4.6). Similarly the concerns of clause 11 of the ISM Code are divided the following paragraphs as environmental management system documentation (clause 4.4.4), document control (clause 4.4.5) and records (clause 4.5.3) in ISO 14001. Clause 12 of the ISM Code correspond the following clauses of ISO 14001 such as the environmental management system audit (clause 4.5.4), management review (clause 4.6). More detail links between ISM Code, and ISO 14001 Standard is given in Table 1.

Similarly the comparison between ISM Code, STCW Convention, MARPOL Convention and ISO 14001 Standard is given in Table 2. Many of the direct company responsibilities in the STCW Convention are largely derived form the relevant provisions in the International Safety Management (ISM) Code. The difference however, is that whereas the ISM Code generally requires shipping companies to ensure that certain procedures related to personnel are established.

The STCW Convention stipulates in some detail that companies must be able to demonstrate that the relevant STCW provisions have been implemented, to ensure that the aims of the convention are met, i.e. that seafarers employed on board are competent qualified and can indeed perform their duties safely and effectively.

Shipboard activities that are mentioned in MARPOL Convention technically describe the main aspects of pollution prevention caused by ships, but the requirements of this convention are not directly linked to ISM Code accept defining and planning the operations in both clauses 7 and 8 of ISM Code. This results to explain what to do, but not clearly define how to do, how to manage or how to follow up. For this reason the cause of integration process of ISO 14001 is professionally needed into Ship Management Business.

Table 1 Links between ISM Code and ISO 14001 Standard

Active links between ISM Code & ISO 14001	1.General	2. S&EP Policy	3. Company Res. & Authority	4. Designated Person(s)	5. Master's Res. & Authority	6. Resources and Personnel	7. Dev. of Plans for Shpborad Opt.	8. Emergency Preparadness	9. Reports & Analy. of NC, Acc, H/O	10. Maint. Of ships & Equipment	11. Documentation	12. Company Ver. Review and Control	13. Cer. Ver. & Control
4.1 General requirements	■												
4.2 Environmental policy		■											
4.3 Planning							■						
4.3.1 Environmental aspect							■						
4.3.2 Legal & other requirements			■										
4.3.3 Objectives and targets	■						■						
4.3.4 Environmental Manag. programme							■						
4.4 Implementation and operation						■							
4.4.1 Structure & responsibility			■	■	■								
4.4.2 Training aware. & competence						■							
4.4.3 Communication						■							
4.4.4 Envir. Manag. Sys. documentation											■		
4.4.5 Document Control											■		
4.4.6 Operational Control							■			■			
4.4.7 Emergency prepard. & response								■					
4.5 Checking & corrective action									■	■			
4.5.1 Monitoring & measurement										■			
4.5.2 NC, CA and PA									■				
4.5.3 Records											■		
4.5.4 Envir. Manag. Sys. Audit												■	
4.6 Management Review												■	

5. MANAGEMENT COVER-UP CYCLE (MCUC) MODEL

The purpose of "Covering-Up Cycle model" is to make an adequate incorporation between all maritime related international requirements and the ISO 14001 Environmental Management Standard into Ship Management Business. Covering-Up Cycle Model can be recognized at two different milestones.

Table 2 Comparison of ISM Code, STCW Convention, MARPOL Convention and ISO 14001 Standard

	ISM Code	STCW Convention	MARPOL Convention	ISO 14001 Standard
Field of Application	Management of safety at sea and pollution prevention	Training, certification and wacthkeeping	Prevention of pollution from ships	Improvement of existing systems to reduce the level of pollution in environment
Applicable to	Ship Management	Administrations, training services, maritime training institutions, ship management companies and shipboard operations	Shipboard operations for all types of ships	All organisations that wishes to implement "Environmental Management System"
Purpose : Demonstrate compliance with	Managing safety and pollution prevention requirements	Training, certification and wacthkeeping requirements	Reducing the risk of pollution form ships	Self declaration of conformance regarding with environmental management
Means: Implementation of	Safety Management System	Training Management System	Pollution prevention regulations and rules	Environmental Management System
Scheme of certification	Shore based audit and shipboard audit	Organisation's Audit	Classification Society's survey program	Environmental System Audit
Validity	5 years subject to audit	5 years subject to assessment	5 years subject to surveys	3 years subject to audit
Compliance	Mandatory	Mandatory	Mandatory	Voluntary

The first milestone defines the individual relationships of each standard or legislation that could be managed in separate phases called as "Covering-Up". Then the aim of the second milestone is to make an efficient integration of each defined phase of first milestone is called as "Cyclic Build Up Process". When the two milestones are initiated to implement in actual shipping practices then the management process is called as Cover-Up Cycle Model.

The fundamental approach of the Cover-Up Cycle model enables a backward and forward data-driven process. It means the actions will be taken step by step. The steps are to identify the environmental aspects, analyse the impacts, measure the significant impacts, and then tailor a solution that could be named as target. When the target is initiated to implement, its effectiveness is measured. If needed, the approach for reaching the target is adjusted for effectiveness. When success is achieved, the set of process actions is closed. Long term monitoring usually follows to ensure that the non-compliances and deficiencies do not arise again.

The infrastructure of organisation in maritime industry that supports Management Cover Up Cycle Model (MCUCM) is very important. That infrastructure is set up so that shoe-based key personnel can identify aspects, department heads can select and review due to their priority, Management Representative(s) or Chief Executive Officer(s) can support relevant resources and the personnel who is responsible from process can able to implement routine operational procedures in an efficient manner.

Together, the process and the infrastructure have the potential to yield measurable differences to establish continual improvement. MCUCM simply constitutes three key ingredients:
1) Interest and support from executive management and operation management.
2) Enthusiasm among shore-based and shipboard personnel for identifying aspects and teaming up to solve them.
3) Technical support for teams using the MCUCM process.

Where these don't exist, momentum wanes and so does prevention of deficiencies. But where all three exist, MCUCM produces results to comply the requirements of Maritime Safety Management System.
Decisions on the performance parameters selection and its own characteristics should always one of the following:

- GO (proposal meets selection criteria and is a priority now)
- HOLD (meets the criteria, but not a priority)
- NO-GO (fails too many criteria)
- REFINE (certain criteria leave questions that must be resolved before a decision)
- REFER (not our function)

Go's are nominations that meet the performance parameter selection criteria and are a priority now. Each GO carries an implication and management thinks the problem is important enough for staff to re-structure their time.

Hold's are nominations that fit the selection criteria, but are not judged a priority at the time. HOLD's are rare since most proposals that fit the selection criteria are important. When a nomination becomes a HOLD, it is held until a later date for evaluation. In this respect the selection criteria might constitute followings:

- ✓ *Is the problem recurring?*
- ✓ *Is there a significant human health risk?*
- ✓ *Is it within Maritime Safety Management System's role?*
- ✓ *Is the problem large enough to matter but not too big to tackle?*
- ✓ *Can success be measured?*

No-go's are nominations that do not fit the selection criteria. Generally, NO-GO's are either not recurring, not Maritime Safety Management System's job. This is not to say that they are not important.

Refine's are nominations with un-answered questions on one or more selection criteria. Usually, the nominator is asked to research the problem then return for the next performance control.

Refer's are nominations about, "It's not our function."

In this respect consideration of the significance of environmental impacts should include, but is not limited to, the following criteria in ship management process:

- *scale of the impact*
- *severity of the impact*
- *probability of occurrence*
- *duration of impact*
- *potential regulatory and legal exposure*
- *difficulty of changing the impact*
- *cost of changing the impact*
- *effect of change on other activities and processes*
- *concerns of interested parties*

The sample format of environmental aspects, impacts, their criteria of significance and the related objectives are proposed in Table 3.

Table 3. Several examples of shipboard environmental aspects and impacts

No	Activities	Aspect	Impact	Criteria of Significance	Significant Impact	Objective	Target
1	Running engines cause leakage from pipes, joints, elbows etc. in engine room	Fuel and lube. oil leakages occur	Contamination of Bilge Water	Improper planned maintenance, Ineffectual precaution	Sea pollution caused by the contaminated bilge water	Reducing bilge water contamination caused by Fuel and Lube. Oil leakages	Improving planned maintenance system
2	General cleaning works on board the vessel	Usage of wasted oils (kerosene, gas oil etc.) during cleaning in the engine room	Contamination of Bilge Water	As a result of not using special trays or waste cotton for cleaning purpose during cleaning, wasted oil to be poured to the bilge.	Sea pollution caused by the contaminated bilge water	Reducing bilge water contamination caused by wasted oils during cleaning process	Using special trays or waste cotton for cleaning purpose
3	Filter cleaning	Spillage may occur during transportation of filters	Contamination of Bilge Water	Careless or incorrect transportation of filters	Sea pollution caused by the contaminated bilge water	Reducing bilge water contamination caused by careless transportation of filters	Filters should be cleaned in special trays and in the designated areas
4	Process in galley and pantry	Food Waste	Sea pollution	Throw away to the nearest land	Sea pollution caused by food waste	Categorisation of garbage	Establishing and implementing Garbage Management Plan
5	Cleaning process during maintenance	Solid carbon residues generated by purifiers or cleaning jobs	Sea pollution	Throw away into sea	Sea pollution caused by solid carbon residues	Categorisation of garbage	Establishing and implementing Garbage Management Plan
6	During ballasting, de-ballasting operations	Transfer of harmful aquatic organisms, and pathogens into coastal waters	Ecological equilibrium change (eco-system change)	Impact of marine species on the environment	Occurrence of non indigenous diseases in marine environment	Ballast Water exchange operation	Establishing and implementing Ballast Water Management Plan

4. Results and Discussions

This study is generally concentrating on the importance of ISO 14001 requirements implementation for Ship Management Companies. Although the identification of policy statement, responsibilities of shipboard personnel and emergency preparedness for each type of contingencies, internal audits, management review activities, calibration and testing procedures of relevant equipment are already established in accordance with the requirements of ISM Code and statutory certification of ships, the environmental planning approach and their targets with in the framework of defined objectives are not clearly known and practiced both by the shore-based management staff and crew members.

Appropriate implementation of ISO 14001 requirements with in the parallel view of Management Cover Up Cycle Model could enable the Ship Management Companies reduce their unforseen expenses and the rate of detentions or arrest during various port state controls.

Consequently this proposed model could be a supportive preventive action for reducing the marine pollution and the rectification of environmental management rules that are not clearly defined in MARPOL Convention. The advantage of Management Cover-Up Cycle Model can enable the shipboard environmental protection activities by controlling the process as a backward and forward data-driven process. It means the actions will be taken step by step. The steps will define the environmental aspects, analyse the impacts, measure the significant impacts, and then tailor a solution that could be named as target. When the target is initiated to implement, its effectiveness is measured. If needed, the approach for reaching the target is adjusted for effectiveness. The proposed method can especially enable the tanker and gas carrier operators to integrate their existing structures for the new international rules and regulations.

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