



Case Study to Develop Models of Compliant Ship Recycling Facilities Final Report

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Final Report
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List of Acronyms

BAT	Best Available Techniques
BCS	Balochistan Conservation Strategy
BDA	Balochistan Development Authority
BEP	Best Environmental Practices
BEPA	Balochistan Environmental Protection Agency
EIA	Environmental Impact Assessment
EMMP	Environmental Mitigation and Monitoring Plan
EMP	Environmental Management Plan
EOBI	Employees Old Age Benefit Institute
FBR	Federal Board of Revenue
GoB	Government of Balochistan
GoP	Government of Pakistan
HKC	Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009
IEE	Initial Environmental Examination
LDT	Light Displacement Tonnage
MARPOL	International Convention for the Prevention of Pollution from Ships
MEPC	Marine Environment Protection Committee
MMD	Marine Mercantile Department, Ministry of Ports and Shipping
MoHRD	Ministry of Human Resource Development
Mol	Ministry of Industries
MoNDM	Ministry of National Disaster Management
MoP&S	Ministry of Ports and Shipping
NCS	National Conservation Strategy
NEP	National Environmental Policy
NEQS	National Environmental Quality Standards
NGO	Non-Governmental Organization
NOC	No Objection Certificate
NOx	Oxides of Nitrogen
OECD	Organization for Economic Cooperation and Development
P&D	Planning and Development
PEPA	Pakistan Environmental Protection Agency
PPE	Personal Protective Equipment
ROs	Recognized Organizations
SRF/SBY	Ship Recycling Facilities/Ship Breaking Yards
SBRI	Ship Breaking and Recycling Industry
SOx	Oxides of sulphur
SRAT	Ship Recycler's Association of Turkey

Glossary of Terms

Ballast	Seawater taken into a vessel's tanks in order to submerge the vessel to proper trim
Basel Convention	The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)
Dead weight tonnage	(DWT) The lifting or carrying capacity of a ship when fully loaded. The deadweight is the difference, between the displacement and the lightweight in tons. It includes cargo, fuel, water (potable, boiler, ballast), stores, passengers, and crew.
Decommission	The decision and process of taking a ship out of service; often used regarding naval vessels
Demolition	The process of taking a ship apart; mostly used for on shore operations
Dismantling	The process of taking a ship apart; term used by the Basel Convention and its guidelines, and by the European Commission (DG Environment)
Displacement	Displacement is a measure of the weight of a navy vessel without monitions, fuel, and crew
Environmentally sound management	Basis for system of management of wastes under the Basel Convention
Displacement tonnage	the weight of water displaced by the vessel, which equals the weight of the vessel, expressed in tons
Gas free certificate (for hot work)	A certificate stating that the atmosphere in a tanker's (empty) cargo tanks is safe for work using cutting equipment (see "hot work")
Gross tonnage	The internal capacity of a vessel
Hong Kong Convention	International Convention for the Safe and Environmentally Sound Recycling of Ships adopted in Hong Kong in May 2009
Hot Work	Means any activity requiring the use of electric arc or gas welding equipment, cutting burner equipment or other forms of flame, as well as heating or spark-generating tools, regardless of where it is carried out on board a ship.
Inventory of Hazardous Materials	A list of hazardous materials on board a ship, prepared by the shipowner under the Hong Kong Convention
International Labour Organization	The United Nations agency dealing with international labour standards and promoting decent work for all
International Organization for Standardization	International standards setting body that publishes management standards such as the environmental management standard series ISO14000 and ISO 30000 on Ship Recycling Management Systems
International Maritime Organization	The specialized agency of the United Nations responsible for the regulatory framework for shipping including maritime safety and preventing pollution from ships
Light displacement tons (or lightweight)	Displacement, in tons, without cargo, fuel, lubricating oil, Water (ballast, fresh feed), consumable stores and passengers and crew and their effects, including liquids in piping,
MARPOL	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978
Marine Environment Protection Committee	A committee of the IMO, its senior technical body on marine pollution related matters
Occupation Health and Safety Assessment	OHSAS 18000 is an Occupation Health and Safety Assessment Series, for health and safety management systems

Series	
Recycling	The process of taking a ship apart; term employed by the shipping industry and IMO.
South Asia	Geographical area, but in particular the three countries involved in SBRI: Bangladesh, India, and Pakistan
Scrapping	The process of taking a ship apart; the term employed by the U.S. Environmental Protection Agency
Ship breaking and recycling industry (SBRI)	In this study, the industry that converts end-of-life ships into steel for use in construction and other recyclable items which are sold in local markets
Ship breaking	The process of taking a ship apart; the term employed by the ILO, the EU, and many national ship breakers' associations
Ship Recycling Convention	The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (2009)

Executive Summary

This case study describes models for compliant ship recycling facilities in consideration of the requirements of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989) (the Basel Convention) and the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (2009) (the Hong Kong Convention or HKC). The tasks were carried out with respect to ship recycling facilities employing the beaching method, being the predominant system currently in use. The case study identifies actions to be undertaken in the short, medium and long term at ship recycling facilities to facilitate compliance with the two Conventions, dealing in particular with the environmentally sound management of hazardous wastes and other wastes and materials. To assist baseline information on ship recycling and downstream waste management in Pakistan has been obtained from questionnaires and interviews with Government, including Competent Authorities (CAs) and industry stakeholders.

A number of areas for improvement have been identified in connection with the segregation and safe storage of hazardous wastes at ship recycling facilities, including provision of impermeable surfaces for temporary storage, on site infrastructure and off-site specialist treatment facilities such as engineered landfill for asbestos and incineration for poly chlorinated biphenyl (PCB) wastes and ozone depleting substances (ODS). The compliant models developed envisage stepwise progression through simple low cost techniques and improved management to investment in equipment and facilities in the longer term. The models are to be tested in cooperation with the Government of Pakistan and industry following an information gathering stage and consultation with relevant stakeholders and are intended to be applicable to all facilities employing the beaching method. From the results two sets of guidance and train-the-trainer manuals, with accompanying materials for operators and for competent authority(ies) will be produced.

Background information on the Basel and Hong Kong Conventions has been supplemented with a field study of ship recycling in Turkey that has provided insights into the development of environmentally sound management of hazardous wastes and materials and other wastes with respect to both Conventions. The study emphasises that fulfilment of ESM of hazardous wastes for ship recycling does not provide complete compliance with the Hong Kong convention which contains

a number of other obligations. However Basel Convention compliance would be improved through more systematic management of wastes and their control by industry and regulatory competent authorities.

SECTION 1

INTRODUCTION, PURPOSE AND STRUCTURE OF REPORT

1. Introduction - Background to the Case study

1.1 Project outline

The intention of this project is to develop a case study on models of compliant ship recycling facilities in consideration of the requirements of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989) (the Basel Convention) and the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (2009) (the Hong Kong Convention or HKC). Actions are to be identified to be undertaken in the short, medium and long term at ship recycling facilities to facilitate compliance with the two Conventions dealing in particular with the environmentally sound management of hazardous wastes and other materials. This will include developing an investigative study on downstream waste management for ship recycling in Pakistan. The models developed are to be tested in cooperation with the Government of Pakistan and Industry following an information gathering stage and consultation with relevant stakeholders.

The project comprises a number of discrete tasks, the combined outputs of which will be the case study and the guidance and training materials. These tasks have been elaborated and are broken down into the main elements as described below and presented in the accompanying Table and Timeline.

The main objectives of the project as a whole are:

- i) Undertake investigations and compile a Baseline Report;
- ii) From the results of the Baseline report prepare a Case Study for operationally compliant models of ship recycling; and
- iii) Road test the models.

The main task elements of the Case Study are:

- Consideration of the Basel and Hong Kong Convention requirements and their respective guidelines;
- Gathering of baseline information on ship recycling and downstream waste management in Pakistan from questionnaires and interviews with

Government, including Competent Authorities (CAs) and industry stakeholders;

- Develop operationally compliant models for dealing with the wastes and materials from ship recycling in an environmentally sound manner;
- Develop two sets of guidance and train-the-trainer manuals, with accompanying materials comprising:
 - Guidance (i) for operators;
 - Guidance (ii) for competent authority (ies), with accompanying “train the trainer” manuals.

All the above tasks are to be carried out with respect to ship recycling facilities employing the beaching method, being the predominant system currently in use. Therefore to be replicable the results obtained must relate to this method.

1.2 Expected results

The results of this case study are to be subject to practical road testing to inform the development of the guidance and train the trainer manuals. The results of this programme of work are the outputs of the project: i) the case study including the stepwise approach to compliance and ii) guidance and train-the-trainer materials for managers and supervisors at ship recycling facilities and for competent authorities assuming regulatory oversight of the industry.

1.3 Scope of application of output

The guidance and training materials are to be replicable for use in ship recycling countries, i.e. they are not specific to one country. The general principles will therefore be outlined and example practices provided. Local conditions and rules will determine how the principles are put into effect in detail.

2. Study Methodology

The Case Study was carried out according to the methodology outlined below. The breakdown of the tasks is as follows:

2.1 Summarize key international agreements and their guidelines

A brief overview of significant information was undertaken and is given for existing international instruments and guidelines. The status and content of relevant international instruments has been reviewed to help establish the context for the whole case study.

2.2 Review global practice and field study examples of ship recycling standards

Global Practices Examples of global practice and technical studies on ship recycling have been reviewed. There is now an extensive literature on ship recycling in developing countries and elsewhere. A short summary has been made of key literature and reported experience of implementing ship recycling techniques and controls for environmentally sound management. This is described including any success criteria, where available, for such approaches and the challenges met in achieving changes.

Field Study- A specific investigation of waste management practice and ship recycling has been undertaken by a field visit to ship recycling and waste management facilities in Turkey. This includes a review of discussions with representatives and visits to facilities in Turkey carried out for this study.

2.3 Baseline study on ship recycling yards and waste management facilities for ship recycling in Pakistan

Preparation of Baseline Report The case study relies on the acquisition of baseline information to inform development of the outputs. Some of this was obtained from readily available information and some from the field work and direct inquiry. Desk studies were undertaken examining available literature and published information. The baseline study consisted of more detailed investigations employing targeted questionnaires, sent to stakeholders involved with SBRI in Pakistan, in order to supplement the existing knowledge and provide up-to-date information. The elements of this latter task were:

- Design of the questionnaire
- Selection of stakeholder recipients among:

- Ship recycling facilities
- Competent authorities
- Downstream waste management facilities
- Circulation of questionnaires
- Gathering of responses
- Evaluation of the results and
- Preparing Baseline Report.

2.3.1 Factors to be taken into account

A number of factors to be taken into account affect the conditions for ship recycling in Pakistan. A brief overview of these factors is provided to give a context for the drivers that create a demand for products from ship recycling activities: –

- Current practice in the SBRI in Pakistan

Information from the baseline report is taken to describe the current situation with respect to SBRI in Pakistan in order to assist in identifying what proposals for changes and improvements may be made.

- Waste Management Infrastructure

Reviewing the general provision of waste management facilities in proximity to Gadani and further afield for hazardous and non-hazardous waste from ship recycling. Consider how this impacts on the provision, separation and storage of waste at ship recycling facilities.

- Market changes and economics –
 - Continuity of supply of ships
 - demand for steel and other products

2.3.2 Potential Opportunities

In the context of developing improved models of ship recycling a number of opportunities may be taken to assist the process. These may include:

- Legislative development.

The implementation of compliant ship recycling goes in parallel with the development of appropriate legislation, regulations and guidelines at the domestic level. Opportunities to affect the direction and timing of changes can be mediated through legislation directed by government policy. Any such opportunities may be identified from the information obtained by the baseline study.

- SBRI coordination and cooperation between operators

New possibilities may emerge for cooperation between ship recycling facility operators, with waste management companies and other industries producing waste, either identified from the baseline survey or stimulated as a result of the investigation.

- Other parallel infrastructure development

Any general development need such as transport infrastructure, energy supply, water may be considered for the potential to support both ship recycling activities other industry and businesses and local communities.

2.3.3 Potential Constraints

A number of constraints may be found that could restrict the potential for development at least in the short term. These may include:

- Ship Recycling Facility Location

The study does not consider ship recycling locations other than at Gadani. The restriction is deliberate as the study relates to the existing ship recycling industry in Pakistan, while the results are potentially replicable elsewhere.

- Land Tenure

Consider whether in practice leasing or ownership of land plays a significant role in investment decisions – or may act as a brake for future development.

- Investment potential

Consider the likelihood and conditions for investment in improvements to SBRI at Gadani.

2.3.4 Timescales – potential rate of change

The rate of development depends on the factors outlined above that translate into the capacity to change. The potential to generate and implement new approaches to ship recycling will be affected by existing capacity (skills, technology, economic), and these will need to be understood in developing any programmes. It is likely that some form of implementation matrix could be assembled to identify which initiatives can be introduced in the short, the medium and long term also taking into account their relative importance and priority needs for improving the protection of human health and the environment. The implementation programme would be established according to available and expected institutional and technical capacity.

2.4 Develop criteria and standards, select operationally compliant models for Ship Recycling and Waste Management

2.4.1 Developing criteria for establishing compliant models

Criteria relevant to the existing conditions at Gadani taken from the key requirements of the Hong Kong and Basel Conventions are to be used to draw up specific recommendations with a focus on environmentally sound management of hazardous wastes and other wastes. Some alternative approaches for SBRI to be considered are to be outlined. A desired draft model is to be set out based on the criteria described and the findings of the baseline survey.

2.5 Develop Actions to be undertaken in short, medium and long term

2.5.1 Select level of technology to be applied

Alternative approaches that have the same net effect although with differing levels of sophistication, such as engineering complexity, will be exemplified.

Implementation Matrix

This element will set out a sample implementation matrix based on the findings of the survey and the analyses in the case study.

Road test

The intention of road testing the compliant models is to establish if they are fit for purpose.

Trialling of the approach outlined as a reality check on the suitability of the proposals after which they will be modified taking into account the feedback gained from key stakeholders.

Apply continuous improvement approach

A continuous improvement approach is intended to support subsequent implementation of the model.

2.6 Develop Guidelines and Train the Trainer Manuals

Separate documents are to be developed to provide guidelines based on the output of the compliant models study to assist:

- Managers and Supervisors
- Competent Authorities

These will consist of guidelines and train-the-trainer manuals.

SECTION 2

BACKGROUND INFORMATION AND BASELINE STUDY

3. Background Information -International Agreements (Conventions) and their guidelines

3.1 The Basel Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their Disposal (1989) is an international agreement that seeks to provide for the environmentally sound management of hazardous and other wastes. Parties to the Convention implement its provisions in national legislation according to the Convention's obligations. The Basel Convention was adopted on 22 March 1989 and entered into force on 5 May 1992. Currently (in June 2012) there are 179 Parties to the Convention. The full text of the Convention can be found at: <http://www.basel.int/text/documents.html>.

The main objectives of the Convention are to:

- Minimize the generation of hazardous wastes and other wastes (in terms both of quantity and potential hazard);
- Treat and dispose of hazardous wastes and other wastes as close as possible to their source of generation in an environmentally sound manner;
- Reduce transboundary movements of hazardous wastes and other wastes to a minimum consistent with their environmentally sound management.

The Basel Convention provides for the regulation of the transboundary movements of hazardous and other wastes. In order to protect human health and the environment against the adverse effects that may result from such wastes, the Convention's system for controlling transboundary movements of hazardous and other wastes is based, *inter alia*, on the following principles and actions:

- The requirement of prior informed consent of a State of import and States of transit and of a contract between the exporter and the disposer specifying environmentally sound management of the wastes in question before an export of waste can take place and, for this purpose, the establishment of a notification procedure;
- The requirement referred to in the Convention as "environmentally sound management" that all practicable steps are taken to ensure that such wastes are managed in a manner to

protect human health and the environment from the adverse effects that could result from those wastes

- A restriction on exports to a country which is not Party to the Convention; and
- An obligation on the exporting state to take back the wastes in the case of a transboundary movement of hazardous wastes or other wastes deemed to be illegal traffic as the result of conduct on the part of the exporter or generator.

3.1.1 Obligations of the Basel Convention

A State that is a Party to the Basel Convention has to have an appropriate national regulatory framework to implement and enforce the requirements of the Convention. This is specifically provided in Article 4 paragraph 4 of the Convention:

“Each Party shall take appropriate legal, administrative and other measures to implement and enforce the provisions of this Convention, including measures to prevent and punish conduct in contravention of the Convention”.

Any person within the national jurisdiction of a State that is a Party to the Basel Convention, who is involved in transboundary movement of hazardous wastes or other wastes, is therefore legally bound to comply with the relevant national laws and regulations governing the transboundary movements of wastes and their disposal. A checklist for the legislator indicating the key provisions to be included in the national legal framework is available on the Basel Convention website¹. The Checklist does not cover all aspects of the Convention but seeks to identify the most fundamental matters that should be addressed in the national implementing legislation. A Model National Legislation document² is also available for the benefit of Parties.

A number of general rights and obligations are found in Article 4 of the Convention, including the right of Parties to prohibit the import of hazardous wastes or other wastes for disposal (note that disposal is defined as final disposal or recovery as described below). As a consequence, the extent of regulation on the transboundary movement of hazardous wastes may differ from country to country. A list of the restrictions imposed under national law in individual country parties is

¹ Available from the website of the Basel Convention under the Legal Frameworks section- Tools for the development of legal frameworks at:
<http://www.basel.int/Implementation/LegalMatters/LegalFrameworks/Tools/tabid/2750/Default.aspx>

² Ibid.

available on the website of the Convention at: <http://www.basel.int/natdef/frsetmain.php>. There is a corresponding obligation of Parties to respect such import prohibitions when duly notified, through the Secretariat of the Convention, of the existence of such prohibitions. The relevant entity at the national level must ensure that information about import prohibitions is circulated to all involved with enforcement and implementation in his country. This would include the Competent Authority, which is the governmental authority designated by a Party to be responsible, within such geographical areas as the Party may think fit, for receiving the notification of a transboundary movement of hazardous wastes or other wastes, and any information related to it, and for responding to such a notification³. The Competent Authority should know about every shipment of hazardous wastes that is expected to, and actually leaving from, transiting through or entering its country, what is regulated by the Basel Convention and what by national legislation. A list of the Competent Authorities is available at: <http://www.basel.int/contact-info/frsetmain.html>.

An amendment to the Convention, the “Ban Amendment” inserts a new Article 4a that prohibits all transboundary movements of hazardous waste from Annex VII (in effect OECD Countries) to non-Annex VII Countries (non – OECD Countries)⁴. The amendment is not yet in force (as of October 2012) although the Parties have agreed on the interpretation of Article 17 paragraph 5 of the Convention (concerning the interpretation of the entry into force of amendments to the Convention) at the tenth meeting of the Conference to the Parties of the Convention on October 2011.

Combating illegal traffic is an important part of the Convention. Article 4.3 asserts that the Parties consider that illegal traffic in hazardous waste is criminal and the associated Article 9.5 requires each Party to introduce appropriate national/domestic legislation to prevent and punish illegal traffic.

A country that has become a Party to the Basel Convention has, amongst other things, thus agreed to:

- Commit itself to introduce appropriate national legislation to regulate the transboundary movements of hazardous and other wastes;
- Consider that illegal traffic in hazardous wastes or other wastes is criminal; and
- Introduce legislation to prevent and punish illegal traffic.

³ Article 2 paragraph 6 of the Convention

⁴ This is described on the Basel Convention website under Legal Matters “The Basel Convention Ban Amendment” at: <http://www.basel.int/Implementation/LegalMatters/BanAmendment/tabid/1484/Default.aspx>

3.1.2 The Basel Convention and Ship Recycling

The Basel Convention has two main potential impacts on ship recycling. The first is that of the obligations of the Convention with respect to downstream management of hazardous and other wastes generated from ship recycling. While the wastes so generated may not be considered to be transboundary movements by a State in whose jurisdiction the waste is generated, the obligations of the Convention itself require environmentally sound management of hazardous and other waste (in the General Obligations under Article 4.2). Secondly, a State may decide to invoke the application of the Convention to ship recycling pending the entry into force of the Hong Kong Convention. In this respect the Conference of the Parties, at its seventh meeting, in Decision VII/26 recognized the importance of the environmentally sound management of the dismantling of ships and that a ship may become waste as defined in Article 2 of the Basel Convention and at the same time it may be defined as a ship under other international rules⁵. It is for the State to decide how to apply its own environmental protection legislation to the range of activities and processes that are undertaken within its jurisdiction.

3.1.3 Environmentally sound management under the Basel Convention

The concept of ESM has been extensively applied to the management of wastes for the operation of facilities that handle them over several decades. It has been elaborated extensively through international debate particularly within the OECD (developed country) area, most recently expressed in the OECD Council Recommendation of 2004 [4], and in terms of activities involving waste management is derived in its current form from the Articles of the Basel Convention. This defines the "environmentally sound management of hazardous wastes or other wastes" in Article 2 of the Convention as:

"...taking all practicable steps to ensure that hazardous wastes or other wastes are managed in a manner which will protect human health and the environment against the adverse effects which may result from such wastes".

This is one of the basic tenets of the Basel Convention. Others include Prior Informed Consent, applied to the transboundary movement of hazardous waste and the requirement to reduce the

⁵ Decision VII/26 of the Conference of the Parties to the Basel Convention is on the website of the Convention at: <http://www.basel.int/Portals/4/Basel%20Convention/docs/meetings/cop/cop7/docs/33eRep.pdf#page=63>

amounts of hazardous waste that are generated in the first place and are not considered further here.

The utility of the Basel concept of ESM is that it establishes a broad framework which can be applied to many circumstances where protection of the environment is a factor in the operation of a process. It does however have its limitations. This definition may appear to be too narrow for the operation of a ship recycling facility as it deals primarily with hazardous wastes (the subject of the Basel Convention). Ship recycling activities cover more than just waste and the processes that are associated with it may give rise to releases of harmful substances that may not be regarded as wastes, in the Basel sense, but nevertheless they may have the capacity to cause harm to the environment. An example of this may be emissions to air of harmful gases caused by the dismantling activity or leakage of oil from storage facilities for use in site plant and equipment.

When considering the operation of a ship recycling facility as a whole, a broader definition is required for the purposes of ESM. This must take into account the nature of the facility and the environment around it. These differ from the majority of facilities covered by the Basel Convention which are wholly land-based. Ship recycling facilities often operate at a land-sea interface with the consequent impacts of tides and shore conditions adding a complicating factor. A definition that may be applied for ESM for operational purposes may be:

“The combination of practical standards, procedures and management controls applied to shoreline, dock and other ship recycling activities, ensuring the protection of human health and the environment from the potential impacts of all the operations carried out that may give rise to release of potentially harmful substances, including wastes, to air, water or land.”

Such a definition seeks to overcome the limitations of the Basel Convention’s own definition while encompassing the particular site and process specific principles applicable to ship recycling and pointing to how they might be converted to have practical expression. A description of ESM that attempts to interpret it for ship recycling purposes was submitted to the 2nd meeting of the IMO/ILO/BC JWG in December 2005, entitled “Environmentally Sound Management–Note by the

United Kingdom as WEOG Representative for the Basel Convention to the Joint Working Group”, as found in the report of the IMO/ILO/BC JWG⁶ [5].

3.1.4 Capacity Building - The Global Programme for Sustainable Ship Recycling

The Basel Convention Secretariat has undertaken a number of capacity building activities to develop implementation programmes for sustainable ship recycling and has developed the Global Programme for Sustainable Ship Recycling. Information on this programme and relevant capacity building activities is found on their website at <http://www.basel.int/Implementation/TechnicalAssistance/ShipDismantling/CapacityBuilding/tabid/2764/Default.aspx>

The Global programme activities include:

- Ship Recycling Technology & Knowledge Transfer Workshop (July 2010)
- Development of a case study elaborating models of compliant ship recycling facilities (this current study)
- Feasibility study to identify environmentally sound, cost effective alternatives to beaching (in progress)
- Developing downstream hazardous waste management capacity in ship recycling countries (under development).

Other earlier practical information relevant to stakeholders on the environmentally sound dismantling of ships has been archived and may be viewed for reference purposes at: <http://archive.basel.int/ships/compilation.html>. This information covers topics on:

- Developing short and medium term measures
- Pre-cleaning and decontamination
- Gas-free-for-hot-work certification
- Industry codes and contracts
- Practical manuals, and

⁶ Found at: <http://www.imo.org/OurWork/Environment/ShipRecycling/Documents/reportofsecondiloimobaselgroupdec2005.pdf>

- National policies

3.2 The Hong Kong Convention

3.2.1 Overview

The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 (the Hong Kong Convention), was adopted at a diplomatic conference held in Hong Kong, China, in May 2009. This was one of the actions of the International Maritime Organization (IMO) in response to the invitation to it to contribute to the development of an effective solution to the issue of ship recycling. The objective was to bring about the means to minimize, in the most effective, efficient and sustainable way, the environmental, occupational health and safety risks related to ship recycling, taking into account the particular characteristics of world maritime transport and the need for securing the smooth withdrawal of ships that have reached the end of their operating lives.

The Hong Kong Convention is aimed at ensuring that ships, when being recycled after reaching the end of their operational lives; do not pose any unnecessary risks to human health, safety and to the environment. Regulations in the new Convention cover: the design, construction, operation and preparation of ships so as to facilitate safe and environmentally sound recycling without compromising the safety and operational efficiency of ships; the operation of ship recycling facilities in a safe and environmentally sound manner; and the establishment of an appropriate enforcement mechanism for ship recycling, incorporating certification and reporting requirements.

Upon entry into force of the Hong Kong Convention, ships to be sent for recycling will be required to carry an inventory of hazardous materials, which will be specific to each ship. An appendix to the Convention provides a list of hazardous materials the installation or use of which is prohibited or restricted in shipyards, ship repair yards, and ships of Parties to the Convention. Ships will be required to have an initial survey to verify the inventory of hazardous materials, renewal surveys during the life of the ship, and a final survey prior to recycling.

Ship recycling yards will be required to provide a "Ship Recycling Plan", specifying the manner in which each ship will be recycled, depending on its particulars and its inventory. Parties will be required to take effective measures to ensure that ship recycling facilities under their jurisdiction comply with the Convention.

3.2.2 Requirements of the Hong Kong Convention for ship recycling States

States that become Party to the Convention (by ratification or accession) will be seeking to implement its obligations through a number of actions, these include the need to:

- Establish the necessary legislation to ensure that Ship Recycling Facilities (SRFs) are designed, constructed, and operated in a safe and environmentally sound manner in accordance with the regulations of the Convention;
- Establish a mechanism for authorizing SRFs;
- Establish a mechanism for ensuring that SRFs comply with the HKC; and
- Designate one or more Competent Authorities (CAs) and a single contact point for communication with relevant entities.

Ship recycling facilities themselves will need to comply with a number of requirements that will be implemented to ensure compliance with the Convention. In particular an SRF:

- Located within the jurisdiction of a Party shall be authorized by that Party. The authorization shall have 5 years' maximum validity;
- Shall only accept ships that comply with the Convention, or which meet its requirements. The SRF shall only accept ships they are authorized to recycle; and
- Shall develop and implement a Ship Recycling Facility Plan (SRFP) that covers: worker safety and training; protection of human health and the environment; roles and responsibilities of personnel; emergency preparedness and response; and systems for monitoring, reporting and record-keeping.

3.2.3 Requirements for ships being dismantled at ship recycling facilities

Separate requirements exist under the Convention for ships being dismantled at recycling facilities. These requirements include that:

- A ship-specific Ship Recycling Plan (SRP) shall be developed taking into account information provided by the ship owner (i.e. IHM, ICIHM, etc.);
- An SRF preparing to receive a ship shall notify its CA of the intent.
- The notification shall include details of:
 - The flag State;
 - The ship and its particulars;
 - The owner and company;
 - The classification society.
 - Details of the IHM and the draft SRP;

- The SRP shall be approved, tacitly or explicitly, by the CA and then shall be made available to the ship for its final survey;
- When the ship has acquired the IRRC, the SRF shall report to its CA the planned start of recycling. The report shall include a copy of the IRRC. Recycling of the ship shall not start prior to the submission of this report;
- When recycling is completed, a Statement of Completion shall be issued by the SRF to its CA. The CA shall copy the Statement to the Administration which issued the IRRC for the ship.

Of the key technical requirements of the Hong Kong Convention, the following could be considered as suitable interim measures:

- Prohibition of installation or use of Hazardous Materials listed in its Appendix 1;
- Provision of the Inventory of Hazardous Materials: (a) to new ships; (b) to existing ships; and (c) to ships going for recycling;
- Safe-for-hotwork and Safe-for-entry : (a) obligations for shipowners; and (b) obligations for ship recycling facilities;
- Preparation of a Ship Recycling Plan for ships destined for recycling;
- (Progressive) Compliance of ship recycling facilities to the Convention's safety, health and environmental standards.

3.2.4 Hong Kong Convention Guidelines

Six voluntary guidelines are currently being developed under the coordination of Japan providing clarification, interpretation, and uniform procedures for technical issues arising from the provisions of the Convention. To date the following guidelines have been developed and adopted by the IMO's Marine Environmental Protection Committee (MEPC) to assist States in the early implementation of the Convention's technical standards:

- 2011 Guidelines for the Development of the Inventory of Hazardous Materials, adopted by resolution MEPC.197 (62);
- 2011 Guidelines for the Development of the Ship Recycling Plan, adopted by resolution MEPC.196 (62);
- 2012 Guidelines for Safe and Environmentally Sound Ship Recycling, adopted by resolution MEPC.210 (63); and

- 2012 Guidelines for the Authorization of Ship Recycling Facilities, adopted by resolution MEPC.211 (63)

Two further guidelines have recently been developed that will assist in the implementation of the Convention once it enters into force, while MEPC may also identify and develop additional guidance or circulars:

- Guidelines for Survey and Certification of Ships under the Hong Kong Convention; and
- Guidelines for Inspection of Ships under the Hong Kong Convention.

These were adopted at MEPC 64, October 2012.⁷

3.2.5 The Hong Kong Convention and waste management

Many of the requirements set out above will have an impact on the methods to be adopted for the management of hazardous waste and materials and other materials and wastes in general terms to ensure their safe and environmentally sound management. The regulations in the annex to the Convention make specific provision for management of wastes from the dismantling process at a ship recycling yard and for the downstream management of waste for ship recycling.

The Guidelines for Safe and Environmentally Sound Ship Recycling make specific reference to environmentally sound management of hazardous materials generated by the activities by reference to the Ship Recycling Facility Plan. The environmental compliance approach is described in the guideline:

“Environmental compliance approach

The SRFP should provide a description of the Ship Recycling Facility's plan and procedures for protecting the environment. The SRFP should demonstrate that the Ship Recycling Facility understands the environmental risks associated with ship recycling, understands and is implementing the environmental requirements imposed by applicable international and national laws and regulations, is capable of managing and disposing of all the materials in the ship in an environmentally sound manner, and is implementing controls to protect the environment, including with respect to handling and disposing of Hazardous Materials. The

⁷ Available on the IMO website at:

[http://www.imo.org/OurWork/Environment/ShipRecycling/Documents/RESOLUTION%20MEPC.222\(64\)%20Survey%20and%20Certification%20Guidelines.pdf](http://www.imo.org/OurWork/Environment/ShipRecycling/Documents/RESOLUTION%20MEPC.222(64)%20Survey%20and%20Certification%20Guidelines.pdf) and at [http://www.imo.org/OurWork/Environment/ShipRecycling/Documents/RESOLUTION%20MEPC.223\(64\)%20Inspection%20Guidelines.pdf](http://www.imo.org/OurWork/Environment/ShipRecycling/Documents/RESOLUTION%20MEPC.223(64)%20Inspection%20Guidelines.pdf) respectively.

SRFP should reflect applicable requirements of the Convention (particularly regulations 20 to 22). The SRFP should describe dedicated infrastructure for the treatment and disposal of Hazardous Materials generated from ship recycling operations pursuant to national laws and regulations. The Ship Recycling Facility should also take account of guidelines developed by international organizations as appropriate. A reference list of such guidelines is provided in appendix 5.”

These other guidelines developed by international organizations mentioned include those produced by the Basel Convention and are listed in the References Section (Section 8) of this Case study.

3.3 Other Relevant International and Regional Agreements

3.3.1 International Labour Organization

Worker health and safety has been regarded as one of the key issues for ship recycling and the International Labour Organization (ILO) has therefore been active in this field. The ILO produced its guidelines - Safety and health in shipbreaking: Guidelines for Asian countries and Turkey⁸ – in 2004 and has been involved in a number of programmes to promote better working conditions and provide training for workers in occupational safety and health for a number of years. The guidelines are designed to assist shipbreakers and competent authorities alike to implement the relevant provisions of ILO standards, codes of practice and other guidelines on occupational safety and health and working conditions, and the provisions of instruments of other relevant international organizations, aiming at progressive improvement. The guidelines contain practical recommendations for use by all those who are responsible for occupational safety and health in shipbreaking operations. The guidelines are not legally binding, nor are they intended to replace national laws, regulations or accepted standards. They provide guidance to those engaged in the framing of relevant provisions and the setting up of effective national systems, procedures and enterprise regulations, where they do not exist.

The International Labour Office of the ILO continues to be involved in initiatives to assist improvements in the working conditions at ship breaking yards.

⁸ Safety and health in shipbreaking: Guidelines for Asian countries and Turkey; Interregional Tripartite Meeting of Experts on Safety and Health in Shipbreaking for Selected Asian Countries and Turkey; Bangkok, 7-14 October 2003; published 2004, International Labour Office Geneva. Found at: <http://www.ilo.org/public/english/standards/relm/gb/docs/gb289/pdf/meshs-1.pdf>

3.3.2 The European Union

The European Commission has developed proposals for an EU-wide Ship Recycling Regulation. On 23 March 2012 the Commission adopted a proposal for a regulation on ship recycling, and for a Council decision regarding ratification of the Hong Kong Convention⁹. This proposal aims to “reduce significantly the negative impacts linked to the recycling of EU-flagged ships, especially in South Asia without creating unnecessary economic burdens. The proposed Regulation brings into force an early implementation of the requirements of the Hong Kong Convention, therefore hastening its entry into force globally.” The proposal includes an evaluation of the standards of facilities for ships being moved from the EU to other facilities by way of inclusion on a list of acceptable facilities. The intention is that this instrument replaces, for ships, the EU Waste Shipments Regulation (that implements the Basel Convention within the EU). This proposed EU Regulation would cover the whole life cycle of EU-flagged ships, allow for early implementation of the requirements of the Hong Kong Convention and, as allowed by the Convention, include more stringent environmental requirements for ship recycling facilities. Ships flying the flag of EU Member States would only be allowed to be recycled in facilities meeting certain requirements. EU Member States would be informed in writing and in due time of the shipowner’s intention to send a ship for recycling. Ship recycling facilities will have to meet a set of environmental and safety requirements in order to be included on a list of authorized facilities, which can be situated world-wide. European ships will be allowed to be recycled only in facilities on that list. Some of the requirements to be met by the ship recycling facilities are stricter than those foreseen by the Hong Kong Convention. This is intended to ensure better traceability for European ships, and guarantee that the waste resulting from dismantling (and any hazardous materials it contains) is managed in an environmentally sound way. This requirement as well as the introduction of sanctions, which would be at least equivalent to those applicable under the current legislation, is to ensure compliance.

Of interest for this current study it is important to note that the proposal states that: “While it is difficult to expect the current ‘beaching’ facilities to be able to meet these requirements, it is possible that upgraded facilities might be able to fulfil these criteria in the future.” What this means in practice is not specified. To avoid confusion, overlaps and administrative burden, it is proposed that ships covered by this new legislation would no longer fall within the scope of the EU Waste Shipments Regulation.

⁹ Found at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2012:0118:FIN:EN:PDF>

4. Global Practice and Field Study Examples of Ship Recycling Standards

4.1 Global Practices in Ship Recycling

The ship recycling industry is based predominantly in South Asia (in India, Bangladesh and Pakistan), which according to 2010 statistics, has approximately 70% of the global ship recycling market. Significant recycling activity also takes place in China (19%), with Turkey and other countries occupying the remaining 10% of the market. Beaching is the predominant method of ship recycling in the South Asian Region, whilst China and some other countries employ an alternative method known as pier breaking. Through the period of development of the Hong Kong Convention and following its adoption in May 2009, the conditions at some of the ship breaking facilities prompted legal challenges which have led to new rules being introduced. In Bangladesh, following a temporary ban on ship breaking, in 2011 the Government of Bangladesh promulgated the Ship Breaking and Recycling Rules¹⁰ pursuant to the order of the Honourable High Court Decision of the Supreme Court, applicable to all ship recycling activities in Bangladesh (predominantly at Chittagong), to be administered by the Ministry of Industries as the lead. The rules create a Ship Building and Ship Recycling Board and concern matters including: examination of the ship before beaching for the presence of hazardous materials; issue of certificates for gas free for man entry and gas free for hot work; the submission of a Ship Recycling Plan by the yard owner prior to demolition and a permit for a Ship Recycling Facility Plan and other matters relating to worker safety and environment.

In India the major part of ship recycling activity is carried out at Alang, Gujarat, although it does occur elsewhere, employing the beaching method. Conditions have been subject to improvements through legal processes as well as by specific upgrading carried out by facilities wishing to tap the market for “green” ship recycling. The controls on ship recycling at Alang have been applied through the Gujarat Pollution Control Board and the Gujarat Maritime Board, which leases the plots. A number of downstream waste treatment facilities are available including hazardous waste treatment and specialized landfill managed by GEPIL (Gujarat Environment Protection Infrastructure Ltd). The

¹⁰ The Ship Breaking and Recycling Rules 2011, Ministry of Industries, Govt of Bangladesh at http://www.moind.gov.bd/index.php?option=com_content&task=view&id=478&Itemid=572

Supreme Court has issued a number of rulings¹¹ with respect to ship recycling, in 2007 setting out directions informed by the recommendations of a Technical Experts Committee appointed by the Supreme Court aimed at regularizing the standards particularly concerning the management of hazardous wastes. More recently in July 2012 the Supreme Court banned the import of ships containing hazardous wastes in accordance with the provisions of the Basel Convention.

A number of countries, including regional groupings, have undertaken extensive studies into the practice of ship recycling and published reports on the conditions found. The results of these studies have been applied to policy actions and decisions to control the processes of ship recycling and, to the extent possible, their international travel with respect to environmental and other obligations. In this context the United Kingdom published its Ship Recycling Strategy in 2006 to make its policies with respect to ship recycling consistent with its obligations under the Basel Convention for the transboundary movements of hazardous waste. The European Union is a regional integrated economic organization and an area where active ship recycling is being carried out. The EU has made a number of declarations concerning the expected environmental and occupational standards for ship recycling. The European Commission of the EU, following a number of investigations including publication of a Green Paper on better ship dismantling in 2007, produced a Communication on an EU strategy on ship dismantling in 2008. This strategy focused on measures to improve ship dismantling conditions as soon as possible, including in the interim period before the entry into force of the Hong Kong Convention: i.e. dealing with key elements of the Convention, encouraging voluntary industry action, providing technical assistance and support to developing countries and better enforcing the current legislation. Support has been provided to ship recycling countries through a grant under their Thematic Programme for the environment and sustainable management of natural resources including energy (ENRTP) to the "Global Programme for Sustainable Ship Recycling" coordinated by the Secretariat of the Basel Convention, with the participation of the International Maritime Organization and of the International Labour Office of the International Labour Organization.

4.2 Field study – Ship Recycling in Turkey

As part of this study a field visit to Turkey was undertaken. This included meetings with relevant Ministry officials in Ankara and at Regional offices in Izmir. A number of Ministries have an active involvement in ship recycling and meetings were held with representatives of the: General

¹¹ Rulings from the Supreme Court of India (Order dated 14/10/2003 and 06/09/2007 in the writ petition No.657/95).

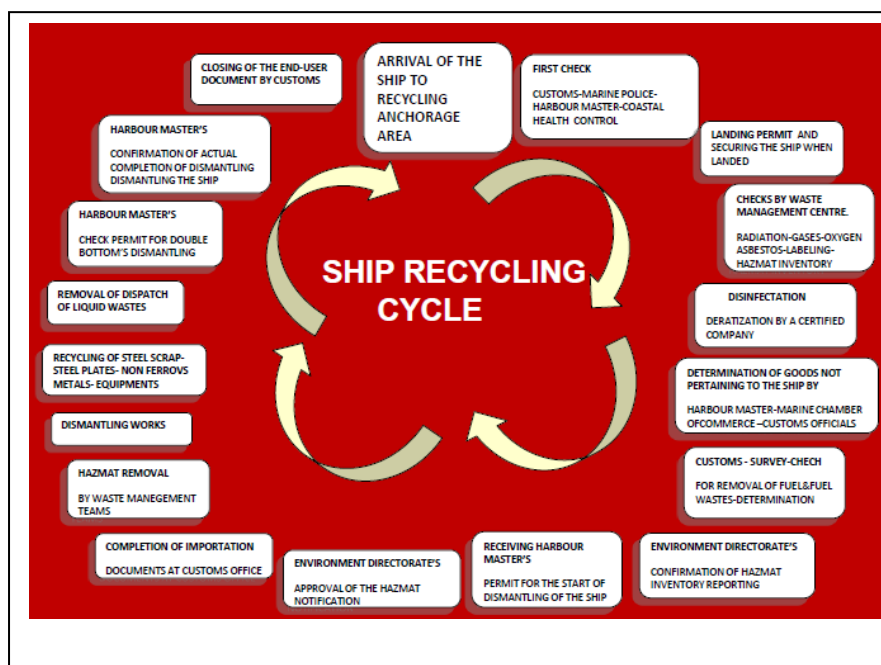
Directorate for Shipbuilding and Shipyards, Ministry of Transportation, Maritime Affairs and Communication, Ministry of Environment and Urbanization, the Ministry of Labour and Social Security, all in Ankara; the Turkish Ship Recyclers Association, Office of the Harbour Master and regional officials of the Ministry of Environment and Urbanization in Izmir. Although not available at the time, the role Ministry of Customs and Trade was also recognized.

4.2.1 Summary of field study findings

The history of the origin of ship recycling in Turkey was provided by the representatives of the Turkish Government. The development of legislation in Turkey and of compliance systems over the last ten years or so as well as descriptions of the responses and changes made by the ship recycling industry to its facilities and practices was described. Site visits were made to the ship recycling yards at Aliaga and waste management facilities.

General description of Ship Recycling in Turkey

Ship dismantling is carried out at Aliaga on the Aegean coast of Turkey some 60km north of the city of Izmir. At present there are 20 recycling yards, together with a communal waste management centre managed by the Ship Recycler's Association of Turkey. Of the recycling yards, 14 have certification relating to OHSAS (ISO 18001), EMS (ISO 14001) and QMS (ISO 9001). Over 300 ships are processed annually amounting to some 650,000 LDT using a combination of "afloat" and "landing" methods, the latter having similarities with the beaching method. The yards have a capacity of 900,000 LDT per annum and 50,000 LDT per ship. Based upon this capacity up to 1,800 workers may be employed. In 2012 some 1,000 workers are employed by ship breakers and another 4,000 through sub-contractors. The ship dismantling activities are carried out in compliance with national legislation as well as ILO, IMO and Basel guidelines. The yards have clearly marked areas for different activities. Ships are recycled according to recycling plans. A general outline of the ship recycling process at Aliaga is shown below:



Ship Recycling Policy and Regulation

Turkey has designated Aliaga as a ship recycling area since 1976 and has had legislation in place concerning ship recycling since 1986, having been updated most recently in 2004. Environmentally sound management at the ship recycling yards is based upon Basel Convention guidelines. Regulations and by-laws are prepared at the national level and implemented by local authorities. Approval and authorization for new recycling yards is made by the local office. Their mandate includes renewal of ship recycling authority certificates. An Environmental Impact Assessment (EIA) is required when the yards are being developed but is not required for each incoming ship.

Ship Recycling Authorization Procedure

A systematic procedure is followed for ship breaking: a Landing Permit is issued after the Customs, Harbour Master and Coastal Health Control authorities have inspected the ship; an inspection is conducted by the Waste Management Centre; following disinfection of the ship, Customs officials make an assessment of items for duty purposes; the inventory of hazardous materials is communicated to the environment directorate and the Harbour Master then issues a permit to allow breaking to commence. The notification documents, cargo manifest and witness reports are required before the permit from the Harbour Master can be issued, authorizing ship dismantling. Hazardous materials and waste, bilge water and sludge must also be removed. The Harbour Master is notified when recycling is complete.

Compliance Monitoring

All relevant departments have the right to inspect recycling yards at any time. The Provincial authorities have been keeping records of their inspections since 2004. Inspectors spend two days every week at the ship recycling yards for audits and observations. The inspectors make their findings on the basis of samples, videotapes, aerial photography and other evidence collected during inspections. Water sampling is carried out every three months. Reports of the analyses have indicated no contamination of the seawater. A working conditions audit is conducted every six months.

While no specific training programmes are in place for inspectors they gain their experience by on-the-job and on-site training given by more senior inspectors.

Enforcement

The Harbour Master has the powers to enforce all applicable legislation. The Ministries also share information about ship recycling activities with each other. Yards which carried out ship recycling activities in breach of permitted conditions have been fined. In extreme cases this can lead to cancellation of a permit or permission to dismantle a ship. If the permission to recycle is withdrawn, all ministries are notified of the decision.

Ship recycling yards have been fined for oil spills – four yards were fined in 2010, six in 2011 and a single yard was fined during the first three months of 2012. At one point during 2012 the licences of 8 ship breaking yards had been suspended for lacking fire-fighting equipment and work being carried out on soil/unpaved areas. Ship recycling yards may appeal against penalties in the courts, however, any fines and penalties must be paid before any appeal court hearing.

Occupational Safety and Health (OSH)

Overview

Most of the workers engaged in ship dismantling are high school graduates. The median age is 35 years and the literacy rate is around 50%. The average working hours are 7.8 hours per day with a six-day week. A typical worker has 10 years' experience. Research has indicated that some 3.5% have had occupational disease and 8.6% of the workers have had a chronic disease for more than a year. About 23% of work force has been affected by occupational accidents. Some of the workers had OSH training before joining ship-breaking yards.

The Ministry of Labour and Social Security has three key organizations, which carry out OSH related activities, the Directorate General of OHS, the Labour Inspection Board and CASGEM (the centre for labour and social security training and research). The Directorate General OHS has been tasked with preparing national policies as well as drafting, adopting and enforcing the legislation. It also carries out research work on safety and prevention of occupational accidents and diseases. The DG OHS is also responsible for authorizing institutions for manufacturing of personal protective equipment (PPE) and addressing compatibility issues of imported materials. In its preparation for accession to the European Union, DG OHS has enacted 33 new regulations.

At present labour laws cover OHS related issues. A draft OHS law covering all sectors is in final stages of preparation. Once passed by the Council (Parliament), risk assessment would be made mandatory. Turkey also has a National Occupational Health and Safety council comprising members from government, private sector, trade unions, NGOs and academia. The major projects launched by the Ministry include improvement of health and safety conditions at workplaces; technical assistance for the development of labs in the OHS Centre; and raising awareness on occupational diseases.

OHS Training

The ILO guidelines on shipbreaking were translated in 2001 and are now in use by some of the ship breakers. To develop a positive approach to control and compliance, from 1985 to 2003 the DG for OHS focused on cooperation (information, education and training) with the ship breakers which fostered an improved attitude to meeting regulatory compliance. With the involvement of CASGEM some 20,000 workers were trained in ship-breaking activities over a span of three months, the training costs being borne by the ship breakers. A decline in accidents and fatalities has occurred, attributable to this approach.

Compliance and Enforcement

Three major safety inspections have taken place. The first inspection (2003-04) revealed that for the period 1985 to 2003, 23 incidents resulted in 29 fatalities. It revealed that OHS training was insufficient and needed immediate attention, as described in the preceding section. A second inspection in 2007 revealed just a single fatality in this period. A third inspection in 2011 simply indicated problems in fire fighting and emergency preparedness. In cases of accidents, especially those resulting in fatality, a Labour Court investigates. A compensation penalty may be applied.

The Ship Recycling Industry - the Ship Recyclers' Association of Turkey

The Ship Recycler's Association of Turkey may be considered to be pivotal to the successful operation of the ship recycling yards through the resources it provides for them. The Association provides administration, legal, waste management, training and marketing services. It is also a point of contact with international organizations and national authorities. Training covering occupational health and safety, risk assessment, emergency response and evacuation and asbestos management, is conducted by third party professionals. The Association manages a common health unit, OHSAS and environmental monitoring unit. The Waste Management Centre, run by the Association, also

manages specialist asbestos removal. This involves all the activities for safe identification and removal according to the standards and procedures. The destinations of wastes and materials for recycling from ship recycling the waste management centre is summarised in the Table below.

Table 4.1 - Waste management from ship recycling at Aliaga, Turkey

Waste	Treatment Method
Asbestos	Industrial landfill
Wastes contaminated with chemicals (Oils and Paints)	Energy generation (fuel additive)
Bunker /Oils/Slops	Energy generation (fuel additive)
Ozone depleting gases	Controlled incineration
Electronics and batteries	Recycling
Cable	Cable recycling facility (lead + copper → Raw material) (cable plastic → fuel additive)
Non-hazardous waste	Municipal landfill

4.2.2 Waste Management in Turkey

Turkey is a Party to the Basel Convention and an OECD member State. Environmental legislation is in place for waste treatment and disposal. The objectives of national waste management legislation are to protect environment and human health; prevent long term problems arising from waste; ensure compliance with national laws and sustainable practices; and provide public assurance on the proper management of waste. Waste is classified into 12 main streams including hazardous waste. Waste recycling facilities must apply for a licence to the provincial department, which is granted following a site visit and verification. There are periodic inspections to ensure compliance with rules and regulations.

Waste Management at Ship Recycling Yards

The Ship Recycler's Association of Turkey has been licensed to remove and temporarily store asbestos, PCB, hazardous waste and oil from all the ship recycling facilities through its Waste Management Centre at Aliaga. The Waste Management Centre has the capacity to handle 600 tonnes of liquid waste. It can also store 20 cubic metres of asbestos and 25 cubic metres of solid waste. Changing facilities for workers engaged in asbestos removal are available with procedures for decontaminating on completion of the work.

Only licensed vehicles may be used for transportation of waste. All waste from ships must be immediately transported to the Waste Management Centre for safe storage. The Waste

Management Centre must make regular returns to the competent authority on the waste generated from the ships.

Waste Management Infrastructure

Three industrial landfill sites are available for safe disposal of asbestos within the region. Oil and contaminated soil is transported to cement factories. Equipment containing PCB, heavy oil and ozone depleting substances (ODS) are shipped to a specialised integrated waste management facility in Izaydas, in the Kocaeli Metropolitan Municipality near Izmit. Cables are sent to recycling facilities and ODS is destroyed in controlled incinerators (high temperature incinerators). Non-hazardous waste is disposed of at municipal landfill sites.

4.2.3 Site Visit Impressions

The ship recycling yard visited at Aliaga in March 2012 was of variable width, from some 50 metres at the top to 150 metres approximately sloping to the sea and the greater part being laid to concrete (hard standing) with drainage channels, forming an even surface suitable for heavy vehicular traffic and mobile plant, to prevent contaminants from polluting the surroundings and provide sampling points for testing.

At the top end of the facility were offices with dining/rest areas and adjacent to them was a weighbridge. A temporary storage area for waste and recyclables with a building with secure covered storage was close to the weighbridge. The yard was clearly delineated from the neighbouring yard with a boundary wall. It was clean and tidy, wash down hoses were available and in use. Materials from dismantling were either being carted by lorry straightaway to storage direct from the ship or placed in discrete piles on the hard standing. A small, level, secondary breaking area also on hard standing was laid out approximately 100 metres from the shore line. Ships were moored bow-facing the yard, held fast with chains ready to be winched further in as dismantling progressed. Workers were wearing personal protective equipment, boots, hard hats and overalls. Inspectors regularly visit yards to assess compliance.

At the Waste Management Centre in addition to the storage facilities for oil, asbestos and other wastes, an ISO container is located, equipped with booms and other pollution control equipment. Next to this is the on-site medical centre.

4.2.4 Turkey's accession to the Hong Kong Convention

Turkey is ready to ratify/accede to the HKC with general support for the process from all stakeholders. In mid-2012 the process was at Parliamentary approval stage, prior to acceding to the Convention. Approvals have been given by a Ministerial committee, followed by the consent from the Council of Commissions and Sub-Commissions. Turkey may then submit the accession document to the Depositary at an appropriate time.

4.2.5 Conclusion

The field visit to Turkey was instructive on a number of points with respect to the issue of developing compliant models for ship recycling at the facilities currently employing the beaching method. The lessons that may be learned from the experience of Turkey and applied by them can be described as follows:

- Ship recycling commenced on essentially unprepared ground deemed suitable for bringing ships close to shore for dismantling;
- Legislation to control ship recycling has been developed over time with policies underpinned by reference to international agreements to which Turkey is party (e.g. ILO on labour and the Basel Convention for waste management and the IMO in due course for the Hong Kong Convention) and followed up with compliance actions;
- Differing Ministerial responsibilities (e.g. labour environment, shipping) do not appear to have hindered development of coherent arrangements to effectively regulate ship recycling and improve environment, health and safety conditions – each has cooperated and contributed to improvements;
- The ship recycler's association played a pivotal role in helping to raise standards as well as act as a coordinated voice for the industry;
- The ship recyclers' association has been proactive in developing practical support to the yards through provision of communal waste management facilities and specialist expertise (such as asbestos removal), these may not have been as cost effective readily if each yard had to supply their own;
- The ship recyclers recognized the need to work with the Ministries;
- Investment in improvements to the facilities has been progressively undertaken over time, to provide affordable environmentally sound management conditions;
- The availability of downstream specialist waste management facilities has greatly facilitated the capacity of the ship recyclers to comply with requirements for off-site hazardous materials and waste treatment and disposal.

Overall, the similarities with “beaching” nations, such as the close proximity of the yards to each other in one geographical area, the application of the “landing” method of ship dismantling and the multiplicity of responsible Ministries involved each with legislative powers within a wide framework, mean that useful comparisons between the experiences of Turkey and the main ship recycling countries can be drawn as helpful indicators for development of improvements at ship recycling facilities.

5. Baseline Information on ship recycling yards and waste management facilities in Pakistan

5.1 Study Location

The principal area of interest is at the ship breaking yards, located at Gadani, Balochistan. Dismantling is carried out by the “beaching” method. The beaching area is spread over 1,256 acres consisting of 314 plots of some 4 acres each. About one third of these yards have been developed. Two-thirds of the developed plots are owned by a local Balochi tribe leader’s family and the remaining one-third are under the ownership of the Balochistan Development Authority with a few plots in private ownership.

The following summarises the results of studies made on the conditions of the regulatory and physical infrastructure for waste management in Pakistan and the current practices at the ship recycling yards to inform the approach towards compliant models for sound waste management.

5.2 Previous study on SBRI in Pakistan – World Bank

The World Bank published a study on The Ship Breaking and Recycling Industry (SBRI) in Bangladesh and Pakistan in December 2010. The study recognized the economic importance of ship breaking for the countries providing employment and materials from recycling. The report identified the issues of common concern as a whole in the ship breaking and recycling industry, particularly environmental protection and worker safety.

Findings of the World Bank Study

This study, commissioned by the World Bank¹², indicated that a considerable amount of hazardous materials has already accumulated in Pakistan. The results of the studies concluded that:

- Asbestos will remain a significant long-term problem (as it is still found in newbuild vessels).
- PCB will still occur in older vessels and naval vessels.
- PCB-contaminated cables are a key area of concern.
- No collection or management options for ODS are available.

¹² The Ship Breaking and Recycling Industry in Bangladesh and Pakistan, Report No 58275-SAS, The World Bank, 2010. Found at: <http://siteresources.worldbank.org/INTPOPS/Publications/22816687/ShipBreakingReportDec2010.pdf>

- Metals in paint pollute the working environment.
- Large volumes of oil and oily water must be managed.

The study also determined that waste management was a key issue but that:

“Hazardous materials that remain on beaches can be well managed locally with improved housekeeping practices and with adequate handling and storage. The lack of hazardous waste disposal and treatment facilities in Bangladesh and Pakistan means that wastes produced must nevertheless be disposed of somewhere. And informal disposal may occur on the beaches, on adjacent unused plots, or on other land in the vicinity.”

At the same time it was noted that (with ship recycling continuing at similar levels) large amounts of hazardous materials are likely to accumulate if the prevailing practices continue over the next 20 years. Table ES3 of the World Bank report showed that Pakistan may accumulate 5,200 tonnes of asbestos, 16,000 tonnes of PCB and 14,000 tonnes of ODS among other materials over the next 20 years.

On regulatory control mechanisms, the report commented that Pakistan possesses some form of basic control mechanism for ship recycling, based around the “no objection” concept. However, the report also observed that such mechanisms do not meet the international norms being put in place under the Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships and noted that Pakistan will need extensive institutional building and infrastructure upgrading to meet those standards.

The report considered the possible consequences of sea level rise and indicated the risk of having vast amounts of sand contaminated from present and historic ship breaking activities exposed to dynamic tidal and wave action over the long term. The view was presented that such redistribution of metals and persistent pollutants from their relative immobilization in the dry sand and shore soils to the dynamic aquatic ecosystem of the tidal zone will pose direct environmental and human health hazards, including through the transfer of pollutants in the marine and human food chains. Combined with other runoff from industrial discharges, it was considered that this added pollution pressure can affect biodiversity and economically important areas such as fisheries and fish and shrimp farms.

Recommendations of the World Bank Study

Recommendations of the report were made against the following objectives, to:

- Reduce the risks to and impacts on workers and the environment of unsafe dismantling practices in the recycling yards;
- Provide safe storage, transport, and disposal options for hazardous materials derived from the recycling process in order to reduce the distribution of unsafe materials in communities;
- Provide options for financing investments and managing them through public-private partnerships; and
- Clean ships prior to starting any breaking or recycling activity.

The general recommendations of the report were for:

- Improvement of enforcement on the ground;
- A proposed strategy included institutional capacity building, enforcement of regulations, and investment in waste management facility(ies);
- Institutional technical capacity is needed, with the strengthening of monitoring and enforcement capacity being essential;
- Significant investment in hazardous waste management, required to achieve compliance with the Hong Kong Convention as well as other relevant international agreements and guidelines in Pakistan;
- The implementation of interventions in the area of hazardous waste management and disposal may present opportunities for engaging in public-private partnerships in Pakistan.

A key recommendation was to reduce the risks from hazardous materials before ship recycling commences. It was found that ships for recycling often call at Karachi and Chittagong or anchor outside for approvals. Such calls can be made mandatory, as it provides an opportunity to perform various pre-demolition cleaning activities such as cleaning cargo tanks, emptying bilge tanks, paint and chemical stores, and waste oil, and unloading surplus fuel under controlled conditions. To manage the operationally generated waste of ships calling at the port of Karachi, MARPOL (the International Convention for the Prevention of Pollution from Ships) reception facilities should be developed. These facilities may, in light of the particular situation at a port of final call, be supplemented with a capacity for handling solid waste and non-operationally generated waste, providing a broader cost recovery base.

Recommendations specifically for Pakistan included the following:

- Infrastructure improvements are needed in the capacity and safety of the main road for transport of all waste and reusable materials generated in the ship recycling yards.
- Significant infrastructure and capacity development in the hazardous waste management sector is required in particular in the long term in order to achieve proper storage and disposal levels leading to compliance with national regulations, the Hong Kong Convention, and other relevant international agreements.
- Investments in hazardous waste management and waste disposal may present opportunities for engaging in public-private partnerships to the benefit of the local urban area of Hub, the greater urban zone of Karachi, the Port of Karachi, and the ship breaking and recycling industry.

5.3 Baseline report for this study – Summary

A Baseline report was prepared for this case study which provides the starting point for consideration of the current state of SBRI in Pakistan and any proposals for development and implementation of compliant models for ship recycling. The relevant part of the report, summarised below and detailed in Appendix A, reviewed the governmental institutional arrangements including the Ministries and Regional authorities involved, the general infrastructure provision and the conditions at the ship recycling yards and the waste management facilities available. The regulatory framework for ship recycling, waste and environmental control was described.

5.3.1 Government Institutions and Competent Authorities

The Ministry of Climate Change

The Ministry of Climate Change (MCC) has assumed the responsibilities of the former Ministry of Environment including environmental protection and preservation, and coordination, monitoring and implementation of environmental agreements with other countries, international agencies and forums. A number of Departments carry out these functions such as the Pakistan Environmental Protection Agency (PEPA) responsible for the implementation of Pakistan Environmental Protection Act, 1997. PEPA also:

- Formulates and revises as necessary National Environmental Quality Standards (NEQS);
- Promotes research and development for the prevention of pollution and protection of the environment;

- Develops general or sector specific policy framework for the protection of the environment;
- Disseminates information on environmental matters of public importance;

The Ministry of Ports and Shipping

The Ministry of Ports and Shipping (MoP&S) is the central policy-making body with administrative authority on matters related to ports and shipping and is the focal ministry for the IMO. The day-to-day operations are handled by the office of the Director General of Ports and Shipping in Karachi. When a ship destined for recycling at Gadani has entered the territorial waters of Pakistan, the Ministry of Ports and Shipping has jurisdiction over it with respect to IMO conventions until the ship reaches the shore at Gadani. It is expected that once the Hong Kong Convention has been ratified, the Directorate General of Ports and Shipping Karachi would deal with matters related to the ship breaking and recycling industry. It would approve the ship recycling plan and check the inventory of hazardous materials.

The Ministry of Industries

The Ministry of Industries (Mol) is the focal point for the promotion and expansion of the industrial sector in Pakistan. The SBRI has been accorded industry status, however, no incentives or policies have yet been implemented by Mol for ship recycling activities. Mol's future role with respect to SBRI may involve initiatives to increase the competence of ship breakers according to the requirements of the HKC.

Balochistan Development Authority (BDA) and Balochistan Environment Protection Agency (BEPA)

BDA has had responsibility for providing basic infrastructure requirements relating to the ship breaking industry at Gadani since September 1978, road construction has been the main activity. BEPA serves as the environmental regulatory body for the province. BEPA is responsible for approving an Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA), required before permission can be granted for a ship to be imported.

5.3.2 Regulatory Framework

The Pakistan Environmental Protection Act of 1997 is the basic environmental law of Pakistan. The Act particularly focuses on the implementation of the Pakistan Environmental Protection Council's policies, delegation of power to government agencies, enforcement of National Environmental Quality Standards, and introduction of EIA/IEE review procedures/systems. The Act also addresses

the regulatory regime for hazardous substances and wastes. Ship breaking is subject to the Balochistan Ship Breaking Industry Rules, 1979. These empower the BDA to lease plots for ship breaking (of the 132 developed plots, some 31 are under this scheme, the rest being in private ownership).

Waste Management

Waste management is dealt with through environmental legislation and local governmental legislation. For both cases, solid waste management is not the primary focus. At present there are no landfill regulations or standards that can provide municipalities with some framework for compliance and monitoring. There are no National Environmental Quality Standards (NEQS) related to waste collection points, equipment or vehicles for transportation of waste, transfer solutions, treatment or recycling facilities including sanitary or landfill sites.

Environmental Sample Rules, 2001

The Environment Sample Rules provide federal as well as provincial EPA authority to enter premises causing environmental degradation and take samples for further analysis and action.

5.3.3 The Ship Recycling Yards and waste management at Gadani – brief overview

The yards at Gadani beach are mainly sand. Containment or protection against contamination of soil, seawater and the surrounding areas is largely lacking. The layout of the yards can be divided into three distinct zones:

1. Permanently zoned areas at the foreshore. Activities performed in these areas are:
 - Oil and other fluids removed from the ship by pumping;
 - Cutting area - into suitable size for transportation consisting of-
 - Primary beaching/block breaking area;
 - Secondary block breaking area
 - Other activities including removal and dismantling of reusable equipment and material including batteries, cables, refrigeration systems, etc.
2. Civil and physical infrastructure:
 - Office buildings;
 - Living quarters;
 - Washrooms/changing rooms;

- Workshops
- Consumables (stores, spares, chemicals) storages; and
- Mosque.

There is no particular consistency in the location of these structures which are not grouped in a specific zone.

3. The remainder of the yard. There are no fixed or permanently allocated areas for any specific activity. The space is mostly used for the following activities:

- Sorting areas for materials and equipment;
- Stockpiling/storage of assorted and finished materials; and
- Storage/dumping of hazardous and non-hazardous waste.

It has previously been estimated by the World Bank study that wastes from the ship recycling industry in Pakistan may accumulate as projected over the next 20 years. An updated survey to determine the actual quantities being produced at present to confirm these projections would be valuable. In the interim planning and provision for these quantities (subject to any update) would be necessary to determine and scope the available environmentally sound capacity within the region, to avoid informal disposal.

Table 5.1 Projected Accumulated Hazardous Waste Amounts from SBRI at Gadani, 2010-30

Hazardous Materials	Units	2000-08	2010-30
Asbestos	Ton	11,700	5,200
PCBs (mainly in Cables)*	Ton	36,000	16,000
ODS (mainly in PU Foam)	Ton	32,000	14,000
Paints (metals, PCBs and TBT)	Ton	102,000	4,550
Heavy Metals (mainly batteries, bearings and anodes)	Ton	101	45
Waste Liquid Organic	m ³	292,000	130,000
Miscellaneous (mainly sewage)	M ³	15,700	7,000
Waste Liquids Inorganic (acids)	Ton	115	51
Reusable Liquids Organic	Ton	99,500	44,200

Source: World Bank Report No 58275-SAS – Ship Breaking and Recycling Industry in Bangladesh and Pakistan, December 2010

* The Values given for PCB correspond to the amount of contaminated materials, which must be treated as hazardous waste under Hong Kong Convention. The actual PCB content based on 1,500 ppm in cables corresponds to 24 Tons.

The World Bank study also projected the fate of the wastes, assuming no new capacity came on stream and the existing ship recycling practice remains unaltered as shown in the following table.

Table 5.2 Projected Principal Disposition of Hazardous Waste from SBRI at Gadani, 2010-30

Hazardous Materials	Units	Remain at Yard /in Beach Sediment	Sold with Equipment or as an Item	Re-rolling Mills	Waste Disposal Site	Unknown
Asbestos	Ton	4,940	260	Nil	Nil	Nil
PCBs (mainly in Cables)	Ton	1,600	14,400	Nil	Nil	Nil
ODS (mainly in PU Foam)*	Ton	13,860	140	Nil	Nil	Nil
Paints (metals, PCBs and TBT)	Ton	455	228	3,867	Nil	Nil
Heavy Metals (mainly batteries, bearings and anodes)	Ton	22.5	22.5	Nil	Nil	Nil
Waste Liquid Organic	m ³	130,000	Nil	Nil	Nil	Nil
Miscellaneous (mainly sewage)	m ³	7,000	Nil	Nil	Nil	Nil
Waste Liquids Inorganic (acids)	Ton	25.5	25.5	Nil	Nil	Nil
Reusable Liquids Organic	Ton	2,210	39,780	Nil	Nil	2,210

Source: World Bank Report No 58275-SAS – Ship Breaking and Recycling Industry in Bangladesh and Pakistan, December 2010

* The calculations assume a small amount of halons in fire-fighting equipment and most of it in foam. Therefore, only small amount is allocated to equipment.

The baseline conditions examined for the World Bank study confirmed the likely widespread variable contamination of the ship recycling yards at Gadani beach with heavy metals, chromium, lead and mercury. Oil and PCB was also found. Follow-up studies would be useful to improve the understanding of the distribution of contaminants and their concentration range. This would assist in identifying any “hot spot” that may benefit from remedial treatment and to help estimate likely costs for any such work.

5.3.4 Waste Management - available downstream capacity for ship recycling wastes

In general this study found that provision for wastes generated from ship recycling is largely similar to that already described in previous studies. Capacity exists for easily recycled materials but is limited for the more hazardous wastes.

There are no known engineered landfill sites for asbestos in the Karachi and Hub region. Similarly there are no known designated facilities for safe disposal of Polychlorinated Biphenyls (PCB), neither incinerators nor engineered landfill suitable for low level PCB wastes. For ozone depleting substances a number of incinerators operate in the Karachi area for industrial and hospital waste although their capacity and capability to deal with ODS is unknown.

Facilities for dealing with lead acid batteries are available as well as for liquid organics (oil and sludge) that have value for energy recovery. Much waste that can be classed as municipal in character is recyclable and is so treated.

5.3.5 Conclusion - downstream waste capacity provision

This present study does not reveal any shift in the provision of formal waste management capacity available to the ship recycling yards, or practices that differ markedly from the previous study conducted for the World Bank, reviewed here, and indicates limited or lacking downstream waste capacity for hazardous wastes particularly arising from ship recycling facilities. As a consequence informal disposal at the ship recycling yards is the most likely current option employed. Any programme to implement compliant models for ship recycling here would therefore need to include attention to the provision of downstream waste treatment capacity as one of its elements.

5.3.6 General infrastructure

The World Bank report commented that: "Since 1978, the BDA has met the basic infrastructure needs of ship breakers, although this has been limited to poor-quality access roads. The supply of electricity is intermittent and unreliable, and very few yards are connected to the grid, despite being in the Karachi Electric Supply Corporation catchment area. Despite a large-scale water supply scheme, there is still a severe shortage of water, and yard owners must purchase supplies privately." The situation is not believed to have changed substantially since then.

5.4 Summary - Gap analysis of the current conditions

The foregoing information is to be used to formulate the approach to developing compliant models for ship recycling, and in particular the management of hazardous materials and wastes, both at the

ship recycling yards and downstream. The main features of the expected improvements that could be made in the short, medium and longer term to ensure environmentally sound management of materials and wastes at ship recycling yards are described in terms of operational and compliance needs. The gaps to be filled in order to develop operationally compliant approaches are set out below in four groups, as “actions to fill gaps” relating to ship recycling, wastes management and their regulation. How they can be addressed is set out in section 5.4.1. The gap actions are for:

- i) The ship recycling yards;
- ii) Downstream waste management;
- iii) Other infrastructure; and
- iv) Competent Authorities assuming regulatory oversight of the industry.

The actions may consist of one or more factors classed as operational, procedural or infrastructural. The overall intention is to reduce as far as possible, over time, the potential for pollution or harm to the environment and human health and to increase the level of control to provide a consistent approach through application of management and procedures to the process of ship dismantling that ensures the best possible standards of environmentally sound management.

5.4.1 Proposed Actions to fill the gaps at Gadani, Pakistan

A number of possible actions that would assist the enhancement of more environmentally sound ship recycling in Pakistan, moving toward compliance with the Basel and Hong Kong Conventions and guidance may be proposed. These may be considered to be consistent with similar countries where the principle ship recycling technique is based on the beaching method.

- i) Actions at the Recycling Yards
 - a) Develop Infrastructure – Containment to prevent pollution

Infrastructure development may be restricted as to what can be achieved at a beaching location. Beaching without any infrastructure at all has similarities with the slipway/landing method, as employed at some developed facilities. The tendency has been to adapt a natural shoreline and improve the shoreside areas by levelling and creating hard standing with reinforced concrete. The limitations that a gently sloping sandy (rather than say a steeply shelving rocky) beach imposes are on the capability (or rather the difficulty) of hauling at least that part of a ship that is being dismantled away from the water to reduce the risk of cutting actions and other operations allowing contamination of the water through spillage of polluting liquids and solids.

A combination of spill prevention and management techniques can be applied to help overcome this problem to the extent that it is possible at a beach. A defined area of the beach where potentially polluting activities are carried out is protected by simple infrastructure (e.g. a concrete base) that acts as a barrier to the escape of polluting materials. There would be drainage for contaminants and the capacity to be periodically cleaned.

This may be achieved by taking defined areas of the beach and creating impermeable hard standing, with environmental protection such as drainage catchpits, on which operations involving hazardous or polluting materials can be carried out.



Hard standing with drainage channels.

Photo: R Watkinson, Aliaga, Turkey 2012

Improvement to vehicle access at the facility to provide firm, level roadways will help to reduce wear and tear on the vehicles. This would permit easier and faster loading onto trucks by mechanical equipment. And provide better stability in poor weather. Simple road base can be constructed with e.g. crushed concrete.

Construction of site roads can be carried out gradually according to a phased plan improving their standards as resources permit. A compacted road base can be provided initially on a single track, ensuring that this is well drained and maintained (filling in pot holes, repair of the edges damaged by traffic and weather).



Liquid storage tanks with bund surround

Photo: R Watkinson

Develop Infrastructure – Fixed Plant

Fixed plant is equipment on site that helps with mechanical operations to provide power and energy (e.g. for lighting) all of which can assist with more efficient, speedier and safer conduct of tasks. This may include improvements to winching gear and cables for safely pulling a ship further away from the shore line while undergoing dismantling. More highly geared pulley systems and ensuring winching cables are in good condition will assist. Where possible fixed cranes for loading and unloading and transporting heavy materials within the yard can be installed to improve speed and efficiency and reduce the amount of manual handling, hence avoiding accident risks.

Use of generators and pumps (themselves obtainable from dismantled ships) will enable for example safer working under low light conditions and the pumping of liquids from drainage catchpits.

Develop Infrastructure – Waste and Materials Storage

As with operational areas these can contribute significantly to improving the containment of potentially polluting materials and provide places where hazardous wastes can be safely stored temporarily before being removed for proper treatment and disposal. Solid and liquid hazardous and other wastes can be securely retained within such areas protected from being distributed around the site by wind or careless impact. The designation of an area also serves to readily identify where wastes need to be put when removed from the ship - or as the result of other operations on site – and from where they need to be removed by waste treatment contractors when arriving to take them away for specialist handling and disposal.

Containment can be constructed in a stepwise fashion. Initially a hard standing area (with good track/road access right up to it) with controlled drainage can be provided with bunded partitions for the reception of waste oils and for storing asbestos waste. Vertical walls can be created from a variety of materials (wood, concrete, steel) according to their availability and made with access from one side to enable materials to be stored and loaded. The orderly emplacement of wastes within containers within the bunded areas will also assist with safe, efficient and low risk storage until ready to be collected. Later, where the waste management system is coordinated with an off-site contractor, this can be integrated with that of the on-site storage. The bunded areas may be used for example to house the contractor's bulk containers into which wastes can be securely placed ready for collection.



Simple covered storage area for hazardous materials using an ISO container with one side cut away.

Photo: R Watkinson

Develop Infrastructure - Mobile Plant

As with fixed plant, cranes and other lifting devices can provide safer and more effective site materials management. Properly maintained and used within their design limits by trained workers, the use of on-site mobile plant to move drums and tanks of fuel and wastes can reduce the incidence of accidents and spillages. Even where spillages have occurred on site plant can also be used to quickly bring resources for clean-up to the spot and remove contaminated absorbents etc. Where there is uneven or soft ground away from hard engineered surfaces, machinery with tracked wheels or low ground pressure tyres can be used to good effect.



Employing on-site mobile plant

Photo: R Watkinson. Aliaga, Turkey 2012

b) Develop Management Procedures

This is similar to the development of the Ship Recycling Plan and the Ship Recycling Facility Plan under the Hong Kong Convention. Quality management systems can be used to provide overall consistency of approach.

c) Develop and implement training programmes

The above actions generally will need to be carried out by workers trained for their particular area of responsibility (e.g. Guidance and train the trainer materials are to be provided within the project associated with this Case Study.) Success in preventing pollution and avoiding accidents is highly dependent on a well trained workforce. Training of large numbers can be achieved as shown by the example of Turkey, who trained 20,000 workers on OHS within three months as described above in 4.2.1 under OHS training.

ii) Actions for Downstream waste management

Waste infrastructure has been identified as being deficient locally and not yet able to service the full range of wastes arising from ship recycling. A full survey is required to establish with more accuracy the likely quantities that may need to be treated over the next 20 years. Estimates were obtained from the World Bank report of waste removed from ships (see section 5.3.3 and Tables 5.1 and 5.2 of this report).

Initially the most urgent need is for the safe disposal of asbestos waste, the safe treatment of PCB and ODS and facilities for properly dealing with oily sludges and oils that cannot be recycled or used as fuel. The latter may have outlets at other industrial facilities that are adapted to or capable of receiving them (subject to an assessment of suitability), or at specialist disposal facilities. The latter will need to be developed and most likely coordinated with a wider strategy for dealing with wastes from other industries. Landfill facilities for wastes for which no other management option is available will be needed and may be designed to accept hazardous wastes in special cells. For example, wastes from cutting such as paint chips, other debris and asbestos can be landfilled with suitable precautions.

The potential intermediate treatment of other wastes needs to be explored further to identify available methods in the short term, e.g. the management of insulation foams, some of which may contain ODS.

Final disposal of some wastes such as PCB may be considered in conjunction with other parallel programmes such as for Stockholm POPs. High temperature incinerators are costly to install, operate and maintain and require careful design to ensure they are well utilised without falling into disrepair. Any projects involving these will require planning for the longer term.

Some of these facilities may be supplied as joint ventures with other waste producing entities such as municipalities and businesses and attention will need to be applied to the optimal siting and sizing of any joint facilities.

iii) Other Infrastructure

This relates to provision of suitable road networks, energy and potable water supplies and waste water and sewage management, etc. Where these are lacking, a programme to progressively improve them can be established as required.

iv) Actions for Competent Authorities

Competent Authorities would gain benefit from further training and capacity building to be able to effectively exercise their powers and duties under relevant legislation. A two stage process is likely to be needed. It is based on the assumption that appropriate legislation is in force with powers and duties of the Competent Authorities clearly defined. Changes to legislation that are made with any impact on the compliance regime may be taken on board during consultation processes and training programmes updated as necessary. Feedback from experience gained in on the ground regulation may contribute to improving the regulations themselves if such steps are built into any legislative change process. The compliance approach will also need to take into account other steps made, such as availability of the waste management infrastructure, to ensure it has been progressed to the extent that the operators of the facilities can comply with requirements and directions for sound management.

Competent Authority capacity can be established firstly with a needs assessment that will determine the overall capability required in terms of manpower and skills training to reach the desired level of competence to inspect and regulate the yards under the current legislation prior to implementation of the Hong Kong Convention, i.e. with respect to the Basel Convention's obligations. In the longer term, a second stage needs assessment will determine the overall capability required in terms of manpower and skills training to reach the desired level of competence to inspect and regulate the yards under the Hong Kong Convention. These may apply to different staff in different Ministries and Departments and may involve skills transfer at appropriate times.

SECTION THREE

COMPLIANT MODELS: CRITERIA & STANDARDS, DESCRIPTION & SELECTION, IMPLEMENTATION PROGRAMME

6. Criteria, standards and operationally compliant model selection for Ship Recycling and Waste Management

6.1 Introduction

In this section the criteria for environmentally sound management in the context of the Basel and Hong Kong conventions are discussed on the basis of the obligations of the conventions. From this a compliant model approach can be selected. The conventions have to be translated into practical models that can be implemented to ultimately deliver the conventions' requirements. How this is achieved depends on the interrelationship between the legal obligations flowing from the conventions into national laws and regulations, the standards set by compliance guidance and industry standards and the level of facility operator applied compliance systems (such as third party auditing) and regulator (competent authority) oversight and compliance processes. It is this network of systems combining the actions of all stakeholders that delivers compliance. Without active input or application from all sources cooperating and contributing to the control it is unlikely that compliance can be achieved. This implies at least two considerations when developing a model approach: i) that any system will inevitably be diverse depending on the range of actors working together (e.g. different government Ministries and Departments, waste and ship recycling industries and their individual and collective organizations), ii) that the number of potential model approaches is likely to be small in terms of variety even if apparently complex (depending on the range of stakeholders involved from i)) through their network of interactions. From this perspective the model approach will be generic. The following sections discuss how the development of appropriate criteria for setting standards of sound management for ship recycling and waste management downstream may be approached and can assist in determining the steps to be taken in the short, medium and long term to deliver ESM compliant approaches.

6.2 Criteria for ship recycling and waste management facilities

The criteria for both types of facilities are essentially the same and expressed in similar terms in the Basel Convention and the Hong Kong Convention. The title of the Hong Kong Convention includes within it the expression "safe and environmentally sound" encompassing two key criteria. The preamble text to the HKC notes the respective roles of the Basel Convention and the International Labour Organization while being mindful of the precautionary approach set out in principle 15 of the Rio Declaration on Environment and Development as referred to in the MEPC Resolution 67(37) of

1995. Article 1 of the HKC then identifies the general obligations in the first four paragraphs of the Article:

“1 Each Party to this Convention undertakes to give full and complete effect to its provisions in order to prevent, reduce, minimize and, to the extent practicable, eliminate accidents, injuries and other adverse effects on human health and the environment caused by Ship Recycling, and enhance ship safety, protection of human health and the environment throughout a ship’s operating life.

2 No provision of this Convention shall be interpreted as preventing a Party from taking, individually or jointly, more stringent measures consistent with international law, with respect to the safe and environmentally sound recycling of ships, in order to prevent, reduce or minimize any adverse effects on human health and the environment.

3 Parties shall endeavour to co-operate for the purpose of effective implementation of, compliance with and enforcement of this Convention.

4 The Parties undertake to encourage the continued development of technologies and practices which contribute to safe and environmentally sound Ship Recycling.”

Paragraph 1 of this Article presents key criteria concerning the prevention, reduction and minimization of accidents and adverse effects on the environment and human health while paragraph 2 recognizes that parties may take more stringent measures than the Convention provides for. Paragraph 4 recognizes the role of continued development of technologies and practices.

Similarly the Basel Convention, in its Article 2.8, defines the meaning of “environmentally sound management” as:

“all practicable steps are taken to ensure that such wastes are managed in a manner to protect human health and the environment from the adverse effects that could result from those wastes”.

Article 4 on General Obligations, within paragraph 2(b), requires Parties to the Convention to take appropriate measures to:

“Ensure the availability of adequate disposal facilities for the environmentally sound management of hazardous wastes and other wastes, that shall be located, to the extent possible, within in it, whatever the place of their disposal;”

Furthermore, Article 4 paragraph 2 (g) requires Parties to:

“Prevent the import of hazardous wastes and other wastes if it has reason to believe that the wastes in question will not be managed in an environmentally sound manner;”

Under the Basel Convention more detailed interpretation of ESM is provided with reference to the Technical guidelines which elaborate on its meaning for the relevant waste operations and ship dismantling.

6.3 Environmentally Sound Management standards and their application

The standard for ESM to be set by legislation and the guidelines that underpin the standards to be met at the facilities is achieved by establishment of criteria that identify the desired outcome. The process of developing standards and implementing them methodically enables the facility to set realistic and **achievable** targets for the standards.

At the international level absolute standards are not always defined for the protection of the environment and human health in the operation of facilities processing materials, except in specific cases where, for example emission limits for combustion plant may be set. Rather, guiding principles and examples of current best practice and available methods are provided so that standards can be established at the national level, with an expectation of continuing improvement. Ultimately the actual standards of management at facilities will depend on the level set by the government in regulations, as monitored through compliance processes by the Competent Authority, together with the degree of compliance that operators achieve. This approach has already been carried out for the environmentally sound management of wastes and is described by the obligations of the Basel Convention for environmentally sound management of wastes, as they are transposed into national legislation. Accompanying guidelines are available at the international level for a range of hazardous wastes and processes for treating and disposing of them, as well as guidelines and standards created for use by competent authorities and operators at the national level. Some examples of these are found in the bibliography in Section 8. The approach for environmentally sound management at ship

recycling facilities should not need to be different, largely reflecting the same standard-setting mechanisms that are also used to apply to other industrial processes.

The detail of ESM standards to be achieved is often technical and extensive. It is therefore usual to elaborate these in guidance documents that are more easily capable of being revised and updated according to experience and progress. This is a more flexible, adaptable and efficient approach compared to setting standards on legislation. The guidance documents themselves may have legal backing by being referenced in the appropriate legislation and can help to interpret the meaning of that legislation in more precise and practical terms. Examples of this at the international level are the BAT/BEP guidelines (guidelines on best available techniques and guidance on best environmental practices) prepared for the Stockholm Convention on Persistent Organic Pollutants. Also a series of reference documents produced by the European Commission's Joint Research Centre has been established for a regional integrated economic organization (the European Union). This publishes documents on Best Available Techniques (BAT) for a wide range of process industries known as BAT Reference documents or BREFs. Versions of these are published for waste incineration and planned for waste treatment among others.

A range of general guidance documents are already available for waste management and for ship recycling. At the international level for ship recycling those most commonly known are the Basel Convention Technical Guidelines series, the IMO Ship Recycling Guidelines and the ILO Guidelines - Safety and Health in Shipbreaking Guidelines for Asian Countries and Turkey. Also available is the ISO standard ISO 30000:2009 which specifies requirements for a management system to enable a ship recycling facility to develop and implement procedures, policies and objectives in order to be able to undertake safe and environmentally sound ship recycling operations in accordance with national and international standards. These are all freely available for use by States, whether party to the Conventions or not, and, in the case of the Hong Kong Convention, irrespective of whether the Convention itself has entered into force or not. The guidance documents are normally only produced in a limited range of (UN) languages, however, and a State wishing to make use of these may also wish to translate, adapt them, or add supplementary guidance that deals with the specific circumstances prevailing in their territory. The Basel Convention Technical Guidelines for the Environmentally Sound Management of the Full and Partial Dismantling of Ships are, however, also available in Bengali, Hindi, Turkish and Urdu.

Over time standards may improve incrementally, depending on a number of factors, such as the complexity of the process, the degree of technology applied, technological progress and the competence and level of training of the workers and management. The rate of improvement can be enhanced by consistent regulation by an expert competent authority, investment and a commitment to continuous improvement. Through applying these improvements in a systematic way standards can be set for the short, medium and longer term that can be met without excessive cost.

6.4 Compliant Models: Description and Model selection

From the foregoing consideration is given to the potential for alternative approaches to compliant models that may differ in their methodology but deliver the same result, or may apply similar techniques but to different standards. It may be possible to adopt more than one approach as progress is made but these are, as discussed in the introduction, likely to be variations on a theme. For the sake of clarity it is considered preferable to decide on one of the alternatives and use that to benchmark progress.

6.4.1 Compliance Framework requirement

As can be seen from the example of the field study given in Section 4 the compliance standard is achieved by the combination of the actions of the relevant government Ministries and Departments at national and regional level, the operators of ship recycling facilities and the operators of downstream waste management facilities. All of these have a role to play in the compliance framework, regardless of the approach taken.

The main elements of each approach should apply to methods of working to encapsulate the criteria and standards discussed in the preceding sections above to ensure:

- a. Environmentally sound management at the yards – through facility design, use and maintenance of equipment, skills and training of workers;
- b. Environmentally sound management at downstream waste management facilities– through facility design, equipment, skills and training;
- c. Monitoring programmes to measure the level of ESM desired is achieved– such as Environmental Assessment are in place and used;
- d. Occupational safety and health is provided for – by risk identification, providing safe systems of work, protective equipment.

The last element concerning OSH is included not to elaborate on the separate requirements for this that are addressed under national and international agreements and law but because environmental management and health and safety are linked, the objectives and means of achieving them are closely aligned. Implementation of good OSH practice tends to lead to good environmental practice and vice versa.

6.4.2 Model Description and Selection

Three basic approaches that are also consistent with delivering the objectives of the HKC and BC over time may be considered by using:

- I) The Basel Convention (and its guidelines) alone as the basis for the model;
- II) The Hong Kong Convention (and its guidelines) alone as the basis for the model
- III) A combination of the Basel and Hong Kong Conventions (and their guidelines).

The first approach may be considered to be appropriate where the State concerned is already a Party to the Basel Convention: the existing national legislation should be suitable or readily adaptable at the national level; Competent Authorities should already exist; the Basel Convention principles are applicable to any kind of materials / waste processing facility where a desired outcome is protection of the environment and human health according to systems of environmentally sound management; there is a large body of published guidance both by the Basel Secretariat and others; and many examples of practical experience of its implementation can be readily found.

The second approach may also be considered appropriate because: the Hong Kong Convention is specific to ship recycling; its provisions have been developed according to the particular needs of shipping and address the design, construction, operation and preparation of ships so as to facilitate safe and environmentally sound recycling without compromising the safety and operational efficiency of ships; it provides for the operation of ship recycling facilities in a safe and environmentally sound manner; and the establishment of an appropriate enforcement mechanism for ship recycling, incorporating certification and reporting requirements; it requires environmentally sound downstream waste management to be taken into account; and it enables States intending to ratify the HKC to develop their implementation in a stepwise manner and be prepared for entry into force of the Convention along a planned route suited to the State in question.

The third approach may comprise a combination of the two above approaches. This may be considered suitable as it potentially represents a better means of ensuring compliance with the Convention currently in force (Basel) while enabling preparation and capacity building to ensure successful implementation of the Hong Kong Convention, which is yet to enter into force. While a Government is considering the steps to take with respect to ratification of the HKC, key aspects of the Hong Kong Convention can be incorporated into existing compliance and regulatory regimes in advance of acceding to the Convention. This approach would be consistent with Resolution 5 of the Diplomatic Conference adopting the Hong Kong Convention which invited Member States of the Organization to consider applying the technical standards contained in the Annex to the Convention on a voluntary basis to ship recycling facilities under their jurisdiction, as soon as operationally feasible. The model can take the form of practical steps that can be supported by appropriate regulatory drivers as found necessary by experience of implementation. This approach may therefore be used as a step wise means of preparing for the entry into force of the Hong Kong Convention without compromising existing compliance with the Basel Convention.

The third approach meets the criteria outlined above in section 6.2 incorporating the relevant aspects of the two conventions and, where appropriate can also take on board linked provisions from other connected conventions such as the Stockholm Convention for Persistent Organic Pollutants and the Montreal Protocol for Ozone Depleting Substances. The approach is adaptable in practical terms and can take on board developments and changes in regulatory infrastructure as they arise.

The model approach itself can be divided into three components: i) practical infrastructure related, ii) operational management and procedural factors and iii) regulatory approaches. The basis of the model can be expressed as a series of checklists that address the various factors that need to be taken into account to establish the standards and means of implementing them together with an implementation matrix that can be completed to act as a road map for introduction of the compliant systems. These are set out in the following sections.

6.5 Compliant Model

6.5.1 Criteria checklist for ship recycling and waste management facilities

In order to determine standards at the national level, in line with the Basel Convention obligations already in place as described above and to incorporate those of the Hong Kong Convention, a checklist may be used to determine that the relevant criteria for ESM are being applied in practical

terms. This will determine the level of infrastructure that is to be installed and developed over time. The relevant criteria would include for example that environmentally sound management policies are established and adopted. This will help to confirm that appropriate actions are being put in place to achieve the objectives of the Conventions. Such a checklist may consider the following points and the current status identified to enable progress to be checked:

Table 6.1 Criteria for ship recycling and waste management facilities infrastructure

Criterion	Status		
	Yet to start	In progress	Achieved
Are there published environmental criteria at national or local level that identify the expected level of environmental protection?			
Are there published environmental standards ¹³ at the national level, either derived from the above criteria or independently (may include relevant recognised international standards)?			
Are there published industry standards, especially those based on convention objectives and obligations?			
Are there technical standards for operation of facilities, such as may have been developed by the operators, including practical manuals?			
Are there environmental assessment techniques or procedures for identifying the potential impact of facilities?			

6.5.2 Criteria checklist for operators of facilities

This identifies the procedural actions for facility operators as opposed to infrastructural ones set out in 6.5.1. These are criteria for management actions for the operators of ship recycling and waste management facilities that they may expect to take into account in order to ensure their compliance with the relevant regulations, guidelines and standards as set at the national and regional/local levels. The checklist in Table 6.2 may also be used to determine that the relevant criteria and actions for ESM are being applied.

¹³ A standard means a defined method of undertaking a task or set of actions that may include the sequence of actions and numerical limits e.g. values that should not be exceeded. A standard will determine the quality of the action or output. For example the OSPAR Commission. 2008. "Overview of Contracting Parties' National Action Levels for Dredged Material (for Denmark)." London .

Table 6.2 Criteria checklist for operators of facilities

Criterion	Status		
	Yet to start	In progress	Achieved
Are there documented operational procedures?			
Are quality management systems (that may be audited by a third party, such as an accredited independent auditor) in place, that underpin the operation of the facility?			
Are staff trained and technically competent?			
Is there monitoring of the operation of individual facilities by the operator to check for compliance with the permit?			
Is there monitoring of the environment outside and in the vicinity of the facility?			
Are records kept of monitoring results and made available/reported to the competent authority?			
Are there provisions (e.g. emergency plans, shut down procedures) for dealing with non-compliance or remediating effects of non-compliance?			

6.5.3 Criteria checklist for competent authorities

In order to review the specification of the role that competent authorities may undertake at the national and regional/local levels the checklist identifies the relevant criteria for ESM compliance and the necessary functions and skills and expertise that competent authorities need to possess in order to monitor and ensure compliance with the regulations and standards. Table 6.3 sets out key criteria for assessing the Competent Authorities' progress in delivering the objectives.

Table 6.3 Criteria Checklist for Competent Authorities

Criterion	Status		
	Yet to Start	In Progress	Achieved
Is the Basel Convention implemented into national law?			
What laws provide for regulation of waste activities i) at domestic level and ii) for imports and exports of waste?			
Is there an environmental regulator charged with ensuring compliance with the legislative regime and empowered to take compliance action?			
Are site-specific permits issued with detailed conditions for site operation on prevention of pollution by limits of emissions to air, water and land?			
Are there penalties for failure to comply, enforceable through the courts (by enforcement action – notices, prosecution etc.)?			
Are there records of documented inspections and data on regulatory monitoring of the facility by a competent authority?			
Does the competent authority follow up on breaches of permits with appropriate compliance action that may lead to enforcement and prosecution?			
Does the Competent Authority undertake training programmes for its staff for inspections, monitoring, compliance and enforcement procedures?			

Each one of these may be elaborated further to incorporate the specific elements that are applicable in the context of national legislation, policies and procedures. The actions for implementation in the short, medium and long term and the generic implementation matrix are described in chapter 7.

7. Actions towards ESM Compliant Model Standards: Short, Medium and Long Term

7.1 General approach

This part proposes what actions may be taken in the short, medium and longer term to effect implementation of the compliant model and continuous improvement for ship recycling facilities, waste management facilities and for competent authorities. It should be stressed that these actions are focused on environmental protection and waste management compliance with reference to related aspects such as general infrastructure where appropriate. These do not therefore constitute a complete set of actions for compliance with the Hong Kong Convention, rather they provide a pathway which will assist in progressive attainment of compliance for environmental protection including the sound management of hazardous materials and wastes and other wastes and materials.

Ship recycling activities can also have implications for workers' health and safety dependent on the practices employed at the facilities. While provisions for occupational health and safety at ship recycling facilities are elaborated in the Hong Kong Convention and its associated guidelines, the focus of this study is on environmentally sound ship recycling, focusing on mitigation measures to reduce impacts on the environment. The study does not therefore prescribe specific actions to be undertaken to improve occupational health and safety standards at the facilities, but acknowledges the strong link between environmentally sound management, in accordance with the obligations of the Basel Convention, and human health.

The actions set out here have been derived from the information obtained on conditions prevailing at the ship recycling facilities for this study to improve compliance with the Basel and Hong Kong Conventions. It is emphasised that, to be effective, coordinated actions may be required both on-site at the ship recycling facilities and at downstream waste management facilities. The actions may be planned and developed in stepwise fashion. The actions are designed to be broadly applicable to conditions prevailing at any beaching facilities. The number of actions proposed may be increased or the timing of their implementation may be adjusted according to more detailed analyses that may be undertaken in the follow up to this case study or for implementation for specific facilities. The aim is to identify first those preparatory actions which will assist in planning, resourcing and management of the later stages and are also relatively easy to implement at low cost. Then those

actions requiring greater financial investment can be planned for at later stages. Several further examples of practical actions have been proposed in a research document submitted to the IMO's Marine Environment Protection Committee by the United Kingdom as a report on potential transitional technology solutions for environmentally sound ship recycling in developing countries¹⁴.

Some of these practices may be dependent on the creation of additional guidance and standards for regulation. The rationale for the actions set out for the short, medium and longer term therefore is that progressively over these time frames, actions are selected that involve:

1. Short term - Minimal Equipment /Cost
2. Medium term - Simple/low cost techniques
3. Longer term - Improved infrastructure and equipment.

The time periods for the actions to be completed are indicative. The Basel Convention Technical Guidelines provided a generic checklist¹⁵ for achieving ESM compliance with timescales within one year, one to five years and five to ten years. Those planning to implement the actions from this report should use the Basel Guidelines as a basis adapted to the specific circumstances found. As the Basel Guidelines have been published for nearly ten years it may be possible to accelerate some of the actions.

¹⁴ Potential Transitional Technology Solutions For Environmentally Sound Ship Recycling In Developing Countries" – Research report WR1110, Department for Food Environment and Rural Affairs, UK, 2009 as submitted to the IMO MEPC 61 as MEPC 61/INF.14, 19 July 2010. Found at: <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=15944>

Aim: To identify, assess and produce guidance on a selected number of appropriate transitional technology solutions for application to environmentally sound ship recycling, which are suitable for use in developing countries.

Objectives

- Develop contextual approach for identifying good practice transitional technology techniques for environmentally sound management at ship recycling facilities in developing countries, based on existing requirements and guidance.
- Propose a range of transitional technology options that will contribute towards environmentally sound ship recycling practice to inform development of standards and guidance (e.g. International Maritime Organization (IMO) consideration of draft guidance documents, development of programmes to support interim measures such as the Global Programme of the International Labour Organization (ILO)/IMO/Basel Convention and any European Commission outreach programme).
- Evaluate health, safety and environmental performance of such transitional technology options, their ease of uptake in developing countries and suggest possible solutions to any barriers to implementation.
- Produce a series of guidance notes on each specific option that could be used to support development of interim measures.

¹⁵ Table 11 of the Basel Convention Technical Guidelines for the Environmentally Sound Management of the Full and Partial Dismantling of Ships, 2003.

7.2 The Compliance approach

This programme assumes that not only the operators of the facilities desire to make the necessary changes to improve standards towards those set out in the Hong Kong and Basel Conventions and their respective Guidelines but also the competent authorities will assist in achieving this objective. The CAs can do this by establishing the conditions whereby the managers of the facilities are set consistent achievable targets that they, and all involved in the chain, can be reasonably expected to meet. For example the CAs can, as part of its initial regulatory approach, focus on encouraging, facilitating and incentivising improvements through creation of planned approaches towards compliance with the Basel and Hong Kong Conventions in contrast to taking enforcement action, at least in the short to medium term, while the programme is established. The competent authorities themselves can use this time period to develop their own capability in inspection, sampling, monitoring and permit setting in order to become better informed about the ship recycling process and its regulation. This will help to build a body of knowledge and practical experience that can be employed to provide consistent, proportionate regulation.

7.3 The Facility approach

It will be necessary to ensure that ship recycling facilities and downstream waste management facilities develop improvements in parallel including any necessary infrastructure improvements.

The main principles to be put into operation at the facilities (waste or ship recycling) are that:

- Substances that may give rise to pollution and endanger the environment and human health, in short or longer term are identified
- Practical measures are designed, procured and put in place to control releases to the environment in a cost-effective manner;
- Worker safety measures, which complement environmental protection actions, are similarly designed and put in place;
- Regular monitoring is carried out to confirm that the environment is protected; and
- Records are made and kept to demonstrate effective control is achieved over time.

7.4 Short, Medium and Long Term actions

7.4.1 Actions to be taken at Ship Recycling Facilities

The priority actions for ESM of waste at ship recycling facilities concern the identification, segregation and safe storage of wastes produced from ship recycling, i.e. those materials from the ship that cannot be re-used or recycled and for which an off-site treatment option must be found in

the short to medium term. The kinds of materials that need to be identified and dealt with are listed in Appendix B. This lists the materials described in the Hong Kong Convention Inventory of Hazardous Materials (IHM Parts I) together with the materials identified in the IMO Guideline for Safe and Environmentally Sound Ship Recycling, adopted at MEPC63 in 2012, listing materials that would form operationally generated wastes and other materials found on board ships that the ship recycling facility should be prepared to handle. The lists (except Part I) are typical rather than exhaustive and potentially other materials that may be Basel Convention hazardous wastes might also be found. Hence the need to ensure an inventory for each ship is provided and is complete. Many of these materials as wastes will require at least temporary storage and protection. Liquid waste will require tank facilities (the tanks can be recovered from ships) and other solid wastes may be kept in distinct zones, either covered or uncovered depending on their hazard properties.

Pending next steps such wastes may be later disposed of as waste management options downstream become increasingly available, according to the actions undertaken to identify and develop new facilities.

Key actions for ship recycling facilities are outlined in Tables 7.1a and 7.1b. The actions are separated into those dealing with the ship itself (Table 7.1a) and those dealing with shoreside activities (Table 7.1b). Tables 7.1a and 7.1b can be applied to facilities being authorized either under the requirements of the Basel or the Hong Kong Convention in general terms (as well as some ILO related actions particularly where health safety and environmental protection issues merge), as allowed for in the applicable domestic legislation. They are practically based and are not necessarily convention specific. Table 7.2 additionally describes a route for graduated development of specific processes aiming towards compliance with the Hong Kong Convention requirements in the short, medium and longer term, where a State is taking steps towards implementation of HKC requirements and accession to this convention. These may be carried out in parallel with the practical actions described in Tables 7.1a and 7.1b. These actions flow from consideration of the format for the Ship Recycling Facility Plan, an example of which is reproduced in Appendix C.

TABLE 7.1a - Actions for Ship Recycling Facilities - The Ship

SHORT TERM WITHIN ONE YEAR	MEDIUM TERM ONE TO THREE YEARS	LONG TERM THREE TO EIGHT YEARS
<i>Minimal Equipment /Cost</i>	<i>Simple/low cost techniques</i>	<i>Improved infrastructure and equipment</i>
Carry out visual inspection, identification and labelling of hazardous materials on board prior to beaching.	Test suspect hazardous materials in situ, sample for confirmatory testing	Document all hazardous materials on board against supplied Inventory of Hazardous Materials
Determine pollutant concentrations prior to removal of bilge and ballast water.	Apply simple tests for key parameters: oil, selected metals	Apply full monitoring protocol for key parameters: oils, PCB, metals (mercury, cadmium)
Make and record visual inspection of pollutants in waters around ship.	Deploy spill containment boom with spill clean-up equipment on standby	
Pump out heavy oils and sludges to drums before starting other work.	Pump out liquids to secure storage	Prioritise pumping over man entry for liquid removal operations inside the tanks
Test compartments for presence of toxins, corrosives, irritants and breathable and flammable gases before entering.		Install gas monitoring equipment at key locations
Ventilate spaces (compartments/tanks) and monitor for breathable and flammable gases during work.		
Remove combustible and recyclable materials, including cables before hot work.		
Clean oil tanks and compartments before starting hot work.		
Apply "hot work" certification system.		
Identify and remove toxic or flammable paint prior to metal cutting. Collect and contain waste paints removed		
Identify and remove to safe store presumed PCB-containing material (closed and open sources - solids and liquid). No hot work carried out on or near any PCB.		
Create dedicated area for asbestos removal. Apply safe removal procedures. Limit access to trained workers.	Seal areas on board ship where asbestos has been identified. Limit access. Filter air emissions. Securely pack all asbestos.	Install dedicated decontamination system.

TABLE 7.1b - Actions for Ship Recycling Facilities – On Shore

SHORT TERM WITHIN ONE YEAR	MEDIUM TERM ONE TO THREE YEARS	LONG TERM THREE TO EIGHT YEARS
<i>Minimal Equipment /Cost</i>	<i>Simple/low cost techniques</i>	<i>Improved infrastructure and equipment</i>
Set out facility plan - design major areas to indicate places for storage, cutting, roadways etc.	Provide firm compacted surfaces suitable for vehicle access.	Pave roadways. Employ lifting machinery and plant for heavy items, with low ground-bearing capacity or on firm services.
Create a dedicated area for segregation of hazardous materials (e.g. PCB, hazardous waste, liquids). Install clear signs to show where each type is put.		Cover hazardous waste handling areas. Test, remove and dispose of PCB containing material to hazardous waste facility. (Optional) Develop communal ship decontamination facility. Utilise environmentally sound treatment/ disposal facilities for hazardous materials.
Install warning signs, buffer protection zone around fuel drums and tanks.	Protect fuel tanks (bunds) on hard standing.	
Inspect winch cables regularly, replace damaged and frayed cable.	Test cables regularly, install pulley and block system.	Install strain gauges and alarms.
Develop and implement spill clean-up and notification procedures.	Provide storm water discharge facilities, to avoid contamination of storm water run-off.	Install and operate draining and pumping equipment to impermeable areas linked to storage tanks /catch pits.
Supply and use Personal Protective Equipment: (Hard hats, gloves, eyes/face protection, welding goggles, torches, safety shoes).		
Supply and use respiratory hazard protective equipment.		
Supply fire extinguishing equipment at risk areas.		Commission dedicated fire and rescue service (joint venture).
Implement appropriate asbestos management procedures in accordance with ILO code of practice. Asbestos work by trained personnel only. Access to asbestos identified areas to designated personnel.	Collect and contain all wastes from asbestos removal processes. Pack asbestos in approved packaging. Decontaminate workers when leaving the designated area.	
Post notices/pictograms of key safety hazards.		
	Provide occupational health service.	Establish medical centre (cooperative venture)

TABLE 7.2 – Specific Additional Actions for Ship Recycling Facilities in States Progressing Towards Hong Kong Convention Compliance

SHORT TERM ONE YEAR	MEDIUM TERM ONE TO THREE YEARS	LONG TERM THREE TO EIGHT YEARS
Establish basic Ship Recycling facility Plan (referring to the IMO Guidelines for the Development of the Ship Recycling Plan) <ul style="list-style-type: none"> • Employers and workers responsibilities • Worker Safety policy • Worker Training programme 	Implement Intermediate Ship Recycling Facility Plan: <ul style="list-style-type: none"> • Worker ESM and safety Training and information • Emergency Plan • Record Keeping • Reporting system for discharges, incidents accidents • Reporting system for accidents injuries etc. 	Advanced Ship Recycling Facility Plan <ul style="list-style-type: none"> • Performance Monitoring Plan • Quality System to achieve HKC goals and continuous improvement
Basic check hazardous materials on board (refer to IMO Guidelines for the Development of the Inventory of Hazardous Materials)	Use Inventory of Hazardous Materials as main	
Safe and Environmentally Sound Management of Hazardous Materials <ul style="list-style-type: none"> • Identify • Label • Segregate 	Upgrade storage <ul style="list-style-type: none"> • Hard standing • Drainage Identify waste disposal facilities <ul style="list-style-type: none"> • Survey capacity 	Upgrade Storage <ul style="list-style-type: none"> • Cover/protect storage areas Waste Management <ul style="list-style-type: none"> • All wastes to authorized ESM facilities
Basic Ship Recycling Plan (Refer to IMO Guidelines for Safe and Environmentally Sound Ship Recycling)		

7.4.2 Actions to be taken at Waste Management (treatment and disposal) facilities

Actions at waste management facilities are based on the potential to develop ESM facilities that are required to deal with the wastes identified from ship recycling. Such facilities are unlikely to be dedicated to wastes from ships and ship recycling activities but would accept hazardous and other wastes from other local or regional sources to obtain sufficient regular quantities to justify the investment in infrastructure needed to ensure ESM status of the facility. The baseline study has indicated that significant challenges exist with respect to ESM waste treatment and disposal capacity in some ship recycling countries. Therefore it is necessary to focus on developing the approach to

introduce such facilities in a manageable phased programme of investment over a suitable timescale, as will also be needed with wastes management at ship recycling facilities. The initiative to deliver ESM waste facilities may be from Government, the private sector or a combination of the two such as a public-private partnership. The actual approach taken will depend on the individual circumstances prevailing.

Sound waste management for ship recycling has the following characteristics:

- Facilities that operate to ESM standards;
- Suitable technology for wastes produced;
- A reporting system that allows timely action to be taken;
- Good quality data and management systems;
- Effective communication between industry and regulator;
- Appropriate guidance from Government and regulator; and
- Sharing of best practice information.

In step with developments at ship recycling facilities Table 7.3 sets out actions that may deliver actual ESM capacity over time where the existing conditions indicate that provision is currently minimal. Due to the likely combination of lead agency – public or private sector – it is assumed the actions described here are likely to be commenced by a governmental agency in terms of initial assessments in the short and medium term and later development may be undertaken by the private sector operators as opportunities for investment are clarified.

TABLE 7.3- Actions for Development of Environmentally Sound Management at Waste Treatment Facilities

SHORT TERM ONE YEAR	MEDIUM TERM ONE TO THREE YEARS	LONG TERM THREE TO EIGHT YEARS
Undertake enhanced survey of waste facilities capacity <ul style="list-style-type: none"> • waste arising at ship recycling yards • waste arising at Gadani • wastes arising from Port Reception Facilities • Wastes at industrial 	Identify needs assessment and gaps from waste survey <ul style="list-style-type: none"> • Identify infrastructure gaps • Decide priority needs (hazardous waste) • Develop infrastructure Improvement Plan (e.g. similar to Stockholm Convention NIPs¹⁶) 	Complete infrastructure development, commission new facilities into operation. <ul style="list-style-type: none"> • Temporary storage/bulking and transfer • Physico-chemical treatment • Incineration (specialized)

¹⁶ An example of this is the Bangladesh National Implementation Plan (NIP) For Management of Persistent Organic Pollutants (POPs), Prepared under UNDP Project BGD/02/G31/1G/99 Bangladesh: Preparation of the POPs National Implementation Plan under the Stockholm Convention, Department of Environment (DoE) Ministry of Environment and

areas (e.g. Hub) <ul style="list-style-type: none"> Classify by Basel Convention Annexes VIII and IX 	<ul style="list-style-type: none"> Identify financing mechanism Initiate development of infrastructure 	<ul style="list-style-type: none"> Hazardous waste landfill Landfill
Identify priority needs for specified waste streams e.g. <ul style="list-style-type: none"> Asbestos PCB ODS Waste oils 	Assess alternative options for long term wastes management <ul style="list-style-type: none"> Pre-decontamination facility Import bans 	All waste to ESM facilities
Establish temporary waste treatment policy <ul style="list-style-type: none"> storage facility for key waste streams import bans on selected hazardous wastes export of selected hazardous waste streams Implement policy decision on above.		

7.4.3 Actions to be taken by Competent Authorities

Competent authorities may undertake a number of roles depending on the type of approach they wish to adopt. This will depend on factors related to national policy, according to the powers conferred upon them, their own stage of development as regulators and perceived needs of the industry being regulated. CAs can act as informer, educator, monitor or enforcer. All actions should be directed towards the achievement of compliance in the most effective and efficient manner. Each type of approach offers benefits in terms of improving compliance and it can be valid to apply one or more of these approaches in combination at different times or to different degrees as appropriate to generate the best results.

In each approach it is useful for the CA to develop and make available for use by industry information about its activities so that the industry can be aware of what is expected of it and to what standards it should be working. This establishes a means by which the expectations of the regulator can be readily communicated to the industry without necessarily going through formal compliance and enforcement processes.

The CA may produce a suite of documents as part of its education and informing approach that identify standards and may include methods on how they may be achieved as a benchmark against which the industry can judge its own working and management methods. In developing its regulatory approach, the CA may produce guidelines and procedural manuals that describe how the CA conducts its inspections, what evidence it expects to find is available and routine matters such as the frequency of visits, whether and how unannounced visits are to be made, an inspectors' credentials, the facilities an inspector needs access to at the site and what areas. It may also include what reports an inspector makes and how the report's results are to be communicated to the facility operators. Other functions that the CA conducts may be for internal use only by the CA, especially where this relates to the conduct of enforcement activities. The general process may be summarized for external use. This would provide information to an operator of a facility on matters such as how inspections are carried out, the range of compliance actions that may be applied (e.g. form verbal advice/warnings, written advice/warnings, issue of prohibition notices and other notices and notice of intention to prosecute for breach of permit conditions). In proceedings for prosecution some internal rules and procedures may become disclosable for examination and it may be useful to ensure these are as clear as possible, in terms of describing how inspectors and officials should conduct themselves etc. Some guidelines are already available from the IMO and the Basel Convention Secretariat which may be further adapted or elaborated for national use. Details of these are in Section 8 - References and Bibliographic Material.

Documents that may be produced can include for example:

- Guidance on application for a permit - indicating the information required, plans, etc.;
- Guidance on standards at ship recycling facilities;
- Guidance on standards at waste treatment and disposal facilities ;
- A Licensing Manual;
- An Inspections Manual;
- An Investigations Manual;
- A Monitoring Manual;
- An Enforcement and Prosecutions Manual.

The range of actions that a CA may develop over time in conjunction with the stepwise improvements in ship recycling and waste management are set out in Table 7.4 below.

TABLE 7.4- Actions for Competent Authorities - Authorization of Ship Recycling and Waste Management Facilities

SHORT TERM ONE YEAR	MEDIUM TERM ONE TO THREE YEARS	LONG TERM THREE TO EIGHT YEARS
Establish (lead) Competent Authority and Ministries		
Develop specialized CA awareness and training programme for ship recycling according to HKC requirements. Develop specialized CA awareness and training programme for waste regulation (where not yet undertaken)	Develop Ship Recycling Facility Authorization Process <ul style="list-style-type: none"> • Conduct initial inspections • Develop (voluntary) compliance action plans with facility operators Develop Waste Management Facility Authorization Package ¹⁷ : <ul style="list-style-type: none"> • Determine ESM requirements • Authorize facilities Develop Compliance Implementation Plans for waste and ship recycling facility authorization	Implement regular monitoring and inspection programmes <ul style="list-style-type: none"> • Site inspection • Sampling • Analysis Undertake compliance action e.g. <ul style="list-style-type: none"> • Administrative notices (inspection reports) • Improvement notices • Prohibition notices • Enforcement • Court procedures
Review legislation <ul style="list-style-type: none"> • Identify lead Ministry(ies) • liaise with Basel Convention Focal Point • Develop plan for any necessary legislative changes • Develop procedural manuals 	Identify needs assessment and gaps from survey for waste in the region <ul style="list-style-type: none"> • Include changes to regulations • Consult and publish new guidelines • replace no objection certificate with revised compliance process 	<ul style="list-style-type: none"> • Implement legislation • Refine processes and revise published guidelines
Determine HKC ratification process	Initiate ratification/accession of HKC	Ratify/accede to HKC

7.4.4 Underpinning Legislation

The foregoing relies on appropriate legislation being put in place if not already available. For example most Sates are now party to the Basel Convention and should have measures in place to implement it. The detail of the legislative framework is complex as has been seen from the overview of the current regulations in Section 5 which describes the range of separate provisions applicable to

¹⁷ This typically includes a description of the relevant national legislation, regulations, relevant guidance etc., the steps required to be carried out by the applicant to obtain an authorization, an application form with details of the information expected to be provided, key deadline dates / timescales for submission and consideration of the application, the name of the competent authority to whom the application is to be sent.

ship recycling and waste management. Some of these may need to be modified or updated in accordance with the new provisions of the Hong Kong Convention in order to transpose this Convention into domestic law. The basis for the following assessment is that the relevant Ministry of the Government concerned may wish to act to adapt existing legislation in concert with its own timetable:

- a) In the short term for the implementation of existing laws and regulations as they may apply to ship recycling taking into account any relevant aspects of the Basel Convention especially for downstream waste management;
- b) In the medium term to introduce interim measures specific to ship recycling that reflect the key requirements of the Hong Kong Convention; and
- c) For the smooth and effective ratification and implementation of the Hong Kong Convention.

An analysis of the legislation already in place may indicate that, initially simple amendments may be all that is required, while concentrating on building capacity for the competent authorities, or that new legislation is required. In many cases the process of ratification/accession to the HKC may require more fundamental changes that would be the subject of a comprehensive review.

7.5 Implementation Matrix

An overall scheme, to give effect to the various elements described above and assist in planning and implementing the actions, can be used to develop a project-based approach to the initiation and delivery of the compliant models. Taking into account the elements described in Tables 7.1 to 7.4 an outline “Implementation Matrix” is set out in Table 7.5 to be used in conjunction with Tables 7.1 to 7.4. This comprises the key task elements and the lead roles for them with strategic planning actions included. The specific timelines for carrying out each of the elements, and their priority for action, will depend on the detail of the programme and for the particular needs of the country concerned. It is however envisaged that this can follow in step with implementation programmes under the Basel Convention and for accession to the Hong Kong Convention as appropriate. An example of the timescales for undertaking the activities is provided in as an indication of how the activities might be progressed as a project by the shaded-in boxes. This is an overview. A more comprehensive project plan would be prepared for each topic area, specifying the detailed elements e.g. with a monthly or quarterly programme.

TABLE 7.5 Compliant Model Ship Recycling Waste Management Implementation Matrix

(shaded blocks are indicative to illustrate how the project elements might be progressed)

Activity	Lead Role	Phase 1- Plan and Initiate (Years)				Phase 2 Develop – Enhance (Years)			
		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8
Competent Authorities									
1. Identify lead Ministry(ies), review legislation, plan change	Government Ministry								
2. Establish (lead) Competent Authority	Government Ministry								
3. Develop awareness and training programme for HKC requirements	Competent Authority								
4. Develop awareness and training programme for waste regulation	Competent Authority								
5. Develop implementation manuals	Competent Authority								
6. Establish, maintain dialogue with industry	Competent authority								
7. Plan, implement phased compliance action plans programme	Competent authority								
Ship Recycling Facilities – ship									
8. Initiate, implement minimal equipment / cost actions	Industry - Ship Recycling Facility								
9. Implement, simple low cost techniques	Industry - Ship Recycling Facility								
10. Improve infrastructure and equipment	Industry – Ship Recycling Facility								
11. Establish, maintain dialogue with Ministry / Competent Authority	Industry and Competent Authority								
Ship Recycling Facilities – shore									
12. Initiate, implement minimal	Industry - Ship								

equipment/ cost actions	Recycling Facility								
13. Implement, simple low cost techniques	Industry - Ship Recycling Facility								
14. Improve infrastructure and equipment	Industry - Ship Recycling Facility								
Develop ESM at Waste Treatment Facilities									
15. Undertake enhanced survey of waste generation, facilities, capacity	Competent Authority								
16. Identify waste infrastructure gaps and needs , compliance requirements	Competent Authority								
17. Identify priority needs for specific waste streams - asbestos, PCB, ODS	Competent Authority								
18. Develop/enhance waste management strategy	Government Ministry								
19. Devise long term wastes management options –e.g. pre cleaning, import bans	Government Ministry								
20. Implement priority waste treatment policy	Competent Authority								
21. Develop / enhance regulatory compliance framework	Competent Authority								
22. Establish new capacity, specialised Facilities	Industry								
23. Establish, maintain dialogue with Ministry/Competent Authority	Industry								
Strategic Financing									
24. Develop, implement sustainable financing strategy	Government Ministry								

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Appendix A: Government Institutions and Regulatory Framework for Ship Recycling in Pakistan

I - Government Institutions and Competent Authorities

Ministry of Climate Change

The Ministry of Climate Change (MCC) has assumed the responsibilities of the former Ministry of Environment. The Ministry has the following roles and responsibilities:

- Develop and implement legislative framework, plans, strategies and programmes on disaster management;
- Coordination with other federal and provincial government ministries, departments and other agencies on disaster management;
- Environmental protection and preservation; and
- Coordination, monitoring and implementation of environmental agreements with other countries, international agencies and forums.

These responsibilities are managed by the following departments:

- National Disaster Management Authority;
- Pakistan Environmental Protection Council;
- Pakistan Environmental Protection Agency;
- Pakistan Environmental Planning and Architectural Consultants Limited
- Global Environmental Impact Study Centre.

The MCC is actively pursuing issues related to the ship breaking and recycling industry. It has participated in a Basel Convention-sponsored Ship Recycling Technology & Knowledge Transfer workshop in Turkey in 2010 and at IMO meetings by invitation. The Ministry is not the focal point for IMO related matters and so not in the lead for issues related to IMO or IMO conventions. Its role as an overseer of environmental protection is however significant as the focal ministry of multilateral environmental agreements to which Pakistan is a party. With respect to the Hong Kong Convention the MCC role is likely to be through environmental protection agencies.

Pakistan Environmental Protection Agency

The Pakistan Environment Protection Agency (PEPA) is a department of the Ministry of Climate Change. Its primary responsibility is the implementation of Pakistan Environmental Protection Act, 1997 in the country. PEPA carries out the following functions:

- Formulate and revise as when required the National Environmental Quality Standards (NEQS) – see next section;
- Promote research and development for the prevention of pollution and protection of the environment;
- Develop general or sector specific policy framework for the protection of the environment;
- Disseminate information on environmental matters of public importance;
- Specify safeguards for the prevention of accidents and human induced catastrophes;
- Promote community level initiatives that lead to conservation of the environment;
- Investigate complaints of environmental degradation.

PEPA is not currently involved in projects with direct impact on SBRI. Responsibility for executing environmental conservation projects in the provinces is delegated to provincial environmental protection agencies and departments.

Ministry of Ports and Shipping

The Ministry of Ports and Shipping (MoP&S) acts as the central policy-making body and has administrative authority on matters related to ports and shipping and is the focal ministry for the IMO. The main functions of the Ministry are:

- Drafting policies and regulations related to ports and shipping;
- Developing national plans on matters related to coastal shipping and inland water transportation;
- Ratification and implementation of relevant international treaties and conventions;
- Navigation and shipping on coastal and inland water-ways especially related to safety of ports and transportation of dangerous goods;
- Training for seamen and developing national talent for shipping;
- Developing lighthouse, lightships, beacons and other provisions for safety of shipping;
- Handling issues related to admiralty and offenses committed at high seas;
- Declarations and delimitations of major ports.

MoP&S enforces MARPOL. The day-to-day operations are handled by the office of the Director General of Ports and Shipping in Karachi. When a ship destined for recycling at Gadani has entered the territorial waters of Pakistan, the Ministry of Ports and Shipping has jurisdiction over it with

respect to IMO conventions until the ship reaches the shore at Gadani. Where a ship has to be towed to Gadani for recycling, the Office of the Chief Engineers and Ship Surveyors authorizes the navigational route. It is expected that once the Hong Kong Convention has been ratified, the Directorate General of Ports and Shipping Karachi would deal with matters related to the ship breaking and recycling industry. It would approve the ship recycling plan and check the inventory of hazardous materials.

Officers within the MoP&S may delegate some environmental aspects of ship recycling facilities and the ship recycling plan by employing recognized organizations (ROs), in particular with respect to the requirements of Regulation 16 (Authorization of Ship Recycling Facilities) and 18 (Ship Recycling Facility Plan) of the Hong Kong Convention.

Mercantile Marine Department (MMD)

Within the MoP&S, MMD is part of the Maritime Safety Administration of Pakistan and its main objective is to ensure the safety of life at sea and inland waters, safety of navigation and protection of marine environment by implementing national rules and international maritime conventions. The main responsibilities of the department include:

- Registration of ships and crafts;
- Statutory surveys/inspections and issuance of certificates to merchant ships, fishing vessels and harbour crafts;
- NOC for Port Clearance to ships sailing out of Pakistani ports;
- Port state control inspections of foreign ships;
- Issues related to compliance with IMDG code;
- Supervision of new construction or major repairs of ships, etc.;
- Execution of various tasks assigned to the department under Merchant Shipping Ordinance, 2000; and
- Act as examination and competency certification authority for seafarer.

MMD has delegated a number of its responsibilities to classification societies acting as ROs as defined by the IMO agreements. Officials of MMD are aware of the requirements of HKC. This Department expects to be the lead for regulation of the ship breaking and recycling industry under the HKC although some tasks may be delegated to ROs.

Chief Engineer and Ship Surveyors Office

The Office of the Chief Engineer and Ship Surveyors Office is part of the Maritime Safety Administration of Pakistan under the Mo&PS. Its main functions are:

- Implementation of IMO and other maritime conventions;
- Ensuring safety of life at sea;
- Ensuring safety of navigation at sea;
- Protecting the marine environment;
- Maintaining training standards and certification of seafarers for shipboard examination.

As the responsibility of implementing IMO conventions has been allocated to the Office of the Chief Engineer, this department is expected to initiate the process of ratification of HKC.

Ministry of Industries

The Ministry of Industries (Mol) is the focal point for the promotion and expansion of the industrial sector in Pakistan. The main objectives of Mol are to facilitate and promote development of industrial clusters; provide incentives for forward and backward integration; enhance competitiveness of the local industry; ensure optimal capacity utilization; and revival of distressed units. It has responsibilities for national industry planning and coordination, development and implementation of industrial policy, acting as a federal agency for promoting of industrial productivity, special studies in the industrial fields and testing industrial products; developing Acts and Rules. Mol is responsible for providing technical assistance and education according to the requirements of the industry. If required, the Ministry can open new centres as well as enhance capacity of the existing centres for imparting technical knowledge and enhancing skills base.

The SBRI has been accorded industry status. However, no incentives or policies have yet been implemented by Mol for ship recycling activities. Mol's future role with respect to SBRI may involve initiatives to increase the competence of ship breakers according to the requirements of the HKC.

Ministry of Human Resource Development

The Ministry of Human Resource Development (MoHRD) deals with the matters related to worker welfare funds and employees' old age benefit, emigration and overseas employment. It is also the focal ministry for ILO-related matters and implements ILO conventions to which Pakistan is a party. The Ministry would become further involved in ship breaking issues on Pakistan's accession to HKC.

Federal Board of Revenue

Federal Board of Revenue (FBR) is responsible for tax collection. The main responsibilities of FBR are (i) formulation and administration of fiscal policies, and (ii) levy and collection of taxes. Pakistan Customs is one of the departments of FBR, responsible for regulating imports and exports. The department works under the powers provided to it through Custom Act, 1969 and Customs Rules, 2001. Chapter 13, Sub Chapter 2 of the Customs Rules 2001 deal with ship breaking. The Rules require duties on ships imported for recycling to be paid in three instalments. Duty is determined on the basis of the ship builder's certificate confirming light displacement tonnage (LDT). The first payment is due before permission can be granted to start beaching, the second instalment within 30 days and the final instalment within 30 days of the second instalment. Failure to pay may result in cancellation of permission. The facility must then commence breaking the ship immediately after receiving the permission from BDA (see below) and other departments.

Balochistan Development Authority

The Balochistan Development Authority (BDA) was established under the Balochistan Development Authority Act of 1974 with the main responsibility to promote economic and industrial development of the province. It is under the administrative control of the Planning and Development Department of the Government of Balochistan. The Act gives the BDA powers to execute development projects for land and water, power, agriculture and industry. BDA can enter into joint ventures with private sector enterprises. It also has the power to borrow foreign current from multilateral agencies such as the World Bank and Asian Development Bank. BDA has had responsibility for providing basic infrastructure requirements relating to the ship breaking industry at Gadani since September 1978. To date road construction has been the main activity.

Balochistan Environment Protection Agency

The Balochistan Environmental Protection Agency (BEPA) serves as the environmental regulatory body for the province. Its responsibilities include:

- Implementing national and provincial laws, rules and regulations including NEQS;
- Protection of the environment and natural resources;
- Integrating environmental issues into provincial development plans;
- Promote environmental awareness and conduct research on environmental issues; and
- Develop policies for improvement and sustainable use of natural resources.

The agency fulfils these responsibilities by:

- Measuring and monitoring discharges into air, water and soil by industrial, urban and agriculture activities;
- Initiating approval process for IEE/EIA for government funded projects;
- Creating awareness among policy and decision makers as well as the general public on environmental damage;
- Building technical capacity and enhancing infrastructure needs of the agency; and
- Drafting provincial legislation on environmental issues facing the province.

BEPA is responsible for approving an Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA), required before permission can be granted for a ship to be imported. The quality of the IEE/EIAs and how they can contribute to the decision making process is not known although it is believed they are essentially generic in nature. BEPA may be able to benefit from capacity building activities such as for critical evaluation of IEE/EIAs submitted by ship recycling facilities.

II - Regulatory Framework

The Pakistan Environmental Protection Act of 1997 is the basic environmental law of Pakistan. The Act particularly focuses on the implementation of the Pakistan Environmental Protection Council's policies, delegation of power to government agencies, enforcement of National Environmental Quality Standards, and introduction of EIA/IEE review procedures/systems. The Act also addresses the regulatory regime for hazardous substances/wastes, resource generation through establishment of a Provisional Sustainable Development Fund, levying of pollution charges and provides an appellant forum for environmental cases. Relevant sections of the Act include:

- Section 11 prohibiting discharge or emission of effluent into to air, water or soil in excess of National Environment Quality Standards (NEQS). Failure to comply with it would result in payment of pollution charges and projects which commenced operations after June 1994 can also be prosecuted on account of compliance failure;
- Section 12 dealing with initial environmental examination (IEE) and environmental impact assessment (EIA). IEE and EIA is required for projects listed in appendices A and B respectively of the Pakistan Environment Protection Agency Review of IEE/EIA Regulations, 2000;

- Section 13 prohibiting the import of hazardous waste into Pakistan and its territorial waters;
- Section 14 dealing with handling of hazardous materials. It mandates the requirement of a licence to generate, collect, consign, transport, treat, dispose of, handle, import and store hazardous substances. Licences issued will be in accordance with the provision of any other local law in force, or any treaty, convention, protocol to which Pakistan is a party.

Ship breaking is primarily governed by the Balochistan Ship Breaking Industry Rules, 1979. These rules are not specific to ship breaking at Gadani but are applicable to ship breaking activity carried out on any beach and coastal place in Balochistan. According to these rules, the BDA has been authorized to regulate affairs of SRF. The Ship Breaking Rules clearly state that the ship breakers are responsible for injury to or death of a person due to the hazardous nature of the yards. They are also responsible for any damage to yards during beaching or recycling/dismantling operations. The dumping of oil at sea, on the beach or anywhere in the yard is strictly prohibited.

The Constitution of Pakistan contains a range of provisions on labour rights covering humane working conditions, restrictions on women and children for certain occupations. Pakistan has ratified 34 ILO Conventions on labour standards of which 33 are in force.

Waste Management

Waste management is dealt with through environmental legislation and local governmental legislation. For both cases, solid waste management is not the primary focus. At present there are no landfill regulations or standards that can provide municipalities with some framework for compliance and monitoring. There are no National Environmental Quality Standards (NEQS, role described below)) related to waste collection points, equipment or vehicles for transportation of waste, transfer solutions, treatment or recycling facilities including sanitary or landfill sites.

National Environmental Quality Standards

National Environmental Quality Standards (NEQS) are the basic law that aims to protect and preserve the environment. The ministry has notified the following NEQS:

- *NEQS for municipal and liquid industrial effluents:* The discharge limits for municipal and liquid industrial effluents are divided into three categories, namely (i) inland waters (ii) sewage and (iii) the sea. The Standards for municipal and liquid industrial effluents set

maximum permissible limits for 32 parameters which include total dissolved solids, fluoride, sulphide, cadmium, etc.;

- *NEQS for industrial gaseous emission:* The Standards for industrial gaseous emissions cover 16 parameters including smoke, chlorine, Hydrogen Fluoride, etc. The Standards also discuss NO_x and SO_x for power plants;
- *NEQS for ambient air:* The Standards lists nine pollutants, namely SO₂, NO_x, O₃, SPM, PM₁₀, PM_{2.5}, Lead and CO whose readings are to be recorded for ambient air quality. The standards also mention reading frequency and method of measurement;
- *NEQS for drinking water:* The Standards cover drinking water criteria for bacterial, physical and chemical parameters; and
- *NEQS for noise:* The Standards for noise sets permissible limits for residential, commercial and industrial areas as well as silence zones. The limits vary according to the time of the day.

Environmental Sample Rules, 2001

The Environment Sample Rules provide federal as well as provincial EPA authority to enter premises causing environmental degradation and take samples for further analysis and action. The Rules describe the procedure for collecting and dispatching samples for analysis. These samples are primary evidence for prosecution of an offence. Where evidence suggests that environmental degradation is taking place, an Environmental Protection Order under the provisions of Section 16 of Pakistan Environmental Protection Act can be issued. Sections 102 and 103 of the Code of Criminal Procedure, 1898 are applicable to searches made under the Environment Sample Rules. A trial carried out under the Rules would be in accordance with the Code of Criminal Procedure, 1898.

Pakistan Environment Protection Agency Review of IEE/EIA Regulations, 2000

This regulation determines if an IEE or an EIA is required for any project. Schedule I of the regulation lists projects requiring IEE and Schedule II lists projects requiring an EIA. For those projects that are not listed in either of two schedules but guidelines either for construction or operation have been issued by EPA, the project proponents are required to provide an affidavit for complying with the issued guidelines. Ship breaking is not mentioned in the schedules nor has EPA issued any guidelines.

An EIA is mandatory for all projects occurring and situated in environmentally sensitive areas. Similarly projects with “adverse environmental effects” are also required to carry out an EIA. Adverse environmental effects are described as impairment of or damage to the environment

including impairment of or damage to human health and safety, biodiversity and property. It also includes pollution.

The Regulations also lay down the procedure for conducting an IEE /EIA, filing for approval and scrutiny of an IEE/EIA submitted for approval. It also describes the steps involved in conducting EIA as well as the methodology for conducting stakeholder consultations. The Regulations give EPAs up to four months for issuance of a No Objection Certificate (NOC). After the lapse of four months, project proponents can proceed on the assumptions that NOC is deemed to have been granted. Projects must comply with the mitigation measures mentioned in the IEE/EIA as well as any other conditions mentioned in the NOC.

The Pollution Charge for Industry (Calculation and Collection) Rules, 2001

The Rules describe the procedure for calculating pollution charges payable by industrial units. According Section 11 of the Environment Protection Act 1997, a pollution charge is to be levied against units that do not comply with NEQS limits. Industrial units that discharge effluent and waste or emit pollutants as well as noise in excess of NEQS are liable to pay pollution charges. The responsibility for correctly calculating and payment of pollution charges lies with the industrial unit. The charges are to be paid biannually on the basis of actual production for the last six months. The Rules cover both liquid effluents and gaseous emissions. Liquid effluents covered include COD, TSS, oil and grease, mercury, nickel, lead, copper, cadmium and pesticides/herbicides and the gaseous emissions covered are CO, NO_x, SO_x and Particulate Matter.

National Conservation Strategy

The National Conservation Strategy (NCS) was adopted in 1992 with the following objectives:

- Conservation of natural resources;
- Sustainable development; and
- Improved efficiency in the use and management of resources.

The NCS aims to achieve fundamental changes in work, lifestyle and habits by integrating environmental considerations into the decision-making process of individual Pakistanis as well as of the government. The NCS facilitates environmental early warning and awareness building of NGOs; it also targets the corporate sector in seeking their support for environmentally sensitive processes and products. The main operating principles of NCS are:

- Achieve greater public partnership in development and management – this was to be achieved through improving public awareness of environmental concerns, encouraging

public participation in amelioration of environmental issues, creating channels of communication between NGOs and governmental institutions for adequate response and strengthening the public participatory mechanism;

- Merge environment and economics in decision-making – this was to be achieved by giving the responsibility of conservation to economic managers and recommended installing environmental monitoring systems; and
- Focus on durable improvements in quality of life – this was to be achieved through balancing natural resources with population, supporting durable improvements in human settlements, preventing and controlling pollution and giving preference to biological solutions.

NCS recommended 14 program areas for priority implementation. Among them managing urban wastes, preventing/abating pollution, protecting water bodies and sustaining fisheries are of relevance.

National Environmental Policy 2005

The National Environmental Policy (NEP) provides a holistic framework for addressing environmental issues faced by the country. The Policy's goal is to protect, conserve and restore the country's environment with an aim of improving quality of life through sustainable development. The main objectives of NEP are quoted below:

- Conserve, restore and efficiently manage environmental resources;
- Integrate environmental considerations in policy making and planning processes;
- Enhance capacity of governmental agencies and other stakeholders at all levels;
- Meet international obligations effectively in line with national aspirations; and
- Launch mass awareness and mobilize communities in favour of environment.

The NEP provides guidelines for various sectors as well as cross sectors. Among the sectors mentioned in NEP, waste management and multilateral environmental agreements are relevant to this baseline study. In cross sector guidelines, environment and local governance are applicable. For waste management, NEP mentions a long list of interventions. Pertinent to this case study are:

- Enforcement of NEQS and a self-monitoring and reporting system;
- Implementation of master plans for treatment of municipal and industrial wastewater in urban and rural areas;

- Enactment and enforcement of rules and regulations for management of municipal, industrial, hazardous and hospital waste;
- Devise strategies for integrated management of municipal, industrial, hazardous and hospital waste at national, provincial and local levels;
- Develop national emergency response and accident prevention plans to prevent and mitigate the effects of accidents causing pollution;
- Provision for financial and other incentives for technology up-gradation, cleaner production technologies, implementation of pollution control and measures as well as compliance with NEQS; and
- Establishment of a marine pollution control commission.

The cross sector guidelines for environment and local governance emphasize effective environmental management at the local level. It is based upon a participatory approach involving all stakeholders to achieve the following interventions:

- Develop and implement EMPs at tehsil and district levels;
- Build/enhance capabilities of local government officials and elected representatives for effective environmental governance;
- Devolve and entrust local governments with authority for effective environmental management; and
- Establish district level sustainable development funds.

The NEP was adopted in 2005 and over the last seven years some of the interventions suggested in the policy have been adopted.

Appendix B: Hazardous materials and wastes found on ships

(Including Parts I, II and III of the Inventory of Hazardous Materials)

a) Hazardous materials contained in the ship's structure and equipment (HKC IHM, Part I)
Asbestos
Polychlorinated biphenyls (PCBs)
Ozone-depleting substances (ODSs)
Anti-fouling compounds and systems
Cadmium and cadmium compounds
Hexavalent chromium and hexavalent chromium compounds
Lead and lead compounds
Mercury and mercury compounds
Polybrominated biphenyls (PBBs)
Polybrominated diphenyl ethers (PBDEs)
Polychlorinated naphthalenes (PCNs)
Radioactive substances
Certain short-chain chlorinated paraffins

(b) Operationally generated wastes (HKC IHM, Part II):
Waste oil (sludge)
Bilge and/or waste water generated by the after-treatment systems fitted on machinery
Oily liquid cargo residues
Ballast water
Raw sewage
Treated sewage
Non-oily liquid cargo residues
Dry cargo residues
Medical/infectious waste
Incinerator ash
Garbage
Fuel tank residues
Oily solid cargo tank residues
Oily or chemical contaminated rags
Dry tank residues
Cargo residues

c) Stores including regular consumable goods (IHM, Part III). (Regular consumable goods potentially containing Hazardous Materials comprise goods which are not integral to a ship and are unlikely to be dismantled or treated at a Ship Recycling Facility.)
Acetylene

Alcohol/methylated spirits
Antifreeze fluids
Anti-seize compounds
Batteries (including lead-acid batteries)
Battery electrolyte
Boiler and feed water treatment and test reagents
Bunkers, e.g. fuel oil
Butane
Carbon dioxide
Chemical cleaner (including electrical equipment cleaner, carbon remover)
Chemical refrigerants
Deionizer-regenerating chemicals
Detergent/bleacher (potentially a liquid)
Engine coolant additives
Evaporator dosing and descaling acids
Extinguishers
Fire-fighting clothing and personal protective equipment
Fuel additive
Fuel gas
Grease
Hydraulic oil
Hydrofluorocarbons (HFCs)
Kerosene
Lubricating oil
Methane
Miscellaneous medicines
Nitrous oxide (N ₂ O)
Oxygen
Paints
Paint stabilizers/rust stabilizers
Perfluorocarbons (PFCs)
Pesticides/insecticide sprays
Propane
Solvents/thinners
Spare parts containing Hazardous Materials
Sulfur hexafluoride (SF ₆)
White spirit

Appendix C: Ship Recycling Facility Plan Elements

(From 2012 Guidelines For Safe And Environmentally Sound Ship Recycling adopted at MEPC 2/3/2012 Appendix 1: Recommended Format Of The Ship Recycling Facility Plan)

1 Facility management

- 1.1 Company information
- 1.2 Training programme
- 1.3 Worker management
- 1.4 Records management

2 Facility operation

- 2.1 Facility information
- 2.2 Permits, licences and certification
- 2.3 Acceptability of ships
- 2.4 Ship Recycling Plan (SRP) development
- 2.5 Vessel arrival management
- 2.6 Ship recycling methodology
- 2.7 Reporting upon completion

3 Worker safety and health compliance approach

- 3.1 Worker health and safety
- 3.2 Key safety and health personnel
- 3.3 Job hazard assessment
- 3.4 Prevention of adverse effects to human health
 - 3.4.1 Safe-for-entry procedures
 - 3.4.1.1 Safe-for-entry criteria
 - 3.4.1.2 Competent person for Safe-for-entry determination
 - 3.4.1.3 Safe-for-entry inspection and testing procedures
 - 3.4.1.4 Oxygen
 - 3.4.1.5 Flammable atmospheres
 - 3.4.1.6 Toxic, corrosive, irritant or fumigated atmospheres and residues
 - 3.4.1.7 Safe-for-entry determination by a competent person
 - 3.4.1.8 Safe-for-entry certificate, warning signs and labels
 - 3.4.1.9 Safe-for-entry operational measures
 - 3.4.2 Safe-for-hot-work procedures
 - 3.4.2.1 Safe-for-hot-work criteria
 - 3.4.2.2 Competent person for Safe-for-hot-work determination
 - 3.4.2.3 Safe-for-hot-work inspection, testing and determination
 - 3.4.2.4 Safe-for-hot-work certificate, warning signs and labels
 - 3.4.2.5 Safe-for-hot-work operational measures
 - 3.4.3 Welding, cutting, grinding and heating
 - 3.4.4 Drums, containers and pressure vessels
 - 3.4.5 Prevention of falling from heights and accidents caused by falling objects
 - 3.4.6 Gear and equipment for rigging and materials handling
 - 3.4.7 Housekeeping and illumination
 - 3.4.8 Maintenance and decontamination of tools and equipment
 - 3.4.9 Health and sanitation
 - 3.4.10 Personal protective equipment

- 3.4.11 Worker exposure and medical monitoring
- 3.5 Emergency preparedness and response plan
- 3.6 Fire and explosion prevention, detection and response

4 Environmental compliance approach

- 4.1 Environmental monitoring
- 4.2 Management of Hazardous Materials
 - 4.2.1 Potentially containing Hazardous Materials
 - 4.2.2 Additional sampling and analysis
 - 4.2.3 Identification, marking and labelling and potential on-board locations
 - 4.2.4 Removal, handling and remediation
 - 4.2.5 Storage and labelling after removal
 - 4.2.6 Treatment, transportation and disposal
- 4.3 Environmentally sound management of Hazardous Materials
 - 4.3.1 Asbestos and materials containing asbestos
 - 4.3.2 PCBs and materials containing PCBs
 - 4.3.3 Ozone-depleting substances (ODSs)
 - 4.3.4 Paints and coatings
 - 4.3.4.1 Anti-fouling compounds and systems (organotin compounds including tributyltin (TBT))
 - 4.3.4.2 Toxic and highly flammable paints
 - 4.3.5 Hazardous liquids, residues and sediments (such as oils, bilge, and ballast water)
 - 4.3.6 Heavy metals (lead, mercury, cadmium and hexavalent chromium)
 - 4.3.7 Other Hazardous Materials
- 4.4 Prevention of adverse effects to the environment
 - 4.4.1 Spill prevention, control and countermeasures
 - 4.4.2 Storm-water pollution prevention
 - 4.4.3 Debris prevention and control
 - 4.4.4 Incident and spills reporting procedures

Plan Attachments

- Facility Map
- Organizational Flow Chart
- Permits, Licences and Certification
- Resumes

SHIP RECYCLING PLAN

SHIP'S PARTICULARS

Type of vessel:	
Name:	
IMO Number:	
Present owner:	
Previous owner:	
Present flag:	
Classification:	
Year of built:	
Length over all:	
Width over all :	
Depth to maindeck:	
Towage draft:	
Dead weight DWT:	
Net tonnage:	
Gross tonnage:	
Light displacement tonnage:	

A. Upon arrival of (ship name...) the vessel's agency which is nominated by (ship owner will arrange arrival questionnaire and formalities at the anchorage area of the ship recycling yard.Ship Recycling yard will arrange a tug to take over the tow of the (ship name)

Before the vessel's mooring operation to the ship recycling yard, the officers/inspectors from Maritime Health Administration, Custom Enforcement office, Custom Immigration office, State Environment and Forestry regional office and HAZARDOUS Waste Management regional office will attend on board for arrival formalities and inspections.

1. The Custom enforcement officers inspect cargo holds/tanks, hatches, engine room, vessel stores, superstructure and accommodation quarters for any materials, cargo, wastes or undeclared materials which are not integral parts of the vessel.
2. The Custom Immigration police officers inspect cargo holds/tanks, hatches, engine room, vessel stores, superstructure and accommodation quarters for any illegal passengers and cargo.
3. The Environment and Forestry and Hazardous Waste Management officers inspect cargo holds/tanks, hatches, engine room, vessel stores, superstructure and accommodation quarters for solid/liquid wastes and cargo.

B. Vessel hauling and procedures performed afterwards:

The Facility has approx. depth of meters at the coastline, averaging meters at.....meters offshore and approx. meters at meters offshore.

Following custom formalities and inspections, (SHIP NAME) will be made ready for towing operation by qualified and authorized crews under control of the operation manager.

SHIP NAME will be towed by the tugboat and grounded from bow-side to the SHIP RECYLING yard shore and secured/tied by shore windlasses from forecastle, starboard side and portside bollards with wire ropes and mooring ropes in order to prevent any direction and position changes of the vessel due to weather and sea conditions.

After completion of towing and mooring operation, heavy oil booms will be laid around the vessel to avoid any oil pollution of the sea. Authorized persons will be made ready with oil spill kits on shore for any oil spillage and pollution.

C. Recycling of (ship name)

1. Measurements and reporting of radiation amount on board by an authorized and certified company.
2. Checking the inventory that was produced in the (country name) by measuring and reporting of explosive/flammable/toxic/cooling gases in the cargo tanks/holds, enclosed spaces, vessel stores, TST, ballast tanks, fuel tanks and cooling systems on board by the authorized and certified company. Depending on the measurements and reports of gases on board, a Gas-free test will be carried out to avoid any accident/explosion during cutting/dismantling of the vessel by hot work and issued a Gas-free certificate by the certified company. [Cooling gases in the system will be transferred to the gas cylinders by the authorized company and transported to the temporary storage station.] Check necessary: are there still cooling gases on board after the clean-up operation?
3. Removing and cleaning of asbestos materials on board of ship name will be done in Turkey , including the marking of remaining asbestos materials.

According to HAZMAT regulations, the certified company which is nominated by the Turkish Ship Recycling Association, will attend on board for inspection of the remaining asbestos materials on board, as specified in the inventory that was produced in the (country name,) and to check whether the clean-up operation is being done properly.

4. Repetition of gas measurements in tanks and enclosed spaces on board during the cutting progression on every other day basis, and reporting.
5. Hazardous materials in small quantities, like dry batteries, wet cell batteries, drugs, medicines, paints, marine chemicals etc. Will be removed from on board and transported to the authorized/certified temporary storage stations.
6. Liquid wastes which are risks for the environment will be removed by authorized company and transported to the temporary storage station.
7. Any kind of materials/equipment in loose and packed condition on board will be removed from on board and stored in accordance with their kinds in closed or open storage areas.
8. Moving instruments, electronic devices, machine equipment, electricity panels, pumps, anchor, chains and other navigation (sailing) equipment etc. in assembled condition will be discharged by the responsible staff and stored in accordance with their kinds in closed or opened storage areas.

9. Insulation materials like glass wool, foam, stone wool, which are not covered under the scope of dangerous wastes, will be removed from the vessel and stored in accordance with their kinds in closed or opened storage areas.
10. Insulation, ship furniture and any kind of wooden materials, which are structural parts of the ship and etc. will be removed from the ship to be dismantled before the cutting operations at place begin, and they will be stored on land.
11. Fire extinguishing-covering up systems (carbon dioxide bottles) pressured gas tubes will be taken out and dispatched by the authorized persons under the supervision of the Waste Management Center to the storage area.
12. Cables, lightening and sprinkling systems will be dismantled and removed from the ship and stored in the storage area. Cables which might contain HAZMATs and cause dioxin emissions will be removed, stored and disposed of by authorized company which is licensed. The licensed company dismantles and cut the cables from on board by special cutting equipments and tools instead of hot work or cutting by gas torches. The dismantled cables will be delivered to a licensed recycling company for peeling and separating the plastic, rubber and copper.
13. The ship deck will be closed with scupper plugs in order to prevent liquid leakages from the deck into the sea.
14. Prior to the dismantling works the fire fighting equipments will be made ready and subjected to a control and additional precautions will be ensured in accordance with the risk assessment.
15. The windlass, bollards, mooring/rigging equipments and other equipments and stores, spare parts will be removed on the forecastle deck and in the bosun store. Completion of removing these items, dismantling progress will be started from Forecastle deck and bosun stores. Each piece will be cut between 1 and 10 tons by torches. Cut pieces will be discharged by shore crane to the temporary storage, they are cut into smaller pieces for loading and transporting to the steel plants.
16. Completion of cutting the forecastle and bosun stores, (ship name) will be shifted by shore windlass to the shore in order to start for cutting the deck and make easier for discharging by shore crane to the land.
17. Start of the actual recycling operation. After shifting the vessel, the main deck will be dismantled and cut from forecastle deck . Pipes, valves and other lines will be cut. Each steel plate and construction will be cut between 5 and 15 tons and discharged by the shore crane to the storage area. Completion of dismantling main deck , the manholes will be opened and gas measurement will be carried out in TST S&P. If any explosive/toxic gas detected then

gas-free will be carried out in TST S&P. Completion of gas-free TST P&S, steel frames will be dismantled and cut.

18. Above progress will be continued until the superstructure and accommodation part are dismantled. After completion of dismantling and cutting of each cargo tanks, deck, fuel and FW tanks and equipments, the vessel will be shifted to the land from side frames of S&P of the vessel by shore windlass. Furthermore it is important to insert here how (ship recycling company name) will dismantle the cargo tanks, followed by the removal of the remaining asbestos below these tanks, under asbestos certified conditions. Furthermore it would be helpful to provide some kind of network planning or weekschedule, that makes clear that the disposal operation (removal of remaining asbestos) starts some weeks after the start of the recycling operation.
19. Dismantling of superstructure, will be started from Com. deck. Antennas and equipments on Com. Deck will be dismantled and cut. Discharged by shore crane to the shore. The top part of nav.bri.deck will be cut. Completion of cutting top of nav.bri.deck, insulation and other materials between the sides will be taken out and ashore. The steel structure of p&s of nav.bri.deck will be cut and dismantled as separate parts between 1 to 10 tons.
20. Completion of the nav.bri.deck , the dismantling progress will be continued same on Cap. Deck, boat deck, poop deck, upper deck and lower deck until to the engine room. Equipments such as windlasses, bollards, pulleys and other equipments on board will be dismantled.
21. Main engine, Aux. engine, compressors, generator sets, other equipments in the main engine room will be dismantled and ashored by shore crane from engine room to the storage area for reconditioning and cleaning. These equipments which dismantled from the main engine room will be sold as 2nd hand to the customers.
22. Completion of dismantling the main engine room , shaft and the propeller on deck will be dismantled and ashored.
23. Before dismantling of the double bottom and bottom of the vessel, the liquid wastes contained in the bottom, bilge, sludge and water etc. tanks of the ship will be removed completely, if any.
24. Before dismantling of the double bottom and bottom, We will apply to the Harbor Master for getting permission in order to start for cutting the double bottom and bottom. Upon received confirmation and permission from The Harbor Master , The double bottom and bottom will be cut.

25. Completion of dismantling the whole ship, ashore steel materials and other steel structure which we can not re-sale and use will be sold to the steel plant. Rests of the equipments which we can sell as 2nd hand as spare parts or whole will be stored in our storage are.

D. Deregistration of the vessel.

Informing the relevant Turkish authorities of the completion of the ship recycling operation, sending them proof that the **ship name** is completely dismantled in an environmentally sound manner at the yard of

Project Manager

Back Cover: Ship Recycling at Aliaga, Turkey using mechanised equipment on hard standing.
Photo: R Watkinson

