

Ship recycling

Practice and regulation today

June 2011



Lloyd's
Register

LIFE MATTERS

Cover image: Ex-USS Oriskany, a former aircraft carrier in the US Reserve Fleet, being sunk for an artificial reef off the coast of Florida. (U.S. Navy photo by Photographer's Mate 2nd Class Jeffrey P. Kraus. Image taken from Wikimedia Commons.)

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Key stakeholders

Flag state

The flag state is the government of the country whose flag a ship is entitled to fly. It is responsible for issuing all the statutory certificates that ships need to trade. This responsibility will often be delegated to what is known as a 'recognised organisation' (RO). This is an organisation which is authorised to undertake these tasks on the flag state's behalf.

International Association of Classification Societies (IACS)

IACS is an international membership organisation made up of 13 classification societies, including Lloyd's Register. Classification societies establish and apply technical standards for the design, construction and operation of ships.

International Ship Recycling Association (I.S.R.A)

I.S.R.A is an international membership organisation for recycling facilities which places emphasis on responsible practices. It has possibly the broadest knowledge and capability in ship recycling today. Other organisations may encompass more facilities and countries, but with a significant proportion of the higher end of the market, I.S.R.A has a strong position in the industry.

International Labour Organization (ILO)

The International Labour Organization is the oldest organisation of the United Nations and is responsible for drawing up and overseeing international labour standards. Its Conventions cover a vast field of law, from health and safety to workers' rights and child labour.

International Maritime Organization (IMO)

The International Maritime Organization is a specialised agency of the United Nations, with one hundred and sixty nine member states and three associate members. The Convention establishing the IMO was adopted in Geneva in 1948 and the IMO first met in 1959. Its headquarters are on the south bank of the River Thames in London.

The IMO's main task is "to develop and maintain a comprehensive regulatory framework for shipping and its remit today includes safety, environmental concerns, legal matters, technical co-operation, maritime security and the efficiency of shipping" (IMO, 2011).

The IMO's main regulatory instrument is the Convention. While many UN Conventions only operate within the boundaries of a signatory state (meaning that they cannot be enforced in countries which have not ratified them) IMO Conventions work differently. Under the 'no more

favourable treatment' clause, once a convention has entered into force, any ship trading internationally is bound to comply fully with it anywhere in the world. Any nation which is a signatory to the convention can refuse entry to its waters or harbours for ships which are not compliant, or can even arrest ships in certain conditions. These extra 'teeth' in IMO conventions are very powerful and far reaching. They also mean that the IMO is well placed to deliver regulatory requirements for ship recycling.

International Organization for Standardization (ISO)

The ISO published the ISO 30000 series of standards on management systems for ship recycling in 2009. Lloyd's Register was one of the team leaders on the project. ISO 30000 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 (ISO, 2011).

The Industry Working Group on Ship Recycling

The Industry Working Group is led by the International Chamber of Shipping (ICS) and comprises the following industry bodies: BIMCO (Baltic and International Maritime Company); IACS (International Association of Classification Societies); IPTA (International Parcel Tankers Association); ITOPF (International Tanker Owners Pollution Federation Limited); Intertanko; Intercargo; and OCIMF (Oil Companies International Marine Forum). The Working Group has been instrumental in developing the Hong Kong Ship Recycling Convention.

National authority

The national authority is the government of the country where the ship recycling facility is based. It may also delegate to a competent authority. It should be noted that this term is not used in the Hong Kong Convention but is used in this publication for clarity.

NGO Platform on Shipbreaking

This is the principal environmental pressure group involved in ship recycling, and was formed in September 2005. It is a conglomeration of several of the familiar pressure groups, such as Greenpeace and the Basel Action network, as well as bodies unique to ship recycling such as the Prevention of Hazardous Shipbreaking Initiative.

Recognised Organisation (RO)

Recognised Organisations are authorised by flag states to carry out statutory surveys and certification on their behalf. Lloyd's Register is an RO for over 140 flag states.

Introduction

This publication begins with the history of ship recycling but the main focus is on the current regulatory and structural realities of the demolition and recycling process today.

Ships have always been recycled. The fabric of a ship, whether of wood a century – and more – ago, or steel today has always had considerable value and the good news is that the shipping industry is well ahead of other industries, such as the automotive and aviation sectors, in re-using some 95–98% of a ship by weight.

But the bad news today is that even if ship recycling has been efficient in providing a ready supply of steel and other metals for re-use, there has been a cost in terms of lives lost and local environmental impact. The demolition of ships is widely associated with dangerous practices and pollution.

Cutting apart big steel structures is a complex and hazardous business. And even though a high proportion by weight of the ship's structure is re-usable, there are significant amounts of plastics and other materials that should be handled carefully and appropriately. The beaching methods most common during demolition today make it difficult to ensure safety and to contain and manage pollutants. Although hazardous materials such as asbestos are already prohibited by previous conventions, and the new Ship Recycling (Hong Kong) Convention will require that all new ships have onboard an Inventory of Hazardous Materials to assist with their handling during decommissioning, there is no requirement to design a ship so that lifecycle safety and environmental costs are considered.

A minority of owners are now seeking greater control over the conditions under which their ships are demolished and the handling and disposal of non-recyclable materials. And there will be some now who will start to consider the full environmental impact, and cost, of building, operating and recycling ships.

But for the present the market is still dominated by practices unchanged for decades. The value of ships at the end of their useful life is dominated by the prevailing freight and sale and purchase markets for ships. The economics of ship demolition and market drivers where demand for scrap steel is highest in the sub-continent, and regional labour markets and regulation that allow beaching, have created a relatively efficient market.

The old model is being challenged with a new regulatory framework – the Ship Recycling (Hong Kong) Convention is in place but has yet to be ratified – it will be some time before new, safer, methods become the norm.

One area that could be encouraged is that of better ships designs – with end-of-life solutions in mind. Lloyd's Register's Strategic Research Group is carrying out work on design for recycling. The group is looking at futuristic technologies and scenarios as they apply to shipping. Although the research is in its early stages, there is no doubt that new approaches to ship designs could help make ship recycling safer and cleaner.

One day 'recycling-friendly' ship designs will become part of the shipping industry and will contribute to increased levels of safety and efficiency in ship recycling. The big questions are, how do we ensure net safety and environmental benefits accrue so that the overall ship design lifecycle really is more sustainable?

The shipping industry is not immune from broad economic, societal and political pressures - as we have seen, with dramatic growth in interest in environmental issues - and new ship designs are very much on the agenda at present.

In a world of growing demand and with the need to use energy intelligently and cost-effectively, we need to become better at re-using materials. We need to become better at understanding where the costs are in the process of designing, building, operating and recycling ships. By recognising at the building stage the eventual certainty that every ship will need to be demolished and recycled the process will become safer.

1. Ship recycling: an introduction

A brief history

Ships have always been valuable and have always been recycled. They are the greatest assets ever moved in bulk, assets which represent such investment that entire new systems of banking and government have been designed to finance them. Given their value, it is inevitable that ships do not simply disappear once they are no longer seaworthy. The wood in the earliest dug out canoe would have provided walls and shelters, the fittings on a Viking longship would have benefited the local village where she was laid to rest, and the copper on a ship's bottom and the long, high-quality timber of her mast and strakes would have been invaluable in future construction projects. Famous examples exist in London alone: the department store Liberty is constructed from the timbers of the fighting ships HMS *Impregnable* and HMS *Hindustan*. (Liberty, 2011)

Another famous example of ship recycling was the *Fighting Temeraire*, the ship that broke the line at Trafalgar. She was famously painted by J.M.W. Turner on her way to be broken up at Beatson's yard, Rotherhithe, two miles from Lloyd's Register's Fenchurch Street offices. Records show the ship was sold for £5,500 and the copper alone was sold back to the Admiralty for £3,000.

As shipbuilding advanced, wood gave way to iron and steel. These ship metals were of the highest quality available. As a result, ship scrapping played a major part in resourcing the industrial revolution.

In 1919, the German High Seas Fleet was scuttled in Scapa Flow – a group of islands in the rough seas north of the British Isles. The value of the steel these ships contained was underlined by the dangerous conditions that people braved to retrieve it. The salvage operation began in 1922 and took almost 20 years.



The Liberty department store, London (image courtesy of Holly Keller).



The *Fighting Temeraire* tugged to her last Berth to be broken, by J.M.W. Turner (image taken from Wikimedia Commons).



A ship recycling facility in Bangladesh (Robin Townsend).



(HMS *Rodney*, *Revenge* and *Nelson* being broken in Inverkeithing in 1949. © RCAHMS (Aerofilms Collection). Licensor www.rcahms.gov.uk)



Barefooted workers carry plates manually (Robin Townsend).

World War II also left a vast amount of steel locked up in redundant warships and cargo ships (some in the US fleet are still awaiting scrapping). These ships were scrapped at places such as Inverkeithing in Britain and yielded in total approximately 500,000 tonnes of high-quality steel.

After the war, ship scrapping continued in places such as La Spezia, Italy, and Japan. However, as the ship building industry shifted eastwards in the 1970s, so did the scrapping industry.

Taiwan was the principal destination, and ships were broken literally in the centre of Kaohsiung port, until, on August 11, 1986, an explosion and fire on board the tanker *Canari* killed 14 people and injured 47 more. Due

to a huge public outcry, what had been an unregulated industry in Taiwan suddenly became subject to a major crackdown. As is typical within the waste sector, the ship scrapping industry moved, overnight.

At exactly this time, Alang, a coastal town in the Indian state of Gujarat, experienced its first major growth spurt in scrapping. Gujarat Maritime Board records the first ship scrapped at Alang as the *MV Kota Tenjung*, beached on February 13, 1983. Reports indicate that by 1989 the number of employees in Alang had reached 40,000. Bangladesh and Pakistan followed suit.

The shipping industry was slow to notice these developments. This isn't so surprising. Waste is often 'out of sight and out of mind', and when a ship changes hands for scrapping, the original owner is commonly unaware of its destination.



The International Maritime Organization (IMO) headquarters in London.

However, there was a growing realisation that working conditions at ship recycling locations were extremely hazardous, and not only in the Indian subcontinent. Will Englund from American newspaper, *The Baltimore Sun*, first became aware of the issues surrounding ship recycling in 1995 when the aircraft carrier *USS Coral Sea* was being scrapped in Brownsville. Problems with the scrapping of this ship had resulted in the company responsible being prosecuted for the first environmental violations within the US shipbreaking industry. The owner, Kerry L. Ellis, was convicted under the Clean Air and Clean Water Acts and died in prison in 2000.

Englund dug deeper. He teamed up with the Investigative reporter Gary Cohn and between them they ran a series of articles exposing the worst excesses of shipbreaking around the world. In April 1998, they won a Pulitzer Prize and today the news articles still make fascinating and engaging reading.

The road to regulation

By the late 1990s, pressure was building on the shipping industry. The 1st Global Ship Scrapping Summit was held in Amsterdam in 1999, a year after Englund and Cohn's prize win.¹ This was just one indication that attitudes were beginning to change and that the industry was realising the need for more responsible ship recycling. Another was the term 'ship recycling' being coined publicly for the first time, by Jim Davies of the International Maritime Industries Forum (IMIF). He asserted that ship recycling was actually (or potentially) an enviably efficient process – far more so than recycling within other industries at that time.

In these ways, the traditional notion of 'scrapping' started to be replaced by the more modern idea of 'recycling'² and words and worries quickly became action.

An 'Industry Working Group on Ship Recycling'³ was rapidly formed under the chairmanship of the International Chamber of Shipping (ICS), consisting of the major shipping industry bodies. This Group delivered the first practical guidance on ship recycling – the Industry Code of Practice on Ship Recycling – in August 2001. This document contained guidelines on achieving safer and more environmentally sound ship recycling, and crucially created the concept of the 'Green Passport' (or 'Inventory of Hazardous Materials'⁴ as it is now known). The Code is still in use today.

Other non-shipping legislative organisations followed the Working Group's lead and issued guidance on ship recycling. The Basel Convention⁵ published Technical Guidelines for the Environmentally Sound Management of the Full and Partial Dismantling of Ships in 2003, and the International Labour Organisation (ILO)⁶ published Safety and Health in Shipbreaking: Guidelines for Asian Countries and Turkey in 2004.

The International Maritime Organization (IMO)⁷ was also spurred on by the shipping industry's initiative. The subject was formally introduced at IMO's 43rd Marine Environmental Protection Committee (MEPC) in 1999 when Norway proposed a new work item on ship scrapping. At MEPC 44 a correspondence group was set up under the chairmanship of Bangladesh and at MEPC 46 in April 2001 a Working Group was established⁸.

¹ The Summit was organised by Mare Forum. Lloyd's Register's Chief Ship Surveyor at the time, Willem de Jong, presented on issues associated with ship recycling.

² This book uses all terms for recycling equally – scrapping, dismantling, recycling and breaking. See the glossary for historical distinctions and specific uses.

³ See 'key stakeholders' for a list of the Industry Working Group member organisations.

⁴ The Inventory of Hazardous Materials, also known as the Green Passport, is an inventory of materials present in a ship's structure, systems and equipment that may be hazardous to health or the environment. It is intended to accompany the ship throughout its life. For more information, see 'The Hong Kong Convention' and 'Recycling in practice'.

⁵ The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal came into force in 1992. It aims to protect human health and the environment against the adverse effects resulting from the generation, management, transboundary movements and disposal of hazardous and other wastes. For more information, see 'The Legislative Arena'.

⁶ See 'key stakeholders' for a description of the ILO.

⁷ See 'key stakeholders' for a description of the IMO.

⁸ There has been a Ship Recycling Working Group at every MEPC since and the subject has slowly climbed up the agenda to its present position at number three.



Shell's LNG carrier *Granatina* achieved the first 'Green Passport'.

The correspondence group recognised that the greatest potential for progress lay in building on the efforts of the Industry Working Group, and, in December 2003, the IMO published Guidelines on Ship Recycling which relied heavily on the Industry Code of Practice and introduced the Green Passport concept. The world's first 'Green Passport' was issued for the Shell LNG Tanker *Granatina* in 2004⁹.

Despite the IMO Guidelines, there was still potential for confusion for owners wishing to recycle their ships, especially given the other recycling-related legislation which existed – legislation such as the Basel Convention¹⁰. The only way forward was to create statutory requirements by developing a legally binding international convention.

The IMO set an ambitious deadline to complete this within the 2008/2009 biennium¹¹. Norway, in particular, acted very strongly in support of this and provided the first draft for discussion at MEPC 55. The text was developed over three and a half years with input from IMO member states and relevant non-governmental organisations, and in co-operation with the International Labour Organization and the Parties to the Basel Convention. Lloyd's Register, through IACS and discussions with other stakeholders, was also actively involved in the Convention's development. Such was the impetus at the IMO that the deadline was achieved and the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships was adopted in May 2009.

Like all IMO Conventions, it will only enter into force¹² when the requisite number of member states has ratified it. At the time of writing, this would be 2014 at the earliest.

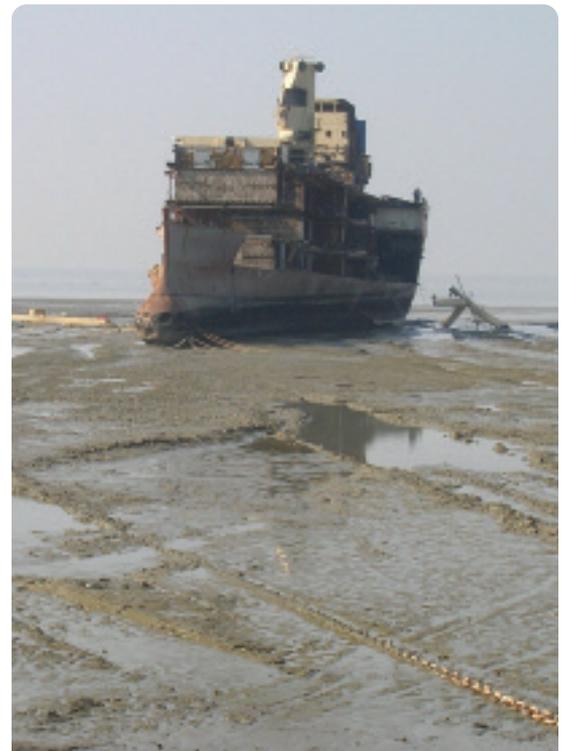
Recycling methods

Beaching

This is the process used in 95% of ship recycling today – key locations being Chittagong in Bangladesh, Alang in India and Gadani in Pakistan. What makes these areas 'hotspots' for recycling is their very big tidal ranges and expansive mudflats. This combination means that at spring tides, ships can be driven as far up the beach as possible, over the mudflats and onto the beach.

Ships often don't make it to the beach and are stranded on the mudflats. If this happens, they are pulled higher with chains or heavy steel wire hawsers at the next suitable tide after being made lighter. The chains are attached to large winches in huts on the beach, and as items and steel are removed from the ships by oxygen cutting, or similar, the winches progressively drag them up the beach. Large blocks may also be cut from the ship, released onto the mudflats and dragged individually by the winches. Once onshore, everything is cut into progressively smaller pieces and then taken from the yard by lorry.

Ship on a mud flat, with chains attached for pulling it up the beach (Robin Townsend).



⁹ Granatina's Green Passport was certified by Lloyd's Register.

¹⁰ The Basel Convention may control export and import of ships as waste. For more information, see 'The Legislative Arena'.

¹¹ UN Agencies such as the IMO operate in discrete two year blocks called 'bienniums' for organisational reasons

¹² See 'The Hong Kong Convention' for the entry into force requirements.

The steel is often cut up into roughly two by four metre pieces and then sold for 'cold rolling' although it may also be cut into inch thick square bars using hydraulic shears and used directly for re-enforcing concrete or similar materials.

The beach is generally divided up into 'plots' about 50 metres wide and up to 100 or 150 metres deep. Infrastructure is minimal: an office building, some heavy duty winches and some walls between plots if preferred. Some temporary storage facilities and areas on concrete or steel bases may exist. More sophisticated operations may have extensive offices, storage areas, concrete areas within the facility, and even large separate secondary operations areas on the shore behind the facility, which might include asbestos treatment areas, materials handling areas, medical facilities, and messing and recreational facilities. Alang, for example, now has its own fire service and hospitals as well as a very large and useful training facility on the hill overlooking the beach.

The hinterland is typically made up of worker's houses as well as shops reselling the items that come off the ship.

A large block, detached from the ship, and pulled individually up the beach (Robin Townsend).



A steel plate stockyard, the 'cash cow' for a recycling facility (Robin Townsend).

A major issue with dismantling ships on tidal mudflats is that any spills of oil or cargo remaining on board are likely to be swept out to sea by the next tide.

Slipway

This is essentially a modification of beaching but with some crucial differences. At present, the main exponent of slipway recycling is Aliaga, Turkey, although there are many small-scale and historical recycling locations which may be described as slipways, such as Inverkeithing in the UK, used after the Second World War, and other locations in Europe today.

A critical difference between beaching and today's slipway recycling is the tide. Slipway recycling, especially in the Mediterranean, is typified by virtually no tide, making the intertidal zone easier to predict and control. The ship still goes hard against the shore or, preferably, a concrete slipway extending to the sea. In either case, the lack of racing tides provides an element of control and means that any accidental spillages have a reasonable chance of being contained.

Normally pieces are removed from the ship by mobile crane working from the shore. The ship is still dragged up the shore as it is lightened, but because the tide is constant, a permanent, predictable and stable water front exists, where the lifting and access operations take place. A temporary quay or semi-permanent jetty may also be added.



A vessel being recycled alongside: the engine room is ballasted clear of the water, cranes are removing machinery, and an oil spill boom is visible (Robin Townsend).

Alongside

This approach is typified by Chinese yards. An abandoned wharf, quayside, or purpose built facility may be used. The vessel is secured alongside in the sheltered waters and pieces are removed by crane. The process is 'top down': the superstructure and upper pieces are removed first, then the work continues along the ship into the engine room until only the double bottom is left. This is called the 'canoe'.

Through a process of ballasting, and lifting, in turn, the aft and forward ends clear, this canoe is further and further reduced until it is either lifted out in one piece, or sent to dry dock for final cutting.

The local impact of any pollution is likely to be increased during alongside recycling since there is no tidal dispersal effect. However, this means that concentrations can be properly monitored, contained and cleaned if necessary.

Drydock

This is the safest, cleanest method of ship recycling but is undertaken relatively rarely due to the expense of building and maintaining drydock facilities. One of the main drydock recycling locations is Leavesley International's facility in Liverpool in the UK. The ship enters drydock and is dismantled piece by piece. On completion, the dock is cleaned and flooded again for the next ship. The chances of accidentally polluting surrounding waters are virtually zero since everything is contained by the dock. However, drydock recycling is expensive.

Key locations

Alang, India

Alang is in the upper North West of the Indian subcontinent, in the district of Gujarat. It is a typical beaching facility. Estimates vary, but it has maybe 160 potential plots for use as ship recycling facilities.

UN Special Rapporteur, Professor Okechukwu Ibeanu, visited Alang in January 2010 as part of a ten-day visit to shipbreaking yards in Alang and Mumbai, and an electronic waste facility in Roorkee. Although he acknowledged significant progress made by India, including the development of an "impressive" regulatory framework, he said that the health and safety situation was still "critical" and that training was "grossly inadequate". He also commented that the Alang Red Cross facility was not equipped for serious accidents—four medical doctors provide healthcare for 30,000 workers as well as the villages of Alang and Sosia. He added: "Semi-skilled and unskilled workers live in makeshift facilities lacking basic sanitation facilities, electricity and even safe drinking water." (Moneylife, 2010.)

At the time of writing, his final report is still awaited.

This paints a bleak picture, but while the problems in Alang are undeniable, there is some evidence of improvements. Lloyd's Register went to Alang in 2008 and visited numerous yards, as well as the training centre and the asbestos disposal facility. It was noticeable that the more work a yard had, the less organised it was, but yards showed a general awareness of the problems and were certainly taking steps to solve them. There was certainly a long way to go: many of the facilities and improvements were clearly insufficient to cope with any large scale operation, and in the case of some new facilities, it was unclear how much they were actually being used.

The asbestos disposal facility was particularly disappointing. Although what appeared to be a state-of-the-art landfill had been provided, it was obvious that the day-to-day operations fell far short of proper standards. Bags of waste were just dumped on the outside of the pit, broken and leaking everywhere. The ship recycling facility owner, who visited the asbestos landfill with the staff from Lloyd's Register recognised the problems immediately and was equally disappointed. It is understood that he later complained to the authorities who authorise the site.



A mixed asbestos and glasswool landfill (Robin Townsend).

While it was easy to see that some yards were better than others, the very nature of the operations in Alang means it is extremely difficult, in practice, to draw a definitive line between an acceptable facility and an unacceptable one. No facility can control a large spill on the intertidal zone. No facility can provide emergency vehicle access to all areas where people work, and all facilities use gravity in an uncontrollable and inherently dangerous manner to dismantle ships.

America

Ship recycling facilities in the US are subject to intense scrutiny by the US Environmental Protection Agency as well as MARAD (the US Maritime Administration), who are one of the industry's major clients.

Operational yards in the US include: All Star Metals and Esco Marine, Inc in Texas; and Marine Metals, Inc and Bay Bridge Enterprises in Maryland.

Yards in the US are understood to operate to very high standards. However, there is a price for this, and although costs have fallen – from a reported \$253 per tonne in 2001, through the AbleUK project at \$144 per tonne, to \$79 in 2007 – it is still expensive. (U. S. Department of Transportation Maritime Administration, 2008.)

Bangladesh

Lloyd's Register visited Bangladesh in January 2008 as part of a United Nations Environmental Programme (UNEP) initiative to improve global shipbreaking standards. At a high-level meeting in Dhaka discussions took place between the many and varied stakeholders, including the ILO, the World Bank, the IMO, the Basel Convention, Union representatives, local officials and pressure groups. At times these discussions became heated, and on several occasions the level of understanding between parties was worryingly low.

We visited several yards in Chittagong. In many places the situation was simply horrendous. Bare footed workers carried raw plates to lorries, clambered over piles of scrap steel or waded out into the mud. Disorganisation and confusion prevailed. Almost no safety precautions were visible. Oil was dumped in pits on the beach and workers washed in puddles. There appeared to be a total lack of understanding of any of the issues or concerns.

While the conditions were shocking, it is necessary to try and put them into context. Bangladesh is a desperately poor nation with enormous problems.



An oil pit on the beach (Robin Townsend).



Workers washing in stagnant pools of water (Robin Townsend).

Whether shipbreaking conditions in Bangladesh are significantly worse than other industry conditions in the country is difficult to judge; for example, there are good reasons why workers don't wear shoes – because they are useless when working in knee deep mud.

The overwhelming feeling throughout a visit to Bangladesh is one of sympathy for the vast number of people who live in such desperate situations: the problems in Bangladesh do not stem from shipbreaking, but they are symptomatic of the issues the country and the population face.

The ship recycling industry in Bangladesh had started to recognise the above issues when this publication was first started, and was making attempts to improve. However, in 2010 it was rapidly overtaken by outside forces and, in particular, an emerging situation in the courts of Bangladesh. This essentially led to an embargo on new ship recycling which is only just beginning to be resolved. Latest news suggests that a total redevelopment of the industry may occur elsewhere in Bangladesh.

Pakistan

Due to the political situation in Pakistan, the country's recycling facilities have not been explored

in detail. However, with the difficulties in Bangladesh Pakistan's influence is increasing.

China

China is rapidly accelerating its capability in ship recycling. The country cannot fail to impress with its best facilities and the combination of scrapping price, quality and volume is unmatched anywhere in the world.

Beaching is banned in China and ship recycling is undertaken alongside. The whole process is controlled, from ship to landfill. Yards are relatively strongly regulated by the government and can also be subject to intense scrutiny from the local authorities.

Lloyd's Register has visited yards in Shanghai and Guangzhou, and the levels of safety, welfare and environmental awareness are excellent. They take pride in their membership of the International Ship Recycling Association (I.S.R.A), and their high standards are often achieved with considerable co-operation and involvement from the owners or their representatives; an approach which is to be recommended.

They have also benefited from a very high standard of existing infrastructure and a good deal of further investment. The facility in Guangzhou, for example, has a plant dedicated to dealing with paint on plate¹³.



An oily equipment/oily block treatment/cleaning area. Note the steel plate which provides further protection to the concrete floor. This area is exceptionally clean despite constant use, due to the yard's commitment to quality (Robin Townsend).

¹³ Paint on plate is a major problem if the paint contains materials that mean the paint must be stripped from the steel. This can be very difficult or expensive and so this yard has designed a purpose built processing plant.



Recycling facilities in Aliaga, Turkey (Robin Townsend).

Turkey

The Turkish government only allows ship recycling in Aliaga, near Izmir, on the west coast. There are between nineteen and twenty-one facilities active on this short peninsular stretch of the Mediterranean. This concentration of yards allows Turkey to centrally control many of the hazardous activities.

Because the Mediterranean has such a small tidal range – the maximum tide is roughly two feet (60 cms) – the yards at Aliaga are able to control the inter-tidal zone and use a slipway approach. Hard standing can be permanently provided and large areas of the yards are concreted to a considerable depth with permanent drainage systems to protect the sea. Booms and spills will also not be swept away.

All of the yards Lloyd's Register has visited in Turkey remove pieces from ships in small sections by crane rather than allowing huge sections to fall under gravity, as is the practice in Alang and Chittagong. Because of the low tidal range, access to the ship on the waterfront is constant and emergency vehicles can always get through. It is also mandatory that water for firefighting is maintained on deck and throughout the yard – something that is impossible if your ship beaches two hundred yards offshore on a tidal mudflat.

Several Turkish yards have been the subject of intense scrutiny by high-profile industry stakeholders and experts, including major class societies (in the ship recycling field), European governments and owners.

These investigations have not found Turkish yards to be perfect, but they have found the facilities extremely keen to improve and, under the correct conditions, to provide a reasonable level of ship recycling. The findings have been borne out through the experiences of both the UK and German navies which have used Turkish yards to dismantle their ships under a high level of scrutiny.

All the above means that Turkey may present a reasonable compromise when balancing the various elements of ship recycling, including OECD/non-OECD¹⁴ export and import requirements; prevailing legislation; investment in facility infrastructure; and safety, environment and welfare standards.

Though Turkey may not be able to match the prices in the subcontinent, the country is certainly building a reputation with discerning clients. Like Chinese yards, Turkey's facilities also generally maintain a high level of involvement with the owner, helping to inspire user confidence.

¹⁴ The Organisation for Economic Co-operation and Development is a body founded in 1961, which provides a forum for governments to seek solutions to common problems. The membership is essentially made up of European nations. America, Canada, Australia, New Zealand, Korea, Chile, Israel, Mexico, Turkey, Japan, Russia, China, India and others are working on the complex membership criteria which must be met in order to join.

2. The legislative arena

The Hong Kong Convention

The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships was adopted in May 2009. "It is aimed at ensuring that ships, when being recycled after reaching the end of their operational lives, do not pose any unnecessary risk to human health and safety or to the environment.

The Convention intends to address all the issues around ship recycling, including the fact that ships sold for scrapping may contain environmentally hazardous substances such as asbestos, heavy metals, hydrocarbons, ozone-depleting substances and others. It will address concerns raised about the working and environmental conditions at many of the world's ship recycling locations.

Regulations in the 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.

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, additional surveys during the life of the ship, and a final survey prior to recycling.

Ship recycling facilities will be required to provide a "Ship Recycling Plan", to specify 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." (IMO, 2011).

Guidelines on implementation

Now that the Convention has been adopted, a series of guidelines are being developed to assist in its implementation. In practice, these should give member states assurance that they will be able to operate fairly within the Convention and confidence in ratifying it.

Although guidelines tend to be 'non-mandatory', many flag states will make these a mandatory part of their enforcement regime – especially when it comes to judging the activities or procedures of recognised organisations.

At present, the guidelines are extremely long and are the subject of sometimes heated debate within the IMO. It is inevitable that their completion will require compromise, and therefore they will not ideally suit all parties. In practice, this may lead to problems with implementation. In these situations, IACS will sometimes publish 'Unified Interpretations'. These clarify how IACS members will act in a particular instance. Such 'Unified Interpretations' are so important that formal review of them is often part of IMO sub-committee agendas.



The conference centre in Hong Kong where the Convention was adopted in 2009.

Entry into force conditions

As with all Conventions, the Hong Kong Convention text includes 'entry into force' conditions. Until these are met, the Convention does not exist as international law. Nor can it be amended. This creates an interesting interim period, during which any shortcomings identified in the text cannot be addressed.

The extract (right) from the Convention details the conditions, some of which are particularly unusual.

The first thing to notice is that the Convention only enters into force 24 months **after** the entry into force conditions are met.

Also, though the 'percentage of gross tonnage' condition in Article 17.1.2 is a standard one, the figure of 40% is unusually high. At the meeting in Hong Kong, several members wanted this percentage to be even higher. It is a difficult balancing act.

It is the final requirement which is the most interesting. It is unique among IMO conventions and is derived from a paper (SR/CONF/41) submitted by one of the members which included various recycling capacity parameters, including the number and tonnage of ships scrapped each year and the maximum possible throughput.

The premise of the requirement is simple: for the Convention to enter into force, the members who are already party to it must be able to demonstrate that they have sufficient scrapping capacity.

The role of the owner

Shipowners must comply with the Hong Kong Convention once it enters into force. That much seems simple, but there are a number of complicating questions:

1. *What, or who, is a shipowner?*

This question has huge consequences. The Convention states that the definition: "...also includes those who have ownership of the ship for a limited period pending

Article

Entry into force

- 1 This Convention shall enter force 24 months after the date on which the following conditions are met:
 - 1 not less than 15 States have either signed it without reservation as to ratification, acceptance or approval, or have deposited the requisite instrument of ratification, acceptance, approval or accession in accordance with Article 16;
 - 2 the combined merchant fleets of the States mentioned in paragraph 1.1 constitute not less than 40 per cent of the gross tonnage of the world's merchant shipping; and
 - 3 the combined maximum annual ship recycling volume of the States mentioned in paragraph 1.1 during the preceding 10 years constitutes not less than 3 per cent of the gross tonnage of the combined merchant shipping of the same States.

its sale or handing over to a Ship Recycling Facility." This is slightly different from our familiar image of a shipowner, if indeed there ever was one. The definition includes the cash buyer and it is clearly the intention to make the buyer responsible as a shipowner.

2. *When is a ship not a ship?*

The Basel Convention has determined that a ship may be a waste on its final voyage. The full impact of this is not properly understood: perhaps it is a ship and a waste at the same time, but who decides this? If it is decided that the ship is a waste, how does the Basel Convention apply? To date, this problem has largely been ignored since shipowners do not go marching to the local port authority and declare the ship is about to go on its final voyage.

However this may not be the case when a ship is sold 'as is, where is'¹⁵ for scrap. This traditional declaration is now a clear signal that the ship is going for scrap and therefore could be considered a waste. This statement will have to be very carefully considered in future.

3. *How is the ship sold?*

The process of how a ship sold for scrap gets from its last trading journey to the yard has many interesting permutations. As mentioned above, it may be sold 'as is, where is' for scrap, or sailed by the long-time owner with the original crew, or anything in between. Sometimes a traditional broker will be involved although there are brokers who specialise in buying for scrap.

¹⁵ 'As is, where is' is a phrase used when a ship is advertised for sale in unspecified condition, at the port where she is presently lying, and when the seller gives no guarantee of the ship condition and will not move it to another port for sale. Everything about the ship is the responsibility of the buyer. The vessel may even be under arrest or in such bad condition that she cannot move – it is up to the potential buyer to investigate.



Spy cartoon of a shipowner – Sir Charles Cayzer, 1904 (Getty Images)

However, selling a ship for scrap is normally where the ‘cash buyer’ comes in. The industry has long recognised the unique risks involved in selling ships for scrap, and this is how the cash buyer has become so prevalent. He buys the ship, essentially for scrap, and assumes all the risks of the transactions. He negotiates with both parties but without necessarily advising them of the details since it is his risk and his profit. He will know a large number of scrap yards and will be negotiating with several of these as he negotiates the price with the owner. Sometimes he will buy a ship without negotiating a firm deal with a yard. In any case, from the time he signs a contract and pays the owner, to the time he is paid for delivering a ship to a yard, the money and the risk are all his. The cash buyer can make and lose an awful lot of money very quickly.

4. How is the ship certified, insured and financed?

If there are so many different ways to define the owner and the ship, then how is the ship insured, who is it flagged with and is it classed? Often the ship completes the required operations so quickly that the questions become irrelevant, but now, under the Convention, the details are under far greater scrutiny.

This must be recognised in the business contracts between the parties buying and selling the ship.

There will be problems when the process is not managed correctly. Owners, bank managers, insurers, class societies, authorities, lawyers and brokers need to reassess their traditional interpretations and act accordingly.

The Basel Convention (BC)

The ‘Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal’ was completed in the late 1980s and came into force in 1992.

It is a very important piece of international law, and its legal position in Europe is effectively enshrined in the European Waste Shipment Regulations (EWSR). Of potentially equal importance is a piece of proposed follow-up legislation called the ‘ban amendment’.

This states that it is illegal to transport waste from an OECD country to a non-OECD country. While this amendment has not come into force, several countries have ratified it, including the whole of the EU, which means it is law for all EU countries. It is also law for China and Turkey, but not India. Coupled with this amendment is a decision by the Basel Convention that a ship ‘may’ be defined as waste because of the hazardous materials it contains.

The combination of these two elements – the ban amendment and the definition of a ship as waste – means that if you declare your intention to dispose of a ship, and you are in a port of an OECD country which has ratified the ban amendment, it might be illegal for you to send your ship for recycling in a non-OECD country.

However, the Basel Convention can only really be applied after the law has been broken, making it ineffective in a fluid international industry such as shipping, since it is unlikely that an owner would deliberately declare an intent to contravene the legislation. Although, as mentioned before, a sale ‘as is, where is’ for scrap is increasingly likely to be interpreted as a declaration in the future.

It is generally acknowledged that the Basel Convention is difficult to put into practice for ships.

The position of the EU

The European Union, as per policy set by the European Commission (EC) and acting on advice from EMSA among others, has noted that a very large proportion of ships going for recycling are EU member state-flagged. They are accordingly determined to act. The EU communication ‘A Strategy for better ship dismantling’ was adopted in 2009, following the 2007 Green Paper on better ship dismantling, as well as subsequent consultations and stakeholder meetings. Although the final outcomes of this strategy are unknown, there is a clear emphasis on unilateral action, early implementation of the Hong Kong Convention and funding through mechanisms such as taxes or port dues.

In particular, the strategy

- points out that end-of-life ships should be regarded as hazardous waste, as a result of the many hazardous substances contained in such ships, and should therefore fall within the scope of the Basel Convention
- calls for an explicit prohibition on 'beaching' of end-of-life ships
- stresses that the Ship Recycling Convention should be evaluated with regard to a level of control equivalent to the Basel Convention
- calls for a funding mechanism that is based on mandatory contributions from the shipping industry and is in line with the producer responsibility principle.

These points might well lead us to believe that there is a likelihood of stricter unilateral requirements within the EU. They also raise some practical issues.

Firstly, calling ships waste under the Basel Convention also invokes the European Waste Shipment Regulations. At the very least, this would restrict movement of ships from the European Union to non-OECD countries outside the EU, and at the most it could cause any movement of the ship to require an individual license.

Second, prohibiting beaching outlaws up to 95% of present recycling and business capacity, with no known practical replacement.

Third, evaluating the Convention independently against the levels of control of the Basel Convention is extremely risky. One of the aims of the Hong Kong Convention was to provide an equivalent level of control – therefore any indication from the EU that it didn't find equivalent levels may complicate matters.

Finally, independent funding mechanisms are always highly contentious and are often very strongly resisted.

However, the message given by the European Commission's Head of Waste Management, Mr Julio Garcia Burques, at the sixth Annual Ship Recycling Conference in June 2011 is that the Hong Kong Convention is at least equivalent to the Basel Convention. Furthermore, the EC recognises in the interim period that it is not appropriate to follow an ineffective regime.

The International Labour Organization (ILO)

The International Labour Organization is the oldest organisation of the United Nations, and its Conventions cover a vast field of law from health and safety to workers' rights and child labour.

Some of the major ILO conventions are still not ratified by the principal ship breaking nations (see Table 1). Despite this, the ILO's expertise in labour matters means it has an important role to play in ship recycling.

Convention number and title	Year of adoption	Ratification status
C138 Minimum Age	1973	Ratified by 155 nations, but not Bangladesh, India or the USA. ¹⁶
C87 Freedom of Association and Protection of the Right to Organise	1948	Ratified by all of Europe except Yugoslavia. Not ratified by India, China, the US or New Zealand.
C155 Occupational Safety and Health	1981	Only ratified by Turkey and China among the major ship recycling nations.
C81 Labour Inspection	1947	Ratified by 141 countries, but not the US or India.
C95 Protection of Wages	1949	Not ratified by Bangladesh, India, China, Pakistan or the US.

Table 1: Ratification status of ILO Conventions (ILO, 2006).

¹⁶ Bangladesh and the USA have ratified the Worst forms of child labour Convention, 1999 C182.

3. Case studies

European yards

Approximately 35% of ships going for recycling are of 'European flag, ownership or Origin' and the EC is at the forefront of formulating relevant strategies and policy. It is therefore essential to examine European yards and government-owned ships.

COWITREN's 2004 study on Oil Tanker Phase Out and the Ship Scrapping Industry listed the following recycling facilities in Europe.

- Simont S.p.a. (Naples, Italy)
- Van Heygen Recycling S.A. (Gent, Belgium)
- Scheepssloperij Nederland B.V. (Gravendeel, Holland)

In 2006, the study was updated to include:

- three facilities in Denmark – Fornaes, Jatop, Smedegaarden in Grenaa and Frederikshavn – which recycle smaller vessels up to 150 metres in length
- two facilities in Greece (Bacopoulos and Savvas Pireus) which recycle smaller vessels
- Undoris JSC (Klaipeda) in Lithuania
- Gdansk shipyard in Poland, which has recycled several naval vessels
- Desguaces de la Arena (Soto del Barco) in Spain, which can dismantle vessels up to 220 metres in length¹⁷
- two facilities in Bulgaria at Varna and Burgas
- 19 yards in Aliaga, Turkey, and
- Aker-Kvaerner (Stord near Stavanger) in Norway, which recycles mainly oil-rigs.

The following European yards are worth exploring in more detail.

Van Heygen Recycling S.A.

The big catch for Van Heygen was (HMS) *Fearless* in 2009. This was quickly followed by *Rame Head* and in late December 2009 *Brambleleaf*. All these ships are major UK warships or Royal Fleet Auxiliaries and represent a very considerable involvement with UK government-owned vessels. The Port of Ghent reports that in 2008 Van Heygen recycled 14,000 tonnes of steel, so while not matching the larger yards, it still has significant capability.

Scheepssloperij Nederland B.V.

This is another yard in Northern Europe that is small but technologically advanced. Scheepssloperij has recycled a significant number of nuclear fuel carriers, one of which is *Pacific Teal*. Because of their service history, recycling these ships is a highly significant achievement; every part of the process for *Pacific Teal* had to stand up to greater scrutiny than would have been the case with an ordinary cargo ship or tanker.

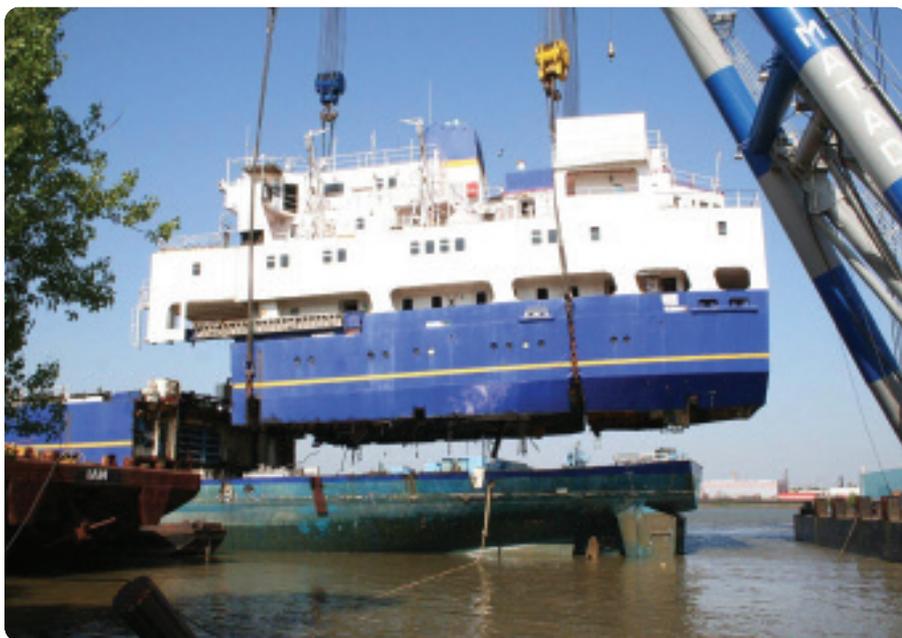
The yard also formed part of the consortium that took on the recycling duties for the technically difficult aft section of *MSC Napoli*.

Harland and Wolff

This yard was not listed in the COWITREN study because it was not recycling ships at the time.

But it has two relevant claims to fame. The first is that it took care of the problematical forward section of *MSC Napoli* which grounded off the South coast of the UK in January 2007. The second is its superb and unusual dry dock. The famous dock is very large but can be divided lengthwise into sections at various intervals. This means that a ship being recycled need not use the whole dock. Instead, the ship can be left at the 'landward' section and the seaward end can be flooded and dried out in the normal fashion so that other operations such as repair work can take place.

¹⁷ Several other yards for smaller ships exist along the Northern coast of Spain.



Lifting an aft section of *Pacific Teal* clear. (Image courtesy of Scheepssloperij Nederland BV.)



Submarines being recycled at the Scheepssloperij facility. (Image courtesy of Scheepssloperij Nederland BV.)



Intrepid arriving at Leavesley's facility and being broken. (Images courtesy of Leavesley International.)

The Leavesley Group

Leavesley was always very well known in the disposal market, but not for ships. This all changed when the UK Ministry of Defence tendered for the recycling of (HMS) *Intrepid*. Leavesley achieved 'preferred bidder' status although they did not have a recycling facility at the time. However, the group soon formed an arrangement with the Canada Graving Dock in Liverpool.

Intrepid was successfully dismantled in 2008. Since then the group has gone on to recycle *Grey Rover* and *Sir Percivale*. Along with successful projects in Turkey and other parts of Europe, this is an example of the UK government successfully using yards to properly dismantle its ships¹⁸.

¹⁸ Another example is Leyal, in Turkey (see page 22).

MV *Fedra* broken in half adjacent to the Europa Point lighthouse, Gibraltar. (Copyright Stephen Bennett and licensed for reuse under a Creative Commons Licence)



**Cammell Laird, Gibraltar
(renamed Gibdock in December 2009)**

In 2008, the bulk carrier *Fedra* suffered engine failure in a storm and was blown hard up against the Rock of Gibraltar where she broke in two.

Cammell Laird, in Gibraltar, won the contract to dismantle the vessel and faced considerable challenges. The yard, although it had a large footprint, did not have the individual spaces or facilities for a recycling project of this size. Despite this, when Lloyd's Register visited the yard in March 2009 they had found innovative solutions to these issues. Their practical, 'can do' approach is to be applauded.

A particular problem was the small space alongside the quay: this was solved by cutting the ship into very small pieces before removing them. Meanwhile, the issue of providing areas to reprocess these smaller pieces with adequate protection for run off and spills

was solved by using temporary concrete bunds with heavy plastic matting and deep sand.

The yard also specialises in high-quality yacht maintenance and therefore needs to demonstrate high environmental standards to its clients. Its ISO 14001 management system allows the yard to identify its critical environmental aspects and their likely significant impacts, and to demonstrate how these are controlled.

Leyal – Aliaga, Turkey

Leyal Ship Recycling Facility has worked extremely hard to demonstrate compliance with stakeholder's requirements and to assist in the development of practical and realistic standards. In 2010, Lloyd's Register completed a ship recycling project with Leyal which allowed the facility to demonstrate that the ship was dismantled in accordance with the owner's specifications. Such benchmark projects are the way forward in the interim period before the Hong Kong Convention enters into force.

Leyal recycling facility in Aliaga, Turkey (Robin Townsend)



Le Clemenceau at AbleUK – taken from outside the yard.
(Copyright Paul Buckingham and licensed for reuse under a Creative Commons Licence.)



Ships

Le Clemenceau

This is the concise version of a very convoluted story.

The aircraft carrier, *Le Clemenceau*, was the pride of the French fleet. After years of successful service her life came to an end in 1997 and a solution had to be found for her disposal. Unfortunately, given the ship's age, there was a very high risk of her containing large amounts of asbestos, as well as PCBs, residual ozone-depleting substances, tributyltin anti fouling agents and a myriad of other hazards.

The ship was sold to a commercial company that tried to recycle her in Turkey, but this fell through and she was in fact arrested by the French authorities and returned to Toulon. There, operations began to pre-clean the ship and remove asbestos. When a member of Lloyd's Register staff visited the ship there was evidence of the removal of vast amounts of material.

Next, the vessel was sent for dismantling at Alang. A number of 'complaints' followed which 'came to a head' on February 15, 2006, when President Chirac, coincidentally on a state visit to India, ordered her back to France.

Le Clemenceau returned via the cape to Brest in North West France. At this point projections of the total cost of recycling the ship were hovering around the 60 million euro mark.

She stayed in Brest for quite some time, her future unclear, until she was finally sold to AbleUK for dismantling, arriving there in February 2009. It is interesting to note that the Inventory of Hazardous Materials for this ship is widely rumoured to have cost one million euros. Nobody will advise how accurate it was or how much use it was in the recycling process.

The same member of Lloyd's Register staff visited the ship again in summer 2009 and was very impressed with the operations. Hazardous materials were managed very effectively by utilising the natural features of the ship, particularly the huge hangar spaces below deck: these were in use for temporary storage and management of material and contributed very effectively to the overall recycling operation. This was a good example of a capable yard using the unique features of a ship or a facility to their advantage.

Independence/Oceanic/Platinum II

This vessel was built in Bethlehem Shipbuilding yard in the early 1950s. Originally named the *SS Independence* she had a long and illustrious career as an ocean liner, and later as a cruise ship.

At the end of her life she was laid up in San Francisco, her future unknown. When she finally left the US it was claimed that she was headed for scrapping and contained PCBs, and was therefore an illegal export.

A complaint was brought against the owners by the US Environmental Protection Agency (EPA). The matter was filed on January 28, 2009, with a 'Consent Agreement and Final Order' between the EPA and respondents Global Shipping, LLC and Global Marketing Systems, Inc., without admitting liability, to the value of \$518,500. (Docket number: TSCA-09-2008-0003).

This is an important case, because, although no offences were proved in court, it demonstrated the potential for government bodies to bring complaints against shipowners, and is especially relevant to the liabilities involving PCBs.

Blue Lady

This is another complicated case. *Blue Lady*, originally named *SS France*, was a prestigious ocean liner. She was built in the famous Chantiers de L'Atlantique shipyard in Saint-Nazaire and delivered in 1962. After a glittering career alongside the great liners of her day, such as *Queen Elizabeth II*, she was sold to Norwegian owners, refitted and named *SS Norway*. She continued in service under this name until her career came to a tragic end in 2003 when a boiler explosion occurred alongside in Miami, killing eight people. In November of the same year, the owner declared she would "never sail again", a phrase which today should set Basel Convention alarm bells ringing.

After this, things became very confusing. The ship had been towed to Bremerhaven but now set off in the direction of the East, moving from one location to the next and passing through a series of owners. She was refused entry to Bangladesh, had a brief stay in the famous anchorage of Fujairah, and then arrived off Alang, renamed *Blue Lady*.



Blue Lady on the beach at Alang. Note the missing forward superstructure, and the holes cut for light and ventilation. (Robin Townsend)

There were a number of problems with *Blue Lady*. She had been built at a time when asbestos was in widespread use. The French, and especially the unions, recognised this fact, and wanted to take responsibility for it¹⁹. There were demonstrations in France against the ongoing risks from asbestos.

Another issue which found its way into the public eye was the amount of radioactive material on board, presumably in the form of ionising smoke detectors. This can be a sensitive issue in Gujarat.

Despite these problems, the ship was finally recycled in Alang. She was in fact 'parked' on the beach during a visit there by Lloyd's Register. The Lloyd's Register staff met some of the consultants responsible for her Ship Recycling Plan and also saw the Plan itself.

Tor Anglia

This is an interesting case, since it demonstrates what owners may have to do to be fully compliant. From 1988, this ro-ro vessel was owned and operated by DFDS Tor Line, and in early 2010 the company arranged for her to be recycled in China. The following excerpt from Lloyds List in March 2010 highlights the issues DFDS faced:

"The owners intended to recycle this ageing ro-ro in China and informed the Danish authorities accordingly. The Danish authorities applied the letter of European law and treated the entire vessel as a waste and not a ship.

The owner was thus forced to ship all wastes from the final voyage back to Europe, even including bilge water despite the fact that under normal MARPOL conditions this should easily be sent to a discharge facility in port.

Other 'remotely toxic' substances will have to be shipped back to Scandinavia.

Despite its decision to have the vessel recycled in China rather than run up a beach, DFDS still found itself facing strong criticism in Denmark".

A couple of things about this case are confusing. Firstly, if the ship was a waste, why, under European Waste Shipment Regulations, was it allowed to go to a non-OECD country at all,²⁰ Secondly, how did the Danish authorities intend to enforce the regulations since the ship was in Fujairah, and could simply, and legally, have changed flag to any other country?

In this example, an impartial observer might conclude that the owner appeared to have acted responsibly and proactively, and was repaid for his good intentions with some highly impractical and inconsistent bureaucracy.²⁰

The US Reserve fleet

The US Navy has a large reserve fleet, split over three principal locations. The James River Fleet and the Beaumont Reserve Fleet are on the East Coast, and the Suisan Bay²¹ Reserve Fleet is near San Francisco on the West Coast. Many of these vessels are very old, in poor shape and in need of recycling.

The US has a working disposal process and has properly identified yards and processes to dispose of these ships. Indeed, it is understood to be successfully reducing the number of obsolete vessels through its phase-out programme. It has developed world-leading techniques and a wealth of expertise in recycling which could prove very useful to the rest of the world. The only major concern is cost.

¹⁹ During Lloyd's Register's time in the yard, very large concessions were made to workers who had potentially been exposed to asbestos during work in the yard.

²⁰ If he had simply ignored his responsibilities and sold his ship to a beach, he would probably have received more money and less hassle. The case shows what a minefield even the most conscientious owner enters. Hopefully, it will not deter others from following a responsible ship recycling route. To be fair to those applying the regulations, it also offers an insight into the very difficult legislative position such ships create. It is not the fault of the enforcers – it is the fault of the difficult legislation.

²¹ Spellings of Suisan vary: Suisun is also found.

A contract has recently been awarded for three of these 'victory' ships, at a cost of \$3.4 million to the US tax payer. This is an almost identical figure to the revenue per tonne of ships recycled in countries such as India.

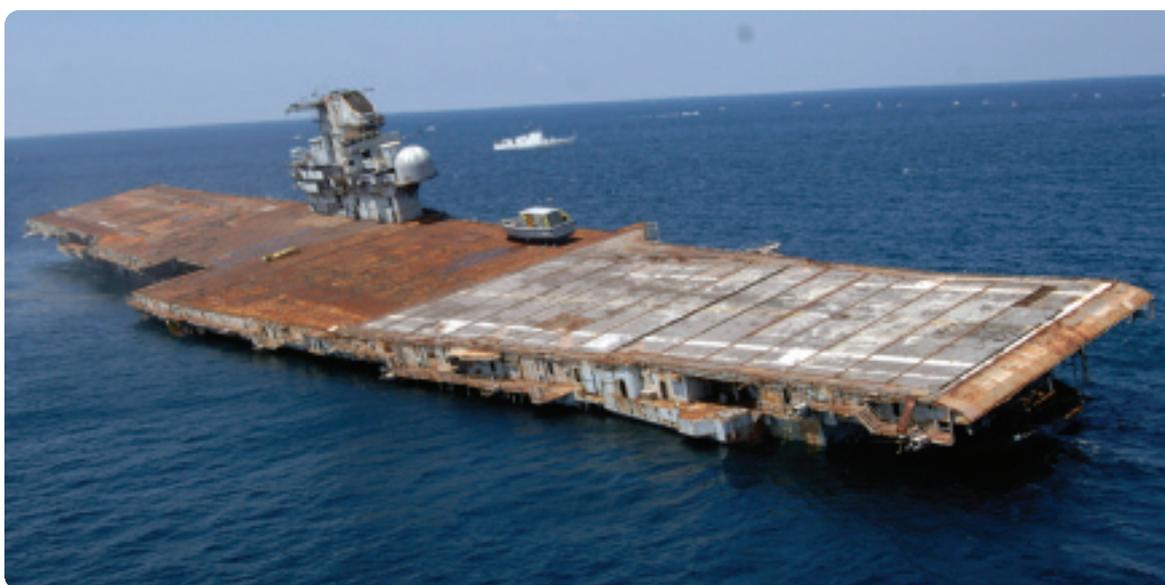
One of the major US ship recycling sites is the area in and around Brownsville, Texas, which is inland from the Gulf of Mexico. Moving West Coast Reserve Fleet vessels to this site for recycling can cause problems due to marine growth. The underwater hulls are therefore carefully cleaned in drydock.

The US has also identified problems with PCBs on board the ships and carries out thorough checks for these hazards, placing great demands on the recyclers for managing them properly.

As well as recycling at locations like Brownsville, the US Navy has also successfully used the 'reefing' method for the Reserve Fleet. The ship is cleaned of all its hazards, suitably prepared and then sunk in a suitable location as an artificial reef. This technique has also been used in the UK (with HMS *Scylla*) and other countries.



Pan American Victory transiting the Panama Canal on her way to be recycled. (Copyright Henk van der Linden).



Ex-USS *Oriskany*, a former aircraft carrier in the US Reserve Fleet, being sunk for an artificial reef off the coast of Florida. (U.S. Navy photo by Photographer's Mate 2nd Class Jeffrey P. Kraus. Image taken from Wikimedia Commons.)

4. Ship recycling in practice

The recycling process through life

Design for recycling

The concept of design for recycling has always been on the industry and regulatory agendas; it is referenced in the Industry Code of Practice and the IMO guidelines. The principle is to design the ship so that the recycling process is as safe, efficient and environmentally sound as possible once it reaches the end of its life.

But design for recycling also reduces risk throughout the ship's life. A ship designed with fewer hazards, which are clearly identified, is a safer ship for builders, crew, visitors, passengers, buyers and recyclers. It will be more reliable to operate, easier to train crew for, and will provide greater confidence and reduced liability.

Design for recycling has three key objectives:

1. To reduce or replace hazardous materials.
2. To accurately provide an Inventory of Hazardous Materials.
3. To make the ship easy to dismantle.



Cryogenic insulation on board an LNG ship – commonly blown using CFCs (Robin Townsend).

1. Reduce or Replace Hazardous Materials

Reducing or replacing hazardous materials depends on finding suitable substitutes. The rewards are potentially vast. If we had prohibited asbestos in the 1970s and used suitable replacements, the savings both in terms of lives and money would have been spectacular.

However, finding replacements can be difficult. Historically, many hazardous materials were used because of their superior performance. Asbestos, for example, not only has fire retardant and heat accepting characteristics, but also has additional strength due to the nature of its fibres. It made materials stronger as well as more heat resistant.

Similarly, CFC gases produced plastic with superior insulating properties, suitable for use in cryogenic insulation on board LNG ships. It was cheap and reliable and maintained its superior performance over decades. It has taken many years of research and expense to find suitable substitutes and even then, their long term performance is uncertain.

2. Accurately provide an Inventory of Hazardous Materials

An IHM will be mandatory for newbuilds once the Convention is in force. While compiling one is not an easy task, it is far easier and more accurate for newbuilds than for existing ships.

The Convention focuses on two lists of hazards which must be included in the IHM. These are Appendix 1 and Appendix 2. Appendix 1 materials - at Lloyd's Register we refer to these as 'the big four' - are asbestos, PCB, TBT antifouling and ozone-depleting substances. These are hazards with undisputedly dangerous properties which are already restricted or banned by existing international legislation. This makes them easy to deal with when compiling an IHM for a newbuild, since the ship should not contain them.

Appendix 2 is more complicated. These materials are not restricted by the Convention, but must be listed. This may lead some people to question the Appendix's value; although it is useful to know where hazards are, it is arguably more useful to control them in some way, as with the bans imposed by Appendix 1.

Any hazardous materials listed in Appendix 1
Cadmium and cadmium compounds
Hexavalent chromium and hexavalent chromium compounds
Lead and lead compounds
Mercury and mercury compounds
Polybrominated biphenyl (PPBs)
Polybrominated diphenyl ethers (PPDEs)
Polybrominated naphthalenes (no more than 3 chlorine atoms)
Radioactive substances
Certain shortchain chlorinated paraffins (alkanes, C10–C13, chloro)

Appendix 2 of the Hong Kong Convention.

For Appendix 2 materials, capturing and verifying the supply chain information from the relevant sub-contractors and sub-suppliers is crucial.²²

3. Make the ship easy to dismantle

This is the least straightforward objective. There is no 'easy' dismantling solution at the moment but research is ongoing. We are conducting two research projects on the subject. One is looking at how the manufacturing process can be used to facilitate effective and safe ship dismantling, and is focusing on concepts such as equipment and system segregation, dismantling techniques, and drawing management. The other is looking at how lifecycle assessment techniques can be used to derive the most benefit from these concepts through a ship's life.

Operation

Inventory of Hazardous Materials for existing ships

As IACS has stated many times at the IMO, it is impossible to provide an accurate inventory of all the hazardous materials on an existing ship. You simply cannot sample, or find documents for, everything on board, especially in the case of materials locked away beneath others.

Finding and quantifying Appendix 2 materials presents particular difficulties, not just for existing ships but for newbuilds too. The heavy metals and their compounds – those made up of lead, cadmium, hexavalent chromium or mercury – are a case in point. These are commonly found on ships and though the Convention does specify threshold value limits for them, they are not high enough to exclude most from inclusion in the IHM.

Solder is just one example. It is commonly made up of around 40% to 60% lead, if not more, and may be present all over a ship. Listing every single piece is a hugely impractical, if not impossible, task.

But listing it is not the only difficulty. For solder and many other items in Appendix 2 it is also unclear how they even pose a danger on board ships. Hexavalent chromium²³, for example, is a serious pollutant which can have very nasty effects on human health in land-based applications, but on board a ship it is mainly used to paint ballast pipes. In this form, it presents very little risk.²⁴

It is clear that Appendix 2 requires further work at IMO and it is likely that yards and owners will have great difficulty with it²⁵. Hopefully, these weaknesses will be recognised and addressed during the interim period before ratification²⁶.

Other materials in Appendix 2 are more obvious and familiar inclusions, and are easier to find and list, though they also present little risk when properly contained and managed. These include unalloyed liquid mercury, used in thermometers or tilt switches, and Americium 241, a radioactive substance mainly found on board ships in ionising smoke detectors, items also commonly found in people's homes.

End of Life

Ship Recycling Plan (SRP)

The SRP is a vital stage in the recycling process. It is produced by the recycling facility, using the information provided by the owner in the IHM, and sets out the plan for recycling the ship.

Since the SRP is based on the IHM, it is important for the owner to establish that the facility accepts the Inventory as a reasonable representation of the hazards likely to be on board. This will help avoid any disputes later.

The Plan and contract also afford an opportunity to negotiate the cost of removing different hazards. In the case of asbestos, for example, if an owner is unable to state how much is on board his ship, the facility can provide an estimate of the amount and the cost.

²² At Lloyd's Register, we provide shipyards with a letter to give to sub-contractors, accompanied by a Hong Kong Convention-compliant form for the sub-suppliers to complete. We perform checks and surveys through the supply chain to ensure the information is reliable.

²³ Hexavalent chromium was the subject of the film *Erin Brockovich*, starring Julia Roberts, which told the real life story of the pollution of a town's water supply.

²⁴ These heavy metals are an important part of land-based electronic waste prohibition, mainly to protect landfill from disposable electronics. This problem does not exist with ships, except for any disposable electronics on board. In any case, these are excluded from the Convention. (See Directive 2002/95/EC (the 'RoHS' Directive) for more information, especially article 4.

²⁵ There are well-founded rumours that certain nations are refusing to complete Appendix 2.

²⁶ We have applied to IACS for more information. See 'what shipowners can do now' for advice on compiling the IHM.

If the shipowner decides the estimate is too high, he can carry out sampling to show that there is less asbestos present and renegotiate. If the estimate is reasonable and not overly expensive, it is likely to cost more to challenge it than to accept it.

Here are some examples:

1. An owner has a 1995 built container ship and does not believe the ship contains asbestos. The facility decides, from experience, that the ship may contain up to two tonnes of asbestos-containing materials in things like windlass linings and gaskets and wishes to charge \$10,000 for the removal. The contract is \$400 per tonne and the lightship mass is 8,000 tonnes – a total of \$3.2 million (at Southeast Asia prices). It will cost the owner \$20,000 for a full asbestos survey.

Likely result: since the cost of sampling is more than the cost of remediation – the owner does not dispute the charge.

2. The owner of a 1975-built chemical tanker with steam engines does not know how much asbestos is on board. However, all the laggings and linings are original and the newbuild yard was known to use large quantities of asbestos. The owner needs to recycle the ship in Europe and therefore does not expect a large profit. The facility estimates that there is 80 tonnes of asbestos on board and quotes \$400,000 for the ship to be pre cleaned. The recycling value is only \$100 per tonne (at European prices), and the lightship mass is only 4,000 tonnes, making the contract price \$400 000, and eradicating any profit for the owner.

Likely result: although the estimate is high, the owner knows that it is reasonable and therefore accepts it.

3. An owner has a 2003-built ship with a full inventory, and certificates and purchase control systems which demonstrate the ship is free of asbestos. However, there is one potential exception: in 2005, 300 tonnes of concrete ballast were poured into the double bottoms, and there was a rumour at the time that subcontractors may have dumped bags of asbestos into the cement. Given this, the yard quotes \$1 million for removing the material (not an

unreasonable sum if we consider the difficulty of removing 300 tonnes of concrete asbestos by hand with jack hammers).

Likely result: in this instance, since the cost of removal is so high, the owner asks a recognised company to sample the asbestos before the recycling contract is agreed.

These examples underline the importance of clear negotiation before recycling contracts are agreed, so that they take into account the risks for all parties.

Owners should present their best estimate of the hazardous materials on board, based on the IHM and any sampling. They should also use the Final Survey to get more detail, or even the recycling process itself, in agreement with the facility, in order to arrive at the best deal.

Likewise, recycling facilities should provide reasonable quotes based on the owner's information. Those that do not negotiate fairly may make huge initial profits from unwary clients, but these gains will be very short lived since all recycling facilities rely on their reputation.

One final example illustrates what might happen if an owner does not provide his best estimate and if the facility acts unreasonably:

The owner of a 1975 panamax bulk carrier declares that there is 'no asbestos' on board, even though this is highly unlikely. The facility deliberately does not mention that it finds the estimate unrealistic, and waits until the final survey (performed on arrival at the port local to the facility) before looking for asbestos. It uses its own inspectors (or a third party it is familiar with) and finds asbestos. The facility then threatens to complain to the authorities about undeclared waste, unless there is a substantial renegotiation of the contract.

As the scrapping market changes, it will be interesting to see how cash buyers position themselves. As 'shipowners' under the Convention they will be responsible for providing the final certificates in the chain. Will they attempt to end the existing certification regime or might they change flag state and use a local authorised company? Traditionally, cash buyers see a ship as a simple commodity. Therefore, any certificate that gets the ship to the facility will suffice.

Obviously any attempt to change flag or certification regime might cause questions to be asked about why the existing regime was unsatisfactory, and any deliberate long term organisation to set this system up might bring into question the international nature and acceptability of the actions.

Final Survey

This survey is essentially a final check on the Inventory of Hazardous Materials, which should already have been provided to the recycling facility as part of the Ship Recycling Plan (SRP) process. It must be carried out by the flag state or a recognised organisation and should make sure that the Inventory is in a suitable state to be agreed by the facility²⁷. Once the final survey is complete, the International Ready for Recycling Certificate is issued.

Roles and responsibilities during the recycling process

The flag state

As well as the Final Survey, the flag State, or RO, is responsible for issuing the certificates the ship requires to be recycled: the Inventory of Hazardous Materials and the International Ready for Recycling Certificate.

The national authority/competent authority

The national authority is responsible for approving ship recycling facilities against the requirements of the Convention, but this may be delegated to a 'competent authority' which may in turn delegate the work to its own recognised organisations. The competent authority will issue a Document of Authorisation for Ship Recycling (DASR). This details the hazardous materials the facility is allowed to handle.

The national authority must also approve the Ship Recycling Plans produced by the facility. The Convention allows this approval to be 'tacit'. In practice, this means the SRP is automatically approved if the facility receives no information from the national authority within a given period of time. Clearly, such a system of assumed approval creates the potential for Plans to go unchecked. If the national authority is adopting tacit approval, it must announce this in advance.

The ship recycling facility

As well as preparing the SRP, the facility must inform the national authority about every ship it intends to recycle. Once dismantling is complete, the facility must send a statement to this effect to the national authority, which then sends it onto the flag state.

The owner

Owners must compile the Inventory of Hazardous Materials and provide this to the recycling facility so that it can prepare the Ship Recycling Plan. It is also the owner's responsibility to choose the recycling facility and to ensure the reporting processes are followed so that the national authority knows the ship will be recycled there.

What can shipowners do now?

Seek information and advice from the industry

Industry Working Group

The Industry Working Group has published an extensive and excellent publication, *Guidelines on Transitional Measures for Shipowners Selling Ships for Recycling*. This contains useful advice on the basic procedures that owners can follow, including obtaining an Inventory of Hazardous Materials.

NGO Platform

The Platform is very active in the ship recycling debate and has been a very useful and often needed voice in the development of the Convention. Owners may benefit from talking with the Platform as part of their decision making process.

Prepare a Ship Recycling Policy

There are a few simple things that an owner can do whether he has ships to scrap or not. The obvious one is to formulate a clear and simple 'ship recycling policy', like the example shown on page 30. The owner will have to appoint a suitable person to ensure the policy is implemented. This may not be a full time job, but the role must be clearly defined and report directly to senior management. An experienced repair yard superintendent would be a good choice, since repair yards and project management are similar.

²⁷ At Lloyd's Register we will not validate an Inventory for use as part of the ship recycling process unless it has been approved during Final Survey along with the recycling facility and the SRP.

Example Ship Recycling Policy

This Policy is designed to help achieve safe and environmentally sound ship recycling. It may also lead to other through-life benefits across the fleet.

All newbuilds will be ordered with Inventories of Hazardous Materials.

All existing ships will achieve Inventories within [2]²⁸[5] years but no later than [2014].

All newbuilds and new installations will exclude the following materials: Asbestos, TBT antifouling, PCB (polychlorinated biphenyls), CFCs, [HCFCs], [HFCs], [CBBs], [PBDE], [PVC] and [mercury],

All ships will have procedures to ensure that these hazardous materials cannot be purchased or brought onto the ship in any manner during operations.

All ships will be recycled in yards which:

- [are authorised in accordance with the IMO convention] / [are licensed by the local authorities in accordance with national law]
- [have [accredited] certification to ISO 30000]
- are members of ISRA.

Before recycling, we will:

- ensure export/import requirements are met
- carry out the Final Survey, with the Ship Recycling Plan and a complete Inventory of Hazardous Materials
- conduct a facility assessment visit

During recycling, we will:

- monitor the dismantling of the vessel
- ensure all wastes from vessel are properly managed
- receive signed confirmation from the yard that the ship has been recycled and make this information available to stakeholders.

The Ship Recycling Policy in detail

Let's look at what each element of the Policy means for the owner.

Inventories of Hazardous Materials for newbuilds

Most major newbuild yards can easily accommodate a request for an IHM. The owner's site team should be aware of the Convention requirements for extra materials controls and should ensure the sub-contractors are also controlling their materials.

We have already looked at the difficulties of listing Appendix 2 materials. Given that a newbuild today will be an existing ship by the time the Convention comes into force, our recommendation is to complete the IHM as far as is practicable.

Inventories of Hazardous Materials for existing ships

When the Convention comes into force, tens of thousands of ships will need Inventories. While class societies like Lloyd's Register can verify and approve IHMs, it is not feasible for them to compile them as well. Owners will probably need to appoint a specialist contractor to carry out sampling and help compile them. Experts within the company – such as safety officers or technical superintendents, can also be trained to capture and submit the information

When choosing a contractor, owners need to have confidence that the service they provide will be acceptable to the approving class society. We maintain lists of 'approved service suppliers' on our online classification site, ClassDirect Live: www.cdlive.lr.org For Appendix 2 materials, we recommend that owners take all reasonable measures to find the required information, especially by asking sub-suppliers and checking plans, and include this information as far as practicable in the Inventory.

Excluding materials

The first five materials in this Policy are very easy to address – they are already almost totally excluded under other legislation. Other materials can be added as the owner wishes. In particular ozone depleting substances and green house gases such as HCFCs may fit in with an existing environmental policy.

²⁸ Items within square brackets can be individually adapted to suit the owner's needs.

Procedures to ensure that hazardous materials cannot be purchased or brought onto the ship

Establishing these procedures will require a degree of central control and shipboard staff will also need to be trained so they are familiar with them. At the very least, any staff with purchasing authority, as well as superintendents, will need to be made aware of the excluded materials and their exclusion must be noted on any purchase orders or invoices. Purchase orders and invoices must also be kept.

Most prudent owners will already have systems for controlling purchases, invoices and receipts and these new procedures can therefore simply be added to them.

The yard
ISO 30000

A yard with a properly certified and implemented ISO 30000 management system can give an owner additional confidence that ships are being scrapped in full compliance with the law, and with other stakeholders views taken into account.

The biggest advantage of ISO 30000 certification is that it is transparent: owners have the right to see vital parts of the management system: the ship recycling policy, the legal compliance register, and the list of identified aspects and impacts of the recycling facility. In this way, they can gauge how well the Standard is being applied. A 30000 management system will also provide an excellent basis for other second or third party visits and inspections.

I.S.R.A

During the interim period before ratification (when facilities will be authorised under the Convention) ISRA membership is currently considered the most reliable way to get access to a reasonable selection of quality ship recycling facilities. There are not many yards without ISRA membership which we would recommend at the moment.

Before recycling

Ensure export/import requirements are met

This includes the potentially complicated process of transporting the ship to the recycling facility. There are

diverse ways of doing this, and at present no one method that all authorities agree and recognise.

Since there are so many different interpretations, it is important to identify, and find out the requirements of, as many of the stakeholders as are relevant: the facility, any 'middle men' such as brokers, the flag state and the national authority.

Any requirements should be put in writing and agreed by all parties; these may include transit states, or local authorities. This may be a difficult, confusing task and plans may have to be changed many times until the process is finalised.

It is recommended that any procedures are based on the Hong Kong Convention and its associated guidelines. Until it is in force, the requirements of other relevant legislation such as the Basel Convention or its local equivalent (for instance, the European Waste Shipment Regulations), should be followed.

Conduct a facility assessment visit

It is strongly recommended that the owner visits the yard with their technical staff and assesses the facility against agreed criteria such as that contained in a facility assessment checklist (see Appendix 1). Alternatively, I.S.R.A certification or membership, or a third party report may suffice.²⁹

During recycling

The Convention does not require shipowners to oversee the recycling process, but we strongly recommend that they do. As an owner, you will have made a considerable investment in the recycling process and monitoring it will help reduce the risk of future liabilities.

We believe owners should check two things: that recycling is being undertaken in a safe and environmentally responsible manner; and that waste is being managed and disposed of properly.

Owners can monitor the recycling process through their own on site assessment team, or by using a recognised third party verification scheme.

²⁹ Lloyd's Register provides an 'audit during dismantling' service: we pre-assess the yard, check the ship inventory and audit the facility at set points during the recycling process, including downstream waste management.

Appendices

Appendix 1

Recycling facility checklist

The facility should first provide evidence of the following;

The minimum dismantling standard will be;

- Primary dismantling alongside, with cranes, in protected waters such that semi permanent booms may be expected to protect the waters from further contamination in the event of accidental spillage
- It is essential to remember that certification should audit downstream waste management areas so all activities outside the yard such as transport and disposal, must be demonstrated, and proposals to include these sites and subcontractors provided, before certification may be considered.

In addition the following criteria must be met:

1. Management System:

- A management system in place which would meet the requirements of ISO 9001: 2000 and/or ISO 14001: 2004, or ISO 30000;2009

2. Establishment:

- In the case of an existing facility – continuous operation at the same site for a minimum of five years under a continuous management structure.

3. Legal Action Status:

- That the company can demonstrate that they have no previous or outstanding legal actions against them – Statutory, Criminal or Private etc.

4. Status & Financial viability:

- The company shall be a legal entity, or a defined part of a legal entity, such that it can be held legally responsible for all its activities
- The company should be able to demonstrate, through its financial statements, assets, debt ratio, insurances etc that there is no risk of the company being unable to fulfil its long term financial obligations, or be able to answer for normally predictable future liabilities.

5. Method of accepting a ship for recycling:

- Demonstrate there is a methodology in place to ensure that all legal requirements for export and import of ship for recycling have been identified by the company, that the company can demonstrate compliance with the identified requirements and that prior informed consent is obtained from all governmental parties concerned prior to acceptance of ship

6. Method of recycling:

- The yard must affirm that during all recycling operations the ship will be properly manoeuvred, controlled and secured in a sheltered environment, protected from currents and tides.
- The yard must confirm that suitable permanent or semi permanent forms of barrier are provided to protect the marine environment, shore, land and air from any form of emission whether through normal, abnormal or emergency operations.
- The yard must affirm that dismantling or removal of all items from the ship, including the large portions of the ship itself is done in a controlled manner and through lifting of the item or portion clear of the vessel and transporting it on properly or specifically designed equipment, via and too areas of proper hard standing for such heavy access and protection of the environment.

7. Emergency provisions:

- The yard must provide details of emergency planning, including access for emergency vehicles and services to all areas of the facility where personnel may work. Proper hard standing for vehicular access must be provided directly to at least one significant area of the ship at all times, and access to and from the ship must at all times be provided in a proper manner to enable emergency access and egress.

8. Safe and environmentally sound operation:

- The yard shall demonstrate that it provides and enforces proper safety equipment and procedures relevant to the work undertaken.

- The yard shall list the primary resources it has to protect the environment against contamination during normal, abnormal and emergency operations, and shall show monitoring equipment, and management of results for all likely principal environmental concerns.
- Such a list must demonstrate reasonable control and restriction of spills and a reasonable likelihood of containment and successful clean up with no long term environmental contamination. This includes permanent bunding and drainage / containment system for the facility in order to protect the waters and ground from surface spills and run off.
- All areas of the facility must be connected by hard standing for vehicular access, and further all area must be properly connected to a planned transport network within the yard which is in turn connected to the national transport network. All areas and connections must be suitable for the vehicles and traffic that may use them in normal, abnormal and emergency operations.
- The yard must demonstrate appreciation and understanding of principal hazardous materials and authorised facilities for dealing with them. This includes transportation and storage within and away from the facility and all downstream waste management activities.

9. Welfare considerations:

- The yard must demonstrate that all workers at the yard and their families living in the immediate vicinity have proper provision both on and off site to proper sanitary facilities, controlled mains drinking water, mess areas and provision of restaurant or similar facilities etc, permanent housing, schools, hospitals and other essential services for their welfare.

10. General information:

- The yard must supply the following information;
- Name, address and contact details including position of responsibility of the contact.
 - Capacity of the yard including length of pier or jetty and depth alongside (maximum draught), approximate sizes of primary and secondary dismantling areas, size of storage area. Maximum annual throughput in terms of DWT or Lightship tonnes. Number and details of ships recycled in the previous 12 months (LxBxT or tonnes). Maximum dimensions of ships that can be accepted (LxBxT) and maximum DWT tonnage.
 - Company details of the principal waste transportation company(ies), and principal receivers of waste, including as a minimum – steel scrap, asbestos landfill and other hazardous landfill, electrical waste, oil and liquid wastes.
 - Company details of any on site essential sub contractors such as specialised waste handling companies for asbestos.
 - Company details of any essential testing or laboratory services for sampling and identification of hazardous materials, or environmental monitoring.
 - Number of employees in the yard
 - Details of any shift working by the yard

Appendix 2

Glossary of terms and abbreviations

Alang: The main recycling area in the North West of India, in Gujarat province

'As is, where is': the term for a ship sold with no guarantee as to its condition or other issues, with all risks and costs on the purchaser. Very much a 'buyer beware' situation, but most ships sold under this description are sold at scrap value, and the purchaser is very aware of the risks

BC: Basel Convention

BIMCO: Baltic and International Maritime Company

Breaking: The term historically used for recycling ships, and still used by Lloyd's Register's classing committee

Chittagong: The main recycling area in Bangladesh

Dismantling: The term for ship recycling used by the Basel Convention

Gadani: The main recycling area in Pakistan

Hawser: a cable or rope used to tow or moor a ship

Hydraulic shears: Large steel cutting fingers often mounted on a large mobile unit, used to cut the steel through shearing, and also to generally pull structure apart. Normally used for lighter structures such as the superstructure

IACS: International Association of Classification Societies

ICS: International Chamber of Shipping

ILO: International Labour Organization

IMIF: International Maritime Industries Forum

IMO: International Maritime Organization

IPTA: International Parcel Tankers Association

ISO: International Organization for Standardization

I.S.R.A.: International Ship Recycling Association

ITOPF: International Tanker Owners Pollution Federation Limited

OCIMF: Oil Companies International Marine Forum

OECD: The Organisation for Economic Co-operation and Development

Scrapping: Historical vernacular. A term not favoured by the IMO, who prefer to use the term recycling since it better reflects the valuable, sustainable re-use of materials and the high asset value of the ship

Appendix 3

Lloyd's Register ship recycling services

Green Passport – verification of Inventory of Hazardous Materials for existing ships and newbuilds. We also provide guidance on completing the IHM and a list of approved suppliers.

ISO 30000 certification

Certification of recycling facilities against the ISO 30000 Standard. This service is provided by Lloyd's Register Quality Assurance (LRQA).

Audit during dismantling – includes pre-assessment of the recycling facility, a check on the Inventory, and auditing of the facility at set points during the recycling process, including downstream waste management.

Early compliance

Statutory certification – Ready for Recycling Certificate and Certificate of Completion

Final survey – survey against the requirements of the Ship Recycling Convention

Approval of Ship Recycling Plans

For further information, visit:

www.lr.org/greenpassport

Appendix 4

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