Appendix 1

Data on historical scrapping and forecasts of future scrapping of EU vessels

1 Context and briefly about the data

The 2007 COWI/DG ENV[1] study, which was prepared as an input to the Green Paper on better ship dismantling, assessed the number and tonnage (LDT) to be scrapped until 2020 and provided a status for the historical developments with a special emphasis on the years 2004-2006. Some of these data have been used to support the analysis on pros and cons of early transposition of the Ship Recycling Convention, prepared by Milieu/COWI as part of the Study in relation to options for new initiatives regarding dismantling of ships.

For ease of reference, the data on historical scrappings and forecasts of future scrapping of EU vessels from the 2007 COWI/DG ENV study, has been summarised in this Appendix.

The assessment of future decommissioning volumes is made for the following 10 'vessel types':

- (Single hull) Oil tankers
- Other tankers
- Bulk
- Container
- Gas
- Passenger/ro-ro/vehicle (including ferries)
- Other cargo vessels
- Non-cargo vessels
- Fishing vessels
- Warships

[1] COWI/DG ENV: 'Ship Dismantling and Pre-cleaning of Ships' (2007)

2 Historical decommissioning, total volumes 1994 - 2006

The estimated level of historical scrapping is summarised in the figure below.

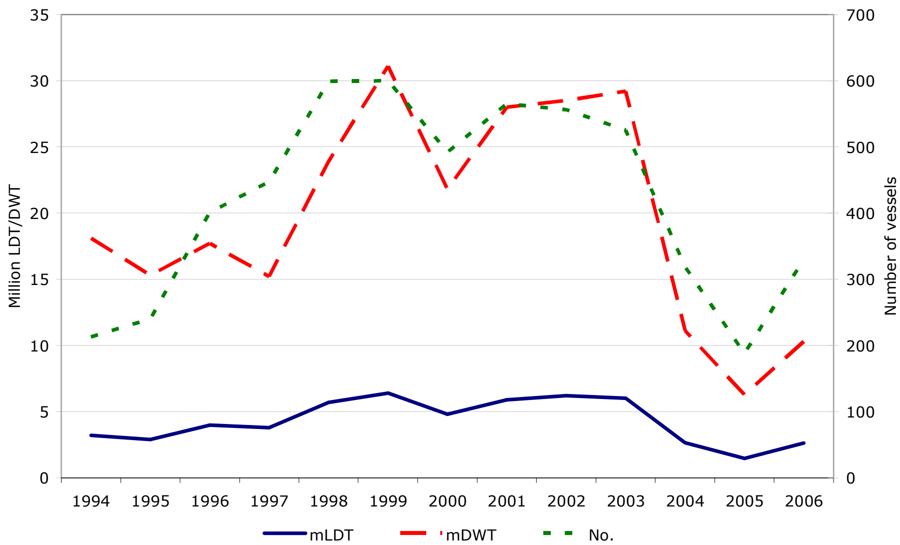

Figure 1 Total historical ship scrapping volumes, all types (Million LDT, Million DWT and number of vessels)

Note: Figures for 2003 and 2006 have been converted to full year.
Source: Clarkson (2006) and COWI/TREN (2004).

From 1994-2006, approximately 5,600 ships were demolished worldwide. There have been considerable variations in the activity level over the years. The ship scrapping activity peaked in 1999 with 600 ships being scrapped representing approximately 6.4 million LDT, while the scrapping activity in 2005 reached an "all time low" of only approximately 1.5 million LDT being scrapped.

The historical scrapping volumes by ship type are shown in the Figure below. The volumes scrapped declined considerably from 2003 to 2004 and 2005 for all major ship types due to historically strong freight markets. It appears - on the basis of data for the first half of 2006 - that scrapping volumes are increasing due to relatively strong drops in the freight rates.

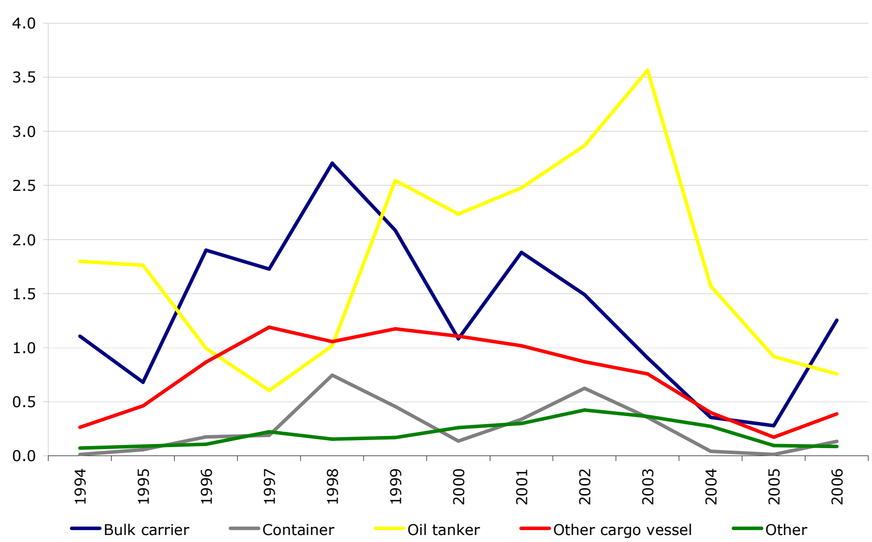

Figure 2 Historical scrapping volumes by ship type (million LDT)

It is seen in the above figure that the decommissioning volume has dropped for all ship types, but in particular the oil tankers are trading beyond their expected life time.

There are no EU records of the destination of warships, but usually the vessels are scrapped nationally or previously used for target practise, although this is not common today. Historically, in many European navies, vessels are often sold for continued use in the navies of friendly nations, but for obsolete vessels it was not uncommon to sell for the scrap value to Asian ship breakers.

Total historical ship scrapping locations for the period 1994-2003 are shown by volumes (share of LDT) in the Figure below.

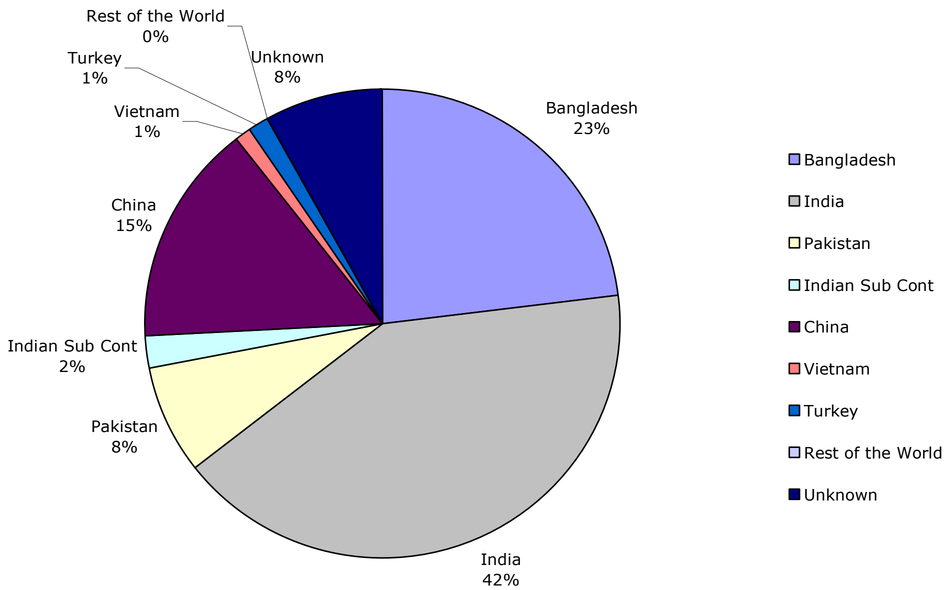

Figure 3 *Total historical ship scrapping volumes 1994-2003, all types by region (share of LDT). The term "Indian sub-continent" is used by Clarkson to denote vessels with an unspecified destination in India, Bangladesh or Pakistan.*

3 Forecasted future scrapping volumes

3.1 Earlier projections

The COWI/TREN study included simple projections for the future scrapping activity for 2003-2015. The projections were based on a simple assessment of the age profile of the fleet (for all other vessel types than oil tankers) and the historically observed life time expectancy. For oil tankers the consequences of different phase-out schemes were assessed, i.e. the IMO MARPOL 13G and EC 1726/2003/Revised MARPOL Annex 1.

For the years 2004-2006 it was estimated that 7-10 million LDT would be scrapped per year, mainly consisting of bulk carrier, passenger/ro-ro/vehicle, other cargo vessels and oil tankers. The actual level of scrapping is much lower approximating an average of 2 million LDT/year from 2004 to 2006. Unless the average life expectancy remain several years higher than previously observed, this has obviously created a back log of until now some 15 million LDT to be scrapped in the future.

The main reason for this is, as mentioned, the strong freight markets, which is the main driver for the shipowners' decision when to scrap (as documented in the COWI/TREN study).

The impressive increase in freight rates since 2002/2003 is illustrated in the figure below. It can be seen that the container time charter rates more than tripled from early 2002 to early 2005 and the tanker segment has shown a similar development.

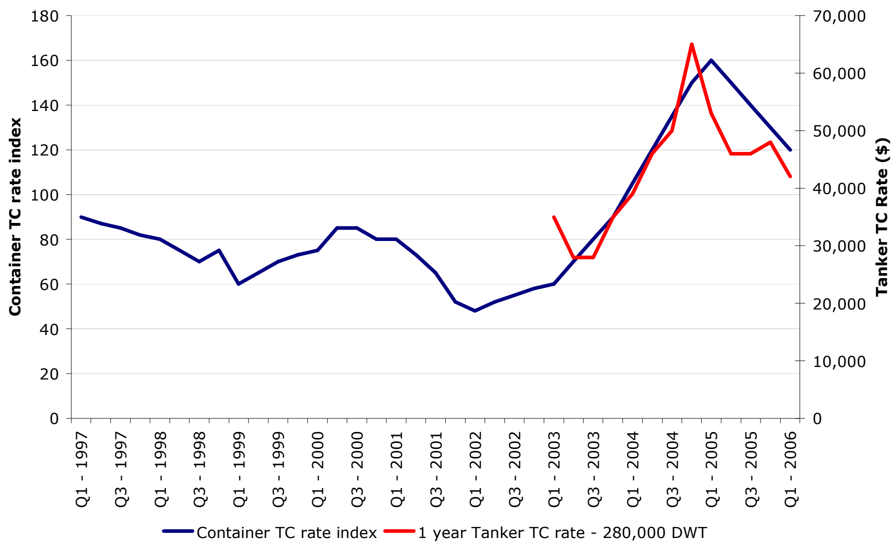

Figure 4 *Freight (time charter) rates. Source: Container, Clarkson (2006), reading from graph; Tanker, Clarksons.net, reading from graph.*

It is emphasised that the present models of phase out do not include forecasts of freight rates and projects scrapping based on historical phase out patterns. Therefore, the recent years' high freight rates leading to continued trading of vessels previously considered at their end-of-life were not predicted and likewise a sudden drop in freight rates with subsequent massive scrapping will not be predicted.

3.2 Total fleet[2]

The estimates of the future total volumes of demolition are shown in Figure 5 below. The detailed volumes of demolition by vessel type and year of scrap can be seen in Table C in Appendix A.

The volumes of scrapping are estimated to fluctuate between around 5-10 million LDT/year during 2007-2020, except for 2010 where a large number of single hull tankers are phased-out. In total, it is estimated that 105 million LDT will be scrapped from 2007-2020.

The future volumes of scrap are estimated to start at a relatively high level for the next few years and then show a declining trend until 2016. From 2017 and onwards, the volume of scrapping is estimated to show an increasing trend.

Not surprisingly bulkers, single hull oil tankers, container vessels and other cargo vessels account for the vast majority of future scrapping.

[2] Only including EU fishing vessels and EU warships. Furthermore, the fleet of Ro-Ros and ferries (type 6) do not cover total global fleet.

The annual decommissioning volumes of fishing vessels are projected to decrease until 2010 where after the annual volumes remains stable between 40,000 and 45,000 LDT.

As mentioned previously it is virtually impossible to forecast the future level of scrapping of warships. As an example the UK naval authorities will decommission approximately 30 naval vessels before 2013, but the majority of these are expected to be sold to foreign governments or to other uses that recycling (UK Defra 2006). The legacy ships that are expected to be recycled comprise five out of the thirty vessels. Two of the vessels are up to 20,000 tons.

In general, it seems fair to assume that warships which today are 25 years or older will be scrapped during the next 14 years (2007-2020). The fleet of European warships aged 25 or older represents 396,000 LDT. Hence annual scrapping of warships can be expected to be in the region of 28,000 LDT.

In lack of suitable information it is assumed that the sale of navy vessels, which is not subtracted here, will balance the added vessels belonging to other government agencies. In the French report on demolition in European military fleets it is estimated that 300,000 LDT may be dismantled over the coming 10 years (MIDN 2007).

The sum of the projected annual scrapping volume for European warships and larger fishing vessels is approx. 70,000 LDT and compared to the merchant fleet it only account for a very small fraction (approx. 1%) of total scrapping.

As actual volumes are sensitive to the developments in the freight market, these numbers should only be seen as indicative for the level of scrapping.

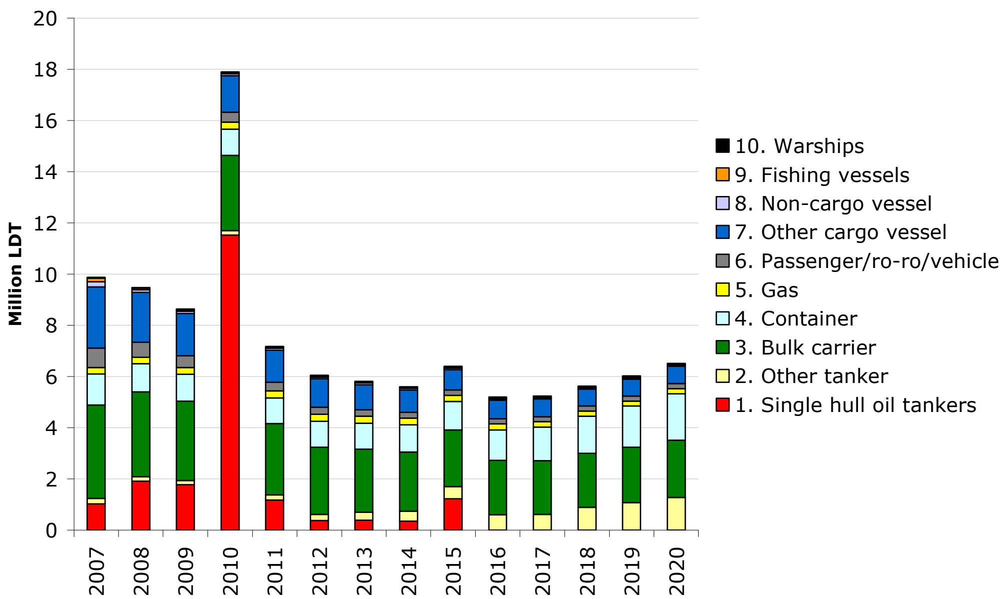

Figure 5 Future volumes of demolition by vessel type and year of scrap - Vessel type 1-10 (Million LDT)

3.3 By owner/flag state

Forecasts by country of ownership and flag state are shown in Figure 6 below. The detailed future volumes of demolition by owner/flag state and year of scrap can be seen in Table 1.

Table 1 Future volumes of demolition by vessel type and year of scrap - Vessel type 1-10 (Million LDT)

	Vessel type										
	1. Single hull oil tanker	2. Other tanker	3. Bulk carrier	4. Container	5. Gas	6. Passenger/ ro-ro/vehicle	7. Other cargo vessel	8. Non-cargo vessel	9. Fishing vessels	10. Warships	Total
2007	1.0	0.2	3.7	1.2	0.3	0.8	2.4	0.2	0.1	0.0	9.9
2008	1.9	0.2	3.3	1.1	0.3	0.6	1.9	0.1	0.1	0.0	9.5
2009	1.8	0.2	3.1	1.0	0.3	0.5	1.7	0.1	0.1	0.0	8.6
2010	11.5	0.2	2.9	1.0	0.3	0.4	1.4	0.1	0.0	0.0	17.9
2011	1.2	0.2	2.8	1.0	0.3	0.3	1.3	0.1	0.0	0.0	7.2
2012	0.4	0.2	2.6	1.0	0.3	0.3	1.1	0.1	0.0	0.0	6.1
2013	0.4	0.3	2.5	1.0	0.3	0.2	1.0	0.1	0.0	0.0	5.8
2014	0.4	0.4	2.3	1.1	0.3	0.2	0.9	0.1	0.0	0.0	5.6
2015	1.2	0.5	2.2	1.1	0.2	0.2	0.8	0.1	0.0	0.0	6.4
2016	-	0.6	2.1	1.2	0.2	0.2	0.7	0.1	0.0	0.0	5.2
2017	-	0.6	2.1	1.3	0.2	0.2	0.7	0.0	0.0	0.0	5.2
2018	-	0.9	2.1	1.4	0.2	0.2	0.7	0.0	0.0	0.0	5.6
2019	-	1.1	2.2	1.6	0.2	0.2	0.7	0.0	0.0	0.0	6.0
2020	-	1.3	2.2	1.8	0.2	0.2	0.7	0.0	0.0	0.0	6.5
Total	19.8	6.8	36.1	16.9	3.4	4.5	15.9	1.0	0.7	0.4	105.6

Vessels owned by non-EU countries and flying the flag of non-EU countries account for the largest share of future scrapping - in the region of 3-6 million LDT/year, except for the peak in 2010 where a large number of single hull oil tankers are phased-out.

Scrapping of vessels, which today are both EU flagged and EU owned, will amount to 1.1-1.8 million LDT/year, except for 2010. EU owned vessels flying the flag of a non-EU country accounts for in the region of 1.0-1.9 million LDT/year. Finally, EU flagged vessels which are owned by non-EU countries, will only account for scrapping of 0.2-0.3 million LDT/year.

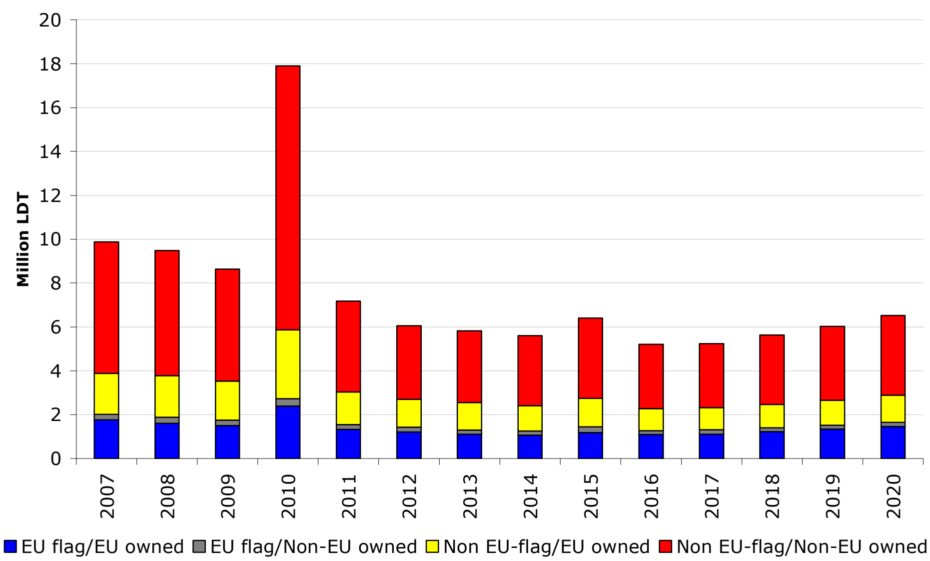

Figure 6 Future volumes of demolition by owner/flag state and year of scrap - Vessel type 1-10 (Million LDT)

Table 2 Future volumes of demolition by owner/flag state and year of scrap - Vessel type 1-10 (Million LDT)

Phase-out year	EU flag/ EU owned	EU flag/Non-EU owned	Non EU-flag/ EU owned	Non EU-flag / Non-EU owned	Total
2007	1.8	0.2	1.9	6.0	9.9
2008	1.6	0.3	1.9	5.7	9.5
2009	1.5	0.2	1.8	5.1	8.6
2010	2.4	0.3	3.1	12.0	17.9
2011	1.3	0.2	1.5	4.1	7.2
2012	1.2	0.2	1.3	3.4	6.1
2013	1.1	0.2	1.3	3.3	5.8
2014	1.1	0.2	1.1	3.2	5.6
2015	1.2	0.3	1.3	3.7	6.4
2016	1.1	0.2	1.0	2.9	5.2
2017	1.1	0.2	1.0	2.9	5.2
2018	1.2	0.2	1.1	3.2	5.6
2019	1.3	0.2	1.1	3.4	6.0
2020	1.5	0.2	1.2	3.6	6.5
Total	**19.4**	**3.1**	**20.6**	**62.5**	**105.6**

The share of vessels operating under a European Union member state flag is 22% measured as LDT[3]. The vessels operated or owned by companies in the EU accounts for 40% and the combination accounts for 43% of the global LDT.

[3] As of Clarkson database September 2006

Appendix 2
Health Safety and Environment issues associated with ship recycling

Health, safety and environment (HSE) issues within ship recycling were detailed in the recent COWI/LITEHAUZ study for EMSA on the Certification of Ship Recycling Facilities[4]. For ease of reference these are included below.

Details on HSE issues within ship recycling

The structural complexity of ships makes ship breaking a challenging process, which involves a series of safety, health and environment issues. These hazards include exposure to surroundings involving hazardous substances and dangerous/harmful situations and operations. The effects of such exposure are generally well known and documented in other comparable industries.

The majority of ship scrapping is undertaken in developing countries where worker safety suffers from inadequacies in several respects. These deficiencies are evident at all steps of the process and include no or insufficient planning, training, personal protection equipment, facilities, etc.

Environmental concerns of ship recycling are first and foremost related to the harmful substances involved and the lack of containment allowing toxic compounds to enter the environment. The nature of some of the major scrapping sites in Asia allows tidal wash-out of these compounds and hence, immediate effects may be avoided in the coastal waters.

Basic standards for workers' health at some of the world's major scrapping sites are not adhered to. The nature of the ship recycling work causes immediate wear-and-tear-related risks which are most often not adequately addressed, but also the long-term exposure to harmful substances is likely to have severe effects on life expectancy. However, in most facilities long-term monitoring of workers' health is non-existent.

The key health, safety and environmental concern within the ship recycling yards are focused around:

- Exposure of hazardous materials to environment and people (workers and residents) during recycling operations
- Safe disposal of the hazardous materials
- Accidents and incidents primarily due to falling heavy objects, falls from heights, explosions and fire.

The different types of hazardous chemicals which are of concern in ship recycling and therefore must be identified in ships are shown in table 2 below, together with their classification with respect to adverse properties were given and their concentration limit for classification as hazardous in a relevant entity for waste containing the substance (EC DG-ENV, 2007)[5]. The recycling activities during which workers are most likely to be exposed are shown in table 3 (ILO, 2001)[6].

[4] European Maritime Safety Agency, Study on the Certification of Ship Recycling Facilities, September conducted by COWI/Litehauz

[5] European Commission Directorate General Environment, Ship Dismantling and Pre-cleaning of Ships, June 2007 conducted by COWI/DHI

[6] ILO, Workers safety in the ship-breaking industries, An Issues Paper, February 2001

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Table 3 Hazardous compounds to be identified at ships, classification of properties and their concentration limits in waste to be classified as hazardous (EC DG-ENV, 2007)

Substance	Classification of hazardous properties according to EU Hazardous Waste Classification	Description of concentration limits for hazardous waste	Basel Convention Hazard Class, Annex III	Basel Convention, Annex VIII
Halons	Depends on the type of halons: Carbontetrachloride: T, Carc3; Methylchlroide: Fx	Yes if conc. > 3 %	H2	
Refrigerants such as R22/R12		Regulated acc. to 2037/2000	H2	
Fuel oil, diesel oil and gas oil	Carc. 3	Yes of conc.>1 %	H3	
Radioactive materials	Radioactive	Dependent on the type of radioactive material	H7	
Waste lead acid batteries	C (R35)	Yes if con. > 1 %	H8	A1160
Asbestos	Carc1	Yes if con. > 0.1 %	H11	A2050
PCB and PCT containing substances	Dangerous to the environment	Yes, if con. > 0.005 %	H11	A3180
Tin based anti-fouling coatings	Toxic and dangerous to the environment	T: if conc.> 3%	H12	A4030
Lubricating oils	Dependent on the type of oil but mainly Carc 2	Yes if con. >0.1 %	H12	A3020, A4060
Hydraulic Oils	Dependent on the type of oil but may be dangerous to the environment	No concentration limits	H12	A3020, A4060
Oil residues (sludge), oil water mixtures, waste oils, oil cont. waste	Dependent on the type of oil but may be dangerous to the environment	No concentration limits	H 12	
Polyvinyl Chloride	None	Not hazardous waste	H13	

Table 3 Main exposure to hazardous substances during the scrapping process (ILO, 2001)

Dismantling activity	Workers' exposure	Environmental exposure	Safety exposure
Asbestos removal and disposal	Exposure to asbestos fibres, especially through inhalation, may cause asbestosis or cancer.	Exposure of people working and living in the neighbourhood, and migration of asbestos fibres to bodies of water.	
PCB removal and disposal	Exposure through inhalation, ingestion, or absorption through the skin may cause adverse health effects.	PCBs are toxic and persistent in the environment. The most carcinogenic PCBs tend to bioaccumulate.	Toxic furans and dioxins are produced when PCBs are heated, e.g. in fire related incidents.
Bilge and ballast water removal	Toxic organics, i.e. solvents or PCBs, may cause serious health effects. Discharge of toxic organics may cause release of poisonous gases.	Metal exposure: consumption of contaminated seafood may cause health problems. Oils and fuels may poison marine organisms and physically soil the environment (birds, fish, plants, etc.). Invasion of alien aquatic species that may disturb the ecological balance.	Flammable vapours or gases may evolve from residues in tanks or compartments.
Oil and fuel removal	Oils and fuels may exhibit toxic characteristics. Main exposure routes are inhalation and consumption of contaminated fish and water.	Oils can have adverse effects on the environment, e.g. by physical damage of wildlife and their habitants. Light refined petroleum products are toxic and represent a fire hazard. Oil spill threatens natural resources, birds, mammals and marine.	Refined petroleum products represent a fire hazard.
Paint removal and disposal	Chemicals/solvents used in stripping evolve VOCs and hazardous air pollutants. Abrasive blasting and mechanical removal generate particulates (i.e. lead dust). These emissions are toxic and may cause cancer. Main exposure route is inhalation.	Waters (incl. blasting residues and paint chips) may have negative effect on the environment through contamination of soil and surface waters.	Paints and coatings may be flammable.
Metal cutting and metal disposal	Torch cutting generates fumes, smoke and particulates (incl. manganese, nickel, chromium, iron, asbestos and lead) that may have toxic effects.	Improper storage and disposal of scrap metal and wastes from cutting processes may contaminate soil and water. Environmentally hazardous fumes may evolve when metal and/or paint is heated, e.g. during hot work.	Pockets of flammable substances represent a fire and explosion hazard when cutting metal.
Removal and disposal of miscellaneous ship machinery	Workers handling ship machinery components may be exposed to contaminants, such as asbestos, PCBs, oil and fuels.	Ship machinery components may be contaminated with hazardous materials, such as asbestos, PCBs, oil and fuels. Improper storage may also lead to lead contamination.	Oils, fuels, etc. may represent a fire and explosion hazard when being disassembled.

Safety

The working conditions at ship recycling facilities are influenced by an environment characterized by large and heavy unsafe structures and the introduction of several simultaneous operations within a small area involving many individuals.

This working environment results in accidents at every stage of the breaking process. In general very little reporting of incidents/accidents and injuries/deaths can be found. The Gujarat Maritime Board (GMB) in India has revealed figures related to accidents and casualties for the years 1997-99, see below table.

Table 4 Incidents at Alang ship recycling facilities in India, reported by Gujarat Maritime Board (ILO, 2001)

Year	No. of workers	Fatal incidents	Deaths	Non-fatal incidents	Injuries	Total No. of incidents
1997	25,000	31	46	3	23	34
1998	25,000	18	26	24	41	42
1999	25,000	26	30	28	36	54
Average	25,000	25	34	18 (26)	33 (38)	43 (48)

Greenpeace estimates that around 1,000 – 1,200 workers have died over the last three decades at Alang, India (Greenpeace/FIDH, 2005).[7] The statistics presented by GMB also include causes of incidents (Table 5). Table 6 includes the self-reported dangers within ship recycling as reported by ship recycling yard workers in Chittagong, Bangladesh during the ILO SAFEREC project (ILO, 2005).

Table 5 Causes and frequencies of the incidents at Alang as reported by Gujarat Maritime Board (ILO, 2001)

Cause	Falling items	Falls	Fire/explosion	Slipping	Suffocation	Wire/rope snapping	Others
Frequency, %	32	17	12	8	4	3	24

[7] Greenpeace/FIDH in cooperation with YPSA, End of life ships. The human cost of breaking ships, December 2005

Table 6 Dangers within ship recycling as reported by employees at Chittagong recycling yards (ILO, 2005)

Particulars	No. of supervisors	% of supervisors	Number of workers	% of workers
At cutting place	1	2		
Explosion	17	28	24	28
Fire	32	53	47	55
Gas	2	4		
Falling heavy objects	22	36	25	30
Falling from ship	2	3		
If Workers work carefully no danger	2	3		
Wire breakage	19	32	1	1
People falling	1	2		
Cutting injury	1	2		
Suffocation			7	8
At least one response	56	93	78	92
No response	4	7	7	8
Total respondents	60	100	85	100

Health

In general it is difficult to find public data or reports on ship recycling workers' health, which suggests that systematic monitoring of health among workers engaged in ship scrapping in these regions is not very common.

Several studies and reports are addressing the poor working conditions of the workers at the ship recycling facilities. Dr Rupa Abdi, an independent researcher and writer, who was working as a consultant at the Centre for Social Studies, Gujarat State, India (IIAS, 2003)[8]: "The labourers in Alang live in poor housing and sanitary conditions and little attention is paid to their health and safety concerns. According to the physicians in and around Alang who treat numerous Alang patients, the combination of hazardous working conditions, congested and unhygienic living conditions, poor quality drinking water, availability of illicit country liquor, and rampant homosexuality and prostitution have given rise to a number of skin, gastrointestinal, and liver diseases besides tuberculosis, leprosy, malaria, malnutrition, cancer, HIV-AIDS, and other sexually transmitted diseases (STD). According to the local Bhavnagar Blood Bank office at Alang, besides 38 confirmed cases of AIDS, about 50-55 new cases of other STD are being reported every week among the labourers".

A very active NGO in Bangladesh Young Power in Social Action, YPSA (YPSA, 2006)[9] refer a study carried out by Roy (2003), showing the following:

- 88% of the ship recycling workers suffered from some form of accidental injury from foot injury to larger accidents
- 87% suffered from muscle pain
- 72% have problems with eyesight
- 52% have breathing difficulty
- 81% of labourers have gastric problems
- 56% suffered from skin diseases and
- 28% have other infections.

[8] IIAS, India's Ship-Scrapping Industry Monument to the Abuse of Human Labour and the Environment, IIAS Newsletter # 32 November 2003

[9] YPSA, Ship Breaking - Towards Sustainable Management, ISBN: 984-32-3448-0, July 2006

Only few studies exist of possible long-term health effects amongst ship recycling workers. Taiwan was previously a destination for end-of-life ships and a 13-year retrospective follow-up study in Taiwan has studied the mortality among former ship breaking workers (Yi-kuen Liu et al., 2003).[10]

The results of the Taiwan study showed that compared to the reference population[11], ship breaking workers had a significantly higher all cause mortality of 11% and a significantly higher mortality from external causes of injury and poisoning of 75%. On the other hand the ship breaking workers did not have significantly different mortality rates from infectious and parasitic diseases, neoplasm, circulatory diseases, respiratory diseases and diseases in the digestive system compared to the reference population.

The 20-39 years old ship breaking workers of the Taiwanese study had a significantly higher mortality from nasopharynx cancer, pleura mesothelioma, traffic accidents, chemical poisoning and submersion compared to the reference population of same age, and in all age groups ship breaking workers had a significantly higher mortality from accidental falls and industrial accidents compared to the reference population. Compared with supervisors/others[12], odd-jobbers had a significantly higher mortality from external causes of injury and poisoning, especially from traffic accidents, and lifters had a significantly higher all causes mortality and a higher mortality from diseases in the digestive system and accidental falls compared with supervisors/others.

Environment

As mentioned above the environmental concerns of ship recycling are primarily related to the harmful substances in the ships and the lack of containment of these during the dismantling processes, storage and transport, which allows the toxic compounds to enter the environment.

The relevant hazardous compounds are well defined as for instance in the IMO inventory of potentially hazardous materials on board ships:

- Asbestos (not a prime environmental concern)
- Additive in paints, including lead, tin, cadmium, organotins (TBTs), arsenic, zinc, chromium, strontium, others
- Materials containing PCBs, PCTs, PBBs at levels of 50 mg/kg or more
- Ozone depleting substances: refrigerants (R12/R22) and halon
- Oil and oil contaminated waste
- Mercury
- Other hazardous substances.

From one of the few real life studies, Table 7 shows an estimate of the amount of these compounds in a 37,500 LDT VLCC (Norwegian Ministry of Environment, 1999).[13]

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[10] Yi-kuen et al., Mortality among former Ship Breaking Workers - a 13 year retrospective follow-up study in TYaiwan, Journal of Occupational Health 2003:45

[11] Reference population: The populations of Kaohsiung County, Kaohsiung City and Pintung County because the ship breaking workers primarily came from these areas.

[12] Supervisors/others posed as reference group because they had the lowest mortality.

[13] Norwegian Ministry of the Environment, Decomissioning of ships. Environmental Protection and Ship Demolition Practices. 1999

Table 7 Materials of potential environmental concern on board a 37,500 LDT VLCC ready for scrapping (Norwegian Ministry of Environment, 1999)

Component	Material	Amount
Anodes	Lead	0,4 kg [1]
	Cadmium	120 kg [1]
Electrical equipment	Batteries (Pb, H_2SO_4)	232 kg (140 kg, 44 litres)
Coatings and paints	Antifouling (TBT)	24,000 kg [2] (1,200 kg)
Refrigerants	R22/F12 [3]	900 kg
Heat insulation	Asbestos	6,000 - 8,000 kg
Electrical installations	PVC cable insulation	10,000 kg
	Light tube capacitors (PCB)	24 kg [4] (14 g)
	Light tubes (Hg)	100 kg [5] (15 g)
Oil residue	Heavy fuel oil	333 m^3
	Hydraulic oil	18 m^3
	Lubrication oil	20 m^3
	Oil sludge	1,820 m^3

1: trace elements that cannot be separated from the main part of metal. Assuming 50% of the anodes have disappeared due to corrosion
2: estimated TBT-content of 5%
3: CFC-gases
4: estimated weight of 50 g/capacitor
5: estimated weight of 100 g/tube.

Several studies of the contamination level at and outside ship recycling facilities have been conducted. In Bangladesh at Chittagong DNV in 2000 (DNV, 2000)[14] collected sea water and sediment samples in the intertidal zone outside some of the ship recycling plots and analysed these for pollution parameters. Further soil, surface water and air samples were collected and analysed from inside one of the ship recycling plots. The conclusions of the results are shown in the table below.

Table 8 Conclusions of analyses of environmental samples taken at or outside ship recycling facilities at Chittagong, Bangladesh in 2000 (DNV, 2000)

Sample analysis	Conclusions
Sediments	Analysed samples do not have concentrations that are alarming. However, this is probably caused by tidal water characteristics. A monitoring programme of sediment sampling should have been made. Reference studies from the same area show significant levels of various pollutants.
Sea water	Analysed samples have not revealed alarmingly high concentrations in the seawater. However, this is most likely due to the sampling sequence and its unfortunate synchronisation versus the tidal frequency (sample on incoming tide). Previous work provides documentation revealing high levels of toxic compounds in the area.
Surface water samples	The DNV analysed samples do show high concentrations of oil in water samples from the breaking area.
Soil	Soil analyses have established significant levels of contaminants such as heavy metals, PCB and TBT.
Air	The analysed air-samples do show a content of heavy metals and organic compounds, while for asbestos there is not detected any in the air sample. The relative small content of heavy metals and organic compounds may be explained with the wind conditions during the sampling. For asbestos the negative result may be explained by the fact that the crushed substance the day of air sampling was not asbestos.

[14] DNV, Decomissioning of ships - Environmental standards, 12. May 2000

Such samples are also taken frequently by various NGOs, but the information value of water and sediment samples taken in extraordinary dynamic coastal environments with tidal gauges up to 10 m is questionable as the authors themselves also mention. Samples taken from soil typically show high contamination in recycling yards.