

**Ships for Scrap II**

# **Steel and Toxic Wastes for Asia**

**The health and environmental hazards in  
recipient states**

**Worker health & safety and environmental  
problems at the Chang Jiang Ship-Breaking Yard  
operated by the China National Shipbreaking  
Corporation in Xiangyang near Jiangyin**

NB.: This document is intended for use in conjunction with the March 1999 paper by the same authors, "Ships for Scrap – Steel and Toxic Wastes for Asia – The health and environmental hazards in recipient states – A fact finding mission to the Indian shipbreaking yards in Alang and Bombay".

The latter explains problems which are here sometimes only touched on.

**GREENPEACE**

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## Introduction

The purpose of Greenpeace's international shipbreaking campaign is to transform the polluting and dangerous business associated with the export of decommissioned ocean going ships

for scrapping, especially from rich OECD members, to various Asian countries.

It must be noted that the transboundary movement of ships for the purpose of scrapping presents unique and complicated legal issues

distinguishing this type of waste from the traditional notion of hazardous waste.

Greenpeace is campaigning with the same vigour for a swift and drastic improvement of worker safety, and of workplace and environmental controls at all scrapping yards worldwide.

We are collaborating with the international Basel Action Network BAN and ITF, the International Transport Federation.

In this effort, Greenpeace examines the conditions under which ships are scrapped, delivering previously unavailable data, findings

design, construction and operation. Strengthened mechanisms are needed to facilitate this process." \*

Notwithstanding the ultimate goal the purpose of this paper is to address immediate measures which can be undertaken.

Within the United Nations (UN) system, the commitment of the following bodies has been gained:

- The UN Commission on Sustainable Development (CSD) has called upon the UN International Maritime Organization (IMO) to address the issue.
- The Technical Working Group (TWG) of the Basel Convention on the Control of



and analyses. Through awareness-raising and providing expertise on the issue we strive to improve these conditions.

"The ultimate goal of any effort to comprehensively address the issue of safe and environmentally sound ship scrapping must be to phase out the use of toxic substances in ship

Transboundary Movements of Hazardous Wastes and their Disposal has spoken out in favour of developing "global standards" for ship scrapping in cooperation with IMO (see below).

- MO's Marine Environment Protection Committee (MEPC) has proposed to place the issue on IMO's agenda.

The last two decisions yet need to be confirmed by the 5th Conference of the Parties to the Basel Convention (COP5) in Basel (6-10.12.1999) and, respectively, the next IMO session in London (March 2000) before concrete work can commence within these bodies. ■

## Background

In the course of a two-day visit on 17 and 18 August 1999 to China, specifically to the Chang Jiang Ship-Breaking Yard operated by the China National Shipbreaking Corporation in Xiagang near Jiangyin (Shanghai region) in the Yangtze delta, a German-Chinese Greenpeace team made the following observations, documented these by video and photographs and discussed them with the responsible yard managers.

Prior to this visit, a number of ship owners and operators selected from the world's "big twenty", including Hamburg Süd, P&O Nedlloyd, Hapag Lloyd and the Greek Costamare shipping group,

were confronted with the way in which the toxic materials installed in their ships can damage human health and the environment in Asia.

A ship from Hamburg/Germany, the container ship COLUMBUS NEW ZEALAND, built in 1972 and owned by the Hamburg Süd group, was traced in October 1998 on the beach of Alang, Gujarat, India. It was in the process of being broken there. Samples of materials were taken from the ship, as were environmental samples from the working environment on the beach, the mudflats, the immediate surroundings and distant inland locations. Potential human and environmental exposures were assessed. Furthermore, all the main processes and the working conditions on the beach were documented photographically and by video.

The video and photos\* were broadcast extensively in TV and newspaper reports.

A comprehensive presentation of the findings, with photos and analysis data, has been given in the February 1999 report "Ships for Scrap: Steel and Toxic Wastes for Asia". The fundamental



\* available from Greenpeace



*Hamburg Süd ship Columbus America at the Chinese shipbreaking yard – just being deprived of its name, August 99*

discussion of environmental, health and safety problems given in that report shall not be repeated in the present text. The two texts are intended to be used together.

After lengthy disputes with the shipping group and its owner, the food company "Dr.Oetker", Hamburg Süd admitted that the conditions in India are "unacceptable" and informed us that it had sought better options all over the world for scrapping its two sibling ships of identical design, the COLUMBUS AMERICA and COLUMBUS AUSTRALIA.

Hamburg Süd stated that both in the USA and in Mexico, where shipbreaking yards ostensibly work to US EPA standards, capacities were exhausted. The group then opted for China in the absence of better alternatives. The state-owned company China National Shipbreaking Corporation (CNSC) showed five shipbreaking yards to Hamburg Süd, of which, thus Hamburg Süd, only one came into question, namely the

Chang Jiang Ship-Breaking Yard in Xiagang near Jiangyin, north-west of Shanghai in the Yangtze delta. This is the flagship yard of CNSC.

Hamburg Süd insisted that the two COLUMBUS ships were processed there and only there, and that certain workplace and environmental measures were implemented. Hamburg Süd itself supplied 100 protective suits and masks for work involving the removal of asbestos-containing materials.

Above all, in accordance with a Greenpeace demand, Hamburg Süd had compiled and supplied to the shipbreaking yard a comprehensive and informative toxics inventory, with precise statement of the hazard points in the ships. To our knowledge, this inventory is unique worldwide.

We have this document on file, together with the worker safety regulations of the yard, which Winpeak Shipping, Hong Kong, was so kind as to translate into English for us.



| LIST OF HAZARDOUS WASTE<br>M/V "COLUMBUS AUSTRALIA"/ "COLUMBUS AMERICA"<br>27.01.1999 |                                                                                   |                  |                            |                                     |          |
|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------|----------------------------|-------------------------------------|----------|
| Page 1 of 2                                                                           |                                                                                   |                  |                            |                                     |          |
| TYPE OF WASTE                                                                         | PAINT AND COATING / PAINT INGREDIENTS LIKE HEAVY METAL (LEAD, COOPER, FERUM), TBT |                  |                            |                                     |          |
| LOCATION                                                                              | AGGREGATE/COMPONENT                                                               | USE              | AMOUNT                     | REMARKS                             | DISPOSAL |
| Shell plating in way of underwater                                                    | Flatbottom                                                                        | AC=Anticorrosion | According to the maker the | In 1982 the old paint in way of the |          |

First page of toxics inventory for the COLUMBUS ships

The visit by the Greenpeace team was supported by Hamburg Süd and was conducted together with representatives of Hamburg Süd and its agents in Hong Kong (Winpeak Shipping).

CNSC managers permitted observation and detailed photo and video documentation of all work processes on land, but refused access to the inside of the ships "for safety reasons".



Cranes

## The Yard

The Chang Jiang Ship-Breaking Yard is one of at least five similar yards operated by the China National Shipbreaking Corporation. It is located in the Yangtze delta, in Xiagang near Jiangyin north-east of Shanghai. The yard started

operations in 1997 and had processed seven ships by August 1999, including the "288", DELTAJOY, KARRINGTON, APPLEBY, CATHY and IBEYRETT. At the time of the visit, the two above-mentioned Columbus ships were in progress, and the



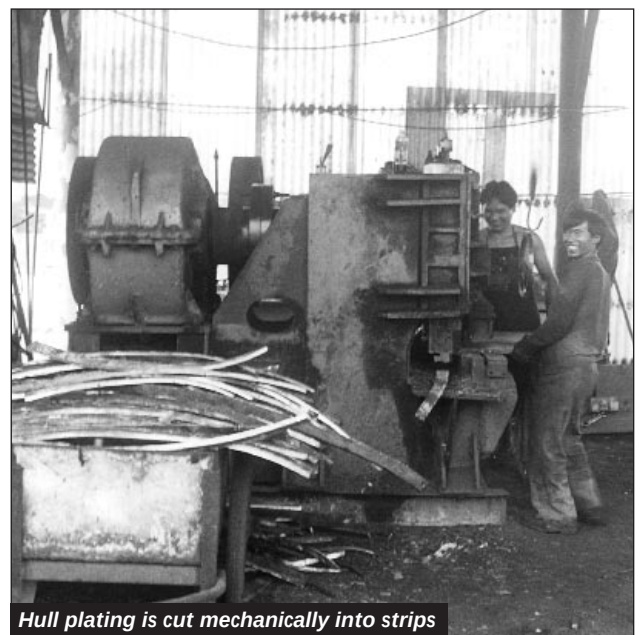
*Full gas cylinders at main issuing office, stored upright at a distance from one another and protected from sun*

SKAGERRAK cargo ship was waiting at anchor. The yard is termed a "state-owned enterprise". It employs some 300 local workers, some on a seasonal basis depending upon jobs in hand, some on a permanent basis. In mid-August 1999, 60-70 persons were observed working in the daytime. Hamburg Süd states that workers have 8-10 hour shifts, with monthly wages amounting to 160 US Dollars.

The premises are a few kilometres away from densely populated residential areas, with no adjoining industrial neighbours. Rice is cultivated directly next to the yard.

The infrastructure of the yard consists of a pier at which the ships dock, and cranes by which heavy parts are lifted ashore or onto river barges for transport to steelworks.

Dismantling work is carried out on paved areas. Here smaller transport vehicles operate, such as fork-lift trucks. Full gas cylinders are stored carefully, with gaps maintained between cylinders, standing upright and under protection from the sun. Cylinders are administered by a central issuing point.



*Hull plating is cut mechanically into strips*

In the generously dimensioned yard, large parts of the steel plating cut from the hulls are transported away for use as provisional flooring slabs, or are cut into strips mechanically. These are then processed to construction steel in cold rolling mills. This prevents fires that might otherwise occur through further torch cutting. ■



## THE PROBLEMS

Working in the light of previous experience and knowledge of the problems generally, Greepeace's team concentrated upon three areas – asbestos, fires, and the organization of work generally, looking especially at safety provisions and environmental protection.

### Asbestos

Ships built before 1980, and some of those built later, contain considerable amounts of asbestos. This was used for insulation (thermal, electrical) and flame protection.

Despite these preparatory inputs, all ship parts with insulation material perceived by the yard management to have an asbestos-like fibre structure or thought to possibly contain asbestos had been taken from the Columbus America under circumstances unknown to us. They lay strewn around the yard during our visit.

Workers clad in whole-body protective clothing extracted manually (with suitable gloves) all insulation materials that could contain asbestos, packed them into plastic sacks, emptied these onto a tip and fetched new loads using the same sacks. Fully packed sacks of this material stood around unclosed. The collection rate may figure around 90%. The remainder is strewn around the yard.



Parts of ships on yard site – removing insulating materials

#### Practices observed:

The Hamburg Süd shipping group, the former owner of the two container ships Columbus America and Columbus Australia, had drawn up a detailed toxics inventory and had submitted this to the yard in order to assist the breaking work. The inventory names and quantifies the different types of asbestos, and lists the various insulating materials in which they occur. The asbestos-relevant hazardous locations on the ships are described precisely.

The working zones of the asbestos collectors were not separated from or marked off against those of other workers. Even visitors were admitted to inspect operations close up without any protection.

The tip directly adjoins the office buildings and working areas, and is separated from a rice field only by a road. Farmers were working in the field. The surface of the tip was about three-quarters covered. It was not kept moist in any systematic way.



**Asbestos gatherers in action –  
with unprotected onlookers**

The protective suits had been supplied by the Hamburg Süd shipping group, which had insisted upon their use. The workers made an untrained impression. At times, they opened their protective masks during work, and in no way refrained from handling the materials directly next to other, unprotected workers. The absurd picture of a group of workers fully clad in protective clothing amidst completely unprotected people gave us the impression that the asbestos problem is not taken seriously, and is perhaps not even really known. The Chinese worker health & safety regulations handed to us made no mention whatsoever of asbestos.

#### **Conclusions:**

The toxics inventory supplied by Hamburg Süd was not observed. Too much material was collected, namely all insulation materials having a fibrous structure. These, however, were not treated with the necessary caution.

While workers dismantling asbestos may perhaps be protected adequately during their work, other persons carrying out other types of work are not. Particularly in the drier times of the year, asbestos dusts can disperse all the time to all the areas of the yard, to the nearby rice fields, and possibly also to residential areas some distance away. The final outcome is that nobody in the area is really protected.

#### **Recommended immediate measures:**

Asbestos is recognized as a hazardous material of the first order. We therefore recommend training a special team for handling asbestos-containing materials, similar to the firefighting team already set up at the yard according to the documents given to us.

The task of the new team would be to:

- identify asbestos fibres by simple methods,
- mark and separate asbestos-containing materials
- instruct other workers and
- monitor all operations through to tipping and sealing the tip.

Furthermore, the team would have responsibility for providing and maintaining protective clothing and equipment. It is advisable for the team head to report directly as safety officer to yard management.

It is essential to continue to demand of former ship owners that they supply toxics inventories stating precisely where asbestos-containing materials are located, and to check these inventories. However, the yard must then also work according to the inventory.

Whole-body protective clothing should already be mandatory for workers fetching asbestos-containing materials from the ship. Critical areas need to be made moist before work begins, in

order to suppress dust formation. Areas in which asbestos-containing parts are stored, dismantled and processed must be separated and sealed off.

Asbestos-containing materials must be collected completely, using industrial suction equipment. Sacks must be tear-resistant and labelled in order to prevent confusion. Sacks must be closed immediately after they are filled and deposited directly on the tip. Sacks must not be emptied or reused.

The entire tip must be covered and kept moist systematically in order to bind any dust escaping from e.g. holes in sacks until the tip is finally

closed. The tip must receive a complete top seal, be fenced off and remain marked as a tip.

Asbestos burial is in principle appropriate and, if implemented, should take place within the grounds of the yard wherever possible.

An urgent first measure that must be implemented immediately is to keep all asbestos-relevant locations, parts and materials moist.

A summary of the most important German regulations on procedures in asbestos clean-up is to be found in (2), page 10f. ■



## Fires

Paints on old ships contain considerable amounts of toxic arsenic, cadmium, lead, mercury and zinc compounds and chromates. As a rule of thumb we can say: the older the more toxic. The outside plating of new ships continues to be coated below the water line with organotin paints (tributyl tin, TBT) in order to prevent fouling. These paints are flammable and are set on fire by torch cutting. These fires create new, cancerogenic polyaromatic hydrocarbons (PAH) such as benzopyrene.

### Practices observed:

Evidently well trained workers without breathing apparatus use hand-held cutting torches to cut up steel parts into pieces small enough to be carried away for further processing. Some workers wear dark goggles. In addition to the small smouldering fires that result constantly from torch cutting, open fires break out regularly, too. These were observed and documented repeatedly during the visit.





*Open fires are put out, smouldering fires are put up with*

Open fires spreading to oil-containing aggregates and to all inflammable materials that are lying around generate further problems which can only be assessed if the material that is burning is known.

At the yard, open fires were put out swiftly with water, but small smouldering fires were left uncontrolled.

#### **Conclusions:**

The workers using the cutting torches are exposed inescapably to toxic vapours (PAHs) and falling ash containing heavy metals. These substances contaminate the entire working area and its surroundings.

Analysis of a sample taken from the workplace of the cutters found it to contain: Arsenic: 65 mg/kg; Lead: 390 mg/kg; Cadmium: 0.3 mg/kg; Chromium: 282 mg/kg. (6)

These values suggest an accumulation of arsenic and toxic heavy metals at the workplace.

The extremely high levels of polycyclic aromatic hydrocarbons (PAH) found in the same dust sample are alarming: 1500 mg/kg (ppm)



*Smouldering fires and toxic conflagration gases arise from torch cutting*

benzo(a)pyrene (BaP) and five other toxicologically relevant PAH compounds at similar levels.(5) The BaP concentration alone exceeds the values stated in the literature by several orders of magnitude: 400 mg/kg in chimney soot; 94.5 mg/kg on the floor of a zinc smelting plant; 3 mg/kg in the soil next to a motorway and so on.

|                                                                                   |              |         |
|-----------------------------------------------------------------------------------|--------------|---------|
|  | Ihre Probe   | -       |
|                                                                                   | Unsere Probe | 9931501 |
| <b>PAK nach EPA</b>                                                               |              |         |
| Naphtalin                                                                         | mg/kg TS     | 180     |
| Acenaphthylen                                                                     | mg/kg TS     | 42      |
| Acenaphten                                                                        | mg/kg TS     | 205     |
| Fluoren                                                                           | mg/kg TS     | 210     |
| Phenanthren                                                                       | mg/kg TS     | 1.700   |
| Anthracen                                                                         | mg/kg TS     | 196     |
| Fluorenthen                                                                       | mg/kg TS     | 2.400   |
| Pyren                                                                             | mg/kg TS     | 2.250   |
| Benzo(a)anthracen                                                                 | mg/kg TS     | 1.600   |
| Chrysen/Triphenylen                                                               | mg/kg TS     | 2.100   |
| Benzo(b)fluoranthren                                                              | mg/kg TS     | 2.400   |
| Benzo(k)fluoranthren                                                              | mg/kg TS     | 800     |
| Benzo(a)pyren                                                                     | mg/kg TS     | 1.500   |
| Indeno(1,2,3-cd)pyren                                                             | mg/kg TS     | 1.100   |
| Dibenzo(a,h)anthracen                                                             | mg/kg TS     | 415     |
| Benzo(g,h,i)perylene                                                              | mg/kg TS     | 1.100   |

PAH levels in mg/kg (=ppm) dry matter

Under German rules governing the handling of hazardous materials, specifically pyrolysis products of organic materials (Technische Regeln zum Umgang mit Gefahrstoffen: TRGS 551 – Pyrolyseprodukte aus organischem Material), PAH-containing substances are classified as hazardous if they contain 50 mg BaP / kg or more.

The potential of substance mixtures containing high PAH levels to cause skin cancer is known since 1775. Increased incidences of certain carcinomas of the skin and the respiratory tract have consistently been found among certain occupational groups such as chimney sweeps, coke oven workers and so-called gas workers.

The yard is paved, so that contamination of the wider environment is held within limits. This in turn means, however, that the workers are exposed all the more to conflagration gases and to drifting and swirling dusts.

#### Recommended immediate measures:

At the workplace:

For the immediate effects of torch cutting:

- Prepare the steel by mechanical removal of paint along the cutting line by means of sandblasting or scrubbing.
- Use protective goggles and, where necessary and certainly in poorly ventilated interiors, breathing apparatus for workers.

For open fires:

- Withdraw materials, i.e. remove all inflammable objects and oil residues rapidly from the yard and consign these either to recycling or, where that is not possible, to controlled landfill.

After fires:

The prime concern is to prevent all kinds of fires. Where this fails, fire residues need to be handled and disposed of as hazardous waste in order to prevent further contaminant accumulation at the workplace.

Regular analyses of dust samples taken from the yard should be undertaken in order to gain an indication of whether and where clean-up measures are necessary.



Typical residues of smouldering fires after torch cutting; here the sample was taken (S)



## General work organization, worker safety and environmental controls

The entire organization of transport and storage operations requires a systematic analysis in order to be able to elaborate more specific recommendations for improved worker safety and environmental protection, and also for improved efficiency.

For instance, loading zones and transport and movement paths are not marked. Nor are there speed limits or crossing and right-of-way rules.

During the lifting and moving of ship parts by cranes, work areas are not separated and marked off. Above all when river barges are being loaded with scrap for transport to steelworks, workers are below suspended parts and can be hit by these should they fall.

Everywhere in the yard, parts from previously processed ships are lying around without any apparent utilization being intended. Oil-containing aggregates and other contaminated parts composed of a wide variety of composite materials pollute the surfaces. Discussions held at the yard could not clarify the final destiny of these parts.

This promotes recurrent fires, which further exacerbate the problems. Arsenic, various heavy metals and extremely high concentrations of cancerogenic polyaromatic hydrocarbons (PAH, see above) were found in a dust sample taken from the yard floor.

The health-endangering and environmentally hazardous pollution of the yard can disperse through rainfall – and in dry times of the year through drifting dust – to the surroundings of the yard and to the waters of the Yangtze river.

### Recommended immediate measures:

One demand must be raised without any further analysis:

It is essential that oil- and lubricant-containing aggregates and ship parts are concentrated in a storage area that has a sealed floor and is strictly separated from all work processes. In this area, all open fires and sparks (including cigarette smoking etc.) must be prohibited.

For further processing, the following needs to be considered:

Many parts of ships are cut mechanically and then cold-rolled. However, many other parts are smelted in blast furnaces. This can generate





emissions problems. For this stage of the process, yard management and company management should cooperate with steelworks operators and the environmental authorities to find solutions

relating to furnace technology and flue gas management and control in steelworks.

END

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