ShipsforScrapIII

SteelandToxic WastesforAsia

FindingsofaGreenpeace StudyonWorkplaceand Environmental ContaminationinAlang-Sosiya ShipbreakingYards, Gujarat,India.

GREENPEACE

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1.Introduction

In some cases, it takes more than 10 years for the symptoms to emerge. It begins with an increasingly pronounced shortness of breath, combined with a rasping, incessant cough. A dry crackling sound accompanies every breath. The condition of the victim rapidly deteriorates. Pretty soon, he suffers significant weight loss, and begins to bring up blood in the sputum everytimehecoughs.

By now, it is probably already too late. The asbestos he has inhaled in some earlier part of his life has done its damage. The fine and virtually indestructible asbestos fibres are now lodgedinthemicroscopicairsacsofhis lungs. The lung's defence mechanisms are faced with no option but to give up theirfutileattemptstodestroythe fibres. Soon, a hardy scar tissue forms around the now inflamed lung walls, making breathing less efficient, and increasingly painful.

Thevictimwillgothroughthemandatory chest and/or abdominal pains, and if a cardiacarrestdoesn'tkillhim,heisquite likely to succumb to a lingering death due to one or other forms of cancers associated with asbestosis – an often-deadly affliction caused primarily by workplaceexposuretoasbestos.Ifheis asmoker,orisexposedtootherpoisons and cancer-causing agents during the course of his work or other activities, cancercouldbecomeanearcertainty.

Themigrantworkersattheshipbreaking yards have a raw deal. In India, they travel long distances, hundreds, sometimes thousands of kilometers, before landing a job at one of the shipbreaking yards. Here, they end up stripping entire ships with bare hands, sledgehammersandgastorches.

They break other people's ships, inhaling poisons contained within the structure of the ships that built the empires of shipowners from far-away countries. What doesn't go into the bodies of the workers ends up in the environment. Many of the poisons, including heavy metals and persistent organic pollutants build up in the environment. From here, they travel through the foodchain damaging entire sectionsoftheecosystem.

The ships are broken to recover valuable steel. Steel, we hear, is what goes into the building of a nation's economyandkeepsthe shipbreakersin business. For their efforts and for living and working in highly poisonous and physically hazardous surroundings, the workers at the shipbreaking yards get anywherebetween$2and$5aday.

Talk of improving the living and working conditions of these workers, and calculators materialize in the hands of the shipbreakers, the steel tycoons, the multinational shipowners, the global regulators.

For these workers, destiny and global inaction dictates a life in poverty and a deathbypoisons.

2.ExecutiveSummary

In June 2000, Greenpeace took up on an official invitation by the Gujarat Maritime Board – the Government agency entrusted with regulating the Alang shipbreaking yards – to enter and take environmental samples from the yards in Alang, Gujarat. At the same time, Greenpeace also entered and took samples from the Mumbai (Bombay) shipbreaking yards with the permission of the Bombay Port Trust.

The results of the analyses reconfirm the findings of Greenpeace's October 1998 investigation of these yards. If anything, two years of inaction is likely to have heightened the extent of toxic contamination at the shipbreaking yards resulting in increased health risks to workers and communities exposed to the poisons released into the environment from the yards.

Popular pressure from workers unions and environmental groups has led to a positive momentum among various stakeholders. Shipbreakers and even cash-starved shipbreaking countries are prepared to shoulder a part of the responsibility. But the shipowners, whose ranks include many multinationals with stated commitments to environmental and social responsibility, have stoutly refused to have anything to do with decontaminating their ships prior to their export to Asia for breaking.

In a submission dated 31 July, 2000, to the Correspondence Group set up by the International Maritime Organisation's Marine Environmental Protection Committee, the International Chamber of Shipping shrugs off all its responsibility in one swift stroke of the pen:

"Working conditions and employee health and safety are not issues which can be determined by shipowners. The issue of worker safety is essentially the responsibility. . . of legislators . . employers...administrators." [1]

However, the popular sentiment may well go against the recalcitrant shipowners. Across the spectrum – from shipbreakers, government functionaries, trade union activists to environmental and health activists – support has grown for the demand that the "polluter pays," that the shipowners who profit from the operation of the ship for more than 25 years must pay for decontamination before export and safe shipbreaking.

The Greenpeace investigation confirmed that shipyard workers are exposed to a deadly cocktail of toxic substances released during the course of shipbreaking. Heavy metals, asbestos, dangerous levels of organotins, and cancer-causing poly aromatic hydrocarbons (PAHs), contaminate the workplace. The levels of some of the pollutants such as organotins and PAHs in the soil and sediment in and around the yards are high enough to warrant the classification of these soils and sediment as hazardous wastes. Many of the poisons found will end up in the bodies of the workers and remain available in the local environment for long periods of time.

Asbestos, the primary pollutant of concern, was found even in the living quarters of the workers. Given the casual manner in which large quantities of asbestos are stripped from the ships, and the proximity of the workers quarters to the shipbreaking yards, it is highly likely that the asbestos in the quarters are carried by air-borne dust and/or by the workers on their clothes.

Investigations conducted by Greenpeace in China and Bangladesh indicate that the conditions in these countries are fundamentally no different, at least as far as asbestos handling is concerned. Our investigators report extensive and visible contamination, and patently unsound work practices in the shipbreaking yards of all three countries – India, China and Bangladesh. However, in China, the workforce was better trained and the torchcutters were better protected. Nevertheless, the workforce and visitors not involved in torchcutting were still exposed to the fumes.

Environmentally too, the Chinese yards offered slighter chances of marine pollution because much of the processing of the steel plates takes place at a distance from the sea on a concrete surface – rather than in the vicinity of the intertidal zone as is the case in India and Bangladesh.

In fact, Greenpeace investigators observed a consistent pattern of hazardous practices relating to asbestos or insulation removal, torchcutting and waste management in the Asian yards. In human terms, these unsafe practices translate, at a conservative estimate, to 100,000 workers in the three countries who are directly exposed to workplace and environmental poisons released during the breaking of contaminated ships-for-scrap.

Dr. Frank Hittmann, the Occupational Health Officer of the German state of Bremen, has publicly stated in an interview with ARD-TV (First German TV) that the lack of safeguards in handling the various contaminants means that every fourth worker in Alang must be expected to contract cancer. [2]

Because many of the poisons released in the course of shipbreaking are persistent and bioaccumulative in nature, the magnitude of environmental and human impact should be assumed to be far greater than merely on the directly-affected workers.
That's the bad news.

The good news is that after more than two years of name-calling and nay-saying, the shipping industry, the shipbreakers and the world governments seem ready to address the threats posed by the breaking of toxic ships-for-scrap to the environment and workers.
India requires special mention for the small, but resolute steps it has taken, to unilaterally address the problem. Besides mandating gas-free certificates for all tankers – which has reportedly brought down the number of worker casualties due to explosions and fires – the Indian authorities, goaded by the country's judiciary and a vigilant press, have also begun laying out guidelines for safe work practices and penalties for violations of the same.

Most notable among these initiatives is that of the Gujarat Maritime Board (GMB) which has issued a notification with broad-ranging, albeit largely un-implementable, regulations.

In Alang, Greenpeace found a marked increase across the yard in the number of workers using hard-hats, gloves and boots. The yards visited also had basic fire-fighting equipment. Although, the types and numbers of protective gear in evidence is by no means adequate, the increased use of protective equipment indicates that with proper guidance, the authorities and shipbreakers will cooperate to make the changes to improve protection for the workers.

Workers using hard-hats(Photo: Santosh Bane)

The Gujarat Maritime Board had put up a number of colourful, simple messages encouraging safe work practices among workers. Several shipbreakers had also put up signboards on safety issues, although the language of communication (English) leaves one wondering whether the target audience is the worker – who speaks Hindi and/or his native language --or the critical English-speaking visitor.

Ironically, India's unilateral moves to enforce gas-free certification has diverted tanker demolition business to Bangladesh, where such regulations if available are not properly enforced. Clearly, anything short of a global regime for decontamination and regulation will merely serve to move the problems from one country to another, rather than solve them.

Experience from industrialized nations indicates that "controlled use" or handling of asbestos with a view to eliminating dangers to worker health are not possible by regulatory means. As a result, the popular wisdom in Europe and many other countries is to ban all use of asbestos.

In other words, even the highly sophisticated techniques of asbestos removal, performed under the supervision of effective regulatory and enforcement machinery by trained workers and watched over by an aware community, cannot completely eliminate the dangers to the health of the workers. Under such circumstances, the proposal from various quarters that decontamination should be done at the Asian shipbreaking yards using better techniques is fraught with danger, given the abysmal state of the enforcement

machinery and the difficulty that workers have in asserting themselves.

Supported by the new evidence, Greenpeace demands are:

1. Shipowners/operators must present a complete inventory of all hazardous material on board the vessel, making a register of the pollutants and analysis of the dangers from the ships;
2. The Polluter (Shipowner/operators) must decontaminate the ships-for-scrap prior to export;
3. Shipbreaking should be conducted without threat to worker or environmental health;
4. Tankers must be made gas-free for hot works prior to export for breaking;
5. Shipowners/operators must disclose the selected shipbreaking facility and the assessment done to ascertain good working conditions and environmental record;
6. Shipowners and shipbreakers must carry out extensive consultations on the breaking plan and put in place expert monitoring;
7. Shipbreaking facilities should be freely accessible by citizen groups, environmental NGOs and trade union activists;
8. Shipbreaking should be subject to a global regulatory regime, rather than a matter of unilateral measures.

Looking ahead, Greenpeace demands that:

1. Existing ships should be made progressively cleaner, by systematically removing, and replacing toxic and hazardous substances during maintenance, repair, refitting and rebuilding programmes;
2. The "next generation" of ships should be "clean ships," i.e. ships that are designed and constructed with a view to eliminating their environmental and health and safety implications upon decommissioning.

As is evident from our demands above, Greenpeace is neither opposed to either the shipping or the shipbreaking industry. We will, however, actively oppose the export of ships that are not decontaminated, and unsound breaking practices that threaten the environment and the health of workers.

3.ScopeandObjectives

Greenpeace's first visit to the Indian shipbreaking yards, in October 1998, was limited by the lack of official permission. During this visit, samples of seawater, soil and sediment were taken only from one plot, the perimeter of the yard, and from the more distant stretches of the coast and inland. As a result, it was not possible to get more than a spotlight picture of soil, sediment and seawater contamination. Neither was it possible to actually determine the nature of contamination in the workers' living quarters.

Nevertheless, the 1998 investigation, was successful in establishing beyond doubt that ocean-going ships contain substantial amounts of toxic and hazardous substances within their structures, and that the breaking of these ships releases these toxic substances into the environment.

Following up on a public offer by the Gujarat Maritime Board (the regulatory authorities for Alang) in February 2000 to permit NGOs to visit the shipbreaking yards, Greenpeace revisited Alang-Sosiya yards in June 2000, nearly two years after its first visit. The visit to Alang was preceded by a short investigation of the Mumbai shipbreaking yard.

In addition to meeting with representatives of the Alang Shipbreakers Association and the Gujarat Maritime Board, the Greenpeace team had two important tasks:

1. To assess the ambient environmental conditions, with special regard paid to toxic contamination, in the workplace and living quarters of the workers;
2. To assess the degree of environmental pollution in the intertidal zone, the scrapping plot, workmen's living quarters and the immediate hinterland.

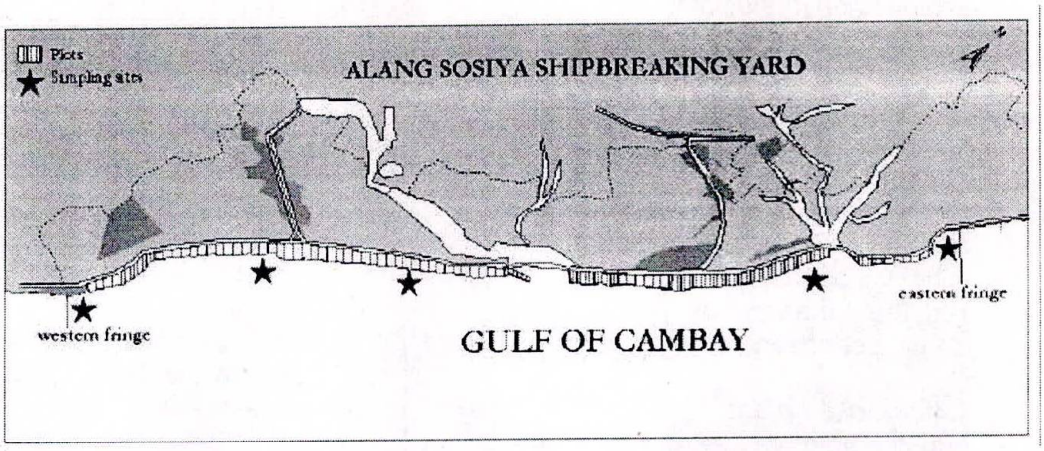
The assessment is not, and was not intended to be, a complete monitoring of the state of the working and natural environment in and around the shipbreaking yards. Rather, the objective was to generate sufficient evidences oas to be able to recommend immediate changes to improve the environmental and workplace quality, and identify problem areas, such as long-term and persistent pollution, that will prove more difficult to tackle.

4.Methodology

Samples were taken on June 6-7, 2000, from approximately predetermined spots in and around the shipbreaking yard.

4.1The IntertidalZone:

Because ships are broken in the intertidal zone, the highest degree of contamination is assumed to be contained within this zone and along the length of the shipbreaking yard. Along the approximately 10-plus kilometer long spread of shipbreaking plots, it was expected (at the time of sampling) that the area with the highest density of plots – between 2000 and 3000 meters from the Eastern Fringe – would be the most contaminated.



Map1:Samplingsitesatthe Alang Sosiya ShipbreakingYardinthetidalrangearea

The sampling spots, "Eastern Fringe" and the "Western Fringe," were each fixed at a distance of 500 metres outward from the last plots on either edgeofthe10kilometerstretch.

Within this belt, samples were taken of seawater and sediment. Analysis and evaluation of these samples focused on finding organotins, mainly Tri Butyl Tin (TBT) and its degradation products. These organotins are released from the toxicandpersistent antifoulingpaintthat is used on ships beneath the water line to discourage the growth of marine life on the ship's surface. Isolated samples were also tested for heavy metals and polyaromatichydrocarbons(PAHs).

4.2WorkingAreaonthePlots :
The greatest immediate toxic threat to health at the workplace comes from the handling of asbestos. Insulation material found lying within a plot, and dust/soil samples from the workers' living quarters, public places and open dumps for ship rejects, were collected for analysesforthepresenceofasbestos.

In terms of ongoing and long-term exposure to workers and impacts on environment, organotins, heavy metals, PAHs, dioxins and furans are the most criticalandrelevantpersistentpoisonsof concern. Because chemicals under thesecategoriesaregenerallylong-lived in the environment and tend to bioaccumulate and magnify, an understanding of the extent of contamination of the environment by these chemicals is important to appreciate the potential long-term and subtle effects on the environment and humanhealth.

Therefore,soilsampleswere takenfrom the working area of the same shipbreaking plots from where sediment and seawater samples were collected. These samples were tested for organotins, PAHs, and dioxins and furans.

This report does not disclose the shipbreaking plot numbers. These plots were chosen to get a geographic representation of the spread of the yard rather than to assess the environmental state of individual yards. Given the existing conditions where none of the shipsaredecontaminatedpriortoarrival at the yards for scrapping,

environmental pollution cannot be avoidedinanyoftheplots.

4.3Workers'LivingQuarters:
Samplesofdustandsoilwerecollected from two huts, one each close to the Western and Eastern Fringe. The huts, which are used by workers to sleep, were expected to be contaminated by asbestos dust, air-borne and/or carried into the areas by workers on their clothing,shoesand/orhair.

4.4OtherSamples:
Adustsampleforasbestosanalysiswas taken from beneath the carpet at the Gopnath Temple, which lies between 200 and 300 metres from the oldest plots. A dust/soil sample was collected from near a refuse dump about 200 meters inland towards the Eastern fringe. The dump contained large amountsofinsulationmaterial,including material that was suspected to contain asbestos.

4.5LaboratoryTesting:
All samples were taken by Greenpeace campaigners Marcelo Furtado, Shailendra Yashwant, Hemant Babuand Nityanand Jayaraman, under the supervisionof Judit Kanthak,achemical engineer with Greenpeace. The Alang samples were taken on 6-7 June, 2000, and the Mumbai samples on 4 June, 2000.

Thesamplesweresenttothelaboratory used in 1998 -- GALAB Hightech Laboratories, Geesthacht, Germany, for analyses. The results were documented in Protocol 1641-1, dated 03-09-2000. [See Annexure 1: "Sample Details and AnalysisMethodology"].

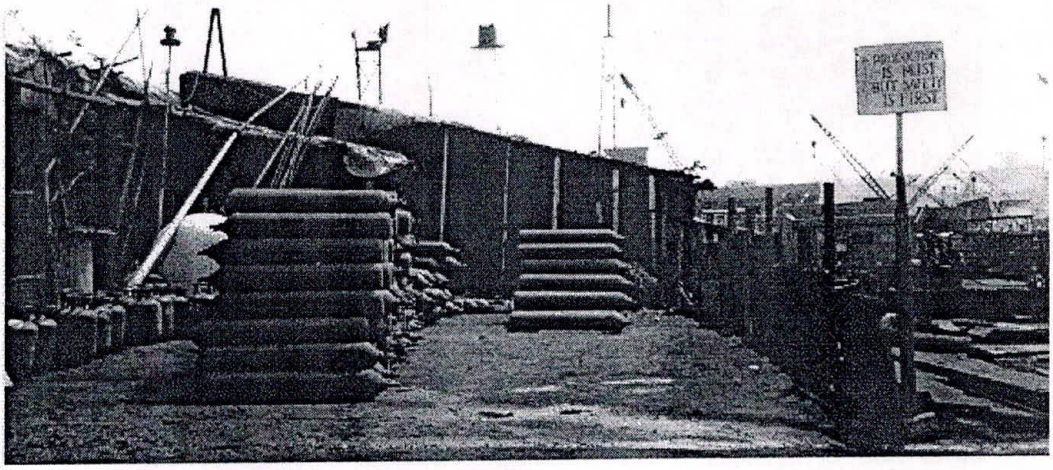
5.Findings

Three years in the limelight has proven to be a positive force for the Indian shipbreaking yards. While little has changedsubstantivelyasfarastherisks duetotoxicexposurefacedbyworkers, it is quite clear that Alang is serious about saving its business and coming clean.Thisisevidentfromtheattitudinal change among shipbreakers and the Governmentregulatoryauthorities.From a head-in-the-sand, devil-may-care attitude,the Alangplayersarelookingat the real causes of their problems, and taking steady, if sometimes merely cosmetic, steps to counter the allegationsofabysmalworkconditions.

Clearly, though, some common-sense and simple work practices that are now mandatory pursuant to the GMB order will serve to significantly reduce workplace exposure to toxics among workers. For instance, the notification requires that "The shipbreaker shall sprinkleseawateroverthe workingarea inordertominimizedustgenerationdue tomaterialhandling." [3]

5.1VisualInspectionReport
Greenpeace investigators found a marked increase across the yard in the number of workers using hard-hats, gloves and boots (see photo p.7) The yards visited also had basic fire-fighting equipment.

Oxygen and acetylene bottles were found stored separately at designated places. It was not possible, though, to determine whether workers differentiate between filled containers that must be storeduprightandemptycontainersthat can be horizontally stacked. All visible bottleswerehorizontallystacked.

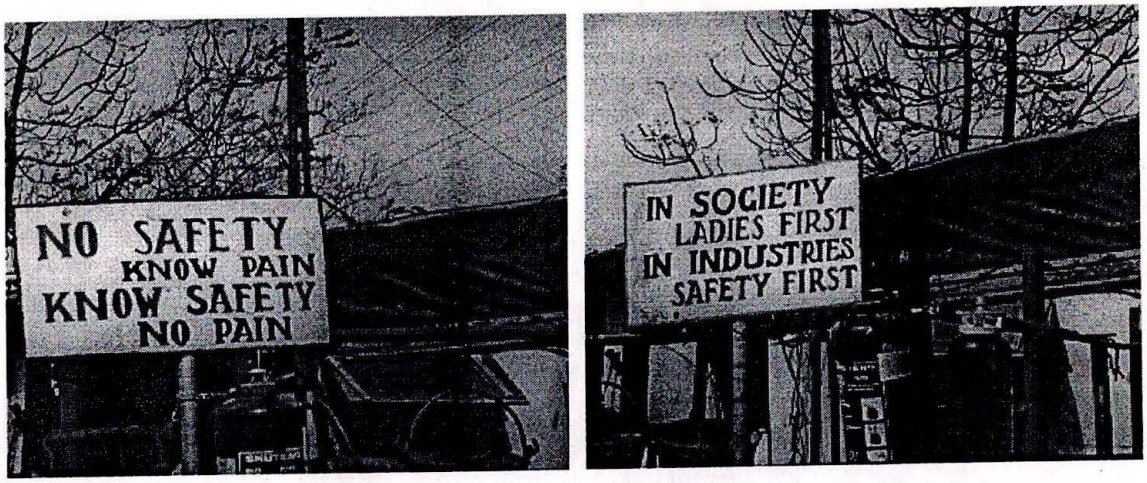


Oxygenandacetylenebottlesstackedhorizontally(Photo: Judit Kanthak)

The Gujarat Maritime Board had put up a number of colourful, simple messages encouragingsafeworkpracticesamongworkers.

Educationalsignboard(GMB)(Photo: SantoshBane)

Several shipbreakers had also put up signboards on safety issues, although the language of communication (English) leaves one wondering whether the target audience is the worker or the critical visitor.



Educational signboards (shipbreakers) (Photo: Judit Kanthak)

At the time of the visit, the Gujarat Maritime Board was also preparing a masterplan for revamping the infrastructure to deal with hazards and hazardous substances. Several shipbreakers were keen to implement easy, immediate actions that would significantly improve workplace safety.

On the ground, though, little had changed.

Whatever limited improvement or changes were in evidence in the yards were oriented toward providing marginal protection for workers from the ubiquitous environmental poisons. Virtually no steps have been taken to prevent environmental contamination. Although the Greenpeace team did not witness any open burning in the few yards it visited, it did encounter several sites outside the plots where sundry discards were either being burnt or had been burnt.

The beaches beyond the two edges of the yards are littered for at least a kilometer with debris, foam and plastics from the yards.

Asbestos continues to be handled and discarded haphazardly. Open dumps with insulation material, oily rags, foam and asbestos dot the landscape. Face masks and respiratory gear were nowhere in evidence. No efforts had been made to suppress dust-generation in the yards or the road.

Opendumps;asbestos(Photo: SantoshBane)

The approach road to the plots and the plots themselves remain dangerously congested. This would prove to be a major obstacle to any meaningful emergency response.

Workers entering the intertidal zone during low-tide continue to do so without adequate footwear exposing themselves to the toxins in the sediment and to stray pieces of metals.

Most damagingly, village children from nearby settlements were found collecting fish and shellfish from the severely contaminated beaches at the fringes of the yard.

5.2 Asbestos

The analyses confirmed the presence of asbestos dust in the workplace, living quarters and public areas, including the hinterland around Alang. Out of a total of six samples taken, five tested positive for asbestos. The implications of these findings for the workers, the shipbreakers themselves, and shop owners/employees along the shipbreaking yard are discussed in the chapter 6 titled "Discussion."

SampleNo.	Locationofsampling	Date of sampling	Description of thesample	Result
18	ShipbreakingPlot	06.06.00	Insulation material	Chrysotile
21	Openwastedump 200minland	06.06.00	Dust+soil	Chrysotile
23A	Livingareal Outside	06.06.00	Dust	Chrysotile
23B	Livingareal Inside,floor	06.06.00	Dust	Chrysotile
47C	LivingareaII Inside,floor	07.06.00	Dust	Amphibolite
48C	LivingareaIII Templeinside,carpet	07.06.00	Dust	Noasbestos

TABLE1:AnalysesResultsforAsbestos. Alang-Sosiya ShipbreakingYard.
Note: Amphibolite is the group name for the following commercial types of asbestos– crocidolite, anthophyllite, amosite, acinoliteand tremolite.

5.3 Organotins

The results indicate severe and extensive contamination of seawater and sediment by poisonous organotin compounds at all sampling sites. This hasseriousimplicationsforworkerswho eitherwalkthroughthemarshy intertidal zone during low-tide or work there draggingpiecesofshipsteeltoshore.

SampleNo.		39	19	34A	29A
Distance to the westernfringe	m	600	2,800	4,600	12,200
Dateofsampling		06.06.00	06.06.00	06.06.00	06.06.00
Monobutyltin	ng/l	462	330	1,220	120
Dibutyltin	ng/l	1,440	739	5,900	59.6
Tributyltin	ng/l	8,400	1,290	10,900	74.1
Tetrabutyltin	ng/l	<20	<20	194	<1
Triphenyltin	ng/l	<20	<20	<1	<1

TABLE2: OrganotinsinSeawater, Alang

Thehighestconcentrationof tributyltin– 19,400 µg/kg in sample # 42A -- was found in the yard area where most plots are clustered together. [See Table 3 below] This lies approximately 2100 meters from the Eastern Fringe. The level found here is approximately between10and100milliontimeshigher than internationally recognized limits (0.005to0.05 µg/kg) for TBT in marine sediment.[4]

Although the level (768 µg/kg) found in the sediment taken from the Western fringe, which is 500 meters away from the last Westside plot, is substantially

lower, port authorities and agencies regulating industrial sites in the European Union are preparing legislation that would classify such sediments as a hazardous waste. For instance, Hamburg, Germany, already has a political decision to classify grime (dredging sludge from the river Elbe) with more than 250 µg/kg as hazardous waste.[5]

SampleNo.		24A	20A	41A	42A	43A
		western fringe				eastern fringe
Distance to the westernfringe	m	0	2,800	4,600	10,100	12,200
Dateofsampling		06-06-00	06-06-00	07-06-00	07-06-00	07-06-00
Monobutyltin	µg/kg	4.7	86.9	41.1	382	3.6
Dibutyltin	µg/kg	55.1	784	311	1,320	10.7
Tributyltin	µg/kg	768	10,100	2,320	19,400	78.4
Tetrabutyltin	µg/kg	18.3	162	31	350	2.1
Triphenyltin	µg/kg	<1	<1	10.1	43.4	<1

TABLE3: Organotincompoundsinmarinesediment,Alang

Table 4 below lays out the organotin content in a soil sample taken from the same plot where marine sediment sample #41A was taken. Soil from this plot was chosen for analyses because the sediment sample here yielded significantlylowerlevelsofTBTthantwo othersamplesforthesamechemical.

Implications for workers of such high levels of organotins in the soil are disturbing, especially since this soil sample comes from a plot where organotin levels in sediment are relativelylowcomparedtothoseinother samples. In other words, we can assume that most plots are even more polluted than indicated in the tested soil sample.

SampleNo.		35A
Distancetothewesternfringe	m	4,600
Dateofsampling		06-06-00
Monobutyltin	µg/kg	61.2
Dibutyltin	µg/kg	92.6
Tributyltin	µg/kg	384
Tetrabutyltin	µg/kg	21.4
Triphenyltin	µg/kg	<1

TABLE4: Organotinsinsoil, Alang

A more detailed analyses of the human and environmental implications of these numbers is dealt with in the following chaptertitled"Discussion."

5.4HeavyMetals

Sediment samples taken from the various plots indicate elevated levels of heavy metals, including those like lead that bioaccumulateinlivingtissue.

Levels of lead, for instance, are already close to the upper limits measured in the German North Sea sediment (250 mg/kg) between 1994-1998.[6]

The levels of other metals detected in the Alang sample are typical of pollution in regions with a long industrial history. The levels are only likely to increase to significantly higher levels if shipbreaking continues with a business-as-usual approach.

SampleNo.		20B	41B	42B
Distancetothewesternfringe	M	2,800	4,600	10,100
Dateofsampling		06-06-00	07-06-00	07-06-00
Arsenic	mg/kg	30	<5	20
Cadmium	mg/kg	<10	<5	<10
Chromium	mg/kg	140	40	70
Copper	mg/kg	270	230	210
Iron	mg/kg	162,500	34,600	63,400
Nickel	mg/kg	80	40	50
Lead	mg/kg	220	110	180
Zinc	mg/kg	1100	670	530

TABLE5:Heavymetalsinsediment, Alang

5.5 Polyaromatic hydrocarbons (PAHs)

The different profiles of the toxic substances analysed in the soil and sediment samples indicate that the sources of contamination in the two media are different. The soil sample, for instance, was contaminated with PAHs from combustion processes. The PAHs contaminating the sediment seem to come from different sources, such as leakedoil.

The practices of open burning – of wastes using oil as a fuel -- observed during Greenpeace's first visit to Alang in 1998 [7] is likely to have played an important role in lending to the profile of the PAHs found in the soil. The PAH profile of the soil sample is similar to an analysis result of combustion residues of an accidental fire at the Chang Jian shipbreaking yard on the banks of the Yangtse River, North of Shanghai in August 1999. The fire was caused during routine torch cutting of ship steel. [8]

The sediment samples do not show a specific pattern. This may be due to:

a) the variety of contamination such as bilge oil, residual fuel, lubricants and greases;

b) the constant movement in the intertidalzone;
c) the influence of aquatic microorganisms degrading the substancestodifferentdegrees.

However, these patterns are consistent withthepracticeatyardswhereoilleaks from the ships end up in the tidal area, while the plots, from where soil samples were taken, are used for torch-cutting thesteelplatesintosmallerpieces.

No.		35C	41C
Descriptionofthesample		Soil	Sediment
Distancetothewesternfringe		4,600m	4,600m
Dateofsampling		06.06.00	06.06.00
Naphtalene	µg/kg	138	661
Acenaphtylene	µg/kg	69	839
Acenaphtene	µg/kg	241	839
Fluorene	µg/kg	69	679
Phenantrene	µg/kg	2,827	822
Anthracene	µg/kg	241	393
Fluoranthene	µg/kg	3,171	929
Pyrene	µg/kg	3,102	893
Benz(a)anthracene	µg/kg	1,206	911
Chrysene/Triphenylene	µg/kg	1,827	911
Benzo(b)fluoranthene	µg/kg	1,792	929
Benzo(k)fluoranthene	µg/kg	793	875
Benzo(a)pyrene	µg/kg	1,275	911
Indeno(1,2,3-cd)pyrene	µg/kg	1,034	893
Dibenz(a,h)anthracene	µg/kg	655	697
Benzo(g,h,l)perylene	µg/kg	896	732

TABLE6: PAHsinsoilandsediment, Alang

The OSPAR (Oslo Paris) Commission on the Protection of the Northeast Atlantics defines a maximum tolerable levelof100 µg/kgforsedimentforeach PAH combination. The levels of PAHs found in the Alang sediment are betweenfourandninetimeshigherthan theseprescribedlevels.Thesedimentof the German North Sea, an area which haswitnessedalongandintensehistory of industrial contamination, also has highlyelevatedlevelsof PAHs.

5.6Dioxinsand Furans

Combustion processes release polyaromatic hydrocarbons, dioxins and furans, often simultaneously. Dioxins and furans (PCDD/F) are normally associated with the incomplete combustion of organochlorine compounds.

Shipbuilding in the 1970s involved the use of a number of organochlorines, including chlorinated solvents in paints; chlorinated flame retardants; polychlorinated biphenyls in sealants,

plastics etc, and PVC in various applications.

Concentrations of PCDD/F in the single sample analysed for the chemicals were found to be low but not insignificant compared to other dioxin hotspots and dioxin-contaminated industrial sites. Nevertheless, because there are no safe levels of exposure to dioxins, and because these chemicals are persistent and bioaccumulative in nature, the very presence of significant levels of dioxins and furans requires that immediate further evaluation be conducted into identifying possible sources and isolating the same.

Sample No.		35B
Distance to the western fringe	m	4,600
Date of sampling		06.06.00
2,3,7,8-TCDD	ng/kg	2
1,2,3,7,8-PeCDD	ng/kg	8
1,2,3,4,-7,8-HxCDD	ng/kg	9
1,2,3,6,7,8-HxCDD	ng/kg	38
1,2,3,7,8,9-HxCDD	ng/kg	17
1,2,3,4,6,7,8-HpCDD	ng/kg	1,230
OCDD	ng/kg	9,680
2,3,7,8-TCDF	ng/kg	50
1,2,3,7,8-PeCDF	ng/kg	45
2,3,4,7,8-PeCDF	ng/kg	52
1,2,3,4,7,8-HxCDF	ng/kg	61
1,2,3,6,7,8-HxCDF	ng/kg	59
1,2,3,7,8,9-HxCDF	ng/kg	4
2,3,4,6,7,8-HxCDF	ng/kg	54
1,2,3,4,6,7,8-HpCDF	ng/kg	284
1,2,3,4,7,8,9-HpCDF	ng/kg	22
OCDF	ng/kg	267
NATO/CCMS-TE	ng/kg	89

TABLE 7: Dioxins and furans in soil, Alang

6. Discussions

6.1 Asbestos

Asbestos-related illnesses pose a serious and constantly increasing risk to the health of workers and people frequenting the shipbreaking yards. If anything, matters have worsened in this regard since Greenpeace's 1998 investigations. That is because ships containing asbestos continue to arrive in Alang, and are subject to the routine grab-rip-dump operations by barehanded, unprotected workers.

Asbestos was found strewn casually around--inthe shipbreakingplotandin opendumpsfurtherinland.Thisposesa serious health risk not only to the shipyard workers, but also to the shipbreakers, the roadside vendors, the transport workers and the Gujarat Maritime Board workers stationed at the shipbreaking yard, not to mention neighbouringcommunitiesofpeasants.

To our knowledge, no medical check-up has been carried out among the workers and other people frequenting the Alang shipbreaking yard to assess the prevalence of asbestos-related ailments. Despite the absence of such data, given the prevailing conditions (both natural and human-induced) it wouldn't be far-fetched to assume that the affliction could be of serious proportions.

1920	Connectionestablishedbetweenasbestosandpulmonaryfibrosis
1936	Recognitionofasbestosisasanoccupationalillness
1940	Connectionestablishedbetweenasbestosisandbronchialcarcinoma
1943	Recognition of bronchial carcinoma in conjunction with asbestosis as an occupationalillness
1960	Connectionbetweenasbestosand mesotheliomaofthepleura
1973	Spray-appliedasbestosbannedintheUSA
1976	Recognitionof mesotheliomaofthepleuraasanoccupationalillness
1979	Spray-appliedasbestosbannedintheFederalRepublicofGermany
1989	ManufactureandsaleofasbestosprohibitedintheFederalRepublicofGermany (deadlinesfortransitionby1994)
1995	Banonthere-useofproductscontainingasbestosinGermany

TABLE 8: Historical development of discoveries and bans relating to asbestos and asbestos-relatedillnesses

The cancer-causing properties of asbestos have been known to science since the 1930s. In fact, few other hazardoussubstancesintheworldhave attractedsomanylaws,regulationsand technical guidelines relating to identification, removal and liability, as hasasbestos.

In the Netherlands, more than 10,000 estimated cases of asbestos-related ailments were recorded between 1969 and 1994. This period corresponds to the early years after exposure. Because many of the asbestos-related ailments, in particular the cancers, manifest themselves approximately 15 to 35 years after exposure, the number of people succumbing to decades-old asbestos exposure is likely to skyrocket inthecomingdecades.Evidenceforthis comes again from the Netherlands, where42,600menandwomenarelikely tosufferfromasbestos-relateddiseases between 1996 and 2030. Of this, the majority will be people who were exposedtoasbestosintheworkplaceor otherwise.

Of the total estimated number – of 52,600 -- of asbestos victims between 1969 and 2030, less than 500 people (those afflicted with asbestosis) are likelytosurvivethedisease.Mostofthe

remainder, afflicted with cancers will succumb to the disease rapidly. [9]

In India, the figure is likely to be substantially higher, with the shipbreaking industry accounting for a significant number.

Interestingly, although asbestos dust and fibre wastes are patently hazardous wastes banned for import into India, the waste asbestos from ships are conveniently ignored by the enforcement authorities. Not only that, the asbestos actually finds its way into the Indian market after workers have manually stripped these deadly fibres from ship structures.

Shiv Gupta, an Alang shipbreaking plot owner, in a revealing interview to Lloyd's List says:
"Dealers pay us Rs. 5 (11 US cents) per kilo, and insist that we do not pack it for them. They prefer to scrape it off themselves, so that they can retain as much of its purity as possible."[10]

The shipbreaking industry will be killed if and when the workers decide to lodge compensation claims for asbestos-related injuries against their employers. [See box "Asbestos Liabilities: A heavy price to pay"]

Interestingly, shipowners and ship-operators, the prime culprits, will have managed to pass on the compensation liabilities to the shipbreakers once they succeed in exporting the ships with the asbestos intact.

Lloyd's of London, which guarantees unlimited liability on its insurance, based on the private fortunes of tens of thousands of investors, is having to pay out increasing amounts in compensation – for asbestos-related illnesses.

With a plethora of cheap insurance policies from the past in their hands, US lawyers are securing astronomical sums in compensation for clients who became ill after handling asbestos-containing material. Claims by asbestos victims have already ruined a number of Lloyd's guarantors; some have even committed suicide. Lloyd's is stricken: unlimited liability and asbestos are clearly a dangerous combination.

Fortunately, the avenues for exporting ships with asbestos to India are gradually closing down. An August 2000 notification[11] by the Gujarat Maritime Board requires that the Master of the ship-for-scrap "shall" present a certificate that no dangerous gas, toxic or any other hazardous chemical/waste are present on board of the ship. While this is not exactly an implementable clause given its vague and all-encompassing nature, it adequately reflects earlier Indian guidelines [12] and the sentiment of the Indian Supreme Court to prevent the import of any hazardous wastes into India. [13]

AsbestosLiabilities:AHeavyPricetoPay

Millionsofworkershavebeenexposedtoasbestosdustsincetheearly1920s.Among shipyard workers, asbestos miners and millers, asbestos product manufacturers, constructionanddemolitionworkers,asbestos-relatedailmentsarenotjustroutine,but increasingly acknowledged as an occupational disease warranting compensation from theemployer.InIndiatoo,avarietyofnationallegislation–theairandwaterActs,the HazardousWastes(ManagementandHandling)Rules(1989),theFactoriesAct(1948) –governstheimport,use,handlinganddisposalofasbestosandasbestoswastes.

It is generally accepted that the risk to workers increases with heavier and long-term exposure. However, investigators have also found asbestos-related diseases in some shipyard workers exposed to high levels of asbestos fibres for only brief periods (as short as 1 or 2 months [14]). Even workers who may not have worked directly with asbestos but whose jobs were located near contaminated areas are known to have developedasbestosis, mesothelioma,andotherasbestos-relatedcancers.

In six Western European countries (Britain, France, Germany, Italy, Netherlands, Switzerland)asbestosexposurewillcause250,000deathsfrom mesotheliomaoverthe next 35 years. At least an equal number is expected to succumb to asbestos-related lungcancer,suggestingthattherewillbemorethan500,000asbestos-relateddeathsin WesternEuropeoverthenext35years. [15]

The financial liabilities associated with asbestos-related compensation and phase-out are mindboggling. A September 1999 study by Greenpeace Netherlands on asbestos-relatedliabilitiesintheNetherlandsatNLG67billion(approx.$30billion)fortheperiod 1999-2045.[16] Of this, a conservatively estimated NLG 7 billion (approx. $3 billion) is expected to serve as compensation for victims and families. Although these figure are an estimate of land-based asbestos liabilities, it is indicative of the magnitude of the problem.

Theargumentsof shipowners that decontamination of ships ought to be done in the Asian shipbreaking yards under an improved regulatory regime ignores these facts. Moreover, the fact that the European Union, and several other countries including the USAhavebannedmost,ifnotall,usesofasbestosisproofthatregulatorymeansare notcommensuratetothedangersposedbyasbestos.Ifthatistheverdictofcountries that claim to have stringent implementation of regulations, it would be hypocritical to expect better handling of asbestos in countries like India, Pakistan, Bangladesh and China.

6.2 Organotins

Tributyltin (TBT) is an aggressive biocide (kills living organisms) that has been used in anti-fouling ship paints since the 1970s. The toxicity of TBT prevents thegrowthof algae, barnacles and other marine organisms on the ship's hull.

In fact, after yearsof scientific backing-and-forthing, the word is out that the preponderance of evidence implicate TBT as constituting an unmanageable

threat to the marine environment. Its impacts on marine organisms range from the subtle to the lethal. [See box: "TBT: Deadly at Sea"]

In 1998, the General Assembly of the International Maritime Organisation decided that the Marine Environment Protection Committee (MEPC) should work on a global legal instrument to ban TBT. It was also decided that the ban should be effective in 2003 when it comes to the application of TBT paint and in 2008 when it concerns the presence of TBT paints on a ship.[17]

TBT: Deadly at Sea

TBT is responsible for the disruption of the endocrine system of marine shellfish leading to the development of male sex characteristics in female marine snails. TBT also impairs the immune system of organisms. Shellfish are reported to have developed shell malformations after exposure to extremely low levels of TBT in the seawater. Recent studies conducted by the Dutch Institute for Marine Research and the Free University (VU) of Amsterdam reveal that sperm whales that live and feed in the deep ocean far from ports and shipping lanes have appreciable amounts of TBT and its breakdown products in their bodies. This indicates that TBT may be widely dispersed in the marine environment, including the deep oceans where sperm whales normally live and feed.

TBT and its degradation products have been isolated from a wide range of marine environmental samples. In many cases, a relationship between levels of environmental contamination and the intensity of shipping traffic can be detected. TBT has been found in the tissues of cetaceans, seals, sea otters and water birds in a wide range of locations around the world. Tissues and sediments sampled from areas with heavy shipping activity show the highest levels of contamination.[18]

In industrialised nations, legal regulations are in place to protect workers from exposure to antifouling paints containing the poisonous tributyl tin (TBT). Skin, eye and lung protection are mandatory for any contact work with TBT-containing paints.

That is because, even in small doses, organotin compounds can damage human health. In occupational health parlance, the maximum workplace concentration (i.e. the highest amount that a healthy worker can be exposed to for eight hours a day) for tributyl tin oxide (TBTO) is 0.05 mg/m^3 of air.

In Alang, there is evidence that the floor of the work area is contaminated with TBT at levels (384μ g/kg) that would render the soil a hazardous waste requiring regulated disposal under some European regulation. Not only that, in the absence of protective masks, workers torch cutting metal plates coated with TBT paints are constantly exposed to metal and TBT fumes through inhalation.

On the basis of peak values measured, Greenpeace identified 10 TBT hotspots in Europe in 1999/2000.[19] Comparison of the peak concentrations of TBT and its degradation products in the sediment at Alang with the values from European

hotspots puts Alang at 6th place among the top ten European TBT hotspots. [See Table 9]

The peak value is the sum of tributyl tin (TBT) and its degradation products dibutyl tin (DBT) and monobutyl tin (MBT). MBT and DBT are also toxic; both are found regularly in the tissue of marine animals.

In Alang – the largest scrapping yard of the world – no TBT cleanup measures are in place. Contamination levels in seawater and sediment are already substantial outside of the scrapping yard.

PORT	LOCALITY OF SAMPLING	SOURCE		ΣMBT,DBT,TBT
Rotterdam The Netherlands	Eemhafenport	Dutch Ministry for Transport and Waterways, 1999	µg/kg	1,000 (TBT only)
Thessaloniki Greece	Port–Dock 24	Greenpeace 10-08-00	µg/kg	1,333
Rostock Germany	Neptunwerft Floatingdock	Greenpeace 09-09-99	µg/kg	4,978
Livorno Italy	Docks	Greenpeace 17-08-00	µg/kg	8,801
Odense Denmark	Lindovaerflets	Danish Energy Ministry, 2000	µg/kg	14,288
Alang– Sosiya Gujarat/India	**Shipbreaking Yard**	**Greenpeace 06-06-00**	**µg/kg**	**21,102**
Barcelona Spain	Fishing harbour	Greenpeace 01-09-2000	µg/kg	22,462
Antwerp Belgium	Port	Greenpeace 2000	µg/kg	28,273
Piraeus Greece	Kinosoura harbour	Greenpeace 10.08.2000	µg/kg	94,792
Hamburg Germany	Norderwerftyard	Greenpeace 17-09-99	µg/kg	106,605
Marseille France	Avant Port Nord Forme10	Greenpeace 25-08-00	µg/kg	241,370

Table 9: Comparison of peak concentrations of TBT and its degradation products in the sediment of European ports with the peak level found in the Alang-Sosiya shipbreaking yard

The degree to which skin can absorb TBT should not be underestimated. Direct, unprotected contact to painted surfaces or walking barefoot along the beach or the intertidal zone (a normal practice in Alang) can be a significant source of exposure, causing local skin irritation or accumulation in the body of the exposed worker. [20]

An increased risk to health is to be expected from the absorption of TBT throughtheskin:

- Through exposure on palms and soles because these parts of the body have better circulation than others;
- When heat, exposure to warmth or physical exercise increase circulationintheskin;
- When work in a damp environment or humidity swells the top layer of skin, allowing increased surface area for absorption.

Allthreeconditionsapplysimultaneously to workers exposed to TBT in shipbreakingyards.

6.3 PAHs,Dioxins/ Furans

The health hazard from PAHs, dioxins and furans comes from directly inhaling fumes, which are released primarily during torchcutting, after torchcutting when paints continue to fume and smoulder, or when wastes are deliberatelyburned. Dioxins,like PAHs, accumulate in dust and sediment, and tissuesof lifeforms. Asaresulttheyare available for uptake either through inhalation, dermal contact or via the foodchain.

PAHs cause malignant tumours by interfering with enzymatic breakdown, affecting the lungs, stomach, intestines and skin. The potential of substance mixtures containing high PAH levels to causeskincancerisknownsince1775. Increased incidences of certain carcinomas of the skin and respiratory tract have consistently been found amongcertainoccupationalgroupssuch as chimney-sweeps, coke oven workers etc.[21]

The PAHs found in the soil samples at the shipbreaking plots are attributable to combustion sources – i.e. torchcutting and/oropenburning.Besidestheimpact on the environment, combustion as a source implies a double exposure for workerstothepoisons–first,duringthe cutting or burning operation through inhalation of fumes; second, by inhalation of PAH-laden dust from the workarea.

Only one soil sample from Alang was analysed for dioxins. The fact that the single sample of soil analysed for dioxins tested positive with significant levels confirms our assumption that shipbreaking as an activity should be further evaluated as a potential dioxin source. Simultaneously, efforts must be made to pinpoint and isolate the potential sources lending to the formationofdioxinsduring shipbreaking.

Dioxins/furans are known to be among the deadliest of persistent and bioaccumulative poisons for which there are no safe levels of exposure. Dioxins are known human carcinogens. Even at lowdoses,thesepoisonsarecapableof causing serious and often irreparable damagetotheimmuneandreproductive systems of lifeforms. Their ability to interfere with the endocrine systems (or hormone-regulating systems) of mammals also means that they are capable of causing sexual disorders alongthefoodchain.

The current low levels should certainly not be taken as indicative of the absenceofaproblem.

In fact, owing to its highly toxic nature, its mobility in the environment and its ability to threaten the global environment, dioxins and furans are amongthe12prioritysubstancesslotted

for global action under the United Nations Environment Program's Treaty on Persistent Organic Pollutants. The treaty that is expected to be finalized in Stockholm in May 2001, calls for strong action to minimize (with the ultimate aim of elimination where feasible) the release of industrial by-product POPs like dioxins.

The Greenpeace investigation did not focus specifically on dioxins and furans. However, the confirmed presence of dioxins at the yards requires that more indepth studies be conducted to assess the dioxin contamination throughout the yard. More importantly, because the coastline surrounding Alang continues to support a dwindling, yet substantial, number of sustenance fisherfolk, it would be important to investigate the possible contamination of marine life by dioxins originating at the yard.

7. Recommendations

At the outset, it must be said that under the given circumstances and conditions at Alang and internationally (in the absence of a global regulatory regime), no recommendations can be made for Alang that would eliminate health risks and environmental hazards.

A fully transparent regime allowing public scrutiny of the shipbreaking yards is a must for conditions to improve. The shipbreaking yards cannot unilaterally function in a manner that eliminates threats to the environment and its workers. For this to happen, ships must arrive at the yard decontaminated. Environmentally, very little can be done to improve the situation at the shipbreaking yards unless the ships arrive decontaminated.

A precondition to workplace safety is the decongestion of shipbreaking yards. This may not be required in the Chinese yards, where space is generously available. But in Alang, the 30 meter plots need to be joined with their neighbours to allow for more space. In the Mumbai shipbreaking yards, where space is at a premium, it would be virtually impossible to improve conditions significantly. Under the circumstances as they exist in Mumbai, closure of the yards may be the only option to prevent further contamination of the environment and workers.

The shipowners claims that worker safety is a problem of the shipbreakers and the shipbreaking country governments reflects the ignorance of the commentators of local regulatory conditions and climatic conditions. The temperatures on the plot and on board the ship can reach 50 degree Celsius in Alang summers making it unbearable for workers wearing protective clothing designed for Northern climates.

Internationally, it is important to invest in the development of safety gear suited to the climatic conditions of India, Bangladesh and China.

Annexure1

SampleDetailsandAnalysisMethodology

SAMPLE NUMBER	SAMPLE TYPE	DESCRIPTION	SAMPLING DATE
18	Insulation material	Shipbreakingplot,2,800 metrestothewesternfringe	06-06-00
19	Seawater	Shipbreakingplot,2,800 metrestothewesternfringe	06-06-00
20A	Sediment	Shipbreakingplot,2,800 metrestothewesternfringe	06-06-00
20B	Sediment	Shipbreakingplot,2,800 metrestothewesternfringe	06-06-00
21	dust+soil	openwastedam,200 metresinlandfrom scrapyard	06-06-00
23A	Dust	Livingareal,outside	06-06-00
23B	Dust	Livingareal,inside,floor	06-06-00
24A	Sediment	westernfringe,500 metresfromthelastplot	06-06-00
29A	Seawater	easternfringe,500 metresfromthelastplot	06-06-00
34A	Seawater	Shipbreakingplot,4,600 metrestothewesternfringe	06-06-00
35A	Soil	Shipbreakingplot,4,600 metrestothewesternfringe	06-06-00
35B	Soil	Shipbreakingplot,4,600 metrestothewesternfringe	06-06-00
35C	Soil	Shipbreakingplot,4,600 metrestothewesternfringe	06-06-00
35D	Soil	Shipbreakingplot,4,600 metrestothewesternfringe	06-06-00
39	Seawater	Shipbreakingplot,600 metrestothewesternfringe	06-06-00
41A	Sediment	Shipbreaking plot, 4,600 m to the western fringe, ebb-tide	07.06.00
41B	Sediment	Shipbreaking plot, 4,600 m to the western fringe, ebb-tide	07.06.00
41C	Sediment	Shipbreaking plot, 4,600 m to the western fringe, ebb-tide	07.06.00
42A	Sediment	Shipbreaking plot, 10,100 m to the western fringe, ebb-tide	07-06-00
42B	Sediment	Shipbreaking plot, 10,100 m to the western fringe, ebb-tide	07-06-00
43A	Sediment	eastern fringe, 500 metres from last plot, from the ebb-tide	07-06-00
47C	Dust	LivingareaII,inside,floor	07-06-00
47D	Dust	LivingareaII,inside,bed	07-06-00
48C	Dust	LivingareaIII,temple,inside,beneathcarpet	07-06-00

Listofthe analysedsamplestakenatthe Alang shipbreakingyard

- All samples were taken in laboratory PP-bottles (manufactured by SARSTEDT) for one-time use. The sampling equipment was recommended and made available by GALAB HightechLaboratories.

- Methods, detection limits and QA/QC procedures are described in the GALAB analysisprotocol:

PARAMETER	DETECTION LIMIT	UNIT	METHOD
Organotincompounds	1	µg/kg	hexaneNaBEt4,GC-AED DACh
Organotincompounds	1	ng/L	hexaneNaBEt4,GC-AED DACh
Dioxinsandfurans	1-50	ng/kg	AbfKlärV Anhang11.3.3.2 (appendixtowasteordinance)
Asbestos		fibre	scanningelectronmicroscopy
Heavymetals	0,01-0,005	g/kg	DIN38414,TXRF DACh
Polychlorinated biphenyls	1	µg/kg	soxhletextraction,GC-MSD
Polycyclic aromatic hydrocarbons	1	µg/kg	soxhlet-extraction,GC-MSD DACh

NOTE: Testprocedures marked DACh are processes accredited in accordance with German DIN 17025 standards

Processesusedanddesignatedlimits

ANNEXURE2

MoretoSafetythanMeetstheEye Health,and Environmental Hazards at Alang

A Commentary by Judit Kanthak, chemicalengineerand Greenpeace's technical person in-charge of conductingthe Alaninvestigation.

Greenpeace campaigner Nityanand Jayaraman:"Sir,doyouknowtheoldest plotin Alang? Where they first started breakingshipsfromabroad?"

GujaratMaritimeBoard'sCapt. Deulkar: "Yes...veryclean...nicepeople."

Such a conversation between Greenpeaceactivistsandthetopofficial of Gujarat Maritime Board at the Alang shipbreaking yard would have been inconceivable in 1998, when Greenpeace first visited the world's largest yard. Things have obviously changed. Today, the two are sitting together at a table in Capt. Deulkar's office located between two active shipbreakingplotsin Alang.

Even a superficial look around the yard gives the impression that some things have changed since our last visit in 1998. In the last two years, people in Alanghavestartedtotakestepsagainst thevisibleandinvisiblehazardstowhich workers are exposed both when dismantling the ships and in their living quarters. Most workers wear protective helmets and working clothes; colourful hand-painted pictorial signs warn of falling parts and exhorting workers to

use helmets – elementary but crucial lessonsinworkplacesafety.

Tidiness and cleanliness, too, seem to be better appreciated in Alang. Despite ongoing work, most of the plots we visited seemed tidy and well-swept. The floors of the owners' office – which are located within the plots are freshly mopped. Visitors are offered water withintheminutesoftheirarrival.

Located amidst the noisy, smoky ambienceoftheshipbreakinngplots, the worker'saccommodationthough spartan and unventilated seem tidy, albeit exposed to dust. Apart from an oversized hard-bed on which 3-6 workerssleep,thereisnootherfurniture in the 100 square foot room. The workers sprinkle water on the floor, of packed mud, during the day to prevent dustfromrising.

But the tragedy behind these honest efforts becomes apparent only upon evaluationofthechemicalanalyses.

With the means at hand in Alang, it is impossible to protect the workplace, the living quarters and the yard surroundings from ship contaminants. With every passing day, the levels of heavy metals, polyaromatic hydrocarbons (PAHs) and tributyl tin (TBT) in the soil, coastal sediments and seawaterareincreasing.

Despitetidalcurrentsandsedimentdrift, the highest concentrations of persistent pollutants in Alang can be expected wherethelargestquantitiesofshipsteel have been recovered over the years – i.e.theoldestandmostactiveplots.

A seawater sample taken from the oldest plot contained 120 times higher levels of the hormone disrupter TBT than a comparable sample taken from the eastern fringe of the 12 km long stretchof shipbreakingplots.

The Greek word 'asbestos' means unquenchable, eternal. In Alang, asbestos is omnipresent. Asbestos fibres are carried by the fine dust to contaminate the air, the soil and the workers' huts. Out of six samples taken and analysed for asbestos, only one tested negative – from beneath the carpet at the Hindu temple at the shipbreakingyard.

By 'clean', Capt. Deulkar obviously means 'well-swept.' Keeping in mind the mind-boggling quantities of hazardous substances extracted from ships and dumped here over the years, Capt. Deulkar's use of language is understandable. Keeping things well-swept is hard enough. To keep things trulycleanhereisimpossibleunlessthe shipscomeinclean.

ANNEXURE3

Greenpeace Activities Since 1998 Targeting the Shipping Industry, GovernmentsandShipbreakersto Seek Commitment for Improvement to the Ship Scrapping Practices

AMSTERDAM,FEBRUARY2001

Dutch environmental inspectorate arrests Sandrien, a ship-for-scrap claimed to be destined for breaking in Asia. The Inspectorate is investigating if the ship's departure to Asia for scrapping constitutes a violation of the Basel Convention-based European wastelegislationprohibitingtheexportof hazardous wastes to non-OECD countries. Greenpeace has demanded that the Sandrien be decontaminated priortoexportforscrapping.

HONGKONG,APRIL29,2000
PROTEST AGAINST P&O NEDLLOYD SHIPINHONGKONGHARBOUR
Greenpeace activists take action to protest proposed and continued dumping of ships in China by P&O Nedlloyd.

ROTTERDAM,APRIL2000
GREENPEACE MEETS P&O NEDLLOYDTOCRITICALLYDISCUSS COOPERATION BETWEEN THE ANGLO-DUTCH COMPANY AND CHINESEYARD
Greenpeace reiterates demand for decontamination before export. P&O Nedlloyd refuses to take hazardous substancesoutbeforeexportingshipsto Asia.

LONDON,MARCH2000
GREENPEACE PRESENTS VIEWS AND DEMANDS TO SHIPPING INDUSTRY AND WORLD GOVERNMENTS AT IMO MEPC 44 TH SESSION

BHAVNAGAR, INDIA, 19 FEBRUARY 2000
INDIAN SHIPBREAKERS COMMIT TO ENVIRONMENTAL QUALITY AND WORKERSSAFETY
The outcome of a workshop on "Challenge to Ship Recycling Industry: EnvironmentandSafety"wascelebrated by industry, environmentalists and government. The Shipbreakers AssociationofIndiaagreedtoengagea drastic transformation of their yards to incorporate good working practices and proper environmental management. The Shipbreakers also supported the platform of decontamination of ships priortodismantling.MaritimeAuthorities agreedtoaGreenpeace/Ban(andother NGOs) team to run a fact-finding missionintheIndianyards.

BELGIUM,21DECEMBER1999
BELGIUMGOVERNMENTARRESTUK "TOXIC" SHIP BOUND TO INDIA FOR SCRAPPING
The Belgium Government arrested the bulk carrier MV FORTHBANK currently docked in Antwerp after receiving an unclearresponsefromitsUKownerson their intention to scrap the vessel in Alang, the largest shipbreaking yard in India. The Belgium Government understand that an European ship bound for scrapping in Asia is a hazardous waste export and subject to the EU hazardous waste export ban in placesince1998.

NEWDELHI,10DECEMBER1999
GREENPEACE PREVENTS TOXIC DUMPINGININDIA
Havingchainedthemselvestoananchor line overnight, Greenpeace activists successfully delayed the beaching of cargo vessel 'Clare' destined for breaking at Alang – the world's largest shipbreakingyardinIndia.Theexportof hazardous ships-for-scrap to Asian shipbreaking yards, such as the highly polluted and unsafe facility in Alang, is effectively toxic waste dumping. Indian Supreme Court orders an enquiry into Greenpeace's allegations of toxic waste dumpingviaships-for-scrap.

NEWDELHI,8DECEMBER1999
WESTCONTINUESTOSEND"TOXIC" SHIPSTOINDIA
Greenpeace today highlighted the continuing dangerous practice of sending Western-owned or operated "toxic"shipstodevelopingcountriessuch as India for dismantling. Workers in developing countries are being exposed toasbestosandother
poisons from ships broken up in unsound labour and environmental condition yards in India, Bangladesh,

China, Philippines and Pakistan. This morning, at Alang in western India – the world's largest shipbreaking yard - activists from the Greenpeace flagship the Rainbow Warrior painted warning signs on the hull of the Global Sao Paulo, a Greek operated vessel waiting to be dismantled. Another six vessels were in the area ready to be scrapped. Greenpeace displayed a banner in an inflatable boat in front of the yard to highlight the danger to workers caused by scrapping of toxics ships.

ROTTERDAM, 9 NOVEMBER 1999
GREENPEACE PROTESTS THE DUMPING OF TOXIC SHIPS TO ASIA
Greenpeace activists today protested plans to scrap the ocean carrier Tokio Express in China and demanded that its owner, Costamare Shipping and its operator Hapag-Lloyd ensure that hazardous materials are removed from the ship prior the scrapping. Activists painted warning messages in Chinese and Hindi on the hull of the ship while it docked at the port of Rotterdam. Hapag-Lloyd agrees to make an inventory of hazardous substances before the ship is sent for scrap. The inventory will be handed over to shipbreaking company.

MUMBAI, INDIA, 21 SEPTEMBER 1999
TRADE UNIONS AND GREENS JOIN HANDS TO CHALLENGE DIRTY SHIPBREAKING IN ASIA
The International Transport Workers Federation (ITF) has today joined hands with Greenpeace, Basel Action Network and Indian trade unions to highlight the occupational health and environmental hazards caused by ships contaminated with toxins exported to Asia for salvage and disposal – an operation known as shipbreaking.

BIELEFELD/HAMBURG, 10 MAY 1999
GREENPEACE PROTEST GERMAN FOOD CO'S EXPORT OF ASBESTOS TO INDIA
The German food company, Dr. Oetker, plans to scrap two asbestos-contaminated ships in Asia, disregarding the fact that this endangers workers there. Greenpeace exposed the plan today in a direct action at the Dr. Oetker office on the Jahnplatz in Bielefeld. This morning, Greenpeace activists placed a 20 x 12 ft 'blow-up' photo under the company logo depicting Indian workers breaking up ships with the caption reading, 'Dr. Oetker exporting cancer'. Below the company was accused of producing 'pudding powder for Germans - asbestos dust for Indians'.

HONGKONG, 12 APRIL 1999
P&O NEDLLOYD: STOP TOXIC TRADE
Greenpeace activists today symbolically returned highly carcinogenic asbestos, contained in a sealed drum to its rightful owner, shipping company P&O Nedlloyd, in Hong Kong and urged the company to stop dumping toxic waste ships in China. The action coincides with negotiations of a technical working group on the Basel Convention in Geneva, Switzerland, seeking to address issues of waste dumping from rich industrialised countries into less industrialized countries.

NEWDELHI, 18 FEBRUARY 1999
SHIPBREAKING IS DANGEROUSLY POLLUTING - GREENPEACE REPORT FINDS
Greenpeace today released the first ever technical and environmental data on the toxic contamination caused by shipbreaking in India through its investigative report "Ships for Scrap: Steel and Toxic Wastes for Asia." The report which was presented at a press conference in New Delhi confirms

allegations by trade unions and non-governmental organisations (NGOs) about the widespread contamination and occupational hazards at the Alang and Mumbai shipbreaking yards in India. However its implications reach far beyond India because similar conditions are known to exist in other shipbreaking states, particularly Pakistan, Bangladesh, the Philippines, China and Vietnam.

SINGAPORE, 11 JANUARY 1999
ENVIRONMENTALISTS PROTEST TOXIC SHIP EXPORT TO ASIA
Greenpeace and Basel Action Network (BAN) activists escorted the toxic-contaminated ship Encounter Bay as it arrived in Singapore harbor this morning, to protest against the export of toxic waste to Asia. In a daring waterborne protest the environmental activists flew banners reading "P&O Nedlloyd Stop Toxic Trade" as the vessel approached the harbor. After it docked, they attached another giant banner to the side of the ship. Singapore is the fifth city where Greenpeace and BAN have protested against the ship as it makes it final journey before being scrapped.

AUCKLAND, NEW ZEALAND, 22 DECEMBER 1998
GREENPEACE, BAN TAKE ACTION AGAINST P&O NEDLLOYD SHIP "ENCOUNTER BAY"
Police arrest Greenpeace activists chained to ship to prevent ship's departure to Asian scrapping yard.

SYDNEY, AUSTRALIA, 18 DECEMBER 1998
Greenpeace takes action against P&O Nedlloyd ship "Encounter Bay."
Activists detain the ship by staying on board the ship for a full-day to protest the refusal of the company to decontaminate the ship before export to Asia.

ROTTERDAM, THE NETHERLANDS, 17 NOVEMBER 1998
Action at P&O Nedlloyd headquarters. Greenpeace submits and explains demands to Director Van Slobbe.

BARCELONA, SPAIN, 15 NOVEMBER 1998
Greenpeace, BAN launch direct action against P&O Nedlloyd ship "Encounter Bay". Company refuses to decontaminate ship prior to export to Asia.
Activists hang banner reading "P&O Nedlloyd: Stop Dumping on Asia" on ship.

NEW DELHI, INDIA, 21 JANUARY 1998.
Greenpeace, Basel Action Network and Indian Trade Unions Join Hands to Protest Against the Export of Toxic ships-for-scrap to India.
A wide spectrum of individuals and organisations including activists from all the Indian central trade unions, people's movements and citizens' groups came together today in a peaceful and colorful protest against the US Government's decision to allow the US Navy and Federal Maritime Administration to export their toxic-laden ships to India, Bangladesh and Pakistan.

NOTE:
In addition to these activities Greenpeace has given presentations at various global events like the NOR(wegian) SHIP fare in Oslo, the First Global Shipbreaking Congress in Amsterdam, the Green Shipping Conference in Hamburg during the last 3 years. Greenpeace has also successfully placed the issue on the agenda of the Basel Convention on hazardous waste trade and the IMO.

[1]SubmissionbytheInternationalChamberof Shippingtothe"ShipRecyclingWorkingGroup"on 31July2000

[2]ARD Erstes Deutsches Fernsehen(FirstGerman TV),ReportMainz,November23,1998

[3]ChapterXII,Sec16(i)(d).Extraordinary Gujarat GovernmentGazetteNotification,ExtraNo.640, dt/. August31,2000. GujaratMaritimeBoard

[4]OSPAR ComissionfortheProtectionoftheMarine EnvironmentoftheNorth-EastAtlantic, Agreement1997-15

[5]B ürgerschaftderFreienundHansestadtHamburg Drucksache16/3080.September26,1999."Hamburg Baggergutkonzept"(HamburgParliamentDredging SludgesConcept)

[6]GermanEPA/Umweltbundesamt, Daten zur Umwelt, Der Zustand der Umweltin Deutschland 2000,ErichSchmidt Verlag&Co.,Berlin 2001.(EnvironmentalData)

[7]Seepage19of"ShipsforScrap:SteelandToxic WastesforAsia–A factfindingmissiontotheIndian shipbreakingyardsin AlangandBombay." Greenpeace,March1999.

[8]Seepage13,"ShipsforScrapII:SteelandToxic WastesforAsia–Workerhealth&safetyand environmentalproblemsattheChang Jiang ShipbreakingyardoperatedbytheChinaNational ShipbreakingCorporationinXiagangnear Jiangyin." Greenpeace,December1999.

[9]Contrast AdviesforGreenpeaceNetherlands, September1999."Asbestos:Deepinthevery fibres ofsociety–Asummaryreport"

[10] Lloyd'sList(Markets:Demolition),Wednesday, January19,2000."Greenpeacestrategyupsetsindian breakers."

[11]"AcertificatefromtheMasteroftheshipshallbe presentedtothePortOfficer,atthetimeof submissionofapplicationunderClause(a)above, certifyingthatnodangerousgas,toxicoranyother hazardouschemical/wastearepresentonboardofthe shipandcertificateofentryaspersection36ofthe FactoriesActbycompetentpersonareproduced." Extraordinary GujaratGovernmentGazette Notification,ExtraNo.640, dt/.August31,2000. GujaratMaritimeBoard.

[12]TheCentralPollutionControlBoardstatesinits "EnvironmentalGuidelinesfor Shipbreaking Industries"that:"Oldvesselscontainingor contaminatedwithanyoftheabovesubstances [PCBs,wasteasbestosdustand fibre,leadandlead compounds]areaccordinglyclassifiedashazardous materials.Thecustomsauthorityand/orthe concernedStateMaritimeBoardshouldensurethis andissueacertificatetothiseffectthatthevesselis freefromtheprohibitedmaterials."

[13]TheIndianSupremeCourtdecidedon5May1997: "Noimportshouldbemadeorpermittedbyany authorityoranypersonofanyhazardouswastewhich isalreadybannedunderthe BaselConventionortobe bannedhereafterwitheffectfromthedatespecified therein."

[14](US)NationalCancerInstitute,Questions andAnswersAboutAsbestosExposure,last modified27Nov2000,asdistributedby www.meb.uni-bonn.de/cancernet/600321.html

[15] PetoJ, DecarliA,La VecchiaC,LeviF, NegriE. TheEuropean mesotheliomaepidemic.British JournalofCancer,1999;79:666-672.

[16]Contrast AdviesforGreenpeaceNetherlands, September1999."Asbestos:Deepinthevery fibres ofsociety–Asummaryreport"

[17]PublicationIMO1998.

[18]Greenpeace Factsheet,September1999:"TBT:A GlobalProblemfortheMarineEnvironment."

[19] Maack,T.,GreenpeaceGermany:"TBTHotspots inEurope".September2000.

[20]GermanTechnicalRegulationonHazardous Substances,June1996,relatingtoseveralhazardous substanceswhichcanenterthehumanbodythrough skin.
TRGS150, Technische RegelnfürGefahrstoffe, UnmittelbarerHautkontaktmitGefahrstoffen,die durchdieHautresorbiertwerdenkönnen (HautresobierbareGefahrstoffe),Juni1996.

[21]Mentionedin Kanthak,J.&A. Bernstorff,"Ships forScrapII:SteelandToxicWastesforAsia– Workerhealth&SafetyandEnvironmentalProblems attheChang Jiang ShipbreakingYardoperatedby ChinaNational ShipbreakingCorporation,at Xiagang,near Jiangyin,China.