

Safe and Environment-friendly approach to recycling of Tanker ship

Capt. Yogesh C. Shah (Research Scholar, Associate Professor)

Indian Maritime University- Navi Mumbai Campus, 400706, India

Email: ycshah@imu.ac.in

ABSTRACT

Every drop counts because it is the little drops of water that make the mighty ocean. Every drop of oil that is prevented from polluting the Ocean will make the Blue Economy a truly Green Economy and every life saved from being lost in accidents, in the recycling yards will truly make every Ship-Recycling yard a safer workplace.

Alang (Gujarat-India), one of the world's biggest ship-breaking yards, recycles about 300 of the 1000 ships that are demolished per annum globally and with India ratifying the Hong Kong convention this number is bound to go up manifold soon.

The two most important aspects of the Hong Kong convention namely, environmentally friendly and labour safety, are directly related to making a scrap ship completely gas-free before being permitted to enter the recycling yard. Although recycling yards are claiming compliance with this convention, it appears that its implementation is not taking place as desired, thereby defeating the very purpose of this convention.

When a product tanker goes for a grade change, the amount of cleaning carried out and efforts made to ensure that cargo tanks are free from the residues of previous cargo, including all kinds of un-broachable oil that may remain in the pumps, pipe-lines or tank bottoms, is humongous. Depending on the size of the tanker, it may take up to a week to completely remove all the traces of residues. Since the commercial interest of the shipowner/charterer is involved, best efforts are made to do the job most professionally, but in the case of a ship that is being scrapped, since the deal has already been done, it is most unlikely that the shipowner would show similar enthusiasm or concern in making the ship gas-free and make it safe for carrying out hot work. Are the people inspecting the ship before permitting its entry into the recycling yard determined to ensure that the ship is absolutely Gas free, before issuing it a Gas Free certificate? Only the number of accidents and the marine pollution incidents will tell the tale. The data was collected through a survey of shipping companies operating tankers and through appropriate authorities at Alang Ship-recycling

yard. The extensive experience of the Author and his colleagues in Tanker operations (Over 20 Years) was utilized in the analysis of data.

Only the involvement of third-party experts from the field in Tank cleaning and gas freeing operations can pave the way to safe & environmental friendly Tanker recycling.

Keywords: - Tankers; Gas Free, Pollution; Safety, Hong Kong Convention, Ship-recycling

1. Introduction

The raison d'être of this paper are the continuing instances of loss of life in shipbreaking yards especially due to tanker explosions/ fire and the after-effects of marine pollution caused by these ships. In this paper, a workable solution has been provided to ensure that no more lives are lost in tanker explosions/fires during the shipbreaking of end-of-life tankers and that the wastes generated from these ships are adequately disposed of.

The Ship-recycling industry has a universal reach. Shipowners from developed countries after sufficiently milking the ships commercially send their End-of-Life ships to Ship-Recycling Yards in South Asian countries to get the highest price for the scrapped vessel because of the existence of cheap labour and lax implementation of environmental and safety policies in these countries.

South Asian ship-breaking industry chiefly comprises of India's Alang, Bangladesh's Chattogram, and Pakistan's Gadani. A closer look at the economy of these three countries reveals that a significant population of these countries depends on the ship-breaking industry for its livelihood, thus making these countries in the South Asia region a favourite destination for ship-breaking.

In Bangladesh, the contribution of the ship recycling industry to the national economy is humungous, by way of supplying 90 to 95% of all its steel requirement for the building construction industry, thereby saving a considerable amount of foreign exchange for the country. Additionally, it generates employment for an estimated 30,000 people directly and 250,000 associated industries.[1]

As far as India is concerned, the ship-recycling sector employs up to 50,000 people directly and a couple of thousands more indirectly through re-rolling mills, scrap traders, oxygen gas facilities, transporters, the real estate market, and the money market.[2]

The Ship-recycling industry in India meets approximately 2% of domestic steel demand that amounts to about 28% of the country's total imported ferrous scrap.[3]

As regards Pakistan, the Gadani yard provides 30% of Pakistan's iron and steel needs. Gadani was the world's largest ship-breaking yard in the 1980s, with over 30,000 direct employees. Today it

employs around 6000 workers.[4]

2. Principal regulations governing the Ship-recycling industry:

The contribution of various UN agencies, principally the IMO to ship recycling, to ensure workers' safety, sustainability and environmentally sound practices in the industry are as follows:

2.1 The UN Agencies [5]

- “Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal”
- Joint ILO/IMO/BC Working Group on Ship Scrapping
- Ship-breaking: a hazardous work (By ILO)

2.2 The IMO [5]

The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 (the Hong Kong Convention).

2.3 IMO Resolutions (Guidelines)[5]: MEPC.196(62)–2011, MEPC.210(63)–2012, MEPC.211(63) – 2012, MEPC.222(64) – 2012, MEPC.223(64) – 2012, MEPC.269(68) – 2015

3. Development of shipbreaking Laws in India:

- 2007 Supreme Court ruling resulted in the formulation of shipbreaking code 2013.
- The revised Shipbreaking code, 2013 was promulgated in 2017 after factoring in pollution.
- On 9th December 2019, the Indian Parliament approved the “Recycling of Ships Bill 2019”, thus ratifying the Hong Kong Convention.

Despite the advent of various conventions/rules/regulations/guidelines regulating ship-breaking at Local, National, Regional and International levels by various bodies, for Safer and Environmentally friendly Ship-Recycling, the efficacy of these efforts has not yielded results. This is evident from the examples listed below of Marine pollution caused by these shipbreaking yards and the numerous accidents/ deaths caused during the dismantling of ships.

4. Marine Pollution caused by the Ship-recycling Industry

4.1 A recent study conducted by the United Nations Environment Programme indicated that the leading shore-based cause of marine pollution is the ship-breaking activities in India, Pakistan and Bangladesh, in South Asia.[6]

4.1.1 According to one study conducted in Chittagong, Bangladesh, shipbreaking activities, as well as the consequential processing and treatment of materials, result in emissions of persistent organic pollutants (POPs).[7]

In the absence of a proper waste disposal facility, the marine environment near these shipyards continue to deteriorate unabatedly.

- 4.1.2 A Greenpeace study shows, shipowners get approximately **two million dollars** for every scrap ship sold to dismantling companies, while they remain absolved from the responsibility of proper recovery and disposal of hazardous wastes generated by these end-of-life ships.
- 4.1.3 The Gujarat Maritime Board, which oversees the shipbreaking business in Alang, tasked the Gujarat Ecology Commission in Vadodara with conducting a research on pollution levels in the city. Metallurgical and Engineering Consultants (India) Limited, Ranchi, was commissioned by the Union Ministry of Steel to conduct another research. Both investigations found that pollution at the shipbreaking yard had increased significantly.[8]
- 4.1.4 During an investigation into a related issue brought up in the Parliament of India, the Central Pollution Control Board (CPCB) discovered enormous volumes of oil in the area where the ships are demolished. This oil is washed away into the sea. According to CPCB, tests on seawater revealed oil and grease concentrations of 22 mg/litre, which is extremely high. Despite the fact that labourers claim to remove a substantial amount of oil from the ships before scrapping them, some oil remains in the lowest area of the hulls. The remaining oil is mixed with sand and tossed into the sea. Oil pollution has the potential to suffocate marine life.[8]

5. Major Accidents in Ship-recycling yards involving Tankers

Listed below are some of the major accidents that took place in the ship recycling yards in the South Asia region:

5.1 Gadani Shipyard, Pakistan

- 5.1.1 **Aces fire in 2016:** The explosion of the floating production storage and offloading oil tanker Aces on 1 November 2016, claimed the lives of 31 workers and seriously injured at least another 58 workers, causing a huge fire. According to the National Trade Union Federation of Pakistan (NTUF), the explosion was caused by the presence of combustible and hazardous gases inside the fuel tank during the dismantling procedure. No cleaning was carried out before the start of dismantling.[9]
- 5.1.2 According to World Maritime News, another tanker caught fire at the Gadani shipbreaking yard on October 11, 2018. No injuries, however, were reported.[10]

- 5.1.3 On 14 October 2018, seven people were injured, of which three suffered critical injuries after an oil tanker Kriti caught fire in Gadani ship-breaking yard's plot number 10. It was when the workers were cutting steel, the fire erupted inside the beached ship. The suspected cause of the fire was that the ships were not properly cleaned from residual oil.[10]
- 5.1.4 At an accident in yard number 66, five more workers were hurt while breaking the Greek ULCC (Tanker) Mistral. The fire took place on 2 November 2018.[11]

5.2 Chattogram Shipyard, Bangladesh.

- 5.2.1 On May 15, 2019, aboard MT BUNGA KELANA 4, which was beached at Chittagong's Mahinur Ship Breaking yard, an explosion and fire resulted in the death of one person and severe burn injuries to five others. The fire started in an abandoned waste oil tank near the engine room, where employees cutting steel components with a torch.[12]
- 5.2.2 On February 18, 2019, two workmen were killed after a fire broke out in the engine room of the tanker GREEK WARRIOR, which was beached in Chittagong.[13]
- 5.2.3 On the 24th March of 2020, while working in the engine room of MT West Energy at Kabir Steel's Khawja yard, two people died and two became ill from toxic gas inhalation.[14]

5.3 Alang-Sosiya Shipbreaking yard, Gujrat, India.

- 5.3.1 On the 22nd of April 1997, an explosion took place at plot number 48, onboard a beached oil tanker. As a result, it was reported that 16 deaths occurred but the unofficial figure of deaths stands at 30. A 700-tonne steel plate was ripped out of the ship's body due to the force of the crash. The reason for this was that the ship was not gas-free. When workers used gas cutters to cut the ship's body, it caught fire, blowing out the gas cylinders and causing a catastrophic explosion.[8]
- 5.3.2 On the 22nd of April 1999, 16 labourers were killed when an oil tanker beached at one of the plots exploded. The explosion was caused because when the workers began cutting the ship's body with gas cutters, which caused the explosion. The body caught fire, causing gas cylinders to explode, thereby resulting in a tremendous explosion.[15]
- 5.3.3 On May 19, 2003, an explosion ripped apart an oil tanker MT Ameena docked at plot number five, killing six persons and injuring five more in Alang. The vessel, MT Ameena, was said to be carrying a huge amount of oil, and the explosion occurred as workers were cutting steel with flame cutters.[16]
- 5.3.4 Pump room explosion and subsequent fire on board an oil tanker MT Union Brave beached

at plot no 82 of the Alang ship-breaking yard resulted in the death of six workers and severe injury to one other on 06 Oct 2012.[17]

- 5.3.5 An explosion on June 28, 2014, onboard chemical tanker “Perin” during dismantling at plot number 140, inside the Alang ship-breaking yard, resulted in the deaths of five persons and injury to at least 10. The explosion was triggered by a suspected gas leak.[18]

It is common knowledge that, due to the lack of transparency in the industry, many accidents go unreported. The actual number of workers that have been either killed or maimed due to accidents in the ship-breaking yard is expected to be much higher. Besides, many more workers suffer from occupational diseases, including cancer and asbestosis, years after having been exposed to toxic fumes and substances at the shipbreaking yards.

It is pertinent to note that, of the three South Asian countries, India has made considerable efforts by putting in place appropriate rules and regulations to improve shipbreaking conditions at Alang, where up to six independent agencies inspect the ships before the beaching permission is granted. The certifying process that the vessel is gas-free is handled by agencies such as the Explosives Department, Gujarat Pollution Control Board and Industrial Safety. Yet the ground reality paints altogether a different picture regarding the number of accidents taking place and the frequency of their occurrence.

6. The Shipbreakers’ Woes

When the shipbreakers were contacted to elicit their views about the state of shipbreaking business particularly concerning workers safety and marine pollution issues, this is what they had to say:

- When a high-pressure flame comes in contact with hydrocarbons like fuel oil, furnace oil, or lubricating oil, shipbreakers concede that there indeed is a risk of a huge explosion taking place. Furthermore, the use of low-pressure gas cylinders to break the vessels raises the risk of explosions manifold.
- Sometimes cleaning of oil from the ship is not given its due importance or the time as the muqaddams (supervisors) are hard-pressed for time to cut up the vessel as soon as it is beached.
- The perils of cutting the ships are summarised by an Alang shipbreaker thus: " Around 300 low-pressure gas cylinders used for cutting the body of the ship, are kept indiscriminately at each yard." A beached ship is usually loaded with about 100 gas cylinders. These ships carry hydrocarbons in the form of diesel, fuel oil, and lubricating oil that are required for the

operation of the ship until beaching. In the majority of cases, the cutting begins without first ensuring that all the traces of hydrocarbons are removed. A large blast results from the contact of high-pressure flame with hydrocarbon vapour.[8]

The above-stated facts indicate that there is an urgent need to find a solution to the above-mentioned problems to save precious lives and to prevent marine pollution.

7. Normal Tank Cleaning Practice & the Costs

Whenever an in-service tanker is to undergo major repairs, thorough cleaning of the ship is carried out and the ship is made gas-free before starting any kind of hot work. Preparing a tanker ship for hot work involves: - Tank Cleaning, Purging of Hydrocarbon Gas and Gas Freeing operation. Set procedures for the same are detailed in the International Safety Guide for Oil Tankers & Terminals.

Tank cleaning is a process in which leftover oil cargo, its residue and cargo vapours are removed from cargo tanks on board a tanker. Tank cleaning is usually undertaken: For carriage of clean ballast; To make tanks gas-free for man entry; To carry out repairs, or while preparing for dry dock; To remove cargo sludge from the tanks and; when loading a cargo grade which is not compatible with previous cargo. As per the data obtained through survey of shipping companies operating tankers:- The tank cleaning process for making an oil tanker Gas free requires on average six days. During these six days, the shipowner has to bear the running cost of the vessel, which involves the following expenses: Indirect Operating Expenses such as Victualling, Insurance, Wages, General Repairs /Stores, Standing Charges and Management Expense.

Following are the typical average operating cost per day for different types of tanker ships: - VLCC: 19-20 Thousand USD/day; SUEZMAX: 12000 USD/day; AFRAMAX / Large Range Tanker 2: 15000 USD/day; Large Range Tanker 1: 13000 USD/day; Thus, for Gas freeing a tanker the shipowner has to incur on an average additional cost ranging anywhere between 72,000 to 120,000 USD, depending on the size of the tanker. Therefore, a ship-owner who is selling his ship as scrap to earn the last bit of profit from an end-of-life ship would certainly not be keen to do a thorough job of gas freeing the tanker incurring additional expenses for the purpose. This is amply clear from the number of cases of explosions/ fire reported in paragraph 5 above.

It has been observed that the Shipbreaking yards in Pakistan and Bangladesh do not have strict regulatory control to ensure that the tanker is Gas free before being offered for beaching. At the

Along shipbreaking yard in India, however, a tanker ship is permitted to beach for shipbreaking only after it has been declared Gas Free by the authorities.

8. The Regulatory Requirement and the Practice

Given below are a summary of the regulatory requirements and the current practices:

- 1) Regulation 8.3 – General requirements of Hong Kong convention warrant that, tankers destined to be recycled shall arrive at the Ship Recycling Facility with cargo tanks and pump room(s) ready for certification as Safe-for-entry, Safe-for-hot work, or both, in accordance with the Party whose authority the Ship Recycling Facility operates.

This puts the onus of delivering a gas-free ship, on the shipowner or cash buyer.

- 2) Indian “Shipbreaking code (revised) 2013” at article 3.21 states that, “Any sweepings of cargo (leftover of last cargo) will be permitted to be cleared upon completion of proper import processes thereto if the sweeping/left out cargo has no commercial value or are not fit for consumption/use, such cargo shall be disposed of by the ship recycler as per appropriate statutes and rules framed thereunder”. **This indicates that even the ship recycler is tasked with ensuring cleaning of oil from cargo tanks, pipelines, fuel oil tanks and lube oil tanks after beaching, before the commencement of shipbreaking.**
- 3) Ship Recycling Facilities must have management systems, procedures, and techniques that do not pose health risks to workers or the population in the vicinity of the Ship Recycling Facility and that prevent, reduce, minimise, and, to the extent practicable, eliminate adverse environmental effects caused by the Ship Recycling Facility, according to Regulations 17.1 and 19 of the Hong Kong Convention's annex. **Thus, it stipulates that the Ship-recycling facility is accountable to ensure that space is gas-free before commencing the shipbreaking and also ensure proper disposal of the hazardous wastes.**
- 4) At present most of the ship owners/ cash buyers clean the scrapped tanker at Fujairah or Singapore since no facility is available to clean the tanker through a professional agency at anchorages of shipbreaking yards. For example, in India, if a professional agency is appointed, then unclean tankers can also be called at Bhavnagar and the same can be cleaned by the professional agency and then inspected by the Petroleum and Explosives Safety Organization (PESO) and if found gas-free, may be permitted for beaching.
- 5) At Alang (India) the petroleum tankers are inspected by the representatives of the Petroleum & Safety Organization (PESO) for their cargo hold only, leaving out cargo pump room, bunker

tanks, lube oil tanks which constitute some of the potential areas for the presence of Hydrocarbon gas (explosive gas). Chemical tankers too are inspected by the competent authority (as approved by state maritime board/ Port authority) for its cargo holds only. PESO does not inspect Chemical and LPG tankers.

Thus, the requirement of the ship being completely gas-free before beaching, as per Shipbreaking code (Revised), 2013 of India and the general requirements (Regulation 8.3) of Hong Kong convention are not fully complied with. This is a major lapse in the system concerning pollution control and safety.

9. CONCLUSION:

For ensuring that tankers are made gas-free before beaching and remain so during the entire process of dismantling of the vessel as also for assisting the ship-recycler in proper waste-disposal, the following solution is suggested: -

- 1) A recognised third-party (RTP), competent to carry out tank cleaning of tankers and make it Gas free be appointed to carry out the job at anchorage before the vessel is cleared for beaching. The RTP should be a company or an agency comprising of a group of experts in the field of tank cleaning of tankers and also in the field of waste disposal.
- 2) This recognised third party should be made responsible for making the tanker gas-free and Safe-for-hot-work certification, inspection and testing as detailed in the Safe-for-hot-work procedures of Annex 4, Resolution MEPC.210(63), 2012 Guidelines For Safe And Environmentally Sound Ship Recycling.
- 3) The recognised third party should be made accountable in case of any accidents involving injuries to persons/ deaths/ damage to property resulting from tanker not being Gas free and should be made liable to pay penalty/compensation to the affected party, as decided by the competent authority.
- 4) The recognised third party should also be made responsible for the safe and environmentally sound disposal of hazardous wastes removed from the ship. Failure to do so by the recognised third party should attract a penalty as decided by the competent authority.
- 5) The responsibility of this recognised third party should commence at the anchorage before beaching and end after the ship is completely dismantled, that is on the issuance of the “Statement of Completion” certificate by the ship-recycling facility as per regulation 25 of the Hong Kong Convention.

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