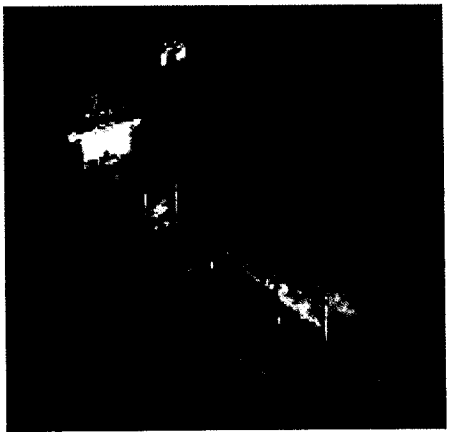
ANNEXURE –A

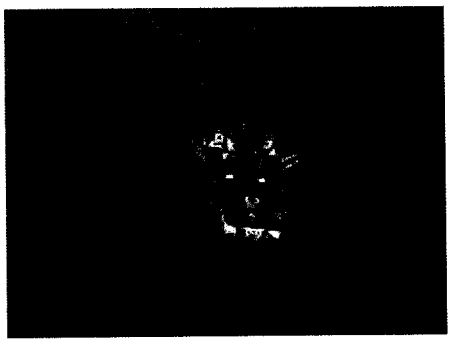
Pollution caused due to Grounding/collisions/accidents:

TASMAN SPIRIT (Pakistan, 2003)



The Maltese tanker TASMAN SPIRIT (87,584 DWT) grounded at the entrance to Karachi Port, Pakistan in the early hours of Sunday 27 July 2003. The vessel was carrying 67,800 tonnes of Iranian Light crude oil destined for the national refinery in Karachi. There were also 440 tonnes of heavy fuel oil in aft bunker tanks. The condition of the grounded tanker deteriorated as she was subjected to continuous stress from the heavy swell of the prevailing south-west monsoon and the vessel subsequently broke in two. In total, it is estimated that some 30,000 tonnes of oil was spilled from the TASMAN SPIRIT, and the incident ranks as the largest crude oil spill since the SEA EMPRESS incident in February 1996 (72,000 tonnes).

PRESTIGE (Spain, 2002)

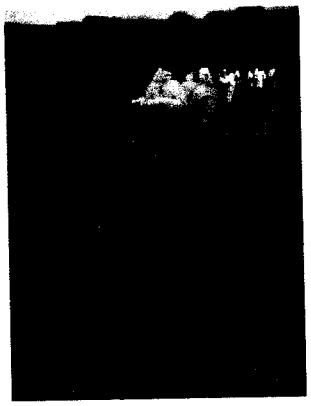


During the afternoon of Wednesday 13 November 2002, the tanker PRESTIGE (81,564 DWT), carrying a cargo of 77,000 tonnes of heavy fuel oil, suffered hull damage in heavy seas off northern Spain. She developed a severe list and drifted towards the coast, and was eventually taken in tow by salvage tugs. The casualty was reportedly denied access to a sheltered, safe haven in either Spain or Portugal and so had to be towed out into the Atlantic. Although attempts were

made by salvors to minimise the stresses on the vessel, she broke in two early on 19 November some 170 miles west of Vigo, and the two sections sank some hours later in water two miles deep. In all, it is estimated that some 63,000 tonnes were lost from the PRESTIGE.

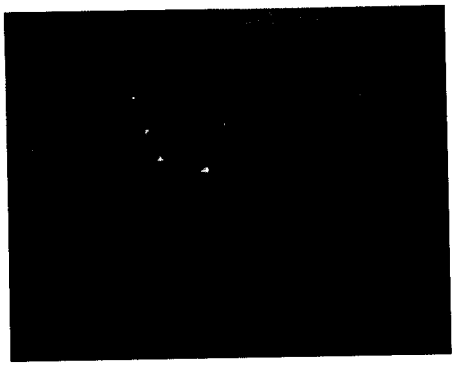
Volunteers cleaning up the aftermath of the Prestige oil spill

ERIKA (France, 1999)



The Maltese tanker ERIKA, carrying some 31,000 tonnes of heavy fuel oil as cargo, broke in two in a severe storm in the Bay of Biscay on 11 December 1999, 60 miles from the coast of Brittany. About 20,000 tonnes of oil were spilled. The bow sank on 12 December and the stern on the following day.

SEA EMPRESS (United Kingdom, 1996)

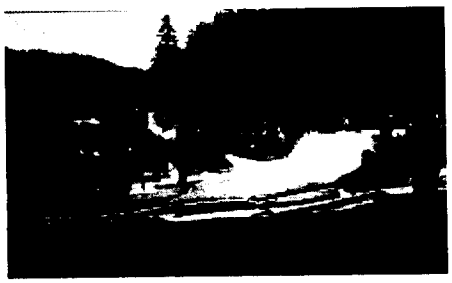


On the evening of 15 February 1996, SEA EMPRESS, carrying 130,000 tonnes of Forties Blend North Sea crude oil, ran aground in the entrance to Milford Haven, South West Wales. Although the tanker was refloated within a couple of hours, it sustained serious damage to its starboard and centre tanks, resulting in a massive release of oil. Attempts to bring the vessel under control and to undertake a ship-to-ship transfer operation were thwarted by severe weather and the tanker grounded and refloated several more times over a period of five days. In all, some 72,000 tonnes of crude oil and 370 tonnes of heavy fuel oil were released into the sea between the initial grounding and the final refloating operation.

BRAER (United Kingdom, 1993)

Following engine failure, BRAER ran aground in severe weather conditions on Garth's Ness, Shetland on 5 January 1993. Over a period of 12 days the entire cargo of 84,700 tonnes of Norwegian Gullfaks crude oil, plus up to 1,500 tonnes of heavy bunker oil, were lost as almost constant storm force winds and heavy seas broke the ship apart. Weather conditions prevented the use of mechanical recovery equipment at sea, although about 130 tonnes of chemical dispersant was applied from aircraft during periods when the wind abated slightly and some oil remained on the surface. Oiling of shorelines was minimal relative to the size of the spill and cleanup involved the collection of oily debris and seaweed by a small workforce.

EXXON VALDEZ (United States, 1989)



EXXON VALDEZ grounded on Bligh Reef in Prince William Sound, Alaska, on 24 March 1989. About 37,000 tonnes of Alaska North Slope crude escaped into the Sound and spread widely.

There was some limited dispersant spraying and an experimental *in-situ* burn trial during the early stages of the spill, but at-sea response concentrated on containment and recovery. Despite the utilisation of a massive number of vessels, booms and skimmers, less than 10% of the original spill volume was recovered from the sea surface. The oil subsequently affected a variety of shores, mainly rock and cobble, to varying degrees over an estimated 1,800km in Prince William Sound and along Alaska's south coast as far west as Kodiak Island.

AMOCO CADIZ (France, 1978)

The tanker AMOCO CADIZ ran aground off the coast of Brittany on 16 March 1978 following a steering gear failure. Over a period of two weeks the entire cargo of 223,000 tonnes of light Iranian and Arabian crude oil and 4,000 tonnes of bunker fuel was released into heavy seas. Much of the oil quickly formed a viscous water-in-oil emulsion, increasing the volume of pollutant by up to five times. By the end of April oil and emulsion had contaminated 320km of the Brittany coastline, and had extended as far east as the Channel Islands

METULA (Chile, 1974)

METULA grounded in the eastern Strait of Magellan, Chile, on 9 August 1974. About 47,000 tonnes of light Arabian crude oil and 3,000 to 4,000 tonnes of heavy fuel oil are estimated to be have been lost. Large volumes of water-in-oil emulsion were produced in the rough sea conditions and much of this landed on shores of northern Tierra del Fuego. Most of the shores affected were of mixed sand and gravel, but two small estuaries including saltmarshes were also oiled. About 4,000 birds are known to have been killed, including cormorants and penguins.

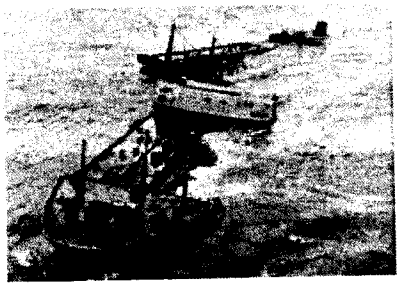
TANIO (France, 1980)

On 7 March 1980 TANIO, carrying 26 000 tonnes of No. 6 fuel oil, broke in two during violent weather conditions off the coast of Brittany, France. As a result approximately 13,500 tonnes of cargo oil was spilled. The stern section, with about 7,500 tonnes of cargo oil aboard, remained afloat and was towed to Le Havre; the bow section, carrying 5,000 tonnes of cargo oil, sank to a depth of 90 metres. Strong northwest winds at the time of the incident moved the oil towards the Breton coast (which had already received major oil impacts from the TORREY CANYON spill in 1967 and the AMOCO CADIZ in 1978). Due to the high viscosity of the oil and severe weather conditions, neither chemical dispersal nor containment and recovery techniques at sea were possible. The spilled oil began to be washed ashore on 9 March, and eventually contaminated about 200km of coastline to varying degrees. Many of the worst affected areas could not be boomed effectively because of the nature of the coastline, the extremely large tidal range (9m) and the severity of the weather at the time of the accident.

ARGO MERCHANT (USA, 1976)

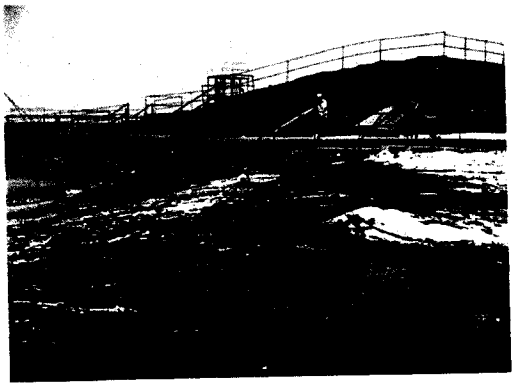
ARGO MERCHANT ran aground on Nantucket Shoals, off Massachusetts, USA, on 15 December 1976, and over the next month spilled her entire cargo (28,000 tonnes) of Venezuelan No 6 fuel oil and cutter stock. Storms broke up the tanker after grounding, and attempts to pump the oil into another vessel failed. *In-situ* burning was attempted on two occasions, but the slick failed to remain alight.

TORREY CANYON (United Kingdom, 1967)



TORREY CANYON ran aground on Pollard Rock on the Seven Stones Reef, near Lands End, Cornwall on 18 March 1967. Thousands of tonnes of oil were soon spilling from the stricken vessel's ruptured tanks and during the next 12 days the entire cargo of approximately 119,000 tonnes of Kuwait crude oil was lost.

MEGA BORG



The MEGA BORG released 5.1 million gallons of oil as the result of a lightering accident and subsequent fire. The incident occurred 60 nautical miles south-southeast of Galveston, Texas on June 8, 1990.

Figure – 1

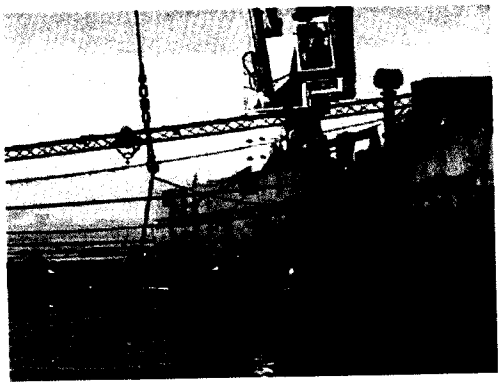


Figure - 2

The figure 1 shown above shows the damages caused to shore by oil pollution caused from a ship and the figure 2 shows oil pollution caused from a ship in harbour water.

ANNEXURE - B

Integrated Management System (IMS) onboard ships

In addition to carrying out amendments /modifications in the existing system as suggested in the study, an effective IMS as described below in detail should be implemented onboard ships. It is seen that recently some of the ships having the Green Star-3 additional notation have environmental management system implemented onboard and they also have an environmental manager posted onboard for the management of the said system. An environmental system implemented and maintained onboard alone can not prevent the pollution from ships. What is required onboard is an integrated management system consisting of quality management system, safety management system and the environmental management system so as to prevent the pollution at the source itself and making every individual fully responsible for his work.

It is a proven fact in the industries that eighty per cent of accidents are caused due to human error. The same rule can be applied to marine industry also. The human error could be classed into the ones caused due to lack of knowledge or awareness of the various operational procedures, legal requirements and /or the ones caused due to the negligence or willful acts of staff onboard. Fixing the accountability and responsibility individually for the officers and crew onboard ships, for the various activities carried out onboard, is the primary task to be done to prevent pollution from ships.

International Safety Management Code (ISM Code) is now mandatory and implemented onboard all ships. This international code deals with all safety and pollution prevention aspects on board ships. Some of the ships have also established and implemented Quality Management System and Environmental Management System as per the ISO-9001:2000 and ISO-14001:2004 standards respectively. An integrated management system (IMS) using the Quality Management System, International Safety Management Code (ISM Code) and the Environmental Management System should be prepared, implemented and maintained onboard all ships as one of the first steps to make

all officers and crew on board ships accountable and responsible for the prevention of pollution from ships.

As per the IMS, the quality policy, environmental policy and the safety policy of the ship shall be specified. The ship's objectives and measurable targets in line with the policies cited above shall be established. Instructions and procedures to operate the ship safely, whilst protecting the environment and being in compliance with relevant international and Flag State legislation, are required. Defined levels of authority, responsibility and lines of communication are required.

Management has to appoint a designated person ashore in the company with whom the officers and crew of the ship can contact with regard to safety and pollution. The Master's responsibility and authority is defined, including verification procedures. The Master has to implement company policy, motivate crew, and review the management system on board. A clear statement of the Master's overriding authority is also required. The shipboard management system implemented should comply with all mandatory requirements and take into account all applicable laws, conventions, codes, guidelines and standards. Such requirements, updated laws and regulations shall be available onboard the ship for ready reference.

The ship shall be manned with seafarers who are qualified, certified and medically fit. A common working language and effective communication are required plus essential instructions and familiarisation before sailing is needed. Training needs for all relevant personnel onboard shall be identified. Procedures for environmental awareness and competence training are required. Procedures to produce plans and instructions are required for key shipboard operations concerning the safety of the ship and prevention of pollution. Plans and procedures shall reflect the identified significant environmental aspects onboard.

Procedures to deal with potential emergency shipboard situations (safety and environmental) including drills and exercises and procedures for Bridge operations like

Voyage planning, Navigation, Collision avoidance, Pilotage, Master's Standing orders, Watch keeping requirements, Emergency, Contingency, Internal communication as well as receiving, documenting and responding to communication from external interested parties shall be established. Procedures for Engine-room Operations like Controlling the operation of main and auxiliary machinery, Steering gear, Bunkering, Waste management, Chemical handling and storage, etc. as well as standing orders, are required. Key Shipboard Operations such as Mooring/unmooring, Anchoring, Ship/Shore access, Watertight integrity, Stress and Stability, Waste management, etc. require procedures. Procedures related to the identified significant environmental aspects concerning Deck and Ballasting Operations should be established.

Key Shipboard Operations concerning Safe Cargo Handling, Pollution Prevention and other operations such as hold/tank preparation, cargo specifications, loading/discharging plans, reporting and waste management, etc. require procedures. Instructions for cargo handling and care are required. Procedures related to the identified significant environmental aspects concerning cargo and operations type of ship should be established.

Shipboard maintenance procedures are required for mandatory/statutory and classification items and maintenance activities that are associated with the identified significant environmental aspects, environmental objectives and targets should be planned and carried out under specified conditions. Critical systems and tasks could be refrigerator plants (with CFC), incinerators, oil-water separators, cargo handling systems (tankers), handling of chemicals, detergents and hazardous waste etc. All necessary records as per the standards have to be maintained. Procedures and routines for calibration of those devices that are used to measure and monitor the cargo are required.

Further, a company supplied management system for use onboard is required. System Familiarization Procedures are required for master, officers and crew. Procedures should describe clearly their duties onboard and also for training and follow up as required. Internal audits on board to verify compliance and system efficiency, by an independent

auditor should be conducted. Procedures for controlling the documentation on board such as master lists, instructions for removal of obsolete documents, for reporting non-conformities and hazardous situations, for on board implementation of corrective and preventive actions and continual improvement are required. The master shall review the management system, and report deficiencies and verify compliance with special requirements. To monitor the implementation and effectiveness of the shipboard systems, procedure for how operational records, registrations and documentation are to be maintained and filed is required.

If such an IMS is implemented and maintained effectively on board ships, pollution from ships can definitely be prevented. No doubt, the continued compliance of the system should be verified by the competent authorities and the certificate to be kept updated at all times.
