BLUE WATERS

Newsletter

On Marine Environment Security

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SHORELINE ASSESSMENT




DAMAGE TO SHORELINE

CONTINGENCY PLAN

LEGISLATION

DRILLS & EXERCISES

POLLUTION RESPONSE CAPACITY

SHORELINE PROTECTION MEASURES

RESOURCES
DISTRICT OFFICIALS FOR MANPOWER, LOCAL RESOURCES

ADVISORY
COAST GUARD
DG SHIPPING
ITOPF

POLLUTER PAYS
EFFORTS THROUGH OSRO AND P&I CLUBS

SUPPORT
COAST GUARD
PORTS
OIL INDUSTRIES
RESOURCES ACTIVATION

SHORELINE RESPONSE MEASURES

A Publication of the Indian Coast Guard

From the Director General's Desk

This edition of 'Blue Waters', deals with issues related to 'Coastline Protection' and is aimed at sharing the information with readers to create awareness on the ongoing efforts related to 'Marine Environment Protection' being undertaken by the Indian Coast Guard at national and international levels.

There is a genuine concern today on the effects of global warming and the degradation to our marine environment. The Government of India and various other agencies are continually developing plans for environment friendly growth, by adopting green practices and clean development mechanisms. Since its inception, the Indian Coast Guard has always observed environment friendly practices and assisted the oil industry, ports and other agencies in establishing contingency plans and adopting preventive actions and best practices. The ICG has also coordinated with various agencies for preventing operation of substandard ships, pollution prevention efforts for pollutants other than oil, and coastal-cleanup measures. The conservation programme established by the Indian Coast Guard for the endangered 'Olive Ridley' species since the late eighties, has been rewarded by the Bombay Natural History Society (BNHS), Mumbai by conferring the 'Green Governance Award' for the year 2008.

Today we are witness to large scale maritime development which makes our coastline prone to environmental degradation. The Indian Coast Guard will be however relentless in its pursuit of implementing total environment protection, and requests support and assistance from various departments, State Govts, ports and oil-handling agencies in establishing the necessary contingency measures to meet any exigencies, and also to prevent accidents taking place at sea. I am certain that a proactive approach by all concerned will pave the way for achieving pollution-free maritime development.

I wish all a very happy and prosperous 2009. Jai Hind.

(Anil Chopra)
Vice Admiral
Director General
Indian Coast Guard

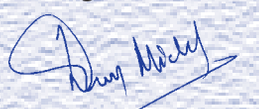
New Delhi
31 Jan 09

Editorial

In this issue of Blue Waters, the theme adopted is 'Shoreline protection measures' an important subject which did not receive much attention that it deserves over the years. There has been encouraging response from the readers who have contributed articles and has been accordingly included in this issue. The Indian Coast Guard being the national coordinating authority for responding to oil spills is making a concerted effort to assist the coastal states to adopt shoreline assessment process and establish environment sensitive index. A Manual on Shoreline Assessment and Response prepared by the Indian Coast Guard is likely to be issued shortly to assist them in establishing necessary coastline protection measures.

The analysis of previous oil spill incidents that occurred in and around Indian coastline indicates that the spills were predominantly of that of Bunker oil. The IMO which adopted the Bunkers Convention in 2001, has entered into force on 21 Nov 08. The current IMO regimes signed by India for liability and compensation for pollution damage covering oil spills do not include bunker oil spills from vessels other than tankers. The key elements include compulsory insurance cover for right of direct action and principle of strict liability which obviates the need to prove negligence. MoS should consider this convention positively for accession by India for claiming damages and to avoid substandard ships operating around the Indian coasts.

Measures discussed during the 12th NOSDCP meeting need to be taken by all concerned for establishing necessary oil spill response capability in ports and oil handling facilities. The IMO Level-1 oil spill response training programme for the year has been drawn up for conduct of training in all three Coast Guard Regions and the resource agencies may benefit from the Coast Guard efforts by sending their representatives for the training.



(Donny Michael)
Commandant
Joint Director (Environment)

CONTENTS

ARTICLES

SHORELINE ASSESSMENT AND CLEANUP MEASURES

Commandant Donny Michael
Joint Director (Environment)

When spilled oil contaminates shoreline habitats in a large coastline such as India, the responders must survey the affected areas to determine the appropriate response. Presently, in Indian context the responsibility of shoreline cleanup comes under the jurisdiction of the District Collectorate who can in turn make the polluter to make necessary arrangements for the cleanup and pay compensation to the affected parties. The Indian Coast Guard is mandated to respond to oil spills that occur in the maritime zones, the Coast Guard generally provides expert advice to the authorities ashore and to the State Pollution Control Boards during an oil spill which has washed ashore. The recent spill that affected the Indian Coast line is the 300 tons oil spill that washed ashore during the stranding of MV Ocean Seraya off Karwar in Jun 2006. There were many lessons learnt and the important lesson learnt was that it is essential that the shoreline assessment should be made immediately after the impact of oil spill on the shore and determine the appropriate response in consultation with the experts and the scientific community.

The coastline of India varies from mudflats to rocky shores and sea grass to mangroves. When oil spill affects the shoreline habitats, the appropriate response methods, the necessary approvals or decision tools for using shoreline clean-up methods can be developed during planning stages by the responders. The shoreline assessment team members should be trained properly to decide on the response options. Specific clean-up recommendations must integrate field data on shoreline habitats, type, and degree of shoreline contamination, and spill-specific physical processes. Clean-up endpoints must be established early so that appropriate clean-up methods can be selected to meet the clean-up objectives. Shoreline surveys must be conducted systematically because they are crucial

components of effective decisions. Also, repeated surveys are needed to monitor the effectiveness and effects of ongoing treatment methods (changes in shoreline oiling conditions, as well as natural recovery), so that the need for changes in methodology, additional treatment, or constraints can be evaluated.

Shoreline Assessment process

During a spill response, shoreline assessment forms an integral component of the response organization. Shoreline assessment teams are often made up of representatives from governmental agencies, the responsible party, and other specialists. Members of the team should be trained and knowledgeable in their roles, which include: shoreline assessment coordinator; shoreline assessment team Leader; and team members. Shoreline assessment teams should collect the data needed to develop a shoreline clean-up plan that maximizes the recovery of oiled habitats and resources, while minimizing the risk of injury from clean-up efforts. Consideration should always be given to the potential for human exposure, by direct contact or by eating contaminated seafood, the extent and duration of environmental impacts if the oil is not removed, natural removal rates, potential for re-mobilised oil to affect other sensitive resources and likelihood of clean-up to cause greater harm than the oil alone. Information from these assessments must meet the requirements of the clean-up operation, being both timely and of uniform quality and content. Finally, the teams must coordinate their field activities with the clean-up managers working in the areas being assessed. This

ensures that all operations are conducted safely and that important information is exchanged. Several guidelines and studies on shoreline assessment have been developed by IMO and the USCG that are aimed at providing practical and technical information to carry out shoreline surveys.

Shoreline Surveys

The Objective of the shoreline survey is to collect data on shoreline types, oiling conditions, and ecological and human-use resources for specific segments. The survey team should reach an agreement on clean-up recommendations for specific segments and also confirm that recommendations are effective and beneficial to the environment.

The shoreline assessment team during their survey should carry out following:

- Confirm segment boundaries.
- Conduct survey to identify shoreline types and extent of oiling.
- Describe the shoreline characteristics, surface oil conditions, buried oil conditions, and special considerations (ecological, recreational, cultural) using standard terms and codes.
- Sketch the segment, if appropriate, focusing on the oil distribution and special considerations.
- Note presence of submerged oil in near shore zone for spills of heavy oil.
- Log and locate all photographs taken, and note the objective of each photograph.
- Collect oil and/or sediment samples based on identified needs.
- Discuss and agree on clean-up recommendations and priorities.
- Complete the surveys each day in time to meet reporting deadlines.

Shoreline Clean-up Methods

The shoreline cleanup methods vary from shore to shore. A problem which occurs after all major oil spills is that there is a large quantity of oily wastes and debris that is generated must be dealt with as part of the response action. A clean-up strategy that minimizes the impact to all sensitive aspects of the environment and minimizes the amount of oily wastes is the most optimal. History has shown that oily wastes or debris that has been buried inappropriately can result in formation of leachates that contaminate surface and groundwater resources. Each clean-up option should be examined with the problem of waste generation and disposal in mind.

Some of the shoreline cleanup methods are as follows :-

(a) **Natural Recovery :** No attempt to remove any stranded oil in order to minimize impact to the environment, or because there is no effective method for clean-up. Oil is left in place to degrade naturally. This type of cleanup measure is used when the natural removal rates are fast (e.g., gasoline evaporation, high energy coastlines), when the degree of oiling is light, or when clean-up actions will do more harm than natural removal. This method may be inappropriate for areas used by high numbers of mobile animals (birds, marine mammals) or endangered species.

(b) **Barriers/Berms :** This method is adopted to prevent entry of oil into a sensitive area or to divert oil to a collection area. In this method a physical barrier (other than a boom) is placed across an area to prevent oil from passing. Barriers can consist of earthen berms, trenching, or filter fences. When it is necessary for water to pass because of water volume, underflow or overflow dams are used.

(c) **Physical Herding :** In a method to free any oil trapped in debris or vegetation on water; or to direct floating oil towards containment and recovery devices; or to divert oil from sensitive areas. Plunging water jets, water or air hoses, and propeller wash can be used to dislodge trapped oil and divert or herd it to containment and recovery areas may emulsify the oil. It is carried out in near shore areas where there are little or no currents,

and in and around man-made structures such as wharves and piers.

(d) **Manual Oil Removal/Cleaning :** This method is adopted to remove oil with hand tools and manual labour. Removal of surface oil using hands, rakes, shovels, buckets, scrapers, sorbents, pitch forks, etc., and placing in containers. No mechanized equipment is used except for transport of collected oil and debris. Includes underwater recovery of submerged oil by divers, for example, with hand tools. This method is adopted whenever there is light to moderate oiling conditions for stranded oil, or heavy oils on water or submerged on the bottom, that have formed semi-solid or solid masses and that can be picked up manually.

(e) **Mechanical Oil Removal :** This method is adopted to remove oil from shorelines, and bottom sediments using mechanical equipment. Oil and oiled sediments are collected and removed using mechanical equipment not specifically designed for pollution response, such as backhoes, graders, bulldozers, dredges, draglines, etc. Requires systems for temporary storage, transportation and final treatment and disposal. Care should be taken to remove sediments only to the depth of oil penetration, which can be difficult with heavy equipment. The heavy equipment should be used carefully where excessive sediment removal may erode the beach or shore.

(f) **Use of Sorbents :** This method is adopted to remove surface oil by absorption by oleophilic (oil-attracting) material placed in water or at the waterline. Sorbent material is placed on the floating oil or water surface, allowing it to absorb oil or is used to wipe or dab stranded oil. Forms include sausage boom, pads, rolls, sweeps, snares, and loose granules or particles. These products can be synthetically produced or be natural substances. Efficacy depends on the capacity of the particular sorbent, wave or tidal energy available for lifting the oil off the substrate, and oil type and stickiness. Recovery of all sorbent material is mandatory. Loose particulate sorbents must be contained in a mesh or other material.

(g) **Vacuum :** This method is adopted to remove oil pooled on a shoreline substrate or sub-tidal sediments. A vacuum unit such as **Linductor** of the Coast Guard inventory is attached via a flexible hose to a suction

head that recovers free oil. The equipment can range from small, portable units that fill individual drums to large super suckers that are truck or vessel-mounted and can generate enough suction to lift large rocks. Removal rates from substrates can be extremely slow. Collected oil and or oil/water mix will need to be stored temporarily prior to recycling or disposal. Oil may be recyclable; if not, it will require disposal in accordance

with local regulations. Large amounts of water are often recovered, requiring separation and treatment.

(h) **Vegetation Cutting/Removal :** This method is adopted to remove portions of oiled vegetation or oil trapped in vegetation to prevent oiling of wildlife or secondary oil releases. Oiled vegetation is cut with weed trimmers, blades, etc., and picked or raked up and bagged for disposal. Vegetation removal will destroy habitat for many animals. Cut areas will have reduced plant growth and, in some instances, plants may be killed. Cutting at the base of the plant stem may allow oil to penetrate the substrate, causing sub-surface contamination. Along exposed sections of shoreline, the vegetation may not recover, resulting in erosion and habitat loss. Trampled areas will recover much more slowly.

(j) **Low-Pressure, Ambient Water Flushing :** This method is adopted to remove fluid oil that has adhered to the substrate or man-made structures, pooled on the surface, or become trapped in vegetation. Ambient-temperature water is sprayed at low pressures (<72 kpa), usually from hand-held hoses, to lift oil from the substrate and float it to the water's edge for recovery by skimmers, vacuum, or sorbents. Usually used with a flooding system to prevent released oil from re-adhering to the substrate downstream of the treatment area.

(k) **High-Pressure, Hot Water Flushing :** This method is adopted to mobilize weathered and viscous oil strongly adhered to surfaces. Hot water (32ºC up to 77ºC) is sprayed with hand-held wands at pressures greater than 720 kPa. If used without water flooding, this procedure requires immediate use of vacuum or sorbents to recover the oil/water runoff. When used with a flooding system, the oil is flushed to the water surface for collection by skimmers, vacuum, or sorbents.

(l) **Dispersants :** This method is adopted to reduce impact to sensitive shoreline habitats and animals that use the water surface by chemically dispersing oil into the water column. Dispersants reduce the oil/water interfacial tension, thereby decreasing the energy needed for the slick to break into small particles and mix into the water column. Specially-formulated products containing surface-active agents are sprayed (at concentrations of 1-5 per cent by volume of the oil) from aircraft or boats onto the slicks. Some agitation is needed to achieve dispersion.

(m) **Herding Agents :** This method is adopted to collect or herd oil into a smaller area and thicker slick in order to increase recovery. Can be used to herd oil away from sensitive areas or to help keep oil contained when it is necessary to move a boom. These agents, which are insoluble surfactants and have a high spreading pressure, are applied in small quantities (2.5-5 litres per lineal kilometre) to the clean water surrounding the edge of a fresh oil slick. They contain the oil, prevent spreading, but do not hold the spill in place. Hand-held or vessel-mounted systems can be used. Must be applied early in spill, when oil is still fluid.

(n) **Nutrient Enrichment (Bio-stimulation) :** This method is adopted to accelerate the rate of oil hydrocarbon degradation due to natural microbial processes by adding nutrients (generally nitrogen and phosphorus) that stimulate microbial growth. If nutrients are a limiting factor (as measured using the interstitial pore water) in an area where shoreline oiling has occurred, water-soluble nutrients can be applied by a spray irrigation system. Nutrients should be applied daily if the impacted area gets completely

submerged by tides and waves and if maximum bio-stimulation is desired. If the impacted area gets submerged only during spring tides, the frequency of nutrient addition will be determined by the intertidal zone water coverage. Using slow-release granular or encapsulated nutrients or oleophilic fertilizer (which adheres to the oil residue on the surface) should require less frequent addition, but time-series monitoring of interspatial pore water nutrient levels is needed to ensure target levels are being maintained, especially throughout the depth of the impacted intertidal zone.

(p) **Natural Microbe Seeding (Bio-augmentation):** A form of bioremediation used to accelerate natural microbial degradation of oil by adding high numbers of oil-degrading microorganisms. Formulations containing specific hydrocarbon-degrading microbes are added to the oiled area because indigenous hydrocarbon degraders are low in number, or, those that are present cannot degrade the oil effectively. Because microbes require nitrogen and phosphorus to convert hydrocarbons to biomass, formulations must also contain adequate nutrients. The number of microbial organisms achievable will determine the biodegradation rate. If nutrients are sufficient to maximize that rate, bio-augmentation will not further increase the biodegradation rate. Research studies conducted with bioengineered organisms or organisms enriched from different environments, grown in the laboratory to high numbers, and applied to an oiled beach to stimulate rapid biodegradation, have failed to prove conclusively that seeding is effective. Bio-augmentation appears less effective than bio-stimulation because of the low level degraders.

(q) **In-situ Burning :** This method is adopted to remove oil from the water surface or habitat by burning it in place. Oil floating on the water surface is collected into slicks at least 2-3 milli-metres (mm) thick and ignited. The oil can be contained in fire-resistant booms, or by natural barriers such as ice or the shoreline. On land, oil can be burned when it is on a combustible substrate such as vegetation, logs, and other debris. Oil can be burned from non-flammable substrates using a burn promoter.

On sedimentary substrates, it may be necessary to dig trenches for oil to accumulate in pools to a thickness that will sustain burning. Heavy oils are difficult to ignite but can sustain a burn once ignited. Emulsified oils may not ignite or sustain a burn when the water content is great than about 25 per cent.

MARINE POLLUTION IN GUJARAT

Asst Commandant JD Dhayalan (0664-J)

Introduction

Gujarat state has 1600 km long Coastal region. On one hand the state government intends to develop variety of industries by liberalisation of specific regulations and providing single window system of environmental and other clearances while on the other hand environmental degradation has been an obvious consequence of rapid urbanisation and industrial growth. With the advent of globalization and the potential availability of finance, manpower and government approvals, there has been a phenomenal rise in the industries that has sprung all along

the coast of Gujarat. The new captive ports in the environmentally sensitive Gulf of Kutch area and the development of petro chemical industries coupled with the increasing movements of large crude carriers and other vessels makes the coast of Gujarat very vulnerable to pollution threats.

Ecologically Important Coastal Areas identified in Gujarat coast

Site	Ecological Importance	Geographic Location	Area in km²	Coastal Length km
Gulf Kachchh	Mangrove Coral Reef	20º15' to 23º35' N 60º05' to 70º22' E	1307.8 (Mangrove) 406.5 (Coral)	131.4 Km (Mangrove) 94.91km (Coral Main) 75.4 Km (Coral Island)
Gulf of Khambat	Estuary	22 º15'-22º 30'N 72º 15'-72º 30'E	6.4 (Mangrove)	2.63 km (Mangrove)

Gulf of Kachchh, the largest coastal habitat in the West coast of India in the state of Gujarat (20º15' to 23º35' N and 60º05' to 70º22' E) is encompassing nearly 1000 km long shoreline covers an area of 7350 square kilometers. It is a shallow water body with depth extending from 60 m at the mouth to less than 20 m at the head of the Gulf. While the average depth is 30 m, the minimum depth is upto 5 m, around Lushington Island. The Gulf is delimited in the north by the Kachchh region and in the south by the Saurashtra region. The Marine National Park and Marine Sanctuary are situated along the southern shore of Gulf from Okha (22º30'N, 69º00'E) and extends eastwards to the vicinity of Khijadia (22º30'N, 70º40'E). This include 42 islands and a complex of fringing reefs backed by mudflats, sand flats, coastal salt marsh, mangrove forests, sand and rocky beaches which support a great diversity of fauna and flora. The area also has many coral islands

fringed with mangroves which provide a disturbance free habitats for many species of nesting birds. Besides these islands, there are a number of wave-cuts, eroded shallow banks like the Pirothan, Deda, Donna, Sankhodhar Beyt, Paga, Adatra and Boria, which supports coral reef development and a vide variety of aquatic species.

Due to availability deep channel and the proximity to the hinterland, the coastline between Jamnagar and Salaya off the Gulf of Kutch is a favorite location these days for industrial development. Many mega industries have been set up like Integrated Petrochemical Refinery at Sikka (RPL) and Vadinar (ESSAR, IOC); Thermal Power Project, Cement Factory & Fertilizer Factory at Sikka, etc.

The operation of these mega industries and associated factories, which are cropping up around the areas pose a severe threat to the fragile marine ecosystem of the Gulf

of Kutch. The permission granted by the state government for the industries to be developed around these areas has not catered for protection measures of the sensitive environment. Noticing this trend with alarm, even the World Bank has stepped in to fund for development of Integrated Coastal Zone Management in the Gulf of Kutch. With the changing scenario of rapid industrialization of Saurashtra coastline, it is absolutely necessary to obtain a baseline data on the status of the marine fauna and the ecosystem present today, before it is too late. This database will be a vital component to assess the impact of the industries and human pressure on the marine biota, in time to come.

Marine operations based pollution affecting Gujarat Coast

Marine Pollution is defined as discharge of waste into the sea resulting in harm to living resources, hazards to human health, hindrance to fishery & impairment of quality for use of seawater. Marine pollution is associated with the changes in the physical, chemical & biological conditions of seawater. The major sources of marine pollution to the Gujarat coast can be categorised as under :-

(a) Operational and accidental discharge of ship borne pollutants.

(b) Oil spills due to faulty handling of SBM operation in the Gulf of Kutch.

(c) Maritime accidents due to collision, fire, explosion or grounding which results in the release of oil, either from the ship or from the cargo tank.

(d) Intentional discharges of oil or oily waste from the pumping of bilges or de-ballasting cargo tanks or from tank washing.

Land based marine pollution to the Gujarat Coast

Disposal of sewage, industrial effluents and agricultural wastes contributes a major chunk of pollutants entering the sea water in the coast of Gujarat. Pesticides & Insecticides are used in agriculture & tons of synthetic detergents are consumed for washing & cleaning purposes in coastal areas of Gujarat every year. Twenty four percent of these chemicals can be expected to find their way into the coastal marine environment.

Ocean disposal is the convenient method of pesticide waste disposal for manufacturing plants located near the

seas. The large amounts of suspended solids deposition may be detrimental to the biota that grows on the seabed and it poses severe threat to the bottom dwellers to sustain with the suspended pollutants that does not dissolve easily.

The fertilizer industry, along with hazardous chemical and petro-chemical industries also pose a threat of marine pollution of different dimension. Fertilizer factories produce large quantities of wastes, which contain a variety of substances such as Oil, Carbon slurry, Ammonia, Urea, Ammonium Sulphate, Phosphate & Fluorides, Acid, Alkali, Arsenic, Caustic, Potassium Carbonate etc.

There are many industries functioning near Hazira, such as Oil & Natural Gas Corporation (ONGC), Indian Oil Corporation (IOC), Gas Authority of India Limited, ESSAR Limited, Heavy Engineering Plant, Reliance Petrochemical Complexes, National Thermal Power Corporation Limited, KRIBHCO Limited. Due to the proximity these industries close to the sea, a large quantity of effluents are discharged in the nearby areas of Tapi estuaries and ultimately the effluent reaches the sea causing bio pollution. The same situation is also arising in the nearby region of Amla Khadi due to industrial expansion of Nandesari and surrounding areas.

Ship Breaking Activities

Ship breaking is an important activity along the West Coast of India especially in Gujarat. Alang, a small coastal town in the state, houses the world's largest ship breaking yard. Forty five thousand workers recycle about 200 ships in this yard each year. This produces 2.6 million tons of scrap steel per year, equivalent to 15 % of the country's total steel production.

Ship breaking industry creates numerous hazards for the coastal and marine environment. Due to the activity of ship breaking large number of dangerous pollutants including toxic waste, oil, polychlorinated bi phenyls and heavy metals are released in the surrounding coastal area which ultimately reaches the sea due to very high tidal range. While most of the oil is removed before a ship is scrapped, the sand and other sorbents which are used to mop up the remaining oil are not disposed off in an environmental friendly manner. High concentration of oil, and other non degradable items ultimately reach the sea as they are far removed from the public eyes.

Other sources of marine pollution

Cooling water from thermal power plants & nuclear installations has also adverse effects on the coastal marine fauna. The largest single source of radioactive liquid waste is probably the water used for cooling reactors.

Adverse Impact of Marine Pollution:

(a) **Loss of Corals Reefs**

There are more than 15 coral islands situated between Akho to Jodiya in the Gulf of Kutch. Both, the mangrove and coral ecosystems are under severe threat due to anthropogenic pollutant influences. In earlier days the activity of extracting lime from dried coral rock took place causing severe destruction of coastal habitats but due to pressure from NGOs and from the public

those activities have been stopped. However the damage is already done and there is a constant decrease in the coral development in the areas. Added to the physical destruction, the soft killing of coral also takes place due to the discharge of industrial and domestic waste in the surrounding sea areas and has made the coral islands in the worst environmental condition.

As a result of these, the abundance of fishes and other marine species near the coral islands are diminishing continuously and a consequence the fishermen are not provided with the opportunity to harvest fish around these areas and thereby causing sever economical hardship to them.

(b) **Loss of Mangroves**

Mangroves provide a natural habitat for many fauna in the environmentally sensitive areas of Gujarat coast. Between the years 1960-1993, there has been a reported decrease of 96 percent in the mangroves in the areas near the Gulf of Khambhat. There has been a corresponding decrease in the Gulf of Kutch area where it was estimated that about 72.5 percent of mangroves has been destroyed Several species of mangroves has been lost irretrievably around these areas.

At present Kori Creek and marine National Park are the two locations in the State where Mangroves cover 78% area. This has been achieved due to efforts made by the environment NGOs and the assistance provided by the Central Government.

Increasing Salinity of ground water resources

To satisfy the need of water for domestic use and for irrigation purpose there are many bore-well operated around the areas and due to this operation of bore wells the level of ground water has been decreased considerably. The coast line starting from Bhavnagar to Una, from Una to Madhavpur, from Madhavpur to Maliya and from Maliya to Lakhpat, the problem of salinity increase in the water bed resurces has affected the local populace. In view of salinity increase, the 2/3 crop

production has decreased and due such factor, the coastal areas are becoming barren. These barren areas are thereafter used for construction of chemical factories and large industrial effluents containing high amount of T.D.S is discharged in the sea from the various regions such as Motikhavdi and Sikka near the Gulf of Kutch. As a result of the effluent discharged the local *marine* ecology has been disturbed to a large extent.

Conclusion

Strict anti-pollution efforts should be put in place and laws relating to environment conservation especially in the Gulf of Kutch and Gulf of Khambat are to be promulgated. There should be strict application of polluter pays principle by way of charging one-time fees to cover the costs of administrative supervision of the coastal environment.

The river run of containing fertilizers, chemicals and pesticides used for agriculture should be recycled and treated prior being discharged in a river which ultimately reaches the seas.

Mass education in environmental matters is essential in order to improve the environment and ecology of coastal region. There should be strict implementation of the laws relating to the prevention of coastal management especially coastal Regulation Zone notification-1991, before establishing new industrial units on the seacoast.

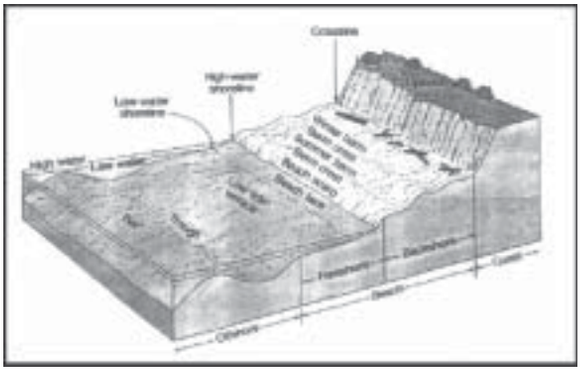
State government is keen to develop silver corridor for industrial development by providing common waste disposal facilities at coastal line of Gujarat. Conceptually it is perfect idea but existing common waste disposal facilities will not be successful without feasibility studies and consequent amendment to the existing laws.

BEACH PROTECTION MEASURES

Commandant HC Upadhyay (0413-M)

A beach is defined as an accumulation of sediment, usually sand or gravel that occupies a portion of the coast. The active beach, an area of loose sediment subject to transport by wind, waves, and currents, is divided into three regions: the backshore, the foreshore, and the offshore area. The active beach is backed by the coastal upland, which can be a dune, a cliff, a soil embankment, a fossil beam, or an engineering structure such as a seawall or a revetment. Common geomorphic features of the beach include beams, scarps, and offshore sand bars.

The amounts and fluxes of sediment in a beach are collectively known as the littoral budget. Healthy beaches



Common beach features

are in a state of dynamic equilibrium, where the net influx of sediment or sources, equals the net loss of sediment or sinks. Sources of beach sediment include skeletal material from coral reef ecosystems, onshore transport of sand, long shore transport, headland erosion, volcanic glass, river input, and erosion (scarping) of the coastal upland. Sediment sinks include loss to deep water, harbors, and channels, offshore transport, long shore transport, impoundment by engineering structures, and storm surge over wash. When there is an imbalance between sources and sinks, the beach will either erode or accrete.

Coastal processes such as **erosion** and **accretion** are site-specific, season specific, and inter annual. Different beaches have different geomorphic characteristics and are subject to different oceanographic conditions. Beach processes can vary dramatically from one end of a particular beach to the other. Site-specific factors such as extent and health of coral reefs, alterations to dune systems, sediment runoff from upland areas, and other human activities also affect coastal processes. Wave and current patterns change dramatically from season to season, and from swell to swell. Because of these variations, each segment of each beach will have its own history of erosion and accretion trends.

Shoreline Protection and Coastal Erosion Hazard Data

The intent of shoreline setbacks is to establish a coastal-hazard buffer zone to protect beach-front development from high-wave events and coastal erosion. Adequate setbacks allow the natural erosion and accretion cycles to occur and help maintain lateral beach access. Furthermore, setbacks provide open space for the enjoyment of the natural shoreline environment.

An analysis of coastal erosion trends would provide data on a property scale to enhance decision making in the coastal zone area. Coastal and marine environments are greatly influenced by the activities of humankind. Increasing public awareness of the sensitivity of these environments would sharply decrease human impacts. Policy makers and agency personnel should be provided with guidance for more effective beach management practices. Equally important is increasing awareness and education of general public. Involvement of both the private and public sector will further strengthen the whole system.

Policy makers and agency personnel need to be better informed so that their decisions are environmentally and economically responsible. The same applies to developers and contractors, especially those working at shoreline properties. A better informed public will support decisions that need to be made.

Further more a beach management or a shoreline protection plan can be put into force which will not only study the present threat and its remedies but also the future consequences and its effect in the area. The recommendations can be used as a guide line for better law formulation, its implementation, and its execution.

IMO NEWS

BUNKER CONVENTION – 2001 ENTERS INTO FORCE ON 21 NOVEMBER 2008

Pollution damage from fuel oil carried on ships will be covered in 2008 with entry into force of international bunkers liability and compensation convention. The last significant gap in the international regime for compensating victims of oil spills from ships is set to be closed, with the entry into force on 21 November 2008 of an international treaty covering liability and compensation for pollution damage caused by spills of oil, when carried as fuel in ships' bunkers. Current regimes covering oil spills do not include bunker oil spills from vessels other than tankers. Criteria for entry into force of the International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001 were met on 21 November 2007, following accession to the treaty by Sierra Leone. The Convention was adopted in 2001 by the International Maritime Organization (IMO), the

United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships.

The convention stipulates that ships over 1,000 gross tonnage registered in a State Party to the Convention will be required to carry on board a certificate certifying that the ship has insurance or other financial security, such as the guarantee of a bank or similar financial institution, to cover the liability of the registered owner for pollution damage in an amount equal to the limits of liability under the applicable national or international limitation regime. In all cases, this amount should not exceed an amount calculated in accordance with the Convention on Limitation of Liability for Maritime Claims, 1976, as amended. The Convention will make the ship owner, defined broadly so as to include the owner, registered owner, bareboat charterer, manager and operator of a ship, liable to pay compensation for pollution damage (including the costs of preventative measures) caused in the territory, including the territorial sea of a State Party, as well as in its exclusive economic zone, or if a State Party has not established one, in an equivalent area.

The Bunkers Convention, which is a free-standing instrument covering pollution damage, is modeled on the International Convention on Civil Liability for Oil Pollution

Damage, 1969 (CLC). Key elements of both include the need for the registered owner of a vessel to maintain compulsory insurance cover; the right of direct action, which would allow a claim for compensation for pollution damage to be brought directly against an insurer; and the principle of strict liability, which obviates the need to prove negligence. Oil fuel tank protection Rules to limit the size of oil fuel tanks on new ships and ensure they are protectively located are included in the International Convention for the Prevention of Pollution from Ships (MARPOL Convention). A new regulation on oil fuel tank protection was adopted in 2004 and entered into force on 01 January 2007.

The regulation applies to all ships delivered on or after 01 August 2010 with an aggregate oil fuel capacity of 600 m^3 and above. It includes requirements for the protected location of the fuel tanks and performance standards for accidental oil fuel outflow. A maximum capacity limit of 2,500 m^3 per oil fuel tank is included in the regulation, which also requires administrations (flag States) to consider general safety aspects, including the need for maintenance and inspection of wing and double-bottom tanks or spaces, when approving the design and construction of ships in accordance with the regulation.

ANTI-FOULING SYSTEMS CONVENTION

The entry into force requirements for the AFS Convention has now been met, following the accession to the treaty by Panama. The Convention has entered into force internationally on 17 September 2008. A "harmful anti-fouling system" is currently defined as any system that includes organotin compounds which act as biocides, although there is provision for additional harmful systems to be included in the future.

Compliance with the convention is achieved if the ship:

- Does not bear such compounds on its hull or external parts or surfaces; or
- Bears a coating that forms a barrier to such compounds leaching from the underlying non-compliant anti-fouling systems.

This applies to all ships except fixed or floating platforms, floating storage units (FSUs), and floating production storage and off-loading units (FPSOs) that have been constructed prior to 01 January 2003 and that have not been in dry-dock on or after 01 January 2003.

While fixed or floating platforms, FSUs and FPSO which have been constructed prior to 01 July 2003, but have not been into dry dock on or after that date, are not legally required to comply with the ban on bearing TBT compounds, it is recommended that they do so as soon as is reasonably practicable.

Survey and Certification

Only ships of 400 gross tonnage and above (excluding fixed, floating platforms, FSUs and FPSOs) engaged in international voyages are subject to surveys under the Convention. Surveys are required as follows :

- An initial survey before the ship is put into service or before the International Anti-Fouling System Certificate is issued for the first time; and
- A survey when the anti-fouling systems are changed or replaced, undertaken to enable the endorsement of the Anti-Fouling System Certificate.

Similarly, only ships of 400 gross tonnage and above engaged in international voyages are required to have an International Anti-Fouling System Certificate. These certificates will be issued after a required survey, as outlined above, is completed.

Ships of 24 metres or more in length but less than 400 gross tonnage (excluding fixed or floating platforms, FSUs and FPSOs) must carry a declaration on Anti-Fouling Systems signed by the owner or authorized agent. The declaration will have to be accompanied by appropriate documentation supporting the fact that the ships' anti-fouling system is compliant with the AFS Convention, e.g. a paint receipt or contractor invoice.

REVISED MARPOL ANNEX II (NOXIOUS LIQUID SUBSTANCES CARRIED IN BULK)

The revised Annex II Regulations for the control of pollution by noxious liquid substances in bulk includes a new four-category categorization system for noxious and liquid substances.

The new categories are :

- **Category X**:

Noxious Liquid Substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a major hazard to either marine resources or human health and, therefore, justify the prohibition of the discharge into the marine environment;

- **Category Y**:

Noxious Liquid Substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a hazard to either marine resources or human health or cause harm to amenities or other legitimate uses of the sea and therefore justify a limitation on the quality and quantity of the discharge into the marine environment;

- **Category Z**:

Noxious Liquid Substances which, if discharged into the sea from tank cleaning or deballasting operations, are deemed to present a minor hazard to either marine resources or human health and therefore justify less stringent restrictions on the quality and quantity of the discharge into the marine environment; and

- **Other Substances**:

Substances which have been evaluated and found to fall outside Categories X, Y or Z because they are considered to present no harm to marine resources, human health, amenities or other legitimate uses of the sea when discharged into the sea from tank cleaning of deballasting operations. The discharge of bilge or ballast water or other residues or mixtures containing these substances are not subject to any discharge requirements of MARPOL Annex II.

The revised annex includes a number of other significant changes. Improvements in ship technology, such as efficient stripping techniques, has made possible significantly lower permitted discharge levels of certain products which have been incorporated into Annex II. For ships constructed on or after 01 January 2007, the maximum permitted residue in the tank and its associated piping left after discharge will be set at a maximum of 75 litres for products in categories X, Y and Z - compared with previous limits which set a maximum of 100 or 300 litres, depending on the product category.

REPORTS

WORLD WATCH

OIL SPILL BY PRINCESS OF THE STARS

The Princess of the Stars ferry sank with 850 people onboard due to Typhoon Fengshen off the coast of Sibuyan Island on 21 Jun 08. Many people lost their lives and numerous bodies remained trapped in the wreck. Five highly toxic pesticides were being transported in two containers onboard the ferry. The operations to recover the bodies were suspended due to the presence of containers of pesticides onboard liable to release these chemicals. A 5 km exclusion zone around the wreck, where fishing and aquaculture activities were prohibited, was set up by the Philippine authorities.

On 11 Jul 08, a fuel slick was reported from the wreck.

INDIA WATCH

No oil spill incident has occurred in our region in the since January 2008. However seven grounding/ sinking around Indian coasts has been reported in this period.

EVENTS

INTERNATIONAL COASTAL CLEANUP DAY

The Indian Coast Guard is the lead agency in coordinating International Cleanup every year. ICG coordinated the event in India to mark the occasion of International Coastal Clean up day on 20 Sep 08 under the aegis of United Nations Environmental Programme (UNEP) – South Asia Cooperative Environmental Programme (SACEP) as a part of regional environmental programme on marine litter activity.

Personnel from Coast Guard and their families, Military, Para military services, Police, Schools, Colleges, Educational Institutions, State/Central NGO's took part in the event which covered large beach tracts in the West and East Coast of India and the island territories of Andaman and Nicobar Islands.

TWELFTH NATIONAL OIL SPILL DISASTER CONTINGENCY PLAN (NOS-DCP) AND PREPAREDNESS MEETING

The 12th National Oil Spill Disaster Contingency Plan and Preparedness meeting, the second bi-annual meeting of 2008 was held at Jawaharlal Nehru Port Trust, Navi Mumbai on 24 Oct 08. Vice Admiral RF Contractor, AVSM, NM, the Chairman, NOSDCP chaired the meeting. A total of 56 delegates from various Govt Departments, Ports and Oil Companies have attended the meeting.

The Chairman, Jawaharlal Nehru Port Shri Shahzad Hussain, IAS welcomed all the delegates and gave the opening address stating the importance of environment protection in the overall component of the growth of the nation.

The Chairman NOSDCP in his inaugural address reiterated the purpose and objective of the NOSDCP meeting and requested the resource agencies to review their preparedness and response capabilities with a view to prepare themselves to respond to any contingency which may arise out at sea or port areas He stated that the forum did not achieve much headway in two vital issues i.e. establishing of Tier-1 response facilities and state level contingency plans although some ports have signed the MoUs for establishing tier-I facilities. He requested the port authorities to resolve the issues pertaining to MoU with port users or else establish the Tier-1 facility of their own and charge the users accordingly.

The Chairman called upon the port and oil handling agencies to take actions for acquisition of Tier-1 facilities in a time bound manner and the non major ports and the State Governments to develop oil spill contingency plan in their areas of jurisdiction so as to establish necessary preparedness measures.

The Secretary, NOS-DCP & Director (Fisheries and Environment), CGHQ briefed the participants about the developments at the national level since last NOS-DCP meeting.

There were two presentations arranged for the benefit of the members during the meeting. The first presentation was on "**Oil Spill Impact on Coral Reefs and Sensitive Island Ecosystem**" by Dr MVM Wafar, Scientist E II, NIO, Goa. The second presentation was on "**Reliance KG Basin FPSO Oil Handling Operations and Marine Environment Protection Efforts**" by Dr PK Pant, Sr Vice President-QHSE, Reliance Industries Ltd, Mumbai.

The important issues which were discussed and deliberated upon during the meeting included the major oil spill exercise and training, establishing Tier-I facilities, use of oil spill dispersant, preparation of Local Contingency Plan, procurement of pollution control vessels for ports, inclusion of new ports under NOSDCP, oil spill response centre at Gulf of Kutch region, revolving trophies for best port and best oil handling agency, Prevention of oil spillage in water, use of oil pollution cess etc.

The Chairman while summing up, thanked all stakeholders for attending this meeting and lauded the efforts put in by the representatives of NIO and Reliance Industries Ltd for their informative presentations. He emphasized the **need to follow up various decisions which have been taken during the meeting in order to enhance synergised preparedness to combat oil spills in Indian waters**.

GREEN GOVERNANCE AWARD -2008

The Bombay Natural History Society (BNHS), a largest nongovernmental organisation in the Indian subcontinent engaged in nature conservation and research has since 1883 has been committed to the conservation of India's natural wealth, protection of the environment and sustainable use of natural resources for a balanced and healthy development of the future generation. Identifying that the corporate, and governmental institutions are emerging as critical players for conservation activities, the BNHS in order to provide the impetus to encourage the environment protection initiatives has instituted the Green Governance Award to recognise and appreciate the organisation's effort that are taken beyond the statutory compliance for protection and conservation of the environment.

His Excellency Shri Raj Mohan Gandhi, Governor, State of West Bengal presenting the Green Governance Award to the Inspector General SPS Basra YSM, PTM ,TM, Commander Coast Guard Region (East) at Raj Bhavan Kolkata on 03 Jan 09.

In recognizing the Indian Coast Guard's conservation effort for the endangered 'Olive Ridley' species, the BNHS conferred the Indian Coast Guard with the Green Governance Award -2008 in the Government Organisation category.

GROUNDING & SINKING INCIDENTS OF MERCHANT VESSELS IN INDIAN WATERS IN 2008

S. No.	Date of Incident	Name of Vessel	Flag	Area of Incident	Nature of Incident
01	07.01.08	MV Robert	Indian	Off Androth Island	Sunk
02	22.03.08	MV CS Signe	Panama	Budge Budge Harbour, Kolkatta	Grounding
03	13.05.08	MV Al Manara	St Kitts	Off Murud	Grounding
04	04.06.08	Barge Al Murtaza	Indian	Off Alang	Grounding
05	23.06.08	Barge MV Nilan	Bangladesh	Nurpur, Kolkatta Port	Sunk
06	05.07.08	MV Golden Star-1	Panama	Paradip Port	Grounding
07	18.09.08	MV Homi Bhabha	-	Off Alang	Grounding

POLLUTION RESPONSE TRAINING PROGRAMME FOR THE YEAR 2009

CGRHQ (East)

DATE	TRAINING	VENUE	COORDINATED BY
24-26 Feb 09	IMO Level-I PR Training	Chennai	PRT(East)
22-28 Apr 09	IMO Level-II PR Training	Chennai	PRT(East)
18-20 Aug 09	IMO Level-I PR Training	Chennai	PRT(East)

CGRHQ (West)

DATE	TRAINING	VENUE	COORDINATED BY
23-27 Feb 09	IMO Level-I PR Training	Mumbai	PRT(West)
23-27 Feb 09	IMO Level-I PR Training	Kochi	CGDHQ-4
13-17 Mar 09	IMO Level-I PR Training	Vadinar	ICGS Vadinar
05-09 Oct 09	IMO Level-I PR Training	Mumbai	PRT(West)
12-16 Nov 09	IMO Level-I PR Training	Vadinar	ICGS Vadinar
26-29 Nov 09	IMO Level-I PR Training	Kochi	CGDHQ-4

CGRHQ (A&N)

DATE	TRAINING/EXERCISE	VENUE	COORDINATED BY
16-18 Feb 09	PR Training	Port Blair	PRT(A&N)
17 Mar 09	Mock drill/PR exercise including Table Top exercise	Port Blair	RHQ(A&N)
18-20 May 09	PR Training	Port Blair	PRT(A&N)
25 Jun 09	Mock drill/PR exercise including Table Top exercise	Port Blair	RHQ(A&N)
10-12 Aug 09	PR Training	Port Blair	PRT(A&N)
17 Sep 09	Mock drill/PR exercise including Table Top exercise	Port Blair	RHQ(A&N)
16-18 Nov 09	PR Training	Port Blair	PRT(A&N)
21 Dec 09	Mock drill/PR exercise including Table Top exercise	Port Blair	RHQ(A&N)

MINOR & MAJOR OIL SPILLS IN INDIAN WATERS (SINCE 1982)

S. No.	Date	Qty and Type of Spill (Tonnes)	Location	Spilled by
01	1982	Not Assessed	West Coast	Sagar Vikas
02	24/10/88	1000	Bombay Harbour	Lajpat Rai
03	1989	Not Assessed	West Coast	SEDCO 252
04	1989	5500/Diesel Oil	795 nm SW of Bombay	MT Puppy
05	04/8/1989	Not Assessed	Bombay Harbour	ONGC Tanker
06	29/8/1989	Not Assessed	Saurashtra coast	Merchant ship
07	29/8/1989	Not Assessed	Bombay Harbour	Unknown
08	22/3/1990	Not Assessed	NW of Cochin	Merchant Ship
09	07/9/1991	692/FO	Gulf of Mannar	MT Jayabola
10	14/11/1991	40000/Crude	Bombay High	MT Zakir Hussain
11	22/2/1992	Tanker wash	40 NM S of New Moore Is	Unknown
12	2/4/1992	1000/Crude	54 NM west of Kochi	MT Homi Bhabha
13	16/8/1992	1060/SKO	Madras Harbour	MT Albert Ekka
14	17/11/1992	300/FO	Bombay Harbour	MV Moon River
15	21/1/1993	40000	Off Nicobar Islands	Maersk Navigator
16	28/3/1993	NK/Crude	Off Narsapur	ONGC shore rig at Kumarada
17	29/4/1993	110/Crude	Bombay Harbour	MT Nand Shivchand
18	10/5/1993	90/FO	Bhavnagar	MV Celelia
19	17/5/1993	6000/Crude	Bombay High	BHN Riser pipe rupture
20	02/8/1993	260/FO	Off New Mangalore	MV Challenge
21	01/10/1993	90/Crude	Cochin Harbour	MT Nand Shiv Chand
22	12/5/1994	1600/Crude	Off Sacromento Pt.	Innovative-1
23	12/5/1994	Not Assessed/FO	360 NM SW of Porbandar	MV Stolidi
24	05/6/1994	1025/Crude	Off Aguada Lt	MV Sea Transporter
25	20/7/1994	100/FO	Bombay Harbour	MV Maharshi Dayanand
26	27/11/1994	288/HO	Off Madras	MV Sagar
27	26/3/1995	200/Diesel	Off Vizag	Dredger Mandovi-2
28	24/9/1995	Not Assessed/FO	Off Dwaka	MC Pearl
29	13/11/1995	Tanker wash	Eliot beach,Madras	Unknown
30	21/5/1996	370 FO	Hooghly River	MV Prem Tista
31	16/6/1996	120 /FO	Off Prongs, Mumbai	MV Tupi Buzios
32	18/6/1996	132 /FO	Off Bandra, Mumbai	MV Zhen Don
33	18/6/1996	128 /FO	Off Karanja, Mumbai	MV Indian Prosperity
34	23/6/1996	110/FO	Off Worli, Mumbai	MV Romanska

S. No.	Date	Qty and Type of Spill (Tonnes)	Location	Spilled by
35	16/8/1996	124/FO	Malabar Coast	MV Al-Hadi
36	25/1/1997	Tank wash	Kakinada Coast	Unknown
37	19/6/1997	210/FO	Off Prongs Lt, Mumbai	MV Arcadia Pride
38	19/6/1997	Not Assessed	Hooghly river	MV Green Opal
39	14/9/1997	Naptha, DieselPetrol	Vizag	HPC refinery
40	02/8/1997	70/FO	Off Mumbai	MV Sea Empress
41	10/3/1998	Gas leak	Bombay High	Drill Rig Noble
42	12/5/1998	Gas Leak	Bombay High	Bombay High platform
43	01/6/1998	20/Crude	Off Vadinar	Vadinar,SBM
44	09/6/1998	Not Assessed	Off Porbandar	Ocean Barge
45	09/6/1998	Not Assessed	Off Veraval	Ocean Pacific
46	08/7/1999	500/FO	Mul Dwarka	MV Pacific Acadian
47	19/7/2000	Not Assessed	Off Sagar Island	MV Prime Value
48	8/9/2000	Not Assessed	Off Fort Aguada	MV River Princess
49	17/12/2000	1/FO	Bombay Harbour	MV STonnesewall Jackson
50	08/6/2001	Not Assessed	Vadinar Gulf of kutch	Not known
51	10/7/2001	1305/Diesel Oil	Hooghly river	MV Lucnam
52	23/09/2002	Not Assessed	Off Pt Calimare 220 NM	MV HIDERBAHY
53	29/04/2003	2000 Ltrs of Arab light crude oil	O5 miles off Kochi	MT BR AMBEDKAR
54	09/05/2003	2000/Naphtha	Mumbai harbour (sw of west Colaba Pt.)	MT UPCO_III
55	18/05/2003	145/FFO	Off Haldia	MV SEGITEGA BIRU
56	10/08/2003	300/Crude Oil	ONGC Rig (BHN)	URAN Pipe Line
57	28/02/2004	01/Crude Oil	36 inches ONGC pipe line at MPT Oil Jetty (Tata Jetty -OPL PIRPAU)	During Cruide oil trasfer from Jawahar Dweep to ONGC -Trombay through 36 ' pipe
58	01/10/2004	500 to 600 Ltrs	Berth – MPT – 8 Goa	During oil transfer
59	23/03/2005	110	Off Goa (Aguada Lt)	MV Maritime Wisdom off Aguada Lt.
60	27/07/2005	80	Fire taken place on oil platform off Bombay high	BHN Platform Bombay High
61	30/08/2005	08	Sunken Ship off Tuticorin	MV IIDA
62	21/04/2006	90	Sunken Ship off Goa	INS Prahar
63	06/05/2006	Minor spill (less than 100 ltrs)	Sunken Tug off Pt. Calimer Tamilnadu	DCI Tug-IV
64	30/05/2006	70 tons of Furnace Fuel Oil	Grounded off Karawar Port	MV Ocean Seraya
65	14/08/2006	4500	Outside Indian EEZ near A&N Islands	MV Bright Artemis & MV Amar
66	15/10/07	13.9/FO	Off Jakhau	MV Star Leikanger & barge Dhan Lakshmi due to collision
67	17/10/07	Not assessed	S Yanam Beach, Kakinada	Oil drifted to shore from oil rigs

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