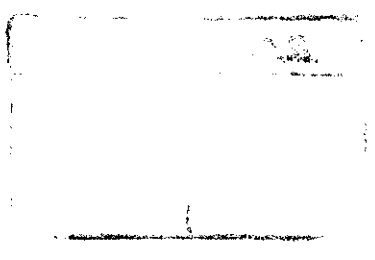


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S. Roy

OIL SPILL CONTINGENCY PLAN
WEST BENGAL

PREPARED BY INDIAN COAST GUARD
DISTT HEADQUARTERS, HALDIA
WEST BENBGAL



24/01/14
24/01/14

4301-SS (AS)
24/12/10

LOCAL CONTINGENCY PLAN – WEST BENGAL

PREFACE

The contingency plans is the over-arching document that embodies the Government response policy and the national/ state/local level response organization for responding to various types of disasters that may affect the local populace and also the flora and fauna. Certain types of pollution can cause irreparable damage to the local ecosystem which sustains large life forms. The coast of West Bengal which measures about 264 kilometers has two major ports, three non major ports. The West Bengal coast has been blessed with vital ecosystems and preservation and protection of the ecosystem is vital for sustainable development. State of West Bengal also houses complex delta of Sunderbans.

The vital ecosystems are predominantly found near the Sunderbans in the east, Mangroves forest area near entire coast of West Bengal. Eco-system has large varieties of flora and fauna and provides habitat for various wildlife and plants. The Indian Constitution and various legislations such as Forest Act, Wildlife Protection Act, Environment Protection Act 1986, Water Act 1974, empowers various authorities for taking necessary prevention and protection actions. However, for developing country like India, developmental activities are taking place at a faster rate and in most cases directly affect the environment protection principles. Pollution is the major by-product of the developmental activities and the oil pollution has become a major threat to the coastal areas due to risks associated with transportation by sea and the increased import of crude oil into India.

The coast of West Bengal now faces increased threat from oil spill from the passing ships and port activities etc. In addition, transportation of cargo and fuel oil, crude oil through Haldi River to Haldia and Kolkata pose risk of oil spill should there be a navigational accident. The need of the hour is the establishment of institutional arrangement through a contingency plan to address oil spill that may affect the coastline, and Hooghly river and take necessary preventive measures.

This Local Contingency Plan (LCP) provides the necessary instructions to all the State Environment Ministry, District Collectors, Revenue administration officials, State Pollution Control Boards, State Maritime Boards, Fisheries Department, Forest Department, Ports and other stake holders regarding their role to be played during an oil spill that washes ashore in the coastal areas of West Bengal. I earnestly request all the agencies to take all actions as per this plan so that the oil spill is mitigated at the earliest causing minimum disruption to the local populace, the fishermen and other economic activities in the affected coastal area.

This LCP has been made with the inputs from the Coast Guard and other relevant agencies. Any suggestions for improvement is always accepted.

Signed/-

All Communication to Government
Should give the Number, Date and
Subject at any previous Correspondence
and be addressed to the Secretary
of the Department concerned

Government of West Bengal

Department of Environment
Block 'G', 2nd Floor, Writers' Buildings, Kolkata - 700 001
Ph. No. 2214-1356, 2214-1357, 2214-1356(F)
e-mail: environmentwb@gmail.com / raydebal@gmail.com

No. EN/ 845 /T-II-4/001/2008

Date : 28/03/2011

From : Debal Ray
Chief Environment Officer

To :

1. The Principal Secretary
Disaster Management Department
Government of West Bengal
2. The District Collector
Purba Medinipur
3. The District Collector
South 24 Parganas
4. The Principal
Sundarban Affairs Department
Government of West Bengal
5. The Principal Secretary
Fisheries Department
Government of West Bengal
6. The Member Secretary
West Bengal Pollution Control Board

Sub : Oil Spill Contingency Plan for West Bengal.

Sir,

I am directed to forward a copy of the Oil Spill Contingency Plan for West Bengal prepared by Indian Coast Guard, District-8, Haldia. You are requested to scrutinize the said plan and convey your valuable opinion in this regard. The Department will take a view on the plan based on the opinion received from your end.

Yours faithfully,



(Debal Ray)

Chief Environment Officer

Pl put up.

AP
30/3/11

JS-I

Encl. as mentioned

B/H
28/3/11

977/540m/11
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CHAPTER-I

INTRODUCTION

1.1 Background

1.1.1 India depends almost 75 percent of the oil requirement from abroad and the oil is exclusively transported by tankers that enter various ports located all over India. There are two Major Ports located in the State of West Bengal having a coastline of 264 kilometers. In addition, The oil tankers and other ships visiting the ports located in West Bengal pose a risk to the coastline areas, whenever they are involved in fire incident, collision, grounding etc. Accidental discharges may involve escape of bunker fuel or oil cargo resulting from a marine incident. The threat is largely a function of the types of oil cargo and bunkers carried the degree of navigational hazards, the weather, and shipping density in the area. The passing merchant ships destined to the ports located in Andhra Pradesh, Orissa and West Bengal carrying oil cargo also pose risk to the coastal areas to the waters adjoining the West Bengal coast. There are possibilities of negligent and intentional oil discharges.

1.2 Purpose and Objectives of Local Contingency Plan

1.2.1 For responding to oil spill, the Indian Coast Guard being the Central Coordinating Authority has developed the National Oil Spill Disaster Contingency Plan (NOSDCP) which has the approval of the Committee of Secretaries and has been in operation since 1996. The NOSDCP brings together the combined resources of the various organizations and departments, Coast Guard, Ports and Oil handling Agencies, and related industries, to provide a level of preparedness to the threat posed to the marine environment by oil spills.

1.2.2 The NOSDCP sets out a clear definition of the responsibilities of the major participants, such as the Coast Guard, various ministries and departments, ports and oil industry. As Indian Coast Guard is the Central Coordinating Authority for oil spill response, the Indian Coast Guard, extends the necessary support such as coordination of oil spill response, providing technical advice, aerial and surface surveillance, assessment support, contingency plan preparation and vetting, conduct of PR audit/inspection and training. The national oil spill contingency plan hierarchy outlined in Figure 1 consists of NOSDCP at the apex level to coordinate significant or disaster type spills, the Regional Oil Spill Disaster Contingency plan (ROSDCP) to coordinate spill in the Western/Eastern/A&N seaboard, utilizing the resources available within the region. The District Oil Spill Disaster Contingency Plan (DOSDCP) coordinates minor oil spills that affect maritime area within the coastal state limits. The contingency plans of the port, oil handling agency plans and the coastal state needs to be integrated with the respective DOSDCP so that a combined effort is made for oil spill response.

1.2.3 The aim of Local Contingency Plan - for the State of West Bengal, is to outline West Bengal government arrangements for responding to oil spills in the coastal and shoreline areas, with the aim of protecting against environmental pollution as a result of oil spill or, where this is not possible, minimise the effect and respond the oil spill in an environment friendly manner and dispose the collected oil/debris in accordance with the existing laws/regulations/orders in force.

1.3 Scope and Geographical Area

1.3.1 This LCP outlines the roles to be played by various authorities and agencies in the event of oil reaching the shorelines. The combined stakeholder arrangements needs to be kept in place by the lead agency of the concerned coastal district authorities in coordination with the port or oil handling agencies located in the coastal district. Such arrangements should be designed to allow a rapid and cooperative response to marine oil spills within the defined area. The Plan is complemented by DOSDCP and ROSDCP besides the port and oil handling agency contingency plans approved by the Coast Guard. Matters of detail are contained in the relevant sections and they are also available in the stakeholders site specific contingency plans. This Plan also coordinates the provision of inter- state and national support through the assistance of the Indian Coast Guard.

✓1.3.2 The following agencies will be responsible for the geographical areas mentioned against for coordination of oil pollution clean-up operations:-

Sl	Geographical Area	Agency
(a)	Oil Pollution in the Shorelines, rivers, creeks, backwaters, mud flats outside the limits of the port area	The State Environment Department and the District Collectors of the concerned coastal Districts
(b)	Oil Pollution in the Major Port limits including the shorelines adjoining the port limits	Concerned Major Ports
(c)	Oil Pollution in the non major ports	Non major ports in coordination with the West Bengal Maritime Board and the local administration(not available)
(d)	Oil Pollution from the offshore installations	The concerned offshore installation operators
(e)	Other maritime zones	Indian Coast Guard in accordance to the provisions of DOSDCP, ROSDCP

*Block
development
officers*

CHAPTER-II

POLICY AND RESPONSIBILITY

2.1 Legislations

2.1.1 The oil pollution from ships and offshore installations including the single buoy moorings and pipelines are regulated by Part XIA of the Merchant Shipping Act 1958. The DG shipping and the Indian Coast Guard are empowered to take action against the polluting ship by issuing notices for clean-up and other necessary actions against the ship-owner/master of the ship/ offshore installation operator. If the oil pollution reaches the shorelines, the master of the polluting ship can also be prosecuted under the Environment Protection Act 1986 if ship failed to take action to prevent and mitigate the oil pollution. The legal action can also be taken by the affected parties by instituting a suit in the civil court for damages for civil wrong.

2.2 Jurisdictional Boundaries and Local Notifications

2.2.1 The entire coast of West Bengal stretches from Medinipur District on the West to the South 24 Parganas district on the East measuring a total distance of 264 Kms of shorelines of West Bengal. The respective coastal District administrators will be the lead agency for coordinating the shoreline response with other agencies and the polluter within their area of coastal district jurisdiction. The District administrator will be assisted by the Tahsildars and Coastal Village Officials. The details of coastal districts of West Bengal are as follows:-

Sub Divisional Officer, Block development officer

Sl	Name of Coastal District	Length of Coastline in Km/ Sensitive Areas (Approx length only, exact length to be verified from the State govt. authorities)
(a)	East Medinipur	80 Kms
(b)	South 24 Parganas	120 kms
(c)	North 24 Parganas	60 kms

2.2.2 Any sighting of oil spill near shore or shoreline areas is to be intimated to the local Coast Guard office if located within the District limits or to the Commander, Coast Guard (West Bengal) at Haldia and to the respective District Collector. The responsible District Collector will in-turn intimate all concerned agencies and other stake-holders in the area. The Coast Guard shall take measures to identify the polluter through aerial search and through other means. The Coast Guard is to be requested by the lead agency to provide aerial assessment to find the extent of spill and classify them, so that appropriate types of tiered response can be undertaken.

2.3 Organisation for Response

2.3.1 Primarily the response for shoreline protection lies with the Environment Ministry of the Government of West Bengal. The Ministry shall be assisted by the concerned District Collectors as lead agency. However, the lead agency cannot address the shoreline response without the assistance from other agencies. The system should be flexible enough to expand and contract in size of the response organisation as required. The response organisation should generally be large enough and sufficiently funded to deal with a pollution incident of a specified size and nature. Arrangement should exist for prompt gathering and dissemination of information to all members of the response organisation about actual or threatened pollution. The decision makers in the response organisation must be available at all times to receive such information. Adequate communication facilities must therefore exist for transmission of instructions and information.

2.3.2 The decision makers in the response organisation must have sufficient authority to initiate action to deal promptly with a spill or with an incident which may lead to a spill. This is of particular importance if oil is to be dealt immediately, before it causes further damage to other amenities. The role of decision makers in the organisation for shoreline clean-up for the State of West Bengal is given in the relevant sections of this LCP.

2.4 On-Scene Commander (OSC)

2.4.1 The OSC is a pre-designated member of the Coast Guard for coordinating oil spill in the maritime zones of India. It can be a Harbour Master/ Pollution Response Officer of the concerned ports, or a competent person nominated as OSC by the District Collector of the concerned coastal district for coordinating the shoreline clean-up. In some cases, the oil will be in the water surface near the shore areas and also on the shorelines. In this scenario, the Coast Guard OSC will be responsible for coordinating the sea based clean-up through the resources arranged by the polluter. The Shoreline/ Beach Supervisor will be responsible for removing the oil that has washed ashore.

2.5 Responsibilities of Designated Agencies

2.5.1 Oil spill response to a shoreline is a collective act by all the concerned agencies and the stakeholders. The responsibilities of Designated Agencies in the event of oil spill are enumerated in the NOSDCP document. For efficient coordination of the shoreline clean-up measures, the following agencies will be responsible for the functions mentioned against:-

Sl	Name of the Agency	Functional Responsibilities
(a)	Indian Coast Guard	Central Coordinating Authority for Oil spill Response. • It acts as On Scene Commander (OSC) when the oil spill is in the maritime zones other than the port and offshore installation areas. • It advises the clean-up agencies for the type of clean-up to be undertaken balancing all the priorities for the environment protection • It coordinates with the State Environment Ministry and the concerned District Collector on the shore-line clean-up Strategy and shoreline restoration planning. • It supervises the clean-up operations which are undertaken by the contractors or private service providers, if requested by the concerned on-site Shoreline/Beach Supervisor.
(b)	Directorate General of Shipping	The Directorate General of Shipping will be responsible for establishing control over the polluting ship or offshore installation. The additional roles are:- • Taking necessary preventive action through the Marine Emergency Response System's Emergency Towing Vessels (ETVs). • Directing the ship owner for clean- up by issuing legal notice • Taking legal actions against the polluting ship for detention • Taking legal action against the ship master, if no clean-up action is initiated • Directing additional ships to assist during the clean-up operations • Facilitating the re-imburement of clean-up cost • Taking legal action against the ship owner for compensation to the affected parties like fishermen, etc.

		pits, recycling facility or to the incinerators. • Promulgate general precautionary messages • Arranging for periodical exercises for shoreline clean-up • Provide administrative infrastructure to the agencies assisting in shoreline clean-up • Arrange for disposal of collected waste in coordination with the State Pollution Control Board • To take action as receiver of wrecks, if the ships involved in oil pollution incident becomes a wreck • To take whatever action necessary to realise the claims from the party/parties responsible for the oil spill through DG Shipping
(e)	West Bengal State Pollution Control Board	• Render all possible assistance to the strict Collector and other lead agencies for shoreline clean-up. • Take legal action in accordance to the powers provided in the relevant legislations • Advise the agencies for disposal of collected debris and oil waste • Assess the environmental damage and provide necessary Remedial measures • Facilitate restoration measures of the affected shoreline/coastal areas
(f)	Setting up of West Bengal Maritime Board (In Progress)	• Assist the non major ports for clean-up of the oil spill in their areas • Take necessary action against the polluting vessel in the non major port area for clean-up • Coordinate with Coast Guard and DG Shipping for issuing notice against the polluting ship master/owner for clean-up • Coordinate with the local administration for clean-up • Provide necessary resources to the non major ports such as tugs / boats/ barges for clean-up • Assist the District Collector in shoreline clean-up measures by providing necessary resources available with the non major ports
(g)	State/Coastal Police Department	• Provide resources such as boats for conveying PR personnel and operation of PR equipment such as Dispersant applications, etc. • Secure the area from the access of the general public • Assist the District Administration for shoreline clean-up measures

(h)	State Forest Department	• Have a list of species that reside in the coastal areas • Confirm whether any wildlife species are affected on account of oil spill • Remove the affected species from the area to a safe place • Take preventive measures against effects of oil spill by coordinating with the local administration for protection of mangroves in Sunderbans protected species in National Marine park. • Survey the affected area and serve notice to the Polluter for remediation of the coastal area • Put up claim for damages/ compensation against the polluter and for restoration efforts
(j)	State Fisheries Department	• Assist /advise local action group in identifying the rich fishing grounds so as to give priority for protection of such grounds from oil spills as well as to avoid use of dispersants. • Assist the local action groups to identify the fishing vessels suitable for mounting the oil spill dispersant equipment • To arrange for suitable fishing vessels on which oil pollution equipment can be mounted. • Advise fishermen on the effects of oil pollution on fisheries • Impose ban on fishing in the affected area • Assist in preparation of claims for fishermen for non fishing days and for restoration of fishing areas
(k)	ICMAM-PD/ NIO/MoES (Integrated Coastal and Marine Area Management NIO (Chennai)	• Mapping of ecologically sensitive areas in the coastal and offshore in consultation with Ministry of Environment and Forest. • Review of the sensitivity mapping listed by other agencies • To provide scientific support through Coastal Ocean Monitoring and prediction system (COMAPS) centre and units in investigations of oil pollution monitoring during the oil spills and also deployment of its research vessels for this purpose, whenever, necessary. • To organize research on impact of oil pollution marine living resources through appropriate scientific programmes / projects. • To organize follow-up research works on the ecological effect of actual oil pollution incidents. • NIO to undertake the oil finger printing analysis to identify the polluting source if the spiller is not identified

(l)	Ministry of Environment and Forest, Government of India	• Determining policy for usage of dispersant in the shoreline areas. • Mapping of ecologically sensitive areas and biosphere reserve along the coastal areas of the State and the effects of oil spill on the local ecosystem • Determining the policy for usage of bio-remediation measures
(m)	Major Ports located in the affected Coastal District	• To be in charge of the overall co- ordination of actions in the area within port limits as regards to oil pollution response measures • To provide manpower and shoreline cleanup resources to the District administration whenever required by them • To provide boats/barges/skimers and pumps for removing oil on water near the shorelines.
(n)	Oil Companies located in the affected coastal district	• To assist Local administration with the available resources and manpower for shoreline clean-up equipment and chemicals as and when required. • To assist in chartering of tankers to undertake transportation / transshipment operations. • To arrange for the storage of oil transshipped.

2.6 Meetings of Designated Agencies responsible for Implementation

2.6.1 On receipt of an oil spill report or information, the District Collector of the affected Coastal State shall convene a planning meeting at a suitable place such as Emergency Response Centre (ERC) requesting all the stakeholders and resource agencies to attend the meeting. Where possible the meeting should convene after a joint visit of the affected area by all concerned. (The meeting should be organized by the lead agency in consultation with Coast Guard.)

2.6.2 A preparedness level meeting will be conducted annually by the State Environment Ministry to review the preparedness of the West Bengal State LCP and take remedial actions in a time bound manner. The meeting should involve all the stakeholders, resource agencies, all coastal District Collectors, Coast Guard and other private oil spill clean-up agencies.

2.7 Joint Training and Exercises

tested by organising mock exercise

2.7.1 The LCP must be exercised regularly at District level by the lead agency of the Coastal District. The area wise exercise for coordinating large oil spill on shoreline will be planned by the State Environment Ministry in coordination with the Coast Guard. Deputation of suitable personnel for training on Pollution Response will be organized by the respective coastal District Administrators.

2.8 Revision and Amendment of the LCP

2.8.1 This local contingency plan will be maintained and updated by the Environment Ministry of the Government of West Bengal. The respective lead agency of every coastal district of West Bengal shall maintain the contact details of all agencies and stakeholders for shoreline oil spill response purposes. The LCP will be updated every year, and will be revised after 5 years or earlier if necessary whenever any major changes need to be made in the LCP.

* The LCP must be approved
by the State Disaster
Management Authority.

CHAPTER-III

OIL SPILL RISKS AND PROTECTION PRIORITIES

3.1 Oil Spill Risks

3.1.1 An oil spill can take place in Indian EEZ or in other areas due to any one the reasons listed in para 3.1.2. There have been many oil spill incidents in the past that happened in Indian waters, which in most cases affected the coastal areas and shorelines of India. The predominant oil spills have occurred in the coast line due to shipping related incidents and only in few cases the oil spills from offshore installations have reached the shorelines.

3.1.2 On analysis of the oil spills that have occurred along the coast and port areas due to various incidents and accidents, the probable sources of oil spill are accordingly listed as follows:-

- Accidental collision.
- Grounding/sinking
- Intentional discharge of bilges
- Blow out
- Discharge from offshore installations
- Subsea pipelines carrying crude oil from Oil Rigs to Shore
- Discharges from Tankers/Ships at Moorings/ Anchorages

3.2 Identification of areas of High Spill Risk

3.2.1 In deciding on the methods of counter-pollution response capability for the shoreline areas, it is clearly desirable to give special emphasis to those areas at highest risk. The perception of risk might be based upon the amount of passing tanker and other shipping traffic, navigational hazards, the location of oil refineries and oil terminal and the existence of offshore oil exploration and production operations and related undersea pipeline transportation. Consequently the shoreline areas located near the ports handling oil has the highest risk. The passing ships also pose a risk to the shoreline area either from the accidents or from the intentional discharge of bilges (waste or used oil from ships).

3.2.2 The degree of attention paid to this aspect of planning will vary from one coastal district to another in the state of West Bengal. A coastal district with a short coastline might find it relatively easy to identify the few areas of high risk whilst a coastal district with a long coastline such as South 24 Paraganas with a complex interaction of many environmental factors, river mouths, creeks and presence of ports might find it more intricate to establish counter pollution capability. Nevertheless, it should always be possible to indicate which areas have higher than average risks. The lead agency of the concerned coastal district should have a map indicating the risks from various sources.

3.3 Fate of Spilled Oil

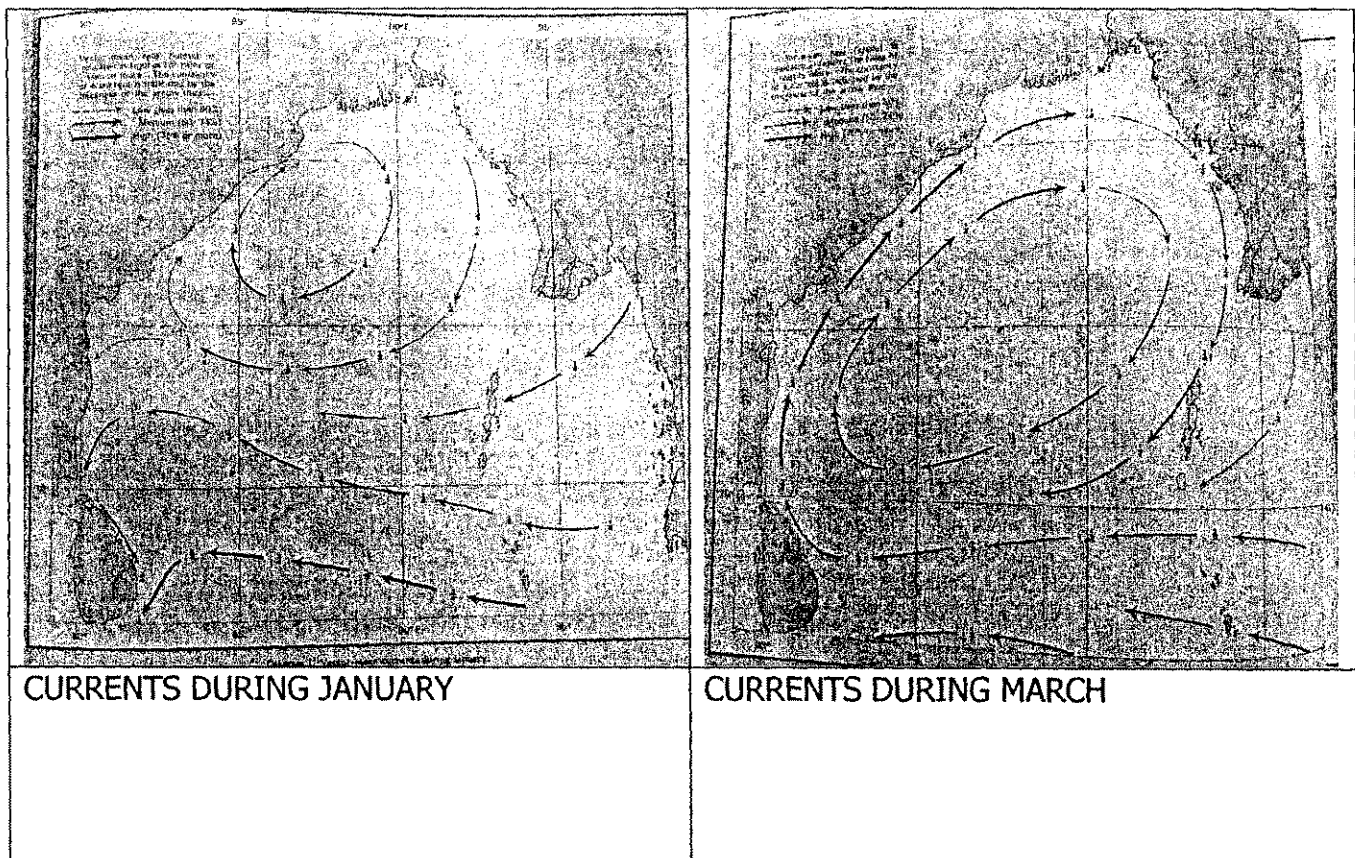
3.3.1 There are wide variations in characteristics of oil and in the way they change with time once the oil has been released into the marine environment. This affect the response options available, and can make speed of response imperative. The tropical weather prevalent in the West Bengal coast and the high wind and wave energy will enhance the fate of oil through the process of evaporation, dissolution, dispersion, spreading and emulsification. Information about the characteristics of different oils can be obtained from the oil industry or from various publications. Further details on the physical and chemical processes which determine the fate of spilled oil may be found in chapter 3 of section IV of the IMO Manual on Oil Pollution.

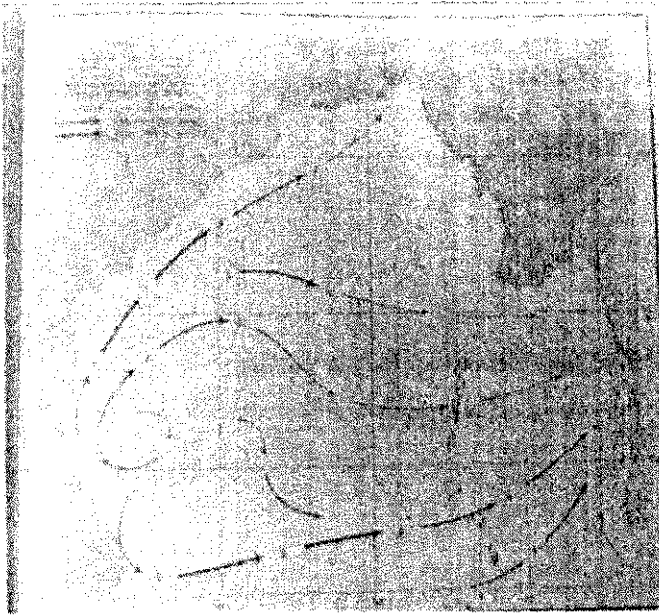
3.4 Probable Oil Spill Movement Based on Local Wind and Current

3.4.1 The probable movement of an oil slick can be forecasted if the speed and direction of current and wind are known. Suitable arrangements should be made for prompt inaccurate

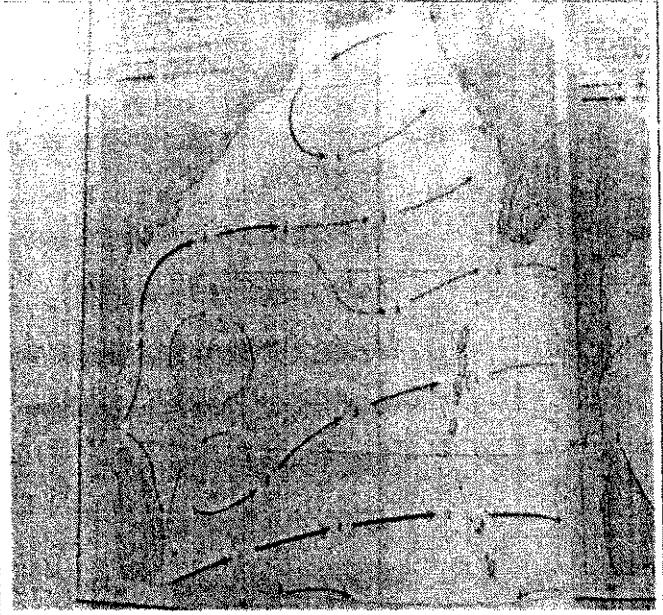
recognised that some high density oils may not always stay on the surface, thus rendering the prediction difficult.

3.4.2 The coastal currents that are prevalent along the West Bengal coast are of two types. The northerly drift - during the months of May to October and the southerly drift - during November to March. The figures illustrated below provide a general indication of the sea currents during the Southwest and Northeast monsoons. Notwithstanding the above, the current pattern for complex navigation channel in Hoogly river also roles great threat to West Bengal ecosystem. A detailed study of current pattern as follows:-

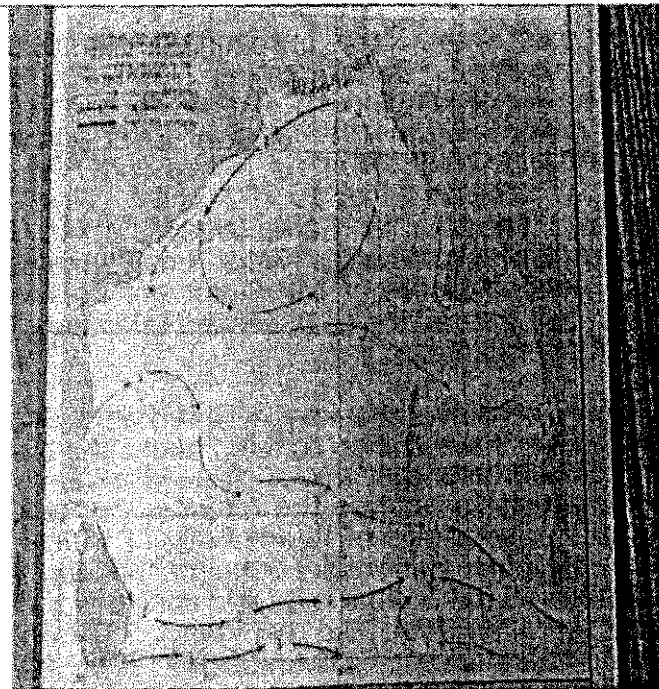




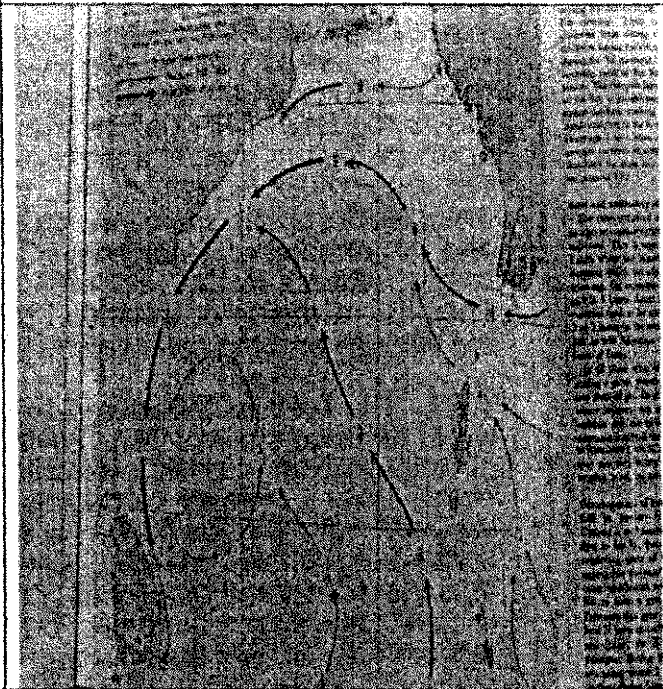
CURRENTS DURING MAY



CURRENTS DURING JULY



CURRENTS DURING SEPTEMBER



CURRENTS DURING NOVEMBER

3.5 Coastal Sensitivity Mapping

3.5.1 For a variety of reasons, some stretches of coastline and coastal waters are more sensitive than others to oil pollution. Some factors which might influence such considerations are the presence of following:-

- Fisheries
- Aquaculture or Mari culture
- Birds and other wildlife
- Areas of particular environmental significance, e.g wetlands
- Industrial use of seawater, e.g in power stations
- Desalination plant
- Amenity beaches
- Pilgrimage area
- Cultural/ archaeological sites

3.6 Sensitivity of Sunderbans Areas

3.6.1 The mangrove-nominated Ganges Delta-the Sunderbans – is a complex ecosystem comprising one of the three largest single tracts of mangrove forests of the world. Shared between two neighboring countries, Bangladesh and India, the larger part (62%) is situated in the southwest corner of Bangladesh. To the south the forest meets the Bay of Bengal; to the east it is bordered by the Baleswar River and to the north there is a sharp interface with intensively cultivated land. The Sunderbans was originally measured (about 200 years ago) to be of about 16,700 sq km. Now it has dwindled to about 1/3 of the original size. The total land area today is 4,143 sq km and the remaining water area of 1,874 sq km encompasses rivers, small streams and canals. Rivers in the Sunderbans are meeting places of salt water and freshwater. Thus it is a region of transition between the freshwater of the rivers originating from the Ganges and the saline water of the Bay of Bengal.

3.6.2 The area is considered to be highly sensitive and was declared as a UNESCO world heritage site in 1997. Environmentalists have shown concern about the possible oil spillage from vessels in and around Sunderbans that might cause disaster for the bio-diversity. A study carried out by scientists to analyse the effect of petrol, diesel and other oils on the growth and survival of seedlings of two species of trees of the Sunderbans shows that the Gewa tree is more vulnerable than the Sundari trees. They also observed other plant communities in the Sundarbans and concluded that an oil spill will affect all types of plants in a different but bad way. The vessels movements at Sandheads and Haldia channel and movement of IWAI vessels operating under Indo – Bangladesh protocol in the Sunderbans pose a considerable threat to the area's bio-diversity.

3.6.3 The Indian Coast Guard does not have jurisdiction over Sunderbans as area of responsibility for ICG starts seaward from baseline which does not include Sunderbans. And hence the Sunderbans area is the responsibility of Government of West Bengal.

3.6.4 The Kolkata Port Trust handled 57.329 million tones of traffic in 2007-2008. The shipping to Kolkata and Haldia passes through Hooghly channel. Any incident of oil spillage in Sandheads or in initial part of channel may result in entering in Sunderbans and pose threat to the ecology of area.

3.6.5 The flora and fauna in Sunderbans will be badly affected by any major spillage which enters Sunderbans reserve areas. Some of the flora and fauna, which may be affected, are as follows :

(a) Flora. The Sunderbans has been classified as a moist tropical forest demonstrating a whole mosaic of seres, comprising primary colonization on new accretions to more mature beach forests, often conspicuously dominated by Keora (*Sonneratia apetala*) and tidal forests. Historically three principal vegetation types have been recognized in broad correlation with varying degrees of water salinity, freshwater flushing and physiographic and which are presented in the wildlife sanctuaries.

Sundari and Gewa occur prominently throughout the area with discontinuous distribution of Dhundul (*Xylocarpus granatum*) and Kankra. Among grasses and Palms, *Poresia coarctata*, *Myriostachya wightiana*, *Imperata cylindrical*, *Phragmites karka*, *Nypa fruticans* are well distributed. Besides the forests, there are extensive areas of brackish and freshwater marshes, intertidal mudflats, sandflats, sand dunes with typical dune vegetation, open grassland on sandy soils and raised areas supporting a variety of terrestrial shrubs and trees.

(b) Fauna. The Sunderbans provide a unique ecosystem and wildlife habitat. The river terrapin (*Batagur baska*), Indian flap-shelled turtle (*Lissemys punctata*), peacock soft-shelled turtle (*Trionyx hyurum*), yellow monitor (*Varanus flavescens*), water monitor (*Varanus salvator*), Indian python (*Python molurus*) and the engal tiger (*Panthera tigris tigris*) are some of the resident species. Some species such as hog deer (*Axis porcinus*), water buffalo (*Bubalus bubalis*), swamp deer (*Cervus duvaucelli*), Javan rhinoceros (*Rhinoceros sondaicus*), single horned rhinoceros (*Rhinoceros unicornis*) and the mugger crocodile (*Crocodylus palustris*) have become extinct in the Sunderbans at the beginning of the last century.

3.6.6 In the past four oil spills have been reported in the vicinity of Sunderbans. In Feb 1992 by MV Wash near New Moore Island, in Jun 1997 by MV Green Opal in Hooghly river, in Jul 2000 by MV Prime Value off Sagar island, and in May 2003 by MV Segitega Biru off Haldia (145 T of FFO). In first three cases the quantity of oil spilt could not be assessed. The effect of these spillage in Sunderbans area was minimal as were minor spills and oil did not enter in the Sunderbans reserve area.

3.6.7 The likely role of agencies involved for protection of Sunderbans area as envisaged as follows :-

- (a) Identify the high risk oil spill areas,
- (b) Analyze and record the tide and current pattern in and around Sunderbans,
- (c) Define areas in terms of sensitivity as per presence of flora and fauna in the area
- (d) Issue required notification for conservation of econogy against oil spill,
- (e) Identify and procure equipment required to prevent and combat oil spill,
- (f) Identify other agencies involved,
- (g) Prepare contingency plan to prevent and combat oil spill

3.6.8 The communication is coordinated with various agencies over phone in case of pollution response in other areas. No contingency plan exists for Sunderbans area and hence no communication plan has been promulgated.

3.6.9 So far West Bengal Govt has commissioned only one coastal police station at Halibari. The police department has started patrolling in the area using hired boats and is planning to establish 05 police stations and 17 out posts in the area. Forest department has been patrolling the area as per their jurisdiction.

CHAPTER IV

SHORELINE OIL SPILL RESPONSE ELEMENTS

4.1 Assumption of Lead Role

4.1.1 Unless the State Environment Ministry will decide otherwise, the concerned District Collector is nominated as the lead agency/person for the shoreline clean-up operation. The deviation from the above nomination will be made if the lead role is coordinated by the Central Government through an appropriate agency based on situation analysis, the size of the spill, the nature of area affected, the resources required and the expertise available for coordinating the clean-up operation. If two or more coastal districts are involved, then the District Administrator in whose district has most sensitive shoreline and also worst affected will assume the lead role and will be assisted by the other District Administrators. Before and during cleaning up of shorelines it is important that both the chain of command and individual tasks are clearly defined and it depends upon the prevailing situation and conditions. The details of presdesignated OSC/ Lead Agency for shoreline clean-up coordination is placed at **Appendix 'B'**.

4.1.2 The lead agency or the State Environment Ministry is to nominate a trained Shoreline/Beach Supervisor who will be responsible for the clean-up operation. The advise of the Coast Guard where required are to be obtained. The District Administrator should extend all material and personnel support to the Shoreline/Beach Supervisor. The public safety is under the responsibility of the beach supervisor. He will be provided with necessary powers to direct the support agencies to undertake necessary actions. In order to ensure that the clean-up operation will work best, the following organisational guidelines and tasks are to be ensured:-

- The work forces are divided into groups of max. 10 people
- A Team Leader is appointed for each of the groups
- The team leaders refer to the Shoreline/Beach Supervisor
- Each group is assigned to a special section of the shoreline or a special job within the limited shoreline if the clean up operation is to be done section by section.
- The activities which the group should carry out must be clear and verifiable.

4.1.3 The team leader will be appointed by the Shoreline/Beach Supervisor. The team leader appointed must ensure that:

- Records of all the work carried out by the group is maintained and handed over to the Shoreline/Beach Supervisor.
- Personnel involved are issued with adequate protective working clothing and other safety equipment.
- The Team Leader is responsible for his/her group following the safety and health regulations.

4.1.4 The Shoreline/ Beach Supervisor is responsible for:-

- Provision of floodlights, generators, shovels, buckets.
- Provision of personal cleaning and toilet facilities
- The crew working on the beach have breaks where refreshments are available.
- All vehicle traffic is controlled. Vehicles should not enter the area without exact instructions about where to go.
- All equipment is cleaned after use and ready for the next day.
- The area is out of bounds until individuals have received a full safety briefing.
- Contact with the press
- Keeping the public at a safe distance. Only authorised personnel is allowed onto beach during operations. Coastal Police may assist in cordoning off the spill site.

4.2 Resource Agencies

4.2.1 The resource agencies for shoreline clean-up operations are the Coast Guard, Central Government agencies, Ports, Oil handling agencies who can provide any of their assets for shoreline clean-up. The District administration of the affected shoreline district should maintain the list of inventory of the available shoreline clean-up equipment of the resource agencies located within their coastal district. The details are to be incorporated in **Appendix 'C'**. Any shoreline clean-up operations involve large manpower. The local Police, Fire Department, Revenue Department, Fisheries Department, Forest Department, NGOs, National Cadet Corps, National Service Scheme, Colleges and Schools can provide manpower for clean-up operations. Regular mock drill and exercises are to be conducted to the volunteers by the district administration so that basic training on shoreline clean-up Methods are imparted to the volunteers.

4.3 Emergency Response Centres (ERCs)

4.3.1 For effective coordination of the shoreline/beach clean-up, the lead agency should establish emergency response centres which should be located as close to the site of the spill. Necessary office space with computers, printers, internet facilities, other communication facilities such as fax, telephone, VHF marine band should be available. During the shoreline clean-up exercises, such identification of establishment of ERCs should be made and the suitable location for establishment of ERCs are to be identified all along the coastline.

4.4 Priorities for protection

4.4.1 In most of the oil spill incident, it may not be possible to prevent some oil coming ashore, and in some circumstance it might be advantageous to deflect the oil to a chosen place onshore. It is therefore necessary to decide in advance which areas are to be given priority for protection. Before making such decisions, a wide variety of interested parties will need to be consulted.

4.4.2 The factors that are to be considered includes:-

- • • Availability of local knowledge ^{of}
- The practicality of protection ^{of} particular resources
- Variations in priorities due to seasonal factors, such as fish and bird breeding seasons and holiday seasons.

4.4.3 Information about agreed priorities must be readily available. The priorities must be listed and cross-referenced to any coastal sensitivity maps. Such an order of priorities can reduce the risk of disagreement and indecision when faced with difficult choices during an oil spill emergency.

4.4.4 Although it is obviously helpful to simply identify sensitive areas, it is also necessary to rank them into some order of priority. It may be that the Shoreline/Beach Supervisor or the Coast Guard nominated OSC will have to face difficult decisions on what resources to protect with limited equipment means. In such circumstances, a priority ranking system of sensitive areas will help the decision-making process. The shorelines of high priority for protection - because they are difficult to clean effectively are as follows:-

- Marshes and mangroves
- Coral reef flats which are exposed at low tide
- Raised fossil reefs with undercuts which allow the floating oil to Penetrate
- Pabble and cobble beaches

- Type of shoreline impacted
 - Characteristics of oil/oily material - tar balls, viscous oil, liquid oil, oiled seaweed, oiled sand
 - Extent of oiling - upper shore/lower shore, heavy, moderate, patchy, light staining.
 - Depth of penetration, oiling of attached algae
 - Sketch maps/profile of shore showing extent of oiling
 - Assess volumes of oily materials. The conversion factors for assisting in quantifying the oil spill in tonnes/barrels/gallons etc, is provided in **Appendix 'E'**
-

4.6.2 Shoreline accessibility. During the planning stage, the accessibility to the affected shoreline can be very difficult in some terrains and vehicles will not be able to move. In order to prevent such stranding of vehicles, it is essential that the accessibility routes are identified. The following factors are to be taken into consideration:-

- - Ease of access by personnel, vehicles and equipment.
 - Access difficulties - determine distance to good roads / parking area, rough tracks, locked gates and who has keys/ private ownership of access roads, high/low cliff.
 - Load bearing capacity of substratum (upper shore/lower shore), roughness of terrain
 - Slope of shore (upper shore/lower shore), (cliff, very steep, steep, gradual, flat)Mark access points on map and sketches
- Mark access points on map and sketches

4.6.3 Accessibility from sea. In certain situations, if the road access is not possible in riverine areas, backwaters, creeks areas etc, it will be beneficial if the area is accessed through the sea routes using the rubber inflatable dinghies or other fishing craft which can land near the shorelines. While approaching such shorelines through the sea routes the following factors are to be taken into consideration:-

- Maximum draft of boat.
- Potential sea conditions.

4.6.4 Temporary storage and removal of oily waste. The following factors are to be taken into consideration during the planning state for temporary storage and removal of oily wastes from the shorelines:-

- Suitability for pre-fabricated tanks, skips, lined pits, piles of oily material/ bin bags
- Ease of access by vacuum trucks, skip lorries, light trailers
- Requirement for transfer pumps

4.6.5 **Shoreline clean-up equipment.** The shoreline clean-up equipment which are essential for the oil removal operations at beaches are as follows:-

- Protective clothing (e.g. coveralls, boots and gloves) for everyone
- Cleaning material, rags, soap, detergents, brushes
- Equipment to clean clothes, machinery, etc., with jets of hot water
- Plastic bags (heavy duty) for collecting oily debris

CHAPTER-V

SHORELINE RESPONSE OPERATIONS

5.1 Shoreline Response

5.1.1 Most oil spills will reach the shorelines and cause visible oil pollution which is particularly sensitive to public opinion. The selection and correct application of clean up techniques are therefore essential. When an oil spill occurs on open water the optimal solution is to intercept and recover the oil before it reaches the shoreline. This is because:-

- The environmental damage is normally less critical in the open water environment
- The logistics of oil removal becomes more complex in the varied natural environment of coastlines compared with the open sea.
- The costs of oil recovery increases dramatically when oil reaches sensitive shorelines compared with open water operations.

5.1.2 Experience has shown that it is very difficult to avoid some oil reaching the shorelines. Mechanical equipment and chemical treatment at sea are often insufficient to recover all oil spilled at sea. When the oil reaches the shoreline, a number of different parameters specific for this particular situation have to be taken into consideration:-

- Quantity of oil
 - Characteristics of the oil (for instance, toxicity and viscosity)
 - Prevailing on-site conditions (weather, season, tides, temperature)
 - Shoreline type or combination of types (cliffs, pebble, sand, marsh)
 - Special Considerations
-

5.2 Shoreline Oil Characteristics

5.2.1 A sample of the spilled oil must be checked in order to know how toxic the oil is. The lead agency should make necessary arrangement to check the ill effects of the oil spill on the health of human beings. This is important to be able to judge the magnitude of the environmental damage on living organisms at the shoreline as well as the risks which the cleaning up team will meet in their efforts to remove the pollution. The viscosity of the oil must be found out as this will determine its behavior on the shoreline.

5.3 On-Site Conditions

5.3.1 The wind, the current and wave patterns which exist or could develop must be known as well as the temperature. These will influence the movement of the spilled oil which, in turn, will affect the success associated with the usage of various types of equipment and with cleaning procedures. It is important to know current high and low tide levels and times in order to plan for efficient clean up operations.

5.4 Behavior and Persistence of Stranded Oil

5.4.1 Various shoreline features can be classified according to their location relative to the waterline:-

- The nearshore zone is located below the low water mark. Because it is always submerged it receives little contamination except for oil that sinks, for example oil covered sediments that erode from higher shoreline areas.
- The intertidal zone is the area between the low and high water marks. Under most conditions this area will be the most heavily contaminated when a shoreline is affected by a spill. If the beach receives a lot of wave action, the heaviest concentrations of oil will occur at the upper portion of the intertidal zone. Oil that is deposited in the lower portion will often be refloated by a rising tide and carried to the upper part of the beach. On low-energy beaches, or when large volumes of oil come ashore, oil can coat the entire intertidal area.
- The backshore area of a beach is located above the level of normal wave activity. This area would only be affected by oil during exceptionally high tides or storm surges. When strong winds are present the oil can be blown some distance beyond the normal high-tide mark. Accumulations of logs and other debris are often found in this area, and can be a useful indicator of the maximum water level during previous storm or high water events.

5.5 Shoreline Types

5.5.1 Various shoreline types have different vulnerability to oil spills and the pattern of deposition of oil can be predicted. For that reason different clean up techniques are applied depending on the type of shoreline. The feasibility of cleaning effectively is also dependent of the type of shoreline found.

5.5.2 Coral reefs are generally submerged, and are only susceptible to floating oil if the reef is exposed at low tide. The coral reefs may also be susceptible to oil that is dispersed, either naturally or through the use of chemicals. Most effects are temporary, but affected reef-dwellers - small fish and other animals - may be swept away from the protection of the reef by waves and currents. Hence use of chemical dispersants for cleanup of oil over coral reefs area may be avoided.

5.5.3 Mangrove forests provide an important habitat for young stages of commercially important fish and prawns, and also as breeding grounds for fish and shellfish. The mangrove forests are found predominantly at Sunderban area. Oil may block the openings of the air breathing roots of mangrove trees or interfere with their salt balance, causing them to die. Hence the containment of oil for protection of the mangroves is the most ideal option of oil spill response.

5.5.4 Pure sandy beaches are normally exposed to strong wave action or currents and have a high self-cleaning potential. Beaches can have a high amenity and recreational value. The Digha Beach in West Bengal. Sandy beaches near Digha are highly populated beaches due to recreational and religious nature. Most of the other beaches are generally sandy and mostly occupied by the fishermen to berth their traditional vessels and to dry up fishing nets. Hence protecting the sandy beaches may be low in priority but any oil spill in the sandy beaches may affect the fishermen, all possible efforts to be made to restore the area as fast as possible by removing the oiled sands.

5.6 Main Steps in Shoreline Clean-up Methods

5.6.1 The four main steps in a shoreline clean-up operation are

Step 1: Assessment

- Determine the need to clean, setting priorities in line with this contingency plan
- Determine required degree of clean-up for each area in accordance with priorities
- Attain agreement between clean-up team, ecological experts, government authorities

Step 2: Select Clean-up Method

- Choose method appropriate to type of shoreline, access, degree of oiling
 - Minimize damage caused by choice of clean-up technique, degree of clean-up
 - Address conflicts of interest (e.g. needs of amenity use versus environment or response speed versus aggressiveness)
-

Step 3: Clean-up Operations

- Monitor clean-up, confirm choices made above, re-evaluate if necessary
- Minimize disturbance of shoreline features
- Minimize collection of un-oiled debris, sediments

Step 4: Termination / Monitoring

- Ongoing assessment of clean-up operations
- Determine when clean-up objectives have been met
- Post-spill monitoring to confirm recovery of shoreline features, biota

5.7 Containment Operations

5.7.1 Containment operations is employed if the protection priorities demand that the sensitive shorelines such as mangroves, salt marshes, coral reefs and rocky shores are protected from the oil spill as the ill effects of oil reaching such shoreline areas can be irreversible. Boom is deployed when an oil spill occurs on open water, in near-shore areas. The boom surrounds and concentrates the spilled oil in a small area. This creates the optimum condition for the skimmer/pump for recovering the oil. Containment operations are very difficult operations and need to be undertaken by expert organisation such as Coast Guard or other national resource agencies such as Ports or Oil handling companies.

5.7.2 Power plants, cooling water intakes, fish farms, yachting marinas etc. often use permanently or semi-permanently deployed booms. When an oil spill reaches the shoreline it can be very difficult to keep the oil inside the containment Boom. In particular, a Fence Boom is inappropriate when the water depth is lower than the boom draught. The boom will simply fall over. In the inter-tidal zone the Containment Boom is not heavy enough to adhere to the ground. For these reasons a Beach Boom (or a Beach Sealing Boom) is to be used to protect the inter-tidal zones. The lead agency or the Shoreline/ Beach Supervisor should arrange for such protection in the sensitive areas.

5.8 Net Environment Benefit Analysis

5.8.1 Once oil has been spilled and reaches the shoreline, urgent decisions need to be made about the options available for response and clean-up in order that the environmental and socioeconomic impacts are kept to the minimum. Getting the correct balance is always a difficult process and conflicts inevitably arise which need to be resolved in the best practicable manner. The advantages and disadvantages of different response options need to be considered and compared, both with each other and with the advantages and disadvantages of natural recovery. This assessment process is sometimes known as Net Environment Benefit Analysis (NEBA)

5.8.2 The process requires taking into account the circumstances of the spill, the practicalities of clean-up response, scientific understanding of the relative impacts of oil and clean-up options, and some kind of value judgment of the relative importance of social, economic and environmental factors. Common sense and consensus-forming are just as important in this decision making as quantifiable scientific information. Decisions are best made if the shoreline clean-up planning process has included consultations and agreements with all the stakeholders and other appropriate organizations.

5.8.3 The NEBA evaluation process typically involves the following steps:-

- Collecting information on the physical characteristics, ecology and human Use Of environmental and other resources of the area of interest
- Reviewing previous spill case histories and experimental results which are relevant to the area and to response methods which could possibly be used
- On the basis of previous experience, predicting the likely environmental outcomes if the proposed response is used
- Alternatively if the area is left for natural cleanup
- Comparing and weighing the advantages and disadvantages of possible responses with each other and with natural clean-up

5.9. Shoreline clean-up Operations

5.9.1 Four options are available when oil hits the shoreline. The level of clean-up is to be planned in advance with the concerned lead agency and the experts. The options are:-

OPTION 1: Do not clean

In some cases cleaning will do more damage than good to the environment (e.g., marsh areas). In areas where there will be quick natural cleaning by high- energy wave action the best option may be to allow nature to do its work alone. This may also be the case if the area is not highly valued, is not used (e.g., remote, desolate areas) or if clean-up costs will be prohibitively high.

OPTION 2: Clean to a minimum standard

If the shoreline area has little value or use it may, nonetheless, be the best option to clean it if the oil on the shoreline has the potential for polluting other areas that are highly valued.

OPTION 3: Clean to the pre-spill condition

If the shoreline is important the best option may be to clean it to as close to its pre-spill condition as reasonably possible.

OPTION 4: Clean to a pristine level

In some cases the shoreline area may be cleaned and restored to a higher level than its original condition. This could be the practical consequence of the clean- up method used or the result of an effort to satisfy the demands of the local population.

5.10 Shoreline clean-up Operations

5.10.1 The shoreline clean-up operation is normally not an emergency operation as is the case with an oil spill on open water. A clean up project can last many weeks or months depending on the amount of oil spilled. Many wrong decisions can be made in planning and carrying out a shoreline clean-up operation. The contingency plan must be used in combination with consulting experts with experience of shoreline clean up. The Coast Guard and other agencies such as NIO, NEERI, Ports and Oil companies have experts with experience which is relevant for the specific oil spill situation and they should be consulted prior[^] undertaking shoreline clean-up.

5.10.2 A shoreline clean-up operation is typically divided into three stages:-

- Stage 1 - Removal of gross pollution and bulk oil
- Stage 2 - Removal of oil
- Stage 3 - Final cosmetic/aesthetic treatment.

5.11 The Principal Shoreline Clean-up Methods

5.11.1 The four main methods for shoreline clean-up are as follows:-

A. Pumping and Skimming Techniques

- Applicable to shorelines that are heavily oiled
- Often the first step in cleaning a heavily contaminated shoreline
- Preferred option because it results in fluid wastes that are relatively free of sediments and debris, which are more easily dealt with in disposal
- Pumping and skimming techniques can also be used in conjunction with flushing techniques

B. Flushing Techniques

- Use water or steam to flush oil from the beach, and direct it to a recovery location
- Applicable to heavily contaminated beaches, and substrates that are relatively impermeable (e.g., mud and saturated beaches, boulders, and man-made structures) that will not allow the flushed oil to penetrate the beach surface
- Typically carried out in conjunction with a skimming operation. The flushed oil is directed down-slope to skimmers positioned at the water's edge, with booms deployed around the skimmers to prevent any loss of the waterborne oil. The effectiveness of flushing is dependent on the use of low or high pressure water, and of using ambient temperature water versus warm water or steam
- Low pressure, cold water is generally the least effective, particularly with sticky oils and emulsions, but is least harmful on the environment
- High pressure water and heated water and steam are more effective, but may remove and/or kill beach-dwelling organisms

C. Sediment Removal Techniques

- Applicable to a variety of shoreline types, and in particular, when the shoreline is heavily contaminated, though likely to cause the greatest environmental impact
- The requirements are access for the heavy equipment required for transporting away oily debris and sediments for disposal and a surface which is able to support heavy equipment
- An important factor to consider is the depth of oil penetration. Important to limit the depth of material removed in order to minimize disturbance to the beach, and to minimize disposal requirements
- The best option is to use manual labor to pick up the oily sediment and mechanical means to transport it away.

D. Biodegradation Techniques

- Generally refers to "active" bioremediation, where nutrients and/or micro-organisms are applied to enhance natural degradation
- Generally suitable for areas that are lightly oiled, especially lightly oiled salt marshes and tidal flats where the use of equipment could increase the environmental effects by forcing oil into the substrate
- It can also be used as a final clean-up step following more active efforts

5.12 Disposal of collected oil/waste

5.12.1 In most spills, even where the at-sea response and shoreline protection operations have been relatively successful, significant quantities of oil will come ashore where it will mix with the beach material. The end result of shoreline clean-up activities is that significant quantities of waste material have to be temporarily stored and transported to their final disposal sites. A critical factor to consider during disposal operations is to minimize the amount of wastes that must be processed. Waste disposal can be the most expensive and time-consuming portion of the spill response, and all efforts should be made to reduce the volume of wastes requiring disposal, particularly when waste materials must be transported to a disposal site. Also, wastes should be segregated as much as possible to maintain flexibility in the choice of disposal options. Disposal techniques for fluid wastes are generally much cheaper and environmentally benign than the techniques for solid wastes. When handling and temporarily storing wastes, care should be taken to minimize additional contamination. Wastes should be stored and transferred in secure containers, and secondary containment such as berms or synthetic liners should be used at storage locations. Covers should be provided for open storage containers and piles of waste material in order to prevent rainwater accumulation and runoff.

5.12.2 The main techniques for waste disposal can be grouped according to the type of waste liquid or solid. For liquid wastes, the main options are:

- Reprocessing / recycling, in which contaminants are removed from the Wastes and the clean product reused
- Combustion techniques, in which the waste fluids are burned, either insitu or using specially designed incinerators

5.12.3 **For solid wastes, the main options are:-**

- Combustion techniques, either in-situ or using specially-designed incinerators
- Stabilization with quick-lime and/or cement
- Burial in specially designed landfills
- Biological techniques, in which natural degradation processes, are Enhanced either in-situ or at a treatment site

5.12.4 The most favorable from an environmental and cost perspective would be recycling and biological techniques. However, both are very limited in their applicability. Generally, only water and debris-free oil is acceptable in reprocessing facilities; and only lightly oiled beach sediments are generally acceptable for biological treatment. For waste fluids, incineration techniques are also generally favourable from a cost and environmental viewpoint, but these are also limited in applicability, being suitable only for fluid oils and emulsions containing little debris.

5.13 Environmental effects of Various Clean-up Techniques

5.13.1 In selecting a shoreline clean-up technique and in managing the clean-up operation, it is important to consider the potential effects of the clean-up effort. In some cases it is possible to do more damage to the environment than that caused by the spill itself. The following are some examples of shoreline clean-up efforts that may increase the overall negative environmental effects:-

- High-pressure flushing with water or steam should be used with discretion, as this can remove all forms of life from a beach, making biological recovery of the beach very difficult. It may be appropriate on man-made structures, though low pressure flushing is preferred in most other cases.

- Use of fresh water (rather than sea water) on ocean shorelines can also kill marine life
- Removing too much sediment from a shoreline, or displacing boulders from a sand or gravel beach, can lead to increased erosion rates and significant, permanent changes in the character of the shoreline
- Using heavy machinery and/or numerous personnel can have long-lasting effects
than most oil spills would by forcing oil into the beach sediments. Although natural cleansing rates may be low, biodegradation usually occurs unless the oil is very toxic or when very large volumes smother vegetation.
- Personnel and equipment, accessing the clean-up site at numerous locations, can do serious and unnecessary damage. Access points should be limited to the minimum necessary to do the job effectively.

5.14 Assistance from Service Providers

5.14.1 The shoreline clean-up equipment available with the resource agencies will not be multi-area specific and some may not be suitable for the kind of response option selected. It will necessitate in importing the specialized equipment from the service providers located outside our country through the P&I club or ship owners. It will involve customs verification and clearance, guarantee from responsible party, mobilization to the site and deployment. The process will consume the valuable time and it will be beneficial if the private oil spill response provider is located in West Bengal near the vulnerable areas. The ship-owners can be directed to contact any of the service providers to undertake shoreline clean-up operations using the appropriate shoreline clean-up equipment. The District Collector are to have the relevant contact details of the service providers who can be called to the response area in emergency.

5.15 Termination of Response

5.15.1 Technical assistance and expertise is important when deciding on when to terminate clean-up operations for a particular shoreline area. The decision to terminate shoreline clean-up operations would be made on a case-by-case basis. The reasons to terminate are:

- The effects of the clean-up operation would be more detrimental than the remaining oil

- The clean-up has satisfied commitments agreed with authorities in Contingency plan
- Point of diminishing returns reached and further clean-up would not be warranted based on the cost of continuing operations
- The disruption to human use or biological activities caused by clean-up operations
- The remaining oil is judged to no longer be a threat to the local ecology light or sporadic oiling remains
- It is judged that natural recovery will be sufficient for restoration of the shoreline

5.15.2 Even when clean-up operations are terminated, post-spill monitoring is usually required to ensure that restoration is proceeding as expected. This will typically involve site visits by experts on a sporadic basis, depending on the extent of the original oiling and on the sensitivity of the area in ecological terms.

CHAPTER-VI

REPORTING AND DOCUMENTATION

6.1 Initial Report – POLREP

6.1.1 Every oil spill sighted at the shoreline or at sea adjoining the coastline of West Bengal are to be reported immediately to the Coast Guard, State Environment Ministry, concerned District collector, State Maritime Board and State Pollution Control Board by telephone or fax. The appropriate agency which is located nearby to the site of the oil spill shall proceed to investigate after obtaining the sighting report from the public. The appropriate agency in most cases will be the District Collector/ SPCB officer who will thereafter make the Pollution Report (POLREP) in accordance to the format in **Appendix 'A'** to Coast Guard, State Environment Ministry and to every other concerned agencies. The primary information that should be reflected in the POLREP are:-

- Quantity and quality of oil spill that is onshore and on water
- Source of the oil spill
- Any resources, flora and fauna that are affected in the area

6.2

Information Gathering

6.2.1 Prompt and accurate gathering of information is most critical at the early stages of a spill. Lead agency should arrange for prompt gathering and dissemination of information. The OSC or Shoreline/Beach Supervisor should put in place a system for gathering, recording and verifying the information received.

- • As the response moves into its project phase, information processes become more regularised and less subject to contradictions and misleading reporting.
- Information and directions must be disseminated in a clear and expedient fashion. There must be adequate communication facilities for transmission of instructions and information.
- The logging and verifying of orders given, received and actions taken, is critical to the ongoing management of the response and response planning.

6.3 Situation Reports

6.3.1 During an oil spill that reaches the shorelines of ~~the~~ West Bengal State, there will be a multiplicity of agencies involved that can be of great assistance in the response. These will include government agencies and private groups alike. In terms of the government groups, the Indian Coast Guard has established the Coast Guard District No.5 operations Centre at Haldia for oil spill response which will be manned 24x7. In addition, the affected Coastal District Administration would have set up an Emergency Response Centres.

6.3.2 Various types of report will be provided to various authorities such as the ship owner will be involved (to provide details of the cargo and crew numbers, especially if human life is at stake), as will the cargo owner (to provide precise information about the nature of the oil), insurers and P&I Clubs who will be responsible for paying compensation. These information need to be centrally collected, collated and disseminated to the concerned authorities for tracking the progress of clean-up and to take further necessary action from the Coast Guard or from the Central Government to bring in additional resources if the situation warrants.

6.3.3 The District Collector being the lead agency for the clean-up operations should collect, collate and disseminate information periodically and send the situation report (SITREP) to the State Environment Ministry and the Coast Guard Operations Centre at Haldia and to other agencies as relevant.

6.3.4 During ^{a major} oil spill ~~major~~ spill, there will be an influx of outside individuals, such as media persons, equipment salespeople, and curious parties of all sorts who have both legitimate interests in the spill and perhaps not so legitimate. It is important to recognise that such groups will inevitably be part of the scene and that mechanisms must be established to communicate with them on a fair basis without, at the same time, advise them to not to interfere with the emergency job at hand.

6.4 Post Incident Reports

State Disaster Management Authority

6.4.1 On successful completion of shoreline clean-up, a report is to be sent to the State environment Ministry and Coast Guard by the lead agency, stating the actions taken right from the incident to the shoreline clean-up strategy an methods adopted, challenges encountered, amount spent, resources mobilized, assistance obtained, the level of clean-up achieved and the monitoring system put in place to observe the effects of clean-up on the Local eco system.

6.5 Documentation

6.5.1 As part of the cost recovery process, the lead agency may be required to substantiate what, why and to what extent the agencies responded to the spill. It is accordingly recommended that the lead agency produce a log of all the shoreline clean-up activities undertaken including the use of clean-up equipment, the amount paid to the volunteers and workers, the transportation and administration cost, the cost paid as compensation to the fishermen and other legitimate users of the beach, the cost incurred for removal of birds/animals from the area should be kept legitimately in a register.

6.5.2 The visual record of the major response activities are also to be maintained. These make excellent materials for reviewing the response and future training. These may include the following:-

- **Notes** - make sure all are well marked (location where taken, date, time, description of what is photographed, video-taped, etc.)
- **Sketches**
- **Videos**
- **Photos** - for photos and video, use a reference object to indicate object being photographed or video -taped (e.g. when taking photo of a hole in a vessel, have a person stand next to the hole to show the reference size)

6.6 Evidence Collection

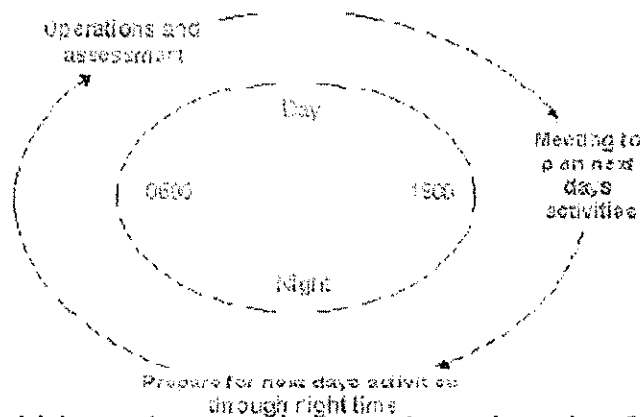
6.6.1 It is important to ensure that a valid case can be presented in support of a claim for compensation or for prosecution in a court of law based on sound evidence. As per present law, the compensation claim and re-imbursement of clean-up costs are administered by the Directorate General of Shipping, Mumbai an Executive body of the Ministry of Shipping, Government of India. The Operational personnel within the Shoreline/Beach Supervisor's team may be assigned the responsibility of gathering the evidence concerning an oil spill. This principally includes the gathering of samples and taking of photographs / videos and ensuring that these are done in a way sufficient to satisfy the scrutiny of potential claims for the recovery of costs or legal proceedings against a polluter. The evidence gathering process is normally carried out under the guidance of someone with legal authority assigned to the OSC team. The lead agency or the OSC maintains responsibility for evidence gathered.

CHAPTER-VII

ADMINISTRATION AND FUNDING

7.1 Administrative Actions for Shoreline Clean-up

7.1.1 The District Administration who acts as the lead agency should plan day to day activities in coordination with the Shoreline/Beach Supervisor or the OSC. The Planning involves the collection, evaluation, dissemination and use of information about the development of the incident and the status of resources through environmental assessment. Necessary logistics arrangement are to be made for the clean-up personnel and the volunteers. It includes creation of tents for rest, supply of food and water, provisioning of first aid, transportation to convey personnel and material from the staging area to the spill site. Preparation of the next day's activities should be developed at the end of the day's activities and adjusted, if necessary, first thing the following morning on the basis of the latest reports.



7.1.2 All plans should be written and disseminated to the OSC, response team and appropriate team leaders. Oil spill response operations are unique in that they may be lengthy (weeks, sometimes months). They usually involve long working days and billeting near the site of the incident. Stress can be a factor for workers and response managers. Some causes of incident stress are:-

- Fatigue
- Long hours

- Pressures of operational decision making
- Activities of response centre
- Constant demands on OSC and team leaders from superiors and, often, politicians

7.1.3 Stress can cause unusual behaviour among all of the response staff and severely affect the decision making capability of the response management team. It is important for the Shoreline/Beach supervisor to provide relief for himself/herself and the response team members and be able to recognize when stress may be affecting the team. It is important that the lead agency is conscious of team needs and provides the logistics support necessary to ensure their well being throughout the response.

7.2 Funding

Appropriate funding mechanism for emergency expenditure from the State Funds may be incorporated in this section.

The State Environment Ministry or the affected shoreline District Administration can obtain the advance clean-up cost or compensation cost from the insurer/polluter.

7.3 Reimbursement of Clean-up Costs

7.3.1 Whenever an oil spill ~~and~~ reaches the shorelines occurs, the affected people want to be reimbursed for the costs of cleaning up the environment or compensated for the damage they have suffered. It generally involves the fishermen who use the sea for their livelihood. The international regime for liability and compensation applicable to tanker spills has been established to provide a mechanism for making legitimate claims for compensation. The IOPC fund claim procedures will be provided by DG Shipping to the concerned lead agency.

7.3.2 Under the 1992 Civil Liability Convention (CLC) to which India is party, claims for compensation for oil pollution damage may be brought against the owner of the tanker which caused the damage (or his insurer). Under the CLC, the ship owner has "strict liability" for pollution damage caused by the escape or discharge of persistent oil from his tanker. This means that he is liable even in the absence of fault on his part. Anyone who has suffered pollution damage in ~~X~~ State of West Bengal on account of oil spill can make a claim for compensation to the shipowner or his insurer. Claimants may be private individuals, par West Bengalerships, companies, private organisations or public bodies, including District or local authorities. If several claimants suffer similar damage, it will be more convenient to submit co-ordinated claims.

7.3.3 Furthermore, on some occasions the oil discharge may be deliberate. Legal action can be taken in accordance with the provisions of the Merchant Shipping Act 1958 and the Environment Protection Act 1986. In many cases prosecutions will be based on the allegation that there has been a contravention of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) which are inscribed in the Merchant Shipping (Prevention of Oil Pollution from Ships) Rules 2010.

OIL SPILL REPORT FORM

Particulars of Person/Organisation
Reporting incident

- a. Name :
- b. Company's Name :
- c. Telephone /Telex Numbers :
- d. Date/Time :
- e. Spill location :
- f. Type and Quality of Oil Spill :
- g. Cause of Spill :
- h. Response to Spillage, if any :
- j. Any other information :

Appendix 'B'**LIST OF PRE DESIGNATED OSC/LEAD AGENCY**
WHEN THE OIL AFFECTS THE SHORELINES OF THE COASTAL DISTRICTS

<u>DISTRICT COLLECTOR</u>	<u>TELEPHONE NO</u>	<u>FAX NO</u>	<u>RESIDENCE NO</u>
South 24- Parganas	033 - 24791694/24793713	033- 24499781- 3/24793456.	033- 24791774/24793456
East Midnapore	03228- 266098.	03228- 269500.	03228- 266120.
North 24- Parganas	033 - 25523662	033- 25523535/25626177.	033- 25523474.

Appendix 'C'**POLLUTION RESPONSE AGENCIES IN THE STATE OF WEST BENGAL**

The Chairman
West Bengal Pollution Control Board,
Paribesh Bhavan, 10 A, Block-LA
Sector III, Salt Lake City, Kolkata – 700 098
(Tele : 033 – 2335 0663, 2335 2813)

The Chairman
KOPT, 15 Strand Road, Kolkata – 700 001
(033 – 2230 8226)

The Terminal Manager
IOCL, Budge Budge Terminal
MG Road, South 24 Parganas,
Kolkata – 700 137 (033 – 2480 2779)

The Director (Production)
MCC PTAV India Corporation Pvt Ltd
PO – Bhuriaraichak, Haldia
Purba Medinipur (WB), (Tele : 27 5572/73,
Fax : 27 5574, 272017)

The Deputy Chairman
HDC, Annex Building, Jawahar Tower,
Haldia Town Ship, Purba Midinapur
West Bengal - 721607
(Tele : 26 3209, 26 3114, Fax : 26 4877)

The Deputy General Manager
The Shipping Corporation of India Ltd.
Jawahar Tower (1st Floor), Township,
Township, (Tele : 26 3209, Fax : 26 4877)

The Executive Director
IOCL, Haldia Refinery, PO Haldia Oil Refinery
Haldia, Purba Medinipur,
(Tele : 25 2267, Fax : 25 2141)

The Project manager
BPCL, Haldia, PO - Durgachak
Haldia, (Tele : 25 2282/16, 25 2671,
Fax : 25 3119, 25 2119)

The Zonal Director
Central Pollution Control Board
1582, Rajdanga Main Road, East Kolkata Township
(Tele : 033 – 2214 1357, Fax : 033 – 2214 1356)

The Manager (Installation)
AVR & Co. Finer Jetty Road,
Haldia, (Tele : 25 2357, Fax : 25 2653)

The Manager (Installation)
HPCL Haldia, Haldia Terminal
PO – Durgachak, Haldia – 721 602
(Tele : 25 2933, 25 2239, Fax : 25 2277)

The Dy General Manager (I/C), IOC Ltd
Paradip Haldia Barauni Pipeline (PHBPL)
Pipeline Kesbere, Haldia, Purba Medinipur (WB)
(Tele : 27 5361, Fax : 27 4025)

The General Manager
Indian Oil Petronus Pvt Ltd
Opp. HPL, Kasbere, Purba Medinipur
Telefax : 27 5797, 27 4949)

The General Factory Manager
Tata Chemicals Ltd, PO Durgachak, Haldia, Purba Medinipur
(Tele : 25 3170, 251 001, Fax : 25 2401, 25 2220/23)

The Plant Head
Haldia Petro Chemicals Ltd, Durgachak,
Haldia, Purba Medinipur – 721 602
(Tele : 27 4574, 27 4815/61, Fax : 27 4420, 27 4876)
6626/9981)

The Senior Manager
Hi Tech carbon, Opp. Finger Jetty Road
Dock Zone, Haldia – 721 604
(Tele : 25 2817, Fax : 25 2818, Kolkata : 033-2282

The Project Manager
Ruchi Infrastructure Ltd Haldia
Dock Zone, Liquid Cargo Park, Chiranjibpur,
Haldia - 721 604
(Tele : 25 3381, 25 3787, Fax : 25 2090, 25 1503)

The Manager
United Storage & Tank Terminals Ltd
Finger Jetty, Haldia
(Tele : 25 2357, 25 3390, Fax : 25 3787, 25 2653)

Appendix 'D'IMPORTANT TELEPHONE NO.OF RESOURCES AGENCIES(a) Ports

<u>Name</u>	<u>Location</u>	<u>Contact No of Control Room</u>	<u>Contact No Of Authorities</u>		
			<u>Name of Post</u>	<u>Office No</u>	<u>Mobile No</u>
Kolkata Port Trust	Kolkata	033-22135164	Chairman	033-22309164	9836298602
			Director Marine Dept	033-22303214	9836298606
			Harbour Master	033-24391730	9836298627
Haldia Dock Complex	Haldia	03224-252313	Manager	03224-252104, 252449	9434052449 snchubey@gmail.cc m
			Dy Manager	03224-252350	9434063161
			Dy Dock Master	03224-252513	9434052513

(b) State Govt

THE INSPECTOR GENERAL OF POLICE (COASTAL SECURITY), KOLKATA	033 – 2214 4416 033 – 2214 5486
THE COMMISSIONER OF POLICE (WEST BENGAL)	033 – 2225 6060
PRINCIPAL SECRETARY HEALTH & FAMILY WELFARE, WEST BENGAL	033 – 2357 5899 033 – 2357 7907
THE SPECIAL SECRETARY(HOME) GOVT. OF WEST BENGAL	033 – 2214 4328
THE ADDITIONAL CHIEF SECRETARY, GOVT OF WEST BENGAL	033 - 22143001

* Principal Secretary, Dept. of Disaster Management

033 22143674

THE PRINCIPAL SECRETARY FISHERIES	033 - 2214 1346
THE INSPECTOR GENERAL (IBWB), KOLKATA	033 - 2282 4422
THE INSPECTOR GENERAL, BSF, KOLKATA	033 - 2282 7259 033 - 2578 2299
THE JOINT DIRECTOR, SIB, KOLKATA	033 - 2460 5597 033 - 2460 7059
ARMY ENGINEERS BRANCH , EASTERN COMMAND	033 - 2222 2693 033 - 2564 3876
THE COMMISSIONER SPL BUREAU, KOLKATA	033 - 2280 0970 033 - 2280 2880
THE NAVAL OFFICER-IN-CHARGE (WB)	033 - 2242 0205
THE COMMISSIONER OF CUSTOMS	033 - 2213 7581 033 - 2242 7388
THE COMMANDING OFFICER 700 SQN (CG)	033 - 2520 8002
THE OFFICER-IN-CHARGE, NSG, KOLKATA	033 - 2526 0322
THE DIRECTOR MARINE DEPT, KoPT	033 - 2230 3214 033 - 2469 3888
THE MANAGER MARINE OPERATION, HDC	03224 - 25 2251
THE PRINCIPAL DIRECTOR, MMD KOLKATA	033 - 2223 0853
THE DIRECTOR, IWAI, KOLKATA	033 - 2439 5570 033 - 2439 1710
THE DISTRICT MAGISTRATE, SOUTH 24 PARGANAS	033 - 2479 3456
THE DISTRICT MAGISTRATE, NORTH 24 PARGANAS	033 - 2562 6177
THE DISTRICT MAGISTRATE PURBA MEDINIPUR	03228 - 26 3500
THE SUPDT OF POLICE, SOUTH 24 PARAGANAS	033 - 2479 3333
THE SUPDT OF POLICE, NORTH 24 PARAGANAS	033 - 2542-3055
THE SUPDT OF POLICE, PURBA MEDINIPUR	03228 - 26 9763
COMMANDANT CISF, KOPT	033 - 2439 7359
COMMANDANT CISF, HDC	03224 - 25 2229
THE PRINCIPAL CONSERVATOR OF FOREST, KOLKATA	033- 2335 8580/81
THE DIRECTOR OF FISHERIES	033 - 2357 6420
THE DC SB IMMIGRATION	033 - 2282 0666 9433152366

(c) Contact Numbers of Existing Marine Police Stations

<u>Marine Police Station</u>	<u>Name of in-charge</u>	<u>Telephone no.</u>	<u>Mobile</u>
Sundaerbans CPS	Kaushik Kundu	03218 - 201100	9830747700
Maipith CPS	Atiqur Rahamn	03174 - 204139	9830092544
Frazerganj CPS	AB Kulia	03210- 225100	983031 9771
Hemnagar CPS	Patro Sikdar	NIL	9831304974
Digha Mohana	Kaushik Basak	03220- 266222	9434231110
Talpatighat CPS	Kaushik Chatterjee	03220-282 002	9836491967

Appendix 'E'CONVERSION FACTORSVOLUME

- | barrel (US) = 42 gallons (US) = 159 litres
- | barrel (Imp) = 45.1 gallons (Imp) = 205 litres
- | gallon (Imp) = 1.2 gallons (US) = 4.546 litres
- | cubic metre = 1000 litres = 6.29 barrels (US)
- | litre = 0.22 gallons (Imp) = 0.03531 cubic feet
- | cubic yard = 0.765 cubic metres
- | cubic foot = 0.0283 cubic metres
- | cubic decimetre = 0.001 cubic metres = 1 litre
- | tonnes (metric) = approx. 7.5 barrels (US) 262 gallons (Imp)

AREA

- | acre = 0.405 hectares = 4050 square metres
- | hectare = 10 square metres = 2.471 acres
- | square kilometre = 100 hectares = 247 acres
- | square metre = 1.196 square yards
- | square yard = 0.836 square metres = 9 square feet
- | square foot = 0.093 square metres
- | square mile = 2.59 square kilometres = 640 acres

LENGTH / DISTANCE

- | kilometre = 0.54 nautical miles = 0.622 miles
- | nautical mile = 1.852 kilometres = 1.151 miles
- | mile = 1.609 kilometres = 1760 yards
- | metre = 1.094 yards = 3.282 feet
- | yard = 0.914 metres
- | foot = 0.305 metres
- | inch = 25.4 millimetres

SPEED

- | 1 knot = 1.85 km/hour = 0.51 metres/second
- | 1 metre/second = 3.6 km/hour = 1.94 knots

MASS

- | 1 tonne (metric) = 1000 kilograms = 0.984 tons (Imp)
- | 1 ton (Imp) = 20 hundredweight = 1016.05 tonnes (metric)

1 hundredweight = 50.8 kilograms = 112 pounds
 1 kilogram = 2.205 pounds = 1 litre of water
 1 gram = 0.035 ounces

FLOW

(Note: Gallons in this table are Imperial, unless otherwise noted.)
 1 cubic metre / hour = 16.7 litres / minute = 3.671 gallons / minute
 1 litre / second = 2.119 cubic feet / minute = 13.21 gallons / minute
 1 cubic foot / minute = 0.1039 gallons / second = 0.472 litres / second
 1 gallon / minute = 0.0631 litres / second
 1 barrel / hour = 2.65 litres / minute = 0.5825 gallons / minute
 1 gallon (US) / acre = 11.224 litres / hectare

PRESSURE

1 psi = 0.069 bar = 6.901 Pascal
 1 bar = 100 Pascal = 14.49 psi
 1 bar = 30 feet of water

ENGINE POWER

1 horsepower = 0.7457 kilowatts

TEMPERATURE

°F to °C deduct 32, multiply by 5,
 divide by 9
 °C to °F multiply by 9, divide by 5, add 32

°C	0	10	20	30	40	50	60	70	80	90	100
°F	32	50	68	86	104	122	140	158	176	194	212

Appendix 'F'**CLEAN-UP GUIDELINES FOR VARIOUS SHORELINE TYPES**

1. Different clean-up techniques will have to be used for different coastal formations, existing in the state of West Bengal, dictating in turn the manpower requirements. The following paragraphs give a rough guide on what should be done (and what should be avoided) at a specific type of coastline.
2. In many cases a "leave-alone" action may be the ecologically most desirable clean-up procedure, especially in biologically sensitive areas (e.g. marshes) where further human interference may be of little ecological benefit. On the other hand, amenity beaches, marinas, industrial installations, etc. are easier to clean and the ecological impact of mistakes made during a clean-up of such areas is limited.
3. Emotions and local sentiments after a spill incident may compel a spill response team to be seen to be taking action. For this reason clean-up operations should be directed towards those high-priority areas that have been identified in advance (i.e. in the contingency plan). If there is some initial question as to the best response options in ecologically sensitive areas preference can be given towards amenity areas that are less ecologically sensitive until sound advice is available on the optimum action to be taken.
4. Even where adjacent coastal formations vary significantly, the interaction between such adjacent polluted areas should be borne in mind. For the same reason protective booming of extremely sensitive spots should continue for some time after the original spill has landed.

SANDY BEACH	
What to do	What to avoid
Consider amenity usage of affected beach, influence of season and ecological advice to determine degree of optimal clean-up	Do not "over-clean" especially do not remove more sand and substrata than is absolutely necessary
Bear in mind that under unfavourable conditions a second clean-up may become necessary	Do not let machinery or people run over contaminated beaches prior to cleaning Avoid workers becoming demoralised by the re-oiling of already-cleaned beaches

If dispersants or other chemicals are allowed and appropriate, apply them with incoming tide Use manual labour to gather oil and oily sand. There is nothing like manual labour to accurately remove oil and oiled sand.	Do not use undiluted dispersant concentrates. If possible, avoid use of fresh water to hose down dispersants. Avoid using earth moving machinery; where possible do not pile oily debris or plough it into the ground. Avoid driving the oil into inaccessible areas or tidal and sub-tidal zones. Raking of the top layer of sand is however an appropriate way to accelerate biodegradation.
Collect floating oil along beach when possible (e.g. in calm situations), perhaps using boom and skimmers	Avoid allowing floating oil moving away from the beach and contaminating other areas.
When large amounts of oil are present, consider directing the oil into lined collection troughs from which it can be pumped away by vacuum trucks	Avoid placing troughs in tidal areas unless they can be emptied between tides.
If available, consider using a beach cleaning machine to remove oiled debris, keeping in mind that such machines are not designed for large debris (e.g. drift wood) or small debris (e.g. tar balls). One option may be to use the machine before the oil lands in order to eliminate flotsam and other debris.	Avoid mixing oil into the beach that could easily be removed with manual labour (e.g. thick sheets of oil on the sand surface)
Consider surf washing and/or tilling for contamination by light oils (e.g. diesel or gas oil)	Avoid pushing heavy (black) oils back into the sea as these may just contaminate other areas. Do not push any oil back to sea if there is little wave energy to disperse it
Decide whether on-site disposal e.g. by mobile incinerators is possible; if not, arrange transport or temporary storage	Do not destroy vegetation bordering the beach more than absolutely necessary; rather, accept slightly oiled spots. Avoid displacing rocks embedded in beach

SCATTERED ROCKS AND TIDAL POOLS	
What to do	What to avoid
Remove bulk oil where possible, perhaps using surface skimmers at high tides or appropriate skimmers at other times (e.g. rope mop across rocky pool areas).	Avoid remobilization of bulk oil. Avoid damaging booms and skimmers in rocky areas
Attempt cleaning by combining hosing with use of diluted dispersants and mechanical removal.	Do not spray freshwater on rocks. Avoid removing bedrock
Sorbents can be used in tidal pools at low tide and retrieved before the tide returns	
If adjacent areas are ecologically sensitive or are already cleaned, consider the deployment of booms, skimmers, sorbents, etc. to contain leaking oil.	
Pay attention to safety of personnel affected by tides	
Clean to a level that addresses the ecological trade-offs	Do not over-clean. Many inter-tidal organisms might be killed in cleaning that would otherwise survive with residual oil contamination
SALT MARSHES	
What to do	What not to do
Where reasonable, give priority to protection by booming, etc. Use propane gas gun or similar device to scare away birds	Avoid any "cosmetic" clean-up procedures
Consult with experts familiar with the ecology, the wildlife and the seasonal cycle of the area as to what precise clean-up should be attempted	
Water flooding with low pressure water may help to remove oil.	

Consider use of organic sorbents (e.g. peat, straw, etc.) which could be left in place without recovery. This will help minimise bird oiling	
In case of doubt, minimise interference with natural cleansing processes	Do not enter marshes with heavy machinery or large teams of clean-up workers
Remove temporary access roads after use, repair damages to marsh substrate as far as possible	Avoid erosion and other long-term changes to area.
MUDDY COASTS	
What to do	What to avoid
Consult local experts familiar with the ecology of the coastline as to which areas should be treated. In many cases a "leave-alone" action will be the ecologically most desirable solution	Do not use heavy machinery or let people trample over the oiled area
If possible, patches of oil may be removed by surface skimmers adjusted to these special circumstances.	Avoid forcing oil into the ground; this will retard biodegradation
Under favourable circumstances the use of sorbents may be considered, especially if isolated concentrations of oil are accessible	Avoid applying sorbents that will or can not be recovered
Where approved use light mechanical equipment (spades and shovels) for manual cleaning	
Remove matting if used and break open temporary roads after work is complete.	Avoid changing the hydrological profile of the area
ESTUARIES	
What to do	What not to do
Reduce the inflow of oil by whatever practical means available, (booms, closing of tidal locks, etc.) and use the outgoing tide to support cleaning action	Avoid overambitious booming
Collect and/or disperse free floating oil at the earliest possible stage.	

Employ clean-up techniques described on other pages of this section in accordance with specific local conditions (e.g. for fishery harbours, marines, etc.).	Carefully avoid damage to sea walls, dikes, etc., bearing in mind that tidal movements in estuaries can be more pronounced than in open sea
Employ inland clean-up techniques in small estuaries or upper reaches of the larger river mouths	Do not obstruct local waterborne traffic more than necessary
Check backwaters and side-streams of rivers for re-pollution potential	

Appendix 'G'**FISHING HARBOUR/LANDING CENTRES LOCATED
IN WEST BENGAL COASTS****Name of Fishing Harbour.****District - South 24 Parganas**

S.No	Name of the Fishing Harbour	Location	No. of Fishing Boat Opearating	Type of Boats		
				Above 30 HP	Below 30 HP	Non Mech
01	Fresergunj	P.S-Namkhana	530	95	230	205
02	Sultanpur	P.S-Diamond Harbour	172	120	29	23
03	Kakdwip	P.S-Kakdwip	459	301	51	107
04	Mayagoalini	P.S.-Sagar	265	41	109	115

District – Purba Medinipur

S.No	Name of the Fishing Harbour	Location	No. of Fishing Boat Opearating	Type of Boats	
				Above 30 HP	
01	shankarpur-Phase-I&II	Shankarpur Ramnagar	352	352	---

List of Fish Landing Sites.District - South 24 Parganas

<u>S.No</u>	<u>Name of the Fishing Harbour</u>	<u>Location</u>	<u>No. of Fishing</u>	<u>Type of Boats</u>		
			<u>Boat Opearating</u>	<u>Above 30 HP</u>	<u>Below 30 HP</u>	<u>Non Mech</u>
01	Nainan	P.S Diamond Harbour	177	92	31	54
02	Nurpur	-do-	50	---	15	35
03	Raichak	-do-	12	---	05	07
04	Hanra	Block Kulpi	55	---	25	30
05	Kulpi Nadirghat	-do-	46	05	15	26
06	Losinberia	-do-	47	---	15	26
07	Rangafala	-do-	39	---	07	32
08	Lot No 8	Block- Kakdwip	144	117	12	15
09	Kalinagar	-do-	670	570	69	31
10	Akshaynagar	-do-	251	174	51	26
11	Narayanpur	Block- Namkhana	874	526	125	223
12	Haripur	-do-	334	55	72	207
13	Dasmile	-do-	232	97	80	55
14	Gangasagar	Block- Sagar	77	--	32	45
15	Beguakhali	-do-	66	---	25	41
16	Chemaguri	-do-	192	12	65	115
17	Raidighi	Block - Raidighi	655	311	149	195
18	Sankijahan	Block- Kultali	158	45	31	82
19	Sitarampur	Block- Patherpratima	257	45	107	105
20	Ramganga	-do-	245	25	95	125

21	Sridharnagar	-do-	251	29	125	97
22	Canning	PS-Canning	79	16	44	19
23	Jharkhali	Block- Basanti	236	02	39	195
24	Sonakhali	-do-	147	----	55	92
25	Purandar	-do-	137	---	32	105
26	Falta	Block- Falta	71	02	04	65
27	Lahiripur	Block –Gosaba	250	---	35	215
28	Gadkhali	-do-	98	---	25	73
29	Gangadharpur	Block- Kakdwip	121	30	39	52
30	Madhusudanpur	-do-	142	--	57	85

District – Purba Medinipur

S.No	Name of the Fishing Harbour	Location	No. of Fishing Boat Operating	Type of Boats		
				<u>Above 30 HP</u>	<u>Below 30 HP</u>	<u>Non Mech</u>
01	Khadalgobra	Khadalgobra ,Digha	38	13	25	
02	Maltrapur	Maltrapur,Digha	20	01	19	
03	Jaldha Ma Basuli	Tajpur Ramnagar	78	18	60	
04	Tajpur Jaldha	Jaldha Ramnagar	547	421	126	
05	Digha Mohana	Digha	817	817	---	
06	Mandarmoni	Silampur, Ramnagar	21	21	---	
	Silampur					
07	New Jaldha	Mandarmoni,Ramnagar	291	182	109	
08	Dadanpatrabar	Dadanpatrabar, Ramnagar	226	219	107	

09	Chemasuli – I	D.Purosottampur, Ramnagar	165	98	67
10	Chemasuli – I	-do-	70	13	57
11	Soula-II	-do-	74	52	22
12	Soula-I	Raghusardarbar,Jalpai Contai	28	06	22
13	Baguran Jalpai-I	Baguranjalpai,Contai	41	18	23
14	Baguranjalpai-II	-do-	26	13	13
15	Haripur	Mankaraiput,Contai	192	96	96
16	Junput	Biramput,Contai	430	265	155
17	Saratpur	Saratpur ,Contai	04	04	---
18	Bhandar Mohana	Baguranjalpai,Contai	25	25	---
19	Soula	Soula, Contai	105	105	---
20	D.Kadua	Kadua,Contai	40	31	09
21	U.Kadua	Kadua,Contai	04	03	01
22	Gopalpur	Gopalpur	63	28	35
23	Bhogpur	Bankiput,Contai	57	36	21
24	Bankiput	-do-	17	05	12
25	Dahasonamul	Dahasonamul,Contai	94	73	21
26	Gorahar	Katkadebichak,Khejuri	43	26	17
27	Sundarpur	Sundarpur,Khejuri	39	07	32
28	Boga Ferryghat	Boga Khejuri	28	03	25
29	Nijkasba	NIJ Kasba , Khejuri	106	39	67
30	Maldinagardolai	Maldinagar,Khejuri	44	03	41
31	D.Kalagechia Dinda	D.Kalagechia,Khejuri	28	06	22
32	Maldinagargiri	Maldinagar,Khejuri	36	07	29

33	Panchuria Dutta	Panchuria ,Khejuri	38	11	27
34	Paschim Panchuria Pradhan	-do-	41	12	29
35	Purba Panchuria Pradhan	-do-	20	09	11
36	Nankar Gobindpur	Washilchak,Khejuri	25	06	19
37	Washilchak	-do-	22	06	16
38	Thanaberia	Thanaberia,Khejuri	74	25	49
39	Kaukhali	Banbasuria,Khejuri	28	14	14
40	Arakbari	Arakbari,Khejuri	69	14	55
41	Dhobaghata	Safarchatta,Khejuri	30	13	17
42	Kadirabadchar Chur Saheb	Kadirabadchar,Khejuri	72	17	55
43	Kadirabadchar Ma Ganga	Sahebnagar	75	10	65
44	Dekhali	Dekhali,Khejuri	55	03	52
45	Gangrachar	Nandigram-I Nandigram	09	06	03

List of Fishing Villages / Hamlets Along CoastSl.No. Name of Fishing Village / HamletsDistrict - South 24 Parganas

01	Nurpur
02	Diamond Harbour
03	Kulpi
04	Lakshmikantapur
05	Tengrabichi
06	Belpukur
07	Kakdwip
08	Phulbari
09	Sagar Collectorganj
10	Namkhana
11	Bharatala
12	Duhlat
13	Kalgora
14	Digampur
15	Gosaba
16	Bhokali
17	Frazerganj
18	Nainan
19	Nurpur
20	Raichak
21	Hanra
22	Kulpi Nadirghat
23	Losinberia

24	Rangafala
25	Lot No 8
26	Kalinagar
27	Akshaynagar
28	Narayanpur
29	Haripur
30	Dasmile
31	Gangasagar
32	Beguakhali
33	Chemaguri
34	Raidighi
35	Sankijahan
36	Sitarampur
37	Ramganga
38	Sridharnagar
39	Canning
40	Jharkhali
41	Sonakhali
42	Purandar
43	Falta
44	Lahiripur
45	Gadkhali
46	Gangadharpur
47	Madhusudanpur

District – Purba Medinipur

- | | |
|----|--------------------|
| 01 | Khadalgobra |
| 02 | Maltrapur |
| 03 | Jaldha Ma Basuli |
| 04 | Tajpur Jaldha |
| 05 | Digha Mohana |
| 06 | Mandarmonisilampur |
| 07 | New Jaldha |
| 08 | Dadanpatrabar |
| 09 | Chemasuli – I |
| 10 | Chemasuli – I |
| 11 | Soula-II |
| 12 | Soula-I |
| 13 | Baguran Jalpai-I |
| 14 | Baguranjalpai-II |
| 15 | Haripur |
| 16 | Junput |
| 17 | Saratpur |
| 18 | Bhandar Mohana |
| 19 | Soula |
| 20 | D.kadua |
| 21 | U.Kadua |
| 22 | Gopalpur |
| 23 | Bhogpur |
| 24 | Bankiput |
| 25 | Dahasonamul |
| 26 | Gorahar |

27	Sundarpur
28	Boga Ferryghat
29	Nijkasba
30	Maidinagardolai
31	D.Kalagechia Dinda
32	Maldinagargiri
33	Panchuria Dutta
34	Paschim Panchuria Pradhan
35	Purba Panchuria Pradhan
36	Nankar Gobindpur
37	Washilchak
38	Thanaberia
39	Kaukhali
40	Arakbari
41	Dhobaghata
42	Kadirabadchar Chur Saheb
43	Kadirabadchar Ma Ganga
44	Dekhali
45	Gangrachar
46	Geonkhali
47	Haldia
48	Digha Mohana
49	Ramnagar
50	Islampur
51	Birampur
52	Kanthi
53	Dariapur
