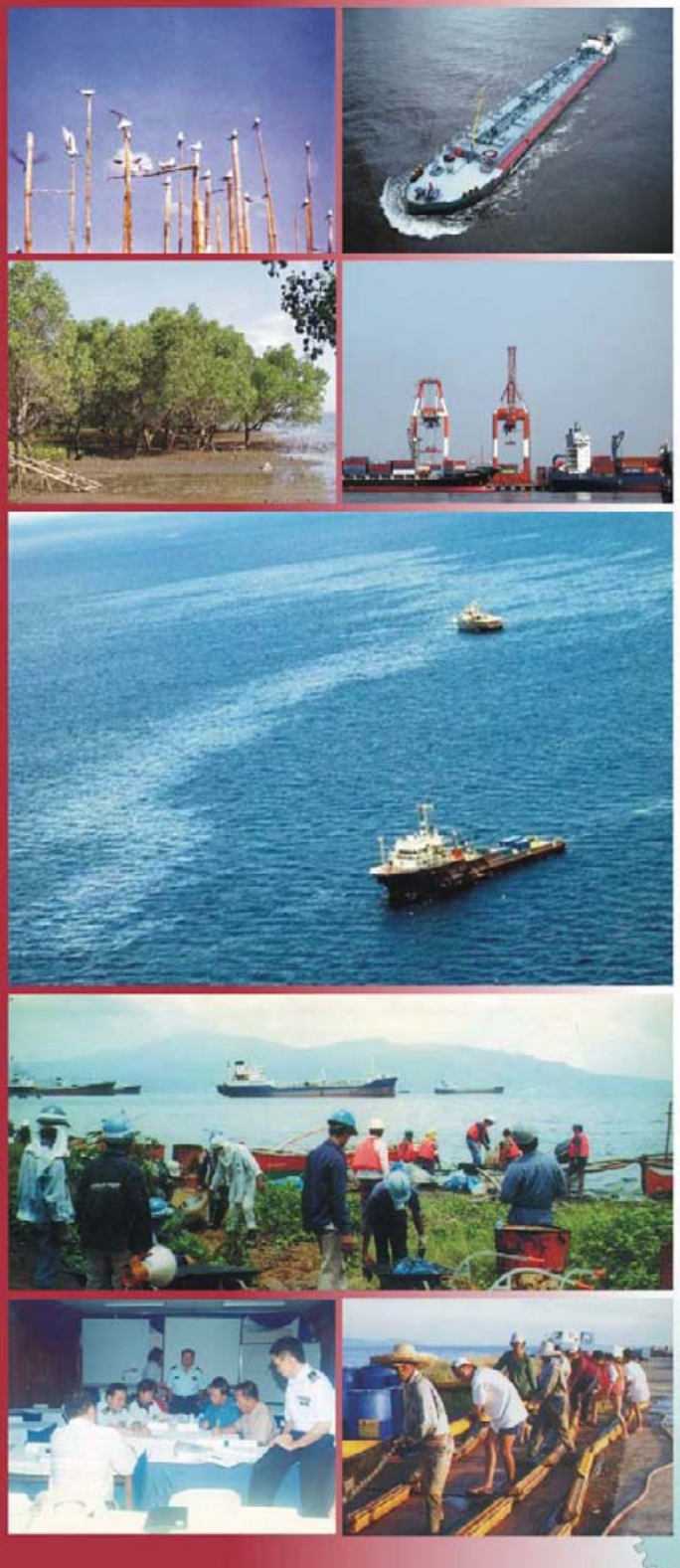

Manila Bay Oil Spill Contingency Plan

November 13, 2006

GEF/UNDP/IMO Regional Programme on
Partnerships in Environmental Management
for the Seas of East Asia

Philippine Coast Guard

Department of Environment
and Natural Resources

The Manila Bay
Oil Spill Contingency Plan

13 November 2006

GEF/UNDP/IMO Regional Programme on Partnerships in
Environmental Management for the Seas of East Asia (PEMSEA)

MISSION STATEMENT

The Global Environment Facility/United Nations Development Programme/International Maritime Organization Regional Programme on Building Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) aims to promote a shared vision for the Seas of East Asia:

> "The resource systems of the Seas of East Asia are a natural heritage, safeguarding sustainable and healthy food supplies, livelihood, properties and investments, and social, cultural and ecological values for the people of the region, while contributing to economic prosperity and global markets through safe and efficient maritime trade, thereby promoting a peaceful and harmonious co-existence for present and future generations."

PEMSEA focuses on building intergovernmental, interagency and intersectoral partnerships to strengthen environmental management capabilities at the local, national and regional levels, and develop the collective capacity to implement appropriate strategies and environmental action programs on self-reliant basis. Specifically, PEMSEA will carry out the following:

- build national and regional capacity to implement integrated coastal management programs;
- promote multi-country initiatives in addressing priority transboundary environment issues in sub-regional sea areas and pollution hotspots;
- reinforce and establish a range of functional networks to support environmental management;
- identify environmental investment and financing opportunities and promote mechanisms, such as public-private partnerships, environmental projects for financing and other forms of developmental assistance;
- advance scientific and technical inputs to support decision-making;
- develop integrated information management systems linking selected sites into a regional network for data sharing and technical support;
- establish the enabling environment to reinforce delivery capabilities and advance the concerns of nongovernmental and community-based organizations, environmental journalists, religious groups and other stakeholders;
- strengthen national capacities for developing integrated coastal and marine policies as part of state policies for sustainable socioeconomic development; and
- promote regional commitment for implementing international conventions, and strengthening regional and sub-regional cooperation and collaboration using a sustainable regional mechanism.

The 12 participating countries are: Brunei Darussalam, Cambodia, Democratic People's Republic of Korea, Indonesia, Japan, Malaysia, People's Republic of China, Philippines, Republic of Korea, Singapore, Thailand and Vietnam. The collective efforts of these countries in implementing the strategies and activities will result in effective policy and management interventions, and in cumulative global environmental benefits, thereby contributing towards the achievement of the ultimate goal of protecting and sustaining the life-support systems in the coastal and international waters over the long term.

Dr. Chua Thia-Eng
Regional Programme Director
PEMSEA

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APPENDICES: DATA DIRECTORY

ACRONYMS AND ABBREVIATIONS

AOR	-	Area of Responsibility
ATON	-	Aids To Navigation
CCDC	-	City Disaster Coordinating Council
CGD NCR-CL	-	Coast Guard District National Capital Region- Central Luzon
CGOF	-	Coast Guard Operating Forces
CPCG	-	Commandant, Philippine Coast Guard
DA	-	Department of Agriculture
DA - BFAR	-	DA – Bureau of Fisheries and Aquatic Resources
DENR	-	Department of Environment and Natural Resources
DENR-EMB	-	DENR – Environmental Management Bureau
DENR-PAWB	-	DENR – Protected Areas and Wildlife Bureau
DILG	-	Department of Interior and Local Government
DOH	-	Department of Health
DOTC	-	Department of Transportation and Communications
EO	-	Executive Order
LGUs	-	Local Government Units
MARINA	-	Maritime Industry Authority
MARPOL	-	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL 73/78)
MBOSCP	-	Manila Bay Oil Spill Contingency Plan (2006)
MC	-	Memorandum Circular
MEPCOM	-	Marine Environmental Protection Command
MMDA	-	Metro Manila Development Authority
MOA	-	Memorandum of Agreement
MOU	-	Memorandum of Understanding
NDCC	-	National Disaster Coordinating Council
NOCOP	-	National Operations Center for Oil Pollution
NRFS	-	Not ready for Sea
OPRC	-	International Convention on Oil Pollution Prevention Preparedness, Response and Co-operation (1990)
OSC	-	On-Scene Commander
OSPAR	-	Oil Spill Preparedness and Response
OSRAP	-	ASEAN Oil Spill Response Action Plan
OSRT	-	Oil Spill Response Team
PAF	-	Philippine Air Force
PAGASA	-	Philippine Atmospheric Geophysical and Astronomical Services Administration
PCG	-	Philippine Coast Guard
PCGA	-	Philippine Coast Guard Auxiliary

PD	-	Presidential Decree
PDCC	-	Provincial Disaster Coordinating Council
PEMSEA	-	GEF/UNDP/IMO Partnership in Environmental Management for the Seas of East Asia
PN	-	Philippine Navy
PNP	-	Philippine National Police
POLREP	-	Pollution Report
PPA	-	Philippine Ports Authority
PSG	-	Presidential Security Group
RA	-	Republic Act
RFS	-	Ready for Sea
SALVTUG	-	Malayan Towage and Salvage Corporation
SAR	-	Search and Rescue
WISE	-	Waterborne Industry Spill Equipment

1.0 INTRODUCTION

Manila Bay is the economic gateway of the Philippines because of the fact that the majority of the economic activities of the Philippines take place in Metro Manila and its environs. The major mode of transporting goods and cargo from Manila to other parts of the country and to other countries is sea transportation. An average of 30,000 vessels a year enter Manila bay and call on its ports. A majority of these vessels, which include tankers, passenger and cargo ships, either utilizes oil as fuel or carries it as their cargo. Ship-sourced pollution may result from either accidental or illegal operational discharge of these vessels.

Oil spills can also emanate from the oil refineries within the bay during the loading and unloading of petroleum products. A number of depots can be found in Manila Bay's shoreline namely:

a. Petron Depot in Rosario, Cavite, and LImay, Bataan;
b. Total Depot in Tondo, Manila,and Mariveles; Bataan
c. Unioil Depot in Lucanin, Mariveles, Bataan
d. Jetti Depot in Naic, Cavite
e. Bataan Petroleum Terminal Inc. in Limay Bataan
f. Total Liquigaz in Barangay Alas-asin, Mariveles, Bataan

Aside from these depots that dot the Manila Bay coast, a large depot could also be found in Pandacan, Manila. Even though the depot is located inside the Pasig River and is kilometers away from the bay itself, the amount of petroleum store in its tank farms could pose a significant threat to Manila Bay.

From February 1998 to December 2004 a total of 18 oil spills occurred within Manila Bay. Out of the 18 spills, nine happened in the Province of Bataan, namely in the ports of Limay and Mariveles with a total volume of 789,751.00 liters. It should be noted that most spills occurred where vessels traffic is heavy.

1.1 AIM OF THE PLAN

The Manila Bay Oil Spill Contingency Plan, referred here as the Plan, aims to outline the multi-sectoral arrangement for responding to oil spills in Manila Bay, with the end in view of protecting the Bay from oil pollution or, where this is not possible, to minimize it effects.

It also aspires to ensure a timely, measured and effective response to oil spill incidents of tier 1 or tier 2 magnitudes which may occur within the Manila Bay.

1.2 SHORT TITLE

The Manila Bay Oil Spill Contingency Plan shall have a short title of MBOSCP.

1.3 POLICY REVIEW

1.3.1 International Conventions

Table 1 shows the list of international conventions in which the Philippine is a signatory and party to**.**

Table 1: International Conventions

Convention	Objective
1. MARPOL 73/78	This Convention replaced the 1954 International Convention for the Prevention of Pollution of the Sea by Oil (OILPOL 54). ○ It sets out a wide range of procedures and ship design and operating requirements aimed at reducing pollution of the sea from ships. ○ Annex I deals with oil pollution.
2. London Dumping Convention 1972	This Convention regulates the discharge of wastes, including oily wastes, at sea.
3. International Convention on Oil Pollution Prevention Response and Co-operation (OPRC) 1990	This Convention makes provision for contingency plans for ships, offshore platforms, coastal terminals and ports, and for the development of national response plans. ○ The Convention also encourages the development of international cooperation in spill preparedness and response. (The Phil. is signatory to this Convention, but it is still subject for ratification by the Philippine Senate.)
4. International Convention on Civil Liability for Oil Pollution Damage (CLC), 1992	This Convention provides for compensation for damage, or response costs incurred, due to spills of persistent oils within a member nation's territorial sea or EEZ. Claims are made against the vessel owner and insurers. ○ CLC is based on the principle of "strict liability", i.e., the vessel which spilled the oil will pay regardless of fault. ○ Liability is also limited, i.e., the costs recoverable are capped (maximum of 59.7 million SDRs or US$81 million).
5. International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND), 1971 and 1992	This Convention provides for the establishment of the International Oil Pollution Compensation (IOPC) Fund, maintained by oil cargo interests, for the purpose of providing additional compensation to the victims of pollution damage in cases where compensation under CLC is inadequate or unobtainable, e.g., because the limit of the CLC is exceeded or because the owner of the vessel cannot be identified. ○ limit of 135 million SDRs (US$194 million)

1.3.2 National Legislations

Under Presidential Decrees Nos. 600, 601, 602 and 979 the Philippine Coast Guard is tasked to develop and maintain oil spill combating capabilities and formulate and enforce rules and regulations concerning Marine Pollution (Table 2). Part of capability development is contingency planning. In 1975, the first National Oil Spill Contingency was created, in which the PCG took the lead in formulating the NOSCP. The plan was then revised in 2002 to address the growing threat of oil spills to the marine resources of the Philippines.

Table 2: National Legislations

Republic Act /Presidential Decree	Objective
1. Republic Act No. 5173 – The Coast Guard Law (October 1967)	• Law creating the Philippine Coast Guard • One of the mandated function of the PCG is Marine Environmental Protection
2. Presidential Decree (P.D.) 600 – Marine Pollution Decree (December 9, 1974).	• Presidential Decree mandating the protection of the Marine Environment.
3. P.D. 601 – Revised Coast Guard Law of 1974 (December 9, 1974)	• Presidential Decree strengthening the PCG • Further clarified the PCG mission of promoting safety of life at sea, environmental protection and maritime law enforcement
4. P.D. 602 – National Oil Pollution Operations Center Decree (December 9, 1974)	• Presidential Decree Creating the National Operations Center for Oil Pollution within the PCG • Mandated the PCG to develop oil spill combating capabilities
5. HPCG Memorandum Circular 01-2001	• Requires vessels, oil companies and other facilities who utilizes “black products” to maintain a contingency plan
6. P.D. 979	• Revision of P.D. 600 governing marine pollution

1.4 RELATIONSHIP OF THE MBOSCP TO OTHER CONTINGENCY PLANS

The Manila Bay Oil Spill Contingency plan aims to create a response mechanism for oil spill within the Manila Bay area only. It would form as part of the Coast Guard District NCR/CL’s oil spill contingency plan, which in turn is part of the National Oil Spill Contingency Plan. It shall deal with a tier 1 or tier 2 oil spill. In case the spill escalates to a tier 3 spill, the NOSCP will take effect. The MBOSCP shall only be applicable to spills which will occur within the Manila Bay area. If the spill spreads outside the geographical scope of the plan, the District Contingency Plan of the Coast District NCR-CL shall be put into action.

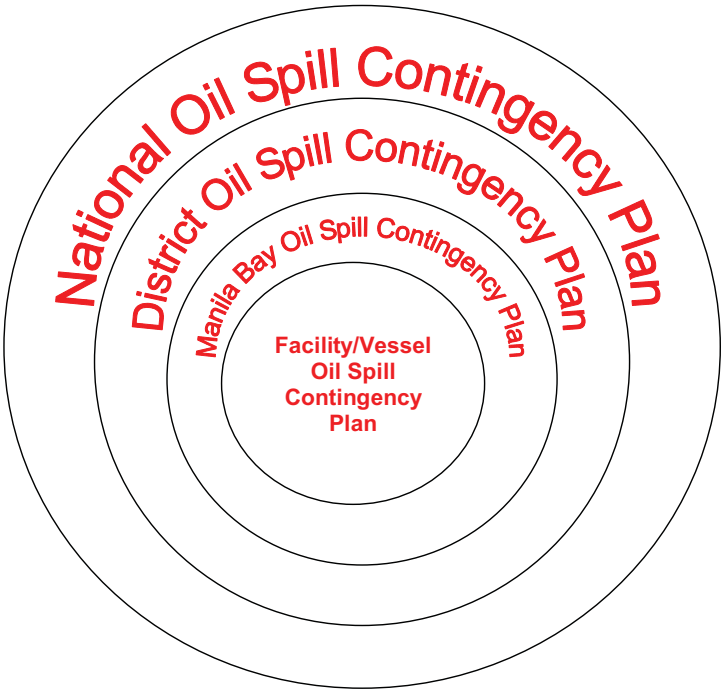


Fig. 1: RELATIONSHIP OF THE MBOSCP TO OTHER CONTINGENCY PLANS

1.4.1 Facility Contingency Plans

PCG Memorandum circular No. 01-2001 requires that the following parties shall prepare individual oil spill contingency plans:

- Oil refineries, terminals and depots
- Oil exploration and production activities
- Power plants and power barges
- Manufacturing plants and other establishments using persistent oil
- Shipping companies (Shipboard Oil Pollution Emergency Plans)
- Shipyards

1.4.2 Coast Guard District Contingency Plan

All Coast Guard Districts are expected to prepare oil spill contingency plans for their area of responsibility, taking into consideration all local and special conditions of the area. The contingency plan shall generally follow the same structure as the national plan.

1.4.3 Ports and other facilities

All ports, oil companies and other installation operating with in the Manila Bay area and its tributaries are required to submit the same, incorporating their response mechanism together with arrangement for tier 2 type of incidents.

All oil spill contingency plans shall be submitted for approval to MEPCOM. All the approved contingency plans must at all times be available at the MEPCOM headquarters, as well as at the relevant Coast Guard District Headquarters.

1.5 SCOPE OF THE PLAN

The Manila Bay Oil Spill Contingency Plan outlines the combined stakeholder arrangements designed to allow rapid and cooperative response to marine oil spills in Manila Bay.

1.6 GEOGRAPHICAL LIMITATION OF PLAN

This plan covers all sea, ports, harbours, and adjoining shorelines including all coastal municipalities and cities along Manila Bay (as shown in Fig. 2).

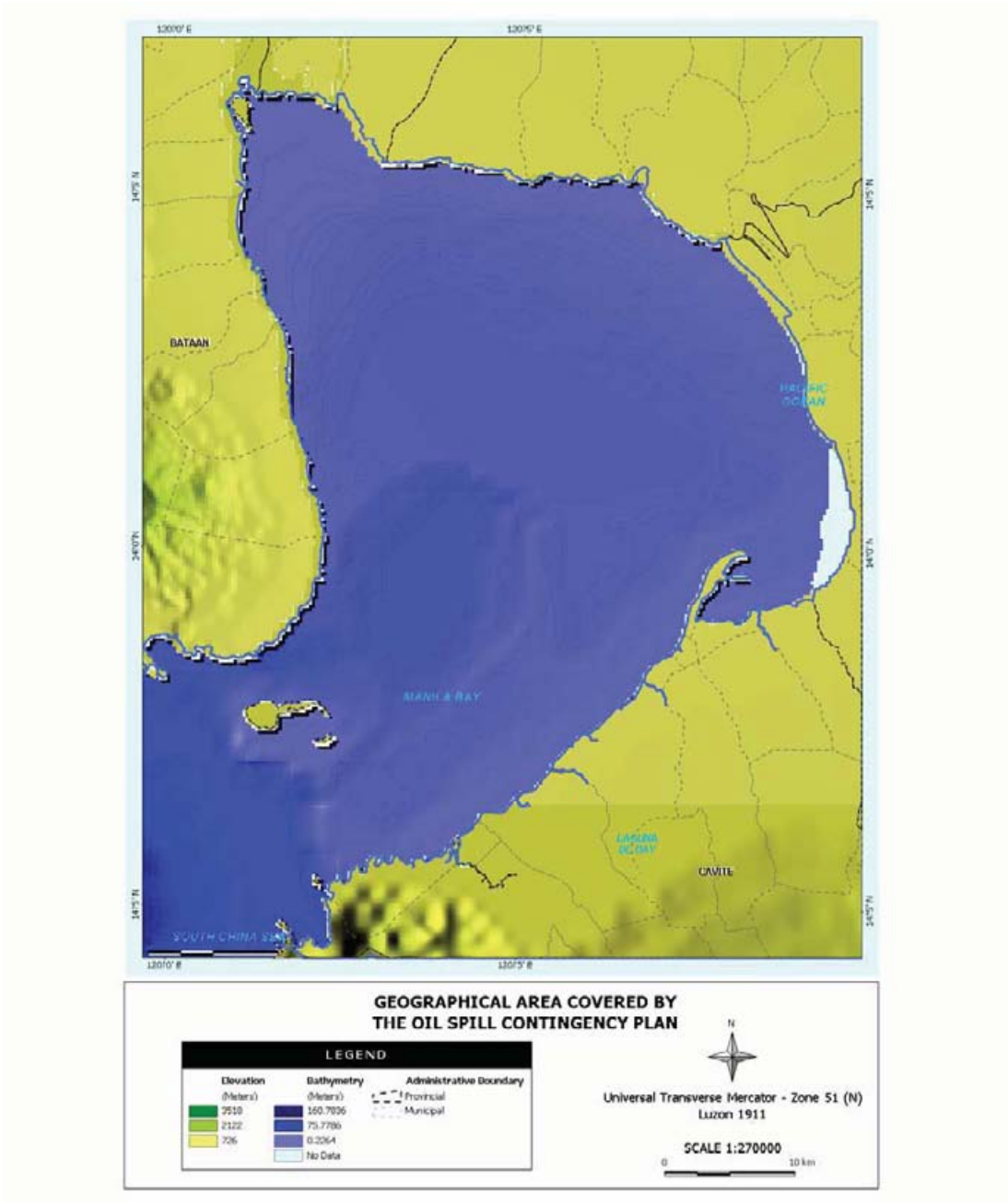


Figure 2. Geographical area covered by this plan

STRATEGY SECTION

2.0 OIL SPILL RISK ASSESSMENT

Oil spill risk assessment involves the identification of areas, resources and socioeconomic activities that are likely to be affected by oil spills. Identification of the risk-causing factors and impact areas will enable the determination of corresponding response strategies and actions required during oil spill incidents.

2.1 RISK FACTORS

The following risk factors are identified as existing in Manila Bay waters:

a. ***Risk-causing factors***

The following factors may cause oil spill incidents:

- Collision
- Grounding
- Hazards to navigation
- Unseaworthiness of vessels
- Negligence and incompetence of the owner/operator, Master or crew
- Improper stowage and control of cargoes
- Presence of oil terminals and depots
- Aging of the fleet of vessels at sea
- Size/type of vessel and operation
- Heavy vessel traffic

b. ***Factors affecting risk***

The assessment also took into consideration the following factors that may increase the risk.

<u>Shipping-related risks</u>

- Density and movement of ships including concentration of fishing and tourist vessels
- Areas that pose a high level of difficulty to safe navigation
- Commercial cargo shipping size, frequency, trading patterns and amounts of oil carried as bunker fuel
- Oil tanker frequency, sizes, shipping patterns and quantities shipped
- Properties of oil shipped as cargo
- Terminal/port design
- Type/amount of oil carried

Environmental factors

- Sea conditions including tidal flow, weather, current, wind, temperature, sea state
- Type of shoreline

Other factors

- future trends, including proposed new ports and projected changes to trading patterns
- presence of oil terminals and depots
- capacity and capability of response team

2.2 IDENTIFICATION OF PROBABLE SOURCES OF OIL SPILLS

The following are activities that may cause oil spill.

a. ***Shipping-related***

1) **International Tanker traffic** - For the year 2003 a grand total of 8,495 tankers entered Manila Bay. Three thousand seven hundred nine of (3,709) of this tankers proceeded to Terminal Management Office, Pasig while four thousand seven hundred eighty six (4,786) docked at the port of Limay in the province of Bataan. These tankers include Very Large Crude Carriers and Large Range Tankers which can carry up to 1 million barrels of oil.

2) **Internal tanker traffic -** There is a total of 127 domestic tankers with an average displacement of 300 G.T. home ported in Manila. These tankers mainly carry petroleum products between the oil depots located in within the Bay, such as the Pandacan Manila Oil Depot, Total Depot and Unioil. They also transport refined products to depots throughout the country. They make use of existing sea lanes in going in and out of the bay. These tankers may pose a risk of a tier 2 to 3 oil spill.

3) **Other ship traffic -** The South and North Harbours, and Manila International Container Terminal in Manila, and the Port of Lamao in Limay, Bataan are among the busiest in the country. In 2003 these harbours catered to a total 9,617 of both cargo and passenger ships with a total tonnage of 32,998,758 GRT. These ships use bunker oil or diesel oil as their main fuel. A ferry terminal is also located inside the CCP complex in Pasay. The boats operating from this terminal transport passengers to and from Port of Orion, Bataan. Aside from these, several privately-operated ports for shipping raw materials and products dot the coast of the Bay. Through these ports and terminals, an average of 30,000 ships arrives and departs annually. There are also fish ports located around the bay. Transport through and from these ports poses great risk from operational as well as accidental discharges from vessels. Oil spills may occur in these areas during bunkering or fuel-transferring operations. There is a risk of tier 1 to 2 oil spills from these vessels.

Appendix A shows the density and vessel traffic in the major ports. The navigational routes and location of ports and terminals are shown in **Appendix B**.

b. ***Other socioeconomic activities***

The nature of the activities being carried out in these areas/industries may pose a threat of oil spill incidence: stockpiling of petroleum products, ship repairs, refuelling of vessels, fuel/cargo tank cleaning and operational discharge.

1) **Petroleum Refining -** There is only one refinery located within Manila Bay. This is the Petron Bataan Refinery located in Limay Bataan. It has a total production capacity of 180,000 barrels per day.

2) **Oil terminals and depots-** There are several oil depots located within the Manila Bay namely, Pandacan oil terminal in the City of Manila, Oil Depots in Bataan and Oil Depots in Cavite. These oil depots can be a source of a tier 2 to tier 3 oil spill.

3) **Manufacturing -** oil spills may occur in factories and establishment using bunker, Diesel, heavy fuel oil etc. as a fuel for their machineries and equipment. There is a risk of a tier 1 spill from these factories.

4) **Power Generation -** a power plant of the National Power Corporation and a number of private power barges operate within Manila Bay which mostly use bunker oil or diesel oil as their fuel. These power barges are located in Navotas and Manila. There is a risk of a tier 1 to tier 2 oil spill from these power barges.

5) **Naval Base and shipyards** - Fort San Felipe located at Sangley Point, Cavite serves as the only naval shipyard that operates within the Bay area. However, several shipyards along Navotas and Bataan coast service a hundred of vessel annually. Used oil from tank cleaning operation during dry docking of vessels serves as the source of oil from these facilities.

2.3 OIL SPILL INCIDENCE IN MANILA BAY

Location and volume of oil spills

From February 1998 to December 2004, a total of 18 oil spills occurred within Manila Bay (does not include incidents in Pasig River), which resulted into over 1.2 million L of oil being spilt into the bay (Table 3). Out of the 18 spills, nine happened in the Province of Bataan, namely in the ports of Limay and Mariveles with a total volume of 789,751 L. The largest oil spill that occurred in Manila Bay happened in Mariveles, Bataan during the MT Mary Anne oil spill incident with a total volume of 747,991 L. The second largest spill occurred in South Harbor Manila during the MT Sea Brothers incident, with a total volume of 420,000 L. It

should be noted that most spills occurred where vessels traffic is heavy, such as ports and harbors.

Based on historical data on the frequency of oil spills and the amount of tanker activity in the area, the possibility of a tier 3 spill can occur in the following areas:

1. Port of Lamao in Bataan
2. South Harbor, Manila
3. Port of Mariveles in Bataan

Table 3: Location and Volume of Oil Spills

Spiller	Volume (L)	Location	Date
M/T Mary Anne	747,991	Mariveles, Bataan	23-Jul-99
M/T Sea Brothers	420,000	SH Manila	19-Mar-99
M/T Bocaue	40,000	Limay, Bataan	9-Feb-99
Tacoma Port Svcs Inc.	840.00	TMO Pasig	5-Jul-03
PBRC Limay Bataan	600.00	Limay, Bataan	31-Mar-98
MV New Vigor	500.00	Limay, Bataan	10-Feb-03
M/T Christian Albert	400.00	SH Manila	4-Jan-00
MT Sea Mark	300.00	Limay, Bataan	25-Aug-01
MV Super Ferry	210.00	NH Manila	21-Jul-01
MT Deborrah Dos	200.00	Limay, Bataan	8-Aug-02
MV Piya Bhum	200.00	MICT Manila	29-Jan-04
Super Ferry 5	150.00	NH Manila	7-Jun-03
MV Princess of New Unity	100.00	NH Manila	22-Nov-01
MT Pulilan	100.00	Limay, Bataan	26-Aug-02
MV Hanjin Kwangyang	50.00	MICT Manila	15-Feb-04
Herma Shiping	30.00	Limay, Bataan	17-May-98
M/T Ocean Pride	30.00	Limay, Bataan	29-May-98
Baseco Shipyard		Engr Island, Mnl	25-May-00

Type of Oil Spilled

In Manila Bay, the typical types of oil spilled were diesel, crude oil, intermediate fuel oil and heavy fuel oil (Table 4). Diesel and other finished petroleum products would dissipate and evaporate in relatively short span of time. However, lubricating oil, intermediate fuel oil, heavy fuel oils and crude oil tend to persist in the environment. These types of oil may cause significant damage to shorelines if left unattended.

Table 4: Physical properties of petroleum products spilled in Manila Bay

Oil Type	Density	Viscosity (cP)	Sources
Diesel	0.82-0.84	2-6	Fuel oil spills from smaller vessels, ferries, etc.
Crude oil (Mainly Arabian)	0.85-0.95	10-200	Cargo spills from tanker traffic, terminals

Intermediate fuel oil	0.9-0.95	200-2000	Fuel oil spills from intermediate – large vessels, refineries, land-based establishments
Heavy fuel oils	0.95-0.99	4000 – 20.000	Fuel oil spills from larger vessels, refineries, land-based establishments

2.4 PROBABLE FATE OF OIL SPILLS

Once oil is spilled into the sea or marine waters, its transformation depends on the properties and composition of the oil, parameters of actual oil spill and environmental conditions. The main characteristics of oil transformation are dynamism, and the interaction to physical, chemical and biological mechanisms of dispersion and degradation up to the complete disappearance as original substance.

The spread of oil spilled on the sea surface occur under the influence of gravity, controlled by oil viscosity and surface tension of water. This is further affected by meteorological, hydrological factors, and the power and direction wind, waves and current.

Determining the spread of oil spilled would enable, among others the identification of appropriate responses and recovery of the oil. For Manila Bay, an oil spill trajectory and fate model, SpillSim®, has been developed. The SpillSim® is generalized spill model combining a number of high resolution hydrodynamic models coupled with a spill motion and fate model that yields the volume of distribution of the material or spilled oil as a function of time after the spill. The spill module incorporates factors such as transport by current, diffusion, surface spreading, evaporation, vertical dispersion and emulsification. The model also takes into account shoreline absorption.

In running the model, data or information needed includes the following:

- Commodity or type of oil spilled
- Spill location
- Initial release date and time
- Total release volume
- Total particles
- Air temperature
- Water temperature
- Horizontal diffusion coefficient
- Time step and integration interval
- Time series observation on wind and current speed and direction

Refer to the *SpillSim User Manual* for details in running the model.

2.5 AREAS SENSITIVE TO OIL SPILL

Categories of risk areas

Areas and resources at risk are categorized based on ecological, economic and social importance as well as sensitivity to oil spills. These areas are illustrated in **Appendix C**. Data/information from the component activities of the Manila Bay Environmental Management Program, such as Risk Assessment, Integrated Environmental Monitoring Program, Environmental and Resource Valuation, Integrated Information Management System for Manila Bay and Manila Bay Atlas, were used in the assessment of risk areas.

a. **Ecologically important areas**

1) ***high***

- **Mangroves and mudflats**. Mangroves are woody, seed-bearing plants that thrive well on mudflats and brackish water. The mangrove ecosystem is extremely productive and supplies resources, such as wood, fish, shellfish and crustaceans. They also protect our shorelines from strong winds, waves and floods. Some species even have medicinal value. In Manila Bay, 16 mangrove species were identified. For the remaining 413.7 ha of mangroves, the average annual value of direct uses amount to PhP7.9 million while the indirect uses amount to PhP161 million.

  Benthic species, shellfish and crustaceans are found in mudflats. They also serve as feeding grounds of migratory birds. The bird sites located along Manila Bay are found in Navotas, Parañaque-Las Piñas, Bataan and Cavite. Around18,656 birds belonging to 87 species were counted. Among these species is the endangered Chinese Egret. Another significant species recorded is the Blacked-winged Cuckoo-shrike, which is the first record of the country. Parañaque-Las Piñas area has the highest diversity with 65 species while Navotas has the highest bird count with 5,840 followed closely by Bataan with 5,543.

- **Seagrass beds**. Seagrasses are the only submerged flowering plants in the marine environment. They flower, develop fruit, produce seeds, and are often found between coral reefs and mangrove forests. Seagrass meadows provide refuge, spawning and nursery grounds for shrimps, sea cucumbers, sea urchins, mussels, crabs and other fishes. In Manila Bay, patches of seagrass beds can be found in Cavite and Bataan.

2) ***moderate***

- **Coral reefs**. Known as the 'rainforests of the sea', coral reefs are home to many different species of fish, mollusks, crustaceans, algae, sponges and reptiles. In Manila Bay, coral reefs can be found in Corregidor Island, Carabao Island, Maragondon and Ternate, Cavite. It takes years for reefs to increase in size, thus damage to a reef may take decades to recover, if at all. The average annual value of the coral reef (37.25 ha) found in Carabao Island in Cavite amount to PhP0.4 million.

- **Sheltered rocky shores**. Rocky shores comprise a wide variety of different habitats and communities, and vary greatly in their sensitivity to and recovery from oil spills. Seaweeds or algae are a common feature of rocky shores, and they are a major source of organic material for other marine life. There are rocky shores in portions of Maragondon and Ternate in Cavite, and Mariveles, Bataan.

- **Sandy beach**. Sandy beach areas can be found in Mariveles (Bataan), and Ternate, Maragondon, Naic, Tanza, and Corregidor Island (Cavite).

- Gravel beaches and riprap

3) ***low***

- **Exposed rocky cliffs, seawalls and wave cut platform**. These are found in Cavite and NCR.

b. **<u>Economically important areas</u>**

1) ***high***

- **Oil refinery and depots**. The Petron Oil Refinery and three oil depots (Petron, Total-Philippines and Unioil) are located in Limay, Bataan. The oil depots of Petron and Jetti are located in Rosarion and Naic, Cavite, respectively. The oil depots of Shell and Caltex are located in Pandacan, Manila along the Pasig River.

- **Fisheries and aquaculture**. Municipal and commercial fisheries are principal activities in Manila Bay, and offers livelihood and income opportunities for communities around the bay. This sector generates on average PhP641 million in net revenues annually. Aquaculture farms, found along the coast of Manila Bay, contribute on average PhP5 billion worth of net revenues annually. Spills may impact fishery resources in the following ways: direct effect on the fish (lethal or sub-lethal); direct effects on fisheries (tainting and interference with fishing activities); and indirect effects through ecosystem disturbance (e.g., impacts on food chains).

- **Ports**. There are seven commercial ports in Manila Bay: North Harbor (Manila), South Harbor (Manila), Manila International Container Terminal (Manila), Ferry Terminal at the CCP Complex (Manila), Port of Lamao (Limay, Bataan), Port of Mariveles (Bataan), and Port of Orion (Bataan). Fish ports are found in Navotas, Parañaque City, Rosario and Tanza (Cavite), Hagonoy (Bulacan), and Orani (Bataan). There are also private ports, such as the Manila Bay Yacht Club, and those operated by industries in Bataan. The net revenues from ports and shipping industry amount to PhP 865,884,407 on average annually.

- **Sea lanes.** A traffic separation scheme is being implemented at the mouth of Manila Bay. The domestic vessels enter into and exit from the bay using

the route at the Cavite side or the south channel. The foreign/international vessels use the Bataan side or north channel in entering and exiting the bay. There is also a traffic separation scheme near the port area in Manila. However, there is no vessel traffic scheme within Manila Bay.

- **Power plants**. The National Power Corporation has Build-Operate-Own (BOO) contracts with private companies for the operation of a diesel power barge in Navotas and also the North Harbor Diesel Power barges. Some manufacturing establishments also have their own power plants.

2) ***moderate***

- **Manufacturing**. There are manufacturing establishments located along the coast of Bataan and the National Capital Region (Navotas and Manila)

- **Shipyards**. There are private shipyards located in Navotas, Malabon, Manila and Mariveles, Bataan. The naval shipyard is located in Fort San Felipe in Cavite City.

- **Naval installations**. A naval base is located at Sangley Point, Cavite City while a marine base is located at Ternate. Cavite.

c. **Socially important areas**

1) ***high***

- **Tourist and recreational sites**. These are found in the National Capital Region, Corregidor Island and Cavite. The annual average net revenues from tourism industry amount to PhP 2 billion.

- **Cultural and historical sites**. National Capital Region, Bataan, Corregidor Island and Cavite

2) ***moderate***

- **Residential areas**. There are settlements found along the coast of Manila Bay. There are also illegal/informal settlements on the seawalls and breakwater.

2.6 PRIORITIES FOR PROTECTION OF SHORELINE RESOURCES

Whenever total protection of all vulnerable environmental resources is unrealistic, priorities for protection should be based on the sensitivity and resource valuation of the resources in question. In order to prevent conflicts as to which areas should be immediately protected, a Priority for Protection list shall be formulated by the multi-sectoral oversight committee.

3.0 ADMINISTRATION

3.1 OVERALL ORGANIZATION AND RESPONSIBILITIES

The PCG through the CGD NCR-CL shall be the primary agency in administering, managing and maintaining this Plan. A multi sectoral oversight committee will be formed to assist the CGD NCR-CL in maintaining, updating the plan and ensuring the preparedness of all involved stakeholders,

3.2 MULTI-SECTORAL OVERSIGHT COMMITTEE

The main function of the multi-sectoral Oversight Committee is to assist the CGD NCR-CL through the District MEP Units, in maintaining and updating the MBOSCP and ensuring preparedness among stakeholders. Among its key functions are:

- ✓ Developing Inter- Agency cooperation
- ✓ Inter-Agency policy agreement
- ✓ Ensuring integration of all Manila Bay wide response arrangements
- ✓ Pre-Commitment of resources
- ✓ Clarification of agency responsibility

3.3 COMPOSITION OF THE MULTI-SECTORAL OVERSIGHT COMMITTEE

Chairman: Coast Guard District - NCR/CL

Members: Undersecretary/Asst. Sec, Water Sector, DENR
Undersecretary/Department of Energy
Asst. Sec, Department of Health
Director, PCG NOCOP
Regional Executive Directors (REDs) of the DENR Regional Offices in NCR, Regions 3 and 4
Director, DENR - Environmental Management Bureau
Director, DA - Bureau of Fisheries and Aquatic Resources
PG-ENROs of: Bataan, Bulacan, Pampanga and Cavite
ENROs of: Navotas, City of Manila, Pasay City, Parañaque City and Las Piñas City
Oil Companies: Shell, Caltex, Petron, Total and Unioil

3.4 MULTI- SECTORAL AGREEMENT

The duties and responsibilities of all stakeholders shall be governed and defined by a *multi-sectoral Memorandum of Understanding* (MOU), which will bind all signatories to abide by the provisions of this plan.

3.5 MEETING SCHEDULE

The Oversight Committee shall meet on the second Friday of June and December of every year at an appropriate venue to be designated by the Chairman. The Chairman may call an emergency meeting as the need arises.

3.6 TRAINING

The PCG will conduct programmed training and exercises for personnel likely to be engaged in oil spill response activities. This programmed training is envisioned to increase the number of personnel and enhancing their knowledge and skills in oil spill response operations. This includes training for first responder, on-scene commander/supervisor and administrators. Stakeholders will be involved in these training and exercises to reinforce their skills and knowledge on spill response operation.

Facilities/ vessel operators are expected to conduct in-house training and related activities to orient, refresh and update those personnel directly involved during a spill incident within their area of operation.

3.7 OIL SPILL RESPONSE EXERCISE

An annual exercise will be conducted, as far as practical, to test the operationality of this Plan.

3.8 MAINTENANCE OF EQUIPMENT

To ensure the equipment's operability during response operations, PCG, oil companies and other facilities with spill-combating resources should periodically conduct maintenance check on their equipment according to an Inspection and Maintenance Program that they should develop.

Maintenance procedure should include actual deployment of spill equipment to a body of water to test their functionality on actual sea operation. The maintenance program should include after use and storage check as well as replacement of spare parts that would be damaged due to the equipment's normal wear and tear characteristics.

4.0 PREPAREDNESS

4.1 DIVISION OF RESPONSIBILITY

In order to adequately define the roles and responsibilities of every stakeholder, this Plan defines the following:

- ✓ Primary National Response Organization as the NOCOP,
- ✓ District Response Organization as 1st Marine Environmental Protection Unit;
- ✓ First Responders pertains to in house/vessel response organizations of oil company and vessel;

Support agencies include NGOs/Private Entities/Government agencies that are identified in the Plan.

4.1.1 Primary National Response Organization

The National Operations Center for Oil Pollution (NOCOP) of the Philippine Coast Guard is the Primary National Response Organization. As such it is responsible for:

- ✓ Maintaining all national oil spill response resources.
- ✓ Ensure that all contingency plans are updated and in compliance with the PCG approved format and adequate enough to protect affected areas

4.1.2 District Response Organization

The CGD NCR/CL through the 1st Marine Environmental Protection Unit shall:

- ✓ Maintain the MBOSCP as well as the CGD NCR-CL oil spill contingency plan;
- ✓ Maintain spill response capability stipulated in this Plan;
- ✓ Ensure that all contingency plans in their Area of Responsibility are updated and in compliance with the PCG approved format and adequate enough to protect affected areas;
- ✓ Shall be the lead agency during Tier 2 response efforts.

4.1.3 Oil Companies/Vessel Response Organization

As stated in HPCG Memorandum Circular 01-2001, Oil Companies and Vessels shall maintain an oil spill response capability to handle Tier 1 spills emanating from their operations. As such they are responsible to undertake the following:

- ✓ Develop and maintain an oil spill contingency plan for their facilities;
- ✓ Develop and maintain on board a Shipboard Oil Pollution Emergency Plan (SOPEP);
- ✓ Maintain oil spill equipment capable of addressing spills from their facilities/vessels;
- ✓ Train enough number of personnel to mount an effective oil spill response operation;

- ✓ Vessel owner/operator should coordinate with their respective insurer on matters concerning claims for damage resulting from the spill incident.

4.1.4 Ports and Terminals

Port authorities, including private ports, are encouraged to maintain an oil spill contingency plan for possible spills in their port facilities and initiate response efforts for spills occurring within their port facilities

4.1.5 Support Agencies

Support agencies are agencies that are, although not mandated to respond to an oil spill, but because of their inherent interest in protecting the marine resources of the bay, should contribute to the oil spill preparedness and response activity stated in the MBOSCP.

The identified support agencies/organizations/entities and their possible roles in oil spill preparedness and response are summarized **Table 5**.

4.1.6 Volunteer Organizations

The Multi-sectoral Oversight Committee will determine volunteer organizations, which can provide assistance during oil spills and will provide a list of said organizations.

Table 5: Roles and Responsibilities of Support Agencies/Sectors

Agency/Sector	Incident Role	
Department of Environment and Natural Resources – Environmental Management Bureau (DENR-EMB) and its regional offices at NCR, Regions 3 and 4	Primary	Government agency responsible for environmental management
	Preparedness	Provides lists and data of resources within the Manila Bay
	Response	- Shall provide expert advice on sensitive resources - Assist the On-Scene Commander on specimen laboratory evaluation and analysis. - Issue permit on dumping of oily solid debris on land. - Identify waste disposal facilities - Provide necessary assistance to the OSC as requested during clean up operation. - Supervise ground dumping
Department of Environment and Natural Resources - Protected Areas and Wildlife Bureau (DENR PAWB) and its regional offices at NCR, Regions 3 and 4	Preparedness	Provides lists and data of resources and habitats within the Manila Bay
	Response	Shall be responsible for: - protected area, habitat and wildlife response. - rehabilitation and restoration of damaged/affected habitats and flora and fauna.

Agency/Sector	Incident Role	
Local Government Units (LGUs)	Primary	Mandated to manage coastal resources of municipal waters
	Preparedness	- Identify sensitive resources - provide additional labor - prepare *local oil spill contingency plans*
	Response	Provide: - disposal facility - additional manpower for clean-up operation - transportation requirements - heavy equipment during shoreline clean up - billeting spaces for responders - logistical support to the response effort
Metro Manila Development Authority (MMDA)	Primary	Mandated to provide metro-wide services, which have metro-wide impact and transcend legal political boundaries, such as development planning, transport and traffic management, solid waste disposal and management, flood control and sewerage management, zoning, land-use planning, health and sanitation, urban protection, pollution control and public safety (RA 7924)
	Preparedness	- Provide additional labor, heavy equipment. - Formulate and implement programs and policies and procedures to achieve public safety, especially preparedness for preventive and rescue operations during times of calamities and disasters.
	Response	Provide: - disposal facility - additional manpower for clean-up operation - transportation requirements - heavy equipment during shoreline clean up - logistical support to the response effort vehicular traffic direction
Philippine Ports Authority (PPA)	Primary	Government agency primary responsible for government port facility operations
	Preparedness	Develop and maintain an oil spill contingency plan for its port facilities covered under this Plan
	Response	- Initiate oil spill response in their facilities - Assist PCG in providing berthing and storage space for foreign vessel with equipment and response team
Philippine Coast Guard Auxiliary (PCGA)	Primary	A volunteer organization dedicated to assist the PCG in fulfilling its mandated functions
	Preparedness	Assist the PCG in conducting lecture and training of their members who are directly involved on activities/industries covered by this

Agency/Sector	Incident Role	
		plan
	Response	Provide: - additional manpower for clean-up operation - provide transportation (aerial and sea-borne surveillance and response) requirements
Local Shipping Lines	Primary	Under the Polluters Pay Principle owner of vessels are responsible for the funding of response efforts to spills from their vessels
	Preparedness	Prepare Shipboard Oil Pollution Emergency Plan
	Response	- Respond to oil spills emanating from their vessels. - Availability of their vessels/facilities to transport MARPOL equipment to spill site on call/request - Assist vessels under distress
Maritime Industry Authority (MARINA)	Preparedness	- Maintain database/inventory of Philippine registered vessels. - Set safety standards for vessels in accordance with applicable conventions and regulations. - Require all domestic ship operators to comply with operational and safety standards for vessels set by applicable conventions and regulations, maintain its vessels in safe and serviceable condition, meet the standards of safety of life at sea and safe manning requirements, and furnish safe, adequate, efficient, reliable and proper service at all times.
	Response	- Require any domestic ship operator to provide shipping services to any coastal area, island or region in the country where such services are necessary for the development of the area, to meet emergency sealift requirements, or when public interest so requires.
Department of Energy (DOE)	Preparedness	Take the lead in Oil Spill Prevention, Control and Response Training to review oil spill prevention measures and ensure preparedness of energy industry players in dealing with oil spill incidents.
Department of Agriculture - Bureau of Fisheries and Aquatic Resources (DA-BFAR)	Response	Assist in determining and identifying fishing grounds and other aquaculture sites that are vulnerable to oil spills Monitoring of fish; determination of food safety
Bureau of Customs (BUCUS)	Response	Assist the PCG in the expeditious clearing of response equipment from foreign sources

Agency/Sector	Incident Role	
Bureau of Immigration	Response	Assist the PCG in the clearing of foreign oil spill response crew/ technical personnel for further attachment to the On Scene Commander
Philippine Navy (PN)	Response	Assist in providing: - additional manpower for clean-up operation - transportation requirements - heavy equipment during shoreline clean up - billeting spaces for responders - logistical support to the response effort - security
Philippine Air Force (PAF)	Response	Assist in providing: - additional manpower for clean-up operation - transportation requirements - heavy equipment during shoreline clean up - billeting spaces for responders - logistical support to the response effort, e.g., air surveillance, etc.
Salvage Companies	Preparedness	Maintain tug boats and barges that could be utilized as oil spill equipment platforms
	Response	Provide vessels for logistical and oil spill response activities
Department of Health (DOH)	Response	Provide: - advise on health safety issues - medical services and practitioners to ensure health safety of clean-up personnel and affected residents.
Disaster Coordinating Councils - cities (CDCCs); - Provincial (PDCCs); - Regional (RDCCs) for NCR, Regions 3 and 4	Response	- Act as coordinating and monitoring body during response operations in their respective jurisdictions in coordination with the PCG.
Department of Interior and Local Government (DILG)	Preparedness and Response	- Establish a system of coordination and cooperation among the citizenry, local executives (LGUs) and DILG to ensure effective and efficient delivery of basic services to the public.

4.2 MBOSCP INCIDENT RESPONSE ORGANISATION

4.2.1 Oil Spill Incident Control Management Team (OSICMT)

During an oil spill response the On-Scene Commander shall have control of all oil spill response operations supported by an *Oil Spill Incident Control Management Team* (OSICMT) composed of the following:

- Operations Manager
- Planning Manager

- Logistics Manager, and
- Finance and Administration Manager.

Members of this team are selected from the identified support agencies.

4.2.2 Functions of the OSICMT

Commander, CGD NCR-CL (CCGD-NCR-CL)

- Over-all command & control of the crisis situation.
- Apprise the Commandant PCG of the crisis situation.
- Recommend to the CPCG the release of appropriate PCG funds to support the operation.

Commander, MEPCOM (CMEPCOM) / Director NOCOP

In the event that the spill shall escalate to a tier three spill, the CPCG through MEPCOM/Director NOCOP shall assume all responsibilities of the Commander, CGD NCR-CL.

- Evaluate reports;
- Designate alert conditions;
- Advise the CCGD-NCR-CL on appropriate course of action in combating the spill;
- Dispatch available resources;
- When necessary, call out the supporting elements;
- Recommend to CMEPCOM the suspension or termination of any operation;
- Liaise with the spiller or his insurer;
- Make recommendations to the port authorities regarding port closure or traffic limitations in the affected area;
- Prepare press releases;
- Prepare other public information material;
- Perform other tasks as directed by CPCG.

On-Scene Commander

The On-Scene Commander shall be the Station Commander of CGS Manila.

- Evaluate spill or potential spill reports;
- Designate the severity of the spill;
- Activate response team and conducts containment, recovery and clean-up operations;
- Sends Pollution Reports (POLREP) to NOCOP;
- Ensure that communication facilities are manned at all times and maintain communication with personnel in charge of assisting response team, support elements and the NOCOP;
- Coordinates all activities at the scene;

- In the event of inclement weather, recommends suspension of operation to NOCOP;
- Recommend termination of any operation;
- Submit post-operation report.

Operations Manager

The Operations Manager shall be the Operations Officer of CGD NCR-CL and shall deploy the MEPU NCR-CL to augment manpower and provide technical skills in oil spill response operation. He shall be responsible for the conduct of the following:

- water operation
- shoreline protection
- shoreline clean up
- air operation
- special operations
- Prepare reports based on received information
- Convey information within and/or outside the Center.

The Operations Manager shall be assisted by a team composed of personnel from the following agencies/entities:

a) Spiller
a) Philippine Navy (PN)
b) Philippine Air Force (PAF)
c) LGUs concerned
d) DENR-PAWB (NCR, R-3 & R-4 PAWCZMS)
e) BFAR (NCR/Region 3,4)
f) PNP - Maritime Group (Manila Bay area)
g) DOH of affected area
h) BFP of affected area

Planning Manager

The Planning Manager shall be the Plans and Programs Officer of the CGD NCR-CL and shall act as the Team Leader of the Planning Unit and will be responsible for the:

- Preparation of a list of all available personnel qualified and trained for the different function
- Coordination for additional labour
- Coordination for the assistance of external consultants and advisors in fields within which limited experience and expertise is available at PCG
- Request for assistance of local government or private agencies.
- Liaison with representatives of supporting elements.
- Coordination with the action of various agencies in supplying needed assistance.

- Establishment of communication with foreign contacts, disseminating appropriate information and request for assistance if required.

The Planning Manager shall be assisted by a team composed of personnel from the following agencies:

a) Spiller
b) PCG
c) PN
d) PAF
e) LGUs concerned
f) PNP

Logistics Manager

The Logistics Manager shall be Logistic Officer of CGD NCR-CL, and shall act as the Team Leader of the Logistics Unit and will be responsible to:

- Ensure immediate availability of needed equipment, supplies and materials.
- Ensure adequate transportation.
- Ensure adequate and effective communication.
- Ensure adequate personnel.
- Ensure that communication equipment is reliable.
- Assist the OSC in disseminating information.

- Assess health and safety hazards related to potential spill response efforts.
- Designate exclusion zones
- Ensure availability of medical assistance and Personnel Protective Equipment (PPE)

The Logistics Manager shall be assisted by a team composed of personnel from the following agencies:

a) Spiller
b) Department of Finance
c) Department of Budget Management
d) PN
e) PAF
f) LGUs concerned

Finance and Administration Manager

The Finance and Administration Manager shall be the Administrative Officer of CGD NCR-CL, and shall act as the Team Leader of the Finance and Administration Unit, and will be responsible to:

- Ensure the availability of funds to support the operations.

- Ensure that financial documentation is prepared.
- Maintain accounting records.
- Record, collate, reproduce, disseminate and secure all relevant documents pertaining to the spill incident.
- Ensure that continual scientific environment quality assessments are carried out and documented.
- Ensure that investigations, inspections and summary adjudication proceeding are conducted and documented.

The Finance Manager shall be assisted by a team composed of personnel from the following agencies:

a) Spiller
b) Department of Finance (DOF)
c) Department of Budget Management (DBM)
d) PCG
e) PN
f) PAF
g) concerned LGUs

4.3 RESPONSE LEVELS: TIER CLASS DEFINITIONS

In order to plan for the appropriate response efforts that are to be mounted, the concept of *Tiered response* has become common internationally. Oil spills and the responses they require are classified according to the size of the spill and the proximity to a response center. The spill dimensions associated with the individual Tier classes are defined in Table 6.

- **Tier 1** - normally associated with small local events for which response resources should exist locally. Examples are spills associated with transfer of fuel or bunker at a terminal, and smaller harbour spills. There will normally be no need to involve external resources for a Tier 1 spill.

- **Tier 2** - a larger spill than tier 1 that may occur in the vicinity of a response centre or smaller spills at distant locations for which resources from several sources may be required; for instance industry and governmental resources.

- **Tier 3** - response is dimensioned for the largest spills, such as large tanker accidents or offshore blowouts. Tier 3 arrangements will usually call for the entire oil spill response resources in a nation and may also call for international assistance.

Table 6: Tier Classification

Tier	Amount	Response
1	Up to 10 m^3	Company or Ship Response Organization/ District Response Organization
2	Up to 1000 m^3	First Tier Response plus National Response Organization
3	> 1000 m^3	The total national resources, with the addition of foreign resources

4.4 CONTROL

4.4.1 Tier 1 spill

The spiller has the prime responsibility of conducting immediate oil spill response operations. However, when the spiller is either unknown or has no capacity to adequately respond to a tier 1 oil spill, the District Response Organization assumes control. The MBOSCP is part of the tier 2 response system.

4.4.2 Tier 2 spill

The District Response Organization assumes control during tier 2 spills. The MBOSCP is also part of the tier 2 response system.

4.4.3 Tier 3 spill

The National Response Organization assumes control during tier 3 spills.

4.5 OIL SPILL INCIDENT CONTROL ROOM AND FACILITIES

The Incident Control Room is located at Headquarters, Coast Guard District-NCR-CL at Coast Guard Base Farola, Muelle de la Industria, Binondo, and Manila. The incident control room is equipped with the necessary radio (VHF-UHF, SSB) and telephone (Facsimile, Internet connection, hotline) communication, oil spill simulation software and hardware, Geographic Information System (GIS), and audio-visual equipment.

4.6 FIELD COMMUNICATION EQUIPMENT

During an event of an oil spill, the PCG OSRT members responding to the spill are provided with radios as their primary means of communication with the OSICMT at the OSICR Channel 16 of the Marine Band will be used as calling channel and channel 88 as the operational channel during spill response operations. Cellular phones are also considered as a means of relaying relevant information to the OSICMT.

4.7 REPORTS

The attached formats (**Appendix D**) for the pollution reports (POLREP) shall be used by the OSRT or personnel responsible for reporting, updating and recording of the incident.

4.8 EQUIPMENT, SUPPLIES AND SERVICES

Equipment is mainly available from three sources, namely: Philippine Coast Guard, Waterborne Industry Spill Equipment (WISE) and private oil companies. List of available equipment is attached as **Appendix E**.

4.8.1 Philippine Coast Guard

Oil Spill Response Equipment of the PCG is stockpiled at the Headquarters of the Marine Environmental Protection Command.

4.8.2 Oil Industry (Petron, Caltex and Shell)

- Petron Corporation has spill equipment located within their facilities in Limay, Bataan and Rosario, Cavite.
- The spill equipment of Shell and Caltex are located in Pandacan, Manila and is being managed by Pandancan Depot Services Inc.

4.8.3 Waterborne Industry Spill Equipment (WISE)

A complete list of available equipment from WISE and their location is shown on **Appendix E**. Although located outside the Manila Bay area, they are available within 24 hours.

4.8.4 Availability of Vessels

PCG has three (3) Search and Rescue Vessels, one (1) buoy tender and several small crafts operating within the Manila Bay. These vessels are on standby status 24 hours a day.

Oil Spill Response Tugboat vessel of the Waterborne Industry Spill Equipment can be tapped upon arrangement. A list of available PCG vessels can be seen in **Appendix E**.

4.8.5 Hiring Of Other Response Vessels

Should the spiller be unable to mount sea operations, the PCG shall hire/contract vessels who can undertake such operations. The spiller will pay for the cost of hiring the vessel. Likewise, should a Coast Guard or Naval Vessel be used during the operations, its logistical and operational expenses will be shouldered by the spiller.

5.0 RESPONSE

5.1 DIVISION OF RESPONSIBILITY

5.1.1 Primary National Response Organization

As the Primary National Response Organization during an oil spill incident, the National Operations Center for Oil Pollution (NOCOP) of the Philippine Coast Guard is responsible for:

- ✓ Over-all command and control of a national oil spill response to a tier 3 spill.
- ✓ Initiating a tier three response
- ✓ Making available all national oil spill response resources
- ✓ Ensure there is adequate spill response actions to protect affected areas
- ✓ Shall be the lead agency during national response efforts

5.1.2 District Response Organization

The CGD NCR/CL, through the 1st Marine Environmental Protection Unit, shall be responsible for a Tier 2 response. In the event that the spiller has no capacity to adequately respond to a Tier 1 incident, it shall:

- ✓ Take over all command and control of Tier 1 and 2 spill response; Initiate a district oil spill response to a Tier 2 spill.
- ✓ Make available all district oil spill response resources;
- ✓ Ensure there is adequate spill response actions to protect affected areas of the CGD NCR/CL;
- ✓ Shall be the lead agency during district response efforts.

5.1.3 In-House/Vessel Response Organization

Oil Companies and vessels are required to mount a first response to a tier 1 spill emanating from their facilities/vessels as such they are responsible for:

- ✓ Responding to spills resulting from their operations;
- ✓ Reporting such incidents to the PCG/ NOCOP;
- ✓ Providing financial assistance to the whole response effort;
- ✓ Pay damages to affected stakeholders.

5.1.4 Support Agencies

Role of support agencies, organizations and other entities during response operation are listed in Section 3 of this Plan/MBOSCP.

5.2 RESPONSE STRATEGIES

5.2.1 General Philosophy and Objectives

Knowing the socio-economic contribution of Manila Bay and its resource to the provinces and cities located within its shores, the preservation of marine resources are of paramount importance. The key objectives of this plan are:

- ✓ Preservation of the viability of Manila Bay to sustain marine life in support of mariculture/aquaculture and fishery activities
- ✓ Protection of cultural and heritage sites in Manila Bay
- ✓ Protection of human life from the harmful effects of oil spills
- ✓ Preservation of amenity and recreational areas within the bay that contribute to the economy of the locality wherein they are located
- ✓ The safety of life and property are of vital importance during an oil spill response operation.
- ✓ Oil response operation should always result in a higher Net Environmental Benefit (see **Appendix F** for Guidelines on Net Environmental Benefit Analysis or NEBA)

5.2.2 Strategy for Open Sea

If a spill will occur in open waters and because of the semi-enclosed nature of the bay, the likelihood that it will reach shore is very high. Shoreline clean-up is more costly and labor intensive than to contain and recover the spilled oil in open sea. It is therefore prudent that, if ever possible the spill be contained and recovered near the source and prevented from reaching shore. With this in mind the following strategies will be adopted:

a) Mechanical containment and recovery
b) Chemical dispersion

5.2.3 Strategy for Coastal Zones

The coastal zone is defined here as the transition zone between open water and the shoreline. Many of Manila bay's coastal zones are utilized as mari-culture areas and ecologically important areas that are sensitive to most oil spill response operations. These areas do not normally allow the use of large recovery systems as in open water, but may still be manoeuvrable by smaller boats.

The main strategies for coastal zones are:

a) Mechanically contain and recover
b) Deflect from sensitive resources
c) Use of sorbents for sensitive coastal zone
d) Chemical dispersion for non-sensitive coastal zone

5.2.4 Strategy for Shoreline Response

Shoreline response strategies that are to be taken should take into account each shoreline type's ability to naturally assimilate and disperse oil.

Response methods to be adopted are:

a) Deflect from sensitive resources
b) Manual sorbents application
c) Manual removal of oiled material (hand, shovels, rakes)
d) Manual cutting of vegetation
e) Low pressure flushing at ambient temperature
f) Warm water/low pressure washing
g) High pressure flushing
h) Manual scraping
i) Beach cleaners
j) Bioremediation
k) Dispersants (chemical beach cleaning agents)
l) Natural cleaning

5.2.5 Strategy for Oil and Waste Storage and Disposal

Oil and oil-contaminated waste must be disposed through the PCG/EMB-DENR accredited contractors or as may be determined by the OSC/Stakeholders. A list of accredited oily waste collectors/transporters/treaters can be seen in **Appendix G**.

5.2.6 Do Nothing Approach

If the monitored spill trajectory and nature of the spilled oil would indicate that it will not impact any sensitive resource, it is suggested that the spilled oil be left to weather naturally but with constant monitoring.

5.2.7 Steps in determining appropriate spill response

The diagram in **Figure 3** details the steps to taken in determining the appropriate response strategy.

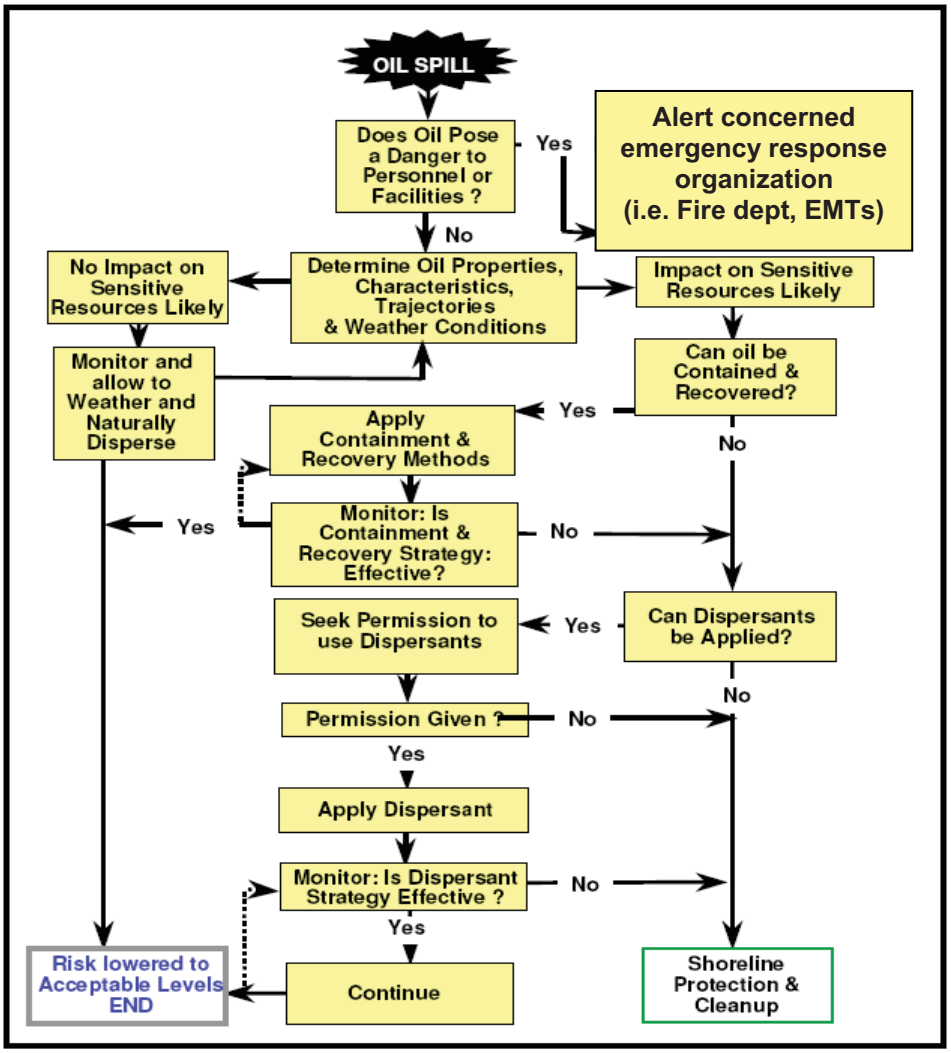


Figure 3: Steps in Determining Appropriate Spill Response

ACTION AND OPERATION SECTION

5.3 PHASES OF INCIDENT RESPONSE

Marine pollution response proceeds through a number of stages (**Figure 4)**, although the duration of each, and the effort expended, varies greatly according to the scale and nature of the incident. The procedures to be followed in each of these are outlined in this Plan/ MBOSCP.

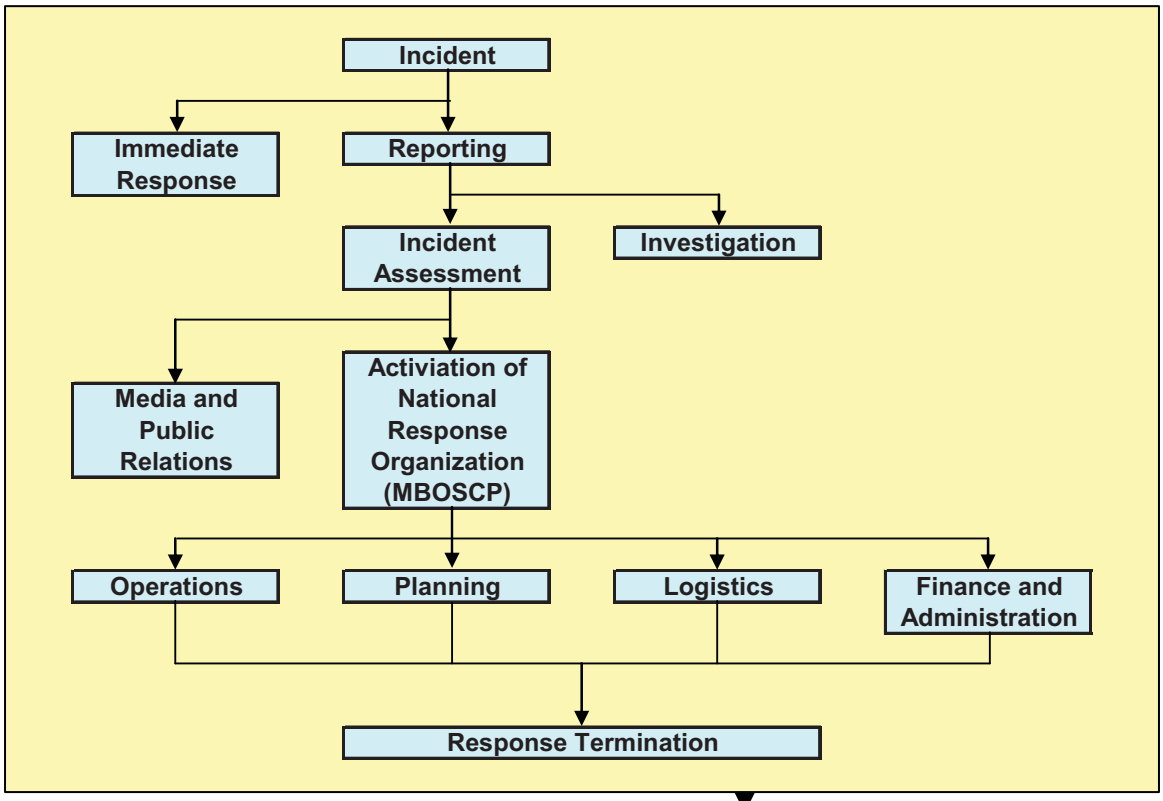


Figure 4: Stages of Oil Spill Response

5.3.1 Reporting

The rapid and accurate reporting of spills is important in enabling a rapid mobilization of an appropriate response.

5.3.1.2 *All Spills*

All oil spills must be reported to the Director, National Operations Center for Oil Pollution.

5.3.1.3 *Spills from Vessels*

All spills into marine waters must be reported immediately to the National Operation Center for Oil Pollution. This reporting is the responsibility of the Master of the Vessel. Spills can also be reported to the nearest Coast Guard Unit. A list of the PCG units and their contact numbers can be found on appendix H

MARINE ENVIRONMENTAL PROTECTION COMMAND/
NATIONAL OPERATIONS CENTER for OIL POLLUTION
CONTACT NUMBER,
Telefax: 063-2-243-0463

A list of contact numbers of all stakeholders that would be involved in a response can be seen on **Appendix H**.

Important Note: Facility Oil Spill Contingency Plans (OSCPs), and vessel's Shipboard Contingency Plans must clearly indicate the reporting procedures that are applicable within their area of operations. The OSCPs must also clearly assign responsibilities for reporting pollution incidents.

5.4 IMMEDIATE RESPONSE

Parties responsible for spills and discharges must take all actions needed to safely:

- Ensure the safety of workers and the public.
- Make the vessel or facility safe.
- Notify the Philippine Coast Guard
- Prevent further release of oil or chemical.
- Limit the spread of oil or chemical.
- Recover spilt oil or chemical.
- Mobilise available resources for any ongoing response.

5.5 INCIDENT ASSESSMENT

Incident assessment may require a number of tasks:

- Investigation of spill source. (This will be conducted by the PCG.)
- Spill location, observation and monitoring.
- Assessment of required level of response. This task is addressed below.

5.5.1 Responsibility for Determining the Response Tier

Tier 1 status is generally determined by the Facility Response Organization Head or Master of the vessel in consultation with the PCG. However, if both parties are unable to determine the tier level or the spiller is unknown the PCG will determine the appropriate spill response level. For spills that require more than a Tier 1 response, a Tier 2 or Tier 3 status is determined by the Philippine Coast Guard.

5.6 ACTIVATION OF THE OIL SPILL INCIDENT CONTROL MANAGEMENT TEAM (OSICMT)

If a response is required, the Commander, CGD NCR-CL shall mobilize a suitable OSICMT. Personnel who can man the different functions are shown in **Figure 5**. The size of the OSICMT will depend on the nature and scale of the incident.

If industry is involved in the spill, a representative from the responsible company will be part of the OSICMT. The distribution and the functions within the OSICMT are described in section 3 of this plan.

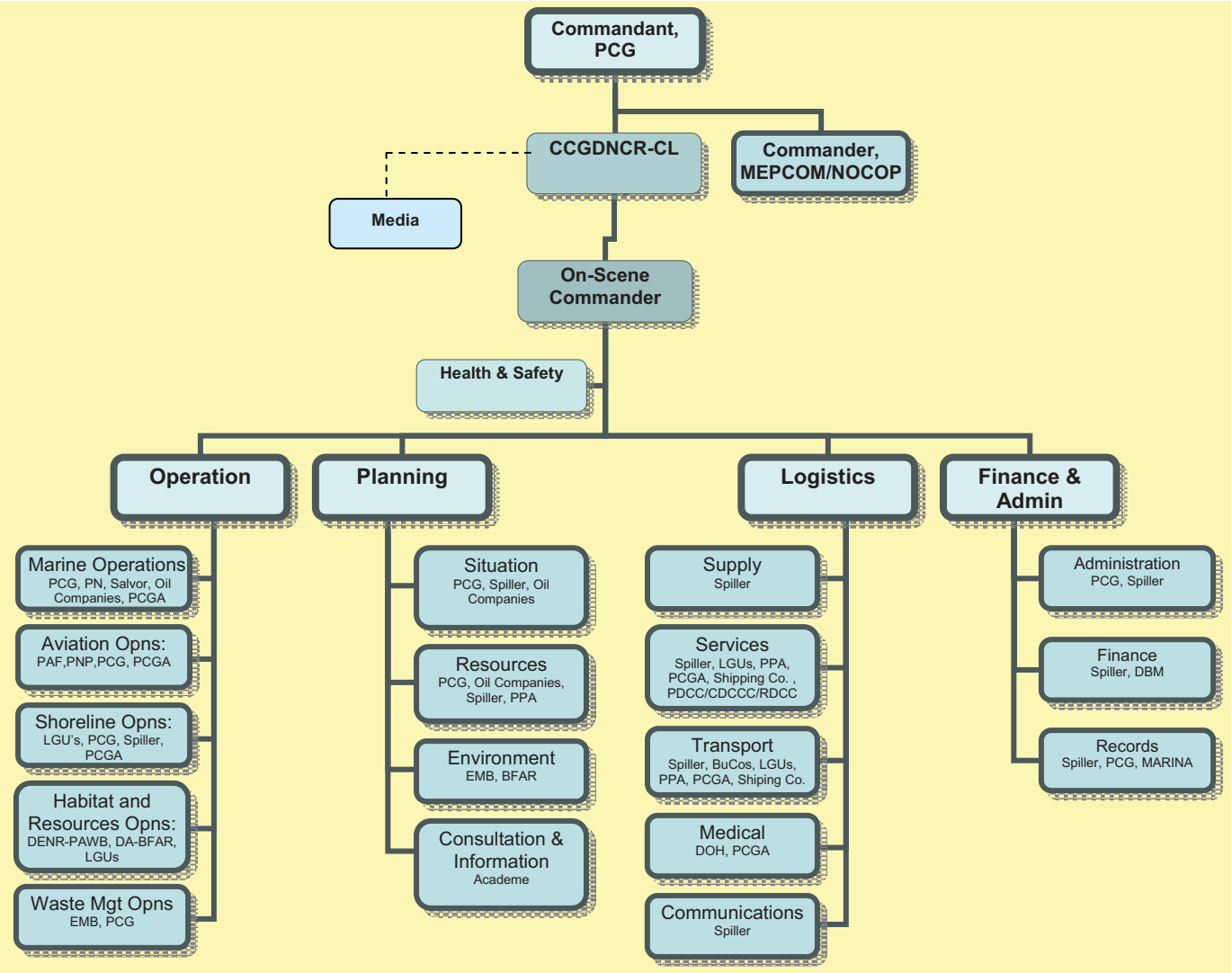


Figure 5: Oil Spill Incident Control Management Team

5.7 MEDIA AND PUBLIC LIAISON

Management of public information and the media will be handled by the Director, NOCOP, through the Public Information Officer of the PCG.

5.8 OPERATIONS

5.8.1 Operational Priorities

For most spills the operational response priorities will be

- Monitoring; natural weathering and dispersal.
- Containment and recovery.
- Use of dispersants.
- Protection of shorelines and other sensitive natural, cultural or socio-economic resource
- Shoreline cleanup.

5.8.2 Monitoring

The behavior and trajectory of oil slicks can be determined by direct observation (surveillance), manual calculation, or through computer modeling. The Aerial Surveillance Manual provides guidelines for this.

5.8.2.1 *Predicting Spill Trajectory*

Manual Calculation:

The trajectory of a spill can be roughly calculated by adding the surface current velocity to 3% of the wind velocity.

Computer Modeling:

Spill trajectory modeling software is available at the PMO, Manila Bay Environmental Management Program and is part of the Integrated Information Management System administered by the PMO, MBEMP. The model requires the supply of current on site wind data (if available) and past, current and future wind data from PAG-ASA.

5.8.2.2 *Identification of Resources at Risk* (refer to Section 2)

5.8.2.3 *Slick Parameters*

Estimating the oil slick area, oil thickness and possible volumes is important in determining the appropriate response strategies and resource requirements.

Estimates of spill volumes can often be made on the basis of the cause and duration of the spill. It is also possible to estimate the volume of a slick on the basis of its appearance at sea, and the area covered.

5.8.3 Containment and Recovery

Effective containment of spilt oil limits the extent of any potential environmental harm. Effective containment of spilt oil limits the extent of any potential environmental harm and will facilitate the recovery of the oil. Containment of an oil spill relies on the effective and efficient deployment of booms. Effective recovery requires the deployment of suitable skimmers and adequate containers for storage of recovered oil.

5.8.3.1 *Constraints*

As noted in Table 7, this response strategy is constrained by a number of environmental and logistics considerations.

Table 7: Constraints to Response Strategies

Response Strategy		Constraints				
		Sea State[1]	Current (knots)[2]	Wind (knots)	Oil Viscosity[3]	Others
Boom	Containment	3-4	1.0	14-22	-	Vessel availability
	Deflection	3-4	2.0	14-22	-	
Skimmers	Weir	1	1.0	7	<1000[4]	Recover waste of storage availability
	Disc	2-3	1.0	11-14	<1000[4]	
	Mop/Belt	3-4	1.0	14-22	<1000[4]	
	Vacuum	1	1.0	7	-	
Physical Break-up[4]		-	-	-	-	Oil type
Dispersants	Vessels	4	-	22.0	<2000[4]	-
	Aircraft	5	-	27.0	<2000[4]	Range
Monitoring		-	-	-	-	Visibility

[1] Beaufort scale

[2] 1 knot = 0.5m/second or 1.8 km per hour approximately

[3] cSt = centistokes

[4] This method should ***not*** be used on fresh spills of light crude or condensate. All light oils should be allowed to weather for at least for a few hours.

The effectiveness of some equipment is restricted to a particular range of oil types (usually, viscosity is the constraint) or sea states. It is important therefore that the characteristics of the spilled oil and weather conditions are known before

equipment is activated. The strategy is also unsuitable for use on very light oils and condensates.

5.8.4 Use of Dispersants

Dispersants act to “break up” surface slicks and will result in oil becoming mixed into the upper layers of the water column (i.e., 0-5m depths).

5.8.4.1 *Considerations and Constraints*

Dispersants should be used to:

- Reduce the fire risk posed by spills of light to moderate crude oils or diesel.
- Facilitate the breakup of spills of dispersable oils.

Dispersants should be used when there is a net environmental benefit, i.e. when the potential harm, done by dispersed oil is less than untreated oil.

Caution: Dispersants should not be used unless authorized by the Philippine Coast Guard. Responders must first seek the approval of the PCG.

The decision as to whether to use dispersants is based on a number of considerations such as:

- Health and safety aspects of handling dispersants must be managed.
- Environmental risks must be assessed.
- Spotter aircraft are required to assist vessels to locate the oil, (unless the oil slick is thick).

5.8.4.2 *Application Methods*

Dispersants may be applied by:

- Vessels equipped with dispersant spray booms: This is a relatively slow method but is particularly applicable for small spills of oil close to the source.
- Helicopter and spray buckets.
- Fixed wing aircraft.

5.8.5 Shoreline Response

When spilled oil cannot be contained and recovered nor dispersed it should be deflected to less sensitive areas and shoreline operations undertaken.

5.8.5.1 *Considerations and Constraints*

Shoreline cleanup strategies must be developed in consideration of shoreline characteristics, such as:

- Substrate type and shoreline type
- Exposure to wave action
- Biological, social or economic resources
- Access available
- Nature of the oil (viscosity etc.)
- Amount of oil present
- Distribution of oil on the beach, and in the sediments
- Available equipment and labor
- Available waste storage areas.

5.8.5.2 *Methods*

Table 7 indicates suitable cleanup methods for various shoreline types. Methods used should be based on a sound assessment of the factors listed above.

Table 7: Clean-up Methods

		Shoreline Type[1]													
Cleanup Methods		**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**
Natural Processes		R	R	F	F	F	R	F	R	C	C	C	C	C	R
Manual Cleanup		F	F	R	R	R	R	R	C	C	C	C	C	R	R
Trenching					F	F	F	F							
Mechanical Sediment Removal							F	R	C						
Mech. Sediment Reworking							R								
Water Washing (Deluge)			F	F	F	F	R	F	F	F	F	F	C	C	
Water Washing (Low P)[2]			F					F	R	F	F	F	C	C	
Water Washing (High P)[2]		C	C	C	C	R	F								F
Hot Water Washing (Low P)[2]		C													F
Hot Water Washing (High P)[2]		C													F
Sand Blasting/Steam Cleaning		C													F
Vacuum Recovery		F	F	F	F	F	F	R	R	C	C	C	C	R	C
Sed't Excavation/Cleaning/Replac't					F	F	F								
Cutting Oiled Vegetation		C	C	C	C	C	C	C		C	C			C	C
Chemical Cleaning		C	C	C	C	C	C								C
Bioremediat-ion:	Nutrient Enhancement				C	C	C	C		C	C				
	Microbial Addition				C	C	C	C	C	C	C	C	C	C	

R — *Recommended – preferred option.*
F — *Feasible, but not preferred option. Assessment needed.*
NA — *Feasible but not available because of location of resources or other logistics constraint.*
C — *Conditional. Possibly useful or may be considered but may have adverse effects or result in damage. Assessment and approval required.*
NR — *Not required. Oil not expected to persist.*
Not recommended – either not feasible, not safe or has significant adverse effects.

(1)
A= *Exposed Bedrock Cliff/Seawalls*
B= *Exposed Bedrock Platform/Reef*
C= *Sheltered Bedrock Platform/Reef*
D= *Exposed Boulder/ Cobble and Rip rap*
E= *Sheltered Boulder/ Cobble and Rip rap*
F= Pebble Beaches
G= Sand Beaches
H= Intertidal Mud/Sand Flats
I= Mangroves
J= Saltmarshes
K= Seagrass (Shallow/Intertidal)
L= Shallow/Intertidal Corals
M= Natural Inlets/ Channels
N= Marinas/ Artificial Waterways

(2) Low P = <50 PSI, High P = >50 PSI

5.8.6 Wildlife Response

Wildlife, particularly birds, may be severely impacted by spilled oil. Migratory birds are especially susceptible to oiling. The DENR PAWB shall be responsible for wildlife response.

5.8.7 Waste Management

Wastes generated by marine containment and recovery, or by shoreline cleanup, must be stored, transported and disposed of according to DENR-EMB guidelines. While this remains the responsibility of the spiller, the DENR-EMB maintains a list of companies licensed to transport, store and dispose of wastes. The DENR EMB or the concerned local government unit will assist the On Scene Commander in the temporary storage and transport of wastes and will assist responsible parties in identifying potential waste storage and disposal contractors.

5.9 RESPONSE TERMINATION

5.9.1 Responsibility

The decision to terminate a Tier 1 response is taken by the District Response Organization in consultation with the affected stakeholders. The OIC of the 1 MEPU will then inform the Director, NOCOP of the group's decision to terminate the response effort. Higher tiered responses can be terminated only on the authorization of the Director, NOCOP in consultation with concerned LGU, DENR-EMB, BFAR, and other concerned agencies as appropriate.

5.9.2 Conditions for Termination

There are no "rules" for deciding when a response should be terminated.

Generally, the decision to stop active cleanup is taken when efforts are not returning any tangible benefit. This decision is rarely made at the same time for all components of the response and some Units will be reduced in size, or demobilized, earlier than others.

5.9.2.1 *Marine and Aerial Response*

Marine Response Operations are stood down when:

- All oil has been recovered; or
- The oil slick has dissipated (broken up); or
- The oil slick has gone out to sea and is beyond the range of response options and is unlikely to return; or
- All oil has impacted shorelines and is unlikely to be refloated. In this case some marine response resources would remain on standby until shoreline response has been terminated.
- The oil has otherwise ceased to be a threat to the environment.

5.9.2.2 *Shoreline Response*

Shoreline cleanup operations may be terminated when:

- All accessible shorelines are clean or
- Cleanup is having no further beneficial effect, or
- Cleanup is having deleterious effects on the shoreline or associated plants or animals, or

- The extent and degree of oiling is judged to be acceptable or as having little or no adverse effects.

5.9.2.3 *Wildlife*

Wildlife response may continue for some time and will generally only cease when all affected animals are cleaned and rehabilitated. Although the wildlife response may continue after the demobilization of the rest of the OSICMT, it is important that NOCOP maintain records so that costs can be claimed where applicable.

5.9.2.4 *Waste Management*

In a major spill the management of wastes may continue for a considerable time beyond the demobilization of field operations. The responsibility for this would generally rest with the Spiller or, if the Spiller is unknown, responsibility lies with the Local Government Unit.

5.9.2.5 *Logistics*

Logistics function will continue until all equipment is recovered, cleaned and returned to its source.

5.9.2.6 *Finance and Administration*

The Finance Unit will be retained until all claims are processed and costs are determined. This may be some time after demobilization of the OSICMT.

5.9.3 Debriefing

The PCG will hold a post-spill debriefing for any spill for which a response was activated. This should be held within 14 days of termination of the response. The debriefing should address:

- Spill causes (if known).
- Speed of response activation.
- Effectiveness of tactics and strategies.
- Equipment suitability.
- Health and Safety issues (if any).
- Communications
- Integration of plan and procedures with other response agencies.
- Possible improvements in plans, procedures strategies or response methods.

5.9.4 Incident Report

The Director, NOCOP shall prepare an incident report, the contents of which should include response cost and damage assessment.

5.9.5 Cost Recovery

Marine pollution incidents can result in expensive cleanup costs and damages.

5.9.5.1 *Response Costs*

All records of response costs must be collated and submitted to the Director of NOCOP for claims recovery. The PCG will process these costs and collate for possible recovery from the Responsible Party.

5.9.5.2 *Compensation Claims*

Members of the public or commercial operators who have incurred costs or damages resulting from an oil pollution incident from a vessel can apply for compensation from the vessel's P&I Club. In large responses, the vessel's insurers shall establish a *Claims Office* located near the incident control room where claims can be lodged.

In the case of spills from other sources, claims should be sent to the Responsible Party (i.e., the spiller). The PCG may collate such claims for presentation to the Responsible Party or their insurers.

The 1992 Civil Liability Convention

Under the 1992 Civil Liability Convention (CLC), claims for compensation for oil pollution damage caused by persistent oil may be made against the registered owner of the ship from which the oil that caused the damage originated (or his insurer).

The shipowner is liable to pay compensation for pollution damage caused by escape or discharge of persistent oil from his ship even if the pollution was not due to any fault on his part. The shipowner is exempt from his liability only in very special circumstances.

The shipowner is entitled to limit his liability to an amount calculated on the basis of the tonnage of the ship. The shipowner is deprived of the right to limit his liability, however, if it is proved that the pollution damage resulted from his personal act or omission, committed with the intent to cause pollution damage, or recklessly and with knowledge that such damage would probably occur.

The 1992 Fund Convention

The 1992 Fund was established in 1996 under the 1992 Fund Convention, and is financed by companies and other entities in Member States that receive certain types of oil carried by sea. The Fund is an intergovernmental organization set up, and governed by States.

Under the 1992 Fund Convention, additional compensation is made available by the 1992 Fund when claimants do not obtain full compensation under the 1992 CLC. The maximum compensation payable by the 1992 Fund for any one incident is 203 million SDR (US$310 million) whatever the size of the ship.

DATA DIRECTORY SECTION

Appendix A
DENSITY AND VESSEL TRAFFIC

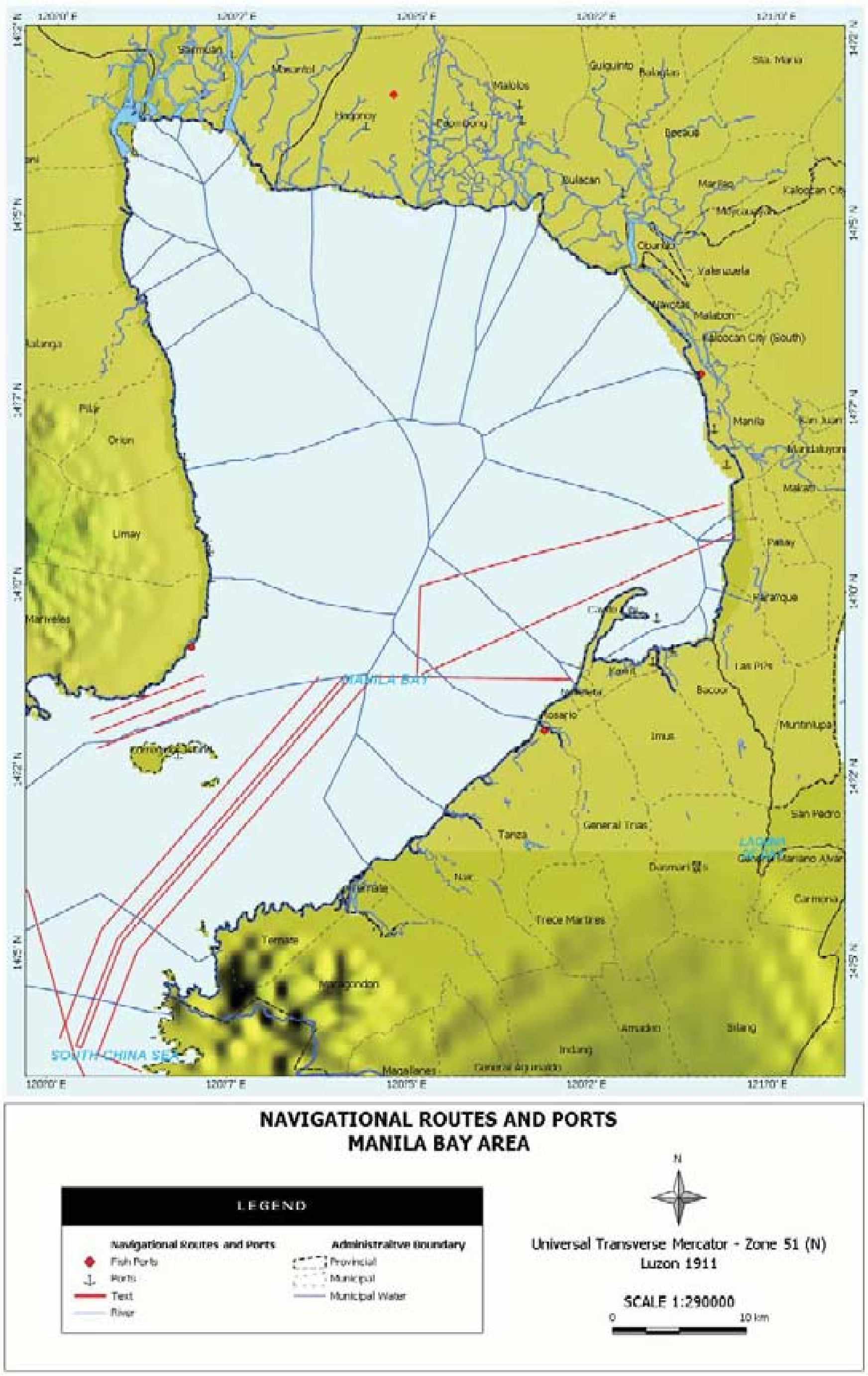
PMO : NORTH HARBOR (MANILA)	
AT BERTH ONLY	
2004	
PARTICULARS	TOTAL
Number of Vessels	6,292
Domestic	6,026
Foreign	266

PMO : LIMAY	
AT BERTH AND ANCHORAGE	
2004	
PARTICULARS	TOTAL
1. Number of Vessels	11,368
Domestic	10,841
Foreign	527

PDO MANILA: MANILA INT'L CONTAINER TERM. FIELD OFFICE	
AT BERTH AND ANCHORAGE	
2004	
PARTICULARS	TOTAL
1. Number of Vessels	2,061
Domestic	4
Foreign	2,057

PMO : SOUTH HARBOR (MANILA)	
AT BERTH AND ANCHORAGE	
2004	
PARTICULARS	TOTAL
1. Number of Vessels	10,135
Domestic	8,329
Foreign	1,806

Appendix B
NAVIGATIONAL ROUTES AND PORTS


NAVIGATIONAL ROUTES AND PORTS
MANILA BAY AREA
LEGEND
Navigational Routes and Ports
Fish Ports
Ports
Text
River
Administrative Boundary
Provincial
Municipal
Municipal Water
N
Universal Transverse Mercator - Zone 51 (N)
Luzon 1911
SCALE 1:290000
0
10 km
MANILA BAY
SOUTH CHINA SEA
Malolos
Guiguinto
Sta. Maria
Bulacan
Meycauayan
Valenzuela
Navotas
Malabon
Kalookan City (South)
Manila
San Juan
Makati
Pasay
Parañaque
Las Piñas
Bacoor
Muntinlupa
Imus
Rosario
Noveleta
Kawit
General Trias
Tanza
Naic
Ternate
Maragondon
Trece Martires
Dasmariñas
Carmona
San Pedro
Silang
Amadeo
Indang
Magallanes
Pilar
Orion
Limay
Mariveles
Hagonoy
Obando
Bocaue
Balagtas
Paombong
Calumpit
Mabalacat
General Mariano Alvarez
Rosario
Balanga

Private Ports in Bataan

STORAGE FACILITIES (PRIVATE PORTS /TERMINALS IN BATAAN)

LOCATION	TYPE	CAPACITY
a. LIMAY		
Petron Bataan Refinery	Crude Oil Storage Tanks	1,000,000 barrels
	LPG Storage Tanks	100,000 barrels
PPI/ Limay Bulk	Warehouse	53,000 Metric Tons
	Open Storage Area	180,000 m
PNOC PDC	Warehouse	3,000 m
	Open Stacking Area	4,000 m
OILINK	Storage Tanks	455,000 barrels
	Open Storage Area	10,000 m
MARIVELES		
Total-Liquigaz	Storage Tanks	180,000 barrels
	LPG Storage Vessels	12,000 metric tons
SMC-BMT	Vertical Silos	18,000 metric tons
	Star Bins	2,500 metric tons
	Intermediate Bins	320 metric tons
	Loading Bins	120 metric tons
ATI-MGT	Vertical Silos	110,000 metric tons
	Warehouse	50,000 metric tons

PORT SERVICES

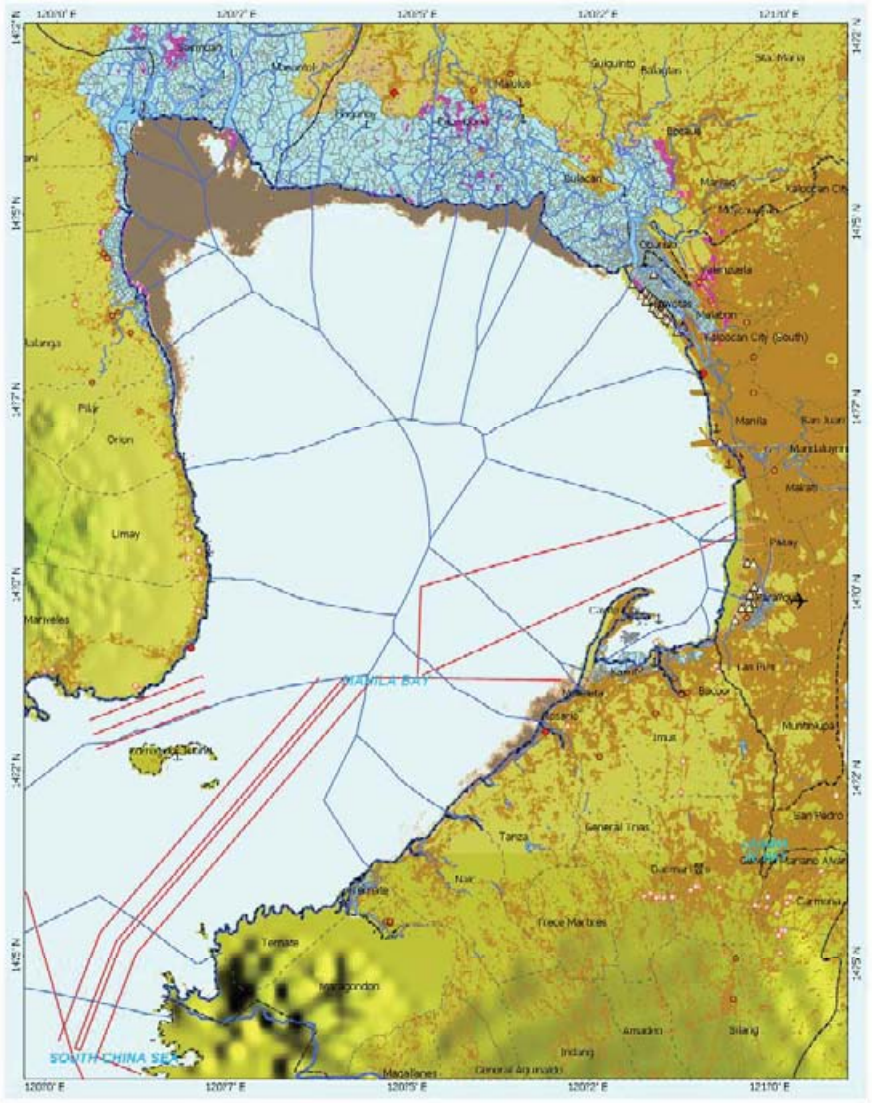
a. CARGO-HANDLING SERVICES

Name of Cargo Handler	Area of Operation	Type of Equipment
DJ Roque const.Co.Inc.	Lamao Anchorage	Special equipment for stevedoring work
Ace Technical	Mariveles Anchorage	Equipment for bulk cargo and grains
Herma Port Terminals	Mariveles	Equipment for explosives and dangerous cargoes
PBR	Limay	Special equipment for petroleum products
PPI	Limay	Shovel grab, conveyors
Oilink International Corp.	Lucanin	Pipelines, storage tanks
Total-Liquigaz	Alas-asin	Pipelines, storage tanks
Bataan Malt Terminal	Mariveles	Unloaders, conveyors, silo
Mariveles Grains Terminal	Mariveles	Unloaders, conveyors, silo

b. BERTHING FACILITIES: (PRIVATE PORTS/TERMINALS IN BATAAN)

Pier/Terminal	Length & Width	Ave. Draft	Berth	Cargo System
b. PBR				
Product Pier	439 m. x 15.90 m.	3.98-13 m.	8	Loaders/ Pipelines
Causeway	85.36 m.			
LPG Pier	24.6 m x 3.0 m.	5.40 m.	1	Loaders/ Pipelines
CBM	305 m. x 49 m.	15.85 m.	1	Submarine Pipes
SBM	341.38 m. x 53.35 m.	22.86	1	Submarine Pipes
c. PPI/ LBHTI				
T-pier	426.7 m. x 411.4 m.	14.0 m.	2	Unloader/ Conveyor
Causeway	299 m. x 4.5 m.	4.50 m	1	Pipelines
d. PNOC/PDC				
Causeway	13 m. wide			
Pier Head	178 m. x 5.0 m.	14.0 m	2	Loading Platform
Protective beam	18.0 m. x 20.0 m.			
e. OILINK				
Sea berth	260.0 m. x 40.0 m.	11.0 m.	1	Pipelines/tanks
Finger pier	60.0 m. x 4.0 m.	3.50	2	Pipelines/tanks
f. Total-Liquigaz	530.0 m. x 5.0 m.	20.0 m.	3	Pipelines/ tanks
g. Edison Bataan	50.0 m x 6.0 m.	6.0 m	1	Pipelines
h. Robust Rocks	200.0 m x 7.0	6.0 m	4	Loading Ramps
i. Herma Port	358.0 m x unlimited	7.50 m.	3	Graving dock/crane
j. SMC-BMT	217.0 m x 15.0	14.50 m	1	Portalino unloader
k. ATI-MGT	156.0 m. x 10.0 m	14.50	2	Vacubators/silos

Appendix C
OIL SPILL SENSITIVITY INDEX MAPS



COMPOSITE MAP FOR OIL SPILL CONTINGENCY PLAN
MANILA BAY AREA

LEGEND

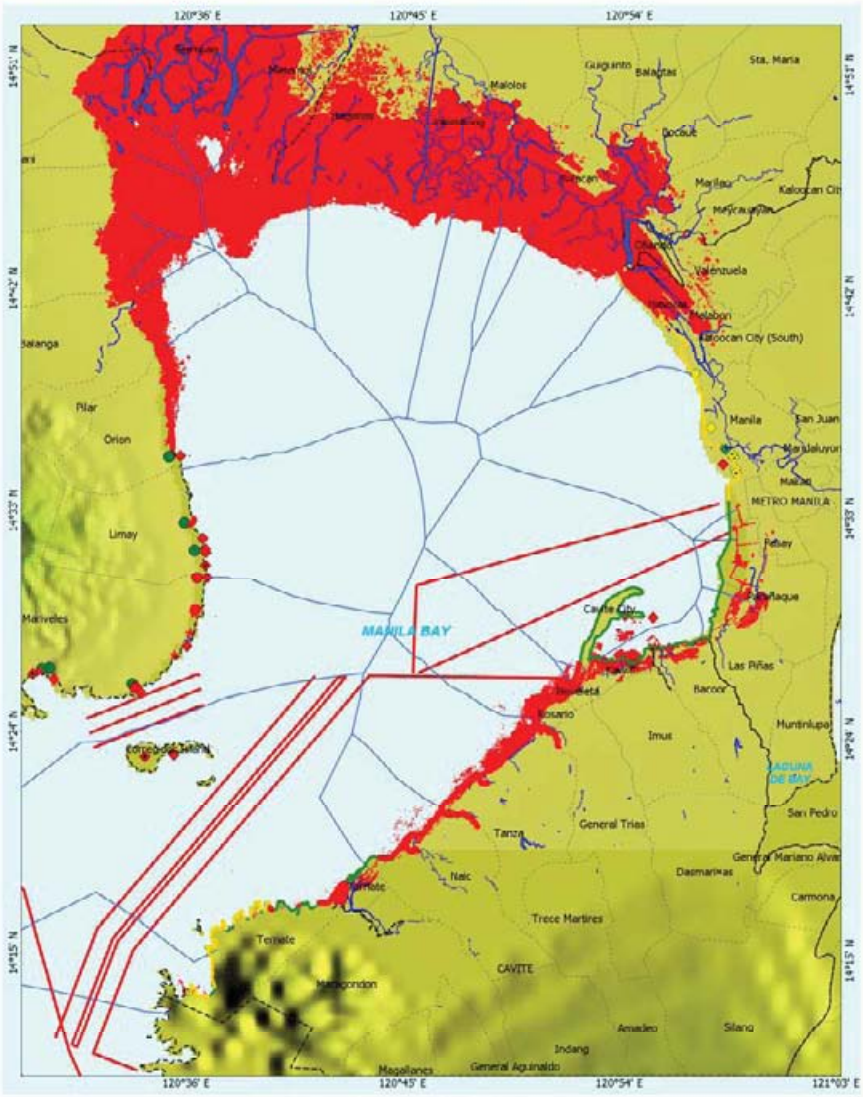
- River
- Navigational Route
- Sea Port/Fish Port/Fish
- Industry
- Historical Site
- Fish Landing
- Bird Watching Site
- Airport
- Built-up Area
- Mangrove
- Aquaculture
- Mudflat
- Administrative Boundary
- Provincial
- Municipal
- Watershed Boundary
- Municipal Water

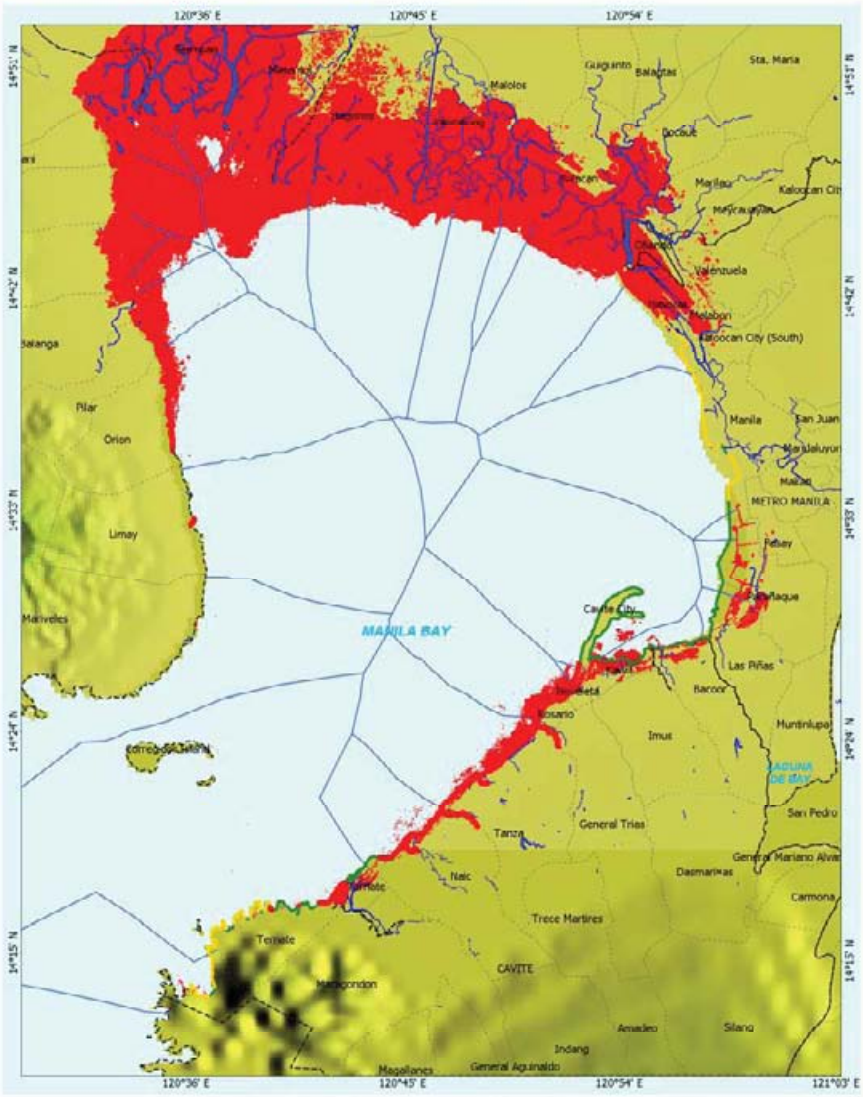
N

Universal Transverse Mercator - Zone 51 (N)
Luzon 1911

SCALE 1:290000

0 10 km


AREAS SENSITIVE TO OIL SPILL
MANILA BAY
LEGEND
Administrative Boundary
Provincial
Municipal
Municipal Water
River
Sensitivity Index
Low (Ports)
Low (Historical Site)
Low (Rocky Cliffs/Sea Wall/Wave Cut)
Moderte (Manufacturing)
Moderate (Historical Site)
Moderate (Rocky Cliffs/Sea Wall/Wave Cut)
High (Ports)
High (Oil Refinery/Depot)
High (Tourism/Recreational Sites)
High (Historical Site)
High (Sea Lanes)
High (Mudflats/Mangrove/Aquaculture)
N
Universal Transverse Mercator - Zone 51 (N)
Luzon 1911
SCALE 1:290000
0
10 km
MANILA BAY
CAVITE
METRO MANILA
Malolos
Meycauayan
Valenzuela
Caloocan City (South)
Manila
Pasay
Parañaque
Las Piñas
Bacoor
Imus
Dasmariñas
General Trias
Tanza
Naic
Trece Martires
Tagaytay
Silang
Carmona
San Pedro
Huntinlupa
Limay
Orion
Pilar
Mariveles
Sta. Maria
Balagtas
Bocaue
Marilao
Kalookan City
San Juan
Malabon
Navotas
Cavite City
Rosario
Ternate
Amadeo
Indang
General Aguinaldo
Magallanes
120°36' E
120°45' E
120°54' E
121°03' E
14°51' N
14°42' N
14°33' N
14°24' N
14°15' N



ECOLOGICALLY IMPORTANT AREAS SENSITIVE TO OIL SPILL
MANILA BAY

LEGEND

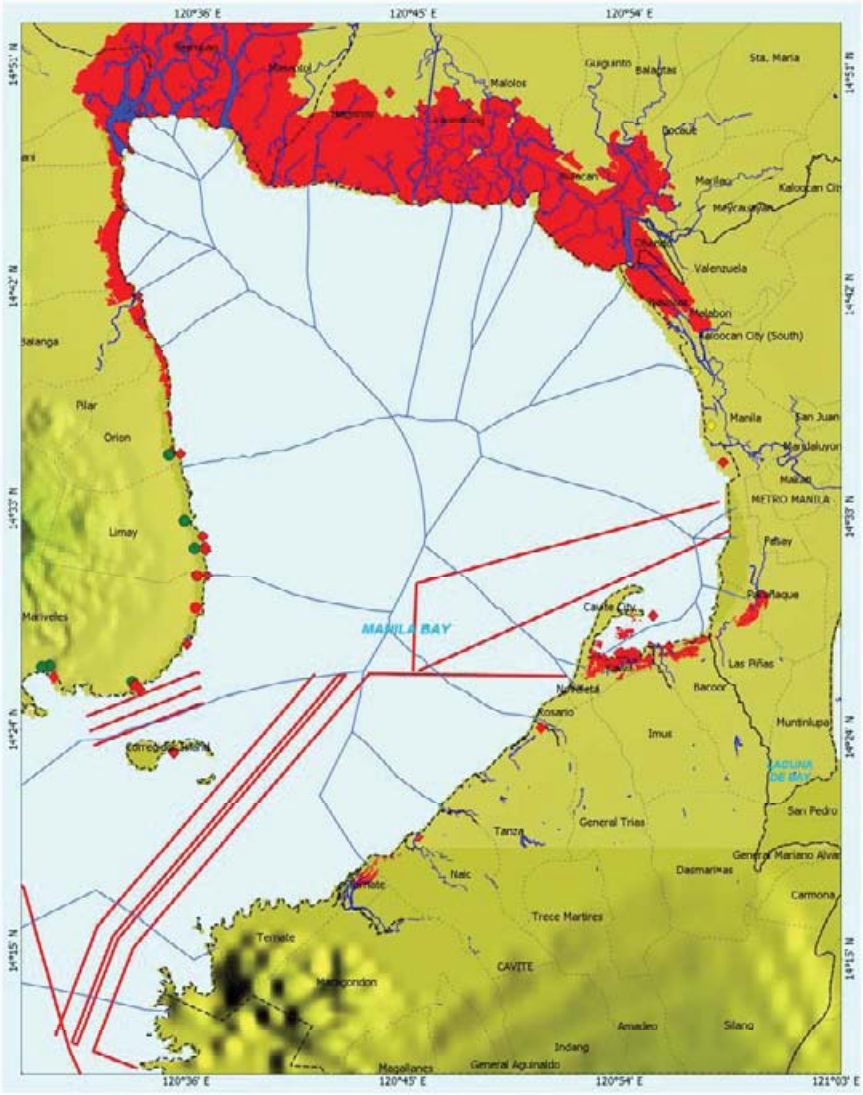
Administrative Boundary	Sensitivity Index
Provincial	Low (Rocky Cliffs/Seawalls/Wave Cut)
Municipal	Moderate (Rocky Shores/Sandy Beach)
Municipal Water	High (Mudflats/Mangrove)
River	

N

Universal Transverse Mercator - Zone 51 (N)
Luzon 1911

SCALE 1:290000

0 10 km



ECONOMICALLY IMPORTANT AREAS SENSITIVE TO OIL SPILL
MANILA BAY

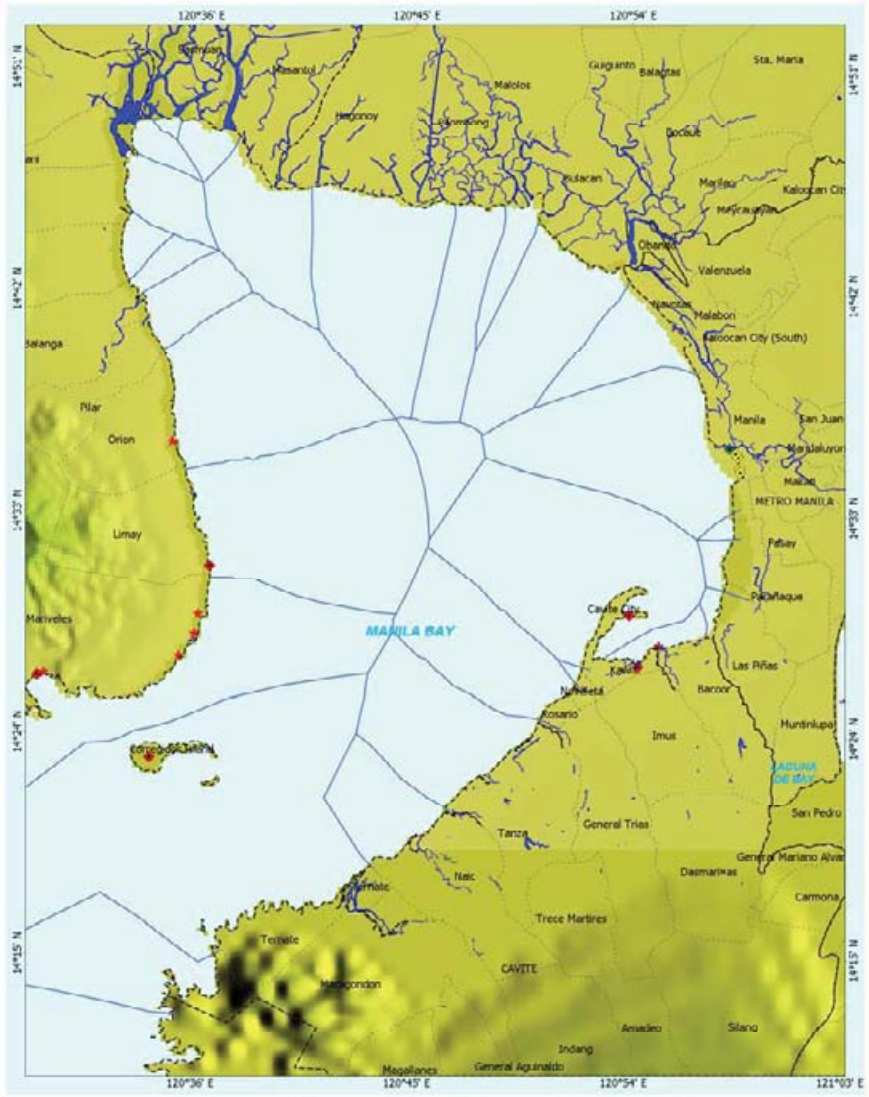
LEGEND

Administrative Boundary	Sensitivity Index
Provincial	Low (Ports)
Municipal	Moderate (Manufacturing)
Municipal Water	High (Oil Refinery/Depot)
River	High (Ports)
	High (Sea Lanes)
	High (Aquaculture)

N

Universal Transverse Mercator - Zone 51 (N)
Luzon 1911

SCALE 1:290000
0 10 km



SOCIALLY IMPORTANT AREAS SENSITIVE TO OIL SPILL
MANILA BAY

LEGEND

Administrative Boundary
- Provincial
- Municipal
- Municipal Water
- River

Sensitivity Index
- Low (Historical Site)
- High (Historical Site)
- Moderate (Historical Site)
- High (Tourism Site)

N

Universal Transverse Mercator - Zone 51 (N)
Luzon 1911

SCALE 1:290000

0 10 km

Appendix D
POLLUTION REPORT
(POLREP)

Name of vessel/source of spill ……..

Date/time of incident…….....……

Date/time of
report…….....……

Location of incident:
bearing/distance…….....……..…

Lat: ……..... Long: …….....

Source of
report…….....……

Contacts: Phone ……..…….…….....Fax ..…….....……

Nature of incident and spill source……..…….…….....…
……

Confirmed: Yes/No

Point of discharge…….....……

Oil type or description ……..…….....…..

Identity and position of ships in vicinity …….....

Cause of discharge…….....

Nature and extent of pollution…….....
……

Drift and rate of pollution…….....

Has discharge ceased …….....…. Weather/sea state/tide …….....……

Samples/photographs taken …….…….....… Agency/organization …….....…..…

Details of Film/Roll/Frame number …….....……

Contacts details: Phone …….....…… Fax …….....

Action(s) taken…….....……..…
……

Details of equipment use…….....……
……

Additional information …….....……..
……
.....
.....……..……..…….....

Appendix E
LIST OF EQUIPMENT

I. PHILIPPINE COAST GUARD (LOCATED AT HMEPCOM/NOCOP)

Unit Description		Quantity
1.	Oil boom (inflatable)	2 sets
2.	Oil boom (solid) including extra	1 set
3.	Oil skimmer Mitsui-COV E3	1 set
4.	Oil tank	1 set
5.	Mitsui transfer Pump	1 set
6.	Dispersant Pump & Spraying System	1 set
7.	Dispersant	12 drums
8.	Sorbents	50 bales

II. OIL INDUSTRY SPILL EQUIPMENT (within Manila Bay Area)

A. LOCATED IN PANDACAN, MANILA

1. CALTEX

Unit Description		Quantity
1.	Slickbar, oil spill containment boom with accessories	4 units
2.	HUTCMNSON oil spill control boom with accessories	5 units
3.	Yamaha speed boat motor	1 unit
4.	Small tug boat 70 HP (low speed)	1 unit
5.	Portable oil recovery system	1 set
6.	Portable dispersant sprayer	1 unit
7.	Corexit dispersant	25 pails
8.	Dascs chemical dispersant	38 pails
9.	Lighted buoy (amber)	3 units

2. SHELL

Unit Description		Quantity
1.	13-ft pollution boat (110 HP)	1 units
2.	Skimmer pump	1 unit
3.	Slick bar oil spill control boom – 193 meters long	1 unit
4.	YOSHII hand sprayer for oil dispersant	2 units
5.	20 D oil dispersant	18 pails
6.	Life jackets	9 pcs.

3. PETRON

Unit Description		Quantity
1.	150-ft long oil spill boom	1 units
2.	50 HP Yamaha outboard motor (speed boat)	1 unit
3.	skimmer pump	1 unit
4.	suction hoses 3”-dia x 10-ft long	7 pcs
5.	discharge hoses 3:-dia x 20-ft long	4 pcs
6.	Back pack sprayer	1 unit
7.	Corexit 9527 dispersant	4 drums

B. LOCATED IN LIMAY, BATAAN

PETRON BATAAN MACHINERY CORPORATION

Unit Description		Quantity
1.	Slickbar oil boom	2000 ft
2.	Vacuum truck	1 unit
3.	Air driven saucer pump for oil recovery	1 unit
4.	Portable back pack dispersant sprayer	15 pails
5.	1 ½” foam eductor type branch-pipe for nozzle dispersant sparyer	5 units
6.	Corexit 9527 dispersant	24 drums
7.	Powered pollution boat	1 unit
8.	work barge	1 unit

III. OIL INDUSTRY SPILL EQUIPMENT INVENTORY

(Outside Manila Bay Area but can be available within 24 hours)

A. PILIPINAS SHELL REFINERY (Tabangao, Batangas City)

	Unit Description	Quantity
9.	Inflatable Boom with accessories	set 1
10.	Skimmer, Disc 12K Komara,	set 1
11.	Dispersant, VDC	20 drums
12.	Sprayer, Dispersant, Back pack type	12 sets
13.	Fast Tank, 1,500 Gallons	2 sets
14.	Shovels	24 pcs
15.	Rakes	24 pcs
16.	Pails	24 pcs
17.	Boat, Fiber Glass w/60 HP Outboard Motor	1 unit
18.	Boat, Mooring/Utility 50 ft. Twin Engine w/ Communication Radio VHF Marine	1 unit
19.	Bag Plastic	100 pcs
20.	Dispersant Sprayer, Diesel Driven Hand Start, Air-cooled Honda D320 Engine	1 unit
21.	Boom, Ro-boom model 800 15 dia. Setrom w/Towing Equipment, Portable Water Pump	2 unit
22.	Boom, Ro-boom Bridle 0610 12 x 25m Satrom with wheels, Air Blower & Towing Equipment	12 sets
23.	Buoy Marker	24 pcs
24.	Drums, Empty	24 pcs
25.	Sorbents	6 pcs
26.	Boat, Tug 3500 with Firefighting Capabilities	1 unit

B. CALTEX (PHILIPPINES) INC. (Batangas Refinery)

1.	Fiberglass Speed Boat - 18 Ft. S/B HABAGAT 200 HP OUTBOARD GASOLINE ENGINE	unit	1
2.	Fiberglass Rowboat	unit	1
3.	Life jackets	pcs	40
4.	Life Buoy Ring	pcs	4
5.	Motorola VHF Mobile type Base radio	unit	1
6.	Motorola VHF Potable Radio Model P200	units	11
7.	Slickbar containment boom		
	a) Boom Trailer	units	3
	b) Boom Marker Float	sets	18

8.	Vacuum Truck		unit	1
9.	VIKOMA 12K M" Oil Skimmer System			
10.	Dynamic Inclined Plane Model 400(Port-A-Dip)			
11.	Sorbents Materials			
	a) Metasorb pads M-70 (18 " square/pad at 200 pads/bale)		bales	94
	b) Metasorb Pillows M-65 (5" x 8" x 21" at 10 pillows/bale)		bales	67
12.	Corexit 9527	5 gallon palls	gals	110
		55 gallon drums	gals	1,100
13.	Basic Slickgone			
	5 gallon pails		gals	595
	25 liter pails		gals	594
14.	Seaspray 11 Meter Controlled Dispersant Spray System		unit	1
15.	6 Meter Spray Ann Geoform GRP Type with 2 sets of nozzles for neat chemical and up to 18% sea water chemical mixture spraying		sets	2
16.	5 FW Diesel Driven Electric Start Pump fitted w/Hypro Series & rated at 150 LPM @ 7 Bar maximum pressure, and Chemical Educator rated at 30 LPM @ 3 Bar maximum		unit	1
17.	Backpack Sprayer		sets	13
18.	Handline Type Applicators			
	a) PRYNE FB-5X Foam Nozzle w/pick-up tube & the following accessories:		sets	4
	- 2-1/2" x 1-1/2" Gated Wye		pcs	2
	- 2-1/2" x 50 ft. coiled Fire Hose		lengths	4
	- 1-1/2" x 50 ft. coiled Fire Hose		lengths	4
	- Hose Spanners		lengths	4
	b) PRYNE FB-5X Foam Nozzle w/o pick-up tube		pcs	4
19.	"STAR" High Pressure Washer Trailer Jet Model HC-2 I 00 NCT, with 18 HP Diesel Engine, 2, l 00 PSI. max. output pressure, 3.5 GPM (13 LPM) water delivery, and 98 C (208 F) max. water temp., and 1,000 liter capacity		unit	1

20.	55 gallon Drums (Open Yellow Colored)	drums	4
21.	Wheelbarrows	units	12
22.	Shovels	units	15
23.	Rakes	pcs	60
24.	Push Brooms	pcs	8
25.	Rubber Mallet	pcs	4
26.	Sledge Hammer	pcs	4
27.	Wooden Poles w/Hook	pcs	12
28.	Crow Bars	pcs	4
29.	Nylon Ropes		
	a) 112" x 50 Ft.	lengths	2
	b) 518" x 100 Ft.	lengths	5
30.	Rubber Boots	pros	20
31.	Chemical Apron	pcs	20
32.	Working Gloves	pcs	50
33.	Chemical Gloves	pros	50
34.	Plastic Bags (30" x 48" x 4 mils)	pcs	1,000
35.	Hand Cleaner	pcs	72
36.	Portable Lantern (Rechargeable battery type-stored at Firehouse/Emergency Control Center)	units	4
37.	Portable Floodlight fitted w/Two-220 VAC mercury lamps	unit	1
38.	Automotive Battery Charger	unit	1
39.	Dispersant Station (Foam Station w/ RP-6 foam Nozzle Reconnected LP-6A line proportioner via hydrant branch off	pc	
40.	1-112" x 50 Ft. colled Fire Hose	lengths	3
41.	COREXIT 9527 Dispersant (5 gal./pail)	pails	4
42.	Hose Spanners pcs		4
43.	METASORB SORBENT PADS M-70	bales	4
44.	METASORB SORBENT PILLOWS M-65	bales	2
45.	Plastic Bags (30" x 48" x Mils)	pcs	100

C. ISLAND WHARF EQUIPMENT:

1 .	Dispersant Station (Handline Cart):		
	a) 2-1/2" x 50 ft. coiled Fire Hose	lengths	2
	b) 2-1/2" x 50 ft. coiled Fire Hose	lengths	4
	c) 1- 1/2" Water Nozzle	pc	1
	d) JS-10 Foam Nozzle	pc	1
	e) LP-9A Line Proportioner	pc	1
	f) Gated Wye 2-1/2" x 1-1/2"	pc	1
	g) COREXIT 9527 Dispersant (5 gal./pail)	pails	4
	h) Hose Spanners	pcs	4

2. METASORB SORBENT PADS M-70	bales	4
3 .METASORB SORBENT PILLOWS M-65	bales	2
4. Plastic Bags (30" x 48" x 4 Mils)	pcs	100

Appendix F
GUIDELINES FOR PERFORMING NET ENVIRONMENTAL BENEFIT ANALYSIS

Guidelines for performing Net Environmental Benefit Analysis

The following describes the elements of a NEBA according to the IPIECA report "Choosing Spill Response Options to minimise damage" (Jennifer M. Baker, Tim Lunel, IPIECA 2000). The below is only an extract, and the
complete report should be consulted for details:

Net Environmental Benefit Analysis

After an oil spill, urgent decisions need to be made about how to minimize environmental and socioeconomic impacts. The advantages and disadvantages of different responses need to be compared with each other and with natural clean-up. This process is called Net Environmental Benefit Analysis. The process must take into account the circumstances of the spill, the practicalities of clean-up response, the relative impacts of oil and clean-up options, and some kind of judgement on the relative importance of social, economic and environmental factors. Decisions are best and most rapidly made if contingency planning has included reviews of environmental and socioeconomic information, and consultations and agreements by appropriate organizations.

Aims of spill response

The aims are to minimize damage to environmental and socioeconomic resources, and to reduce the time for recovery. This can involve guiding or re-distributing the oil into less sensitive environmental components removing oil from the area of concern and disposing of it responsibly. Initiation of a response, or a decision to stop cleaning and leave an area for natural clean-up, should be based on an evaluation made both before the spill (as part of the contingency planning process) and after.

The evaluation process

Evaluation typically involves the following steps:

- Collect information on physical characteristics, ecology and human use of environmental and other resources of the area of interest.
- Review previous spill case histories and experimental results that are relevant to the area and to response methods that could be used.
- On the basis of previous experience, predict the likely environmental outcomes if the proposed response is used, and if the area is left for natural clean up.
- Compare and weigh the advantages and disadvantages of possible responses with those of natural clean up.

Conclusions of the IPIECA report

Some damage caused by specific response options may be justifiable if the response has been chosen for the greatest environmental and socio-economic benefit overall.

- Groundwork for evaluation of response options is best done before a spill as part of contingency planning.
- The advantages and disadvantages of different responses should be weighed up and compared both with each other and with the advantages and disadvantages of natural clean up.
- Response options need to be reviewed when a spill occurs, and such a review should be an ongoing process in cases of lengthy clean-up operations.
- Offshore and near shore dispersant spraying can lead to an outcome of least environmental harm.
- For onshore evaluation, it is necessary to consider both the shore in itself, and systems, which interact, with the shore.
- In many cases of oiling there is no long-term ecological justification for clean up.
- For extremely oiled shores, moderate clean up can facilitate ecological recovery, but aggressive clean up may delay it.
- In most cases of shore oiling where moderate clean-up is considered likely to reduce the damage to socio-economic resources, wildlife or near-shore habitats, this will not make a significant difference to the shore ecological recovery times.

Selection of response method in open sea

Several methods exist to combat oil spilled on water. The method to apply for specific case must be considered based on the environmental conditions and the type of natural resources to be protected against the oil spill. The methods must also be compared to the no-response alternative and be selected so that a net environmental benefit is achieved.

Mechanical recovery

Mechanical recovery constitutes the most common approach for combat of marine oil spills. The mechanical recovery operation will typically involve the following components:

Booms for containment of oil
Skimmers for recovery of oil
Pumps
Oil/water separators
Temporary Storage
Vessels for towing of booms and operation of recovery units

The operation may involve three or two vessels, depending on how the boom is deployed. The purpose of the boom is to concentrate the oil to a thick enough layer for effective recovery to take place. The effectiveness of booms to accumulate the oil is highly dependent on wave conditions, tow speed, boom configuration and oil properties. It is commonly assumed that booms lose oil by entrainment at relative speeds exceeding 0,7 knots, even though some novel inventions show promise for higher speeds.

A variety of skimmers exist, each type being suited for different conditions. Roughly, skimmers can be divided into concepts based on weir-principle, suction, adhesion or mechanical lifting/submersion. The main parameters affecting the performance of skimmers are slick thickness, wave conditions and a number of oil parameters; the main parameters being viscosity, density and amount of water in emulsion. When a thick oil layer can be accumulated in the boom configuration, the weir skimmer concept is often considered the most versatile. However this concept depends on the oil flowing to the skimmer and is therefore not suited for highly viscous oils. It also depends on the skimmer being equipped with the necessary facility for removal of free water recovered with the oil, as the weir skimmer concept will recover large volumes of water whenever the oil slick thickness is reduced below a certain limit. Table 1 indicates how different skimmer concepts are affected by wave conditions and oil viscosity.

Table 1. Skimmer types and how these are affected by sea states and oil viscosity

Skimmer Type	Operating Principle	Adapted to High Sea States	Oil Viscosity		
			L	M	H
Weir	Overflow to sink	Fair	Good	Good	Poor
Sorbent Belt	Adhesion	Poor	Fair	Good	Fair
Paddle belt	Mechanical lifting	Poor	Poor	Fair	Good
Brush	Adhesion/lifting	Fair	Fair	Good	Good
Disc	Adhesion	Fair	Fair	Good	Poor
Drum	Adhesion	Poor	Fair	Good	Poor
Mop	Adhesion	Fair	Fair	Good	Poor

The effectiveness of mechanical recovery operations is highly dependent on sea states. At wave heights exceeding 3 meters, booms lose significant oil quantities by oil drainage under the boom and by droplet entrainment by oil breaking off from the oil slick. Figure 1 shows the relationship between wave height and effectiveness, as recognised for the oil spill preparedness offshore Norway. This assumes that the sufficient number of recovery systems is available and the relationship can be seen as natural limitations of a mechanical recovery operation.

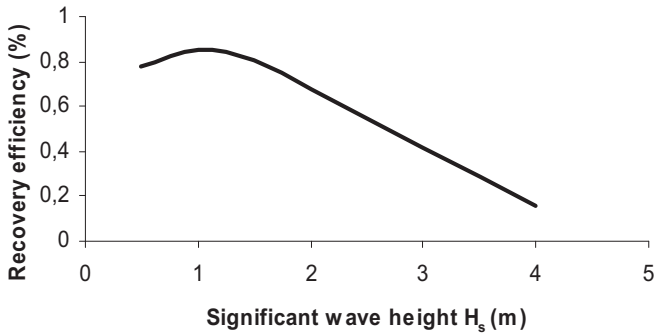


Figure 1. Indication of relationship between wave height and recovery efficiency

The relationship in Figure 1 assumes sufficient visibility. It is assumed that light conditions better than dusk/twilight, defined by the sun being over -6^{o} relative to the horizon, is sufficient for an oil spill combat operation to take place. During nighttime the recovery effectiveness may vary from zero to close to full effectiveness when appropriate surveillance equipment is provided. Sometimes IR cameras mounted on aerostat or helicopter are used to monitor the spill and guide recovery operation during dark periods.

Chemical dispersion

Dispersants contain chemicals, which reduce the surface tension between oil and water and therefore result in the break-up and dispersal of the slick throughout the water column under the action of waves and turbulence. The break-up of the oil into small droplets promotes the biodegradation, oxidation and other oil weathering processes. It may also prevent oil from being driven to the shore by the surface current. Dispersants can remove oil from the water surface and may reduce immediate damage to waterfowl and other wildlife that could be adversely affected by surface oil.

In most cases, however, the decision on whether to use dispersants is a trade-off between the possible short-term impact of dispersed oil in the water masses and the comparatively long-term impact of oil stranded on the shoreline.

The effective use of dispersants relies on the energy provided by dynamic sea being sufficient to break oil off the slick and entrain it in the water masses. In many cases, even with waves, the slick will have to be agitated to get sufficient energy to disperse the oil, for instance by water cannons.

Older dispersant contained large proportions of inherently toxic hydrocarbon-based solvents which, when applied to an oil slick, increased the volume of hydrocarbon pollutants present in the water. Dispersants have, however, developed towards much less toxic components, making the use of such chemicals more accepted in many countries.

The application of dispersants will normally take place by two basic methods:

Application from workboat
Aerial application (aeroplane or helicopter)

The dosage varies greatly with 1:10 as a typical rule of thumb. The logistical complications with filling/refilling and application are significant for chemical dispersion as a large-scale response option. Droplet size of the dispersant when applied is crucial to effectiveness, with small droplets being most effective but more liable to excessive wind drift.

Dispersants do not work with all oil types and in all conditions. As a general rule dispersant effectiveness fall rapidly with viscosities exceeding 2000 cP. The chemical treatment should therefore take place relatively short time after the oil is released to the sea, as emulsification and weathering may increase the oil viscosity above this limit within a couple of hours, depending on sea state.

Table 2. Oil Spill Dispersants

Advantage	Disadvantage/considerations
Removes/reduces surface oil Enhances biodegradation Can be applied by aircraft	Impact on fish and aquatic organisms Additional pollution Logistical complications Limited to low viscosities Relatively short window of opportunity

In situ burning

In situ burning involves the controlled combustion of spilled oil. Typically oil is contained in a fire-resistant boom and ignited using a hand-held igniters or a helicopter-deployed ignition system. Burns may also be conducted within natural barriers formed by the shoreline. The technique will only work with a minimum oil slick thickness, commonly assumed to be 2 mm for fresh oil. With a relatively thick layer (> 5 cm) of oil, a large fraction, up to 95 %, may be removed by burning. After burning is completed, burn residues may sink and the opportunity to recover these residues is limited. Burning will have relatively localised air quality impacts.

In situ burning does not work on emulsion with water content above a certain limit, depending on the oil. Commonly 20% water content is used as a rule of thumb. The window of opportunity for the application of this technique may therefore be limited to a few hours, depending on oil type and weather conditions. The sea should also be relatively calm, with short-period wind-waves of less than 1 m.

Table 3. In Situ- Burning

Advantage	Disadvantage/considerations
Removes large portions of oil May be logistically simple	Air pollution Does only work on contained slick/ need for fireproof booms Limited to low water contents in emulsion Limited to low sea states Works only on slicks thicker than approximately 2 mm Relatively limited window of opportunity

Selection of methods for shoreline cleanup and protection

Various techniques exist for cleaning of shoreline areas that have been affected by an oil spill. Since shoreline areas often are highly sensitive, special care must be taken in selecting techniques for such areas. Experience has often showed that the cleanup efforts have caused greater damage to the shorelines than the spill itself. As in all oil spill response, the emphasis must be on achieving the greatest net environmental benefit. In many cases this is achieved by a combination of non-aggressive mechanical oil removal techniques and degradation/removal of the oil by natural processes.

Mechanical removal

Shoreline cleanup by mechanical removal involves a wide range of different tools and techniques, reflecting the highly variable conditions that a shoreline area can represent. Techniques may be ranging from manually removal of oil using sorbents or simple tools to the use of more advances beach cleaning machinery. Here is only listed a number of techniques/tools commonly applied to remove oil at a shoreline:

Manual sorbents application
Manual removal of oiled material (hand, shovels, rakes)
Manual cutting of vegetation
Low pressure flushing at ambient temperature
Vacuum trucks
Warm water/low pressure washing
High pressure flushing
Manual scraping
Beach cleaners
Tractor/Ripper, bulldozer, motor grader, elevating scraper, front end loader
Sandblasting
Steam cleaning

Bioremediation

Bioremediation is the application of nutrients (fertilisers containing nitrogen and phosphorus) to the shoreline to accelerate the natural biodegradation of the oil. Oil biodegradation is the natural process by which microorganisms oxidise hydrocarbons, ultimately converting them to carbon dioxide and water. The process is limited by the availability of oxygen, moisture and nutrients needed by microbes.

The use of non-native bacteria is not recommended as most areas have indigenous bacteria that are capable of degrading the oil.

Bioremediation is typically used as a final treatment step after completing conventional shoreline treatment or in areas where other methods are not possible or recommended. Pooled oil or tar balls should be removed manually before applying nutrients.

Data collected to date indicate that when proper guidelines are followed, the environmental risk associated with bioremediation is negligible.

Natural cleansing

Oil is left to degrade by natural processes. The no-response method is typically used on high-energy beaches, primarily cobble, boulder and rock, where wave action is assumed to remove most of the oil in a short period of time or where active cleaning is expected to have unacceptable effects. The disadvantage is apparently that the area may take an extended period to recover. Also, unwanted additional spreading of the oil may occur as oil is washed back into water.

Any cleaning technique should be compared to the natural cleaning option before being applied.

In situ burning

In situ burning is carried out at shorelines by igniting the upwind end of the oiled area and allowing the oil to burn downwind. The method is typically used on substrate or vegetation where sufficient oil has collected to sustain ignition, if oil is of a type that will sustain burning and local air pollution regulations allow. The method will kill surface organisms in burn area and the residue may be somewhat toxic. The method will also cause local and time-limited air pollution and may result in erosion if root systems are affected.

Selection of combat methods for specific habitats

This section discusses the considerations that should be made in selecting combat method for different habitats. Before any clean-up measure is attempted, an assessment should be made of the net environmental benefit in employing the method as compared to allowing natural processes to work on the oil pollution. Clearly, there are great variations within each habitat type and the considerations here are only meant as guidelines that may assist in selection of the appropriate response option.

Response measures are discussed in terms of:

- Protective measures (measures to prevent or reduce amount of oil reaching a habitat or a resource)
- Cleanup measures (measures employed after oil has polluted an area)

Methods are classified as:

- Preferred - has little environmental impact, should be the first selection
- Viable - may be used after careful consideration of environmental impact
- Avoid - will likely have significant adverse environmental impact

The information in this section is largely based on recommendations by IMO /4/ and IPIECA /5/.

Open water

The open water environment includes offshore, nearshore and enclosed waters and may be neighbouring various other habitats, which will be treated in later sections. Clean-up techniques for open water also act as a protection technique for other habitats. The selection of combat methods to be employed in open water is often a question of how to most effectively prevent damage to vulnerable natural resources along shoreline areas that may be affected by the slick.

Mechanical recovery is the most common response option in open water, but is somewhat limited by sea state. This method is the only option that may allow near complete prevention of environmental damage and is the preferred option when conditions allow effective operation. In general, sea-conditions in Philippine waters are in

favour of mechanical recovery since significant wave heights seldom exceed 3 m, which is considered the limit for modern recovery systems.

Leaving the oil to be naturally dispersed is an option when oil drift simulations exclude oil affecting the shoreline and weather conditions are such that natural dispersion will occur effectively.

Chemical dispersion is another viable option, but must be applied within a few hours after the spill before weathering renders the oil undispersable. Chemical dispersion is a likely choice if drift is towards the shoreline and weather conditions are unfavourable for mechanical recovery. In all cases the potential environmental impact on subsurface organisms must be considered.

In situ burning is a viable option but is very limited to sea states and water content in emulsified oils. Fire-proof booms must likely be used for effective burning to take place and mechanical recovery of the oil may appear to be a more natural option once the oil is contained.

Table 4. Open water response

Response options in Open water		
Preferred	**Viable**	**Avoid**
Mechanical recovery Natural processes	Chemical dispersion In situ burning	

Rocky shorelines

Rocky shores comprise a wide variety of different habitats and communities and vary greatly in their sensitivity to and recovery from oil spills. In general, the least sensitive shores, and those with the greatest potential for natural recovery are found on wave-exposed coasts. However, exceptions from this rule are numerous. Rocky shoreline areas are often crucial nesting sites for sea birds. Rocky coasts in more sheltered areas are generally more sensitive to oil spills and also more sensitive to damage from clean-up measures.

The preferred method for protection of such coastlines is by recovery of oil in open water at safe distance from the coast. Protection of areas by deflecting booms closer to the shore is an option but is often ineffective due to harsh wave and current conditions.

In many cases the no-response approach is preferred for rocky shores due to effective natural removal of oil by waves in such areas. Other viable options for the cleanup of stranded oil are the use of suction devices, low pressure flushing by cold water or manual removal. More aggressive methods that may be used are: hot water washing, high pressure/hot water washing or steam cleaning. Such methods may, however, lead to the complete destruction of the natural biological community and should be avoided unless a clear net environmental benefit is achieved.

Table 5. Measures for rocky shores

Protective measures for rocky shores		
Preferred	**Viable**	**Avoid**
Mechanical recovery in open water Chemical dispersion	Deflecting booms closer to shore	
Clean-up measures for rocky shores		
Preferred	**Viable**	**Avoid**
Natural processes Manual removal/ suction devices Low pressure/high flow/ cold water flushing	Dispersants Sorbents Burning	How water /high pressure washing Steam cleaning

Coral reefs

Coral reefs are productive areas supporting a diverse group of organisms. They are also important as barriers reducing coastal erosion. Commercially, reefs are often important for local tourism. Coral reefs are easily damaged when oiled and may take long to recover. Cleaning of the reef itself is practically impossible to conduct.

Natural dispersion of oil in coral reef areas may be great due local wave breaking, thus exposing the coral reefs to the oil droplets. In general the bulk of a surface oil slick will float over reefs without affecting them. However, some reef areas are exposed to the air at low tides and can get in direct contact with an oil spill

Field studies indicate that chronic minor oiling can lead to significant decline of nearby coral community. This situation may occur as a result of a surface oil slick passing the submerged reef and stranding in nearby shores, followed by long term leaching of oil absorbed in the shoreline material.

Best protection of coral reefs is achieved by mechanically recovering the oil in open water, outside the reef area. If sea states allow, booms may be applied nearby the reef to contain oil for recovery or deflection to less sensitive areas. Care must be taken not to damage reefs with anchors and boats.

Alternatively the use of dispersants is recommended to avoid large concentrations of oil in contact with the reefs and to enhance biodegradation. Dispersion should, preferably be carried out in deeper water to allow proper dilution and as low an oil concentration as possible in the water column before entering the reef area. Dispersants should ideally not be used over and near the reef, unless this is essential for the protection of more sensitive areas inshore from the reef area, such as mangrove swamps.

Cleaning of the reef is very difficult or often impossible to conduct. Any operation in the area may damage the reef physically and may also be dangerous to carry out. In some cases a low energy method, such as low pressure flushing may be used as a cleaning method.

Table 6. Coral reefs

Protective measures for coral reefs		
Preferred	**Viable**	**Avoid**
Mechanical recovery in open water Chemical dispersion in deep water	Deflecting booms close to reef area	Chemical dispersion in reef area
Clean-up measures for coral reefs		
Preferred	**Viable**	**Avoid**
Natural processes	Manual removal/ suction devices Low pressure/ cold water flushing	Hot water /high pressure washing Steam cleaning Burning

Mangroves

Mangroves are found on sheltered shores and in estuaries, often adjacent to coral reefs, seagrass beds and tidal marshes. Mangrove areas are highly productive and provide habitats for a large variety of organisms as well as serving as nursery ground for many fish and crustacean species. Mangroves also have an anti-erosion effect. It is generally agreed that mangroves are particularly sensitive to oiling and that they are priority areas for protection.

Oil slicks may enter mangrove forests when the tide is high and be deposited on the roots and sediment surface as the tide recedes. Mangroves may be killed by oil covering the breathing pores, or by the toxicity of oil components. Oil may further penetrate into the sediments and may kill a variety of organisms.

Mangroves with oiled aerial roots can be saved if cleaned short after contamination. However, as mangrove forests can be virtually impenetrable, large-scale cleanup after an oil spill in such areas is operationally difficult, very labour demanding and may damage the area greatly.

Preventing oil from reaching mangrove areas is especially important given the difficulties involved in cleanup in such areas. The preferred protective approach is mechanical recovery of oil in open water, alternatively chemical dispersion of oil in as deep waters as possible.

Booms may be used in relatively calm waters closer to the mangroves to prevent oil to enter the area. Oil may be contained and recovered or deflected to less sensitive areas.

Studies indicate that mangroves tolerate dispersed oil better than untreated oil. However, the dispersed oil may more adversely affect many organisms living in the mangrove area. A net environmental benefit must justify the use of dispersants close to mangrove areas.

Sorbents booms or pads may be effective as physical barriers to prevent oil from contacting mangroves.

Any attempted cleaning after oiling of mangroves has occurred must be started as soon as possible to minimise oil penetration into sediments and absorption into aerial roots. Possible methods may be low-pressure flushing, use of sorbents, vacuum pumping and manual removal.

Table 7. Mangroves

Protective measures for mangroves		
Preferred	**Viable**	**Avoid**
Mechanical recovery in open water	Deflecting booms close to mangrove area Chemical dispersion outside mangrove area	
Clean-up measures for mangroves		
Preferred	**Viable**	**Avoid**
Natural processes	Manual removal/ suction devices Low pressure, cold water flushing Sorbents	Hot water /high pressure washing Steam cleaning Burning

Saltmarshes

Tropical saltmarshes often occur in conjunction with mangroves, usually in the upper intertidal zone. Salt marshes are typically poor in plant species. Fauna includes crabs and worms and the area may be important as feeding and roosting ground for birds.

Saltmarshes are typically found in sheltered areas and the vegetation and sediments have normally large oil holding capacities making saltmarshes effective oil traps. Recovery times vary greatly, from one or two years to decades. This depends on a number of factors, the longest recovery times being associated with thick smothering deposits on the marsh surface and substantial sub-surface penetration into sediments. Salt marshes are usually assumed to recover more rapidly than mangroves.

The main protection technique is by oil recovery in open water outside marsh areas, as described in other sections. Dispersants will likely not be effective in the calm waters nearby salt marshes, but may be a viable protective measure used in open water before oil enters the shoreline. The use of booms and skimmers in sheltered areas nearby salt

marshes may be considered, as can sorbents material in the shape of booms, blankets or pads.

Case histories have showed that many marsh areas have recovered successfully by natural means. Cleanup operations may often be damaging to the areas and the no-response option may often be the best choice. If it is decided to intervene, little intrusive methods may be preferred, such as the use of a limited crew and avoiding heavy machinery. Viable methods are pumping of pooled oil and the use of booms and skimmers, use of sorbents and low-pressure flushing.

In situ burning has showed some promise as a method for removal of oil in marshes. The method is likely to kill all life in the immediate vicinity of the burning area. The underground part of most plants will likely survive provided there is enough water and/or soil for protection.

Table 8. Salt marshes

Protective measures for salt marshes		
Preferred	**Viable**	**Avoid**
Mechanical recovery in open water	Booms for protection of area Chemical dispersion in open water	
Clean-up measures for salt marshes		
Preferred	**Viable**	**Avoid**
Natural processes	Manual removal/ pumping of oil Low pressure, cold water flushing Sorbents Burning of pooled oil	Hot water /high pressure washing Steam cleaning

Seagrass beds

Seagrass beds dominate many areas of tropical shoreline and tend to be found in sheltered regions, often close to mangrove and coral reefs. Seagrass beds are highly productive and provide habitats for a large variety of organisms as well as serving as nursery ground for many fish and crustacean species. Seagrass beds occur both in intertidal zones and in shallow sub tidal areas. In intertidal seagrass beds, oiling will likely occur by direct contact with surface oil as water level goes down. For sub tidal seagrass, chronic leaching from the neighbouring intertidal areas may be more damaging.

The best protective option is the recovery of oil in open water outside the area or the use of dispersants in deeper waters.

As seagrass beds usually are located in calm areas, booms and skimmers may in some cases be operated in the vicinity of the areas or in the area itself. Oil should be prevented

from entering intertidal seagrass beds. Dispersants are not likely to be effective in such areas due to lack of mixing energy.

Cleanup of oiled seagrass in the intertidal area is difficult. Possible viable options are low-pressure flushing, use of sorbents and skimmers. However, natural cleansing is often the best option.

Table 9. Seagrass beds

Protective measures for seagrass beds		
Preferred	**Viable**	**Avoid**
Mechanical recovery in open water	Booms for protection of area Chemical dispersion in open water	
Clean-up measures for seagrass beds		
Preferred	**Viable**	**Avoid**
Natural processes	Booms and skimmers in area Low pressure, cold water flushing Sorbents	Hot water /high pressure washing Dispersion Burning

Sandy shores

Sandy shores have high value as recreational/tourist sites and are ecologically important as a habitat for a variety of organisms.

Oil will generally accumulate on the sediment surface in the upper intertidal zone and may also penetrate below the surface. The degree of penetration is influenced among other factors by sediment grain size, water content of sediments and the properties of the oil, with the combination of coarse sediments and low oil viscosities allowing most penetration.

Oil persistence on the beach is also determined by wave action. Oil that is washed out by waves may be redeposited offshore, potentially having an adverse effect on seabed organisms.

Beaches are best protected by oil recovery in open water outside the beach area. Booms and skimmers may potentially be used along the shores to recover oil, depending on wave conditions in the area. Booms may also be used to divert oil to less sensitive areas. Dispersants may be used in open water outside the beach (as deep as possible and as far away from the beach as possible). Oil may in some cases be incorporated in the sediments after use of dispersants.

Natural cleansing may be suitable for beaches with high wave energy. However, beaches may be important recreational areas or nesting ground for turtles, imposing a pressure on responders to actively clean up the beach. Also, even though wave action effectively may

wash oil back into the sea, a band of oiled sediments or tarballs may be formed in the upper tidal zone.

Methods for the cleanup of beaches involve a variety of mechanical techniques ranging from manual removal by the use of shovels and rakes to the use of heavy beach cleaning machinery. The feasibility of using heavy machinery, such as tractors and bulldozers depend on whether the sediments can support the weight of such machinery.

Sediment removal may be an option where oiling is substantial, but oil has not penetrated deeply. The upper sand layer may be scraped off using graders if the beach is uniform enough to allow this. Front-end loaders may also be used but are likely to remove excessive sediment quantities. The decision is often made to move oiled sediments from the upper part of the beach to lower parts of the intertidal zones, allowing for a higher degree of natural dispersion of oil.

Often substrate mixing is used as a method to enhance aeration and evaporation after most of the oil has been removed by other methods. Various types of machinery for this purpose are available.

Sediment removal may not be recommended on sheltered shores since such beaches usually are richer in organisms and sediment profile re-establishing will be slower.

Dispersants are not generally used for cleaning of sand because they can accelerate penetration of oil into the substrate. The same consideration may be made for in-situ burning since oil heating will lower the oil viscosity, potentially enhancing penetration into sediments

Table 10. Measures for sandy shores

Protective measures for sandy shores		
Preferred	**Viable**	**Avoid**
Mechanical recovery in open water	Booms for protection of area Chemical dispersion in open water	
Clean-up measures for sandy shores		
Preferred	**Viable**	**Avoid**
Natural processes	Manual removal Beach cleaning machinery Sediment removal Displacement of sediments from upper to lower intertidal zones to enhance natural cleaning Low pressure, cold water flushing Sorbents Substrate mixing	Hot water /high pressure washing Dispersion Burning

Muddy shores

Muddy shores often occur in sheltered areas, in many cases close to mangroves and salt marshes. The areas are often important feeding grounds for birds. Muddy shores tend to be waterlogged which reduces oil penetration.

Muddy shores can be virtually impossible to clean up because the sediments are too soft to allow access. Therefore, protective measures are highly important. Protection is best carried out in open water outside the area. Often waters are calm nearby muddy shore areas allowing effective use of booms and skimmers, while dispersants may be ineffective due to the lack of mixing energy. Dispersed oil may increase oil incorporation in sediments. Deflective booms or sorbent booms may be effective at preventing the oil from reaching muddy shores.

Clean up of muddy shores may be difficult to accomplish and natural cleansing may be the only feasible option. If the sediments are rigid enough to support cleanup work, feasible methods may be low-pressure flushing, manual removal, use of sorbents and vacuum pumps.

Table 11. Muddy shores

Protective measures for muddy shores		
Preferred	**Viable**	**Avoid**
Mechanical recovery in open water	Deflecting booms or sorbent booms for protection of area Chemical dispersion in open water	
Clean-up measures for muddy shores		
Preferred	**Viable**	**Avoid**
Natural processes	Low pressure, cold water flushing Sorbents Manual removal Pumping of pooled oil	Hot water /high pressure washing Dispersion

Appendix G
LIST OF ACCREDITED OIL WASTE COLLECTORS/TRANSPORTERS

Name / Address / Tel. no.	Permit issued
International Towage & Transport Corp. 2868 Lamayan St., Sta. Ana, Manila Tel #: 521-0911	Oil Waste collector
G & G Marine Anti-Pollution Service 9 Eliseo St., Concepcion Subd., Valenzuela, M.M. Tel #:	Oily waste transporter
Sea Clean Anti-Pollution Services 1195 Maria Orosa St., Ermita, Manila Tel #: 810-0503	Waste transporter
Rapid Ports Utilities Corporation 603 Ermita Center Bldg. 1350 Roxas Blvd., Ermita, Manila Tel #: 522-9984; 536-0509	Waste collector
Gluekauf Marine Anti-Pollution Services Rm. 704 VIP Bldg., Plaza Ferguson Roxas Blvd., Ermita, Manila Tel #: 521-1365; 521-1751; 521-7520	Marine anti-pollution sludge collection services
Maharlika Marine Anti-Pollution Services Naval St., Navotas, M.M. Tel #:	Sludge collection contractor
Enviroconsult Marine Services Manila Tel #:	Waste collection contractor

Appendix H
LIST OF CONTACT NUMBERS

Agency	Address	Tel. No.
Philippine Coast Guard		
Marine Environmental Protection Command	Coast Guard Base, Farola, Binondo, Manila	Tel: 243-0463
National Operations Center for Oil Pollution	Coast Guard Base, Farola, Binondo, Manila	Tel: 243-0463
Coast Guard Action Center	HPCG, 139 25th St. Port Area Manila	Tel: 527-3873
Coast Guard District NCR-CL	Coast Guard Base, Farola, binondo, Manila	Tel: 243-0474 or 243-0465
Port State Control Manila	HPCG, 139 25th St. Port Area Manila	
Coast Guard Station Manila	North Harbor, Tondo, Manila	Tel: 245-3035 or 245-3072
Coast Guard Station Pasig		562-0178
Coast Guard Station Laguna		652-5155
Coast Guard Station Corregidor		0927-3812092
Coast Guard Detachment Navotas		0928-7009989
Coast Guard Detachment Lamao		(047) 244-6936
Oil Companies		
Petron Corporation (Head Office)		Tel: 886-3780
Petron Bataan Refinery		Tel: 886-3187
Petron Pandacan		Tel: 563-8521
Petron Rosario (Cavite) Terminal		Tel: (046) 438-1996
National Agencies		
Bureau of Fisheries and Aquatic Resources	860 Arcadia Bldg. Quezon Ave, Quezon City	Tel: 3725057 Fax: 3725048
Environmental Management Bureau	DENR Compound Visayas Ave. Diliman QC	Tel: 929-6626
Metro Manila Development Authority	MMDA Bldg. EDSA	Tel: 8824151 to

	cor Grease St. Guadalupe, Metro Manila	66 280-0283
Philippine Ports Authority	Port Area, Manila	Tel: 527-8356; 530-1256
Department of Health	San Lazaro Compound, Rizal Ave., Sta. Cruz Manila	Tel: 743-8301 loc. 1132 Fax: 743-1829
Department of Energy	PNPC Complex Fort Bonifacio, Metro Manila	Tel: 840-2286 Fax: 840-1731
Maritime Industry Authority	PPL Bldg, 1000 UN Ave. Cor. San Marcelino St Manila	Tel: 521-0107 Fax: 524-2746
National Disaster Co-ordinating Council (NDCC)		Tel: 911-5061 to 65 Fax: 911-1406; 912-5668; 912-0984
National Disaster Co-ordinating Council Regional Office		Tel: 912-6675
Philippine National Police (DILG)		Tel: 721-8598
Bureau of Customs (BUCUS)		Tel: 526-6355 Fax: 527-4511
Bureau of Air Transportation (ATO)		Tel: 832-0906
Bureau of Quarantine and International Health Surveillance		Tel: 527-4655 ; 527-4654
Bureau of Immigration		Tel: 527-3260 ; 527-3248
General Headquarters, Armed Forces of the Philippines (AFP)		Tel: 911-7996
Local Government Units		
Municipality of Samal, Bataan	Samal, Bataan	Tel: (047) 451-1521
Bataan Provincial Government Environmental and Natural Resources Office	Provincial Capitol Balanga City, Bataan	Tel: (047)-2372946
Bataan ICM Program	Provincial Capitol	Tel: (047)-

	Compound Balanga City, Bataan	2371012
Bulacan Provincial Government Environmental and Natural Resources Office	Capitol Bldg. Malolos, Bulacan	Tel/fax: (044) 791-6365
Cavite Provincial Government Environmental and Natural Resources Office	Cavite Provincial Capitol, Trece Martires City, Cavite City	(046) 419-0916
Pampanga Provincial Government Environmental and Natural Resources Office	San Fernando, Pampanga	(045) 961-4713
Office of the Mayor, City of Manila	Manila City Hall	527-5004
Office of the Mayor, City of Parañaque	Parañaque City Hall	826-8244
Office of the Mayor, City of Pasay	Pasay City Hall	832-7676
Office of the Mayor, Municipality of Navotas	Navotas Municipal Hall	281-8861/282-6195
Office of the Mayor, City of Las Piñas	Las Piñas City Hall	871-4343
Office of the Mayor, City of Malabon	Malabon City Hall	281-3598/281-3405
DENR Regional Offices		
DENR Region-3	San Fernando, Pampanga	Tel: (045)-961-4236
DENR Region-4	Roxas Blvd., Manila	Tel: 405-0050; 405-0002
DENR NCR	Roxas Blvd., Manila	Tel: 435-2509
Others		
Malayan Towage and Salvage Corp.	2/F La Paz Center Building, Herrera cor. Salcedo St. Makati City	Tel: 818-3702
UP- Marine Science Institute (UP-MSI)	University of the Philippines, Diliman Q.C.	922-3959
Manila Bay Integrated FARMC	Samal, Bataan	Tel: (047) 451-1521
Sagip Pasig Movement		Tel: (6347) 237-

		1012/ 791-6174