Oil spill contingency planning evaluation for the Philippine management

Daisy A. Jaboli

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WORLD MARITIME UNIVERSITY
Malmo, Sweden

Oil Spill Contingency Planning Evaluation
for
The Philippine Management

by
Daisy A. Jaboli
Republic of the Philippines

A dissertation submitted to the World Maritime University in partial fulfillment of the requirements for the award of the degree of

Master of Science
in
GENERAL MARITIME ADMINISTRATION
1993
I certify that all the material in this dissertation that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this dissertation reflect my own personal views, and are not necessarily endorsed by the University.

Daisy A. Jaboli
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It gives me great pleasure to dedicate this work
to my Father who has provided me the daily sustenance of abiding generosity, belief and affection
and
to a loved friend from whom I learned to be patient in the midst of overwhelming difficulties.
Acknowledgments

This work is a product of many minds. It has come into existence with the inspiration and wisdom of many thinkers. There have been so many kind people at the United States Coast Guard that I dare not weigh and sort their contributions. Suffice it to say that the busiest, wisest people were unfailingly kind, remarkably available and highly revealing to me. Among the many distinguished leaders who have shaped my ideas are the following: Capt Richard M. Larrabee III, LCdr Peyton Coleman, Mr. Gary L. Ott, LCdr Mike Smith, LCdr Robert A. Van Zandt, Cdr Timothy E. Tilghman, LCdr Robert J. Brulle, LCdr Ernest Del Bueno, LCdr Dave Sherrod, LCdr Mark McEwen, Lt William H. Crozier, Mr. Ed Levine and Mr. Jonathan K. Waldron. To them, I express my deepest admiration and sincere gratitude for the insights shared during my field training.

At different stages of development, Professor Theodore J. Sampson performed the invaluable role of guiding me write this work. The suggestions and comments offered were extremely valuable. I cannot thank him enough for his lectures in Contingency Planning — and for creating an environment where my knowledge and understanding in oil spill response management was expanded.

I also would like to thank Mr. Manuel P. Cortez, my "make it happen" friend and affirming, creative mentor, for his guidance, wisdom, support and professional expertise in oil spill response. Commodore Carlos L. Agustin for allowing me to freely use the National Oil Spill Contingency Plan. They were both instrumental in the vision of this project. Their trust and confidence have greatly influenced me in my quest to contribute, in some small way, to the oil spill contingency planning process currently undertaken in the Philippines.

My parents, sisters and brothers continue to support me with understanding in all my endeavors and particularly during the "crunches". Their prayers and love made the dark stretches passable.
Two real good friends, Mr. Ambrose Wong and Mr. Dinh Xuan Manh, deserve thanks for the willingness to impart their knowledge in computer and for the assistance extended to complete this task.

Finally, I am deeply indebted and grateful to GRAND DUCHY of LUXEMBOURG for providing fellowship of my studies at the World Maritime University; to Mr. Philip S. Tuazon and Mr. H. R. Vitasa (ex-Administrator and Deputy Administrator for Planning, respectively, of the Maritime Industry Authority) who, in the midst of my struggles, had been most gracious in providing me every possible encouragement to make this "dream" a reality.
Abstract

This research synthesizes a conceptual framework for establishing a unified response management system to handle a catastrophic oil spill in Philippine waters. It provides a descriptive management technique based on sound principles, to serve as a tool to enhance the effectiveness of a response action. This exploratory study focuses on response planning and management practices which form the root of organizational decline and contribute to the creation of an environmental crisis. (As perceived, environmental crisis caused by oil spill is that arising from three friction-building conditions: public outcry, private party responsibility, and government's dual mission as a helper and prosecutor of the spiller. The findings of this activity are validated by using data from large accidental spill disasters and applying the lessons learned from these incidents.)

Unified Response Mgt Syst

Descriptive mg technique as tools to enhance the effectiveness of a response action.
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CHAPTER 1

INTRODUCTION AND BACKGROUND

*The challenge is to be a light, not to be a judge.*

RATIONALE:

As an archipelago with an extensive marine territory, the Philippines is constantly threatened by oil pollution. The south and west coasts of the country face the Celebes Sea and South China Sea, respectively, which are heavily used as waterways by vessels of various sizes, mostly crude oil carriers. This area forms the traffic belt for international trading ships in the Southeast Asia region. By virtue of its higher traffic density, the country has a relatively high degree of sensitivity to oil pollution from collision, grounding, and other marine accidents. The country's anti-pollution resources must be concentrated in the vicinity of this major VLCC route. A major oil spillage may well create a national emergency which brings with it considerable attention and public concern. The occurrence of such event requires the fullest cooperation and participation of everyone affected.

The shoreline of the Philippines is twice that of the United States, in terms of size. Majority of these shore lines, based on their nature are considered critical. They have valuable and vulnerable marine and coastal resources such as mangroves, coral reefs, fishery spawning grounds, fish resources, coastal aquaculture sites and marine parks and reserves. Any oil spill, regardless of its size, can become catastrophic depending on how it will affect these critical shorelines.

The risk of spills is also recognized by the frequency of tankers passing
through the Philippine waters and using local ports for the transport of imported oil. The magnitude of crude oil being imported by the country annually is 74,825,000 barrels (source: Philippine National Oil Company Shipping and Transport Corporation).

Finally, it is a fact that the sea has a great influence upon the life of Filipino people. It provides many important contributions to their welfare in the form of protein, transportation, energy, employment, recreation, and other economic, social, and cultural activities. As such, it must be protected from the serious effects of oil pollution. Environmental needs must be given their proper weight relative to economic and energy concerns.

DESCRIPTION OF THE STUDY:

This study is generally designed to evaluate the contingency planning process being undertaken in the Philippines relative to oil spill. The focus of this work is placed on identifying any areas of deficiency and building on strategic strengths to develop the country's position in dealing with a catastrophic spill. It contributes to incorporate an alternative approach to any vulnerabilities or failing points that emerge in the administrative and technical aspects of spill response planning and management related activities currently being practiced in the country.

This research attempts to answer two specific questions, namely;

(1) Is there a need to improve the existing spill response capability of the nation?

(2) What steps should be taken to improve the country's spill response capability and maintain a state of readiness during an emergency such that it can adequately respond to a catastrophic spill should one occur in Philippine waters?
The purpose of this study is not to present any hasty or premature judgment on the manner the Philippine Coast Guard regulates functions related to oil pollution. On the contrary, it is tailored to offer ways to become more effective in its vital role to exercise authority in the prevention, containment, abatement and control of marine oil pollution. It provides a path which will lead to increase its level of performance in oil spill response. It contributes to gain a significant credibility in the implementation of this particular function. To be more specific, this study should serve as a practical tool for implementing change.

It is the objective of this work to establish a unified response management system to handle a catastrophic oil spill in Philippine waters. Because environmental crisis caused by oil spills arise from three friction-building conditions: public outcry, private party responsibility, and the government's dual mission as a helper and prosecutor of the spiller, an improved response system is not only a topic of great interest but also a necessity for survival during an emergency.

This activity is organized in four parts:

*Chapter II highlights the Philippine regulations concerning oil pollution prevention and control. It gives a brief description on the different legislations being implemented by the Philippine Coast Guard (PCG).*

*Chapter III summarizes the existing national oil spill contingency plan according to the following subsections:*

(1) *Purpose and Objective of the plan;*

(2) *Geographic Boundaries;*

(3) *Planning and Response Organizations;*

(4) *Response System and Policies; and*

(5) *Training/Exercises or Drills.*
Chapter IV is the core of the study. It presents an evaluation on the effectiveness of current spill response planning and management practices and other requirements laid down in the national contingency plan. There are two important areas of concern:

(1) Administrative Framework

The analysis and discussion are centered on the organization and responsibility for response.

(2) Technical Framework

The analysis and discussion are centered on training and preparedness for response to oil spill incidents.

Chapter V presents the conclusions and recommendations based on the findings made from the assessment in the preceding chapter.

The method for generating the desired objective of this study focused on spill response practices which form the root of organizational decline and contribute to the creation of an environmental crisis. In the interviews conducted, planning meeting attended for spill response drill, command post drill exercise observed, and materials/ data collected during the field training, the writer concentrated not only on what people thought was important for an effective response to oil spill incidents but on what they actually did. The interviews helped people to relive experiences by reviewing what really happened and how they perceived the outcomes of a variety of situations. By systematically analyzing them with objective criteria, the writer was able to generate those factors that produce a unified response management system.

It should be clearly stated what this study will and will not do. Although any response activity demands creativity, the writer's intention is not to prescribe directly how to become creative. Rather, focus is made on how to harness and apply the
creativity that already exists in the organization. It can be the shipping or oil company which represents as the spiller or the Philippine Coast Guard which serves both as the helper and prosecutor of the spiller.

PROBABILITY OF A FUTURE CATASTROPHIC SPILL IN THE SOUTHEAST ASIAN SEAS:

The Philippines is strategically located in the South China Region. This region is an important link for energy material transportation. It is a heavily-used route between the Middle East, East Asia and the United States (Figure 1). Located between the Indian and Pacific Oceans, the Southeast Asian seas are specifically a throughway for ship traffic between the Persian Gulf oil ports and Japan. Japan is the largest oil importing country in the region. "Of the 233,660,000 kiloliters of crude oil supplied domestically each year, more than ninety percent is imported", declares K. Kuwabara, Director, Maritime Disaster Prevention Division, Japan Maritime Safety Agency. Moreover, most nations in the region are importing oil. Brunei, China, Indonesia and Malaysia, however, export significant quantities to regional and other destinations.

A catastrophic tanker spill is perceived to occur in the South China Sea and Celebes Sea. These areas are considered as the principal routes of very large crude oil carriers (VLCC) and ultra large crude oil carriers (ULCC) (Figure 2). The most important of the sea routes traverses the southern Andaman Sea, the Straits of Malacca and Singapore, the South China Sea, and the Luzon Strait. An alternative route for tankers too large to navigate the Malacca-Singapore Straits safely goes south of Sumatera and Java before entering Indonesian archipelagic waters via the Lombok Strait. Thereafter, the route follows a navigational channel through the Makassar Strait and the Celebes Sea before passing south of the Philippine Island of Mindanao into the Pacific Ocean. In addition to the oil routes through the region, there are trade routes within it. Singapore, at the end of the Malacca-Singapore straits and the entrance to the South China Sea, is the principal shipping hub and one of the busiest ports in the world. The major routes for trade within the Southeast
Asia region originate and fan out from Singapore.

Important marine subregions that present navigational hazards are briefly described below. They are presented in the order a vessel proceeds from the Indian Ocean through Southeast Asian seas to Japan.

**The South China Sea**

After leaving the Singapore Strait most large vessels take a northeasterly course into the South China Sea. Transit through the sea and to the main ports poses navigational hazards, especially in the shallow waters of Spratly Islands, shown in many nautical charts as the "Dangerous Ground", situated north by Brunei and east of the Philippine Island of Palawan.

**The Luzon Strait**

The principal exit from the South China Sea for ships bound for Japan or across the Pacific to North America has three navigable channels — the Bashi, the Balintang, and the Babuyan. These three channels comprise the Luzon Strait between Taiwan and Luzon. Each channel is wide and deep enough to permit transit by large ships. The northernmost of the three, the Bashi, is most often used by ships bound for Japan and ports on the Asian coast north of the South China Sea. The Balintang Channel is the recommended route for ships enroute to Seattle, San Francisco, and other ports on the west coast of the United States. Ships enroute to Honolulu from Manila and other Southeast Asian ports usually use the southernmost Babuyan Channel. The strong northeasterly trade winds make for rough seas in the Luzon Strait, and frequent typhoons make the channels hazardous during the July to December season.

**Selat Lombok, the Makassar Strait, and the Celebes Sea**

Ships can enter the Java Sea after leaving the Singapore Strait. However, the much greater drafts of modern vessels, particularly tankers, have made the passage more difficult. A longer but safer route is Selat Lombok which is wide and deep
enough for the world's largest tankers. Most vessels using this route are bound for the Makassar Strait which leads to the Celebes Sea and ultimately south of Mindanao to the Pacific Ocean and Japan. The Makassar Strait presents no serious navigational obstacles to the ULCCs that traverse the Celebes Sea. Northerly winds predominate in the Makassar Strait and north-northeasterlies occur in the Celebes Sea. The ocean currents are much more complicated. Vessels bound for Japan meet these strong currents and brisk northeasterly trade winds as they pass south of Mindanao and enter the Pacific. As such, navigation in this area does not guarantee a complete relief from any occurrence of accidental spillage.

The Sulu Sea

The Sulu Sea is the largest of the semi-enclosed seas largely under Philippine jurisdiction. It serves as pathway for ships bound for the South China Sea from the Pacific Ocean via the Surigao Strait north of Mindoro or the Balabac Strait. Ships enroute to Manila from Selat Lombok also transit the sea.

PROBABILITY OF A MAJOR SPILL IN TERRITORIAL WATERS:

Apart from a regional basis, the increasing density of maritime traffic, especially that of oil tankers in Philippine waters has also increased the risk of oil spills. There are four refineries presently operating in the country. Three refineries, Bataan Refining Corporation, Caltex Philippines, Inc. and Pilipinas Shell Petroleum Corporation, are engaged in crude oil refining and have an estimated combined output of 289,000 barrels per stream day. Bataan Refining Corporation has a rated capacity of 155,000 barrels per stream day while Caltex and Shell have 68,000 and 66,000 barrels per stream day (PCG), respectively. The fourth refinery, Philippine Petroleum Corporation located near Laguna Lake in Rizal, is engaged in lubricating oil refining and has a rated capacity of 33,000 barrels per stream day (PCG). The refineries send their products to the Pandacan terminal, the only major crude oil depot with a capacity of about 5 million barrels. From the terminal, the products are
distributed over the Philippines to the major cities in the country. Figures 3 shows the tanker routes to the different storage sites and Figure 4 the corresponding credible spill assumption at these sites.

The risk of oil pollution is further enhanced by the possibility of accidental oil spills occurring from offshore oil operations being conducted in the northwest of Palawan (Figure 5). Activities related to offshore exploration are foreseen as one of the sources of a major spill in the Philippine waters. Figure 6 shows hypothetical oil spill trajectories for five points of origin in the South China Sea. Specifically, a spill from the hypothetical point of origin off the coast of Sabah, Malaysia would create an oil slick in Philippine-claimed waters and would cross waters claimed by Brunei. Such a situation will positively raise transnational issues that require transnational response action.

LARGE SPILLS ARE NOT RARE:

Factors that warrant examination include the historical patterns of large oil spills due to tanker accidents. Such spills have occurred fairly regularly and have always been highly publicized events. They garnered national and worldwide attention. Of course, other spill events are threatening in just the same way but they do not rouse many emotions as these incidents do.

Tanker spills are certainly a contributor to oil pollution problem. They are more dramatic and highly visible. They can cause widespread and long lasting harm. While it is true that routine discharges associated with the transport of oil account the largest source of petroleum inputs to the marine environment worldwide (Figure 7), the impact is often subtle and less immediately obvious. Under normal circumstances, oil spill response action does not require the participation of the national response team as compared to large spills caused by tanker accidents.

The framework of explanation proposed in Chapter IV needs empirical validation. In this regard, the most significant international spill cases (100,000
barrels and over) which occurred from accidental causes like collisions and groundings were selected for presentation in Appendix I. A data of other oil spill cases (below 100,000 barrels) is found in Appendix II. From the incident summary or description made, a set of facts will emerge that should serve as a guide in an attempt to determine which type of spill most likely will occur in Philippine waters.

THE HUMAN ERROR THEORY:

Organizational and political interests come into one accord well with attributions of individual rather than organizational responsibility. When systems break down, organizations seem to need a scapegoat; a clearly defined responsible party, usually an individual. Discussions about safety are set so that system-level variables are ruled out of consideration.

Shipping industry representatives and government regulators (who are interested in constructing a particular version of reality) frequently claim that 80% of significant marine accidents are caused by human error. The category of human error has become a descriptive form and a conduit for political communication. Individual responsibility and moral failure exist as the center of a particular tragedy. Thus, controversial political arguments are often confined on the distribution of responsibility or more bluntly, who did what to whom.

"Accounts of accidents and catastrophes appear as descriptions of events and rhetorics of persuasion", declares Lee Clarke, author of Oil Spill Fantasies. Rhetorics are forms of argument used to convince actors to adopt a particular position. They are symbolic, usually spoken and written, conduits for persuasion. Players in social struggle over risks --- which might also be called risk games --- wield rhetorics to set the terms of an argument. The defenders and challengers use them to win adherents to their positions. A party wins the risk game if it successfully establishes a particular rhetoric as the legitimate one in a given political arena. Boundaries are drawn around the problem --- so that questions and issues are considered relevant to the discussion while others are not.
The human error theory of marine or environmental accidents works in oil and shipping companies' interests. It protects them, to some degree, from outside scrutiny and political recriminations. In like manner, regulators, especially the Coast Guard, accept and promulgate the human error rhetoric. For example, investigations mainly focus on what types of human error are responsible for this or that accident, rather than what might be the underlying cause of those errors. Readers of reports are rarely invited to focus their attention on shipboard equipment, maintenance practices, vessel design or shoreside management. The reason behind this motive is the fact that "there is an incredible incentive in wanting to look good in the public eye - or not wanting to look bad" according to Robert D. Kennedy, CEO of Union Carbide Corporation, Danbury, Connecticut. However, it is no accident, so to speak, that the human error theory of system breakdown puts all the responsibility on the operators of the system and little or none on the system itself.

As an explanation for catastrophe, human error entails a theory of how social systems break down: Individuals are incompetent, or poorly trained, or confused, or they just do not follow the rules. It follows that if people have those unfortunate attributes, the obvious remedy is to fix or replace individuals. The human error theory is premised to the view that individual action is the proper basis for large explanations. Because individuals cause action, according to the human error theory, it seems only natural that they be accorded responsibility when things go wrong.

To mention, it is no surprise that human error drew enormous attention as the problem responsible for the EXXON VALDEZ spill incident. The Great Alaskan Oil Spill was a high order offense, threatening livelihoods, killing wildlife, and diminishing natural beauty. Of course, other large accidental spill events, as described in Appendix I, were threatening in just the same way but did not rouse many emotions. There seemed to be something different about the EXXON VALDEZ disaster. Perhaps it was because the event seemed so needless; or maybe the photographs of black sludge next to ice-blue glaciers, and the videos of viscous, sticky waves of crude breaking over the heads of surely dying birds left people feeling disgusted.
In the EXXON VALDEZ spill, the human error theory of catastrophe directed attention to Captain Hazelwood and his alcohol abuse. His lack of judgment — his human error — brought considerable moral condemnation. After the spill occurred, Captain Hazelwood lose his license to master a tanker, making him unemployable in the shipping industry. The obvious answer is that he did not follow the rules for safety. He was polluted with blame. Becoming a symbol of evil and irresponsibility, as Captain Hazelwood did, is common when alcohol and tragedy coexist in the same social space. Grant, for the sake of argument, that Hazelwood's penalty was just, however, there is a defensible case that Hazelwood may have been drinking, but was not sufficiently impaired to render him incompetent to command the EXXON VALDEZ. Exclusively focusing on substance abuse neglects the fact that oil spills and incapacitation happen to sober captains. This does not mean however, that a captain's drunkenness could be considered irrelevant in explaining an accident. Had Hazelwood died with a heart attack or a stroke, the official rhetoric would have revolved around "an act of God", not human error.

The human error theory of accident causation is a powerful political rhetoric. Its focus on the individual misses many non-individual causes of accidents. Once the rhetoric becomes the accepted vocabulary for explaining accidents like that of the EXXON VALDEZ, other issues are excluded from significant political discussion. Most important to note is that this rhetoric defines the problem as one of individual moral failure, while overlooking the contribution of social, structural, or cultural organization. Larry Hirschholm, writing about Three Mile Island, put it well:

"While it may be convenient to blame maintenance workers, no amount of discipline or motivation will eliminate such errors. Manuals, protocols, and job instructions may dictate a range of procedures, but in the real world, errors of omission and commission may be caused by job turnover, the stress of shift work, backbiting among workers, the pressure to complete a maintenance job and return the system to service, a supervisor out sick, disgruntled maintenance workers, an operator who is ill or asleep at the controls — in short, all the contingencies and events of human living. We often find the tendency toward error exacerbated by the social organization of jobs and skills and the information relationships that..."
shape cooperation at work''.

Had the Valdez Coast Guard facility been equipped with sufficient technology and personnel with real authority, the EXXON VALDEZ spill might not have happened the way it did.

This official interpretation should be viewed skeptically because they assign blame to individual operators; protecting organizations from closer scrutiny and responsibility for the safety of their technical systems. Such a focus deflects political and analytical attention away from technical system-level explanations which should rather be regarded as factors in disasters. Consequently, the organizational roots of the crisis remain unexamined and obscured. "Without the roots, we don't get the fruits'', Stephen R. Covey, writing about Principle-Centered Leadership, so aptly states.
Figure 1  *Major Crude Oil Importers*
Figure 2: Principal Tanker Routes in Southeast Asia Region

Figure 3 Tanker Routes to Different Storage Sites
Figure 4 Spill Assumption
Figure 5. Offshore Oil Operation Sites

Figure 6 Hypothetical Oil Spill Trajectories

(for five points of origin in the South China Sea)
Figure 7 Petroleum Inputs to the Marine Environment
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CHAPTER II

REGULATIONS CONCERNING OIL POLLUTION

PREVENTION AND CONTROL

Recognizing the urgent need to prevent, mitigate or eliminate the increasing damages to marine resources as a result of pollution, the Philippines promulgated the following legislations:

(1) Republic Act No. 3931. This Act provides the establishment of the National Water and Air Pollution Control Commission. Its functions and responsibilities are classified as described below:

(1.1) Research and studies --- amassing adequate and reliable information on pollution in the country;

(1.2) Plans and programs --- pollution control;

(1.3) Standard-setting --- standards and guidelines for its operational functions related to licensing, approval of plans, issuance of specific orders to control pollution, and determination of violations of the law or its own orders;

(1.4) Monitoring --- current information and development as basis for administrative decisions in the implementation of its functions;
(1.5) **Investigation** --- determination of specific circumstances reflecting violations of law;

(1.6) **Enforcement** --- prevention or abatement of pollution through specific orders and imposition of sanctions upon offenders in the form of cancellation or suspension of permits, criminal penalties and/or payment of damages.

(2) **Presidential Decree No. 984.** This is an amendment of Republic Act No. 3931. The decree retained the above functions but greater responsibilities were added to the previous functions of the Commission. Section 6 (a) states that the Commission is mandated to:

> Determine the location, magnitude, extent, severity, causes, effects and other pertinent information regarding pollution of the country and conduct continuing researches and studies on the effective means for the control and abatement of pollution.

> It further states that it shall develop comprehensive multi-year and annual plans for the abatement of existing pollution and the prevention of new or imminent pollution, the implementation of which shall be consistent with the national development plan of the country.

(3) **Presidential Decree No. 600, otherwise known as the Marine Pollution Decree of 1974.** This decree was signed into law on 09 December 1974. It specifically prohibits the spillage of oil or any hazardous substance or noxious liquid substances within the territorial and inland waters of the country. It also empowers the Philippine Coast Guard (PCG) to subscribe, promulgate and enforce rules and regulations for the prevention and control of marine pollution. The rules and regulations that were issued
required operators of ships of 1,000 tons and above to install antimarine pollution equipment on their vessels not later than 31 December 1978. In addition, the installation of oily-water-filtering devices and slop tanks to receive oil residues from the vessels were required under these rules.

The designation of PCG as the principal body for regulating, monitoring, and responding to oil pollution related activities raised uncertainties in the sense that the scope of its authority is shared with the National Pollution Control Commission. The two government agencies have rule-making and enforcement authorization; the former from Presidential Decree No. 600, and the latter from Republic Act No. 3931. As a result, Presidential Decree No. 600 was later amended by Presidential Decree No. 979.

(4) Presidential Decree No. 979, otherwise known as the Marine Pollution Decree of 1976. This law was passed on 18 August 1976. Section 6 states that:

_It shall be the joint responsibility of the Philippine Coast Guard and the National Pollution Control Commission to coordinate and cooperate with each other in the enforcement of this decree and its implementing rules and regulations._

In practice, the Philippine Coast Guard is the lead or responsible agency for spills or releases of oil and hazardous substances in coastal zones. On the other hand, the National Pollution Control Commission mandate is adhered to for inland areas.

(5) Presidential Decree No. 602, known as the National Oil Pollution Operations Center Decree. This decree was signed into law on the same day as the Marine Pollution Decree of 1974. It created the National Operations Center for Oil Pollution (NOCOP) in the Philippine
body in charge of implementing the National Oil Spill Contingency Plan which was promulgated on 30 June 1975. The NOCOP is headed by a Director/Commander who exercises overall responsibility in the prevention, containment, abatement and control of marine pollution in all bodies of water within the territorial jurisdiction of the country, including ports, harbors, coastlines, lakes, rivers and their tributaries.

RESPONSIBILITY IN CASE OF OIL SPILLS UNDER MEMO CIRCULAR No. 01-91:

Memorandum Circular No. 01-91 provides the implementing guidelines pursuant to RA 3931, PD 984, PD 600 and PD 979 as rationalized in accordance with the International Convention for the Prevention of Pollution from ships, MARPOL 73/78.

Under the current system, the first line of defense when an oil spill occurs is the company responsible for the spill, the company's oil spill response contractors, and local government emergency managers. If needed, a variety of government agencies stand ready to support, assist, or take over. Most of these potential responders have their own plans and standard operating procedures, which govern their response actions and structures.

Regardless of the government and private response capabilities, all oil releases which cause a sheen on the navigable waters of the Philippines must, by law, be reported immediately by the spiller to the NOCOP. So far, no single report made, triggered a full-scale national response action.

Once an oil spill is reported, the NOCOP immediately notifies a predesignated On-Scene-Commander (OSC). The OSC determines the status of the local response and monitors the situation to determine if greater national involvement is necessary. It is the OSC's job to ensure that the cleanup, accomplished by industry, is appropriate, timely, and minimizes environmental
damage. The OSC determines that the local action is sufficient and that no additional national government action is required. If a larger volume of oil is involved or the situation is more complex, the NOCOP's Director may remain on the scene to monitor the response and advise on the deployment of equipment and personnel.

However, if the spiller or OSC determines that the spill is beyond the capacity of the company or industry responders to manage --- because of scope or complexity of the response, or lack of experience and/or equipment of the local responders, or the spiller is unknown --- the OSC takes command of the response. The OSC may call in additional contractor support, request the services of other government agencies, and convene the Response Teams on the scene or by phone for counsel, to access special expertise, or for particular logistical support. The spiller remains liable for all actual removal costs incurred by the national government in responding to the spill.

The National Response Team (NRT) stands ready to provide backup support to the OSC during a spill response. However, the NRT is not an operational body --- it does not direct spill responses. The NRT's primary responsibilities include setting and maintaining national response policy, evaluating the effectiveness of the National Response System (NRS), and making recommendations to improve the system. The hierarchy of response support is set forth in the National Contingency Plan. The Plan, which is described in the next chapter, delineate the players and the responsibilities for making decisions. It does not indicate, however, what the decisions should be.

It must be recognized that oil spills, both large and small, are inevitable. Preventive measures would only minimize the chances of an oil spill ever occurring. They cannot be completely prevented. Steps were taken to control some of the chronic oil pollution associated with tanker operations in the international scheme, such as requiring segregated ballast tankers and better controlling tanker loading operations. Better tanker construction, expert navigation and pilotage on tankers carrying petroleum products, and proper maintenance were also introduced and implemented. However, in most cases, these measures are not always carried out.
REFERENCES


2. *PRESIDENTIAL DECREE No. 600, Secs 4-8*

3. *Philippine Coast Guard, Memorandum Circular No. 01-91, PREVENTION, CONTAINMENT, ABATEMENT AND CONTROL OF MARINE POLLUTION*
CHAPTER III

THE NATIONAL OIL SPILL CONTINGENCY PLAN

DESCRIPTION OF THE PLAN:

The National Oil Spill Contingency Plan (NCP), referred to as the Plan in this chapter, was primarily designed to accomplish the task to strengthen the nation's ability to act in the event of an oil spill emergency in Philippine waters. It serves to protect the environment from the damaging effects of oil spills by providing a response mechanism for combatting oil at sea using the combined resources of the private sector and the government. It also promotes the coordination and direction of national and local response systems and the development of local government and private capabilities to handle such spills. In short, it is the blueprint for coordination of responsibility, authority, and information flows.

The Plan has not been revised since its promulgation on June 30, 1975. It supplements the various decrees, rules and regulations concerning the prevention of marine pollution, all of which are mentioned in the preceding chapter. Further, it has the following major components:

(1) Objectives:

\(\sqrt{a}\) To develop appropriate preventive measures and effective systems for discovering and reporting the existence of an oil spill;

\(\sqrt{b}\) To institute prompt measures in order to restrict the spread of
oil;

(c) To assure that the public health and welfare are provided adequate protection;

(d) To apply techniques related to cleanup and disposal of the collected oil; and

(e) To institute actions to recover cleanup costs.

(2) Implementing Units

(a) National Operations Center for Oil Pollution (NOCOP)

The NOCOP is headed by a Director who supervises the operation at its offices based in South Harbor, Manila. He is assisted by a permanent staff and a complement of Marine Pollution Control Units (MPCU) and, on an interim basis, by consultants composed of representatives from other government and private agencies. Fig. 8 shows the country's oil spill control organizational chart and Fig. 9 shows NOCOP's organizational chart.

The Director's functions are as follows:

(a.1) Directs the overall operation;

(a.2) By virtue of Section 6, P.D. 602, establishes communication with ASEAN and other foreign contact points, gives appropriate information to them and requests for assistance, if needed; and

(a.3) Performs specific duties as given in Appendix III.
(b) The On-Scene-Commander (OSC)

Coordination and direction of pollution control efforts at the scene of the discharge is accomplished through the leadership of the OSC. He is the PCG Station Commander in whose area of responsibility the spill has occurred. Appendix IV gives the list of PCG stations throughout the country.

In the absence of the Station Commander, the senior PCG personnel first on the sight assumes the duties of the OSC until the arrival of the predesignated OSC or any officer designated by the OSC or by higher authorities.

The OSC’s duties are as follows:

(b.1) Assesses and passes detailed reports on the situation to NOCOP;

(b.2) Controls and coordinates activities at the scene;

(b.3) Evacuates survivors; and

(b.4) Performs specific duties as given in Appendix III.

(c) Assisting Units:

The following groups assist the OSC at the scene of the pollution spill:

(c.1) Response teams are teams attached or for attachment to the OSC which initiates response action in controlling the spill and its spread. These teams report to the OSC for control and shall not leave the scene without clearance from the same;
(c.2) Support elements are military or civilian units/elements which provide assistance to the OSC/NOCOP on air surveillance, transport of personnel, equipment and supplies, and services such as advisory and investigation. In the case of military units, these may not necessarily be attached to the OSC for control but the OSC may request local military commanders close to the scene to have, in alert status, their personnel, engineering/equipment and vehicles to assist in containing the encroaching oil to the shorelines and beaches and to help in cleaning the contaminated beaches.

(c.3) A salvage company may be designated to conduct immediate salvage operations. The work to be undertaken depends on the course of action which the OSC and the salvage team leaders may deem necessary in the given situation. The list of accredited salvors is given in Appendix V.

(c.4) A clearing team is composed of representatives from the Bureaus of Customs, Quarantine, and Immigration and the PCG Boarding team that will attend to the clearance of assisting foreign representatives.

(c.5) Oil refineries/terminals/depots and other facilities discharging oil and other industrial wastes into the sea are required to create their respective response teams. By virtue of Section 3 of P.D. 602 and Memorandum Circular No. 02-77, they may be called upon for attachment to the OSC/NOCOP and also make their respective anti-pollution equipment and materials available upon the OSC's request.

(3) Actions Taken:

The actions taken in the Plan and usually in contingency plans of oil companies can be separated into five relatively distinct phases.
For descriptive purposes, these are Phase I - Discovery and Notification; Phase II - Evaluation and Initiation of Action; Phase III - Containment and Countermeasures; Phase IV - Cleanup, Mitigation and Disposal; and Phase V - Documentation and Cost Recovery. It must be recognized that elements of any one phase may take place concurrently with one or more other phases.

(a) Phase I - Discovery and Notification

An oil discharge may be discovered through; a.1) a report submitted by a discharger; a.2) deliberate searches by vessel patrols and aircraft; and a.3) incidental observations by government entities or the general public. In all these cases, the discovery of pollution spills should be reported immediately to the NOCOP and/or nearest PCG station by wire or telephone or by any means with the least possible delay.

The alerting or initial report to the NOCOP and/or the OSC should provide as much known information as possible in order for the OSC/NOCOP to evaluate the degree of severity of the spill and thus indicate the type and degree of mobilization needed. Such report should try to provide the following information:

(1) Type of pollutant (i.e. diesel oil, crude oil, etc.);

(2) Name of water course of area, the location where the spill occurred and/or its present position;

(3) Identified cause of spill and name of spiller, if possible;

(4) Time and date the spill occurred, if known or when first observed;

(5) Any concerned officer who has been notified and if they have
responded;

(6) Any pertinent information; and

(7) Name, address and telephone number of caller.

(b) Phase II - Evaluation and Initiation of Action

The OSC ensures that a report of an oil spill is immediately investigated and verified. Based on the available information, the OSC will: b.1) evaluate the magnitude and severity of the spill; b.2) determine the feasibility of removal and the type and degree of mobilization required; and in the course of the operation, b.3) assess the effectiveness of the removal actions.

The OSC sends to the NOCOP his initial report on the spill and subsequent Pollution Reports (POLREPS) in a timely manner as developments occur, at least twice daily at 0800 H and 2000 H, in accordance with the formats given in Appendix VI. The OSC, whenever appropriate and as soon as possible after receiving an alerting report, will advise the NOCOP of the need to initiate further governmental response actions such as requests for additional resources to conduct further surveillance or initiation of removal and containment operations. The OSC sees to it that adequate surveillance is maintained to determine whether removal/containment actions are being carried out properly.

At all times in the course of the operation, the OSC should ensure that constant communication is maintained with the persons in charge of the various assisting units and the NOCOP. The primary radio net used at the scene of the spill are continuously-watched frequencies. The voice radio call signs assigned are given in Appendix VII while the communication flow chart used during the emergency is shown in Figure 10. Other means of communication
including visual signs may be used at the scene.

(c) Phase III - Containment and Countermeasures

These are defensive actions to be initiated as soon as possible after the discovery and notification of a discharge. These actions may include public health and welfare protection activities, evacuation activities, source control procedures, salvage operations, placement of physical barriers to stop or slow the speed of a pollutant, emplacement or activation of booms or barriers to protect specific installations and sensitive areas and the employment of chemicals and other materials to restrain the pollutant and its effects on water-related resources. General Procedures on the containment of spills are given in Appendix VIII.

(d) Phase IV - Cleanup, Mitigation and Disposal

This includes oil recovery and monitoring to determine the scope and effectiveness of removal activities. Actions that can be resorted to include the use of suction devices, skimmers and belt devices and other collection devices for floating pollutants, the use of burning, dispersion and sinking to remove oil and the use of mechanical removers, and non-toxic dispersants to remove and treat oil on the beaches and shorelines. The use of dispersants is, however, limited to certain cases and there are no provisions for disposing of and storing the contaminated or waste materials collected during the cleanup operations. General procedures on the removal and treatment of spills including the use of dispersants are also given in Appendix VIII.

(e) Phase V - Documentation and Cost Recovery

This includes a variety of activities depending on the location of and circumstances surrounding a particular discharge. With regard
to recovery of removal cost and damage to state property, the principle of having the polluter pay for the damages and costs incurred is generally followed. The Plan states that the sponsoring company or unit shall be responsible and shall provide for the administrative and logistical requirements of personnel and equipment deployed at the scene. However, the units, organizations or groups of volunteers incurring expenses in the operation should maintain a true account of the expenses incurred. The settlement of bills will depend on the circumstances of individual cases of operations and also upon the results of legal action which would normally determine the liability and the extent of cost and damage from the offender or spiller. There are, however, no provisions for damages claimed by a Third Party.

For documentation purposes, the NOCOP and the PCG Station/OSC maintains a journal of communication received and transmitted. Aside from the POLREPS, a written post-operations report of the OSC should reach the NOCOP not later than five (5) days after the termination of an operation.

The collection of scientific and technical information of value to the NOCOP and the scientific community as a basis for research and development activities is considered in this phase. It must be recognized that the collection of samples and necessary data are performed at the proper time during the operation to fix liability and for other purposes.

(4) Inventory of Pollution Control Resources

The ownership, type and location of oil containment, recovery and cleanup equipment and materials and their location are given in Appendix IX.
OTHER CONTINGENCY PLANS IN THE COUNTRY, e.g. INDUSTRY, COOPERATIVES, REGIONAL

Memorandum Circular No. 02-77 requires all oil refineries and major loading ports such as Pandacan, Poro, Cebu, Davao, Iloilo, Bacolod and Sucat oil terminals to be equipped with oil containment, recovery and dispersal equipment duly approved by the PCG. In line with this regulation, those engaged in oil refinery and transport operations have formulated their own oil spill contingency plans. Firms engaged in oil exploration and production activities have generally followed the industry's standards and procedures in the provisions of oil spill cleanup and acceptable dispersants even in the absence of governmental requirements. Prior to the exploration phase, an environmental characterization study of the potential oilfield was conducted. This study has addressed the various environmental considerations of offshore oil exploration and production activities undertaken.

Refineries, in addition to the required pollution abatement facilities, are required to have a minimum 1,000 feet of oil containment boom while 150 feet is prescribed for each depot in major loading ports. A minimum of 5-20 drums of dispersants duly approved by the PCG should also be provided in refineries and depots. In the event of an oil spill, these refineries and major loading ports also activate their own contingency procedures. Training exercises involving simulated oil spills are conducted on a regular basis to maintain a high level of preparedness.

There are, however, existing arrangements wherein all the major oil companies and their barging contractors have their respective roles in terms of manpower and equipment to assist in any oil spill. Notable among these existing arrangements are the Mutual Aid Agreement on Oil Spills along the Pasig River and other areas arising from the operational scope of the Pandacan Terminal and the Memorandum of Agreement Among Oil Companies on Oil Spill Cooperative for Poro, Bacolod, Iloilo and Davao. Oil companies and barging companies operating in the Laguna Lake also have a standing arrangement to pool their resources in the event of an oil spill in the lake.

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On the sub-regional level, the Philippines, along with Malaysia and Indonesia formed a cooperative Network for Oil Spill Countermeasures in the Lombok/Makassar Straits and Sulawesi Sea to combat oil spill pollution in the areas mentioned. In order to further strengthen the plan, a Sulawesi Sea Oil Spill Response Network was subsequently established in Davao, Philippines in 1984.

On the regional level, the Philippines is a signatory to the ASEAN Contingency Plan formulated by members of the Association of Southeast Asian Nations --- the Governments of Brunei Darussalam, Indonesia, Malaysia, the Republic of Singapore, the Republic of the Philippines and Kingdom of Thailand. The country is also a member of one body known as the ASEAN Council on Petroleum (ASCOPE) which is tasked to standardize environmental and safety regulations for offshore drilling and combat transnational oil spills.

NATIONAL OIL SPILL EXPERIENCES:

Oil spills due to shipping and oil handling-related accidents that occurred in Philippine waters are listed in Table 1. From 1975 to 1986, fifty-one oil spill experiences took place involving a discharge of more than six million liters. This volume does not include those which are less than 400 liters and the numerous deliberate or indiscriminate dumping/discharges of oil and oily waters caused by vessels plying the domestic route from Manila Bay to the southern portion of the country.

An analysis of the major spills that occurred in Philippine waters shows that:

(1) Almost half of the spills, that is 47%, involves 50-5000 barrels (7950-794,937 liters) and only 6% accounts for spills greater than 5000 barrels.

(2) Accident situations such as sinking, collision, grounding and others, comprise 71% of all spills and 29% occurs during cargo handling
operations such as loading, bunkering and discharging.

(3) Sinking due to typhoon or bad weather is reported as the cause of all the spills over 5000 barrels.

All of the above findings are summarized in Table 2. Oil spill incidents in Bataan and Batangas for the period 1975 - 1990 are shown in Table 3.
Figure 8  Oil Spill Control Organizational Chart
Figure 9  NOCOP Organizational Chart

MPCU: Marine Pollution Control Unit
Figure 10 Communication Flow Chart
<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Type</th>
<th>Volume, l</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasig River</td>
<td>03 Aug 75</td>
<td>Fuel Oil</td>
<td>5,284</td>
<td>Barge sinking</td>
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<td>Cavite</td>
<td>03 Aug 75</td>
<td>Fuel Oil</td>
<td>9,247</td>
<td>Grounding</td>
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<td>Negros Occ.</td>
<td>17 Oct 75</td>
<td>Fuel Oil</td>
<td>Not specified</td>
<td>Collision</td>
</tr>
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<td>Cavite</td>
<td>13 Apr 76</td>
<td>Waste Oil</td>
<td>1,590,180</td>
<td>Accident</td>
</tr>
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<td>Davao</td>
<td>18 Aug 76</td>
<td>Fuel Oil</td>
<td>1,680</td>
<td>Leakage</td>
</tr>
<tr>
<td>La Union</td>
<td>11 Oct 76</td>
<td>Fuel Oil</td>
<td>1,470</td>
<td>Grounding</td>
</tr>
<tr>
<td>Davao</td>
<td>10 Dec 76</td>
<td>Fuel Oil</td>
<td>Undetermined</td>
<td>Grounding</td>
</tr>
<tr>
<td>San Nicolas</td>
<td>27 Dec 76</td>
<td>Diesel Oil</td>
<td>8,450</td>
<td>Sinking</td>
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<td>Bacolod City</td>
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<td>Gasoline</td>
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<td>Line damage</td>
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<td>Diesel Oil</td>
<td>347,378</td>
<td>Leakage</td>
</tr>
<tr>
<td>Pasig River</td>
<td>09 Sep 77</td>
<td>Fuel Oil</td>
<td>Undetermined</td>
<td>Collision</td>
</tr>
<tr>
<td>Dumaguete Pier</td>
<td>16 Sep 77</td>
<td>Diesel Oil</td>
<td>13,000</td>
<td>Crack</td>
</tr>
<tr>
<td>Pasig River</td>
<td>12 Aug 78</td>
<td>Bunker Oil</td>
<td>625,633</td>
<td>Discharge</td>
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<td>Manila Bay</td>
<td>09 Oct 78</td>
<td>Fuel Oil</td>
<td>114,471</td>
<td>Grounding</td>
</tr>
<tr>
<td>Pasig River</td>
<td>14 Nov 78</td>
<td>Lube Oil</td>
<td>266,683</td>
<td>Sinking</td>
</tr>
<tr>
<td>Not specified</td>
<td>28 Nov 78</td>
<td>Diesel Oil</td>
<td>30,000</td>
<td>Sinking</td>
</tr>
<tr>
<td>Pasig River</td>
<td>28 Nov 78</td>
<td>Diesel Oil</td>
<td>40,000</td>
<td>Sinking</td>
</tr>
<tr>
<td>Or. Mindoro</td>
<td>10 May 79</td>
<td>Diesel Oil</td>
<td>111,291</td>
<td>Accident</td>
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<td>Or. Mindoro</td>
<td>02 Jun 79</td>
<td>Diesel Oil</td>
<td>63,555</td>
<td>Accident</td>
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<td>Pasig River</td>
<td>12 Jul 79</td>
<td>Bunker Oil</td>
<td>2,082</td>
<td>Accident</td>
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<td>Mindoro</td>
<td>29 Nov 79</td>
<td>Diesel Oil</td>
<td>30,060</td>
<td>Sinking</td>
</tr>
<tr>
<td>Iloilo City</td>
<td>03 Dec 81</td>
<td>Crude Oil</td>
<td>1,041</td>
<td>Accident</td>
</tr>
</tbody>
</table>

Table 1 Oil Spill Incidents in Philippine Waters, 1975 - 1986

Source: NOCOP

more on the next page ..........
<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Type</th>
<th>Quantity</th>
<th>Cause</th>
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<tr>
<td>La Union</td>
<td>19 Dec 81</td>
<td>Bunker Oil</td>
<td>158,987</td>
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<td>Gen. Santos</td>
<td>28 Apr 82</td>
<td>Bunker Oil</td>
<td>14,573</td>
<td>Leakage</td>
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<td>Cebu</td>
<td>28 Apr 82</td>
<td>Bunker Oil</td>
<td>352,000</td>
<td>Leakage</td>
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<td>Cebu</td>
<td>15 Jun 82</td>
<td>Bunker Oil</td>
<td>346,674</td>
<td>Leakage</td>
</tr>
<tr>
<td>Zambales</td>
<td>Aug 83</td>
<td>Bunker Oil</td>
<td>Undetermined</td>
<td>Grounding</td>
</tr>
<tr>
<td>La Union</td>
<td>26 Nov 83</td>
<td>Bunker Oil</td>
<td>Undetermined</td>
<td>Sinking</td>
</tr>
<tr>
<td>Iloilo</td>
<td>15 Dec 83</td>
<td>Bunker Oil</td>
<td>497,597</td>
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<td>Pandacan</td>
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<td>Bunker Oil</td>
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<td>Sinking</td>
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<td>Diesel Oil</td>
<td>11,000</td>
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<td>Zamboanga</td>
<td>27 Sep 85</td>
<td>Bunker Oil</td>
<td>625</td>
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<td>Pangasinan</td>
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<td>Iloilo City</td>
<td>26 May 86</td>
<td>Bunker Oil</td>
<td>1,041</td>
<td>Leakage</td>
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<tr>
<td>Iloilo City</td>
<td>30 Jun 86</td>
<td>Bunker Oil</td>
<td>477</td>
<td>Leakage</td>
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<td></td>
<td>0 - 5 b (0-795l)</td>
<td>&gt;5 - 50 (&gt;795-7950)</td>
<td>.50 - 5000 (&gt;7950-794937)</td>
<td>Over 5000 (&gt;794937)</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------</td>
<td>---------------------</td>
<td>---------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Sinking</td>
<td>---</td>
<td>1</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Collision</td>
<td>---</td>
<td>---</td>
<td>1</td>
<td>---</td>
</tr>
<tr>
<td>Grounding</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>---</td>
</tr>
<tr>
<td>Loading/Discharging</td>
<td>1</td>
<td>7</td>
<td>6</td>
<td>---</td>
</tr>
<tr>
<td>Bunkering</td>
<td>---</td>
<td>---</td>
<td>1</td>
<td>---</td>
</tr>
<tr>
<td>Others</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>---</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>4</td>
<td>13</td>
<td>24</td>
<td>3</td>
</tr>
<tr>
<td><strong>%</strong></td>
<td>8.0</td>
<td>25.0</td>
<td>47.0</td>
<td>6.0</td>
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Table 2  Philippine Oil Spills By Cause/Operation

*Source: Philippine Coast Guard*
<table>
<thead>
<tr>
<th>Vessel/Company</th>
<th>Location</th>
<th>Date</th>
<th>Type</th>
<th>Volume</th>
<th>Cause</th>
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<tr>
<td>MV Laya</td>
<td>Mariveles</td>
<td>22 Feb 77</td>
<td>Fuel Oil</td>
<td>Not specified</td>
<td>Sinking</td>
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<tr>
<td>Barge</td>
<td>Bataan</td>
<td>27 Sep 78</td>
<td>Bunker Oil</td>
<td>1,112,911</td>
<td>Sinking</td>
</tr>
<tr>
<td>Barge</td>
<td>Bataan</td>
<td>08 Oct 78</td>
<td>Bunker Oil</td>
<td>476,982</td>
<td>Sinking</td>
</tr>
<tr>
<td>Vessel</td>
<td>Bataan</td>
<td>10 Oct 78</td>
<td>Bunker Oil</td>
<td>1,059,915</td>
<td>Sinking</td>
</tr>
<tr>
<td>MT Raha</td>
<td>Bataan</td>
<td>06 Nov 78</td>
<td>Crude Oil</td>
<td>4,200</td>
<td>Leakage</td>
</tr>
<tr>
<td>Sulayman</td>
<td>Bataan</td>
<td>25 Jan 90</td>
<td>IFO</td>
<td>500,000</td>
<td>Crack</td>
</tr>
<tr>
<td>MT Fernando</td>
<td>Batangas</td>
<td>21 Sep 76</td>
<td>Fuel Oil</td>
<td>840</td>
<td>Grounding</td>
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<td>LSCO</td>
<td>Batangas</td>
<td>27 Dec 76</td>
<td>Diesel/Fuel</td>
<td>8,450</td>
<td>Sinking</td>
</tr>
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<td>Lumberjack</td>
<td>Batangas</td>
<td>22 Aug 77</td>
<td>Bunker Oil</td>
<td>3,123</td>
<td>Crack</td>
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<td>MV General Santos</td>
<td>Batangas</td>
<td>16 Oct 77</td>
<td>Fuel Oil</td>
<td>8,957</td>
<td>Grounding</td>
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<td>MV Hain</td>
<td>Batangas</td>
<td>27 Sep 78</td>
<td>Bunker Oil</td>
<td>5,500</td>
<td>Grounding</td>
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<td>Plancier</td>
<td>Batangas</td>
<td>05 Jun 79</td>
<td>Crude Oil</td>
<td>2,310</td>
<td>Ruptured hose</td>
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<td>MT Jydda</td>
<td>Batangas</td>
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<td>Bunker Oil</td>
<td>20,620</td>
<td>Not specified</td>
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<td>MT Petheray</td>
<td>Batangas</td>
<td>16 Jan 87</td>
<td>IFO</td>
<td>18,973</td>
<td>Separator overflow</td>
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<tr>
<td>Gil</td>
<td>Batangas</td>
<td>15 Aug 89</td>
<td>Bunker Oil</td>
<td>206,700</td>
<td>Grounding</td>
</tr>
<tr>
<td>Shell Refinery</td>
<td>Batangas</td>
<td>05 Jan 80</td>
<td>Oily water</td>
<td>15,000</td>
<td>Deteriorated tank leak</td>
</tr>
</tbody>
</table>

Table 3 Oil Spill Incidents in Bataan and Batangas, 1975 - 1990

Source: Philippine Coast Guard
REFERENCE

1. Philippine Coast Guard, NATIONAL CONTINGENCY PLAN for OIL SPILLS
CHAPTER IV

CONTINGENCY PLANNING AND RESPONSE

EVALUATION

As mentioned in Chapter III, the National Contingency Plan (or Plan) has not been revised since its inception eighteen years ago. Many advances have already occurred in the field of oil spill control and containment technology. Equally important are issues pertaining to the environmental consequences of offshore oil operations and transfrontier oil spills. There exists no regulation for controlling oil spills from exploration activities.

The Plan has served the country in responding to discharges, most of which were ship generated and, fortunately, minor. There have been no reported major spill incidents involving offshore oil activities despite the intensive offshore oil operations off Palawan. But neither of these good safety records should dissuade the government authorities from confronting the potential threat of oil pollution from offshore activities and heavy tanker traffic in the South China Sea and Celebes Sea. The risk and probability of a future catastrophic spill in Philippine waters arising from these categories, as comprehensively determined in the first chapter, certainly needs to be recognized.

From the case histories presented in Chapter I, Appendix I, it can be seen that tanker accidents receive widespread publicity. While they do not constitute the largest source of oil input to the marine environment, they are important in terms of the environmental damage they cause. One catastrophic accidental spill can be devastating, in terms of economic and environmental impacts. LCDR Peyton Coleman, in an interview at the USCG Reserve Training Center, Yorktown, VA, supported such observation by saying that "although accidental spillage causes only a
fraction of the total oil pollution resulting from maritime transport activities, the fact that their effects are concentrated in a small area means that the consequences can be disastrous". There is no miracle cure for a major spill. Any existing feelings that current planning and preparations are sufficient, are anchored in good past spill records that provide a false security. Such misconceptions call for early and continuous preparation to cope with uncertain events that will occur over time. Whether present management know-how and government preparation can really deliver an effective response to a spill of national significance requires closer examination.

The country, for one thing, is not prepared to handle oil spills of transnational nature. Theoretically, the Plan being supplemented by the contingency plans of the three major oil companies in the country, Philippine National Oil Company's Petron, Pilipinas Shell and Caltex (Philippines) is able to effectively cope with only small to moderate sized oil spills. All the measures and regulations concerning the control and prevention of oil pollution promulgated by the government, as in the Plan, are limited to territorial waters, inland navigable waters and tributaries. In the event of a very large spill, the government definitely needs regional and international assistance. This need for mutual regional cooperation is not only limited to response equipment and technology but extends to the involvement of various government authorities and private organizations. Coordination efforts are expected to touch on areas including national command systems during the response, pre-approval of nonmechanical cleanup methods, ensuring continuity in the application of different plans, coordination of resources and vessel traffic management schemes in the location of the spill. As the response activities increase in intensity, obviously the response organization expands to accommodate the increased demands placed on it. Such condition, positively creates inconsistencies in regulations, enforcement strategies, duplicative requirements and actual responsibilities of response. All these things, in addition to a vague management system increase the pressure on the OSC who is responsible for ensuring a proper and effective response to the emergency. Neglecting these potentially uncontrollable situations hinders an effective response. Therefore, they should be instituted for oil spills in Philippine waters. Specifically, the Plan should be reviewed and amended as needed, to ensure that it activates the most effective response structure for oil releases of national significance.
Further, the fact should never be placed aside that major oil spills make for angry citizens and hungry reporters. Unlike other systems with similar potential to inflict devastation and harm, such as fires and floods, oil spills usually supply a highly visible target for public outrage, as well as generous photo opportunities to keep emotions fueled. The spiller who is responsible in cleaning up the mess while operating in a manner that is familiar to him, must survive intense public and governmental scrutiny. On the other hand, government authorities must participate as part of the response organization by providing essential oversight and assistance, while at the same time functioning outside the organization as prosecutors of the spiller and as political entities sensitive to their clientele. All of these show that concern about oil pollution response needs to be matched by an appropriate command system not only with a military regimen but with a large component of common sense. To know these factors in a conscious, deliberate way is to get a step in front of them.

Responding to a spill of national significance requires an augmenting organization to support the local response organization. Focus must be maintained on the need to develop a standardized response management system. A national response strategy should be established to effectively deal with many peripheral issues. Similarly, an integrated command and control mechanism has to be identified to address such releases. This mechanism is necessary in order to adequately utilize the resources of the parties responsible for the spill, the Response Teams, the affected local governments and neighboring countries in the region.

While it is true that the ASEAN countries share genuine concern about the threat of oil pollution in the region, the fact that the national responses vary widely in scope and purpose will possibly create transnational issues when a transnational response is required. Without the slightest doubt, interest is apparent in various modes of regional cooperation for oil pollution prevention and control, even in the idea of an appropriate subregional convention. However, the diversity of the region limits the feasibility and desirability of bringing national responses into one accord.

At this time, it is very difficult to evaluate whether the country's contingency
Catastrophes are always necessary to bring problems or issues to the attention of the entire response community. True enough, it is always possible to imagine a situation which might be called the worst thinkable accident. However, it must be recognized that a response capability based on this concept would be unrealistic and impossible to justify from an economic point of view.

On the other hand, it is nearly impossible to imagine an important hazard in which the contingency organization does not play the role as agent of harm or rescue. All the large spill events cited in Chapter I, Appendix I suggest the importance of studying regulatory issues, especially how regulating organizations may anticipate and respond to mishaps, or may fail to do so. For example in the case of the Exxon Valdez oil spill, a great discrepancy has been observed between the demands of the catastrophe and the risk perceptions of planners, experts and decision makers. Utilizing the lessons learned from these events provides guidance to predicting potential problems in future catastrophic spills in Philippine waters.

A very common reaction of organizations attempting to implement change when pressure is felt is that they simply tough it out by creating more strict regulations. Sometimes if disturbing doubts and questions persistently arise, they respond by looking to escape or by trying to spread the weight of the issues around, as in the form of transferring blame. Projection, as this is generally called, only interferes with the organization's capacity to see objectively. True enough, facing the issues is the essential prelude to deal with them. However, to build a framework for sustained success in spill response management goes beyond looking at how people and organizations react to the incident. "Getting it wrong is part of getting it right", John R. O'Neil says in writing The Paradox of Success.

SPILL RESPONSE RESOURCE LIMITS:

The present spill laws of the Philippines impose significant demands for resources to be expended by owners and operators of vessels and oil handling facilities. This new requirement for availability of oil spill resources to augment and
improve the existing response capability evolved as a reaction of the government to the sinking of Liberty Bell Trading tanker named "Fernando" off Limay, Bataan on January 25, 1990. As reported, the ship released 200,000 liters of bunker fuel. A 10 km stretch of coastline at Bataan was contaminated by the oil spilled. The resulting 25 cm deep slick has damaged the fishing grounds of at least 400 families along this coast. The stir created by the incident led to the enactment of additional regulations and prompted the Philippine Coast Guard to intensify the implementation of **Memorandum Circular No. 01-91** which was issued on 08 January 1991. Under this, all refineries, terminals, bulk plants and operators/owners of tanker vessels are required to maintain designated quantities of oil spill equipment and chemical dispersants. Because of budgetary constraints and prohibitive costs of oil spill equipment and chemical dispersant, most industries and tanker operators could hardly comply with the memorandum.

Compliance with the provisions of the above mentioned spill regulations requires major commitments of time and money from both oil and shipping industries. To the three large oil companies in the country and some cleanup cooperatives, most of this effort has been allocated to the purchase of the required equipment. Government, on the other hand, is also committed to increased research and development programs. But, will the expenditure of these resources really make a difference? Will the huge expenditures help the public realize that regardless of these efforts, there still will be oil spills? Will these efforts really reduce the environmental impacts of a catastrophic oil spill should one occur in Philippine waters? Finding a new path is just a matter of staying open to a wide range of possible answers to these questions.

Romeo Gagui, Director of Iloilo District Office, Maritime Industry Authority, in his 1992 Master of Science dissertation for the World Maritime University pointed out that two of the major problems encountered by the government in the implementation of marine environment protection functions are, limited response capability and adherence to Marpol requirements. He stressed the fact that "response to pollution incidents are hampered by the limited equipment available. The exorbitant costs of peculiar items to pollution control makes procurement difficult. The acquisition of new technology and devices is likewise hampered by financial constraints. In a Third
World country where most of the commercial bottoms are secondhand vessels, operators find it hard to adhere to MARPOL requirements like oil-water separators and related equipment because of the expensive capital outlay they entail. In addition, the standards set by various international conferences like MARPOL 73 are very hard to attain in relation with the capability of a struggling domestic shipping industry.

The new oil response equipment may be needed, but its presence could also give a false sense of security, a feeling that this equipment is a sufficient preparation for the coming oil spill emergency. It must be recognized that oil spill resources are finite. Limited resources have to be focused selectively in ways that have the potential to improve the response to oil spills. To do this, a particular question has to be raised as to whether the huge legislated expenditure of resources focuses on areas with the potential to accomplish the most, or is it focused on areas where little positive impact can be achieved. Mostly, as CAPT R. M. Larrabee, USCG Captain of the Port, New York, said, "it is necessary to ensure that during each stage of an oil spill, the contingency organization can set realistic priorities, use technology and management techniques appropriate for each phase of the incident and make the public policy decisions most likely to help the environment".

Response resources include personnel, mechanical equipment, chemical additives, and/or processes that are used in the treatment or removal of oil. Due to the limits imposed by current technology, it follows that the number of response resources is also finite. Because resources are limited during a spill emergency, response priorities are needed to provide a framework both for advance planning and for allocation of these available resources during the emergency.

Most often when discussing oil spill response, three general response options emerge: mechanical resources, chemical dispersants, and in situ burning. Each removal option is directly linked to the most critical variable — time. This implies that in assessing the efficiency of response options, two factors must be considered: encounter rate and effectiveness. Options must be chosen that have a higher encounter rate, meaning countermeasures that gage large amounts of spilled oil rapidly, and that are effective enough to remove a significant amount of the encountered oil from the water surface.
**Mechanical equipment.** Mechanical equipment generally has low encounter rates and low effectiveness. The capacity to empty a very large swimming pool with one, two, or a hundred eye droppers is an appropriate illustration of trying to remove oil on the surface of the ocean with mechanical skimming systems. All too often, oil skimmers work like eye droppers hopelessly chasing a thin film of oil on a very large ocean. They have generally a fairly high oil recovery rate because of their high pumping capacity, but they do not discriminate well between oil and water and thus have a low recovery efficiency. They are simple to operate but do not work well in choppy waves. This key limitation, encounter rate, is but one of the many factors limiting the use of mechanical equipment.

Similarly, most booms become ineffective in currents over 1 knot and wave heights over 6 feet. In wave heights in the range of 6 to 9 feet, the efficiency of the equipment decreases as oil escapes the boom. The severe weather that is often associated with vessel casualties frequently exceed these conditions. Oil is whipped into the water and splashed over the booms, and little recovery is possible. In addition, mechanical recovery and containment systems cannot be deployed without considerable support resources. For example, large offshore booms require larger boats, heavier equipment, and often specialized equipment to deploy and recover. Other key variables that affect the effectiveness of mechanical resources are geographical location, mechanical reliability, and manpower or amount of equipment required for deployment. Garry L. Ott, NOAA Scientific Support Coordinator, in an interview at the Coast Guard Reserve Training Center, Yorktown, VA, said that "these key limiting factors will remain for every spill response despite the commitment of considerable resources to new mechanical technologies". Added to this, LCDR Larry Brooks of the same training center, said that "there have been advances in response equipment technology, but there are limits to what even the most effective response can accomplish". By these it is made clear that reliance on mechanical equipment as the primary response option at the very early stage of the spill puts responders in a no-win position immediately. New regulations are only creating unrealistic expectations which responders will be unable to achieve even under the most favorable conditions.
**Dispersants.** The use of dispersants requires agreement by a circle of government jurisdictions. The decision process requires a relatively detailed and technical discussion that weighs the trade-off of potential short term environmental effects of a treated slick against the possible long term shoreline impacts and other effects of an untreated slick. In other words, the approval process is usually too lengthy to fall within the time frame for their effective use. Without a nationally approved list of chemical dispersants and established criteria for their use, in all probability, dispersants will not be used.

On the other hand, dispersants are most effective when they are applied early, because the oil becomes less disperseable as its viscosity increases. In addition, they can be readily deployed by aircraft over a large area especially when sea conditions preclude mechanical response.

In the United States, for example, technical information available in the National Contingency Plan Product Schedule provides basic toxicity and effectiveness data of chemical dispersants. However, the data contained in the schedule may not be considered as constituting an approved list of chemical agents. Approval is based on criteria for toxicity and efficiency developed during a rigorous review and approval process. Each Regional Response Team (RRT) must develop its own technical criteria for chemical dispersant use. Moreover, this discussion among all involved jurisdictions must occur immediately following the incident. Often, the technical discussion must then be supported by the capacity to implement a detailed technical monitoring plan to assess immediately the effectiveness of the dispersant and the impact of the dispersed oil on the local environment. The definition of impact and the scientific methods required to measure this impact must be based on technical criteria acceptable to all involved jurisdictions. After all of this technical information is in place, a number of government jurisdictions then debate and vote on the use of the dispersants.

Despite the best efforts of RRTs to streamline this process, all too often the result of this technical exercise is no decision at all, or a decision that comes too late
to affect the outcome of the spill event which amounts to the same thing. Further, despite the best possible presentation of technical information to interested jurisdictions, the potential to use dispersants will decrease as the number of government jurisdictions involved in the process continues to increase and decisions will be based on factors other than knowledge already existing in scientific literature.

A good example that could be cited to validate the above observation is the fact that fishermen can claim that future fishing has been compromised because dispersants were used. There is no scientific support for this claim. In fact, there may be no way to support or refute the claim, but the claim has been made. The potential risk of liability in the face of claims that are difficult to understand and difficult to prove can have a chilling effect on government jurisdictions which are distinctly uncomfortable with the technical issues regarding dispersant use. Although this overly simple example can be challenged, the fact remains that, in the absence of a plan agreed upon in advance, it is easier for government agencies to not make a decision or to say no. They may perceive their own liabilities as being greater if they allow dispersant use than if they do not.

From the arguments posed, it is clear that advance planning is necessary to use dispersants effectively on oil during the very early stages of the spill to prevent it from spreading or stranding on sensitive shorelines. Technical evaluations can only be thoroughly completed through advance planning when there is time to review the technical literature and considering the tradeoff of potential short-term effects against possible long-term shoreline impacts of the untreated slick. Following this technical evaluation, the jurisdictions involved in the decision must develop a plan which provides the OSC with pre-approval for dispersant use under selected criteria. Because the dispersibility of oil decreases rapidly with weathering, prompt response, made possible by the pre-approval process, is essential.

The limitation on the use of mechanical equipment and dispersants is reflected in the experiences encountered in some significant large spill incidents (Oil Spill Case Histories, 1967 - 1991 and Appendix I):

(1) HAVEN (1991; 142,857 barrels). "Booms were deployed as a
precautionary measure at recreational beaches. The booms held some slicks offshore, but storms eventually blew the booms and the oil on to the beaches.

(2) MEGA BORG (1990; 100,000 barrels). "...... steps were taken to obtain dispersant approval in the event of a major release. Later that day, dispersant use within 5 nautical miles of the Mega Borg was approved, but dispersants were not expected to be used unless large amounts of oil were released".

(3) ARAGON (1989; 175,000 barrels). "There was no response at sea, as conditions in the area were too rough to use removal equipment. Vessels were unable to get into the coves to facilitate near shore recovery. All cleanup took place from the shoreside and generally consisted of pumping, manual, and mechanical removal with any equipment which could be obtained".

(4) KHARK 5 (1989; 452,400 barrels). "Approximately 6,600 gallons of dispersal agents were applied to the floating oil in the first week of January. Over 1,500 gallons of Finasol OSR-2, made from hydrocarbon-based solvents, were applied in two passes by six aircraft with spraying equipment. A tugboat dispatched from Spain applied approximately 5,000 gallons of A-3 dispersant closer to shore. These chemical dispersants were relatively ineffective, as they were applied after the oil had weathered".

(5) EXXON VALDEZ (1989; 240,500 barrels). "At the height of the containment efforts, it is estimated that a total of 100 miles of boom was deployed. Almost all the types of boom available on the market were used and tested during the spill. Due to the size of the spill, it was necessary to employ inexperienced workers to deploy and tend booms, and this led to some booms being incorrectly used or handled, and sometimes damaged. Some boom sank because of improper deployment, infrequent tending, or leakage and/or inadequacy in the buoyancy system. Other problems included fabric tears in boom due to debris, and tearing at anchorage
points from wave action. In some cases, ballast chains were ripped off during boom recovery if the boom was lifted by the chain. One estimate suggests that 50% of the damage to larger boom came during boom recovery. For self-inflating booms, it was important to keep the inflation valves above the water during deployment so that the boom did not become filled with water and have to be replaced. When several types of boom were used in one operation, there were often problems with incompatible connectors between different types of boom.

The primary means of open water oil recovery was with skimmers. In general, most skimmers became less effective once the oil had spread, emulsified, and mixed with debris.

Exxon also tested the dispersant application in Prince William Sound. The decision to approve a large scale test of dispersant was reached after an extensive program aimed at evaluating shoreline cleaning technologies...... The dispersants effectiveness and impact were then compared to mechanical shoreline cleanup methods, and this information was used to determine whether dispersant should be used for shoreline treatment. The Research and Development Committee evaluating the proposal for dispersant use recommended against broad-scale application of the product because tests had not adequately demonstrated that removal and recovery efficiency outweighed possible adverse effects. The committee recommended using the dispersant only on Smith Island, subject to continued review of the effectiveness of recovery procedures by on-scene monitors".

(6) BURMAH AGATE (1979; 254,761 barrels). "Through the duration of the response, four skimming barriers (Open Water Oil Containment and Recovery System, OWOCRS) and one Lockheed skimmer (Open Water Oil Recovery System, OWORS) were used. Heavy seas, typical of winter weather in the area, hindered booming and oil recovery efforts. Oil began to entrain under the OWOCRS when the current reached 0.75 knots, and once the current reached 1 knot the OWOCRS were totally useless.
Furthermore, the OWOCR\S were only useful in a stationary configuration and could not be maneuvered effectively to follow a moving slick. Problems also arose due to constant replacement of vessels in the OWOCR\S configuration. Eleven vessels were rotated through deployment and maintenance of the OWOCR\S. This rotation was caused by short-term contracting of vessels by the owners of the Burmah Agate".

(7) MOCO CADIZ (1978; 1,619,048 barrels). "A 2.5-mile long segment of boom protected the Bay of Morlaix. Although it required constant monitoring, the boom functioned properly because this sheltered area was protected from severe weather and from receiving excessive quantities of oil. Boom was largely ineffective in other areas due to strong currents and enormous quantities of oil. Skimmers were used in harbors and other protected areas. However, skimmer efficiency was limited due to the blocking of pumps and hoses by seaweed".

(8) BORAG (1977; 213,690 barrels). "There were limited stocks of dispersant available, but the necessary vessels and helicopters to make effective application of them were not available. Little additional oil spill response equipment was available in Taiwan. Further cleanup measures included offering five dollars reward for every barrel of recovered oil. Locals collected oil manually using buckets which were brought to the CPC oil terminal for disposal".

(9) URQUIOLA (1976; 513,000 barrels). "The largest mobilization of resources occurred during the dispersant application. As many as eleven vessels were involved in applying the hydrocarbon based chemical products. Many different products were reportedly used during the operations. Some attempts were made to contain floating oil with boom. Due to the lack of an oil spill response or contingency plan, booming equipment was not available locally. A 36-inch French made boom was borrowed from a nearby refinery, but sank after three days. Two booms were flown from Great Britain and managed to contain oil but broke loose because of wind and sea conditions".

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(10) ST. PETER (1976; 279,000 barrels). "No oil spill control and cleanup equipment was available in the area, and freight costs to bring such equipment into the area were high. Some dispersant was available in Ecuador, but it was considered toxic, and no equipment was available to apply the dispersant to the spill. Specialized diving equipment needed for any vessel salvage was unavailable. An advisor from the Canadian Coast Guard was consulted for treatment and contamination removal recommendations, but no known response activities were ever undertaken".

(11) METULA (1974; 398,020 barrels). "Boom was expected to be ineffective due to the strong currents and tides. Chemical dispersants and the equipment to apply them were not available. They would have been difficult to use and possibly ineffective due to the weather and tidal conditions. It was estimated that 5,000 tons of dispersant chemicals would have been required to disperse the quantity of oil spilled. Lack of cleanup equipment and personnel would have made an effective beach cleanup impossible. Much of the affected shoreline was inaccessible to heavy equipment, even if the equipment had been available. There was also considerable concern about the possible damage to the environment caused by cleanup with chemicals or mechanical equipment".

(12) TORREY CANYON (1967; 860,000 barrels). "It was the first incident to draw universal attention to the dangers of dispersants. Extremely large quantities of dispersants were used during the response. Contamination by oil without dispersants resulted in less adverse biological effect than where dispersants were used".

In situ burning. In situ burning was first attempted on the Torrey Canyon in 1967. Since then, significant progress has been made in refining the process and identifying the potential environmental impact. However, the use of burning produces a trade-off that must be evaluated by local authorities. The trade-off is between removing oil from the water and releasing the products of combustion into
the atmosphere. Measurements thus far indicate that combustion products released into the atmosphere are no more hazardous than those released by evaporating oil, and that the total environmental loading of toxic components remains the same or is reduced by the combustion of crude oil spills on water. Burning produces black sooty smoke that is a highly visible pollutant and may raise concerns about human health effects, whereas oil on the surface of the water, while also polluting in terms of volatiles entering the atmosphere, is usually perceived by the public to be less threatening to human health.

Politically, in situ burning is not readily accepted as a response option due to the public’s perception that the pollution is only moving from the water to the air. Similarly, in some circumstances such as when oil is not isolated from the vessel that spilled it, burning could put the vessel, its remaining cargo, and any personnel still on board at risk.

It is now time to consider response management systems that should be used during catastrophic spill emergencies. Systems that are evolving under national spill laws and existing regulations actually delay the decision-making process and the implementation of effective response during the critical emergency phase of a spill event.

The succeeding sections will focus on the most expedient areas of improvement: the need for a standardized or unified OSC response management system and the need to provide a model for making decisions concerning oil spill response. It should be emphasized that the management systems discussed and recommended in the succeeding sections are never risk-free. However, it is believed that the risk of change and the chaos it may bring are far less than the danger of lingering too long in the established niche.

THE NATIONAL RESPONSE SYSTEM: Where should it go from here?
The nation's system of responding to oil spills is a multilayered partnership between the government and industry developed since the creation of the National Contingency Plan. The system comprises a network of individual contingency plans that describe the roles, responsibilities, requirements, and capabilities at different levels of the government and industry. Coordination among the plans is mostly voluntary.

The National Contingency Plan cannot mandate or detail the activities of the industry. The system relies upon every level of government and industry taking the initiative to develop effective contingency plans, coordinate with other response partners, and exchange information on a wide range of oil spill response issues.

The National Contingency Plan (NCP), as described in Chapter III, provides only the basic framework and guidelines for the country's national response to oil discharge. Specifically, it provides three fundamental types of activities: preparedness planning and coordination for response to a discharge of oil, notification and communication, and response operations at the scene of a discharge or release. To perform these activities, organizational elements were created by the NCP as follows:

(1) National Operations Center for Oil Pollution (NOCOP). The NOCOP is primarily a planning, policy and coordinating body. It does not respond directly to spill incidents. It provides policy guidance prior to an incident and assistance to the OSC during an incident. Its assistance usually takes the form of technical advice and coordination with Response Teams.

(2) Response Teams. The Response Teams are responsible for planning and preparedness activities before response actions, and providing support to the OSC when one is activated during a response.

(3) On-Scene-Commander (OSC). The OSC is the PCG Station Commander with prime responsibility for directing and coordinating response efforts at the scene of a discharge or release. It is only at this level where actual field response operations occur.
At the heart of the national government's role in responding to oil spills is the National Response System (NRS). The system refers to the hierarchy of procedures set forth in the NCP, which was developed to ensure that the resources and expertise of the national government would be immediately available for oil spills that are beyond the capacity of the organization responsible for the spill. A basic premise is that the spiller is responsible for taking appropriate action.

The National Response System (NRS) provides an adequate vehicle for preparedness and response functions of the NCP. It clearly defines the advisory roles for the NOCOP and Response Teams. At the OSC level, the responsibilities are clearly defined. However, a significant deficiency in the NCP remains unresolved. The NRS does not specify the organizational structure or management system to be used by the OSC in a response to a catastrophic spill. With no standardized response management system or prioritized listing of response objectives in place to assist the OSCs in carrying out their responsibilities, the effectiveness of the response will be reduced. Responders need to take decisive action early. The OSC, prior to taking decisive action, must be well informed on all aspects of the spill and the potential outcome of using available response options. Once response resources have been identified, the OSC must have a tested response management system to use those resources effectively. Implementation of an ad hoc organization will always be a possibility. However, it draws the focus of the responders away from the objective, thereby significantly reducing the effectiveness of the response.

A significant deficiency reflected in almost all of the large spill incidents listed in Chapter I Appendix I is that no standardized response management system was in place to handle a discharge of the specified magnitude. It seems that diagnoses of disorganization are common in cases of important hazards. There has been a widespread failure to put existing knowledge into practice. To fill this management void, it is imperative that a response management system be adopted.

Take the Exxon Valdez incident. There were at least five contingency plans available at the time of the grounding of the Exxon Valdez, each with its own ostensible contribution to mitigating the worst consequences of an oil spill. These
included: The National Oil and Hazardous Substances Pollution Contingency Plan; The Alaska Regional Oil and Hazardous Substances Pollution Contingency Plan; The State of Alaska's Oil and Hazardous Substances Pollution Contingency Plan; The Coast Guard's Captain of the Port Prince William Sound Pollution Action Plan; and The Alyeska Pipeline Service Company's Oil Spill Contingency Plan for Prince William Sound. Each plan delineates different functions and procedures to be performed by myriad organizations in the event of a minor, moderate, or major oil spill. Lack of planning was not an important barrier to effective response to the Exxon Valdez oil spill. The NCP, along with the other contingency plans included explicit directives for arranging more than a dozen organizations.

Every organization connected with the Exxon Valdez spill was criticized for failing to respond properly to the accident. Exxon and Alyeska were taken to task for not having enough response equipment on hand, and for not deploying boom, skimmers, and dispersant-carrying aircraft soon enough. The Coast Guard has been faulted for neglecting to take immediate control of the response and allowing its facilities to operate poorly.

At the collective level, the frequent lament was that these organizations, along with others on the scene, were poorly or incompetently coordinated. As LCDR Mark McEwen of the Marine Environmental Protection Division, USCG Headquarters, described it "lack of coordination was so overwhelming that confusion existed and chaos reigned". This lack of coordination meant that organizations spent too much time developing a division of labor and not enough time implementing available solutions.

The limitation of response resources as they are directly linked to time is described in the preceding section of this chapter. It is seen that the effectiveness of mechanical resources is subject to the limitations associated with environmental conditions, geographical location, mechanical reliability, and manpower or equipment required for deployment. Chemical dispersants, to yield a high rate of effectiveness, must be used at the very early stage of the spill. However, the approval process of dispersants is considered as a trap for their effective use. In situ burning, politically, is not readily accepted as a response option due to public's
perception that the pollution is only moving from the water to the air.

**What is needed**

These recognized limitations, in addition to multiagency and multifunctional involvement, comprise the complexity of managing a catastrophic oil spill incident. This section will focus primarily on the most expedient area of improvement: the need for a standardized OSC response management system. What is needed is a standardized management system that:

1. Establishes common prioritized response objectives to focus effective response efforts.

2. Can be used in response to a minor spill as well as major spill without a significant change in the basic organization.

3. Is capable of expanding and contracting without disruption to the effectiveness of ongoing response activities.

4. Provides immediate and effective action when human intervention can make a significant difference in the environmental outcome of an oil discharge.

5. Is simple enough to be easily understood, yet retains the ability to provide adequate structure.

6. Is tried and tested, therefore provides confidence in it.

7. Promotes mutual aid. In a fiscal environment of downsizing pressure and of limited manpower and resources, a mutual aid type of response is inevitable.

8. Preidentifies qualified personnel. As experienced during the
Exxon Valdez spill, Coast Guard personnel were selected in a random, unstructured method. This often put in the field personnel who were not sufficiently trained to perform their assigned task immediately upon entering the area of operations.

(9) Establishes prestaging sites. The immediate area of operation is not the place to prestage personnel and equipment. Personnel who are not directly and immediately assisting the effort hinder an effective response.

What options are available

Focus must be maintained on the need to develop a standardized response management system to fill a need identified in the NRS. The most prevalent option available is the incident command system (ICS). This management technique is a tool to be used in conjunction with many other tools to enhance the effectiveness of a response. At present, many versions of ICS serve as the foundation for response to many types of incidents in the United States. One of ICS's key attributes is its flexibility in application to a specific type of incident.

The basic principles of the ICS were developed as a result of problems arising from the response to wildfires. Analysis of what went wrong identified four general problem areas (Incident Command System National Training Curriculum: Background and Curriculum Development, 1993):

(1) Different organizations and terminologies;

(2) Inadequate joint planning (lack of coordinated planning between agencies and unclear lines of authority);

(3) Lack of accurate, current information; and

(4) Limited prediction capability (due to inadequate and incompatible
From these general problem areas, a standard, all risk ICS management system was developed. The ICS developed standardized functional areas into which all response effort responsibilities could be assigned (Figure 11). Within the framework of these functional areas, goals for the management system were defined and established as components (Figure 12). Standard ICS components include (National Interagency Incident Management System: ICS Operational System Description, 1981):

1. **Unified Command Structure** - facilitates joint planning of activities, integrated operations, and optional use of all available resources.

2. **Modular Organization** - builds from the top down in a modular fashion based on the type and complexity of the incident, has virtually unlimited expandability.

3. **Consolidated action plans** - used to keep the response organization focused on the incident response goals and objectives.

4. **Manageable span of control** - limits the number of direct subordinates, increases accountability and adherence to the action plan by reducing free play.

5. **Common terminology** - provides a unifying language reducing confusion in a multiagency response.

6. **Comprehensive resource management** - maintains an accurate view of the availability of all resources using a standardized system.

7. **Predesignated incident facilities** - may include a command post, incident base, communication center, staging areas, helibases, and helispots.

8. **Integrated communications** - establishes a common and single
communication plan; emphasizes the use of plain English with no codes or acronyms used.

Since its implementation, ICS has proved to be a very effective management system and has the ability to be applied to many types of emergencies.

**What to adopt**

Now that the need for a proven response management system has been identified, the next step is deciding what to adopt. The NRS should be modified to fill the need for a response management system at the OSC level. Prioritized response objectives should be adopted to provide focus for all other facets of improving the effectiveness of a response. Additionally, prioritized response objectives diminish the tendency of responders to be process oriented rather than product oriented. These prioritized objectives should be to protect human life/safety, minimize environmental impacts, and minimize social and economical impacts.

The **proposed standardized response management system** (Figure 13) has many components:

1. **Unified command structure (UCS).** In almost all oil spill and hazardous substance releases a UCS should be used. This structure focuses on the necessary partnership of the OSC, the responsible party, and affected regional and/or national jurisdictions. In the event of a conflict arising between the parties of the UCS, the OSC should resolve disputes, ensuring that response efforts are continued in a timely fashion. The concept of UCS simply means that all organizations who have a jurisdictional responsibility at a multijurisdictional incident contribute to the process of determining overall response objectives, selecting strategies, planning tactical operations, ensuring integrated tactical operations, and making maximum use of all assigned resources.
(2) Modular organization. The standard incident command system (ICS) organization chart indicating a unified command top structure is shown in Figure 14. If one individual can simultaneously manage all major functional areas, no further organization is required. If one, or more, of the areas requires independent management, an individual is made responsible for that area. As response efforts build, the organization should expand downward using predefined modules. These organizational modules should not impose a rigid structure, but allow flexibility while preserving focus of the organization on the response objectives.

Logistics. The incident command system seems to retain its value when it comes to oil spill logistics. Because logistics is a fairly generic function, it doesn't seem to matter a great deal that private and public entities are commingled in the response. While it is true that when public and private resources are mixed, there can be problems with unions, liability, and so forth, there does not appear to be any significant modification of ICS needed to deal with these situations. On the contrary, ICS provides a common platform on which logistical managers can meet to compliment one another's strengths in procuring and maintaining the needed material and personnel.

Planning. With the exception of the command position, the planning section affords the strongest involvement for government agencies. For example as practiced in the United States, when an oil spill occurs in Washington State waters, a very knowledgeable and prepared team of natural resource experts mobilizes immediately to survey the spill scene, establish flow trajectories, set protection priorities, and advise on strategy (e.g., which beaches to protect) as well as tactics (e.g., use of heavy equipment). This group is called the Natural Resource Damage Assessment (NRDA) team. It summarizes biological information from prepared data bases, forms rapid consensus recommendations, and feeds this to the command. Since an oil spill is primarily an insult to the environment, it is right on target to have environmental prowess driving planning, and environmentally based plans driving the response. Where oil spills are concerned, the ICS planning section needs a major portion of its emphasis devoted to environmental
information and strategic planning.

**Operations.** There is a perceived need to separate vessel stability, lightering, and salvage work from what would be the standard ICS operations section. As far as oil spills are concerned, the operations section is focused on containment and cleanup, and salvage work does not fit in it. Even if the wider category of operations will be used embracing salvage work within that section, some companies may feel the need to separate the two anyway. Salvage and containment/cleanup are so fundamentally different that they deserve separate status on the company's oil spill organization chart. Thus, two non-ICS sections are created in place of the standard ICS operations.

**Finance.** Money can present a slightly difficult situation. If a spiller accepts financial responsibility, there is little commingling of private funds with public monies and things go pretty smoothly. In this case, a representative of each government agency need to work only with the finance section chief to see that the bills government is ringing up on its own account are properly documented for later reimbursement. However, if the responsible party cannot pay for part of the response, or refuses to, the NOCOP should resolve the matter by bringing one, two, or several streams of public funding into the response. This complication challenges the leadership of the finance section to find ways to honor the separate rules for expenditure and auditing for each public and private source of funding. Traditional ICS does not seem to envision vast expenditures of commingled public and private money, although it sets the stage and the spirit for working through this problem in a unified manner.

**Legal.** ICS does not seem to have much to say in this aspect. It's hard to find where one is supposed to locate law enforcement investigations and legal advice. This question seems to center around whether the issue is related to the actual spill response such as property trespass, and faulty equipment used. But oftentimes good advice is a matter of whose lawyer one is talking to. Conventional wisdom suggests keeping government prosecutorial actions clearly outside ICS.
Public Affairs. A unified command spill response should always employ a joint information center. This center can provide excellent protection to all parties by eliminating conflicting press releases. However, the fact should not be denied that it can also be the battleground for establishing favorable perspectives. For example, even given the same data, the spiller's slant may be that there is minimum environmental damage under the circumstances; the OSC's view may hold that there is potential for major damage; and the NOCOP's view may find that damage has been controlled according to plan. Each party has a value scheme against which such things are judged and the appropriate slant is taken. Once differences in emphasis are perceived, ICS does not help much to prevent divisive questions from the press and the resultant pitting of one OSC against another. The challenge to the public affairs officers is to find maximum common ground, be forthright with press questions, and to steer their OSCs away from speculation and value judgments and toward the facts as much as possible in their public remarks.

(3) Consolidated action plans. These specific plans in a standardized format, identify response objectives and the strategies to be used in accomplishing the response for a specific period of time. The consolidated action plan should include all tactical and support requirements for the operational period.

(4) Manageable span of control. Limiting the number of subordinates under the direct control of a supervisor precludes the possibility of the supervisor being overloaded with information. Safety factors and management planning shall influence the correct ratio of supervisor to subordinate for each incident. The range of responsibility should normally be 3 to 7 subordinates for each supervisor. Span of control is essential to maintaining the effectiveness of the response actions especially during a rapid buildup.

(5) Common terminology. A common language is essential to an
effective multiagency response. The terms used should be collected primarily from existing sources such as the NCP and associated laws and regulations. Standard ICS terminology should only be included if it does not conflict with existing NRS terms. Some ICS terms will have to be modified to mesh with the NRS. For the benefit of persons not normally working with the Coast Guard, a list of common terminology should be included in all Coast Guard response documents.

(6) Comprehensive resource management. The ability to track and manage all available resources is essential to effective response. A sound resource management system should be composed of three major parts.

Standard tracking system. Each resource on scene should have a simple status code of assigned, available, or out of service. The person responsible for a resource is tasked with providing status changes to the central coordinating office.

Standardized unit designations. There are three principal designations. A single resource is an individual piece of equipment and including the personnel required to operate it. A task force is any combination of resources assembled for a specific mission and/or a geographical area. It should include a common communications system and a designated leader. The size of the task force should be determined by the guidelines of manageable span of control.

Spill response resource inventory. This computerized inventory shall include a listing of available resources from private industry and government, both nationally and internationally.

(7) Predesignated incident facilities. During any incident, several types of facilities must be established in the area of operations. In many cases, facilities should be identified in the national contingency plan. These types of facilities should include:
Incident command post. The OSC should direct response operations from here. This facility should be in the general proximity of the spill. Facilities should be large enough to handle the anticipated growth of the command staff.

Field support base. These facilities are geographically located to best support operations. Examples would be a large vessel used for berthing, feeding, and providing sanitation or other centralized locations in a large area of operations.

Staging areas. These highly mobile facilities serve as temporary locations for response resources. Staging areas serve as fueling sites and also provide basic services for personnel. In each area a staging manager should be assigned who shall track incoming/outgoing equipment and personnel.

Prestaging site. In a response to a spill of national significance, a prestaging site is needed. This should be geographically outside the area of operations and should serve as a processing area for incoming personnel. The prestaging site should be situated near a major airport and be responsible for equipment issue, incident specific training, and coordinating transportation into the area of operations. For a major spill, as personnel and/or equipment are requested, these resources should be assembled at the prestaging site. Once personnel are processed and trained and equipment has been readied, they should collectively be sent into the area of operations. Any resource that is not properly prepared to be an asset to the response effort is a hindrance.

Airbase. Normally this is a fixed location capable of maintaining and fueling both helicopters and fixed-wing aircraft. The airbase should have access by road for the transport of personnel, equipment, and supplies. Conceivably a large spill would require more than one airbase.

(8) Integrated communications. Being able to communicate with other responders is vital to conducting an effective response. A common and
single communication plan should be used. It should emphasize the use of plain English with no codes or acronyms. This communications plan should be drafted by the NOCOP and maintained in the national contingency plan.

(9) Tiered response system. Tiered equipment response for industry shall soon be a requirement. For a spill of national significance, a plan for tiered Coast Guard response shall be developed. This shall focus on identifying personnel to fill designated specialized billets to provide immediate response and controlled growth.

(10) Qualification tracking system. The appropriate time to identify qualified personnel to respond to a major spill, is not during the response efforts. To effect a timely response, this must be done well in advance. The system currently being used within the Coast Guard for reserve mobilization manpower requirements is the reserve mobilization order system. This system could be modified as needed to solve the problem of finding qualified personnel. Modifications should include expanding the system to track both active duty and reserve personnel.

How to implement the changes

With the functional areas and components of the response management system being defined, they must be laid on a foundation to support and maintain them. The foundation, as indicated in Figure 15, is composed of three main areas: training, exercises, and planning. As with the implementation of any system that is perceived as new, there is a critical need for training personnel in how the system works. Training is a key factor in the success of the implementation process. It also contributes to the continued effectiveness of a program.

Implementation training should be a concerted effort to familiarize personnel identified as potential participants with the concepts of unified command structure. Training should be conducted in sessions at the NOCOP, PCG Headquarters and district offices.
System maintenance training shall focus on maintaining the proficiency of responders. This should include personnel who are unfamiliar with the system. Likewise, proficiency would also be maintained at exercises by testing the response management system.

Pre-deployment training should be tailored to ensure that personnel responding to an incident know what their job entails, what specific procedures are being used in the response, and have incident specific training, such as survival training. This training should be conducted at the prestaging site. The exercise program of the response management system is a key to the overall success of the program to improve the NRS. This preparedness exercise program does not only test plans but identifies areas for improvement in a continuous process to conduct more effective responses.

The planning cycle should be directly linked to the exercise cycle and should establish times when the NCP and other associated response documents should be reviewed and revised. Upon establishment of the required frequency of exercises, a planning cycle shall be developed.

All three areas: training, exercises, and planning must be present to establish a viable and productive response management system (Figure 16). In addition, for a standardized response management system to be effective, there must be some form of written guidance. A manual that is concise and does not give an agonizing detail is necessary. This means that "disaster preparedness should focus on general principles and not on specific details, therefore simple, not complex plans should be developed", LCDR Robert A. Van Zandt said in his lecture on deliberate planning at the Maritime Safety School, USCG Reserve Training Center, Yorktown, VA. The document should be composed of a brief, but well defined core document that would outline the general principles and structure of the system. For example, related topics could be included such as a detailed standardized response organization for a spill of national significance, specific guidance and diagrams of the tiered response, personnel identified for key billets within the tiered response, a detailed template for a standardized response organization for OSCs, and standardized forms with
Implementing change is the most difficult step in improving response efforts. Following a management principle contained in this section, it is necessary to establish a specific objective to focus work efforts. Likewise, it is also important to establish a task completion time frame. Given the need to implement a standardized response management system, this time frame should be short, but remain obtainable. As the work team progresses, the schedule would be adjusted, maintaining focus on the deadline imposed by the objective.

Developing a response management system for the Coast Guard can only be done with an initiative that starts at the headquarters level. Once the objective has been accepted at headquarters, dedicated resources must be assigned to complete the task within the time frame established. Remembering that preparedness should focus on general principles, and not specific details, simple plans should be developed.

Finally, when implementing the response management system, planners must ensure that the building blocks of the foundation: training, exercises, and planning are included. If the foundation is not properly laid, the response management system will end up as just another plan on a bookshelf.

MODEL FOR MAKING DECISIONS CONCERNING OIL SPILL RESPONSE:

Oil spills, like fires, are emergencies that change over time. No single type of decision making structure and no single type of preparedness plan can cover the range of needs for a response to either. The initial phase of an oil spill requires a decision process best described as authoritative: the power of a single entity to make decisions. As the emergency enters succeeding phases where more organizations become involved, larger participation requires a decision process best described as democratic: decisions by multiple entities. Finally, the investigation of the effects of
the incident on the environment requires a technical, rigorous decision process often described as methodical: involving the recognition of a problem, the collection of data through observations and experiment, and formulating and testing of hypotheses. Each of these phases requires a different type of plan. Each type of plan must also detail methods for clear, accurate communication with the public during all phases of the response. A general overview of the phases of an oil spill incident using these terms is shown in Figure 17.

**Emergency response phase ---- authoritative decision making.** A mental picture of a blazing forest fire or a burning building clearly captures the concept of emergency. Emergency is the part of fire fighting that gets the public's attention. At this stage, many important tasks, such as fire prevention, receive far less attention. The phase of a fire emergency when most of the fire is extinguished is called overhaul. Firefighters must then ventilate the building of smoke and begin to cleanup the burning debris.

The oil spill emergency phase begins when the vessel goes aground and the crew and integrity of the ship are at risk, or when oil is flowing into the ocean or threatens an environmentally sensitive area. In other words, it is when lives have to be saved and public health protected, the vessel stabilized, and the oil contained or controlled at its source and prevented from entering sensitive environments.

In this phase some human intervention could make a difference in the outcome. There is no way to eliminate all impacts, but there are ways to minimize them. Action must be immediate and effective. Fighting a fire or saving a vessel in distress all require that trained and expert personnel should operate within a command hierarchy, identify and share common goals.

The NCP has no specific guidance about the kind of decision making structure required during the initial hours or days of the spill's emergency phase other than that the PCG OSC is to direct the response. The unified command structure proposed in the preceding section of this chapter is best suited for application in the emergency phase. This unified command and control structure includes a
fundamental support system focused on providing training and building the personnel and team expertise needed to accomplish a common goal. Although this command structure is authoritative, the relationship of the property owner and the CG OSC remains a partnership. For example, the CG OSC does not automatically assume the responsibilities of the vessel's master or property owner even during the extreme conditions of a vessel casualty at sea. Rather the OSC, in partnership with the master and owners, acts to focus government efforts to save the vessel and cargo and reduce any environmental harm resulting from the incident. The responsibilities of the master and owners for the safety of their vessel and cargo, and their efforts to mitigate damage to the environment, are not automatically assumed by the OSC.

The draft design of the above mentioned decision-making structure that shall respond to an oil spill of national significance focuses on the very necessary partnership of the OSC, property owners, and affected regional and national jurisdictions. The OSC shall focus on the government's efforts with the vessel's master and/or owners of oil facilities and shall direct actions where necessary. The operations plan for this emergency phase of the incident emphasizes equipment, detailed command structure, command relationships, task group organization and control, communication needs and procedures, logistics systems, and tasking methods required to accomplish the goal. The tone of the operations is authoritative and reflects the specific tasks and responsibilities of a decision-making hierarchy required to accomplish commonly held goals.

The emergency phase is not the time to form a committee to discuss detailed tactics on how to fight an oil spill. The preparedness planning process is the opportunity to develop a list of priorities and goals for the protection of environmental resources. The NOCOP must develop pre-approved spill response tactics --- for example, chemical dispersants, in situ burning, mechanical equipment strategies that the OSC can use within the demands of the emergency decision making structure. Similarly, preparedness planning should allow the OSC to respond under specified emergencies with multiple technologies simultaneously. Oil spill response can make a positive impact on the outcome if the planning process allows the OSC during the emergency phase of the event to focus the most appropriate response tools on control, containment, and preventing oil from entering
environmentally sensitive areas.

**Overhaul phase — democratic decision making.** This phase of the event begins around the time when the vessel is stabilized, as much oil as possible has been controlled or contained at the source of the release, and mechanical equipment is in place to protect threatened environmentally sensitive areas. The salvage of the vessel may have begun, and the long weeks and months of cleanup of the oil that has stranded on the shoreline now has to be sorted out. Characteristic of this phase, as when fire fighters have knocked down the blazing fire, is a little time to think about the next step. The emergency phase is winding down, and as the overhaul phase begins, a number of jurisdictions join the OSC to sort out roles and provide useful input for the events to follow.

A decision making structure proposed for the overhaul phase of the incident is contained in Figure 18. It outlines the decision process and organization that must be established to collect, discuss, document, and recommend appropriate countermeasure techniques to the OSC for the oil stranded on the shoreline. To support this structure, a manual should be prepared which outlines the different types of shorelines and sensitive resources in the area, recommended shoreline countermeasures, and details procedures for sending out field teams for many jurisdictions to collect and document observations of the stranded oil. Importantly, this manual should also outline the technical review and conflict-resolution process among the many jurisdictions involved.

Once oil is spilled, often little can be done to stop its spread by using mechanical equipment. Even with the best response technology available, and assuming an immediate and coordinated effort, experience has proved that a significant amount of oil from a major offshore spill during severe weather cannot be recovered. With improvements in technology it may be theoretically possible to do better. But "it is unlikely that mechanical equipment will result in recovery of even half the oil from a big spill", according to Ed Levine, Scientific Support Coordinator, Governor's Island, New York.
Similarly, once the oil has stranded on the shoreline there may be little that can be done without further damaging the environment. In the Exxon Valdez spill, the increasingly aggressive measures to remove weathered oil were thought by National Oceanic and Atmospheric Administration (NOAA) scientists on-scene to be counterproductive. Later reports documented their adverse effects.

Shoreline cleanup techniques that are now recommended use relatively non-intrusive and non-destructive methods. This relatively modest human effort to cleanup a shoreline recognizes that natural processes are often much better than human intervention. As it is not possible to repair the forest immediately after a fire, it is not possible to remove all of the oil stranded on the shoreline by means that prevent further damage to the environment. Shoreline cleanup should be done with the goal of reducing the environmental impacts of the stranded oil and to promote natural recovery. Often, this will mean that oil is best removed by natural means or only partially removed by human intervention.

Preparedness planning for the cleanup of stranded oil must include local jurisdictions. Expertise can identify environmentally sensitive areas and local oceanography that are extremely important. Similarly, local universities, research institutions, and local jurisdictions have valuable expertise on the environment in which they live and work. The spilling of oil into their backyard morally demands their involvement in decisions on how their backyard should be cleaned up.

However, final decisions must be based not only on knowledge of the local environment but also on knowledge of the probable fate and behavior of the spilled oil, the effects and effectiveness of the various cleanup methods, and the ecological tradeoffs involved in choosing among them. Therefore, it is vital that spill experts and environmental experts be involved in these decisions. The decisions themselves must be made with the goal of minimizing the impacts of the spilled oil and promoting natural recovery of the affected shoreline. Many of these decisions can be made in advance within the area contingency planning process.

Public outreach. The anger of citizens following an oil spill that contaminates their home, a beach, or marsh is a force that must be noted,
understood, and addressed. The portrayal by the media of heartrending scenes of oiled (or dead) birds and other sea life, beaches, and marshes leads to the public's perception that a major catastrophe has occurred. However, citizen anger in response to an oil spill is quite real and cannot be blamed fully on a manipulative media. Many people feel violated by the fouling of their home by an incident over which they had no control. Although oil spills are relatively short-lived events and other environmental insults may be very much more damaging in the long term, this overall environmental perspective is easily overshadowed by the public's emotional reactions to oil spills.

The oil spill has a short-term life cycle created by both the emergency situation and the focus of the media and special interest groups. The long-term cycle of an oil spill is the fate and effect of the oil as it enters into the natural environment. The immediate short-term event is given much attention while long term events are seldom accurately covered outside of technical literature. Consequently, the perceived impact of an oil spill may be little related to what ultimately happens to the oil or to the interaction that the oil has on the affected area. The public needs help from the responders to make sense out of the event.

One task which should receive attention during the contingency planning process is outreach to the public before and during oil spills. A consensus with government jurisdictions, industry, special interest groups, and the public must be developed to complement the increase in efficiency of oil spill response equipment. While a large amount of money probably will gain only a marginal increase in the effectiveness of oil spill response equipment, considerably less money could accomplish the important mission of providing the public with a realistic frame of reference on the amount of waterborne and stranded oil likely to be recovered and communicating the realistic prospects for long-term environmental recovery.

One method of building understanding is to include the public in the training and to allow public participation in the shoreline survey process. These activities will permit some public access to the spill scene, allow public input to the decision-making structure and provide an opportunity for oil spill experts at the scene to communicate realistic perspectives to these important stakeholders.
Investigation phase — methodical decision making. The investigation phase begins somewhere after the immediate emergency. A vessel casualty investigation — why did the vessel’s steering system fail? — is one type. Another type is an attempt to characterize in a relatively methodical way the effects of the oil spill on some aspect of the environment, such as a particular bird or oyster population. An investigation is undertaken primarily to determine the damage to natural resources, using a specific criteria and procedures established by law, to assess monetary compensation for environmental damages to a responsible party.

The investigation phase can begin as early as the emergency phase of the incident. The planning section chief under the standard ICS organization shall serve in this phase as the primary environmental advisor to the OSC and coordinates an interagency team of scientists or technical advisors to support the OSC’s emergency response operations.

Within hours of the start of the emergency phase of the incident, the planning section chief’s tasks begin to shift as more jurisdictions become involved in the incident and demands increase for a more democratic decision-making process. During the overhaul phase of the incident, this section chief can serve as the OSC’s principal point for contact and coordination of scientific studies for members of the scientific community not participating directly in the OSC’s response operations. The planning section, in addition to its own expertise should coordinate the flow of information from experts in universities, consulting firms, other government agencies, and the oil industry. The capacity of numerous agencies and jurisdictions to bring important and useful technical and scientific information to the scene of a spill is highly valuable. Communication of the information gathered during the emergency phase of the response can be vital to the success of the response effort.

The technical and scientific characterization of the oil's impact on the environment requires a different type of decision-making structure than the authoritative emergency and democratic overhaul phases. Making decisions during the investigation of the fate and effect of an oil spill on the environment is
necessarily more methodical than is possible at the onset of an emergency and must involve scientific cooperation and review of data, methods, and objectives. All data collected during the spill, by government agencies or the responsible party, should be made available to the scientific community as soon as possible, consistent with quality control.

Finally, the process of determining a proper compensation to the public for injury to natural resources from the release of oil or chemicals is too complex. Further, it is too time-consuming to address damage during the emergency response phase of the spill event. This is no time for government and the spiller to arrive at a mutually agreeable definition, for example, of environment, a natural resource, injury, or loss.

Because natural resource damage assessments are eventually decided in the courts, the immediate effect at a spill scene is to polarize the scientists and other contractors working for each side and to stop the free flow of information. This shifts the decision-making process to a type best described as litigious, contentious and subject to law suits. It is vital that the information gathered about the spill be shared so that appropriate response efforts may be launched and coordinated. Restricting information flow is the worst thing that can happen. This occurred during the Exxon Valdez spill response and continued afterwards, when response planners should have been sharing and applying the information to strengthen spill response preparedness. According to Gary L. Ott, NOAA/USCG Reserve Training Center, Yorktown, VA, "many of the studies conducted during the spill are still not available to the scientific community".

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ICS FUNCTIONAL AREAS

COMMAND

LOGISTICS  PLANNING  OPERATIONS  FINANCE

Figure 11 Incident Command System Functional Areas
Figure 12  Components of the Incident Command System
Figure 13 Components of the Proposed Response Management System
Figure 14  Proposed Standard Incident Command System Organization Chart  
(showing a unified command top structure)
Figure 15  Foundation of the Proposed Response Management System  Training, Exercises, Planning
Figure 16  Relationships of Training, Exercises, and Planning
(that improve the Proposed Response Management System)
### Figure 17  Overview of the overlapping phases of an oil spill incident

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### DECISION STRUCTURE

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### PLANNING METHODOLOGY

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Figure 18  Decision Making Process for Evaluating Activities in Overhaul Phase
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2. Etkin, D S (1990) Oil Spill Contingency Planning: A Global Perspective, OIL SPILL INTELLIGENCE REPORT, pp 7-93
CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

1. Compliance with the provisions of recently passed national spill regulations requires major commitments of time and money from government and industry. Most of this effort has gone into the purchase of more response equipment by oil companies and cleanup cooperatives. Government, on the other hand, is also committed to increased research and development programs. These efforts have placed the means at hand to improve the country's ability to respond to oil spills. It is now time to consider the management systems to be used during spill emergencies. Systems that are evolving under the national spill laws will delay the decision-making process and the implementation of effective response during the critical emergency phase of a catastrophic spill event.

2. The need has been identified for a standardized management system to assist the OSC in conducting a more effective and efficient response. Presently, with no such system in place, it is important that one be implemented as soon as possible. The National Response System is not generally able to cope with a large spill should one occur in Philippine waters or nearby seas.

3. Effectively responding to a spill of national significance requires an innovative, practical organization that can be rapidly implemented as appropriate to develop a national response strategy, acquire necessary resources to carry out that strategy, and proactively deal with the many peripheral national issues. It must be recalled that the National Contingency Plan, though establishes the membership and the general roles of the Response Teams and other implementing units to support the OSC, was not intended to serve as a step-by-step guide for responders' actions, nor to detail facilities for appropriate coordination and communications, public information, and reporting on a large scale as required by catastrophic spill incidents such as those listed in Appendix I. Through the development of a unified command structure, the
nation will be better prepared to respond to a future catastrophic spill in Philippine waters.

4. Oil spills are complex and there is no way for a response to be perceived as successful. However, it is possible to minimize its environmental and social impacts. The system is already in place for fires, and has proven effective. It is honed and refined with each fire experience. For oil spills, it requires a holistic approach that emphasizes setting priorities, selecting appropriate technologies to accomplish the objectives, and putting in place a management system that allows rapid and effective implementation of technologies. The absence of this kind of strategy in the current National Response System will result in two kinds of problems --- national or governmental management of the incident is fragmented among agencies with diverse legislative responsibilities, and the information that circulates among senior executive officials and public press is sometimes contradictory and often confusing.

5. In creating a response management system, there is no need to look far. A management system based on knowledge currently available should be implemented. Such system should be formed by applying the lessons learned from large spill incidents and the management practices of the Incident Command System.

**Emergency response phase.** The emergency response phase of an incident is action and equipment oriented and requires a decision-making structure that directly involves few jurisdictions. The standard ICS organization chart showing a unified command top structure (Figure 14, page 85) is recommended as the most appropriate model during SAR, vessel emergencies, and efforts to contain the spilled oil. Support of the OSC should be within the unified command and control structure by a limited number of oil spill specialists who have experience in rapidly evaluating the fate and behaviour of oil and the ecological trade-offs involved in choosing among response options. This means that not all the individuals and groups that feel they are stakeholders can expect to be directly involved in making decisions during the emergency phase of the response. Action during the emergency phase of an oil spill should be directed by expert spill fighters,
just as expert fire fighters direct action during a forest fire.

The National Contingency Plan should be reviewed to allow the OSC to predict the interests, objectives, and priorities of the contingency organization. The OSC would then be able to marshal rapidly a suite of pre-approved oil spill response technologies including chemical dispersants, in-situ burning, mechanical equipment, and containment booming, to best meet the emergency objectives. If the goal in this phase is to act quickly to control the movement of the oil and prevent it from spreading to sensitive near shore and coastal environments, serious consideration should be made to giving the OSCs pre-approval to carry out the technologies that seem to offer the best potential as rapid-rate response strategies.

It is recommended that a national list of approved dispersants, based on efficiency and toxicity criteria for classes of oil and environmental conditions, be published. Without a national list of approved chemical agents, linked with a pre-approved dispersant use plan, the above mentioned response tool cannot be used rapidly and effectively. National criteria and guidelines are necessary to put in place a framework to make timely and effective decisions on major incidents that cross national or regional jurisdictions. Collection of data on effectiveness and effects should not be a condition of dispersant use approval. These questions should be settled in advance by laboratory and field research. Likewise, national criteria for monitoring the application of approved chemical agents should be developed in advance.

**Overhaul phase.** The decision-making process during the overhaul phase involves numerous jurisdictions. It requires diplomacy as the needs of many jurisdictions and individuals must be considered and methods devised either to meet those needs or respond to demands for explanations. The decision-making process may become cumbersome as participants sort out their anger, frustrations, and needs, often in a public forum. The desire to return to the clean, authoritative decision-making style used during the emergency phase is
understandable, but this is neither practical nor appropriate, considering the demands of the participants.

The decision-making structure shown in Figure 18, page 89, is recommended for use in this phase. It outlines the decision process and organization that will collect, discuss, document, and recommend appropriate countermeasure techniques to the OSC for oil stranded on the shoreline. The democratic process involving the appropriate jurisdictions can ensure that the needs and interests of each jurisdiction—and the environment—are met.

Even with the best use of shoreline cleanup countermeasures, and the most attentive use of advice and identification of priorities by all participants, it has always been an experience from large spill events that a significant amount of oil cannot be recovered nor can be impacted environmental areas be immediately repaired. In fact, massive physical cleanup of shorelines using aggressive measures to remove the oil is usually counterproductive to long-term environmental recovery. Research has not proven that the relatively modest human efforts to remove oil from oiled shoreline are better for the environment than natural processes.

The capacity must be developed to build a consensus with government jurisdictions, industry, special interest groups, and the public. If government and industry can spend a large amount of money on the research, development, purchase, and use of oil spill response equipment that may not successfully remove much of the oil from the environment, they should also spend some resources on studying how to interact with the public. The participation of the public and numerous jurisdictions in the field of survey and evaluation of the oiled shorelines is but one method of involving people who have been impacted by the oil spill. This participation in the response effort is very significant in building a realistic impression about the spill and a consensus about which methods are appropriate to remove oil from a shoreline or when any cleanup method will no longer result in a net environmental benefit.
Investigation phase. It is recommended that the government agency that directs spill response, approves methods, and sets standards should not be the same agency that makes an assessment on the impacts for damage of natural resources. Agencies involved in a spill response action should have a role in one or the other activity, but not both.

It is also vital that the government agencies with responsibilities for spill response have their mission clearly defined "to minimize the ecological impacts of the spill". These agencies should cooperate fully with all jurisdictions responding to the spill and freely exchange scientific and technical information, so that the goal will be accomplished. Penalties and blame should be settled at a later date and by different agencies from those working on the operational aspects of the spill.

6. Oil spill response should have a high place on the national agenda reflecting public awareness and concern on this area. The task of shoring up the national capability to respond to oil spills through the NRS is imposing. While the national government can and should be a leader, all levels of government — National, District, and Municipal — and the private sector must share the responsibility for improving the nation's response capability. Both industry and government should make long-term commitments to increasing the country's oil spill response capability which recognize that despite the best efforts, catastrophic oil spills will occur. If rebuilding the nation's response capabilities results in complacency, allowing the system to deteriorate as time passes loses the most important lessons of these large spill incidents.

7. The recommended response management system should be exercised more frequently to ensure that the oil spill contingency plan remains active and planning assumptions continue to be challenged. Exercises should be coordinated among all levels of government and industry that more realistically simulate actual response situations. Exercises should be designed in a manner that genuinely stress the response command system. Existing mechanisms, such as national and regional conferences should be better structured to permit frank dissemination of weaknesses
and other lessons learned from exercises.

8. Finally, contingency planners must fight the tendency to delay the implementation of a response management system. Once implemented, the system can be refined through the process of training, exercises, and planning. To wait until a catastrophic spill occurs in Philippine waters to develop a response management system would be too late.
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APPENDIX I

MOST SIGNIFICANT INTERNATIONAL SPILL CASES FROM ACCIDENTAL CAUSES

(100,000 barrels and over)

TORREY CANYON (1967)

On 18 March 1967, the tanker vessel Torrey Canyon ran aground on Pollard Rock on Seven Stones Reef off Lands End in England due to master's negligence. The entire cargo, approximately 860,000 barrels was released into the sea and burned during the next twelve days. The spilled oil formed three distinct slicks which drifted up the English Channel, coast of West Cornwall, and into the Bay of Biscay.

The response command post was established at Plymouth. Ships of the Royal Navy carrying detergents were enroute to the scene within four hours of the grounding. The Royal Air Force and the Royal Navy implemented an early warning system for oil movement. A panel of expert scientists was assembled to consider scientific problems involved with the cleanup procedure. A detergent was sprayed on much of the floating oil to emulsify and disperse it. Manual methods were used for removal of oil on many of the sandy beaches, although the dissected nature of the shoreline made it impossible to clean the whole coastline. Cleanup operations included pumping and bailing of oil as well as bulldozing of oiled sand on the beaches. Over 1,400 personnel from the British armed services assisted the beach
cleanup. The vessel lost structural integrity on March 26, releasing more oil into the water. Since toving the vessel off the reef was deemed impossible, the government authorities decided to bomb the vessel to burn the remaining oil. The vessel was bombed by the Royal Navy on March 28-30 during periods of low water when the vessel was in clear view.

This incident prompted the English Government to take initiative in organizing an early meeting of the Intergovernmental Maritime Consultative Organization to consider needed changes in international maritime law and practice. Relevant maritime laws were considered to be overly complex and out of date in many respects. It was also the first incident to draw universal attention to the dangers of dispersants. Extremely large quantities of dispersants were used during the response. Contamination by oil without dispersants resulted in less adverse biological effect than where dispersants were used.

WORLD GLORY (1968)

At 1500 on 13 June 1968, the World Glory, bound for Huelva, Spain, broke up approximately 65 miles ENE of Durban, South Africa. Only 10 of the 34 crew members survived the accident. The stern section of the vessel sank after about two hours, while the bow section drifted southwest with the Agulhas Current. All the ship’s cargo, 334,043 barrels of Kuwait crude oil, eventually spilled into the Indian Ocean. Wildlife impacts were minimal. Mostly recreational beaches were threatened but no confirmed reports of oil impacting the shore had been received.

The response was led by the Port Captain of Durban. Since the economy of Natal, South Africa, depended on the upcoming winter tourist season, the primary response goal was to keep the oil from impacting the mainly recreational shoreline. Dispersant operations were organized by personnel from the Department of Fisheries and the Department of Industries. Other parties involved in the response include the Department of Transportation, South African Defense Force, the Durban Corporation, the Oceanographic Research Institute, the Natal Anti-Shark Measures Board, and the Council for Scientific and Industrial Research. Duration of response
was approximately 20 days with an estimated cost of $420,000.

Fly ash residue from burnt coal was applied in an attempt to soak up oil and settle it on the bottom. Aerial dispersant spraying operations began on June 16 and was completed by July 2. While the winds hampered some of the aircraft dispersing ability, favorable currents helped the vessel dispersing operations.

WAFRA (1971)

On the morning of 27 February 1971, the tanker Wafra was taken under tow off Cape Agulhas, South Africa after her engine room flooded. Later that day the towline broke, and the vessel drifted onto the Agulhas Reef, five miles from Cape Agulhas. Cargo tanks were ruptured, and Arabian crude oil began to leak from the vessel. On March 8, the vessel was pulled off the reef by the tug Oceanic, and towed to a position 200 miles from the coast where it deliberately sunk on March 12. Approximately 200,000 barrels of crude oil spilled into the sea, about half of it at the site of the grounding and the rest as the tanker was towed to the site of its sinking. A 30-mile long by 5-mile wide oil slick formed at the site of the grounding. Dispersant operations were conducted under the supervision of the Division of Sea Fisheries. A helicopter applied an oil solvent to the slick immediately after it formed but failed to prevent its spreading.

SEA STAR (1972)

Early on the morning of December 19, 1972, the Sea Star and the Horta Barbosa collided in the Gulf of Oman. Both vessels caught fire, and were abandoned by their crews. The Horta Barbosa fire was extinguished within a day. The Sea Star drifted SSE, leaking burning oil from a forty-foot hole in its side. The Sea Star was taken under tow by Awal Contracting and Trading Company tug while still on fire on December 21. Occasional explosions rocked the vessel, and eventually caused it to sink on December 24, 1972. Approximately 937,000 barrels of crude oil spilled from the Sea Star.
METULA (1974)

On 09 August 1974, the VLCC (Very Large Crude Carrier) Metula ran hard aground on Satellite Bank, at the western end of First Narrows in the Strait of Magellan near the southern tip of South America. The vessel was traveling from west to east at nearly 15 knots and came to a stop in approximately 260 feet. The Metula was over 1,000 feet long and ordinarily required 3 miles to stop. Oil immediately began pouring into the water from ruptured cargo and fuel tanks. The amount of oil spilled into the sea was 398,020 barrels.

There was no action taken to contain or disperse the oil that spilled from the vessel. Operations were hampered by rough weather, logistical difficulties and financial responsibility. For this reason, the Metula spill area became a natural laboratory for studying the long term effects of oil on the environment.

Consideration had been given to cleanup. Boom was expected to be ineffective due to the strong currents and tides. Chemical dispersants and the equipment to apply them were not available. They would have been difficult to use and possibly ineffective due to the weather and tidal conditions. It was estimated that 5,000 tons of dispersant chemicals would have been required to disperse the quantity of oil spilled. Lack of cleanup equipment and personnel would have made an effective beach cleanup impossible. Much of the affected shoreline was inaccessible to heavy equipment, even if the equipment had been available. There was also considerable concern about the possible damage to the environment caused by cleanup with chemicals or mechanical equipment.

Chilean authorities decided that cleanup of the beaches was not warranted, in view of other economic needs and the relative ecological importance of the area. It was felt that there was no way to prevent the pollution of the beaches, and that the response effort was better spent on re-floating the vessel and preventing further spillage of oil.
USCG National Strike Force personnel were sent to the site of the grounding at the request of the Chilean government. Ten people were on-scene to support and guide any cleanup measures that might be undertaken, and to assist with the salvage and lightering operations of the vessel.

CORINTHOS and TARIK IBN ZIYAD (1975)

On 31 January 1975, Corinthos was rammed as the Edgar M. Queeny maneuvered away from its dock. The Corinthos was in the process of offloading 315,000 barrels of Algerian crude oil at the British Petroleum terminal at Marcus Hook, Pennsylvania. The resulting explosion and fire reportedly shot flames 400-500 feet up into the air. The Corinthos' hull split and sank, while continuing to smolder until February 6. The Edgar M. Queeny was carrying phenol, vinyl acetate, and paraffin at the time of the incident. Approximately 2,000 barrels of paraffin and 266,000 barrels of oil were released as a result of the impact. Twenty six of the forty-four people aboard the Corinthos lost their lives as a result of the collision, explosion, and fire. Although the Edgar M. Queeny also caught fire, no fatalities were reported on that vessel.

Coast Guard personnel monitored the fire and pollution, controlled traffic and patrolled the security zone during the response. Pollution contractors were on scene within seventy-seven minutes of notification. Response personnel began booming creeks and wildlife areas immediately. Oiled waterfowl were taken to a cleaning facility at a New Jersey Armory. The Regional Response Team was activated from January 31 through February 5. Coast Guard personnel from Marine Safety Office Philadelphia and the Atlantic Strike Team responded to the spill. Other response agencies included the Philadelphia City Fire Department, the U.S. Army, and the U.S. Navy. During 1976, the two sections of the sunken CORINTHOS were raised and towed to Camden, New Jersey to be scrapped. Asphalt-like residue on the shoreline of the Delaware River was manually removed with shovels. Booms were placed at the entrances of Carroy, Old Man's, and Raccoon Creeks. Floating boom deployed around the vessel created a security zone. Within seventy-seven minutes of notification cleanup personnel began deploying
directional boom at Elinsboro Point, New Jersey in an effort to trap free-floating oil.

The Tarik Ibn Ziyad grounded on March 26, 1975 while entering the Sao Sebastiao terminal at Santos, Brazil. Tanks ruptured and the vessel leaked 109,950 barrels of oil for approximately 15 hours. Oil impacted beaches at Governador Island, Bananal, Freguesia, Pitangueriras, Bandeiras, Engenhoca, Jardim Guanabara, and the Island of Fundao where oil was accidentally ignited. Oil entered the Jequia River, heavily oiling the biological preserve there. The oil in the preserve caught fire and destroyed mangrove trees.

The State Environmental Engineering Foundation (FEEMA) coordinated the spill response of which the Ministry of the Navy, the Municipal Street Cleaning Company of the municipality of Rio de Janeiro, and Petroleo Brasileiro (PETROBRAS) were the principal participants. Overflights from helicopters supplied by the Navy began within five days to monitor the movement of the oil. Application of dispersants, and the use of straw as an absorbent were the two principal cleanup techniques. Skimmers and 440 yards of boom supplied by PETROBRAS were deployed in the Jequia Channel. Cleanup operations on the beaches were conducted by the Municipal Street Cleaning Company and included the spreading of straw as an absorbent, and some applications of dispersant. Oil soaked straw was removed manually. Cleanup response lasted until April 6, 1975.

**ST. PETER, URQUIOLA, and ARGO MERCHANT (1976)**

The tank vessel St. Peter departed Tumaco, Colombia on February 4, 1976 with 279,000 barrels of Orito crude. On the evening of February 4, a fire broke out in the engine room and the crew abandoned ship after unsuccessful attempts to extinguish the fire. There were subsequent explosions on board the St. Peter. The fire continued to burn until February 5. The vessel sank in over 3,000 feet of water approximately 18 miles off Cabo Manglares, Colombia. An Ecuadorian patrol boat returning to the site on February 6, found only an oil slick approximately one square mile in area.
The sunken vessel released an initial burst of oil and then continued to slowly leak oil for some time. The vessel was known to be leaking oil nine months after the sinking. The area affected by the spill covered a distance of over 200 miles, from Buenaventura, Colombia in the north to Punta Galera, Ecuador in the south. The predominant shorelines in the area were sandy beaches, rocky shores, and estuarine areas with mangroves. The heaviest oiling occurred in the area of Tumaco, Colombia and portions of the shoreline to the south, near the border of Ecuador.

Several logistical and financial constraints restricted the cleanup and response options available to Colombia and Ecuador. Little or no oil spill control and cleanup equipment was available in the area, and freight costs to bring such equipment into the area were high. Some dispersant was available in Ecuador, but it was considered toxic, and no equipment was available to apply the dispersant to the spill. Specialized diving equipment needed for any vessel salvage was unavailable. An advisor from the Canadian Coast Guard was consulted for treatment and contamination removal recommendations, but no known response activities were ever undertaken.

On 12 May 1976, the tank vessel Urquiola struck a submerged object while approaching the Coruna Oil terminal at La Coruna, Spain. The vessel began to leak cargo from the damaged bow section. Due to the threat of explosion and fire, the Port Commandant ordered the Urquiola out of the harbor, away from the refinery and town of 200,000 inhabitants. While being assisted out of the harbor by two tugs, the leaking vessel grounded again, further rupturing the bow tanks. All of the crew, except for the captain and pilot, abandoned the ship when it began to list. Two hours later the vessel exploded, killing the captain. Approximately 513,000 barrels of oil burned in the subsequent 16-hour fire. Burning oil spread out from the vessel and was eventually extinguished by the cooling effect of the seawater. Dense clouds of smoke were blown over the town of La Coruna. A safety zone one mile in radius was established around the vessel after air monitors detected high levels of volatile gases. Despite these precautions, a second explosion and fire rocked the vessel on the morning of May 14.
Between May 12 and May 21, oil was estimated to be leaking at a rate of 2,200 barrels per day. An estimated 180,000-220,000 barrels of the cargo polluted the Spanish coast. On May 21, a smaller tanker and tug began lightering the Urquiola. About 50,000 barrels of crude oil had been removed from the vessel by May 25, when lightering operations were halted by rough seas. Ten to fifteen-foot seas detached a large section of the bow. On June 8, the stern section, containing an estimated 22,000 barrels of bunker fuel, was towed to a more protected area five miles to the west. The stern was partially lightered before developing a crack in one of the tanks that resulted in further, limited leakage.

Following the fire, the Spanish Navy and a fleet of commercial vessels applied over 2,000 tons of chemical dispersants to the vessel and surrounding waters in spite of resistance mounted by Spanish oceanographers. Cleanup of the oiled shoreline was primarily accomplished by manual labor. Skimmers and booms were used for water recovery with mixed results.

The largest mobilization of resources occurred during the dispersant application. As many as eleven vessels were involved in applying the hydrocarbon based chemical products. Many different products were reportedly used during the operations. Some attempts were made to contain floating oil with boom. Due to the lack of an oil spill response or contingency plan, booming equipment was not available locally. A 36-inch French made boom was borrowed from a nearby refinery, but sank after three days. Two booms were flown from Great Britain and managed to contain oil but broke loose because of wind and sea conditions.

Cleanup of the oiled beaches was a slow and methodical process. Many of the affected areas were unsuitable for the use of mechanical cleanup equipment. The decision was made by local authorities to spend available money to employ the local people rather than purchase complex equipment. Cleanup operations were very slow where oiling was extremely heavy. Much of the cleanup was conducted simply by using buckets and shovels. In some areas, cleanup techniques were improperly applied. The most successful cleanup operation involved the combination of machinery and manual removal.
On 15 December 1976, the Liberian tanker Argo Merchant went aground on Fishing Rip (Nantucket Shoals), 29 nautical miles southeast of Nantucket Island, Massachusetts in high winds and ten-foot seas. The vessel was carrying approximately 183,000 barrels of No. 6 fuel oil (80%) and cutter stock (20%). The master of the Argo Merchant requested permission to dump cargo in an effort to control draft and refloat the vessel. Permission was denied and attempts to lighter and refloat the vessel using emergency pumps and an Air Deliverable Anti-Pollution Transfer System (ADAPTS) were unsuccessful. The following day the weather worsened and the crew members of the vessel were evacuated. On December 17 the vessel began to pivot clockwise and buckle. On December 21 the vessel broke in two aft of the king post, spilling approximately 36,000 barrels of cargo. The bow section split forward of the bridge and capsized on December 22, resulting in the loss of the remaining cargo. The bow section floated 400-500 yards to the southeast and eventually sunk while the stern section remained aground. Prevailing currents carried the spilled oil away from the shorelines and beaches of Nantucket. Weather conditions and uncharted depths surrounding the wreck made salvage attempts difficult.

In-situ burning was attempted on two occasions. In the first burning attempt, conducted on December 27, a USCG helicopter dropped isolated boxes of Tullanox 500 charged with JP-4 jet fuel into the oil and ignited the boxes using a timed grenade. The isolated boxes burned, but the flame failed to spread. The second attempt was conducted on December 31. The USCG vessel Spar, aided by aircraft, located a slick which broke into smaller pancakes as the Spar maneuvered alongside. Sixty-six pounds of Tullanox 500 were thrown near the center of the slick but much of the material was blown off of the slick. The experiment was terminated after attempts to ignite the slick failed to sustain a burn.

Due to the offshore movement of the spill, concern for resources shifted from potential shoreline impacts to the economically important fishing grounds in the area of Georges Bank. The grounding of the Agro Merchant initiated intense scientific activity between December 15 and February 12. Studies related to the fate and
effects of the oil as well as the modeling of trajectories were conducted to begin the process of assessing ecological impacts.

Media attention during the Agro Merchant spill was considerable. Though the oil never impacted the coast, public perception a year after the spill was that widespread and serious damage had occurred. The USCG was the target of increasing criticism during the incident. Criticism of the Coast Guard's handling of the incident was noted at a U.S. Senate hearing. A problem of conflicting information had developed due to the release of information from two different sources, the district office and the Coast Guard air station. After the two command posts were consolidated, public information problems were minimized.

IRENE's CHALLENGE, BORAG, and VENOIL (1977)

On 17 January 1977, the 640-foot tank vessel Irene's Challenge broke into two pieces approximately 200 miles south of Midway Island and 50 miles north of Lisianski Island, Hawaii. The amount of light crude oil spilled into the sea was 237,600 barrels. The deck plates of the vessel failed due to the stress incurred by several days of rough seas. Twenty eight of the thirty one crewmen were picked up by the Pacific Arrow. The three remaining crew members were not found.

Since the two sections sank quickly, a towing operation was not attempted. Questions were raised concerning the feasibility of towing the partially submerged sections of the vessel. The resulting slick and surfacing oil was observed and tracked by the Coast Guard for ten days. Dispersant use was recommended in the event of any oil impacting the shoreline. The natural dispersion of the oil by wave action negated dispersant use.

The incident occurred 57 miles from U.S. coastline, which is outside the area of U.S. jurisdiction for action and reimbursement. Due to the location of the incident, the Intervention on the High Seas Act was required. Section 1472 of this act allows the use of action when interests of the U.S. are threatened by pollution. Funding of the response was available through Section 1486 of the same act.
On 07 February 1977, the Borag grounded on Hsin Lai Reef off Keelung, Taiwan while enroute to the Chinese Petroleum Corporation oil terminal at Shen Ao. On February 15, heavy weather caused the vessel to break up and sink, releasing more oil. Approximately 213,690 barrels of No. 4 Fuel Oil leaked from the vessel. Most of the oil drifted out to sea, but 60 miles of sand beaches and rocky shores along Taiwan's northern coast were oiled. A large amount of oil entered the Keelung Harbor, causing welding to be prohibited for fear of igniting a fire. Oil was trapped in a number of small fishing village harbors and accumulated to a thickness of up to four inches.

International Tanker Owners Pollution Federation Ltd. (ITOPF) personnel arrived on scene on February 13 to assist in oil spill response operations. The oil there proved to be too viscous to be recovered by the skimmer. The power stations at Sheh Ho and Shen Ao had some Bennett booms which were effectively used. There were limited stocks of dispersant available, but the necessary vessels and helicopters to make effective application of them were not available. Little additional oil spill response equipment was available in Taiwan. Further cleanup measures included offering five dollars reward for every barrel of recovered oil. Locals collected oil manually using buckets which were brought to the CPC oil terminal for disposal.

The anchovies fishery was disrupted as fishermen were reluctant to risk oiling their nets. Scarcity of abalone and tuna, and mortalities among crabs, lobsters, and crawfish were claimed by fishermen. Likewise, fishermen claimed mortalities among the eels, and interference with their harvesting.

On the morning of December 16, 1977, the Venoil and the Venpet collided 40 miles off Cape St. Francis, South Africa. The Venpet was damaged, releasing burning bunker oil over the starboard deck of the Venoil and into the surrounding water. The Venoil suffered serious fire damage. The impact also holed two of the Venoil's tanks. Both ships were abandoned, and began to drift towards the coast.
The fires on board both vessels went out as they drifted. Approximately 155,000 barrels of Iranian heavy crude oil, and 33,000 barrels of bunker fuel oil spilled from the Venoil. Approximately 31,000 barrels of bunker fuel oil spilled from the Venpet, in ballast at the time of the collision. Of the 219,000 barrels of oil spilled, it is estimated that 25 percent burned.

Dispersant spraying operations began almost immediately from five Kusweg anti-pollution vessels directed by aircraft. However, by December 18, the oil had emulsified to an extent where the dispersants were not effective. The oil became so thick that it significantly slowed the vessels traversing it. Dispersant operations were scaled down at this point, and only slicks of fresh oil were sprayed. When the second slick was found dispersant operations began there. However, as this slick was also composed of thick, emulsified oil, operations were suspended shortly after beginning. Approximately 158,500 gallons of dispersant were sprayed on the various slicks.

Oil impacts to the rocky shore areas were left to degrade under the influence of the weather, except for one recreational rocky shore beach that was treated by manual removal and sandblasting of rocks followed by dispersant application. Cleanup on other rocky shores consisted of manual removal of mousse trapped among the rocks. Oiled recreational sand beaches were treated by manual removal of oiled sand and debris. Removal of sand was minimized, and no dispersants were used on the sand beaches. Straw was spread on some sand beaches to absorb the oil. Oiled straw, debris and sand were disposed of in landfills, and in some cases, was buried above the high tide watermark on the beaches where they were collected.

The greatest wildlife damage was seen in the sand and mudflat areas of the Brak rivers. Birds, crabs, and prawns were severely oiled, and mortalities were high.

**AMOCO CADIZ (1978)**

On 16 March 1978, the Amoco Cadiz ran aground on Postall Rocks, three miles off the coast of Brittany due to failure of the steering mechanism. The vessel
had been enroute from the Arabian Gulf to Le Havre, France when it encountered stormy weather which contributed to the grounding. The entire cargo of 1,619,048 barrels, spilled into the sea. A slick 18 miles wide and 80 miles long polluted approximately 200 miles of Brittany's coastline. Beaches of 76 different Breton communities were oiled.

The isolated location of the grounding and rough seas restricted cleanup efforts for the two weeks following the incident. Severe weather resulted in the complete break up of the ship before any oil could be pumped out of the wreck. As mandated in the "Polmar Plan", the French Navy was responsible for all offshore operations while the Civil Safety Service was responsible for shore cleanup activities. Although the total quantity of collected oil and water reached 100,000 tons, less than 20,000 tons of oil were recovered from this liquid after treatment in refining plants.

Oil penetrated the sand on several beaches to a depth of 20 inches. Subsurface oil separated into two or three layers due to the extensive sand transfer that occurred on the beaches during rough weather. Piers and slips in the small harbors from Porspoder to Brehat Island were covered with oil. Other impacted areas included the pink granite rock beaches of Tregastel and Perros-Guirec, as well as the tourist beaches at Plougasnou. The total extent of oiling one month after the spill included approximately 200 miles of coastline.

A 2.5-mile long segment of boom protected the Bay of Morlaix. Although it required constant monitoring, the boom functioned properly because this sheltered area was protected from severe weather and from receiving excessive quantities of oil. Boom was largely ineffective in other areas due to strong currents and enormous quantities of oil. Skimmers were used in harbors and other protected areas. However, skimmer efficiency was limited due to the blocking of pumps and hoses by seaweed. Vacuum trucks were used to remove oil from pier and boat slip areas where the seaweed was thick. Stranded oily seaweed was manually removed from the beaches using rakes and front-end loaders. Natural cleaning of the sand by wave action occurred on oil penetrated beaches after ploughing and harrowing of the sediments. Both artificial and bacterial cultures were poured on the oily sand before
harrowing. Several brands of diluted and concentrated dispersants were used. Good dispersal of oil was difficult since the emulsified oil was several centimeters thick in some places.

A rubber powder made from old tires was applied to promote oil absorption. The powder was spread with water hosed aboard French Navy ships or applied manually by workers from small fishing boats. Wave action proved to be insufficient in mixing the powder with the oil. The powder had little effect on the slick because it remained on top of the oil. High pressure hot water was very effective in cleaning oil from rocky shoreline areas during the third and fourth months of cleanup. A small amount of dispersant was applied to prevent the oiling of the cleaned rocks during the next high tide.

The nature of the oil and rough seas contributed to the rapid formation of a "chocolate mousse" emulsification of oil and water. This viscous emulsification greatly complicated the cleanup efforts. French authorities decided not to use dispersants in sensitive areas or the coastal fringe where water depth was less than 50 meters.

At the time, the Amoco Cadiz incident resulted in the largest loss of marine life ever recorded from an oil spill. Mortalities of most animals occurred over the two-month period following the spill. Some of the fish caught in the area reportedly had a strong taste of petroleum. Cleanup activities on rocky shores, such as pressure washing, also caused habitat impacts.

The Amoco Cadiz spill was one of the most studied oil spills in history. Many studies remain in progress. This was the largest recorded spill in history and was the first spill in which estuarine tidal rivers were oiled. No follow-up mitigation existed to deal with asphalt formation and problems that resulted after the initial aggressive cleanup. Additional erosion of beaches occurred in several places where no attempt was made to restore the gravel that was removed to lower the beach face. Many of the affected marshes, mudflats, and sandy beaches, were low-energy areas. Evidence of oiled beach sediments can still be seen in some of these sheltered areas. Layers of sub-surface oil still remain buried in many of the impacted beaches.
BURMAH AGATE and INDEPENDENTA (1979)

On the morning of November 1, 1979, the Burmah Agate and the Mimosa collided at the entrance to Galveston Harbor. The Mimosa struck the Burmah Agate on its starboard side, tearing an 8 by 15 foot hole in the hull near Cargo Tank No. 5. An explosion occurred upon impact, and the leaking oil ignited. The USCG immediately dispatched the Coast Guard Cutter Valiant to begin search and rescue operations. By 1230 all 26 crew members of the Mimosa had been found, but only 6 of the Burmah Agate's 37 crew members were accounted for. The owners of the Burmah Agate assumed responsibility for the spill response. They contracted Clean Water, Inc. for cleanup operations, and Smit International Inc. to fight fires on the Burmah Agate, and to assist in salvage. The Burmah Agate burned until January 8, 1980 and was towed to Brownsville, Texas on February 1 for scrapping.

Approximately 254,761 barrels of oil spilled from the tanker. Thirty-eight percent was recovered through lightering operations. Of the remaining oil, an estimated 1.7% was picked up by skimmers, 0.5% impacted beaches, 48% burned, and 12% dispersed offshore. Ultimately, 2,100 barrels impacted various beaches and marshes.

Through the duration of the response, four skimming barriers, Open Water Oil Containment and Recovery System (OWOCRS) and one Lockheed skimmer, Open Water Oil Recovery System (OWORS) were used. Heavy seas (typical of winter weather in the area) hindered booming and oil recovery efforts. Oil began to entrain under the OWOCRS when the current reached 0.75 knot, and once the current reached 1 knot the OWOCRS were totally useless. Furthermore, the OWOCRS were only useful in a stationary configuration, and could not be maneuvered effectively to follow a moving slick. Problems also arose due to constant replacement of vessels in the OWOCRS configuration. Eleven vessels were rotated through deployment and maintenance of the OWOCRS. This rotation was caused by short-term contracting of vessels by the owners of the Burmah Agate. While problematic, the rotation of various types of vessels did illuminate the
characteristics of a vessel best suited for OWOCR S deployment and maintenance. These characteristics were: seaworthiness (which the crew boats did not have due to their small size), large work area astern, maneuverability (twin-screw, bow-thruster equipped boats worked the best), onboard tank space, open stern close to the water, and adequate power. Of all the vessels used, a large offshore supply vessel worked the best. Deployment of booms and skimmers around the burning tanker before the fire was extinguished resulted in the ignition and subsequent loss of 4000 feet of Goodyear boom and one OWOCR S. The Marco Class V skimmer proved to be the most effective skimmer. The Lockheed skimmer broke down and spare parts were not readily available. This made on-site repair of the OWORS impossible. Furthermore, the deployment of the OWORS in conjunction with the OWOCR S was difficult. When attached to an outrigger on a vessel, the OWORS did have partial success in recovering oil.

On 15 November 1979, the Independenta and the Evrialy collided at the southern entrance of the Bosphorus. The Independenta exploded and both vessels began to burn. The Independenta grounded a half of a mile from the port of Hydarpasa and burned until December 14. The Independenta was carrying 714,760 barrels of Es Sider crude oil. Little oil was found on the water, and it was surmised that the majority of the oil had burned on the tanker. Any slicks of oil probably drifted into the Sea of Marmara and dissipated. From November 17 to November 27, there was slight leakage from the vessel. The vessel suffered another major explosion on December 6, resulting in more oil spilled. The slick from the vessel drifted towards the port of Hydarpasa. Despite booms across its entrance, approximately 380 barrels of oil entered the harbor.

The Turkish Navy attempted to extinguish the fire early in the incident, but the intensity of the fire caused these efforts to be abandoned. The Director of the Marmara Sea District took over the spill on November 19, and the Navy withdrew. International Tanker Owners Pollution Federation Ltd. (ITOPF) personnel came on scene on November 17. The Turkish government refused permission for overflights, and all pollution surveys were conducted by boat. Little pollution was found and the ITOPF personnel left on November 27. Explosions onboard the vessel on the night
of December 6, prompted the return of ITOPF personnel on December 10. Strong prevailing winds during the leakage of oil from the December 6 explosion prevented the boom across the port of Hydarpasa from being more effective. There were no reports of adverse effects to the local fishing industry, as neither a major fish migration nor the fishing season were in progress at the time. The largest concern was for the shorelines of Kalolimno and Marmara Islands. They are the source of important beach sand (used for construction) and marble industries.

ASSIMI (1983)

On 07 January 1983, a fire broke out in the engine room of the tanker Assimi. The crew abandoned ship and the Assimi was taken under tow by the tug Solano. On January 10, an explosion occurred aboard the vessel and it burned fiercely for several days as it was towed into the Arabian Sea. The tanker was towed to a point 200 miles off the coast of Oman where it sank on January 16. A second explosion occurred as the vessel was sinking which ignited the oil on the surface of the water. Approximately 379,000 barrels of oil spilled from the vessel. A slick formed above the area where the vessel sank. There was no coastal pollution resulting from the incident.

The government of Oman convened a council that included representatives from the Council for Conservation of the Environment and the Prevention of Pollution (CCEPP), Sultanate of Oman navy (SON), Sultanate of Oman Air Force (SOAF), the Royal Oman Police (Marine), the Maritime Affairs Department, the Ministry of Petroleum and Minerals, and the petroleum industry. The council was to form a response strategy in the event of a release of oil. ITOPF and Smit International were asked to provide expertise, and representatives from those organizations arrived in Oman on January 12. International transport Company Contractors, the salvors of the ASSIMI, contracted Smit International to help fight the fire. Equipment and personnel from Smit fought the fire using water and foam from their tug SMIT PIONEER. On January 11, the fire was still burning, and the firefighters flooded the pump room in an attempt to keep the fire from spreading from the engine room to the cargo tanks.
The government of Oman contacted the Gulf Area Oil Companies Mutual Aid Organization (GAOCMAO) to provide an aircraft with dispersant spraying capabilities. Vessels from the Sultanate of Oman Navy (SON), were equipped with booms and dispersants. Dispersants were obtained from Saudi Arabia and Dubai to supplement the stock of Petroleum Development Oman (PDO). No dispersants were applied, because the oil was observed to dissipate rapidly.

ATHENIAN VENTURE (1988)

On 22 April 1988, the tanker Athenian Venture was found by the Canadian research vessel Hudson 400 miles southeast of Cape race, Newfoundland. The Athenian Venture had apparently experienced a violent explosion as it was broken in two and on fire. The Athenian Venture had been enroute from Amsterdam, Netherlands, to New York, New York, with a cargo of approximately 250,000 barrels of unleaded gasoline on board. The bow and aft sections were approximately two miles apart when found. The bow section sank at 1400 on April 22. The aft section continued to drift on fire for the next 7 weeks, finally sinking on June 17 about 200 miles from the Azores. Most of the gasoline burned in the extensive fires. The remaining oil dissipated very rapidly, most of which was lost to evaporation. Weather conditions immediately following the accident were good, with high visibility and calm seas.

The USCG coordinated rescue with the Canadian Coast Guard. Five airplanes and seven merchant vessels participated in the two-day search for survivors. The Athenian Venture had a crew of 24, and the wives of 5 crew members were also on board. Initially it appeared that one of the lifeboats was missing from the vessel, but later it was found that all the lifeboats had burned. No survivors were ever found, and all 29 people were presumed dead.

EXXON VALDEZ, KHARK 5, and ARAGON (1989)
On 24 March 1989, the tanker Exxon Valdez, enroute from Valdez, Alaska to Los Angeles, California, ran aground on Bligh Reef in Prince William Sound, Alaska. The vessel was travelling outside normal shipping lanes in an attempt to avoid ice. Within 6 hours of the grounding, the Exxon Valdez spilled approximately 10.9 million gallons (or 240,500 barrels) of its 53 million gallon cargo of Prudhoe Bay Crude. Eight of the eleven tanks on board were damaged. The oil would eventually impact over 1,100 miles of non-continuous coastline in Alaska, making the Exxon Valdez the largest oil spill to date in U.S. waters.

The response to the Exxon Valdez involved more personnel and equipment over a longer period of time than did any other spill in U.S. history. Logistical problems in providing fuel, meals, berthing, response equipment, waste management and other resources were one of the largest challenges to response management. At the height of the response, more than 11,000 personnel, 1,400 vessels and 85 aircraft were involved in the cleanup.

Shoreline cleanup began in April of 1989 and continued until September of 1989 for the first year of the response. The response effort continued in 1990 and 1991 with cleanup in the summer months, and limited shoreline monitoring in the winter months. Fate and effects monitoring by state and Federal agencies are ongoing. Cleanup operations continued in the summer months of 1990 and 1991. By 1990, surface oil, where it existed, had become significantly weathered. Sub-surface oil, on the other hand, was in many cases much less weathered and still in a liquid state. The liquid sub-surface oil could give off a sheen when disturbed. Cleanup in 1991 concentrated on the remaining reduced quantities of surface and sub-surface oil.

Deployment of boom around the vessel was complete within 35 hours of the grounding. Exxon conducted successful dispersant test applications on March 25 and 26 and was granted permission on March 26 to apply dispersants to the oil slick. Due to the large storm that began the evening of March 26, much of the oil turned into mousse. As dispersants aren't generally able to dissipate oil in the form of mousse, it was no longer practical to use dispersants on floating oil during this response.
On the evening of March 25, a test in-situ burn of oil on water was conducted. Approximately 15,000 to 30,000 gallons of oil were collected using 3M Fire Boom towed behind two fishing vessels in a U-shaped configuration, and ignited. The oil burned for a total of 75 minutes and was reduced to approximately 300 gallons of residue that could be collected easily. It was estimated that the efficiency of this test burn was 98% or better. Again, continued in-situ burning was not possible because of the change in the oil's state after the storm of March 26.

Because there was not enough equipment to protect all the shorelines that could be impacted, Federal, state and local agencies collaborated to establish shoreline protection priorities. The agencies decided that fish hatcheries and salmon streams had the highest priority; accordingly, containment booms were deployed to protect these areas. Overall, the deflection of oil from the hatcheries was very successful. At the height of the containment efforts, it is estimated that a total of 100 miles of boom was deployed. Almost all the types of boom available on the market were used and tested during the spill response.

Due to the size of the spill, it was necessary to employ inexperienced workers to deploy and tend booms, and this led to some booms being incorrectly used or handled, and sometimes damaged. Some boom sank because of improper deployment, infrequent tending, or leakage and/or inadequacy in the buoyancy system. Other problems included fabric tears in boom due to debris, and tearing at anchorage points from wave action. In some cases, ballast chains were ripped off during boom recovery if the boom was lifted by the chain. One estimate suggests that 50% of the damage to larger boom came during boom recovery. For self-inflating booms, it was important to keep the inflation valves above the water during deployment so that the boom did not become filled with water and have to be replaced. When several types of boom were used in one operation, there were often problems with incompatible connectors between different types of boom. Booms to be re-used were hand cleaned early on in the spill, and as the spill progressed were cleaned in one of the two barges with mechanical washing facilities. Aerial surveillance was used to direct the deployment of booms and skimmers for open water oil recovery.
The primary means of open water oil recovery was with skimmers. In general, most skimmers became less effective once the oil had spread, emulsified, and mixed with debris. To save time, it was almost practical to keep skimmer offloading equipment and oil storage barges near the skimmers.

Sorbents were used to recover oil in cases where mechanical means were less practical. The drawback to sorbents was that they were labor intensive and generated additional solid waste. Sorbent booms made of rolled pads were more effective than booms made of individual particles because these absorbed less water and were stronger, and did not break into many small particles if they came apart. A hopper dredge was also used to collect oil for the first time in the United States. The drawbacks to using the dredge were that it recovers large amount of water with the oil and must be used offshore because of its deep draft.

Early on in the response, storage space for recovered oil was in short supply. To combat the storage problem, water was decanted from skimmers to tanks into a boomed area before offloading. As a result, the remaining viscous oil mixture was difficult to offload, the process sometimes taking up 6 to 8 hours. The oil remaining on the Exxon Valdez, was completely offloaded by the end of first week in April 1989. After offloading operations were completed, the tanker was towed to Naked Island in Prince William Sound for temporary repairs and was brought to California for further repairs.

Along the large scale beach washing, manual cleanup, raking and tilling the beaches, oily debris pickup, enhanced bioremediation and spot washing were used to cleanup the oil. In some locations, oil was thick enough to be picked up with shovels and buckets. In addition, mechanical methods were used on a few sites, including the use of bulldozers to relocate or remove the contaminated beach surfaces. Mechanical rock washing machines, which were manufactured for the spill, were not used to clean contaminated rocks and return them to the beach.

Beach applications of dispersants were tried in several locations, followed by a warm water wash. No significant change in oil cover or the physical state of the oil
was observed as a result of the treatment. Exxon also tested the dispersant application in Prince William Sound. The decision to approve a large scale test of dispersant in August was reached after an extensive program aimed at evaluating shoreline cleaning technologies. The monitoring program addressed three major issues: migration of oil in shoreline sediments, the migration of sediments and oil in the nearshore environments, and the migration of oil in the water column, each being evaluated in the monitoring program. The dispersant's effectiveness and impact were then compared to mechanical shoreline cleanup methods, and this information was used to determine whether dispersant should be used for shoreline treatment. The Research and Development Committee evaluating the proposal for dispersant use recommended against broad-scale application of the product because tests had outweighed possible adverse effects. The committee recommended using the dispersant Corexit only on Smith Island, subject to continued review of the effectiveness of recovery procedures by on-scene monitors.

Cleanup operations in 1989 ceased by the end of September. All parties involved in the response agreed that continuation of cleanup into the Alaskan winter would jeopardize the safety of cleanup crews. In addition, it was speculated that the winter storms in Alaska could significantly remove oil from shorelines, including sub-surface oil.

Cleanup in 1990 began in April and ended in September. Surveys in the spring of 1990 showed that oiling conditions had been reduced or changed over the winter. Surface oil in 1990 was significantly weathered but subsurface oil was relatively fresh in some locations. Cleanup techniques in 1990 focused more on manual methods of treatment such as hand wiping and spot washing as well as bioremediation. Mechanical equipment was used on a few sites.

An important observation that resulted from the Exxon Valdez oil spill was that natural cleaning process, on both sheltered and exposed beaches, were in many cases very effective at degrading oil. It took longer for some sections of shoreline to recover from some of the invasive cleaning methods (hot water flushing in particular) than from the oiling itself.
The Exxon Valdez oil spill aroused more media and public interest (both national and international) than any other spill in U.S. history. In an effort to absorb and use input from the multitude of groups concerned with the effects of the spill, the Interagency Shoreline Cleanup Committees (ISCC) were formed to monitor beach cleanup progress. The ISCCs focused on identifying strategic resource planning needs and consisted of representatives from Exxon, environmental groups, private landowners, native groups and state and Federal agencies. There were ISCCs formed in Homer, Kodiak, Seward and Valdez.

Concern over oil related wildlife mortality was intense during the spill. The grounding occurred at the beginning of the bird mitigation season.

On 19 December 1989, the Iranian tanker Khark 5 bound for refineries in Northern Europe exploded and caught fire approximately 400 miles north of the Canary Islands. An estimated 452,400 barrels of the 1,714,300 barrels on board spilled into the sea. The 35 crew members were rescued by the passing Soviet vessel Sarny.

Ocean currents carried the abandoned vessel south towards the Canary Islands. A Moroccan Government Response Task Force consisting of members from the Moroccan Royal Navy, Interior Ministry, Ministry of Fisheries, and the Civil Defense Force responded to the incident. According to a joint Spain/Morocco contingency plan, the Spanish government was prepared to provide aid if necessary. The Moroccan government sent a formal request to the U.S. Coast Guard for technical assistance in evaluating the situation. An Atlantic Strike Team (AST) representative was sent to the scene on January 4, 1990. The International Tanker Owners Pollution Federation (ITOPF) provided cleanup equipment and an on-scene advisor.

Smit Tak, a Dutch salvage company, repaired a 60 foot by 90-foot hole in the vessel's port side. Early efforts to tow the damaged vessel away from the shore were hampered by 8-foot waves and high winds. On January 1, a tug secured a line to the KHARK 5 and began towing the vessel towards the Madeira Islands off Portugal as
Morocco and Spain refused to allow the vessel close to their shores. Fourteen aircraft and seven boats were used to spray detergents on the slick.

Approximately 600 meters of inflatable boom was placed across the lagoon at Oualidia to protect oysters from the oil. Some of the floating oil was vacuumed into oil separators. Approximately 6,600 gallons of dispersal agents were applied to the floating oil in the first week of January. Over 1,500 gallons of Finasol OSR-2, made from hydrocarbon-based solvents, were applied in two passes by six aircraft with spraying equipment. A tugboat dispatched from Spain applied approximately 5,000 gallons of A-3 dispersant closer to shore. These chemical dispersants were relatively ineffective, as they were applied after the oil had weathered.

The Khark 5 may not have been structurally sound since it had been damaged three times in air strikes during the 8-year Iran-Iraq war. The seaworthiness of the Khark 5 was also questioned because it was underinsured.

Morocco was ill-prepared to deal with the magnitude of this oil spill. News of the incident did not appear in the international press until eleven days after the initial explosion and fire. Much time was lost prior to any response while the Iranian owners and the Dutch salvage company were involved in financial disputes.

While under tow, the Spanish tank vessel Aragon suffered damage during a storm on December 29, 1989, approximately 360 miles off the coast of Morocco. The damage resulted in the release of approximately 175,000 barrels of mexican Maya Crude Oil into the Atlantic Ocean, near the Madeiran archipelago.

The Portuguese Navy was in charge of the response. They monitored the initial movement of the oil until it made landfall. Approximately 3 weeks after the spill, pollution occurred on the Portuguese Island of Porto Santo, with oil believed to have been from the ARAGON. This was later confirmed when oil samples were taken from the vessel. Oil filled five coves on the east side of the island. The oil was held in place by the prevailing winds, although some along shore migration of oil was driven by currents. This caused pollution of the sand beach on the south
coast of the island, an important tourist and recreation beach.

Portuguese authorities requested assistance from the International Tanker Owners Pollution Federation (ITOPF) and the European Economic Community (EEC) Task Force. Specialists from the ITOPF and EEC Task Force recommended bringing additional equipment to the island, as there was no pollution response force already in place.

There was no response at-sea, as conditions in the area were too rough to use removal equipment. Vessels were unable to get into the coves to facilitate near shore recovery. All cleanup took place from the shoreside and generally consisted of pumping, manual, and mechanical removal with any equipment which could be obtained.

Cleanup equipment was flown to Porto Santo from France, Denmark, Germany, and the United Kingdom in heavy transport aircraft.

Poor access to the shorelines and limited transportation assets on the island hampered the ability of the cleanup personnel to remove the oil. Where access was possible, bulldozers, dump trucks, and backhoes provided effective recovery. Booms were used to hold oil against the coves, where it was pumped by high-viscosity screw pumps into storage tanks and pits which had been dug to increase the rate of recovery. Recovered bulk oil was stored temporarily in these tanks and pits until it could be carried away for longer term storage. A disused quarry near the port was used for this purpose, but transport of oil was limited by the number of trucks and the condition of the roads. An estimated 10,000 cubic meters of bulk oil were recovered from Porto Santo.

Logistics were a major problem during this response. Very little heavy equipment was available for use and was brought to the island from other locations. Trucks were shipped from Madeira. The spill affected areas which were not accessible to large vehicles. Many roads had to be built or improved on Porto Santo in order to handle the size and number of vehicles used in the response.
The cleanup operation was an international effort. Organizations instrumental in this response included the Portuguese Navy, the ITOPF, the EEC Task Force, the governments of France, Germany, the United Kingdom, and the Netherlands. Their efforts were critical to the rapid procurement and proper use of cleanup equipment.

MEGA BORG (1990)

On 08 June 1990, while the Italian tank vessel Fraqmura was lightering the Norwegian tank vessel Mega Borg, an explosion occurred in the pump room of the Mega Borg. The two ships were in the Gulf of Mexico, 57 miles southeast of Galveston Texas in international waters, but within the U.S. exclusive economic zone. As a result of the explosion, a fire started in the pump room and spread to the engine room. An estimated 100,000 barrels of Angolan Palanca crude was burned or released into the water from the MEGA BORG during the next seven days.

Approximately 238 barrels of oil was discharged when the Fraqmura intentionally broke away from the Mega Borg. Explosions on the Mega Borg, caused the stern of the ship began to settle lower in the water and list to the port side. A continuous discharge of burning oil flowed over the aft port quarter of the ship. Less than an hour after the explosions on the Mega Borg, the U.S. Coast Guard in Galveston dispatched two USCG cutters to the scene. Shorelines that suffered oiling included Holly Beach and Dung Beach in Texas, Paveto Beach in Louisiana, and the Mermontau River in Louisiana.

The initial focus of the response effort was to extinguish the fire on the Mega Borg and offload the remaining cargo. Firefighting vessels began to arrive on the morning of June 9. Over 50 commercial vessels and more than a dozen skimmers were used during the response. In addition, a USCG Air-Eye aircraft, equipped with side-looking airborne radar was used to determine the distribution of the spilled oil.

Two more explosions occurred on board the Mega Borg on June 9. The fire was fueled by cargo from the No. 4 tank which was leaking into the engine/pump
room. Initially, the vessel was so hot that it was feared that the application of foam to extinguish the fire might be ineffective or increase the possibility of explosion. Firefighters cooled the hull of the ship and attempted to prevent the fire from spreading to the other cargo tanks. Six vessels were used to fight the fire.

In preparation for the possible "worst case" oil release, involving over 833,000 barrels of cargo remaining on the Mega Borg, representatives from the USCG Marine Safety Office Galveston, and state and Federal resource agencies met to draft a coastal priority plan.

Another contingency plan was made in the event of imminent sinking of the Mega Borg. The vessel would be towed inshore and run aground. Two tugs were standing by in the event of such a possibility. It was speculated that if it sank at its offshore location, the vessel might implode and release the remainder of its cargo.

On June 9, steps were taken to obtain dispersant approval in the event of a major release. Later that day, dispersant use within 5 nautical miles of the Mega Borg was approved, but dispersants were not expected to be used unless large amount of oil were released. Bioremediation tests were conducted on June 15 and 18. These were the first tests of a bioremediation agent on an oil spill in open waters in the United States.

In the first few days of the response, skimmers focused on oil localized around the Mega Borg. The oil spread and approached shorelines in Texas, and the flow of oil from the Mega Borg decreased and more of the skimmers were focused on the leading edge of the slick. During the response, extensive air support was required to direct skimming operations.

There were logistical problems associated with communications and response to a spill nearly 60 miles offshore. There were also communications delays with the owners of the vessel. Communications with offshore personnel were facilitated with cellular phones, high frequency radios and VHF-FM. USCG Air Station Houston became the logistical base for the oil spill; personnel and equipment were transported to the spill site and the Air Station became the staging area for much of
the response equipment.

HAVEN and KIRKI (1991)

On 11 April 1991, the tanker Haven caught fire while anchored 7 miles off of Genoa, Italy. The Haven suffered a series of explosions and broke into three parts. A portion of the deck sank, and the rest of the vessel began to drift to the southwest. The bow section sank in water 7 miles off Arenzano. The rest of the vessel was towed to shallower waters 1.5 miles off Arenzano where it sank on April 14.

Of the 1,000,000 barrels onboard the HAVEN when it caught fire, approximately 450,000 barrels burned. It was estimated that 142,857 barrels spilled into the sea before the HAVEN sank, and small quantities of oil continued to leak from the wreck afterwards. On April 17, oil impacted the beaches at Arenzano, Cogoleto, and Varazze. Fishing boats, yachts, moorings, and the harbor walls were heavily oiled. Twenty-five miles of Italian coastline were impacted by 1,400 barrels of oil.

The Harbor Master in Genoa was responsible for the cleanup and recovery of the oil. ITPF personnel arrived on scene the day of the spill to advise the Harbor Master, and to monitor the operations.

The Italian Coast Guard maintained booms in the vicinity of the wreck, and attempted recovery of the oil with skimmers. Ecolmare was contracted for containment and recovery operations. Approximately 35,700 barrels of oil were recovered by April 16.

Booms were deployed as a precautionary measure at recreational beaches. The booms held some slicks offshore, but storms eventually blew the booms and the oil onto the beaches. Shoreline cleanup was conducted by authorities local to the oiled areas. Cleanup was done by volunteers and the army, and consisted mostly of manual removal of oil and oiled debris. Approximately 26,140 cubic yards of oiled debris were collected.
On July 21, 1991, the Greek tanker Kirki caught fire 20 miles off the coast of Western Australia, near Cervantes. The vessel was enroute from the Arabian Gulf to Kwinana, Australia. It was owned by Mayamar Marine Enterprises of Piraeus, Greece. The Kirki's bow broke off in heavy seas, rupturing two of the forward tanks. Approximately 135,000 barrels of light Murban crude were spilled, most of it on the first day. Small amounts of oil leaked during the subsequent towing of the Kirki. The salvage vessel Lady Kathleen was in the area of the incident and responded quickly to the Kirki's distress call. The Lady Kathleen towed the vessel to the west away from the shore, preventing further casualties.

The ruptured tanks on the Kirki continued to leak small amounts of oil as the vessel was towed an additional 55 miles west from the shoreline. Recovery and cleanup equipment were flown to the area, but application of dispersants was the primary response. Use of dispersants began on July 22 and ended the next day. Dispersants were applied from aircraft to the area of the initial spill. Small amounts of dispersants were sprayed by boat to areas closer to shore.

While the heavy seas prevented use of booms and skimmers in the spill area, booms were deployed as a preventive measure around some of the more sensitive islands in the area. Besides the dispersion due to wave action, the oil was further broken up by five fishing boats that repeatedly traversed the slick.

Plans were made to transfer the oil remaining on the stern section of the Kirki to another vessel. The Kirki was towed to a point 70 miles northwest of the Australian coast by the salvage ship Lady Elizabeth. Between August 14 to August 19, 484,000 barrels of light Murban crude, fuel oil, and waste oil, were transferred to the Liberian tanker Flying Clipper. Due to the missing bow, the Kirki could not be anchored, so the transfer operations were performed while all three vessels involved were underway. The Australian Maritime Safety Authority reported that it was the first time that such an operation was ever performed and it was very successful.
## APPENDIX II

### OTHER OIL SPILL CASE HISTORIES

(below 100,000 barrels)

<table>
<thead>
<tr>
<th>Spill Name</th>
<th>Location</th>
<th>Date</th>
<th>Barrels</th>
</tr>
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<tbody>
<tr>
<td>Alvenus</td>
<td>Cameron, LA</td>
<td>07/30/84</td>
<td>65,000</td>
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<tr>
<td>Amazon Venture</td>
<td>Savannah River, GA</td>
<td>12/04/86</td>
<td>11,900</td>
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<td>Amerada Hess Oil</td>
<td>St. Croix, USVI</td>
<td>09/20/89</td>
<td>10,000</td>
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<td>APEX 3417, 3503</td>
<td>Galveston Bay, TX</td>
<td>07/28/90</td>
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<td>Arrow</td>
<td>Nova Scotia, Canada</td>
<td>02/04/70</td>
<td>77,000</td>
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<td>Ashland Petrol. Co</td>
<td>Monongahela River</td>
<td>01/02/88</td>
<td>23,810</td>
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<td>Bayou Lafousche</td>
<td>Houston Ship Ch. TX</td>
<td>03/09/73</td>
<td>10,000</td>
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<td>Betelgeuse</td>
<td>SW, Ireland</td>
<td>01/08/79</td>
<td>14,720</td>
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<td>Brazilian Marina</td>
<td>Sao Sebastiao Brazil</td>
<td>01/09/78</td>
<td>73,600</td>
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<td>Cabo Pilar</td>
<td>Punta Davis, Chile</td>
<td>10/08/87</td>
<td>40,900</td>
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<td>Chevron Hawaii</td>
<td>Deer Park, TX</td>
<td>09/01/79</td>
<td>20,000</td>
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<td>Chevron Main Pass</td>
<td>11 m. E Miss. River</td>
<td>02/10/70</td>
<td>65,000</td>
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<td>Christos Bitas</td>
<td>Irish Sea, SW</td>
<td>10/12/78</td>
<td>21,990</td>
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<tr>
<td>Concho</td>
<td>Kill Van Kull, NY</td>
<td>01/19/81</td>
<td>18,149</td>
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<tr>
<td>Eleni V</td>
<td>Norfolk, England</td>
<td>05/06/78</td>
<td>52,500</td>
</tr>
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<td>ESSO Puerto Rico</td>
<td>Miss. River, LA</td>
<td>02/04/77</td>
<td>10,000</td>
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<td>Exxon Refinery</td>
<td>Arthur Kill, NY</td>
<td>01/02/90</td>
<td>13,500</td>
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<tr>
<td>Gen. Colocotronics</td>
<td>Eleuthera Bahamas</td>
<td>03/07/68</td>
<td>37,700</td>
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<tr>
<td>Grand Eagle</td>
<td>Marcus Hook, PA</td>
<td>09/28/85</td>
<td>10,357</td>
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<td>Tank Farm</td>
<td>Hackensack, NJ</td>
<td>05/26/76</td>
<td>47,619</td>
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<td>Jupiter</td>
<td>Bay City, MI</td>
<td>09/16/90</td>
<td>20,000</td>
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<tr>
<td>Kurdistan</td>
<td>Newfoundland</td>
<td>03/15/79</td>
<td>43,900</td>
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<tr>
<td>Lakehead Pipeline Co.</td>
<td>Grand Rapids, MN</td>
<td>03/03/91</td>
<td>40,476</td>
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*more on the next page ..........*
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<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Date</th>
<th>Depth</th>
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<tbody>
<tr>
<td>Nord Pacific</td>
<td>Corpus Christi, TX</td>
<td>07/13/88</td>
<td>15,350</td>
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<td>Ocean Eagle</td>
<td>San Juan, Puerto Rico</td>
<td>03/03/68</td>
<td>83,400</td>
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<td>Olympic Alliance</td>
<td>English Channel</td>
<td>11/12/75</td>
<td>14,000</td>
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<tr>
<td>Olympic Glory</td>
<td>Houston Ship Ch., TX</td>
<td>01/28/81</td>
<td>20,000</td>
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<tr>
<td>Oregon Standard</td>
<td>San Francisco, CA</td>
<td>01/18/71</td>
<td>20,400</td>
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<td>Pacific Glory</td>
<td>English Channel</td>
<td>10/23/70</td>
<td>24,780</td>
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<td>Peck Slip</td>
<td>San Juan, Puerto Rico</td>
<td>12/19/78</td>
<td>11,000</td>
</tr>
<tr>
<td>Puerto Rican</td>
<td>San Francisco, CA</td>
<td>10/31/84</td>
<td>38,500</td>
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<tr>
<td>Sansinena</td>
<td>Los Angeles, CA</td>
<td>12/17/76</td>
<td>30,000</td>
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<td>Sea Spirit</td>
<td>Mediterranean Sea</td>
<td>08/06/90</td>
<td>48,875</td>
</tr>
<tr>
<td>SFI 41</td>
<td>Mississippi River</td>
<td>11/24/85</td>
<td>16,300</td>
</tr>
<tr>
<td>Shell Platform 26</td>
<td>Gulf of Mexico</td>
<td>12/01/70</td>
<td>58,640</td>
</tr>
<tr>
<td>Sivand</td>
<td>Hamber Estuary, Eng.</td>
<td>09/28/83</td>
<td>48,000</td>
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<tr>
<td>Tano</td>
<td>Brittany, France</td>
<td>03/07/80</td>
<td>98,955</td>
</tr>
<tr>
<td>Texas</td>
<td>Mississippi River</td>
<td>03/07/86</td>
<td>17,055</td>
</tr>
<tr>
<td>Trinimar Mar. Well</td>
<td>Gulf of Paria, Venez.</td>
<td>08/08/73</td>
<td>36,650</td>
</tr>
<tr>
<td>US Stra. Petr. Reserve</td>
<td>W. Hackberry, LA</td>
<td>09/21/78</td>
<td>72,000</td>
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<tr>
<td>UMTB 283</td>
<td>Aleutian Is., AK</td>
<td>12/26/88</td>
<td>47,620</td>
</tr>
<tr>
<td>V884/885/883/882</td>
<td>Mississippi River</td>
<td>04/02/83</td>
<td>13,212</td>
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<tr>
<td>Witwater</td>
<td>Galeta Is., Panama</td>
<td>12/13/68</td>
<td>14,000</td>
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<tr>
<td>YUM II/Zapoteca</td>
<td>Gulf of Mexico</td>
<td>10/10/87</td>
<td>58,640</td>
</tr>
<tr>
<td>Zoe Colocotronis</td>
<td>Cabo Rojo, Puer. Rico</td>
<td>03/18/73</td>
<td>37,579</td>
</tr>
</tbody>
</table>
APPENDIX III

TASK ORGANIZATION AND SPECIFIC DUTIES

1. Evaluates reports.

2. Designates alert conditions.

3. Advises the OSC of appropriate courses of action in combatting the spill.

4. Dispatches available resources.

5. Maintains displays and status of the situation.

6. When necessary, calls out the supporting elements.

7. Ensures that adequate supply of materials and equipment are available.

8. Considers request of local government or private agencies for assistance.

9. Liaises with representatives of supporting elements.

10. Coordinates the actions of various agencies in supplying needed assistance.

11. Acts as the local point for national public information release.

12. Establishes communication with foreign contact points, disseminating appropriate information and requests for assistance if required.

13. Directs suspension or termination of any operation.
ON SCENE COMMANDER

1. Evaluates spill or potential spill reports.

2. Designates the severity of spill.

3. Activates response team and conducts containment, recovery and cleanup operations.

4. Sends POLREPS to NOCOP.

5. Ensures that his communication is manned at all times and maintains communication with men in charge of assisting response team, support elements and the NOCOP.

6. Recommends port closure or limits traffic in the area affected to the port authorities.

7. Requests other agencies and groups to consider taking appropriate response action.

8. Coordinates all activities at the scene.

9. Obtains sufficient water samples from the area for analysis.

10. Collects, assists and provides documentation to agencies concerned with legal matters.

11. In the event of inclement weather, recommends suspension of operation to NOCOP.

12. Recommends termination of any operation.
13. Submits operation report.

14. Obtains and safeguards information, records and samples adequate for legal and research purposes.

**SUPPORT ELEMENTS**

1. Air surveillance support element advises OSC and/or NOCOP of aerial observation of area coverage of spill as requested.

2. Support elements advise OSC of capabilities and standby for action upon request.

3. Provide other services as requested.

**OFFICER IN CHARGE OF ASSISTING RESPONSE TEAM**

1. If already on the scene, the officer initiates response action in controlling the spill and its spread.

2. Reports for control to OSC.

3. Deploys ship team as instructed by OSC.

4. Reports to OSC problems encountered.

5. Reports new development or progress as often as possible to OSC.

6. Maintains close coordination with OSC.

7. Recommends course of action to take to OSC.
SEARCH AND RESCUE (SAR) UNIT

1. Coordinates with OSC their activities in the area.

2. Provides assistance to OSC as requested.

SALVAGE TEAM

1. Coordinates activities with OSC.

2. Informs/recommends action to take as regards marine pollution control.

BEACH CLEARING PARTY

1. When not under the control of OSC, informs same of its alert status and capabilities.

2. Recommends priorities of activities.

3. Maintains close coordination with the OSC.

4. Cleans the affected beaches.

CONSULTANTS

1. Advises the Director, NOCOP of the situation.

2. Evaluates the situation and recommends courses of action to be taken.
APPENDIX IV

LIST OF PCG STATIONS

Commandant
Headquarters, Philippine Coast Guard
25th Street, Port Area, Manila
Tel. No. AFP: 68-48; PLDT: 48-32-07

Director
National Operations Center for Oil Pollution (NOCOP)
C/o Headquarters, Philippine Coast Guard
25th Street, Port Area, Manila

Commander
Shore Facilities Command
Fort Santiago, Intramuros, Manila
Tel. No. 40-52-58

Commander
Headquarters, First Coast Guard District
Farola Compound, Muelle de la Industria
Binondo, Manila
Tel. No. 49-27-39

Station Commander
Coast Guard Station, Aparri
Appari, Cagayan

Station Commander
Coast Guard Station, Batangas
Santa Clara, Batangas City

Station Commander
Coast Guard Station, Legaspi
Pier Site, Legaspi City

Station Commander
Coast Guard Station, Lucena
Cotta, Lucena City

Station Commander
Coast Guard Station, Manila
Pier 8, North Harbor
Manila

Station Commander
Coast Guard Station, Puerto Real
Puerto Real, Quezon

Station Commander
Coast Guard Station, San Fernando
Poro St., San Fernando, La Union

Commander
Headquarters, Second Coast Guard District
Quezon Boulevard, Cebu City

Station Commander
Coast Guard Station, Bacolod
Bacolod, Negros Occidental

Station Commander
Coast Guard Station, Cagayan de Oro
Cagayan de Oro
Station Commander
Coast Guard Station, Cebu
Quezon Boulevard, Cebu City

Station Commander
Coast Guard Station, Dumaguete
Dumaguete City

Station Commander
Coast Guard Station, Catbalogan
Catbalogan, Western Samar

Station Commander
Coast Guard Station, Iloilo
Iloilo City

Station Commander
Coast Guard Station, Masbate
Masbate, Masbate

Station Commander
Coast Guard Station, Maasin
Maasin, Leyte

Station Commander
Coast Guard Station, Roxas
Culasi, Antique

Station Commander
Coast Guard Station, Surigao
Surigao, Surigao City
Station Commander
Coast Guard Station, Tacloban
Tacloban City
APPENDIX V

LIST OF ACCREDITED SALVORS

1. Luzon Stevedoring Corporation
Second Street, Port Area, Manila
Tel. No. 48-16-81/89; 49-71-31

2. United Salvage & Towage (Phils), Inc.
Rm. 42, Paris Apts., Paris Street, Malate, Manila
Tel. No. 59-82-51

3. Blue Green Waters, Inc.
751 Ongpin Street, Binondo, Manila
Tel. No. 49-88-11 loc 518

4. A.D.S. Salvors
5429 Sampaguita Street, Makati, Rizal

5. Bag (Phils.), Inc.
Subic, Zambales
Tel. No. 23-50-17

6. MCH Salvage Services
57 Cabatuan St., Quezon City

7. Antonio Asprec
Agoo, La Union

8. Benedicto Vicencio
360 Gen. Luna Street
Malabon, Rizal

9. Roger G. Garnale
Cumicat Trading, 1359 Gomez Street
Paco, Manila; Tel No. 50-84-30; 58-37-04

10. Subic Marine Services
26 Luna 11, Malabon, Rizal

11. Floating Marine Repair Services, Inc.
1451 San Marcelino Street
Manila; Tel. NO. 50-92-32

12. Mr. Dassad Ussam
3003 D. Kakarong Street, Makati, Rizal

13. Oriental Salvage Corporation
122 M. Acosta Street, Pasay City

14. Capco Marine Salvage Corporation
8066 D. Silva Street, Sto. Nino, Paranaque, Rizal
Tel. No. 47-60-71/79 loc 263; 40-02-19

15. Cebu Salvage Corporation
Opon, Mandaue, Cebu

16. V. R. Mateo Enterprises
81 Malumanay St., Teachers Village
Diliman, Quezon City
Tel. No. 98-02-08

17. Eduardo Calixto Enterprises
142 Fortunata St., Pasay City
18. **F. Llanes Hauler-Contractor**  
Suite 402, Puzon Building  
E. Rodriguez Ave., Quezon City  
Tel. No. 78-89-11 loc 112

19. **E. Dacu Marine Salvage Services**  
210 Dalisay St., Bacood, Sta. Mesa, Manila

20. **Cardinal Products, Inc.**  
Suite 102, Puzon Building  
E. Rodriguez St., Quezon City

21. **Orebuena Enterprises**  
307 Calvo Building, Escolta, Manila

22. **Albegon Marine Salvage Services**  
2384 Espiritu St., Singalong, Manila

23. **J. Silverio Marine Salvage Services**  
21 Niugan, Malabon, Rizal

24. **Medina-Pogoy Trading Incorporated**  
411 Coit Bldg., Plaza Lacson  
Sta. Cruz, Manila; Tel. No. 40-26-10

25. **Demetrio Delfinado**  
Jose Panganiban, Camarines Norte

26. **Saludes Enterprises**  
Jose Panganiban, Camarines Norte

27. **New Triton Enterprises**  
626 Downtown Center Bldg., Rosario, Manila  
Tel No. 49-49-55 loc 626; 98-35-51
28. **Antonio Camanag Salvage Operation**  
Dra. Salamanca Road, Cavite City

29. **Super Island Timber Development Corp.**  
271 Roosevelt Ave., Quezon City

30. **POL Enterprises**  
531 P. Pio Street, Cavite City

31. **A. C. Travel Corporation**  
Phil. Village Hotel  
Pasay City; Tel. NO. 80-74-19; 80-74-53
APPENDIX VI

COMMUNICATION AND REPORT

1. Purpose

To inform and advise the OSC and the NOCOP of a spill situation and set forth the procedure to be followed in preparing and transmitting the reports on a spill.

2. Objectives

a) To alert the appropriate OSC of a spill situation;

b) To speed the flow of information pertaining to an incident;

c) To relay advice, instruction and reports pertaining to an incident; and

d) To provide for alerting, notification, surveillance and warning of a pollution spill.

3. Communication Procedures

a) The person initially reporting the spill to the OSC or NOCOP should use telephone if possible, otherwise, telegraph;

b) Masters of vessels at sea should use every available means to report the spill to the NOCOP or nearest PCG unit/station;
c) The initial report of a pollution spill will be in accordance with the information and format in the next section; and

d) POLREPS (Pollution Reports) will be submitted by the OSC to the NOCOP in a timely manner as development occurs and at least twice daily at 0800 H and 2000 H.

4. Pollution Spill Reports

a) Alerting or initial report to the OSC should provide as much known information as possible in order for the OSC to evaluate the degree of severity of the spill and indicate the type and degree of mobilization needed. Such report should attempt to provide the following information:

a.1) Type of pollutant

a.2) Name of water course of area, the location of where spill occurred and/or its present position.

a.3) Identify cause of spill and name of spiller, if possible;

a.4) Time and date the spill occurred, if known or when first observed;

a.5) Indicate, if any, concerned offices notified and if they have responded;

a.6) Any other pertinent information, and

a.7) Name, address and telephone number of caller.

5. The POLREP Format
a) This format shall be used by the OSC for reporting the present situation and progress of action.

b) The format consists of five basic actions as follows:

**SITUATION**

b.1) Full details on the spill, including type and quantity of material, who is involved, extent or coverage, duration of spill, areas threatened, predicted movement, success of control effort and prognosis.

b.2) The location, in general and specific terms. The general location would include ports and harbors, terminals, beaches and other waterways of river areas. The specific location would be expressed in geographic coordinates.

b.3) The type of material would include the general nature or characteristics, such as persistent oil, toxic material, harmful substances.

**ACTION**

Summary of actions taken by the responsible party, local forces and others.

**PLANS**

Planned actions to take.

**RECOMMENDATION**

Appropriate actions or requests pertaining to the responses.
STATUS

Indicate case cleared, participation of response team terminated, as appropriate.

c) Transmission of the POLREP should not be delayed to obtain information not immediately available. Such information should be included in subsequent POLREPS.
APPENDIX VII

LIST OF CALL SIGNS USED

These call signs are used in the voice radio procedure during oil spill control operations.

<table>
<thead>
<tr>
<th>Unit</th>
<th>Call sign</th>
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<tbody>
<tr>
<td>Director, NOCOP</td>
<td>GREEN POND</td>
</tr>
<tr>
<td>OSC</td>
<td>WATERCOOLER</td>
</tr>
<tr>
<td>(The station name after the call sign completely identifies the OSC being addressed, i.e. &quot;WATERCOOLER DUMAGUETE THIS IS GREEN POND BREAK........&quot;)</td>
<td></td>
</tr>
<tr>
<td>Response Team (First)</td>
<td>CASCADE ONE</td>
</tr>
<tr>
<td>Response Team (Second)</td>
<td>CASCADE TWO</td>
</tr>
<tr>
<td>Succeeding Response Team</td>
<td>CASCADE _____</td>
</tr>
<tr>
<td>(The number depends on the sequence such response team joined the scene and as designated by the OSC).</td>
<td></td>
</tr>
</tbody>
</table>

Support Elements:

| Air Surveillance/Transport         | SUNSHINE                    |
| (or regular call sign assigned if known) |

| Water Support Craft               | ROCK BOTTOM                 |
(or regular call sign assigned/name or bow number of vessel if known)

**Beach/Shore Element**  
SANDBAR

**Spiller**  
BLACK GOLD  
(or regular call sign assigned if known)

**Search and Rescue Unit**  
WATCHER  
(or assigned call sign/name of vessel if known)

**Salvage Team**  
WELDER

**Clearing Team**  
PAPERCLIP
APPENDIX VIII

GENERAL PROCEDURES ON REMOVAL AND TREATMENT OF SPILLS

A. Containment and Removal of Oil Spill

1. Contain oil slicks with a boom to reduce the area into which they spread and to facilitate recovery.

2. In open seas, deploy a V-shaped floating boom with its apex downwind, the free end retarded by a sea anchor or by a suitably maneuvered boat.

3. In rivers, the alignment of the boom is in the shape of a chevron, so that all floating matters are deflected to each side of the stream where collection is made easier.

4. Remove the film of oil with skimmers. Take samples.

5. Apply sorbents or dispersants when necessary subject to restrictive provisions.

6. Burning the oil may be resorted to if evaluated as safe or if conditions are favorable, respectively. Burning is permitted only in areas of open sea away from heavily fished areas, fish spawning or nursery grounds and shell fish beds, preferably where the water is fairly deep and where bottom currents are not likely to direct the sunken oil into amenity beaches or areas of biological interest.
B. Removal of Oil on the Beaches

1. When removal is necessary, the contaminated layer of the beach is removed mechanically and the collected wastes are disposed of properly.

2. Use available sorbents.

3. Burning may be resorted to when it does not pose any risk to life and property.

C. Dispersants and Other Chemicals to Treat Oil Spills

1. Definitions:

   a) Collecting Agents - include chemicals or other agents that can gel, absorb, harden, entrap, fix or make the oil mass more rigid or viscous in order to facilitate surface removal of oil.

   b) Dispersing Agents - are those chemical agents or compounds which emulsify, or disperse oil into the water column or act to further the surface spreading of oil slicks in order to facilitate dispersal of the oil into the water column.

2. Collecting agents are considered to be generally acceptable, provided these materials do not, in themselves, or in combination with the oil, increase the pollution hazard.

3. Dispersants may be used in any place, at anytime, and in quantities, designated by the OSC when their use will:

   a) In the judgment of the OSC, prevent or substantially reduce hazard to human life or substantial hazard of fire to property;
b) In the judgment of NOCOP, prevent or reduce substantial hazard to a major segment of the population of vulnerable species of waterfowls; and

c) In the judgment of NOCOP, considering toxicity to marine life and persistence in marine environment, result in the least overall environmental damage, or interference with designated user.

4. Except as noted in paragraph 4 above, dispersants shall not be used:

a) On any distillate fuel oil;

b) On any spill of oil less than 200 barrels in quantity;

c) On any shoreline;

d) In any water less than 100 feet in depth;

e) In any water containing major pollution, or areas of spawning or passage areas for species of fish or marine life which may be damaged or rendered commercially less marketable by exposure to dispersant or dispersed oil;

f) In any water where winds and/or currents are of such velocity and direction that dispersed oil mixture would likely be carried to shore areas within 24 hours; or

g) In any water where such use may affect surface water supplies.

5. Dispersants may also be used if other control methods are judged to be inadequate or not feasible:

a) Information has been provided to NOCOP in sufficient time prior to its use for review by NOCOP on its toxicity, effectiveness, and
persistently determined by the standard procedures published by NOCOP, and if:

b) Applied during any 24-hour period in quantities such that its concentration in the top and foot of the water column does not exceed the dispersant’s 96 hour TL50 (a concentration which will kill 50% of the test species) for the most sensitive marine species.

D. Sample Collection

In taking such samples, the following conditions are to be followed in all cases:

a) Glass containers of a quart size are to be used. The stopper shall be made of glass or teflon. Leave an air space between level of liquid and stopper:

b) Previously unused containers are preferred. Containers that have been cleaned with a strong detergent thoroughly rinsed, and dried may be used; and

c) Samples must be properly labeled.
APPENDIX IX

OWNERSHIP, TYPE AND LOCATION OF
OIL CONTAINMENT RECOVERY AND CLEANUP
EQUIPMENT AND MATERIALS

I Caltex (Philippines), Inc.

a) Pandacan Terminal (Manila)

2 x 2.5  Dispersant pick-up, tube or Eductor

1 x 1.25  Dispersant pick-up, tube or Eductor

1  Portable Oil Recovery System consisting of slurp, pump, water/oil separator

1  Portable storage tank and 12 in. hoses

500 ft.  Hutchinson oil barrier boom

2 drums  Corexit Dispersant

5 drums  Oil Dispersant
        Two-way hand radios, range 5 miles

b) Batangas Refinery (San Pascual, Batangas)

1 x 1500 ft  Oil Barrier Boom
<table>
<thead>
<tr>
<th>Quantity</th>
<th>Item Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Soxel Standard Oil Skimmer</td>
</tr>
<tr>
<td>1</td>
<td>Motor Boat, 20 ft, fiber-glass</td>
</tr>
<tr>
<td>1</td>
<td>Truckload of hay</td>
</tr>
<tr>
<td>30 sacks</td>
<td>Corn bobs</td>
</tr>
<tr>
<td>4</td>
<td>Hand sprayer for dispersant</td>
</tr>
<tr>
<td>2 x 2.5</td>
<td>Dispersant pick-up, tube or Eductor</td>
</tr>
<tr>
<td>1</td>
<td>Deballast tank, 20,000 barrels capacity</td>
</tr>
<tr>
<td>2</td>
<td>Air-operated floating skimmer pumps</td>
</tr>
<tr>
<td>2</td>
<td>Vacuum pumps and 2 rafts with 4-ft D x 12-ft oil containers</td>
</tr>
<tr>
<td>1</td>
<td>Dinghy boat</td>
</tr>
<tr>
<td>5</td>
<td>Vehicles with CL and mounted mobile radio</td>
</tr>
<tr>
<td>3 units</td>
<td>Portamobile radios</td>
</tr>
<tr>
<td>4 units</td>
<td>Walkie-talkie Trans-receivers; range 5 miles</td>
</tr>
<tr>
<td>11 units</td>
<td>Message rates (receiver only)</td>
</tr>
<tr>
<td>100 drums</td>
<td>Non-toxic oil dispersant</td>
</tr>
<tr>
<td>20 drums</td>
<td>Dispersant, Jansolv, BC-1100 and Corexit</td>
</tr>
</tbody>
</table>
Pollution control and fire boat equipped with 500-gpm pump, capable of carrying 15-20 people and pulling 1500 ft x 12 in. oil barrier boom and spraying dispersants on oil spills

Lengths of 100 ft each straw booms

II Bataan Refining Company (Limay, Bataan)

3000 ft Oil spill deployment boom

20 drums Corexit oil dispersant

1 Oil spill deployment motor boat

1 Oil skimmer
Portable Walkie-talkie Transreceivers, range 5 kms.

III Petrophil Corporation

a) Pandacan Terminal (Manila)

400 ft Oil boom

1 Oil skimmer

1 Motor boat

50 drums Corexit 7664 dispersant

1 Marathon hose (4 in. x 500 ft)
1

<table>
<thead>
<tr>
<th>Item</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil water separator</td>
<td></td>
</tr>
<tr>
<td>VHF radios, range 2-3 kms.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Electronic megaphone, range 100 m.</td>
<td></td>
</tr>
</tbody>
</table>

b) Mandaue Bulk Plant (Mandaue, Cebu)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 ft</td>
<td>Oil boom</td>
</tr>
<tr>
<td>1</td>
<td>Oil skimmer</td>
</tr>
<tr>
<td></td>
<td>VHF radios, range 2-3 kms.</td>
</tr>
<tr>
<td>1</td>
<td>Electronic megaphone, range 100 m.</td>
</tr>
<tr>
<td>1</td>
<td>Oil water separator</td>
</tr>
</tbody>
</table>

c) Iloilo Bulk Plant (Iloilo City, Iloilo)

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 ft</td>
<td>Oil boom</td>
</tr>
<tr>
<td>1</td>
<td>Oil skimmer</td>
</tr>
<tr>
<td>1</td>
<td>Motor boat</td>
</tr>
<tr>
<td>5 drums</td>
<td>Dispersant</td>
</tr>
<tr>
<td>1 unit</td>
<td>Back pack sprayer</td>
</tr>
<tr>
<td>1</td>
<td>Oil water separator</td>
</tr>
<tr>
<td></td>
<td>VHF radios, range 2-3 kms.</td>
</tr>
<tr>
<td>1</td>
<td>Electronic megaphone, range 100 m.</td>
</tr>
</tbody>
</table>
IV  PNOC Shipping and Transport Company (PSTC)

327 ft  Oil spill boom

Tugs to assist Shell, Caltex and Bataan refineries in towing oil pollution control equipment and chemicals to the site of oil spillage

3 drums  Oil dispersant at the Batangas office

3 drums  Oil dispersant at the Limay office

1 drum  Oil dispersant and a back pack, each white tanker

2 drums  Oil dispersant and a back pack, each black tanker

VHF radios 24-hour operation installed on all tankers, tugs and all PSTC offices (Roxas Blvd., Pandacan, Batangas, and Limay)

SSB (Single Side Band) radios on all tankers and PSTC offices, range Manila-Davao

CW (Continuous Wave), use of Morse Code Signal Radio on all tankers and all PSTC offices

V  Philippine Petroleum Corporation
a) Refinery (Barangay Malaya, Pililla, Rizal)

2 x 270 ft  Oil spill boom with 12-inch skirt
1 x 270 ft  Spare oil spill boom (with LSCO)
2 x 270 ft  Spare oil spill boom (1 each at each wharf for bilge and ballast water draining)
1        Electric motor-driven oil skimmer
1 x 100 ft Skimmer discharge hose
2        Motorized bancas (contracted)
8 units  Walkie-talkie Transreceivers
1        Telephone (phone-mounted)
         Hay available
         Radio base station

b) Feedstock Bulk Terminal (Sucat, Muntinlupa, Rizal)

1 x 125 ft  Oil spill boom with 12-inch skirt
1          Electric motor-driven oil skimmer, floating saucer type
1          Motorized banca (contracted)
          Radio base station

VI Pilipinas Shell Petroleum Corporation
a) Oil Refinery (Tabangao, Batangas)

<table>
<thead>
<tr>
<th>500 ft</th>
<th>36-inch oil spill boom</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 ft</td>
<td>9-inch oil spill boom</td>
</tr>
<tr>
<td></td>
<td>Oil skimmer</td>
</tr>
<tr>
<td></td>
<td>WSB-type dispersant sprayer</td>
</tr>
<tr>
<td>8 drums</td>
<td>Dispersant concentrate, 10%</td>
</tr>
<tr>
<td></td>
<td>Two-way radio, Motorola MB, range 10 kms</td>
</tr>
</tbody>
</table>

b) Oil Marketing

i) Shell Pandacan Installation

<table>
<thead>
<tr>
<th>750 ft</th>
<th>Oil spill boom with accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oil skimmer with accessories</td>
</tr>
<tr>
<td>2 units</td>
<td>Back pack oil dispersant applicators</td>
</tr>
<tr>
<td>2 drums</td>
<td>Oil dispersant</td>
</tr>
<tr>
<td></td>
<td>Two-way radio, range 2 kms</td>
</tr>
</tbody>
</table>

ii) Shell Island Installation

<table>
<thead>
<tr>
<th>120 ft</th>
<th>Hay boom</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 unit</td>
<td>Back pack oil dispersant applicator</td>
</tr>
</tbody>
</table>
1 Ferry boat
4 drums Oil dispersant

VII Alcorn (Production) Philippines, Inc.

In 1985, Alcorn International of Houston, Texas bought the production rights to the Cadlao Oilfield (22 miles off Northwest Palawan) of Amoco Philippines Petroleum Company and the Nido and Matinloc Oilfields (off Northwest Palawan) of Philippines-Cities Service, Incorporated. Alcorn (Production) Philippines, Inc., a subsidiary, is currently operating these oilfields.

a) Cadlao offshore production facility (Amoco)

Warren Springs oil dispersant spraying equipment

12 tons Concentrated dispersant which is sufficient to disperse 1200 tons oil

Channel 6 VHF radios

SSB (Single Side Band) radios

b) Philippines-Cities Service, Inc. equipment

1 unit VIKOMA Seapack with 1500 ft boom and seaskimmer

4 units Service boats

3 units Helicopters

159
31 drums Corexit oil dispersant

VIII Oil Industry Emergency Mutual Aid Organization

The signatories of this Oil Spill Emergency Mutual Aid Agreement (Shell, Caltex and Petrophil) provides at its own expense, the pollution equipment/facilities at the designated area of responsibility for use by any of the participants in the event of an oil spill. The equipment/facilities provided at each location are as follows:

1 Oil pollution boat
600 ft Slick Bar oil booms with accessories
1 Oil skimmer and accessories
1 Boat-mounted oil dispersant applicator
2 Back packed oil dispersant applicator
5 drums Oil dispersant

The above equipment/facilities are provided at each of the following locations:

a) Caltex in Bacolod;
b) Petrophil in Lapus, Iloilo City;
c) Shell in Poro, La Union;
d) Caltex in Sasa, Davao.