

U.S. Department
of Transportation

United States
Coast Guard



Memorandum

Subject: MISSION ANALYSIS REPORT (MAR) N-001-95
DEEPWATER MISSIONS

Date: 22 DEC 1995
16050

From: Chief of Staff

Reply to: G-CPP-1
Attn. of: MS. M. GISSING
72364

To: Chief, Office of Law Enforcement and Defense
Operations

Ref: (a) Final Deepwater Mission Analysis Report of 6 Nov 1995
(b) COMDTINST M16010.1B Planning and Programming Manual -
Volume I (HQ Manual)

1. Reference (a) forwarded the final Mission Analysis Report (MAR) (Part I and Part II) on the Deepwater Missions. This MAR was distributed throughout CGHQ for comment and a MAR Review Board was held on 6 November 1995.

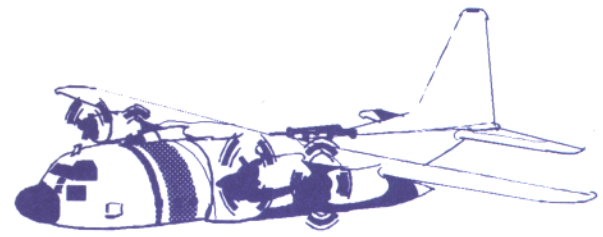
2. In accordance with reference (b), I approve your (MAR) (Part I and Part II). You are directed to prepare a project nomination memorandum to be forwarded via G-CCS, to G-AT for future consideration by the Coast Guard Acquisition Review Council (CGARC). This acceptance memorandum followed by the project nomination memorandum constitutes the formal delivery of the Deepwater Mission Analysis Report to the acquisition process. Any changes or additions in documentation will be addressed through the acquisition process.

3. Please thank your staff for the extensive work they have done on this project, it represents a true milestone in Coast Guard pre-acquisition planning and lays the groundwork for the future of our organization. BRAVO ZULU!

A handwritten signature in black ink, appearing to read "Kent H. Williams", with a long horizontal flourish extending to the right.

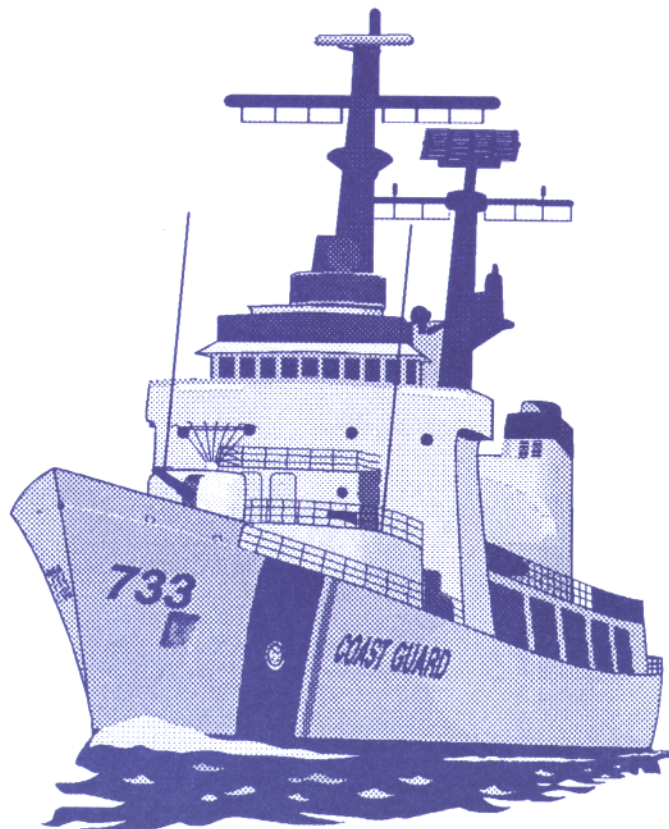
KENT H. WILLIAMS

Copy:	G-CPA	G-AT	G-CCS-2
	G-MPR	G-TP	G-OCU-MA
	G-NP		



DEEP WATER MISSION ANALYSIS REPORT

06 November 1995



Executive Summary

Introduction. Since 1790 the U.S. Coast Guard has maintained an impressive high seas capability which, in reality, is at the core of the very essence of the organization. All Coast Guard roles--Maritime Law Enforcement, Maritime Safety, National Defense, and Marine Environmental Protection--are performed in the Deepwater arena, which is defined as that area beyond the normal operating range of single-crewed shore based small boats, where either extended on scene presence, long transit distances, or forward deployment is required in order to perform the mission. The Coast Guard's outstanding performance in the Deepwater area stands in extremis, however, as almost all of our major assets which pursue these crucial missions are rapidly approaching the end of their service lives.

Methodology. In order to define the problem, and estimate its scope, the Deepwater Mission Analysis Report reviews all missions performed in the Deepwater environment, both current and proposed, and provides an estimate of what capabilities the Coast Guard will require to carry out these responsibilities effectively, including an approximation of needed level of effort. These mission demands and required capabilities, referred to as Demand Projections and Functional Requirements respectively, were then compared with our present and projected assets to determine whether the service can continue these duties without resorting to major acquisition. The analysis has indicated that the Coast Guard will continue to have Deepwater responsibilities well into the future, but will suffer two major resource shortcomings: resource availability and resource capability.

Resource Availability. Availability shortcomings exist already and will grow alarmingly to over 500K combined surface and air hours annually as our assets reach their end of service life. This figure represents only routine mission demand; surge operations which have become so common in recent years cannot be estimated accurately. Unfortunately, resources for these operations are taken "out of hide" from routine operations. Today's resources seem adequate and the current gap may not be as serious as it appears. The gap can be partially explained by the fact that new missions--MARPOL Enforcement, Lightering Zone Enforcement, and Foreign Vessel Inspection--were added to the demand figures despite the fact that they are not now being performed by Deepwater assets. A larger portion of the availability gap stems from new law enforcement program standards which will require more effort. Applied uniformly regardless of operating area, the standards demand more activity than is currently dedicated to law enforcement operations. In reality, Coast Guard Deepwater forces are meeting the standards in the high threat areas where they concentrate effort, but fall short in low priority areas.

Whether or not this present resource gap is acceptable is beyond the scope of this analysis, however the future gap clearly is a major concern. The Coast Guard will be but a hollow shell of its former self if left to pursue its many Deepwater responsibilities without relief after our assets reach the ends of their service

lives and are eliminated from the inventory. Retention of some of these obsolete platforms may seem an economical option, but will prove inefficient and unsafe.

Resource Capability. Although Coast Guard assets are presently quite capable, this analysis shows that capability improvements must be made, particularly as new mission requirements are added to our workload. Increases in our C4I capabilities, our ability to classify targets, our abilities to dispatch boarding parties more efficiently, and the speed of our surface assets must be addressed. Since surveillance is such a major portion of the Coast Guard's proactive function, innovations in surveillance technologies could prove to be a force multiplier by eliminating the need for some of our more traditional assets. This notwithstanding, our missions will continue to require on scene presence, with a large passenger carrying capacity and a good deal of sustainability. This points to the continued need for a number of larger surface assets. Likewise, innovative "eyes in the sky" could reduce the need for conventional aircraft, but aircraft on scene capabilities will continue to be a requirement. The need remains for some sort of air asset with the capability to transport and recover personnel and supplies, and the ability to interact with Coast Guard assets and targets on scene.

Alternatives. The Deepwater Mission Analysis has considered non-material alternatives to straight one-for-one replacement of our resources, and technological enhancements that will allow us to do the job better with fewer major assets. Emerging technology may allow us to realize economies in replacing operational capabilities, and changing the way we do business may also result in more efficiency. There are some economies to be realized in these areas, and the Coast Guard must look at exploiting them as much as possible, however these alternatives will serve only to mitigate the gaps, not eliminate them. It does not appear that they can totally replace the need for long range, multi-mission surface and air assets.

Summary. There is no avoiding the fact that if the nation desires the Coast Guard to continue our tradition of outstanding service in the Deepwater environment, major acquisition of assets will be required. There is simply no one else available to assume these national maritime priorities in the absence of the Coast Guard. This analysis provides sufficient justification to commence an acquisition project which will determine the most efficient means to replace our fading capabilities. While the type, number, and mix of new assets cannot be determined without a great deal of further analysis, the need for action to replace these assets is clear, and commencement of a major acquisition project is an urgent necessity.

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INTRODUCTION

"From Aztec shore to Arctic Zone, to Europe and Far East"... For over two hundred years Coast Guard men and women have served with distinction around the globe. From its inception the Coast Guard has been called upon to defend U.S. interests abroad, and present conditions require even greater involvement. Today's newspapers document Coast Guard service in Haiti and the Adriatic Sea; mariners rely on our tracking of icebergs in the North Atlantic; marine resources are protected from the Northwest Atlantic fishing grounds to the far reaches of the Pacific; and the war against drugs is waged in two oceans, from the source countries to the shores of the U.S. The Coast Guard's mandate to pursue offshore missions, far from shoreside support, remains clear. This pursuit requires sophisticated capabilities in order to perform safely and efficiently.

Our current resources, however, are aging rapidly. Our 378' (115m) High Endurance cutters (WHECs), whose serviceability has already been extended through the Fleet Renovation and Modernization (FRAM) program, begin to reach the end of their service lives in 2003. The 210' (64m) Medium Endurance cutters (WMECs), which have also been renovated under the Major Maintenance Availability (MMA) program, reach the end of their service lives beginning in 2001. Even our "new" 270' (82.5m) WMECs are facing end of service life, beginning in 2012.

Our aircraft face similar problems. The Coast Guard's HC-130 long range aircraft reach the end of their service lives soon: 1997 for our three 1600 series airframes; 1998 for the five 1500 series airframes; and 2003 for the twenty-two 1700 series airframes. Our HU-25 Falcon jets will reach their end of service life in 2003, and our HH-65 short range helicopters in 2004. Conventional wisdom in the fleet is that these ships and aircraft are barely adequate to carry out the Coast Guard's present missions. As they continue to age, while more new mission requirements are thrust upon the Coast Guard, serious system deficiencies will occur.

The Deepwater Mission Analysis represents a thorough look at the Coast Guard's deepwater missions--those missions conducted beyond the normal operating range of shore based small boats which generally require either extended on scene presence, long transit to the operating area, forward deployment of our forces, or a combination of these factors--and examines our ability to carry them out, both now and in the future.

In the past, acquisitions of major Coast Guard assets were not based on projected future missions, but the assumption that present missions would continue and that similar assets would be required. Mission Analysis replaces this weakness with planning based on the best prediction possible of what our missions of the

future will be; what measure of effort will be required; what capabilities our assets will require to carry out these missions; and whether the Coast Guard will have the resources it needs for the tasks at hand.

Mission Analysis is an ongoing process. This Mission Analysis Report serves as a "snapshot" to document some of the more critical findings to date. Through consultations with the various Program Directors and their staffs, **Demand Projections** have been computed which provide estimates of what missions will continue into the future, and how much effort will be required in the execution of these duties. All of these projections are in conformance with the major Coast Guard and military planning documents, and are based on the best information available to those responsible for administering these programs. Other missions may arise but only those which are virtually certain have been included in the Demand Projections in order to present a conservative picture of our needs. **Functional Requirements** list in detail the capabilities required to perform these duties safely and efficiently. These capabilities were developed independent of hardware considerations in order to encourage innovative solutions rather than relying solely on traditional systems.

Mission Analysis is an ongoing process and the Deepwater project will continue into the future. Although the estimates included in this present analysis are as complete as possible, missions and priorities will change. Already the analysis has identified missions which could very well come our way in the future, but are not solid enough to project employment figures for this Mission Analysis Report. As new missions are added and old missions cease, the ongoing mission analysis process will allow future planners and acquisition teams to have the best possible information upon which to base their decisions.

Mission Analysis promotes the exploitation of emerging technology since its innovative use could result in considerable savings. Advances in technology which might be employed, as well as non-material alternatives to major acquisition, are discussed briefly. These measures could have considerable impact on the future demand, however much more thorough analysis will be needed to determine the most cost beneficial systems to meet our service force needs. While emerging technology may offer exciting prospects, it does not appear that we will have advanced to the point where the entire fleet has become unnecessary.

To assist in budgetary planning, a worst case cost estimate was computed, which assumes a one-for-one replacement of all Deepwater ships and aircraft. Although this extreme does not appear necessary, this estimate helps define the magnitude of the Coast Guard's problem.

The purpose of this Mission Analysis Report is to document need, not propose solutions. Much more analysis is required before the solution to our Deepwater dilemma is arrived at. The need, however, is obvious, and careful planning must begin.

DEEPWATER MISSION ANALYSIS REPORT

PART I

SECTION 1. MISSION SUMMARIES

The U.S. Coast Guard is the United States' primary maritime operating agency and is a key element in maintaining the nation's economic, social, environmental, and military security. One of the nation's five Armed Forces, the Coast Guard is characterized by a unique combination of disciplines which extend far beyond traditional military roles. Our law enforcement activities include not only combatting the illicit drug trade, protecting our marine resources, and preventing marine pollution, but extend to the enforcement of all federal laws in the maritime jurisdiction. Our seagoing expertise has enabled us to make the oceans a safer place for those who work and travel on, over, and under the seas throughout the world, both by our response to maritime distress incidents, and our proactive prevention efforts. The Coast Guard has been at the forefront of the nation's efforts to prevent marine pollution and ensure prompt response to such incidents when they occur. The Coast Guard is not merely another small navy, duplicating the efforts of others, but is a sensible complement to the other armed forces, offering expertise developed from our peacetime operations which is available nowhere else. This complex organization of people, ships, aircraft, boats, and shore stations is tasked with the following primary roles:

MARITIME LAW ENFORCEMENT - Promote national well-being, security, and economic prosperity by enforcing national and international laws and treaties throughout the maritime region.

MARITIME SAFETY - Facilitate safe, effective marine transportation and promote the maritime public's well-being and economic prosperity by minimizing injury, death, and property damage on, over, and under the high seas and waters subject to the jurisdiction of the United States.

NATIONAL DEFENSE - Support the National Security strategy of the United States by engaging in domestic and international efforts that enhance the image of the United States, protect our economic interests, and defend U.S. citizens and property.

MARINE ENVIRONMENTAL PROTECTION - Protect the marine environment and preserve our natural resources while promoting national well-being and economic prosperity.

Deepwater missions are those which are conducted beyond the normal operating range of single crewed shore based small boats. They generally require either extended on scene presence, long transit distance to reach the operating area, forward deployment

of our forces, or a combination of these factors. All four of the Coast Guard's primary roles are conducted in the Deepwater environment. Within these four roles the Deepwater Coast Guard performs a variety of missions. These are summarized in the following sections of this report.

1.1 SUMMARY OF MARITIME LAW ENFORCEMENT ROLE

The Coast Guard, as the Nation's lead maritime law enforcement agency, has broad, multifaceted jurisdictional authority. The current Maritime Law Enforcement (MLE) emphasis is on (1) protecting fisheries and other living marine resources, (2) combating illicit drug trafficking, and (3) interdicting illegal migrants at sea. These missions account for over 97% of the Coast Guard resources expended on Law Enforcement. The Coast Guard, however, is responsible to enforce all federal laws at sea, and other responsibilities include preventing the smuggling of other contraband such as firearms and currency, ensuring compliance with recreational, commercial fishing and other vessel safety laws, responding to vessel incidents involving violent acts or other criminal activity, and providing support to other federal, state and local law enforcement agencies. For the purposes of this report these miscellaneous categories will be referred to as the General Law Enforcement Mission.

1.1.1 MISSION MANDATE

The statutory basis for all Coast Guard law enforcement missions is contained in 14 USC 2: "The Coast Guard shall enforce or assist in the enforcement of all applicable federal laws on, under, and over the high seas and waters subject to the jurisdiction of the United States". 14 USC 89 provides active duty Coast Guard petty officers, warrant officers and commissioned officers authority to board, search, detain, arrest, and/or seize in appropriate circumstances. Other statutes that provide mandates for the Coast Guard's Maritime Law Enforcement Mission include:

- Title 16 USC- Conservation
- Title 18 USC- Crimes
- Title 19 USC- U.S. Customs Authority and Duties
- Title 21 USC- Food and Drugs (abuse)
- Title 26 USC- Internal Revenue Code
- Title 31 USC- Money and Finance
- Title 33 USC- Navigation and Navigable Waters
- Title 46 USC- Shipping (Maritime Safety, Inspection)
- Title 49 USC- Transportation

1.1.2 SUMMARY OF DRUG INTERDICTION MISSION

The Coast Guard is the lead agency for maritime drug interdiction and shares the lead with the U.S. Customs Service (USCS) for air interdiction. Coast Guard maritime drug interdiction operations in the source and transit zones rely primarily on our high seas boarding program, which call for on board inspections of vessels for compliance with U.S. & International law. An aggressive high seas boarding program is essential for both deterring and interdicting drug shipments at sea. The drug interdiction mission complements international counterdrug operations and

initiatives, and provides valuable data to the national intelligence community, as well as investigative leads to other law enforcement agencies. The goal is to deny the smuggler the use of particular air, land, and maritime routes, not to interdict all the contraband being transported. Disrupting traffickers forces them to develop new, more costly methods and routes and reduces the flow of illicit drugs into the United States via air and maritime routes.

The major focus of the Coast Guard's drug interdiction efforts have been in the Caribbean Basin due to the proximity of the source countries. Intelligence forecasts indicate this trend will continue. A substantial amount of drugs are transported to the West Coast, however, and as efforts to disrupt Caribbean routes are successful, the smuggler will attempt to circumvent the concentration of law enforcement agencies by using maritime routes on both coasts.

Intelligence is vital to conducting efficient interdiction operations. A majority of drug interdictions are based on intelligence. Analysis of available intelligence data, and significant shifts in smuggling tactics, indicate that drug traffickers fear Coast Guard efforts and vary their operations accordingly. The fear is not of air or maritime blockades, or occasional concentrated efforts which are somewhat static in geography and transitory in time, but rather of a high rate of contact with Coast Guard forces on a routine basis. Thus, the best interdiction tactics are Coast Guard omnipresence and frequent boarding activities. Achieving frequent contact is costly, as it requires sustained presence in the transit and arrival zones by a substantial number of Coast Guard units, but it produces results.

1.1.2.1 Mission Requirements for Drug Interdiction

The key requirements for successful drug interdiction are surveillance and presence in areas where the possibility of contraband smuggling exists. The capability to respond to intelligence information and known incidents of drug smuggling such as air drops or mother ship rendezvous as they occur is required for this activity. The ability to dispatch boarding teams and maintain a continuous on scene presence, thus providing a visible deterrence to the smuggler are important mission requirements. A more detailed listing of functional requirements can be found in appendix A of this report.

1.1.2.2 Current Asset Capabilities and Employment

Surface assets including high (WHEC) and medium (WMEC) endurance cutters and patrol boats (WPB) are utilized for surveillance and boardings in the drug interdiction mission. Aviation assets employed include C-130 aircraft for long range surveillance, HU-25 aircraft for medium range surveillance and air intercepts, HH-60J helicopters for medium range surveillance and as part of combined operations such as Operation Bahamas and Turks and

Caicos (OPBAT). HH-60J's are also capable of deploying onboard the 270 WMEC's when necessary. The HH-65 Dauphine helicopter is used as a short range surveillance asset in support of surface platforms and can deploy aboard 210/270 WMECs and WHECs. Although there are only two RG-8 aircraft that operate solely in D7, and primarily in the coastal zone, they are capable, in limited cases, of supporting surveillance requirements for deepwater missions.

1.1.2.3 Drug Interdiction Mission Performance

Measures of Effectiveness have not yet been published officially for field units. The Operational Law Enforcement Division, however, has recently developed a suite of indicators to capture the complexity of law enforcement operations and predict success. These factors include both qualitative and quantitative data which are vertically aligned at each organizational level so that achievement at one level will "roll up" and lead to achievement at the next higher level. Additional information on the Measures of Effectiveness can be found in the most recent draft of the Maritime Law Enforcement Program Description. Results of computer modeling conducted by the Naval Undersea Warfare Center indicate that the Coast Guard is effective in its use of the resources available to the counterdrug effort, but the Demand Projections show a gap in the resources necessary to meet program standards. This will be discussed further in Section 3 (Problem Statement/Analysis of Gap and Deficiencies) of this report.

1.1.2.4 Future Demand for the Drug Interdiction Mission

The demand for future drug interdiction operations is based on intelligence gathered from the National Intelligence Consumers Committee, the Drug Enforcement Agency, the Customs Service, the Department of Justice, and the Department of Defense Counter-Narcotics Director's Staff (J-3). It is anticipated that drug production will remain steady for a few years and then decline slightly as source country initiatives begin to show results. In response to this, the user demand is expected to remain the same for marijuana and hard-core cocaine users, with some decline in cocaine demand for casual users. Heroin shipments are expected to increase, but methods of transportation and source countries are similar to those already used for cocaine shipments, thus the effect on Coast Guard operations should be minimal. Pacific Basin source countries may account for an increased share of illicit drugs as multi-decade interdiction efforts in the Caribbean continue to become more effective.

In recent years, Coast Guard assets were required to devote a major amount of operational hours in the Caribbean towards stemming the unusually large numbers of illegal migrants from Haiti and Cuba (Abstract of Operations Report). If current migrant interdiction operations return to their pre-FY 93 levels as projected, Coast Guard involvement in drug interdiction should

return to at least 1991 levels. As outlined in the ELT Program Directions, the program has developed new, more stringent program standards for drug interdiction. These standards will result in a major increase in demand for drug interdiction assets despite the above assumptions concerning a leveling of drug trafficking, thus it appears that even a return to 1991 enforcement levels will result in a gap between required and available capability. More detailed information on the actual demand is available in the Data Collection Report produced by the Naval Undersea Warfare Center for the Deepwater Mission Analysis Project.

1.1.3 SUMMARY OF LIVING MARINE RESOURCES ENFORCEMENT MISSION

Our oceans represent a significant source of renewable wealth, a livelihood for commercial fishermen, a source of recreation for over 17 million Americans, and a rich supply of seafood for the American public. Commercial and recreational fisheries annually contribute to the U.S. economy \$50 billion and \$17 billion, respectively. Due to the intangible ecosystem benefits from protection of marine mammals, endangered species, and fragile habitats, harvesting must be balanced with appropriate management and conservation measures to ensure the renewability of these resources. The Coast Guard has an integral role in maintaining this balance.

The Coast Guard's role is to provide law enforcement support that promotes a high rate of compliance with the laws and regulations which are designed to support the conservation and management of our Nation's living marine resources. While the Coast Guard shares enforcement responsibility with the National Marine Fisheries Service (NMFS), and in fact the Secretary of Commerce is responsible for establishing these measures, the Coast Guard is the only agency with the maritime infrastructure and authority to project a federal law enforcement presence into the U.S. Exclusive Economic Zone (EEZ) and upon the high seas. In addition to providing at sea enforcement services, the Coast Guard holds a nonvoting seat on each of the eight regional fishery management councils to advise fishery managers on the enforcement and safety implications of resource management proposals. The Coast Guard's participation in the council process is focused on assisting resource managers develop management measures which are likely to attain the highest rate of compliance by resource users.

The Coast Guard carries out its enforcement responsibilities by: (a) patrolling the perimeter of the U.S. EEZ to prevent foreign encroachment and harvesting of our marine resources; (b) patrolling within the EEZ to ensure U.S. fishermen comply with domestic management measures; (c) protecting U.S.-origin anadromous fish such as salmon throughout their migratory range, including areas of the high seas beyond the EEZ; and (d) patrolling areas of the high seas beyond our EEZ to monitor compliance of U.S. and foreign fishing vessels with international agreements such as the U.N. moratorium on large-scale pelagic driftnet fishing on the high seas, straddling stocks in the central Bering Sea, and other highly migratory species. Since the enactment of the Magnuson Fishery Conservation and Management Act in 1976, U.S. management goals have shifted from the single objective of encouraging U.S. utilization of marine resources to several interrelated objectives directed to conservation: (a) restoring depleted stocks and maintaining currently productive stocks, (b) protecting critical marine habitats, and (c) reducing the adverse impacts of incidental by-catch. Enforcement implications of these goals for the Coast Guard are that:

- * fisheries management and enforcement is complex;
- * the demand for the Coast Guard to monitor harvesting activities within the U.S. EEZ has increased; and
- * there is an increased expectation, on the part of various external stakeholders, that Coast Guard personnel possess expertise, skill, and knowledge in fisheries management issues.

1.1.3.1 Mission Requirements for the Living Marine Resource Enforcement Mission

To meet the objectives of the Coast Guard fisheries law enforcement program, it is necessary for the Coast Guard to project a continuous enforcement presence throughout the U.S. EEZ and along its boundary, as well as in international areas of interest to the U.S. This presence must have the capability to deter illegal or unauthorized activity by documenting violations through vessel boardings and inspections. A more detailed listing of functional requirements can be found in appendix A of this report.

1.1.3.2 Current Asset Capabilities and Employment for the Living Marine Resource Enforcement Mission

Currently, fisheries enforcement is conducted using nearly all of the Coast Guard's surface and air assets. These platforms are deployed by area and district commanders based on threat assessments developed using current and projected fishing activity and historical trends. Employment strategies vary by region depending on several factors including the size of the area, the number of vessels expected to be in the area and the number of enforcement assets available. The most common strategy is to deploy a single surface patrol unit and provide it with air surveillance support. The district commanders in New England and Alaska have found great success in utilizing a Command Task Unit or CTU strategy. In this approach, a large surface unit serves as the on scene commander and coordinates the activities of several smaller surface patrol craft and patrolling aircraft. The seakeeping and support capabilities of these larger platforms prove invaluable for this mission.

1.1.3.3 Living Marine Resource Enforcement Mission Performance

A detailed analysis of the Coast Guard's fisheries law enforcement program is contained in the Commandant's Fisheries Law Enforcement Study and Implementation Plan (Study). This document provides the detailed guidance needed to achieve the Commandant's objective for the fisheries law enforcement program. The Study and Implementation Plan are the day to day operating manual for fisheries law enforcement program managers. It contains the basis for Measures of Effectiveness for the fisheries law enforcement program currently being developed by the Operational Law Enforcement Division (G-OLE). As part of the

study, a resource model was developed to project the enforcement resource requirements of each fishery. This model indicates a greater need for enforcement assets in virtually all fisheries. The model results also correlate with district-generated unconstrained fisheries enforcement resource demand projections. As was the case with drug interdiction, modeling conducted by the Naval Undersea Warfare Center indicates that Coast Guard assets are being utilized as effectively as possible, however the fisheries enforcement demand projections indicate a gap in the resources necessary to meet program standards. This will be discussed further in Section 3 (Problem Statement/Analysis of Gap and Deficiencies) of this report.

1.1.3.4 Future Demand for the Living Marine Resource Enforcement Mission

The Fisheries Study and the NUWC Mission Demand report project a steady demand for Coast Guard fisheries enforcement services at least through 2015. As stated above, however, current Coast Guard LMR efforts are falling short of this level of demand. Although overall demand is predicted to remain fairly constant, the shift of fisheries activity from the Atlantic to the Pacific that has been occurring for the past five years, will most likely continue as Atlantic fishery stocks decline. The *Coast Guard Fisheries Enforcement Strategy Study Report* notes that the area where fishing activity in the U.S. EEZ is most likely to increase is in the Central and Western Pacific. Further analysis will determine the effect this may have on force structure, mix and disposition. Though the exact employment strategies for fisheries enforcement assets will shift as the nature of the fisheries fluctuate, there will be a continuing requirement for Coast Guard surface and air capabilities to meet the objectives of the fisheries law enforcement program.

1.1.4 SUMMARY OF THE ALIEN MIGRATION INTERDICTION OPERATIONS (AMIO) MISSION

In the past 20 years the Coast Guard has taken on an ever-increasing role in deterring the illegal flow of migrants into the U.S. Alien Migrant Interdiction Operations (AMIO) is a law enforcement mission conducted to enforce U.S. immigration law, principally by interdicting undocumented migrants at sea before they reach U.S. territory. The mission includes surveillance, detection, classification, identification and prosecution of targets of interest. The AMIO mission may be conducted worldwide involving any source country, however, the majority of U.S. Coast Guard migrant interdictions have occurred in the Caribbean where ocean transits are of shorter duration. There is an emerging need to perform these operations off both coasts of the U.S., as evidenced by recent interdictions of People's Republic of China (PRC) migrants. Migration is a function of economic and political factors beyond the control of the Coast Guard and thus the AMIO mission is conducted as both a proactive and reactive activity as was the case during the 1994 migrations from Cuba and Haiti. Interdiction of illegal aliens is an episodic, dynamic, labor and resource intensive operation, requiring a sustained presence at sea in the area of operations.

The AMIO mission is well suited to the Coast Guard, given our history of humanitarian service to people at risk on the high seas, and the Coast Guard's maritime law enforcement role. Coast Guard forces are experts in Search and Rescue missions and are highly skilled in law enforcement matters concerning maritime smuggling. In recent years Coast Guard involvement in AMIO has ranged from routine patrolling of known smuggling routes to major responses such as the mass exodus from Haiti and Cuba in 1994 and the Cuban Mariel Boatlift in 1980.

1.1.4.1 Mission Requirements for the Alien Migration Interdiction Operations Mission

Proactive patrols are required to counter the normal flow of illegal migrants. These patrols require surveillance of assigned areas where suspected illegal migration may occur, and the capability to dispatch boarding teams to suspect vessels and subsequently escort them to their final disposition. The typical reactive nature of AMIO was demonstrated by the recent mass migration incidents off Haiti and Cuba. A more detailed listing of functional requirements can be found in appendix A of this report.

When conducting AMIO, both proactive and reactive, assets must be capable of sustained presence on scene, and must have the capability to rescue a large number of people simultaneously in the event that the typical unseaworthy or overloaded migrant craft sinks or capsizes during the attempted voyage.

1.1.4.2 Current Asset Capabilities and Employment For Alien Migration Interdiction Operations

The assets employed in the AMIO mission include all surface and air assets available to perform in the Deepwater environment. The amount of assets is strictly dependent on the flow of migrants. In normal situations several high or medium endurance cutters and aircraft may be involved in surveillance and interdiction operations. In surge operations such as Able Manner, massive numbers of ships and aircraft are required at any one time. During the course of ABLE MANNER/ABLE VIGIL the flow of migrants and pace of operations increased to such a degree that it was necessary to task assets and personnel from PACAREA to assist in the operations in the Caribbean.

1.1.4.3 Alien Migrant Interdiction Operations Mission Performance

The Law Enforcement program has been working on developing Measures of Effectiveness for the AMIO mission. The *USCG Migrant Interdiction Mission Assessment* dated 27 January, 1995 details this effort. The report noted, "A definitive MOE exists in theory (the number of undocumented migrants interdicted prior to entering the U.S. via maritime routes divided by the number of undocumented migrants actually attempting to enter the U.S. via maritime routes), but since very few illegal migrants come forward to be counted, the denominator to this ratio is an unknown." The program has identified quantifiable indicators to be used together to gain a qualitative assessment of the AMIO program effectiveness. These include the Level of Effort, Interdiction Ratio (based on intelligence reporting), and Trends in Interdiction (a Deterrence indicator).

Using this method overall effectiveness for AMIO in FY94 was determined to be 90%. However, it should be noted that the effort to achieve this level of performance during the pulse operations with Haiti and Cuba caused resources to be diverted, and this resulted in reduced availability for other Coast Guard missions. More detailed information on the MOE's can be found in the *Migrant Interdiction Mission Assessment*.

1.1.4.4 Future Demand for the Alien Migrant Interdiction Mission

Analysis of historical and future trends emphasize the influence on AMIO caused by political and economic situations of other nations. Predictions for the scope of future Alien Migrant Interdiction Operations are based on intelligence from Coast Guard, Immigration Naturalization Service (INS), Department of Justice, U.S. Border Patrol, and various embassy sources. The forecasts and projections contained in this report identify only the demand to conduct pro-active AMIO patrols, but does not identify the demand needed to deal with extraordinary reactive operations.

The Caribbean basin is the primary area of operations for AMIO and all indications are that this will continue. The proximity

to the U.S. of a number of small, "economically challenged" countries indicates that this area of the world will continue to be a primary source of illegal immigration. Intelligence estimates and analyses contained in the *1994 USCG Migrant Interdiction Mission Assessment*, indicate that immigration from the Dominican Republic to Puerto Rico will increase, and other nations in the Caribbean basin will be used to funnel migrants directly into the United States.

Although the Caribbean basin appears to continue to be the main source for illegal migration, many studies indicate migrant activity is on the rise worldwide. Recent Rand Corporation research has documented a steady and rapid rise in refugee movements from less than three million in 1970, to more than eighteen million in 1992. Unfortunately, these numbers will continue to escalate in the years to come, and this trend will no doubt be reflected in the number of migrants who attempt to gain access to the U.S. Intelligence estimates indicate that many areas along both the East and West Coasts can expect to become targeted by migrants. Los Angeles and New York will remain favored destinations for PRC migrants. The recent trend of PRC migrants traveling to Latin and South America, then gaining access to the U.S. via the land route will continue. This will necessitate a Coast Guard presence along those sailing routes to interdict traffic such as occurred during the 1995 Operations CLOVERLEAF and STORM CLOUD off of the Southern California and Mexican coasts. The number of incidents of Asian migrant smuggling has historically been less than Caribbean incidents. However, Asian migrant cases should continue to have a significant, even increasing, impact on deepwater operations. The typical Pacific AMIO case requires over 30 days for deepwater assets to prosecute. These cases may occur less frequently, but they constitute a considerable drain on resources when they do arise.

The possibility of mass migration incidents will continue to exist. Mass migration contingency plans have been developed, but are dynamic, especially in the areas of timely intelligence, interagency coordination (especially with DOS and INS), interdiction of migrant vessels, search and rescue, medical attention and repatriation. A significant degree of flexibility is necessarily built into these plans in recognition of the dynamic nature of the migrant threat, the degree of interagency coordination essential to their execution, and the political sensitivities of the issue. This makes it impossible to predict accurately the demand necessary for the reactive mission. However, it should be noted that as occurred in the mass migration incidents from Haiti and Cuba, the Coast Guard must provide the necessary assets, and this will have an impact on the Coast Guard's ability to meet demand in other areas.

In light of this assessment, it is anticipated that the steady state threat in this region will remain at 1991 levels with a significant possibility of mass migration incidents occurring with little or no warning.

1.1.5 SUMMARY OF THE GENERAL LAW ENFORCEMENT MISSION

The General Law Enforcement Mission includes all maritime law enforcement operations that are not included in the Drug Interdiction Mission, the Living Marine Resources Enforcement Mission, or the Alien Migration Interdiction Operations Mission. As noted in the Maritime Law Enforcement Program Description, this primarily involves the prevention of contraband smuggling other than drugs and migrants, but also involves the enforcement of International Agreements and all other federal laws. Since General Law Enforcement is usually performed incident to other missions, it proves to be an efficient use of our law enforcement resources.

1.1.5.1 Mission Requirements for the General Law Enforcement Mission

The prosecution of this mission requires both proactive patrolling and a reactive response to intelligence information that may be received. The current scope of the operations is minor and the pro-active portion of the mission is conducted frequently as a secondary outcome of a fisheries, AMIO or counter drug patrol. The response to specific intelligence is handled on a case by case basis according to the reliability of the information and availability of an asset. More detailed functional requirements are included in those found in Appendix A of this report for the other Law Enforcement Missions.

1.1.5.2 Current Asset Capabilities and Employment for the General Law Enforcement Mission

The assets employed in this mission include all surface and air assets available to perform in the Deepwater environment.

1.1.5.3 General Law Enforcement Mission Performance

The *Maritime Law Enforcement Program Description*, dated 5 August 1994, states two objectives regarding law enforcement activities that fall into this category:

- (1) Prevent contraband smuggling on vessels in water and noncommercial aircraft flying over waters subject to the jurisdiction of the U.S.
- (2) Promote compliance with Federal laws and International agreements regarding prevention of crime on vessels in waters and noncommercial aircraft flying over waters subject to the jurisdiction of the U.S.

As noted with the other law enforcement missions the most recent draft of the Law Enforcement Program Description identifies a suite of indicators that are used to provide a measure of effectiveness for the General Law Enforcement mission area.

1.1.5.4 Future Mission Demand for the General Law Enforcement Mission

Current national priorities and projections of future priorities, combined with a low level of General Law Enforcement type violations in past years, indicate that the primary emphasis of Coast Guard Law Enforcement efforts will continue to be on the "bread and butter" activities-- Living Marine Resources Enforcement, Drug Interdiction, and Alien Migration Interdiction. Proactive General Law Enforcement activities will most likely continue to be performed in conjunction with these other missions, and the Coast Guard will continue to respond to specific intelligence or requests from other agencies as the situation dictates. The best estimates are this mission will be so limited as to be insignificant when compared to the resource demand of other Coast Guard missions.

1.2 SUMMARY OF MARITIME SAFETY ROLE

The Maritime Safety Role consists of three missions in the deepwater environment: Deepwater Search and Rescue (SAR), International Ice Patrol (IIP) and Data Buoy Support. These will be summarized in the following sections.

1.2.1 MISSION MANDATES

The operation of rescue facilities is one of the Coast Guard's primary duties (14 USC 2), and the Coast Guard is specifically authorized to engage in saving life and property on and under the high seas and on and under the waters over which the United States has jurisdiction (14 USC 88). The United States has entered into a number of SAR agreements with neighboring states which govern Coast Guard participation in SAR operations. The *National Search and Rescue Plan* of 1986 provides guidance and assigns SAR responsibilities to all federal agencies with Search and Rescue responsibilities. The U.S. entered into formal agreement with the other maritime nations at the International Conference on Safety of Life at Sea (SOLAS) Convention of 1915, and this treaty remains in effect with but minor changes. In addition to Search and Rescue the Coast Guard is authorized by 46 App USC 738a to administer the International Ice Observation and Ice Patrol Service in support of the Maritime Safety Mission.

The Coast Guard is authorized by 14 USC 141 to use its people and assets to help other federal agencies. A NOAA/USCG Memorandum of Agreement dated 27 March, 1972 documents the Coast Guard's support to the National Data Buoy Center (NDBC), and Working Agreements signed by NDBC and the Coast Guard on 9 September 1993 provide for up to 141 cutter days support (scheduled and unscheduled) for the program in Atlantic Area, and 140 days in Pacific Area, with additional provisions made for boat and aircraft support and cutter support beyond the original scope. These Working Agreements can be terminated by either agency with a one year advance notice.

1.2.2 SUMMARY OF THE DEEPWATER SEARCH AND RESCUE MISSION

Search and Rescue (SAR) is without doubt the mission that the Coast Guard is best known for, both domestically and throughout the world. Saving lives and property at sea has been a mainstay of the Coast Guard and will remain a primary focus in the Coast Guard's Maritime Safety Role into the foreseeable future. The effort dedicated to SAR in the Deepwater environment is typically but a small percentage of the overall Search and Rescue mission, however this certainly does not mitigate the need for the capability required to perform this vital function.

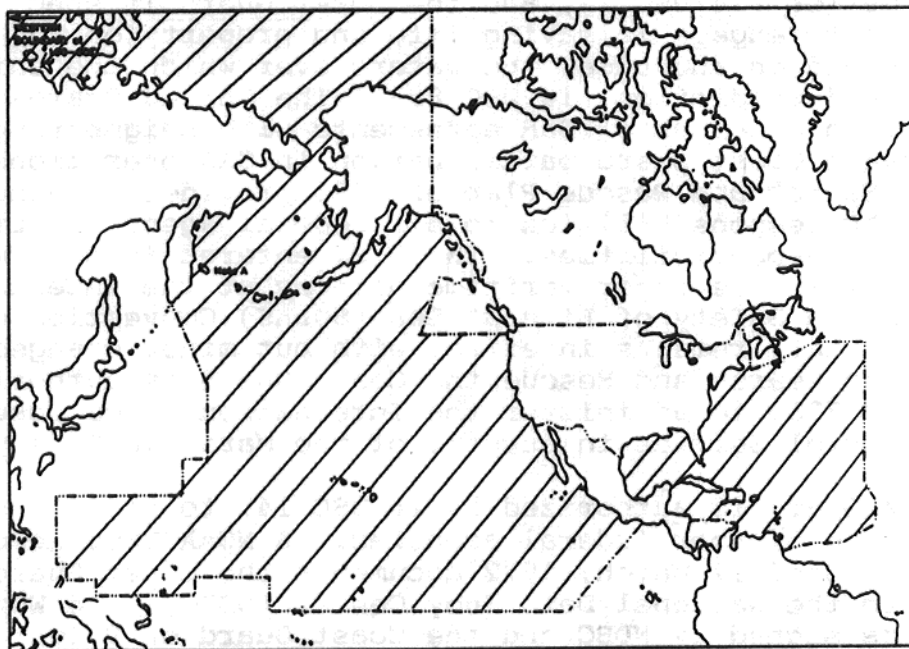
The Coast Guard is responsible for conducting Search and Rescue throughout the Maritime SAR Area, a massive region which includes all waters subject to the jurisdiction of the United States, and high seas areas covering much of the North Atlantic and Pacific Oceans, as well as a substantial portion of the Arctic Ocean as depicted in Figure 1-1. In addition, maritime tradition and international law require Coast Guard assets to respond to distress requests for assistance in any area that they are operating in, regardless of location.

Figure 1-1

1.2.2.1 Mission Requirements for Deepwater Search and Rescue

The ability for assets to search for and locate distressed mariners and recover them from positions of peril; provide medical advice, assistance, or evacuation; and when necessary, provide subjects safe transport to shoreside locations are the primary requirements of the mission. As a secondary priority, Coast Guard SAR assets may attempt to recover or control damage to distressed vessels and other property. Such assistance may consist of controlling or terminating flooding, fire fighting, dewatering, providing mechanical assistance, and towing of stricken vessels. A more detailed listing of functional requirements can be found in appendix B of this report.

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Maritime SAR Region

Figure 1-1

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1.2.2.2 Current Asset Capabilities and Employment For Deepwater Search and Rescue

All Coast Guard Deepwater assets are utilized for SAR, however long range aircraft assume the lion's share of this mission, in the Deepwater environment, due to their speed and superior search abilities. Once on scene they can assess the situation quickly, drop survival or salvage equipment, and vector other SAR assets including non-Coast Guard vessels of opportunity to the distress scene. Not to be dismissed is the peace of mind Coast Guard aircraft bring to survivors by maintaining vigilance over them until a surface or rotary wing asset arrives to assist. Surface platforms are employed primarily as vessels of opportunity, reacting when other duties place them in the vicinity of SAR cases. These assets do not patrol specifically for SAR response, but serve in a reactive capacity. The Coast Guard has always relied on non-Coast Guard resources of opportunity to assist in SAR cases, from commercial SAR or salvage assets who maintain a living by providing such assistance, to good Samaritans responding to requests from the Coast Guard-run Automated Mutual Assistance Vessel Rescue system (AMVER) in order to assist fellow mariners. While the Coast Guard will continue to exploit such help, it is not a force that can be relied on with any degree of certainty, and unless our mandate changes, the Coast Guard will always require a SAR response capability.

1.2.2.3 Deepwater Search and Rescue Mission Performance

The SAR program utilizes several Performance Standards to measure SAR effectiveness. The overall Coast Guard standard for asset response time is to have assets on scene within two hours of notification of a SAR incident, 90% of the time. Since time is so critical in most SAR cases, significant lowering of standards for offshore cases would not seem to be in the best interest of the mariner. Given the large distances involved in Deepwater SAR cases, however, a proposed Deepwater goal (used only for the purposes of this report) would be to have Coast Guard assets on scene within six hours in cases involving Coast Guard response. Program goals also call for the saving of 90% of lives involved with distress cases, and 70% of the property. Coast Guard SAR forces have been very successful in meeting these standards in past years. Most Deepwater SAR cases involve large search areas due to uncertainty as to where the subjects of the search experienced their distress. The ability to search an area thoroughly is a function of search asset speed, detection capability, and on scene endurance. Our SAR assets must arrive on scene as quickly as possible and search large areas quickly since life expectancy for SAR subjects decreases rapidly with time. An appropriate goal (again, used only for the purpose of this report) upon which to base asset capabilities is to achieve at least an 80% Probability of Success, defined as the probability that the search object is in the search area *and* that it will be located, for at least 90% of all Deepwater SAR cases.

1.2.2.4 Future Demand for the Deepwater Search and Rescue Mission

While it is difficult to estimate future SAR demand due to the reactive nature of the mission, historical SAR employment has been reasonably steady, and these trends, coupled with several assumptions for the future, allow us to project demand with reasonable accuracy.

We anticipate that advances in technology and the enforcement of vessel standards will play a major role in reducing SAR demand. Improved vessel construction, and equipment will result in fewer vessels having accidents. Improved communications will result in an improvement of distress notification, more timely and complete information passed to SAR assets, and an improvement in our ability to coordinate non-Coast Guard vessels of opportunity. These improvements will no doubt lead to more cases as our forces become aware of distress cases which earlier would have escaped Coast Guard notice. Improvements in navigation and sensing equipment should allow rescue forces to locate the victims of distress much more quickly.

The commercial shipping population is expected to remain fairly constant into the foreseeable future, so advances in technology cited above will reduce demand. The population of recreational vessels is expected to increase considerably, however, which will offset the reduction of SAR employment for this category of vessels. Commercial fishing vessels are expected to reduce in numbers, however as fisheries stocks decline it is quite likely that masters of the remaining vessels will take ever-increasing risks, such as performing less maintenance while spending more time fishing, in order to remain fiscally viable. Should this assumption prove true, the result would likely be a rise in F/V SAR.

As a result of these assumptions and historical trends, we expect a moderate annual increase of Deepwater SAR cases on the order of 10-20 cases in Atlantic Area, and 0-5 cases in Pacific Area through the year 2015. This increase would result in a demand of approximately 4,000 surface hours and 3,000 air search hours in 2000, rising to 7,000 surface hours and 3,000 air hours in 2015. Better sensors and technological advances such as EPIRBs and transponders will probably allow aircraft to absorb the additional search load without adding to employment hours, thus offsetting the additional number of SAR cases. The much slower response time of surface assets, however, coupled with little or no improvement in assistance time on scene, will mean more employment time for these platforms as the case load becomes greater.

1.2.3 SUMMARY OF THE INTERNATIONAL ICE PATROL MISSION

Since 1914 the Coast Guard has been responsible for the management and operation of the mission now known as the International Ice Patrol (IIP), an international effort to warn mariners of the presence of icebergs in the vicinity of major shipping lanes. Even in this modern age, icebergs remain a very real hazard to shipping. While icebergs are a constant menace in the Arctic, of greater concern are those carried south by the Labrador Current into the great circle shipping lanes between Europe and the U.S. and Canada. This area is also plagued with frequent dense fogs caused by the meeting of the cold Labrador Current and the warm Gulf Stream. The combination of fog and icebergs in an area of major shipping activity is a deadly one, and vigilance is necessary to preserve lives and maintain efficient shipping routes.

The Coast Guard began an ice patrol in 1913, the year after the tragic loss of RMS TITANIC and over 1,500 of her passengers. Alarmed by the prospect of continued loss of life and property due to icebergs, the world's major maritime nations called for an international ice observation and patrol service shortly thereafter. Since the U.S. had already gained experience in this endeavor, it was asked to lead the effort, with costs being defrayed by the 13 member nations. Iceberg observations, initially made by ship but now conducted primarily by fixed wing aircraft, are disseminated to the shipping community, and since the service began, no loss of life or vessels has occurred within its area of responsibility.

1.2.3.1 Mission Requirements for International Ice Patrol

The Coast Guard is responsible to provide for ice observation and broadcast of shipping advisories whenever the presence of icebergs threaten the shipping routes. The threat typically exists from February through July, but conditions vary annually and operations commence as conditions require. The Coast Guard is responsible for those ice regions of the North Atlantic Ocean through which the major trans-Atlantic shipping tracks pass, generally an area bounded by 38 degrees North to 52 degrees North latitude, and 39 degrees West to 57 degrees West longitude (Figure 1-2). A more detailed listing of functional requirements can be found in appendix B of this report.

1.2.3.2 Current Asset Capabilities and Employment For International Ice Patrol

Fixed wing aircraft conduct almost all reconnaissance work for the IIP. Seagoing buoy tenders are occasionally deployed to support the mission, but since this employment is infrequent and may be discontinued, their use will not be factored into mission demand. Ice reconnaissance flights are conducted on the average of ten days a month during the ice season. The typical patrol is

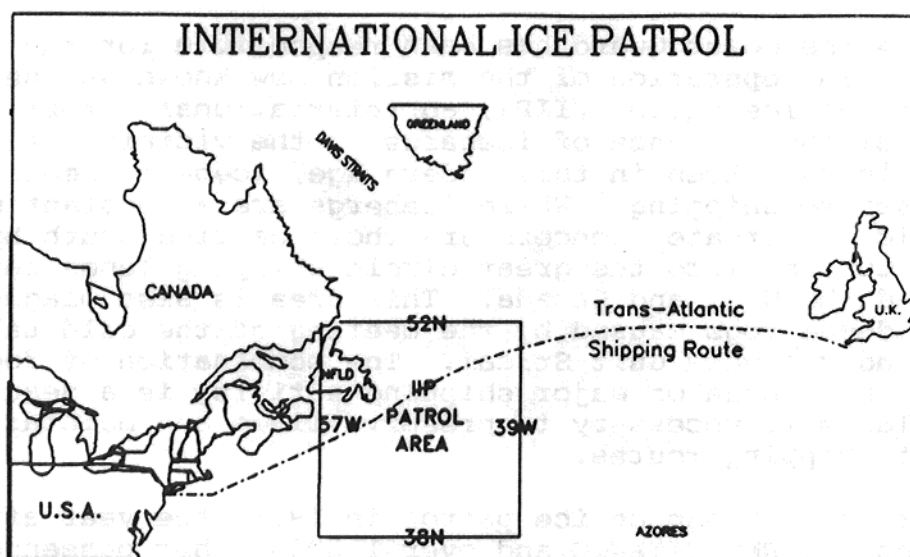


Figure 1-2

five to seven hours long. HC-130 Hercules aircraft are the primary assets used, but HU-25 Falcons are also employed at the beginning and end of the season when the limits of the ice is not so extreme and the "shorter-legged" Falcons are able to fly a complete patrol. Information concerning ice conditions is collected from the air surveillance flights and ships transiting the area and is passed to the International Ice Patrol Operations Center, which disseminates the information to the shipping community.

1.2.3.3 International Ice Patrol Mission Performance

The goals of the IIP are simply to detect and track all icebergs of sufficient size to be a danger to shipping, and maintain an accurate track on them until they no longer constitute a danger.

1.2.3.4 Future Demand for the International Ice Patrol

The Coast Guard's involvement in the IIP should remain unchanged into the foreseeable future. The activity is mandated by federal law and international treaty, both of which are expected to remain in effect. The mission is partially funded by the customers it serves so funding considerations should not dictate change. No significant breakthroughs in shipboard sensor technology, which would obviate the need for IIP, is expected. Ice is extremely difficult for even the most modern radars to detect, as evidenced by the fact that three ships struck icebergs within the IIP ice limits as recently as the 1993 season. Similarly, no dramatic increases in airborne sensors are expected in the near future. Satellite reconnaissance may become an aid to the mission, but due to lack of satellites this emerging technology is not expected to be available within the next 15-20 years. No increase in activity is forecast, so future demand should remain constant.

1.2.4 SUMMARY OF THE DATA BUOY SUPPORT MISSION

The Coast Guard supports the National Oceanic and Atmospheric Administration (NOAA) in establishing and maintaining a system of offshore environmental data collection buoys which enhance the National Weather Service's weather forecasting ability. Since the buoy system was first established, the Coast Guard has provided this support to the National Data Buoy Center (NDBC) in the form of deployment, maintenance, and recovery of NDBC's offshore buoys. Our expertise in buoy systems and operations, coupled with our available fleet of capable surface and air assets, make the Coast Guard a logical participant in this mission, and NDBC could not easily obtain similar assistance elsewhere.

1.2.4.1 Mission Requirements for Data Buoy Support

The Coast Guard is responsible to provide for maintenance of NDBC buoys, and also establishes most new buoys and transports relieved buoys to maintenance facilities. This service is almost always conducted with NDBC technicians present. Requirements of this activity include transportation of technicians to buoys and the ability to provide maintenance and industrial support including electrical, electronic and mechanical expertise for onboard buoy systems, rigging assistance with the complex mooring systems, and old fashioned manpower when the small number of technicians is insufficient to handle heavy tools and equipment. Assets also must establish real time communications links with NDBC's data network to validate data being transmitted by the buoy. Finally transportation of replacement buoys to and from station is required. A more detailed listing of functional requirements can be found in appendix B of this report.

1.2.4.2 Current Asset Capabilities and Employment for the Data Buoy Support Mission

Buoy tenders are utilized most frequently in this mission, particularly when heavy lift capability is required, such as for the retrieval of buoy moorings, or recovery or transporting of smaller buoys. When this capability is not required, other Coast Guard vessels of opportunity, such as patrol boats or Medium and High Endurance cutters, are employed. Aircraft are occasionally used to locate offstation buoys and, in limited cases, to transport small parties to buoys. Utility or buoy boats are also used to support buoys close to shore, however these operations are not covered in the scope of this analysis.

1.2.4.3 Data Buoy Support Mission Performance

The Data Buoy Support mission goals are simply to support all planned maintenance to data buoys within the agreed upon allotted cutter days, and to provide discrepancy response within the constraints of other Coast Guard mission priorities.

1.2.4.4 Future Mission Demand

Future demand was computed assuming that NOAA will continue its data buoy program, and that the Coast Guard will continue its support. It should be noted that eliminating some or all of NOAA's functions has been discussed as part of the effort to reduce government. Such an action would no doubt have a profound effect on the Coast Guard, but whether the Coast Guard would assume more oceanographic tasking, or be relieved of its present data buoy responsibilities remains to be seen. This issue must be revisited during the ongoing mission analysis process.

If NOAA maintains its present responsibilities, it will continue to require Coast Guard support for the data buoy program. NOAA has investigated contracting for its data buoy support needs in the past, and determined this to be impractical due to cost and nonavailability of contractors. Technology improvements should result in decreased maintenance demands, however NDBC has no improvement projects ongoing, therefore demand for current buoys must be assumed to be steady. NDBC does have plans to increase its number of data buoys considerably. This expansion to the existing program has suffered from lack of support within NOAA during the last few budget cycles, however support seems to be gaining and our assumption is that this program will come to fruition and demand for Coast Guard services will increase. Demand should remain constant through the year 2005, then increase approximately 60%.

1.3 SUMMARY OF NATIONAL DEFENSE ROLE

The Coast Guard has participated in practically every war or national contingency since our nation was founded, however, our specific National Defense Role is somewhat difficult to define since throughout our history, most Coast Guard defense involvement has been on an ad hoc basis. The Coast Guard offers the nation a defense bargain, as our assets are much less expensive than higher tech Navy platforms, and they are employed for most of their service lives conducting other missions, thereby "earning their keep" during peacetime. Typically requests for assistance have been made as wartime situations demanding our expertise arise. In World War II, Coast Guard expertise in small boat handling was required for the operation of amphibious landing craft, and our Arctic experience was utilized in the Greenland theater. During the Korean Conflict, the Coast Guard was called upon to provide more weather stations and SAR coverage. In Viet Nam, our patrol boat experience was utilized in the riverine portion of the warfighting effort, while our boarding and vessel inspection know-how played a crucial role there and in the more recent actions in the Persian Gulf, the Adriatic Sea, and off Haiti.

To prepare for such tasking, the Coast Guard must maintain interoperability with DOD, and the Navy in particular. Similar equipment, coupled with joint training and doctrine, is essential to ensure the Coast Guard can respond to complement DOD forces when required. In an attempt to define Coast Guard defense responsibilities better, the Navy-Coast Guard Board (NAVBOARD) has recognized five missions suitable for Coast Guard involvement: Polar Icebreaking, Maritime Aids to Navigation, Environmental Defense Operations, Maritime Interception Operations (MIO), and Deployed Port Operations, Security and Defense (DPOSD). Additionally, the Center for Naval Analyses has been commissioned to study other appropriate missions which Coast Guard assets could be expected to conduct across the continuum from peacetime to war, particularly within the spectrum of operations other than war (OOTW). The Deepwater MAR will be updated in late 1996 to reflect the study's findings and recommendations. Until such time as our responsibilities are more clearly articulated, the Coast Guard must maintain the flexibility that has become its hallmark, and remain ready to respond to all taskings.

1.3.1 MISSION MANDATES

The Coast Guard is, by statute, "a military service and a branch of the armed forces of the United States at all times" (14 USC 1). It is required to "maintain a state of readiness to function as a specialized service in the Navy in time of war" (14 USC 2) and to operate as a service in the Navy when the President so directs (14 USC 3). It is also specifically authorized to assist the Department of Defense in performance of any activity for which the Coast Guard is especially qualified (14 USC 141, 145). The November 1993 NAVBOARD Board validated the Coast Guard's National Defense role, and the May 1994 NAVBOARD Board validated

Maritime Interception Operations and Deployed Port Operations, Security and Defense as Coast Guard missions. A Memorandum of Agreement between the Department of Defense and the Department of Transportation on the use of U.S. Coast Guard capabilities and resources in support of the National Military Strategy has been recently signed, and a draft annex to the MOA will address cutter support to national defense missions.

1.3.2 SUMMARY OF THE MARITIME INTERCEPTION OPERATIONS (MIO) MISSION

Maritime Interception Operations (MIO) is a naval mission conducted to enforce the seaward portion of certain sanctions against another nation or group of nations. The operation may include surveillance of approach zones, querying and/or stopping inbound vessels, boarding and searching them to ensure compliance with applicable international rules and U.N. resolutions, and diverting or redirecting those vessels not in compliance. MIO serves both political and military purposes, often following show of force demonstrations, and occasionally may be conducted as a precursor to further military actions. Maritime Interception Operations are conducted worldwide, as the need arises, and involves naval surface combatants, naval aviation, and supporting forces organized as naval task forces. MIO may be conducted in low to medium threat environments, however the operations are resource-intensive, requiring specialized training and a sustained presence in the area of operations.

The MIO mission is ideally suited to Coast Guard platforms, given our boarding and inspection expertise, professional links with the commercial shipping industry, and variety of surface platforms and aircraft. Coast Guard forces provide a more benign MIO force option to the National Command Authorities (NCA), allowing forces to be tailored depending on the target country and political message to be conveyed. In recent years, Coast Guard involvement in the MIO mission has ranged from providing law enforcement detachments to conduct boardings from USN platforms in the Middle East and Adriatic, to providing a number of surface assets and aircraft to assist the USN in conducting all phases of MIO in support of Operation SUPPORT DEMOCRACY off Haiti.

1.3.2.1 Mission Requirements for Maritime Interception Operations

Assets are required to conduct thorough surveillance of an assigned area of responsibility, detect and intercept all shipping, and dispatch trained boarding or inspection teams, providing for their logistics, support, transportation, and protection. Sustained presence in the operating area is a necessity. A more detailed listing of functional requirements can be found in appendix C of this report.

1.3.2.2 Current Asset Capabilities and Employment for Maritime Interception Operations

Assets employed in MIO vary considerably depending on CINC/NCC requests. When major Coast Guard involvement is required, such as Operation SUPPORT DEMOCRACY, the most likely assets for use are High and Medium Endurance Cutters due to their ability to conduct multiple boardings and their Command and Control capabilities. Virtually all aircraft classes in the Coast Guard inventory were used in SUPPORT DEMOCRACY.

1.3.2.3 Maritime Interception Operations Performance

The goal of the MIO mission is to ensure that no contraband cargo reaches port. Currently no Measures of Effectiveness (MOE) have been established for Maritime Interception Operations by the Navy or Coast Guard. Were it possible to measure, an MOE would be based on the effectiveness of detecting all inbound carriers of contraband, stopping them, searching them effectively, and turning them away from port. At this point in time, the measure of how well Coast Guard and Navy forces perform these tasks is rather subjective, but our efforts have generally been considered successful.

1.3.2.4 Future Demand for Maritime Interception Operations

It is difficult to estimate future demand for the MIO mission, given its reactive nature, except to note that these operations have been employed quite frequently in recent years and demand will most likely continue. MIO missions will most likely be the result of United Nations actions, although the potential exists for the United States to act unilaterally in the imposition of an MIO regime. The imposition of economic sanctions against offending countries has become an action favored by the UN in the effort to bring those countries back into the community of nations short of an act of war.

The Coast Guard will continue to play a role in MIO equal to or greater than our present role, due to the projected reduction of USN surface combatants. As the demand for sanctions enforcement grows and the Navy's ability to become involved in the mission becomes limited by its reduced size, the Coast Guard becomes the logical choice to perform this mission in certain circumstances.

1.3.3 SUMMARY OF THE DEPLOYED PORT OPERATIONS, SECURITY AND DEFENSE (DPOSD) MISSION

The Deployed Port Operations, Security and Defense (DPOSD) mission is a national defense mission conducted to ensure port and harbor areas are maintained free of hostile threats, terrorist actions and safety deficiencies which would be a threat to support and re-supply operations. DPOSD serves both political and military purposes, often following show of force demonstrations and may be conducted either in preparation for a military action, or following such action to restore order to a geographic area. The Deployed Port Operations, Security and Defense mission is conducted worldwide, as the need arises, and involves naval surface combatants, naval aviation, command and control platforms, and supporting forces of various services organized as Harbor Defense Commands of the Maritime Defense Zones. The deployed teams and assets for this mission are normally deployed overseas in low or medium threat environments. The DPOSD mission is a resource-intensive operation which requires special training and continued, sustained presence within the area of operations and includes: port safety and security, marine environmental protection, waterways management, and search and rescue.

DPOSD is ideally suited to Coast Guard resources, given our boarding expertise, professional links with the commercial shipping industry, expertise in waterways management and port security, and expertise in the Maritime Defense Zones. In recent years, Coast Guard involvement in the DPOSD mission has ranged from providing Port Security Units (PSUs) to the Middle East, to providing a number of surface assets and aircraft to assist the USN in providing a Harbor Defense Command in support of Operation RESTORE DEMOCRACY off Haiti.

1.3.3.1 Mission Requirements for the Deployed Port Operations, Security and Defense Mission

Conduct thorough surveillance of an assigned area of operations, and dispatch appropriate assets to investigate any threat to security. Assets must be capable of sustained presence. A more detailed listing of functional requirements can be found in appendix C of this report.

1.3.3.2 Current Asset Capabilities and Employment for the Deployed Port Operations, Security and Defense Mission

Assets employed in DPOSD vary considerably depending on CINC requests. When major Coast Guard involvement is required, such as Operation RESTORE DEMOCRACY, the most likely Deepwater assets for employment are High and Medium Endurance cutters due to their Command and Control capabilities and limited logistics support capability. Air support for this mission is generally provided by DOD rather than Coast Guard aviation assets.

1.3.3.3 Deployed Port Operations, Security and Defense Mission Performance

The goal is to ensure port and harbor areas are maintained free of hostile threats, terrorist actions and safety deficiencies which would be a threat to support and re-supply operations. No Measures of Effectiveness (MOE) have yet been established for the Deployed Port Operations, Security and Defense mission by the Navy or Coast Guard, however a simple measure would be whether port and harbor areas are kept operational continuously throughout the duration of the contingency. To date, Coast Guard and Navy forces performing these tasks have been successful in meeting this goal.

1.3.3.4 Future Demand for Deployed Port Operations, Security and Defense

Given its reactive nature, it is difficult to estimate future demand for the DPOSD activity except to note that these operations have been employed in recent years and demand will most likely continue. DPOSD missions will most likely be the result of tasking from the CJCS in the applicable Planning, Warning, and Execute Orders that will be promulgated as the result of CINC requests. All projections for international relations predict higher levels of regional tensions after the demise of the former Soviet Union. There are numerous forecasts in DoD and other agencies, at the classified level that address LRCs, such as those ongoing in Yemen and in Rwanda, and the potential for additional limited regional contingencies (LRC) in Southeast Asia, in the Baltics, and in the Balkans, among other places. Coast Guard involvement in these areas will depend on the threat posed to U.S. interests, but current plans call for our participation.

The Coast Guard will continue to play a role in DPOSD equal to or greater than our present role. Should the U.S. become involved in an LRC where cargo must be transported through a seaport, then the DPOSD mission may be implemented and the Coast Guard may provide personnel, expertise and assets as outlined in Annex C of the Memorandum of Agreement between the Department of Defense and Department of Transportation on the use of U.S. Coast Guard Capabilities and Resources in Support of the National Military Strategy.

The Total Force '93 War Game pointed to the need for multiple Harbor Defense Commands (HDCs)/Deployable Elements of the Maritime Defense Zones to support a "two nearly simultaneous regional conflicts". Eight HDCs/Deployable elements were deemed necessary for the two scenarios gamed, meaning as many as eight DPOSD mission taskings could take place simultaneously. Assuming a six-simultaneous DPOSD mission scenario, there is the possibility of needing 12 to 18 cutters, depending on the location and degree of threat in the area. During the Global Game '94, all large Coast Guard cutters were involved in the game because of the need for assets; the U.S. Navy did not have enough ships to handle all contingencies in the game.

1.3.4 SUMMARY OF GENERAL DEFENSE OPERATIONS

This somewhat arbitrary category includes all Defense missions other than Maritime Interception Operations (MIO) or Deployed Port Operations, Security and Defense (DPOSD) which the Coast Guard may support. Tasking is dependent on the needs of the National Command Authorities (NCA), and various capabilities may be employed. Most Coast Guard tasking would be in Operations Other Than War (OOTW), in mission areas where the Coast Guard has developed expertise. Hopefully, wartime mission areas and warfighting functional capabilities will be better defined by the Center for Naval Analyses study. Possible operations include surveillance, forward presence, amphibious ready group (ARG) escort, sealift protection, sea lines of communication (sloc) control, noncombatant evacuation, naval special warfare, combat SAR, mine warfare, salvage, security assistance, polar operations, anti-terrorism and disaster relief. These operations could be conducted worldwide, as the need arises, and are normally in support of other naval surface combatants, naval aviation, and supporting forces organized as naval task forces. Coast Guard forces normally conduct such operations in a low threat environment, and the required asset capabilities will vary with the tasking but normally will require some defensive and limited offensive warfare capabilities. In all cases a sustained presence in the area of operations and interoperable communications and sensor links are required.

Coast Guard platforms can serve well in Defense operations given our flexibility and training as a military force. With dwindling Navy surface resources available to the NCA and the shift towards low intensity conflict in the littoral areas of the world, the Coast Guard provides a viable, valued resource to support the CINCs in the performance of these missions. Coast Guard assets often provide the CINCs with forces that may be more suited to low threat missions than high end Navy assets. Coast Guard surface and air assets participate in fleet exercises on a routine basis, and most recently participated in Operations SUPPORT DEMOCRACY and RESTORE DEMOCRACY. Coast Guard assets have extensive involvement in international operations such as UNITAS, TRADE WINDS, and OP VISTA, forging valuable ties with the forces of other nations while furthering national priorities. At the time of this writing, a Coast Guard High Endurance cutter is deployed in a Partnership for Peace mission in the Mediterranean/Black Sea in support of the U.S. Sixth Fleet, demonstrating once again the Coast Guard's proficiency and interoperability.

1.3.4.1 Mission Requirements for General Defense Operations

The capability to perform surveillance, visit, board, search and seize (VBSS), limited unit defense, and provide berthing and logistics support for additional personnel are partial requirements of this activity. Assets must be capable of operating worldwide with sustained presence in the area of responsibility. A more detailed listing of functional requirements can be found in appendix C of this report.

1.3.4.2 Current Asset Capabilities and Employment for General Defense Operations

The assets employed in General Defense Operations vary considerably depending on the threat and CINC requests. When major Coast Guard involvement is required, such as Operation SUPPORT DEMOCRACY, the most likely assets for use are High and Medium Endurance cutters due to their ability to conduct limited warfare missions and their Command and Control capabilities. Polar icebreakers participate in crucial operations, but will not be included in this analysis due to their single mission focus. All aircraft classes in the Coast Guard inventory are capable of supporting the surface assets to be employed. During the last five years, aviation resource hours in support of Defense Operations have declined. This is the result of extraordinary tasking to our more traditional non-defense missions, particularly AMIO. This trend should not be projected for future requirements.

1.3.4.3 General Defense Operations Mission Performance

The goal of these missions is to ensure for the national defense through the prosecution of missions designed to counter a threat to national security. Currently no Measures of Effectiveness (MOE) have been established for General Defense Operations by the NCA, Navy or Coast Guard. A measure of how well Coast Guard and DOD forces perform these tasks is subjective, but Coast Guard preparation and efforts have generally been considered successful.

1.3.4.4 Future Demand for the General Defense Operations Mission

Defense Operations are reactive in nature and dependent on the needs of the CINCs, therefore it is difficult to estimate future demand. There is a need, however, to ensure that the Coast Guard forces are trained and have the required capability to respond to CINC requests in the future. Given the current world situation, all projections are for higher levels of regional tensions and conflicts.

Coast Guard involvement in Defense Operations depend on the threat posed to U.S. interests and the CINCs' requests based on the NCA's course of action. It is most likely that the Coast Guard will continue to play a role in this mission area that is equal to or greater than our present role. As the demand for assets grows, and the Navy's ability to respond becomes limited due to its reduced size, the Coast Guard can serve the national interest by complementing DOD efforts in our specialized areas of expertise. This was confirmed by the final report, issued by the USN-USCG National Defense Quality/Process Action Team Subgroup on Cutter Capabilities and Potential Assignments, which concerned Coast Guard missions in Joint Littoral Warfare/Low Threat Environment.

1.4 SUMMARY OF MARINE ENVIRONMENTAL PROTECTION ROLE

The Marine Environmental Protection Role consists of three missions in the Deepwater environment. These are MARPOL Enforcement, Lightering Zone Enforcement, Foreign Vessel Inspection.

1.4.1 MISSION MANDATES

There are numerous statutes contained in 33 USC and 46 USC which provide the Coast Guard the authority to conduct the Marine Environmental Protection Mission. They include the Federal Water Pollution Control Act (Clean Water Act), The Oil Pollution Act of 1990 (OPA 90), the Port and Waters Ways Safety Act of 1972 (PWSA) as amended by the Port and Tanker Safety Act of 1978 (PTSA), and the Act to Prevent Pollution from Ships (APPS).

1.4.2 SUMMARY OF THE MARPOL ENFORCEMENT MISSION

The United States is party to Annexes I, II, III, and V of the International Convention for the Prevention of Pollution from Ships (MARPOL), which covers the discharge of oil, noxious liquid substances (NLS) packaged hazardous materials, and garbage respectively. The U.S. takes direct enforcement action for oil and NLS discharges within 12 nautical miles of the coast, and garbage throughout the EEZ. Sightings of other discharges outside of these areas are referred to the appropriate flag state. The Coast Guard is responsible for enforcing these regulations on commercial shipping, fishing vessels, and recreational vessels. Since recreational craft normally remain in the coastal response zone, and enforcement of MARPOL regulations on fishing vessels occurs in conjunction with LMR enforcement, this analysis will concentrate on MARPOL enforcement activities for deep draft commercial vessels only.

1.4.2.1 Mission Requirements for MARPOL

To date, this new mission has been prosecuted only on an ad hoc basis. Dedicated surveillance operations employing shore based aircraft, and occasionally patrol boats, have been conducted in the Florida Straits, Gulf of Mexico, and off the California coast. Surveillance coupled with a limited surface presence seems to be the most efficient means of conducting this task. A more detailed listing of functional requirements can be found in appendix D of this report.

1.4.2.2 Future Mission Demand

Dedicated, or even collateral, employment in this new mission represents a significant increase in Deepwater asset demand since traditionally, Deepwater assets have become involved in pollution prevention/response activities on a reactive, infrequent basis only. While there is no data which suggests a specific pattern

of where MARPOL violations occur, it is assumed that deep draft commercial vessels are most likely to discharge contaminants on the approaches to their intended major ports, preferring to avoid using shoreside reception facilities. Demand is based on periodic air and surface searches of assigned surveillance sectors, approximately 50 to 100 nautical miles offshore, in the vicinity of port approaches. The number of commercial vessels transiting U.S. waters over the next ten years is expected to increase over current levels with the greatest increase coming in the transportation of oil. It is expected, that as enforcement efforts become anticipated, and the number of vessels increases, some offending vessels will attempt to evade detection by dumping further offshore, and more vessels in general will need to be observed, thus necessitating a larger surveillance zone with more surface search hours required. This should drive the number of surface search hours up but will not have an effect on the number of required air search hours.

1.4.3 SUMMARY OF THE LIGHTERING ZONE ENFORCEMENT MISSION

The Oil Pollution Act of 1990 requires that new tank vessels (with certain exceptions) operating on waters subject to the jurisdiction of the United States be equipped with double hulls. Existing single hull tank vessels must also be fitted with a double hull or phased out of service to the U.S. on a schedule that began on January 1, 1995, and ends on January 1, 2015. Tank vessels that do not meet the double hull requirements may continue to operate to deep water ports or designated lightering zones which are more than 60 nautical miles offshore until 2015. Regulations designating the lightering zones are under development. The Coast Guard will be responsible for enforcing applicable vessel safety and pollution prevention regulations in designated lightering zones.

1.4.3.1 Mission Requirements for the Lightering Zone Enforcement Mission

The basic requirement of the Lightering Zone Enforcement Mission is the capability to surveil lightering zones and conduct boardings as necessary. Seventy-four percent of the nation's crude oil imports were received in Gulf of Mexico ports, and twenty-nine percent of this was lightered. A more detailed listing of functional requirements can be found in appendix D of this report.

1.4.3.2 Future Demand for Lightering Zone Enforcement

Prosecution of the Lightering Zone Enforcement Mission will require air surveillance of the lightering zones for approximately 60% of all lightering activity, and surface or air assets deploying inspection teams for approximately 30% of lightering activity. Detailed Coast Guard estimates of lightering zone activity are contained in the Coast Guard Mission Analysis Data Collection Report conducted by the Naval Underwater Warfare Center. Oil imports into the U.S. are expected to rise 28% over the next ten years, and we expect the number of ships off-loading at lightering zones to increase proportionately even as double hull tankers replace the older single hull ships, since the deepwater port is already operating at maximum capacity and no new deepwater ports are presently contemplated. The introduction of newer hulls, however, should lead to a higher rate of compliance with pollution regulations after the first five years of the program, and therefore fewer enforcement boardings should be required after the year 2000. This trend should result in a gradual reduction in the number of surface assets required. Air surveillance demand is expected to remain constant through the year 2015.

1.4.4 SUMMARY OF THE FOREIGN VESSEL INSPECTION MISSION

The Coast Guard is responsible for the enforcement of a number of safety and pollution prevention regulations on ships operating in U.S. waters. Foreign vessels are given annual inspections and spot-checked when they arrive in U.S. ports, where they are often found to be non-compliant. This problem is of increasing concern to regulators and has received Congressional attention. An offshore inspection program has been proposed, which would ensure compliance with U.S. laws before vessels enter U.S. waters.

1.4.4.1 Mission Requirements for the Foreign Vessel Inspection Mission

Surveillance of operating areas and the ability to conduct at sea boardings are the basic requirements of this mission. This mission is not conducted in the Deepwater environment currently. A more detailed listing of functional requirements can be found in appendix D of this report.

1.4.4.2 Future Mission Demand

At sea boardings of foreign vessels destined for U.S. ports is a new concept called for by Port State Control initiatives. Under this concept, when vessels make their advance notice of planned arrival to a U.S. port, the Captain of the Port will make a determination as to whether the vessel is a high priority target of interest based on information concerning the vessel's flag state, owners, and previous history. Such vessels, referred to as priority one vessels, will be boarded and inspected at sea whenever possible. With the exception of some trial inspections, this program has not yet been implemented.

Demand for this new mission has been based on the number of priority one vessels expected in U.S. ports. A 1994 Coast Guard study compared the number of priority one vessels against the overall number of foreign vessel arrivals. The worst case estimate is that this percentage of priority one vessels (1.8%) will remain constant over the next 20 years. In all likelihood the number of inspection violations will decline as Port State Control goals are realized, however, the number of boardings will not decline accordingly since an aggressive inspection program will remain necessary to achieve this end. Coast Guard and industry estimates call for foreign vessel arrivals to increase by approximately 500 annually. Inspections are projected to take approximately 24 hours to perform, and the inspectors would most likely require support of a surface asset.

SECTION 2. POSSIBLE MISSIONS/TASKS OF THE FUTURE

2.1 OVERVIEW

The Coast Guard is a dynamic service facing continual change. Our service began as a revenue collecting agency, and the primary roles that the Coast Guard has become known for--Maritime Law Enforcement, Maritime Safety, Marine Environmental Protection, and National Defense--evolved as the organization matured. The Coast Guard is unique among federal agencies in that it has combined several diverse natures--military, humanitarian, regulatory, and enforcement--to pursue its maritime roles. Its wide variety of responsibilities results in almost all maritime matters of national concern passing under Coast Guard scrutiny. Although previous sections of this report represent today's best projection of future Coast Guard missions, it is almost certain that more will be added; it would be irresponsible to assume otherwise. This section considers a number of mission possibilities, some quite probable and others a bit more far-fetched, that could come the Coast Guard's way. Undoubtedly, new missions will arise that are well beyond this limited prognostication. It would be premature to allocate precious resources for such missions at this time, however these possibilities should be considered when required asset capabilities are discussed. Most of the capabilities required for these missions are similar to those required for our better defined responsibilities. Raising these issues now serves as a "placeholder" in order to ensure that further consideration is dedicated to future missions in subsequent phases of Deepwater Mission Analysis. The Commandant's Strategic Planning staff will soon conduct a study of what the future might hold for the Coast Guard and what mission changes we might anticipate. The Deepwater Mission Analysis Report will be updated in 1996 to reflect the findings of this study.

2.2 NATIONAL DEFENSE OPERATIONS

A mission area seemingly ripe for significant changes is National Defense. Although the Coast Guard has participated in all of our nation's warfighting efforts, our defense role has been loosely defined. In times of emergency, the Coast Guard's existing capabilities have been examined and requests for assistance came based on our equipment or expertise. Given the current budgetary climate in the Department of Defense, and the likelihood of our next naval conflict being littoral in nature rather than open ocean, the Coast Guard should have much to offer. Our role is not to become the country's second navy, but to complement a shrinking U.S. Navy. Operations DESERT SHIELD/DESERT STORM and UPHOLD DEMOCRACY are recent examples where the Coast Guard was able to provide singular, non-redundant, complementary naval resources to support the national military strategy. Coast Guard

assets represent a real economy to the taxpayer, especially if our considerable expertise were taken into account beforehand, rather than on an ad hoc basis as has often been the case. With this in mind, the Commandant has asked Chief of Naval Operations to assist the Coast Guard in determining what its proper defense role should be, and what capabilities should be built into any new assets. The subject has been referred to the Center for Naval Analyses for study, and their recommendations are eagerly anticipated. Although this input will not be available for inclusion in this report, its findings will be included in a late-1996 update to the Deepwater MAR. Some possible national defense roles for the Coast Guard follow.

2.2.1 Forward Presence

National objectives are often served by the presence of U.S. forces deployed on either a permanent or periodic basis, whose role is to be engaged forward with a view to preventing conflicts and controlling crises. These forces also perform a variety of activities which promote stability and demonstrate U.S. engagement and commitment to defend our interests. The Coast Guard's involvement in an international role of this type seems to be expanding significantly. Our experience in the Caribbean, interacting with many other nations, is but one example. The Coast Guard also offers a cheaper, more benign alternative to the presence of traditional naval forces. Our worldwide reputation as a humanitarian and law enforcement agency would allow the nation to project an image quite different than deployment of a naval task force would. Many nations' navies have much more in common with the Coast Guard than the U.S. Navy due to their smaller size and interest in "Coast Guard-type" missions such as migrant operations, fisheries and counter-narcotics enforcement, and environmental protection. Further involvement in this mission would require no capabilities beyond those already listed for the Coast Guard's projected future missions, except that a considerable endurance capability would be a necessity. Significant involvement in such missions could have a considerable impact on routine missions, however.

2.2.2 Surveillance

This activity is the systematic observation of aerospace, surface or subsurface areas, places, persons or objects by a variety of means primarily for the purpose of locating, identifying and determining the movements of ships, submarines, aircraft, and other vehicles. Through joint operations and training with Navy forces and counter-narcotics operations the Coast Guard has developed surveillance expertise which could serve national objectives. Coast Guard assets have, or could easily have, C4I and sensor equipment similar to Navy assets, and again, might project a more low-key image when national interests are best accomplished through such means.

2.2.3 Convoy Escort

During World War II the Coast Guard achieved notable success in providing convoy escort for troop and logistic vessels destined

for war-torn Europe. While protecting these massive convoys from enemy naval forces is no doubt a thing of the past, protecting petroleum shipments from terrorists, or food shipments from pirates might not be. The employment of Coast Guard escorts would free up limited naval assets for other operations. A capability for sustained on scene endurance would be required for this mission were it to become a reality.

2.2.4 Mine Warfare

This mission has grown in importance since the large scale use of mines in the Iran-Iraq war, and the recognition that mines could very well become a favored weapon of maritime terrorists. The mission had been a lower priority of the Navy for many years, however, the service is currently commissioning its new Mine Hunter Class (MCM) vessels to counter this threat. The operation, with its small vessels and crews operating primarily in sea lanes and navigable waters, seems very well suited to Coast Guard expertise. Coast Guard buoy tenders have conducted route surveys for the Navy, and have participated to a limited extent in training and exercises. With the potential of increased maritime terrorism added to increased MCM taskings, the Coast Guard could conceivably play a role in future U.S. littoral mine warfare.

2.2.5 Post Conflict Peacebuilding

In keeping with its humanitarian character, the Coast Guard has participated in recent peacebuilding efforts in post conflict arenas such as Grenada, Panama, and Haiti. Closely related are nation assistance efforts, primarily through training--search and rescue, counter-narcotics, maritime safety, and environmental protection--performed around the globe by small training teams or cutters which make portcalls in conjunction with other mission tasking. Such efforts are typically conducted on an ad hoc basis, with forces being diverted from normal operations at a considerable cost to those missions. If a more definitive role in this mission were to be defined for the Coast Guard, assets should be designated for the activity so as not to detract from other equally important tasking.

2.3 MARINE RESOURCES AND THE ENVIRONMENT

As a worldwide leader in these activities, the Coast Guard could expect increased responsibilities domestically or internationally.

2.3.1 UN/International Operations

The Coast Guard enjoys a worldwide reputation for its counternarcotics, migrant interdiction, and fishery enforcement operations. Illicit activities in these areas present problems

throughout the world and frustrate the international community. The drug trade will not go away. Fishery disputes will intensify as resources continue to dwindle. Bleak economic forecasts ensure that illegal migrant activity will grow substantially. It is well within the realm of possibility that the Coast Guard could be asked to assume an international enforcement role in these or similar areas. U.S. prestige and expertise might be seen as the best or only way to solve international dilemmas. Some combined operations with other navies, coast guards, and foreign government agencies have already been undertaken. The Coast Guard would be a natural for assuming a global leadership role, but the cost of doing so on a long term basis would be significant if assets were diverted from other responsibilities. Patrols far away from the Coast Guard's traditional operating areas could require high endurance assets beyond the capabilities of many of our current platforms.

2.3.2 Non-living Marine Resources

Exploitation of the oceans' riches has been long anticipated but has not yet become a major reality. It is only a matter of time, however, before man pursues these resources with a vengeance. Agreements already exist which allow coastal states to manage resources beyond the Exclusive Economic Zone (EEZ). Providing protection for these resources, and safety for those attempting to exploit them, could easily become one of the Coast Guard's major activities, requiring far more assets than are presently in the inventory. Unlike the majority of these future possibilities, this activity will most likely require capabilities not covered by our traditional missions, such as detection of underwater materials and activities, or submarine capability for rescue or apprehension. The U.S. Navy presently has primary responsibility for **underwater search and rescue** since they are the only government agency with any submarine resources, however if underwater mining, submarine tourism and similar activities experience the growth that many project, dwindling Navy assets will be woefully inadequate.

2.3.3 Oceanographic Data Collection and Survey

Coast Guard vessels and aircraft were formerly tasked with making and reporting rudimentary oceanographic observations. When the National Oceanic and Atmospheric Administration became a reality, followed by that agency's better equipped survey ships, this responsibility gradually fell away from the Coast Guard. As discussed previously, NOAA's future is somewhat uncertain. Additionally, its fleet is aging rapidly and no decisions have yet been made to upgrade or replace these assets. It is quite possible that the Coast Guard, along with other government and private ships of opportunity, could be tasked with filling the void. This mission could probably be performed in conjunction with other operations as long as there are no requirements for systematic observations over large, defined areas. The only likely additional capability Coast Guard assets would require for such random observations would be data measuring systems and the means to transfer data to the appropriate parties.

2.4 DISASTER AND TERRORISM RESPONSE AND PROTECTION

Unfortunately, both terrorism and natural disasters appear to be on the rise worldwide. The Coast Guard's expertise in law enforcement and humanitarian response make it the logical choice to become the nation's lead maritime agency in combating both threats. At present, Coast Guard forces serve in an ad hoc capacity whenever required, but if a more coordinated response is seen as desirable, response capabilities should be planned for. If terrorist activity becomes a larger threat in the marine environment, the Coast Guard will no doubt have to respond with a capability to detect and deter such activities. Our response might begin with an activity somewhat like the Deployable Port Operations Security and Defense forces discussed earlier, but may have to evolve to some sort of strike team. Depending on the threat and location, large surface and air assets could be required.

In responding to a marine or coastal disaster, surface assets with large electrical generating and water distilling capabilities could make a major difference to a small city without such resources after a disaster. Law enforcement assistance to local authorities after the breakdown of existing infrastructures, such as that provided in St. Croix by the Coast Guard in the aftermath of Hurricane Hugo could save many lives and property. First aid or more sophisticated medical response, and mass patient evacuation are services that perhaps only the Coast Guard could provide in certain isolated coastal areas.

2.5 SUMMARY

With but few exceptions, the capabilities required to carry out these future missions, and others like them, would seem to be accounted for in the functional requirements for the better defined missions discussed earlier in this report. If these possibilities become realities, however, a more detailed analysis of the missions and their functional requirements would be necessary. Undoubtedly some required capabilities would be modified and the number of necessary assets could change significantly. As Deepwater Mission Analysis undergoes subsequent iterations, missions of the future must be revisited and either expanded upon if tasking seems more likely, or removed from consideration if no longer feasible. Since Mission Analysis is a continuous process, analysts will have the opportunity to update these forecasts with increasing clarity.

SECTION 3. PROBLEM STATEMENT/ANALYSIS OF GAP AND DEFICIENCIES

3.1 GENERAL

The Coast Guard's ability to prosecute missions effectively falls short in two primary areas: **resource capabilities** and **resource availability**. Our assets do not have all of the capabilities to perform as efficiently as they should. When compared with the functional requirements generated for each primary mission, the capabilities of our present assets show their age. Of greater concern is the undeniable fact that the Coast Guard will not have sufficient assets to meet future employment needs.

3.2 RESOURCE CAPABILITY GAP

The capabilities our assets will require to perform all missions efficiently were developed carefully by reducing each mission into its primary elements and determining the needs for each, independent of hardware or system considerations. These capability needs--the **Functional Requirements**--are broad in nature and establish capabilities required for overall mission completion, not capabilities required for each individual asset. Some redundancy in Functional Requirements exists across mission lines since various missions have similar requirements. This redundancy serves to illustrate the economies of the Coast Guard's historical use of multi-mission assets, and points towards the potential of similar savings in the future.

A comparison between these requirements and current asset capabilities indicate that Coast Guard assets are very capable, but will not meet all requirements for the future. The gap in capability does not necessarily represent an inability to perform the mission entirely, but indicates less efficient mission prosecution. Careful attention must be devoted to ensuring that as many functional requirements as possible are accounted for in asset upgrades or acquisition. Future sensitivity analyses will quantify the relationships between specific requirements and their impact on effectiveness. Failure to provide the required capabilities in some way will guarantee failure. Incapable assets make for very poor economies.

In the short term, emerging technology can be employed today on current assets to close the present capability gap, thus improving our current effectiveness. Analysis of computer modeling based on current operations indicate that the capabilities most in need of upgrading--areas where the biggest improvements in effectiveness could be achieved--are in target classification, boarding enhancements, and Command, Control, Communications, Computers and Intelligence (C4I) improvements. Minimal expenditures could bring about considerable efficiencies while longer term relief is still in the planning stages.

3.3 RESOURCE AVAILABILITY GAP

The resource availability gap is defined by comparing our employment needs with current and future asset availability.

3.3.1 Demand Projections

In order to determine future demand for the various Deepwater missions, each Coast Guard program area identified which Deepwater missions the Coast Guard would pursue in the future, and what employment effort would be required to conduct these responsibilities properly. These **Demand Projections** are conservative estimates of high probability missions. Other possible future missions have been omitted from the calculations in order to avoid exaggerating demand. As these and other missions become more certain, they will be added to the demand calculations. By necessity, these employment estimates were based on current assets, i.e. estimates were based on air and surface operational hours. As much as possible, the planners involved did not merely project historical trends into the future, but attempted to identify factors that would influence the various missions, and examine how these would effect the missions in the future. Whenever practical, sources outside of the Coast Guard were consulted to validate predictions.

The Naval Undersea Warfare Center and their support services contractor, Sonalysts, Inc., analyzed the raw input from the programs and computed total Coast Guard Deepwater demand in the *Coast Guard Mission Analysis Data Collection Report*, dated 30 December 1994. Tables 3-1 and 3-2 illustrate the expected Deepwater demand for surface and air assets. The demand was further adjusted to account for variations in operations, and errors in the LEIS data which was a primary factor in estimating Law Enforcement demand. The resulting demand ranges are shown in Figures 3-1 and 3-2. While these projections are certainly subject to change, they represent the best estimates available based on current data. As the Deepwater project continues, the demand projections must be reevaluated periodically to ensure that assumptions on future trends and factors influencing the mission remain accurate. Further explanation of the methodology is available in the *Coast Guard Mission Analysis Data Collection Report*, dated 30 December 1994, and *USCG Deepwater Mission Demand Gap Analysis Report* of October 1995.

3.3.2 Resource Availability

The methodology used to determine vessel and aircraft availability varied according to each asset and the standards by which it operates. Larger cutter availability was based on **Days Away From Homeport** (DAFHP), a Coast Guard imposed limit of 185 days for WHECs and WMECs, as outlined in the *Cutter Employment Standards*, which was established primarily to ensure adequate quality of life for cutter crews. WPB availability was computed based on **underway hour limits**, a more stringent standard for these smaller vessels.

**TABLE 3-1: SURFACE DEMAND PROJECTIONS
(RESOURCE HOURS)**

	1995	2000	2005	2010	2015
Drug Interdiction	236,697	236,697	236,697	236,697	236,697
Living Marine Resources	188,591	188,591	188,591	188,591	188,591
AMIO	23,486	23,486	23,486	23,486	23,486
General Law Enforcement	0	0	0	0	0
Defense Operations	3,671	3,671	3,671	3,671	3,671
Search and Rescue	2,628	3,708	4,788	5,868	6,948
Data Buoy	445	825	1,226	1,226	1,226
Lightering Enforcement	1,281	1,204	1,086	1,009	893
Marpol Enforcement	2,074	3,110	4,147	5,184	6,221
Foreign Vessel Inspection	3,960	4,824	5,688	6,552	7,416
Total	462,567	466,116	469,380	472,284	475,149

**TABLE 3-2: AVIATION DEMAND
PROJECTIONS (FLIGHT HOURS)**

	1995	2000	2005	2010	2015
Drug Interdiction					
Fixed-Wing	34,696	34,696	34,696	34,696	34,696
Rotary-Wing	8,138	8,138	8,138	8,138	8,138
Living Marine Resources					
Fixed-Wing	15,540	15,540	15,540	15,540	15,540
Rotary-Wing	6,281	6,281	6,281	6,281	6,281
AMIO					
Fixed-Wing	3,402	3,402	3,402	3,402	3,402
Rotary-Wing	358	358	358	358	358
General Law Enforcement					
Fixed-Wing	972	972	972	972	972
Rotary-Wing	631	631	631	631	631
Defense Operations					
Fixed-Wing	2,010	2,010	2,010	2,010	2,010
Rotary-Wing	42	42	42	42	42
Search and Rescue					
Fixed-Wing	1,834	1,834	1,834	1,834	1,834
Rotary-Wing	1,080	1,080	1,080	1,080	1,080
Lightering Enforcement					
Fixed-Wing	0	0	0	0	0
Rotary-Wing	1,478	1,478	1,478	1,478	1,478
MAROL Enforcement					
Fixed-Wing	186	186	186	186	186
Rotary-Wing	0	0	0	0	0
Foreign Vessel Inspection					
Fixed-Wing	186	186	186	186	186
Rotary-Wing	0	0	0	0	0
TOTAL					
Fixed-Wing	58,826	58,826	58,826	58,826	58,826
Rotary-Wing	18,008	18,008	18,008	18,008	18,008

Cutter Demand vs Availability (DAFHP)

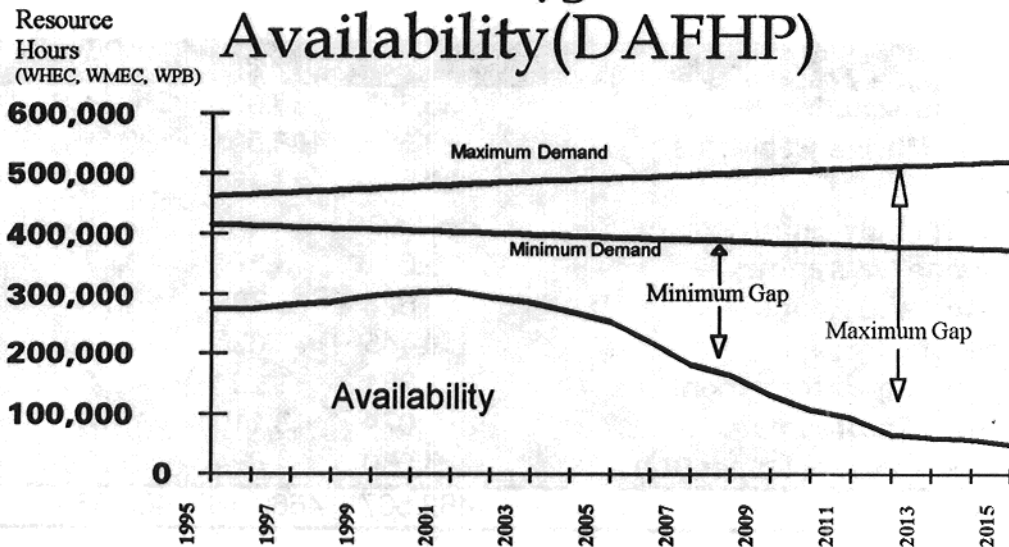


Figure 3-1

Aviation Asset Demand vs Availability (Program Flight Hours)

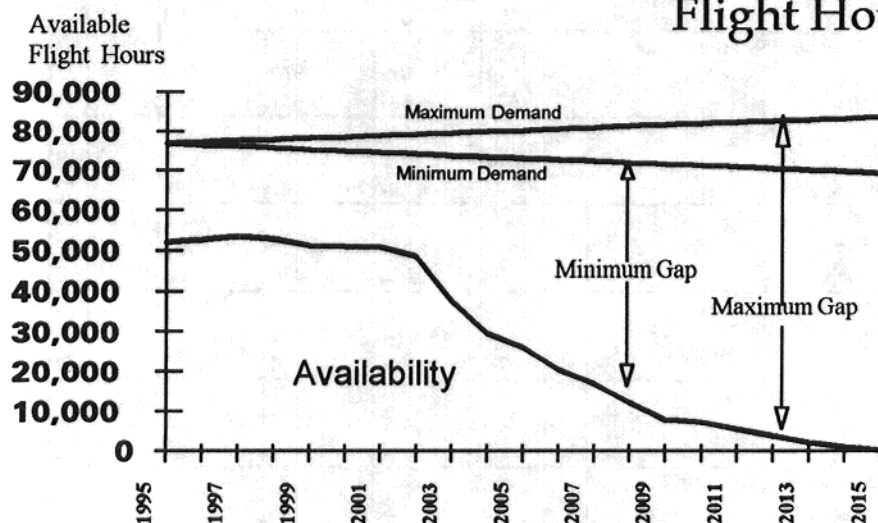


Figure 3-2

The annual limits are 1800 hours for 110' WPBs, and 1500 hours for 82' WPBs. Aircraft availability was based on a similar concept, **program flight hours**, which is described in the *Aircraft Management Plan*. Overall availability is affected by the following factors which were deducted from the raw figures: maintenance time, training time, non-Deepwater mission time, patrol breaks, and asset commissionings or decommissionings. Further information on the computation of resource availability is available in the *USCG Deepwater Mission Demand Gap Analysis Report* of October 1995. Resource availability is illustrated in Figures 3-1 and 3-2.

3.3.3 Current Resource Availability Gap

Figures 3-1 and 3-2 illustrate the comparison of demand projections and asset availability. The comparison indicates a rather large shortfall, not only in the future, but in the current year as well. This gap seems to contradict the general opinion that the Coast Guard is doing quite well in carrying out its responsibilities; an explanation is in order.

The first factor contributing to the size of the gap was the fact that several new missions included in the demand projections--Foreign Vessel Inspection, MARPOL Enforcement, and Lightering Zone Enforcement--are not currently Deepwater responsibilities and therefore not performed by Deepwater assets. We do not have a reserve capacity to conduct these missions, approximately 7,000 hours annually, therefore in order to assume these responsibilities, our assets would either have to give up other tasking, or conduct the new duties concurrently with existing missions. It appears that some mission overlap might be possible, but most of the new tasking will have to come from elsewhere.

The major portion of the availability gap has resulted from our law enforcement missions. Proposed new program standards, which are more stringent than past measures, were factors which increased law enforcement demand considerably. Computer simulation and past experience in these critical missions indicate that these standards are appropriate and achievable, given the right resources. For the most part, these new standards are being met in the areas where our forces are operating, i.e. the high threat areas where most illicit activity occurs. Low threat areas are not covered nearly as effectively, if at all, which accounts for a large portion of the gap.

The inability to cover low threat areas may not be a serious shortcoming. Covering these lower priority areas would cost a great deal in time and effort, while yielding very little in return. Computer simulation has indicated that Coast Guard Deepwater assets are very effective in the high priority areas where they operate and the large gap in availability should not be viewed as a linear representation of a deficiency in overall Coast Guard mission effectiveness. Future analysis will be necessary to

**TABLE 3-3: SURFACE AVAILABILITY
(RESOURCE HOURS)**

<i>DAFHP Hours</i>		<i>DAFHP Hours</i>	
<i>Year</i>	<i>Available</i>	<i>Year</i>	<i>Available</i>
1995	276,488	2006	220,676
1996	275,159	2007	182,734
1997	283,021	2008	164,400
1998	287,807	2009	132,782
1999	297,393	2010	108,051
2000	303,390	2011	94,455
2001	306,643	2012	66,803
2002	295,365	2013	61,081
2003	286,695	2014	58,318
2004	272,102	2015	50,117
2005	255,024		

**TABLE 3-4: AVIATION AVAILABILITY
(FLIGHT HOURS)**

<i>Flight Hours</i>		<i>Flight Hours</i>	
<i>Year</i>	<i>Available</i>	<i>Year</i>	<i>Available</i>
1995	51,979	2006	20,519
1996	52,715	2007	16,876
1997	53,491	2008	12,124
1998	52,925	2009	7,855
1999	51,324	2010	7,045
2000	51,164	2011	5,393
2001	50,889	2012	3,841
2002	48,817	2013	2,158
2003	37,773	2014	937
2004	29,492	2015	51
2005	25,941		

quantify the gap's impact on overall Coast Guard effectiveness and to focus on resource mix and specific Area/District resource needs. Nothing in the preceding remarks invalidate the new program standards, however, and their achievement, at least in priority operation areas, should most likely remain a Coast Guard goal. The standards are undergoing review at present. A 1996 revision to this report will document results and determine the effects of any changes on the current and future availability gaps.

3.3.4 Availability Range

The apparent public satisfaction with the Coast Guard's current level of effectiveness, coupled with practical and political considerations which will most likely make growth of our force structure impossible, compel us to take a hard look at the current availability gap as it has been calculated thus far. Figures 3-3 and 3-4 illustrate a different methodology for calculating availability.

These estimates show the assets' availability excluding most personnel and fiscal constraints. In essence they serve as a measure of the potential availability of the assets. Surface assets were assumed to be available 24 hours/day for 365 days/year, reduced only by the hours the resource can not conduct Deepwater operations such as programmed maintenance, required training involving the resource and entire crew such as REFTRA, and time devoted to non-Deepwater operations, whether inport or at sea. Aviation assets were assumed to have 50% more program flight hours available.

These calculations represent a much higher resource availability than our present employment standards allow, but they do give us an accurate look at hull and airframe availability. The Coast Guard is experimenting with changes to methods of operating which may allow us to come closer to reaching this availability potential. Technology may allow us to reduce maintenance procedures and realize training efficiencies which will push potential availability even beyond that shown in Figures 3-3 and 3-4. Fiscal reality demands that we pursue this course, and all future analyses regarding new assets must explore maximizing availability.

3.3.5 Future Resource Availability Gap

The resource availability gap grows alarmingly when the ends of service life of our aging ships and aircraft are factored in. The majority of the Deepwater surface and aviation assets will reach this point by 2015. Vessels are already scheduled for decommissioning in FY95, and many ships and aircraft will reach the end of their service life just after the turn of the century. As these assets are retired from service, the resource availability will decrease dramatically while demand continues to increase, thus exacerbating the shortfall. Figures 3-5 and 3-6

Cutter Demand VS Availability (Resource Hours)

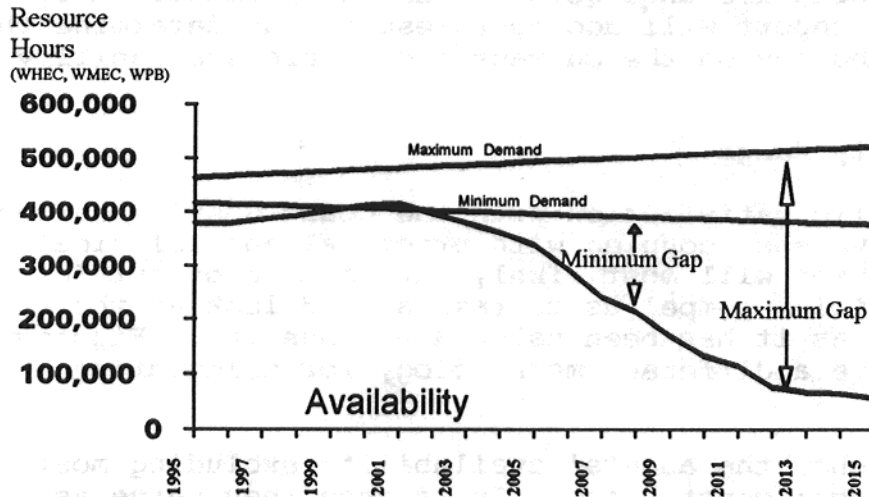


Figure 3-3

Aviation Asset Demand VS Availability

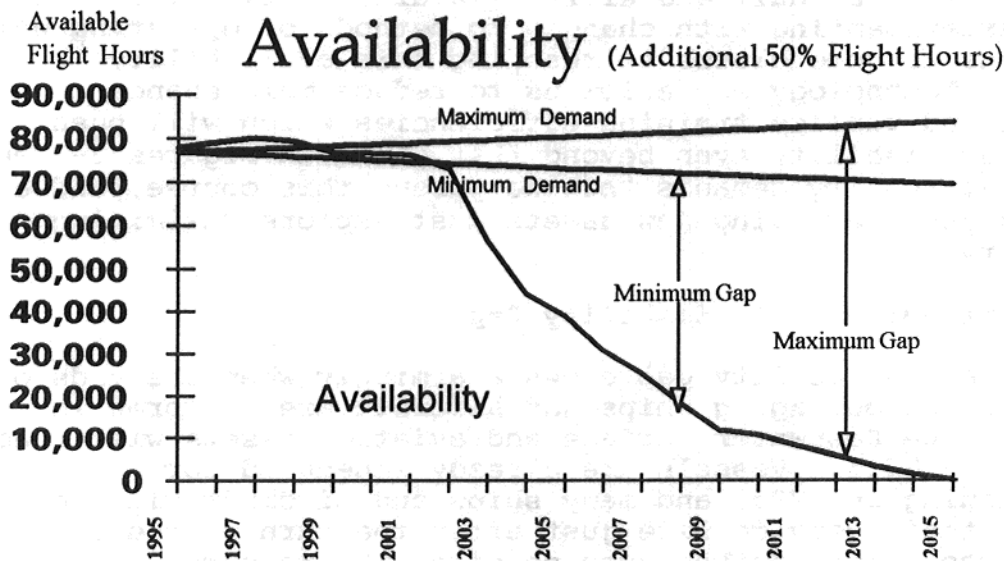


Figure 3-4

PERCENTAGE OF SURFACE AVAILABILITY BY CLASS

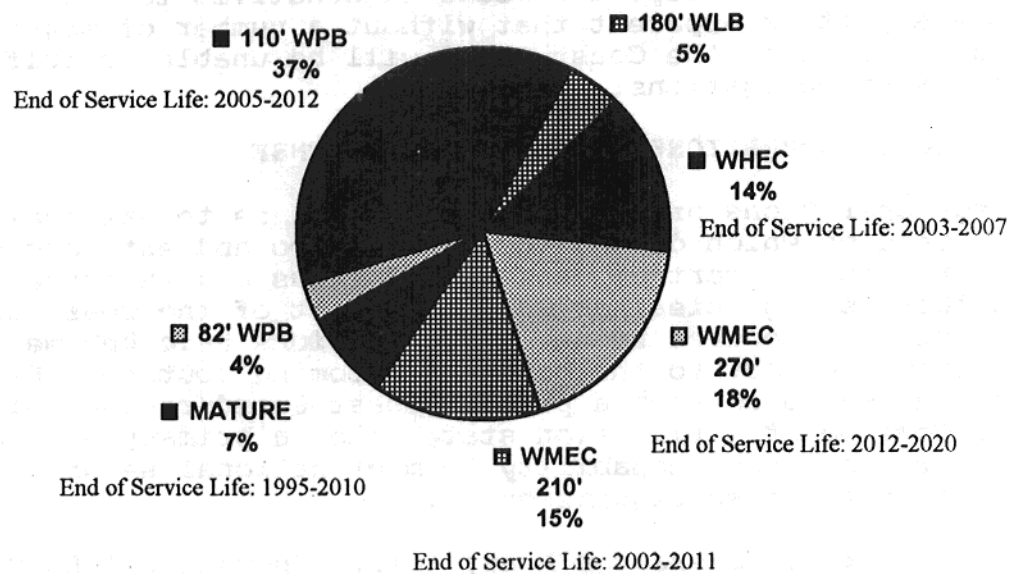


Figure 3-5

PERCENTAGE OF AVIATION AVAILABILITY BY TYPE OF AIRCRAFT

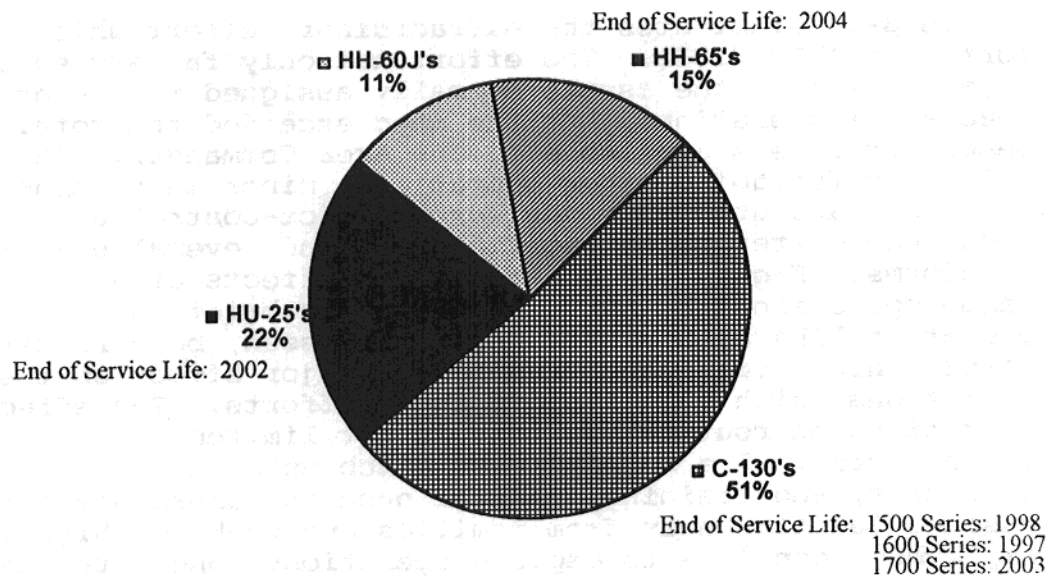


Figure 3-6

illustrate the percentage of overall Deepwater mission availability that is provided by current surface and aviation assets and their projected ends of service life. Subsequent sections of this report discuss alternatives to fill this gap, however, it is apparent that without a number of major surface and air assets, the Coast Guard will be unable to fulfill its Deepwater obligations.

3.4 SURGE OPERATIONS AND NATIONAL DEFENSE

Surge operations are unscheduled responses to national emergencies which demand increased tempo and extraordinary efforts on the part of Coast Guard crews and resources. Response to these emergencies has long been part of the Coast Guard's experience, however recently such actions have become more frequent, almost to the point of becoming routine. Response is considered to be such a primary Coast Guard responsibility that the *Commandant's Direction* states that a primary Service goal is to "Provide surge capability to meet national security and disaster response requirements".

These operations exact a heavy toll. Operation ABLE MANNER, which commenced in January 1993 in response to a tremendous outpouring of illegal Haitian migrants, required large numbers of dedicated cutters and aircraft for a period of almost two years. Operation ABLE VIGIL lasted little more than a month in 1994, but the effort to rescue thousands of Cuban boat people required virtually all Atlantic Area Deepwater assets, supplemented by cutters from Pacific Area and a number of Navy platforms. Where ABLE MANNER had a sustained profound effect on the rest of Atlantic Area Deepwater operations, ABLE VIGIL caused almost all routine operations except for Search and Rescue to come to a brief halt.

Figure 3-7 illustrates the extraordinary effort which was put forth for ABLE VIGIL. The effort not only far exceeded the capabilities of the assets normally assigned to operations in the theater of operations, but the need exceeded the total amount of Deepwater assets available to the Area Commander. The void was filled by foregoing other operations, minor maintenance and training, and utilizing smaller District-controlled cutters, High Endurance cutters from Pacific Area, and several U.S. Navy platforms. Figure 3-8 contrasts the effects of a sustained, high tempo operation like ABLE MANNER, and a brief but intense operation like ABLE VIGIL. As can be seen, both require far more assets than normal, and thus have a major effect on the routine operations which must support these efforts. The effect of surge operations on routine missions is not limited only to the period of the surge. The necessity to catch up on delayed maintenance, logistics, and training, and the need to compensate personnel for unscheduled time away from families and weeks of high tempo employment continue to degrade operations long after the surge has concluded.

The common thread connecting surge operations in recent memory is

LEVEL OF EFFORT (SURFACE ASSETS) FOR OPERATION ABLE VIGIL (19 AUG -23 SEP 94)

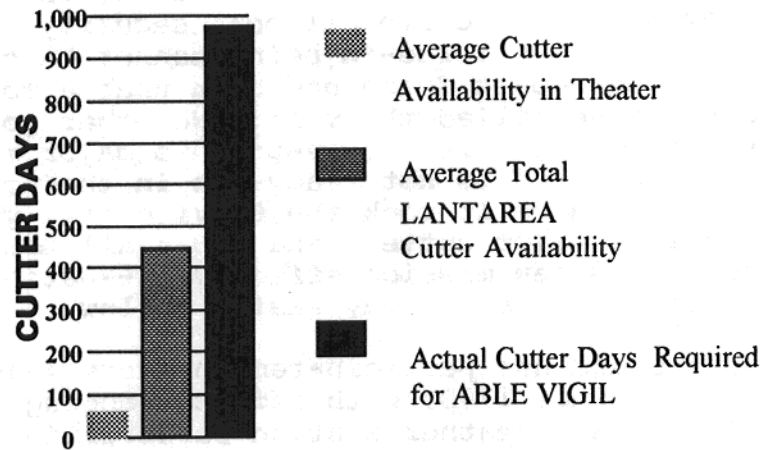


Figure 3-7

CUTTER SURGE EFFORTS FOR ABLE VIGIL AND ABLE MANNER

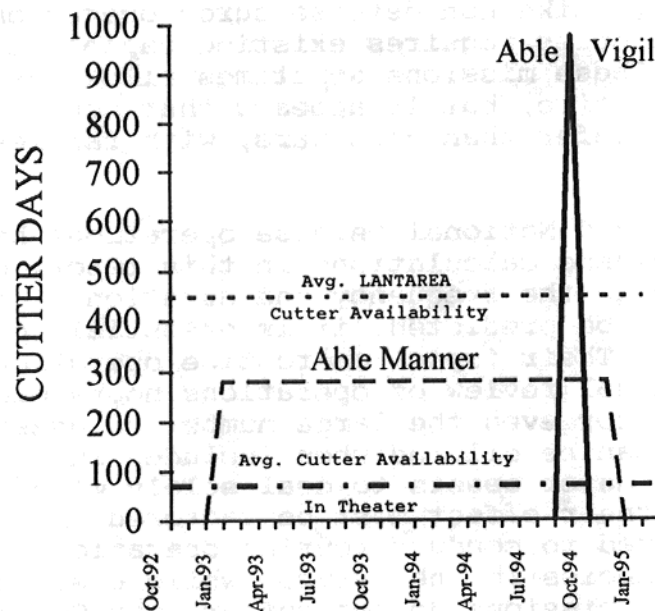


Figure 3-8

that the Coast Guard had an existing multi-mission force structure, with well trained, flexible personnel ready to respond. Our most recent operations have demonstrated the value of maintaining this capability. In awarding the Coast Guard the Department of Transportation Gold Medal for Outstanding Achievement after the eventful year of 1994, Transportation Secretary Federico Pena recognized that "the responsiveness of the Coast Guard provided the opportunity for the administration to implement an effective national security policy." The importance of this force-in-being cannot be overemphasized, because if the Coast Guard had been unable to respond, nobody else could have filled the void. No other government agency has the assets or expertise to respond to major maritime disasters. If the Coast Guard is not ready--as in the notable example of Prohibition, where it took the Service five years to obtain the additional 25 major cutters and 300 small boats required to prosecute this new mission effectively--national priorities will not be met and disaster may easily follow.

The Coast Guard has participated in every major conflict or contingency since 1790, with efforts ranging from increasing our existing SAR and weather station capabilities in support of the Korean War, to the employment of 400 ships and cutters and over 600 small boats while fighting World War II. While National Defense operations are not considered surge operations per se, their effects are similar. Our response to tasking for recent short term military operations such as SUPPORT/RESTORE DEMOCRACY had a somewhat limited effect on routine operations, but the Coast Guard's participation in the much longer efforts such as Operation MARKET TIME in Viet Nam, or the Korean War--without the huge build up in personnel and assets that was realized in World War II--had profound and longlasting effects on domestic responsibilities. Like non-defense surge operations, response to national contingencies requires existing capable assets and well-trained crews. These missions sometimes allow the luxury of limited advance notice, but it appears that contingencies of the future will be briefer than past wars, with far less time for preparation.

Surge operations and National Defense operations have been separated from demand calculations in this report due to their uncertainty. While the frequency and duration of these operations cannot be predicted, it is essential to recognize that they will occur. Their impact on routine operations is more severe than a casual review of operations hours might suggest since statistics for even the large number of assets and operating hours can be diluted when included in an annual report. We cannot obtain major assets to deal solely with these operations, but their effect must be factored into calculations for forces required to conduct routine operations. In order to respond to emergencies in the future, while ensuring that important routine missions do not suffer, the Coast Guard must retain the capable force structure, the flexibility, and expertise that have served the nation so well in the past. The required capability must already exist before the emergency arises; the value of a force that can respond within hours, as it did in ABLE VIGIL, cannot be over-estimated. The nation requires that the Coast Guard remain "Semper Paratus".

3.5 MISSION IMPACT

The Coast Guard's Deepwater fleet of cutters and aircraft is the essence of the Service. The first assets purchased in 1790 were Deepwater assets--the original ten cutters--and today's missions still require the capability to take people to sea and sustain them on scene for extended periods of time. Our cutters and aircraft are barely adequate to perform our Deepwater missions today, and when our ships and aircraft begin to reach the ends of their service lives in a few short years, the resource gap will become overwhelming.

The aging of the Deepwater fleet may not seem cause for public concern for a number of years. If nothing is done, initially the Coast Guard will merely experience seemingly insignificant decreases in mission effectiveness. Failure to exploit new technologies will cause us to fall farther behind and will deny us potential economies in crewing and asset availability. As our assets become obsolete and maintenance miracles fail to delay the inevitable any further, however, we will reach a point where major responsibilities will have to be abdicated. The impact will begin to manifest itself in our inability to conduct our proactive missions fully in high threat areas, and will slowly escalate to an inability to provide sufficient resources to our reactive missions such as Search and Rescue, response to environmental disasters, and response to mass migration attempts. The Coast Guard will no longer be "Semper Paratus" as we lose the flexibility and speed of response that has become the hallmark of our organization. No one else is available to fill this void and carry out these national priorities. The Coast Guard must retain the vital capabilities required to carry out its functions, and the effort should begin now.

SECTION 4. NON-MATERIAL ALTERNATIVES AND TECHNOLOGICAL ENHANCEMENTS

4.1 INTRODUCTION

The purpose of this report is to define the Coast Guard's shortcomings in the Deepwater area, and to provide a general estimate of the magnitude of the problem. A gap exists between the Coast Guard's existing Deepwater resources and those required to carry out all projected missions. This gap will grow considerably when today's major assets reach the end of their service lives. Since our present assets were acquired, technology has advanced considerably. Careful exploitation of new and emerging technology, coupled with innovative changes in our methods of conducting operations, could reduce demand, and thus the gap, considerably. This section outlines possibilities among no cost non-material alternatives and low cost technological enhancements which may provide a means to close the capability gap in the near future, or which may allow us to realize savings in the more distant future. These suggestions are not all-inclusive, nor do they presume to prioritize alternatives, but they are offered to provoke further thought since clever use of technology could serve to reduce substantially the gap between mission demand, and resource availability and capability.

4.2 NON-MATERIAL ALTERNATIVES

4.2.1 Changes In Missions or Regulations

In our present budget climate where government is attempting to downsize not expand, all Coast Guard missions must be examined with a view towards cancellation or transfer of the mission to an entity better equipped to carry it out. A quick look at our Deepwater missions indicates that most are best kept intact and under Coast Guard cognizance, but several possibilities exist for scaling back.

The Coast Guard could reduce or end its participation in the **Data Buoy** program. Even if NOAA retains its responsibility for the program, the Coast Guard could decide that it no longer has the resources to assist. Both the buoy tender community and Deepwater assets would realize resource savings if this mission were not performed. The Coast Guard has provided this assistance to NOAA since the program's inception, however, and has received considerable funding from NOAA for these services. The Coast Guard has also been a recipient of the important meteorological information derived from these data sources, so a decision to abandon this mission would be a difficult one.

The **Foreign Vessel Inspection** mission is still in the conceptual stage and could be scaled back to provide resource savings. Prosecuting this mission as presently envisioned represents the largest increase in Deepwater resource demand. However undesirable, the mission could continue to be conducted pierside as it is at present, although this would not solve the problem of unsafe or environmentally hazardous vessels entering U.S. waters. The mission could be conducted closer to shore by utility or patrol boats rather than the more costly Deepwater assets. A careful "spot-check" inspection program based on vessel and flag state safety histories can ensure efficient prosecution of this new mission.

Changes in regulations could lessen the need for on scene surveillance in some mission areas. In **fisheries enforcement**, for example, some consideration has been given to requiring fishing vessels to carry transponders which would indicate vessel positions at all times. This, coupled with revised regulations which would allow catch inspection at the dock prior to sale, might obviate the need for some on scene enforcement. This alternative raises a number of substantial questions such as how to monitor equipment used to harvest fish (if indeed this factor remains important), and how future search and rescue will be prosecuted if the traditional cutters on the fishing grounds were eliminated. Given these and other real constraints, it seems very unlikely that the need for an on scene presence by surface assets could ever be eliminated entirely.

Legislative changes and new **AMIO** agreements with source countries could have an effect on these operations. Expedited Exclusion legislation, which would allow illegal migrants to be brought into U.S. territory for immediate processing and deportation might reduce the need for large cutters to transport migrants, however the need to transport and care for large numbers of migrants could very well remain. Standing agreements on the interdiction and repatriation of migrants would also reduce the time necessary to prosecute AMIO cases, allowing fewer assets more time to conduct proactive operations. Finally, a decision could be made to eliminate at sea interdictions, delaying enforcement action until illegal migrants arrive off U.S. shores, but this action would fail to provide the safety to boat people that has historically been a major factor in the nation's migrant interdiction program, a decision that should not be made lightly.

4.2.2 Use of National Surveillance Assets

Surveillance is one of the key elements in all Deepwater missions. If we cannot detect and identify targets, we cannot save them, or observe their illicit activity, or clean up their damage to the environment. Surveillance is also the most time-intensive, and therefore expensive, elements of our operations. Improvements in surveillance could result in substantial cost

savings, and possibly result in fewer patrolling assets being required. Although the potential would seem almost unlimited, **satellite surveillance** has not been fully utilized to date. Coast Guard missions seem to suffer when competing among other national interests for scarce time on shared satellite systems. Changes in defense missions and national priorities may improve our chances to utilize these assets, and the Coast Guard should continue to investigate whether these systems could be of value to our efforts. The Coast Guard is also investigating the use of **space-based radar** systems which offer similar benefits. Several **Shorebased Over the Horizon (OTH)** radar sites exist which might also offer the means to view large areas without the need for as many patrol assets. Although the Coast Guard's entire area of responsibility is not covered by these sites, and our use of them may not prove practical, the Coast Guard must continue its investigation into the feasibility of such systems.

4.2.3 Changes In Operations, Training, Doctrine, and Crewing

A large percentage of cutter and aircraft operational time is devoted to training. Although this training is conducted in conjunction with normal operations as much as possible, this necessary requirement still exacts a heavy toll on an asset's available operational time. The Coast Guard and other services are investigating the feasibility of employing virtual reality and other innovative training techniques in lieu of more traditional and time-intensive methods of training. While these innovations may result in a reduction of necessary training, the reduction will most likely be a small one and have little bearing on the scope of this project. A review of the necessity of various time-intensive training programs and exercises, and their required frequencies may yield significant savings, however. A seemingly insignificant exercise such as our chemical, biological and radiological (CBR) drill requires approximately one cutter day per year for our Deepwater cutters. Refresher Training exacts a major toll, with its four week schedule and major transit time requirements. While it is certainly not the intent of this analysis to advocate lowering training standards, careful review might result in savings.

With the exception of possible changes in fishing surveillance and AMIO regulations discussed above, no changes in doctrine which would have an effect on resource capabilities or numbers are anticipated in the near future. Changes in surveillance could result in fewer on scene assets being required, but would not eliminate the need for assets to respond to sightings, or the desirability for some sort of on scene presence for the purposes of deterrence.

It is almost a certainty that future assets will be minimally-crewed. While this may drive costs per asset down, it will not effect the number of assets required, and caution must be employed when determining optimal crew sizes. While modern commercial vessels can sail safely with greatly reduced crews, they are not capable of performing the myriad of tasks which are

routine on multi-mission Coast Guard cutters. Technology has yet to eliminate the larger number of personnel who are required to perform law enforcement duties, supervise hundreds of interdicted migrants, launch boats and helicopters simultaneously, defend their ship against attackers and the harsh environment, and save lives and property in all weather conditions. Advances will undoubtedly come, but economies must be balanced against safety and mission completion.

Perhaps the biggest operational change which could result in asset savings could be an increase in asset availability time. Our assets are presently quite limited by maintenance and crew restraints. Approximately fifty percent of a ship or aircraft's time is spent in a non-operational status due to these concerns. An experiment to determine the feasibility of increasing the operational availability of a major cutter from the standard 185 days per year to 300 days a year is in the planning stages. The success of such an effort would obviously have major implications for cutter availability, and could lead to similar improvements in aircraft availability. It does not seem possible that such a change could be achieved without cost. Major changes to maintenance schedules and procedures and to personnel policies would be required to realize this increase in availability, and these costs may prevent this idea from becoming a reality. The Coast Guard is also formulating a Strategic Homeporting plan which would concentrate cutter homeports so as to realize savings in support structures for similar assets, and locate assets closer to their normal operating areas to limit transit times and increase availability. These and similar efforts should certainly continue.

4.3 MINOR TECHNOLOGICAL ENHANCEMENTS

4.3.1 Detection/Classification Improvement

Computer simulation of current Coast Guard operations has indicated that significant efficiencies in mission prosecution could result from improvement in **target detection and classification** over what is now available to most of our assets. This assessment is also borne out in the remarks of several operational commanders, particularly those who have prototyped the APS-137 Inverse Synthetic Aperture Radar (ISAR) radar. One task unit commander, equipped with this equipment, reported that he was able to stretch his detection horizon far beyond that of other Coast Guard cutters, sort (classify) contacts on the radar, a task which cannot be performed on existing cutter radars, and thus avoid costly diversions which other cutters must make to classify or identify targets which later prove to be of no interest.

Improved radar or other all weather sensors for aircraft would allow the same number of aircraft to cover larger areas with higher detection and classification capability. This would

reduce the number of sorties required to cover patrol areas, and possibly the number of surface assets as well. The benefits to be gained from such an improvement could easily be quantified through additional computer sensitivity modeling.

Non-shipboard surveillance systems should be considered as force multipliers. Although such systems might well prove very costly, their employment could eliminate the need for some on scene surveillance assets in the various theaters of operation. Shared use of national surveillance assets, as discussed above, may become reality, but is tenuous at best. As technology drives prices down, it is conceivable that the Coast Guard could own its own satellite system, however, even in the future this cost may be prohibitive. The same could be said for OTH radar systems, although these might be somewhat more feasible. Other, less costly alternatives may eventually be available. **Unmanned Aerial Vehicles** (UAVs) might provide surveillance of limited areas comparable to that offered by satellites, with the additional benefit of their being available to surveil specific areas whenever needed. **Airborne Reconnaissance-Low aircraft**, again deploying from shoreside, may provide a method to search large areas quickly and cheaply. Being manned, these assets would be far more responsive to changes in plans or requests for additional information, and they might also provide the deterrence effect of having identifiable Coast Guard assets in an area, something the various unmanned surveillance systems would not do. They would be limited to smaller search areas than the unmanned systems, but would no doubt prove a great deal cheaper than these other systems.

4.3.2 Boarding Enhancements

Visits to vessels and inspections of their crews and cargoes are essential to all law enforcement operations. Computer simulation has validated the long-held opinion of operational commanders that our cutters are severely limited by the number of boardings they can conduct in any given time. Even our larger cutters are limited by the number of boats available; the number of people required to man boarding teams, boat crews, and boat lowering details; the range at which small boats can navigate safely away from the cutter; the necessity for small boats to remain close to the cutter for the protection of the boat crew and boarding party; and the limiting effects heavy weather has on boat launching and crew transfer operations. Improving boarding party transfer and boat launching systems could have a dramatic effect on the numbers of boardings without requiring a larger number of major surface assets.

Providing larger, more capable small boats or other similar vehicles, which could range farther from the mother vessel and carry enough people to allow for limited protection outside of the cutter's immediate area could also extend the patrol craft's area of influence. Obviously, the more capable these small

vehicles are, and the more that are carried or deployed, the higher the cost, but even a large fleet of very capable vehicles could still be more economical than large numbers of cutters.

Deploying boarding parties by helo is an option that has been proven by other navies. Such an operation could be utilized in higher sea states which preclude boat transfers, and helos could transfer boarding teams greater distances and more quickly. Helo transfers suffer from many similar drawbacks as boat transfers, however, in that they are (presently, at least) very manpower and maintenance intensive, and frequently subject to weather restrictions. Helos do not solve the problem of providing protection for the boarding parties, and present surface assets can only deploy one helo at any one time.

4.4 SUMMARY

Despite technology's rapid advances and subtle changes to our missions, the Coast Guard most likely will not be able to rely solely on such means to solve its Deepwater shortcomings completely. Nothing discussed in this section obviates the need for sustained on scene presence in the operating areas. Careful exploitation of future technology should result in economies, however, and will definitely play a role in determining what type and how many assets are required. Such efficiencies must not be overlooked. It is time for the Coast Guard to go forward and explore the best ways to obtain the necessary capabilities which will allow us to continue the success we have realized in the past.

DEEPWATER MISSION ANALYSIS REPORT

PART II

SECTION 5. RANGE OF ALTERNATIVES

5.1 Alternatives Identification

Examination of the various Deepwater functional requirements leads to the conclusion that while future technology may serve as a force multiplier, there appear to be no technological innovations which will obviate the need for surface and aviation assets. Further detailed analyses will be required to determine individual asset capabilities, asset supportability, and resulting cost-effective resource mixes. The following general alternatives are identified as avenues for further study, and are offered as a rough cost estimate to help in defining possible solutions to our Deepwater gap. Again, these alternatives are not all-inclusive, nor are they prioritized. It is not improbable that a combination of these alternatives may prove to be the best solution to closing our operational shortfall while conforming to the budget realities of the future.

5.1.1 Status Quo

The analysis produced in this report should clearly indicate that the Coast Guard cannot hope to maintain the status quo with respect to the condition of our major assets. Asset availability and capability gaps exist now, and will grow alarmingly as our major assets reach the end of their service lives in a few short years. Ships and aircraft are complex systems which require amazing amounts of manpower intensive maintenance and repair. The quantity of maintenance and repair required generally follows a "bathtub" curve consisting of wear-in, sustainment, and wear-out phases. The timing of the transition from sustainment to wear-out phase is sometimes difficult to predict, but maintenance and repair costs can often rise dramatically as an asset enters the wear-out phase. Supportability, deterioration associated with age, and inflation are all contributing factors in this phase of decreased reliability or reduced operational availability. There is a point of diminishing economy in continuing to operate and support aging ships and aircraft, especially when these older assets may not meet the functional requirements for the missions they support.

5.1.2 Renovation/SLEP/Modernization of Present Resources

As assets reach or exceed the end of their design service life, they become increasingly inefficient and unsafe to operate. Several means exist to restore utility to major assets: Renovation, Service Life Extension Program (SLEP), and Modernization.

Renovation returns an asset to designed capabilities, regulatory compliance, habitability, safety and maintainability.

SLEP extends the life of an asset by maintaining current capabilities. **Modernization** upgrades capabilities or provides enhancements to reliability, safety, habitability, or maintainability. **Upgrading**, a term used in this report to cover all three processes, may be a feasible alternative for many of our aging Deepwater resources if mission functional requirements do not change substantially. This is true only if new technology or equipment becomes available which will lower life cycle costs while improving capabilities, and can conveniently interface with the existing asset and its related systems.

The Coast Guard's 378' WHECs and 210' WMECs have recently undergone midlife renovations. Once they reach the end of their new service lives, they may again be candidates for upgrading, however their advanced age will definitely be a serious concern. These ships will almost certainly require major hull and superstructure replacement due to their age, and speed requirements may not be achievable.

The 270' WMECs, which approach the end of their service lives beginning in 2012, appear to be excellent candidates for upgrade. Although they are slower ships than the Coast Guard will probably need for many Deepwater missions and lack the long on scene endurance capability required for some, they should still meet most mission functional requirements and would therefore be valuable assets if modernized. These vessels seem to be more maintenance intensive than some of our older cutters, so it is conceivable that upgrading might not be feasible for this class. Vessel surveys are being conducted to assess the ships' future potential.

Most Coast Guard aircraft may also be candidates for upgrading. At present none of our aviation assets have undergone service life extension, although some have had renovations to improve their reliability during the latter part of their planned service lives. The newer aviation assets appear to be better candidates for upgrading, though thorough surveys of these aircraft should be conducted, along with cost benefit analyses, before final decisions on this alternative are made.

These programs to upgrade or extend an asset's service are not always the most economical alternative, however, and careful analysis must precede a decision to resort to this solution. For example, since manpower represents the largest life-cycle cost of a major asset, it is safe to assume that minimal crewing will be an absolute necessity on any new or upgraded assets. Reducing crew size requires costly enhancements to monitoring, control, alarm and other safety features. A decision to ignore these necessities equates to a decision to accept a higher level of

risk in operations, or to reduce the operational workload of the assets involved. Obviously, neither of these options are viable.

Current ship technology includes automated systems which reduce the need for personnel, but the extent to which these systems can be installed on existing platforms quickly becomes limited by the original design. New environmental regulations may also present a costly hurdle to upgrading, especially if assets were constructed with environmentally hazardous materials as so often seems to be the case. These concerns, and others, could require such extensive refit of existing platforms that new acquisition becomes the only logical alternative. Further study, such as Reliability, Maintainability, and Availability (RMA) and Life Cycle Cost Model (LCCM) analyses, will be required to compare cost effectiveness of upgrading current assets versus new acquisition.

5.1.3 Acquisition of New Assets

Renovation and modernization alone probably will not provide for the total reduction of our mission shortfall. Service life extension will provide some economy, but the point of diminishing returns may be reached more quickly than we would hope, therefore acquisition of new assets must be considered as an alternative to deal with the need in the Deepwater area.

SECTION 6 JUSTIFICATION FOR MAJOR SYSTEMS ACQUISITION

6.1 Summary of Rationale for Acquisition

The Deepwater mission area consists of a broad arena with many crucial missions and a vast array of resources. The future makeup of Deepwater assets may not be determined for quite some time as future technology and alternatives must be considered. As discussed previously, some economies will no doubt be discovered, and other force multipliers conceived, which will allow the Coast Guard to close the future mission availability and capability gaps efficiently. It seems apparent, however, that although efficiencies will be found, Deepwater missions cannot be carried out without a new generation of major surface and air assets.

6.2 Resource Estimate

Determining the acquisition costs for a project of this scope is not possible at this stage because the Deepwater programs include so many evolving missions, and utilize so many varying types of assets. The many variables will not be sorted out until much later in the project after further careful analysis. Perhaps the best way to provide a gross estimate of the magnitude of such an acquisition for planning purposes is to cost out both upgrading and one-for-one replacements for all major assets that will reach the end of their service lives by the year 2015. Since the Coast Guard will hopefully find more efficient means to close our mission shortfall, this measure should serve as a "worst case" estimate.

6.2.1 Surface Asset Acquisition

The Coast Guard's present Deepwater cutter inventory consists of 12 378' WHECs, 13 270' WMECs, and 16 210' WMECs. The recent WHEC Fleet Renovation, Alteration, and Modernization (FRAM) cost approximately \$70M per hull, and the 210' WMEC Midlife Maintenance Availability (MMA), approximately \$20M per hull. A reasonable estimate for the total upgrading for all 41 cutters, therefore, would be \$820M to \$2.9B.

In order to estimate total replacement of the surface fleet, a generic replacement vessel was employed. The ship would be of monohull construction with traditional shaft/propellor propulsion, weighing approximately 2500 long tons light ship displacement, with capabilities approximating that of the present 270' WMEC except for greater length and speed. The Rough Order of Magnitude Estimate for this ship, a Class R estimate based on NAVSEA standards, is \$66.4M to \$101.6M for the lead ship, or a total replacement cost of \$2.16B to \$3.30B for 41 hulls (estimate reflects the economy realized by continuous construction of such a large number of ships).

6.2.2 Air Asset Acquisition

Although the Coast Guard's two classes of rotary wing aircraft provide a good deal of support to Deepwater missions, their replacement has not been estimated for this report. The HH-65 aircraft are primarily a coastal zone platform, with only 15% of their resource hours devoted to Deepwater missions. Considerations as to necessary capabilities are best left for the upcoming Coastal Zone Mission Analysis. Our HH-60J aircraft, used in both Deepwater and Coastal Zone, may reach end of service life as early as the year 2006, if present levels of employment continue. Our Deepwater missions require rotary wing aircraft or a similar capability, and analysis of this need cannot be overlooked or delayed indefinitely.

Service life extension of our 30 C-130 airframes would cost approximately \$2.9M per airframe, for a total of \$87M. Since the HU-25 does not seem to be a good candidate for renovation, no service life extension estimate has been computed.

The replacement cost of the current production model of the C-130 is \$45M per airframe, which would result in a total replacement cost of \$1.35B. To replace our HU-25 medium range jet aircraft capability would cost approximately \$15M per airframe, or \$315M to replace the entire inventory.

6.3 MINIMUM RESOURCE ATTRIBUTES

A great deal of in-depth analysis will be necessary in order to determine what type of acquisition will be required to fill the Coast Guard's Deepwater gap. Updating versus new construction, converting functional requirements to asset capabilities, and determining the appropriate service force mix are but some of the many decisions which must be made in the future. Findings of this report, however, point clearly to several qualities which our new assets must share. These qualities must be considered to be nonnegotiable and beyond compromise in order to guarantee economy and success in the Twenty-First Century.

First and foremost, our analysis to date has uncovered no technology or technique that will eliminate totally the need for Coast Guard personnel to go to sea. We must be present where the action is--the Central Pacific, the deep Caribbean, wherever our responsibilities demand--in order to enforce laws and regulations, to deliver people and equipment, to rescue and recover those in distress, and to respond to environmental disasters. The future seems to point to even more of this Deepwater activity. Technology may mitigate this need somewhat, or allow us to reduce the number of assets required, but surface and air assets must be capable of maintaining a sustained high seas presence.

Our assets must continue to be multi-mission. The versatility of

our assets has proven to be remarkably economical to the taxpayer, and the key to the Coast Guard's flexibility in the midst of changing missions and priorities. Many of our present major assets were designed for missions which ended or evolved early in the lives of the resources, but their multi-mission capabilities allowed them to serve well in new missions. This trait has also served us well in responding to wartime emergencies and contingencies, and will be essential to ensure that future Coast Guard assets are able to contribute to national defense, despite the uncertain nature of this role. Consideration should be given to employing modularity and space/weight reservation techniques in order to obtain economical assets with the flexibility to serve as needed.

Minimal crewing will be an important factor in keeping resource costs down, as long as the effort to economize does not take priority over mission success. Recent high tempo operations have proven the necessity to conduct demanding simultaneous operations for extended periods of time. We must ensure that we retain the right number of personnel to get the job done without sacrificing responsibilities or the well-being of our crews.

Technology and innovative operating procedures must be also be employed to increase the availability of our resources. Modern systems employed by various industry and government entities throughout the world indicate that increasing operational hours while maintaining personnel well-being, maintenance standards, and mission success is an achievable goal.

Our new or updated assets must be environmentally friendly; public concerns with the environment demand it. Environmental concerns must be a priority when choosing propulsion systems, but careful planning must also be given to maintenance requirements and materials, trash handling systems, hazardous waste production and disposal, and general consumption of resources by systems and personnel. Unfortunately, retrofitting yesterday's assets to conform to tomorrow's regulations may very well prove infeasible, thus precluding the upgrading of some of our present assets.

APPENDIX A

FUNCTIONAL REQUIREMENTS FOR MARITIME LAW ENFORCEMENT MISSIONS

DRUG INTERDICTION FUNCTIONAL REQUIREMENTS

In order to conduct the Drug Interdiction mission effectively, the Coast Guard must have the capability to:

Intelligence

- Access accurate intelligence which provides position, course, speed and description of target, and specifies the age and accuracy of the information.
- Access intelligence in near real time via a secure conduit.

Deterrence

- Make contact with threat profile traffic in Counter Drug high threat areas. (Contact may be defined as being identified by the subject target as being a Coast Guard resource.)
- Board vessels detected and determined to be Targets of Interest.

Surveillance

- Detect and track vessels and aircraft of interest in a 150NM x 200NM high threat area, via covert means.
- Detect vessels (both passively and actively) day or night in all weather conditions.
- Remain on scene in any weather for a period of up to 30 days.

Sort and Intercept

- Provide link between the Operational Commander and the On Scene Commander, enabling the exchange of information required to define targets of interest versus targets which are not of interest.
- Sort targets of interest from targets not of interest prior to compromising covert posture.
- Sort targets within sufficient range for intercept to occur in all weather conditions.
- Intercept suspected narco-traffickers upon detection.

Boarding

- Compel vessels, using minimum force necessary, to allow LE boarding team to board at sea.
- Provide a command presence/cover for boarding team.
- Place boarding team, consisting of four to eight persons, safely aboard vessels of interest, day or night in all weather conditions.
- Equip and transfer boarding team with 10-12 lbs boarding kit.
- Board profile traffic in High Threat Areas.
- Use sensor technology (both installed and exportable) to warn of hazardous atmospheres or exposures to hazardous materials.

Custodial Functions

- Escort vessels of any size and tow vessels of up to 200ft in length.
- Provide custody crews to operate seized vessels.
- Accommodate up to 12 detainees for a period of five days plus 700NM transit.
- Provide food, water, shelter, and sanitation requirements until detainees are transported ashore.
- Provide secure stowage of up to 250 cu. ft. of contraband for five days plus 700NM transit.
- Provide a prisoner watch for five days plus 700NM transit.
- Transfer personnel, unfamiliar with at-sea evolutions, to and from targeted vessels at sea.

Command & Control

- Transmit and receive secure voice and data in real or near real time.
- Access Coast Guard LE, and other agency LE databases in near real time.
- Communicate in real or near real time, in all modes (voice, data, video), with CG resources and all appropriate federal, state and local agencies and the maritime public while conducting operations.

- Provide data link for transmission of sensor, voice, tactical display, and record traffic between the Operational Commander and the On Scene Commander as well as other friendly forces in near real time.
- Maintain simultaneous real-time secure or protected communications with Operational Commander and other Coast Guard and federal agency assets.

Commander Task Unit (CTU) Functions

- Conduct a boarding with own forces while simultaneously monitoring a boarding conducted by other forces.
- Accommodate a CTU staff of up to four persons for periods of up to 60 days.
- Provide support and accommodations for up to six representatives of other agencies/friendly forces (Customs/State/DEA/) for periods of up to 30 days.

LIVING MARINE RESOURCE ENFORCEMENT FUNCTIONAL REQUIREMENTS

In order to conduct the Living Marine Resource mission effectively, the Coast Guard must have the capability to:

Intelligence

- Access accurate intelligence which provides position, course, speed and description of target, and specifies the age and accuracy of the information.
- Access intelligence in near real time via a secure conduit.

Deterrence

- Make contact with fishing vessels in high threat areas. (Contact may be defined as being identified by the subject target as being a Coast Guard resource.)
- Board vessels detected and determined to be Targets of Interest.

Surveillance

- Detect fishing vessels from 15 to 200 feet, constructed of wood, metal, fiberglass or concrete, located in high threat areas.
- Detect vessels day or night in all weather conditions.
- Detect and identify fixed fishing gear such as long-lines, fish pots or traps and driftnets.
- Remain on scene in any weather for a period of up to 30 days.

Sort and Intercept

- Provide link between the Operational Commander and the On Scene Commander, enabling the exchange of information required to define which targets are of interest and which are not.
- Sort targets of interest from targets not of interest prior to compromising covert posture.
- Sort targets within sufficient range for intercept to occur in all weather conditions.
- Intercept known suspects.

Boarding

- Compel vessels, using minimum force necessary, to allow LE boarding team to board at sea.

- Provide a command presence/cover for boarding team.
- Place boarding team, consisting of four to eight persons, safely aboard vessels of interest, day or night in all weather conditions.
- Equip and transfer boarding team with 10-12 lbs boarding kit.
- Conduct simultaneous boardings in close proximity. A close proximity may be defined as the area in which the parent unit may maintain positive and effective control.
- Board vessels in High Threat Areas.
- Board vessels in Low Threat Areas.
- Use sensor technology (both installed and exportable) to warn of hazardous atmospheres or exposures to hazardous materials.

Custodial Functions

- Escort vessels of any size and tow vessels of up to 200ft in length.
- Provide custody crews to operate seized vessels.

Command & Control

- Transmit and receive secure voice and data in real or near real time.
- Access Coast Guard LE, and other agency LE databases in near real time.
- Communicate in real or near real time, in all modes (voice, data, video), with CG resources and all appropriate federal, state and local agencies and the maritime public while conducting operations.
- Provide data link for transmission of sensor, voice, tactical display, and record traffic between the Operational Commander and the On Scene Commander as well as other friendly forces in near real time.
- Monitor fishing vessels' transponders in real time.
- Maintain simultaneous real time secure or protected communications with Operational Commander and other Coast Guard and federal agency assets.

Commander Task Unit (CTU) Functions

- Conduct a boarding with own forces while simultaneously monitoring a boarding conducted by other forces.
- Accommodate a CTU staff of up to four persons for periods of up to 30 days.
- Provide support and accommodations for up to six representatives of other agencies/friendly forces (Customs/State/INS/NMFS) for periods of up to 21 days.

ALIEN MIGRATION INTERDICTION OPERATIONS FUNCTIONAL REQUIREMENTS

In order to conduct AMIO effectively, the Coast Guard must have the capability to:

Intelligence

- Access accurate intelligence which provides position, course, speed and description of target, and specifies the age and accuracy of this information.
- Access intelligence in near real time via a secure conduit.

Deterrence

- Make contact with threat profile traffic in AMIO high threat areas. (Contact may be defined as being identified as a Coast Guard resource by the subject target.)
- Board vessels detected and determined to be Targets of Interest.

Surveillance

- Detect and track (both passively and actively) targets in high threat areas, from a single person in an innertube to an 100+ft wooden or steel freighter, as well as sailboats of all sizes and construction.
- Detect vessels day or night in all weather conditions.
- Remain on scene in any weather for periods of up to 30 days.

Sort and Intercept

- Provide link between the Operational Commander and the On Scene Commander, enabling the exchange of information required to define which targets are of interest and which are not.
- Intercept and interdict targets suspected of migrant smuggling activity as far from the U.S. as possible in all weather conditions.
- Sort targets within sufficient range for intercept to occur outside of U.S. waters in all weather conditions.
- Intercept known illegal immigration suspects detected.

Boarding

- Compel vessels, using minimum force necessary, to allow LE boarding team to board at sea.
- Provide a command presence/cover for boarding team.

- Place boarding team, consisting of four to eight persons, safely aboard vessels of interest, day or night in all weather conditions.
- Equip and transfer boarding team, including 10 to 12 pound boarding kit.
- Conduct simultaneous boardings in close proximity. A close proximity may be defined as the area in which the parent unit may maintain positive and effective control.
- Use sensor technology (both installed and exportable) to warn of hazardous atmospheres or exposures to hazardous materials.

Custodial Functions

- Escort vessels of any size and tow vessels of up to 200ft in length.
- Provide custody crews to operate seized vessels.
- Support and transport up to 300 migrants at sea for periods of up to 72 hrs.
- Support and transport up to 150 migrants at sea for periods of up to four weeks.
- Provide food, water, shelter, and sanitation requirements to migrants, separate from own forces' facilities.
- Provide custody crews, from own crew or embarked personnel, to provide security over migrants.
- Transfer personnel, unfamiliar with at-sea evolutions, and large quantities of food and supplies, to and from migrant vessels at sea.
- Provide basic medical services for migrants and crew.

Command & Control

- Transmit and receive secure voice and data in real or near real time.
- Access Coast Guard LE, and other agency LE databases in near real time.
- Communicate in real or near real time, in all modes (voice, data, video), with CG resources and all appropriate federal, state and local agencies and the maritime public while conducting operations.

- Provide datalink for transmission of sensor, voice, tactical display, and record traffic between the Operational Commander and the On Scene Commander as well as other friendly forces in near real time.
- Maintain simultaneous real time secure or protected communications with Operational Commander and other Coast Guard and federal agency assets.

Commander Task Unit (CTU) Functions

- Conduct a boarding with own forces while simultaneously monitoring a boarding conducted by other forces.
- Accommodate a CTU staff of up to four persons for periods of up to 30 days.
- Provide command and control support for embarked staff without negatively impacting unit's independent communications and command and control functions.
- Provide support and accommodations for up to six representatives of other agencies/friendly forces (Customs/State/INS) for periods of up to 30 days.
- Monitor, track, and coordinate activities of other CG and friendly assets, both air and surface.

APPENDIX B

FUNCTIONAL REQUIREMENTS FOR MARITIME SAFETY MISSIONS

DEEPWATER SAR FUNCTIONAL REQUIREMENTS

In order to fulfill our Search and Rescue responsibilities effectively in the Deepwater environment, the Coast Guard must have the capability to:

Mission Prosecution - Upon notification of distress:

- Arrive on scene as quickly as possible.
- Transit to location of distress in all weather conditions.
- Determine and control own unit's position to within 500 yards so as to conform to SAR Action Plan.
- Search area of distress with 90% Probability of Detection for search objects as small as a four man raft, in weather conditions up to Sea State 5.
- Conduct On Scene Commander (OSC) functions, including coordination of Search and Rescue Unit (SRU) response, monitoring of SRU performance, adoption of SAR Action Plan to on scene conditions and incident developments, and communicating with the SAR Mission Coordinator in real time.
- Deploy Datum Marker Buoys.
- Render medical assistance to survivors.
- Render firefighting assistance to save life at sea but limited to avoid unnecessary risk in property saving efforts.
- Render emergency repair assistance to distress craft.
- Deliver necessary medical supplies to survivors, and Rescue & Assistance (firefighting, dewatering, repair) supplies to stricken vessels in all weather conditions.
- Transfer personnel, unfamiliar with at-sea evolutions, from distressed vessels at sea.
- Provide food, water, shelter, and sanitation requirements until survivors are transported ashore.
- Render towing assistance to disabled vessels of up to 3000 gross tons.

- Locate local assets of opportunity (communicate/ coordinate) w/command and control, receive all distress (and urgent marine information broadcasts, safety, etc.,) calls properly broadcast, communicate with party(s) in distress (and friendly forces), establish position or lob on all international distress (calling, homing) and national distress (calling and homing) frequencies.
- Mark/remove/sink/destroy hazards to navigation.

Command & Control

- Receive all distress calls properly broadcast within the boundaries of U.S. Maritime SAR Area or areas where CG assets may be employed on other missions.
- Communicate with party(s) in distress in real time, in accordance with international SAR standards.
- Detect/recognize international distress signals, and differentiate between legitimate distress traffic and hoaxes.
- Establish position or a LOB on all International Distress frequencies.
- Communicate in real or near real time with local assets to coordinate non-Coast Guard direct assistance.
- Conduct data search for non-Coast Guard assets known to be operating near the search area, and communicate with those assets in real time.
- Communicate in real or near real time, in all modes (voice, data, video), with CG resources and all appropriate federal, state and local agencies and the maritime public while conducting operations.
- Develop, coordinate and communicate Search Action Plan to units on scene.
- Access, in real time, all data bases necessary to prosecute case.

INTERNATIONAL ICE PATROL FUNCTIONAL REQUIREMENTS

In order to carry out its International Ice Patrol responsibilities effectively, the Coast Guard must have the capability to:

Surveillance

- Provide surveillance over an area measuring approximately 63,000 square nautical miles (700 nm limit X 90 nm swath) along the Limits of All Known Ice a minimum of every two weeks.

Detect, identify, and accurately position glacial ice targets as small as three x four meters in dimension in all weather conditions, day or night, up to Sea State 4.

Oceanographic Data Collection

- Determine oceanic surface current speed and direction in order to provide inputs for iceberg drift and deterioration modeling.
- Determine oceanic bathythermographic profiles.
- Perform oceanographic research including Expendable Conductivity Temperature Detector casts up to 700 miles offshore.

Command & Control

- Provide two-way voice communications, up to seven hundred nautical miles offshore, between the embarked Ice Reconnaissance Detachment (IceRecDet) and the International Ice Patrol headquarters.

Support

- Transport up to 3000 pounds of IIP materials/equipment from International Ice Patrol headquarters.

DATA BUOY SUPPORT FUNCTIONAL REQUIREMENTS

In order to provide support to the National Data Buoy Office effectively, the Coast Guard must have the capability to:

Prosecution

- Respond within 48 hours to data buoys which have been set adrift due to mooring failure or loss.
- Locate and secure off-station data buoys in order to prevent their grounding, destruction, or loss.
- Respond to unscheduled data buoy service requests (discrepancy response) within 21 days as practicable within constraints of other Coast Guard mission priorities.
- Lift and carry data buoys weighing 10 tons or less in weather conditions up to Sea State 4. (Many NDBC deepwater missions are in-water service only, and do not require towing, lifting, or carrying buoys)
- Tow data buoys weighing 95 tons and smaller.
- Transport up to 3 persons and up to 600 pounds of equipment to a data buoy in weather conditions up to Sea State 4.

Navigation

- Determine the moored position of data buoys to within 1 NM accuracy when the buoy station is greater than 50 NM offshore, and within 1/4 NM accuracy when the buoy is within 50 NM of shore.
- Sound ocean bottom depths with a recording depth sounder in depths up to 20,000 feet when deploying buoys.

Command & Control

- Provide two-way communications (voice and data) in real time, up to six hundred miles offshore, between the embarked National Data Buoy Center (NDBC) field team and the NDBC data analysts located at Stennis Space Center, Bay St. Louis, Mississippi.

Support

- Provide berthing and messing for as many as three people comprising the NDBC field team, for sorties of up to six days.
- Transport up to 6000 pounds of NDBC materials/equipment to support a buoy deployment/exchange operation, and up to 600 pounds for a buoy service (non-heavy lift) operation.

APPENDIX C

FUNCTIONAL REQUIREMENTS FOR NATIONAL DEFENSE MISSIONS

MARITIME INTERCEPTION OPERATIONS FUNCTIONAL REQUIREMENTS

In order to conduct MIO effectively, the Coast Guard must have the capability to:

Command & Control

- Be interoperable with DOD forces including C4I and intelligence processing systems that are compatible with DOD forces.
- Exercise command and control of own unit operations and multi-national operations (CG, DOD, NATO, and similar coalitions) using a real time data link geographic/tactical display.
- Maintain a tactical link, interoperable with DOD and allied systems, capable of real time passing of information.
- Monitor and display geographical tracks of friendly, neutral, and hostile forces.
- Communicate with own service units, DOD resources, NATO forces, and other federal agencies by voice or data, secure and clear in real or near real time.
- Perform Aircraft Control Unit (ACU) duties for aircraft involved in ASU operations.
- Provide command and control support for embarked staff without negatively impacting unit's independent communication and command and control functions.

Warfighting

- Conduct shipboard helicopter operations.
- Detect, identify, localize, and track surface targets.
- Engage surface threats with antisurface armament, as established ROE permit.

Intelligence

- Collect, process, and disseminate all source intelligence to collection centers/command centers.
- Access, store, process, manipulate, and cross-reference information from intelligence databases.

- Fuse local tactical information with database information in near real time.
- Access intelligence in near real time via a secure conduit.
- Maintain appropriate (SECRET-high) interoperability with DOD intelligence systems.

Surveillance

- Detect vessels day or night in all weather conditions
- Board all detected Targets of Interest

Sort and Intercept

- Sort targets of interest from targets not of interest.
- Sort targets within sufficient range for intercept to occur in all weather conditions while still on the high seas or in area designated for intercept and boarding.

Boarding

- Conduct boardings/searches of vessels to determine cargo type and determine whether or not cargo meets sanction guidelines.
- Compel vessels, using minimum force necessary, to allow boarding team to board at sea.
- Provide a command presence/cover for boarding team.
- Place boarding team, consisting of four to eight persons, safely aboard vessels of interest, day or night in all weather conditions.
- Equip and transfer boarding team with 10-12 lbs boarding kit.
- Divert or seize vessels determined to be in violation of sanction guidelines.

Custodial Functions

- Escort vessels of any size and tow vessels of up to 200ft in length.
- Provide custody crews to operate or control seized vessels.
- Provide custody crews, from own crew or embarked personnel, to provide security over seized vessel crew.

DEPLOYED PORT OPERATIONS, SECURITY AND DEFENSE FUNCTIONAL REQUIREMENTS

In order to conduct DPOSD effectively, the Coast Guard must have the capability to:

Command & Control

- Be interoperable with DOD forces including C4I and intelligence processing systems that are compatible with DOD forces.
- Exercise command and control of own unit operations and multinational operations (CG, DOD, NATO, and similar coalitions) using a real time data link geographic/tactical display.
- Maintain a tactical link, interoperable with DOD and allied systems, capable of real time passing of information.
- Monitor and display geographical tracks of friendly, neutral, and hostile forces.
- Communicate with own service units, DOD resources, NATO forces, and other federal agencies by voice or data, secure and clear.
- Perform Aircraft Control Unit (ACU) duties for aircraft involved in ASU operations.
- Provide command and control support for embarked staff without negatively impacting unit's independent communication and command and control functions.

Warfighting

- Detect (both passively and actively), identify (both covertly and openly), localize, and track surface targets.
- Engage surface threats with antisurface armament, as established ROE permit.
- Provide for safe and efficient operation of all vessels as they transit designated harbors.
- Provide waterside protection to key port assets, i.e. piers, buildings, or high value vessels.
- Conduct coastal sea control patrols to enforce security perimeter around designated ports.
- Conduct search and rescue (SAR) operations.
- Operate in U.S. territorial waters under direction of a Coast Guard or Maritime Defense Zone (MDZ) Command, or in foreign waters as part of the Harbor Defense Command within the Naval Coastal Warfare structure.

Intelligence

- Collect, process, and disseminate all source intelligence to collection centers/command centers.
- Access, store, process, manipulate, and cross-reference information from intelligence databases.
- Fuse local tactical information with database information in near real time.
- Access intelligence in near real time via a secure conduit.
- Maintain appropriate (SECRET-high) interoperability with DOD intelligence systems.

Logistics

- Operate independently without replenishment (except fuel) for periods of up to 45 days.
- Provide basic logistical/support services to subordinate units for periods of up to 45 days.
- Provide in-theater transport and support of Harbor Defense Commands and deployed PSUs.

Surveillance

- Conduct surveillance and reconnaissance.
- Detect vessels day or night in all weather conditions.

Sort and Intercept

- Sort targets of interest from targets not of interest.
- Sort targets within sufficient range for intercept to occur before the vessel threatens the safety of the port.

GENERAL DEFENSE OPERATIONS FUNCTIONAL REQUIREMENTS

In order to conduct General Defense Operations effectively, the Coast Guard must have the capability to:

Command & Control

- Be interoperable with DOD forces including C4I and intelligence processing systems that are compatible with DOD forces.
- Exercise command and control of own unit operations and multinational operations (CG, DOD, NATO, and similar coalitions) using a real time data link geographic/tactical display.
- Maintain a tactical link, interoperable with DOD and allied systems, capable of real time passing of information.
- Monitor and display geographical tracks of friendly, neutral, and hostile forces.
- Communicate with own service units, DOD resources, NATO forces, and other federal agencies by voice or data, secure and clear.
- Perform Aircraft Control Unit (ACU) duties for aircraft involved in ASU operations.
- Implement Operations Security (OPSEC) measures and conduct deception operations.
- Provide command and control support for embarked staff without negatively impacting unit's independent communication and command and control functions.

Intelligence

- Collect, process, and disseminate all source intelligence to collection centers/command centers.
- Access, store, process, manipulate, and cross-reference information from intelligence databases.
- Fuse local tactical information with database information in near real time.
- Access intelligence in near real time via a secure conduit.
- Maintain appropriate (SECRET-high) interoperability with DOD intelligence systems.

Warfighting

- Prevent and control damage to own unit.

- Provide anti-air defense of own ship in cooperation with other forces.
- Detect, identify, and track air targets.
- Engage airborne threats using surface-to-air armament.
- Provide anti-surface ship defense for own ship and support anti-surface ship defense of a geographic area in cooperation with other forces.
- Detect, identify, localize, and track surface ship targets.
- Engage surface threats with anti-surface armaments.
- Disengage, evade, and avoid surface attack.
- Conduct shipboard helicopter operations.
- Conduct helicopter in flight refueling operations.
- Provide control for air operations in support of antisurface attack operations.
- Collect, process, disseminate all source intelligence to collection centers/command centers.
- Conduct Electronic Support Measures (ESM) operations in support of own unit.
- Conduct Electronic Countermeasures (ECM) operations in support of own unit.
- Conduct Electromagnetic Acoustic Emission Control (EMCON) operations in support of own unit.
- Conduct towing/search/salvage/rescue operations.
- Conduct intercept, stop, board, and seizure operations on vessels.
- Conduct search and rescue (SAR) operations in a combat/noncombat environment.
- Support/conduct/provide intelligence collection.
- Conduct surface and air surveillance and reconnaissance.
- Conduct magnetic silencing.

Logistics

- Operate independently without replenishment (except fuel) for periods of up to 45 days.

- Conduct at sea replenishment operations.
- Provide fuel and support services for an embarked helicopter to operate for 45 days.
- Provide adequate health care in order to operate independently for periods of up to 45 days.
- Provide basic logistical/support services to subordinate units for periods of up to 45 days.
- Provide berthing and messing for an embarked squadron staff, other official advisors, and/or augmenting boarding team members.
- Provide first aid assistance, triage, and resuscitation.
- Conduct routine underway marine science observations (i.e. temperature, sea state, visibility, water temperature etc.), in support of DOD operations.
- Support/provide for the evacuation of combatant and non-combatant personnel in areas of civil or international crisis.

APPENDIX D

FUNCTIONAL REQUIREMENTS FOR MARINE ENVIRONMENTAL PROTECTION MISSIONS

MARPOL FUNCTIONAL REQUIREMENTS

In order to conduct our MARPOL enforcement responsibilities effectively, the Coast Guard must have the capability to:

Threat Monitoring

- Monitor threat areas up to 200 nautical miles offshore for periods of at least 48-72 hours. Threat areas could, on limited occasions, be located further than 200NM offshore.
- Detect and monitor 100% of the vessels within assigned threat areas, with ability to determine vessel type, course, and speed, for periods of up to 48 hours.
- Monitor vessels visually within 30 minutes of their detection.
- Identify vessels as they are underway, in all weather conditions.
- Detect garbage in the water, as small as 1.5 cubic meters, in all weather conditions.
- Detect and determine the size of oil and hazardous material discharges in all weather conditions.
- Receive reports of possible pollution incidents in near real time, analyze data, and investigate on scene conditions.

Command & Control

- Receive vessel/pollution information from data bases of other national assets in near real time.
- Communicate in near real time, in all modes (voice, data, video), with CG resources and all appropriate federal, state and local agencies and the maritime public while conducting operations.
- Conduct secure communications with Coast Guard assets and other federal, state, and local agencies.
- Communicate via voice with merchant vessels in accordance with GMDSS standards.
- Transmit and receive documents/data between on scene units and command centers in near real time.

- Access, near real time, all appropriate data systems.
- Conduct On Scene Commander (OSC) functions, including determining appropriate response to pollution incidents and coordinating the operations of on scene assets.
- Provide command and control support for embarked Federal On Scene Coordinator (FOSC) staff without negatively impacting unit independent communication and command and control functions.

Inspection

- Board all designated targets of interest, in all weather conditions.
- Conduct onboard inspections of merchant vessels, including documents, machinery, garbage, sewage, navigation, and ship operations.
- Place a boarding team consisting of up to 12 persons and 150 pounds of inspection equipment on a vessel in all weather conditions up to sea state 4.
- Detect hazardous atmospheres or exposure to hazardous materials.
- Provide adequate on scene risk assessments to prevent unnecessary personnel exposure to hazardous materials.
- Protect all personnel on scene from food, water, and blood borne pathogens.

Mission Support

- Provide sufficient support, including berthing and messing, for up to 12 deployed personnel on scene for up to 48 hours.
- Provide adequate shelter, sanitation, food, etc. for 20 non-Coast Guard personnel for a period of 72 hours.

Case Prosecution

- Provide Level A hazardous material response up to 200 nautical miles offshore.
- Obtain oil and hazardous material samples, properly handle them, and have analysis results with 48 hours of incident.
- Conduct on scene sobriety tests on crew members involved in maritime incident.

LIGHTERING ZONE ENFORCEMENT FUNCTIONAL REQUIREMENTS

In order to conduct our Lightering Zone enforcement responsibilities effectively, the Coast Guard must have the capability to:

Threat Monitoring

- Monitor threat areas up to 50-100NM offshore for periods of at least 48-72 hours.
- Monitor vessels visually within 30 minutes of their detection.
- Identify vessels, as they are underway, in all weather conditions.

Command & Control

- Conduct secure communications with Coast Guard assets and other federal, state, and local agencies.
- Communicate in near real time, in voice, data, and video modes, with Coast Guard resources and other federal, state, and local agencies and the maritime public while on scene in lightering zones.
- Communicate via voice with merchant vessels in accordance with GMDSS standards.
- Transmit and receive documents/data between on scene units and command centers in near real time.
- Access, near real time, all appropriate data systems.

Inspection

- Board all designated targets of interest, in all weather conditions.
- Conduct inspections of merchant vessels, including documents, machinery, garbage, sewage, navigation, and ship operations within 2 hours of identification of vessel as target of interest.
- Place a boarding team consisting of up to 12 persons and 150 pounds of inspection equipment on a vessel in all weather conditions up to sea state 4.
- Detect hazardous atmospheres or exposure to hazardous materials.
- Provide adequate on scene risk assessments to prevent unnecessary personnel exposure to hazardous materials.

- Protect all personnel on scene from food, water, and blood borne pathogens.

Case Prosecution

- Provide Level A hazardous material response up to 200 nm offshore.
- Conduct on scene sobriety tests on crew members involved in maritime incident.

Mission Support

- Provide sufficient support, including berthing and messing, for up to 16 deployed personnel making up confined space entry team.
- Provide adequate shelter, sanitation, and food for up to 20 non-Coast Guard personnel for periods of up to 72 hours.

FOREIGN VESSEL INSPECTION FUNCTIONAL REQUIREMENTS

In order to conduct our Foreign Vessel Inspection responsibilities effectively, the Coast Guard must have the capability to:

Threat Monitoring

- Monitor threat areas up to 50-200NM offshore for periods of at least 48-72 hours.
- Monitor vessels visually within 30 minutes of their detection.
- Identify vessels, as they are underway, in all weather conditions.

Command & Control

- Receive vessel information from data bases of other national assets in near real time.
- Conduct secure communications with Coast Guard assets and other federal, state, and local agencies.
- Communicate in near real time, in voice, data, and video modes, with Coast Guard resources and other federal, state, and local agencies and the maritime public while on scene in lightering zones.
- Communicate via voice with merchant vessels in accordance with GMDSS standards.
- Transmit and receive documents/data between on scene units and command centers in near real time.
- Access, near real time, all appropriate data systems.

Inspection

- Board designated targets of interest, weather permitting, or prevent entry into U.S. waters until boarding is conducted.
- Conduct inspections of merchant vessels, including documents, machinery, garbage, sewage, navigation, and ship operations.
- Place a boarding team consisting of up to 12 persons and 150 pounds of inspection equipment on a vessel in all weather conditions up to sea state 4.
- Detect hazardous atmospheres or exposure to hazardous materials.

- Provide adequate on scene risk assessments to prevent unnecessary personnel exposure to hazardous materials.
- Protect all personnel on scene from food, water, and blood borne pathogens.

Mission Support

- Provide sufficient support, including berthing and messing, for up to 16 deployed personnel making up confined space entry team.
- Provide adequate shelter, sanitation, food, etc. for 20 non-Coast Guard personnel for a period of 72 hours.

Case Prosecution

- Provide Level A hazardous material response up to 200 nm offshore.
- Conduct on scene sobriety tests on crew members involved in maritime incident.

APPENDIX E

BIBLIOGRAPHY

References, background materials, previous studies, and other supporting documents.

Instructions/Orders/Regulations/Manuals

- U.S. Coast Guard. COMDTINST 16000.26 "Business Plan for Marine Safety, Security and Environmental Protection". 26 January 1994.
- U.S. Coast Guard. COMDTINST 5280.1 "Mission Analysis Policy". 9 January 1995.
- U.S. Coast Guard. HQINST 16050.1 "Mission Analysis Reports". 21 August 1992.
- U.S. Coast Guard. COMDTINST 7132.1 "U.S. Coast Guard Capital Investment Plan". 10 February 1995
- U.S. Coast Guard. COMDINST 16010.12 "The Commandant's Direction". 10 August 1994
- U.S. Coast Guard. COMDTINST M3100.5 "Cutter Employment Standards". 22 July 1991.
- U.S. Coast Guard. "Aviation Management Plan FY-95". 08 March 95.
- U.S. Coast Guard. COMDTINST M16120.5A "National Search and Rescue Manual". 01 February 1991
- U.S. Coast Guard. COMDTPUB P16107 "SAR STATISTICS FY1989-1994".
- U.S. Coast Guard. COMDTINST M5000.3B "Coast Guard Regulations".

Program Descriptions/Directions

- U.S. Coast Guard. "Maritime Law Enforcement Program Description". 24 July 1995.
- U.S. Coast Guard. "ELT Surveillance Requirements Document". 01 May 1995.
- U.S. Coast Guard. "Program Direction for the ELT Program". 27 December 1994.
- U.S. Coast Guard. "Program Description for the U.S. Coast Guard Intelligence Program". September 1993.
- U.S. Coast Guard. "Program Direction for the Intelligence Program". 17 November 1993.
- U.S. Coast Guard. "Program Description Short Range Aids to Navigation". 6 December 1993.

U.S. Coast Guard. "Program Direction for Short Range Aids to Navigation". 30 October 1992.

U.S. Coast Guard. "Office of Engineering, Logistics and Development Program Description for the Engineering Program and Research and Development Program FY-1996". 01 October 1993.

U.S. Coast Guard. "Office of Engineering, Logistics and Development Program Direction for the Engineering Program FY-1996". 17 December 1993.

U.S. Coast Guard. "Office of Engineering, Logistics and Development Program Direction for the Research and Development Program FY-1996". 01 October 1993.

U.S. Coast Guard. "Command, Control and Communications Program Description FY 1994". 01 October 1993.

U.S. Coast Guard. "Program Direction for Command, Control, Communications, and Information Technology Support Program". 23 October 1993.

U.S. Coast Guard. "Program Description for Defense Operations Program". 24 September 1993.

U.S. Coast Guard. "Program Direction for Defense Operations Program". 30 October 1992.

U.S. Coast Guard. "Port Safety and Security Program Program Description FY 1992-96". 17 November 1989.

U.S. Coast Guard. "Ice Operations Program Description".

U.S. Coast Guard. "Program Direction for Ice Operations".

Coast Guard Letters/Memos/Reports

Commander, Eleventh Coast Guard District. "1994 Eleventh District Law Enforcement Threat Assessment". 6 December 1993.

Commander, Eleventh Coast Guard District. "Operation Crystal Ball Report". 5 June 1995.

Commander, Thirteenth Coast Guard District. "1994 Law Enforcement Threat Assessment". 30 November 1993.

Commander, Fourteenth Coast Guard District. "Law Enforcement Threat Assessment". 02 December 1993

Commander, Seventeenth Coast Guard District. "USCG District Seventeen Fisheries Threat Assessment 1994". 1994.

U.S. Coast Guard. "USCG Migrant Interdiction Mission Assessment". 27 January 1995.

Commander Seventh Coast Guard District. "CCGDSEVEN Strategic Deployment Initiative".

U.S. Coast Guard, Strategic Planning Staff. "Economic Scan 2015". 1995.

U.S. Coast Guard, Strategic Planning Staff. "Technology Scan 2015". 1995.

U.S. Coast Guard, Strategic Planning Staff. "Environmental Trends 2015". 1995.

U.S. Coast Guard, Strategic Planning Staff. "Societal and Demographic Trends 2015". 1995.

U.S. Coast Guard, Strategic Planning Staff. "International and Domestic Scan 2015". 1995.

U.S. Coast Guard, Office of Acquisition. "WHEC/WMEC Replacement Project Costs". 30 May 1995

U.S. Coast Guard. Office of Engineering, Logistics and Development "HEC/MEC Rough Order of Magnitude Cost Estimate". 31 May 1995.

Commander, Coast Guard Pacific Area ltr 3200, dtd 13JUL95, Subj: Review of Final Draft of Deepwater Mission Analysis Report.

Commander, Coast Guard Atlantic Area ltr 3200, dtd 03JUL95, Subj: Review of Final Draft of Deepwater Mission Analysis Report.

Contracted Studies/Reports

Naval Undersea Warfare Center. "Coast Guard Mission Analysis Data Collection Report". 30 December 1994.

Naval Undersea Warfare Center. "Coast Guard Mission Analysis Data Collection Report, Appendix A Coast Guard Mission Demand Inputs". 30 December 1994.

Naval Undersea Warfare Center. "Coast Guard Mission Analysis Data Collection Report, Appendix B Target Density Estimation Data". 30 December 1994.

Naval Undersea Warfare Center. "Coast Guard Mission Analysis Data Collection Report, Appendix C Helicopter-Capable Cutters Tactics Questionnaire Analysis". 30 December 1994.

Naval Undersea Warfare Center. "Coast Guard Mission Analysis Data Collection Report, Appendix D Non-Helicopter-Capable Cutter Tactics Questionnaire Analysis". 30 December 1994.

Naval Undersea Warfare Center. "Coast Guard Mission Analysis Data Collection Report, Appendix E Aircraft Tactics Questionnaire Analysis". 30 December 1994.

Naval Undersea Warfare Center. "Coast Guard Mission Analysis Data Collection Report, Appendix F Sample Questionnaires". 30 December 1994.

Naval Undersea Warfare Center. "Coast Guard Mission Analysis Data Collection Report, Appendix G Field Interview Results". 30 December 1994.

Naval Undersea Warfare Center. "U.S. Coast Guard Mission Effectiveness Modeling and Analysis". 28 April 1995.

Conklin and Decker Associates, Arlington TX. "HH65 and HC130 Cost Benefit Analyses and HU25 Market Analysis". 4 May 1995.

The Arlington Institute Contract No. DTOS59-91-R-00190, Task No. 8, dtd March 1993. "The Road to 2012: Looking toward the next two Decades."

MicroSystems Integration, Inc and Battelle Ocean Sciences Contract No. DAAL03-91-C-0034 TCN Number 92-342, dtd June 1993. "Coast Guard Fisheries Enforcement Strategy Study Report".

Department of Defense. "Report of the Commission on Roles and Missions of the Armed Forces". 24 May 1995.

Miscellaneous

U.S. Department of Transportation. "Literature Survey for Drug Interdiction Measures of Effectiveness". 5 April 1994.

Office of Management and Budget. Circular No. A-109 "Major System Acquisitions". 5 April 1976.

U.S. Coast Guard. "NOAA/USCG Memorandum of Agreement". 27 March 1972.

U.S. Coast Guard. "NDBC/USCG Working Agreements". 7 September 1993.

U.S. Coast Guard. "U.S. Coast Guard Cutters Abstract of Operations Report FY1989-1994".

U.S. Coast Guard. "Memorandum of Agreement between the Department of Defense and the Department of Transportation on the Use of U.S. Coast Guard Capabilities and Resources in Support of the National Military Strategy". 03 October 1995.

U.S. Coast Guard. *Commandant's Bulletin*, "Four Primary Missions". January 1995.

Department of Defense. "National Military Strategy of the United States of America 1995".

National Defense University Press. "Castro's Ploy-America's Dilemma: The 1980 Cuban Boatlift". December 1988.
Author- Alex Larzelere.

United States Government Printing Office. "Rum War at Sea". 1964.
Author- Malcom F. Willoughby, CDR, USCGR(T).

U.S. Coast Guard. "The United States Coast Guard in South East Asia During the Vietnam Conflict". 1986.
Author- Lt. Eugene N. Tulich.

U.S. Coast Guard. "Rum War The U.S. Coast Guard and Prohibition".
Author- Donald L. Canney.