United States Coast Guard Integrated Deepwater System (IDS)

Report to Congress on the Feasibility of Accelerating the Integrated Deepwater System

Purpose: This paper addresses acceleration of the present IDS implementation schedule from 20 years to 10 years and the associated benefits and impacts of that acceleration. It frames the issues and addresses factors such as feasibility, impact on resources, and the benefits of increased capabilities, readiness, and efficiencies. A notional "plan" is presented to assess these factors.

Background: The Coast Guard's Request for Proposal (RFP) for the Integrated Deepwater System stated, *"The Government will award to the Offeror whose proposal offers the best value in terms of Operational Effectiveness, Total Ownership Cost, Management Capability and Technical Feasibility. ..."* The Coast Guard published two procurement documents for guidance: the System Performance Specification (SPS) and the Modeling and Simulation Master Plan (MSMP). Simply stated, the SPS described the capabilities the system needed, and the MSMP provided extensive background data on missions (in 1998 terms), mission requirements, assets, and the operational standard by which the future system would perform.

Proposed Funding: The IDS solution proposed was the result of numerous iterations in design that spanned nearly four years - developed in Phase 1 (Concept and Functional Design) and refined in Phase 2 (RFP). The design's specifications and requirements consistently considered the system's operational effectiveness and total ownership cost. As further guidance, the Coast Guard provided notional funding profiles for capital acquisition costs (CA), and operation and maintenance costs (OE). The CA notional prime contractor funding level was set at $300 million for FY02 and $500 million (in FY98 dollars) for the remaining years of the implementation schedule. The CA prime contract funding did not include government program management costs. The OE funding level was set at $996 million (in FY98 dollars).

Figure 1 (Table of CA and OE Funding Requirements) represents the present funding levels needed to execute the system's integrator, Integrated Coast Guard System (ICGS), implementation plan in 20 years. These figures represent funds in "then-year" dollars needed for the prime contractor and government program management.

Funding Received or Expected: The fiscal year 2002 appropriations provided $320 million for the IDS project of which $30 million funded Government program management. The President's fiscal year 2003 and 2004 budget requests each provide $500 million for IDS with $30 million and $34 million respectively planned for Government program management.

Based on a funding profile of $500 million annually in "then-year dollars" vice $500 million FY98 dollars adjusted for inflation, the full implementation of the IDS is 27 years. A longer implementation schedule dictates legacy assets remain in operation an extended period and well beyond most of their programmed service life. Maintenance and support data indicates that costs to operate, maintain and support legacy surface and air platforms continue to escalate. Some legacy assets, such as the HH-60J medium range search helicopter and 270-foot Medium Endurance cutter, will require major service life extension projects (SLEPs) in an extended implementation scenario. The potential exist that more capital improvement funding will be needed to sustain legacy assets and less funding will be available for new assets.

Discussion: Following the terrorist attacks of September 11, 2001, both the Bush administration and Congress identified homeland security as a top priority. The effective capability and presence of the Integrated Deepwater System supports and benefits not just non-homeland security missions (e.g., Search and Rescue, Marine Environmental Protection, and others) but also a wide range of missions associated with Homeland Security, including Alien Migrant and Drug Interdiction. The various, multi-mission assets that comprise the Integrated Deepwater System will allow the Coast Guard to push America's borders out with a layered defense critical to Maritime Domain Awareness, a key element of Homeland Security. This concept of operations provides multiple opportunities in multiple geographic layers – to detect and interdict terrorist activity as far at sea as possible to the ports, coastal approaches and the Marine Transportation System (MTS).

Assumptions: In assessing the benefits, resource implications, and impacts associated with accelerating Deepwater, the following assumptions and conditions were established:

- Full implementation of the present IDS system (exclusive of new requirements) would be achieved in 10 years.
- The production schedule is achievable and realistic.
- The procurement of the accelerated system begins in FY02 and ends in FY11, while the delivery of assets extends to FY13.
- Workforce and facility upgrades were adjusted to maintain operational effectiveness.

A. FEASIBILITY OF ACCELERATING THE RATE OF PROCUREMENT IN THE COAST GUARD'S INTEGRATED DEEPWATER SYSTEM FROM 20 YEARS TO 10 YEARS

In determining the feasibility of accelerating the Integrated Deepwater System, two issues must be addressed – ability for the contractor and the government to support an accelerated implementation schedule, and the reasonableness of accelerating IDS.

1. Are the government and the contractor capable of acceleration?

The 10-year acceleration plan proposes concurrent design and construction of the three cutter classes - National Security Cutters (NSCs), Offshore Patrol Cutters (OPCs), and Fast Response Cutters (FRCs) - using multiple shipyards. Integrated Coast Guard Systems (ICGS), a joint venture between Lockheed Martin and Northrop Grumman Ship Systems, has teamed with various subcontractors, including Halter–Bollinger, the contractor that produced the 110-foot Island Class cutters and is constructing the 87-foot Coastal Patrol boats. ICGS has reviewed the industrial shipbuilding capacity inherent in Northrop Grumman and Halter-Bollinger and has determined there is sufficient capacity to simultaneously design and construct these three cutter classes.

The aviation assets - Vertical Unmanned Aerial Vehicle (VUAV), Maritime Patrol Aircraft (MPA), Vertical Take-off and Landing Recovery and Surveillance Aircraft helicopter (VRS), and Multi-Mission Cutter Helicopter (MCH) – will be designed and manufactured by a variety of subcontractors, with no single contractor responsible for production of more than one asset. ICGS has proposed Bell Helicopter Textron to manufacture the VUAV, EADS CASA for the MPA, Bell-Augusta Aerospace to produce the VRS, and EADS Euro copter to upgrade the current HH-65A to the MCH.

As such, ICGS and the Coast Guard are confident that the industrial base has the capacity to implement this acceleration plan.

The next issue is determining the Coast Guard's ability to support the acceleration of the IDS. The greatest impact to the Coast Guard in accelerating IDS will be in workforce management (including training and training support) and facilities. Each of these issues and acceptable solutions are addressed in later sections of this report.

2. Is it reasonable and suitable to accelerate IDS?

<u>Deepwater is a key contributor to Maritime Homeland Security (MHLS)</u>

Accelerating the IDS provides the Coast Guard the means to make Homeland Security improvements sooner. The IDS was formulated using a C4ISR network centric "common operational picture" that is key to Maritime Domain Awareness (MDA). Maximizing operational effectiveness, a pillar of this project since inception and well before September 11th, offers great value and is essential to the performance of homeland security missions. IDS will replace and modernize the Coast Guard's aging and obsolete fleet and support systems into a more capable and network-central system, necessary for MHLS.

The Coast Guard's MHLS Strategy is built on the main pillars of preventing terrorist attacks, reducing U.S. vulnerabilities to attack, protecting maritime borders, ports, and coastal approaches, protecting the U. S. Marine Transportation System (MTS), and recovering from those attacks should they occur. This strategy, supported with much-needed resources, will provide critical security improvements across the full spectrum of potential threats to the maritime domain. Executing this mission is crucial since more than 95 percent of all overseas products and materials, by volume, enter or leave the country through the nation's ports and waterways.

<u>Deepwater's platforms and systems are needed now to support Maritime Homeland Security and sustain non-homeland security Coast Guard missions</u>

Terrorist threats to America's homeland are significantly more complex and challenging than at any other time in our history. IDS is urgently needed to transform Coast Guard operational capabilities and performance vital to homeland security while safeguarding its multiple other missions. IDS will modernize patrol boats, aircraft, helicopters, multi-mission cutters, and the C4ISR systems that link them to federal, state, local and interagency activities, and form a formable-layered defense for MHLS.

The growing demand for Coast Guard MHLS operations will continue into the foreseeable future—leading to a "new normalcy" of increased operations requirements. During <u>FY 2000</u>, the Coast Guard recorded <u>35,350</u> law-enforcement boardings. This number climbed to <u>37,162</u> during <u>FY 2002</u>. The *Maritime Transportation Security Act of 2002* increases focus in 361 ports and the MTS—granting new authority and extending Coast Guard jurisdiction over foreign-flag ships from 3 to 12 miles. Most of the responsibility for meeting these increased maritime security requirements will fall to the Coast Guard. Deepwater assets are crucial for national defense and homeland security, pushing borders as far out to sea as possible, while directly supporting coastal zone and port and harbor security missions with sophisticated command and control capabilities and increased presence.

While today there is a justifiable emphasis on Maritime Homeland Security, the Coast Guard will need to continue to support other mission areas such as search and rescue, marine environmental protection, and others. Acceleration of IDS provides additional capability and capacity, in terms of extra mission hours, reliability and presence to directly support these demands.

B. INCLUDE AN ESTIMATE OF ADDITIONAL RESOURCES REQUIRED

Total Ownership Cost (TOC) comparisons were made using ICGS's TOC model to compare the accelerated 10-year plan with the present 20-years implementation plan. Prime contract and government program management are included in these figures. The implementation plans displayed in Figures 1 and 2 (Table of CA and OE Funding Requirements) reflect "then-year dollars" and apply a 2.6% inflation rate. These figures do not assume potential savings due to economies of scale, nor do they reflect costs associated with CA personnel.

A total CA savings of approximately $4 billion (then-year dollars) is realized under the 10-year acceleration plan over the "build-out" of the system based on this comparison. These savings are achieved through CA funding that exceeds $1 billion yearly from FY05 to FY10, but is significantly less than the original 20-Year Plan between the years 2010 and 2022. OE costs to support and sustain IDS remain nearly constant throughout the period in both scenarios.

Implementation Plan Options, Expressed in Then Year (Budget) Dollars				
	CA		OE	
Fiscal Year	20.5 Years	10 Years	20.5 Years	10 Years
FY02	320	320	1,166	1,173
FY03	478	478	1,195	1,209
FY04	500	500	1,253	1,270
FY05	871	1,892	1,283	1,299
FY06	888	1,663	1,308	1,326
FY07	608	1,506	1,300	1,351
FY08	762	1,472	1,379	1,384
FY09	768	1,428	1,431	1,424
FY10	779	1,226	1,528	1,465
FY11	790	988	1,519	1,541
FY12	787	122	1,545	1,611
FY13	855	165	1,721	1,718
FY14	845	180	1,776	1,803
FY15	908	202	1,825	1,896
FY16	897	188	1,871	1,944
FY17	919	214	1,971	2,027
FY18	1,001	271	2,052	2,097
FY19	1,016	343	2,119	2,163
FY20	1,029	326	2,199	2,229
FY21	1,001	324	2,294	2,318
FY22	308	314	2,383	2,389
FY23	251	268	2,473	2,481
FY24	253	260	2,562	2,560
FY25	278	285	2,648	2,658
FY26	259	366	2,750	2,753
FY27	262	269	2,838	2,845
FY28	268	275	2,947	2,943
FY29	254	261	3,052	3,030
FY30	288	295	3,153	3,136
FY31	273	280	3,262	3,246
FY32	282	269	3,359	3,351
FY33	250	257	3,476	3,466
FY34	190	197	3,598	3,588
FY35	132	138	3,715	3,714
FY36	131	137	3,843	3,843
FY37	135	140	3,978	3,988
FY38	135	140	4,117	4,147
FY39	139	138	4,260	4,261
FY40	100	145	4,421	4,421
FY41	178	181	4,597	4,597
Total at Buildout	16,022	11,473		
Total at FY41	20,388	18,423	100,168	100,664

Figure 1: Table of CA and OE cost comparisons for the 20-year and 10-year implementation

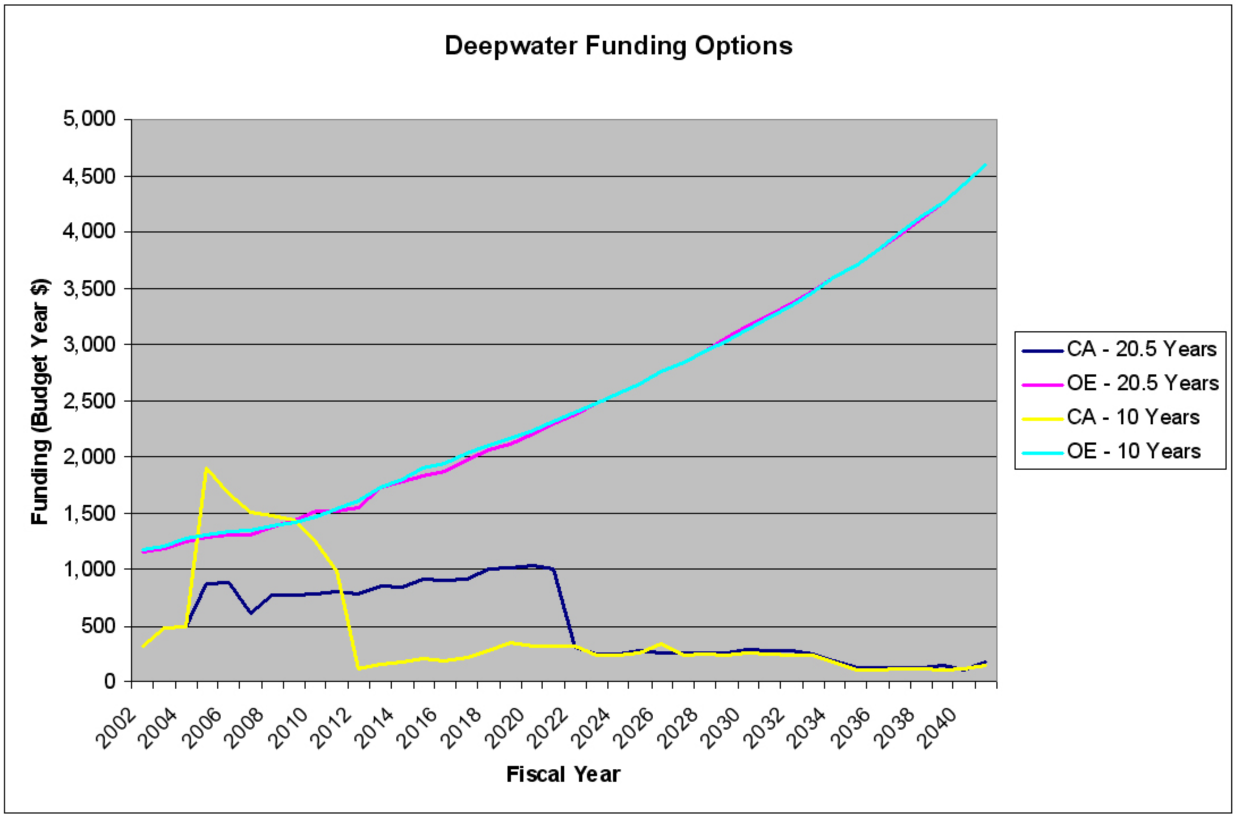

Figure 2: Chart of CA and OE cost comparisons for the 20-year and 10-year implementation

Accelerated implementation would negate the need for some SLEPs of legacy assets, such as the HH-60J and 270-foot Medium Endurance Cutter, and eliminate the need for the majority of the 123-foot conversions in favor of accelerated implementation of the FRC, and mitigate the need for additional investments to legacy assets. OE costs are similar for both options. During the initial years (from 2002 to 2007) preliminary/detailed design and construction schedules for both the 20-Year Plan and the 10-Year Plan appear similar. Acceleration of assets does not occur until actual production commences.

Economic Analysis of Real CA Cash Flows

The economic analysis of the difference in real CA expenditures between the 20 and 10 year plans will vary based on the assigned discount rate. Figure 3 (Sensitivity of Discount Rates) depicts a sensitivity analysis of real CA cash flow differences for various discount rates over a 20-year period based upon the nominal CA cash flows in Figure 1. The lower the discount rate, the greater the differences in real CA expenditures attributed to the 10-year acceleration plan.

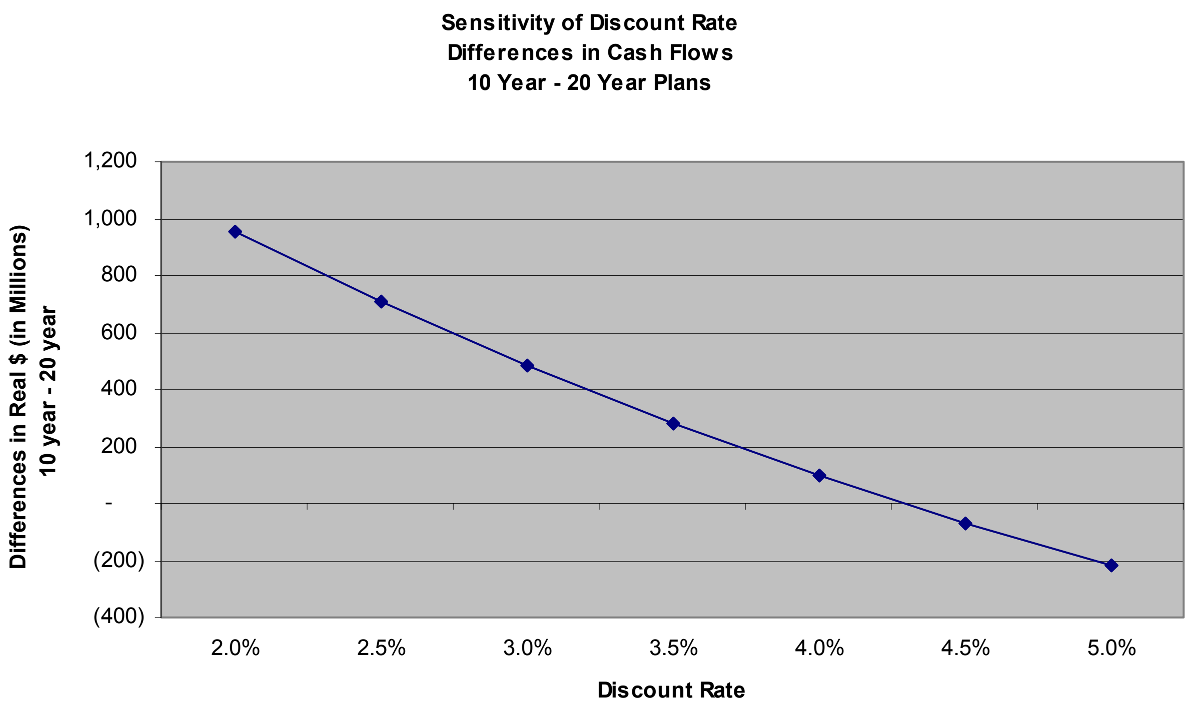

Figure 3: Chart of real CA cash flow differences 20-year and 10-year implementation

An analysis of the Coast Guard's ability to support acceleration identified workforce management and facilities as key elements. These elements are discussed in the following sections.

Personnel: Acceleration of IDS requires a temporary increase in personnel. This requirement reaches a maximum of 400 additional surface asset crewmembers in year nine of the accelerated plan (2012). This increase, as depicted in Figure 4 (Deepwater Surface Fleet Manning Deltas with Acceleration), results from a more aggressive and compact delivery schedule that shortens the gap between commissioning new assets and decommissioning legacy assets. IDS maximizes the number of fully trained personnel aboard cutters and this shorter period results in an overlap in personnel training schedules. The overlap ensures that total system performance will not degrade. Using $50,000 as an average yearly per-person expense for pay and benefits, the additional OE cost in 2012 (the most demanding year) for extra personnel is approximately $20 million. The total additional OE cost for extra surface personnel under an accelerated implementation plan is approximately $110 million (FY03 dollars).

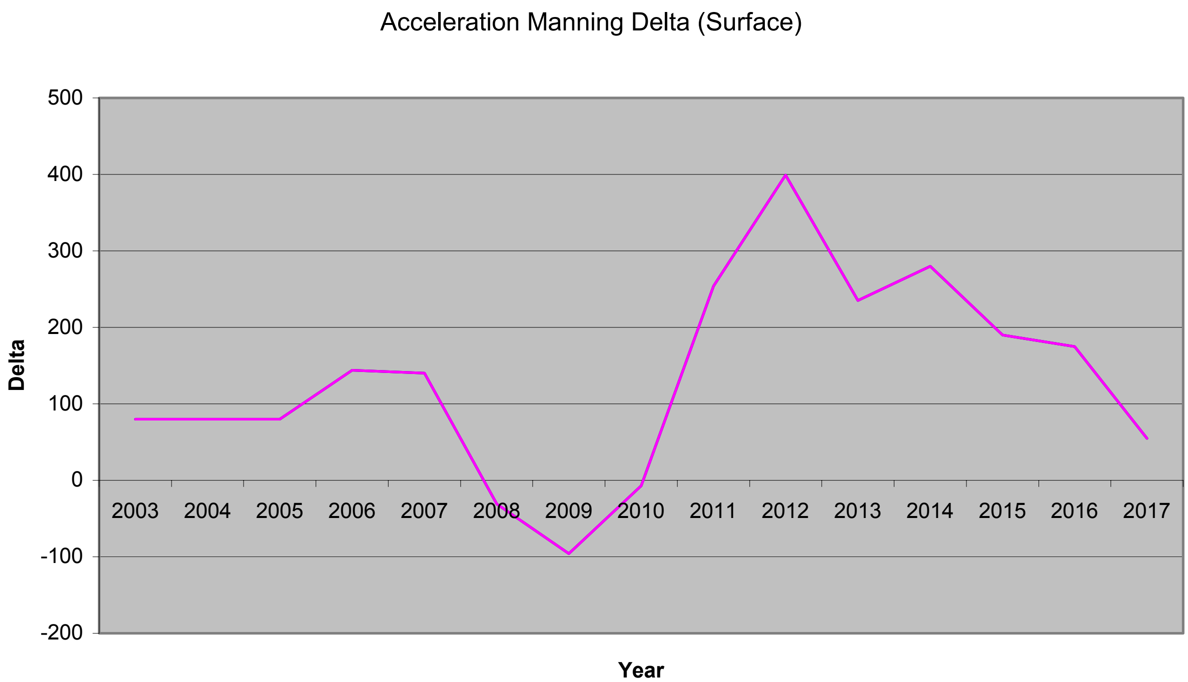

Figure 4: Additional Personnel Requirements for 10-year acceleration

Training and Training Support: Training and Training Support for an accelerated implementation is another consideration. The Coast Guard's present training system infrastructure will have difficulties compensating for an accelerated Deepwater implementation. Training centers are close to their maximum output capacities, and their ability to expand training center throughput is limited by physical plant size (classrooms, barracks, dining facilities, etc.) as well as the availability of qualified instructors. Under the 10-Year Plan, more than *800 cutter personnel per year* will need pre-commissioning training during 2010 and 2012 as the Deepwater fleet launches 15 to 16 new ships annually.

As illustrated in Figure 5, this represents approximately 80% increase in pre-commissioning training demand over the heaviest demand of the 20-Year Plan. Similarly, while the 20-year plan requires no significant increase in current instructional staffing at the Coast Guard's Aviation Training Center in Mobile, AL, the accelerated plan requires doubling of student throughput and corresponding staffing increases during the new asset rollout period.

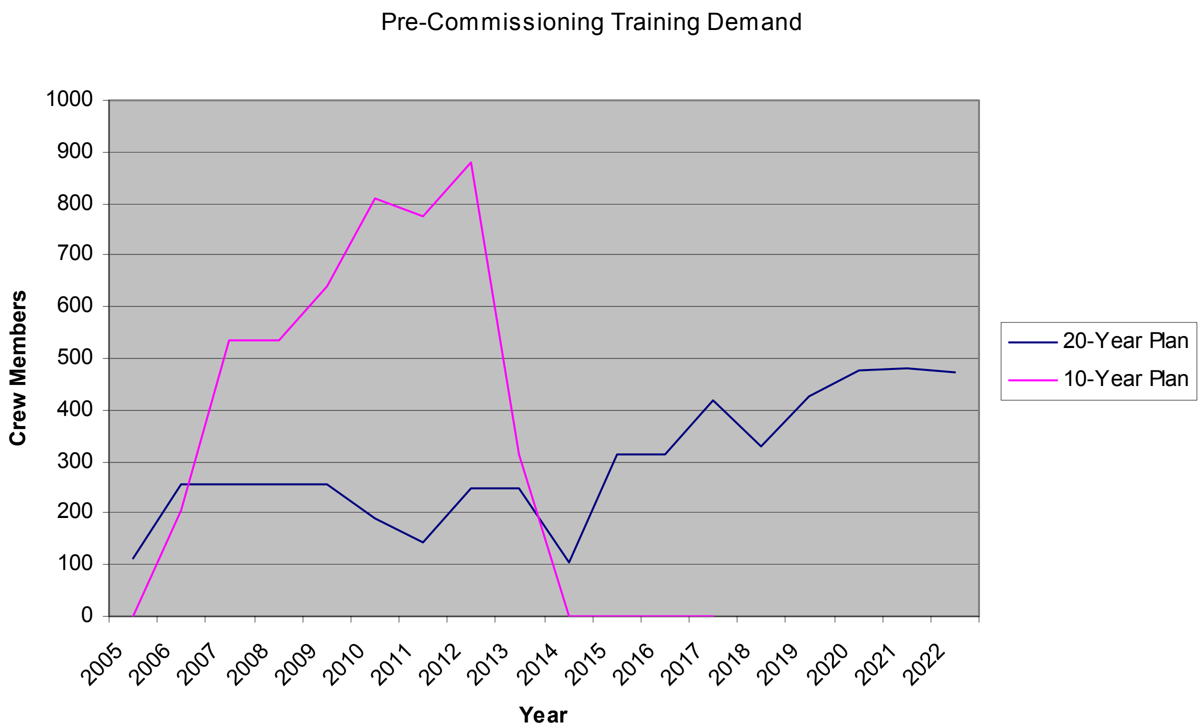

Figure 5: Pre-commissioning Training demand for 10-year acceleration

Two primary options exist to increase training system capacity quickly to support an accelerated Deepwater implementation. The first (and more practical) option is commercial procurement for billeting and instruction – essentially the same path being taken by the training centers today to handle increased training loads associated with growing the workforce and increased training requirements to meet Homeland Security demands. This alternative is preferred as the need for additional training is only a temporary surge due to acceleration. The second alternative is expanding "bricks and mortar" and training new instructors at the existing training centers. This option is not desirable due to the long lead-time required and the resulting excess capacity once this temporary requirement is complete.

The two principal Coast Guard training centers anticipate spending an additional $5 million in each of the next two fiscal years for the overflow of student berthing. Similarly, the Aviation Technical Training Center (ATTC) currently spends $11,500 per student for 20 weeks of contract instruction and billeting of aviation school students who cannot be trained at ATTC due to lack of physical-plant capacity. Utilizing these figures, a rough order of magnitude (ROM) estimate of contracting costs for the "bow wave" of pre-commission training resulting from Deepwater acceleration can be determined. Assuming an average of eight weeks of required training per crewmember and a $1,000 cost per student per week for contract training and billeting, system expenditures for surface pipeline training will increase by approximately $9.0 million (FY03 dollars) for the period 2010 to 2013. Additionally, acceleration will cost approximately $1.0 million (FY03 dollars) for contract aviation training for the period 2006 to 2009. The total additional OE cost for training under an accelerated implementation plan is approximately $10 million (FY03 dollars).

Another challenge associated with the workforce is training program development. Deepwater assets are technically sophisticated platforms linked together by state-of-the-market C4ISR systems, and will demand a highly trained and proficient workforce to operate. As such, the entire *concept* of training in the Coast Guard is being reevaluated. Distance learning programs, "e-learning", life-long learning, and "schoolhouse" leveraging of training technology are all initiatives currently underway to meet the training needs of the Deepwater program. The "e-learning" system (upon maturity) is projected to be capable of reducing overall resident training requirements by 10%, reducing, but not eliminating, this training surge. Furthermore, contracting training program development is another viable option for addressing this need.

Another important workforce management facet to consider is the transition of personnel. As an example, in year six of the 10-Year Plan (2008), 13 legacy cutters are retired while 12 Deepwater cutters are commissioned and, in 2010, 16 legacy cutters are retired and replaced by 15 Deepwater cutters – impacting at least 1,000 crewmembers and their families by the transition. This is nearly a 100 percent increase over the most active year under the current 20-Year Plan. This high degree of flux in the workforce will require close coordination and management by the Coast Guard's Personnel Command and human resources management system. Clustering of cutters in homeports is a concept proposed under Deepwater to obtain efficiencies in areas such as personnel assignments and logistics support. Careful phase-in of Deepwater cutters in these homeports will be coordinated to mitigate large numbers of personnel transfers during acceleration.

Finally, the Coast Guard's management of Training Allowance Billets (TABs) will require reevaluation. The Coast Guard establishes TABs to assist with the flux of personnel receiving proper training to perform their duties. Not only must personnel be highly trained, they must be *fully trained upon arrival* as proposed in the Deepwater "optimal crewing" model. The present Deepwater implementation plan identifies the need for 400 additional TABs. Under the 10-Year Plan, TABs will have to be concentrated into a shorter timeframe, creating a bow wave of TABs earlier in the implementation schedule. This change in TAB distribution must be closely monitored.

In summary, accelerating the Deepwater implementation plan to 10 years will impact the Coast Guard's manpower, personnel and training systems. Due to the temporary nature of this surge in requirements, it makes sense to use contract support in lieu of building capacity into the Coast Guard's training infrastructure. Some savings identified with acceleration will need to be re-invested in personnel, training and training support. Approximately $120 million (FY03 dollars) is a total rough order of magnitude of additional OE costs for personnel and training under the accelerated plan.

Facilities: Accelerating the IDS will also accelerate the construction of needed shore facilities and infrastructure more than originally scheduled. Structures, such as, lengthened piers to accommodate larger cutters and hangar facilities for new unmanned aerial vehicles, are required. The number of needed shore facility projects and costs will not change significantly from the 20-year Plan, but construction will have to be accomplished earlier. The construction required in the first five years under the 20-year plan is approximately $24 million. Under the accelerated plan, the first five years of construction increases to approximately $90 million. These accelerated costs are illustrated in Figure 6 (Shore Facility CA Design Costs) and Figure 7 (Shore Facility CA Construction Costs).

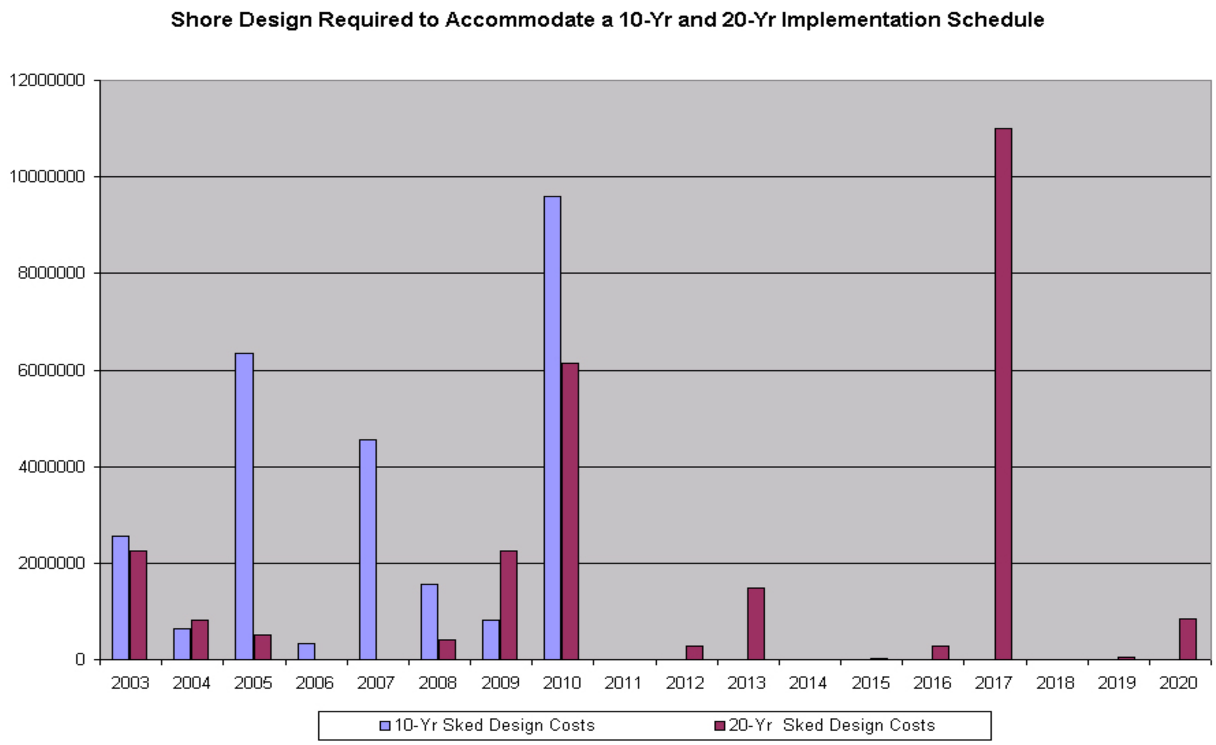

Figure 6: Shore CA Design cost comparison between the 20-year and 10-year schedule

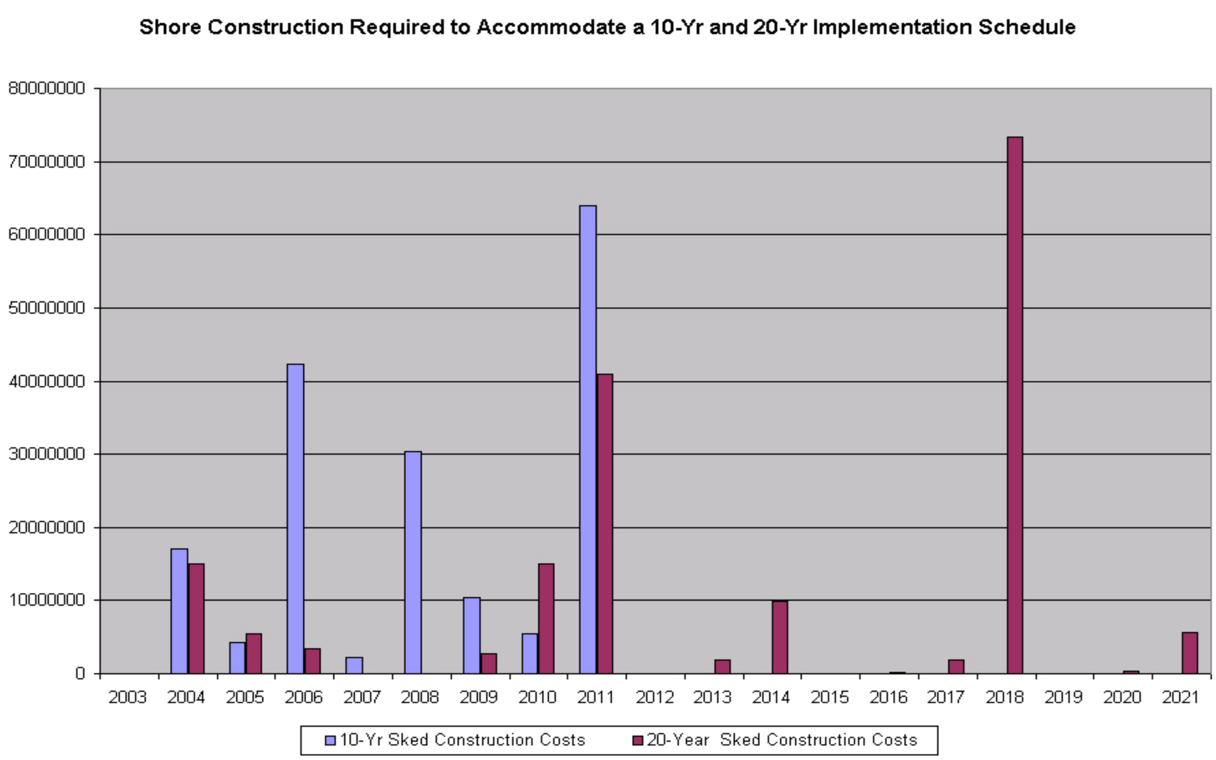

Figure 7: Shore CA Construction cost comparison between the 20-year and 10-year schedule

This acceleration of shore projects could present some feasibility issues, as it is a significant increase to the Coast Guard civil engineering program's planned workload. Contracting out services would potentially help alleviate this issue. The typical timeframe for shore construction, as documented by Commandant's instructions, is five years. As such, four of the first five years of projects are already behind schedule. This anomaly is easier to adjust in the 20-year plan where the shore requirements are relatively less intensive in the first five years. Headquarters Civil Engineering staff will be further engaged during the detailed study due in February 2003 to assess the actual feasibility of this increase in shore construction.

C. DESCRIBE THE RESULTING INCREASED CAPABILITIES

The phase in for the 10-Year plan and a listing of the new cutters and aircraft is contained in Figure 8 (IDS Asset Implementation Schedule). The National Security Cutters will be built-out three years earlier (2010). The Offshore Patrol Cutter will be constructed nine years earlier (2013). Most 110-foot to 123-foot conversions will be eliminated in lieu of the more capable Fast Response Cutter, which will be produced ten years earlier (2012). The 10-year schedule also produces the Long Range Interceptor nine years earlier (2013), and Short Range Prosecutor eight years earlier (2013).

Aviation assets include six C130 Long Range Search aircraft, a VTOL Recovery and Surveillance Aircraft introduced six years earlier (2011), Vertical Unmanned Aerial Vehicles built six years earlier (2012), twin-engine turboprop Maritime Patrol Aircraft built two years earlier (2010), shipboard capable Multi-mission Cutter Helicopters (2013), and High Altitude Endurance Unmanned Air Vehicle aircraft implemented eight years earlier (2008).

Date	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Year Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Surface	Baseline Build Schedule							Accelerated Schedule						
NSC	0	0	0	0	1	2	3	4	5	6	7	8	8	8
	0	0	0	0	1	3	5	7	8	8	8	8	8	8
OPC	0	0	0	0	0	0	0	0	0	0	1	2	3	6
	0	0	0	0	0	1	2	4	9	15	22	25	25	25
FRC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	4	13	22	31	40	49	58	58	58	58
LRI	0	0	0	0	1	2	3	4	5	6	8	10	11	14
	0	0	0	0	1	4	7	11	19	28	37	42	42	42
SRP	0	4	11	18	26	34	42	50	54	55	57	59	60	63
	0	1	1	1	6	18	30	43	56	68	81	82	82	82
Aviation	2002 1	2003 2	2004 3	2005 4	2006 5	2007 6	2008 7	2009 8	2010 9	2011 10	2012 11	2013 12	2014 13	2015 14
MPA	0	0	0	9	12	15	22	26	30	35	35	35	35	35
	0	0	0	8	14	20	26	32	35	35	35	35	35	35
VRS	0	0	0	0	0	0	0	0	0	0	0	0	3	10
	0	0	0	0	8	14	20	26	32	34	34	34	34	34
MCH	0	0	0	0	0	7	17	35	46	52	72	93	93	93
	0	0	0	0	4	17	30	43	56	69	81	93	93	93
VUAV	0	0	0	0	8	13	18	23	28	33	38	43	48	53
	0	0	0	3	11	21	31	41	51	60	69	69	69	69
HAUAV	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	7	7	7	7	7	7	7	7

Figure 8: IDS Asset Implementation Schedule

Prior to contract award, the Coast Guard hired the Center for Naval Analyses (CNA) to assist in evaluating the *operational effectiveness* of the proposals of the three competing industry teams vying for the Integrated Deepwater System (IDS) contract. CNA developed the CNA Integrated Deepwater System (IDS) Asset Assessment Tool (CIAAT) for this assessment. CIAAT is relatively simple, but effective, spreadsheet-based tool which does not directly measure operational effectiveness. Instead, it measures the "presence" a candidate IDS can project, i.e., the number of square miles of ocean which the IDS's surface and air assets can search per day (the "Surface" and "Air" scores, respectively) and the area over which the total IDS can detect, identify, and board targets in the Deepwater operating area (the "Total Patrol" score). Since the Coast Guard currently performs most of its Deepwater missions through proactive, on-scene presence of cutters and aircraft in the Deepwater operating area and almost certainly will continue to do so for the foreseeable future, CIAAT provides a reasonable, high level proxy for Deepwater mission execution – higher CIAAT measures for an IDS candidate should mean better performance across a broad range of missions.

The CIAAT model was used to compare the relative operational benefits of accelerating Deepwater (see Figure 9). The CIAAT model showed in year 2013 (full implementation of the accelerated plan) more than a 75 % improvement in both surface and total patrol scores over the 20-Year Plan. In year 2022, the model depicts no difference between plans as the current 20-year plan is also fully implemented. The model projects the same level of performance in each plan until 2007, but a significant increase in performance between 2007 and 2013. Prior to 2007, the asset mix of each plan is essentially the same, as preliminary and detail designs of IDS assets are similar and performed in the early years of the implementation plans. However, as more new assets are deployed beginning in 2007, the 10-Year Plan provides progressively greater operational performance over the 20-Year Plan. This advantage is clearly illustrated in Figure 9.

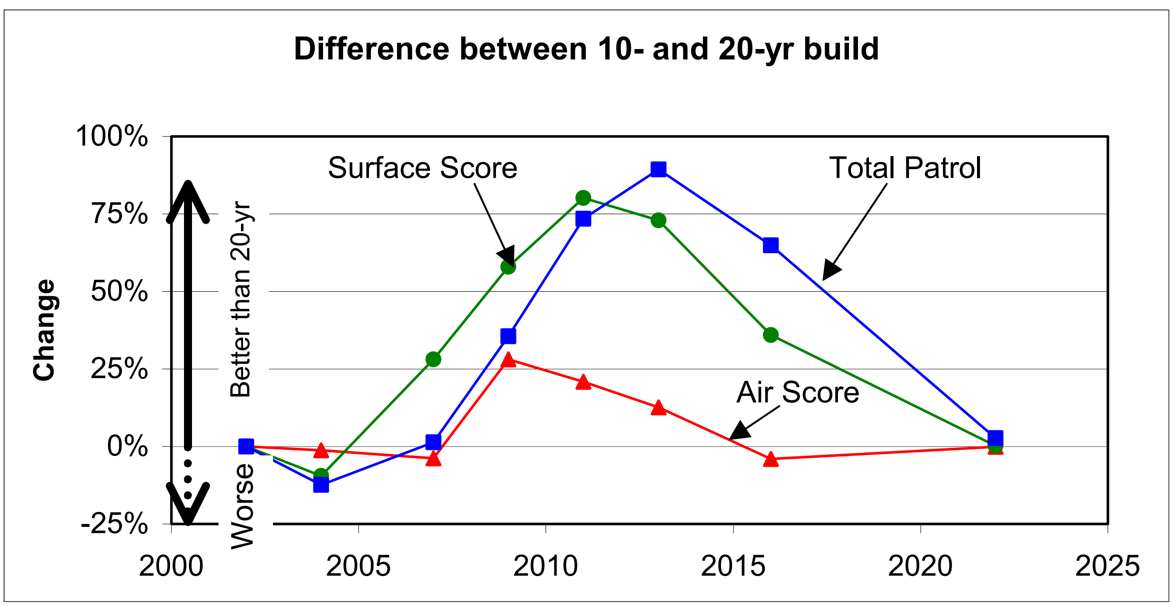

Figure 9: CIAAT Curve comparing performance of 20-year and 10-year plans

Increased Capability due to command, control, communications, computers, intelligence, surveillance, and reconnaissance improvements: CIAAT does not account for the benefits of an interoperable, network-centric system of assets. Deepwater's C4ISR architecture will link the cutter, aircraft and shore command sensor and decision support capabilities, building a common operational picture which will enable operational commanders to make timely, better-informed decisions to place the right asset in the right place at the right time. Key to increased capability under an accelerated plan is earlier implementation of C4ISR components, such as earlier introduction of upgrades to Coast Guard command and control centers providing faster data processing and integrating these centers with other information sources (i.e., Department of Defense and other federal, state, and local government agencies). Implementing C4ISR earlier will also provide increased interoperability with the Coast Guard's National Distress Response System – Rescue 21 - for coordinated and effective prosecution of all coastal missions. Acceleration in the C4ISR area will reap benefits from both a tactical and strategic perspective.

Tactical performance is described as the ability to carry out a specific mission. These missions vary significantly in complexity. At the lower end of the complexity scale, tactical performance is characterized by the ability of a single Fast Response Cutter (FRC) to locate, identify, and interdict a small vessel smuggling migrants or drugs, or to conduct a single-unit Search-and-Rescue (SAR) case. At the higher end of the complexity scale, tactical performance is the ability of an operational commander to coordinate several surface platforms, their organic air assets, non-organic air assets; and the associated command, control, and communication infrastructure (both shore and asset specific) in resolving a multi-unit/multi-day SAR effort or to close a specific route to narcotics or migrant smugglers. Inherent within tactical operations is the ability to search, detect, interdict, board, coordinate local assets, and communicate plans and/or results.

Strategic performance is described as the ability of the Coast Guard to support national security objectives (e.g., Maritime Domain Awareness), support agency specific and national intelligence collection and analysis programs, communicate and exchange data with federal, state and local agencies, and ensure proper overall force asset allocation given general overall objectives. Inherent within strategic performance is the existence of a secure data exchange network, ability to exchange information, planning tools, analyze data, and disseminate force allocation plans.

Tactical Advantages of Acceleration: Significant increases in tactical capabilities will be realized as C4ISR components of the IDS proposal are implemented within an accelerated schedule.

Sensors: Improved detection and classification capabilities inherent to the application of sensors such as Electro Optical Forward Looking Infrared Radar (EO/FLIR) and Electronic Support Measures (ESM) that will increase detection range and the environment within which detection can be relied upon. The EO/FLIR will provide a round the clock visual detection capability to both Legacy cutters (WHEC, WMEC,) and IDS end-state surface assets that will radically increase the probability of detection of a target during darkness and other periods of reduced visibility. ESM equipment installed aboard IDS end-state assets (NSC, OPC) and the ability to share this data seamlessly via the Common Operational Picture (COP) will significantly improve the tactical ability to detect, identify, and locate targets with a unique electronic signature.

Small boat data exchange capabilities: The tactical data communication ability of the LRI (Long Range Interdiction) and SRP (Short Range Prosecutor) organic small boats will improve performance of boarding operations from both an effectiveness (rapid data and graphics exchange with the parent cutter to improve command decision capability) and timeliness perspective. The present system of managing information between the boarding team and the parent cutter is inefficient.

Integration with Rescue 21: The IDS end goal of full integration with the Coast Guard's concurrent Rescue 21 acquisition will enhance force allocation capabilities with the coastal zone. The ability to exchange both distress and target positional data between coastal surface/shore assets and IDS assets will become a force multiplier in the prosecution of emergent SAR, harbor security, and achieving Maritime Domain Awareness.

Navigation: The utilization of the COMDAC Integrated Navigational System (C-INS) as an electronic navigation tool will enhance situational awareness and the ability of both Legacy and IDS surface assets to transit all waters (restricted harbor, coastal and offshore) in all weather conditions. This feature will significantly enhance the safety and security of our personnel.

Coast Guard command and control planning and decision tools (CG-C2): The CG-C2 and system and Common Operational Picture (COP) will provide improved planning tools that allow the operational commander to best position all assigned operational assets (both organic and non-organic) to achieve mission goals. Significant increases in situational awareness and the ability to rapidly react, plan mitigation, and reallocate assets to achieve dynamic mission requirements will be realized.

Strategic Implications of Acceleration:

Internal Coast Guard data fusion: IDS C4ISR system improvements will provide classified (secret level) data communications links to allow for increased flow of time-sensitive data and a shared Common Operational Picture (COP) among operational units, including headquarters, district and area command centers. This capability will provide a much more comprehensive picture in terms of Maritime Domain Awareness. The ability to conduct operations with state-of-the-market information and networking technology that provides a COP among widely dispersed decision makers, situational and detecting sensors, and forces and assets into a highly adaptive, comprehensive system to achieve mission effectiveness is referred to as a network-centric-system.

National intelligence gathering/analysis: IDS C4ISR improvements will enhance the Coast Guard's ability to share information with other national intelligence agencies. The fusion of national intelligence will improve Maritime Domain Awareness, and the ability to respond to emerging threats.

Coordination with national, state, and local law enforcement agencies: Many of the Coast Guard's command-and-control tools will allow seamless data exchange with other agencies involved in offshore law enforcement activities (migrant interdiction operations, counter-narcotics operations, fisheries enforcement, etc.).

Within the first 5 years under the 10-year acceleration plan, Deepwater would modernize 42 HH-60J helicopters, 93 HH-65A helicopters, 17 command facilities ashore, and most multi-mission cutters. New sensor equipped MPA and VUAVs will restore lost capability and add flight hours. NSCs, OPCs, and FRCs will allow for less manpower intensive evolutions, deliver improved C4ISR systems and provide more patrol days.

Deepwater allows the Coast Guard to push America's borders out with a layered defense throughout the maritime domain – from a tough goal line defense to far offshore prevent defense - protecting the U.S. homeland--detecting, intercepting, and prosecuting potential threats in the littorals and on the high seas. More capable Deepwater assets on station will reduce risk to U.S. homeland ports, waterways, coastal areas, and open ocean. Capabilities will be shared or cascaded to all agencies—improving interoperability in unified ports (those ports where various agencies collaborate and share information) across the nation.

Specific examples of increased capabilities include:

- New cutters specifically designed for better sea keeping, enabling higher sustained transit speeds, and launch and recovery of small boats, helicopters, and VUAVs in higher sea states. Deepwater assets, with increased endurance and range, can be redeployed quickly to emerging high-priority missions.
- The National Security Cutter and Offshore Patrol Cutter combination will provide greater capability and resource hours than the current High-Endurance and Medium-Endurance cutters.
- The National Security Cutter, with a Multi-mission Cutter Helicopter and two Vertical Unmanned Aerial Vehicles embarked, significantly improves the area surveillance capacity compared to a legacy 378-foot High Endurance Cutter/HH-65A Helicopter package.
- The IDS total aviation solution (manned/unmanned) at completion delivers 80 percent more flight hours than the legacy system. Increased MHLS missions have greatly increased previously planned flight hours/patrol days.

D. OUTLINE INCREASES IN COAST GUARD'S HOMELAND SECURITY READINESS

One of the benefits of the IDS is the application of a systems engineering approach not only in the early design stages, but also throughout the life of the asset. Maximizing readiness and availability is built into the Deepwater design. It is part of the System Performance Specification (SPS) that pertains to supportability and lists "Increase Operational Availability" as a primary objective. Increased operational availability and readiness are achieved through:

- **High Reliability** – early design considers extended Mean Time Between Failure (MTBF). Built in redundancy means a reduction in total failures and an increase in readiness.
- **Reliability Centered Maintenance (RCM) –** Automated performance monitoring and failure data collection aids in predicting failure and results in reduced tasking.
- **Performance Based Logistics (PBL) –** Provides an incentive to the contractor to provide full, high quality, and immediate initial support for new assets.
- **Logistics Matrix Product Teams –** Focused on using Measures of Effectiveness, monitoring performance, identifying problems, analyzing, and developing solutions.

The above concepts, employed on a system wide basis, have been adopted as part of the SPS to maximize availability and readiness.

A detailed analysis of the Coast Guard's legacy assets was made in 1998 and used as the basis to measure IDS operational effectiveness. During the implementation, the contractor, ICGS, is required to maintain system Operational Effectiveness at or above the identified 1998 level. Unfortunately, operational realities have changed since 1998, and these assumptions and standards are no longer valid for today's operating environment. Increased demands coupled with obsolete and deteriorating legacy assets has lead to spiraling maintenance costs and decreased readiness. In 2002, two major cutters and several aircraft were decommissioned due to their deteriorated condition -- an unmistakable demonstration that the assumptions made about projected asset life in 1998 are no longer sufficient.

Major cutter classes use the percentage of time an underway asset is "free of major machinery and equipment casualties" as an indicator of readiness. The target for time free of casualties is 72 percent. The casualties are described in order of severity from C1 to C4. A C3 casualty results in a significant decrease in flexibility for mission accomplishment and will increase vulnerability of the asset under many, but not all, envisioned operational scenarios. A C4 casualty is the most severe and will prevent a cutter from performing its primary mission without additional resources. Figure 10 (Fleet Readiness) measures the number of times each class of cutter is free of C3 and C4 equipment failures. All classes of cutters reveal a downward trend in readiness with the 378-foot High Endurance Cutter showing only a 27 percent time free of C3/C4 casualties.

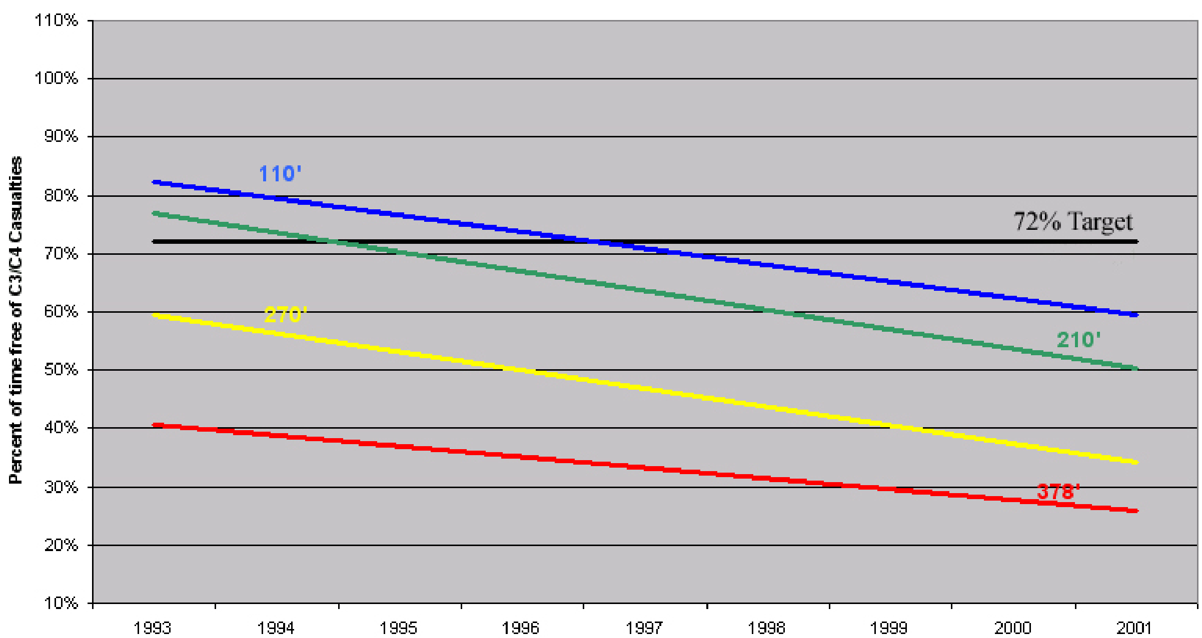

Figure 10: Fleet readiness data

Aviation assets rely on a somewhat different readiness indicator. Data is calculated, on a 24-hour basis, to measure the amount of time an asset is available for employment on any assigned mission. The target or goal is 71 percent. Figure 11 (Aircraft Availability) reveals the percent availability of each major class of aircraft.

Only one class of aircraft, the HH-65A short-range recovery helicopter, meets the target of 71 percent. All classes, except the HC-130H long-range search aircraft, show deterioration in availability. The HC-130H shows an increase in availability due to additional funding provided in early 1997 when availability reached an unacceptable level (close to 60 percent).

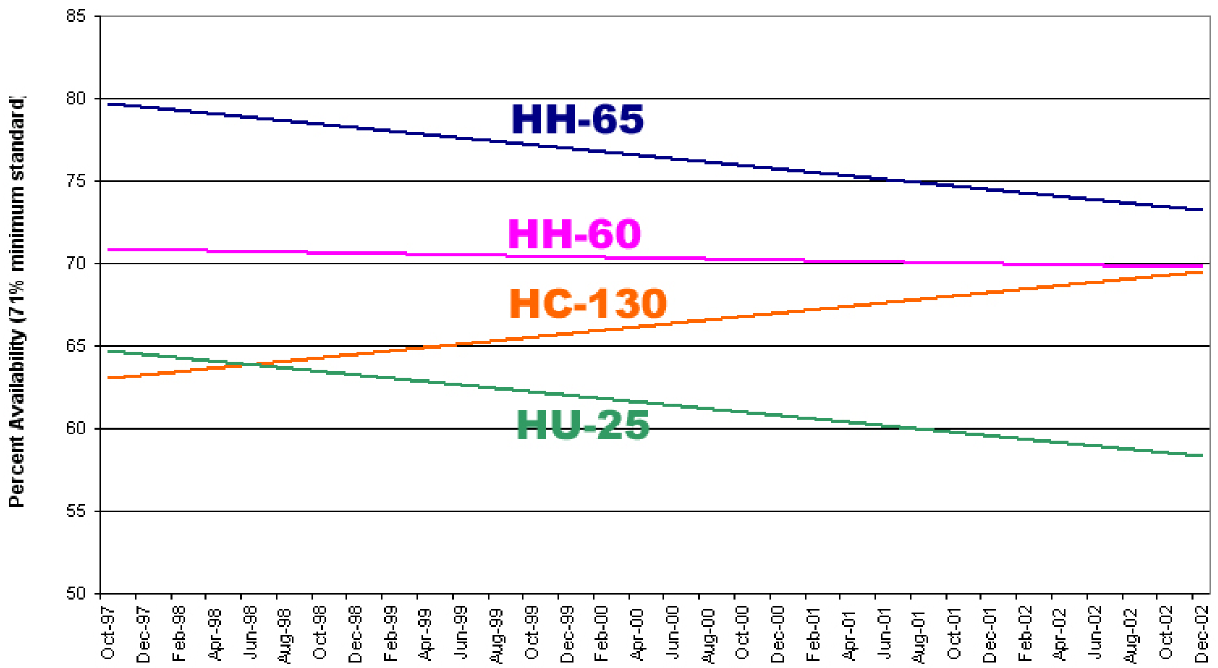

Figure 11: Aviation readiness data

Note: Although still trending downward, HU-25 readiness has improved slightly due to an improved sensor suite

<u>The Coast Guard's aviation assets are not fully sensor equipped, are costly to operate, and are becoming less dependable.</u>

Despite upgrades to the HU-25C/D Medium Range Search aircraft and the HC-130H Long Range Search aircraft, the fact remains that many aircraft continue to operate with limited or obsolete sensor capabilities. The lack of sensors complicates safety of flight and degrades situational awareness. There are limited sensor suites for the HC-130H fleet so not all aircraft conduct missions with the new sensor package that includes a forward-looking infrared radar and tactical workstation. Of the original 41 HU-25 aircraft procured, only 17 remain in service due to reliability and maintainability problems. Recently, 3 HC-130H aircraft were taken out of service based on their material condition and high cost of depot level maintenance required to make them flight-worthy.

The HH-60J Medium Range Recovery Helicopter and HH-65A short-range-recovery helicopters also operate with obsolete sensors. The HH-65 still operates with its original 20-year old radar, which is unreliable and rapidly becoming unsupportable.

Aircraft that do have sensor packages can only share sensor information via voice communications. These aircraft lack the communication/data connectivity to direct assets in response to dynamic security threats. Assets do not have real-time connectivity with command centers or units having tactical control—totally incompatible with today's need for total "security-space awareness" and interagency connectivity.

The HH-65A fleet is experiencing increased and frequent engine malfunctions. This readiness degrader is serious and a significant safety of flight issue that puts flight crews at risk. A recent engine failure during a HH-65A shipboard deployment highlights the seriousness of this readiness degrader. Far from land, the engine failure forced the flight crew to perform a single-engine shipboard landing. This is a high-risk maneuver since the HH-65A cannot hover on one engine. Additional challenges confronting the flight crew in this specific example included the cutter's relatively small flight deck for the emergency landing and the dynamics of the ship's pitch and roll associated with the sea state. The pilot had to exercise extraordinary skill and the crew had to jettison excess weight – including their only life raft, to perform a no-hover landing on this flight deck in this example.

Providing newer assets sooner will reverse adverse trends in deteriorating material condition of legacy assets, dangerous conditions, and spiraling maintenance costs.

Cutters are unable to get underway and others cannot complete patrol obligations due to mechanical casualties. In the past legacy assets routinely operated above levels that the support infrastructure could sustain—resulting in reduced readiness and degraded quality of service for Coast Guard men and women.

Specific examples of deteriorating material condition/ readiness and increased maintenance costs:

- Since 1997, legacy Deepwater cutter maintenance costs increased 30% to 110%.

- 22 of 49 110' WPBs have significant hull degradation…17 hull breaches since FY01, totaling more than $11M in emergency repairs & averaging 3 months out-of-service per hull.
- WHEC fleet averages one main space casualty, with the potential to escalate to main space fire, on every patrol - posing an increased threat to crew safety and reduced ability to meet patrol obligations.
- SENECA recently experienced a major fire to a ship's service generator while underway - the crew had to use emergency override procedures and secure fuel on the mess deck to shut down the engine.
- Recent gas turbine casualties aboard HAMILTON and RUSH resulted in $1.2M in turbine replacement cost for each cutter and lost patrol days.
- STORIS was recently towed to port following a main motor fire.
- ACUSHNET recently missed a patrol due to 3 of 4 main motor casualties.
- HH-65 Helicopter class has experienced 65 separate incidents of engine roll-backs (loss of power) in last five years, requiring an already power-limited helicopter to conduct single-engine landings on cutter flight decks.
- HU-25 Falcon Aircraft engines are no longer manufactured in private sector and are exorbitantly expensive to operate and repair.

Aging inventory of antiquated and maintenance-intensive legacy assets is not equal to today's challenges:

- Lack of a Coast Guard wide capability to intercept drug and illegal migrant "go-fast" boats. (The Airborne Use-of-Force operational concept has been highly successful however; it is employed in a limited capacity).
- Cutters deploy regularly without helicopter aviation detachments.
- Daily cutter operational evolutions such as flight operations and launch and retrieval of small boats are manpower intensive and inefficient.
- Presently assets do not have real-time connectivity to other units or command

IDS will significantly improve overall system readiness, operational capabilities, and capacity. Existing legacy assets are a conglomeration of separate "platform-centric" assets and systems, with little integrated logistics support system or common C4ISR architecture. The end result is not an integrated approach but rather many different assets, with unique one-of-a-kind systems, being maintained as well as can be expected by a dedicated and motivated workforce. Operation with less than a fully capable asset and robbing parts from several non-operational assets to obtain one operational asset (referred to as parts cannibalization) are two of several ways the workforce copes with the current state of legacy assets.

E. DESCRIBE ANY INCREASES IN OPERATIONAL EFFICIENCIES

The increased mission hours that a fully implemented IDS provides offers a meaningful opportunity to improve the efficiency of Coast Guard operations. The 1998 baseline legacy asset system provided approximately 405 thousand mission hours. This figure does not account for changes resulting in decommissioning of some assets since 1998 (2 WMECs and several aircraft have since been decommissioned). By converting "Cutter days" to hours to reflect the common measurement of mission hours, the fully implemented IDS will provide approximately 575 thousand mission hours –or a 42 percent increase (additional 170 thousand mission hours). Efficiency is a measure of how well something operates. Section C of this report described the increased capabilities associated with acceleration, noting increased presence and a more robust C4ISR architecture as the primary attributes. Therefore increases in operational efficiencies may be defined by the following equation:

Efficiency = Increased Capability + Increased Mission Hours

The additional mission hours are attributed, in part, to a greater operational tempo for major cutters. An innovative crewing concept that involves rotating crewmen will allow a cutter to get underway for 230 days while limiting the personnel tempo to 185 days. This compares to major legacy cutters that currently target 185 days away from homeport. The Fast Response Cutter is planned for 3,000 annual operating hours compared to the legacy 110' Island Class Cutter that is currently programmed at 1,800 hours annually. A significant increase in IDS aviation mission hours (over 90,000) is attributable to UAVs.

Increased efficiency for lower cost: Acceleration under the 10-Year Plan provides another efficiency that is not readily apparent but deserves emphasis. The 10-Year Plan provides significantly more mission hours in half the time of the current 20-Year Plan. In other words, the Coast Guard will benefit from increased efficiency much sooner under the 10-Year Plan – and at a cost savings of approximately $4 billion (then-year dollars). This point is illustrated in Figure 12 (Overall Deepwater Capacity). The blue shaded area identifies the difference between the two plans. The shaded area equates to an extra 943 thousand mission hours. Not only will the IDS produce more mission hours but acceleration also provides an additional 943 thousand mission hours on top of a more efficient system -- a significant benefit.

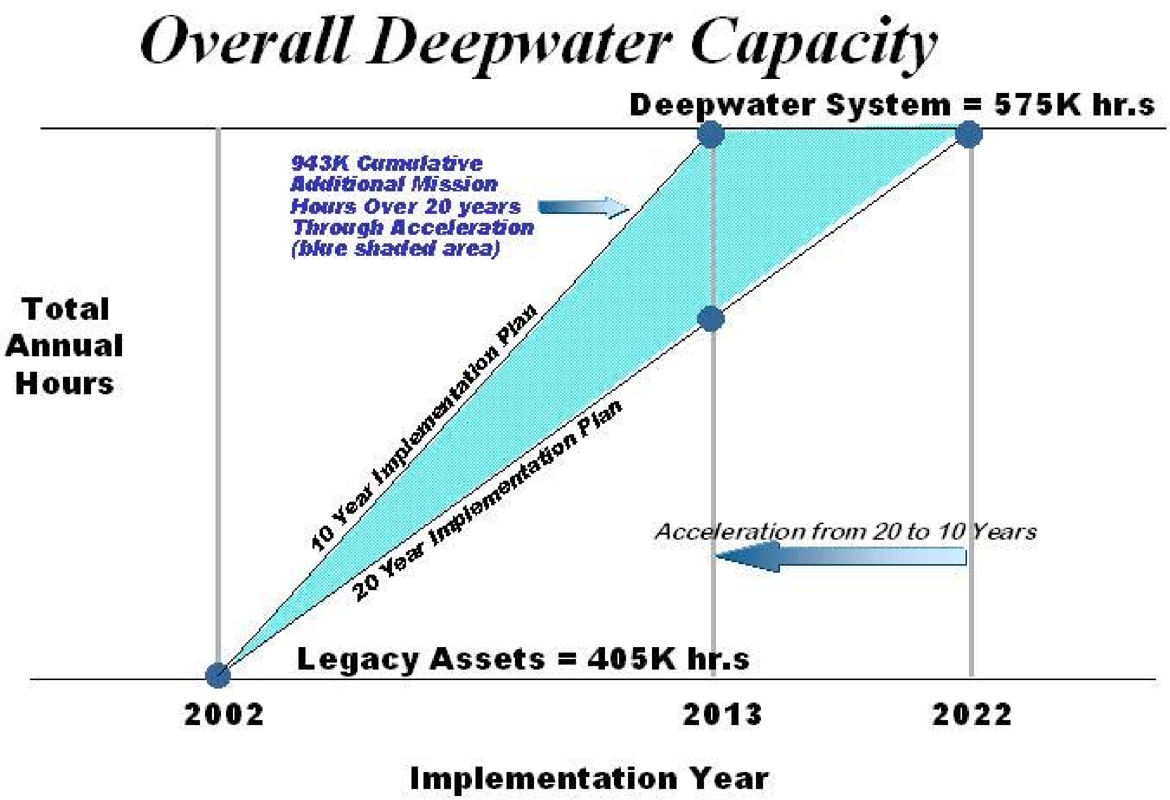

Figure 12: Additional Mission Hours provided through acceleration

Glossary of Terms

CA – Capital Acquisition

C4ISR – command, control, communications, computers, intelligence, surveillance, and reconnaissance

CIAAT – Center for Naval Analyses Integrated Asset Assessment Tool

EO/FLIR – Electro Optical Forward Looking Infrared Radar

ESM – Electronic Support Measure

FRC – Fast Response Cutter. 130 ft / 198 long tons / 30 kts max (proposed)

HAE-UAV – High Altitude Endurance Unmanned Aerial Vehicle. max range 3,000 nm + (proposed)

HFSWR – High Frequency Surface Wave Radar

ICGS – Integrated Coast Guard Systems. A partnership between Lockheed Martin and Northrop Grumman Ship Systems

IDS – Integrated Deepwater System

KPP – Key Performance Parameter

LRI – Long Range Interceptor. 11 meters / 150 lbs. equipment capacity / 45 kts (proposed)

MCH – Multi-mission Cutter Helicopter. EADS HH-65X / max range 420 nm (proposed)

MDA – Maritime Domain Awareness

MHLS – Maritime Homeland Security

MPA – Maritime Patrol Aircraft. Variant of CASA 235 / max range 3,055 nm (proposed)

MSMP – Modeling and Simulation Master Plan

MTS – Marine Transportation System

NSC – National Security Cutter. 425 ft / 3,686 long tons / 28 kts max (proposed)

OE – Operational Expense

OPC – Offshore Patrol Cutter. 341 ft / 2,921 long tons / 22 kts max (proposed)

SPS – System Performance Specification

SRP – Short Range Prosecutor. 7 meters / 150 lbs. equipment capacity / 36 kts (proposed)

VRS – VTOL Recovery and Surveillance Aircraft. Bell-Augusta AB-139 / max range 511 nm (proposed)

VUAV – Vertical Unmanned Aerial Vehicle. Bell HV-911 Eagle Eye / max range750 nm