

# DEPARTMENT OF HOMELAND SECURITY

# Office of Inspector General

## Re-Engining of the HH-65 Helicopter

## United States Coast Guard



Notice: The Department of Homeland Security, Office of the Inspector General, has redacted this report for public release under the Freedom of Information Act, 5 U.S.C. § 552 (b)(4).

## Office of Audits

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**Homeland  
Security**

## Preface

The Department of Homeland Security (DHS) Office of Inspector General (OIG) was established by the Homeland Security Act of 2002 (*Public Law 107-296*) by amendment to the Inspector General Act of 1978. This is one of a series of audit, inspection, investigative, and special reports prepared by the OIG as part of its DHS oversight responsibility to identify and prevent fraud, waste, abuse, and mismanagement.

This report assesses the strengths and weaknesses of the program or operation under review. It is based on interviews with employees and officials of relevant agencies and institutions, direct observations, and a review of applicable documents.

The recommendations herein have been developed to the best knowledge available to the OIG, and have been discussed in draft with those responsible for implementation. It is my hope that this report will result in more effective, efficient, and economical operations. I express my appreciation to all of those who contributed to the preparation of this report.

A handwritten signature in black ink, appearing to read "Clark Kent Ervin".

Clark Kent Ervin  
Inspector General



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## Abbreviations

ACCB	Aircraft Configuration and Control Board
AEC	American Eurocopter
AMIO	Alien Migration Interdiction Operations
ARSC	Coast Guard's Aircraft Repair and Supply Center
AUF	Airborne Use of Force
CGNR	Coast Guard Identification Number
DHS	Department of Homeland Security
DOD	Department of Defense
FAA	Federal Aviation Administration
FADEC	Full Authority Digital Engine Control system
FLIR	Forward Looking Infrared
GAO	Government Accountability Office
G-O	Assistant Commandant for Operations
G-S	Assistant Commandant for Systems
HITRON	Helicopter Interdiction Tactical Squadron
HLS	Homeland Security
HOGE	Hover Out of Ground Effect
HUD	Heads Up Display
IDS	Integrated Deepwater System
ICGS	Integrated Coast Guard Systems
IPT	Integrated Product Team
LANTAREA	Atlantic Area
LE	General Law Enforcement
LMR	Living Marine Resource
MCH	Multi-mission Cutter Helicopter
MPA	Maritime Patrol Aircraft
MTBF	Mean Time Between Failures
NCGI	Non-Contract Government Incurred
OEM	Original Equipment Manufacturer
OIG	Office of Inspector General
ONF	Operation New Frontier
PACAREA	Pacific Area

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PDM	Planned Depot Maintenance
PBH	Power-By-the-Hour
RAC	Risk Assessment Code
SAR	Search and Rescue
SHP	Shaft Horse Power
SLEP	Service Life Extension Project
SPS	System Performance Specification
SRR	Short Range Recovery
VUAV	Vertical Takeoff and Landing Unmanned Aerial Vehicle
VDEL	Vertical Delivery
VI	Vertical Insertion





## **Introduction**

This report presents the results of our review of the United States Coast Guard's (Coast Guard) HH-65 Dolphin helicopter re-engining project. The review was initiated in response to a February 11, 2004, letter from the Chairman and Ranking Member of the House of Representatives, Committee on Appropriations, Homeland Security Subcommittee, expressing concern that the re-engining requirements specified for the HH-65 helicopter are not sufficient for the needs of the Coast Guard over the Deepwater Project time frame. During subsequent discussions with Subcommittee staff, additional concerns were raised about the capabilities of the LTS-101-850 engine<sup>1</sup> and the potential cost, delivery, and operational risks associated with the Coast Guard's decision to enter into a contract with Integrated Coast Guard Systems (ICGS)<sup>2</sup> to re-engine the HH-65 fleet with Turbomeca Arriel 2C2 engines. In a March 30, 2004, letter to the Homeland Security Subcommittee, we responded to the following five questions:

- Will re-engining the HH-65 resolve air crew safety and reliability concerns?
- What are the costs, delivery, and operational risks associated with the Coast Guard's decision to assign responsibility for re-engining the HH-65 to ICGS?
- What impact will the re-engining project have on the Coast Guard's other legacy air assets?
- Should the re-engined HH-65 aircraft be upgraded to perform the Coast Guard's Helicopter Interdiction Tactical Squadron (HITRON) mission?<sup>3</sup>

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<sup>1</sup> The engine under evaluation as a temporary replacement for the current HH-65 LTS-101-750 engine.

<sup>2</sup> ICGS is the prime contractor for the Coast Guard's Deepwater Project.

<sup>3</sup> The HITRON Squadron was established in FY 2000 to employ airborne use of force in the interdiction of go-fast boats engaged in the smuggling of illegal drugs through the U.S. maritime contiguous zone. The squadron currently operates a fleet of eight MH-68A helicopters leased from Agusta Aerospace Corporation at a cost of \$14.3 million per year. The current HITRON five-year lease is renewable on a yearly basis and expires during January 2008.

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- Will the re-engined HH-65 be able to meet the Multi-mission Cutter Helicopter (MCH) requirements outlined in the existing Deepwater contract?

This report expands our response to those questions and includes developments through August 31, 2004, regarding the HH-65 re-engining project.

## Results in Brief

According to the Coast Guard, replacing the Honeywell LTS-101-750 engines that are currently installed on the Coast Guard's HH-65 fleet will resolve many of the safety and reliability issues that have plagued the HH-65 fleet for much of the past decade. However, extended negotiations between the Coast Guard, ICGS, and its subcontractors<sup>4</sup> has postponed the implementation of the re-engining project by several months. Re-engining the HH-65 was authorized by the Commandant of the Coast Guard on January 15, 2004, because of an urgent and compelling need to mitigate safety and operational risks associated with the aircraft. It has been almost eight months since the Coast Guard directed ICGS to take immediate and definitive action to re-engine the HH-65 fleet, yet a formal agreement to re-engine the HH-65 fleet has yet to be finalized.

In addition, ICGS' latest proposal<sup>5</sup> does not meet the Coast Guard's desire to have 84 operational aircraft completed by July 2006. Instead, ICGS proposes to have 84 of the 95 re-engined aircraft completed by June 2007 – eleven months beyond the Commandant's 24-month deadline. Extending the delivery date will expose HH-65 air crews to additional risk due to the unprecedented rate at which in-flight loss of power mishaps are occurring.

Further, ICGS' latest cost proposal for re-engining the entire HH-65 fleet is [REDACTED] than the Coast Guard's estimate for re-engining the aircraft in-house at its Aircraft Repair and Supply Center (ARSC). This is a significant cost differential given ICGS' intention to have the majority of the re-engining work performed by ARSC, the effect these additional expenditures will have on the Coast Guard's ability to sustain and upgrade its legacy aviation assets, and the stated inability of ICGS to deliver 84 re-engined aircraft within

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<sup>4</sup> Eurocopter is the manufacturer of the HH-65 airframe and the airframe modifications kits, including the N4 gearbox upgrade kit, to be installed aboard the HH-65. Turbomeca is the manufacturer of the Arriel 2C2 engine.

<sup>5</sup> ICGS/Lockheed Martin Proposal dated July 21, 2004.

<sup>6</sup> Ibid.

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the Commandant's 24-month time frame. The proposal also exceeds the Coast Guard's AC&I estimate for the re-engining project.<sup>7</sup>

The Coast Guard plans to fund the re-engining project using almost \$200 million originally budgeted to sustain and upgrade legacy air assets, including its Jayhawk (HH-60), Dolphin (HH-65), and Hercules (HC-130) fleets. Use of these funds for the re-engining will force the Coast Guard to postpone or cancel critical maintenance and upgrade projects that could result in fleet cannibalization<sup>8</sup> and the grounding of key aviation assets as early as FY 2007.

The Coast Guard also decided not to replace the eight MH-68A helicopters operated by its HITRON squadron with re-engined and Airborne Use of Force (AUF)-capable HH-65s. This decision eliminates an opportunity to resolve the air crew safety, power, maneuverability, and operational endurance issues associated with the leased aircraft. The use of re-engined and AUF-capable HH-65s for the HITRON mission would eliminate the need for a lease and result in a net savings of [REDACTED] dollars over the next three years.<sup>9</sup>

We recommended that the Commandant implement the recommendation made by its Assistant Commandant for Operations in May 2004 to re-assert control over the HH-65 re-engining project and perform the re-engining as a government performed project. The Coast Guard does not concur with this recommendation, their primary rationale being that ICGS minimizes the operational, legal, and contract performance risks associated with the re-engining. The Coast Guard believes that it receives significant benefits from the current ICGS contract that far outweigh the costs of having ICGS manage the project. We do not believe those benefits have been demonstrated in this instance.

We also recommended that the Coast Guard expedite the replacement of the MH-68A helicopters with re-engined HH-65s equipped with the AUF package of upgrades, acquire and refurbish additional HH-65 aircraft and airframes, and use the savings resulting from the termination of the MH-68A lease to mitigate the impact the re-engining project will have on the maintenance and upgrade of its legacy air assets. The Coast Guard agreed in part with these recommendations, but in all three cases cites a lack of funding as the primary reason for not implementing them.

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<sup>7</sup> The Coast Guard's Aviation Capital Improvement Plan, dated January 7, 2004, allocated [REDACTED] to the HH-65 re-engining project.

<sup>8</sup> The borrowing of parts from one aircraft in order to keep another aircraft operational.

<sup>9</sup> The elimination of \$43.5 million dollars in lease costs minus the estimated [REDACTED] dollar cost (estimated at [REDACTED] aircraft) of adding the AUF upgrade to eight re-engined HH-65s.

<sup>10</sup> The HH-60 mishap rate data covers the period October 1, 2003, through August 31, 2004.

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## Background

In 1984, the Coast Guard procured 96 twin-engine, short-range recovery (SRR) HH-65 helicopters equipped with LTS-101-750 engines. The compact design of this engine provided limited potential for power growth. Expanding mission parameters and critically needed mission growth exacerbated the performance requirements gap to a point where the aircraft can no longer meet the Coast Guard's SRR mission requirements. There are currently 84 operational HH-65 aircraft deployed to 17 Coast Guard air stations throughout the United States. The HH-65 helicopter performs several important missions including search and rescue, homeland security, enforcement of laws and treaties, drug interdiction, marine safety, and marine environment protection. The aircraft is also the Coast Guard's primary cutter deployable helicopter.

There has been an increase in the number of HH-65 in-flight loss of power mishaps over the past three and one half years. Coast Guard HH-65 air crews reported 32 in-flight loss of power mishaps between FY 2000 and FY 2002. During FY 2003, HH-65 air crews reported another 32 in-flight loss of power mishaps, or a three-fold increase over FY 2000, which led to the Commandant's October 3, 2003, decision to impose operational restrictions on the HH-65 fleet. These restrictions are affecting the aircraft's ability to conduct search and rescue, homeland security, enforcement of laws and treaties, drug interdiction, marine safety, and marine environment protection missions from Coast Guard cutters. In addition, these restrictions have limited the aircraft's ability to perform medical evacuation missions involving takeoffs and landings from rooftop landing pads and other confined areas.

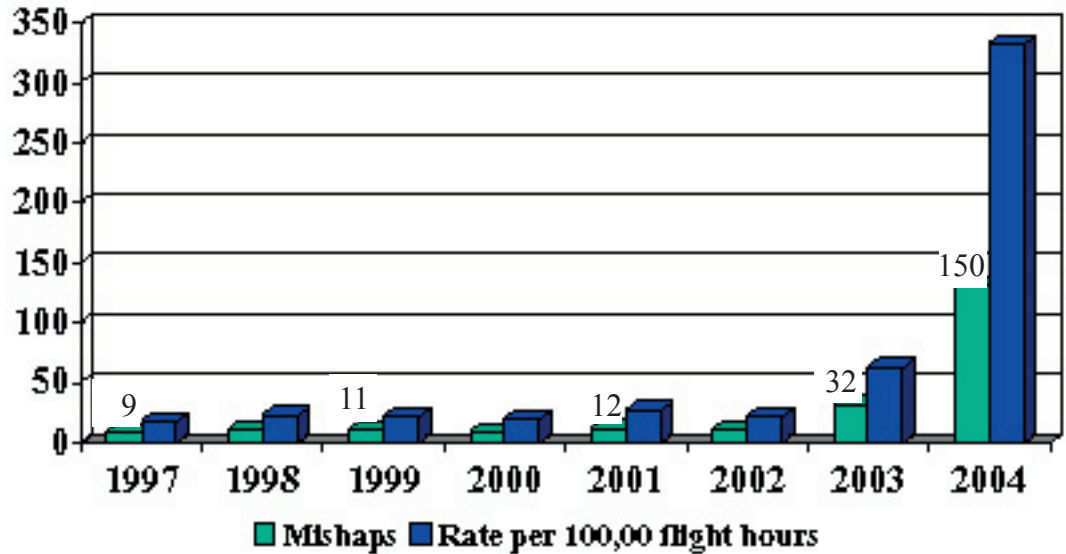
The number and rate of in-flight loss of power mishaps have continued to increase despite the imposition of flight restrictions. Between October 1, 2003, and August 31, 2004, HH-65 air crews reported 150 in-flight loss of power mishaps. This translates into a mishap rate of 314 mishaps per 100,000 flight hours. In comparison, the Coast Guard's in-flight loss of power mishap rate for the HH-60 helicopter is 18 mishaps per 100,000 flight hours.<sup>10</sup> Chart 1 includes a summary of HH-65 in-flight loss of power mishaps per 100,000 flight hours between FY 1997 and FY 2004.<sup>11</sup>

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<sup>11</sup> The data covers the period October 1, 1996, through August 31, 2004.

<sup>12</sup> One mission by a single aircraft.

**Chart 1. – HH-65 In-Flight Loss of Power Mishaps  
FY 1997 to FY 2004 (August 31, 2004)**



Source: U.S. Coast Guard

In an October 3, 2003, message announcing the decision to impose operating restrictions on the HH-65, the Commandant stated:

*“I cannot be more emphatic. The safety and reliability of the HH-65 power plant is the number one priority for USCG aviation. The safety of our flight crews is paramount. Our most valued asset remains the professional Coast Guard men and women who continue to admirably answer our Nation’s call. The missions we perform carry inherent risks, the equipment we provide to complete those missions should be nothing short of safe and reliable.”*

The erratic performance of the aircraft’s current LTS-101-750/850 engine and control system has shaken the confidence of the HH-65 community. Recent communications from commanding officers of several air stations cited concerns that engine malfunctions were draining resources and significantly affecting the air station’s ability to perform Coast Guard missions. Maintenance technicians are spending more time diagnosing and fixing problems, only to see them soon recur. Training missions, which previously were completed in one sortie,<sup>12</sup> are now requiring two or more sorties, adding additional takeoffs and landings. These

<sup>13</sup> According to the Coast Guard, ICGS independently selected the Arriel 2C2 engine for the HH-65 re-engining project.

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additional sorties increase the workload of air station personnel as well as increase air crew exposure to in-flight loss of power mishaps.

The following excerpt from an April 2004 communication between the commanding officer of a Coast Guard air station and Coast Guard headquarters is indicative of the level of concern being expressed within the HH-65 community regarding the safety of flight and reliability issues associated with the HH-65:

*“...I conservatively estimate we spent 50 maintenance man-hours, 10 ground run hours, 6.2 test flight hours chasing this problem. As a skipper I’m proud of the perseverance my maintenance crews displayed in solving this problem, but at the same time, I’m completely frustrated at the sheer effort expended to deal with this ridiculously complex and unreliable engine control system. In reading similar accounts from other air stations, one has to wonder just how many ‘unnecessary replacement of components’ situations have occurred not only recently but over the years, and what that has cost us. Even with the application of new trouble-shooting devices such as the breakout box, we still find ourselves tangled in these time-consuming resource draining trouble-shooting tail chases. I realize we have folks working around the clock to bring the solution on board quickly. However, we absolutely cannot allow any time line delays in implementing the solution, not only from a risk exposure perspective, but also a maintenance resource perspective. We are grinding our maintenance workforce into the ground with this engine control system....”*

## Safety and Reliability

When completed, re-engining the Coast Guard’s HH-65 helicopter fleet, using the Arriel 2C2 engine, will remedy long-standing safety and reliability issues that have plagued the HH-65 since its introduction in 1984. The selection of the Arriel 2C2 was the culmination<sup>13</sup> of a three year, six million dollar effort by the Coast Guard to develop the HH-65 into an AUF-capable platform.<sup>14</sup> The urgency to develop the HH-65 into an AUF-capable platform increased following the terrorist attacks of September 11, 2001, and the Coast Guard’s realization that it needed to develop an organic AUF capability to perform HLS missions along the United

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<sup>14</sup> AUF is not currently part of the HH-65 or Deepwater mission profile.

<sup>15</sup> The HH-65 that was re-engined and given the AUF upgrades was designated CGNR 6560.

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States coastline. The majority of HH-65s are stationed near our nation's busiest and most strategic seaports.

The Coast Guard began investigating the use of a modified HH-65 to perform counter-drug missions during the early part of 2001 following a lengthy delay in the production, testing, and delivery of eight MH-68A aircraft for the HITRON squadron. The MH-68A is a militarized version of the Agusta A109E aircraft that was re-configured to AUF specifications to conduct counter drug operations from Coast Guard cutters. While the concept of operations underlying the HITRON counter drug mission has been successful, the Coast Guard has determined that the MH-68A helicopter does not meet the minimum reserve power, maneuverability, and operational endurance requirements for the AUF mission.

In November 2001, the Coast Guard tasked Eurocopter to conduct a market survey and engineering analysis of suitable engine candidates that would provide the HH-65 with the AUF capability. The Eurocopter market survey identified the Arriel 2C2 engine as the engine best able to provide the HH-65 with the power, speed, maneuverability, and endurance needed to perform the AUF mission.

Between September 2002 and December 2003, the Coast Guard's ARSC, in close coordination with the Assistant Commandant for Operations (G-O), Assistant Commandant for Systems (G-S), Turbomeca, Eurocopter, and NAVAIR Patuxent River, developed and flight-tested a re-engined and AUF-capable HH-65.<sup>16</sup> This aircraft was fitted with a pair of Arriel 2C2 engines, updated engine controls and gauges, an extended nose, an N4 gearbox, and the AUF package of upgrades.

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<sup>16</sup> In addition to SAR, non-HLS missions include: Marine Safety; Aids-to-Navigation; Ice Operations; Marine Environmental Protection; and Living Marine Resources.



Source: U.S. Coast Guard

**CGNR 6560 – Prototype AUF HH-65C** -- Re-engined HH-65 with the extended nose, N4 gearbox, and AUF upgrades based at the Coast Guard's Aircraft Repair and Supply Center, Elizabeth City, North Carolina. The aircraft has been deployed on counter-drug operations in the Eastern Pacific.

According to the Coast Guard, the flight testing and performance analysis of a HH-65 that was fitted with the Arriel 2C2 engines and AUF upgrades (CGNR 6560), validated Eurocopter's earlier determination that the performance of the re-engined and upgraded HH-65 meets or exceeds the power, speed, maneuverability, and endurance requirements needed to safely execute the AUF mission. In contrast, flight-testing and performance analysis of HH-65s powered by LTS-101-750/850 engines determined that the engine lacked the power, maneuverability, and endurance requirements needed to safely execute non-HLS missions<sup>16</sup> such as search and rescue (SAR), let alone the more demanding AUF and HLS missions.<sup>17</sup> Appendix A presents a comparison of the performance capabilities between the LTS-101 and Arriel 2C2 engines under varying operating conditions.

<sup>17</sup> Homeland Security Missions include: Drug Interdiction; Migrant Interdiction; other law enforcement (including foreign fisheries); Port, Waterways, and Coastal Security; and Defense Readiness.

<sup>18</sup> Manufacturers of the HH-65 airframe and Arriel 2C2 engine.

<sup>19</sup> The May 28, 2004, proposal included \$62 million dollars worth of Lockheed Martin and Integrated Coast Guard System labor, material,



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## Cost, Delivery, and Operational Risks

The inability of the Coast Guard, ICGS, and its subcontractors (Eurocopter and Turbomeca)<sup>18</sup> to agree on a final contract has delayed the development and implementation of the HH-65 modification line at ARSC. It also will postpone the delivery of re-engined aircraft by several months, extend the operational restrictions imposed on the HH-65 fleet, and expose HH-65 air crews to additional in-flight loss of power mishaps. In addition, the Coast Guard's decision to assign responsibility for the HH-65 re-engining project to ICGS will significantly and, in our view, unnecessarily, increase the project's final cost.

ICGS' initial proposal to re-engine 95 HH-65 aircraft was approximately [REDACTED] the Coast Guard estimates it would have cost them to re-engine the same number of aircraft at its Aircraft Repair and Supply Center (ARSC). This was a significant cost differential given ICGS' initial intention to have ARSC re-engine more than half of the HH-65 fleet, the effect that the additional expenditures would have on the Coast Guard's ability to sustain and upgrade its legacy aviation assets, and the fact that the proposal would not complete the re-engining within the Commandant's 24-month time frame. Appendix B contains photographs of HH-65s undergoing overhaul at ARSC.

ICGS, its subcontractors, and the Coast Guard engaged in a de-scoping session during June 2004 for the purpose of finding a way to reduce the cost of the re-engining proposal without compromising the Commandant's desire to re-engine all 95 HH-65s within a 24-month period. On July 21, 2004, ICGS submitted a second proposal recommending that the Coast Guard re-engine the entire HH-65 fleet at its ARSC at a proposed cost of [REDACTED]. While ICGS was successful in reducing the size, scope, and cost of the first proposal, the proposal still contained millions of dollars worth of material handling, labor, incentive expenses, and fees. For example, the July 2004 proposal included performance award and incentive fee criteria that could reward ICGS up to \$36 million for the timely delivery of goods and services that the contractor has little or no direct control over. The re-engining proposal was to be valid through Tuesday, August 31, 2004.

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overhead expenses, and incentive fees.

<sup>20</sup> Maintenance contract between the Coast Guard and Honeywell to support the LTS-101 engines currently installed aboard the HH-65 fleet.

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ICGS also has experienced difficulty developing and implementing a realistic delivery schedule. Shortly after accepting responsibility for the re-engining project, ICGS provided the Coast Guard and the Homeland Security Subcommittee with a notional delivery schedule. The March 2004 schedule called for the first re-engined HH-65 to be delivered for flight-testing by June 4, 2004, with an additional 20 aircraft to be delivered by the end of CY 2004. In addition, the schedule committed to re-engine the first 84 aircraft before July 2006, the date for which the Coast Guard's Power-by-the-Hour contract with Honeywell expires.<sup>20</sup> On May 14, 2004, ICGS informed the Coast Guard that delivery of the first re-engined HH-65 would be delayed until July 2004 and that the remaining 83 operational aircraft would be delivered by July 2006.<sup>21</sup> They also said the entire HH-65 fleet (95 helicopters) would be delivered to the Coast Guard by January 2007.<sup>22</sup> However, ICGS' May 28, 2004, proposal issued two weeks later decreased the total number of aircraft to be re-engined by the July 2006 deadline from 84 to 54, with the remaining 41 aircraft to be re-engined by August 2007 - well beyond the Commandant's 24-month timetable.

The delivery schedule accompanying ICGS' July 21, 2004, proposal decreases the total number of aircraft to be re-engined by July 2006 from 54 to 52 aircraft. The remaining 43 aircraft are scheduled to be re-engined by the end of November 2007, or 46 months after the Coast Guard assigned responsibility for the re-engining project to ICGS. Table 1 provides a summary of the aircraft delivery schedules provided by ICGS to the Coast Guard between March and July 2004.

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<sup>21</sup> According to the Coast Guard, the delivery of the first re-engined HH-65 will not occur before September 2004.

<sup>22</sup> All 84 aircraft would have to be delivered by July 2006 in order to meet the Commandant's 24 month timetable.

<sup>23</sup> GAO Report: Coast Guard's Deepwater Program Needs Increased Attention to Management and Contractor Oversight (GAO-04-380; March 2004). GAO Report: Coast Guard: Deepwater Program Acquisition Schedule Update Needed (GAO-04-695; June 2004).

**Table 1 – Proposed ICGS Delivery Schedules,  
HH-65 Re-engining Project (March – July 2004)**

Date	ICGS Notional Production Schedule March 16, 2004	ICGS Notional Production Schedule May 14, 2004	ICGS Notional Production Schedule Proposal Dated May 28, 2004	ICGS Notional Production Schedule Proposal Dated July 21, 2004
By June 2004	HH-65 No. 1			
By July 2004				
By August 2004	HH-65 No(s). 2-5			
By September 2004	HH-65 No(s). 6-10			
By December 2004	HH-65 No(s). 11-21	HH-65 No(s). 1-2		
By December 2005	HH-65 No(s). 22-69	HH-65 No(s). 3-43		
By July 2006	HH-65 No(s). 70-95	HH-65 No(s). 44-84	HH-65 No(s). 1-54	HH-65 No(s). 1-52
By December 2006		HH-65 No(s). 85-95	HH-65 No(s). 55-70	HH-65 No(s). 53-70
By January 2007			HH-65 No(s). 71-74	HH-65 No(s). 71-73
By May 2007			H-65 No(s). 74-87	HH-65 No(s). 74-83
By August 2007			HH-65 No(s). 88-95	HH-65 No(s). 84-89
By November 2007				HH-65 No(s). 90-95

Source: U.S. Coast Guard and ICGS

ICGS' July 2004 proposal could further increase the number of HH-65s that will have to be removed from operational service to meet the revised delivery schedule. The Coast Guard typically has 11 HH-65 aircraft out-of-service for overhauls and upgrades at any given time. The latest American Eurocopter Corporation (AEC) proposal to ICGS contains an option to re-engine 46 HH-65s at its Columbus, Mississippi, plant at a per unit labor cost that is almost three times what it would cost the Coast Guard to perform the same work at ARSC. The AEC option offers the Coast Guard an opportunity to expedite the re-engining project by about three months. However, should the Coast Guard exercise this option, more than 17 HH-65s would have to be removed from service at any given time. According to the Coast Guard, removing more than 17 aircraft from service would significantly impact its ability to train personnel and execute its search and rescue, migrant interdiction, law enforcement, marine environmental protection, and HLS missions.

The findings of two recently issued Government Accountability Office (GAO) reports<sup>23</sup> have increased our concern about ICGS' ability to manage the HH-65 re-engining project. In March 2004, GAO reported problems in delivery,

<sup>24</sup> According to Coast Guard's Office of Budget and Programs, the MPA delay was the result of Coast Guard requirement changes and available funding.

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performance, cost control, and contract administration of two major Deepwater projects: the modernization, lengthening, and life extension overhaul for the 110-foot Island Class patrol boat fleet; and the acquisition of maritime patrol aircraft (MPA). Under ICGS' plan, the first Island Class patrol boat, the *MATAGORDA*, was scheduled for a November 2003 delivery. However, the *MATAGORDA* was not delivered until March 2004. According to the GAO, the delay affects the delivery schedules and costs associated with the remaining 48 cutters to be upgraded under the contract.

The GAO reports that schedule milestones for the MPA acquisition have not been met.<sup>24</sup> Delivery of the first two MPAs was originally scheduled for FY 2005. However, current plans call for these aircraft to be delivered during late FY 2006 or early FY 2007. The delays involving the Island Class patrol boats, the MPA, and now the HH-65s, all occurred early in the projects' time line, raising serious uncertainties about ICGS' ability to meet its delivery schedules.

The GAO criticizes Deepwater's Integrated Product Teams (IPTs), the same entity that has been administering the HH-65 re-engining project. The GAO reported that Deepwater IPTs struggled to collaborate and accomplish their missions effectively, due to training deficiencies, inadequate communication among members, lack of timely charters to vest IPTs with authority for decision-making, and high turnover rates for IPT membership. The recent resignation of the Deepwater team leader responsible for overseeing the HH-65 re-engining project working group is a case in point.

On June 14, 2004, the GAO issued a second report on the status of Deepwater projects. The report contains additional details on the status of a number of critical assets to be upgraded or acquired during the Deepwater time frame. The GAO noted that in two instances, the delivery of assets were so far behind schedule that it would be impossible for ICGS to return them to their original schedule. Of the 18 Island Class patrol boats scheduled to be lengthened, upgraded, and delivered to the Coast Guard by the end of FY 2005, only eight are now scheduled to be completed by the end of FY 2005. In addition, the GAO cited that the delivery of the Vertical Take-Off and Landing Unmanned Aerial Vehicle (VUAV) has experienced similar delays.

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<sup>25</sup> This amount does not include funding for HH-65 engine replacement or maintenance.

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## Effect on the Coast Guard's Legacy Aviation Assets

The Coast Guard's decision to use funds from the Deepwater's legacy asset maintenance account to fund the HH-65 re-engining project will postpone or cancel nearly \$200 million of AC&I funding originally dedicated for the sustainment and upgrade of its legacy aviation assets for FY 2004 through FY 2006. According to the Coast Guard, the deferment of these much-needed upgrades could impact the readiness of key legacy air assets, including the re-engined HH-65, HH-60, and HC-130 aircraft.

Prior to the Commandant's decision to re-engine the HH-65, the Coast Guard had budgeted \$226 million for maintenance and upgrades to the Coast Guard's legacy aircraft.<sup>25</sup> These upgrades originally included the updating of the weather and surface search radar and Forward Looking Infrared (FLIR) installations aboard its HH-65, HH-60, and HC-130. The Coast Guard also planned to re-engineer and upgrade the HH-65's tail rotor blade assembly and landing gear. In addition, other airframe, radar, sensor, and avionics upgrades were budgeted for the HH-60 helicopter. Many of these upgrades however, have been cancelled or indefinitely postponed. Table 2 contains a listing of the legacy aviation asset sustainment and upgrade projects originally planned for FY(s) 2004 through 2006.

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<sup>26</sup> The average time (usually expressed in hours) that a component works without failure. The Coast Guard requires its aircraft components to meet a MTBF of 800 hours.

**Table 2. –USCG Legacy Aviation Asset Sustainment and Modernization Spend Plan (FY 2004 thru FY 2006)**

<b>AIR</b>	<b>Requested FY 2004 (\$Thousands)</b>	<b>FY 2004 Received</b>	<b>Requested ** FY 2005 (\$Thousands)</b>	<b>FY 2005 * Spend Plan</b>	<b>Requested ** FY 2006 (\$Thousands)</b>	<b>FY 2006 * Spend Plan</b>
HH-65 Landing Gear Recapitalization	\$ 2,200	\$ 0	\$ 2,600	\$ 0		
HH-60 Avionics Upgrade	\$ 29,600	\$ 10,000	\$ 23,400	\$ 0		
HH-60 Service Life Extension Project (SLEP)	\$ 1,300	\$ 0	\$ 4,500	\$ 0		
HH-60 Integrated Radar/FLIR Upgrade	\$ 4,400	\$ 0	\$ 11,000	\$ 0		
HH-65 Integrated Radar/FLIR Upgrade	\$ 6,000	\$ 0	\$ 15,500	\$ 0		
HC-130 APS-137 Search Radar Replacement	\$ 11,830	\$ 0	\$ 10,500	\$ 0		
HC-130 Weather Radar Replacement	\$ 9,520	\$ 0	\$ 3,702	\$ 0		
HH-65 Tail Rotor Recapitalization	\$ 2,850	\$ 0	\$ 2,850	\$ 0		
HH-60 T-700 Engine Upgrade	-----	\$ 0	\$ 8,000	\$ 0		
<b>Total</b>	<b>\$ 67,700</b>	<b>\$ 10,000</b>	<b>\$ 82,052</b>	<b>\$ 0</b>		

Source: U.S. Coast Guard

\* Data from Integrated Deepwater System Projected FY05-FY09 Budget Plan

\*\* Data from Aviation Capital Improvement Plan – dated 7 January 2004

According to the Coast Guard, failure to make the improvements and upgrades to its legacy aircraft will increase operating costs. It also will reduce the operational capability of critical air assets at a time when the overall number of flight hours devoted to Coast Guard missions is increasing. Between FY 2001 and FY 2003, the total number of flight hours for all Coast Guard legacy aircraft in support of Coast Guard missions increased by 9%. Further, many of the planned maintenance and upgrades are needed because of the decline in the Mean Time Between Failure (MTBF)<sup>26</sup> rate of critical components. For example, between

<sup>27</sup> According to the Coast Guard, the Army recently discontinued the use of the RDL-1300.

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FY 1997 and FY 2003, the MTBF of weather radar components installed aboard the HH-65, HH-60, and HC-130 aircraft declined from 946 to 400 hours.

During the same period, the Army declared the RDR-1300 radar obsolescent and the original equipment manufacturer will soon stop making replacement parts for this system.<sup>27</sup> Currently, the Coast Guard employs the RDR-1300 aboard its HH-65, HH-60, and HH-130 aircraft. According to the Coast Guard, the declining MTBF associated with the RDR-1300 is expected to impact maintenance and repair costs and increase the stress on its spare parts system. Over time, the lack of spare parts could force Coast Guard air stations to cannibalize<sup>28</sup> aircraft in order to maintain aircraft and air station readiness.

## **HH-65 and the Coast Guard's HITRON Mission**

The replacement of the eight leased aircraft operated by the HITRON squadron with a re-engined and AUF-upgraded HH-65 would resolve the air crew safety, power, maneuverability, and flight endurance issues associated with the fleet of leased aircraft. It also would reduce the number of flight hours devoted to AUF-related training, free-up valuable transit time and asset support required to deploy HITRON assets to the Coast Guard's Pacific Area (PACAREA) for counter-drug deployments, eliminate an aircraft lease valued at more than \$43 million over the next three years, and offset some of the costs associated with the sustainment of legacy aviation assets. The Coast Guard's HITRON unit has been conducting counter drug interdiction since its inception in 1999.<sup>29</sup> The unit also has performed a variety of HLS missions since the September 11, 2001, attacks. These include HLS overflights over major U.S. cities including: New York City, New Orleans, Houston, and Los Angeles. More recently, these aircraft were part of an Enhanced Maritime Safety and Security Team (EMSST) involved in providing security at the recent G-8 conference in Atlanta, Georgia, President Reagan's memorial in Washington, DC, and the Democratic National Convention in Boston, Massachusetts.

The HITRON squadron operates eight leased AUF-equipped MH-68A aircraft from its Cecil Field facility in Jacksonville, Florida, at a cost of more than \$14

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<sup>28</sup> Taking parts from otherwise serviceable aircraft to keep other aircraft flying. Cannibalization takes planes out of the rotation, increases the workload and maintenance on the other planes, and depletes flexibility in meeting response requirements. It also translates Coast Guard parts shortages into personnel problems because it doubles the maintenance workload.

<sup>29</sup> The original HITRON "unit" started conducting drug interdiction in 1999. The HITRON "unit" was later transformed into the larger HITRON "squadron," which started conducting drug interdiction mission in 2001.

<sup>30</sup> Annual cost estimate includes leasing and maintenance costs associated with the MH-68A.

million a year.<sup>30</sup> Currently, the HITRON lease is in year one of a one-year contract with four option years (through 2008). The current lease option expires in January 2005.

According to the Coast Guard, the decision to lease AUF-capable aircraft to perform the HITRON mission was originally intended as a stopgap measure until the Coast Guard could undertake a more permanent solution. The Coast Guard has known since at least December 2002 that a re-engined HH-65 with the AUF upgrades installed could perform the HITRON mission. Table 3 includes a list and estimated cost of the minimum upgrades needed to transform a re-engined HH-65 into an AUF-capable aircraft.

**Table 3. – List of the AUF Upgrades Needed to Make the Re-engined HH-65 an AUF-Capable Aircraft**

AUF Upgrades	
Law Enforcement Lights, Loudhailer, Siren	
Aircraft Armor	
Weapons Mount and Hardware	
FLIR <sup>31</sup> Optical Sensor System	
CDU 900 Software Upgrade	
Night Vision Goggles Heads Up Display (HUD)	
Satellite Communications (Voice)	
Sixth Fuel Cell <sup>32</sup>	
<b>Estimated Cost --</b>	<b>Per Aircraft<sup>33</sup></b>

Source: U.S. Coast Guard

Although the current Deepwater contract does not include a requirement for AUF-capable aircraft, the Coast Guard testified before Congress that there is an urgent need to develop their rotary-wing aircraft into AUF-capable platforms to be able to perform the HITRON and HLS missions. The Coast Guard also is in the process of changing the Deepwater System Performance Specification (SPS) to include the requirement that all Coast Guard rotary-wing aircraft, including the HH-65, be AUF-capable. The HH-65 performance specifications for AUF currently being considered are based on the current HITRON lease contract. These specifications include:

<sup>31</sup> Forward Looking Infrared Radar system. An identical FLIR system is installed aboard CGNR 6560

<sup>32</sup> According to the Coast Guard, a sixth fuel cell could be installed aboard a re-engined HH-65 for an estimated \$44,000.

<sup>33</sup> The estimated cost of adding the AUF upgrade includes \$1,075,000 dollars worth of non-recurring engineering costs allocated among eight HH-65 airframes.

<sup>34</sup> With the extended nose and N4 gearbox upgrades installed.



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Power Reserve - a 20% reserve power requirement measured from maximum continuous power when taking off at its maximum gross weight of 9,200 pounds. A re-engined HH-65 provides a 20% power margin when taking off at its maximum gross weight of 9,480 pounds.

Maneuverability - 45 knots sideward flight. The re-engined HH-65 operated at its maximum gross weight of 9,480 pounds is capable of a speed of 55 knots sideward flight.

Flight Endurance - 2 hours and 30 minutes endurance, including 20 minutes of reserve fuel. The re-engined HH-65, fitted with a sixth fuel cell, will have 3 hours and 30 minutes endurance, including 20 minutes of reserve fuel, when taking off at its maximum gross weight of 9,480 pounds.

Although HITRON's squadron of MH-68A aircraft have successfully interdicted go-fast boats smuggling drugs into the United States, they do not meet the minimum power, maneuverability, and flight endurance requirements outlined in the latest HITRON contract. Further, the Coast Guard's decision to bypass Aircraft Configuration and Control Board (ACCB) procedures and remove critical safety equipment, such as emergency floats and hoist from the MH-68A to improve its flight endurance, coupled with a history of unresolved problems with the aircraft's tail rotor blade assembly, continue to raise serious questions about the safety and the suitability of the aircraft for the HITRON mission. The replacement of the MH-68A with a re-engined and AUF-capable HH-65 would eliminate the air crew safety and operational issues associated with the MH-68A, and reduce the net operating expenses associated with the HITRON squadron by an estimated \$38 million dollars over the next three years. It also would provide the Coast Guard with the opportunity to take advantage of the operating efficiencies currently provided by the HH-65 maintenance, logistic, and training infrastructure, as well as provide the foundation for future expansion of its AUF-capability along the U.S. Great Lakes, Atlantic, Pacific, and Gulf coasts.

## **Ability of the HH-65 to Meet Deepwater's MCH Requirements**

According to the Coast Guard's recently retired Chief, Office of Aeronautical Engineering, a re-engined HH-65 equipped with the extended nose upgrade, N4 gearbox, and fuel cell upgrades would meet existing Multi-mission Cutter Helicopter (MCH) power, maneuverability, and endurance requirements, as defined by the existing Deepwater contract.

The re-engined HH-65 also would meet the additional MCH mission requirements currently envisioned by the Coast Guard.<sup>34</sup> The Coast Guard is currently working to amend the MCH requirements in the Deepwater contract to include AUF, vertical insertion,<sup>35</sup> and vertical delivery<sup>36</sup> mission capabilities. According to the Coast Guard, the re-engined HH-65, equipped with the AUF upgrades, when operated at its maximum take-off weight of 9,480 pounds, would be capable of conducting the AUF, vertical insertion, and vertical delivery missions with a 20% reserve power and an on-scene endurance of 1 hour and 30 minutes. Table 4 contains a summary of the upgrades needed to meet future AUF, HLS, and MCH requirements.

**Table 4. - Summary of Upgrades Needed to Meet Future AUF, HLS, and MCH Requirements**

Re-engining Upgrades	AUF Upgrades	MCH Upgrades
Turbomeca 2C2 Engine	Law Enforcement Lights, Loudhailer, Siren	Tail Rotor Upgrade
N4 Gearbox	Aircraft Armor	Landing Gear Upgrade
Extended Nose	Weapons Mount and Hardware	Fenestron (10 Bladed)
	FLIR Optical Sensor System	Digital Flight Director System
	CDU 900 Software Upgrade	Radar Upgrade
	NVG Heads Up Display (HUD)	Avionics Upgrade
	Satellite Communications (Voice)	Satellite Communications (Data)
	Sixth Fuel Cell	Flight Deck Assist System
		MFD Software Upgrade (FLIR)
		Avionics Relocation

Source: U.S. Coast Guard

The larger question facing the Coast Guard is not whether the re-engined and upgraded HH-65 will be able to perform the MCH mission, but whether there will be a sufficient number of re-engined HH-65s to perform all required missions. The original 96 HH-65s were purchased at a time when the number and complexity of Coast Guard missions were fewer and less complicated. In contrast, the missions performed by the HH-65 today are increasingly varied and

<sup>35</sup> The vertical insertion mission, as envisioned by the Coast Guard, calls for the MCH to deliver a four-person boarding team (via fast-roping) to a potentially hostile vessel or platform within an operational radius of 50 nautical miles. According to the Deepwater contract, the MCH will be deployed from Coast Guard cutters.

<sup>36</sup> The vertical delivery mission, as envisioned by the Coast Guard, calls for the MCH to be able to lower (by rescue basket or Coast Guard sling) a four-person boarding team onto a non-hostile vessel located within an operational radius of 50 nautical miles.

<sup>37</sup> The LTS-101-850 engine is an upgraded version of the LTS-101-750 engine, which was originally installed aboard the HH-65.

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complex. The increased training required to perform these missions are steadily eroding available flight hours. For example, the Program Flight Hours for the HH-65 is 645 flight hours per year. However, 45% of the program flight hours are devoted to training for legacy and HLS missions, thereby reducing the number of flight hours devoted to the Coast Guard's legacy missions to about 355 hours per year.

The number of HH-65 flight hours rarely change from year to year. Hence, any increase in the number of flight hours devoted to Ports and Waterway Coastal Security (PWCS), Defense Readiness, and Enforcement of Laws and Treaty missions is attained at the expense of other Coast Guard missions. For example, the number of HH-65 flight hours flown in support of PWCS, Defense Readiness, Enforcement of Laws and Treaties, and various support missions between FY 2001 and FY 2003 increased by 34% (8,524 flight hours). During the same period, the total number of HH-65 flight hours flown in support of non-HLS missions, i.e., SAR, Marine Safety, Ice Operations, and Aid-to-Navigation, decreased by 13% (2,611 flight hours). For the Coast Guard to restore the lost flight hours, they could either increase the number of program flight hours for the re-engined HH-65 or acquire and refurbish additional HH-65s and airframes.

To its credit, the Coast Guard is beginning to address its force structure shortfalls. During July 2003, the Commandant requested that its Deepwater sponsors assess the personnel, training, equipment, and infrastructure implications and gaps associated with the Coast Guard's heightened role in national security and national defense. According to the Coast Guard, the ongoing Performance Gap Analysis will provide the road map for developing the force structure needed to meet the Coast Guard's legacy and homeland security responsibilities. It is clear from our review of the preliminary analysis conducted to date, the Coast Guard expects a re-engined and AUF-capable HH-65 to play a vital and prominent role in the solution.

## Latest Developments

Concern about the lack of progress, the rising cost, and increasing risks associated with the HH-65 re-engining project is mounting within the Coast Guard's senior aviation leadership. In a May 18, 2004, memorandum to the Commandant, the Assistant Commandant for Operations recommended that the ongoing delays, burgeoning costs, and increased operational risks associated with the re-engining project could be mitigated if the Coast Guard re-asserted control over the HH-65

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re-engining project and placed responsibility for re-engining the HH-65 into “the capable hands of ARSC.” The Assistant Commandant also recommended that some of the re-engined HH-65s be configured to perform the HITRON AUF mission.

The June 8, 2004, failure of the Honeywell LTS-101-850<sup>37</sup> engines that were installed aboard a HH-65 assigned to Air Station Miami, and the subsequent grounding of aircraft that were fitted with the engine, is increasing our concern that the Coast Guard may not have an adequate number of spare engines to maintain the readiness of its HH-65 fleet during the re-engining time frame. This engine failure was the third LTS-101-850 engine failure reported during FY 2004.<sup>38</sup> Prior to the most recent engine failure, the Coast Guard had intended to install LTS-101-850 engines aboard 25 HH-65’s at Air Stations Miami, New Orleans, Corpus Christi, Houston, and ATC Mobile to improve the aircraft’s hot weather performance. According to the Coast Guard, 32 spare engines are needed during any three-month period to maintain the operational readiness of the HH-65 fleet.

As of July 14, 2004, the Coast Guard’s air stations had 17 spare LTS-101-750 engines available.<sup>39</sup> Further, Honeywell has halted production of the LTS-101-750 engine in 1990. While the Coast Guard could compensate for the shortage by using used LTS-101-750 engines removed from the HH-65s undergoing overhaul and modification, the condition and availability of these engines is unknown. We are concerned about the Coast Guard’s ability to obtain spare LTS-101 engines given the delays in the establishment of a HH-65 modification line.<sup>40</sup> We also are concerned about the cost and operational impact on air stations should they be forced to ship spare engines from other units or cannibalize HH-65 aircraft, which have been taken out of service for scheduled maintenance, to meet minimum station readiness requirements. Consequently, the Coast Guard can ill-afford any additional delays in the development and implementation of the HH-65 modification line.

Air crew safety and the operational readiness of Coast Guard air stations have continued to deteriorate in the 15 weeks that have elapsed since the Assistant Commandant for Operations’ May 18, 2004, memorandum. The number of in-

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Honeywell’s ability to provide a comparable number of the original LTS-101-750 engines is not known.

<sup>38</sup> Two prior LTS-101-850 engine failures occurred on November 5 and November 8, 2003.

<sup>39</sup> The Coast Guard also reported that 6 of their 17 air stations (35%) that fly the HH-65 had no spare engines.

<sup>40</sup> The July 2004 proposal would create a HH-65 modification line at ARSC. The purpose of the modification line would be to re-engine those HH-65 aircraft that do not require a complete overhaul.

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flight loss of power mishaps has increased by 29%; the LTS-101-850 engine, which was intended to temporarily support the HH-65 fleet during the re-engining project, failed during testing; and, the estimated date for completing the re-engining of the entire fleet of HH-65s has slipped by eleven months.

Given the air crew safety, delivery delays, high cost, and operational risks associated with the HH-65 re-engining project, the Coast Guard should implement the recommendation of its senior aviation leadership to re-assert control of the HH-65 re-engining project and execute the HH-65 fleet re-engining as a government performed project at ARSC. The Coast Guard should take action to reduce the impact of the re-engining project upon the operational readiness and capability of the HH-65 fleet. Finally, the Coast Guard should take advantage of a timely and cost-effective opportunity to develop an organic asset capable of performing the AUF missions.

## Recommendations

We recommend that the Commandant:

1. Direct the Coast Guard's senior leadership, including the Assistant Commandants for Operations and Systems and the Chief Counsel, to implement the Assistant Commandant for Operations' May 18, 2004, recommendation that the HH-65 re-engining project be taken from ICGS and performed as a government performed project.
2. Expedite the replacement of the MH-68A helicopters operated by the HITRON squadron with re-engined HH-65s equipped with the Airborne Use of Force upgrades.
3. Acquire and refurbish additional HH-65 aircraft and airframes to reduce the effect on mission readiness and operational capability associated with the removal of HH-65s from service for re-engining and to compensate for the HH-65s assigned to the HITRON squadron.
4. Use the savings resulting from the termination of the HITRON lease to mitigate the costs associated with the maintenance of its legacy aviation assets.

Appendix A  
 Comparison of the Performance of the LTS-101 and  
 Arriel 2C2 Engines – 10/20% Power Reserve

**Comparison of the Performance of the Honeywell LTS-101 and Arriel 2C2 Engines  
 10% Power Reserve**

Mission Profile (Temperature in Celsius)	LTS-101 Engine			Arriel 2C2 Engine	
	Power Required (SHP) 50 Ft No Wind HOGE *	Power Available		Power Required (SHP) 50 Ft No Wind HOGE	Power Available (SHP) 2C2
		750	850		
<b>10% Reserve</b>					
SAR (15 Degrees @ Sea Level)	470	569	649	664	914
Vertical Insertion (15 Degrees @ Sea Level)	482	569	649	693	914
AUF (15 Degrees @ Sea Level)	470	569	649	664	914
SAR (35 Degrees @ Sea Level)	506	435	496	681	795
Vertical Insertion (35 Degrees @ Sea Level)	531	436	497	714	795
AUF (35 Degrees @ Sea Level)	506	435	496	681	795

Source: U.S. Coast Guard

\* Hover Out of Ground Effect

**Comparison of the Performance of the Honeywell LTS-101 and Arriel 2C2 Engines  
 20% Power Reserve**

Mission Profile (Temperature in Celsius)	LTS-101 Engine			Arriel 2C2 Engine	
	Power Required (SHP) 50 Ft No Wind HOGE*	Power Available		Power Required (SHP) 50 Ft No Wind HOGE	Power Available (SHP) 2C2
		750	850		
<b>20% Reserve</b>					
SAR (15 Degrees @ Sea Level)	595	569	649	724	914
Vertical Insertion (15 Degrees @ Sea Level)	622	569	649	756	914
AUF (15 Degrees @ Sea Level)	595	569	649	724	914
SAR (35 Degrees @ Sea Level)	735	436	497	743	795
Vertical Insertion (35 Degrees @ Sea Level)	779	436	497	779	795
AUF (35 Degrees @ Sea Level)	735	436	497	743	795

Source: U.S. Coast Guard

\* Hover Out of Ground Effect

**HH-65 PDM Line – U.S. Coast Guard Aircraft Repair and Supply Center,  
Elizabeth City, NC**





**HH-65 PDM Line – U.S. Coast Guard Aircraft Repair and Supply Center,  
Elizabeth City, NC**



## **Purpose, Scope, and Methodology**

We evaluated the efforts undertaken by the Coast Guard and its Deepwater Strategic partners to resolve the escalating safety, reliability, and operational capability issues associated with the HH-65 fleet of helicopters. In addition, we assessed the capability of the re-engined and upgraded HH-65 to perform the MCH requirements outlined in the existing Deepwater contract.

To understand the actions that have been taken to re-engine the HH-65, we reviewed: the steps taken to resolve the engine safety and reliability issues affecting the HH-65 fleet; the test results for the LTS-101-850 and Arriel 2C2 engines; and the air crew safety, power, maneuverability, and endurance issues associated with the MH-68A. We examined test reports documenting the ability of the MH-68A and the re-engined HH-65 to perform the HITRON mission. To ascertain the production capability of ARSC, we visited the facility and interviewed personnel responsible for maintaining, overhauling, and upgrading the HH-65 (Dolphin), HH-60 (Jayhawk), HU-25 (Falcon), and HC-130 (Hercules) fleet of aircraft. We also analyzed the Coast Guard's FY 2004 through FY 2006 budget request to determine the viability of funding for legacy aviation asset maintenance and upgrades.

We interviewed officials from Coast Guard headquarters in Washington, DC and Coast Guard's ARSC in Elizabeth City, NC. A series of headquarter interviews were conducted with officials from the Chief of Staff's Office of Programs, the Deepwater Program Executive Office, the Office of Aviation Forces, the Office of Aeronautical Engineering, and the Office of Safety and Environmental Health. A series of ARSC interviews were conducted with officials from the Office of the Commanding Officer for the ARSC Product Line and officials responsible for the HH-65 overhaul, repair, and modification line.

We performed the review between February 2004 and August 2004 under the authority of the Inspector General Act of 1978, as amended, and according to generally accepted government auditing standards. However, we relied on the Coast Guard's test and evaluation data, without independently validating the information. For example, we did not validate the accuracy of the Coast Guard's and Coast Guard contractor flight-testing and performance analyses involving HH-65 fitted with the Arriel 2C2 engines and AUF upgrades or on the HH-65 fitted with LTS-101-750/850 engines. In addition, we did not validate the analysis of a Eurocopter market survey, which evaluated compatible engines qualified to meet certain Coast Guard specifications for the HH-65 aircraft. Determinations

on engine capability were based on the assertions and HH-65 engine test data analyses provided by the Coast Guard management and Coast Guard aeronautical engineering experts.

Throughout the review, we worked closely with Coast Guard officials. We greatly appreciate the cooperation and professional courtesies extended by the Coast Guard to the OIG audit team. Major OIG contributors to the project are identified in Appendix E.



Commandant  
United States Coast Guard

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**MEMORANDUM**

SEP 14 2004

From: *Thomas H. Collins*  
T.H. COLLINS, ADM  
Commandant, U.S. Coast Guard

Reply to: CG-823  
Attn of: Mark Kulwicki  
202-267-2294

To: DHS OIG

Subj: DHS OIG REPORT: "RE-ENGINEING OF THE HH-65 HELICOPTER"

Ref: (a) DHSIG Draft Report A-04-25 dated 31 August 2004

1. This memorandum transmits our reply comments to your draft report's findings and recommendations contained in reference (a). We have included those comments in enclosure (1).
2. Re-engineing our HH-65's is the Coast Guard's top aviation priority. The safety of our personnel and operational reliability of our assets in service to the public is at risk. The Coast Guard has developed and will continue to refine a re-engineing solution that restores our fleet to full capability in the fastest possible way at a reasonable cost to the taxpayer. We will settle for nothing less.
3. The Coast Guard does not support your first recommendation to take the re-engineing project from Integrated Coast Guard System (ICGS). The decision to use ICGS to re-engine the HH65 helicopter was the right decision when it was made and is the right decision today. Your recommendation was based on dated and preliminary cost information. Further, there are additional benefits of the chosen approach that must be considered. For a marginal increase in project cost, the Coast Guard receives extensive, expert project management services to ensure timely delivery, as well as significant legal and performance risk mitigation, along with critical linkage to the Integrated Deepwater System. We believe the benefits of this contract far outweigh the costs. The report also fails to address the fact that terminating the ICGS task order would delay the project and increase our operational risk significantly.
4. The Coast Guard supports the intent of recommendations two, three and four. Modifying organic aircraft, including the HH-65's, to add airborne use of force (AUF) capability is necessary to meet homeland security mission requirements. It has been our intention to replace leased Helicopter Interdiction Squadron (HITRON) aircraft with Coast Guard owned aircraft since HITRON's inception. While incorporating AUF upgrades into the HH-65 re-engineing program would produce some efficiency, the Coast Guard does not currently have the funding or the spare aircraft needed to support this. We appreciate your endorsement for obtaining the resources needed to carry out this critical mission.
5. Any report comments that describe ICGS cost or schedule proposals should not be publicly released. This information, if released, would compromise ICGS' ability to negotiate fairly with its subcontractors.
6. If you have any questions, please contact Mark Kulwicki at (202) 267-2294

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Enclosure: (1) U.S. Coast Guard Comments

**STATEMENT ON DEPARTMENT OF HOMELAND SECURITY INSPECTOR  
GENERAL REPORT**

**TITLE:** "RE-ENGINEING OF THE HH-65 HELICOPTER", United States Coast Guard,  
Report Number OIG-A-04-25 dated 31 August 2004.

- I. U.S. COAST GUARD POSITION:** The Coast Guard does not concur with the recommendation to terminate the HH-65 re-engineing delivery task order with Integrated Coast Guard Systems (ICGS) in order to conduct the re-engineing as a government performed project. The Coast Guard receives significant benefits from the current ICGS contract that far outweigh the costs of having ICGS manage the project.

The current ICGS contract minimizes operational risk by providing the fastest possible resolution to the significant HH-65 safety and reliability problem. The current contract also minimizes legal and performance risk by taking advantage of an in-place commercial competitive contract vehicle that provides clear linkage to the Coast Guard's Integrated Deepwater Solution. The Coast Guard also takes advantage of the acquisition experience and leverage provided by the ICGS industry partners.

The Coast Guard concurs in part with the recommendation to expedite the replacement of the MH-68 helicopters operated by the Helicopter Interdiction Squadron (HITRON) with re-engined HH-65's equipped with Airborne Use of Force (AUF) upgrades. The Coast Guard is planning to arm all organic helicopters to perform homeland security duties, but must also replace the capability that will be lost when the lease for the eight MH-68's expires. Ending the HITRON contract without a one-for-one helicopter replacement plan would create a significant shortfall in homeland security presence and response capacity. The Coast Guard does not currently have funding to perform the AUF modifications, and does not have any spare operational aircraft that can be used to backfill the MH-68's if the HITRON contract was terminated early.

The Coast Guard concurs in part with the recommendation to acquire and refurbish additional HH-65 aircraft and airframes to reduce the effect on mission readiness and operational capability associated with the removal of HH-65s from service for re-engineing and to compensate for the HH-65s assigned to the HITRON squadron. To support the shortest possible timeline, the Coast Guard will remove up to six operational aircraft out of service at any given time for re-engineing. The Coast Guard is currently looking at alternatives for mitigating the operational impacts resulting from the loss of aircraft during both the re-engineing project and for when the HITRON lease expires.

The Coast Guard concurs in part with the recommendation to use the savings resulting from the termination of the HITRON lease to mitigate the costs associated with the maintenance of its legacy aviation assets. The Coast Guard does not currently have the funding or the spare operational capacity to replace the HITRON leased helicopters with HH-65's. The Coast Guard does plan on replacing the leased MH-68's with Coast Guard owned HH-65's in the future to minimize the total ownership cost of operating the HITRON. Any savings can then be applied towards higher priority Coast Guard projects such as maintenance of legacy aviation assets.

## II. RECOMMENDATIONS AND RESPONSES:

**Recommendation # 1: Direct the Coast Guard's senior leadership, including the Assistant Commandants for Operations and Systems and the Chief Counsel, to implement the Assistant Commandant for Operations' May 18, 2004, recommendation that the HH-65 re-engining project be taken from ICGS and performed as a government performed project.**

The Coast Guard does not concur with this recommendation.

Because of the timing of the audit, the Inspector General's team relied heavily on pre-decisional materials, preliminary cost estimates and notional schedules. Further refinement of these inputs demonstrates clearly that the Coast Guard made the right decision in contracting with ICGS to manage this project.

The Coast Guard HH-65 reengining project decision-making process considered the inputs of the Assistant Commandants for Operations, Systems, Acquisitions, and the Deepwater Program Executive, among others. Since the time that the Assistant Commandant for Operations raised concerns over the differences between ICGS' cost proposals and internal Coast Guard estimates, both ICGS and the Coast Guard have refined their cost figures based on updated scopes of work and subcontractor pricing.

To ensure that contract negotiations did not delay the project's progress, the Coast Guard issued a notice to proceed shortly after the project start date, with an obligation of sufficient funds to complete all development work and move into production. The total contract price was agreed to in early September 2004, and the Coast Guard and ICGS continue to negotiate the delivery schedule, focusing on alternatives to minimize the project duration. The negotiated price and the Coast Guard estimate for the main body of work is exactly the same. The *total project cost* difference is [REDACTED] which accounts for ICGS management costs and profit, far less than the [REDACTED] initially reported in the Inspector General's report. The Coast Guard views the [REDACTED] as a reasonable cost for the services ICGS is providing, particularly in light of the many unquantified benefits that the Coast Guard receives:

***The ICGS contract reduces legal risk.*** By using the legally acceptable alternative of placing an order under an existing competitive contract, the Coast Guard reduced the legal risk of potential disputes and protests over the engine replacement decision. The Coast Guard clearly articulated this risk during the decision-making process, as validated by the Government Accounting Office in their March 2004 "Replacement of HH-65 Helicopter Engine" report to Congress (GAO-04-595).

***The ICGS contract reduces cost risk.*** The ICGS joint venture provides significant expertise and leverage in obtaining competitive pricing from subcontractors. This leverage comes from the significant volume and dollar value of contracting work that the joint venture partners manage for their many customers worldwide, and the Coast Guard's effective oversight of the ICGS contract.

***The ICGS contract reduces schedule risk.*** The Inspector General's report suggests that the Coast Guard has lost control of the contract performance, apparently based on a three-month delay in delivery of the first re-engined HH-65. The Coast Guard has been fully engaged in all aspects of the project from contract management to detailed engineering design, and retains reasonable control of contract and project performance.

ICGS was given a notice to proceed with the work shortly after project inception. The lack of a "final contract" did not impact the production schedule as suggested in the Inspector General's report. The availability of parts is the schedule's critical path driver, a problem that would exist even if the Coast Guard performed the re-engining itself. ICGS continues to work with parts suppliers to accelerate the delivery of engines and parts kits beyond the industrial manufacturing capacity that exists today.

ICGS, the Coast Guard, the engine manufacturer and the aircraft manufacturer have been engaged since the project started in conducting the engineering needed to move into full production. Nearly 2,000 parts are needed for each engine change, many of them custom made by the aircraft manufacturer to fit the Coast Guard HH-65. The Coast Guard maintains that the re-engining project is proceeding at best speed, and could not have been accelerated had the Coast Guard managed the project itself. ICGS also has the flexibility to utilize multiple production lines to accelerate the delivery schedule and is currently exploring delivery alternatives that would involve re-engining production lines beyond the Coast Guard's organic capabilities.

***The ICGS contract reduces performance risk.*** As noted in the March 2004 GAO report, the alignment between the HH-65 re-engining and the Coast Guard's future Deepwater aircraft requirements is critical to prevent significant cost and schedule implications and risks. The Coast Guard chose to engage ICGS, the Deepwater System Integrator, in the HH-65 re-engining project to provide this alignment. This arrangement eliminates the risk that the re-engined aircraft will undergo duplicative work when being converted to the Deepwater Multi-mission Cutter Helicopter (MCH). Because ICGS already had included conversion of the HH-65's to MCH in its accepted Implementation Plan and would be responsible for follow-on repair costs, the re-engining project is functionally an accelerated project that was already approved for funding under the Deepwater program rather than an additional expense to the Coast Guard. If the Coast Guard had re-engined the HH-65 itself, it would assume the risk that ICGS would not warrant the power and engine solution, putting all repair costs outside the ICGS contract and creating significant integration challenges for the Coast Guard.

Terminating the ICGS HH65 re-engining task order contract would create impacts not quantified in the Inspector General's report. The sunk costs could not be recouped, and ICGS could be entitled to other termination entitlements, which would significantly reduce or eliminate any cost "savings" gained from termination. A termination for the purpose of converting the work to in-house performance could also be improper without assessment in accordance with OMB Circular A-76 requirements. Finally, the Coast Guard would have to assume full oversight of the project, incurring costs in contracting, project management, other overhead functions and opportunity costs that have not been quantified. The Coast Guard would then likely experience the same challenges that ICGS

is facing with obtaining critical parts and scheduling work to minimize the project timeline.

**Recommendation #2: Expedite the replacement of the MH-68A helicopters operated by the HITRON squadron with re-engined HH-65s equipped with the Airborne Use of Force upgrades.**

The Coast Guard concurs in part with this recommendation. The Coast Guard does not currently have the funding necessary to complete the airborne use of force (AUF) modifications, nor does it have spare operational HH-65's to replace the MH-68's.

The Coast Guard is using MH-68 helicopters in the HITRON unit as a bridging strategy until the service can outfit organic Coast Guard helicopters for AUF and identify replacement capacity for the loss of the eight leased MH-68 aircraft.

The eight MH-68's provide a total of 800 deployed days aboard Coast Guard cutters each year performing counter-drug, migrant interdiction and other homeland security missions. The Coast Guard is looking at alternatives for replacing this capacity. If this involves purchasing additional HH-65 or similar airframes, the acquisition is likely to take a number of years to both procure and missionize new aircraft. Taking HH-65's from other operational units to replace the MH-68's in the interim creates critical operational gaps in other Coast Guard mission areas.

As a short-term measure, continuing to lease the MH-68's is a reasonable and economical approach to provide this critical operational capability while the Coast Guard obtains the necessary funding for AUF modifications and MH-68 backfills.

**Recommendation #3: Acquire and refurbish additional HH-65 aircraft and airframes to reduce the effect on mission readiness and operational capability associated with the removal of HH-65s from service for re-engining and to compensate for the HH-65s assigned to the HITRON squadron.**

The Coast Guard concurs in part with this recommendation. In order to support the shortest possible timeline for re-engining, the Coast Guard must make a significant number of airframes available to the re-engining production lines. The Coast Guard developed a plan that makes 17 aircraft available at any given time for re-engining and scheduled overhauls. Eleven aircraft are normally being overhauled at any given time based on a four year planned overhaul cycle, meaning that the service would have to make only six *additional* aircraft available for the re-engining effort. The Coast Guard believes that it can provide this number of aircraft in the short term without significant operational readiness degradation.

The planned rate of production is based on the projected availability of engines and parts. The Coast Guard and ICGS are looking at alternatives for increasing throughput in the event that engines and parts can be delivered at a faster rate than anticipated. Procuring new HH-65's that can be used to mitigate the operational impacts of re-engining and then later be used to replace HITRON MH-68's is one of the alternatives being considered, but that alternative relies on funding not currently available.



**Recommendation #4: Use the savings resulting from the termination of the HITRON lease to mitigate the costs associated with the maintenance of its legacy aviation assets.**

The Coast Guard concurs in part with this recommendation. The Coast Guard does not currently have the funding or the spare operational capacity to immediately replace the HITRON leased helicopters with HH-65's. The Coast Guard plans on replacing the leased MH-68's with Coast Guard-owned HH-65's in the future to minimize the total ownership cost of operating the HITRON. Any savings can then be applied towards higher priority Coast Guard projects such a maintenance of legacy aviation assets.

As cited in the Inspector General's report, the Coast Guard has a number of critical legacy aviation asset projects that must be funded over the next three to five years in order to sustain current readiness levels. While the Coast Guard focuses on the re-engining effort, the sustainment of other legacy air assets, and the critical AUF capability improvement, the HITRON lease continues to provide a cost effective means to provide unique and highly valuable HITRON capabilities.

## OIG Evaluation of U.S. Coast Guard Response

The OIG issued the formal draft version of the report to the Coast Guard on August 31, 2004. The final report is based on the analysis of information provided to the OIG up to and including August 31, 2004.

### Contracting with ICGS

OIG remains concerned about the Coast Guard's decision not to have ARSC implement the HH-65 re-engining solution as a government performed project. Our review of the documentation indicated the Coast Guard was aware at the outset of the re-engining project that its use of an outside contractor would take longer and cost more than it would have if they elected to have ARSC perform the re-engining as a government performed project. They were also aware that any extension of the project's time line would: expose HH-65 air crews to the risks of additional in-flight loss of power mishaps; further postpone critical legacy aviation asset maintenance and upgrade projects; and extend the operational restrictions placed on the HH-65 fleet which are significantly impacting the Coast Guard's ability to perform its SAR and other humanitarian-related missions.

From a contract performance and cost perspective, the Coast Guard maintains that an ICGS solution will restore the operational capability of the HH-65 fleet in the fastest possible way at a reasonable cost to taxpayers. While this is a worthy goal, it is not what ICGS and the Coast Guard have provided the HH-65 community to date. For example, ICGS' initial re-engining solution was 34 days late and included \$123 million worth of goods and services that the Coast Guard did not ask for and could not afford.<sup>41</sup> It then took ICGS an additional 16 weeks to reach an agreement with its subcontractors to buy engines and modification kits at the price quoted in the proposal. ICGS also has not met its June deadline for delivering the first re-engined HH-65. Finally, neither ICGS nor the Coast Guard have provided ARSC with the funding it needs to develop a B to C modification line despite ICGS' intention to have ARSC re-engine the entire HH-65 fleet.

Whether the Coast Guard stays the course with ICGS or decides to have ARSC perform the re-engining as a government performed project does not change the fact that the lengthy negotiations have already affected the delivery of engines and modification kits, postponed the development of the modification line at ARSC, and ultimately pushed back the delivery of re-engined HH-65s into FY 2008, well

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<sup>41</sup> The Business Case Analysis, which was due to the Coast Guard on April 19, 2004, was not delivered until sometime in June, 2004.

beyond the Commandant's completion date. Ironically, this is exactly what Coast Guard's Judge Advocate General predicted would happen in January 2004. In a memo to the Commandant's Chief of Staff outlining the legal issues surrounding the HH-65 re-engining project, he predicted the selection of ICGS to develop and implement the HH-65 re-engining solution would reduce the Coast Guard's control over the project, lengthen the negotiation process, increase project costs, and ultimately delay the delivery of re-engined aircraft. It took ICGS almost five months to conclude what the Coast Guard's senior aviation leadership had already determined back in December 2002, --- that a re-engined HH-65 with the Turbomeca 2C2 engine, N4 gearbox, extended nose, and an additional fuel cell would resolve the safety and reliability problems associated with this aircraft. Further, ICGS' recommendation that ARSC re-engine the entire HH-65 fleet will cost the Coast Guard about [REDACTED] more than it would have cost them if the re-engining was performed by ARSC as a government performed project.

The Coast Guard contends that because of the timing of the audit, the Inspector General's team relied heavily on pre-decisional materials, preliminary cost estimates and notional schedules, and that further refinement of these inputs demonstrates clearly that the Coast Guard made the right decision in contracting with ICGS to manage this project. However, the information in our report was presented by or developed in concert with senior Coast Guard officials. These include: the Coast Guard's Chief of Operations; the Chief, Office of Aviation Forces; the Chief, Office of Aeronautical Engineering; the Chief, Office of Aviation Safety, and the Commanding Officer, Coast Guard's Aviation Repair and Supply Center.

The Coast Guard response also fails to note that ICGS' most recent re-engining proposal was virtually identical (except for the cost) to the re-engining solution presented by the Coast Guard's senior aviation leadership to the Commandant in December 2003. We would also note that at the time the Coast Guard assigned the re-engining project to ICGS, the staff assigned to ARSC and the Coast Guard's Office of Aviation Forces and Office of Aviation Engineering, had spent two years working with Turbomeca and AEC to construct the first re-engined and AUF-capable HH-65. In addition, ARSC has developed the capability to fabricate many of the unique parts included in the B to C modification kit. ICGS, on the other hand, had no prior experience maintaining, overhauling, upgrading, or operating the HH-65.

The Coast Guard also says that terminating the ICGS HH-65 re-engining task order contract would create impacts not quantified in the Inspector General's

report -- the sunk costs could not be recouped, and ICGS could be entitled to other termination entitlements, which would significantly reduce or eliminate any cost "savings" gained from termination. They believe termination for the purpose of converting the work to in-house performance could also be improper without assessment in accordance with OMB Circular A-76 requirements. Finally, the Coast Guard would have to assume full oversight of the project, incurring costs in contracting, project management, other overhead functions, and opportunity costs that have not been quantified. The Coast Guard would then likely experience the same challenges that ICGS is facing with obtaining critical parts and scheduling work to minimize the project time line.

OIG agrees that the termination of the contract entered into with ICGS on September 17, 2004, would likely result in costs that would diminish the savings that would be achieved had the Coast Guard decided to have ARSC perform the re-engining as a government performed project. The response, however, fails to note that the Coast Guard was well-aware of our recommendation to terminate the contract with ICGS. The recommendation was included in the discussion draft version of the report provided to the Coast Guard on July 27, 2004. The recommendation was also a major topic of discussion at the August 3, 2004, exit conference with the Coast Guard. Finally, the recommendation was included in the formal draft version of the report issued to the Coast Guard on August 31, 2004. Consequently, the Coast Guard could have avoided these additional expenses had it implemented our recommendation.

### **Other Recommendations**

The OIG is pleased to note that the Coast Guard supports the intent of recommendations two, three, and four. In the short term, implementing these three recommendations would: eliminate an expensive and marginally-capable aircraft from the Coast Guard's inventory; expand the Coast Guard's counter drug and AUF capabilities; minimize the impact the re-engining project is having on the Coast Guard's ability to perform the Short Range Recovery (SRR) mission; and, help restore funding for critical legacy aviation asset maintenance and upgrade projects. OIG would support Coast Guard funding requests that expedite their efforts to eliminate the air crew safety, reliability, and performances issues associated with the HH-65.

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