Audit Report

OFFICE OF THE INSPECTOR GENERAL

AIR FORCE HELICOPTER FUEL CELL MILITARY SPECIFICATION TESTING

Report No. 94-039 February 11, 1994

Department of Defense

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Acronym

EFC	Engineered Fabrics Corporation

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February 11, 1994

MEMORANDUM FOR ASSISTANT SECRETARY OF THE AIR FORCE
(FINANCIAL MANAGEMENT AND COMPTROLLER)

SUBJECT: Audit Report on Air Force Helicopter Fuel Cell Military Specification Testing (Report No. 94-039)

We are providing this audit report for your review and comments. This report, the third in a series of reports relating to aircraft fuel cells procured by DoD, discusses inquiries from Congressmen David L. Hobson and George W. Darden and allegations of improprieties concerning qualification testing of fuel cells procured by the Air Force for H-3 and H-53 helicopters.

DoD Directive 7650.3 requires that all audit recommendations be resolved promptly. We deleted two draft recommendations based on comments from the Air Force. We request that the Commander, Warner Robins Air Logistics Center, Air Force Materiel Command, provide estimated completion dates for the planned actions on final report recommendations by April 11, 1994.

We appreciate the courtesies extended to the audit staff. If you have any questions about this audit, please contact Mr. Salvatore D. Guli, Program Director, at (703) 692-3025 (DSN 222-3025) or Mr. Ronald W. Hodges, Project Manager, at (703) 692-3178 (DSN 222-3178). Appendix I lists the distribution of this report. Please contact us if you have requests or suggestions for future audits. The audit team members are listed inside the back cover.

David K. Steensma

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Deputy Assistant Inspector General
for Auditing

Office of the Inspector General, DoD

Report No. 94-039 **February 11, 1994**
(Project No. 3CF-8009)

AIR FORCE HELICOPTER FUEL CELL MILITARY SPECIFICATION TESTING

EXECUTIVE SUMMARY

Introduction. This audit was performed in response to complaints regarding qualification testing of H-3 and H-53 helicopter fuel cells manufactured by the Italian company, Sekur S.p.A., a member of the Pirelli Group (Sekur-Pirelli). The complainant alleged that the Air Force did not require Sekur-Pirelli to perform H-3 and H-53 helicopter fuel cell qualification testing in accordance with applicable military specification requirements. The complainant also alleged that the Air Force did not comply with recommendations made by the Air Force Safety Mishap Investigation Board related to a fatal H-53 helicopter mishap. According to the allegation, the Air Force Safety Mishap Investigation Board recommended that the entire H-53 helicopter fuel system be made crashworthy to prevent the recurrence of fatalities during similar helicopter mishaps. We received an inquiry related to the H-53 helicopter fuel cell testing allegations from Congressman George W. Darden. In addition, we received an inquiry from Congressman David L. Hobson concerning the safety of the H-53 helicopter fuel system.

Objectives. The audit objectives were to determine whether DoD complied with fuel cell qualification testing requirements for selected helicopters and whether internal controls were in place to verify that DoD performs required testing of helicopter fuel cells. To adequately answer the allegations, we amended the audit objectives to focus on whether the Air Force verified compliance with military specification testing requirements for H-3 and H-53 helicopter fuel cells. We reviewed several safety issues and internal controls applicable to military specification testing.

Audit Results. Warner Robins Air Logistics Center, Air Force Materiel Command, Robins Air Force Base, Georgia, inappropriately approved Sekur-Pirelli as a qualified source of H-3 helicopter self-sealing fuel cells. As a result, Warner Robins Air Logistics Center awarded five contracts valued at $445,200 to Sekur-Pirelli with no assurance that the H-3 helicopter fuel cells met military specification requirements (Part II).

We concluded that the H-53 helicopter fuel cell testing and safety allegations were generally unfounded (Appendix D). We referred the H-53 helicopter fuel system safety concerns to the Air Force. The Air Force Safety Agency completed a system safety engineering analysis of H-53 helicopter fuel system configurations and provided the results of its analysis to Congressman Hobson.

Internal Controls. The Special Operations Forces Management Directorate, Warner Robins Air Logistics Center, had not established an internal management control program as required by the Federal Managers' Financial Integrity Act. The Special Operation Forces Management Directorate did not establish internal controls over evaluating and approving potential sources for helicopter components (source approval process). We are not reporting these deficiencies as material internal control weaknesses because the Special Operations Forces Management Directorate agreed to implement an internal management control program. See Part I for the internal controls reviewed.

Potential Benefits of Audit. Implementation of the recommendations will result in improvements over the source approval process. Although benefits could be realized by implementing the recommendations, the benefits were not monetary. Safety of aircraft and crew and compliance with military specifications are not quantifiable characteristics. Appendix G summarizes the potential benefits resulting from the audit.

Summary of Recommendations. We made recommendations to redesignate the Sekur-Pirelli H-3 helicopter fuel cells as nonself-sealing and to impose restrictions on helicopters equipped with these fuel cells to non-hostile environments. We also recommended that Warner Robins Air Logistics Center officials include controls over the source approval process in the implementation of the internal management control program.

Management Comments. In response to draft report recommendations, the Air Force determined that the estimated cost to perform the required military specification testing unavailable through contractor testing records was not economically feasible for eight H-3 helicopters that remain in the Air Force helicopter inventory. The Air Force agreed to designate the Sekur-Pirelli H-3 helicopter fuel cells as nonself-sealing and direct customers to use Engineered Fabrics Corporation helicopter fuel cells during flights in hostile areas. The Air Force also agreed that controls to verify contracts are awarded to qualified sources would be included in the internal management control program. A summary of management comments is in Part II of this report. A complete text of management comments is in Part IV.

Audit Response. In response to the Air Force comments to the draft report, we deleted the draft recommendations to verify contractor compliance with military specification testing requirements. We request the Commander, Warner Robins Air Logistics Center, to provide completion dates for the planned actions on the remaining recommendations by April 11, 1994.

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This report was prepared by the Contract Management Directorate, Office of the Assistant Inspector General for Auditing, Department of Defense. Copies of the report can be obtained from the Secondary Reports Distribution Unit, Audit Planning and Technical Support Directorate (703) 614-6303 (DSN 224-6303).

Part I - Introduction

Background

We initiated this audit, the third in a series of aircraft fuel cell audits, in February 1993 as a result of complaints regarding qualification testing of helicopter fuel cells manufactured by the Italian company, Sekur S.p.A., a member of the Pirelli Group (Sekur-Pirelli). A complainant alleged that the Air Force purchased from Sekur-Pirelli H-3 helicopter fuel cells that may not have been tested in accordance with the applicable military specification. In March 1993, the complainant alleged that the Air Force also purchased fuel cells for another aircraft, the H-53 helicopter, without requiring Sekur-Pirelli to perform full safety and performance testing required by the applicable military specification. The complainant also alleged that contract F09603-91-C-0624 did not improve the safety of the H-53 helicopter fuel system and did not meet Air Force Safety Mishap Investigation Board recommendations that the entire H-53 helicopter fuel system be made crash-resistant. In April 1993, we received an inquiry from Congressman David L. Hobson requesting a safety analysis of the Sekur-Pirelli fuel system (Appendix A). We referred the fuel system safety issue to the Air Force Safety Agency in May 1993 for review (Appendix B). In June 1993, we received an inquiry from Congressman George W. Darden related to the H-53 helicopter fuel cell testing allegations (Appendix C).

Air Force H-3 and H-53 Helicopters. The Air Force uses the H-3 helicopter for combat and rescue missions. The H-53 helicopter is used for overt and covert special operations forces missions.

H-3 Helicopter. The H-3 helicopter contains a total of four fuel cells: two forward and two aft cells. The H-3 helicopter was manufactured by Sikorsky Aircraft, United Technologies, and has been operational in the Air Force inventory for more than 20 years. In 1988, the Air Force began phasing out the H-3 helicopter. As of April 1993, nine H-3 helicopters remained in the active Air Force inventory.

H-53 Helicopter. The H-53 helicopter contains two main fuel cells. The H-53 helicopter was manufactured by Sikorsky Aircraft, United Technologies, and has been operational in the Air Force inventory for more than 20 years. As of July 1993, the Air Force had 47 H-53 helicopters in its active inventory.

Fuel Cell Characteristics. A fuel cell is a flexible bladder shaped to fit a designated cavity in an aircraft and designed to hold aircraft fuel. Air Force H-3 helicopter fuel cells are self-sealing and manufactured to military specification MIL-T-5578C, "Tank, Fuel, Aircraft, Self-Sealing." H-53 helicopter fuel cells have both crash-resistant and self-sealing properties and are manufactured to military specification MIL-T-27422B, "Tank, Fuel, Crash-Resistant, Aircraft."

Both military specifications require the helicopter fuel cells to satisfy specified performance requirements. Self-sealing fuel cells are designed to seal themselves when punctured by hostile fire. A crash-resistant, self-sealing fuel cell contains the self-sealing feature and, within certain tolerances, should not leak or burst if the helicopter crashes.

Air Force Safety Mishap Investigation Board. Air Force Regulation 127-4, "Investigating and Reporting US Air Force Mishaps," establishes the general program for investigating and reporting Air Force mishaps. The Air Force conducts safety investigations of aircraft mishaps to identify the causes and to make recommendations to prevent recurrence. The Air Force convenes a Safety Mishap Investigation Board to conduct the investigation when a comprehensive effort is deemed necessary. The Air Force tracks open recommendations and prepares a semiannual status report of preventive actions.

Air Force Fuel Cell Logistics Support. The Warner Robins Air Logistics Center, Air Force Materiel Command, Robins Air Force Base, Georgia (Warner Robins), created the Special Operations Forces Management Directorate (Special Operations Directorate) to provide technical and logistical support for aircraft designed to penetrate hostile, politically denied, or sensitive areas. As part of a reorganization initiated in September 1993, the Special Operations Directorate was renamed Special Operations Forces Systems Program Office. For consistency, the audit report will refer to this support group as Special Operations Directorate. The Rotary Wing Division of the Special Operations Directorate is responsible for helicopter support. Within the Rotary Wing Division, engineering officials are responsible for evaluating and approving potential sources for helicopter components. In this report, we refer to evaluating, approving, and qualifying potential sources as the source approval process.

Qualified U.S. Fuel Cell Manufacturer. Engineered Fabrics Corporation (EFC) is the only domestic source approved to manufacture H-3 and H-53 helicopter fuel cells for the Air Force. Goodyear Aerospace Corporation manufactured fuel cells for the Air Force before being purchased by Loral Corporation in March 1987. In April 1989, K & F Industries purchased Loral's Engineered Fabrics Division, which is now referred to as EFC.

Objectives

The audit objectives were to determine whether DoD complied with fuel cell qualification testing requirements for selected helicopters and whether internal controls were in place to verify that DoD performs required testing of helicopter fuel cells. To adequately answer the allegations, we amended the audit objectives to focus on whether the Air Force verified compliance with military specification testing requirements for H-3 and H-53 helicopter fuel cells. We reviewed several safety issues and the internal controls applicable to

military specification testing. Appendix D lists the specific testing and safety allegations for the H-53 helicopter and the results of our review of each allegation.

Scope and Methodology

Audit Methodology. The audit focused on allegations concerning the Warner Robins acquisition of H-3 and H-53 helicopter fuel cells. To answer the allegations, we determined whether the Air Force ensured compliance with military specification testing requirements as part of the source approval process. We reviewed Warner Robins policy and procedures for identifying, evaluating, qualifying, and approving potential fuel cell contractors. We examined contract files dated 1959 to 1993, fuel cell military specifications, and H-3 and H-53 helicopter engineering data and correspondence. We interviewed Air Force H-3 and H-53 helicopter engineers and contracting personnel to discuss military specification requirements, source approval and qualification requirements, and safety issues. We also reviewed, for a 1985 H-53 helicopter mishap, the accident report, the Air Force Safety Mishap Investigation Board report, and the Air Force procedures for implementing Safety Mishap Investigation Board recommendations.

We responded to congressional inquiries related to the allegations. Based on our referral, the Air Force Safety Agency completed a system safety engineering analysis of H-53 helicopter fuel system configurations and provided the results of its analysis to Congressman Hobson.

We reviewed eight contracts awarded by Warner Robins contracting officials between 1983 and 1992 for H-3 helicopter fuel cells. The eight contracts were valued at $839,712. We also reviewed contract F09603-91-C-0624, awarded in May 1991 for $2,073,723, for H-53 helicopter crash-resistant, self-sealing fuel cells with assembly kits. We did not use statistical sampling procedures to select fuel cell contracts for review because of the small number of contracts involved.

Use of Technical Experts. We obtained guidance concerning military specification testing from contract, procurement, and industrial specialists in the Office of the Assistant Inspector General for Auditing, DoD. In addition, we obtained technical guidance from the Standardization Program Division, Manufacturing Modernization Directorate, Deputy Assistant Secretary of Defense (Production Resources), Office of the Assistant Secretary of Defense (Economic Security), and the Aircraft Division, Naval Air Warfare Center. Navy materials engineers and aerospace engineers helped evaluate the crash-resistance of Sekur-Pirelli H-53 helicopter fuel cell fittings. In addition, the Navy engineers evaluated Sekur-Pirelli military specification test data and examined the H-53 helicopter fuel cell wall to determine whether a construction change invalidated test results.

Audit Period, Standards, and Locations. This economy and efficiency audit was conducted from February through October 1993 in accordance with auditing standards issued by the Comptroller General of the United States, as implemented by the Inspector General, DoD. Accordingly, we tested internal controls as were considered necessary. We did not rely on computer-processed data to perform this audit. Appendix H lists organizations visited or contacted.

Internal Controls

Internal Controls Reviewed. We limited our evaluation of the Air Force implementation of the Federal Managers' Financial Integrity Act to the Special Operations Directorate at Warner Robins. We examined Rotary Wing Division internal controls related to the source approval process. The audit identified material internal control weaknesses as defined by Public Law 97-255, Office of Management and Budget Circular A-123, and DoD Directive 5010.38.

Internal Control Weaknesses Identified. The Special Operations Directorate had not established an internal management control program as required by the Federal Managers' Financial Integrity Act. In addition, the Rotary Wing Division did not establish controls to require verification of source approval decisions by Warner Robins engineering officials. We did not recommend implementing an internal management control program and are not reporting internal control weaknesses as material because the Special Operations Directorate agreed to implement an internal management control program. Recommendation 2., if implemented, will assist in correcting the internal control weaknesses. Correcting the internal control weaknesses will result in no monetary benefits; Appendix G provides details on other potential benefits of the audit.

Prior Audits and Other Reviews

General Accounting Office. Report No. NSAID 90-214 (OSD Case No. 8379), "F-15 Fuel Cells, the Air Force Needs Better Data for Informed Decisions," August 16, 1990. The report stated that the Air Force did not maintain adequate data on F-15 aircraft fuel cells to identify premature fuel cell failures, to establish repair and replacement policies based on the actual life of F-15 aircraft fuel cells, and to evaluate the advantages of an extended manufacturer's warranty. The report also stated that the Air Force did not have the data necessary to determine life-cycle cost advantages of using one fuel cell material over another. The report recommended that the Air Force collect F-15 aircraft fuel cell data, such as useful life, failure rates, and maintenance costs, and that management use data to assess the life-cycle cost of fuel cell materials and the merits of an extended warranty. The report also recommended that Air Force management use the data to revise the conditions under which fuel cells should be repaired or discarded.

During the General Accounting Office audit, Air Force officials stated that the automated maintenance records being installed at Warner Robins and Air Force F-15 maintenance depots would detail the historical data and other information needed to perform life-cycle cost analyses for the F-15 aircraft fuel cells, including dates the fuel cells were installed and reasons for replacement.

Inspector General, DoD. Report No. 94-027, "DoD Compliance with Lobbying Restrictions Imposed by the Byrd Amendment," December 30, 1993. The audit addressed DoD compliance with the requirements imposed by the Byrd Amendment. The audit also evaluated a Hotline allegation that a company violated the Byrd Amendment by not disclosing certain lobbying activities. The audit determined that many senior DoD officials were not familiar with the Byrd Amendment requirements and that DoD compliance with these contract requirements could be improved. The Hotline allegation that a company violated the Byrd Amendment by not reporting the use of consultants to influence DoD officials and members and employees of Congress was not substantiated.

The Director of Defense Procurement did not agree that additional actions were needed to improve DoD compliance with the Byrd Amendment. The Army, the Navy, and the Defense Information Systems Agency agreed to make the recommended improvements.

Report No. 94-025, "Pricing of American Fuel Cell and Coated Fabrics Company Contracts," December 28, 1993. This report, the second in a series of reports related to aircraft fuel cells procured by DoD, concerns the pricing of fuel cells for the Navy F-14 aircraft. The report stated that the Navy did not obtain fair and reasonable prices on six negotiated contracts, valued at $1.8 million, awarded to American Fuel Cell and Coated Fabrics Company for F-14 aircraft fuel cells. As a result, American Fuel Cell and Coated Fabrics Company defectively priced the six contracts, and the Navy made overpayments in the amount of $474,599.

The Navy stated that defective pricing did not occur because the contracting officer did not rely on the contractor-submitted cost and pricing data to determine price reasonableness. However, the Navy agreed to request a voluntary refund from the contractor for the questioned overpayments. The Defense Contract Audit Agency performed the defective pricing audits based on oral and written statements from the contracting officer that he relied on the certified cost and pricing data. In response to the Navy's comments to the draft report, we also recommended additional training for the cognizant Navy contracting officer and that the Navy reimburse the Defense Contract Audit Agency for the costs of performing six postaward audits.

Report No. 94-001, "Aircraft Fuel Cell Procurements," October 13, 1993. This report, the first in a series of reports relating to foreign- and U.S.-manufactured aircraft fuel cells procured by DoD, concerns crash-resistant, self-sealing fuel cells manufactured by domestic sources for the Army's CH-47D Chinook and AH-64 Apache helicopters. The report stated that Army CH-47D and AH-64 helicopter fuel cells experienced premature failures due to systemic quality problems. In addition, the Army did not use the

useful life of the fuel cells in acquisition and maintenance decisions to ensure quality fuel cells were received. The report also stated that the allegations related to pricing were not substantiated.

The report recommended design and manufacturing changes on the fuel cells to improve the quality of the fuel cells. The report also recommended that expected useful life for CH-47D and AH-64 helicopter fuel cells be considered when making economic repair and replacement decisions and be used as an internal control objective to verify the quality of helicopter fuel cells. The Army generally concurred with the recommendations.

Report No. 92-140, "Competitive Bidding Practices on Contract F09603-91-C-0624," September 30, 1992, addressed the validity of a bid proposal made by Sekur-Pirelli. The report stated that Sekur-Pirelli did not offer a price below its expected cost to produce fuel cells for the Air Force H-53 helicopter. The report contained no recommendations.

Part II - Finding and Recommendations

Acquisition of H-3 Helicopter Fuel Cells

Warner Robins engineering officials approved Sekur-Pirelli as a qualified source for H-3 helicopter self-sealing fuel cells without determining whether the H-3 helicopter fuel cells met military specification testing requirements. The inappropriate approval occurred because Warner Robins management officials did not establish internal controls to verify that source approval decisions by Warner Robins engineering officials were adequately supported. As a result, the Warner Robins contracting officer awarded five contracts valued at $445,200 for 83 H-3 helicopter self-sealing fuel cells with no assurance that the fuel cells met military specification testing requirements.

Background

The Rotary Wing Division submitted a purchase request to the Warner Robins contracting officer for 30 H-3 helicopter self-sealing fuel cells in October 1988. Before the purchase request was initiated, the Army suspended EFC (Loral Corporation at the time), the only approved source for H-3 helicopter fuel cells, from conducting business with the Government. Because Warner Robins officials considered the fuel cell acquisition an urgent requirement, Warner Robins engineering officials identified and approved Sekur-Pirelli as a new source. The contracting officer issued solicitation F09603-89-R-68311 in April 1989 for Sikorsky Aircraft parts S6132-63012 and S6132-63030. Sikorsky Aircraft technical drawings for the parts clearly showed that the fuel cells should be manufactured in accordance with military specification MIL-T-5578C.

H-3 Helicopter Fuel Cell Military Specification Requirements. Military specification MIL-T-5578C requires the fuel cell manufacturer to perform Phase I and Phase II preproduction testing. Phase I testing evaluates fuel cell manufacturing methods, while Phase II testing determines whether the fuel cell will function within a designated aircraft. The military specification requires gunfire-resistance testing under both phases.

Preproduction testing is defined in Federal Acquisition Regulation part 9, "Contractor Qualifications," as testing and evaluation of the first article for conformance with contract requirements before or in the initial stage of production. Federal Acquisition Regulation part 9 states that testing and approval requirements may be waived when supplies similar to those specified have been previously delivered by the offerer and accepted by the Government.

H-3 Helicopter Fuel Cell Solicitation Requirement. The Warner Robins H-3 helicopter fuel cell solicitation stated that offers would only be considered when it could be determined before award that the H-3 helicopter fuel cells being offered would meet the Air Force requirement. The solicitation required

potential offerers to identify the source of technical data used to perform the contract including drawing number, revision letter, and date of the last revision. Offerers were required to submit a technical data package and to provide evidence that the H-3 helicopter fuel cells proposed would meet the Air Force requirement.

EFC was removed from the suspension list before the solicitation was issued and was therefore eligible to compete for the contract. Because EFC and Sekur-Pirelli were listed as previously approved sources, both companies were exempt from providing the technical data package and evidence that H-3 helicopter fuel cells met the Air Force requirement. Air Force Logistics Center Regulation 800-10, "Establishing Precontract Award Qualification Requirements and Processing Source Approval Requests," November 10, 1986, defines an approved or qualified source as a prime contractor that satisfactorily furnished or demonstrated the ability to furnish parts and that has been approved by responsible engineering officials.

Contract Award. Before contract award, the Warner Robins contracting officer answered a congressional inquiry from Congressman Newt Gingrich by stating

> The solicitation is restricted to sources considered qualified to produce the fuel cells. . . . Any contractor awarded a contract under this solicitation will be subject to testing criteria applicable to the appropriate part number.

The contracting officer evaluated bids from EFC and Sekur-Pirelli and, on August 29, 1989, awarded contract F09603-89-C-2565 for 30 H-3 helicopter fuel cells, valued at $168,060, to Sekur-Pirelli, the low bidder. Warner Robins officials later exercised the option to purchase additional H-3 helicopter fuel cells, increasing the value of the contract to $352,380. Still later, Warner Robins officials awarded four additional H-3 helicopter fuel cell contracts, including modifications, valued at $92,820, to Sekur-Pirelli. Appendix E shows the H-3 helicopter fuel cell contracts awarded to Sekur-Pirelli between 1988 and 1992, for a total of 83 H-3 helicopter fuel cells valued at $445,200.

Approval of Sekur-Pirelli as an H-3 Helicopter Fuel Cell Source

Warner Robins officials did not verify source approval documentation when approving Sekur-Pirelli as an H-3 helicopter fuel cell source. Warner Robins officials believed Sekur-Pirelli was already an approved source for H-3 helicopter fuel cells based on:

- qualification by similarity,
- qualification by the Italian government, and

o qualification by Sikorsky Aircraft, the H-3 helicopter original equipment manufacturer.

Qualification Based on Similarity. Warner Robins engineering officials approved Sekur-Pirelli to manufacture H-3 helicopter fuel cells based on a false assumption that Sekur-Pirelli provided similar fuel cells to the Navy and Coast Guard. Air Force Logistics Command Regulation 800-10, paragraph 3(g), defines a similar item as,

> an item which, when compared to the item being acquired or qualified, has essentially the same manufacturing processes with comparable magnitude of difficulty, and criticality; has the same materials or materials of comparable characteristics; and operates or functions in essentially the same environment or application.

Warner Robins officials, through discussions with the Navy, became aware of a contract with Agusta, an Italian aircraft manufacturer, under which Sekur-Pirelli manufactured Navy H-3 helicopter fuel cells. Warner Robins officials were also aware that Sekur-Pirelli had manufactured H-3 helicopter fuel cells for the Coast Guard. Warner Robins officials were not aware, however, that the Navy and Coast Guard H-3 helicopters were equipped with nonself-sealing fuel cells. Nonself-sealing fuels cells are not similar because they require different manufacturing processes and do not contain self-sealing materials.

Qualification Based on Certification By Italian Government. Warner Robins engineering officials approved Sekur-Pirelli to manufacture H-3 helicopter fuel cells based on an outdated and incomplete Italian certification. Warner Robins officials believed they were required to accept sources qualified by the Italian government without verifying compliance with military specifications. Defense Federal Acquisition Regulation Supplement appendix T, "Italy Memorandum of Understanding," states that DoD will give full consideration to all sources qualified by the Italian government. The memorandum of understanding does not, however, state or imply automatic acceptance of the Italian government certification.

Supporting Documentation. The Warner Robins engineering files showed that Warner Robins officials relied on Italian Ministry of Defense certifications for self-sealing fuel cells without obtaining reasonable assurance that Sekur-Pirelli performed tests required by military specification MIL-T-5578C. The Italian Ministry of Defense certified that Sekur-Pirelli performed Phase I preproduction tests for self-sealing fuel cells according to military specification MIL-T-5578C. However, the certification contained deficiencies that should have caused Warner Robins officials to request additional information or test data.

For example, the Italian Ministry of Defense certification was outdated and incomplete. The certification was dated July 4, 1973, and referred to a 1972 test report. Military specification MIL-T-5578C was amended in 1974, 1981, and 1983. The revisions changed certain testing requirements and could have invalidated the 1972 test data. No evidence existed to suggest that Warner Robins officials considered the potential impact of military specification

revisions upon test results. In addition, the Italian Ministry of Defense certification did not show whether Sekur-Pirelli performed or met Phase II test requirements.

Need for Supporting Documentation. DoD Manual 4120.3M, "Defense Standardization and Specification Program Policies, Procedures, and Instructions," August 1978, requires that, once a product has been granted qualification approval by a foreign manufacturer's own country, the appropriate test data should be submitted for evaluation to the DoD activity purchasing the product. If the evaluation shows deficiencies, the DoD activity requests additional information or tests as appropriate and approves the product only when satisfied that the product conforms to all requirements of the U.S. military specification.

Warner Robins officials had information available that demonstrated the need to obtain and evaluate documentation supporting the Italian Ministry of Defense certification. For example, Warner Robins files contained documentation from the Italian government showing that the Italian Ministry of Defense certified that Sekur-Pirelli manufactured crash-resistant, self-sealing fuel cells for the Army CH-47C helicopter in accordance with military specifications. However, the files also contained a letter from Boeing Vertol Company, the original equipment manufacturer for the CH-47 helicopter, to Agusta discussing Sekur-Pirelli compliance with CH-47C helicopter fuel cell military specification testing. The letter showed that Boeing Vertol Company reviewed the Sekur-Pirelli test results, found deficiencies, and refused to approve the CH-47C helicopter fuel cells until Sekur-Pirelli could show full compliance with applicable specifications. As a result of the Boeing Vertol Company review, Sekur-Pirelli provided additional information and performed additional tests to meet military specification requirements.

Qualification Based on Approval by Original Equipment Manufacturer. Warner Robins engineering officials approved Sekur-Pirelli to manufacture H-3 helicopter fuel cells without verifying that Sekur-Pirelli previously provided self-sealing fuel cells to Sikorsky Aircraft. Sikorsky Aircraft, the H-3 helicopter original equipment manufacturer, licensed Agusta to produce H-3 helicopters. According to Warner Robins officials, Sikorsky Aircraft provided Agusta with all H-3 helicopter changes and configuration updates. Warner Robins officials stated that the license agreement between Sikorsky Aircraft and Agusta made Agusta the same as an original equipment manufacturer and satisfied Sikorsky Aircraft. As a result, Warner Robins officials believed Sekur-Pirelli was automatically qualified to manufacture H-3 helicopter fuel cells.

Consideration of Agusta as an Original Equipment Manufacturer. In a March 22, 1988, letter to the Special Operations Directorate, the Warner Robins competition advocate provided guidance that supports our conclusion that Agusta was not the same as an original equipment manufacturer (Appendix F). The letter stated that Agusta would be listed as an approved source for H-3 helicopter parts when the Agusta-manufactured parts were identical to those manufactured by Sikorsky Aircraft. The Warner Robins competition advocate required additional verification because the parts were not

identical. Since Sikorsky Aircraft did not approve the Sekur-Pirelli H-3 helicopter fuel cells, Warner Robins officials were responsible for verifying that Sekur-Pirelli H-3 helicopter fuel cells complied with military specifications. The Warner Robins files contained no correspondence with Agusta concerning the H-3 helicopter fuel cells.

Approval by Sikorsky Aircraft. Sikorsky Aircraft did not approve Sekur-Pirelli as a qualified source for H-3 helicopter self-sealing fuel cells. We contacted the program manager for the Sikorsky Aircraft H-3 helicopter to obtain a list of sources approved to manufacture H-3 helicopter fuel cells, including those sources approved under license agreements. The program manager at Sikorsky Aircraft provided a list that showed EFC as the only approved source. When questioned about Sikorsky Aircraft's license agreement with Agusta, the program manager stated that Agusta approved its own H-3 helicopter component sources. However, Sikorsky Aircraft would not consider any fuel cell manufacturer an approved source without verifying compliance with Sikorsky Aircraft standards and requirements.

Urgency Cited as Factor in Source Approval. Warner Robins officials stated that urgency affected the manner in which Sekur-Pirelli was approved as an H-3 helicopter fuel cell source, but documentation did not exist to support that position. Warner Robins officials could not provide historical data showing the number of helicopters grounded because of fuel cell shortages. In addition, Federal Acquisition Regulation 6.302-2, "Unusual and Compelling Urgency," prescribes procedures for processing urgent requirements. Warner Robins contracting officials did not use urgent and compelling procurement procedures to purchase the fuel cells.

Internal Controls

Special Operations Directorate officials did not establish an internal management control program, as required by Air Force Regulation 15-1, "Internal Controls," which implements the Federal Managers' Financial Integrity Act. Special Operations Directorate officials stated that personnel generally did not understand the Federal Managers' Financial Integrity Act and believed the act applied only to personnel with financial responsibilities.

The Special Operations Directorate failure to establish internal management controls was the major contributing factor to the improper approval of Sekur-Pirelli as a qualified source for H-3 helicopter fuel cells by Rotary Wing Division officials. For example, Rotary Wing Division officials did not develop written standard operating procedures for source approval by engineers, did not require documentation of source approval decisions, and did not perform adequate supervisory reviews of source approval decisions.

We did not make recommendations specific to implementing the Federal Managers' Financial Integrity Act because Special Operations Directorate officials agreed to include an internal management control program in their

directorate reorganization plan as part of the overall Air Force Materiel Command reorganization plan to integrate weapon systems management. Warner Robins officials began implementing the reorganization plan in September 1993.

Conclusion

H-3 Helicopter Fuel Cells Compliance With The Military Specification. The Air Force has no assurance that Sekur-Pirelli H-3 helicopter fuel cells meet the military specification. Warner Robins officials must initiate action to obtain and evaluate Sekur-Pirelli test results to determine whether the tests were performed in accordance with the latest revised military specification for self-sealing fuel cells. If Sekur-Pirelli test results are deficient or unavailable, Warner Robins officials should determine the economic feasibility of conducting the required testing. If conducting the testing is not feasible, Warner Robins officials should determine alternatives that will reduce the possibility of exposing the Sekur-Pirelli H-3 helicopter fuel cells to potentially hazardous conditions. Possible alternatives include replacing the Sekur-Pirelli H-3 helicopter fuel cells with EFC H-3 helicopter fuel cells on hand or redesignating the Sekur-Pirelli H-3 helicopter fuel cells as nonself-sealing.

Effective Source Approval Process. Special Operations Directorate officials must implement a comprehensive system of internal management controls to provide reasonable assurance that potential source approvals are accomplished correctly, efficiently, and effectively. At a minimum, Special Operations Directorate officials should establish internal management control objectives and techniques that ensure adequate documentation and supervisory review of source approval decisions by engineers. Implementation of the internal management control program should improve the source approval process and provide reasonable assurance that contracts are awarded only to approved sources and that potential new sources meet the same requirements imposed upon original sources.

Recommendations, Management Comments, and Audit Response

Deleted Recommendations. The Air Force, in comments on the draft audit finding and recommendations, stated that recommended actions to evaluate whether Sekur-Pirelli H-3 helicopter fuel cells meet MIL-T-5578C specification requirements were not economically feasible. The Air Force helicopter inventory contains only eight H-3 helicopters, all of which are scheduled to be phased out of the inventory by September 1994. The Air Force accepted draft Recommendation 3. as the optimum alternative for the remaining Sekur-Pirelli

helicopter fuel cells. Based on the Air Force comments, we deleted draft report Recommendations 1. and 2. from the final report. Draft report Recommendations 3. and 4. were renumbered 1. and 2., respectively.

We recommend that the Commander, Warner Robins Air Logistics Center, Air Force Materiel Command:

1. Evaluate the feasibility of each of the following recommendations to determine the optimum alternative and then implement as appropriate.

a. Redesignate the Sekur-Pirelli H-3 helicopter fuel cells as nonself-sealing and restrict helicopters equipped with Sekur-Pirelli fuel cells to non-hostile use environment.

b. Replace the Sekur-Pirelli H-3 fuel cells with Engineered Fabrics Corporation H-3 helicopter fuel cells already in the Air Force inventory.

2. Issue guidance to the Special Operations Forces Management Directorate, Warner Robins Air Logistics Center, to include in the implementation of its internal management control program, internal controls to verify that contracts are awarded only to qualified sources and that potential new sources meet the same requirements imposed upon original sources. At a minimum, the directorate should establish internal management control objectives and techniques that ensure adequate documentation and supervisory review of source approval decisions by engineers.

Management Comments. The Air Force concurred with the finding and recommendations, stating that the Air Force will designate Sekur-Pirelli fuel cells as nonself-sealing and direct customers to use Engineered Fabrics Corporation helicopter fuel cells for flights in hostile areas. The Air Force also stated that all procurement actions requiring the approval of new sources will be reviewed by the Integrated Product Team leader and the engineering group leader. In addition, the internal management control program will contain internal controls to verify that contracts are awarded to qualified sources.

Audit Response. The planned actions of the Air Force satisfy the intent of the recommendations. We ask that the Air Force provide estimated completion dates for the planned actions in response to the final report.

Part III - Additional Information

Appendix A. Inquiry From Congressman David L. Hobson

DAVID L. HOBSON
7TH DISTRICT, OHIO
COMMITTEES
APPROPRIATIONS
SUBCOMMITTEE ON MILITARY CONSTRUCTION
BUDGET
STANDARDS OF OFFICIAL CONDUCT

CONGRESS OF THE UNITED STATES
HOUSE OF REPRESENTATIVES

WASHINGTON OFFICE:
1507 LONGWORTH HOUSE OFFICE BLDG
WASHINGTON, DC 20515-3507
(202) 225-4324

DISTRICT OFFICES:
ROOM 220 POST OFFICE
150 NORTH LIMESTONE STREET
SPRINGFIELD, OH 45501-1118
(513) 325-0474

212 S. BROAD STREET
ROOM 50
LANCASTER, OH 43130-1969
(614) 654-5149

April 13, 1993

The Honorable Derek J. Vander Schaaf
Deputy Inspector General
Department of Defense
400 Army Navy Dr.
Arlington, VA 22202-2884

Dear Mr. Vander Schaaf:

About five years ago an old CH-53 crashed. It is my understanding that the mishap investigation board determined that five of the seven fatalities could have been prevented. The board recommended that the entire CH-53 A/B/C fuel system be made crashworthy.

To prevent a reoccurrence of the fatal crash, Warner Robins Air Logistics Center issued F09603-91-R-30819, which called for a crashworthy replacement fuel system. I have been advised that during the solicitation process the Air Force repeatedly stressed that the CH-53E crashworthy fuel system should be followed as much as possible. Notwithstanding the objectives of the mishap investigation board, a contract was awarded to Sekur-Pirelli for a fuel system that did not contain many of the safety related components of the existing CH-53E.

It is requested that you perform a safety analysis of the Sekur-Pirelli fuel system to determine if it is fully capable of avoiding a reoccurrence of the previous fatal crash. As part of your review, please identify the CH-53E crashworthy fuel system components that were not included by Sekur-Pirelli but would have contributed to safety and the CH-53E components that were clearly unnecessary. Finally, it is requested that I be immediately advised if any CH-53s containing Sekur-Pirelli's replacement fuel system are involved in a fatal crash.

Thank you for your attention. If you require additional information please do not hesitate to contact me or Greg Moody at 202-225-4324. I look forward to your response.

Sincerely,

DAVID L. HOBSON
Member of Congress

cc: The Honorable Charles A. Bowsher
Comptroller General

Col. Charles L. Fox, USAF
Chief, Programs and Legislation Division

THIS STATIONERY PRINTED ON PAPER MADE OF RECYCLED FIBERS

Appendix B. Inspector General, DoD, Referral to the Air Force Safety Agency

INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
400 ARMY NAVY DRIVE
ARLINGTON, VIRGINIA 22202 2884

MAY 10 1993

MEMORANDUM FOR ACTING SECRETARY OF THE AIR FORCE

SUBJECT: Inquiry from Congressman David L. Hobson

The enclosed inquiry from Congressman David L. Hobson is forwarded for your review and action as appropriate. The inquiry concerns the CH-53E helicopter fuel systems.

Congressman Hobson is aware that his letter has been referred to you for reply.

Your assistance in the matter is appreciated.

Derek J. Vander Schaaf
Deputy Inspector General

Enclosure*

*The enclosure is the letter at Appendix A.

Appendix C. Inquiry From Congressman George W. Darden

GEORGE (BUDDY) DARDEN
7TH DISTRICT GEORGIA
COMMITTEE
APPROPRIATIONS
SUBCOMMITTEES
DEFENSE
TREASURY, POSTAL SERVICE AND GENERAL GOVERNMENT
WASHINGTON OFFICE:
2303 RAYBURN BUILDING
WASHINGTON, DC 20515-1007
(202) 225-2931

Congress of the United States
House of Representatives
Washington, DC 20515-1007

DISTRICT OFFICES:
376 POWDER SPRINGS STREET
SUITE 100
MARIETTA, GA 30064-3634
(404) 422-4489
301 FEDERAL BUILDING
ROME, GA 30161-3144
(706) 291-7777
200 RIDLEY AVENUE
CITY HALL
LAGRANGE, GA 30240
(706) 882-4978
315 BRADLEY STREET
CARROLLTON, GA 30117
(404) 832-0853

June 15, 1993

The Honorable Derek J. Vander Schaaf
Deputy Inspector General
Department of Defense
400 Army Navy Drive
Arlington, Virginia 22202-2884

Dear Mr. Vander Schaaf:

In a letter dated May 7, 1993, my constituent, Engineered Fabrics, brought to your attention that the Air Force may have accepted and installed foreign fuel cells in MH-53J helicopters under contract F09603-91-C-0624 which were not in full compliance with the contract's safety design requirements under MIL-T-27422B.

Specifically, it is my understanding that the military specification, paragraph 4.6.5.5, requires that fuel cell fittings have a strength of 80 percent of the panel strength. Engineered Fabrics has advised me that the upper fittings provided by Sekur-Pirelli do not appear to be of the same fiber lock or hairy hole design for which test data was submitted and that they have estimated the strength of the fittings delivered under the subject contract to be only 10-20 percent of the contract requirement. This suggests a design weakness which could lead to a catastrophic loss of life in a rollover crash.

In accordance with FAR 5.403(a) it is requested that I be provided (in pounds) the strength of each of the seven upper fittings and the panel as required by MIL-T-27422B and that I be provided (in English) the actual test data and drawings for these upper fittings, as well as any specific Air Force fitting review that demonstrates full specification compliance as delivered to the Air Force. If such data is not immediately availbale, it is suggested that the helicopters be grounded until full compliance with these safety specifications is proven.

Sincerely,

George (Buddy) Darden
Member of Congress

GWD:rcp

Appendix D. Audit Response to Specific Testing and Safety Allegations

We responded to several allegations related to the Warner Robins acquisition of H-53 helicopter fuel cells. The allegations and our responses to allegations concerning testing and safety requirements for crash-resistant, self-sealing fuel cells for the Air Force H-53 helicopter are below.

Allegations

Allegation 1. Complainant alleged that Sekur-Pirelli was never required to perform full safety and performance testing for the H-53 helicopter fuel cell under military specification MIL-T-27422B. (Source: Complainant letter of March 1, 1993.)

Audit Response. Allegation 1 was not substantiated. Sekur-Pirelli is in the process of performing full safety and performance testing for the H-53 helicopter fuel cell under military specification MIL-T-27422B. Sekur-Pirelli submitted 1976 Phase I test data to Warner Robins engineering officials. The Air Force H-53 helicopter engineer at Warner Robins evaluated the test data and qualified the Sekur-Pirelli crash-resistant, self-sealing construction for the H-53 helicopter fuel cell based on the results of tests performed on similar crash-resistant, self-sealing fuel cells.

Sekur-Pirelli successfully performed Phase II drop and gunfire tests on the H-53 helicopter fuel cells. Sekur-Pirelli will submit a final test report when the remaining Phase II tests are performed. On June 24, 1993, Air Force officials successfully completed installation of the Sekur-Pirelli H-53 helicopter fuel cells and assembly parts on three models of the Air Force H-53 helicopters, and Warner Robins officials gave approval to Sekur-Pirelli to begin production.

Allegation 2. Complainant alleged that Sekur-Pirelli fittings are not crash-resistant and do not meet military specification MIL-T-27422B pullout strength requirements. (Source: Congressman George W. Darden letter of June 15, 1993, and complainant letters of March 1, 1993; March 4, 1993; May 7, 1993; May 14, 1993; and July 26, 1993.)

Audit Response. Allegation 2 was not substantiated. With the assistance of a Navy materials engineer and a Navy aerospace engineer, an examination of a Sekur-Pirelli H-53 helicopter fuel cell revealed the fuel cell was crash-resistant based on military specification MIL-T-27422B requirements. Sekur-Pirelli fittings were fiber-lock, crash-resistant, and met the 80-percent pullout strength requirement. The Navy materials engineer also evaluated the Sekur-Pirelli 1976 Phase I test data and concluded that the Sekur-Pirelli 1976 Phase I test data complied with military specification MIL-T-27422B.

Allegation 3. Complainant alleged that Sekur-Pirelli strengthened its wall construction, invalidating the 1976 Phase I tests that the Air Force used to qualify Sekur-Pirelli by similarity. (Source: Complainant letters of May 7, 1993, and May 14, 1993.)

Audit Response. Allegation 3 was not substantiated. The Air Force H-53 helicopter engineer stated that Sekur-Pirelli added a fourth layer of rubber to the wall construction in high stress areas to meet the crash-resistant requirements of military specification MIL-T-27422B. Because the fittings were not placed in the high stress areas, the fourth layer of rubber did not affect the strength of the fittings. Accordingly, the Air Force engineer accepted Sekur-Pirelli 1976 Phase I test data. A Navy aerospace engineer examined the reinforcements on the fuel cell and concluded the type of reinforcements and the placement of the fittings did not affect the strength of the fittings or the validity of Sekur-Pirelli 1976 Phase I tests.

Allegation 4. Complainant alleged that the Sekur-Pirelli H-53 helicopter fuel system being delivered to the Air Force is not crash-resistant. (Source: Complainant letters of March 1, 1993, and July 26, 1993.)

Audit Response. The Air Force has the technology to answer allegations related to crash-resistance; therefore, the Air Force Safety Agency completed a system safety engineering analysis of the Sekur-Pirelli H-53 helicopter fuel system. The Air Force provided the results of the analysis to Congressman David L. Hobson.

Allegation 5. Complainant alleged that the Sekur-Pirelli system does not contain frangible valves at most tank-aircraft interface points. (Source: Complainant letters of March 1, 1993, and July 26, 1993.)

Audit Response. Allegation 5 was substantiated, but the use of frangible valves was not a requirement of contract F09603-91-C-0624. The Sekur-Pirelli H-53 helicopter fuel system does not contain frangible valves at the tank-aircraft interface points. The contract statement of work did not require the contractor to use frangible fittings. The statement of work required new fittings to be of self-sealing, breakaway design, and reuse of the existing fittings was required to the maximum extent possible.

Allegation 6. Complainant alleged that at the November 28, 1990, preproposal conference, Mr.* and Mr.* [Warner Robins officials] provided a briefing of the accident that brought about solicitation F09603-91-R-30819 for a crash-resistant fuel system. The complainant also alleged that Warner Robins officials stressed that the crash-resistant protections incorporated in the Navy CH-53E helicopter fuel system should be emulated for the rework of three models of the Air Force H-53 helicopter. (Source: Complainant letter of March 4, 1993.)

*Names deleted to protect the privacy of the individuals.

Audit Response. Allegation 6 was not substantiated. The minutes of the preproposal conference contained no statements requiring emulation of the Navy CH-53E helicopter fuel system for the rework of three models of the Air Force H-53 helicopter. In addition, the minutes did not contain a discussion of the accident that brought about solicitation F09603-91-R-30819 for a crash-resistant fuel system. Mr. * and Mr. * stated that they did not brief conference participants about the 1985 accident. The minutes stated that remarks and explanations made at the conference would not qualify the terms of the solicitation and that the terms of the solicitation and specifications would remain unchanged unless the solicitation was amended in writing.

Allegation 7. Complainant alleged that the Air Force Safety Mishap Investigation Board recommended that the entire fuel system for three models of the Air Force H-53 helicopter be made crash-resistant. (Source: Complainant letter of March 4, 1993.)

Audit Response. Allegation 7 was not substantiated. The Air Force Safety Mishap Investigation Board did not recommend that the entire fuel system for three models of the Air Force H-53 helicopter be made crash-resistant.

Allegation 8. Complainant alleged that the Air Force Safety Mishap Investigation Board identified the problem as torn fuel lines and reportedly found that the existing fuel cell did not rupture. (Source: Complainant letter of March 4, 1993.)

Audit Response. Allegation 8 was not substantiated. The Air Force Safety Mishap Investigation Board report did not refer to torn fuel lines and did not state whether or not the existing fuel cell ruptured.

Allegation 9. Complainant alleged that the Air Force Safety Mishap Investigation Board concluded that the crash-resistant fuel system of the Navy CH-53E helicopter, which contained frangible valves in the fuel lines and fuel cells, would probably have survived the crash. (Source: Complainant letter of March 4, 1993.)

Audit Response. Allegation 9 was not substantiated. The Air Force Safety Mishap Investigation Board report did not refer to the crash-resistant fuel system of the Navy CH-53E helicopter.

Allegation 10. Complainant alleged that the Air Force Safety Mishap Investigation Board evaluation supports the conclusion that the weakest link in the fuel system is the lack of frangible fittings and that modification of the fuel cells without full self-sealing of the fuel system is useless. (Source: Complainant letter of March 4, 1993.)

Audit Response. Allegation 10 was not substantiated. Frangible fittings were neither discussed nor recommended in the Air Force Safety Mishap Investigative Board report.

Allegation 11. Complainant alleged that, to meet the crash-resistant objectives of the Air Force Safety Mishap Investigation Board, the Sekur-Pirelli fuel system must be replaced with more crash-resistant fuel cells in combination with frangible valves and other crash-resistant fuel system components. (Source: Complainant letter of March 4, 1993.)

Audit Response. Allegation 11 was not substantiated. According to Air Force Regulation 127-4, "Investigating and Reporting US Air Force Mishaps," the objective of the Air Force Safety Mishap Investigation Board is to investigate mishaps to determine the cause and prevent recurrence. The report did not discuss crash-resistant objectives or support the complainant's conclusion that the Sekur-Pirelli fuel system must be replaced with more crash-resistant fuel cells in combination with frangible valves and other crash-resistant fuel system components.

Appendix E. Sekur-Pirelli H-3 Helicopter Fuel Cell Contracts

Contract	Award Date	Quantity of Fuel Cells	Total Value of Contract
F09603-89-C-2565	Aug. 29, 1989[1]	64	$352,380[2]
F09603-89-C-2817	Aug. 25, 1989[1]	9	40,050[2]
F09603-91-M-1024	Feb. 20, 1991	5	23,850
F09603-91-M-2044	May 23, 1991	3	18,120
F09603-91-M-2049	May 21, 1991	2	10,800
Total		83	$445,200

[1]Warner Robins engineering officials qualified Sekur-Pirelli under contract F09603-89-C-2565, awarded 4 days later than contract F09603-89-C-2817, because contract F09603-89-C-2565 was initiated first.

[2]Contract total values include the value of contract modifications.

Appendix F. Competition Advocate Guidance

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS WARNER ROBINS AIR LOGISTICS CENTER (AFLC)
ROBINS AIR FORCE BASE, GEORGIA 31098-5990

REPLY TO ATTN OF: CREM

22 MAR 1988

SUBJECT: Qualification of Agusta as an Approved Source for H-3 Parts (Your Ltr, 9 Mar 88)

TO: MMSX

1. In the spring and summer of 1984 MM, PM, and CR personnel worked with Agusta personnel in establishing approval procedures for H-3 items. The approval procedures of the Agusta Group for H-3 items are: Agusta will request CRE for approval for item(s) they wish to produce for the Air Force. Agusta will categorize the item(s) as either "Identical to Sikorsky - Produced Item" or "Similar to Sikorsky - Produced Items(s)." Agusta will identify the differences on similar items, including copies of the drawings. Conditions for approval were:

a. Agusta will be listed as an approved source for all H-3 parts/assemblies for which the Agusta-manufactured parts/assemblies are identical to those produced by Sikorsky. All components/subassemblies are manufactured to the Sikorsky drawings or purchased from source/specification control vendors.

b. Agusta will be considered for approval for H-3 parts/assemblies for which the Agusta-manufactured parts/assemblies are similar to those produced by Sikorsky. Approval/disapproval will be rendered by the appropriate MMSX personnel. Unless major dissimilarities exist, Agusta will be approved.

c. Agusta will be considered a potential source for all other H-3 items and may be required to submit first articles for qualification.

2. During one of the meetings with Agusta personnel we found out that Agusta has modified many of the parts on the H-3 they manufacture. These parts may or may not be interchangeable with the Air Force H-3 parts. Therefore, we do not recommend you waive Agusta first articles. We recommend that we continue to use the above qualification procedures.

3. If the team that you have visiting Agusta finds out things have changed since 1984 and you would like to change existing procedures, please let us know.

W. T. Etheridge
W. T. ETHERIDGE, Chief
Aircraft Msl & Vh Engr Br
Dir of Competition Advocacy

AFLC – Lifeline of the Aerospace Team

Appendix G. Summary of Potential Benefits Resulting From Audit

Recommendation Reference	Description of Benefit	Amount and/or Type of Benefit
1.	Program Results. Avoids potential safety hazards if the Sekur-Pirelli H-3 helicopter fuels cells do not meet military specification MIL-T-5578C or do not properly self-seal.	Nonmonetary.
2.	Internal Controls. Reduces the possibility of approving potential sources without adequate supporting data.	Nonmonetary.

Appendix H. Organizations Visited or Contacted

Office of the Secretary of Defense

Standardization Program Division, Manufacturing Modernization Directorate, Deputy Assistant Secretary of Defense (Production Resources), Office of the Assistant Secretary of Defense (Production and Logistics), Falls Church, VA

Department of the Army

Standardization Office, Aviation and Troop Command, Army Materiel Command St. Louis, MO
Engineering Directorate, Aviation and Troop Command, Army Materiel Command, St. Louis, MO

Department of the Navy

Naval Air Systems Command, Arlington, VA
- Engineering Directorate, Arlington, VA
- Aircraft Division, Naval Air Warfare Center, Lakehurst, NJ
- Naval Aviation Depot, Naval Air Station, Pensacola, FL

Naval Aviation Supply Office, Naval Supply Systems Command, Philadelphia, PA

Department of the Air Force

Office of the Chief of Safety, Washington, DC
- Air Force Safety Agency, Norton Air Force Base, CA

Air Force Materiel Command, Wright-Patterson Air Force Base, OH
- Office of the Judge Advocate General, Wright-Patterson Air Force Base, OH
- Office of Safety, Wright-Patterson Air Force Base, OH
- Office of the Judge Advocate General, Warner Robins Air Logistics Center, Robins Air Force Base, GA
- Competition Advocacy Directorate, Warner Robins Air Logistics Center, Robins Air Force Base, GA
- Small and Disadvantaged Business Utilization Office, Warner Robins Air Logistics Center, Robins Air Force Base, GA
- Rotary Wing Division, Special Operations Forces Management Directorate, Warner Robins Air Logistics Center, Robins Air Force Base, GA

Defense Organizations

Defense Logistics Agency, Alexandria, VA
Defense Plant Representative Office, Sikorsky Aircraft, United Technologies, Hartford, CT

Non-Federal Organizations

Propulsion Systems Design, McDonnell Douglas Helicopter Company, Mesa, AZ
H-3 Helicopter Program Office, Sikorsky Aircraft, United Technologies, Hartford, CT

Appendix I. Report Distribution

Office of the Secretary of Defense

Director of Defense Procurement
Deputy Assistant Secretary of Defense (Production Resources)

Department of the Army

Secretary of the Army
Auditor General, Department of the Army

Department of the Navy

Secretary of the Navy
Assistant Secretary of the Navy (Financial Management)
Commander, Naval Air Systems Command
Commander, Naval Aviation Depot, Pensacola
Auditor General, Naval Audit Service

Department of the Air Force

Secretary of the Air Force
Assistant Secretary of the Air Force (Financial Management and Comptroller)
Commander, Air Force Materiel Command
  Commander, Warner Robins Air Logistics Center
Commander, Office of the Chief of Safety
Commander, Air Force Safety Agency
Auditor General, Air Force Audit Agency

Defense Organizations

Director, Defense Contract Audit Agency
Director, Defense Logistics Agency
  Commander, Defense Contract Management Command

Non-Defense Federal Organizations and Individuals

Office of Management and Budget
National Security and International Affairs Division, Technical Information Center, General Accounting Office

Chairman and Ranking Minority Member of Each of the Following Congressional Committees and Subcommittees:

Senate Committee on Appropriations
Senate Subcommittee on Defense, Committee on Appropriations
Senate Committee on Armed Services
Senate Committee on Governmental Affairs
House Committee on Appropriations
House Subcommittee on Defense, Committee on Appropriations
House Committee on Armed Services
House Committee on Government Operations
House Subcommittee on Legislation and National Security, Committee on Government Operations

Senator John Glenn, U.S. Senate
Congressman George W. Darden, U.S. House of Representatives
Congressman Newt Gingrich, U.S. House of Representatives
Congressman David L. Hobson, U.S. House of Representatives

Part IV - Management Comments

Department of the Air Force Comments

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON DC

19 JAN 1994

MEMORANDUM FOR ASSISTANT INSPECTOR GENERAL FOR AUDITING, OFFICE OF THE INSPECTOR GENERAL, DEPARTMENT OF DEFENSE

FROM: AF/LG

SUBJECT: DOD/IG Draft Audit Report on Air Force Helicopter Fuel Cell Military Specification Testing (Project No. 3 CF-8009) - INFORMATION MEMORANDUM

This is in reply to your request for Air Force comments on the subject report We concur with the subject report's findings; our comments are attached.

Point of contact is Major Teresa Dicks, AF/LGMY, 7-9178.

JOHN M. NOWAK, Lt Gen, USAF
DCS/Logistics

Attachment:
Audit Comments

TITLE: DOD/IG Audit of Helicopter Fuel Cell Specification Testing (Project No. 3 CF-8009)

A. Recommendation 1: Obtain and evaluate the Sekur-Pirelli H-3 helicopter fuel cell test results to determine whether Sekur-Pirelli H-3 helicopter fuel cells meet the requirements of military specification MIL-T-5578C.

Corrective Action: No further action is anticipated on this recommendation. Warner Robins ALC has requested all Sekur-Pirelli test data on the H-3 fuel cell through the US Embassy. The data we received was the same as the original documents. It would not accomplish anything to request further test data.

B. Recommendation 2: If the first recommendation cannot be implemented, perform an analysis to evaluate the economic feasibility of the Air Force conducting the military specification testing of the Sekur-Pirelli H-3 helicopter fuel cells. If economically feasible, conduct the testing to establish whether the Sekur-Pirelli H-3 helicopter fuel cells meet MIL-T-5578C specification requirements.

Corrective Action: We have investigated the feasibility of conducting a test program to obtain the data which was not available from Sekur-Pirelli. The cost for conducting the program is approximately $20,000. Since there are only eight aircraft left in the inventory and these will be retired by September 1994, there is not sufficient justification to spend the funds conducting a test program.

C. Recommendation 3: If the first and second recommendations cannot be implemented, evaluate the feasibility of each of the following recommendations to determine the optimum alternative and then implement as appropriate.

(1) Redesignate the Sekur-Pirelli H-3 fuel cells as nonself-sealing and restrict helicopters equipped with the Sekur-Pirelli fuel cells to non-hostile use environment, or

(2) Replace the Sekur-Pirelli H-3 helicopter fuel cells with Engineered Fabrics Corporation H-3 helicopter fuel cells already in the Air Force inventory.

Corrective Action: The H-3 aircraft will be phased out of the inventory by September 1994. Regardless, the Sekur-Pirelli fuel cells will be designated as nonself-sealing and directions will be provided to our customers to use the Engineered Fabrics Corporation if they are required to fly in hostile areas. At present there are no aircraft in hostile areas. We only have one organization (three H-3 aircraft assigned) which has a mobility requirement; however, this organization is scheduled to turn in all their aircraft by mid-1994. This unit can not accept a tasking because they have entered conversion status.

D. Recommendation 4: Issue guidance to the Special Operations Forces Management Directorate, Warner Robins Air Logistics Center, to include in the implementation of its internal management control program, internal controls to verify that contracts are awarded only to qualified sources and that potential new sources meet the same requirement imposed upon original sources. At a minimum, the directorate should establish internal documentation and supervisory review of source approval decisions by engineers.

Corrective action: Under the Integrated Product Team (IPT) concept, all procurement actions requiring the approval of new sources are reviewed by the IPT Leader. Prior to the approval of the IPT leader, the engineering group leader will review the procurement documentation (SOW, data items, and all required attachments). Also, the internal management control program shall contain controls to verify that contracts are only awarded to qualified sources.

Audit Team Members

Paul J. Granetto	Acting Director, Contract Management Directorate
Salvatore D. Guli	Audit Program Director
Ronald W. Hodges	Audit Project Manager
Myra M. Frank	Senior Auditor
Dora Y. Lee	Auditor
Jasper J. Sciuto	Auditor
Lorin T. Pfeil	Auditor
Michelle A. Catullo	Auditor
Ana M. Myrie	Administrative Support