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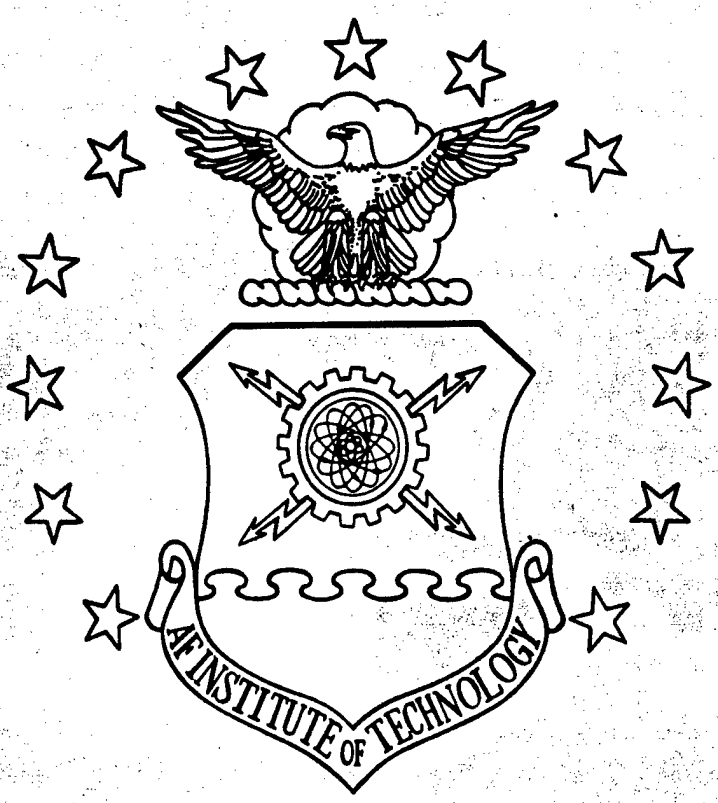
An Evaluation of U.S. Air Force Aviation Fuel Consumption Factors to Accurately Predict Aviation Fuel Costs by Aircraft Mission, Design, and Series

Jodi A. Clayton



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THESIS

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AFIT/GCA/LAS/96S-2

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THESIS

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In Partial Fulfillment of the

Requirements for the Degree of

Master of Science in Cost Analysis

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PREFACE

The purpose of this research was to evaluate the ability of Air Force published fuel factors to accurately predict the cost of aviation fuel (AVFUEL) for United States Air Forces in Europe (USAFE) aircraft. The Fuels Automated Management and Accounting System (FAMS) was implemented in 1994 and provides detailed information concerning gallons consumed by tail number for all aircraft in the Air Force inventory. Cost factors developed since 1994 use FAMS as the primary data source. The research objective was to assess how accurately aviation fuel factors, based on FAMS data, predicted actual fuel costs for USAFE aircraft.

I would like to first thank my husband, Capt Jeffrey C. Clayton, for supporting me with my decision to attend AFIT even though it meant being stationed apart. I also wish to thank the numerous individuals that provided assistance for this research project. Specifically, I wish to thank Ms. Wendy Kunz and Mr. Bo Wheeler of the Assistant Secretary of the Air Force, Financial Management and Comptroller, Cost Factors Division (SAF/FMCCF), and Mr. Dennis Cavanaugh of the Defense Finance Accounting and Finance Service, Denver Colorado (DFAS-DE) for providing all the data needed for the completion of this thesis. Lastly, and most importantly, I would like to thank Lt Col Stephen A. Giuliano and Professor Daniel Ferens for their guidance and support in the writing of this thesis. Without their time and patience, this project would have been impossible to complete.

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ABSTRACT

The purpose of this thesis was to undertake a systematic, scientific study of the accuracy of Air Force published fuel factors to estimate fuel costs at MAJCOM level by mission, design, and series (MDS) since the implementation of the Fuels Automated Management System (FAMS) under the current environment of decentralized aviation fuel (AVFUEL) funding.

The research found that, at MAJCOM level, the use of USAF published AVFUEL factors in estimating out-year costs would have overstated costs in both fiscal year (FY) 1994 and FY 1995 by $2.5 M (FY 1994), by $.25 M (FY 1995), and potentially understates costs by $2.7 M for the current fiscal year (FY 1996). Additionally, the research found that at the MDS level, the use of AVFUEL factors would have greatly understated costs for some aircraft while overstating costs for other aircraft. Since AVFUEL funding is decentralized at base level and not at MAJCOM level, the large cumulative forecast errors and mean absolute percentage errors at the MDS level are of great interest. According to the data presented in this research paper, use of AVFUEL factors at the MDS level for use in estimating AVFUEL costs is not recommended for USAFE assigned aircraft. Lastly, the research does not support any tendency for any category of aircraft to be any more or less accurate in predicting AVFUEL costs using AVFUEL consumption factors.

AN EVALUATION OF U.S. AIR FORCE AVIATION FUEL CONSUMPTION FACTORS TO ACCURATELY PREDICT AVIATION FUEL COSTS BY AIRCRAFT MISSION, DESIGN, AND SERIES

I. INTRODUCTION

Overview/Background

The Air Force spends over $3 billion annually on aviation fuel (2:3). Prior to fiscal year (FY) 1994, the Assistant Secretary of the Air Force, Financial Management and Comptroller (SAF/FM), centrally controlled aviation fuel (AVFUEL) funding through a centrally managed allotment (CMA) of the Operations and Maintenance appropriation.

To ensure funding was available, a realistic estimate of obligations expected to be incurred for the period was recorded against the CMA. Estimates of AVFUEL budget requirements are based on aviation fuel consumption factors (6:16). Factors are developed for each type of aircraft, also known as mission, design, and series (MDS). The number of gallons consumed by MDS is obtained through the Aviation Fuel Management and Accounting System (AMAS). Estimates of authorized flying hours, also known as programmed hours, are provided by HQ USAF Directorate of Plans and Training (HQ USAF/XOOT). Each fuel factor, in gallons per flying hour, is multiplied by an estimate of future flying hours to arrive at an estimate of total AVFUEL requirements in gallons for each MDS. Programmed AVFUEL requirements are then converted to dollars using Program Budget Decision (PDB) fuel prices for that fiscal year (5:2).

In 1990, the Air Force Audit Agency (AFAA) found that AVFUEL cost consumption factors and out-year budget estimates for fuel consumption were inaccurate. The AFAA estimated the total impact of the understated consumption factors for the FY 1990/1991 budget to be approximately $124.4 million (7:18). The AFAA also found that the CMA was not adequately managed to prevent overobligation. Overobligation of funds must be investigated and could necessitate a report to the President of the United States should sufficient funding not be available (7:17). The conditions reported by the AFAA occurred because AMAS did not provide accurate, timely, and complete information.

On October 1, 1991, USAF moved funding control from the centrally managed allotment to base level for 12 Air Force Bases to test the concept of decentralization of aviation fuel funding. The objective of the decentralization of aviation fuels test was to provide for more accurate fuel consumption rates. These rates in turn would enhance budget preparation and accuracy. Under the decentralized concept, commanders would be incentivized to actively manage their programs by allowing them to reprogram any savings gained through increased accuracy and reporting of data for fuel consumed and also for fuel conservation techniques. For the 12 bases involved in the test program, payments for all AVFUEL issued to a base's assigned aircraft were now made at a local level, requiring each base to, "track, collect, and report all AVFUEL issued to their aircraft both at and away from the aircraft's home station" (7:4). The test began on 1 October 1991 and ended on 31 March 1992.

On 24 May 1993, General Merrill McPeak, USAF Chief of Staff, announced that funding for aviation fuel for the Air Force flying hour program would transfer from an Air

Force centrally managed allotment to wing level Air Force-wide. The purpose of this decentralization of aviation fuels funding was to provide for more accurate fuel consumption rates thereby enhancing budget preparation and accuracy, promoting reduced fuel consumption, and providing commanders flexibility to reprogram savings gained through fuel conservation techniques. The transfer of funding took effect on 1 October 1993 (5:1; 11:1).

Problem Statement

Numerous studies have been done concerning the management of Air Force aviation fuels (1; 2; 5; 6; 7; 8; 10; 11; 12). In 1990, the AFAA estimated that AMAS, the existing AVFUEL management system, led to the under-statement of the FY 1990/1991 budget by 2.3% or approximately $124.4 million (6:18). The issues of AVFUEL data accuracy and timeliness were again addressed in the 1992 AFAA Review of Aviation Fuel Decentralization Test (7) and have since been the crux behind the implementation of a new fuels management system, the Fuels Automated Management System (FAMS). The concept of FAMS is to provide an automated collection and information management and control system for fuels using microcircuit technology. In a point paper distributed a FAMS program management review and workshop, Maj Doug Simms of SSC/LGSF claimed that FAMS should reduce the current 2% error rate (12:8).

Now that AVFUEL funding and responsibility have been decentralized Air Force-wide, wing commanders require accurate fuel consumption rates in order to manage their funding and have the ability and flexibility to reprogram any savings gained. Until this

thesis effort, no known efforts to determine whether or not the FAMS goal of reducing the 2.3% error rate have been accomplished. This research will determine the accuracy and reliability of USAF AVFUEL published consumption factors, using FAMS as the primary data source, to track and forecast fuel consumption for USAFE aircraft.

Research Questions

The purpose of this thesis is to undertake a systematic, scientific study of the accuracy of Air Force published fuel factors to estimate fuel costs at MAJCOM level by MDS. This research will determine the accuracy, adequacy, and reliability of FAMS to develop aviation fuel factors for tracking and forecasting fuel consumption for Air Force aircraft. The following questions will be addressed:

1. How accurate are the published aviation fuel factors in estimating out-year costs at MAJCOM? by MDS at MAJCOM level?
2. Concerning accuracy, do any AVFUEL factors for any category of aircraft (fighter, bomber, trainer, etc.) or MDS show a tendency to be less or more accurate than others?

Scope and Limitations

The scope of this study is to determine the accuracy of Air Force published aviation fuel factors in estimating out-year costs by MDS at MAJCOM level. The research will determine whether data from the Fuels Automated Management System

(FAMS) decreases the 2.3% error rate found under the previous fuels accounting system, the Aviation Fuel Management and Accounting System (6).

This research will be limited to published fuel consumption factors which are based on data obtained since the implementation of the Fuels Automated Management System (FAMS) in FY 1994. Specifically, the review will examine accuracy of fuel factors by MDS for USAFE for FY 1994, FY 1995, and the first two quarters of FY 1996. Cost and gallons consumed source data will be limited to the Visibility and Management of Operating and Support Costs (VAMOSC) database and the database (HO33A) obtained from the Defense Finance Accounting Service in Denver, Colorado (DFAS-DE). Fuel factor data by MDS will be obtained from the Air Force AVFUEL Factor Summary, Air Force Instruction (AFI) 65-503, Table A13-1, published for each fiscal year. Flying hour data will be obtained from the History of USAF Flying Hours for Planning and Reference (A41), also published annually.

Methodology

Cost factors and expert judgment are two estimating methods used by financial analysts to forecast aviation fuel costs. The objective of this research is to determine the accuracy, adequacy and reliability of USAF aviation fuel consumption factors for tracking and forecasting fuel consumption. Each MDS's fuel factor within each command will be evaluated in terms of its ability to accurately predict the cost of fuel for that aircraft for that command for FY 1994, FY 1995, and first two quarters of the current fiscal year (FY 1996). The research will determine whether or not fuel consumption factors developed

since the implementation of FAMS reduce the 2.3% error rate found under the previous system, AMAS. Forecast performance for both estimating methods mentioned above will be measured using cumulative sum of forecast error (CFE) and mean absolute percentage error (MAPE) formulas. Each of these forecast performance measures will be discussed in detail in Chapter III.

Significance of Research

Aviation fuels are a significant portion of the Air Force budget, averaging over $3 billion annually for the past five years (2:3). Estimates of AVFUEL budget requirements are based on aviation fuel consumption factors (4; 6:12). In 1990, the AFAA estimated that AMAS, the existing AVFUEL management system, led to the under-statement of the FY 1990/1991 budget by 2.3% or approximately $124.4 million (6:18). The issues of AVFUEL data accuracy and timeliness were again addressed in the 1992 AFAA Review of Aviation Fuel Decentralization Test (7) for 12 test bases and have since been the crux behind the implementation of a new fuels management system, the Fuels Automated Management System (FAMS).

This is the first research effort to assess the effect of the decentralization of aviation fuels funding on a MAJCOM's operations and maintenance (O & M) budgets by MDS. Until this thesis effort, no known efforts to determine whether or not the FAMS goal of reducing the 2.3% error rate have been accomplished. This research is essential if the Air Force is to obtain the objectives of the aviation fuels decentralization plan (5).

Thesis Outline

This thesis will first chronologically review the current literature associated with the aviation fuel data process in Chapter II. Chapter II begins with a review of research associated with the initial concept of decentralizing Air Force aviation fuel funding through Air Force-wide implementation. The review will include an examination of the use and development of aviation fuel consumption factors and previous research associated with the decentralized fuel concept. Chapter III will explain the methodology used in conducting this research and the statistical tools used for analysis and evaluation. Research findings will be analyzed and evaluated in Chapter IV. Finally, Chapter V will provide a brief summary of the first three chapters and the findings addressed in Chapter IV, discuss conclusions, and make recommendations for follow-on research.

II. LITERATURE REVIEW

Overview

The purpose of this thesis is to undertake a systematic, scientific study of the accuracy of Air Force published fuel factors to estimate fuel costs at MAJCOM level by MDS since the implementation of FAMS under the current environment of decentralized AVFUEL funding. This literature review discusses the procedures used for collecting data associated with the transfer of, recording, billing, and payment for aviation fuel for Air Force aircraft. The literature review first describes the chronological development of the aviation fuel data process starting with the initial concept of decentralization through Air Force-wide implementation. A review of previous research associated with the decentralized fuel concept follows.

Background

Initial Concept of Air Force Decentralization of Aviation Fuel (AVFUEL) Funding. Decentralization of Air Force aviation fuels funding was initially proposed in the fiscal year (FY) 1990 Defense Management Review Initiative (DMRI) (5:4). The objective of the review was to evaluate the possibility of providing commanders with fiscal control over their aviation fuel funding. The increase to a commanders budget would be significant, as FY 1991 Air Force AVFUEL sales totaled more than $5.7 billion (7:1). Fiscal control would be used to promote reduced fuel consumption by providing an incentive that would allow commanders to use any savings accrued through fuel

conservation techniques to meet other Air Force mission needs. The DMRI was not approved, however, because the Air Force did not have an accounting system capable of implementing the program (1:1).

Test of the Decentralization of AVFUEL Funding Concept. According to the test plan dated 12 September 1991, the Air Force Chief of Staff directed a 6-month test of the decentralization funding concept at 12 Air Force bases (7:4). For these 12 bases, HQ USAF moved AVFUEL funds management to wing level. The test began on 1 October 1991 and ended on 31 March 1992 (with the exception of two bases in Air Combat Command). To evaluate the test results for consideration of Air Force wide expansion and implementation, HQ USAF developed procedures to collect detailed cost data.

Prior to FY 1994, the Assistant Secretary of the Air Force, Financial Management and Comptroller (SAF/FM), centrally controlled aviation fuel (AVFUEL) funding through a centrally managed allotment (CMA) of the Operations and Maintenance appropriation. The process began with the Defense Logistics Agency contracting for the purchase of AVFUEL. Initial payment to these contracted vendors was made from the Air Force Fuels Stock Fund managed by the Fuels Division at the San Antonio Air Logistics Center (SA-ALC). Under this system, each Air Force installation was responsible for reporting AVFUEL sales and issues data. Reporting was accomplished through the Standard Base Supply System (SBSS) which produced Fuels Sales Analysis Reports (M27). The M27 was transmitted to SA-ALC which was responsible for consolidating AVFUEL sales and issues data. To reimburse the stock fund for initial payment, the stock fund charged a standard price to an Air Force centrally managed allotment of the Operations and

Maintenance Appropriation for all AVFUEL issued to Air Force aircraft based on the M27 reports. SA-ALC forwarded the consolidated M-27 data to the Defense Finance and Accounting Center at Denver (DFAS-DE) . Using the M27 as documentation, DFAS-DE made payment to the stock fund from the centrally managed allotment of the Operations and Maintenance Appropriation. Under this system, the home station was responsible for all reporting, processing, and tracking of AVFUEL sales made by the home-station. These sales consisted of all sales made at the home station and all air-to-air refueling provided by the home station. The home station was not involved in reporting, processing, or tracking of sales occurring away from the home station, nor did it have any responsibility to track air-to-air refueling received for their aircraft from another base's aircraft. Under the centrally managed system, at no time was the home station responsible for the payment of aviation fuel issued or used.

On October 1, 1991, USAF moved funding control from the centrally managed allotment to base level for 12 Air Force Bases for the aviation fuel decentralization test. For the 12 bases involved in the test program, payments for all AVFUEL issued to a base's assigned aircraft were now made at a local level, requiring each base to "track, collect, and report all AVFUEL issued to their aircraft both at and away from the aircraft's home station" (7:4).

Air Force-wide Implementation of the Decentralization of AVFUEL Funding. On 24 May 1993, General Merrill McPeak, USAF Chief of Staff, announced that funding for aviation fuel for the Air Force flying hour program would transfer from the Air Force centrally managed allotment to wing level for all Air Force units. The purpose of

decentralizing aviation fuel funding was to provide for more accurate fuel consumption rates, thereby enhancing budget preparation and accuracy, promoting reduced fuel consumption, and providing commanders flexibility to reprogram savings gained through fuel conservation techniques (5:1; 11:1). The transfer of funding took effect on 1 October 1993 (11:1).

The office of Assistant Secretary of the Air Force, Financial Management and Budget (SAF/FMB), based initial funding on weighted, Air Force composite fuel factors for each mission design series (MDS). Prior to and for FY 1994, SAF/FMB determined funding levels for each major command. Since the start of FY 95, aviation fuel (AVFUEL) budgets have been based upon MAJCOM developed and USAF approved, unique fuel factors (4:10).

AVFUEL factors are used by the Assistant Secretary of the Air Force, Financial Management and Cost, Cost Factors Division (SAF/FMCCF) to monitor, track and perform variance analyses for fuel issues. MAJCOMs use fuel factors to perform economic analyses, support force structure and programmatic change exercises, and other analyses as required (8). In computing aviation fuel budgets, the most critical component is the fuel factor. Fuel factor development methodology assumes an historical relationship between flying hours (independent variable) and fuel consumption (dependent variable) will continue within the historical relevant range of flying hours. The independent variable is assumed to indirectly capture changes in fuel consumption rates which occur with changes in mission profile (4). Fuel factors are based on two key, historical inputs: hours flown and gallons consumed. Several databases are available for factor development.

Flying hour data can be obtained from the History of USAF Flying Hours for Planning and Reference document (A41). Fuel issue data can be obtained from the FAMS database, as well as the Visibility and Management of Operating and Support Costs (VAMOSC) database (4).

Since the start of FY 1995, fuel factors are developed for each specific weapon system or MDS, by each MAJCOM. Estimates of current year authorized flying hours, also known as programmed hours, are provided by HQ USAF Directorate of Plans and Training (HQ USAF/XOOT). Each fuel factor, in gallons per hour, is multiplied by estimated flying hours to arrive at an estimate of total AVFUEL requirements in gallons for each MDS. Programmed AVFUEL requirements are then converted to dollars using Program Budget Decision (PDB) fuel prices for that fiscal year (5:2). Under the decentralized funding concept, wing commanders receive funding for aviation fuel from their MAJCOM for aircraft assigned to them and are responsible for all host assigned aircraft fuel servicing payments, regardless of where the servicing takes place (5:2).

As a result of the decentralization of AVFUEL funding test, the Personal Computer Aviation Fuels Interfund Bill Processing System (PCFUELS) was developed and introduced by DFAS-DE specifically for the implementation of the decentralization of aviation fuel funding. In accordance with the implementation plan, bills for aviation fuel issued in FY 94 and thereafter to Air Force and Air National Guard flying organizations, have been charged to operation and maintenance funds of the flying organization.

PCFUELS first requires establishing flying hour projected costs in PCFUELS and the General Accounting and Finance System (BQ) by comptroller personnel. Projected

obligations are based on fuel consumption factors and projected flying hours provided by operations group resource personnel. Comptroller personnel use AF Form 406, Miscellaneous Obligation/Reimbursement Document (MORD), to record monthly estimated costs at mission, design, and series (MDS) level.

The process of documenting actual fuel consumption begins at the squadron level. The unit commander for each flying squadron appoints a unit document control officer. The Document Control Officer (DCO) is responsible for ensuring a valid DD Form 1896, Jet Fuel Identaplate (credit card), is onboard all aircraft. Additionally, the DCO is responsible for ensuring the entire tail number is recorded on all fuel related documents and that all transactions for in-flight and off-station refueling of all host aircraft are reported back to the home station daily (5:4). These transactions are reported by the DCO to the Base Fuels Management Officer (BFMO) for daily processing.

The BFMO processes all documents into the Fuels Automated Management System - Base Level (FAMS-B). The FAMS-B information is transferred daily by the Defense Data Network (DDN) to the Fuels Automated Management System - Air Force Level (FAMS-A) at San Antonio Air Logistics Center (SA-ALC). SA-ALC sends the Air Force level sales data to the Defense Finance and Accounting Service in Denver, Colorado (DFAS-DE). DFAS-DE transmits monthly interfund bills via the Defense Automatic Addressing System (DASS) direct to PCFUELS at the bases. PCFUELS then updates the projected obligations with actual obligations in the BQ system (5:21).

Previous Research

There are several recent sources which address improving the accuracy and timeliness of the Air Force fuels process. Capt Phillip R. Frederick's 1988 thesis concerning Project Petroleum Resource Management Initiatives discusses the structure, operations, and procedures of a typical Fuels Management Branch (8). In September of 1989, the USAF Cost Center (AFCSTC/OSF) performed a study to determine the adequacy and reliability of stock fund records in order to develop aviation fuel factors for tracking and forecasting fuel consumption (10). In March of 1990, the Air Force Audit Agency (AFAA) conducted a review of the Air Force aviation fuel financial management (6). Also in 1990, Capt Gregory K. Bergstrom researched and reported informational requirements for the MAJCOM level fuels automated management system (FAMS-C) (2). In September of 1990, Synergy, Inc. published a cost-benefit analysis of the proposed Fuels Automated Management System (FAMS) (10). More recently, the Air Force Audit Agency accomplished a detailed review of the decentralization test in 1992 (7). Each of these efforts sought to improve the fuels data process. Each review and its impact is discussed below.

Project Petroleum Resource Management (PETROL RAM) Initiatives. In 1988 Capt Frederick gathered information on the structure, operations, and procedures of a typical base Fuels Management Branch. The purpose of his research was to provide a handbook on Project Petroleum Resource Management (PETROL RAM) initiatives (8:2). Project PETROL RAM is an Air Staff initiative designed to develop methods to enhance and automate all aspects of the Air Force's fuels operations. Five PETROL RAM

initiatives have been identified and grouped together under the Fuels Automated Management System (FAMS). The five initiatives are Automated Tank Gauging (ATG), Automated Data Collection/Fuels Dispensing System (AFC/FDS), Automated Fuels Service Station (AFSS), PETROL RAM PC, and PETROL RAM Software (8:16-21). At the time Frederick's research was conducted, all five initiatives were undergoing prototype testing. Of particular interest to this research effort are the ATG and AFC/FDS initiatives. ATG automates the process of collection data for fuel inventories, tank water levels, and fuel temperature. The original contract awarded in February 1993 was protested and a new award date was projected for December 1993 with installation to begin in 1994 (12:3). AFC/FDS is a system in which technology is used to automate issues of fuel to aircraft. Using AFC/FDS, each aircraft is equipped with an encoded identification module which contains information such as type of fuel required, tail number, and billing address (8:17,19). AFC/FDS will automatically collect fuel dispensing transactions as aircraft are refueled (12:3). To date, AFC/FDS is not in use Air Force-wide and its potential impact on the accuracy and timeliness of FAMS data is unknown. Air Force-wide fielding of AFC/FDS is scheduled to be complete by the end of FY98 (12:3).

Report of Audit, Review of Air Force Aviation Fuel Financial Management. At the request of the Office of the Assistant Secretary of the Air Force, Financial Management and Comptroller, the AFAA conducted a review of the Air Force aviation fuel financial management in 1990 (6). The audit determined that the system of policies, procedures, and internal controls applicable to aviation fuel financial management was inadequate. Of the several objectives identified in the audit, one of the objectives

specifically sought to verify the accuracy of fuel cost consumption factors and its impact on out-year budget estimates for fuel consumption. The analysis determined that deficiencies in the Aviation Fuel Management Accounting System (AMAS) caused consumption data to be understated since FY 1981. The audit found that AMAS did not provide accurate, complete, and timely billing and consumption data. According to the report:

> This understatement, although small in average percentage terms, has led to inaccurate fuel cost consumption factors and out-year (FY 1990/1991) budget estimates...(the) AVFUEL requirements as stated in the FY 1990/1991 budget were inaccurate because AVFUEL consumption factors used to estimate budget requirements were understated. (6:4,6)

According to the audit, FY 1990/1991 budgeted amounts for AVFUEL were understated an estimated $124.4 million (approximately 2.3%) annually (6:6). In response to this finding, the Air Force Cost Center (AFCSTC) revised the consumption factors. AFCSTC estimated total AVFUEL requirements and then calculated individual MDS factors on a *pro rata* basis. However, the audit noted that the revised factors may:

> Not accurately predict actual consumption by type of aircraft. This condition occurred because AFCSTC did not use actual SBSS [stock fund] consumption data by type of aircraft as the basis for revising the factors... Although the revised factors may reasonably predict consumption at the overall customer level, they will be inaccurate at the type of aircraft level. For example, fuel consumption based on AFCSTC factors for two type of ASIF aircraft would have overstated predicted consumption by over $10 million for FY 1990. (6:6)

The audit recommended that the Air Force Cost Center base future cost factors on actual stock fund reported consumption by MDS. Additionally, the audit recommended

that SAF/FM approve the Air Force Cost Center's proposal to modify and use the standard base supply system's (SBSS) M27 report for billing and reporting AVFUEL consumption instead of AMAS. SAF/FM concurred with the recommendation and added that by March 31, 1990, an evaluation of the AMAS versus the M27 would be accomplished to determine the validity of the M27 for computation of consumption factors.

USAF Cost Center Study. In a cost-benefit study conducted by Synergy Inc., it was reported that the USAF Cost Center performed a study to determine the adequacy and reliability of stock fund records to develop aviation fuel factors for tracking and forecasting fuel consumption in September of 1989 (10:3-4). According to Synergy, fuel consumption data was extracted from the standard base supply system (SBSS) by MDS and command for comparison with the current factors and the AMAS system data. At the time, the AMAS consumption data had been aggregated at the appropriation level only. The purpose of the study was to conduct a variance analysis to compare the factors as well as to determine the validity of the AMAS-backed factors developed in past years. The variance analysis was inconclusive because of problems associated with the stock fund data by MDS (10:3-4). The study concluded that the reporting problems in the current stock fund systems resulted in continually understating stock fund consumption each year. Refinement of the current factors using stock fund data was determined to be almost impossible until the reporting problems identified are corrected and/or a new system is implemented (10:3-5). According to the cost benefit analysis performed by Synergy, Inc., "The implementation of the Fuels Automated Management System (FAMS) will eliminate

95 percent of the errors that lead to the erroneous inputs of the current D022 [stock fund] system (10:3-5)."

FAMS Cost Benefit Analysis. In September of 1990, Synergy, Inc. published a cost-benefit analysis of the proposed Fuels Automated Management System (FAMS) (17). FAMS is an approved Air Force Defense Management Review Initiative (DMRI) which provides improved management processes. Synergy estimated that cost savings mainly attributable to the Aircraft Microchip Automated Data Collection/Fuel Dispensing System (ADC/FDS), the Automated Fuels Service Station (AFSS), and Automatic Tank Gauging (ATG) systems, and utilization of microcircuit smart card technology for aviation fuel sales at off-base locations, will save the U.S. Air Force approximately $47.6 M annually (17:x). Additionally, Synergy predicted erroneous billings, late billings and unbilled transactions would be eliminated through implementation of FAMS electronic data initiatives.

FAMS, when fully implemented, incorporates three of the PETROL-RAM projects mentioned above: ADC/FDS, AFSS, and ATG. Together, these systems will provide an automated, electronic fuel accounting system for the centralized tracking of fuel sales Air Force-wide. According to the study:

> The implementation of the FAMS microchip technology for recording jet fuel sales will electronically record the following data elements at the point of sale:
>
> Mission, design, series (MDS) - aircraft tail number, serial number
> Command identification - customer identification code
> Issue date
> Home station - home Department of Defense Activity Code system

Issuing base
Supplemental address
Signal code
Gallons issued
Type fuel (JP-4, JP-8, commercial). (17:2-4)

The importance of properly identifying fuel transactions at the point of issue is to eliminate the current problems of unbilled reimbursables, over-obligation of appropriated funds, and budget shortfalls due to understated fuel consumption factors (10:2-1). Cost savings using smart card and microchip technology assume a 6 year FAMS implementation schedule from FY 92 to FY 97. However, to date, smart card technology and ADC/FDS have not been implemented Air Force-wide.

Requirements Defined for FAMS-C. In 1990, Captain Gregory K. Bergstrom researched informational requirements for the FAMS-C system. His research aided in the design of the MAJCOM level fuels management information system by researching the desired capabilities of the system, the specific data required to establish and maintain a data base, data access levels, and modes for data transmission (2:vi). Much of Capt Bergstrom's efforts resulted in the FAMS-C system in use today that provides MAJCOM's inventory, facility, equipment, and personnel status from each base's FAMS-B system.

Air Force Audit Agency Conducts Review of Decentralization Test. The AVFUEL decentralization test was done at 12 USAF bases for 6 months. The test was extended to 12 months for two Air Combat Command (ACC) bases. At the request of SAF/FM, the Air Force Audit Agency (AFAA) reviewed the aviation decentralization test

in 1992. The AFAA audited 9 of the 12 test bases, as well as several MAJCOMS (7:1). Due to the newness of the test, prior to this request "no previous reviews of this area [had] been completed by the Air Force Audit Agency, Air Force Inspection Agency, Department of Defense Inspector General, or the U.S. General Accounting Office" (7:1). The objective of the audit was to:

> Evaluate the adequacy of policies, procedures, and data collection processes supporting the test of AVFUEL decentralization. Specifically, [the auditor] reviewed the accuracy and timeliness of (a) AVFUEL sales data, (b) aircraft flying hour data, and (c) wing and major command AVFUEL Savings Advisory Group reports and analyses forwarded to HQ USAF and the Air Force Cost Analysis Agency. (7:1)

To evaluate the policies, procedures, and data collection processes, the AFAA used several methodologies. A random sampling of 30 AVFUEL transactions at each of the 9 sites was taken. Each transaction was evaluated in terms of accuracy and timeliness of fuels sales processing into the Standard Base Supply System (SBSS). The reporting and transfer of flying hour data was reviewed for accuracy and timeliness based on data obtained from the base-level Core Automated Maintenance System to Equipment Inventory, Multiple Status, Utilization Reporting Subsystem. The AFAA also tested local procedures to collect and report away from home station AVFUEL data. To determine the accuracy and timeliness of data transfer, the AFAA tracked one month of AVFUEL data from SBSS to the centralized aviation/ground fuels management system at SA-ALC. The audit validated data reported to HQ USAF and MAJCOM advisory reports for monthly quantities reported against quantities billed. Additionally, the AFAA interviewed

key personnel responsible for monitoring, evaluating, and reporting problems for the test program.

The audit began in February and continued through April 1992 reviewing documentation dated October 1991 through February 1992 (7:2). Major findings of the audit reported that:

1. Current accounting and recording procedures were inadequate to support a decentralized AVFUEL funding concept. The auditor found that:

> This condition occurred because existing systems were not designed to process decentralized AVFUEL billing and payment transactions, and test bases did not develop effective local procedures to collect and process the needed AVFUEL data. As a result, bases paid fuel bills that were either erroneous or questionable. (7:11)

2. Of the nine bases reviewed, not one reported accurate and timely AVFUEL sales data. The auditor found that:

> This condition occurred because test bases failed to develop effective local procedures to collect, process, and report AVFUEL consumption in a decentralized environment, as outlined in the test plan. This condition resulted in a misstated fuel use ranging from a 2.9 percent overstatement to a 24.1 percent understatement of monthly sales, and untimely reporting to the major commands and Air Staff...Moreover, the reports from November 1991 through January 1992 showed approximately 2 million gallons ($1.4 million) less AVFUEL consumption than actual billings for AVFUEL from DFAS-DE. (7:6)

3. Fuels sales were not always reported nor billed in a timely manner. Specifically, the audit found that:

> At the four bases with tanker aircraft, in-flight refueling documentation was batch processed, resulting in the sales being

> recorded an average of 16 days after the fuel (more than 3.7 million gallons) was issued. Subsequently, fuel sales were not always reported nor funds obligated during the month they occurred ... During the test, DFAS-DE billed the test based using the data received through the M-27 Report. Bases received bills about 50 days following the M-27 report month. (7:6; 7:10)

Many of the problems identified in the audit had previously been identified. For example, to improve billing timeliness and facilitate decentralized billing, the audit reported that the Air Force Standard Systems Center was in the process of developing a Fuels Automated Management System (FAMS). The FAMS concept is to:

> Offer electronic point of sale data collection and on-line transaction processing. This system will also provide an on-line centralized data retrieval capability which gives mangers total visibility over fuel consumption for both home station and transient aircraft servicing. Testing of the FAMS tracking system is planned in Fiscal Year 1993, and development of FAMS will continue through 1997. (7:10)

FAMS was introduced to manage USAF fuels and is a developing, growing system. The concept of FAMS is to provide an automated collection and information management and control system for fuels using microcircuit technology. FAMS consists of three hardware systems to collect fuels transaction and inventory data at base level and information management systems to support three levels of users; FAMS-A for Air Force level users, FAMS-B for base level users and FAMS-C for MAJCOM users. A FAMS program management review and workshop was held at Kelly AFB, Texas from 27-30 September 1993. In a point paper distributed at the workshop, Maj Doug Simms of SSC/LGSF wrote:

> FAMS reduces the current 2% error rate in a $4 billion annual fuels budget; reduces the risk of loss of life and real property; reduces USAF

> fuels management manpower; and provides accurate information for war planning, which increases the USAF's ability to respond to threats. It will eliminate much of the paperwork and manual input in today's fuels management. Independent cost-benefit analysis shows FAMS will provide an annual savings of $45 million when fully implemented. (12:8)

Until this thesis effort, no known efforts to determine whether or not the FAMS goal of reducing the 2% error rate have been accomplished.

Summary

This chapter described, in general terms, the history of the current aviation fuels sales data process. The chapter presented a chronological review of the procedures for collecting data associated with the transfer of, billing and payment for aviation fuel in the Air Force. Several studies have been accomplished to address the management of Air Force fuels. The data collection, retention, and reporting procedures identified in the audit of the decentralized test were identified as continued problem areas. Based on personal experience and interviews with various people in the field, there still appears to be a problem. These problems affect each fiscal year's budgeted rates and ultimately the funding provided to bases; they also make the objectives of the implementation plan difficult to achieve. Now that the test has been implemented Air Force-wide, the purpose of this thesis it to provide a follow-up research effort. Until now, no study has been accomplished to address the impact FAMS data has on Air Force objectives of developing more accurate fuel consumption rates, budget preparation, and commander reprogramming of savings. This thesis will determine whether any of the problem areas

identified in the audit currently exist. The methodology used to perform this research is explained in the next chapter.

III. METHODOLOGY

Overview

This chapter discusses the research methodology used for this thesis effort. The chapter begins with a background of the problem followed by a description of the research design and selection of subjects. Next, data collection and description, and data processing and analysis are discussed. The chapter concludes with methodological assumptions, limitations, and a brief chapter summary.

Background

At the close of a fiscal year, not all of the data for fuels issued have been processed through FAMS. As such, financial analysts must make forecasts as to how much funding should be set aside for bills not yet received for current year aviation fuel costs incurred. A forecast is a prediction of future events. The objective of forecasting is to develop a useful forecast from known information. As described earlier, a financial analyst can estimate AVFUEL requirements using expert judgment or cost factors.

Cost factors and expert judgment are two estimating methods used by financial analysts to forecast aviation fuel costs. Expert judgment is a qualitative opinion based on the financial analyst's experience. The cost factors estimating method uses USAF published AVFUEL factors, hours flown, and a composite cost per gallon to arrive at an estimate.

The objective of this research is to determine the accuracy, adequacy and reliability of USAF aviation fuel consumption factors for tracking and forecasting fuel consumption for USAFE aircraft. Each MDS's fuel factor within each command will be evaluated in terms of its ability to accurately predict the cost of fuel for that aircraft for USAFE for FY 1994, FY 1995, and first two quarters of the current fiscal year (FY 1996). The research will determine whether or not fuel consumption factors developed since the implementation of FAMS reduce the 2.3% error rate found under the previous system, AMAS (6).

Research Design

Since decentralization, hours flown, gallons consumed and dollars expended are tracked by MDS by fiscal year at base level. Additionally, MAJCOMs track and consolidate data for hours flown, gallons consumed, and dollars expended for each MDS within their command. For this study, each MDS was evaluated in terms of dollars expended at MAJCOM level. This research effort used quarterly data for each MDS for USAFE.

Each MDS within USAFE was evaluated in terms of its actual data in gallons consumed and dollars expended at MAJCOM level on a quarterly basis. Actual data is defined as updated data collected at some point in time after the end of a fiscal year in which the gallons were consumed and for which the Operations and Maintenance (O&M) appropriation used is now expired. Specifically, actual data for FY 1994 hours flown, gallons consumed, and costs incurred are as of 30 September 1995. Actual data for FY

1995 hours flown, gallons consumed, and costs incurred are as of 31 July 1996. No actual data is available for FY 1996 as the current fiscal year does not end until 30 September 1996.

Actual data was compared to data as of the end of the fiscal year in which the costs were initially incurred and recorded for each MDS. The 30 September current year data is based on expert judgment and is termed as "Estimated -- Gallons and "Estimated -- Cost" and represents the gallons and cost for each MDS at the close of the fiscal year in which the gallons were consumed.

Actual costs were also compared to projected costs. The projected costs, termed "Factor" costs, are projected costs based on published USAF AVFUEL consumption factors. Costs are projected quarterly based on hours flown, fuel price, and appropriate aircraft consumption factor. As discussed earlier, the USAF uses cost factors to predict aircraft fuel consumption costs. Cost factors are simple cost estimating relationships between a dependent and an independent variable. A factor can be expressed as either a ratio or percentage and is used as a multiplier of an independent variable. AVFUEL factors are based on two key, historical inputs: hours flown and gallons consumed from the previous fiscal year. USAF Aviation Fuel (AVFUEL) factors are expressed as a ratio in terms of gallons per flying hour.

Selection of Subjects

Quarterly data for hours flown, gallons consumed, and dollars spent were collected for each unclassified aircraft mission, design, and series (MDS) for USAFE for FY 1994, FY 1995, and the first two quarters of FY 1996.

USAFE was selected as the sample command for this study due to its variability of aircraft and operational mission requirements. Additionally, USAFE was least affected by the USAF reorganization that occurred in 1994 and 1995, making data more readily available and reliable.

Data Collection and Description

Cost and gallons consumed data was obtained through the Visibility and Management of Operating and Support Costs (VAMOSC) database provided by SAF/FMCCF and from the Defense Finance Accounting Service in Denver, Colorado (DFAS-DE). Data from DFAS-DE was also used to validate initial cost and gallons data received from SAF/FMCCF. SAF/FMCCF provided net quarterly cost and gallons consumed data for each MAJCOM by MDS for FY 1994 and FY 1995. Cost data from SAF/FMCCF for 1995 included updated cost and gallons consumed data for FY 1994. DFAS-DE provided net monthly cost and gallons consumed data for each MAJCOM by MDS for FY 1995 and the first ten months of FY 1996. All data provided by DFAS-DE was as of 31 July 1996. In order to use data provided by DFAS-DE for this study, monthly data for both costs incurred and gallons consumed were grouped into quarterly and then cumulative data using Microsoft® Excel.

Cost estimates using AVFUEL consumption factors require three key inputs: hours flown, fuel price, and MDS specific AVFUEL consumption factor. Quarterly hours flown by MDS for each MAJCOM for FY 1994, FY 1995, and current year were obtained from the History of USAF Flying Hours for Planning and Reference Report (A-41) through HQ USAF/XOFP. Composite AVFUEL prices for each command are published annually and were obtained from the Logistics Cost Factors Commodity Specific Inflation index for AVFUEL, AFI 65-503, Table A5-1. Aircraft fuel consumption factors are published annually and were obtained from the Command Unique MDS AVFUEL Factor Summary, AFI-65-503, Table A13-1.

Actual recorded data for FY 1994, FY 1995, and FY 1996 was used and represented current year dollar amounts for each fiscal year. Therefore, data normalization to account for the time value of money was not necessary.

Data Processing and Analysis

Two forecasting error techniques were used to measure forecast performance: cumulative sum of forecast errors (CFE) and mean absolute percent of error (MAPE). Forecast error is defined as:

$$E_t = D_t - F_t \qquad (1)$$

where

E_t = forecast error for period t.

D_t = actual cost for period t

F_t = forecast for period t

Forecast performance can be measured by forecast errors. Forecast error analysis can help the analyst detect when something is going wrong with the forecasting system. Forecast error can sometimes result from an inability to accurately assess the cost drivers or from something outside an analyst's control (9:452). The cumulative sum of forecast error (CFE) and the mean absolute percent error (MAPE) forecasting measures were selected for this study as measurements of forecast error.

The CFE was used first to measure the bias in the forecast in dollars. Bias refers to the tendency of a forecast to be too high or too low. Bias is particularly important in this study due to the fact that AVFUEL funding is only available for one fiscal year. AVFUEL funding is part of a base's operations and maintenance (O & M) funds which is a one year appropriation. Therefore, for this study, a high CFE represents a misapplication of funds.

Forecast performance will be measured using CFE for actual cost versus expert judgment forecast and actual cost versus AVFUEL factor forecast for each MDS for USAFE. If a forecast is always lower than actual cost, the value of CFE will gradually get larger and larger and be represented by a positive number. A large positive CFE in this case, sends a signal to the analyst that the amount of funding reserved was inadequate. Should funds not be available to cover the unanticipated bill at base, MAJCOM, or USAF level, an overobligation of funds could occur. An overobligation of funds at USAF level must be investigated and could necessitate a report to the President of the United States should sufficient funding not be available (7:17).

Inversely, if the forecast is always higher than the actual cost, the value of the CFE will gradually get larger and larger and be represented by a negative number, its magnitude being represented in absolute terms. A large negative CFE in this case, sends a signal to the analyst that the amount of funding reserved was too much. In this case, the excess funds can not be reissued for new requirements and for all practical purposes, are lost. For obvious reasons then, a large negative CFE is not desired.

CFE will be generated by quarter and fiscal year. The equation for CFE is defined as:

$$CFE = \Sigma E_t \tag{2}$$

Additionally, the mean absolute percentage error (MAPE) was used to measure the dispersion of forecast error in percentage terms. The Air Force spends approximately $3 billion annually for AVFUEL (2:3). MAPE is useful for putting forecast performance in perspective (9:454). A large CFE may appear to be large in absolute terms but can be relatively small in percentage terms. Therefore, MAPE is used in this analysis to express AVFUEL forecast errors in percentage terms in order to maintain perspective. If MAPE is small, the forecast is typically close to actual cost. Conversely, if MAPE is large, the forecast is not close to actual cost and should signal the analyst that something is wrong. The equation for MAPE is defined as:

$$MAPE = \{\Sigma (|E_t| / D_t) * (100)\} / n \tag{3}$$

where

$E_t = D_t - F_t$

D_t = actual cost for period t

n = total number of periods

The CFE and MAPE will be presented for each MDS within USAFE in Appendix B and C respectively.

Methodological Assumptions

In computing AVFUEL costs using the cost factor methodology, several assumptions were made. Costs provided by the VAMOSC database and by DFAS-DE are assumed to be recorded in the base level accounting and finance system in the same quarter in which they were reported here. In computing projected costs, hours flown are based on actual hours flown and not projected hours as stated in the A41 report. All hours flown as stated in the A41 report are assumed to be accurate. In computing projected costs, command unique MDS AVFUEL factors listed by command in AFI 65-605, Attachment 13, Table A13-1 were used when listed, otherwise the composite MDS AVFUEL factor was used. Lastly, composite fuel prices listed by command for each fiscal year in AFI 65-605, Attachment 5, Table A5-1 are assumed to be accurate.

Limitations

The cost factor methodology has been criticized for its simplicity. A cost factor is a legitimate form of a cost estimating relationship, where the dependent variable is directly proportional to the independent variable. No provisions for operational mission changes in the independent variable, flying hours, have been made when analyzing forecast error. AVFUEL factor development methodology assumes an historical relationship between flying hours (independent variable) and fuel consumption (dependent variable) will continue within the historical relevant range of flying hours. The independent variable is assumed to indirectly capture changes in fuel consumption rates which occur with changes in mission profile (4).

Summary

This chapter discussed the research methodology used for this thesis effort. Cost factors and expert judgment are two estimating methods used by financial analysts to forecast aviation fuel costs. The objective of this research is to determine the accuracy, adequacy and reliability of USAF aviation fuel consumption factors for tracking and forecasting fuel consumption. Each MDS will be evaluated in terms of its actual data in gallons consumed and dollars expended at MAJCOM level on a quarterly basis. Forecast performance for both estimating methods mentioned above will be measured using cumulative sum of forecast error (CFE) and mean absolute percentage error (MAPE) formulas.

Next, an analysis of research findings will be presented in Chapter IV. Supporting data is presented in tabular form in Appendix D. An evaluation of the findings will follow the analysis.

IV. FINDINGS AND ANALYSIS

Overview

This chapter provides a summary of the AVFUEL data analysis. Forecast performance for both expert judgment and cost factor estimating methods are presented using cumulative sum of forecast error (CFE) and mean absolute percentage error (MAPE) formulas. The CFE and MAPE were calculated for each aircraft mission, design, and series (MDS) for all unclassified USAFE aircraft. The objective of this research is to determine the accuracy, adequacy and reliability of USAF aviation fuel consumption factors for tracking and forecasting fuel consumption. An evaluation of the findings is presented, followed by a summary of the chapter.

The Data

The data was evaluated in terms of the research questions posed in Chapter I, Introduction, namely:

1. How accurate are the published aviation fuel factors in estimating out-year costs at MAJCOM level? by MDS at MAJCOM level?
2. Concerning accuracy, do any AVFUEL factors for any category of aircraft (fighter, bomber, trainer, etc.) or MDS show a tendency to be less or more accurate than others?

The CFE was calculated for "Actual" versus "Estimate" cost and for "Actual" versus "Factor" cost. The "Actual" cost is defined as updated cost collected at some point in time after the end of a fiscal year in which the gallons were consumed and for which the Operations and Maintenance (O&M) appropriation used is now expired. Specifically, "Actual" data for FY 1994 costs incurred are as of 30 September 1995. "Actual" data for FY 1995 costs incurred are as of 31 July 1996. The term "Estimate" cost refers to costs recorded as of the 30 September of the year in which the costs were initially incurred. The "Estimate" cost data is based on expert judgment. Estimates using expert judgment are based on the experience and judgment of the financial analyst. The term "Factor" cost are cost estimates developed using USAF AVFUEL factor development methodology alone. Factored costs are based on hours flown, fuel price, and appropriate aircraft consumption factor.

Research Question 1a. How accurate are the published aviation fuel factors in estimating out-year costs at MAJCOM level?

At MAJCOM level, the CFE for "Actual" versus "Estimate" for the United States Air Forces in Europe (USAFE) Command was calculated to be $605,220 for 1994 (Appendix B). This figure represents an understatement of $605,220 for USAFE's aviation fuel bill at 30 September 1994 when the O & M appropriation expired. In other words, after the appropriation expired, USAFE received additional bills totaling $605,220 for which no funds had been reserved. In percentage terms, the mean absolute percentage

error (MAPE) was calculated to be 0.49 percent. This figure equates to an error of 0.49 percent at the MAJCOM level (Appendix C).

At MAJCOM level, the CFE for "Actual" versus "Factor" for USAFE was calculated to be - $2,502,674 for 1994 (Appendix B). Had AVFUEL factors been used, this figure would have represented an overstatement of $2,502,674 for USAFE's aviation fuel bill at 30 September 1994 when the O & M appropriation expired. In other words, after the appropriation expired, USAFE would have potentially lost $2,502,674 for which funds had been reserved but had no associated bill. In percentage terms, the mean absolute percentage error (MAPE) was calculated to be 2.04 percent (Appendix C). Use of AVFUEL factors for FY 1994 would have led to an error in percentage terms of 2.04 percent (Appendix C) at the MAJCOM level.

At MAJCOM level, the CFE for "Actual" versus "Estimate" for the United States Air Forces in Europe (USAFE) Command was calculated to be $2,325,027 for 1995 (Appendix B). This figure represents an understatement of $2,325,027 for USAFE's aviation fuel bill at 30 September 1994 when the O & M appropriation expired. In other words, after the appropriation expired, USAFE received additional bills totaling $2,325,027 for which no funds had been reserved. In percentage terms, the mean absolute percentage error (MAPE) was calculated to be 2.38 percent (Appendix C). This figure equates to an error of 2.38 percent at the MAJCOM level.

At MAJCOM level, the CFE for "Actual" versus "Factor" for USAFE was calculated to be - $251,990 for 1995 (Appendix B). Had AVFUEL factors been used, this figure would have represented an overstatement of $251,990 for USAFE's aviation

fuel bill at 30 September 1995 when the O & M appropriation expired. In other words, after the appropriation expired, USAFE would have potentially lost $251,990 for which funds had been reserved but had no associated bill. In percentage terms, the mean absolute percentage error (MAPE) was calculated to be 0.26 percent. Therefore, use of AVFUEL factors for FY 1995 would have led to an error in percentage terms of 0.26 percent at the MAJCOM level.

At MAJCOM level, the CFE for "Actual" versus "Estimate" for the United States Air Forces in Europe (USAFE) Command was calculated to be $0 for 1996 (Appendix B). For FY 1996 the "Actual" and "Estimate" figures are identical due to the fact that the fiscal year is still in progress. In percentage terms, this figure also equates to a zero percent MAPE (Appendix C).

At MAJCOM level, the CFE for "Actual" versus "Factor" for USAFE was calculated to be $2,709,197 for 1996 (Appendix B). If AVFUEL factors are used, this figure may have represent an understatement of $2,709,197 for USAFE's current fiscal year aviation fuel bill. In other words, on 30 September 1996, USAFE may potentially understate AVFUEL costs by $2,709,197 based on AVFUEL factors. Use of AVFUEL factors for FY 1996 may lead to an error in percentage terms of 5.71 percent (Appendix C) at the MAJCOM level.

Research Question 1b. How accurate are the published aviation fuel factors in estimating out-year costs by MDS at MAJCOM level?

At the MDS level in 1994, "Estimates" for the KC135E, KC135R, and KC135T aircraft were overstated by a total of $598,747 (Appendix B). Conversely, "Estimates" for all other USAFE aircraft were understated by a total of $1,203,967 (Appendix B). The mean absolute percentage error (MAPE) for each of these aircraft are listed in Appendix C. Of concern is the MAPE for the C020A, CT043A, KC-135E, and KC-135T aircraft which all have MAPE over two percent (Appendix C).

At the MDS level in 1994, had AVFUEL factors been used, this figure would have represented a total overstatement of $9,938,607 for the following type aircraft: A10A, C130E, F004G, F15A, F15B, F15C, F15E, F16C, F111E, and OA10A (Appendix B). All other USAFE aircraft underestimated costs using the AVFUEL factors for a total of $7,435,933 (Appendix B). For 1994, the net impact of the "Factor" costs using USAF AVFUEL consumption factors is an overstatement of total funds required of $2,502,674 (Appendix B). Use of AVFUEL factors results in large mean absolute percentage errors (MAPEs) for virtually all USAFE aircraft at the MDS level. The MAPE for each of these aircraft is listed in Appendix C.

At the MDS level in 1995, only the "Estimate" for the KC135T aircraft was overstated by a total of $3,011. Conversely, "Estimates" for all other USAFE aircraft were understated by a total of $2,328,038. The mean absolute percentage error (MAPE) for the KC135T aircraft was calculated to be .13 percent (Appendix C). Only the F15C,

F16C and KC135R aircraft had MAPEs above two percent. The MAPE for each of these aircraft is listed in Appendix C.

At the MDS level in 1995, had AVFUEL factors been used, this figure would have represented a total overstatement of $2,119,168 for the following type aircraft: A10A, C9A, F15C, F15D, F15E, T43AC, KC135Q, and KC135R. All other USAFE aircraft underestimated costs using the AVFUEL factors for a total of $1,867,177. For 1995, the net impact of the "Factor" costs using USAF AVFUEL consumption factors is an overstatement of total funds required of $251,990. Again, the use of AVFUEL factors results in large mean absolute percentage errors (MAPEs) for virtually all USAFE aircraft as compared to MAPEs using "Estimate" figures. Of concern is the MAPE for the A10A, C020A, C021A, C130E, F15C, F15D, F16C, F16D, KC135R, KC135T, and OA10A aircraft, all of which have MAPEs over two percent. The mean absolute percentage error (MAPE) for each of these aircraft for 1995 is listed in Appendix C.

At the MDS level in 1996, figures for "Actual" and "Estimate" costs for all aircraft are the same, resulting in a zero CFE (Appendix C). Consequently, the mean absolute percentage error (MAPE) for all aircraft at the MDS level for FY 1996 is zero percent (Appendix C).

At the MDS level in 1996, if AVFUEL factors are used, this figure currently represents an overstatement of $112,955 for C12C and F16C aircraft. All other USAFE aircraft may potentially underestimate costs based on AVFUEL factors for a total of $2,822,152. For 1996, the net impact of the "Factor" costs using USAF AVFUEL consumption factors currently represents an understatement of total funds required of

$2,709,197 (Appendix B). Of concern is the MAPE for the A10A, C020A, C021A, C130E, F15C, F15D, F15E, F16D, CT043A, KC135R, KC135T, and OA10A aircraft, all of which have MAPEs over two percent. These aircraft had MAPEs in 1995 that were also over two percent (Appendix C). The mean absolute percentage error (MAPE) for each of these aircraft for 1996 is listed in Appendix C.

Evaluation

At MAJCOM level the use of USAF published AVFUEL factors alone in estimating out-year costs by MAJCOM would have overstated costs in both FY 1994 and FY 1995 by $2,502,674 or 2.04% (1994) and by $251,990 or 0.26% (1995). In other words, after the appropriation expired, USAFE would have potentially lost over $2.75 M for FY 1994 and FY 1995 for which funds had been reserved but had no associated bill. If AVFUEL factors are used for 1996, USAFE may potentially understate AVFUEL costs by $2,709,197 according to the estimate cost data provided by DFAS-DE. According to the data, use of AVFUEL consumption factors for FY 1996 may lead to a 5.71 percent error in costs.

Although the net effect in percentage terms is relatively small for all fiscal years, the use of USAF published AVFUEL fuel factors in estimating out-year costs by MDS by MAJCOM would have greatly understated costs for some aircraft while overstating costs for other aircraft. The individual MDS CFEs for "Actual" versus "Factor" are listed in Appendix B for FY 1994, FY 1995, and FY 1996. This effect can be seen at the MDS

level in percentage terms using MAPE calculations. MAPE calculations are located in Appendix C for the same fiscal years.

With the decentralization of AVFUEL funding in FY 1994, wing commanders are responsible for the tracking, processing, and payment of AVFUEL for all aircraft assigned to their station. The large cumulative forecast errors and mean absolute percentage errors at the MDS level shown in this research effort are cause for great concern as funding is decentralized to base level where unique MDSs are located. According to the data presented in this research paper, use of AVFUEL factors at the MDS level for use in estimating AVFUEL costs is not recommended for aircraft assigned to USAFE .

Research Question 2. Concerning accuracy, do any AVFUEL factors for any category of aircraft (fighter, bomber, trainer, etc.) or MDS show a tendency to be less or more accurate than others?

There does not appear to be any consistency with regard to the ability of AVFUEL factors to be more or less accurate in predicting any particular category of aircraft. The analysis did show, however, that use of AVFUEL factors for the following aircraft overstated costs for both FY 1994 and FY 1995: A10A, F15C, and F15E aircraft. The analysis also showed that the use of AVFUEL factors for the following aircraft understated costs for both FY 1994 and FY 1995: C020A, C21A, F16D, and OA10A. For specific CFE and MAPE numbers, see Appendices B and C.

Summary

At MAJCOM level the use of USAF published AVFUEL factors in estimating out-year costs by MAJCOM would have overstated costs in both FY 1994 and FY 1995 by $2,502,674 or 2.04% (FY 1994), by $251,990 or .26% (FY 1995), and potentially understates costs by $2,709,197 or 5.71 percent for the current fiscal year (FY 1996).

Of greater concern is the use of USAF published AVFUEL fuel factors in estimating out-year costs by MDS by MAJCOM. The data demonstrates that at the MDS level, the use of AVFUEL factors would have greatly understated costs for some aircraft while overstating costs for other aircraft. Since AVFUEL funding is decentralized at base level and not at MAJCOM level, the large cumulative forecast errors and mean absolute percentage errors at the MDS level are of great interest. According to the data presented in this research paper, use of AVFUEL factors at the MDS level for use in estimating AVFUEL costs is not recommended for USAFE assigned aircraft.

Finally, in response to the second research question, the research does not support any tendency for a particular category of aircraft to be any more or less accurate in predicting AVFUEL costs using AVFUEL consumption factors.

V. CONCLUSIONS AND RECOMMENDATIONS FOR FOLLOW-ON RESEARCH

Overview

This chapter presents the researcher's conclusions to the two main research questions which drove this research project. The objective of this research was to determine the accuracy, adequacy and reliability of USAF aviation fuel consumption factors for tracking and forecasting fuel consumption. Briefly, this research determined the accuracy of the published aviation fuel factors in estimating costs by MAJCOM and by MDS by MAJCOM, and whether any specific AVFUEL factors for any category of aircraft (fighter, bomber, trainer, etc.) or MDS showed a tendency to be less or more accurate than others. The results obtained answered all of the research questions. This chapter concludes with recommendations for future study.

Conclusions to Research Questions

Research Question 1. How accurate are the published aviation fuel factors in estimating out-year costs by MAJCOM? by MDS at MAJCOM level? At MAJCOM level the use of USAF published AVFUEL fuel factors in estimating out-year costs by MAJCOM would have overstated costs in both FY 1994 and FY 1995 by $ 2,502,674 or 2.04 % (1994) and by $ 251,990 or .26% (1995). The overstatement of costs is misleading in percentage and in dollar terms due to the offsetting of overstatements and understatements of cost at the MAJCOM level. The use of USAF published AVFUEL factors in estimating out-year costs by MDS by MAJCOM would have greatly understated

costs for some aircraft while overstating costs for other aircraft (see Appendix B for MDS details). This condition occurred because use of USAF AVFUEL consumption factors at the MDS level are inaccurate. More importantly, AVFUEL funding is managed at base level and not at MAJCOM level. Due to the fact that AVFUEL funding is managed at base level where only several, usually similar, aircraft are assigned, the use of USAF AVFUEL consumption factors for estimating AVFUEL cost by MDS is not recommended for base level. Until PETROL RAM projects are fully implemented, expert judgment is preferred over the use of AVFUEL consumption factors in estimating AVFUEL consumption by MDS.

Research Question 2. Concerning accuracy, do any AVFUEL factors for any category of aircraft (fighter, bomber, trainer, etc.) or MDS show a tendency to less or more accurate than others? The research does not support any tendency for a particular category of aircraft to be any more or less accurate in predicting AVFUEL costs using AVFUEL consumption factors. The analysis did show, however, that use of AVFUEL factors for the following aircraft overstated costs for both FY 1994 and FY 1995: A10A, F15C, and F15E aircraft. The analysis also showed that the use of AVFUEL factors for the following aircraft understated costs for both FY 1994 and FY 1995: C020A, C21A, F16D, and OA10A.

Recommendations for Follow-on Research

The research suggests that a similar study be done for other USAF commands to determine whether similar problems exist. In widening the scope of the research question,

the researcher may be able to determine if like aircraft in different commands face similar challenges in estimating AVFUEL costs using AVFUEL consumption factors.

The research strongly advocates that the timeliness and accuracy of FAMS input data be investigated. AVFUEL consumption factors rely heavily on accurate and timely information from the FAMS database. For those MDSs that have fuel factors that are inaccurate in estimating out-year costs, the researcher recommends that a breakdown in percentage terms of how the fuel was obtained (within Air Force, within DoD, contracted source, non-contracted source, etc.) be determined. Additionally, for those MDSs that have fuel factors that are inaccurate in estimating out-year costs, the researcher recommends that timeliness in days by issue category be investigated.

The use of Automated Data Collection/Fuels Dispensing System (AFC/FDS) will hopefully increase the timeliness and accuracy of FAMS data, and in-turn increase the reliability of AVFUEL consumption factors to accurately predict AVFUEL costs at the MDS level. Air Force-wide fielding of AFC/FDS is scheduled to be complete by the end of FY98 (12:3). To date, AFC/FDS is not in use Air Force-wide and its potential impact on the accuracy and timeliness of FAMS data is unknown.

APPENDIX A: GLOSSARY OF TERMS AND ACRONYMS

ACC	Air Combat Command
ADC/FDS	Aircraft Microchip Automated Data Collection/Fuel Dispensing System
AFB	Air Force Base
AFCSTC	Air Force Cost Center
AFSS	Automated Fuels Service Station
AMAS	Aviation Fuel Management and Accounting System
ANSI	American National Standards Institute
ATG	Automatic Tank Gauging System
AVFUEL	Aviation Fuel
AVPOL	Aviation Petroleum, Oils, and Lubricants
BQ	General Accounting and Finance System
BFMO	Base Fuels Management Officer
CFE	Cumulative Forecast Error
DASS	Defense Automatic Addressing System
DFAS-DE	Defense Finance and Accounting Service at Denver, Colorado
DLA	Defense Logistics Agency
DMRI	Defense Management Review Initiative
DoD	Department of Defense
DSN	Defense Data Network
FY	Fiscal Year
FAMS	Fuels Automated Management System
FAMS-A	Fuels Automated Management System - Air Force Level
FAMS-B	Fuels Automated Management System - Base Level
FAMS-C	Fuels Automated Management System - Command Level
FAS	Fuels Automated System
MAJCOM	Major Command

MAPE	Mean Absolute Percent Error
MDS	Mission Design Series
MORD	Miscellaneous Obligation/Reimbursement Document
O & M	Operations and Maintenance
ORD	Operational Requirements Document
PCFUELS	Aviation Fuels Interfund Billing Processing System
PDB	Program Budget Decision
SAF/FMB	Secretary of the Air Force, Financial Management and Budget
USAFE	United States Air Forces in Europe
USAF/XOOT	United States Air Force, Directorate of Plans and Training
VAMOSC	Visibility and Management of Operating and Support Costs

APPENDIX B: CUMULATIVE FORECAST ERROR (CFE) DATA RECORDS

CFE ACTUAL VERSUS ESTIMATE FOR FY 1994
UNITED STATES AIR FORCES IN EUROPE

MDS	FY 94 Q1	FY 94 Q2	FY 94 Q3	TOTAL FY 94
A10A	$ 1,908	$ 2,341	$ 18,671	$ 37,118
C009A	$ 23,465	$ 45,095	$ 52,093	$ 69,485
C12C	$ -	$ -	$ -	$ -
C020A	$ 40,128	$ 79,184	$ 117,263	$ 151,434
C021A	$ (298)	$ 2,322	$ 2,322	$ 10,463
C130E	$ (18,494)	$ (18,494)	$ (9,776)	$ 99,041
F004G	$ -	$ -	$ -	$ -
F015A	$ -	$ -	$ -	$ -
F015B	$ -	$ -	$ -	$ -
F015C	$ (11,952)	$ (11,952)	$ (5,713)	$ 22,297
F015D	$ -	$ -	$ 8,476	$ 9,405
F015E	$ -	$ 3,475	$ 167,815	$ 411,121
F016A	$ -	$ -	$ -	$ -
F016B	$ -	$ -	$ -	$ -
F016C	$ 3,428	$ 8,083	$ 63,981	$ 347,514
F016D	$ -	$ -	$ 2,713	$ 4,193
F111E	$ 6,259	$ 6,259	$ 6,259	$ 6,259
CT043A	$ 2,368	$ 5,007	$ 8,138	$ 15,345
EF111A	$ -	$ -	$ -	$ -
KC135A	$ -	$ -	$ -	$ -
KC135E	$ -	$ -	$ -	$ (13,731)
KC135Q	$ -	$ -	$ -	$ -
KC135R	$ (68,716)	$ 354,622	$ (510,353)	$ (554,828)
KC135T	$ -	$ -	$ (30,188)	$ (30,188)
0A10A	$ -	$ 372	$ 10,693	$ 20,292
RF004C	$ -	$ -	$ -	$ -
TOTAL	**$ (21,904)**	**$ 476,314**	**$ (97,606)**	**$ 605,220**

CFE ACTUAL VERSUS FACTOR FOR FY 1994
UNITED STATES AIR FORCES IN EUROPE

MDS	FY 94 Q1	FY 94 Q2	FY 94 Q3	TOTAL FY 94
A10A	$ (89,496)	$ (235,028)	$ (1,420,222)	$ (1,549,566)
C009A	$ 171,590	$ 312,697	$ 415,688	$ 491,757
C12C	$ -	$ 186	$ 186	$ 186
C020A	$ 160,412	$ 319,344	$ 388,539	$ 445,592
C021A	$ 33,139	$ 82,562	$ 198,291	$ 250,881
C130E	$ (83,002)	$ (217,442)	$ (138,175)	$ (94,194)
F004G	$ (343,208)	$ (397,352)	$ (397,352)	$ (395,246)
F015A	$ (65,137)	$ (67,475)	$ (67,475)	$ (67,476)
F015B	$ (12,948)	$ (17,695)	$ (17,695)	$ (17,696)
F015C	$ (388,354)	$ (688,564)	$ (792,773)	$ (888,051)
F015D	$ 24,888	$ 22,237	$ 50,121	$ 73,533
F015E	$ (547,825)	$ (1,132,339)	$ (1,761,219)	$ (2,609,047)
F016A	$ -	$ 812	$ 812	$ 812
F016B	$ -	$ 488	$ 488	$ 488
F016C	$ (319,553)	$ (784,442)	$ (3,300,667)	$ (3,474,815)
F016D	$ (60,107)	$ (47,189)	$ (10,145)	$ 7,118
F111E	$ (426,068)	$ (433,049)	$ (433,049)	$ (433,049)
CT043A	$ 17,134	$ 25,435	$ 39,836	$ 30,631
EF111A	$ 508	$ 508	$ 508	$ 508
KC135A	$ 3,029	$ 7,020	$ 7,020	$ 8,326
KC135E	$ 185,764	$ 245,243	$ 272,982	$ 318,020
KC135Q	$ (9,993)	$ 107,362	$ 159,322	$ 186,004
KC135R	$ (342,942)	$ 1,110,178	$ 4,545,333	$ 5,205,002
KC135T	$ 9,455	$ 29,312	$ 400,653	$ 412,343
0A10A	$ (81,364)	$ (197,816)	$ (297,809)	$ (409,467)
RF004C	$ 4,323	$ 4,732	$ 4,732	$ 4,732
TOTAL	**$ (2,159,755)**	**$ (1,950,275)**	**$ (2,152,070)**	**$ (2,502,674)**

CFE ACTUAL VERSUS ESTIMATE FOR FY 1995
UNITED STATES AIR FORCES IN EUROPE

MDS	FY 95 Q1	FY 95 Q2	FY 95 Q3	TOTAL FY 95
A10A	$ 636	$ 2,403	$ 5,328	$ 8,105
C009A	$ 830	$ 830	$ 2,452	$ 15,097
C12C	$ -	$ -	$ -	$ -
C020A	$ -	$ -	$ 1,443	$ 1,912
C021A	$ 1,686	$ 3,974	$ 5,777	$ 17,944
C130E	$ 7,235	$ 27,527	$ 34,700	$ 57,680
F004G	$ -	$ -	$ -	$ -
F015A	$ -	$ -	$ -	$ -
F015B	$ -	$ -	$ -	$ -
F015C	$ -	$ 249,060	$ 251,895	$ 338,176
F015D	$ -	$ -	$ -	$ -
F015E	$ 12,866	$ 50,600	$ 124,391	$ 413,108
F016A	$ -	$ -	$ -	$ -
F016B	$ -	$ -	$ -	$ -
F016C	$ 11,881	$ 370,448	$ 534,822	$ 763,875
F016D	$ -	$ 1,367	$ 6,972	$ 6,972
F111E	$ -	$ -	$ -	$ -
CT043A	$ -	$ 1,733	$ 1,733	$ 1,733
EF111A	$ -	$ -	$ -	$ -
KC135A	$ -	$ -	$ -	$ -
KC135E	$ -	$ -	$ -	$ -
KC135Q	$ -	$ -	$ -	$ -
KC135R	$ (28,955)	$ 51,734	$ 510,647	$ 693,237
KC135T	$ (7,238)	$ 100,532	$ (3,011)	$ (3,011)
0A10A	$ 2,767	$ 8,355	$ 8,938	$ 10,199
RF004C	$ -	$ -	$ -	$ -
TOTAL	**$ 1,708**	**$ 868,563**	**$ 1,486,087**	**$ 2,325,027**

CFE ACTUAL VERSUS FACTOR FOR FY 1995
UNITED STATES AIR FORCES IN EUROPE

MDS	FY 95 Q1	FY 95 Q2	FY 95 Q3	TOTAL FY 95
A10A	$ (154,886)	$ (226,137)	$ (364,709)	$ (337,687)
C009A	$ 31,204	$ 49,470	$ (53,833)	$ (49,676)
C12C	$ -	$ -	$ -	$ -
C020A	$ 29,761	$ 66,136	$ 75,213	$ 77,594
C021A	$ 23,472	$ 26,884	$ 45,576	$ 78,153
C130E	$ 274,465	$ 452,840	$ 413,961	$ 426,478
F004G	$ 3,804	$ 3,804	$ 3,804	$ 3,804
F015A	$ -	$ -	$ -	$ -
F015B	$ -	$ -	$ -	$ -
F015C	$ (175,577)	$ (414,152)	$ (533,767)	$ (425,594)
F015D	$ (14,987)	$ (75,961)	$ (62,048)	$ (34,026)
F015E	$ (235,306)	$ (478,656)	$ (557,709)	$ (81,983)
F016A	$ -	$ -	$ -	$ -
F016B	$ -	$ -	$ -	$ -
F016C	$ (65,276)	$ 212,024	$ 2,145	$ 939,443
F016D	$ 48,267	$ 15,433	$ 24,935	$ 60,955
F111E	$ 1,110	$ 1,285	$ 1,285	$ 1,285
CT043A	$ 5,935	$ 12,140	$ (6,046)	$ (3,698)
EF111A	$ -	$ -	$ -	$ -
KC135A	$ -	$ -	$ -	$ -
KC135E	$ -	$ -	$ -	$ -
KC135Q	$ (5,289)	$ (5,289)	$ (5,289)	$ (5,289)
KC135R	$ 1,293,729	$ 355,902	$ 1,327,597	$ (1,181,215)
KC135T	$ 92,341	$ 387,799	$ 917,575	$ 100,394
0A10A	$ (11,577)	$ (11,491)	$ 110,979	$ 179,071
RF004C	$ -	$ -	$ -	$ -
TOTAL	**$ 1,141,190**	**$ 372,031**	**$ 1,339,669**	**$ (251,990)**

CFE ACTUAL VERSUS ESTIMATE FOR FY 1996
UNITED STATES AIR FORCES IN EUROPE

MDS	FY 96 Q1	FY 96 Q2
A10A	$ -	$ -
C009A	$ -	$ -
C12C	$ -	$ -
C020A	$ -	$ -
C021A	$ -	$ -
C130E	$ -	$ -
F004G	$ -	$ -
F015A	$ -	$ -
F015B	$ -	$ -
F015C	$ -	$ -
F015D	$ -	$ -
F015E	$ -	$ -
F016A	$ -	$ -
F016B	$ -	$ -
F016C	$ -	$ -
F016D	$ -	$ -
F111E	$ -	$ -
CT043A	$ -	$ -
EF111A	$ -	$ -
KC135A	$ -	$ -
KC135E	$ -	$ -
KC135Q	$ -	$ -
KC135R	$ -	$ -
KC135T	$ -	$ -
0A10A	$ -	$ -
RF004C	$ -	$ -
TOTAL	**$ -**	**$ -**

CFE ACTUAL VERSUS FACTOR FOR FY 1996
UNITED STATES AIR FORCES IN EUROPE

MDS	FY 96 Q1	FY 96 Q2
A10A	$ (662)	$ 35,597
C009A	$ (9,695)	$ 3,411
C12C	$ (10,827)	$ (10,827)
C020A	$ 3,690	$ 14,166
C021A	$ 28,370	$ 60,544
C130E	$ 167,790	$ 225,998
F004G	$ -	$ -
F015A	$ -	$ -
F015B	$ -	$ -
F015C	$ 58,489	$ 208,908
F015D	$ 22,883	$ 31,489
F015E	$ 645,821	$ 1,135,378
F016A	$ -	$ -
F016B	$ -	$ -
F016C	$ (210,453)	$ (102,128)
F016D	$ (12,860)	$ 66,115
F111E	$ -	$ -
CT043A	$ 1,744	$ 7,699
EF111A	$ -	$ -
KC135A	$ -	$ -
KC135E	$ -	$ -
KC135Q	$ -	$ -
KC135R	$ 674,533	$ 842,071
KC135T	$ 520,070	$ 165,132
0A10A	$ 5,380	$ 25,644
RF004C	$ -	$ -
TOTAL	**$ 1,884,273**	**$ 2,709,197**

APPENDIX C: MEAN ABSOLUTE PERCENTAGE ERROR (MAPE) DATA RECORDS

MAPE, ACTUAL VERSUS ESTIMATE FOR FY 1994
United States Air Forces in Europe

MDS	FY 94 Q1	FY 94 Q2	FY 94 Q3	TOTAL FY 94
A10A	0.25%	0.13%	0.67%	1.02%
C009A	1.98%	1.86%	1.41%	1.40%
C12C		0.00%	0.00%	0.00%
C020A	9.34%	9.74%	10.23%	10.42%
C021A	0.09%	0.32%	0.20%	0.67%
C130E	1.09%	0.55%	0.22%	1.71%
F004G	0.00%	0.00%	0.00%	0.00%
F015A	0.00%	0.00%	0.00%	0.00%
F015B	0.00%	0.00%	0.00%	0.00%
F015C	0.32%	0.17%	0.05%	0.15%
F015D	0.00%	0.00%	1.01%	0.80%
F015E	0.00%	0.03%	0.86%	1.57%
F016A		0.00%	0.00%	0.00%
F016B		0.00%	0.00%	0.00%
F016C	0.08%	0.09%	0.45%	1.87%
F016D	0.00%	0.00%	0.14%	0.18%
F111E	1.14%	1.15%	1.15%	1.15%
CT043A	8.23%	7.37%	7.97%	4.93%
EF111A	0.00%	0.00%	0.00%	0.00%
KC135A	0.00%	0.00%	0.00%	0.00%
KC135E	0.00%	0.00%	0.00%	4.32%
KC135Q	0.00%	0.00%	0.00%	0.00%
KC135R	1.07%	2.10%	1.75%	1.56%
KC135T	0.00%	0.00%	2.53%	2.50%
0A10A	0.00%	0.04%	0.74%	1.08%
RF004C	0.00%	0.00%	0.00%	0.00%
TOTAL	**0.08%**	**0.79%**	**0.10%**	**0.49%**

MAPE, ACTUAL VERSUS FACTOR FOR FY 1994
United States Air Forces in Europe

MDS	FY 94 Q1	FY 94 Q2	FY 94 Q3	TOTAL FY 94
A10A	11.60%	13.29%	50.60%	42.66%
C009A	14.51%	12.89%	11.22%	9.88%
C12C		100.00%	100.00%	100.00%
C020A	37.34%	39.28%	33.89%	30.65%
C021A	10.34%	11.45%	16.86%	16.08%
C130E	4.88%	6.51%	3.06%	1.63%
F004G	35.74%	34.89%	34.89%	34.64%
F015A	27.24%	25.28%	25.28%	25.28%
F015B	28.93%	32.51%	32.51%	32.51%
F015C	10.29%	9.82%	7.30%	6.03%
F015D	9.93%	4.04%	5.99%	6.25%
F015E	9.43%	9.16%	8.98%	9.95%
F016A		100.00%	100.00%	100.00%
F016B		100.00%	100.00%	100.00%
F016C	7.30%	8.62%	23.43%	18.68%
F016D	8.96%	3.61%	0.53%	0.31%
F111E	77.35%	79.63%	79.63%	79.63%
CT043A	8.23%	7.37%	7.97%	4.93%
EF111A	100.00%	100.00%	100.00%	100.00%
KC135A	15.44%	29.73%	29.73%	33.41%
KC135E	100.00%	100.00%	100.00%	100.00%
KC135Q	5.91%	16.13%	20.00%	20.90%
KC135R	5.33%	6.57%	15.62%	14.67%
KC135T	100.00%	18.38%	33.54%	34.19%
0A10A	23.60%	23.82%	20.61%	21.87%
RF004C	100.00%	100.00%	100.00%	100.00%
TOTAL	**7.59%**	**3.22%**	**2.24%**	**2.04%**

MAPE, ACTUAL VERSUS ESTIMATE FOR FY 1995

United States Air Forces in Europe

MDS	FY 95 Q1	FY 95 Q2	FY 95 Q3	TOTAL FY 95
A10A	0.09%	0.17%	0.27%	0.30%
C009A	0.08%	0.04%	0.08%	0.36%
C12C				0.00%
C020A	0.00%	0.00%	0.24%	0.22%
C021A	0.61%	0.75%	0.71%	1.55%
C130E	0.41%	0.82%	0.76%	0.95%
F004G	0.00%	0.00%	0.00%	0.00%
F015A				0.00%
F015B				0.00%
F015C	0.00%	4.04%	2.79%	2.66%
F015D	0.00%	0.00%	0.00%	0.00%
F015E	0.22%	0.43%	0.72%	1.77%
F016A				0.00%
F016B				0.00%
F016C	0.38%	5.44%	5.08%	4.81%
F016D	0.00%	0.14%	0.46%	0.35%
F111E	0.00%	0.00%	0.00%	0.00%
CT043A	0.00%	0.65%	0.49%	0.46%
EF111A				0.00%
KC135A				0.00%
KC135E				0.00%
KC135Q	0.00%	0.00%	0.00%	0.00%
KC135R	0.36%	0.36%	2.74%	2.91%
KC135T	1.20%	5.97%	0.10%	0.13%
0A10A	0.83%	1.45%	0.89%	0.71%
RF004C				0.00%
TOTAL	**0.01%**	**1.70%**	**2.04%**	**2.38%**

MAPE, ACTUAL VERSUS FACTOR FOR FY 1995
United States Air Forces in Europe

MDS	FY 95 Q1	FY 95 Q2	FY 95 Q3	TOTAL FY 95
A10A	21.55%	16.42%	18.69%	12.38%
C009A	3.02%	2.35%	1.77%	1.99%
C12C				0.00%
C020A	15.89%	16.01%	12.29%	8.89%
C021A	8.54%	5.06%	5.64%	6.77%
C130E	15.41%	13.46%	9.10%	7.01%
F004G	100.00%	100.00%	100.00%	100.00%
F015A				0.00%
F015B				0.00%
F015C	6.09%	6.71%	5.92%	3.35%
F015D	6.70%	21.60%	10.68%	4.23%
F015E	3.99%	4.05%	3.24%	0.35%
F016A				0.00%
F016B				0.00%
F016C	2.07%	3.11%	0.02%	5.92%
F016D	10.13%	1.60%	1.64%	3.08%
F111E	100.00%	100.00%	100.00%	100.00%
CT043A	5.06%	4.57%	1.71%	0.98%
EF111A				0.00%
KC135A				0.00%
KC135E				0.00%
KC135Q	100.00%	100.00%	100.00%	100.00%
KC135R	16.07%	2.45%	7.12%	4.95%
KC135T	15.28%	23.02%	28.97%	4.27%
0A10A	3.46%	1.99%	11.03%	12.53%
RF004C				0.00%
TOTAL	**4.43%**	**0.73%**	**1.84%**	**0.26%**

MAPE, ACTUAL VERSUS ESTIMATE FOR FY 1996

United States Air Forces in Europe

MDS	FY 96 Q1	FY 96 Q2
A10A	0.00%	0.00%
C009A	0.00%	0.00%
C12C	0.00%	0.00%
C020A	0.00%	0.00%
C021A	0.00%	0.00%
C130E	0.00%	0.00%
F004G	0.00%	0.00%
F015A	0.00%	0.00%
F015B	0.00%	0.00%
F015C	0.00%	0.00%
F015D	0.00%	0.00%
F015E	0.00%	0.00%
F016A	0.00%	0.00%
F016B	0.00%	0.00%
F016C	0.00%	0.00%
F016D	0.00%	0.00%
F111E	0.00%	0.00%
CT043A	0.00%	0.00%
EF111A	0.00%	0.00%
KC135A	0.00%	0.00%
KC135E	0.00%	0.00%
KC135Q	0.00%	0.00%
KC135R	0.00%	0.00%
KC135T	0.00%	0.00%
0A10A	0.00%	0.00%
RF004C	0.00%	0.00%
TOTAL	**0.00%**	**0.00%**

MAPE, ACTUAL VERSUS FACTOR FOR FY 1996

United States Air Forces in Europe

MDS	FY 96 Q1	FY 96 Q2
A10A	0.12%	3.27%
C009A	0.88%	0.15%
C12C	0.00%	0.00%
C020A	2.14%	3.44%
C021A	9.34%	9.90%
C130E	10.00%	6.42%
F004G	0.00%	0.00%
F015A	0.00%	0.00%
F015B	0.00%	0.00%
F015C	1.85%	3.25%
F015D	10.00%	11.43%
F015E	11.92%	10.54%
F016A	0.00%	0.00%
F016B	0.00%	0.00%
F016C	5.78%	1.29%
F016D	3.29%	6.45%
F111E	0.00%	0.00%
CT043A	1.62%	3.15%
EF111A	0.00%	0.00%
KC135A	0.00%	0.00%
KC135E	0.00%	0.00%
KC135Q	0.00%	0.00%
KC135R	12.38%	9.13%
KC135T	33.59%	5.36%
0A10A	1.67%	3.98%
RF004C	0.00%	0.00%
TOTAL	**7.83%**	**5.71%**

APPENDIX D: RAW DATA RECORDS

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	928,821	2,128,274	3,380,308	4,376,444
	AFE	A10A	ESTIMATED GALLONS	926,564	2,125,495	3,357,736	4,331,113
	PRICE	FACTOR	ACTUAL COST	$ 771,415	$ 1,767,898	$ 2,806,992	$ 3,632,438
FY 1994	0.8156	654	ESTIMATED COST	$ 769,507	$ 1,765,557	$ 2,788,321	$ 3,595,320
FY 1995	0.7129	645	FACTOR COST	$ 860,911	$ 2,002,926	$ 4,227,214	$ 5,182,004
FY 1996	0.7657	568	HOURS FLOWN	1,614	3,755	7,925	9,715
			CFE ACTUAL- ESTIMATED	$ 1,908	$ 2,341	$ 18,671	$ 37,118
			CFE ACTUAL-FACTOR	$ (89,496)	$ (235,028)	$ (1,420,222)	$ (1,549,566)
			MAPE ACTUAL- ESTIMATED	0.25%	0.13%	0.67%	1.02%
			MAPE ACTUAL-FACTOR	11.60%	13.29%	50.60%	42.66%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	1,308,031	2,675,950	4,092,660	5,528,630
	AFE	C009A	ESTIMATED GALLONS	1,279,762	2,621,651	4,029,697	5,444,767
	PRICE	FACTOR	ACTUAL COST	$ 1,182,350	$ 2,425,522	$ 3,704,262	$ 4,976,104
FY 1994	0.8156	982	ESTIMATED COST	$ 1,158,885	$ 2,380,427	$ 3,652,169	$ 4,906,619
FY 1995	0.7129	982	FACTOR COST	$ 1,010,760	$ 2,112,825	$ 3,288,574	$ 4,484,347
FY 1996	0.7657	984	HOURS FLOWN	1,262	2,638	4,106	5,599
			CFE ACTUAL- ESTIMATED	$ 23,465	$ 45,095	$ 52,093	$ 69,485
			CFE ACTUAL-FACTOR	$ 171,590	$ 312,697	$ 415,688	$ 491,757
			MAPE ACTUAL- ESTIMATED	1.98%	1.86%	1.41%	1.40%
			MAPE ACTUAL-FACTOR	14.51%	12.89%	11.22%	9.88%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL		242	242	242
	AFE	C12C	ESTIMATED GALLONS		242	242	242
	PRICE	FACTOR	ACTUAL COST		$ 186	$ 186	$ 186
FY 1994	0.8156	105	ESTIMATED COST		$ 186	$ 186	$ 186
FY 1995	0.7129	113	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	101	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ 186	$ 186	$ 186
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	100.00%	100.00%	100.00%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	452,516	876,466	1,255,179	1,604,422
	AFE	C020A	ESTIMATED GALLONS	404,358	781,132	1,113,965	1,424,416
	PRICE	FACTOR	ACTUAL COST	$ 429,638	$ 812,925	$ 1,146,469	$ 1,453,727
FY 1994	0.8156	598	ESTIMATED COST	389510	$ 733,741	$ 1,029,206	$ 1,302,293
FY 1995	0.7129	633	FACTOR COST	$ 269,226	$ 493,582	$ 757,931	$ 1,008,135
FY 1996	0.7657	681	HOURS FLOWN	552	1,012	1,554	2,067
			CFE ACTUAL- ESTIMATED	$ 40,128	$ 79,184	$ 117,263	$ 151,434
			CFE ACTUAL-FACTOR	$ 160,412	$ 319,343	$ 388,538	$ 445,592
			MAPE ACTUAL- ESTIMATED	9.34%	9.74%	10.23%	10.42%
			MAPE ACTUAL-FACTOR	37.34%	39.28%	33.89%	30.65%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	327,855	736,947	1,185,491	1,584,041
	AFE	C021A	ESTIMATED GALLONS	328,213	734,149	1,182,693	1,572,491
	PRICE	FACTOR	ACTUAL COST	$ 320,610	$ 721,349	$ 1,175,961	$ 1,559,875
FY 1994	0.8156	206	ESTIMATED COST	$ 320,908	$ 719,027	$ 1,173,639	$ 1,549,412
FY 1995	0.7129	206	FACTOR COST	$ 287,471	$ 638,788	$ 977,671	$ 1,308,994
FY 1996	0.7657	204	HOURS FLOWN	1,711	3,802	5,819	7,791
			CFE ACTUAL- ESTIMATED	$ (298)	$ 2,322	$ 2,322	$ 10,463
			CFE ACTUAL-FACTOR	$ 33,139	$ 82,561	$ 198,290	$ 250,881
			MAPE ACTUAL- ESTIMATED	0.09%	0.32%	0.20%	0.67%
			MAPE ACTUAL-FACTOR	10.34%	11.45%	16.86%	16.08%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	2,002,827	3,972,327	5,361,692	6,882,089
	AFE	C130E	ESTIMATED GALLONS	2,025,109	3,994,609	5,373,255	6,764,298
	PRICE	FACTOR	ACTUAL COST	$ 1,700,825	$ 3,338,981	$ 4,508,885	$ 5,780,769
FY 1994	0.8156	765	ESTIMATED COST	$ 1,719,319	$ 3,357,475	$ 4,518,661	$ 5,681,728
FY 1995	0.7129	765	FACTOR COST	$ 1,783,827	$ 3,556,424	$ 4,647,060	$ 5,874,963
FY 1996	0.7657	747	HOURS FLOWN	2,859	5,700	7,448	9,416
			CFE ACTUAL- ESTIMATED	$ (18,494)	$ (18,494)	$ (9,776)	$ 99,041
			CFE ACTUAL-FACTOR	$ (83,002)	$ (217,443)	$ (138,175)	$ (94,194)
			MAPE ACTUAL- ESTIMATED	1.09%	0.55%	0.22%	1.71%
			MAPE ACTUAL-FACTOR	4.88%	6.51%	3.06%	1.63%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	1,237,187	1,457,296	1,457,296	1,459,833
	AFE	F004G	ESTIMATED GALLONS	1,237,187	1,457,296	1,457,296	1,459,833
	PRICE	FACTOR	ACTUAL COST	$ 960,266	$ 1,138,940	$ 1,138,940	$ 1,141,046
FY 1994	0.8156	1878	ESTIMATED COST	$ 960,266	$ 1,138,940	$ 1,138,940	$ 1,141,046
FY 1995	0.7129	1621	FACTOR COST	$ 1,303,474	$ 1,536,292	$ 1,536,292	$ 1,536,292
FY 1996	0.7657	1675	HOURS FLOWN	851	1,003	1,003	1,003
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ (343,208)	$ (397,352)	$ (397,352)	$ (395,246)
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	35.74%	34.89%	34.89%	34.64%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	290,096	323,803	323,803	323,803
	AFE	F015A	ESTIMATED GALLONS	290,096	323,803	323,803	323,803
	PRICE	FACTOR	ACTUAL COST	$ 239,127	$ 266,953	$ 266,953	$ 266,953
FY 1994	0.8156	1608	ESTIMATED COST	$ 239,127	$ 266,953	$ 266,953	$ 266,953
FY 1995	0.7129	1652	FACTOR COST	$ 304,264	$ 334,429	$ 334,429	$ 334,429
FY 1996	0.7657	1554	HOURS FLOWN	232	255	255	255
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ (65,137)	$ (67,476)	$ (67,476)	$ (67,476)
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	27.24%	25.28%	25.28%	25.28%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	53,916	65,651	65,651	65,651
	AFE	F015B	ESTIMATED GALLONS	53,916	65,651	65,651	65,651
	PRICE	FACTOR	ACTUAL COST	$ 44,757	$ 54,436	$ 54,436	$ 54,436
FY 1994	0.8156	1608	ESTIMATED COST	$ 44,757	$ 54,436	$ 54,436	$ 54,436
FY 1995	0.7129	1652	FACTOR COST	$ 57,705	$ 72,132	$ 72,132	$ 72,132
FY 1996	0.7657	1554	HOURS FLOWN	44	55	55	55
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ (12,948)	$ (17,696)	$ (17,696)	$ (17,696)
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	28.93%	32.51%	32.51%	32.51%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	4,681,001	8,709,241	13,434,366	18,193,059
	AFE	F015C	ESTIMATED GALLONS	4,693,157	8,721,397	13,439,003	18,163,703
	PRICE	FACTOR	ACTUAL COST	$ 3,774,224	$ 7,012,862	$ 10,853,253	$ 14,717,020
FY 1994	0.8156	1610	ESTIMATED COST	$ 3,786,176	$ 7,024,814	$ 10,858,966	$ 14,694,723
FY 1995	0.7129	1617	FACTOR COST	$ 4,162,578	$ 7,701,425	$ 11,646,026	$ 15,605,071
FY 1996	0.7657	1554	HOURS FLOWN	3,170	5,865	8,869	11,884
			CFE ACTUAL- ESTIMATED	$ (11,952)	$ (11,952)	$ (5,713)	$ 22,297
			CFE ACTUAL-FACTOR	$ (388,354)	$ (688,563)	$ (792,773)	$ (888,051)
			MAPE ACTUAL- ESTIMATED	0.32%	0.17%	0.05%	0.15%
			MAPE ACTUAL-FACTOR	10.29%	9.82%	7.30%	6.03%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	302,270	663,855	1,010,135	1,419,784
	AFE	F015D	ESTIMATED GALLONS	302,270	663,855	999,924	1,408,454
	PRICE	FACTOR	ACTUAL COST	$ 250,744	$ 550,110	$ 836,678	$ 1,176,550
FY 1994	0.8156	1610	ESTIMATED COST	$ 250,744	$ 550,110	$ 828,202	$ 1,167,145
FY 1995	0.7129	1617	FACTOR COST	$ 225,856	$ 527,873	$ 786,556	$ 1,103,017
FY 1996	0.7657	1554	HOURS FLOWN	172	402	599	840
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ 8,476	$ 9,405
			CFE ACTUAL-FACTOR	$ 24,888	$ 22,237	$ 50,122	$ 73,533
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	1.01%	0.80%
			MAPE ACTUAL-FACTOR	9.93%	4.04%	5.99%	6.25%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	7,112,679	15,125,009	23,967,376	32,042,386
	AFE	F015E	ESTIMATED GALLONS	7,112,679	15,120,921	23,763,554	31,545,124
	PRICE	FACTOR	ACTUAL COST	$ 5,806,558	$ 12,356,930	$ 19,605,054	$ 26,226,384
FY 1994	0.8156	1961	ESTIMATED COST	$ 5,806,558	$ 12,353,455	$ 19,437,239	$ 25,815,263
FY 1995	0.7129	1916	FACTOR COST	$ 6,354,383	$ 13,489,269	$ 21,366,272	$ 28,835,431
FY 1996	0.7657	1800	HOURS FLOWN	3,973	8,434	13,359	18,029
			CFE ACTUAL- ESTIMATED	$ -	$ 3,475	$ 167,815	$ 411,121
			CFE ACTUAL-FACTOR	$ (547,825)	$ (1,132,339)	$ (1,761,218)	$ (2,609,047)
			MAPE ACTUAL- ESTIMATED	0.00%	0.03%	0.86%	1.57%
			MAPE ACTUAL-FACTOR	9.43%	9.16%	8.98%	9.95%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	0	955	955	955
	AFE	F016A	ESTIMATED GALLONS	0	955	955	955
	PRICE	FACTOR	ACTUAL COST	$ -	$ 812	$ 812	$ 812
FY 1994	0.8156	781	ESTIMATED COST	$ -	$ 812	$ 812	$ 812
FY 1995	0.7129	812	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	828	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ 812	$ 812	$ 812
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	100.00%	100.00%	100.00%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	0	574	574	574
	AFE	F016B	ESTIMATED GALLONS	0	574	574	574
	PRICE	FACTOR	ACTUAL COST	$ -	$ 488	$ 488	$ 488
FY 1994	0.8156	781	ESTIMATED COST	$ -	$ 488	$ 488	$ 488
FY 1995	0.7129	812	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	833	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ 488	$ 488	$ 488
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	100.00%	100.00%	100.00%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	5,375,044	11,165,497	17,282,897	22,812,227
	AFE	F016C	ESTIMATED GALLONS	5,370,809	11,155,368	17,204,758	22,392,402
	PRICE	FACTOR	ACTUAL COST	$ 4,379,399	$ 9,098,712	$ 14,087,918	$ 18,600,410
FY 1994	0.8156	888	ESTIMATED COST	$ 4,375,971	$ 9,090,629	$ 14,023,937	$ 18,252,896
FY 1995	0.7129	822	FACTOR COST	$ 4,698,952	$ 9,883,154	$ 17,388,585	$ 22,075,225
FY 1996	0.7657	875	HOURS FLOWN	6,488	13,646	24,009	30,480
			CFE ACTUAL- ESTIMATED	$ 3,428	$ 8,083	$ 63,981	$ 347,514
			CFE ACTUAL-FACTOR	$ (319,553)	$ (784,442)	$ (3,300,667)	$ (3,474,815)
			MAPE ACTUAL- ESTIMATED	0.08%	0.09%	0.45%	1.87%
			MAPE ACTUAL-FACTOR	7.30%	8.62%	23.43%	18.68%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	808,619	1,577,300	2,313,898	2,780,037
	AFE	F016D	ESTIMATED GALLONS	808,619	1,577,300	2,310,630	2,775,028
	PRICE	FACTOR	ACTUAL COST	$ 670,664	$ 1,307,164	$ 1,918,540	$ 2,305,896
FY 1994	0.8156	888	ESTIMATED COST	$ 670,664	$ 1,307,164	$ 1,915,827	$ 2,301,703
FY 1995	0.7129	822	FACTOR COST	$ 730,771	$ 1,354,353	$ 1,928,685	$ 2,298,778
FY 1996	0.7657	875	HOURS FLOWN	1,009	1,870	2,663	3,174
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ 2,713	$ 4,193
			CFE ACTUAL-FACTOR	$ (60,107)	$ (47,189)	$ (10,145)	$ 7,118
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.14%	0.18%
			MAPE ACTUAL-FACTOR	8.96%	3.61%	0.53%	0.31%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	672,442	663,375	663,375	663,375
	AFE	F111E	ESTIMATED GALLONS	664,314	655,247	655,247	655,247
	PRICE	FACTOR	ACTUAL COST	$ 550,814	$ 543,833	$ 543,833	$ 543,833
FY 1994	0.8156	1643	ESTIMATED COST	$ 544,555	$ 537,574	$ 537,574	$ 537,574
FY 1995	0.7129	1520	FACTOR COST	$ 976,882	$ 976,882	$ 976,882	$ 976,882
FY 1996	0.7657	0	HOURS FLOWN	729	729	729	729
			CFE ACTUAL- ESTIMATED	$ 6,259	$ 6,259	$ 6,259	$ 6,259
			CFE ACTUAL-FACTOR	$ (426,068)	$ (433,049)	$ (433,049)	$ (433,049)
			MAPE ACTUAL- ESTIMATED	1.14%	1.15%	1.15%	1.15%
			MAPE ACTUAL-FACTOR	77.35%	79.63%	79.63%	79.63%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	241,494	398,651	580,972	726,595
	AFE	CT043A	ESTIMATED GALLONS	238,641	392,619	571,168	708,107
	PRICE	FACTOR	ACTUAL COST	$ 208,114	$ 345,166	$ 499,762	$ 621,453
FY 1994	0.8156	877	ESTIMATED COST	$ 205,746	$ 340,159	$ 491,624	$ 606,108
FY 1995	0.7129	877	FACTOR COST	$ 190,980	$ 319,731	$ 459,926	$ 590,822
FY 1996	0.7657	867	HOURS FLOWN	267	447	643	826
			CFE ACTUAL- ESTIMATED	$ 2,368	$ 5,007	$ 8,138	$ 15,345
			CFE ACTUAL-FACTOR	$ 17,134	$ 25,435	$ 39,836	$ 30,631
			MAPE ACTUAL- ESTIMATED	1.14%	1.45%	1.63%	2.47%
			MAPE ACTUAL-FACTOR	8.23%	7.37%	7.97%	4.93%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	612	612	612	612
	AFE	EF111A	ESTIMATED GALLONS	612	612	612	612
	PRICE	FACTOR	ACTUAL COST	$ 508	$ 508	$ 508	$ 508
FY 1994	0.8156	1458	ESTIMATED COST	$ 508	$ 508	$ 508	$ 508
FY 1995	0.7129	1550	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	1576	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 508	$ 508	$ 508	$ 508
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	100.00%	100.00%	100.00%	100.00%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	23,100	27,908	27,908	29,482
	AFE	KC135A	ESTIMATED GALLONS	23,100	27,908	27,908	29,482
	PRICE	FACTOR	ACTUAL COST	$ 19,626	$ 23,617	$ 23,617	$ 24,923
FY 1994	0.8156	2261	ESTIMATED COST	$ 19,626	$ 23,617	$ 23,617	$ 24,923
FY 1995	0.7129	2261	FACTOR COST	$ 16,597	$ 16,597	$ 16,597	$ 16,597
FY 1996	0.7657	2261	HOURS FLOWN	9	9	9	9
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 3,029	$ 7,020	$ 7,020	$ 8,326
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	15.44%	29.73%	29.73%	33.41%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	218,146	290,396	323,817	377,458
	AFE	KC135E	ESTIMATED GALLONS	218,146	290,396	323,817	394,239
	PRICE	FACTOR	ACTUAL COST	$ 185,764	$ 245,243	$ 272,982	$ 318,020
FY 1994	0.8156	1878	ESTIMATED COST	$ 185,764	$ 245,243	$ 272,982	$ 331,751
FY 1995	0.7129	1952	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	1883	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ (13,731)
			CFE ACTUAL-FACTOR	$ 185,764	$ 245,243	$ 272,982	$ 318,020
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	4.32%
			MAPE ACTUAL-FACTOR	100.00%	100.00%	100.00%	100.00%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	203,649	801,824	959,591	1,071,678
	AFE	KC135Q	ESTIMATED GALLONS	203,649	801,824	959,591	1,071,678
	PRICE	FACTOR	ACTUAL COST	$ 169,034	$ 665,506	$ 796,449	$ 889,828
FY 1994	0.8156	2152	ESTIMATED COST	$ 169,034	$ 665,506	$ 796,449	$ 889,828
FY 1995	0.7129	2152	FACTOR COST	$ 179,027	$ 558,144	$ 637,127	$ 703,824
FY 1996	0.7657	2674	HOURS FLOWN	102	318	363	401
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ (9,993)	$ 107,362	$ 159,322	$ 186,004
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	5.91%	16.13%	20.00%	20.90%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	6,212,616	16,629,634	29,188,723	37,032,420
	AFE	KC135R	ESTIMATED GALLONS	6,302,596	16,250,973	29,865,845	37,776,374
	PRICE	FACTOR	ACTUAL COST	$ 6,436,639	$ 16,890,994	$ 29,108,049	$ 35,474,679
FY 1994	0.8156	1735	ESTIMATED COST	$ 6,505,355	$ 16,536,372	$ 29,618,402	$ 36,029,507
FY 1995	0.7129	1875	FACTOR COST	$ 6,779,581	$ 15,780,816	$ 24,562,716	$ 30,269,677
FY 1996	0.7657	1816	HOURS FLOWN	4,791	11,152	17,358	21,391
			CFE ACTUAL- ESTIMATED	$ (68,716)	$ 354,622	$ (510,353)	$ (554,828)
			CFE ACTUAL-FACTOR	$ (342,942)	$ 1,110,178	$ 4,545,333	$ 5,205,002
			MAPE ACTUAL- ESTIMATED	1.07%	2.10%	1.75%	1.56%
			MAPE ACTUAL-FACTOR	5.33%	6.57%	15.62%	14.67%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	11,391	193,419	1,080,972	1,095,056
	AFE	KC135T	ESTIMATED GALLONS	11,391	193,419	1,118,210	1,132,294
	PRICE	FACTOR	ACTUAL COST	$ 9,455	$ 159,498	$ 1,194,505	$ 1,206,195
FY 1994	0.8156	1735	ESTIMATED COST	$ 9,455	$ 159,498	$ 1,224,693	$ 1,236,383
FY 1995	0.7129	1875	FACTOR COST	$ -	$ 130,186	$ 793,852	$ 793,852
FY 1996	0.7657	1955	HOURS FLOWN	0	92	561	561
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ (30,188)	$ (30,188)
			CFE ACTUAL-FACTOR	$ 9,455	$ 29,312	$ 400,653	$ 412,343
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	2.53%	2.50%
			MAPE ACTUAL-FACTOR	100.00%	18.38%	33.54%	34.19%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	415,284	1,000,256	1,740,321	2,256,134
	AFE	0A010A	ESTIMATED GALLONS	415,284	999,808	1,727,398	2,231,145
	PRICE	FACTOR	ACTUAL COST	$ 344,825	$ 830,584	$ 1,444,817	$ 1,871,895
FY 1994	0.8156	654	ESTIMATED COST	$ 344,825	$ 830,212	$ 1,434,124	$ 1,851,603
FY 1995	0.7129	557	FACTOR COST	$ 426,189	$ 1,028,400	$ 1,742,626	$ 2,281,362
FY 1996	0.7657	541	HOURS FLOWN	799	1,928	3,267	4,277
			CFE ACTUAL- ESTIMATED	$ -	$ 372	$ 10,693	$ 20,292
			CFE ACTUAL-FACTOR	$ (81,364)	$ (197,816)	$ (297,809)	$ (409,467)
			MAPE ACTUAL- ESTIMATED	0.00%	0.04%	0.74%	1.08%
			MAPE ACTUAL-FACTOR	23.60%	23.82%	20.61%	21.87%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	5,209	5,702	5,702	5,702
	AFE	RF004C	ESTIMATED GALLONS	5,209	5,702	5,702	5,702
	PRICE	FACTOR	ACTUAL COST	$ 4,323	$ 4,732	$ 4,732	$ 4,732
FY 1994	0.8156	1649	ESTIMATED COST	$ 4,323	$ 4,732	$ 4,732	$ 4,732
FY 1995	0.7129	1627	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	1634	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 4,323	$ 4,732	$ 4,732	$ 4,732
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	100.00%	100.00%	100.00%	100.00%

				FY 94 Q1	FY 94 Q2	FY 94 Q3	FY 94 TOTAL
	FY CMD	MDS	ACTUAL GAL	32,884,805	69,491,164	109,704,516	142,332,689
	AFE	TOTAL	ESTIMATED GALLONS	32,915,681	68,962,906	109,879,234	141,677,734
	PRICE	FACTOR	ACTUAL COST	$ 28,459,679	$ 60,563,949	$ 95,995,081	$ 122,849,160
FY 1994	0.8156		ESTIMATED COST	$ 28,481,583	$ 60,087,635	$ 96,092,687	$ 122,243,940
FY 1995	0.7129		FACTOR COST	$ 30,619,436	$ 62,514,225	$ 98,147,153	$ 125,351,834
FY 1996	0.7657		HOURS FLOWN				
			CFE ACTUAL- ESTIMATED	$ (21,904)	$ 476,314	$ (97,606)	$ 605,220
			CFE ACTUAL-FACTOR	$ (2,159,757)	$ (1,950,276)	$ (2,152,072)	$ (2,502,674)
			MAPE ACTUAL- ESTIMATED	0.08%	0.79%	0.10%	0.49%
			MAPE ACTUAL-FACTOR	7.59%	3.22%	2.24%	2.04%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	1,012,324	1,939,750	2,749,610	3,842,652
	AFE	A10A	ESTIMATED GALLONS	1,011,428	1,936,365	2,742,106	3,831,237
	PRICE	FACTOR	ACTUAL COST	$ 718,773	$ 1,377,257	$ 1,951,407	$ 2,727,936
FY 1994	0.8156	654	ESTIMATED COST	$ 718,137	$ 1,374,854	$ 1,946,079	$ 2,719,831
FY 1995	0.7129	645	FACTOR COST	$ 873,659	$ 1,603,394	$ 2,316,116	$ 3,065,623
FY 1996	0.7657	568	HOURS FLOWN	1,900	3,487	5,037	6,667
			CFE ACTUAL- ESTIMATED	$ 636	$ 2,403	$ 5,328	$ 8,105
			CFE ACTUAL-FACTOR	$ (154,886)	$ (226,137)	$ (364,709)	$ (337,687)
			MAPE ACTUAL- ESTIMATED	0.09%	0.17%	0.27%	0.30%
			MAPE ACTUAL-FACTOR	21.55%	16.42%	18.69%	12.38%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	1,363,062	2,790,470	4,037,133	5,551,367
	AFE	C009A	ESTIMATED GALLONS	1,362,169	2,789,577	4,034,496	5,533,347
	PRICE	FACTOR	ACTUAL COST	$ 1,032,301	$ 2,109,070	$ 3,044,668	$ 4,157,032
FY 1994	0.8156	982	ESTIMATED COST	$ 1,031,471	$ 2,108,240	$ 3,042,216	$ 4,141,935
FY 1995	0.7129	982	FACTOR COST	$ 1,001,097	$ 2,059,599	$ 3,098,500	$ 4,206,707
FY 1996	0.7657	984	HOURS FLOWN	1,430	2,942	4,426	6,009
			CFE ACTUAL- ESTIMATED	$ 830	$ 830	$ 2,452	$ 15,097
			CFE ACTUAL-FACTOR	$ 31,204	$ 49,471	$ (53,832)	$ (49,675)
			MAPE ACTUAL- ESTIMATED	0.08%	0.04%	0.08%	0.36%
			MAPE ACTUAL-FACTOR	3.02%	2.35%	1.77%	1.19%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL		0	0	0
	AFE	C12C	ESTIMATED GALLONS		0	0	0
	PRICE	FACTOR	ACTUAL COST		$ -	$ -	$ -
FY 1994	0.8156	105	ESTIMATED COST		$ -	$ -	$ -
FY 1995	0.7129	113	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	101	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%	0.00%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	245,673	542,412	805,132	1,147,558
	AFE	C020A	ESTIMATED GALLONS	245,673	542,412	803,099	1,144,865
	PRICE	FACTOR	ACTUAL COST	$ 187,253	$ 413,160	$ 611,769	$ 873,177
FY 1994	0.8156	598	ESTIMATED COST	$ 187,253	$ 413,160	$ 610,326	$ 871,265
FY 1995	0.7129	633	FACTOR COST	$ 157,492	$ 347,023	$ 536,555	$ 795,581
FY 1996	0.7657	681	HOURS FLOWN	349	769	1,189	1,763
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ 1,443	$ 1,912
			CFE ACTUAL-FACTOR	$ 29,761	$ 66,137	$ 75,214	$ 77,596
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.24%	0.22%
			MAPE ACTUAL-FACTOR	15.89%	16.01%	12.29%	8.89%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	338,999	658,813	1,000,608	1,432,719
	AFE	C021A	ESTIMATED GALLONS	336,625	653,267	992,913	1,410,803
	PRICE	FACTOR	ACTUAL COST	$ 274,745	$ 531,633	$ 808,500	$ 1,154,177
FY 1994	0.8156	206	ESTIMATED COST	$ 273,059	$ 527,659	$ 802,723	$ 1,136,233
FY 1995	0.7129	206	FACTOR COST	$ 251,273	$ 504,749	$ 762,924	$ 1,076,024
FY 1996	0.7657	204	HOURS FLOWN	1,711	3,437	5,195	7,327
			CFE ACTUAL- ESTIMATED	$ 1,686	$ 3,974	$ 5,777	$ 17,944
			CFE ACTUAL-FACTOR	$ 23,472	$ 26,884	$ 45,576	$ 78,153
			MAPE ACTUAL- ESTIMATED	0.61%	0.75%	0.71%	1.55%
			MAPE ACTUAL-FACTOR	8.54%	5.06%	5.64%	6.77%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	2,323,059	4,347,975	5,948,992	8,032,395
	AFE	C130E	ESTIMATED GALLONS	2,314,323	4,316,730	5,908,199	7,964,668
	PRICE	FACTOR	ACTUAL COST	$ 1,780,773	$ 3,364,563	$ 4,549,491	$ 6,085,222
FY 1994	0.8156	765	ESTIMATED COST	$ 1,773,538	$ 3,337,036	$ 4,514,791	$ 6,027,542
FY 1995	0.7129	765	FACTOR COST	$ 1,506,308	$ 2,911,722	$ 4,135,529	$ 5,658,744
FY 1996	0.7657	747	HOURS FLOWN	2,762	5,339	7,583	10,376
			CFE ACTUAL- ESTIMATED	$ 7,235	$ 27,527	$ 34,700	$ 57,680
			CFE ACTUAL-FACTOR	$ 274,465	$ 452,841	$ 413,962	$ 426,478
			MAPE ACTUAL- ESTIMATED	0.41%	0.82%	0.76%	0.95%
			MAPE ACTUAL-FACTOR	15.41%	13.46%	9.10%	7.01%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	5,358	5,358	5,358	5,358
	AFE	F004G	ESTIMATED GALLONS	5,358	5,358	5,358	5,358
	PRICE	FACTOR	ACTUAL COST	$ 3,804	$ 3,804	$ 3,804	$ 3,804
FY 1994	0.8156	1878	ESTIMATED COST	$ 3,804	$ 3,804	$ 3,804	$ 3,804
FY 1995	0.7129	1621	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	1675	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 3,804	$ 3,804	$ 3,804	$ 3,804
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	100.00%	100.00%	100.00%	100.00%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL		0	0	0
	AFE	F015A	ESTIMATED GALLONS		0	0	0
	PRICE	FACTOR	ACTUAL COST		$ -	$ -	$ -
FY 1994	0.8156	1608	ESTIMATED COST		$ -	$ -	$ -
FY 1995	0.7129	1652	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	1554	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%	0.00%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL		0	0	0
	AFE	F015B	ESTIMATED GALLONS		0	0	0
	PRICE	FACTOR	ACTUAL COST		$ -	$ -	$ -
FY 1994	0.8156	1608	ESTIMATED COST		$ -	$ -	$ -
FY 1995	0.7129	1652	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	1554	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%	0.00%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	4,059,565	8,690,093	12,695,378	17,911,415
	AFE	F015C	ESTIMATED GALLONS	4,059,565	8,339,308	12,340,601	17,435,115
	PRICE	FACTOR	ACTUAL COST	$ 2,882,693	$ 6,170,409	$ 9,014,538	$ 12,719,320
FY 1994	0.8156	1610	ESTIMATED COST	$ 2,882,693	$ 5,921,349	$ 8,762,643	$ 12,381,144
FY 1995	0.7129	1617	FACTOR COST	$ 3,058,270	$ 6,584,561	$ 9,548,305	$ 13,144,914
FY 1996	0.7657	1554	HOURS FLOWN	2,653	5,712	8,283	11,403
			CFE ACTUAL- ESTIMATED	$ -	$ 249,060	$ 251,895	$ 338,176
			CFE ACTUAL-FACTOR	$ (175,577)	$ (414,152)	$ (533,767)	$ (425,594)
			MAPE ACTUAL- ESTIMATED	0.00%	4.04%	2.79%	2.66%
			MAPE ACTUAL-FACTOR	6.09%	6.71%	5.92%	3.35%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	314,977	495,292	818,510	1,132,357
	AFE	F015D	ESTIMATED GALLONS	314,977	495,292	818,510	1,132,357
	PRICE	FACTOR	ACTUAL COST	$ 223,634	$ 351,713	$ 581,192	$ 804,030
FY 1994	0.8156	1610	ESTIMATED COST	$ 223,634	$ 351,713	$ 581,192	$ 804,030
FY 1995	0.7129	1617	FACTOR COST	$ 238,621	$ 427,674	$ 643,240	$ 838,056
FY 1996	0.7657	1554	HOURS FLOWN	207	371	558	727
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ (14,987)	$ (75,961)	$ (62,048)	$ (34,026)
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	6.70%	21.60%	10.68%	4.23%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	8,310,205	16,660,544	24,225,208	32,867,869
	AFE	F015E	ESTIMATED GALLONS	8,292,085	16,589,273	24,050,006	32,286,912
	PRICE	FACTOR	ACTUAL COST	$ 5,901,756	$ 11,830,982	$ 17,203,301	$ 23,355,776
FY 1994	0.8156	1961	ESTIMATED COST	$ 5,888,890	$ 11,780,382	$ 17,078,910	$ 22,942,668
FY 1995	0.7129	1916	FACTOR COST	$ 6,137,062	$ 12,309,639	$ 17,761,011	$ 23,437,760
FY 1996	0.7657	1800	HOURS FLOWN	4,493	9,012	13,003	17,159
			CFE ACTUAL- ESTIMATED	$ 12,866	$ 50,600	$ 124,391	$ 413,108
			CFE ACTUAL-FACTOR	$ (235,306)	$ (478,657)	$ (557,710)	$ (81,984)
			MAPE ACTUAL- ESTIMATED	0.22%	0.43%	0.72%	1.77%
			MAPE ACTUAL-FACTOR	3.99%	4.05%	3.24%	0.35%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL		0	0	0
	AFE	F016A	ESTIMATED GALLONS		0	0	0
	PRICE	FACTOR	ACTUAL COST		$ -	$ -	$ -
FY 1994	0.8156	781	ESTIMATED COST		$ -	$ -	$ -
FY 1995	0.7129	812	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	828	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%	0.00%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL		0	0	0
	AFE	F016B	ESTIMATED GALLONS		0	0	0
	PRICE	FACTOR	ACTUAL COST	$ -	$ -	$ -	$ -
FY 1994	0.8156	781	ESTIMATED COST		$ -	$ -	$ -
FY 1995	0.7129	812	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	833	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%	0.00%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	4,444,149	9,597,873	14,839,197	22,339,316
	AFE	F016C	ESTIMATED GALLONS	4,427,418	9,076,118	14,085,931	21,263,445
	PRICE	FACTOR	ACTUAL COST	$ 3,155,401	$ 6,815,115	$ 10,536,149	$ 15,871,992
FY 1994	0.8156	888	ESTIMATED COST	$ 3,143,520	$ 6,444,667	$ 10,001,327	$ 15,108,117
FY 1995	0.7129	822	FACTOR COST	$ 3,220,677	$ 6,603,091	$ 10,534,004	$ 14,932,549
FY 1996	0.7657	875	HOURS FLOWN	5,496	11,268	17,976	25,482
			CFE ACTUAL- ESTIMATED	$ 11,881	$ 370,448	$ 534,822	$ 763,875
			CFE ACTUAL-FACTOR	$ (65,276)	$ 212,024	$ 2,145	$ 939,443
			MAPE ACTUAL- ESTIMATED	0.38%	5.44%	5.08%	4.81%
			MAPE ACTUAL-FACTOR	2.07%	3.11%	0.02%	5.92%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	671,309	1,352,695	2,134,064	2,788,128
	AFE	F016D	ESTIMATED GALLONS	671,309	1,350,769	2,124,243	2,781,053
	PRICE	FACTOR	ACTUAL COST	$ 476,636	$ 961,829	$ 1,516,901	$ 1,981,290
FY 1994	0.8156	888	ESTIMATED COST	$ 476,636	$ 960,462	$ 1,509,929	$ 1,974,318
FY 1995	0.7129	822	FACTOR COST	$ 428,369	$ 946,396	$ 1,491,966	$ 1,920,334
FY 1996	0.7657	875	HOURS FLOWN	731	1,615	2,546	3,277
			CFE ACTUAL- ESTIMATED	$ -	$ 1,367	$ 6,972	$ 6,972
			CFE ACTUAL-FACTOR	$ 48,267	$ 15,433	$ 24,935	$ 60,956
			MAPE ACTUAL- ESTIMATED	0.00%	0.14%	0.46%	0.35%
			MAPE ACTUAL-FACTOR	10.13%	1.60%	1.64%	3.08%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	1,563	1,810	1,810	1,810
	AFE	F111E	ESTIMATED GALLONS	1,563	1,810	1,810	1,810
	PRICE	FACTOR	ACTUAL COST	$ 1,110	$ 1,285	$ 1,285	$ 1,285
FY 1994	0.8156	1643	ESTIMATED COST	$ 1,110	$ 1,285	$ 1,285	$ 1,285
FY 1995	0.7129	1520	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	0	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 1,110	$ 1,285	$ 1,285	$ 1,285
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	100.00%	100.00%	100.00%	100.00%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	150,759	352,183	468,827	499,151
	AFE	CT043A	ESTIMATED GALLONS	150,759	349,742	466,386	496,710
	PRICE	FACTOR	ACTUAL COST	$ 117,223	$ 265,351	$ 353,451	$ 378,932
FY 1994	0.8156	877	ESTIMATED COST	$ 117,223	$ 263,618	$ 351,718	$ 377,199
FY 1995	0.7129	877	FACTOR COST	$ 111,288	$ 253,211	$ 359,498	$ 382,631
FY 1996	0.7657	867	HOURS FLOWN	178	405	575	612
			CFE ACTUAL- ESTIMATED	$ -	$ 1,733	$ 1,733	$ 1,733
			CFE ACTUAL-FACTOR	$ 5,935	$ 12,140	$ (6,047)	$ (3,699)
			MAPE ACTUAL- ESTIMATED	0.00%	0.65%	0.49%	0.46%
			MAPE ACTUAL-FACTOR	5.06%	4.57%	1.71%	0.98%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL		0	0	0
	AFE	EF111A	ESTIMATED GALLONS		0	0	0
	PRICE	FACTOR	ACTUAL COST		$ -	$ -	$ -
FY 1994	0.8156	1458	ESTIMATED COST		$ -	$ -	$ -
FY 1995	0.7129	1550	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	1576	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%	0.00%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL		0	0	0
	AFE	KC135A	ESTIMATED GALLONS		0	0	0
	PRICE	FACTOR	ACTUAL COST		$ -	$ -	$ -
FY 1994	0.8156	2261	ESTIMATED COST		$ -	$ -	$ -
FY 1995	0.7129	2261	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	2261	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%	0.00%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL		0	0	0
	AFE	KC135E	ESTIMATED GALLONS		0	0	0
	PRICE	FACTOR	ACTUAL COST		$ -	$ -	$ -
FY 1994	0.8156	1878	ESTIMATED COST		$ -	$ -	$ -
FY 1995	0.7129	1952	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	1883	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%	0.00%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	-7,448	-7,448	-7,448	-7,448
	AFE	KC135Q	ESTIMATED GALLONS	-7,448	-7,448	-7,448	-7,448
	PRICE	FACTOR	ACTUAL COST	$ (5,289)	$ (5,289)	$ (5,289)	$ (5,289)
FY 1994	0.8156	2152	ESTIMATED COST	$ (5,289)	$ (5,289)	$ (5,289)	$ (5,289)
FY 1995	0.7129	2152	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	2674	HOURS FLOWN	0	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ (5,289)	$ (5,289)	$ (5,289)	$ (5,289)
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	-100.00%	-100.00%	-100.00%	-100.00%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	10,861,107	18,874,686	24,505,531	30,665,849
	AFE	KC135R	ESTIMATED GALLONS	10,901,883	18,829,793	23,814,959	29,722,342
	PRICE	FACTOR	ACTUAL COST	$ 8,052,021	$ 14,508,749	$ 18,651,067	$ 23,861,625
FY 1994	0.8156	1735	ESTIMATED COST	$ 8,080,976	$ 14,457,015	$ 18,140,420	$ 23,168,388
FY 1995	0.7129	1875	FACTOR COST	$ 6,758,292	$ 14,152,847	$ 17,323,470	$ 25,042,840
FY 1996	0.7657	1816	HOURS FLOWN	5,056	10,588	12,960	18,735
			CFE ACTUAL- ESTIMATED	$ (28,955)	$ 51,734	$ 510,647	$ 693,237
			CFE ACTUAL-FACTOR	$ 1,293,729	$ 355,902	$ 1,327,597	$ (1,181,215)
			MAPE ACTUAL- ESTIMATED	0.36%	0.36%	2.74%	2.91%
			MAPE ACTUAL-FACTOR	16.07%	2.45%	7.12%	4.95%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	851,096	2,321,396	4,409,669	3,259,473
	AFE	KC135T	ESTIMATED GALLONS	861,290	2,227,046	4,461,368	3,311,172
	PRICE	FACTOR	ACTUAL COST	$ 604,292	$ 1,684,386	$ 3,167,220	$ 2,350,039
FY 1994	0.8156	1735	ESTIMATED COST	$ 611,530	$ 1,583,854	$ 3,170,231	$ 2,353,050
FY 1995	0.7129	1875	FACTOR COST	$ 511,951	$ 1,296,587	$ 2,249,645	$ 2,249,645
FY 1996	0.7657	1955	HOURS FLOWN	383	970	1,683	1,683
			CFE ACTUAL- ESTIMATED	$ (7,238)	$ 100,532	$ (3,011)	$ (3,011)
			CFE ACTUAL-FACTOR	$ 92,341	$ 387,799	$ 917,575	$ 100,394
			MAPE ACTUAL- ESTIMATED	1.20%	5.97%	0.10%	0.13%
			MAPE ACTUAL-FACTOR	15.28%	23.02%	28.97%	4.27%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	471,925	811,525	1,417,214	2,013,253
	AFE	0A010A	ESTIMATED GALLONS	468,031	799,759	1,404,627	1,998,891
	PRICE	FACTOR	ACTUAL COST	$ 335,078	$ 576,195	$ 1,006,009	$ 1,429,492
FY 1994	0.8156	654	ESTIMATED COST	$ 332,311	$ 567,840	$ 997,071	$ 1,419,293
FY 1995	0.7129	557	FACTOR COST	$ 346,655	$ 587,686	$ 895,030	$ 1,250,422
FY 1996	0.7657	541	HOURS FLOWN	873	1,480	2,254	3,149
			CFE ACTUAL- ESTIMATED	$ 2,767	$ 8,355	$ 8,938	$ 10,199
			CFE ACTUAL-FACTOR	$ (11,577)	$ (11,491)	$ 110,979	$ 179,070
			MAPE ACTUAL- ESTIMATED	0.83%	1.45%	0.89%	0.71%
			MAPE ACTUAL-FACTOR	3.46%	1.99%	11.03%	12.53%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL		0	0	0
	AFE	RF004C	ESTIMATED GALLONS		0	0	0
	PRICE	FACTOR	ACTUAL COST		$ -	$ -	$ -
FY 1994	0.8156	1649	ESTIMATED COST		$ -	$ -	$ -
FY 1995	0.7129	1627	FACTOR COST	$ -	$ -	$ -	$ -
FY 1996	0.7657	1634	HOURS FLOWN		0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%	0.00%

				FY 95 Q1	FY 95 Q2	FY 95 Q3	FY 95 TOTAL
	FY CMD	MDS	ACTUAL GAL	35,417,682	69,435,427	100,054,793	133,483,222
	AFE	TOTAL	ESTIMATED GALLONS	35,417,008	68,295,171	98,047,164	130,312,637
	PRICE	FACTOR	ACTUAL COST	$ 25,742,204	$ 50,960,212	$ 72,995,463	$ 97,749,840
FY 1994	0.8156		ESTIMATED COST	$ 25,740,496	$ 50,091,649	$ 71,509,376	$ 95,424,813
FY 1995	0.7129		FACTOR COST	$ 24,601,015	$ 50,588,180	$ 71,655,793	$ 98,001,830
FY 1996	0.7657		HOURS FLOWN		0	0	
			CFE ACTUAL- ESTIMATED	$ 1,708	$ 868,563	$ 1,486,087	$ 2,325,027
			CFE ACTUAL-FACTOR	$ 1,141,189	$ 372,032	$ 1,339,670	$ (251,990)
			MAPE ACTUAL- ESTIMATED	0.01%	1.70%	2.04%	2.38%
			MAPE ACTUAL-FACTOR	4.43%	0.73%	1.84%	0.26%

	FY CMD	MDS		FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	AFE	A10A	ESTIMATED GALLONS	713,300	718,945	1,432,245
	PRICE	FACTOR	ACTUAL COST	$ 542,115	$ 546,418	$ 1,088,533
FY 1994	0.8156	654	ESTIMATED COST	$ 542,115	$ 546,418	$ 1,088,533
FY 1995	0.7129	645	FACTOR COST	$ 542,777	$ 510,158	$ 1,052,936
FY 1996	0.7657	568	HOURS FLOWN	1,248	1,173	2,421
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ (662)	$ 36,260	$ 35,597
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.12%	6.64%	3.27%

	FY CMD	MDS		FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	AFE	C009A	ESTIMATED GALLONS	1,380,056	1,409,755	2,789,811
	PRICE	FACTOR	ACTUAL COST	$ 1,105,409	$ 1,135,745	$ 2,241,154
FY 1994	0.8156	982	ESTIMATED COST	$ 1,105,409	$ 1,135,745	$ 2,241,154
FY 1995	0.7129	982	FACTOR COST	$ 1,115,104	$ 1,122,639	$ 2,237,743
FY 1996	0.7657	984	HOURS FLOWN	1,480	1,490	2,970
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ (9,695)	$ 13,106	$ 3,411
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.88%	1.15%	0.15%

	FY CMD	MDS		FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	AFE	C12C	ESTIMATED GALLONS			0
	PRICE	FACTOR	ACTUAL COST			0
FY 1994	0.8156	105	ESTIMATED COST			$ -
FY 1995	0.7129	113	FACTOR COST	$ 10,827	$ -	$ -
FY 1996	0.7657	101	HOURS FLOWN	140	0	$ 10,827
			CFE ACTUAL- ESTIMATED	$ -	$ -	140
			CFE ACTUAL-FACTOR	$ (10,827)	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	$ (10,827)
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%
						0.00%

	FY CMD	MDS		FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	AFE	C020A	ESTIMATED GALLONS	209,637	288,185	497,822
	PRICE	FACTOR	ACTUAL COST	$ 172,637	$ 239,389	$ 412,026
FY 1994	0.8156	598	ESTIMATED COST	$ 172,637	$ 239,389	$ 412,026
FY 1995	0.7129	633	FACTOR COST	$ 168,947	$ 228,913	$ 397,860
FY 1996	0.7657	681	HOURS FLOWN	324	439	763
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 3,690	$ 10,476	$ 14,166
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	2.14%	4.38%	3.44%

	FY CMD	MDS		FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	AFE	C021A	ESTIMATED GALLONS	354,977	359,343	714,320
	PRICE	FACTOR	ACTUAL COST	$ 303,912	$ 307,403	$ 611,315
FY 1994	0.8156	206	ESTIMATED COST	$ 303,912	$ 307,403	$ 611,315
FY 1995	0.7129	206	FACTOR COST	$ 275,542	$ 275,229	$ 550,771
FY 1996	0.7657	204	HOURS FLOWN	1,764	1,762	3,526
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 28,370	$ 32,174	$ 60,544
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	9.34%	10.47%	9.90%

	FY CMD	MDS		FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	AFE	C130E	ESTIMATED GALLONS	2,059,922	2,377,679	4,437,601
	PRICE	FACTOR	ACTUAL COST	$ 1,678,384	$ 1,839,347	$ 3,517,731
FY 1994	0.8156	765	ESTIMATED COST	$ 1,678,384	$ 1,839,347	$ 3,517,731
FY 1995	0.7129	765	FACTOR COST	$ 1,510,594	$ 1,781,139	$ 3,291,733
FY 1996	0.7657	747	HOURS FLOWN	2,641	3,114	5,755
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 167,790	$ 58,208	$ 225,998
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	10.00%	3.16%	6.42%

	FY CMD	MDS		FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	AFE	F004G	ESTIMATED GALLONS			0
	PRICE	FACTOR	ACTUAL COST			$ -
FY 1994	0.8156	1878	ESTIMATED COST			$ -
FY 1995	0.7129	1621	FACTOR COST	$ -	$ -	$ -
FY 1996	0.7657	1675	HOURS FLOWN	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%

	FY CMD	MDS		FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	AFE	F015A	ESTIMATED GALLONS			0
	PRICE	FACTOR	ACTUAL COST			$ -
FY 1994	0.8156	1608	ESTIMATED COST			$ -
FY 1995	0.7129	1652	FACTOR COST	$ -	$ -	$ -
FY 1996	0.7657	1554	HOURS FLOWN	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%

	FY CMD	MDS		FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	AFE	F015B	ESTIMATED GALLONS			0
	PRICE	FACTOR	ACTUAL COST			$ -
FY 1994	0.8156	1608	ESTIMATED COST			$ -
FY 1995	0.7129	1652	FACTOR COST	$ -	$ -	$ -
FY 1996	0.7657	1554	HOURS FLOWN	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%

	FY CMD	MDS		FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	AFE	F015C	ESTIMATED GALLONS	4,162,577	4,306,557	8,469,134
	PRICE	FACTOR	ACTUAL COST	$ 3,164,122	$ 3,270,331	$ 6,434,453
FY 1994	0.8156	1610	ESTIMATED COST	$ 3,164,122	$ 3,270,331	$ 6,434,453
FY 1995	0.7129	1617	FACTOR COST	$ 3,105,633	$ 3,119,912	$ 6,225,545
FY 1996	0.7657	1554	HOURS FLOWN	2,610	2,622	5,232
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 58,489	$ 150,419	$ 208,908
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	1.85%	4.60%	3.25%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL	300,973	61,425	362,398
	AFE	F015D	ESTIMATED GALLONS	300,973	61,425	362,398
	PRICE	FACTOR	ACTUAL COST	$ 228,735	$ 46,683	$ 275,418
FY 1994	0.8156	1610	ESTIMATED COST	$ 228,735	$ 46,683	$ 275,418
FY 1995	0.7129	1617	FACTOR COST	$ 205,852	$ 38,077	$ 243,929
FY 1996	0.7657	1554	HOURS FLOWN	173	32	205
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 22,883	$ 8,606	$ 31,489
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	10.00%	18.44%	11.43%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL	7,131,601	7,037,826	14,169,427
	AFE	F015E	ESTIMATED GALLONS	7,131,601	7,037,826	14,169,427
	PRICE	FACTOR	ACTUAL COST	$ 5,420,114	$ 5,347,923	$ 10,768,037
FY 1994	0.8156	1961	ESTIMATED COST	$ 5,420,114	$ 5,347,923	$ 10,768,037
FY 1995	0.7129	1916	FACTOR COST	$ 4,774,293	$ 4,858,367	$ 9,632,659
FY 1996	0.7657	1800	HOURS FLOWN	3,464	3,525	6,989
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 645,821	$ 489,557	$ 1,135,378
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	11.92%	9.15%	10.54%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL			0
	AFE	F016A	ESTIMATED GALLONS			0
	PRICE	FACTOR	ACTUAL COST			$ -
FY 1994	0.8156	781	ESTIMATED COST			$ -
FY 1995	0.7129	812	FACTOR COST	$ -	$ -	$ -
FY 1996	0.7657	828	HOURS FLOWN	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL			0
	AFE	F016B	ESTIMATED GALLONS			0
	PRICE	FACTOR	ACTUAL COST			$ -
FY 1994	0.8156	781	ESTIMATED COST			$ -
FY 1995	0.7129	812	FACTOR COST	$ -	$ -	$ -
FY 1996	0.7657	833	HOURS FLOWN	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL	4,794,660	5,630,134	10,424,794
	AFE	F016C	ESTIMATED GALLONS	4,794,660	5,630,134	10,424,794
	PRICE	FACTOR	ACTUAL COST	$ 3,643,985	$ 4,278,997	$ 7,922,982
FY 1994	0.8156	888	ESTIMATED COST	$ 3,643,985	$ 4,278,997	$ 7,922,982
FY 1995	0.7129	822	FACTOR COST	$ 3,854,438	$ 4,170,672	$ 8,025,110
FY 1996	0.7657	875	HOURS FLOWN	5,753	6,225	11,978
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ (210,453)	$ 108,325	$ (102,128)
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	5.78%	2.53%	1.29%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL	513,778	834,741	1,348,519
	AFE	F016D	ESTIMATED GALLONS	513,778	834,741	1,348,519
	PRICE	FACTOR	ACTUAL COST	$ 390,472	$ 634,395	$ 1,024,867
FY 1994	0.8156	888	ESTIMATED COST	$ 390,472	$ 634,395	$ 1,024,867
FY 1995	0.7129	822	FACTOR COST	$ 403,332	$ 555,420	$ 958,752
FY 1996	0.7657	875	HOURS FLOWN	602	829	1,431
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ (12,860)	$ 78,975	$ 66,115
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	3.29%	12.45%	6.45%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL			0
	AFE	F111E	ESTIMATED GALLONS			0
	PRICE	FACTOR	ACTUAL COST			$ -
FY 1994	0.8156	1643	ESTIMATED COST			$ -
FY 1995	0.7129	1520	FACTOR COST	$ -	$ -	$ -
FY 1996	0.7657	0	HOURS FLOWN	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL	137,998	159,014	297,012
	AFE	CT043A	ESTIMATED GALLONS	137,998	159,014	297,012
	PRICE	FACTOR	ACTUAL COST	$ 107,962	$ 136,072	$ 244,034
FY 1994	0.8156	877	ESTIMATED COST	$ 107,962	$ 136,072	$ 244,034
FY 1995	0.7129	877	FACTOR COST	$ 106,218	$ 130,117	$ 236,335
FY 1996	0.7657	867	HOURS FLOWN	160	196	356
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 1,744	$ 5,955	$ 7,699
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	1.62%	4.38%	3.15%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL			0
	AFE	EF111A	ESTIMATED GALLONS			0
	PRICE	FACTOR	ACTUAL COST			$ -
FY 1994	0.8156	1458	ESTIMATED COST			$ -
FY 1995	0.7129	1550	FACTOR COST	$ -	$ -	$ -
FY 1996	0.7657	1576	HOURS FLOWN	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL			0
	AFE	KC135A	ESTIMATED GALLONS			0
	PRICE	FACTOR	ACTUAL COST			$ -
FY 1994	0.8156	2261	ESTIMATED COST			$ -
FY 1995	0.7129	2261	FACTOR COST	$ -	$ -	$ -
FY 1996	0.7657	2261	HOURS FLOWN	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL			0
	AFE	KC135E	ESTIMATED GALLONS			0
	PRICE	FACTOR	ACTUAL COST			$ -
FY 1994	0.8156	1878	ESTIMATED COST			$ -
FY 1995	0.7129	1952	FACTOR COST	$ -	$ -	$ -
FY 1996	0.7657	1883	HOURS FLOWN	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL			0
	AFE	KC135Q	ESTIMATED GALLONS			0
	PRICE	FACTOR	ACTUAL COST			$ -
FY 1994	0.8156	2152	ESTIMATED COST			$ -
FY 1995	0.7129	2152	FACTOR COST	$ -	$ -	$ -
FY 1996	0.7657	2674	HOURS FLOWN	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL	7,015,696	4,961,540	11,977,236
	AFE	KC135R	ESTIMATED GALLONS	7,015,696	4,961,540	11,977,236
	PRICE	FACTOR	ACTUAL COST	$ 5,446,767	$ 3,771,743	$ 9,218,510
FY 1994	0.8156	1735	ESTIMATED COST	$ 5,446,767	$ 3,771,743	$ 9,218,510
FY 1995	0.7129	1875	FACTOR COST	$ 4,772,234	$ 3,604,205	$ 8,376,439
FY 1996	0.7657	1816	HOURS FLOWN	3,432	2,592	6,024
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 674,533	$ 167,538	$ 842,071
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	12.38%	4.44%	9.13%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL	2,037,470	2,016,257	4,053,727
	AFE	KC135T	ESTIMATED GALLONS	2,037,470	2,016,257	4,053,727
	PRICE	FACTOR	ACTUAL COST	$ 1,548,470	$ 1,534,205	$ 3,082,675
FY 1994	0.8156	1735	ESTIMATED COST	$ 1,548,470	$ 1,534,205	$ 3,082,675
FY 1995	0.7129	1875	FACTOR COST	$ 1,028,400	$ 1,889,143	$ 2,917,543
FY 1996	0.7657	1955	HOURS FLOWN	687	1,262	1,949
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 520,070	$ (354,938)	$ 165,132
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	33.59%	23.13%	5.36%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL	424,582	422,919	847,501
	AFE	0A010A	ESTIMATED GALLONS	424,582	422,919	847,501
	PRICE	FACTOR	ACTUAL COST	$ 322,691	$ 321,419	$ 644,110
FY 1994	0.8156	654	ESTIMATED COST	$ 322,691	$ 321,419	$ 644,110
FY 1995	0.7129	557	FACTOR COST	$ 317,311	$ 301,155	$ 618,466
FY 1996	0.7657	541	HOURS FLOWN	766	727	1,493
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 5,380	$ 20,264	$ 25,644
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	1.67%	6.30%	3.98%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL			0
	AFE	RF004C	ESTIMATED GALLONS			0
	PRICE	FACTOR	ACTUAL COST			$ -
FY 1994	0.8156	1649	ESTIMATED COST			$ -
FY 1995	0.7129	1627	FACTOR COST	$ -	$ -	$ -
FY 1996	0.7657	1634	HOURS FLOWN	0	0	0
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ -	$ -	$ -
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	0.00%	0.00%	0.00%

				FY 96 Q1	NET FY 96 Q2	FY 96 TOTAL
	FY CMD	MDS	ACTUAL GAL	31,237,227	30,584,320	61,821,547
	AFE	TOTAL	ESTIMATED GALLONS	31,237,227	30,584,320	61,821,547
	PRICE	FACTOR	ACTUAL COST	$ 24,075,775	$ 23,410,070	$ 47,485,845
FY 1994	0.8156		ESTIMATED COST	$ 24,075,775	$ 23,410,070	$ 47,485,845
FY 1995	0.7129		FACTOR COST	$ 22,191,503	$ 22,585,145	$ 44,776,648
FY 1996	0.7657		HOURS FLOWN			
			CFE ACTUAL- ESTIMATED	$ -	$ -	$ -
			CFE ACTUAL-FACTOR	$ 1,884,272	$ 824,925	$ 2,709,197
			MAPE ACTUAL- ESTIMATED	0.00%	0.00%	0.00%
			MAPE ACTUAL-FACTOR	7.83%	3.52%	5.71%

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[redacted]

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13. ABSTRACT *(Maximum 200 words)*

The purpose of this thesis was to undertake a systematic, scientific study of the accuracy of Air Force published fuel factors to estimate fuel costs at MAJCOM level by mission, design, and series (MDS) since the implementation of the Fuels Automated Management System (FAMS) under the current environment of decentralized aviation fuel (AVFUEL) funding. The research found that, at MAJCOM level, the use of USAF published AVFUEL factors in estimating out-year costs would have overstated costs in both fiscal year (FY) 1994 and FY 1995 by $2.5 M (FY 1994), by $.25 M (FY 1995), and may potentially understate costs by $2.7 M for the current fiscal year (FY 1996). Additionally, the research found that at the MDS level, the use of AVFUEL factors would have greatly understated costs for some aircraft while overstating costs for other aircraft. Since AVFUEL funding is currently decentralized at base level, the use of AVFUEL factors for estimating costs at the MDS level is not recommended for USAFE assigned aircraft.

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