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# An Analysis into the Effectiveness of Aircraft Maintenance under the Combat Wing Structure

Derrick R. Barthol

**AN ANALYSIS INTO THE EFFECTIVNESS OF AIRCRAFT MAINTENANCE UNDER THE COMBAT WING STRUCTURE**

THESIS

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AFIT/GLM/ENS/05-02

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# AN ANALYSIS INTO THE EFFECTIVENESS OF AIRCRAFT MAINTENANCE UNDER THE COMBAT WING STRUCTURE

THESIS

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AN ANALYSIS INTO THE EFFECTIVENESS OF AIRCRAFT MAINTENANCE

UNDER THE COMBAT WING STRUCTURE

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## Abstract

Organizational structure builds the foundation from which organizations operate. To gain full potential of structural efficiencies in the current operating environment, public and private firms are continually modifying their organizational structure. The U.S. Air Force is no different and underwent its most recent reorganization in the fall of 2002 replacing the post-Gulf War format of the previous decade. Air Force leadership needs to understand how well the current structure is performing at achieving its intended objectives.

This research investigates the effectiveness of the recent change to Air Force organizational structure on aircraft maintenance performance through an analysis of aircraft maintenance metrics. To observe effects both within and across the Air Force, four years of data were analyzed from three F-16 units and three KC-135 units representing two of the significant Air Force Major Commands (MAJCOMs). The analytical methods used for this research include testing assumptions of normality and variance of sample data. Next, homogeneity of variance and comparison of means tests were used to identify significant differences between data of pre- and post-combat wing structures. Then, the direction of any noted changes was made apparent and categorized for quantification using weighted factor analysis. Finally, trend analysis was performed to assist in determining overall effectiveness of the combat wing structure. Results of this analysis allowed the researcher to postulate an answer to the overall research question. This answer and other associated findings can assist Air Force leaders in understanding how to enhance operational performance.

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AN ANALYSIS INTO THE EFFECTIVENESS OF AIRCRAFT MAINTENANCE UNDER THE COMBAT WING STRUCTURE

# I. Introduction

## Background

"Restructure," "reorganization," and the most recently used "transformation" are all words not uncommon to members of every Air Force organization. If not for the implementation of change, the Air Force would not exist as a separate service today. Beginning in 1907 when the first Aeronautical Division was formed by the U.S. Army Signal Corps, the chronology of military aviation is defined by patterns of change. "The Air Force enjoys an unprecedented level of organizational flexibility that originated in its common heritage. Airmen expect change, look forward to it, and thrive on it." (Deptula, 2001:87). Dramatic changes in the world relating to military function and national security are motivating factors toward organizational change and were readily apparent throughout the decade following the Persian Gulf conflict of the early 1990's.

Since the reorganization of the Air Force in 1992 and subsequent downsizing of personnel, operations in maintaining stability in the Middle East continued along with humanitarian and peacekeeping operations in places like Somalia, Rwanda, Haiti, and the Balkans (Benson, 1997). The Air Force also played a role in the air campaign to end civil war in Bosnia in late 1995 and implemented the Expeditionary Air Force (EAF) concept in that same year. Since then, the service has been maintaining an increased level of deployed troops throughout the world. To further enhance operations during this new and ever changing global environment, leadership directed its focus on the logistics efforts under the Chief of Staff of the Air Force Logistics Review (CLR) in September of 1999. The CLR sought to concentrate on wing-level process improvements while balancing operations with EAF objectives (Zettler, 2001). Processes requiring attention were recognized from inputs made by MAJCOMs and Air Force directed research agencies. These processes were categorized into four main focus areas: Training and officer development, Supply and Transportation management, Logistics plans, and Aircraft maintenance. Of the 423 core CLR issues identified, over 50 percent were related to the aircraft maintenance discipline which became the focus of this research.

Recommendations and implementation steps toward improvement were developed and presented to leadership in the fall of 2000 (Hall, 2002). From these, initiatives in aircraft maintenance were directed at concerns for sortie production and health of fleet issues. Included in the aspect of long-term fleet health was a focus on maintenance metrics and alignment of "core functions" under a common group-level organization. Transformational test phases for implementing a new organizational structure were put into place in early 2001. Later that year, the events surrounding the September 11th terrorist attacks further advanced the direction necessary for future Air Force operations. In April 2002, General John Jumper, Chief of Staff of the Air Force (CSAF), directed an Air Force-wide wing-level reorganization to take effect on October 1st of that year. Under this new arrangement known as the "Combat Wing Structure", aircraft maintenance functions would be aligned under a dedicated maintenance group commander in an effort to enhance core competencies, improve aircraft sortie production, and fleet health.

## Problem Statement

Senior Air Force leaders need to know how well the new combat wing structure is performing at achieving the intended objectives of aircraft maintenance organizations. This research seeks to identify the impact of the combat wing structure by detecting changes in aircraft maintenance performance metrics as a measure of effectiveness.

## Research Question

This research seeks to answer the question, "How effective has the new combat wing structure been at meeting the intended objectives set forth for aircraft maintenance organizations?"

## Investigative Questions

In order to successfully meet the research objective, the following investigative questions must be addressed:

1. What are the driving reasons behind and objectives of the Air Force's implementation of the combat wing structure?
2. How can these objectives be measured?
3. What were the performance measurements prior to implementation?
4. What are the performance measurements after implementation?
5. Are there significant differences between pre- and post-implementation performance measurements?
6. What other explanations exist as confounding variables in the analysis of the data?

**Methodology**

This study investigates the theory that organizational structure may or may not influence the effectiveness of aircraft maintenance through its impact on maintenance performance metrics. First, a comprehensive review of the literature sets a basis for the types of organizational structures, both internal and external to the Air Force. It also identifies the driving reasons for the Air Force's most recent reorganization and builds a framework of principal factors used to measure aircraft maintenance performance. This information then dictates the types of data to collect and the statistical methods used in analyzing data from both pre- and post-implementation phases. Tests for normality and homogeneity of variance are first performed to overcome basic assumptions necessary for further analysis. Then, variance tests and comparison of means are used as the primary analysis tools to identify whether or not a significant difference exists between data sets. Next, weighted factor analysis is applied to quantify results obtained in the previous tests. Finally, trend analysis is used to assist in making a final deduction of the effectiveness of aircraft maintenance under the new combat wing structure.

**Scope and Limitations**

This research is limited to the effects of the Air Force reorganization on wing-level organizations chosen for analysis. The results and/or methodologies may not be applicable to other aircraft maintenance organizations within the Air Force. Also, results are based on the quantitative variables selected as a measurement of aircraft maintenance performance. Altering these variables may produce different results. A third limitation of this research is the dependency on accurate data entry. As with all statistical analysis, the resulting output is limited by the quality of the input data used during the analysis. A final identifiable limitation of this research is based on the timeframe of data collection. Both the period over which data was collected and the maturity of each organizational structure at the time of collection may influence analysis results.

**Assumptions and Confounding Factors**

In performing this research, some general assumptions must be made regarding the data and the analysis methods used. The first assumption concerns the accuracy of data retrieved from the numerous maintenance information systems used by the Air Force. These systems are identified as the primary data collection tools containing the most comprehensive and accurate data used by maintenance managers at all levels. Next, data obtained across separate time segments and geographic locations were assumed to be independent from one another. This was done since the actions of any certain sample set did not influence the actions or results of any other sample set. Additionally, there are common assumptions required when performing statistical analysis. These assumptions are described and tested during the analysis portion of this research. A final assumption made involves confounding factors. Confounding factors are those items that may have influenced the data and/or the analysis results, but were difficult or unable to account for. These factors include items such as operational tempo, leadership changes, and others. Additional detail about confounding factors applicable to this research and the attempts made to reduce their impact are described in a later chapter.

**Summary**

This chapter presented the background and problem statement surrounding the reasons for conducting this research. It also defined the research question and investigative questions that will be used in positing answers to the problem. A brief overview of the methodology for the research was included along with a summary of the associated shortcomings and limitations.

Chapter 2, Literature Review, identifies information found in published literature relating to organizational structure and maintenance performance measurements. It also defines work performed by previous researchers in an effort to use their findings, short-comings, and suggestions in conducting an effective study.

Chapter 3, Methodology, provides insight into the methods used when conducting this research. It outlines the purpose and model used along with the integral components necessary for meaningful, high quality research.

Chapter 4, Analysis and Results, utilizes the methods and information previously outlined in conducting the actual data analysis. It includes the individual statistical tests performed and the results obtained for each of the selected samples.

Chapter 5, Conclusions and Recommendations, presents a collective answer to the research objective and discloses specific findings made while conducting this research. It also provides recommendations from these results and addresses associated areas for possible future research.

# II. Literature Review

## Introduction

This chapter summarizes the foundational literature used in this research to establish the basic theory of organizational structure and describe the Air Force's evolutionary structural changes. It also presents material describing aircraft maintenance performance measures used in determining the effectiveness of the most recent change to organizational structure. Finally, it provides a brief overview of the methods and outcomes from previous research performed regarding aircraft maintenance performance and organizational structure.

## Organizational Theory

The subject of organizational structure has long been a topic reviewed and analyzed by business leaders and educational scholars alike. When establishing an appropriate structure or contemplating a change to an existing structure, one must first understand the fundamentals of organizational theory along with the benefits and detriments associated with each (Hall, 2002). In association with these concepts, one must also consider how structure supports the mission and strategy of the organization, whether or not the structure provides the best use of personnel and resources, and if it will perform in the most efficient and effective manner.

Investigation of the published literature identified two main dimensions when characterizing structural arrangements within an organization as shown in Figure 1. The first involves the type of organizational control and hierarchy in which the organization will operate. Hall (2002) identifies how these structures range from a traditional vertical arrangement built like pyramid, to a more horizontal or flat arrangement. The differences in these arrangements involve the issues of centralization of authority, communication, and control throughout each level of the organization. The second area of consideration when adopting an organizational structure revolves around the focus of the organization. This focus may be directed toward the functions of the organizational units or around the products and/or services the organization provides (Hall, 2002). Descriptions of both vertical and horizontal arrangements, along with the functional and product/service oriented structures are provided in the subsequent paragraphs.

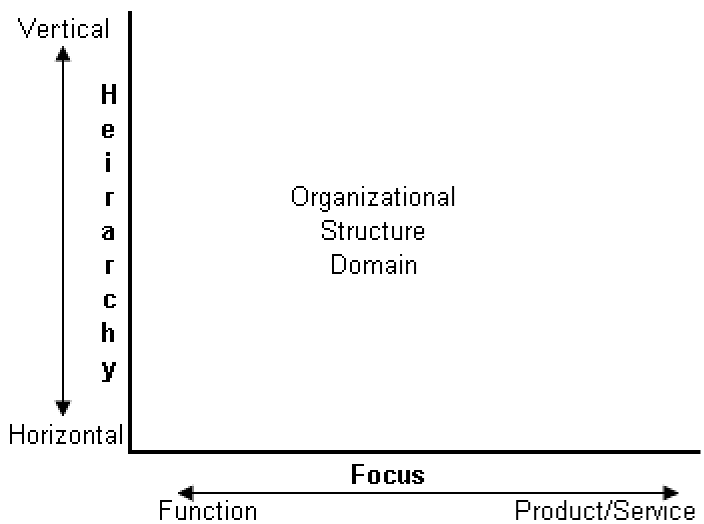



Figure 1. Organizational Structure Domain

Vertical Structure. Within a vertical arrangement, leadership is centered on a single entity at the top of a hierarchical pyramid and is directed downward through several layers of management (Hall, 2002). At each level, authority is given over only those agencies directly overseen by the management head. Communication and control is centralized within a top-to-bottom arrangement of executives and managerial levels providing immediate accountability for the performance of each organizational division. Figure 2 provides a graphical example of the typical vertical organization.

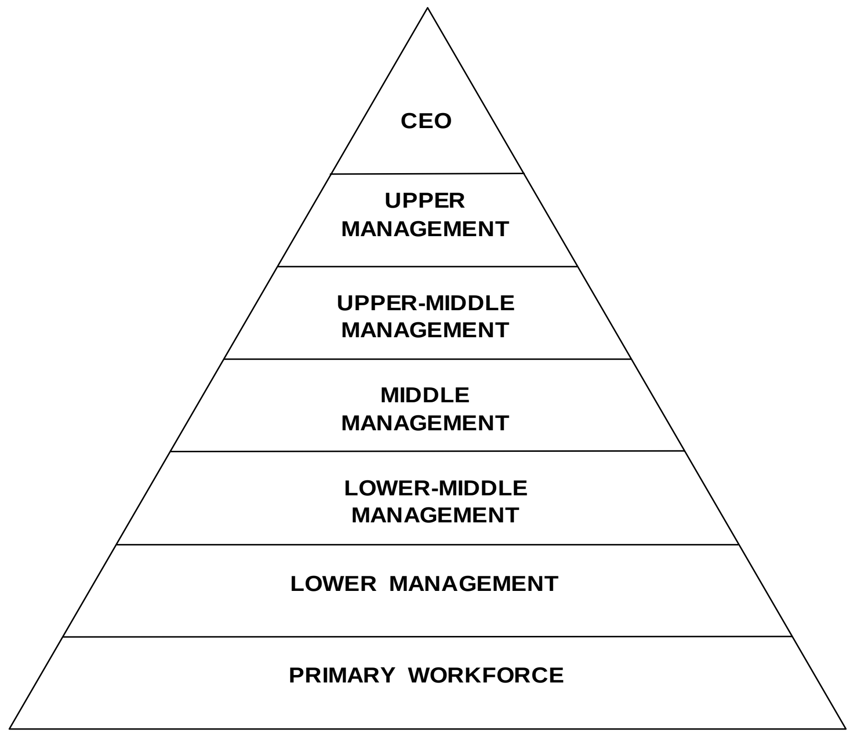



Figure 2. Example of Vertical Structure

<u>Horizontal Structure</u>. At the other extreme is the horizontal or flat organizational structure. Under this type of arrangement, managerial levels are significantly reduced and authority is more decentralized across multiple levels of leadership (Hall, 2002). Communication across levels is essential and the span of control gained by management becomes wider. Personnel working within a horizontal structure are required to understand more about the functions of other agencies within the organization and work in parallel with the goals of those agencies. An example of the horizontal structure is portrayed in Figure 3.

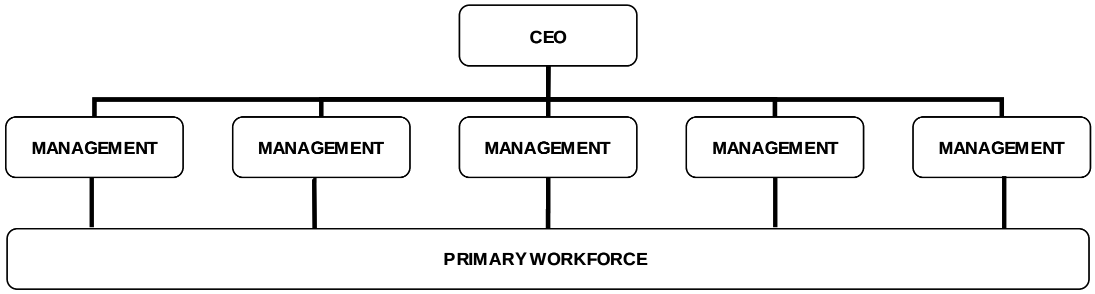



Figure 3. Example of Horizontal Structure

When choosing either a vertical or horizontal structural arrangement, one must evaluate the function at these two extremes. Hall (2002) explains that vertical arrangements are designed for centralization of authority and direct control typical of the large manufacturing organizations of the past. Problems with vertical structure include slow communication through the levels of hierarchy, restricted decision making, and possible detachment between top management and operations. He continues stating that horizontal arrangements, in contrast, emphasize a decentralization of authority and control enabling increased communication and flexibility within the organization. The trend of many organizations today is toward the horizontal type structure.

Functional Structure. Functional structure exists when common activities are grouped into departments, areas, or units (Hall, 2002). The emphasis of functionally organized firms is to increase efficiency by combining skills and capitalizing on expertise and experience. An in-depth knowledge base is maintained through a certain level of specialization gained by an association of similarly related skills. Figure 4 depicts the common organizational elements found in a functional type structure.

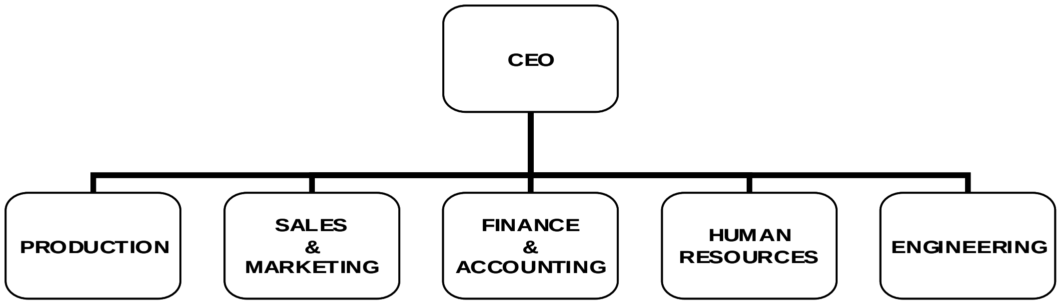



Figure 4.  Example of Functional Structure

Product/Service Structure.  A structure built around products or services occurs when the activity of the company is determined by the different types of supplied products and services (Hall, 2002).  Within this format, product groups are formed by incorporating members possessing each of the necessary skill sets required to produce a product or provide a service.  For each additional product or service, a new product group must be formed with the attributes required for that specific product or service.

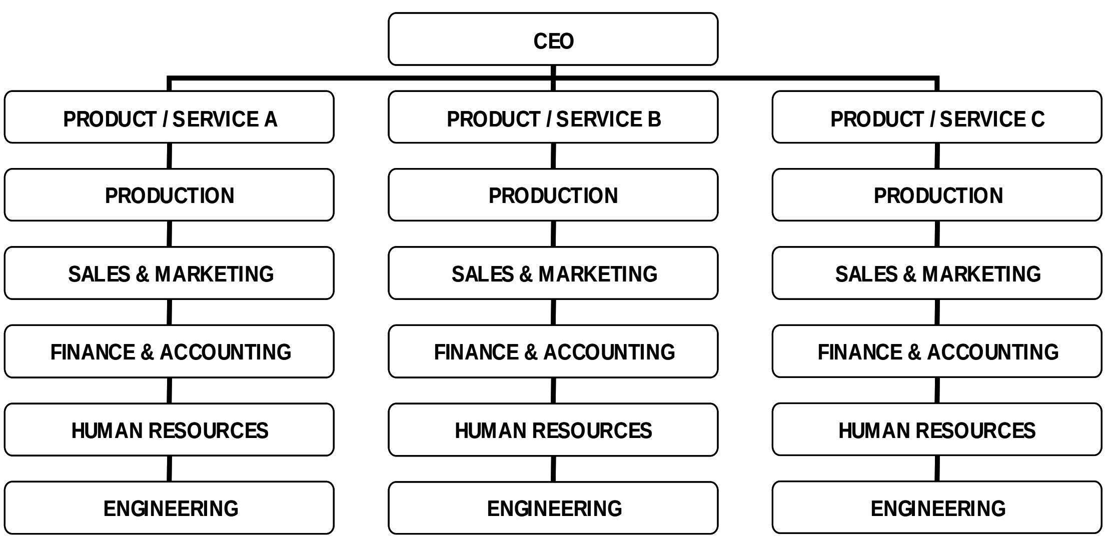



Figure 5.  Example of Product/Service Structure

In distinguishing between functional or product/service oriented structures, again one must associate the resources and goals of the organization with the attributes of each structure. Hall (2002) describes that functional structures obtain efficiency through consolidating resources and specialization. The downfall to this format is a stove-piping of skills and narrowed view of organizational objectives. Product/Service oriented structures essentially reverse these issues by requiring members to possess a wide knowledge base of required skills and overall goals of the entire organization. However, it does lose the efficiency of functional association through the increased number of independently operational departments.

Organizations may operate best anywhere in between the extremes previously described or through any combination thereof. In today's rapidly changing global environment, the aspects of organizational objectives, technology, and availability of resources must be evaluated in determining an effective organizational structure. Finding the proper balance point between vertical and horizontal structure, and building toward a functional or product/ service orientation is an ever-changing process.

**Air Force Structures**

The Air Force's organizational structure has undergone many changes throughout its history in an effort to maximize its own performance and efficiency. In an effort to provide guidance in establishing Air Force structure, Air Force Instruction (AFI) 38-101, Manpower and Organization, outlines the following management principles: "Emphasis on wartime tasks, Functional grouping, Lean organizations, Skip-echelon structure, and Standard levels" (Department, 2003:5).

From these principles Air Force organizations are directed to establish common structures capable of accomplishing wartime tasks with minimal resources at maximum efficiency. The parts are to work closely together toward the primary mission without requiring unnecessary intermediate levels of management. "Factors such as scope of responsibility, span of control and functional grouping of related missions/activities are the predominant factors that determine organizational kind." (Department, 2003:5).

Prior to October 2002, the last formal change to Air Force organizational structure occurred in 1992. At the end of the Cold War in the late 1980's, the Air Force and other services were directed to begin a 25 percent reduction in force structure (Deptula, 2001). This caused the Air Force to make fundamental changes to its organizational composition which resulted in what is known as the "Objective Wing Structure". Under the objective wing structure, four groups were formed to perform the major functions of the operational wing as shown in Figure 6.

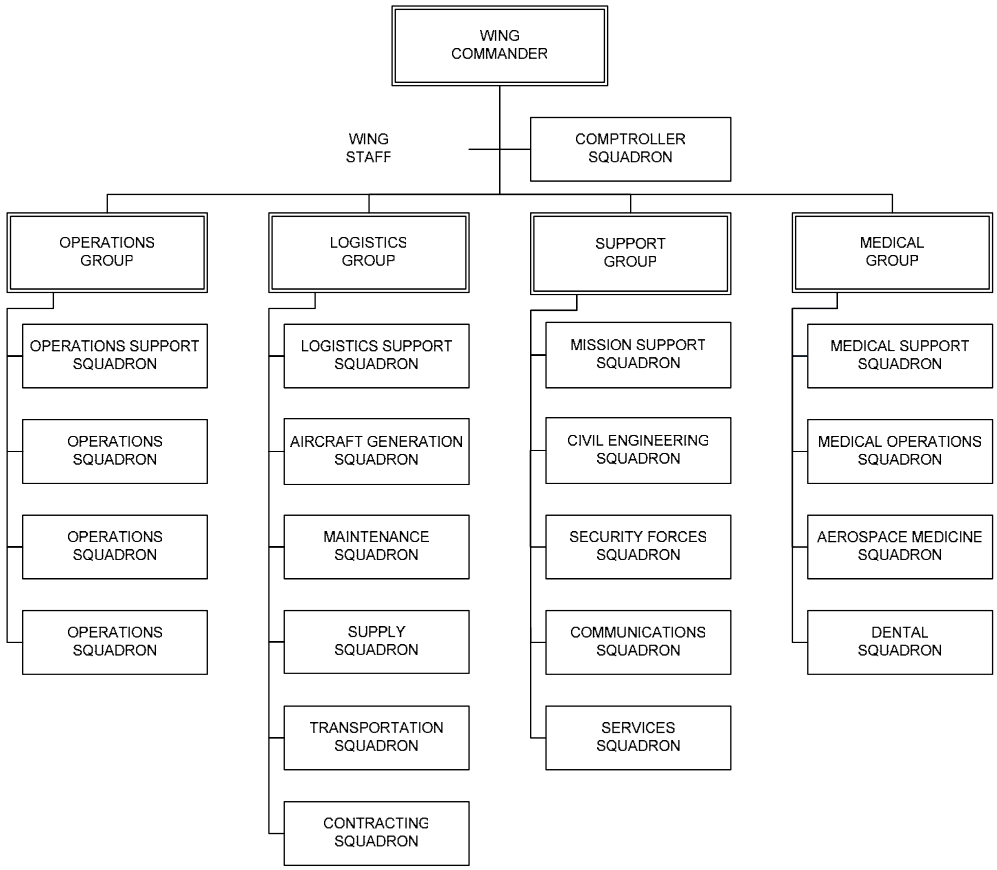



Figure 6. Objective Wing Structure (AFI 38-101, Fig 3.5)

Aircraft maintenance organizations were divided and aligned under both the Operations Group and the Logistics Group depending on MAJCOM and primary mission. Standard fighter wings under Air Combat Command (ACC) sought to align all on-equipment aircraft maintenance within the Operations Group. Maintenance resources and those functions directly related to sortie generation were under the control of an Operations Squadron Commander as depicted in Figure 7. Major maintenance and off-equipment aircraft maintenance functions remained under the Logistics Group as previously depicted.

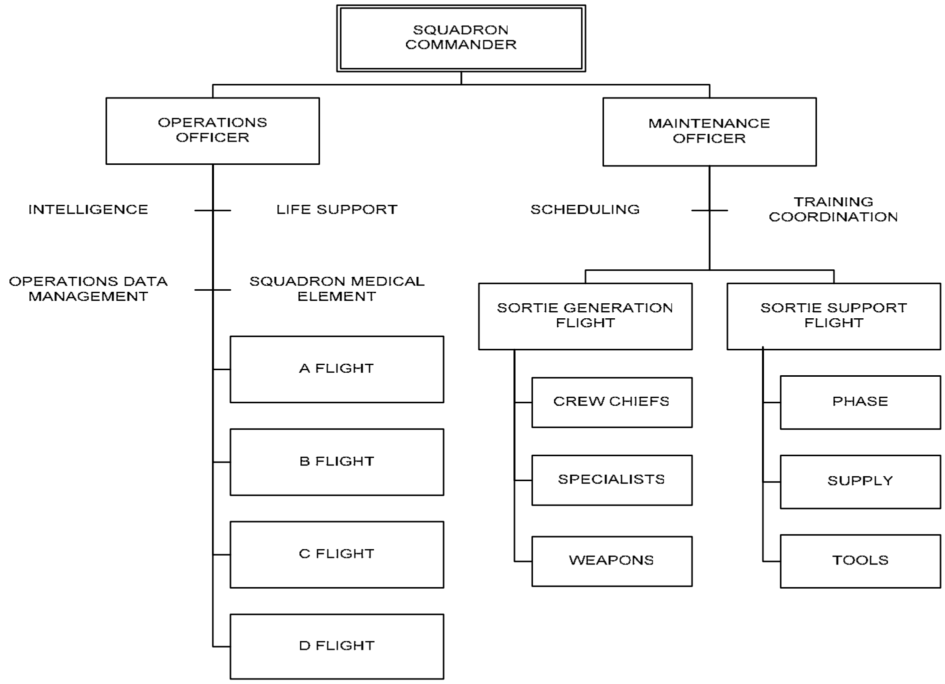



Figure 7. Operations Squadron Structure (AFI 38-101, Fig 3.11)

Strategic Airlift and Refueling units within Air Mobility Command (AMC) aligned all on- and off-equipment aircraft maintenance functions under the Logistics Group with the incorporation of the Aircraft Generation Squadron. This was done with the intent to match functions more closely to mission requirements.

The goals of the objective wing structure were to decentralize authority, remove unnecessary layers, and give field commanders responsibility for all elements necessary for mission accomplishment (Gray & Ranalli, 1992). The objective wing was designed to align personnel around a specific "manufacturing division", the operational flying squadron, and a specific product, sorties. The Operations Group was responsible for the entire sortie producing effort. The Logistics Group performed all major and off-equipment aircraft maintenance and other supporting logistical functions.

During the 1990's, the Air Force continued to recognize the need to adapt to the changing global environment (Deptula, 2001). Corrective actions were required in response to the difficulties encountered in the Persian Gulf War propelling initiatives that required new ways of operating. The emergence of the Aerospace Expeditionary Force concept in the mid-1990's intended to further decentralize authority and provide the flexibility needed to fight the battles of the new century.

Following the Chief of Staff Logistics Review (CLR) of 2001, General Jumper directed all aircraft wings to organize under a universal format known as the "Combat Wing Structure" depicted in Figure 8.

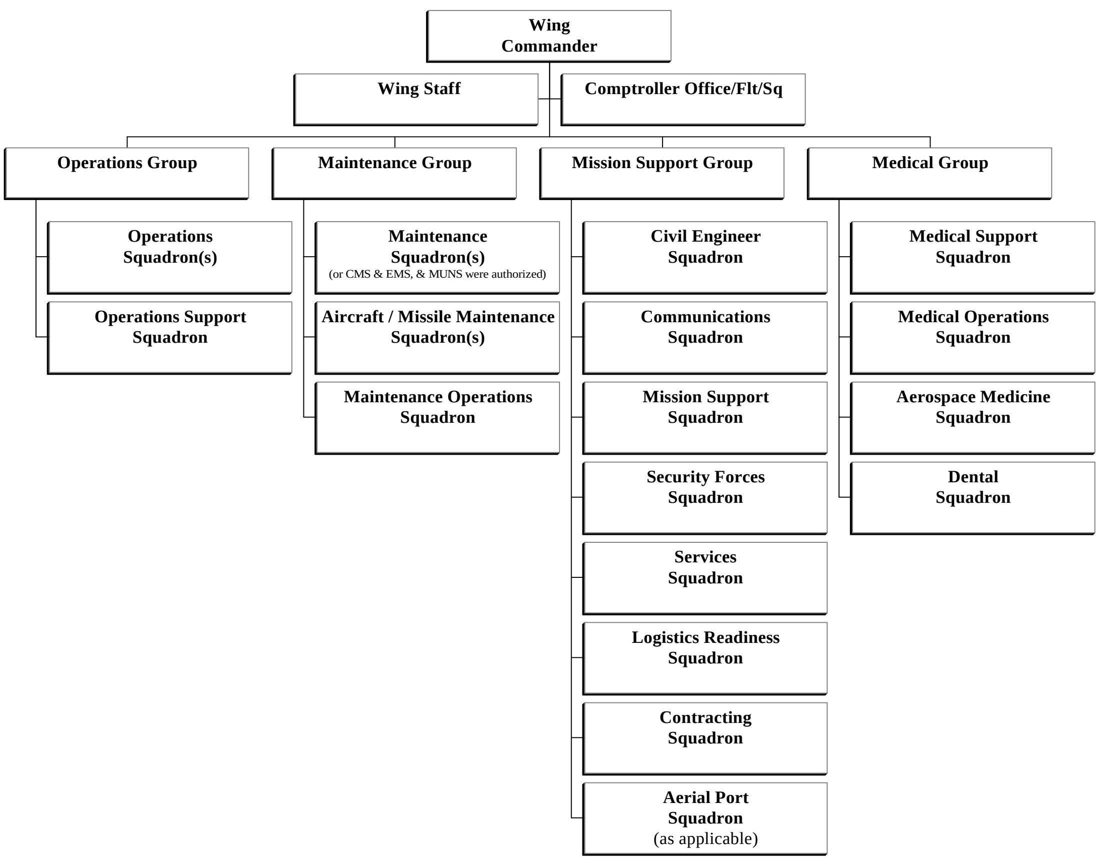



Figure 8. Combat Wing Structure (PAD 02-05, Appendix I to Annex A)

The major changes under the new combat wing structure were intended to focus on core competencies within each group (Chapman, 2002). The Medical Group saw little in the way of changes under this reorganization. The previously titled Support Group witnessed the incorporation of three new squadrons and was renamed the Mission Support Group (MSG). Standard logistics functions of supply and transportation were merged forming the new Logistics Readiness Squadron and were transferred to the MSG from the old Logistics Group. Additionally, the entire Contracting Squadron and Aerial Port Squadron, at those locations possessing one, were also realigned under the MSG. With the sole mission of providing all aspects of aircraft maintenance, the Logistics Group is now called the Maintenance Group (MXG). The Operations Group was relieved of all maintenance related resources and functions which were returned to the MXG.

The intent of this structure was to standardize operations across the Air Force and enhance its expeditionary capabilities (Chapman, 2002). The vision projected by the CSAF, General John Jumper, was to allow each group to focus on the essential core competencies and re-instill a focus on maintenance policy, procedures, training, discipline, and enforcement. He sought to obtain improvements in sortie production and fleet health for aircraft maintenance organizations as called for by inputs to the CLR (Zettler, 2001). For the personnel of the organizations, members would be able to gain mentorship from everyone in the chain of command from the group commander down.

**Aircraft Maintenance Performance Measurements**

When measuring performance, it is critical to identify and use the appropriate metrics. Research exposed that no one measurement of sortie production or fleet health exists which driving the search for key maintenance metrics.  There were three resources used when defining and selecting aircraft maintenance performance measurements.  They include:  Air Force Instructions, Monthly Maintenance Reports and MAJCOM briefings, and the Air Force Chief of Staff Logistics Review.

Air Force Instruction 21-101, Aerospace Equipment Maintenance Management, describes 23 of what it calls "primary maintenance metrics" (Department, 2001).  These metrics include both leading and lagging type indicators used in identifying the impact of maintenance capabilities and trends in maintenance performance.  AFI 21-101 gives universal guidance to all aircraft maintenance organizations throughout the Air Force as to the types of metrics to observe and how to calculate the measurements.  A comprehensive list of these terms and their definitions are provided in Appendix A.

Maintenance data system analysis sections are each required to prepare and submit unit health of force reports and representative maintenance data to headquarters as outlined in MAJCOM supplements to AFI 21-101 (Department, 2001).  The principle report used is the (M)9203, Monthly Logistics Readiness Indicators, which provides headquarters units information on the designated aircraft maintenance metrics.  The metrics reported include the following:  Mission Capable (MC) Rate, Total Not Mission Capable Maintenance (TNMCM) Rate, Total Not Mission Capable Supply (TNMCS) Rate, Cannibalization Rate (CR), Home Station Logistics Departure Reliability (HSLDR) Rate, Logistics Air Abort Rate (AAR), Break Rate (BR), 8/12 Hour Fix Rate (FR), Delayed/Deferred Discrepancy (DD) Rate, and Dropped Objects (DOP).

Each MAJCOM also conducts regularly scheduled briefings, typically monthly, describing the performance of the organizations under their command.  The following metrics were found to be present in at least one of the multiple MAJCOM briefings: Awaiting Maintenance (AWM), Awaiting Parts (AWP), Repeat/Recur Discrepancy Rate (R/R), Average Possessed Aircraft (APA), Hourly Use, World-wide Logistics Departure Reliability (WW LDR), Enroute LDR, Flying Schedule Effectiveness (FSE), Scheduling Deviations, Maintenance/Operations Deviations (DEV), and Maintenance Scheduling Effectiveness (MSE), in addition to all those provided in the (M)9203 report.

Finally, the Air Force Chief of Staff Logistics Review that prompted the changes to organizational structure identified three categories of performance indicators (Zettler, 2001). The first category was "Overall Balance Indicators," which included Flying Hour Program (FHP), Utilization Rate (UTE), DEV Rate, MSE, and FSE. The second category was "Sortie Production Indicators," including Abort Rate (AR), 8-hour FR, BR, Repeat (RP) Rate, Recur (RC) Rate, Mission Capable Parts (MICAP) Rate, and CR. The final category was "Fleet Health Performance Indicators," which include TNMCM, Average Repair Cycle Processing Time (RCP), DD, R/R Rate, Time Compliance Technical Order (TCTO) Backlog, Phase Flow Days (PF), and Phase Time Distribution Interval (TDI).

Once metrics are identified, the next step involves collecting the data. Obtaining accurate and unbiased information is critical to performing proper analysis in an effort to identify organizational performance. Analysis sections rely upon data retrieved from various maintenance information systems for generating information. AFI 21-101 (Department, 2001) identifies the following primary data sources: Core Automated Maintenance System (CAMS)/Integrated Maintenance Data System (IMDS), G081 (CAMS for Mobility), Reliability and Maintainability Information System (REMIS), Standard Base Supply System (SBSS), Air Force Knowledge System (AFKS), and AF/IL-approved command-unique analysis tools.

**Previous Research**

Since 1980, nine other research projects were identified relating to aircraft maintenance performance with respect to organizational structure, the last of which occurred in 2001 prior to the latest reorganization. Seven of the nine projects used a form of means comparison and regression analysis. The remaining two research projects used a method known as "Constrained Facet Analysis", which was deemed inappropriate for further use, and thus excluded them from use in this research. More important than the results of these projects are the metrics used, the shortcomings identified, and the critical elements recognized as being necessary in performing meaningful analysis. An overall data table of the seven researchers and the metrics each used is provided in Appendix B.

Diener and Hood (1980) performed an analysis of organization and its effects on sortie generation capability and maintenance quality. Their sample included aircraft from six active duty fighter squadrons. They utilized 10 months of data from which they chose six independent and nine dependent variables. Their analysis techniques included stepwise regression, Wilcox signed rank test, and correlation analysis. The overall result of their analysis showed mixed results toward the influence of organization on sortie generation and maintenance quality. The principle result influencing future research identified that maintenance data can not be assumed to be normally distributed and may require the use of non-parametric statistical methods.

Gililland (1990) examined the relationships of measures used in evaluating a unit's performance. He obtained data from six mobility wings over a 6-month interval.

He chose five independent and eight dependent variables and used stepwise regression, correlation analysis, and residual analysis. Results identified four variables of CR, AWM, APA, and AWP as principle components which could be used in modeling aircraft performance. The impact of these results provided a model using interaction and residual analysis.

Jung (1991) sought to further the research performed by Gilliland using nine different aircraft from Strategic Air Command over a 21-month period. He used similar analysis techniques of stepwise regression, correlation analysis, and residual analysis in evaluating 23 independent and three dependent variables. The results of this analysis directed that an aggregate model of multiple aircraft types yielded inconsistent and inconclusive results.

Davis and Walker (1992) attempted to make a comparison of aircraft performance across services by comparing two Air Force aircraft (F-15 & F-16) with two Navy aircraft (F-14 & F-18). Pre-objective wing data was gathered for Air Force aircraft while data from Navy aircraft represented performance under an objective wing structure. This was due to the lack of objective wing data within the Air Force at the time. Analysis techniques of stepwise regression and a paired T-test were used along with a split-half technique. Only four independent variables and one dependent variable were used. Results were ineffective at providing meaningful analysis between the two samples due to inconsistencies in variables and measuring techniques.

Gray and Ranalli (1993) sought to determine the impact of the major Air Force reorganization that took place in 1992. Similar techniques from past research of stepwise regression, correlational, and residual analysis were utilized. They selected two aircraft types (B-52 & KC-135) from one Air Force base and chose nine independent and two dependent variables for their analysis. A collection encompassing 37 months of B-52 aircraft data and 28 months of KC-135 aircraft data was obtained from monthly maintenance summaries. Results determined that there was a significant improvement in the dependent and some independent variables, representing improved performance under the new structure.

Stetz (1999) attempted to detect the impact of similar organizational structure changes on a specific aircraft maintenance organization. His intent was to determine the existence of improvements in productivity under the new structure. Data were collected and analyzed covering 24 months of pre- and 24 months of post-organizational structure. The sample selection included only one airframe (E-3) and one organizational unit (552 ACW). Using the established techniques of stepwise regression and a T-test comparison, he tested a total of 21 variables chosen by common use at the 552 ACW and use in past research. Results of the analysis proved effective in determining a minimal impact as a result of the organizational change.

Commenator (2001) expanded the previous work in evaluating the effects of the objective wing structure and aircraft maintenance performance. Again using stepwise regression and comparison of means, he identified 10 variables (nine moderating factors and organizational structure) for use in his model. Results of this particular analysis were mixed, finding that a significant positive influence was made on at least one aircraft maintenance performance measure for five of the six units tested.

**Summary**

This chapter outlined the basis of organizational theory and the domain in which organizational structure is built.  It described the vertical and horizontal methods of hierarchy and control and also the functional and product/service orientation that may be followed.  It then identified the structural basis of Air Force organizations, past and present, in an effort to show the contrast between the two.  This was followed by comprehensive descriptions of the aircraft maintenance performance measures directed and used by Air Force leadership.  The chapter ended with a listing of the methods used and key results obtained by previous researchers on associated topics.

# III.  Methodology

## Purpose Statement

The purpose of this research was to determine the effectiveness of the newly implemented combat wing structure, as measured by aircraft maintenance performance. The study proposes to accomplish this by first identifying the research model used for the analysis.  Next, it identifies the population/sample used in conducting the research along with the aircraft maintenance metrics selected for assessment.  This was followed by identifying sources used for obtaining the previously mentioned maintenance metrics and the time interval over which the data were collected.  Finally, it describes the statistical analysis methods used in an attempt to detect significant differences between pre- and post-structural change maintenance data.

## Research Paradigm

This research used techniques both quantitative and qualitative in nature.  A comprehensive review of the literature set the basis for organizational structure and change theory, both external and internal to the Air Force.  It also built a framework of important factors used in measuring aircraft maintenance performance.  This drove the types of data to collect and the methods of analyzing the data from both pre- and post-implementation phases of the recent Air Force organizational change.  Quantitative analysis tools were used to measure and compare the performance of aircraft maintenance organizations.  The data collected for this study dictated the specific statistical methods used during this portion of the research.  Then, the results were categorized and quantified for use in determining the overall results.  An evaluation of the analysis was conducted throughout to determine the existence of any confounding variables suspect in the research.

**Theoretical Model**

The theory of this research is that the combat wing structure has been effective at meeting its intended objectives of improving aircraft maintenance performance. This research focuses specifically on the areas of overall balance, sortie production and fleet health. In evaluating this theory, an array of maintenance metrics were collected and analyzed using multiple statistical analysis methods. The tests that were conducted include the following: normality of the sample distribution, homogeneity of variance, means comparison, weighted factoring, and trend analysis. The first three tests were used to determine data characteristics and if statistically significant differences exist between pre- and post-organizational change data. The direction of any noted changes were then classified and quantified using weighted factor analysis. Finally, trend analysis was used to supplement the previous findings and aid in determining the overall conclusions.

**Population and Sample Selection**

The population for this study is U.S. Air Force aircraft maintenance organizations organized under the combat wing structure. Since the reorganization in 2002, this population includes units from all MAJCOMs throughout the Air Force. The sample used for this study includes aircraft maintenance organizations from both Air Combat Command (ACC) and Air Mobility Command (AMC). These commands were selected based on their steadfast operational mission and structural impact of the reorganization. As shown in the literature review, ACC underwent significant organizational changes during the reorganization while AMC felt less of an impact. This allows for not only a comparison within each command, but also a comparison across commands.

The aircraft chosen was limited to one mission design series (MDS) from each MAJCOM. Representing ACC is the F-16 Fighting Falcon which has been in operation since 1979. The F-16 is a core component of the Air Combat Command. Representing AMC is the KC-135 Strato-tanker. It has a long history with the AMC dating back to 1957 and has remained a staple throughout the decades. Both aircraft, as with the commands they represent, have had a continuous mission over time. Three operational units of each MDS were selected for comparison. The similarities between them included: mission, organizational size and structure, aircraft type, and operations tempo. Additionally, these units were found to be commonly compared to one another in command level briefings. F-16 units from the 20FW, Shaw AFB, the 388FW, Hill AFB, and the 27FW, Cannon AFB were chosen as well as KC-135 units from the 22ARW, McConnell AFB, the 92 ARW, Fairchild AFB, and the 319ARW, Grand Forks AFB.

**Variable Selection**

The literature review identified the objectives of the reorganization as enhancing the areas of sortie production and improving fleet health. For this reason, measurement of these two elements was the main focus during variable selection. Also discovered in the literature review, there are no direct measurements of either sortie production or fleet health available. To aid in variable selection, commonalities and discords between aircraft maintenance metrics recognized in Air Force Instructions, MAJCOM reports and briefings, and the CLR were identified. A table of the data sources and the aircraft maintenance metrics each recognizes was constructed and is presented in Appendix C.

It is important to note that four of the variables are identified in the Air Force Instruction as key metrics, yet are not recognized by the other sources. They include: Hangar Queen (HQ), Primary Aerospace Vehicle Authorized vs. Possessed (P/P), Personnel Assigned (PA), and Upgrade Training (UT). Additionally, the two variables of AWM and AWP are only noted in MAJCOM Briefings. Most importantly, four variables are presented in the CLR which drove the reorganization, but are not acknowledged in any of the other sources. The variables noted are FHP, MICAP, TCTO Backlog, and TDI.

When selecting aircraft maintenance metrics to be used in the comparative analysis, a compilation of the sources described in Chapter 2 was used. Primary consideration was given to the factors described within the CLR and supplemented with metrics from the other sources. Figure 9 depicts the final variable selection and arrangement in relation to their measurement objective.

| Abbreviation | Variables | Indicator |
|---|---|---|
| DEV | Deviation Rate | Overall Balance |
| FHA | Flying Hours, Actual | |
| FSA | Sorties Flown, Actual | |
| FSE | Flying Schedule Effectiveness | |
| MSE | Maintenance Scheduling Effectiveness | |
| HUTE | Utilization Rate, Actual Hourly | |
| SUTE | Utilization Rate, Actual Sortie | |

| Abbreviation | Variables | Indicator |
|---|---|---|
| FR | 8-Hour Fix Rate | Sortie Production |
| AR | Abort Rate | |
| BR | Break Rate | |
| CR | Cannibalization Rate | |
| RC | Recur | |
| RP | Repeat | |

| Abbreviation | Variables | Indicator |
|---|---|---|
| APA | Average Possessed Aircraft | Fleet Health Performance |
| DD | Delay/Deferred Discrepancies | |
| R/R | Repeat/Recur | |
| RCP | Average Repair Cycle Processing | |
| MMH | Maintenance Man-hours / Flying Hour | |
| TNMCM | Total Non-mission Capable for Maintenance | |
| MC | Mission Capable | |

Figure 9.  Research Variables

First depicted are Overall Balance Indicators.  The DEV Rate used included only those deviations accountable to maintenance and operations, excluding all others such as weather, air traffic control, etc.  This was done in an effort to only account for those actions affected by aircraft operations.  The FHP outlined in the CLR was represented by the metrics of Actual Flying Hours (FHA) and Actual Sorties Flown (FSA).  FSE and MSE represented measurements of planning capabilities and were used where data were available.  UTE Rate included both the actual Hourly Utilization (HUTE) Rate as well as actual Sortie Utilization (SUTE) Rate.

Next were Sortie Production Indicators which reflected all but one of the CLR metrics, MICAP, which was inaccessible.  The six remaining metrics of 8-Hour FR, AR, BR, CR, RC, and RP Rate were all included in the research.  The AR metric used was a combined total abort rate as opposed to separate air and ground aborts.

Third were Fleet Health Performance Indicators which were altered slightly from the CLR.  PF Days, TDI, and TCTO Backlog were eliminated for their specific airframe applicability and inaccessibility.  Included in the analysis were DD, R/R, and TNMCM. Average RCP Time information was only available and analyzed for the F-16 airframe. To supplement this section, the additional variables of Average Possessed Aircraft (APA), Maintenance Man-hours/Flying Hour (MMH), and MC Rate were incorporated.

**Data Collection**

Actual data used for analysis were collected with assistance from the MAJCOM Analysis departments of ACC/LGP and AMC/A44QA, the Information Systems department of MSG/MAR, and individual analysis sections from each of the selected units.  The primary sources for retrieval included electronic maintenance data collection systems of CAMS, GO81, and REMIS as described in Chapter 2.  The data contained in these systems is known to be the most accurate (approximately 95%) and comprehensive source of aircraft maintenance performance measurements.  Undeniably, these systems are also the sole source used by organizational leaders when reviewing maintenance performance on a routine basis.  Comprehensive tables of maintenance data representing each of the sample units are presented in Appendix D. Additionally, time series plots of the collected data are provided in Appendix J.

### Time Interval

The time interval covered when collecting data extended over a five year period surrounding the effective date of the reorganization. In an effort to reduce possible skewing of the results, only four years of data were used in the analysis. The most recent two year period since the reorganization, which included the 24 months from October 2002 to September 2004, was used to represent the performance under the current combat wing structure. The year immediately preceding the reorganization was greatly impacted by contingency operations conducted in response to the September 11, 2001 terrorist attacks. For this reason, data during the September 2001 through September 2002 time period were excluded from the analysis. Pre-implementation data was gathered for a comparable 24 month period beginning September 1999 and ending August 2001. Table 1 illustrates the time interval described above.

Table 1. Time Interval

| **Analysis Time Interval** | | |
|---|---|---|
| Pre-reorganization | Excluded | Post-reorganization |
| | | |
| Sep 99 - Aug 01 | Sep 01 - Sep 02 | Oct 02 - Sep 04 |

### Statistical Tools

The primary statistical tool used in conducting this research was the JMP® Version 5.1 (JMP 5.1) statistical analysis software package. JMP 5.1 provides a means to "dynamically link statistics with graphics to interactively explore, understand, and visualize data" (JMP 5.1, 2004).

**Analysis Methods**

From the results of past research and guidance from statistical experts, tests for normality and equal variance of the sample data were conducted first. Each of these tests was performed to identify the basic data characteristics of the sampling distribution. This must be accomplished in an effort to overcome some of the basic assumptions of statistical testing and make relative comparisons of like items. In the event that differences exist in sampling distributions or variance tests prove to not be equal, the statistical methods used for comparison must be expanded from a simple to a more complex form.

To begin the analysis, a significance level of 0.05 was selected for all hypotheses testing in an effort to reduce the number of Type I errors. These errors occur when the null hypothesis is rejected as true, when in fact the null hypothesis is true (McClave and others, 2001:340-344). A large level of significance allows for most of an entire population to fall within the rejection region and the null would be rejected. A small level of significance enables acceptance of the alternate hypothesis with very little of the population falling within the rejection region.

<u>Normality Tests</u>. Normality tests were first performed to overcome the assumption that the data were from a normal distribution. This was conducted using a goodness of fit test known as the Shapiro-Wilk W test available in JMP 5.1. This type of test is an empirical distribution function test which is proven to offer advantages, such as improved power, over typical Chi-square tests (JMP 5.1, 2004). The test produces a W-

value ranging from 0.000000 to 0.999999 along with an associated probability, or p-value, ranging from 0.0000 to 0.9999. The Shapiro-Wilk W test establishes a null hypothesis that the data are from a normal distribution, based on standard hypothesis testing. Therefore, if the p-value produced by the test was less than 0.05, the null hypothesis was rejected and the data considered non-normal.

Variance Tests. Tests of variance were conducted in two phases in order to identify homogeneity and determine change characteristics of sample data. Five types of variance tests were available for evaluation purposes. They included the O'Brien, Brown-Forsyth, Levene, Bartlett, and 2-sided F-test. Each of them produces an F-ratio accurate to four decimal places and an associated p-value ranging from 0.0000 to 0.9999. As with the test for normality, a p-value less than 0.05 will reject the null hypothesis that the data has equal variances and consider them unequal. By definition, the Levene test does not make any assumption of data normality, nor is it limited to the number of groups tested as is the case with some of the other tests (JMP 5.1, 2004). For these reasons the Levene method was the only test of equal variance selected for use in this research.

Comparison of Means Tests. Comparison of sample means tests were the primary method used in detecting whether or not significant differences exist between measurements of sample data from pre- and post-organizational structure change. Similar to the variance tests, the mean values were first tested for changes in data sets followed by identification of the direction of any changes. There were three types of means comparisons tests used in the analysis, each of which was selected based on the results of the normality and variance tests previously conducted. For the data reflecting normality and equal variance, a simple analysis of variance (ANOVA) F-test was performed. Data portraying normality, but unequal variance was compared using the Welch ANOVA F-test. Finally, any data identified to be from a non-normal distribution was tested using the non-parametric Wilcoxon / Kruskal-Wallis (Rank Sum) tests. For both the ANOVA F-test and Welch ANOVA F-test, a respective F-ratio and p-value was produced, as with the variance tests. Under the Wilcoxon / Kruskal-Wallis (Rank Sum) tests, the F-ratio was excluded and replaced with a Chi-square value. For all three means comparison tests described, the null hypothesis was that the mean values of the measures were equal. P-values produced that were less than the selected 0.05 level of significance rejected the null hypothesis and the means were considered different.

Separate comparisons were made for each of the selected variables identified in Figure 9 for both the F-16 and KC-135 aircraft maintenance units. Those characterized as having unequal variance or different mean values between pre- and post-combat wing implementation were then further analyzed for direction of change. Depending on the specific variable, either an increase or decrease in mean value was recognized as desirable, as presented in Table 2. Alternatively, an overall reduction in variance was preferred regardless of the individual variable.

Table 2. Desired Direction of Change in Mean Value

| Desired Direction of Change in Mean Value | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Variables | | Desired Result | Variables | | Desired Result | Variables | | Desired Result |
| Overall Balance | DEV | ▼ | Sortie Production | FR | ▲ | Fleet Health | APA | ▲ |
| | FHA | ▲ | | AR | ▼ | | DD | ▼ |
| | FSA | ▲ | | BR | ▼ | | R/R | ▼ |
| | FSE | ▲ | | CR | ▼ | | RCP | ▼ |
| | MSE | ▲ | | RC | ▼ | | MMH | ▼ |
| | HUTE | ▲ | | RP | ▼ | | TNMCM | ▼ |
| | SUTE | ▲ | | | | | MC | ▲ |

Identified changes to the maintenance variables were then plotted in one of nine categories for each of the aircraft units.  The categories include:  improved mean and improved variance (+M, +V), improved mean and equal variance (+M, =V), equal mean and improved variance (=M, +V), improved mean and degraded variance (+M, -V), equal mean and equal variance (=M, =V), degraded mean and improved variance (-M, +V), equal mean and degraded variance (=M, -V), degraded mean and equal variance (-M, =V), and finally degraded mean and degraded variance (-M, -V).  Through this method, a visualization of patterns in the data was observed across the airframe as a whole.  To quantify this data, a numerical value of positive one (+1) was assigned for each respective change category the variable occupied.  Next, category totals were obtained for each variable type (overall balance, sortie production, and fleet health) by type aircraft and a composite total.

Weighted Factoring.  Further determination of the analysis results were made through weighted factor analysis.  This was accomplished by first assigning a weight value to each measurement classification.  Both mean and variance were weighted equally in this analysis based on the similar managerial implications of improved or degraded performance in either area.  Those variables with no detected change to either mean value or variance were assigned an overall score of zero (0) establishing the midpoint of the weight scale.  Next, a positive one (+1) was associated with the improvement to mean value or variance representing a desired effect.  In contrast, those variables with degraded mean value or variance were assigned a negative one (-1) reflecting an undesirable effect.  For variables having equal means and/or variances for both pre- and post-implementation data, a zero (0) was assigned signifying no benefit/detriment to performance. All possible weight factor combinations were then calculated and are portrayed in Table 3.

Table 3. Weighted Factor Scale

| **Weighted Factor Summary** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **+M,+V** | **+M,=V** | **=M,+V** | **+M,-V** | **=M,=V** | **-M,+V** | **=M,-V** | **-M,=V** | **-M,-V** |
| **+2** | **+1** | **+1** | **0** | **0** | **0** | **-1** | **-1** | **-2** |

The weighted factor was then multiplied by the values previously obtained in each of the three categories of overall balance, sortie production, and fleet health. Values were computed for each individual category by aircraft, combined category total, overall total by aircraft, and composite totals. These values were then used in evaluating effectiveness of aircraft maintenance under the combat wing structure.

Trend Analysis. Trend analysis was the final tool used in making the overall determination of research results. Data from each of the tested variables were investigated for trends in measured value both prior to and following the reorganization. Simple linear regression techniques were performed to determine the slope, or trend, of the data measurements over time. The regression formula for this portion of the analysis and its parameters are described below.

Formula: $$y = \beta_0 + \beta_1 x + \varepsilon$$

where, $y$ is the variable being measured
$x$ is time
$\beta_0$ is the intercept
$\beta_1$ is the slope
$\varepsilon$ is the associated error

Then, these trends were recognized as improving, degrading, or remaining the same and compared between pre- and post-implementation periods. This was done using an additional regression formula and the same 0.05 percent significance level to detect differences. This model uses the inclusion of a dummy variable combined with standard hypothesis testing. The formula and its parameters are explained below along with the elements of the hypothesis test.

Formula: $y = \beta_0 + \beta_1 x + \alpha_1 z + \alpha_2 xz + \varepsilon$

where, y is the variable being measured
x is time
z is a dummy variable
z = 0 for pre-combat wing
z = 1 for post-combat wing
$\beta_0$ is the intercept for z = 0
$\beta_1$ is the slope for z = 0
$\alpha_1$ is the difference in intercept for z = 1
$\alpha_2$ is the difference in slope for z = 1
$\varepsilon$ is the associated error

Therefore, if $\alpha_2$ equals 0 both lines have the same slope.

Hypothesis: $H_0: \alpha_2 = 0$ vs. $H_1: \alpha_2 \neq 0$

Due to the necessary exclusion of the last year of pre-combat wing data, individual observations of actual data plots were also made during each statistical trend comparison. An additional classification of "uncertain" was included to account for any instances where it could not be determined whether or not a change in slope was a product of the reorganization. These uncertainties fit into only one of two possible scenarios. First were those trends heading in an improving or degrading direction and leveled off at or near a maximum/minimum value following the reorganization. In these instances, it was assumed that the trend would have leveled off under either structure and any noted change excluded from further calculations. Next were those conditions where the ending level of the trend from the pre-combat wing period varied greatly from the starting level of the trend from the post-combat wing period. In this situation, if the trend appeared to be returning to a level maintained during the pre-combat wing period the direction was determined uncertain and the change information also excluded. These results were again categorized and quantified by variable type and aircraft unit. Category and overall totals were then used to further evaluate the impact of organizational structure on aircraft maintenance performance.

**Confounding Factors**

Due to the nature of this research, there are numerous confounding factors that could undesirably alter the analysis results. These confounds may originate internally during the methodology of the research or externally through environmental occurrences. When performing internal tasks, every attempt was made to minimize the potential for confounds in an effort to provide meaningful results.

The first confound noted is population/sample selection. Each of the sample sub-populations chosen was selected based on similarities in unit size, resources, airframe, and mission. Uncontrollable, however, were other factors such as operating environment, and leadership changes which were considered to have very little impact on results.

Variable selection was the next possible confounding factor. The variables themselves could prove to obscure the results due to changes in meaning and methods of calculation over time. Each of the variables chosen was reviewed for changes in meaning and formulation from the initial collection date until the final month of this study. When necessary, raw data was obtained and a similar formula was used to calculate the variable measurement.

A third potential confound involves the methods of data collection used and physical data entry. The possibility exists that errors may have occurred in data retrieval commands or data entry at the point of origin into information systems through final transfer to the database used for this research. Every attempt was made to overcome these errors during the analysis phase of the research. Similar data was collected using identical systems and methods for uniformity in calculation and comparison.

An additional confounding factor relates to the time over which the analysis was conducted. As mentioned earlier, steps were taken to eliminate the possible skewing of data due to the operations surrounding the September 11, 2001 attacks. However, unable to overcome was the relationship of organizational maturities between the two time periods. Pre-combat wing data was collected covering the 8- to 10-year point of the organization's structural establishment. Post-combat wing data was obtained during its infancy, covering the first two years of existence. This factor was insurmountable and was considered the best viable option in conducting this research. Obtaining data from earlier in the pre-combat wing structure would have been increasingly difficult and undoubtedly would have introduced many more confounding variables into the analysis.

The final confounding factor addressed relates to the external events that occurred simultaneously with the observation period of this research. It is uncertain if changes that took place within the logistics functions of supply and transportation influenced any of the maintenance operations. These areas were affected similarly to aircraft maintenance and work to support their primary mission. Additionally, varying defense budgets and the programs they are focused towards may have unknowingly influenced overall results.

**Summary**

Chapter 3 outlined the methodology used in conducting this research. It included the research paradigm and theoretical model used in defining this research. Additionally, the population and sample used in the analysis and the variables selected were outlined along with the sources of data and time interval of data collection. The statistical tool and various analytical methods used in conducting the analysis were also described in detail. Finally, a number of possible confounding factors surrounding this research were presented.

# IV. Data Analysis and Results

## Overview

Chapter 4 presents the analysis conducted and results obtained while researching the effectiveness of aircraft maintenance under the combat wing structure. The analysis portion was divided into two phases in an effort to identify whether or not changes to maintenance performance occurred following the reorganization. In the first phase, the characteristics of the sampling data were analyzed for those F-16 and KC-135 aircraft maintenance metrics outlined in Chapter 3. Sampling distributions were created and tested for normality, equality of variance, and comparison of means. Variance and means comparison test results were further analyzed for specific effect on the three categories of maintenance metrics. During the second phase, trend analysis was performed using simple linear regression and data plotting. These results were similarly characterized and investigated for effected changes as a result of the reorganization. The following paragraphs present a systematic compilation of the testing and analysis results.

## Analysis Results

The results of the analysis will contribute to determining the level of aircraft maintenance performance prior to and following the Air Force's implementation of the combat wing structure. They will first demonstrate whether or not statistically significant differences exist between the two data sets. This is performed in an effort to ascertain the effectiveness of achieving the objectives set forth for aircraft maintenance organizations. Results will also suggest if organizational structure was a major factor contributing to any observed changes in performance measurements. Individual results of the previously described tests are presented in the following paragraphs.

**Normality Tests**

Each of the variables from the six aircraft maintenance organizations was tested for normality across pre- and post-implementation time segments. Of the 110 possible groups of sample variables, 58 were identified as displaying characteristics representative of a normal distribution. The remaining 52 sample selections were categorized as non-normal distributions and directed any further analysis to follow non-parametric means. Separate unit and individual variable results are explained in the following paragraphs. Detailed analysis results representing the normality tests are presented in Appendix E.

20FW. As a result of testing the 20 variables from the 20FW for normality, 9 were identified as being normally distributed during both pre- and post-implementation. DEV, SFA, SUTE, AR, BR, CR, R/R, TNMCM, and MC all had p-values which justified accepting the null hypothesis that the distributions were normal for both segments of data. The remaining 11 variables rejected the null hypothesis in either pre- or post-implementation portions resulting in it being considered from a non-normal distribution. The variables included in this category are: FHA, FSE, MSE, HUTE, FR, RC, RP, APA, DD, RCP, and MMH. Table 4 depicts the results of the normality test for the 20FW.

Table 4. 20FW Shapiro-Wilk Normality Test Results

| **20FW** | **Shapiro-Wilk Normality Test** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Normal | Non-Normal | Variable | Normal | Non-Normal | Variable | Normal | Non-Normal |
| DEV | X | | FR | | X | APA | | X |
| FHA | | X | AR | X | | DD | | X |
| SFA | X | | BR | X | | R/R | X | |
| FSE | | X | CR | X | | RCP | | X |
| MSE | | X | RC | | X | MMH | | X |
| HUTE | | X | RP | | X | TNMCM | X | |
| SUTE | X | | | | | MC | X | |

27FW. Data from the 27FW presented 12 variables characterized as reflective of a normal distribution. A p-value in excess of 0.05 was obtained for FHA, SFA, FSE, HUTE, SUTE, FR, AR, BR, RC, RP, APA, and R/R data. The eight variables of DEV, MSE, CR, DD, RCP, MMH, TNMCM, and MC could not be considered from the normal distribution as represented by a p-value of less than 0.05.

Table 5. 27FW Shapiro-Wilk Normality Test Results

| 27FW | Shapiro-Wilk Normality Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Normal | Non-Normal | Variable | Normal | Non-Normal | Variable | Normal | Non-Normal |
| DEV | | X | FR | X | | APA | X | |
| FHA | X | | AR | X | | DD | | X |
| SFA | X | | BR | X | | R/R | X | |
| FSE | X | | CR | | X | RCP | | X |
| MSE | | X | RC | X | | MMH | | X |
| HUTE | X | | RP | X | | TNMCM | | X |
| SUTE | X | | | | | MC | | X |

388FW. The 11 variables of DEV, SFA, HUTE, SUTE, FR, BR, APA, R/R, MMH, TNMCM, and MC from the 388FW all accepted the null hypothesis with a p-value greater than 0.05. There were nine variables characterized as being of a non-normal distribution. They include FHA, FSE, MSE, AR, CR, RC, RP, DD, and RCP and are depicted in Table 6.

Table 6.  388FW Shapiro-Wilk Normality Test Results

| 388FW | Shapiro-Wilk Normality Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Normal | Non-Normal | Variable | Normal | Non-Normal | Variable | Normal | Non-Normal |
| DEV | X | | FR | X | | APA | X | |
| FHA | | X | AR | | X | DD | | X |
| SFA | X | | BR | X | | R/R | X | |
| FSE | | X | CR | | X | RCP | | X |
| MSE | | X | RC | | X | MMH | X | |
| HUTE | X | | RP | | X | TNMCM | X | |
| SUTE | X | | | | | MC | X | |

<u>22ARW</u>.  Data from the 22ARW exposed 9 of the 17 tested variables as being from a normal distribution.  HUTE, SUTE, FR, BR, CR, RP, APA, DD, and MMH all had sufficient p-values which accepted the null hypothesis.  The other eight variables of FHA, SFA, MSE, AR, RC, R/R, TNMCM, and MC were considered from non-normal distributions.  Each possessed a p-value less than 0.05 which rejected the null hypothesis.  Table 7 and subsequent tables include the characters "n/a" identifying those variables not applicable to the test performed.

Table 7.  22ARW Shapiro-Wilk Normality Test Results

| 22ARW | Shapiro-Wilk Normality Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Normal | Non-Normal | Variable | Normal | Non-Normal | Variable | Normal | Non-Normal |
| DEV | n/a | n/a | FR | X | | APA | X | |
| FHA | | X | AR | | X | DD | X | |
| SFA | | X | BR | X | | R/R | | X |
| FSE | n/a | n/a | CR | X | | RCP | n/a | n/a |
| MSE | | X | RC | | X | MMH | X | |
| HUTE | X | | RP | X | | TNMCM | | X |
| SUTE | X | | | | | MC | | X |

92ARW. From the 16 variables of the 92ARW, 10 were categorized as being normally distributed with p-values exceeding the 0.05 level of significance. FHA, SFA, HUTE, SUTE, FR, BR, RC, RP, R/R, and TNMCM all accepted the null hypothesis. Only the remaining six variables of AR, CR, APA, DD, MMH, and MC rejected the null hypothesis and were considered from a non-normal distribution.

Table 8. 92ARW Shapiro-Wilk Normality Test Results

| 92ARW | Shapiro-Wilk Normality Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Normal | Non-Normal | Variable | Normal | Non-Normal | Variable | Normal | Non-Normal |
| DEV | n/a | n/a | FR | X | | APA | | X |
| FHA | X | | AR | | X | DD | | X |
| SFA | X | | BR | X | | R/R | X | |
| FSE | n/a | n/a | CR | | X | RCP | n/a | n/a |
| MSE | n/a | n/a | RC | X | | MMH | | X |
| HUTE | X | | RP | X | | TNMCM | X | |
| SUTE | X | | | | | MC | | X |

319ARW. Again, 17 variables were tested against the null hypothesis that the data were from a normal distribution. The seven variables of SFA, HUTE, SUTE, FR, BR, TNMCM, and MC from the 319ARW accepted the null hypothesis with p-values greater than 0.05. FHA, MSE, AR, CR, RC, RP, APA, DD, R/R, and MMH were the other variables considered from non-normal distributions by their respective p-values.

Table 9.  319ARW Shapiro-Wilk Normality Test Results

| 319ARW | Shapiro-Wilk Normality Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Normal | Non-Normal | Variable | Normal | Non-Normal | Variable | Normal | Non-Normal |
| DEV | n/a | n/a | FR | X | | APA | | X |
| FHA | | X | AR | | X | DD | | X |
| SFA | X | | BR | X | | R/R | | X |
| FSE | n/a | n/a | CR | | X | RCP | n/a | n/a |
| MSE | | X | RC | | X | MMH | | X |
| HUTE | X | | RP | | X | TNMCM | X | |
| SUTE | X | | | | | MC | X | |

## Variance Tests

Variance tests were used as the second step in determining the composition of sample data.  They were also used in recognizing changes that may have occurred following the implementation of the combat wing structure.  Homogeneity of variance was first tested to overcome the assumption of equal variance between data sets.  Next, sample variances of each variable were identified and evaluated for the direction of change that occurred between pre- and post-implementation data.

Results of the Levene test yielded 31 out of the 110 total variables displaying unequal variance characteristics.  Similarity in variance was detected in 79 variables by way of p-values which accepted the null hypothesis that the variances were equal.  Of the 31 variables identified as unequal, 13 were determined to have improved through a decrease in variance.  The remaining 18 variables demonstrated a worsening in results reflected by an increase in variance.  Detailed analysis results and data tables representing the tests for equal variance and direction of change are found in Appendix F.

20FW.  There were 6 variables from the 20FW which possessed unequal variance and 14 that were determined to be equal.  A p-value of less than 0.05 was obtained for the variables of DEV, FSE, MSE, BR, APA, and MMH rejecting the null hypothesis. FHA, SFA, HUTE, SUTE, FR, AR, CR, RC, RP, DD, R/R, RCP, TNMCM, and MC all demonstrated p-values which allowed accepting that their variances were equal.

Upon recognition of the six variables with unequal variance, further examination was conducted to determine the direction of change which occurred. The three Overall Balance variables of DEV, FSE, and MSE all showed improvements through a decrease in variance. In contrast, the Sortie Production variable of BR and two Fleet Health variables of APA and MMH demonstrated degraded performance through an increase in variance. Table 10 identifies those variables determined to have unequal variance and/or improved variance by the mark in the respective column.

Table 10. 20FW Levene Homogeneity of Variance Test Results

| 20FW | Variance Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Unequal | Improved | Variable | Unequal | Improved | Variable | Unequal | Improved |
| DEV | X | X | FR | | | APA | X | |
| FHA | | | AR | | | DD | | X |
| SFA | | | BR | X | | R/R | | X |
| FSE | X | X | CR | | | RCP | | |
| MSE | X | X | RC | | X | MMH | X | |
| HUTE | | | RP | | | TNMCM | | |
| SUTE | | | | | | MC | | |

<u>27FW</u>. Data from the 27FW exposed 4 variables with unequal variance and 16 variables characterized with equal variance. Only CR, APA, DD, and R/R rejected the null hypothesis with p-values of less than 0.05, classifying their variances as unequal. The p-values of DEV, FHA, SFA, FSE, MSE, HUTE, SUTE, FR, AR, BR, RC, RP,

RCP, MMH, TNMCM, and MC all exceeded 0.05. By accepting the null hypothesis, these variables were all considered having equal variance.

One Sortie Production variable and two Fleet Health variables showed improved variance between pre- and post-implementation data. These variables were BR, APA, and R/R respectively. Only the Fleet Health variable of DD showed an apparent increase and subsequent worsening in variance.

Table 11. 27FW Levene Homogeneity of Variance Test Results

| **27FW** | **Variance Test** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Unequal | Improved | Variable | Unequal | Improved | Variable | Unequal | Improved |
| DEV | | X | FR | | | APA | X | X |
| FHA | | | AR | | | DD | X | |
| SFA | | X | BR | | X | R/R | X | X |
| FSE | | | CR | X | X | RCP | | X |
| MSE | | X | RC | | X | MMH | | |
| HUTE | | | RP | | X | TNMCM | | X |
| SUTE | | X | | | | MC | | |

<u>388FW</u>. Only 2 of the 20 total variables from the 388FW rejected the null hypothesis and were considered having unequal variance. MSE and APA were the only two variables with a p-value less than the 0.05 significance level representing unequal variance. The remaining variables obtained p-values greater than 0.05 and were considered having equal variance. These 18 variables included DEV, FHA, SFA, FSE, HUTE, SUTE, FR, AR, BR, CR, RC, RP, DD, R/R, RCP, MMH, TNMCM, and MC.

Both the Overall Balance variable, MSE, and Fleet Health variable, APA, exhibited improved variance following the change in organizational structure.

Table 12.  388FW Levene Homogeneity of Variance Test Results

| 388FW | Variance Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Unequal | Improved | Variable | Unequal | Improved | Variable | Unequal | Improved |
| DEV | | X | FR | | | APA | X | X |
| FHA | | | AR | | | DD | | |
| SFA | | X | BR | | X | R/R | | X |
| FSE | | | CR | | | RCP | | X |
| MSE | X | X | RC | | | MMH | | |
| HUTE | | | RP | | X | TNMCM | | X |
| SUTE | | X | | | | MC | | |

<u>22ARW</u>.  There were 5 of 17 variables from the 22ARW that had p-values less than 0.05, rejecting the null hypothesis that their variances were equal.  FHA, SFA, HUTE, SUTE, and DD were classified as having unequal variance.  The other 12 variables all possessed p-values which were greater than 0.05.  Equal variance was identified for MSE, FR, AR, BR, CR, RC, RP, APA, R/R, MMH, TNMCM, and MC.

All four Overall Balance variables recognized with unequal variance experienced a worsening in variability.  Included were the variables FHA, SFA, HUTE, and SUTE. In contrast, the Fleet Health variable of DD demonstrated improvement through a notable decrease in variance.

Table 13.  22ARW Levene Homogeneity of Variance Test Results

| 22ARW | Variance Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Unequal | Improved | Variable | Unequal | Improved | Variable | Unequal | Improved |
| DEV | n/a | n/a | FR | | X | APA | | |
| FHA | X | | AR | | X | DD | X | X |
| SFA | X | | BR | | | R/R | | |
| FSE | n/a | n/a | CR | | | RCP | n/a | n/a |
| MSE | | X | RC | | | MMH | | X |
| HUTE | X | | RP | | | TNMCM | | X |
| SUTE | X | | | | | MC | | X |

92ARW. The 92ARW possessed 6 of 16 variables with p-values less than the 0.05 significance level. FHA, SFA, HUTE, SUTE, APA, and MC rejected the null hypothesis that the variances were equal. The other ten variables had p-values greater than 0.05 and were all considered having equal variance. These variables included: FR, AR, BR, CR, RC, RP, DD, R/R, RCP, MMH, and TNMCM.

Again, the Overall Balance variables FHA, SFA, HUTE, and SUTE depicted unequal variance and a degrading in measured value. The Fleet Health variable APA also exhibited these same characteristics. MC, another Fleet Health variable, did however demonstrate a considerable improvement in variance.

Table 14. 92ARW Levene Homogeneity of Variance Test Results

| 92ARW | Variance Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Unequal | Improved | Variable | Unequal | Improved | Variable | Unequal | Improved |
| DEV | n/a | n/a | FR | | | APA | X | |
| FHA | X | | AR | | | DD | | |
| SFA | X | | BR | | | R/R | | X |
| FSE | n/a | n/a | CR | | | RCP | n/a | n/a |
| MSE | n/a | n/a | RC | | X | MMH | | |
| HUTE | X | | RP | | X | TNMCM | | X |
| SUTE | X | | | | | MC | X | X |

319ARW. Just fewer than one-half of the 17 variables from the 319ARW contained p-values of less than 0.05 which rejected the null hypothesis. Unequal variance was considered for the variables of FHA, SFA, MSE, HUTE, SUTE, BR, CR, and APA. The remaining nine variables of FR, AR, RC, RP, DD, R/R, MMH, TNMCM, and MC possessed p-values exceeding 0.05.

All five Overall Balance variables depicted unequal variance and degraded measurements of variability. FHA, SFA, MSE, HUTE, and SUTE all had sizeable increases in variance for post-implementation data. In contrast, two Sortie Production variables and one Fleet Health variable demonstrated significant improvements in variance. BR, CR, and APA obtained measurable decreases in variance under the combat wing structure.

Table 15. 319ARW Levene Homogeneity of Variance Test Results

| 319ARW | Variance Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Unequal | Improved | Variable | Unequal | Improved | Variable | Unequal | Improved |
| DEV | n/a | n/a | FR | | X | APA | X | X |
| FHA | X | | AR | | | DD | | |
| SFA | X | | BR | X | X | R/R | | X |
| FSE | n/a | n/a | CR | X | X | RCP | n/a | n/a |
| MSE | X | | RC | | X | MMH | | |
| HUTE | X | | RP | | X | TNMCM | | X |
| SUTE | X | | | | | MC | | X |

**Comparison of Means Tests**

These tests were conducted in two phases similar to the variance tests exposing the results for this next critical portion of the analysis. The first phase analyzed changes in measurements using an appropriate means comparison test to determine if differences between mean values were significant. During the second phase, the mean values of each variable were identified and evaluated for the direction of change that occurred between pre- and post-implementation data. Summary tables for each aircraft unit were then developed to illustrate the outcomes of both test phases.

Results of the means comparison tests yielded 59 out of the 110 total variables displaying significant differences in mean value. No noticeable changes were detected in 51 variables by way of p-values which accepted the null hypothesis that the mean values were equal. Of the 59 variables identified as significantly different, 37 were determined to have improved in mean value. The remaining 22 variables demonstrated a worsening in results reflected by a degraded mean value. Detailed analysis results and tables representing the means comparisons and direction of change in mean value for each unit are portrayed in Appendix G.

20FW. Data from 11 of the 20 variables analyzed from the 20FW displayed changes of significance through their appropriate comparison of means test. There were four Overall Balance, four Sortie Production, and three Fleet Health Indicators evaluated for improvements to mean value. The p-value of DEV, FHA, SFA, MSE, FR, AR, BR, RC, APA, DD, and MMH all exceeded 0.05 suggesting the two compared values were significantly different.

Upon further analysis, the four variables of DEV, MSE, RC, and DD all showed significant improvement in mean value. In contrast, FHA, SFA, FR, AR, BR, APA, and MMH all portrayed a worsening in mean value. A summary of the results obtained from the 20FW is depicted in Table 16.

Table 16. 20FW Means Comparison Test Results

| 20FW | Means Comparison Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Different | Improved | Variable | Different | Improved | Variable | Different | Improved |
| DEV | X | X | FR | X | | APA | X | |
| FHA | X | | AR | X | | DD | X | X |
| SFA | X | | BR | X | | R/R | | X |
| FSE | | X | CR | | | RCP | | |
| MSE | X | X | RC | X | X | MMH | X | |
| HUTE | | X | RP | | X | TNMCM | | |
| SUTE | | | | | | MC | | X |

27FW. The 27FW data showed considerable changes occurred to 9 of 20 the variables tested. Two Overall Balance, three Sortie Production, and four Fleet Health Indicators all demonstrated significant difference between pre- and post-implementation data. DEV, FSE, FR, BR RP, APA, RCP, TNMCM, and MC all contained p-values of less than 0.05 which rejected the null hypothesis.

The eight variables of DEV, FSE, FR, RP, APA, RCP, TNMCM, and MC all demonstrated improvement in mean values. BR was the only variable to show a measurable worsening in mean value.

Table 17. 27FW Means Comparison Test Results

| 27FW | Means Comparison Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Different | Improved | Variable | Different | Improved | Variable | Different | Improved |
| DEV | X | X | FR | X | X | APA | X | X |
| FHA | | | AR | | | DD | | |
| SFA | | | BR | X | | R/R | | X |
| FSE | X | X | CR | | X | RCP | X | X |
| MSE | | X | RC | | X | MMH | | |
| HUTE | | | RP | X | X | TNMCM | X | X |
| SUTE | | | | | | MC | X | X |

<u>388FW</u>. There were 11 variables which displayed significant changes between data sets from the 388FW. Three Overall Balance, two Sortie Production, and six of the Fleet Health indicators contained p-values that rejected the null hypothesis that the means were the same. DEV, FHA, MSE, AR, BR, APA, DD, RCP, MMH, TNMCM, and MC were all determined to have significantly different values following the reorganization and required further inquiry.

Improvements in mean values were observed by the variables of DEV, FHA, MSE, APA, DD, TNMCM, and MC. Conversely, the variables of AR, BR, RCP, and MMH were all shown to have unwanted changes in mean values.

Table 18. 388FW Means Comparison Test Results

| 388FW | Means Comparison Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Different | Improved | Variable | Different | Improved | Variable | Different | Improved |
| DEV | X | X | FR | | X | APA | X | X |
| FHA | X | X | AR | X | | DD | X | X |
| SFA | | X | BR | X | | R/R | | X |
| FSE | | X | CR | | | RCP | X | |
| MSE | X | X | RC | | | MMH | X | |
| HUTE | | X | RP | | X | TNMCM | X | X |
| SUTE | | | | | | MC | X | X |

<u>22ARW</u>. Analysis of the 22ARW data identified 11 of 17 variables having p-values which indicated significant changes in mean values. Overall Balance and Sortie Production both contained four variables and Fleet Health possessed three variables. FSA, SFA, MSE, HUTE, FR, AR, CR, RC, APA, R/R, and MMH all rejected the null hypothesis that the means were the same. Additional investigation was conducted on these variables.

Further examination showed improvements to mean values in 7 of the 11 variables that were previously identified with significant changes. They included the variables of FHA, SFA, HUTE, AR, CR, APA, and MMH. Alternatively, the variables of MSE, FR, RC, and R/R had unwanted directional changes in mean value.

Table 19. 22ARW Means Comparison Test Results

| 22ARW | Means Comparison Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Different | Improved | Variable | Different | Improved | Variable | Different | Improved |
| DEV | n/a | n/a | FR | X | | APA | X | X |
| FHA | X | X | AR | X | X | DD | | X |
| SFA | X | X | BR | | | R/R | X | |
| FSE | n/a | n/a | CR | X | X | RCP | n/a | n/a |
| MSE | X | | RC | X | | MMH | X | X |
| HUTE | X | X | RP | | | TNMCM | | X |
| SUTE | | X | | | | MC | | |

92ARW. For the 92ARW, means comparison tests identified 8 of the 16 total variables tested as showing significant changes between pre- and post-implementation data. Three Overall Balance, one Sortie Production, and four Fleet Health variables rejected the null hypothesis that the means were the same. FHA, SFA, HUTE, CR, APA, DD, TNMCM, and MC contained p-values less than the 0.05 level of significance and were evaluated for direction of change.

A desirable improvement in mean value and variance was found in the variables of FHA, SFA, HUTE, CR, APA, TNMCM, and MC. Only one variable, DD, had a degraded mean value following the change to organizational structure.

Table 20. 92ARW Means Comparison Test Results

| 92ARW | Means Comparison Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Different | Improved | Variable | Different | Improved | Variable | Different | Improved |
| DEV | n/a | n/a | FR | | | APA | X | X |
| FHA | X | X | AR | | | DD | X | |
| SFA | X | X | BR | | | R/R | | X |
| FSE | n/a | n/a | CR | X | X | RCP | n/a | n/a |
| MSE | n/a | n/a | RC | | X | MMH | | X |
| HUTE | X | X | RP | | X | TNMCM | X | X |
| SUTE | | X | | | | MC | X | X |

319ARW. Significant changes were identified in 9 of the 17 variables from the 319ARW. All five Overall Balance, two Sortie Production, and two Fleet Health indicator variables rejected the null hypothesis with p-values less than 0.05. FHA, SFA, MSE, HUTE, SUTE, AR, CR, APA, and MC all had significant changes in mean value and were investigated further.

An improved mean value was observed in the variables of FHA, SFA, HUTE, SUTE, CR, APA, and MC. In contrast, both MSE and AR possessed degraded mean values.

Table 21. 319ARW Means Comparison Test Results

| 319ARW | Means Comparison Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | SORTIE PRODUCTION | | | FLEET HEALTH | | |
| Variable | Different | Improved | Variable | Different | Improved | Variable | Different | Improved |
| DEV | n/a | n/a | FR | | X | APA | X | X |
| FHA | X | X | AR | X | | DD | | X |
| SFA | X | X | BR | | X | R/R | | X |
| FSE | n/a | n/a | CR | X | X | RCP | n/a | n/a |
| MSE | X | | RC | | X | MMH | | X |
| HUTE | X | X | RP | | X | TNMCM | | X |
| SUTE | X | X | | | | MC | X | X |

**Qualitative Summary Results**

The results from the previous two phases of the analysis were combined and categorized using the nine possible alternatives described in the methodology. This data was plotted for each variable to expose any patterns in the results. Two separate data plots were developed for each aircraft type with a specific focus on either mean or variance. Then, a transformation was performed to quantify the data into measurable information for further consideration. Weighted factoring was then applied to appropriately evaluate detected changes. Data plots used for this portion of the analysis are provided in Appendix H. The following paragraphs present summary results obtained for each individual aircraft type and an overall combined summary.

F-16 Summary. When evaluating the categorical data plots of the F-16 aircraft units, clearly recognizable patterns were apparent. First, it was observed that a sizeable number of variables displayed universal improvements in mean value. Fleet Health was the primary beneficiary with a pattern of improvement surrounding the indicators of APA, DD, TNMCM, and MC. Additionally, Overall Balance indicators of DEV and MSE showed enhanced mean values. In contrast, only a small detectable pattern was evident in Sortie Production with universally degraded mean values to both AR and BR. Fleet Health portrayed one indicator, MMH, which appeared to have worsened in this aspect. When observing the impact on variance, an overwhelming majority were not influenced. The Overall Balance variable MSE and Fleet Health variable APA were the only two with a noticeable array, both indicating a positive effect on variability.

Upon consolidating this information by category and transposing it to numerical values, it was identified that nearly 60 percent of the variables displayed considerable changes. Evaluating these changes, 37 percent of the total variables showed sizable improvements in either mean value or variance. The most noticeable were gains in mean value without affecting variance which occurred to 23 percent of the variables. Just as important to realize is that less than 20 percent were negatively impacted since the reorganization was performed. Table 22 portrays the collective numerical results obtained for the F-16 aircraft.

Table 22. F-16 Means/Variance Summary Results

| F-16 | Summary | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | +M,+V | +M,=V | =M,+V | +M,-V | =M,=V | -M,+V | =M,-V | -M,=V | -M,-V | Total |
| OVERALL BALANCE | 3 | 4 | 1 | 0 | 11 | 0 | 0 | 2 | 0 | 21 |
| SORTIE PRODUCTION | 0 | 3 | 1 | 0 | 8 | 0 | 0 | 5 | 1 | 18 |
| FLEET HEALTH | 2 | 7 | 1 | 0 | 6 | 0 | 1 | 2 | 2 | 21 |
| Total | 5 | 14 | 3 | 0 | 25 | 0 | 1 | 9 | 3 | 60 |
| Percent | 8.33% | 23.33% | 5.00% | 0.00% | 4167% | 0.00% | 167% | 15.00% | 5.00% | 100.00% |

This information was then assessed using the weighted factor analysis described in the methodology portion of this research. Table 19 depicts the weight value applied above each of the respective categories. Values were calculated for each classification and variable type followed by category totals. The performance indicators of Overall Balance and Fleet Health received positive scores of nine (+9) and five (+5) respectively. Using these quantities, both areas were deemed to have improved since implementing the combat wing structure. Sortie Production, however, was determined to have worsened under this structure with a score of negative three (-3). Combining this information, the

F-16 aircraft appeared to benefit overall with a score of positive eleven (+11). These results are portrayed in Table 23.

Table 23. F-16 Weighted Factor Results

| F-16 | Weighted Factor Summary | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Weighted Value | 2 | 1 | 1 | 0 | 0 | 0 | -1 | -1 | -2 | |
| Variable | +M,+V | +M,=V | =M,+V | +M,-V | =M,=V | -M,+V | =M,-V | -M,=V | -M,-V | Total |
| OVERALL BALANCE | 6 | 4 | 1 | 0 | 0 | 0 | 0 | -2 | 0 | 9 |
| SORTIE PRODUCTION | 0 | 3 | 1 | 0 | 0 | 0 | 0 | -5 | -2 | -3 |
| FLEET HEALTH | 4 | 7 | 1 | 0 | 0 | 0 | -1 | -2 | -4 | 5 |
| Total | 10 | 14 | 3 | 0 | 0 | 0 | -1 | -9 | -6 | **11** |

KC-135 Summary. As done with the F-16 aircraft, categorical data plots for the KC-135 were first analyzed for detectable patterns. Again, desirable improvements in mean value were evident in numerous areas. Tight groupings surrounded the Overall Balance indicators FHA, SFA, and HUTE. Equally noticeable was the cluster around the Sortie Production variable of CR. Fleet Health also demonstrated consistent gains to APA quantities. Universal degradation to mean values was nearly undetectable with the Overall Balance indicator of MSE being the only variable under possible consideration. When observing the impacts on variability, Overall Balance portrayed the only patterns which were all negative. FHA, SFA, HUTE, and SUTE all suffered with increased variance subsequent to the implementation of the combat wing structure.

Numerical values were again tabulated for each of the different variable types and change classifications. Once more, a comparative 62 percent of the total variables demonstrated evident changes to either mean value or variance. A cumulative 24 percent of the variables showed only improvements in both areas. An additional 22 percent rendered an enhancement in mean values, but were combined with degraded variance. Only 18 percent of the total variables depicted a worsening in mean value or variance. The information previously described is presented in its entirety in Table 24.

Table 24. KC-135 Means/Variance Summary Results

| KC-135 | Summary | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | +M,+V | +M,=V | =M,+V | +M,-V | =M,=V | -M,+V | =M,-V | -M,=V | -M,-V | Total |
| OVERALL BALANCE | 0 | 0 | 0 | 10 | 0 | 0 | 2 | 1 | 1 | 14 |
| SORTIE PRODUCTION | 1 | 3 | 1 | 0 | 10 | 0 | 0 | 3 | 0 | 18 |
| FLEET HEALTH | 2 | 4 | 1 | 1 | 8 | 0 | 0 | 2 | 0 | 18 |
| Total | 3 | 7 | 2 | 11 | 18 | 0 | 2 | 6 | 1 | 50 |
| Percent | 6.00% | 14.00% | 4.00% | 22.00% | 36.00% | 0.00% | 4.00% | 12.00% | 2.00% | 100.00% |

Using the weighted factors analysis as before, the outcome was shown to have improved overall KC-135 aircraft maintenance actions. Overall Balance was inferior to previous performance scoring negative five (-5). On the contrary, Sortie Production and Fleet Health were enhanced acquiring individual scores of positive three (+3) and positive seven (+7). Final computations resulted in attaining a cumulative score of positive five (+5) for this aircraft.

Table 25. KC-135 Weighted Factor Results

| KC-135 | Weighted Factor Summary | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Weighted Value | 2 | 1 | 1 | 0 | 0 | 0 | -1 | -1 | -2 | |
| Variable | +M,+V | +M,=V | =M,+V | +M,-V | =M,=V | -M,+V | =M,-V | -M,=V | -M,-V | Total |
| OVERALL BALANCE | 0 | 0 | 0 | 0 | 0 | 0 | -2 | -1 | -2 | -5 |
| SORTIE PRODUCTION | 2 | 3 | 1 | 0 | 0 | 0 | 0 | -3 | 0 | 3 |
| FLEET HEALTH | 4 | 4 | 1 | 0 | 0 | 0 | 0 | -2 | 0 | 7 |
| Total | 6 | 7 | 2 | 0 | 0 | 0 | -2 | -6 | -2 | **5** |

Overall Results Summary. To gain insight into the overall impact to the Air Force as a whole, results from both aircraft types were combined and analyzed. As expected, 60 percent of the 110 variables showed changes of one type or another. Calculations revealed 30 percent of the total experienced only positive effects. Another 10 percent recognized equally improvements to mean value, but were combined with an increase in variability. Merely 19 percent of the total variables displayed progress solely in an unfavorable direction. These results are depicted in Table 26.

Table 26. Overall Means/Variance Summary Results

| Overall | Summary | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | +M,+V | +M,=V | =M,+V | +M,-V | =M,=V | -M,+V | =M,-V | -M,=V | -M,-V | Total |
| OVERALL BALANCE | 3 | 4 | 1 | 10 | 11 | 0 | 2 | 3 | 1 | 35 |
| SORTIE PRODUCTION | 1 | 6 | 2 | 0 | 18 | 0 | 0 | 8 | 1 | 36 |
| FLEET HEALTH | 4 | 11 | 2 | 1 | 14 | 0 | 1 | 4 | 2 | 39 |
| Total | 8 | 21 | 5 | 11 | 43 | 0 | 3 | 15 | 4 | 110 |
| Percent | 7.27% | 19.09% | 4.55% | 10.00% | 39.09% | 0.00% | 2.73% | 13.64% | 3.64% | 100.00% |

After applying weighted factors, category totals revealed definitive improvements in performance. Overall Balance portrayed an enhancement with a total score of positive four (+4). Sortie Production demonstrated a neutral outcome balancing out with a score of zero (0). Fleet Health showed an overwhelming improvement with a resulting score of positive twelve (+12). An overall enhancement to aircraft maintenance performance was achieved represented by a score of positive sixteen (+16).

Table 27. Overall Weighted Factor Summary Results

| **Overall** | **Weighted Factor Summary** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Weighted Value | 2 | 1 | 1 | 0 | 0 | 0 | -1 | -1 | -2 | |
| Variable | +M ,+V | +M ,=V | =M ,+V | +M ,-V | =M ,=V | -M ,+V | =M ,-V | -M ,=V | -M ,-V | Total |
| OVERALL BALANCE | 6 | 4 | 1 | 0 | 0 | 0 | -2 | -3 | -2 | 4 |
| SORTIE PRODUCTION | 2 | 6 | 2 | 0 | 0 | 0 | 0 | -8 | -2 | 0 |
| FLEET HEALTH | 8 | 11 | 2 | 0 | 0 | 0 | -1 | -4 | -4 | 12 |
| Total | 16 | 21 | 5 | 0 | 0 | 0 | -3 | -15 | -8 | **16** |

Sensitivity Analysis. Next, sensitivity analysis was performed to understand the implications of selecting equal weights for changes in mean value and variance. It was apparent that most reports and briefings used to convey performance results did not consider variance. For this reason, the weight applied to changes in variance was reduced from one to zero in one-tenth increments for both aircraft types and the overall summary results. The effects of these changes were then analyzed for impact on the previously obtained results. The following paragraphs describe the outcome of this analysis.

Figure 10 portrays the impact of changing the weight applied to differences in variance on each of the three F-16 performance indicators and the total. It is made apparent that Overall Balance, Fleet Health, and the summary total still remain positive numbers. Sortie Production is unaffected by the changes and remains constant at negative three (-3). This indicates that previously obtained results are resolute in their depiction of F-16 aircraft maintenance performance.

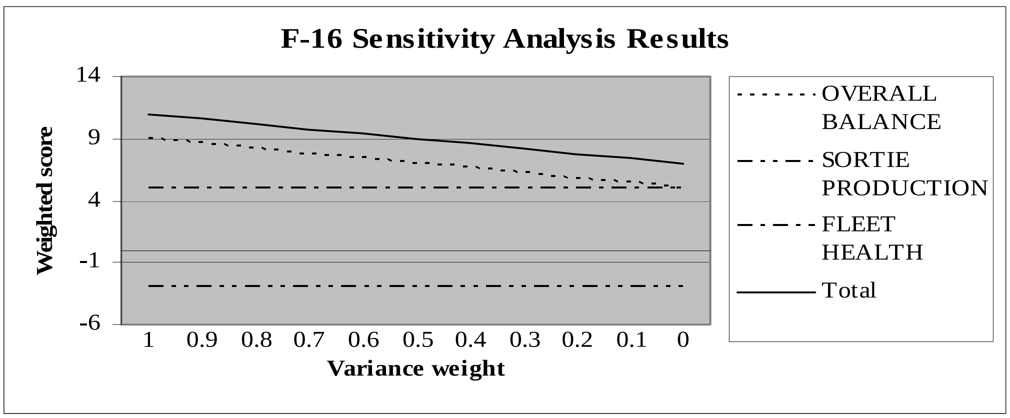



Figure 10. F-16 Sensitivity Analysis of Weighted Variance

The same procedures were performed for the KC-135 aircraft and are presented in Figure 11. As the weight given to variance is reduced, the Overall Balance indicator reverts from negative to positive at approximately 0.6. The two other indicators and the total all remain above zero throughout the entire range of variance weights. This denotes that if changes in variance are considered one-half as important as changes in mean value or less, every aspect of KC-135 aircraft maintenance performance achieved positive results.

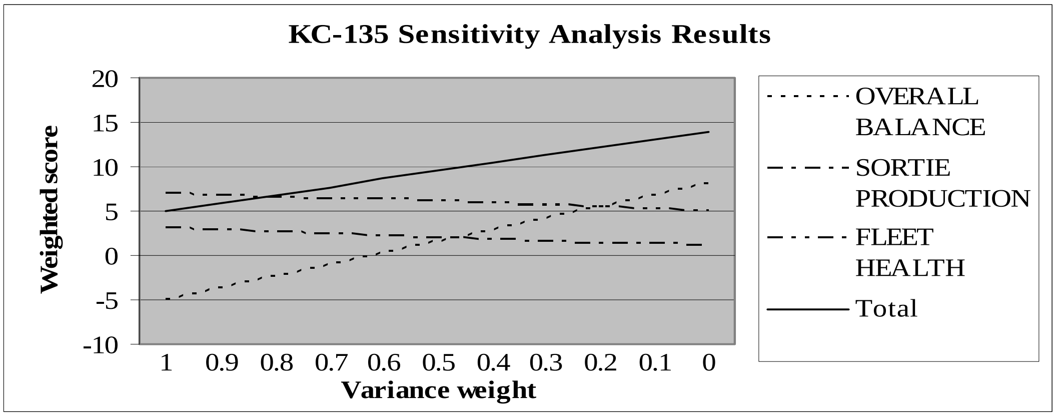



Figure 11.  KC-135 Sensitivity Analysis of Weighted Variance

The final step in performing sensitivity analysis involved observing the effects on the combined performance indicators of both aircraft.  Figure 12 represents the impact of the diminishing values given to changes in variance on overall performance indicators and assessment total.  First to point out is that the comprehensive total indication shows that performance fell substantially above zero on the scale.  This fact is further enhanced with the reduction of weight assigned to changes in variance.  Additionally, both Overall Balance and Fleet Health also shared these favorable results resting well into the positive range.  Sortie Production, however, begins a slight decline into small negative numbers from its origin at zero on the weighted value scale.

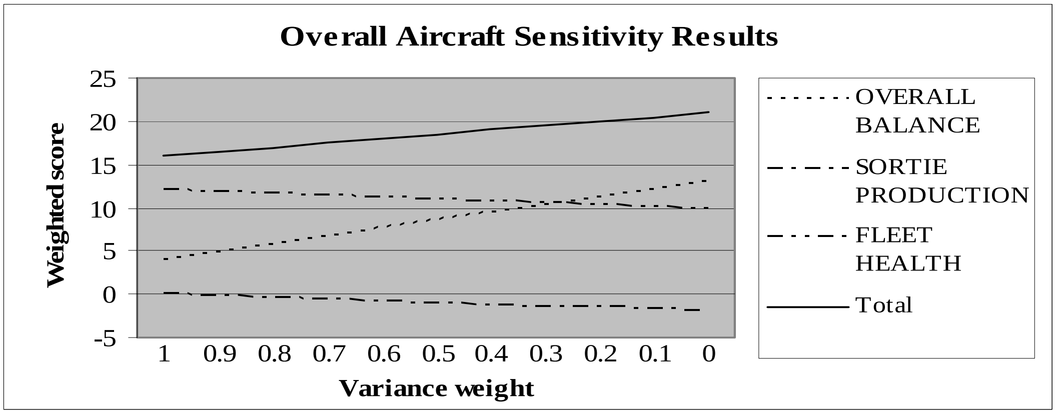



Figure 12. Overall Sensitivity Analysis of Weighted Variance

## Trend Analysis

To further enhance the study, analysis procedures extended into an investigation of resultant trends in aircraft maintenance metrics. Line charts were used to document maintenance measurements for each variable over both collection periods. Then, linear regression was used to determine and plot trend lines in the data. Once identified, these trends were compared to one another to recognize any improvement/degradation toward the desired direction of the metric.

Results of the trend analysis tests identified 42 out of the 110 total variables displaying significant changes in trend direction. No change was noted in the remaining 68 variables. Of the 42 variables identified as significantly different, 26 were determined to have made an improvement in trend direction. The other 16 variables demonstrated an undesirable change in trend direction. There were 12 variables from the combined trends that were characterized as changing significantly which were removed from further use due to uncertainty in the trend. The following paragraphs present the results obtained for each aircraft unit and a combined quantitative outcome of this portion of the study.

Supporting linear regression analysis tables used in this portion of the research are shown in Appendix I.

20FW. Upon evaluating the trends in data from the 20FW, six variables showed significant differences between pre- and post-combat wing structures. This was represented by a p-value of less than 0.05 when using the comparison of regression lines model which rejected the null hypothesis that the slopes the same. One Sortie Production variable, BR, and one Fleet Health variable, MMH, both demonstrated improving trends following the comparison. In contrast, three Overall Balance variables and one Fleet Health variable were identified as shifting toward a worse direction. Included were DEV, FHA, FSE, and APA. Upon further investigation, the variables of DEV, FSE, BR, and MMH were eliminated from additional calculations. The first two appeared to have leveled off at or near a peak value and the later two appeared to be returning to a previously maintained value. Table 28 depicts the variables with significant differences in trend, improvements, and decision of uncertainty as indicated with a mark in the appropriate column.

Table 28. 20FW Trend Analysis

| 20FW | Trend Analysis Results | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | | SORTIE PRODUCTION | | | | FLEET HEALTH | | | |
| Variable | Different | Improved | Uncertain | Variable | Different | Improved | Uncertain | Variable | Different | Improved | Uncertain |
| DEV | X | | X | FR | | | | APA | X | | |
| FHA | X | | | AR | | | | DD | | | |
| SFA | | | | BR | X | X | X | R/R | | X | |
| FSE | X | | X | CR | | | | RCP | | X | |
| MSE | | | | RC | | X | | MMH | X | X | X |
| HUTE | | | | RP | | X | | TNMCM | | X | |
| SUTE | | | | | | | | MC | | X | |

27FW. The data from the 27FW exhibited ten variables with the appropriate slope parameter containing a p-value of less than 0.05 depicting significantly different trends following the implementation of the combat wing structure. This included one Overall Balance, One Sortie Production, and three Fleet Health variables which demonstrated significant improvements to their trend. The variables of MSE, RC, APA, DD, and MC all possessed these characteristics. There were, however, four Overall Balance variables and one Fleet Health variable which showed a worsening in trend. DEV, FHA, HUTE, SUTE, and MMH were all included in this category. Upon evaluation, DEV, SUTE, and DD were excluded from the analysis. Both DEV and SUTE appeared to level off and the remaining variables looked as though they were returning to a previous state.

Table 29. 27FW Trend Analysis

| 27FW | Trend Analysis Results | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | | SORTIE PRODUCTION | | | | FLEET HEALTH | | | |
| Variable | Different | Improved | Uncertain | Variable | Different | Improved | Uncertain | Variable | Different | Improved | Uncertain |
| DEV | X | | X | FR | | | X | APA | X | X | |
| FHA | X | | | AR | | | | DD | X | X | X |
| SFA | | | | BR | | X | X | R/R | | X | |
| FSE | | | X | CR | | X | | RCP | | | |
| MSE | X | X | | RC | X | X | | MMH | X | | |
| HUTE | X | | | RP | | X | | TNMCM | | X | |
| SUTE | X | | X | | | | | MC | X | X | |

388FW. There were seven variables from the 388FW with an appropriate slope parameter containing a p-value less than 0.05, rejecting the null that the slopes were the same. Two Sortie Production variables and two Fleet Health exhibited considerable improvements in trend direction. These variables included FR, RP, R/R, and MC. The three remaining variables of APA, RCP, and MMH all expressed degraded trends.  There was no uncertainty surrounding these variables and therefore all seven were included in later calculations.

Table 30.  388FW Trend Analysis

| 388FW | Trend Analysis Results | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | | SORTIE PRODUCTION | | | | FLEET HEALTH | | | |
| Variable | Different | Improved | Uncertain | Variable | Different | Improved | Uncertain | Variable | Different | Improved | Uncertain |
| DEV | | X | | FR | X | X | | APA | X | | |
| FHA | | | X | AR | | | | DD | | X | X |
| SFA | | | | BR | | | | R/R | X | X | |
| FSE | | X | | CR | | X | | RCP | X | | |
| MSE | | | X | RC | | X | | MMH | X | | |
| HUTE | | | X | RP | X | X | | TNMCM | | X | |
| SUTE | | | | | | | | MC | X | X | |

<u>22ARW</u>.  There were five variables from the 22ARW with an appropriate slope parameter which rejected the null hypothesis and were considered significantly different. One Overall Balance variable, SUTE, one Sortie Production variable, BR, and two Fleet Health variables all showed an improvement in trend following the reorganization.  Only the additional Fleet Health variable, APA, showed a degrading in trend direction.  Of these, SUTE and APA were both barred from further use as a result of uncertainty regarding the reason for change.  It was perceived that these variables were returning to a previously maintained value.

Table 31. 22ARW Trend Analysis

| 22ARW | Trend Analysis Results | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | | SORTIE PRODUCTION | | | | FLEET HEALTH | | | |
| Variable | Different | Improved | Uncertain | Variable | Different | Improved | Uncertain | Variable | Different | Improved | Uncertain |
| DEV | n/a | n/a | n/a | FR | | X | X | APA | X | | X |
| FHA | | X | X | AR | | | | DD | X | X | |
| SFA | | | | BR | X | X | | R/R | | X | X |
| FSE | n/a | n/a | n/a | CR | | X | | RCP | n/a | n/a | n/a |
| MSE | | X | X | RC | | X | | MMH | X | X | |
| HUTE | | X | | RP | | X | X | TNMCM | | X | |
| SUTE | X | X | X | | | | | MC | | | |

92ARW. The data from the 92ARW exhibited nine variables with the appropriate slope parameter containing a p-value of less than 0.05 depicting significantly different trends following the implementation of the combat wing structure. There were four Overall Balance and three Fleet Health variables which demonstrated an improvement in trend direction. These variables included FHA, SFA, HUTE, SUTE, APA, DD, and MMH respectively. Two additional Fleet Health variables, TNMCM and MC, depicted worsening trend changes following the reorganization. These two variables, however, and DD were excluded due to uncertainty involving trend direction.

Table 32. 92ARW Trend Analysis

| 92ARW | Trend Analysis Results | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | | SORTIE PRODUCTION | | | | FLEET HEALTH | | | |
| Variable | Different | Improved | Uncertain | Variable | Different | Improved | Uncertain | Variable | Different | Improved | Uncertain |
| DEV | n/a | n/a | n/a | FR | | X | | APA | X | X | |
| FHA | X | X | | AR | | X | | DD | X | X | X |
| SFA | X | X | | BR | | | X | R/R | | | |
| FSE | n/a | n/a | n/a | CR | | X | | RCP | n/a | n/a | n/a |
| MSE | n/a | n/a | n/a | RC | | | X | MMH | X | X | |
| HUTE | X | X | | RP | | X | | TNMCM | X | | X |
| SUTE | X | X | | | | | | MC | X | | X |

319ARW. Five variables from the 319ARW were identified as having significantly different trends by the appropriate regression model parameter and its associated p-value. One Overall Balance, two Sortie Production, and one Fleet Health variable depicted improving trends following the implementation of the combat wing structure. These variables included FHA, FR, BR, and MMH. Only MSE, an Overall Balance variable, demonstrated a significant degrading in direction of trend. All of these variables were able to be used during the next stage of calculations.

Table 33. 319ARW Trend Analysis

| 319ARW | Trend Analysis Results | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| OVERALL BALANCE | | | | SORTIE PRODUCTION | | | | FLEET HEALTH | | | |
| Variable | Different | Improved | Uncertain | Variable | Different | Improved | Uncertain | Variable | Different | Improved | Uncertain |
| DEV | n/a | n/a | n/a | FR | X | X | | APA | | X | |
| FHA | X | X | | AR | | X | | DD | | X | |
| SFA | | X | | BR | X | X | | R/R | | X | |
| FSE | n/a | n/a | n/a | CR | | X | | RCP | n/a | n/a | n/a |
| MSE | X | | | RC | | X | | MMH | X | X | |
| HUTE | | X | | RP | | X | | TNMCM | | X | |
| SUTE | | X | | | | | | MC | | X | |

Overall Summary Results. Table 34 lists the category totals attained after calculations were tabulated for each aircraft unit. Positive numbers in the table indicate the cumulative number of trends that reverted from an unwanted direction to a preferred one. Conversely, negative numbers reflect the cumulative number of trends that changed from desirable to one that was unfavorable. Separate totals can be observed for each aircraft type, performance indicator classification, and overall total.

Table 34. Overall Trend Analysis Results

| Trend Analysis Results by Unit | | | | | | | |
|---|---|---|---|---|---|---|---|
| Variable \ Unit | F-16 | | | KC-135 | | | Total |
| | 20FW | 27FW | 388FW | 22ARW | 92ARW | 319ARW | |
| Overall Balance | -1 | -1 | 0 | 0 | 4 | 0 | 2 |
| Sortie Production | 0 | 1 | 2 | 1 | 0 | 2 | 6 |
| Fleet Health | -1 | 1 | -1 | 2 | 2 | 1 | 4 |
| Unit Total | -2 | 1 | 1 | 3 | 6 | 3 | **12** |

Looking at aircraft type first, only minimal resulting changes in trends were recognized by F-16 organizations. A slight negative trend was shared in Overall Balance across two of the three units with the remaining unit showing no overall difference. Sortie Production demonstrated a favoring toward improvements in direction of change by a majority of the units. A mixed result was obtained in the area of Fleet Health with two units each depicting one negative overall change in trend and the third unit showing a single positive trend change. Overall, the F-16 acquired balanced results with an equal number of improved and degraded changes in trend. The KC-135 units were able to achieve notably consistent trend improvements, as opposed to those previously described for the F-16. Overall Balance contained two units with no resulting changes and one unit with four positive changes in trend direction. One unit expressed no difference in Sortie Production while the remaining two both demonstrated a positive direction of change. Fleet Health displayed increasingly improved results, this time with all units achieving some type overall improvement value. As a whole, the KC-135 depicted overwhelmingly positive results when observing changes in performance trends.

Upon reviewing category totals for Overall Balance, Sortie Production, and Fleet Health, all three depicted considerable positive outcomes. The negative effects to Overall Balance expressed by the F-16 units were overshadowed by the positive effects of the KC-135. This area was able to achieve an overall score of positive two (+2). Sortie Production, however, demonstrated universally improving trends across both aircraft types and obtained a total score of positive six (+6). The larger gains achieved by the KC-135 units again outweighed the losses of F-16 units when summing up the category of Fleet Health. A value of positive four (+4) was calculated in this area. When evaluating all of the major indicators, it appears that overall improvements have been made to changes in trends to aircraft maintenance performance. This is reflected by all positive numbers for the individual totals and an overall total score of positive twelve (+12).

**Summary**

This chapter presented the results of multiple analytical methods used when conducting this research. Common analysis assumptions of normality and variability were first determined in an effort to conduct further mathematical tests. Following these assessments, data comparisons were made along with detailed investigations into the directional changes of significantly different variables. Notable data was then classified into a meaningful arrangement and assigned value through weighted factoring. Finally, trend analysis was used to help solidify the influence organizational structure had on changes in aircraft maintenance performance.

# V. Conclusions and Recommendations

## Introduction

While attempting to find answers to the questions posed at the beginning of this research, numerous direct and indirect findings were made. The following paragraphs describe the conclusions to the analysis in regards to the investigative questions and the overall research question. They are then followed by recommendations that can be made from the analysis results and additional recommendations for future research in this area of study.

## Conclusions

Structural changes are made to organizations with the expectation of improving performance and/or efficiencies within an organization. The Air Force set out for such results when it announced the implementation of the Combat Wing Structure in October, 2002. Through an investigation of published literature, the desired results were said to be focused on improvements to aircraft maintenance in the areas of Overall Balance, Sortie Production, and Fleet Health.

In answering the overall research objective, it was concluded that converting to the current combat wing structure was effective in attaining its proposed outcomes. Each section of the analysis was evaluated and both were in agreement when making this determination. From a comprehensive perspective of analysis results, the majority of areas within each MAJCOM and across the Air Force showed positive effects since the reorganization. F-16 units demonstrated mixed results with substantial gains in Overall Balance and Fleet Health performance measurements. They did, however, produce undesirable results in Sortie Production. To offset this issue, the negative performance measurements were shared improving performance trends in the same area. Only slight negative trends were indicated in the areas of Overall Balance and Fleet Health. KC-135 units achieved greater results showing gains in two of the three areas of performance measurements and all categories of future trends. Overall Balance measurements were the only area of negative performance. As a whole, all performance and trend indications demonstrated positive overall results with the exception of Sortie Production performance which was neutral.

The first and maybe most remarkable finding made during this research was that there is no single metric used to measure any of the three areas in which the Air Force had set out to improve upon. Without a clear and identifiable metric, it is difficult, if not impossible to determine the effects of managerial decisions on respective performance factors. It is also problematic in that what one entity might determine as essential to measuring a certain aspect of organizational effectiveness, another may not. From the measurements selected, it was identified that similar metrics are not used across MAJCOMs, yet Overall Balance, Sortie Production, and Fleet Health are common to all aircraft maintenance organizations.

A second observation which should garner the attention of Air Force leaders was made during the data collection portion of this analysis. It was made apparent that certain elements described by leadership as measures of performance were not readily available at all organizational levels. Aircraft maintenance data are not kept in a universal information management system which causes difficulty in retrieving and performing analysis on past data. Some metrics are not used, stored, or obtainable at different organizational levels due to inadequate systems.

**Recommendations from Analysis**

The first recommendation is in reference to the initial finding of the research. It is imperative that leadership defines what it considers to be indicators of Overall Balance, Sortie Production, and Fleet Health. Without consistency in these topics, maintenance managers at all levels and across organizations are dealt with making their own determinations as to what constitutes each one.

A second recommendation is also directed toward leadership and their ability to closely evaluate maintenance data collection systems used Air Force-wide. Today's technology is capable of performing significantly greater functions than in the past. Establishing an enterprise-wide system would notably enhance communication channels and information transfer to managers and the warfighter. An investigation should be conducted or change directed to the establishment of this type of system.

**Recommendations for Future Research**

During the process of conducting this research, numerous opportunities emerged for possible topics which would advance the subject of this study. The following paragraphs present areas for future research relating to organizational structure and its influence on performance.

Qualitative Research. A second half to this research involves studying the impact to those items considered qualitative in nature. As described in the CLR, the intent of the Air Force-wide reorganization was to not only improve upon sortie production and fleet health, but also build upon the core competencies within each occupational specialty. As with many situations, certain trade-offs may exist between two areas of considerable importance. Improvements recognized in one area may result in a sacrifice to the performance of another. Future research should focus on evaluating those more qualitative managerial related aspects in an attempt to ascertain any changes that occurred since the reorganization.

Performance Metrics. While conducting this research, it was discovered that Fleet Health and Sortie Production are key areas of importance to leadership, yet no single metric exists to measure either of these subjects. Research should be conducted in an effort to aid leadership in modeling and developing metrics that accurately represent the context of what is considered Fleet Health and Sortie Production. In this way, a representation of aircraft maintenance performance could be reviewed and managed.

Logistics Readiness Functions. Two additional major changes that occurred during the recent reorganization were the creation of the Logistics Readiness Officer and segregation of their associated functions from aircraft maintenance. Just as important to understand is the impact that the reorganization had on the Logistics Readiness functions. Research in this area could be performed on the quantitative metrics used in the Logistics Readiness career field or various qualitative measurements established by the researcher.

**Summary**

This chapter culminates the extent of this research with associated conclusions made from the investigation and analysis portions previously described. A focus was maintained on answering the overall research question regarding the effectiveness of aircraft maintenance following the most recent change in organizational structure. Finally, a list of potential future research topics were presented in an effort to further advance the subject of structural change and its impact on aircraft maintenance performance.

## Appendix A - Primary Maintenance Metrics
## (as described in AFI 21-101)

**Abort (Total) Rate (AR).** A unit's abort rate is a leading indicator of both aircraft reliability and quality of maintenance performed. It is the percentage of missions aborted in the air and on the ground. An abort is a sortie that ends prematurely and must be re-accomplished. The abort rate may be measured separately as ground or air aborts.
**Total AR (%)** = Air + Ground Aborts x 100 / Total Sorties Flown + Ground Aborts
**Maintenance aborts** are those sorties ended prematurely on the ground or in the air caused by system failures/maintenance problems. Maintenance abort rates can gauge both aircraft reliability and quality of maintenance performed. Maintenance abort rates can be calculated using the following formulas.
**Maintenance Air AR (%)** = Air Aborts (Maintenance) x 100 / Total Sorties Flown
**Maintenance Ground AR (%)** = Ground Aborts (Maintenance) x 100 / Total Sorties Flown + Ground Aborts
**Break Rate (BR).** The break rate is a leading, flying-related metric. It is the percentage of aircraft that land in "Code-3", or "Alpha-3" for Mobility Air Force (MAF), status (unable to complete at least one of its primary missions). This metric primarily indicates aircraft system reliability. It may also reflect the quality of aircraft maintenance performed. If Fix Rates (refer to paragraph 1.10.3.6.) are used as a measurement of maintainability, the Break Rate is the complementary measurement of reliability. For true evaluation of equipment/system reliability, measurements must be taken at the system/subsystem level. It is also an excellent predictor of parts demand. Several indicators that follow break rate are Mission Capable (MC), Total Not Mission Capable for Supply (TNMCS), Cannibalization Rate (CR) and Repeat/Recur (R/R).
**BR (%)** = Number of Sorties that Land "Code-3" x 100 / Total Sorties Flown
**Cannibalization Rate (CR).** The CR is a leading indicator that reflects the number of cannibalization (CANN) actions (removal of a serviceable part from an aircraft or engine to replace an unserviceable part on another aircraft or engine or to fill an RSP). In most cases, a cannibalization action takes place when base supply cannot deliver the part when needed and mission requirements demand the aircraft be returned to an MC status. The CR is the number of cannibalization actions for total sorties flown. This rate includes all aircraft-to-aircraft, engine-to-aircraft, and aircraft/engine to RSP cannibalization actions. Since supply relies on the back shops and depot for replenishment, this indicator can also be used, in part, to indicate back shop and depot support.
**CR (%)** = Number of Aircraft and Engine CANNs x 100 / Total Sorties Flown
**Deferred (or Delayed) Discrepancy (DD) Rate (DDR).** The DDR is a leading indicator that should be closely evaluated in comparison to other metrics. This rate represents the average deferred discrepancies across the unit's average possessed aircraft fleet. Discrepancies are considered deferred when: a) they are discovered and the decision is made to defer them, b) discrepancies are scheduled with a start date greater than 5 days after the discovery date, or c) discrepancies are awaiting parts with a valid off base requisition. Delayed discrepancies may be Awaiting Maintenance (AWM) or Awaiting Parts (AWP). Although minor maintenance actions must sometimes be deferred or

delayed to a more opportune time, maintenance should try to keep this rate as low as possible. If delayed discrepancies can't be scheduled/combined with a more extensive maintenance action, maintenance schedulers should routinely schedule their aircraft down for a day when required to work deferred discrepancies. The DDR metric measures AWM + AWP rates, though individual AWM and AWP rates can and should also be monitored.

**Total DDR (%)** = Total (Snapshot) AWM + AWP Discrepancies / Average Aircraft Possessed

**AWM DDR (%)** = Total (Snapshot) AMW Discrepancies / Average Aircraft Possessed

**AWP DDR (%)** = Total (Snapshot) AWP Discrepancies / Average Aircraft Possessed

**Aircraft Possession**. A key factor in metrics involves aircraft "possession". The Air Force mandates each aircraft will always be owned or "possessed" by a designated organization. Possession is an indicator of an organization's or aircraft fleet's health. Aircraft that are under the control of their owning base are possessed by that organization. An aircraft that flies to depot for maintenance/inspection or is repaired by a depot team at the base is temporarily possessed by depot. In calculating the various aircraft maintenance metrics, possession is calculated in units of hours normally for specific time periods (e.g., monthly, annual, etc.).

**Departure (Logistics) Reliability (DR) Rate (DRR).** This is a broader leading metric used primarily for airlift aircraft that may show a composite of supply, saturation or maintenance problems. The on-time standard for departures are those within 15 minutes of the daily scheduled departure time. The metric provides the commander with an objective measure of the health of the air mobility system and reflects the percentage of departures that are on-time. The main focus of the departure reliability metric is to strengthen the air mobility system through accountability for process improvement. This metric may also be subdivided into other categories (e.g., worldwide departure or en route).

**DRR (%)** = Number of Departures **–** Number of Logistics Delays x 100 / Number of Departures

**Fix Rate (FR).** The FR is a leading indicator showing how well the repair process is being managed. It is a percentage of aircraft landing with CAP Code-3 or 4 pilot reported discrepancies (PRDs) returned to flyable status in a certain amount of time (clock hours). Problems found by maintenance after the aircraft lands (ground found) are not considered in the fix time. The fix time stops when all CAP Code-3 or 4 PRDs are fixed even if the aircraft remains NMC. This metric is an excellent tool to track "dead time" in aircraft repair processes because it measures the speed of repair and equipment maintainability. The common, standard interval for this metric is 12-hours. However, fighter units typically measure fix rate at shorter intervals (4 and/or 8 hours) along with the 12-hour rate.

**FR (%)** = "Code-3" Breaks Fixed Within 12 Hours of Landing x 100 / Total "Code-3" Breaks

**Flying Schedule Effectiveness (FSE) Rate**. This leading indicator is a measure of how well the unit planned and executed the weekly flying schedule. The flying scheduled developed by tail number is the baseline upon which the FSE is derived by comparing each day's deviations. Deviations that decrease the FSE from 100% include: scheduled sorties not flown because of maintenance, supply, operations, weather, HHQ, air traffic control, sympathy, or other reasons; scheduled sorties that takeoff more than 30 minutes prior to scheduled takeoff; scheduled sorties that takeoff more than 15 minutes after their scheduled takeoff time (30 minutes for RC-135, EC-135, and U-2 aircraft); and sorties that are added to the schedule. Disruptions to the flying schedule can cause turmoil on the flight line, send a ripple effect throughout other agencies, and adversely impact scheduled maintenance actions. [Adjusted Sorties Scheduled = Total Sorties Scheduled - Sorties Cancelled for Monthly/Yearly Utilization (UTE) Rate Achievement + Sorties Added for End of Fiscal Year UTE Close Out]. Some MAF units calculate FSE using the formula in paragraph 1.10.3.7.2.

**FSE (%)** = Adjusted Sorties Scheduled **–** Chargeable Deviations x 100 / Adjusted Sorties Scheduled

**MAF FSE (%)** = Sorties Scheduled **–** Total Deviations x 100 / Sorties Scheduled

**Hangar Queen (HQ) (Average) Rate**. A Hangar Queen is an aircraft that has not flown for at least 30 consecutive days in their possessed status, or not flown within 10 days after being gained from depot possession (in "D/B-Status" codes). Refer to Chapter 18 for HQ categories/criteria. This indicator is used to evaluate management of the Hangar Queen program and to assist units with problems beyond their control. The HQ rate captures the average number of aircraft hangar queen days (all categories) for a specified reporting period.

**HQ (%)** = Total Acft Days in all HQ Categories (in report period) x 100 / Days (in report period)

**Home-Station Logistics Departure Reliability (HSLDR) Rate**. This is a leading metric used primarily by the MAF for airlift aircraft. This delineates down to only first-leg departures of unit-owned aircraft departing home station.

**HSLDR Rate (%)** = # of HS Departures **–** # of HS Logistics Delays x 100 / # of HS Departures

**Maintenance Schedule Effectiveness (MSE).** This is a leading indicator that measures success in the unit's ability to plan and complete inspections and periodic maintenance on-time per the maintenance plan. Deviations to the plan are recorded. A low MSE rate may indicate a unit is experiencing turbulence on the flight line or in the back shops. This indicator is primarily used as feedback to maintenance managers on the success and adherence to scheduled maintenance plans and actions.

**MSE (%)** = Number of Scheduled Mx Actions Completed On-Time x 100 / Total Number of Mx Actions Scheduled

**Mission Capable (MC) Rate**. The MC rate is perhaps the best-known yardstick for measuring a unit's performance. It is the percentage of possessed hours (excluding aircraft in "B-Type" possession purpose code/purpose identifier code status: BJ, BK, BL, BN, BO, BQ, BR, BT, BU, BW, BX) for aircraft that are FMC or PMC for specific measurement periods (e.g., monthly or annual). This metric is a lagging indicator and represents a broad composite of many processes and metrics. A low MC rate may indicate a unit is experiencing many hard breaks, parts supportability shortfalls or workforce management issues. Maintenance managers should look for workers deferring repairs to other shifts, inexperienced workers, lack of parts from supply, poor in-shop scheduling, high cannibalization rates or training deficiencies. High commitment rates may also contribute to a lower MC rate. The key is to focus on negative trends and identify systemic, underlying causes. Further, the root factors of the MC rate should be measured, evaluated and reported through the use of the TNMCM, TNMCS and NMCB rates.

**MC (%)** = FMC Hours + PMC Hours - "B-Type" Status Hours x 100 / Possessed Hours

**Total Not Mission Capable Maintenance (TNMCM) Rate**. Though a lagging indicator, the TNMCM rate is perhaps the most common and useful metric for determining if maintenance is being performed quickly and accurately. It is the average percentage of possessed aircraft (calculated monthly/annually) that are unable to meet primary assigned missions for maintenance reasons (excluding aircraft in "B-Type" possession identifier code status). Any aircraft that is unable to meet any of its wartime missions is considered Not Mission Capable (NMC). The TNMCM is the amount of time aircraft are in NMCM plus Not Mission Capable Both (NMCB) status. Maintenance managers should look for a relationship between other metrics such as R/R, BR and FR to the TNMCM Rate. A strong correlation could indicate heavy workloads (e.g., people are over tasked), poor management, training problems or poor maintenance practices. The TNMCM is also called "out for maintenance."

**TNMCM (%)** = NMCM Hrs + NMCB Hrs - "B-Type" Status Hrs x 100 / Possessed Hours

**Total Not Mission Capable Supply (TNMCS) Rate**. Though this lagging metric may seem a "supply responsibility" because it is principally driven by availability of spare parts, it is often directly indicative of maintenance practices. For instance, maintenance can keep the rate lower by consolidating feasible cannibalization actions to as few aircraft as practical. This monthly/annual metric is the average percentage of possessed aircraft that are unable to meet primary missions for supply reasons. The TNMCS rate is the time aircraft are in NMCS plus NMCB status. TNMCS is based on the number of airframes out for MICAP parts that prevent the airframes from performing their mission (NMCS is not the number of parts that are MICAP). Maintenance managers must closely monitor the relationship between the Cannibalization Rate (CR) and TNMCS. TNMCS is also called "out for supply."

**TNMCS (%)** = NMCS Hrs + NMCB Hrs - "B-Type" Status Hrs x 100 / Possessed Hours

**Primary Aerospace Vehicle Authorized (PAA) vs. Possessed (P/P) Rate**. PAA are those aircraft authorized for a unit to perform their operational mission(s). It forms the basis to allocate operating resources to include manpower, support equipment, and flying hour funds. This metric shows a comparison of the unit's PAA versus average possessed aircraft for a particular time period. It identifies units below PAA so MAJCOM/ HAF can assist in reallocating resources to support contingency taskings or to reduce flying hour requirements.

**P/P (%)** = Average Number of Possessed Aircraft x 100 / Total Unit Aircraft PAA

**Personnel Availability (PA).** Personnel availability simply provides a measure of manning status. It compares the number of personnel authorized to the number of personnel available. A maintenance manager may find it useful to review data based on skill level. In which case, compare the personnel authorized to the number of personnel holding a specific skill level. The number authorized is based on the Unit Manning

Document. The number available includes only those available for duty, which excludes those who are reassigned, on leave, TDY, etc.

**PA (%)** = Total Number of Personnel Available x 100 / Total Number of Personnel Authorized

**Phase Flow (PF) Average**. A phase time-distribution interval (TDI) is a product that shows hours remaining until the next phase on each aircraft possessed by a unit. This leading metric measures the average phase time remaining on the fleet. It should be approximately half the inspection interval and should appear as a diagonal line when the fleet PF average is portrayed graphically in a TDI (e.g., "scatter gram"). However, a unit may have good reasons to manage its phase flow so the data points define a pattern other than a diagonal line. For example, in preparation for a long-distance overseas deployment, a unit may need to build up the average phase time remaining on its fleet, because phase capability may be limited for a short time. Beware of gaps or groupings, especially on aircraft with less than half the time remaining to phase.

**PF** = Total Hours of All Possessed Aircraft Until Next Phase / Total Possessed Aircraft Assigned

**Repair Cycle Processing (RCP) Total Time/Rate.** Though primarily considered a "supply-related metric," this indicator can be an excellent local management tool. It is the average time expressed in days that an unserviceable asset spends in the repair cycle at a unit. This indicator is for repairable aircraft parts only; it does not include engines or support equipment. The clock begins when the replacement part is issued to the flight line and ends when the serviceable asset is returned from the repair facility to the parts store for reissue. To improve the process of repairing parts, the different steps in that process must be measured.

**RCP (%)** = (Pre-Mx + Repair + Post-Mx Days) – AWP Days x 100 / Number of Items Turned In

**Repeat/Recurring (R/R) Discrepancy Rate**. This metric is a leading indicator and perhaps the most important and accurate measure of the unit's maintenance quality. It is the average number of repeat and recur system malfunctions compared to the total number of aircrew discrepancies. A repeat discrepancy is when the same malfunction occurs in a system/subsystem on the next sortie/sortie attempt after the discrepancy originally occurred and was cleared by maintenance (including CNDs/no-defect-noted, etc). A recurring discrepancy is when the same system/subsystem malfunction occurs on the 2nd thru 4th flights/attempted flights after the original flight in which the malfunction occurred and was cleared by maintenance (including CNDs/no-defect-noted, etc). A high R/R rate may indicate lack of thorough troubleshooting; inordinate pressure to commit aircraft to the flying schedule for subsequent sorties; or a lack of experienced, qualified or trained technicians. The more complex the weapon system and the greater the operations tempo, the more susceptible a unit is for repeat or recurring discrepancies. Examine each R/R discrepancy and seek root causes and lasting fixes. The goal should be to keep all repeat and recurring discrepancies to a minimum.

**R/R (%)** = Total Repeats + Total Recurs x 100 / Total Pilot Reported Discrepancies

**Upgrade Training (UT) Rate**. This metric reflects the percentage of technicians in upgrade training. The goal should be to keep the combined total less than 40 percent because the higher the number, the greater the training burden. Training should be given high priority, as the number of personnel in training (and more importantly, the quality of the maintenance training program) invariably affects other aircraft metrics (e.g., R/R or FR) in ways that may not be immediately obvious.

**UT (%)** = Number of Technicians in Upgrade Training x 100 / Total Number of Technicians

**Utilization (UTE) Rate**. The UTE rate is a leading indicator, but serves as a yardstick for how well the maintenance organization supports the unit's mission. The UTE rate is the average number of sorties or hours flown per primary aerospace vehicle inventory (PAI) aircraft per month. This measurement is primarily used by operations in planning the unit's flying hour program. Maintenance uses this measurement to show usage of assigned aircraft. Since UTE rates are used for planning, actual UTE rates (computed at the end of the month) are used to evaluate the unit's monthly accomplishment against the annual plan. Typically, CAF units measure the sortie UTE rate, while MAF units measure the hourly UTE rate to more accurately measure the combined performance of operations and maintenance.

**UTE Rate** = Sorties (or hours) Flown per Month / PAI Aircraft per Month

# Appendix B - Previous Research Variables

| Variable | Diener & Hood (1980) 6 I, 9 D | Gililland (1990) 5 I, 8 D | Jung (1991) 25 I, 3 D | Davis & Walker (1992) 8 I, 1 D | Gray & Ranalli (1993) 9 I, 2 D | Stetz (1999) 17 I, 2D | Commenator (2001) 9 I, 10 D |
|---|---|---|---|---|---|---|---|
| Air Abort / Rate | | | | | I / | I | I / |
| Ground Abort / Rate | D | D | I / I | I | | I | I / |
| Avg MMH to return AC to FMC | D | | | | | | |
| Awaiting Maintenance | | I | | | | | |
| Awaiting Parts | | I | | | | | |
| Base Self-sufficiency | | I | | | | | |
| Breaks / Rate | | | I / I | | | I / | I / |
| Cancels / Rate | | | I / I | | I / | / I | |
| CANN / Rate | | I / | I / I | | I / | / I | I / |
| Delay Discrepancies / Rate | | | | | I | / I | |
| Enroute Reliability | | D | | | | | |
| Fix (4/8/12) / Rate | | | I / I | | | I / | D / D / D |
| FMC | D | | I | | | | |
| Home Station Reliability | | D | | | | | |
| Hourly Utilization | | | | | | I | I |
| Hours Allocated | I | | | | | | |
| Hours Flown | I | | | | | | |
| Hours Flown / Hours Allocated | I | | | | | | |
| Labor Rate | D | | | | | | |
| Late take-off / Rate | | | I | | / I | I / | |
| MC | | D | D | D | D | D | |
| Mean Skill Level | I | | | | | | |
| MHr Expended | | | I | | | | |
| MHr/Sortie | | | I | | I | | |
| MMH for 400-hr Phase Insp | D | | | | | | |
| Mx Personnell Assigned | I | | | | | | |
| Mx Planning Effectiveness | | | | | | I | |
| Mx Scheduling Effectiveness | | D | | | | | D |
| MxMhr/FHr | D | D | I | I | I | D | D |
| NMC | | | I | I | | | |
| NMCB | | | I | I | | | |
| NMCM | D | | I | I | D | I | |
| NMCS | | | I | I | | I | |
| Personnel Assigned vs. Authorized | I | | | | | | |
| Personnel Authourized / Aircraft | | | | I | | | |
| PMC | | | I | | | | |
| PMCB | | | I | | | | |
| PMCM | | | I | | | | |
| PMCS | | | I | | | | |
| Possessed Aircraft | | I | I | | I | I | I |
| Possessed Hours | | | I | | | | |
| Recur | | | | | | I | D |
| Repeat | D | D | | | | I | D |
| Repeat/Recur | | | | | | | D |
| Scheduling Effectiveness | D | | | | I | I | D |
| Sortie Duration | | | I | | | | I |
| Sortie Utilization | | | | | | I | I |
| Sorties Attempted | | | I | | | | |
| Sorties Flown | | | I | | | | |
| Sorties Scheduled | | | I | | | | |
| TNMCM | | | D | | | | D |
| TNMCS | | | D | | | | I |
| Train Reliability | | D | | | | | |
| Utilization | | | I | I | | | |

I = Independent D = Dependent

## Appendix C - Maintenance Metrics Comparison Table

| Maintenance Metrics | | | | |
|---|---|---|---|---|
| Source / Variable | Air Force Instructions | Monthly Reports | MAJCOM Briefings | CLR |
| APA | X | | X | |
| AR | X | X | X | |
| AWM | | | X | |
| AWP | | | X | |
| BR | X | X | X | X |
| CR | X | X | X | X |
| DD | X | X | X | X |
| DEV | | | X | X |
| DOP | | X | X | |
| DR | X | X | X | |
| FHA | | | | |
| FHP | | | | X |
| FR | X | X | X | X |
| FSA | | | | |
| FSE | X | | X | X |
| HQ | X | | | |
| MC | X | X | X | |
| MICAP | | | | X |
| MMH | | | | |
| MSE | X | | X | X |
| P/P | X | | | |
| PA | X | | | |
| PF | X | | | X |
| R/R | X | | X | X |
| RC | | | | X |
| RCP | X | | | X |
| RP | | | | X |
| TCTO Backlog | | | | X |
| TDI | | | | X |
| TNMCM | X | X | X | X |
| TNMCS | X | X | X | |
| UT | X | | | |
| UTE | X | | X | X |

# Appendix D - Data Tables

## 20FW Data:

| | | | OVERALL BALANCE | | | | | | | SORTIE PRODUCTION | | | | | | FLEET HEALTH PERFORMANCE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MDS | Base | Date | DEV | FHA | SFA | FSE | MSE | HUTE | SUTE | FR | AR | BR | CR | RC | RP | APA | DD | R/R | RCP | MMH | TNMCM | MC |
| F16 | 20FW | Sep-99 | 7.2 | 1884.5 | 1070.0 | 66.8 | 96.5 | 22.4 | 13.7 | 85.5 | 5.7 | 12.2 | 13.6 | 5.0 | 12.0 | 84.1 | 2.3 | 4.1 | 4.8 | 38.1 | 9.5 | 84.1 |
| F16 | 20FW | Oct-99 | 10.9 | 2245.9 | 1226.0 | 79.6 | 97.6 | 27.1 | 15.7 | 86.5 | 4.0 | 9.1 | 11.3 | 4.0 | 10.0 | 83.0 | 3.6 | 3.6 | 4.2 | 37.4 | 7.1 | 84.6 |
| F16 | 20FW | Nov-99 | 9.0 | 2290.8 | 1425.0 | 84.7 | 95.7 | 27.4 | 18.3 | 90.1 | 4.9 | 11.3 | 11.9 | 10.0 | 4.0 | 83.7 | 3.4 | 2.8 | 3.3 | 35.2 | 5.9 | 84.9 |
| F16 | 20FW | Dec-99 | 15.2 | 1756.9 | 1116.0 | 70.1 | 96.6 | 21.3 | 14.3 | 76.2 | 4.5 | 9.1 | 12.6 | 8.0 | 12.0 | 82.5 | 2.8 | 5.2 | 3.5 | 35.3 | 10.5 | 81.1 |
| F16 | 20FW | Jan-00 | 10.1 | 1853.8 | 1154.0 | 71.4 | 94.9 | 22.3 | 14.8 | 75.0 | 5.4 | 12.9 | 13.0 | 12.0 | 24.0 | 83.3 | 3.5 | 7.2 | 0.0 | 45.4 | 10.5 | 83.5 |
| F16 | 20FW | Feb-00 | 10.3 | 2375.4 | 1469.0 | 85.8 | 93.6 | 27.6 | 18.8 | 85.4 | 5.0 | 10.8 | 11.1 | 15.0 | 10.0 | 86.0 | 2.8 | 4.5 | 3.1 | 36.3 | 9.6 | 83.8 |
| F16 | 20FW | Mar-00 | 9.4 | 2348.4 | 1466.0 | 78.1 | 86.4 | 27.0 | 18.7 | 82.6 | 3.1 | 11.8 | 8.5 | 20.0 | 9.0 | 87.0 | 2.2 | 6.0 | 4.3 | 51.8 | 9.0 | 85.0 |
| F16 | 20FW | Apr-00 | 10.7 | 1997.6 | 1293.0 | 78.0 | 89.0 | 23.1 | 16.6 | 86.2 | 3.7 | 9.5 | 9.9 | 8.0 | 8.0 | 86.4 | 2.2 | 4.4 | 2.5 | 45.2 | 7.9 | 85.9 |
| F16 | 20FW | May-00 | 5.4 | 2364.8 | 1446.0 | 90.9 | 87.1 | 27.2 | 18.5 | 82.9 | 2.7 | 10.1 | 6.7 | 11.0 | 13.0 | 86.8 | 2.2 | 5.7 | 2.9 | 32.8 | 9.2 | 84.3 |
| F16 | 20FW | Jun-00 | 8.4 | 2558.2 | 1366.0 | 86.0 | 86.8 | 29.4 | 17.5 | 85.0 | 4.3 | 10.8 | 6.8 | 9.0 | 14.0 | 87.0 | 1.9 | 5.7 | 3.3 | 38.5 | 10.4 | 83.0 |
| F16 | 20FW | Jul-00 | 7.1 | 2177.4 | 1414.0 | 87.1 | 88.8 | 25.0 | 18.1 | 77.0 | 4.8 | 11.7 | 6.5 | 23.0 | 12.0 | 87.0 | 1.9 | 7.3 | 3.2 | 40.4 | 9.6 | 85.9 |
| F16 | 20FW | Aug-00 | 8.3 | 2799.9 | 1740.0 | 86.3 | 88.5 | 32.2 | 22.3 | 84.8 | 4.5 | 13.3 | 9.8 | 13.0 | 18.0 | 87.0 | 2.0 | 5.0 | 2.2 | 44.9 | 11.6 | 82.9 |
| F16 | 20FW | Sep-00 | 5.9 | 1975.3 | 1309.0 | 76.8 | 91.1 | 22.7 | 16.8 | 86.0 | 3.6 | 14.7 | 9.2 | 10.0 | 10.0 | 87.0 | 2.2 | 4.6 | 3.3 | 45.4 | 11.6 | 82.3 |
| F16 | 20FW | Oct-00 | 6.9 | 2284.0 | 1536.0 | 88.7 | 95.4 | 27.1 | 19.7 | 87.1 | 4.7 | 11.1 | 7.1 | 7.0 | 5.0 | 84.4 | 2.3 | 2.4 | 3.3 | 36.9 | 8.8 | 85.3 |
| F16 | 20FW | Nov-00 | 6.0 | 2199.9 | 1578.0 | 91.7 | 92.1 | 25.7 | 20.2 | 86.1 | 3.4 | 12.7 | 7.9 | 14.0 | 9.0 | 85.5 | 2.3 | 4.9 | 3.4 | 34.9 | 12.0 | 82.6 |
| F16 | 20FW | Dec-00 | 7.7 | 1620.3 | 1051.0 | 70.4 | 92.3 | 19.1 | 13.5 | 83.3 | 5.2 | 11.4 | 8.4 | 7.0 | 8.0 | 84.9 | 2.2 | 4.1 | 3.9 | 54.9 | 11.1 | 84.3 |
| F16 | 20FW | Jan-01 | 6.3 | 2602.0 | 1622.0 | 91.0 | 96.4 | 29.9 | 20.8 | 90.0 | 3.7 | 11.1 | 6.8 | 11.0 | 14.0 | 87.0 | 1.8 | 4.8 | 3.6 | 38.8 | 9.1 | 86.3 |
| F16 | 20FW | Feb-01 | 5.2 | 1841.4 | 1149.0 | 76.1 | 91.8 | 21.2 | 14.7 | 90.7 | 4.2 | 13.1 | 8.7 | 11.0 | 13.0 | 86.7 | 1.9 | 6.3 | 3.7 | 50.2 | 9.4 | 84.9 |
| F16 | 20FW | Mar-01 | 4.1 | 2285.0 | 1425.0 | 80.0 | 91.4 | 26.8 | 18.3 | 86.6 | 4.5 | 11.5 | 5.5 | 5.0 | 11.0 | 85.4 | 1.4 | 3.8 | 4.2 | 32.7 | 9.5 | 83.3 |
| F16 | 20FW | Apr-01 | 4.6 | 2483.2 | 1564.0 | 89.9 | 94.8 | 29.5 | 20.1 | 86.2 | 4.4 | 12.1 | 5.4 | 3.0 | 11.0 | 84.3 | 2.1 | 2.8 | 3.8 | 29.0 | 11.0 | 83.5 |
| F16 | 20FW | May-01 | 5.0 | 2701.2 | 1654.0 | 88.9 | 96.0 | 31.2 | 21.2 | 92.9 | 2.7 | 11.1 | 6.2 | 27.0 | 11.0 | 86.5 | 2.1 | 8.4 | 4.2 | 33.0 | 9.5 | 82.9 |
| F16 | 20FW | Jun-01 | 7.1 | 2113.9 | 1138.0 | 84.5 | 95.5 | 24.5 | 14.6 | 77.6 | 4.5 | 13.4 | 8.2 | 6.0 | 9.0 | 86.3 | 2.2 | 3.8 | 3.6 | 39.6 | 10.8 | 82.0 |
| F16 | 20FW | Jul-01 | 5.6 | 2164.9 | 1363.0 | 88.5 | 96.1 | 25.1 | 17.5 | 83.8 | 4.4 | 10.9 | 7.1 | 13.0 | 4.0 | 86.4 | 1.9 | 3.8 | 3.2 | 46.1 | 10.7 | 82.3 |
| F16 | 20FW | Aug-01 | 6.2 | 2686.8 | 1777.0 | 89.9 | 99.0 | 31.7 | 22.8 | 85.8 | 3.8 | 10.7 | 6.0 | 12.0 | 5.0 | 84.7 | 2.5 | 3.3 | 2.8 | 30.6 | 12.3 | 81.0 |
| F16 | 20FW | Oct-02 | 4.0 | 2022.1 | 1316.0 | 86.1 | 99.2 | 25.9 | 16.9 | 85.7 | 6.0 | 13.8 | 11.0 | 4.0 | 9.0 | 70.2 | 2.1 | 3.0 | 2.9 | 54.0 | 11.5 | 81.8 |
| F16 | 20FW | Nov-02 | 3.1 | 1791.7 | 1055.0 | 90.0 | 99.1 | 23.0 | 13.5 | 89.4 | 3.8 | 15.2 | 12.3 | 9.0 | 10.0 | 75.8 | 2.4 | 5.3 | 3.6 | 70.8 | 9.0 | 83.5 |
| F16 | 20FW | Dec-02 | 2.1 | 1590.2 | 901.0 | 80.1 | 98.9 | 20.4 | 11.6 | 81.4 | 5.1 | 14.3 | 10.1 | 7.0 | 11.0 | 81.6 | 1.7 | 6.0 | 7.7 | 75.3 | 7.3 | 85.9 |
| F16 | 20FW | Jan-03 | 4.8 | 2204.0 | 1272.0 | 82.1 | 98.5 | 28.3 | 16.3 | 79.7 | 5.9 | 14.3 | 10.2 | 14.0 | 13.0 | 82.0 | 1.3 | 4.8 | 3.1 | 76.7 | 12.0 | 83.2 |
| F16 | 20FW | Feb-03 | 5.3 | 2205.6 | 1086.0 | 85.9 | 97.0 | 28.3 | 13.9 | 72.6 | 4.8 | 15.5 | 7.4 | 5.0 | 8.0 | 88.7 | 1.2 | 2.8 | 3.3 | 58.4 | 10.2 | 86.0 |
| F16 | 20FW | Mar-03 | 5.3 | 3745.8 | 1398.0 | 87.5 | 97.1 | 56.8 | 21.2 | 88.3 | 5.4 | 19.6 | 11.9 | 24.0 | 19.0 | 93.5 | 1.2 | 6.5 | 3.7 | 55.1 | 9.7 | 85.5 |
| F16 | 20FW | Apr-03 | 4.1 | 2980.9 | 1273.0 | 85.7 | 95.0 | 38.2 | 16.3 | 76.6 | 6.5 | 18.5 | 13.6 | 20.0 | 11.0 | 91.9 | 1.2 | 7.0 | 2.9 | 86.7 | 11.2 | 82.8 |
| F16 | 20FW | May-03 | 7.7 | 1772.6 | 1073.0 | 81.7 | 95.3 | 22.7 | 13.8 | 77.2 | 5.4 | 15.9 | 12.0 | 4.0 | 15.0 | 85.8 | 1.6 | 4.3 | 2.7 | 87.7 | 11.5 | 83.8 |
| F16 | 20FW | Jun-03 | 5.5 | 2101.5 | 1266.0 | 87.5 | 95.4 | 26.9 | 16.2 | 81.8 | 4.8 | 14.8 | 10.8 | 15.0 | 12.0 | 79.2 | 1.5 | 5.9 | 3.2 | 57.6 | 8.9 | 84.2 |
| F16 | 20FW | Jul-03 | 5.8 | 2295.4 | 1540.0 | 88.6 | 93.4 | 31.7 | 21.3 | 77.1 | 4.9 | 11.4 | 9.1 | 9.0 | 14.0 | 74.5 | 2.5 | 4.6 | 3.6 | 44.5 | 10.6 | 84.3 |
| F16 | 20FW | Aug-03 | 3.4 | 1971.9 | 1326.0 | 88.9 | 97.0 | 27.4 | 18.4 | 77.5 | 3.4 | 11.4 | 11.2 | 2.0 | 4.0 | 76.9 | 1.7 | 1.5 | 2.0 | 50.3 | 10.0 | 83.1 |
| F16 | 20FW | Sep-03 | 5.3 | 1636.6 | 821.0 | 91.8 | 98.1 | 22.7 | 11.4 | 81.5 | 5.2 | 15.8 | 10.5 | 4.0 | 3.0 | 74.3 | 1.5 | 2.2 | 3.7 | 55.6 | 7.6 | 88.1 |
| F16 | 20FW | Oct-03 | 5.5 | 2708.5 | 1735.0 | 86.4 | 87.7 | 37.6 | 24.1 | 83.8 | 5.6 | 13.8 | 9.8 | 8.0 | 6.0 | 78.7 | 1.8 | 2.4 | 2.7 | 58.3 | 11.6 | 83.0 |
| F16 | 20FW | Nov-03 | 3.9 | 2006.1 | 1291.0 | 90.7 | 99.0 | 27.9 | 18.0 | 87.8 | 5.0 | 12.1 | 6.8 | 6.0 | 7.0 | 79.6 | 1.4 | 3.4 | 3.5 | 69.4 | 8.1 | 86.4 |
| F16 | 20FW | Dec-03 | 4.8 | 1688.6 | 1201.0 | 84.9 | 98.6 | 23.5 | 16.7 | 90.4 | 4.6 | 13.0 | 6.9 | 8.0 | 3.0 | 79.6 | 1.0 | 2.9 | 3.1 | 52.0 | 7.4 | 88.3 |
| F16 | 20FW | Jan-04 | 3.8 | 1726.1 | 1173.0 | 77.2 | 97.1 | 24.0 | 16.3 | 87.9 | 4.0 | 11.9 | 4.9 | 5.0 | 6.0 | 79.5 | 1.3 | 3.2 | 3.6 | 43.1 | 7.8 | 87.5 |
| F16 | 20FW | Feb-04 | 4.5 | 2169.7 | 1518.0 | 88.8 | 96.3 | 30.1 | 21.1 | 83.5 | 4.6 | 10.8 | 5.3 | 8.0 | 4.0 | 79.3 | 1.4 | 3.0 | 3.2 | 45.2 | 11.7 | 83.7 |
| F16 | 20FW | Mar-04 | 7.4 | 2226.7 | 1502.0 | 89.3 | 96.4 | 30.9 | 20.9 | 78.0 | 5.4 | 11.2 | 7.5 | 3.0 | 12.0 | 76.2 | 1.2 | 3.5 | 2.4 | 50.7 | 12.3 | 82.4 |
| F16 | 20FW | Apr-04 | 3.6 | 1856.4 | 1274.0 | 92.7 | 98.5 | 25.6 | 17.6 | 83.5 | 4.1 | 9.5 | 5.4 | 9.0 | 3.0 | 71.1 | 1.3 | 4.0 | 3.0 | 48.2 | 9.6 | 85.2 |
| F16 | 20FW | May-04 | 5.4 | 1867.9 | 1143.0 | 93.4 | 93.8 | 25.9 | 15.9 | 86.2 | 5.3 | 10.1 | 7.3 | 6.0 | 5.0 | 67.6 | 1.4 | 4.0 | 4.2 | 51.2 | 8.8 | 85.1 |
| F16 | 20FW | Jun-04 | 9.1 | 1526.0 | 1035.0 | 81.1 | 93.8 | 21.2 | 14.4 | 74.6 | 7.8 | 12.9 | 8.1 | 9.0 | 9.0 | 66.8 | 1.4 | 5.2 | 3.1 | 55.8 | 10.8 | 83.6 |
| F16 | 20FW | Jul-04 | 4.4 | 1534.3 | 1085.0 | 86.8 | 92.6 | 21.3 | 15.1 | 78.4 | 5.8 | 12.8 | 7.0 | 4.0 | 8.0 | 65.8 | 1.2 | 3.1 | 3.4 | 55.8 | 10.8 | 83.3 |
| F16 | 20FW | Aug-04 | 6.1 | 1600.3 | 1049.0 | 81.1 | 96.9 | 22.2 | 14.6 | 74.2 | 6.1 | 11.4 | 8.7 | 5.0 | 2.0 | 68.3 | 0.9 | 1.9 | 2.8 | 48.2 | 11.6 | 82.2 |
| F16 | 20FW | Sep-04 | 4.9 | 1534.5 | 784.0 | 85.1 | 97.7 | 21.3 | 10.9 | 73.3 | 6.9 | 11.5 | 6.0 | 6.0 | 4.0 | 69.4 | 1.2 | 3.2 | 4.4 | 40.7 | 6.9 | 88.9 |

# 27 FW Data:

| | | | OVERALL BALANCE | | | | | | | SORTIE PRODUCTION | | | | | | FLEET HEALTH PERFORMANCE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MDS | Base | Date | DEV | FHA | SFA | FSE | MSE | HUTE | SUTE | FR | AR | BR | CR | RC | RP | APA | DD | R/R | RCP | MMH | TNMCM | MC |
| F16 | 27FW | Sep-99 | 14.6 | 1194.2 | 909.0 | 69.9 | 95.9 | 24.1 | 13.8 | 67.1 | 6.2 | 8.0 | 13.2 | 3.7 | 3.2 | 66.1 | 4.3 | 6.9 | 3.4 | 46.5 | 20.0 | 74.3 |
| F16 | 27FW | Oct-99 | 16.3 | 1472.2 | 1087.0 | 74.2 | 95.3 | 22.3 | 16.5 | 75.0 | 5.0 | 8.5 | 8.6 | 1.3 | 3.1 | 64.5 | 6.2 | 4.4 | 4.4 | 35.7 | 11.6 | 81.4 |
| F16 | 27FW | Nov-99 | 17.9 | 1471.8 | 1074.0 | 66.2 | 94.8 | 22.3 | 16.3 | 80.4 | 7.7 | 10.4 | 9.0 | 2.9 | 3.1 | 64.5 | 6.9 | 6.1 | 5.1 | 35.2 | 12.1 | 79.7 |
| F16 | 27FW | Dec-99 | 15.0 | 1234.9 | 987.0 | 63.3 | 97.2 | 18.7 | 15.0 | 70.6 | 5.1 | 8.6 | 8.8 | 2.2 | 3.0 | 64.5 | 6.3 | 5.2 | 3.3 | 46.1 | 13.4 | 77.1 |
| F16 | 27FW | Jan-00 | 16.0 | 1496.4 | 1097.0 | 69.6 | 99.4 | 22.7 | 16.6 | 76.6 | 5.6 | 10.1 | 9.9 | 3.5 | 2.9 | 62.6 | 5.4 | 6.3 | 0.0 | 44.0 | 16.1 | 77.9 |
| F16 | 27FW | Feb-00 | 14.6 | 1403.5 | 1067.0 | 67.7 | 97.6 | 21.3 | 16.2 | 68.2 | 5.7 | 8.0 | 8.2 | 2.5 | 3.2 | 61.6 | 5.0 | 5.8 | 4.0 | 49.8 | 17.1 | 79.1 |
| F16 | 27FW | Mar-00 | 15.8 | 1351.8 | 1034.0 | 60.6 | 98.5 | 20.5 | 15.7 | 73.6 | 6.7 | 8.4 | 9.4 | 4.3 | 1.9 | 60.8 | 5.0 | 6.3 | 4.8 | 47.5 | 13.9 | 78.4 |
| F16 | 27FW | Apr-00 | 12.5 | 1573.4 | 1136.0 | 70.6 | 98.7 | 23.8 | 17.2 | 80.6 | 5.9 | 5.9 | 11.2 | 4.7 | 2.7 | 60.8 | 4.8 | 7.4 | 5.7 | 29.7 | 13.8 | 80.0 |
| F16 | 27FW | May-00 | 16.8 | 1610.6 | 1200.0 | 78.2 | 99.8 | 24.4 | 18.2 | 71.7 | 5.1 | 8.3 | 9.3 | 2.7 | 2.3 | 61.3 | 5.2 | 4.9 | 4.4 | 39.4 | 16.1 | 79.6 |
| F16 | 27FW | Jun-00 | 11.5 | 1479.2 | 1068.0 | 63.7 | 99.2 | 24.6 | 17.8 | 75.4 | 7.0 | 6.1 | 9.9 | 4.1 | 2.0 | 59.7 | 3.5 | 6.1 | 6.9 | 40.0 | 13.6 | 78.1 |
| F16 | 27FW | Jul-00 | 14.8 | 1600.8 | 1074.0 | 70.6 | 99.4 | 26.7 | 17.9 | 74.2 | 6..8 | 8.3 | 12.8 | 4.3 | 4.9 | 54.3 | 2.5 | 9.3 | 5.2 | 32.1 | 18.3 | 72.4 |
| F16 | 27FW | Aug-00 | 23.4 | 2056.1 | 1275.0 | 66.6 | 98.6 | 34.3 | 21.3 | 69.3 | 7.2 | 10.0 | 14.0 | 5.6 | 3.1 | 57.7 | 4.3 | 8.7 | 3.7 | 38.9 | 19.0 | 72.0 |
| F16 | 27FW | Sep-00 | 14.0 | 1831.5 | 748.0 | 69.0 | 98.9 | 30.5 | 12.5 | 72.2 | 6.1 | 13.0 | 19.3 | 4.8 | 5.4 | 58.7 | 4.8 | 10.2 | 5.6 | 31.9 | 15.9 | 73.6 |
| F16 | 27FW | Oct-00 | 15.3 | 1678.4 | 1046.0 | 68.2 | 88.6 | 27.8 | 17.5 | 73.0 | 7.5 | 12.0 | 17.9 | 3.2 | 4.9 | 59.8 | 5.2 | 8.1 | 4.9 | 42.2 | 14.9 | 73.9 |
| F16 | 27FW | Nov-00 | 14.5 | 1500.4 | 950.0 | 63.7 | 88.3 | 25.0 | 15.8 | 77.8 | 6.3 | 10.4 | 17.9 | 5.4 | 2.1 | 58.7 | 4.5 | 7.5 | 10.7 | 24.4 | 15.2 | 74.5 |
| F16 | 27FW | Dec-00 | 19.2 | 1235.8 | 660.0 | 57.8 | 94.9 | 22.9 | 12.2 | 75.4 | 6.1 | 9.8 | 17.6 | 4.7 | 2.7 | 51.2 | 3.9 | 7.4 | 7.5 | 30.3 | 18.1 | 74.8 |
| F16 | 27FW | Jan-01 | 11.9 | 1343.9 | 993.0 | 54.6 | 92.4 | 24.9 | 18.4 | 82.2 | 7.0 | 10.2 | 12.4 | 3.4 | 1.5 | 49.6 | 3.3 | 4.9 | 5.1 | 36.0 | 17.0 | 75.5 |
| F16 | 27FW | Feb-01 | 11.0 | 1366.3 | 1028.0 | 64.4 | 96.7 | 25.3 | 19.0 | 81.0 | 5.1 | 8.2 | 10.8 | 3.1 | 0.9 | 51.0 | 3.9 | 4.0 | 3.2 | 38.2 | 12.9 | 79.3 |
| F16 | 27FW | Mar-01 | 14.5 | 1284.5 | 992.0 | 55.4 | 96.4 | 23.8 | 18.4 | 73.0 | 7.4 | 9.0 | 11.1 | 4.5 | 4.3 | 49.8 | 2.9 | 8.7 | 3.4 | 30.5 | 18.8 | 72.9 |
| F16 | 27FW | Apr-01 | 11.0 | 1566.6 | 1144.0 | 66.3 | 90.0 | 29.0 | 21.2 | 73.3 | 5.2 | 7.9 | 6.4 | 3.6 | 4.6 | 51.9 | 3.0 | 8.2 | 6.7 | 23.8 | 10.2 | 82.1 |
| F16 | 27FW | May-01 | 10.5 | 1975.3 | 1504.0 | 71.9 | 94.2 | 32.9 | 25.1 | 73.0 | 4.5 | 6.6 | 6.3 | 2.9 | 2.0 | 55.5 | 3.1 | 4.9 | 6.5 | 13.4 | 10.8 | 81.0 |
| F16 | 27FW | Jun-01 | 12.6 | 1680.6 | 1379.0 | 79.6 | 94.9 | 28.0 | 23.0 | 69.2 | 4.7 | 7.5 | 7.3 | 4.0 | 3.3 | 58.6 | 2.9 | 7.3 | 5.0 | 31.7 | 19.0 | 74.9 |
| F16 | 27FW | Jul-01 | 11.9 | 1449.9 | 1057.0 | 68.6 | 97.4 | 24.2 | 17.5 | 67.5 | 6.4 | 7.9 | 10.1 | 2.2 | 3.1 | 58.6 | 3.5 | 5.3 | 3.7 | 25.9 | 14.7 | 76.0 |
| F16 | 27FW | Aug-01 | 11.9 | 1809.7 | 1335.0 | 69.2 | 94.3 | 30.2 | 22.3 | 75.5 | 5.9 | 8.2 | 8.6 | 4.9 | 5.5 | 58.6 | 3.8 | 10.4 | 4.5 | 30.5 | 15.5 | 78.2 |
| F16 | 27FW | Oct-02 | 8.1 | 1661.1 | 1265.0 | 68.7 | 91.7 | 27.7 | 21.1 | 73.5 | 5.5 | 11.6 | 12.3 | 5.5 | 3.0 | 61.6 | 7.2 | 8.5 | 2.8 | 50.1 | 18.2 | 71.0 |
| F16 | 27FW | Nov-02 | 8.6 | 1358.4 | 1053.0 | 83.1 | 93.2 | 22.6 | 17.6 | 79.7 | 7.4 | 11.2 | 8.9 | 3.3 | 1.8 | 62.5 | 7.3 | 5.1 | 2.8 | 35.4 | 11.4 | 80.5 |
| F16 | 27FW | Dec-02 | 8.5 | 1401.6 | 919.0 | 72.2 | 94.3 | 23.3 | 15.3 | 78.9 | 6.6 | 13.4 | 10.8 | 3.0 | 1.4 | 63.4 | 7.0 | 4.5 | 2.6 | 33.2 | 11.5 | 82.6 |
| F16 | 27FW | Jan-03 | 4.3 | 1916.2 | 1190.0 | 85.6 | 96.2 | 31.8 | 19.8 | 85.7 | 5.2 | 11.2 | 8.4 | 4.4 | 1.8 | 64.1 | 21.4 | 6.2 | 3.2 | 23.2 | 7.4 | 84.9 |
| F16 | 27FW | Feb-03 | 3.7 | 1418.6 | 935.0 | 75.4 | 94.2 | 22.9 | 15.1 | 84.8 | 4.6 | 8.4 | 12.6 | 3.5 | 1.9 | 64.4 | 16.7 | 5.4 | 2.7 | 38.3 | 9.3 | 84.0 |
| F16 | 27FW | Mar-03 | 4.7 | 1968.2 | 1162.0 | 76.9 | 94.5 | 31.8 | 18.7 | 84.6 | 5.6 | 12.3 | 12.0 | 4.3 | 3.3 | 64.0 | 13.8 | 7.7 | 2.6 | 36.8 | 12.0 | 82.3 |
| F16 | 27FW | Apr-03 | 7.5 | 1811.5 | 977.0 | 82.0 | 94.9 | 27.0 | 14.6 | 77.1 | 5.8 | 13.4 | 10.7 | 2.5 | 4.3 | 60.2 | 11.6 | 6.8 | 2.6 | 28.5 | 9.7 | 84.5 |
| F16 | 27FW | May-03 | 6.6 | 1544.7 | 668.0 | 86.7 | 96.6 | 21.1 | 9.2 | 81.8 | 4.8 | 9.9 | 9.7 | 4.3 | 3.0 | 58.5 | 9.3 | 7.3 | 2.6 | 27.4 | 5.6 | 88.7 |
| F16 | 27FW | Jun-03 | 5.6 | 1339.9 | 1040.0 | 86.1 | 95.7 | 18.2 | 14.2 | 80.8 | 7.3 | 9.5 | 7.2 | 4.1 | 3.3 | 61.8 | 6.5 | 7.5 | 2.1 | 34.7 | 8.1 | 86.7 |
| F16 | 27FW | Jul-03 | 6.3 | 1394.9 | 1054.0 | 84.1 | 98.3 | 23.2 | 17.5 | 77.9 | 6.3 | 12.9 | 9.6 | 4.3 | 2.4 | 65.3 | 11.5 | 6.7 | 2.3 | 52.4 | 9.4 | 84.8 |
| F16 | 27FW | Aug-03 | 7.0 | 1365.8 | 988.0 | 79.8 | 97.9 | 22.8 | 16.5 | 85.7 | 5.8 | 9.2 | 9.6 | 2.6 | 1.7 | 65.9 | 9.4 | 4.3 | 2.2 | 35.5 | 8.1 | 86.2 |
| F16 | 27FW | Sep-03 | 3.2 | 1036.9 | 820.0 | 79.4 | 98.8 | 17.3 | 13.7 | 86.2 | 4.7 | 11.5 | 14.4 | 4.0 | 2.1 | 65.4 | 7.8 | 6.1 | 2.8 | 58.4 | 7.5 | 86.2 |
| F16 | 27FW | Oct-03 | 5.8 | 1759.0 | 1275.0 | 71.9 | 98.1 | 28.8 | 21.1 | 68.5 | 6.7 | 10.0 | 9.2 | 3.1 | 2.8 | 66.0 | 2.9 | 5.9 | 2.6 | 33.8 | 9.5 | 85.1 |
| F16 | 27FW | Nov-03 | 8.0 | 1400.4 | 1087.0 | 70.0 | 99.4 | 23.3 | 18.1 | 69.0 | 6.7 | 7.7 | 9.1 | 2.3 | 2.7 | 65.7 | 1.2 | 5.0 | 3.3 | 38.6 | 8.8 | 86.1 |
| F16 | 27FW | Dec-03 | 9.1 | 1326.2 | 1004.0 | 79.8 | 97.9 | 22.1 | 16.7 | 80.4 | 8.2 | 10.2 | 10.9 | 3.1 | 2.4 | 66.0 | 3.6 | 5.5 | 4.2 | 49.4 | 9.1 | 85.4 |
| F16 | 27FW | Jan-04 | 7.5 | 1658.5 | 1147.0 | 79.7 | 98.9 | 27.6 | 19.1 | 72.3 | 7.5 | 10.4 | 8.8 | 3.6 | 2.7 | 66.4 | 3.9 | 6.3 | 4.0 | 31.4 | 7.4 | 85.8 |
| F16 | 27FW | Feb-04 | 9.4 | 1383.5 | 960.0 | 58.5 | 97.3 | 22.6 | 16.0 | 73.0 | 7.2 | 10.4 | 10.0 | 3.9 | 2.0 | 69.8 | 2.2 | 5.9 | 8.4 | 44.9 | 11.4 | 83.5 |
| F16 | 27FW | Mar-04 | 5.2 | 1992.5 | 1376.0 | 81.2 | 98.1 | 29.3 | 22.9 | 77.3 | 5.7 | 9.6 | 8.7 | 3.8 | 3.4 | 67.0 | 2.3 | 7.2 | 4.5 | 39.6 | 10.7 | 84.8 |
| F16 | 27FW | Apr-04 | 5.3 | 1522.7 | 1101.0 | 81.0 | 99.0 | 25.4 | 18.1 | 77.4 | 6.2 | 8.6 | 7.2 | 1.9 | 1.4 | 66.9 | 1.7 | 3.3 | 5.0 | 28.5 | 8.4 | 88.3 |
| F16 | 27FW | May-04 | 9.0 | 1599.4 | 1084.0 | 73.8 | 97.1 | 26.7 | 18.1 | 81.7 | 5.4 | 8.6 | 5.4 | 2.3 | 1.4 | 67.3 | 1.3 | 3.7 | 4.3 | 26.1 | 9.9 | 84.9 |
| F16 | 27FW | Jun-04 | 6.3 | 1638.7 | 1202.0 | 77.6 | 98.0 | 27.3 | 20.0 | 77.6 | 6.1 | 10.4 | 7.1 | 3.3 | 3.5 | 66.7 | 2.2 | 6.8 | 4.5 | 33.8 | 10.7 | 81.4 |
| F16 | 27FW | Jul-04 | 5.9 | 1117.2 | 865.0 | 82.9 | 99.3 | 18.6 | 14.4 | 72.6 | 6.4 | 8.4 | 6.9 | 3.8 | 1.9 | 66.7 | 3.4 | 5.8 | 4.4 | 68.2 | 8.9 | 86.0 |
| F16 | 27FW | Aug-04 | 4.8 | 1460.2 | 1028.0 | 74.5 | 99.4 | 24.3 | 17.1 | 77.3 | 5.4 | 8.6 | 7.4 | 2.7 | 2.9 | 67.0 | 2.7 | 5.6 | 4.3 | 37.0 | 7.3 | 86.1 |
| F16 | 27FW | Sep-04 | 7.4 | 847.8 | 712.0 | 66.2 | 98.4 | 14.1 | 11.9 | 80.3 | 8.3 | 10.0 | 9.7 | 3.2 | 2.2 | 66.2 | 2.3 | 5.4 | 4.0 | 70.2 | 7.5 | 87.7 |

388FW Data:

| | | | OVERALL BALANCE | | | | | | | SORTIE PRODUCTION | | | | | | FLEET HEALTH PERFORMANCE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MDS | Base | Date | DEV | FHA | SFA | FSE | MSE | HUTE | SUTE | FR | AR | BR | CR | RC | RP | APA | DD | R/R | RCP | MMH | TNMCM | MC |
| F16 | 388FW | Sep-99 | 10.6 | 1167.1 | 846.0 | 75.8 | 94.9 | 20.8 | 15.7 | 74.6 | 3.9 | 7.5 | 12.1 | 1.1 | 1.2 | 56.0 | 3.8 | 2.3 | 3.5 | 41.1 | 19.3 | 72.6 |
| F16 | 388FW | Oct-99 | 8.9 | 1428.9 | 1016.0 | 86.0 | 95.6 | 26.0 | 18.8 | 79.5 | 6.6 | 11.0 | 12.9 | 2.0 | 1.2 | 56.0 | 4.5 | 3.2 | 3.8 | 38.8 | 15.3 | 76.7 |
| F16 | 388FW | Nov-99 | 10.9 | 1278.8 | 874.0 | 76.8 | 87.7 | 22.9 | 16.2 | 77.4 | 5.9 | 10.0 | 13.3 | 1.1 | 1.6 | 56.8 | 4.7 | 2.7 | 3.5 | 51.3 | 20.8 | 72.7 |
| F16 | 388FW | Dec-99 | 9.5 | 1158.9 | 643.0 | 64.4 | 96.1 | 20.8 | 11.9 | 69.6 | 7.6 | 8.7 | 12.2 | 1.4 | 0.6 | 57.0 | 4.4 | 2.0 | 3.3 | 57.7 | 18.9 | 71.2 |
| F16 | 388FW | Jan-00 | 7.8 | 1122.9 | 811.0 | 64.9 | 75.3 | 19.7 | 15.0 | 69.6 | 7.0 | 9.7 | 15.8 | 1.1 | 1.1 | 57.1 | 4.3 | 2.2 | 0.0 | 50.8 | 17.9 | 70.0 |
| F16 | 388FW | Feb-00 | 9.3 | 1225.2 | 877.0 | 65.0 | 79.7 | 21.1 | 16.3 | 75.3 | 7.0 | 10.6 | 15.0 | 0.9 | 2.3 | 58.0 | 3.1 | 3.2 | 2.6 | 53.3 | 18.0 | 69.7 |
| F16 | 388FW | Mar-00 | 11.0 | 1395.2 | 913.0 | 64.7 | 84.6 | 23.5 | 16.6 | 68.1 | 6.8 | 10.2 | 10.7 | 1.5 | 1.5 | 58.1 | 2.1 | 3.0 | 3.2 | 40.3 | 20.5 | 70.4 |
| F16 | 388FW | Apr-00 | 9.5 | 1517.7 | 1102.0 | 80.7 | 95.3 | 26.2 | 20.4 | 69.9 | 4.4 | 8.4 | 10.2 | 0.8 | 0.8 | 57.9 | 5.3 | 1.6 | 2.1 | 30.2 | 17.6 | 74.7 |
| F16 | 388FW | May-00 | 8.8 | 1582.8 | 1181.0 | 82.0 | 94.0 | 28.6 | 21.9 | 74..8 | 5.8 | 8.7 | 9.3 | 1.0 | 0.5 | 55.3 | 3.7 | 1.5 | 1.7 | 31.6 | 17.2 | 76.7 |
| F16 | 388FW | Jun-00 | 6.4 | 1425.6 | 1128.0 | 76.0 | 84.1 | 26.5 | 20.7 | 79.0 | 5.6 | 7.2 | 2.1 | 1.1 | 1.2 | 54.6 | 1.4 | 2.3 | 4.4 | 22.9 | 15.2 | 78.2 |
| F16 | 388FW | Jul-00 | 18.6 | 1342.1 | 1060.0 | 74.2 | 92.2 | 22.8 | 19.6 | 59.7 | 6.7 | 6.3 | 7.1 | 1.2 | 1.2 | 60.2 | 3.6 | 2.4 | 5.0 | 40.5 | 21.2 | 71.6 |
| F16 | 388FW | Aug-00 | 11.2 | 1964.4 | 1421.0 | 81.0 | 84.9 | 33.3 | 23.7 | 65.0 | 4.9 | 8.7 | 11.0 | 0.7 | 0.9 | 59.1 | 4.0 | 1.6 | 2.9 | 31.9 | 25.0 | 66.9 |
| F16 | 388FW | Sep-00 | 13.1 | 1224.8 | 850.0 | 74.6 | 79.0 | 21.3 | 14.2 | 73.1 | 5.5 | 9.2 | 9.1 | 1.8 | 0.6 | 57.7 | 3.5 | 2.4 | 4.1 | 39.7 | 24.6 | 66.3 |
| F16 | 388FW | Oct-00 | 14.2 | 1474.6 | 1031.0 | 75.0 | 91.5 | 25.3 | 17.0 | 74.6 | 6.3 | 12.2 | 11.6 | 1.8 | 2.4 | 58.3 | 5.3 | 4.2 | 4.0 | 27.9 | 19.6 | 72.2 |
| F16 | 388FW | Nov-00 | 11.0 | 1318.6 | 918.0 | 60.7 | 91.5 | 21.7 | 14.4 | 81.1 | 7.7 | 8.0 | 12.8 | 0.7 | 0.6 | 60.9 | 3.2 | 1.3 | 0.0 | 31.8 | 16.1 | 74.1 |
| F16 | 388FW | Dec-00 | 11.7 | 1113.1 | 720.0 | 56.2 | 92.8 | 18.6 | 11.4 | 63.7 | 4.8 | 12.6 | 12.9 | 1.3 | 2.1 | 59.8 | 3.1 | 3.4 | 2.9 | 35.8 | 22.1 | 70.2 |
| F16 | 388FW | Jan-01 | 15.3 | 1444.0 | 936.0 | 56.5 | 93.9 | 24.6 | 15.3 | 68.3 | 6.9 | 8.8 | 12.8 | 0.9 | 1.6 | 58.7 | 4.0 | 2.5 | 4.0 | 40.8 | 20.9 | 70.3 |
| F16 | 388FW | Feb-01 | 12.6 | 1124.2 | 726.0 | 50.0 | 91.4 | 18.1 | 11.0 | 70.9 | 7.1 | 10.8 | 13.7 | 2.6 | 2.7 | 62.1 | 2.0 | 5.3 | 2.5 | 46.9 | 18.9 | 72.4 |
| F16 | 388FW | Mar-01 | 7.0 | 2338.6 | 1651.0 | 86.1 | 97.1 | 35.5 | 24.4 | 70.5 | 4.2 | 7.4 | 7.1 | 1.0 | 2.0 | 65.9 | 2.2 | 3.0 | 1.9 | 24.9 | 17.0 | 74.1 |
| F16 | 388FW | Apr-01 | 10.8 | 1819.7 | 1231.0 | 78.7 | 89.9 | 27.9 | 18.2 | 67.0 | 5.2 | 8.4 | 7.1 | 1.7 | 2.2 | 65.3 | 3.9 | 3.9 | 2.7 | 26.9 | 17.0 | 75.1 |
| F16 | 388FW | May-01 | 6.6 | 1770.9 | 1319.0 | 80.2 | 96.3 | 27.7 | 20.0 | 73.0 | 4.2 | 8.4 | 7.1 | 1.5 | 1.9 | 63.9 | 2.8 | 3.4 | 2.5 | 27.8 | 14.1 | 75.9 |
| F16 | 388FW | Jun-01 | 8.4 | 1786.9 | 1412.0 | 86.7 | 95.4 | 28.1 | 21.6 | 69.6 | 3.9 | 6.5 | 4.4 | 1.3 | 1.5 | 63.5 | 3.8 | 2.8 | 3.1 | 31.7 | 14.5 | 76.6 |
| F16 | 388FW | Jul-01 | 9.0 | 1569.8 | 1258.0 | 83.3 | 96.8 | 24.3 | 18.8 | 67.3 | 4.1 | 7.8 | 7.8 | 0.7 | 1.4 | 64.5 | 4.1 | 2.1 | 0.0 | 32.6 | 18.1 | 74.9 |
| F16 | 388FW | Aug-01 | 11.7 | 1996.8 | 1437.0 | 80.3 | 97.8 | 31.1 | 21.7 | 67.5 | 4.5 | 8.6 | 7.7 | 0.9 | 1.3 | 64.3 | 3.3 | 2.2 | 2.7 | 30.8 | 19.8 | 72.7 |
| F16 | 388FW | Oct-02 | 6.2 | 2026.5 | 1415.0 | 77.5 | 94.0 | 30.5 | 21.3 | 74.6 | 5.7 | 10.1 | 7.5 | 1.3 | 1.5 | 64.3 | 6.7 | 2.8 | 2.9 | 50.9 | 12.7 | 81.9 |
| F16 | 388FW | Nov-02 | 8.3 | 1599.2 | 1136.0 | 78.8 | 98.3 | 24.2 | 17.2 | 71.9 | 6.0 | 7.8 | 12.7 | 0.7 | 1.5 | 67.3 | 3.9 | 2.2 | 4.0 | 50.9 | 16.4 | 77.0 |
| F16 | 388FW | Dec-02 | 11.4 | 1021.0 | 715.0 | 53.5 | 97.4 | 15.4 | 10.8 | 67.1 | 13.4 | 11.5 | 17.0 | 1.8 | 3.1 | 69.6 | 4.5 | 4.9 | 4.7 | 89.6 | 14.6 | 80.3 |
| F16 | 388FW | Jan-03 | 8.3 | 1846.6 | 1243.0 | 79.4 | 98.7 | 27.7 | 18.8 | 67.6 | 6.8 | 11.5 | 12.6 | 1.6 | 1.6 | 69.0 | 2.9 | 3.2 | 2.6 | 43.2 | 17.5 | 77.8 |
| F16 | 388FW | Feb-03 | 12.2 | 1199.9 | 876.0 | 60.3 | 93.5 | 19.6 | 13.2 | 58.7 | 5.4 | 10.6 | 16.4 | 1.9 | 2.4 | 69.7 | 2.4 | 4.3 | 2.7 | 60.0 | 19.4 | 75.1 |
| F16 | 388FW | Mar-03 | 8.8 | 2846.8 | 1233.0 | 75.0 | 94.9 | 43.3 | 18.7 | 64.0 | 9.0 | 10.1 | 17.0 | 2.3 | 1.5 | 69.3 | 0.5 | 3.8 | 3.2 | 45.0 | 17.2 | 75.9 |
| F16 | 388FW | Apr-03 | 3.4 | 2583.9 | 1205.0 | 81.6 | 94.5 | 37.9 | 18.3 | 69.7 | 5.5 | 10.1 | 17.7 | 1.7 | 1.5 | 67.9 | 3.1 | 3.2 | 3.6 | 40.6 | 17.5 | 75.3 |
| F16 | 388FW | May-03 | 11.3 | 1642.0 | 968.0 | 74.0 | 96.8 | 24.2 | 14.6 | 65.3 | 6.3 | 9.8 | 11.2 | 2.3 | 0.8 | 68.9 | 1.8 | 3.1 | 4.2 | 34.3 | 12.0 | 81.8 |
| F16 | 388FW | Jun-03 | 8.2 | 2404.2 | 1209.0 | 83.9 | 95.4 | 36.6 | 18.3 | 69.9 | 6.8 | 11.2 | 12.5 | 1.2 | 1.1 | 73.5 | 1.4 | 2.3 | 4.0 | 45.3 | 13.8 | 79.5 |
| F16 | 388FW | Jul-03 | 9.7 | 2445.6 | 1292.0 | 85.8 | 97.2 | 37.1 | 19.6 | 68.5 | 7.5 | 11.1 | 13.9 | 1.2 | 1.1 | 73.1 | 8.5 | 2.3 | 3.8 | 56.2 | 15.7 | 77.4 |
| F16 | 388FW | Aug-03 | 5.8 | 2113.5 | 1146.0 | 89.3 | 97.1 | 32.0 | 17.4 | 66.4 | 6.8 | 9.3 | 9.8 | 0.6 | 1.8 | 72.3 | 5.8 | 2.4 | 4.7 | 45.8 | 13.5 | 79.5 |
| F16 | 388FW | Sep-03 | 5.7 | 1531.6 | 907.0 | 80.0 | 98.8 | 23.2 | 13.7 | 74.0 | 5.9 | 8.5 | 9.6 | 0.6 | 1.0 | 70.7 | 3.1 | 1.6 | 4.4 | 56.6 | 13.9 | 79.8 |
| F16 | 388FW | Oct-03 | 4.2 | 1801.3 | 1293.0 | 79.3 | 89.2 | 27.3 | 19.6 | 68.8 | 5.9 | 8.4 | 6.7 | 1.1 | 1.4 | 69.9 | 2.7 | 2.5 | 3.9 | 46.8 | 13.4 | 80.4 |
| F16 | 388FW | Nov-03 | 13.1 | 1223.9 | 912.0 | 62.6 | 98.8 | 18.5 | 13.8 | 68.9 | 10.4 | 11.3 | 8.7 | 1.4 | 1.2 | 69.6 | 2.8 | 2.6 | 3.4 | 53.6 | 16.3 | 76.8 |
| F16 | 388FW | Dec-03 | 9.1 | 1388.1 | 953.0 | 71.2 | 99.0 | 20.8 | 14.3 | 74.7 | 8.6 | 9.6 | 10.5 | 1.2 | 1.2 | 68.3 | 1.9 | 2.4 | 4.2 | 71.6 | 15.7 | 79.3 |
| F16 | 388FW | Jan-04 | 7.6 | 1379.6 | 996.0 | 52.5 | 96.6 | 20.9 | 15.1 | 79.4 | 8.4 | 9.7 | 7.8 | 2.1 | 1.4 | 69.9 | 1.3 | 3.5 | 6.0 | 85.8 | 14.4 | 82.0 |
| F16 | 388FW | Feb-04 | 6.7 | 1452.2 | 982.0 | 55.1 | 97.1 | 22.0 | 14.9 | 85.5 | 8.1 | 11.2 | 8.7 | 0.9 | 1.5 | 71.6 | 1.4 | 2.4 | 3.3 | 90.0 | 12.4 | 82.2 |
| F16 | 388FW | Mar-04 | 6.1 | 2255.1 | 1584.0 | 82.7 | 98.5 | 33.9 | 23.9 | 77.9 | 6.6 | 9.8 | 7.5 | 0.8 | 0.9 | 71.5 | 0.5 | 1.7 | 3.7 | 65.1 | 13.0 | 84.6 |
| F16 | 388FW | Apr-04 | 6.3 | 1791.9 | 1242.0 | 80.9 | 99.1 | 27.2 | 18.8 | 79.8 | 5.7 | 9.2 | 5.3 | 0.6 | 0.7 | 71.6 | 1.9 | 1.3 | 3.2 | 62.7 | 12.4 | 85.0 |
| F16 | 388FW | May-04 | 5.2 | 2011.5 | 1403.0 | 84.0 | 94.2 | 30.5 | 21.3 | 77.5 | 5.2 | 10.8 | 7.2 | 1.1 | 1.2 | 71.3 | 1.9 | 2.3 | 5.0 | 50.6 | 12.9 | 83.7 |
| F16 | 388FW | Jun-04 | 6.7 | 1936.6 | 1470.0 | 80.9 | 98.1 | 29.3 | 22.3 | 71.5 | 7.2 | 9.8 | 7.3 | 0.6 | 0.7 | 71.5 | 2.8 | 1.3 | 3.6 | 57.7 | 13.4 | 83.5 |
| F16 | 388FW | Jul-04 | 5.8 | 1772.6 | 1367.0 | 89.5 | 92.2 | 26.8 | 20.7 | 79.3 | 6.5 | 8.1 | 7.6 | 1.1 | 1.2 | 70.6 | 2.4 | 2.3 | 3.9 | 57.4 | 11.6 | 85.3 |
| F16 | 388FW | Aug-04 | 5.0 | 1689.1 | 910.0 | 72.5 | 97.2 | 25.5 | 13.8 | 82.2 | 5.5 | 9.9 | 9.3 | 0.6 | 1.5 | 71.4 | 1.1 | 2.1 | 8.1 | 65.5 | 9.6 | 87.9 |
| F16 | 388FW | Sep-04 | 5.0 | 1972.1 | 1009.0 | 85.5 | 98.1 | 29.5 | 15.3 | 81.4 | 6.6 | 9.6 | 9.1 | 1.5 | 1.0 | 71.5 | 1.1 | 2.5 | 3.6 | 77.1 | 11.9 | 82.8 |

22ARW Data:

| | | | OVERALL BALANCE | | | | | | | SORTIE PRODUCTION | | | | | | FLEET HEALTH PERFORMANCE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MDS | Base | Date | DEV | FHA | SFA | FSE | MSE | HUTE | SUTE | FR | AR | BR | CR | RC | RP | APA | DD | R/R | RCP | MMH | TNMCM | MC |
| KC135 | 22ARW | Sep-99 | n/a | 1113.3 | 310.0 | n/a | 99.0 | 45.0 | 12.0 | 71.4 | 1.7 | 5.2 | 11.4 | 0.0 | 0.6 | 24.7 | 6.2 | 0.6 | n/a | 21.5 | 9.7 | 75.0 |
| KC135 | 22ARW | Oct-99 | n/a | 1292.8 | 351.0 | n/a | 100.0 | 52.8 | 13.5 | 100.0 | 0.3 | 1.4 | 7.3 | 0.0 | 0.8 | 24.0 | 6.1 | 0.8 | n/a | 13.7 | 5.9 | 83.8 |
| KC135 | 22ARW | Nov-99 | n/a | 1561.5 | 401.0 | n/a | 100.0 | 70.1 | 17.0 | 100.0 | 0.5 | 0.6 | 10.7 | 1.0 | 0.0 | 23.8 | 6.4 | 1.0 | n/a | 21.4 | 15.0 | 77.7 |
| KC135 | 22ARW | Dec-99 | n/a | 1400.6 | 364.0 | n/a | 100.0 | 54.7 | 13.7 | 75.0 | 0.9 | 2.7 | 12.3 | 0.4 | 0.2 | 25.6 | 6.5 | 0.6 | n/a | 30.5 | 8.8 | 84.8 |
| KC135 | 22ARW | Jan-00 | n/a | 1346.4 | 341.0 | n/a | 100.0 | 50.8 | 12.3 | 75.0 | 0.3 | 1.4 | 9.8 | 0.2 | 0.4 | 29.0 | 4.6 | 0.6 | n/a | 11.7 | 8.2 | 90.3 |
| KC135 | 22ARW | Feb-00 | n/a | 1549.0 | 401.0 | n/a | 84.5 | 55.5 | 13.5 | 54.5 | 1.3 | 3.2 | 8.7 | 0.6 | 0.8 | 30.6 | 5.9 | 1.4 | n/a | 12.6 | 10.3 | 85.3 |
| KC135 | 22ARW | Mar-00 | n/a | 1800.3 | 429.0 | n/a | 81.0 | 65.2 | 14.9 | 40.0 | 0.2 | 1.5 | 9.7 | 1.9 | 1.7 | 27.7 | 7.8 | 3.6 | n/a | 14.4 | 9.7 | 81.7 |
| KC135 | 22ARW | Apr-00 | n/a | 1719.4 | 425.0 | n/a | 92.0 | 63.1 | 14.9 | 75.0 | 1.2 | 2.2 | 8.8 | 1.1 | 1.3 | 28.0 | 9.3 | 2.4 | n/a | 11.0 | 7.3 | 87.6 |
| KC135 | 22ARW | May-00 | n/a | 1721.2 | 433.0 | n/a | 92.5 | 65.6 | 15.6 | 100.0 | 1.2 | 2.4 | 12.5 | 0.7 | 1.5 | 27.5 | 9.0 | 2.2 | n/a | 19.0 | 7.1 | 88.2 |
| KC135 | 22ARW | Jun-00 | n/a | 1473.9 | 369.0 | n/a | 97.4 | 55.6 | 13.8 | 64.3 | 2.2 | 4.7 | 12.0 | 0.8 | 0.8 | 27.3 | 8.3 | 1.6 | n/a | 22.2 | 7.7 | 88.2 |
| KC135 | 22ARW | Jul-00 | n/a | 1318.3 | 342.0 | n/a | 92.1 | 48.3 | 12.4 | 57.1 | 1.2 | 2.4 | 13.0 | 1.8 | 2.0 | 29.0 | 6.3 | 3.8 | n/a | 14.4 | 9.7 | 88.3 |
| KC135 | 22ARW | Aug-00 | n/a | 1731.3 | 413.0 | n/a | 89.9 | 64.6 | 14.9 | 77.8 | 1.3 | 5.4 | 19.6 | 2.2 | 1.6 | 28.4 | 6.6 | 3.8 | n/a | 22.4 | 11.4 | 85.2 |
| KC135 | 22ARW | Sep-00 | n/a | 1734.0 | 403.0 | n/a | 82.9 | 54.2 | 12.5 | 54.5 | 1.3 | 3.9 | 15.0 | 1.6 | 1.2 | 33.1 | 7.3 | 2.8 | n/a | 12.9 | 7.2 | 89.4 |
| KC135 | 22ARW | Oct-00 | n/a | 1811.9 | 437.0 | n/a | 87.5 | 54.0 | 12.8 | 71.4 | 0.5 | 1.8 | 16.1 | 1.0 | 1.2 | 33.2 | 8.7 | 2.2 | n/a | 15.2 | 10.5 | 88.2 |
| KC135 | 22ARW | Nov-00 | n/a | 1572.5 | 390.0 | n/a | 95.4 | 48.8 | 12.1 | 62.5 | 0.8 | 2.7 | 9.7 | 0.2 | 0.9 | 33.5 | 7.3 | 1.1 | n/a | 16.9 | 7.5 | 87.3 |
| KC135 | 22ARW | Dec-00 | n/a | 1304.4 | 307.0 | n/a | 96.4 | 42.5 | 9.8 | 36.4 | 2.0 | 4.2 | 14.6 | 0.5 | 0.3 | 33.5 | 9.6 | 0.8 | n/a | 19.1 | 7.7 | 86.6 |
| KC135 | 22ARW | Jan-01 | n/a | 1643.0 | 404.0 | n/a | 95.2 | 53.4 | 12.1 | 12.5 | 0.3 | 2.8 | 13.7 | 0.3 | 0.5 | 32.6 | 9.1 | 0.8 | n/a | 33.9 | 9.6 | 86.3 |
| KC135 | 22ARW | Feb-01 | n/a | 1489.3 | 349.0 | n/a | 81.5 | 49.7 | 10.9 | 12.5 | 1.3 | 3.3 | 11.3 | 0.3 | 0.0 | 31.1 | 9.5 | 0.3 | n/a | 15.7 | 9.4 | 87.9 |
| KC135 | 22ARW | Mar-01 | n/a | 1492.9 | 371.0 | n/a | 86.6 | 60.5 | 14.8 | 55.6 | 0.0 | 2.9 | 21.0 | 0.7 | 1.2 | 26.3 | 11.4 | 1.9 | n/a | 30.3 | 13.8 | 80.9 |
| KC135 | 22ARW | Apr-01 | n/a | 1699.8 | 423.0 | n/a | 82.1 | 59.2 | 14.6 | 37.5 | 0.3 | 2.3 | 12.8 | 0.4 | 0.6 | 30.2 | 11.4 | 1.0 | n/a | 23.0 | 12.4 | 85.4 |
| KC135 | 22ARW | May-01 | n/a | 1628.4 | 418.0 | n/a | 98.7 | 60.3 | 15.3 | 57.1 | 0.7 | 2.1 | 14.5 | 0.9 | 0.2 | 28.3 | 12.1 | 1.1 | n/a | 29.8 | 11.9 | 84.7 |
| KC135 | 22ARW | Jun-01 | n/a | 1576.2 | 401.0 | n/a | 86.8 | 54.7 | 13.2 | 63.6 | 1.1 | 3.5 | 16.3 | 0.3 | 0.0 | 30.2 | 11.2 | 0.3 | n/a | 24.1 | 12.9 | 83.5 |
| KC135 | 22ARW | Jul-01 | n/a | 1792.0 | 414.0 | n/a | 91.2 | 60.7 | 13.4 | 33.3 | 0.3 | 2.5 | 18.5 | 0.4 | 0.9 | 31.2 | 7.2 | 1.3 | n/a | 21.6 | 13.1 | 85.7 |
| KC135 | 22ARW | Aug-01 | n/a | 1735.9 | 451.0 | n/a | 81.5 | 57.8 | 14.2 | 33.3 | 0.9 | 3.1 | 14.9 | 0.7 | 0.4 | 31.4 | 8.0 | 1.1 | n/a | 30.2 | 19.2 | 77.7 |
| KC135 | 22ARW | Oct-02 | n/a | 3037.5 | 557.0 | n/a | 79.6 | 70.6 | 12.9 | 50.0 | 0.2 | 2.0 | 10.6 | 0.5 | 0.9 | 42.5 | 10.0 | 1.4 | n/a | 12.6 | 9.0 | 84.2 |
| KC135 | 22ARW | Nov-02 | n/a | 2499.1 | 455.0 | n/a | 82.2 | 58.4 | 10.6 | 50.0 | 0.2 | 1.9 | 14.9 | 2.2 | 1.7 | 43.2 | 9.4 | 3.9 | n/a | 27.7 | 9.6 | 83.0 |
| KC135 | 22ARW | Dec-02 | n/a | 2471.6 | 418.0 | n/a | 82.9 | 59.7 | 10.1 | 75.0 | 0.0 | 3.0 | 10.7 | 2.1 | 0.9 | 44.6 | 9.2 | 3.0 | n/a | 12.5 | 7.1 | 87.0 |
| KC135 | 22ARW | Jan-03 | n/a | 2695.3 | 464.0 | n/a | 86.7 | 64.5 | 11.0 | 58.3 | 0.2 | 2.8 | 17.7 | 1.3 | 1.5 | 41.6 | 8.6 | 2.8 | n/a | 10.4 | 6.6 | 86.6 |
| KC135 | 22ARW | Feb-03 | n/a | 2933.2 | 482.0 | n/a | 95.1 | 77.0 | 12.5 | 22.2 | 0.0 | 2.0 | 14.8 | 3.3 | 2.0 | 38.4 | 8.3 | 5.3 | n/a | 9.6 | 10.2 | 81.2 |
| KC135 | 22ARW | Mar-03 | n/a | 4814.2 | 854.0 | n/a | 68.3 | 112.0 | 19.7 | 57.1 | 0.0 | 0.9 | 12.9 | 1.6 | 0.9 | 43.6 | 8.4 | 2.5 | n/a | 3.9 | 5.6 | 86.2 |
| KC135 | 22ARW | Apr-03 | n/a | 4771.1 | 866.0 | n/a | 95.7 | 103.7 | 18.8 | 45.5 | 0.1 | 1.3 | 11.2 | 2.2 | 2.2 | 45.5 | 8.7 | 4.4 | n/a | 4.5 | 7.0 | 84.6 |
| KC135 | 22ARW | May-03 | n/a | 2173.5 | 387.0 | n/a | 89.7 | 50.0 | 8.8 | 16.7 | 0.3 | 1.6 | 10.3 | 1.2 | 1.0 | 45.5 | 7.6 | 2.2 | n/a | 23.7 | 7.2 | 88.8 |
| KC135 | 22ARW | Jun-03 | n/a | 2400.7 | 452.0 | n/a | 83.6 | 58.4 | 10.9 | 50.0 | 0.5 | 0.5 | 5.4 | 0.8 | 1.9 | 41.5 | 7.5 | 2.7 | n/a | 16.6 | 9.3 | 86.3 |
| KC136 | 22ARW | Jul-03 | n/a | 2286.1 | 442.0 | n/a | 93.8 | 55.0 | 10.6 | 0.0 | 1.1 | 3.3 | 7.1 | 2.1 | 0.3 | 42.1 | 7.5 | 2.4 | n/a | 13.8 | 10.2 | 85.9 |
| KC137 | 22ARW | Aug-03 | n/a | 2103.5 | 416.0 | n/a | 90.6 | 49.5 | 9.7 | 25.0 | 0.0 | 3.0 | 9.8 | 2.9 | 1.0 | 41.3 | 7.4 | 3.9 | n/a | 18.3 | 11.6 | 83.3 |
| KC135 | 22ARW | Sep-03 | n/a | 2330.6 | 466.0 | n/a | 86.7 | 55.1 | 10.8 | 83.3 | 1.1 | 2.9 | 7.3 | 2.1 | 1.5 | 40.9 | 8.8 | 3.6 | n/a | 20.2 | 11.4 | 82.4 |
| KC135 | 22ARW | Oct-03 | n/a | 2734.1 | 521.0 | n/a | 93.9 | 67.8 | 12.9 | 33.3 | 0.9 | 0.7 | 7.2 | 2.4 | 0.7 | 38.7 | 8.3 | 3.1 | n/a | 18.1 | 17.4 | 77.6 |
| KC135 | 22ARW | Nov-03 | n/a | 2783.1 | 550.0 | n/a | 79.4 | 68.7 | 13.6 | 50.0 | 0.5 | 1.9 | 7.5 | 1.9 | 1.5 | 37.9 | 7.2 | 3.4 | n/a | 17.8 | 11.5 | 82.1 |
| KC135 | 22ARW | Dec-03 | n/a | 2407.7 | 455.0 | n/a | 82.0 | 64.0 | 12.1 | 35.3 | 0.2 | 3.7 | 15.8 | 1.4 | 0.6 | 37.6 | 7.3 | 2.0 | n/a | 12.9 | 9.1 | 86.7 |
| KC135 | 22ARW | Jan-04 | n/a | 2953.4 | 538.0 | n/a | 87.7 | 76.0 | 13.8 | 27.3 | 0.6 | 4.1 | 13.7 | 1.6 | 1.4 | 38.2 | 7.5 | 3.0 | n/a | 11.8 | 12.4 | 84.0 |
| KC135 | 22ARW | Feb-04 | n/a | 2780.2 | 536.0 | n/a | 82.0 | 76.1 | 14.6 | 29.4 | 1.5 | 3.2 | 6.3 | 1.1 | 0.2 | 36.5 | 8.4 | 1.3 | n/a | 9.9 | 9.7 | 85.0 |
| KC135 | 22ARW | Mar-04 | n/a | 3117.6 | 617.0 | n/a | 80.2 | 84.2 | 16.6 | 39.3 | 1.8 | 4.5 | 5.2 | 0.6 | 1.3 | 38.0 | 7.6 | 1.9 | n/a | 8.6 | 10.2 | 85.2 |
| KC135 | 22ARW | Apr-04 | n/a | 3262.7 | 633.0 | n/a | 95.7 | 88.2 | 17.1 | 22.2 | 0.8 | 4.3 | 8.6 | 2.7 | 2.1 | 36.6 | 7.0 | 4.8 | n/a | 8.8 | 10.7 | 84.6 |
| KC135 | 22ARW | May-04 | n/a | 3035.5 | 594.0 | n/a | 85.6 | 84.3 | 16.4 | 26.1 | 1.4 | 3.9 | 7.8 | 2.3 | 0.2 | 37.0 | 7.2 | 2.5 | n/a | 8.2 | 9.3 | 86.1 |
| KC135 | 22ARW | Jun-04 | n/a | 3231.7 | 624.0 | n/a | 85.2 | 89.3 | 17.2 | 15.4 | 0.3 | 4.2 | 4.2 | 1.9 | 0.6 | 36.3 | 8.6 | 2.5 | n/a | 9.1 | 10.9 | 86.5 |
| KC135 | 22ARW | Jul-04 | n/a | 2927.7 | 573.0 | n/a | 85.5 | 83.6 | 16.0 | 27.3 | 0.5 | 3.9 | 7.0 | 1.4 | 1.0 | 36.1 | 7.8 | 2.4 | n/a | 15.4 | 9.3 | 87.1 |
| KC135 | 22ARW | Aug-04 | n/a | 2646.3 | 537.0 | n/a | 88.1 | 76.7 | 15.6 | 38.9 | 0.0 | 6.8 | 7.1 | 1.5 | 0.7 | 35.3 | 6.0 | 2.2 | n/a | 9.4 | 11.9 | 83.7 |
| KC135 | 22ARW | Sep-04 | n/a | 2633.3 | 555.0 | n/a | 82.3 | 79.7 | 16.7 | 50.0 | 0.0 | 5.0 | 6.7 | 0.7 | 0.0 | 33.1 | 7.9 | 0.7 | n/a | 15.2 | 10.7 | 84.4 |

# 92ARW Data:

| | | | OVERALL BALANCE | | | | | | | SORTIE PRODUCTION | | | | | | FLEET HEALTH PERFORMANCE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MDS | Base | Date | DEV | FHA | SFA | FSE | MSE | HUTE | SUTE | FR | AR | BR | CR | RC | RP | APA | DD | R/R | RCP | MMH | TNMCM | MC |
| KC135 | 92ARW | Sep-99 | n/a | 811.2 | 172.0 | n/a | n/a | 31.0 | 6.5 | 77.8 | 0.6 | 6.1 | 8.8 | 13 | 2.6 | 28.2 | 2.6 | 3.9 | n/a | 18.2 | 17.4 | 40.7 |
| KC135 | 92ARW | Oct-99 | n/a | 1055.2 | 237.0 | n/a | n/a | 39.4 | 8.7 | 69.2 | 13 | 5.7 | 7.7 | 2.6 | 16 | 26.7 | 3.9 | 4.2 | n/a | 22.2 | 20.6 | 64.7 |
| KC135 | 92ARW | Nov-99 | n/a | 1115.7 | 252.0 | n/a | n/a | 39.4 | 8.9 | 56.3 | 11 | 8.3 | 10.3 | 16 | 0.5 | 28.4 | 3.7 | 2.1 | n/a | 13.3 | 11.4 | 74.2 |
| KC135 | 92ARW | Dec-99 | n/a | 849.5 | 188.0 | n/a | n/a | 33.7 | 7.4 | 75.0 | 2.3 | 5.6 | 8.0 | 17 | 17 | 26.8 | 2.8 | 3.4 | n/a | 15.4 | 11.1 | 78.1 |
| KC135 | 92ARW | Jan-00 | n/a | 899.9 | 174.0 | n/a | n/a | 34.2 | 6.6 | 63.6 | 0.5 | 6.6 | 16.1 | 2.1 | 16 | 25.7 | 4.0 | 3.7 | n/a | 32.4 | 13.7 | 83.8 |
| KC135 | 92ARW | Feb-00 | n/a | 872.7 | 182.0 | n/a | n/a | 41.6 | 8.3 | 72.7 | 17 | 7.3 | 8.0 | 11 | 0.6 | 21.5 | 3.7 | 17 | n/a | 29.9 | 18.8 | 73.6 |
| KC135 | 92ARW | Mar-00 | n/a | 1097.1 | 226.0 | n/a | n/a | 43.2 | 8.9 | 33.3 | 0.8 | 4.3 | 6.7 | 3.8 | 15 | 26.5 | 3.7 | 5.3 | n/a | 16.5 | 11.1 | 52.7 |
| KC135 | 92ARW | Apr-00 | n/a | 1070.5 | 240.0 | n/a | n/a | 42.0 | 9.4 | 60.0 | 0.4 | 5.9 | 9.2 | 2.7 | 3.8 | 27.3 | 3.3 | 6.5 | n/a | 14.7 | 14.7 | 81.9 |
| KC135 | 92ARW | May-00 | n/a | 1429.3 | 323.0 | n/a | n/a | 54.1 | 12.2 | 46.2 | 0.9 | 6.3 | 6.9 | 15 | 15 | 27.7 | 3.8 | 3.0 | n/a | 15.2 | 12.6 | 85.0 |
| KC135 | 92ARW | Jun-00 | n/a | 1316.7 | 294.0 | n/a | n/a | 42.1 | 9.1 | 66.7 | 14 | 6.5 | 9.5 | 0.6 | 2.2 | 30.4 | 4.3 | 2.8 | n/a | 13.0 | 9.9 | 87.5 |
| KC135 | 92ARW | Jul-00 | n/a | 1073.1 | 229.0 | n/a | n/a | 40.0 | 8.5 | 60.0 | 0.9 | 3.2 | 10.1 | 0.7 | 0.7 | 27.7 | 3.1 | 14 | n/a | 12.7 | 13.1 | 84.5 |
| KC135 | 92ARW | Aug-00 | n/a | 1317.6 | 273.0 | n/a | n/a | 47.7 | 9.9 | 33.3 | 11 | 4.9 | 4.4 | 10 | 15 | 28.2 | 3.9 | 2.5 | n/a | 14.9 | 11.1 | 86.3 |
| KC135 | 92ARW | Sep-00 | n/a | 1294.1 | 252.0 | n/a | n/a | 53.9 | 10.5 | 70.0 | 12 | 5.1 | 11.9 | 11 | 2.3 | 24.0 | 3.9 | 3.4 | n/a | 17.7 | 10.4 | 86.3 |
| KC135 | 92ARW | Oct-00 | n/a | 1253.2 | 283.0 | n/a | n/a | 43.5 | 9.8 | 50.0 | 2.9 | 7.0 | 13.1 | 12 | 3.2 | 27.9 | 3.2 | 4.4 | n/a | 17.4 | 12.9 | 84.1 |
| KC135 | 92ARW | Nov-00 | n/a | 1205.5 | 265.0 | n/a | n/a | 42.2 | 9.0 | 66.7 | 17 | 7.8 | 12.1 | 14 | 3.8 | 29.6 | 4.6 | 5.2 | n/a | 21.2 | 15.1 | 81.7 |
| KC135 | 92ARW | Dec-00 | n/a | 1096.2 | 254.0 | n/a | n/a | 38.7 | 9.0 | 62.5 | 2.0 | 4.4 | 11.8 | 19 | 15 | 29.1 | 6.0 | 3.4 | n/a | 26.1 | 14.5 | 82.8 |
| KC135 | 92ARW | Jan-01 | n/a | 1138.2 | 247.0 | n/a | n/a | 45.9 | 9.9 | 50.0 | 0.0 | 4.4 | 8.2 | 3.0 | 2.5 | 26.3 | 5.0 | 5.5 | n/a | 16.3 | 11.6 | 87.8 |
| KC135 | 92ARW | Feb-01 | n/a | 1275.0 | 244.0 | n/a | n/a | 55.4 | 10.6 | 66.7 | 11 | 3.3 | 9.8 | 18 | 12 | 25.3 | 4.3 | 3.0 | n/a | 16.6 | 13.4 | 86.0 |
| KC135 | 92ARW | Mar-01 | n/a | 1144.9 | 239.0 | n/a | n/a | 51.3 | 10.7 | 50.0 | 0.0 | 10 | 14.2 | 11 | 0.6 | 23.8 | 6.3 | 17 | n/a | 25.9 | 16.4 | 81.0 |
| KC135 | 92ARW | Apr-01 | n/a | 850.0 | 195.0 | n/a | n/a | 45.9 | 10.5 | 37.5 | 0.7 | 5.3 | 17.4 | 0.0 | 18 | 20.5 | 5.7 | 18 | n/a | 32.1 | 16.0 | 81.4 |
| KC135 | 92ARW | May-01 | n/a | 1050.4 | 218.0 | n/a | n/a | 44.9 | 9.3 | 44.4 | 3.1 | 5.7 | 11.5 | 0.0 | 3.5 | 25.5 | 5.2 | 3.5 | n/a | 28.7 | 11.1 | 87.6 |
| KC135 | 92ARW | Jun-01 | n/a | 1036.0 | 242.0 | n/a | n/a | 37.7 | 8.6 | 28.6 | 13 | 4.7 | 4.2 | 2.7 | 0.0 | 27.4 | 5.0 | 2.7 | n/a | 8.4 | 5.9 | 90.9 |
| KC135 | 92ARW | Jul-01 | n/a | 1104.5 | 257.0 | n/a | n/a | 37.7 | 8.8 | 25.0 | 0.0 | 2.0 | 3.1 | 0.0 | 0.7 | 29.1 | 4.8 | 0.7 | n/a | 11.6 | 11.2 | 83.4 |
| KC135 | 92ARW | Aug-01 | n/a | 1198.6 | 269.0 | n/a | n/a | 40.2 | 9.0 | 40.0 | 2.6 | 7.1 | 3.3 | 0.4 | 15 | 29.9 | 4.1 | 19 | n/a | 28.5 | 11.5 | 84.4 |
| KC135 | 92ARW | Oct-02 | n/a | 1072.7 | 209.0 | n/a | n/a | 34.8 | 6.8 | 42.9 | 15 | 8.4 | 26.1 | 18 | 0.9 | 31.5 | 6.8 | 2.7 | n/a | 30.8 | 10.6 | 84.9 |
| KC135 | 92ARW | Nov-02 | n/a | 1032.5 | 203.0 | n/a | n/a | 31.3 | 6.2 | 78.6 | 0.5 | 7.7 | 7.9 | 18 | 2.2 | 32.9 | 6.1 | 4.0 | n/a | 26.6 | 11.6 | 86.3 |
| KC135 | 92ARW | Dec-02 | n/a | 1231.5 | 210.0 | n/a | n/a | 39.3 | 6.7 | 62.5 | 10 | 4.7 | 7.1 | 15 | 3.0 | 32.2 | 5.3 | 4.5 | n/a | 19.7 | 6.3 | 90.5 |
| KC135 | 92ARW | Jan-03 | n/a | 1245.7 | 250.0 | n/a | n/a | 38.2 | 7.7 | 57.1 | 5.6 | 10.0 | 5.6 | 0.8 | 19 | 32.5 | 6.4 | 2.7 | n/a | 23.4 | 8.3 | 87.9 |
| KC135 | 92ARW | Feb-03 | n/a | 1808.8 | 314.0 | n/a | n/a | 56.5 | 9.8 | 18.2 | 10 | 3.8 | 9.0 | 15 | 15 | 32.2 | 7.4 | 3.0 | n/a | 15.0 | 12.0 | 82.7 |
| KC135 | 92ARW | Mar-03 | n/a | 2023.7 | 354.0 | n/a | n/a | 95.0 | 16.7 | 63.6 | 17 | 3.2 | 9.3 | 0.4 | 15 | 21.1 | 10.9 | 19 | n/a | 13.2 | 12.6 | 83.5 |
| KC135 | 92ARW | Apr-03 | n/a | 1937.7 | 337.0 | n/a | n/a | 78.8 | 13.7 | 62.5 | 12 | 2.6 | 9.5 | 0.0 | 18 | 24.0 | 10.6 | 18 | n/a | 14.7 | 11.7 | 82.6 |
| KC135 | 92ARW | May-03 | n/a | 1266.5 | 252.0 | n/a | n/a | 32.1 | 6.3 | 47.8 | 4.4 | 10.2 | 4.0 | 11 | 15 | 39.1 | 6.3 | 2.6 | n/a | 34.3 | 11.9 | 83.0 |
| KC135 | 92ARW | Jun-03 | n/a | 1303.5 | 254.0 | n/a | n/a | 31.0 | 6.0 | 33.3 | 0.8 | 2.6 | 2.0 | 0.8 | 13 | 41.0 | 4.6 | 2.1 | n/a | 25.6 | 5.4 | 91.7 |
| KC136 | 92ARW | Jul-03 | n/a | 1075.9 | 234.0 | n/a | n/a | 32.4 | 7.1 | 50.0 | 0.0 | 19 | 6.0 | 15 | 2.0 | 31.3 | 4.6 | 3.5 | n/a | 24.4 | 9.8 | 87.2 |
| KC137 | 92ARW | Aug-03 | n/a | 1090.8 | 220.0 | n/a | n/a | 36.6 | 7.3 | 63.6 | 0.9 | 5.1 | 10.5 | 3.3 | 19 | 30.9 | 5.7 | 5.2 | n/a | 25.9 | 12.7 | 81.5 |
| KC135 | 92ARW | Sep-03 | n/a | 2060.9 | 384.0 | n/a | n/a | 53.0 | 9.9 | 65.0 | 0.3 | 5.4 | 10.1 | 14 | 0.7 | 41.7 | 6.6 | 2.1 | n/a | 16.2 | 9.1 | 86.3 |
| KC135 | 92ARW | Oct-03 | n/a | 1907.0 | 383.0 | n/a | n/a | 49.8 | 9.9 | 56.3 | 13 | 4.2 | 5.7 | 0.5 | 0.3 | 39.1 | 7.0 | 0.8 | n/a | 18.2 | 8.8 | 88.3 |
| KC135 | 92ARW | Nov-03 | n/a | 2324.5 | 399.0 | n/a | n/a | 58.8 | 10.1 | 69.2 | 15 | 6.5 | 3.0 | 0.0 | 2.0 | 40.7 | 5.6 | 2.0 | n/a | 10.4 | 10.3 | 87.3 |
| KC135 | 92ARW | Dec-03 | n/a | 2077.8 | 408.0 | n/a | n/a | 53.0 | 10.3 | 72.0 | 12 | 4.2 | 3.9 | 11 | 2.3 | 40.6 | 4.2 | 3.4 | n/a | 15.2 | 9.4 | 87.8 |
| KC135 | 92ARW | Jan-04 | n/a | 2422.9 | 440.0 | n/a | n/a | 59.2 | 10.7 | 15.4 | 16 | 6.0 | 5.3 | 12 | 3.3 | 41.8 | 5.6 | 4.5 | n/a | 10.8 | 12.7 | 83.2 |
| KC135 | 92ARW | Feb-04 | n/a | 2399.3 | 427.0 | n/a | n/a | 58.2 | 10.3 | 7.7 | 14 | 6.1 | 4.7 | 11 | 19 | 40.7 | 7.0 | 3.0 | n/a | 10.4 | 9.2 | 88.3 |
| KC135 | 92ARW | Mar-04 | n/a | 2765.3 | 517.0 | n/a | n/a | 71.8 | 13.4 | 27.3 | 10 | 4.2 | 3.7 | 2.4 | 13 | 39.9 | 5.6 | 3.7 | n/a | 12.9 | 9.5 | 87.8 |
| KC135 | 92ARW | Apr-04 | n/a | 2908.8 | 511.0 | n/a | n/a | 72.0 | 12.6 | 21.4 | 0.6 | 5.5 | 5.1 | 2.2 | 2.2 | 41.2 | 6.0 | 4.4 | n/a | 9.6 | 11.5 | 83.7 |
| KC135 | 92ARW | May-04 | n/a | 3081.3 | 568.0 | n/a | n/a | 79.0 | 14.5 | 24.2 | 2.5 | 5.8 | 3.0 | 11 | 0.9 | 39.9 | 6.6 | 2.0 | n/a | 6.9 | 8.4 | 88.5 |
| KC135 | 92ARW | Jun-04 | n/a | 3108.9 | 590.0 | n/a | n/a | 78.9 | 15.0 | 45.0 | 0.5 | 3.4 | 3.7 | 0.8 | 0.0 | 40.2 | 5.6 | 0.8 | n/a | 7.2 | 9.6 | 87.7 |
| KC135 | 92ARW | Jul-04 | n/a | 2451.0 | 484.0 | n/a | n/a | 61.9 | 12.2 | 37.1 | 15 | 7.3 | 12.7 | 0.8 | 0.5 | 39.4 | 5.3 | 13 | n/a | 9.6 | 13.1 | 81.1 |
| KC135 | 92ARW | Aug-04 | n/a | 2517.6 | 473.0 | n/a | n/a | 72.2 | 13.6 | 56.8 | 11 | 7.9 | 9.3 | 16 | 14 | 35.2 | 5.7 | 3.0 | n/a | 9.4 | 12.9 | 82.6 |
| KC135 | 92ARW | Sep-04 | n/a | 2641.6 | 473.0 | n/a | n/a | 75.6 | 13.5 | 71.9 | 0.4 | 6.8 | 4.9 | 0.5 | 0.5 | 35.2 | 6.1 | 10 | n/a | 7.6 | 11.1 | 84.0 |

319ARW Data:

| | | | OVERALL BALANCE | | | | | | SORTIE PRODUCTION | | | | | | FLEET HEALTH PERFORMANCE | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MDS | Base | Date | DEV | FHA | SFA | FSE | MSE | HUTE | SUTE | FR | AR | BR | CR | RC | RP | APA | DD | R/R | RCP | MMH | TNMCM | MC |
| KC135 | 319ARW | Sep-99 | n/a | 1340.5 | 273.0 | n/a | 88.9 | 43.0 | 7.9 | 25.0 | 0.0 | 2.7 | 9.8 | 1.0 | 0.0 | 33.1 | 6.0 | 1.0 | n/a | 11.5 | 10.3 | 86.1 |
| KC135 | 319ARW | Oct-99 | n/a | 1599.4 | 312.0 | n/a | 94.1 | 52.0 | 9.2 | 100.0 | 0.0 | 0.6 | 13.8 | 1.0 | 1.0 | 31.7 | 6.5 | 2.0 | n/a | 11.5 | 10.4 | 86.6 |
| KC135 | 319ARW | Nov-99 | n/a | 1416.9 | 293.0 | n/a | 94.7 | 46.5 | 9.0 | 16.7 | 0.4 | 3.7 | 13.0 | 1.0 | 4.0 | 32.0 | 6.7 | 5.0 | n/a | 11.5 | 10.7 | 83.1 |
| KC135 | 319ARW | Dec-99 | n/a | 1140.0 | 262.0 | n/a | 100.0 | 37.7 | 7.9 | 44.4 | 1.4 | 5.6 | 13.3 | 1.0 | 1.0 | 32.3 | 6.2 | 2.0 | n/a | 10.7 | 11.1 | 82.5 |
| KC135 | 319ARW | Jan-00 | n/a | 1248.1 | 256.0 | n/a | 100.0 | 39.6 | 7.3 | 66.7 | 0.9 | 5.6 | 8.3 | 0.4 | 0.4 | 32.5 | 6.4 | 0.8 | n/a | 9.9 | 9.2 | 86.0 |
| KC135 | 319ARW | Feb-00 | n/a | 1513.1 | 320.0 | n/a | 100.0 | 48.8 | 9.0 | 57.1 | 0.8 | 3.3 | 6.8 | 0.8 | 1.2 | 31.6 | 6.9 | 2.0 | n/a | 10.2 | 10.7 | 82.0 |
| KC135 | 319ARW | Mar-00 | n/a | 1361.5 | 272.0 | n/a | 46.2 | 51.2 | 9.5 | 80.0 | 0.4 | 3.2 | 6.3 | 1.2 | 0.8 | 26.9 | 5.9 | 2.0 | n/a | 6.5 | 9.4 | 69.8 |
| KC135 | 319ARW | Apr-00 | n/a | 943.2 | 195.0 | n/a | 100.0 | 39.3 | 7.7 | 0.0 | 0.0 | 0.7 | 14.1 | 0.5 | 0.5 | 24.2 | 4.7 | 1.0 | n/a | 8.8 | 10.3 | 73.5 |
| KC135 | 319ARW | May-00 | n/a | 1301.5 | 274.0 | n/a | 98.0 | 56.6 | 11.6 | 50.0 | 0.9 | 1.9 | 12.7 | 0.5 | 0.0 | 23.1 | 4.2 | 0.5 | n/a | 9.0 | 12.2 | 83.1 |
| KC135 | 319ARW | Jun-00 | n/a | 1259.1 | 261.0 | n/a | 100.0 | 45.3 | 8.6 | 40.0 | 1.3 | 2.8 | 13.8 | 0.0 | 1.3 | 27.8 | 4.9 | 1.3 | n/a | 6.4 | 8.8 | 85.4 |
| KC135 | 319ARW | Jul-00 | n/a | 1212.8 | 224.0 | n/a | 100.0 | 44.1 | 7.3 | 66.7 | 0.0 | 1.8 | 7.0 | 1.1 | 1.1 | 27.1 | 5.4 | 2.2 | n/a | 2.8 | 6.7 | 82.0 |
| KC135 | 319ARW | Aug-00 | n/a | 1174.0 | 235.0 | n/a | 100.0 | 44.5 | 7.7 | 40.0 | 0.0 | 3.1 | 2.5 | 0.5 | 0.0 | 26.0 | 7.2 | 0.5 | n/a | 5.2 | 8.9 | 87.4 |
| KC135 | 319ARW | Sep-00 | n/a | 984.9 | 215.0 | n/a | 98.7 | 40.5 | 8.7 | 0.0 | 0.0 | 1.9 | 14.2 | 1.0 | 0.5 | 22.9 | 7.8 | 1.5 | n/a | 10.3 | 15.4 | 80.4 |
| KC135 | 319ARW | Oct-00 | n/a | 972.4 | 205.0 | n/a | 100.0 | 49.1 | 10.2 | 55.6 | 1.6 | 5.2 | 14.9 | 0.5 | 0.0 | 21.3 | 6.7 | 0.5 | n/a | 13.5 | 19.0 | 75.0 |
| KC135 | 319ARW | Nov-00 | n/a | 906.8 | 213.0 | n/a | 100.0 | 46.4 | 10.6 | 40.0 | 0.0 | 3.2 | 15.3 | 0.5 | 0.5 | 21.4 | 6.5 | 1.0 | n/a | 16.3 | 16.9 | 78.3 |
| KC135 | 319ARW | Dec-00 | n/a | 679.9 | 150.0 | n/a | 100.0 | 30.9 | 6.7 | 0.0 | 0.7 | 1.8 | 10.9 | 0.7 | 0.7 | 23.2 | 8.0 | 1.4 | n/a | 21.4 | 14.7 | 79.0 |
| KC135 | 319ARW | Jan-01 | n/a | 904.8 | 190.0 | n/a | 100.0 | 47.8 | 9.8 | 40.0 | 1.2 | 5.6 | 17.9 | 1.2 | 1.7 | 20.3 | 6.8 | 2.9 | n/a | 14.5 | 17.3 | 77.1 |
| KC135 | 319ARW | Feb-01 | n/a | 994.7 | 204.0 | n/a | 100.0 | 48.5 | 9.5 | 38.5 | 1.6 | 7.6 | 13.8 | 4.3 | 5.4 | 22.3 | 5.9 | 9.7 | n/a | 14.5 | 21.1 | 76.0 |
| KC135 | 319ARW | Mar-01 | n/a | 1379.3 | 294.0 | n/a | 100.0 | 53.1 | 10.8 | 37.5 | 1.1 | 8.0 | 11.3 | 3.6 | 3.9 | 26.4 | 6.4 | 7.5 | n/a | 13.9 | 14.4 | 81.9 |
| KC135 | 319ARW | Apr-01 | n/a | 1634.3 | 347.0 | n/a | 100.0 | 52.9 | 10.5 | 46.7 | 1.3 | 6.3 | 8.6 | 2.0 | 3.3 | 31.1 | 5.5 | 5.3 | n/a | 13.9 | 13.6 | 82.7 |
| KC135 | 319ARW | May-01 | n/a | 1391.5 | 304.0 | n/a | 100.0 | 47.5 | 9.7 | 37.5 | 0.4 | 4.1 | 14.2 | 0.7 | 1.8 | 30.7 | 4.8 | 2.5 | n/a | 14.1 | 15.0 | 77.7 |
| KC135 | 319ARW | Jun-01 | n/a | 1531.3 | 325.0 | n/a | 100.0 | 51.9 | 10.7 | 50.0 | 0.0 | 1.7 | 8.2 | 0.3 | 1.6 | 29.9 | 4.5 | 1.9 | n/a | 8.1 | 12.3 | 80.8 |
| KC135 | 319ARW | Jul-01 | n/a | 1459.1 | 323.0 | n/a | 100.0 | 47.8 | 10.0 | 21.4 | 0.3 | 5.1 | 6.6 | 0.7 | 0.7 | 31.5 | 5.3 | 1.4 | n/a | 13.5 | 10.6 | 84.1 |
| KC135 | 319ARW | Aug-01 | n/a | 1396.1 | 322.0 | n/a | 100.0 | 44.5 | 9.1 | 29.4 | 0.4 | 7.0 | 15.8 | 1.4 | 2.1 | 33.1 | 5.7 | 3.5 | n/a | 14.9 | 11.1 | 83.0 |
| KC135 | 319ARW | Oct-02 | n/a | 2123.3 | 381.0 | n/a | 90.6 | 51.3 | 8.3 | 16.7 | 0.8 | 1.9 | 11.0 | 0.8 | 1.4 | 42.1 | 6.7 | 2.2 | n/a | 17.1 | 11.1 | 83.4 |
| KC135 | 319ARW | Nov-02 | n/a | 1883.8 | 335.0 | n/a | 80.6 | 46.9 | 8.5 | 25.0 | 0.6 | 4.8 | 6.2 | 1.2 | 2.1 | 41.9 | 6.5 | 3.3 | n/a | 8.2 | 8.9 | 81.8 |
| KC135 | 319ARW | Dec-02 | n/a | 1695.3 | 313.0 | n/a | 73.2 | 43.7 | 7.9 | 36.4 | 1.3 | 4.5 | 7.8 | 0.6 | 1.9 | 41.3 | 6.7 | 2.5 | n/a | 17.5 | 11.2 | 82.0 |
| KC135 | 319ARW | Jan-03 | n/a | 1901.0 | 345.0 | n/a | 76.3 | 48.2 | 8.7 | 58.3 | 1.5 | 4.3 | 8.2 | 0.6 | 0.3 | 40.5 | 6.3 | 0.9 | n/a | 10.0 | 14.7 | 79.2 |
| KC135 | 319ARW | Feb-03 | n/a | 1932.3 | 366.0 | n/a | 97.1 | 52.2 | 9.5 | 38.5 | 1.2 | 4.9 | 9.0 | 1.7 | 1.7 | 38.5 | 6.8 | 3.4 | n/a | 8.1 | 13.5 | 83.4 |
| KC135 | 319ARW | Mar-03 | n/a | 3055.0 | 596.0 | n/a | 100.0 | 85.3 | 16.1 | 36.4 | 0.7 | 2.2 | 10.5 | 1.1 | 0.9 | 36.1 | 8.0 | 2.0 | n/a | 9.5 | 7.7 | 86.0 |
| KC135 | 319ARW | Apr-03 | n/a | 3179.0 | 639.0 | n/a | 100.0 | 105.5 | 21.0 | 40.0 | 0.9 | 2.6 | 6.5 | 0.3 | 0.6 | 30.2 | 9.3 | 0.9 | n/a | 7.2 | 8.2 | 86.1 |
| KC135 | 319ARW | May-03 | n/a | 829.5 | 161.0 | n/a | 100.0 | 21.8 | 4.2 | 0.0 | 1.9 | 3.7 | 5.0 | 1.9 | 2.5 | 38.3 | 6.3 | 4.4 | n/a | 14.6 | 5.1 | 89.9 |
| KC135 | 319ARW | Jun-03 | n/a | 989.9 | 215.0 | n/a | 100.0 | 26.0 | 5.4 | 66.7 | 4.8 | 5.8 | 8.1 | 0.6 | 4.5 | 39.1 | 4.8 | 5.1 | n/a | 40.0 | 9.6 | 88.1 |
| KC136 | 319ARW | Jul-03 | n/a | 1914.0 | 355.0 | n/a | 86.7 | 50.4 | 9.3 | 28.6 | 1.1 | 2.0 | 5.1 | 0.4 | 0.4 | 39.0 | 4.6 | 0.8 | n/a | 8.8 | 8.0 | 88.2 |
| KC137 | 319ARW | Aug-03 | n/a | 1907.5 | 396.0 | n/a | 95.5 | 45.4 | 9.1 | 33.3 | 1.0 | 4.4 | 6.8 | 0.8 | 0.4 | 41.2 | 4.5 | 1.2 | n/a | 9.1 | 10.9 | 85.5 |
| KC135 | 319ARW | Sep-03 | n/a | 2477.5 | 458.0 | n/a | 100.0 | 61.5 | 11.2 | 73.3 | 1.3 | 4.9 | 5.3 | 0.0 | 0.7 | 40.7 | 4.6 | 0.7 | n/a | 13.1 | 11.3 | 85.4 |
| KC135 | 319ARW | Oct-03 | n/a | 2680.6 | 492.0 | n/a | 83.9 | 61.8 | 11.2 | 42.9 | 0.4 | 1.7 | 4.3 | 1.1 | 1.4 | 42.7 | 4.4 | 2.5 | n/a | 7.6 | 6.9 | 91.5 |
| KC135 | 319ARW | Nov-03 | n/a | 2674.9 | 495.0 | n/a | 41.9 | 61.8 | 11.1 | 57.1 | 0.6 | 5.6 | 6.5 | 1.4 | 1.2 | 42.2 | 4.6 | 2.6 | n/a | 5.5 | 10.6 | 83.9 |
| KC135 | 319ARW | Dec-03 | n/a | 2150.1 | 394.0 | n/a | 68.2 | 49.3 | 8.9 | 42.1 | 1.0 | 4.9 | 5.3 | 2.1 | 1.8 | 43.0 | 5.4 | 3.9 | n/a | 9.4 | 10.0 | 84.0 |
| KC135 | 319ARW | Jan-04 | n/a | 2237.0 | 417.0 | n/a | 55.5 | 52.3 | 9.7 | 50.0 | 2.6 | 4.4 | 4.3 | 0.7 | 1.5 | 42.1 | 5.3 | 2.2 | n/a | 7.6 | 16.8 | 77.2 |
| KC135 | 319ARW | Feb-04 | n/a | 2315.5 | 426.0 | n/a | 50.8 | 53.8 | 9.6 | 41.2 | 1.6 | 4.1 | 7.5 | 0.2 | 1.2 | 42.8 | 5.7 | 1.4 | n/a | 7.7 | 19.7 | 75.9 |
| KC135 | 319ARW | Mar-04 | n/a | 2834.7 | 492.0 | n/a | 55.3 | 72.3 | 12.4 | 42.9 | 1.0 | 3.0 | 5.5 | 1.4 | 1.4 | 38.5 | 5.9 | 2.8 | n/a | 7.8 | 12.5 | 84.2 |
| KC135 | 319ARW | Apr-04 | n/a | 2851.1 | 498.0 | n/a | 53.4 | 72.5 | 12.6 | 92.3 | 0.6 | 2.9 | 5.5 | 1.1 | 0.4 | 38.5 | 5.8 | 1.5 | n/a | 9.7 | 11.9 | 84.3 |
| KC135 | 319ARW | May-04 | n/a | 3109.5 | 532.0 | n/a | 60.3 | 84.0 | 14.3 | 70.0 | 0.4 | 2.1 | 5.3 | 1.2 | 0.6 | 36.8 | 5.4 | 1.8 | n/a | 5.3 | 10.9 | 83.0 |
| KC135 | 319ARW | Jun-04 | n/a | 3050.6 | 508.0 | n/a | 68.6 | 82.0 | 13.6 | 72.7 | 1.0 | 4.4 | 5.1 | 0.6 | 0.8 | 37.5 | 4.8 | 1.4 | n/a | 8.0 | 8.7 | 84.3 |
| KC135 | 319ARW | Jul-04 | n/a | 2825.5 | 467.0 | n/a | 64.8 | 73.4 | 12.1 | 53.8 | 1.3 | 3.2 | 10.1 | 1.1 | 1.1 | 38.7 | 4.9 | 2.2 | n/a | 6.7 | 11.9 | 82.8 |
| KC135 | 319ARW | Aug-04 | n/a | 2863.3 | 464.0 | n/a | 69.8 | 71.5 | 11.6 | 41.7 | 1.3 | 2.6 | 4.3 | 0.0 | 0.7 | 39.8 | 4.5 | 0.7 | n/a | 9.0 | 8.1 | 88.6 |
| KC135 | 319ARW | Sep-04 | n/a | 2840.5 | 466.0 | n/a | 70.6 | 73.0 | 11.8 | 60.0 | 1.1 | 3.2 | 4.5 | 0.3 | 1.4 | 39.0 | 4.2 | 1.7 | n/a | 9.8 | 8.0 | 85.1 |

# Appendix E - Normality Test Results

## 20FW:

| Shapiro-Wilk Normality Test | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 20FW | | Group | | | | | | | | Result |
| | | Pre | | | | Post | | | | |
| | Variable | W | p | Null | Distribution | W | p | Null | Distribution | Overall |
| OVERALL BALANCE | DEV | 0.918990 | 0.0555 | Accept | Normal | 0.947868 | 0.2435 | Accept | Normal | Normal |
| | FHA | 0.979460 | 0.8857 | Accept | Normal | 0.818332 | 0.0006 | Reject | Non-Normal | Non-Normal |
| | SFA | 0.965088 | 0.5487 | Accept | Normal | 0.977991 | 0.8561 | Accept | Normal | Normal |
| | FSE | 0.905548 | 0.0283 | Reject | Non-Normal | 0.971920 | 0.7145 | Accept | Normal | Non-Normal |
| | MSE | 0.928378 | 0.0897 | Accept | Normal | 0.860129 | 0.0034 | Reject | Non-Normal | Non-Normal |
| | HUTE | 0.971121 | 0.6947 | Accept | Normal | 0.747580 | 0.0001 | Reject | Non-Normal | Non-Normal |
| | SUTE | 0.964110 | 0.5263 | Accept | Normal | 0.960840 | 0.4555 | Accept | Normal | Normal |
| SORTIE PRODUCTION | FR | 0.915457 | 0.0464 | Reject | Non-Normal | 0.954416 | 0.3367 | Accept | Normal | Non-Normal |
| | AR | 0.971861 | 0.7130 | Accept | Normal | 0.978828 | 0.8733 | Accept | Normal | Normal |
| | BR | 0.972452 | 0.7276 | Accept | Normal | 0.947225 | 0.2357 | Accept | Normal | Normal |
| | CR | 0.927932 | 0.0877 | Accept | Normal | 0.961456 | 0.4684 | Accept | Normal | Normal |
| | RC | 0.905466 | 0.0282 | Reject | Non-Normal | 0.814883 | 0.0005 | Reject | Non-Normal | Non-Normal |
| | RP | 0.913399 | 0.0418 | Reject | Non-Normal | 0.950554 | 0.2785 | Accept | Normal | Non-Normal |
| FLEET HEALTH | APA | 0.875872 | 0.0069 | Reject | Non-Normal | 0.953990 | 0.3298 | Accept | Normal | Non-Normal |
| | DD | 0.859770 | 0.0033 | Reject | Non-Normal | 0.871017 | 0.0055 | Reject | Non-Normal | Non-Normal |
| | R/R | 0.960797 | 0.4547 | Accept | Normal | 0.957314 | 0.3869 | Accept | Normal | Normal |
| | RCP | 0.833221 | 0.0011 | Reject | Non-Normal | 0.698647 | 0.0001 | Reject | Non-Normal | Non-Normal |
| | MMH | 0.950594 | 0.2791 | Accept | Normal | 0.887368 | 0.0117 | Reject | Non-Normal | Non-Normal |
| | TNMCM | 0.952240 | 0.3028 | Accept | Normal | 0.927327 | 0.0850 | Accept | Normal | Normal |
| | MC | 0.976976 | 0.8343 | Accept | Normal | 0.926921 | 0.0832 | Accept | Normal | Normal |

## 27FW:

| Shapiro-Wilk Normality Test | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 27FW | | Group | | | | | | | | Result |
| | | Pre | | | | Post | | | | |
| | Variable | W | p | Null | Distribution | W | p | Null | Distribution | Overall |
| OVERALL BALANCE | DEV | 0.912840 | 0.0407 | Reject | Non-Normal | 0.970544 | 0.6804 | Accept | Normal | Non-Normal |
| | FHA | 0.950639 | 0.2797 | Accept | Normal | 0.964192 | 0.5282 | Accept | Normal | Normal |
| | SFA | 0.944180 | 0.2020 | Accept | Normal | 0.984731 | 0.9647 | Accept | Normal | Normal |
| | FSE | 0.966357 | 0.5785 | Accept | Normal | 0.938570 | 0.1516 | Accept | Normal | Normal |
| | MSE | 0.888523 | 0.0124 | Reject | Non-Normal | 0.898361 | 0.0199 | Reject | Non-Normal | Non-Normal |
| | HUTE | 0.951677 | 0.2945 | Accept | Normal | 0.970589 | 0.6815 | Accept | Normal | Normal |
| | SUTE | 0.960321 | 0.4449 | Accept | Normal | 0.984021 | 0.9569 | Accept | Normal | Normal |
| SORTIE PRODUCTION | FR | 0.959637 | 0.4312 | Accept | Normal | 0.952695 | 0.3096 | Accept | Normal | Normal |
| | AR | 0.962740 | 0.4959 | Accept | Normal | 0.964819 | 0.5425 | Accept | Normal | Normal |
| | BR | 0.944421 | 0.2045 | Accept | Normal | 0.950525 | 0.2781 | Accept | Normal | Normal |
| | CR | 0.896101 | 0.0178 | Reject | Non-Normal | 0.976179 | 0.8164 | Accept | Normal | Non-Normal |
| | RC | 0.983161 | 0.9462 | Accept | Normal | 0.976471 | 0.8230 | Accept | Normal | Normal |
| | RP | 0.940479 | 0.1672 | Accept | Normal | 0.954308 | 0.3350 | Accept | Normal | Normal |
| FLEET HEALTH | APA | 0.932165 | 0.1090 | Accept | Normal | 0.928210 | 0.0889 | Accept | Normal | Normal |
| | DD | 0.963247 | 0.5070 | Accept | Normal | 0.866856 | 0.0046 | Reject | Non-Normal | Non-Normal |
| | R/R | 0.962027 | 0.4805 | Accept | Normal | 0.989896 | 0.9960 | Accept | Normal | Normal |
| | RCP | 0.919090 | 0.0558 | Accept | Normal | 0.788360 | 0.0002 | Reject | Non-Normal | Non-Normal |
| | MMH | 0.972292 | 0.7236 | Accept | Normal | 0.886753 | 0.0114 | Reject | Non-Normal | Non-Normal |
| | TNMCM | 0.973076 | 0.7429 | Accept | Normal | 0.846219 | 0.0019 | Reject | Non-Normal | Non-Normal |
| | MC | 0.953372 | 0.3200 | Accept | Normal | 0.753332 | 0.0001 | Reject | Non-Normal | Non-Normal |

## 388FW:

| Shapiro-Wilk Normality Test | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 388FW | | Group | | | | | | | | Result |
| | | Pre | | | | Post | | | | |
| Variable | | W | p | Null | Distribution | W | p | Null | Distribution | Overall |
| OVERALL BALANCE | DEV | 0.940671 | 0.1688 | Accept | Normal | 0.944606 | 0.2064 | Accept | Normal | Normal |
| | FHA | 0.910630 | 0.0364 | Reject | Non-Normal | 0.983816 | 0.9545 | Accept | Normal | Non-Normal |
| | SFA | 0.961855 | 0.4768 | Accept | Normal | 0.969290 | 0.6495 | Accept | Normal | Normal |
| | FSE | 0.915078 | 0.0455 | Reject | Non-Normal | 0.873272 | 0.0061 | Reject | Non-Normal | Non-Normal |
| | MSE | 0.873397 | 0.0061 | Reject | Non-Normal | 0.874658 | 0.0065 | Reject | Non-Normal | Non-Normal |
| | HUTE | 0.959956 | 0.4375 | Accept | Normal | 0.981823 | 0.9269 | Accept | Normal | Normal |
| | SUTE | 0.974047 | 0.7664 | Accept | Normal | 0.968575 | 0.6319 | Accept | Normal | Normal |
| SORTIE PRODUCTION | FR | 0.980822 | 0.9105 | Accept | Normal | 0.977337 | 0.8422 | Accept | Normal | Normal |
| | AR | 0.924230 | 0.0725 | Accept | Normal | 0.806852 | 0.0004 | Reject | Non-Normal | Non-Normal |
| | BR | 0.960430 | 0.4471 | Accept | Normal | 0.945901 | 0.2205 | Accept | Normal | Normal |
| | CR | 0.955121 | 0.3484 | Accept | Normal | 0.903589 | 0.0257 | Reject | Non-Normal | Non-Normal |
| | RC | 0.907609 | 0.0313 | Reject | Non-Normal | 0.921948 | 0.0645 | Accept | Normal | Non-Normal |
| | RP | 0.958118 | 0.4018 | Accept | Normal | 0.840451 | 0.0015 | Reject | Non-Normal | Non-Normal |
| FLEET HEALTH | APA | 0.925407 | 0.0770 | Accept | Normal | 0.939966 | 0.1628 | Accept | Normal | Normal |
| | DD | 0.970137 | 0.6704 | Accept | Normal | 0.853270 | 0.0027 | Reject | Non-Normal | Non-Normal |
| | R/R | 0.942167 | 0.1823 | Accept | Normal | 0.928142 | 0.0886 | Accept | Normal | Normal |
| | RCP | 0.916061 | 0.0478 | Reject | Non-Normal | 0.818651 | 0.0006 | Reject | Non-Normal | Non-Normal |
| | MMH | 0.936625 | 0.1371 | Accept | Normal | 0.927948 | 0.0877 | Accept | Normal | Normal |
| | TNMCM | 0.967875 | 0.6149 | Accept | Normal | 0.966675 | 0.5860 | Accept | Normal | Normal |
| | MC | 0.971932 | 0.7148 | Accept | Normal | 0.974273 | 0.7718 | Accept | Normal | Normal |

## 22ARW:

| Shapiro-Wilk Normality Test | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 22ARW | | Group | | | | | | | | Result |
| | | Pre | | | | Post | | | | |
| Variable | | W | p | Null | Distribution | W | p | Null | Distribution | Overall |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | FHA | 0.936274 | 0.1347 | Accept | Normal | 0.779853 | 0.0001 | Reject | Non-Normal | Non-Normal |
| | SFA | 0.939085 | 0.1556 | Accept | Normal | 0.850698 | 0.0023 | Reject | Non-Normal | Non-Normal |
| | FSE | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | MSE | 0.903778 | 0.0259 | Reject | Non-Normal | 0.938117 | 0.1481 | Accept | Normal | Non-Normal |
| | HUTE | 0.986540 | 0.9806 | Accept | Normal | 0.956821 | 0.3779 | Accept | Normal | Normal |
| | SUTE | 0.983170 | 0.9463 | Accept | Normal | 0.951354 | 0.2898 | Accept | Normal | Normal |
| SORTIE PRODUCTION | FR | 0.954248 | 0.3340 | Accept | Normal | 0.969976 | 0.6664 | Accept | Normal | Normal |
| | AR | 0.940185 | 0.1647 | Accept | Normal | 0.859810 | 0.0033 | Reject | Non-Normal | Non-Normal |
| | BR | 0.965639 | 0.5615 | Accept | Normal | 0.968743 | 0.6360 | Accept | Normal | Normal |
| | CR | 0.967194 | 0.5984 | Accept | Normal | 0.927199 | 0.0844 | Accept | Normal | Normal |
| | RC | 0.895015 | 0.0169 | Reject | Non-Normal | 0.978298 | 0.8626 | Accept | Normal | Non-Normal |
| | RP | 0.957143 | 0.3838 | Accept | Normal | 0.965236 | 0.5522 | Accept | Normal | Normal |
| FLEET HEALTH | APA | 0.953666 | 0.3247 | Accept | Normal | 0.954861 | 0.3441 | Accept | Normal | Normal |
| | DD | 0.952290 | 0.3035 | Accept | Normal | 0.973175 | 0.7453 | Accept | Normal | Normal |
| | R/R | 0.870152 | 0.0053 | Reject | Non-Normal | 0.976085 | 0.8143 | Accept | Normal | Non-Normal |
| | RCP | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | MMH | 0.927672 | 0.0865 | Accept | Normal | 0.958241 | 0.4041 | Accept | Normal | Normal |
| | TNMCM | 0.919802 | 0.0578 | Accept | Normal | 0.913283 | 0.0416 | Reject | Non-Normal | Non-Normal |
| | MC | 0.894688 | 0.0166 | Reject | Non-Normal | 0.932991 | 0.1137 | Accept | Normal | Non-Normal |

92ARW:

| Shapiro-Wilk Normality Test | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 92ARW | | Group | | | | | | | | Result |
| | | Pre | | | | Post | | | | |
| Variable | | W | p | Null | Distribution | W | p | Null | Distribution | Overall |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | FHA | 0.959219 | 0.4229 | Accept | Normal | 0.921645 | 0.0635 | Accept | Normal | Normal |
| | SFA | 0.962302 | 0.4864 | Accept | Normal | 0.936933 | 0.1393 | Accept | Normal | Normal |
| | FSE | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | MSE | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | HUTE | 0.958413 | 0.4074 | Accept | Normal | 0.931716 | 0.1065 | Accept | Normal | Normal |
| | SUTE | 0.953991 | 0.3298 | Accept | Normal | 0.935400 | 0.1288 | Accept | Normal | Normal |
| SORTIE PRODUCTION | FR | 0.947981 | 0.2449 | Accept | Normal | 0.940160 | 0.1645 | Accept | Normal | Normal |
| | AR | 0.945883 | 0.2203 | Accept | Normal | 0.733543 | 0.0001 | Reject | Non-Normal | Non-Normal |
| | BR | 0.966650 | 0.5854 | Accept | Normal | 0.970120 | 0.6700 | Accept | Normal | Normal |
| | CR | 0.975932 | 0.8108 | Accept | Normal | 0.746676 | 0.0001 | Reject | Non-Normal | Non-Normal |
| | RC | 0.962690 | 0.4948 | Accept | Normal | 0.954400 | 0.3365 | Accept | Normal | Normal |
| | RP | 0.938048 | 0.1476 | Accept | Normal | 0.975087 | 0.7912 | Accept | Normal | Normal |
| FLEET HEALTH | APA | 0.929300 | 0.0940 | Accept | Normal | 0.847630 | 0.0020 | Reject | Non-Normal | Non-Normal |
| | DD | 0.961922 | 0.4783 | Accept | Normal | 0.800829 | 0.0003 | Reject | Non-Normal | Non-Normal |
| | R/R | 0.973148 | 0.7446 | Accept | Normal | 0.967777 | 0.6125 | Accept | Normal | Normal |
| | RCP | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | MMH | 0.914168 | 0.0435 | Reject | Non-Normal | 0.913779 | 0.0426 | Reject | Non-Normal | Non-Normal |
| | TNMCM | 0.952845 | 0.3119 | Accept | Normal | 0.937783 | 0.1456 | Accept | Normal | Normal |
| | MC | 0.707459 | 0.0001 | Reject | Non-Normal | 0.941364 | 0.1749 | Accept | Normal | Non-Normal |

319ARW:

| Shapiro-Wilk Normality Test | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 319ARW | | Group | | | | | | | | Result |
| | | Pre | | | | Post | | | | |
| Variable | | W | p | Null | Distribution | W | p | Null | Distribution | Overall |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | FHA | 0.958192 | 0.4032 | Accept | Normal | 0.916736 | 0.0495 | Reject | Non-Normal | Non-Normal |
| | SFA | 0.959329 | 0.4251 | Accept | Normal | 0.968168 | 0.6220 | Accept | Normal | Normal |
| | FSE | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | MSE | 0.334861 | 0.0001 | Reject | Non-Normal | 0.924027 | 0.0717 | Accept | Normal | Non-Normal |
| | HUTE | 0.966876 | 0.5908 | Accept | Normal | 0.967081 | 0.5957 | Accept | Normal | Normal |
| | SUTE | 0.974944 | 0.7878 | Accept | Normal | 0.934129 | 0.1206 | Accept | Normal | Normal |
| SORTIE PRODUCTION | FR | 0.956883 | 0.3791 | Accept | Normal | 0.979228 | 0.8812 | Accept | Normal | Normal |
| | AR | 0.872222 | 0.0058 | Reject | Non-Normal | 0.692586 | 0.0001 | Reject | Non-Normal | Non-Normal |
| | BR | 0.949301 | 0.2617 | Accept | Normal | 0.940641 | 0.1686 | Accept | Normal | Normal |
| | CR | 0.941368 | 0.1750 | Accept | Normal | 0.891778 | 0.0145 | Reject | Non-Normal | Non-Normal |
| | RC | 0.709749 | 0.0001 | Reject | Non-Normal | 0.965172 | 0.5507 | Accept | Normal | Non-Normal |
| | RP | 0.831342 | 0.0010 | Reject | Non-Normal | 0.821627 | 0.0007 | Reject | Non-Normal | Non-Normal |
| FLEET HEALTH | APA | 0.897084 | 0.0187 | Reject | Non-Normal | 0.866658 | 0.0045 | Reject | Non-Normal | Non-Normal |
| | DD | 0.979372 | 0.8840 | Accept | Normal | 0.886298 | 0.0112 | Reject | Non-Normal | Non-Normal |
| | R/R | 0.758739 | 0.0001 | Reject | Non-Normal | 0.932030 | 0.1082 | Accept | Normal | Non-Normal |
| | RCP | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | MMH | 0.974257 | 0.7715 | Accept | Normal | 0.581358 | 0.0001 | Reject | Non-Normal | Non-Normal |
| | TNMCM | 0.936315 | 0.1350 | Accept | Normal | 0.935154 | 0.1271 | Accept | Normal | Normal |
| | MC | 0.948752 | 0.2546 | Accept | Normal | 0.962586 | 0.4925 | Accept | Normal | Normal |

# Appendix F - Variance Test Results

20FW:

| Levene Homogeneity of Variance Test | | | | | |
|---|---|---|---|---|---|
| 20FW | | | | Result | |
| Variable | | F-Ratio | p-value | Null | Equality |
| OVERALL BALANCE | DEV | 5.2295 | 0.0269 | Reject | UnEqual |
| | FHA | 18780 | 0.1772 | Accept | Equal |
| | SFA | 0.0526 | 0.8196 | Accept | Equal |
| | FSE | 13.0663 | 0.0007 | Reject | UnEqual |
| | MSE | 5.5959 | 0.0223 | Reject | UnEqual |
| | HUTE | 2.9697 | 0.0916 | Accept | Equal |
| | SUTE | 0.5609 | 0.4577 | Accept | Equal |
| SORTIE PRODUCTION | FR | 2.3622 | 0.1312 | Accept | Equal |
| | AR | 0.5333 | 0.4689 | Accept | Equal |
| | BR | 7.5820 | 0.0084 | Reject | UnEqual |
| | CR | 0.0816 | 0.7764 | Accept | Equal |
| | RC | 0.1780 | 0.6571 | Accept | Equal |
| | RP | 0.5671 | 0.4553 | Accept | Equal |
| FLEET HEALTH | APA | 24.2805 | 0.0001 | Reject | UnEqual |
| | DD | 10716 | 0.3060 | Accept | Equal |
| | R/R | 0.0448 | 0.8333 | Accept | Equal |
| | RCP | 0.0102 | 0.9199 | Accept | Equal |
| | MMH | 5.6130 | 0.0221 | Reject | UnEqual |
| | TNMCM | 12705 | 0.2655 | Accept | Equal |
| | MC | 3.2306 | 0.0788 | Accept | Equal |

| Variance Analysis | | | | | | |
|---|---|---|---|---|---|---|
| 20FW | | Group | | Change | | Result |
| Variable | | Pre | Post | Desired | Actual | |
| OVERALL BALANCE | DEV | 6.6 | 2.4 | ▼ | ▼ | Decreased |
| | FHA | 98969.6 | 268425.6 | ▼ | ▲ | Increased |
| | SFA | 44119.5 | 52635.0 | ▼ | ▲ | Increased |
| | FSE | 57.3 | 17.5 | ▼ | ▼ | Decreased |
| | MSE | 13.9 | 7.2 | ▼ | ▼ | Decreased |
| | HUTE | 12.6 | 61.3 | ▼ | ▲ | Increased |
| | SUTE | 7.3 | 11.6 | ▼ | ▲ | Increased |
| SORTIE PRODUCTION | FR | 20.4 | 29.2 | ▼ | ▲ | Increased |
| | AR | 0.6 | 10 | ▼ | ▲ | Increased |
| | BR | 19 | 6.3 | ▼ | ▲ | Increased |
| | CR | 6.1 | 6.1 | ▼ | ▲ | Increased |
| | RC | 34.0 | 28.4 | ▼ | ▼ | Decreased |
| | RP | 19.4 | 20.1 | ▼ | ▲ | Increased |
| FLEET HEALTH | APA | 2.1 | 57.9 | ▼ | ▲ | Increased |
| | DD | 0.3 | 0.2 | ▼ | ▼ | Decreased |
| | R/R | 2.3 | 2.2 | ▼ | ▼ | Decreased |
| | RCP | 0.9 | 11 | ▼ | ▲ | Increased |
| | MMH | 47.1 | 171.4 | ▼ | ▲ | Increased |
| | TNMCM | 2.3 | 2.9 | ▼ | ▲ | Increased |
| | MC | 2.1 | 4.1 | ▼ | ▲ | Increased |

27FW:

| Levene Homogeneity of Variance Test | | | | | |
|---|---|---|---|---|---|
| 27FW | | | | Result | |
| Variable | | F-Ratio | p-value | Null | Equality |
| OVERALL BALANCE | DEV | 2.3236 | 0.1343 | Accept | Equal |
| | FHA | 0.8647 | 0.3573 | Accept | Equal |
| | SFA | 0.0335 | 0.8557 | Accept | Equal |
| | FSE | 0.5581 | 0.4588 | Accept | Equal |
| | MSE | 2.9592 | 0.0921 | Accept | Equal |
| | HUTE | 0.4775 | 0.4930 | Accept | Equal |
| | SUTE | 0.0313 | 0.8603 | Accept | Equal |
| SORTIE PRODUCTION | FR | 0.7435 | 0.3930 | Accept | Equal |
| | AR | 0.2340 | 0.6309 | Accept | Equal |
| | BR | 0.0105 | 0.9189 | Accept | Equal |
| | CR | 6.4540 | 0.0145 | Reject | UnEqual |
| | RC | 1.9866 | 0.1654 | Accept | Equal |
| | RP | 2.1307 | 0.1512 | Accept | Equal |
| FLEET HEALTH | APA | 7.1605 | 0.0103 | Reject | UnEqual |
| | DD | 23.2530 | 0.0001 | Reject | UnEqual |
| | R/R | 4.1619 | 0.0471 | Reject | UnEqual |
| | RCP | 0.8527 | 0.3606 | Accept | Equal |
| | MMH | 2.0101 | 0.1630 | Accept | Equal |
| | TNMCM | 1.4249 | 0.2387 | Accept | Equal |
| | MC | 0.5589 | 0.4585 | Accept | Equal |

| Variance Analysis | | | | | | |
|---|---|---|---|---|---|---|
| 27FW | | Group | | Change | | Result |
| Variable | | Pre | Post | Desired | Actual | |
| OVERALL BALANCE | DEV | 8.9 | 3.1 | ▼ | ▼ | Decreased |
| | FHA | 51179.0 | 78880.9 | ▼ | ▲ | Increased |
| | SFA | 32938.0 | 29005.7 | ▼ | ▼ | Decreased |
| | FSE | 37.9 | 47.9 | ▼ | ▲ | Increased |
| | MSE | 11.1 | 4.7 | ▼ | ▼ | Decreased |
| | HUTE | 14.8 | 19.7 | ▼ | ▲ | Increased |
| | SUTE | 9.9 | 9.7 | ▼ | ▼ | Decreased |
| SORTIE PRODUCTION | FR | 18.3 | 26.1 | ▼ | ▲ | Increased |
| | AR | 0.9 | 1.1 | ▼ | ▲ | Increased |
| | BR | 2.9 | 2.6 | ▼ | ▼ | Decreased |
| | CR | 13.9 | 4.4 | ▼ | ▼ | Decreased |
| | RC | 1.2 | 0.7 | ▼ | ▼ | Decreased |
| | RP | 1.5 | 0.6 | ▼ | ▼ | Decreased |
| FLEET HEALTH | APA | 23.9 | 6.6 | ▼ | ▼ | Decreased |
| | DD | 14 | 28.3 | ▼ | ▲ | Increased |
| | R/R | 3.3 | 1.6 | ▼ | ▼ | Decreased |
| | RCP | 3.9 | 1.9 | ▼ | ▼ | Decreased |
| | MMH | 75.7 | 156.6 | ▼ | ▲ | Increased |
| | TNMCM | 7.5 | 6.1 | ▼ | ▼ | Decreased |
| | MC | 9.1 | 12.2 | ▼ | ▲ | Increased |

388FW:

| Levene Homogeneity of Variance Test | | | | | |
|---|---|---|---|---|---|
| 388FW | | | | Result | |
| Variable | | F-Ratio | p-value | Null | Equality |
| OVERALL BALANCE | DEV | 0.0024 | 0.9608 | Accept | Equal |
| | FHA | 2.4911 | 0.1213 | Accept | Equal |
| | SFA | 0.6108 | 0.4385 | Accept | Equal |
| | FSE | 0.0000 | 0.9991 | Accept | Equal |
| | MSE | 14.7145 | 0.0004 | Reject | UnEqual |
| | HUTE | 3.1453 | 0.0828 | Accept | Equal |
| | SUTE | 0.3120 | 0.5791 | Accept | Equal |
| SORTIE PRODUCTION | FR | 2.1410 | 0.1502 | Accept | Equal |
| | AR | 0.7061 | 0.4051 | Accept | Equal |
| | BR | 3.6057 | 0.0639 | Accept | Equal |
| | CR | 0.1155 | 0.7355 | Accept | Equal |
| | RC | 0.8712 | 0.3555 | Accept | Equal |
| | RP | 1.8763 | 0.1774 | Accept | Equal |
| FLEET HEALTH | APA | 8.8737 | 0.0046 | Reject | UnEqual |
| | DD | 3.9676 | 0.0523 | Accept | Equal |
| | R/R | 0.1384 | 0.7116 | Accept | Equal |
| | RCP | 0.7856 | 0.3800 | Accept | Equal |
| | MMH | 3.2951 | 0.0760 | Accept | Equal |
| | TNMCM | 0.6540 | 0.4228 | Accept | Equal |
| | MC | 0.5033 | 0.4816 | Accept | Equal |

| Variance Analysis | | | | | | |
|---|---|---|---|---|---|---|
| 388FW | | Group | | Change | | Result |
| Variable | | Pre | Post | Desired | Actual | |
| OVERALL BALANCE | DEV | 8.0 | 6.7 | ▼ | ▼ | Decreased |
| | FHA | 103147.5 | 210355.9 | ▼ | ▲ | Increased |
| | SFA | 68821.0 | 48870.1 | ▼ | ▼ | Decreased |
| | FSE | 109.6 | 121.9 | ▼ | ▲ | Increased |
| | MSE | 40.1 | 6.2 | ▼ | ▼ | Decreased |
| | HUTE | 20.1 | 46.4 | ▼ | ▲ | Increased |
| | SUTE | 14.0 | 11.2 | ▼ | ▼ | Decreased |
| SORTIE PRODUCTION | FR | 27.9 | 44.2 | ▼ | ▲ | Increased |
| | AR | 1.6 | 3.5 | ▼ | ▲ | Increased |
| | BR | 2.7 | 1.1 | ▼ | ▼ | Decreased |
| | CR | 11.6 | 13.2 | ▼ | ▲ | Increased |
| | RC | 0.2 | 0.3 | ▼ | ▲ | Increased |
| | RP | 0.4 | 0.3 | ▼ | ▼ | Decreased |
| FLEET HEALTH | APA | 11.5 | 4.0 | ▼ | ▼ | Decreased |
| | DD | 1.0 | 3.8 | ▼ | ▲ | Increased |
| | R/R | 0.9 | 0.8 | ▼ | ▼ | Decreased |
| | RCP | 1.8 | 1.3 | ▼ | ▼ | Decreased |
| | MMH | 90.5 | 232.3 | ▼ | ▲ | Increased |
| | TNMCM | 8.1 | 5.4 | ▼ | ▼ | Decreased |
| | MC | 9.5 | 11.8 | ▼ | ▲ | Increased |

22ARW:

| Levene Homogeneity of Variance Test | | | | | |
|---|---|---|---|---|---|
| 22ARW | | | | Result | |
| Variable | | F-Ratio | p-value | Null | Equality |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a |
| | FHA | 7.7658 | 0.0077 | Reject | UnEqual |
| | SFA | 8.2662 | 0.0061 | Reject | UnEqual |
| | FSE | n/a | n/a | n/a | n/a |
| | MSE | 0.8469 | 0.3622 | Accept | Equal |
| | HUTE | 12.9418 | 0.0008 | Reject | UnEqual |
| | SUTE | 13.9349 | 0.0005 | Reject | UnEqual |
| SORTIE PRODUCTION | FR | 0.8586 | 0.3590 | Accept | Equal |
| | AR | 0.3862 | 0.5374 | Accept | Equal |
| | BR | 1.2615 | 0.2672 | Accept | Equal |
| | CR | 0.2946 | 0.5899 | Accept | Equal |
| | RC | 1.5159 | 0.2245 | Accept | Equal |
| | RP | 0.3467 | 0.5589 | Accept | Equal |
| FLEET HEALTH | APA | 1.3019 | 0.2598 | Accept | Equal |
| | DD | 14.7372 | 0.0004 | Reject | UnEqual |
| | R/R | 0.0156 | 0.9012 | Accept | Equal |
| | RCP | n/a | n/a | n/a | n/a |
| | MMH | 1.1628 | 0.2865 | Accept | Equal |
| | TNMCM | 1.5863 | 0.2142 | Accept | Equal |
| | MC | 3.6942 | 0.0608 | Accept | Equal |

| Variance Analysis | | | | | | |
|---|---|---|---|---|---|---|
| 22ARW | | Group | | Change | | Result |
| Variable | | Pre | Post | Desired | Actual | |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a |
| | FHA | 36133.5 | 452812.4 | ▼ | ▲ | Increased |
| | SFA | 1604.3 | 14415.4 | ▼ | ▲ | Increased |
| | FSE | n/a | n/a | n/a | n/a | n/a |
| | MSE | 46.6 | 41.1 | ▼ | ▼ | Decreased |
| | HUTE | 47.1 | 258.8 | ▼ | ▲ | Increased |
| | SUTE | 2.6 | 9.6 | ▼ | ▲ | Increased |
| SORTIE PRODUCTION | FR | 590.1 | 370.3 | ▼ | ▼ | Decreased |
| | AR | 0.3 | 0.3 | ▼ | ▼ | Decreased |
| | BR | 1.4 | 2.3 | ▼ | ▲ | Increased |
| | CR | 12.4 | 13.8 | ▼ | ▲ | Increased |
| | RC | 0.4 | 0.5 | ▼ | ▲ | Increased |
| | RP | 0.3 | 0.4 | ▼ | ▲ | Increased |
| FLEET HEALTH | APA | 8.9 | 11.9 | ▼ | ▲ | Increased |
| | DD | 4.0 | 0.8 | ▼ | ▼ | Decreased |
| | R/R | 1.1 | 1.2 | ▼ | ▲ | Increased |
| | RCP | n/a | n/a | n/a | n/a | n/a |
| | MMH | 46.1 | 32.8 | ▼ | ▼ | Decreased |
| | TNMCM | 9.3 | 5.8 | ▼ | ▼ | Decreased |
| | MC | 15.3 | 5.6 | ▼ | ▼ | Decreased |

92ARW:

| Levene Homogeneity of Variance Test | | | | | |
|---|---|---|---|---|---|
| 92ARW | | | | Result | |
| Variable | | F-Ratio | p-value | Null | Equality |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a |
| | FHA | 35.7209 | 0.0001 | Reject | UnEqual |
| | SFA | 31.5822 | 0.0001 | Reject | UnEqual |
| | FSE | n/a | n/a | n/a | n/a |
| | MSE | n/a | n/a | n/a | n/a |
| | HUTE | 23.5965 | 0.0001 | Reject | UnEqual |
| | SUTE | 18.8987 | 0.0001 | Reject | UnEqual |
| SORTIE PRODUCTION | FR | 2.1709 | 0.1475 | Accept | Equal |
| | AR | 0.1845 | 0.6696 | Accept | Equal |
| | BR | 1.5672 | 0.2169 | Accept | Equal |
| | CR | 0.2508 | 0.6189 | Accept | Equal |
| | RC | 1.5822 | 0.2215 | Accept | Equal |
| | RP | 1.1942 | 0.2802 | Accept | Equal |
| FLEET HEALTH | APA | 17.6866 | 0.0001 | Reject | UnEqual |
| | DD | 1.0653 | 0.3074 | Accept | Equal |
| | R/R | 0.3473 | 0.5585 | Accept | Equal |
| | RCP | n/a | n/a | n/a | n/a |
| | MMH | 0.4059 | 0.5272 | Accept | Equal |
| | TNMCM | 2.5714 | 0.1157 | Accept | Equal |
| | MC | 8.8783 | 0.0046 | Reject | UnEqual |

| Variance Analysis | | | | | | |
|---|---|---|---|---|---|---|
| 92ARW | | Group | | Change | | Result |
| Variable | | Pre | Post | Desired | Actual | |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a |
| | FHA | 27332.6 | 471878.0 | ▼ | ▲ | Increased |
| | SFA | 1431.9 | 14815.9 | ▼ | ▲ | Increased |
| | FSE | n/a | n/a | n/a | n/a | n/a |
| | MSE | n/a | n/a | n/a | n/a | n/a |
| | HUTE | 40.7 | 354.1 | ▼ | ▲ | Increased |
| | SUTE | 1.6 | 10.2 | ▼ | ▲ | Increased |
| SORTIE PRODUCTION | FR | 242.5 | 417.8 | ▼ | ▲ | Increased |
| | AR | 0.8 | 1.6 | ▼ | ▲ | Increased |
| | BR | 3.1 | 5.0 | ▼ | ▲ | Increased |
| | CR | 14.0 | 24.3 | ▼ | ▲ | Increased |
| | RC | 1.0 | 0.6 | ▼ | ▼ | Decreased |
| | RP | 1.1 | 0.7 | ▼ | ▼ | Decreased |
| FLEET HEALTH | APA | 6.1 | 32.6 | ▼ | ▲ | Increased |
| | DD | 0.9 | 2.5 | ▼ | ▲ | Increased |
| | R/R | 2.1 | 1.5 | ▼ | ▼ | Decreased |
| | RCP | n/a | n/a | n/a | n/a | n/a |
| | MMH | 48.8 | 63.4 | ▼ | ▲ | Increased |
| | TNMCM | 10.1 | 4.2 | ▼ | ▼ | Decreased |
| | MC | 136.2 | 8.5 | ▼ | ▼ | Decreased |

319ARW:

| Levene Homogeneity of Variance Test | | | | | | |
|---|---|---|---|---|---|---|
| 319ARW | | | | Result | |
| Variable | | F-Ratio | p-value | Null | Equality |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a |
| | FHA | 17.1541 | 0.0001 | Reject | UnEqual |
| | SFA | 7.1155 | 0.0105 | Reject | UnEqual |
| | FSE | n/a | n/a | n/a | n/a |
| | MSE | 15.4322 | 0.0003 | Reject | UnEqual |
| | HUTE | 19.7579 | 0.0001 | Reject | UnEqual |
| | SUTE | 8.5803 | 0.0053 | Reject | UnEqual |
| SORTIE PRODUCTION | FR | 0.1562 | 0.6945 | Accept | Equal |
| | AR | 0.0236 | 0.8786 | Accept | Equal |
| | BR | 8.1233 | 0.0065 | Reject | UnEqual |
| | CR | 12.1974 | 0.0011 | Reject | UnEqual |
| | RC | 0.6780 | 0.4145 | Accept | Equal |
| | RP | 3.5180 | 0.0671 | Accept | Equal |
| FLEET HEALTH | APA | 10.3999 | 0.0023 | Reject | UnEqual |
| | DD | 0.7545 | 0.3896 | Accept | Equal |
| | R/R | 3.4497 | 0.0697 | Accept | Equal |
| | RCP | n/a | n/a | n/a | n/a |
| | MMH | 0.5836 | 0.4488 | Accept | Equal |
| | TNMCM | 0.8412 | 0.3638 | Accept | Equal |
| | MC | 1.5567 | 0.2185 | Accept | Equal |

| Variance Analysis | | | | | | |
|---|---|---|---|---|---|---|
| 319ARW | | Group | | Change | | Result |
| Variable | | Pre | Post | Desired | Actual | |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a |
| | FHA | 63317.6 | 407567.8 | ▼ | ▲ | Increased |
| | SFA | 2788.2 | 11811.1 | ▼ | ▲ | Increased |
| | FSE | n/a | n/a | n/a | n/a | n/a |
| | MSE | 122.8 | 340.1 | ▼ | ▲ | Increased |
| | HUTE | 33.5 | 365.7 | ▼ | ▲ | Increased |
| | SUTE | 1.7 | 11.8 | ▼ | ▲ | Increased |
| SORTIE PRODUCTION | FR | 584.5 | 407.6 | ▼ | ▼ | Decreased |
| | AR | 0.3 | 0.8 | ▼ | ▲ | Increased |
| | BR | 4.6 | 15 | ▼ | ▼ | Decreased |
| | CR | 14.6 | 4.1 | ▼ | ▼ | Decreased |
| | RC | 1.0 | 0.3 | ▼ | ▼ | Decreased |
| | RP | 2.0 | 0.8 | ▼ | ▼ | Decreased |
| FLEET HEALTH | APA | 19.1 | 8.0 | ▼ | ▼ | Decreased |
| | DD | 1.0 | 16 | ▼ | ▲ | Increased |
| | R/R | 5.2 | 14 | ▼ | ▼ | Decreased |
| | RCP | n/a | n/a | n/a | n/a | n/a |
| | MMH | 16.3 | 48.8 | ▼ | ▲ | Increased |
| | TNMCM | 12.7 | 10.4 | ▼ | ▼ | Decreased |
| | MC | 19.7 | 13.3 | ▼ | ▼ | Decreased |

# Appendix G - Comparison of Means Analysis Results

20FW:

| 20FW | | Means Comparison Test | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Variable | | Normality | Variance | Test Used | F-Ratio or $X^2$ | p-value | Null | Result |
| OVERALL BALANCE | DEV | Normal | UnEqual | Welch | 18.4064 | 0.0001 | Reject | Significant |
| | FHA | Non-Normal | Equal | Wilcoxon | 6.0208 | 0.0141 | Reject | Significant |
| | SFA | Normal | Equal | ANOVA F | 7.7200 | 0.0079 | Reject | Significant |
| | FSE | Non-Normal | UnEqual | Wilcoxon | 2.6878 | 0.1011 | Accept | Not Significant |
| | MSE | Non-Normal | UnEqual | Wilcoxon | 11.0936 | 0.0009 | Reject | Significant |
| | HUTE | Non-Normal | Equal | Wilcoxon | 0.0086 | 0.9260 | Accept | Not Significant |
| | SUTE | Normal | Equal | ANOVA F | 2.1434 | 0.1500 | Accept | Not Significant |
| SORTIE PRODUCTION | FR | Non-Normal | Equal | Wilcoxon | 4.3816 | 0.0363 | Reject | Significant |
| | AR | Normal | Equal | ANOVA F | 15.7552 | 0.0003 | Reject | Significant |
| | BR | Normal | UnEqual | Welch | 10.2569 | 0.0029 | Reject | Significant |
| | CR | Normal | Equal | ANOVA F | 0.1068 | 0.7453 | Accept | Not Significant |
| | RC | Non-Normal | Equal | Wilcoxon | 4.8500 | 0.0276 | Reject | Significant |
| | RP | Non-Normal | Equal | Wilcoxon | 3.4275 | 0.0641 | Accept | Not Significant |
| FLEET HEALTH | APA | Non-Normal | UnEqual | Wilcoxon | 17.9037 | 0.0001 | Reject | Significant |
| | DD | Non-Normal | Equal | Wilcoxon | 23.6301 | 0.0001 | Reject | Significant |
| | R/R | Normal | Equal | ANOVA F | 4.0309 | 0.0506 | Accept | Not Significant |
| | RCP | Non-Normal | Equal | Wilcoxon | 1.0464 | 0.3063 | Accept | Not Significant |
| | MMH | Non-Normal | UnEqual | Wilcoxon | 36.5672 | 0.0001 | Reject | Significant |
| | TNMCM | Normal | Equal | ANOVA F | 0.0007 | 0.9787 | Accept | Not Significant |
| | MC | Normal | Equal | ANOVA F | 32.4060 | 0.0784 | Accept | Not Significant |

| Means Analysis | | | | | | |
|---|---|---|---|---|---|---|
| 20FW | | Group | | Change | | Result |
| Variable | | Pre | Post | Desired | Actual | |
| OVERALL BALANCE | DEV | 7.6 | 5.0 | ▼ | ▼ | Improved |
| | FHA | 2233.8 | 2031.8 | ▲ | ▼ | Degraded |
| | SFA | 1389.6 | 1213.2 | ▲ | ▼ | Degraded |
| | FSE | 82.6 | 86.4 | ▲ | ▲ | Improved |
| | MSE | 93.1 | 96.4 | ▲ | ▲ | Improved |
| | HUTE | 26.1 | 27.7 | ▲ | ▲ | Improved |
| | SUTE | 17.8 | 16.5 | ▲ | ▼ | Degraded |
| SORTIE PRODUCTION | FR | 84.7 | 81.3 | ▲ | ▼ | Degraded |
| | AR | 4.2 | 5.3 | ▼ | ▲ | Degraded |
| | BR | 11.5 | 13.4 | ▼ | ▲ | Degraded |
| | CR | 8.7 | 8.9 | ▼ | ▲ | Degraded |
| | RC | 11.0 | 8.1 | ▼ | ▼ | Improved |
| | RP | 10.7 | 8.3 | ▼ | ▼ | Improved |
| FLEET HEALTH | APA | 85.5 | 77.3 | ▲ | ▼ | Degraded |
| | DD | 2.3 | 1.5 | ▼ | ▼ | Improved |
| | R/R | 4.8 | 3.9 | ▼ | ▼ | Improved |
| | RCP | 3.3 | 3.4 | ▼ | ▲ | Degraded |
| | MMH | 39.7 | 58.0 | ▼ | ▲ | Degraded |
| | TNMCM | 9.9 | 9.9 | ▼ | ▲ | Degraded |
| | MC | 83.7 | 84.7 | ▲ | ▲ | Improved |

27FW:

| 27FW | | Means Comparison Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | | Normality | Variance | Test Used | F-Ratio or $X^2$ | p-value | Null | Result |
| OVERALL BALANCE | DEV | Non-Normal | Equal | Wilcoxon | 35.2825 | 0.0001 | Reject | Significant |
| | FHA | Normal | Equal | ANOVA F | 0.1173 | 0.6757 | Accept | Not Significant |
| | SFA | Normal | Equal | ANOVA F | 0.5843 | 0.4485 | Accept | Not Significant |
| | FSE | Normal | Equal | ANOVA F | 29.6632 | 0.0001 | Reject | Significant |
| | MSE | Non-Normal | Equal | Wilcoxon | 0.6309 | 0.4270 | Accept | Not Significant |
| | HUTE | Normal | Equal | ANOVA F | 1.1148 | 0.2996 | Accept | Not Significant |
| | SUTE | Normal | Equal | ANOVA F | 0.7376 | 0.3949 | Accept | Not Significant |
| SORTIE PRODUCTION | FR | Normal | Equal | ANOVA F | 10.9956 | 0.0018 | Reject | Significant |
| | AR | Normal | Equal | ANOVA F | 0.2182 | 0.6427 | Accept | Not Significant |
| | BR | Normal | Equal | ANOVA F | 9.9224 | 0.0029 | Reject | Significant |
| | CR | Non-Normal | UnEqual | Wilcoxon | 2.4568 | 0.1170 | Accept | Not Significant |
| | RC | Normal | Equal | ANOVA F | 0.7117 | 0.4032 | Accept | Not Significant |
| | RP | Normal | Equal | ANOVA F | 5.3577 | 0.0251 | Reject | Significant |
| FLEET HEALTH | APA | Normal | UnEqual | Welch | 34.3865 | 0.0001 | Reject | Significant |
| | DD | Non-Normal | UnEqual | Wilcoxon | 0.2876 | 0.5917 | Accept | Not Significant |
| | R/R | Normal | UnEqual | Welch | 4.0724 | 0.0501 | Accept | Not Significant |
| | RCP | Non-Normal | Equal | Wilcoxon | 11.8142 | 0.0006 | Reject | Significant |
| | MMH | Non-Normal | Equal | Wilcoxon | 0.7863 | 0.3752 | Accept | Not Significant |
| | TNMCM | Non-Normal | Equal | Wilcoxon | 28.3118 | 0.0001 | Reject | Significant |
| | MC | Non-Normal | Equal | Wilcoxon | 28.6388 | 0.0001 | Reject | Significant |

| Means Analysis | | | | | | |
|---|---|---|---|---|---|---|
| 27FW | | Group | | Change | | Result |
| Variable | | Pre | Post | Desired | Actual | |
| OVERALL BALANCE | DEV | 14.5 | 6.6 | ▼ | ▼ | Improved |
| | FHA | 1527.8 | 1496.8 | ▲ | ▼ | Degraded |
| | SFA | 1076.8 | 1038.0 | ▲ | ▼ | Degraded |
| | FSE | 67.1 | 77.4 | ▲ | ▲ | Improved |
| | MSE | 95.9 | 97.0 | ▲ | ▲ | Improved |
| | HUTE | 25.4 | 24.2 | ▲ | ▼ | Degraded |
| | SUTE | 17.7 | 17.0 | ▲ | ▼ | Degraded |
| SORTIE PRODUCTION | FR | 74.0 | 78.5 | ▲ | ▲ | Improved |
| | AR | 6.1 | 6.2 | ▼ | ▲ | Degraded |
| | BR | 8.8 | 10.3 | ▼ | ▲ | Degraded |
| | CR | 11.3 | 9.4 | ▼ | ▼ | Improved |
| | RC | 3.7 | 3.5 | ▼ | ▼ | Improved |
| | RP | 3.2 | 2.5 | ▼ | ▼ | Improved |
| FLEET HEALTH | APA | 58.4 | 65.0 | ▲ | ▲ | Improved |
| | DD | 4.3 | 6.6 | ▼ | ▲ | Degraded |
| | R/R | 6.8 | 5.9 | ▼ | ▼ | Improved |
| | RCP | 4.9 | 3.5 | ▼ | ▼ | Improved |
| | MMH | 35.1 | 39.8 | ▼ | ▲ | Degraded |
| | TNMCM | 15.3 | 9.5 | ▼ | ▼ | Improved |
| | MC | 76.9 | 84.5 | ▲ | ▲ | Improved |

388FW:

| 388FW | | Means Comparison Test | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Variable | | Normality | Variance | Test Used | F-Ratio or $X^2$ | p-value | Null | Result |
| OVERALL BALANCE | DEV | Normal | Equal | ANOVA F | 15.3764 | 0.0003 | Reject | Significant |
| | FHA | Non-Normal | Equal | Wilcoxon | 7.9800 | 0.0047 | Reject | Significant |
| | SFA | Normal | Equal | ANOVA F | 1.5687 | 0.2167 | Accept | Not Significant |
| | FSE | Non-Normal | Equal | Wilcoxon | 0.5980 | 0.4394 | Accept | Not Significant |
| | MSE | Non-Normal | UnEqual | Wilcoxon | 15.9306 | 0.0001 | Reject | Significant |
| | HUTE | Normal | Equal | ANOVA F | 2.8450 | 0.0984 | Accept | Not Significant |
| | SUTE | Normal | Equal | ANOVA F | 0.1367 | 0.7133 | Accept | Not Significant |
| SORTIE PRODUCTION | FR | Normal | Equal | ANOVA F | 0.7341 | 0.3960 | Accept | Not Significant |
| | AR | Non-Normal | Equal | Wilcoxon | 5.9794 | 0.0145 | Reject | Significant |
| | BR | Normal | Equal | ANOVA F | 5.9294 | 0.0188 | Reject | Significant |
| | CR | Non-Normal | Equal | Wilcoxon | 0.0027 | 0.9589 | Accept | Not Significant |
| | RC | Non-Normal | Equal | Wilcoxon | 0.0068 | 0.9340 | Accept | Not Significant |
| | RP | Non-Normal | Equal | Wilcoxon | 0.1805 | 0.6709 | Accept | Not Significant |
| FLEET HEALTH | APA | Normal | UnEqual | Welch | 171.9524 | 0.0001 | Reject | Significant |
| | DD | Non-Normal | Equal | Wilcoxon | 8.1101 | 0.0044 | Reject | Significant |
| | R/R | Normal | Equal | ANOVA F | 0.0577 | 0.8112 | Accept | Not Significant |
| | RCP | Non-Normal | Equal | Wilcoxon | 10.3031 | 0.0013 | Reject | Significant |
| | MMH | Normal | Equal | ANOVA F | 34.1408 | 0.0001 | Reject | Significant |
| | TNMCM | Normal | Equal | ANOVA F | 36.2057 | 0.0001 | Reject | Significant |
| | MC | Normal | Equal | ANOVA F | 69.5427 | 0.0001 | Reject | Significant |

| Means Analysis | | | | | | |
|---|---|---|---|---|---|---|
| 388FW | | Group | | Change | | Result |
| Variable | | Pre | Post | Desired | Actual | |
| OVERALL BALANCE | DEV | 10.6 | 7.5 | ▼ | ▼ | Improved |
| | FHA | 1483.0 | 1830.6 | ▲ | ▲ | Improved |
| | SFA | 1056.7 | 1144.4 | ▲ | ▲ | Improved |
| | FSE | 73.3 | 75.7 | ▲ | ▲ | Improved |
| | MSE | 90.7 | 96.4 | ▲ | ▲ | Improved |
| | HUTE | 24.9 | 27.7 | ▲ | ▲ | Improved |
| | SUTE | 17.7 | 17.3 | ▲ | ▼ | Degraded |
| SORTIE PRODUCTION | FR | 71.1 | 72.7 | ▲ | ▲ | Improved |
| | AR | 5.7 | 7.1 | ▼ | ▲ | Degraded |
| | BR | 9.0 | 10.0 | ▼ | ▲ | Degraded |
| | CR | 10.2 | 10.6 | ▼ | ▲ | Degraded |
| | RC | 13 | 13 | ▼ | ▲ | Degraded |
| | RP | 14 | 14 | ▼ | ▼ | Improved |
| FLEET HEALTH | APA | 59.6 | 70.2 | ▲ | ▲ | Improved |
| | DD | 3.6 | 2.8 | ▼ | ▼ | Improved |
| | R/R | 2.7 | 2.6 | ▼ | ▼ | Improved |
| | RCP | 2.8 | 4.0 | ▼ | ▲ | Degraded |
| | MMH | 37.0 | 58.4 | ▼ | ▲ | Degraded |
| | TNMCM | 18.7 | 14.2 | ▼ | ▼ | Improved |
| | MC | 72.8 | 80.6 | ▲ | ▲ | Improved |

# 22ARW:

| 22ARW | | Means Comparison Test | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Variable | | Normality | Variance | Test Used | F-Ratio or $X^2$ | p-value | Null | Result |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | FHA | Non-Normal | UnEqual | Wilcoxon | 35.2653 | 0.0001 | Reject | Significant |
| | SFA | Non-Normal | UnEqual | Wilcoxon | 28.4201 | 0.0001 | Reject | Significant |
| | FSE | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | MSE | Non-Normal | Equal | Wilcoxon | 6.2816 | 0.0122 | Reject | Significant |
| | HUTE | Normal | UnEqual | Welch | 22.3872 | 0.0001 | Reject | Significant |
| | SUTE | Normal | UnEqual | Welch | 0.0785 | 0.7811 | Accept | Not Significant |
| SORTIE PRODUCTION | FR | Normal | Equal | ANOVA F | 10.5320 | 0.0022 | Reject | Significant |
| | AR | Non-Normal | Equal | Wilcoxon | 6.4414 | 0.0111 | Reject | Significant |
| | BR | Normal | Equal | ANOVA F | 0.1144 | 0.7367 | Accept | Not Significant |
| | CR | Normal | Equal | ANOVA F | 11.3631 | 0.0015 | Reject | Significant |
| | RC | Non-Normal | Equal | Wilcoxon | 17.8213 | 0.0001 | Reject | Significant |
| | RP | Normal | Equal | ANOVA F | 2.8329 | 0.0991 | Accept | Not Significant |
| FLEET HEALTH | APA | Normal | Equal | ANOVA F | 126.8722 | 0.0001 | Reject | Significant |
| | DD | Normal | UnEqual | Welch | 0.1119 | 0.7402 | Accept | Not Significant |
| | R/R | Non-Normal | Equal | Wilcoxon | 13.7289 | 0.0002 | Reject | Significant |
| | RCP | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | MMH | Normal | Equal | ANOVA F | 14.9858 | 0.0003 | Reject | Significant |
| | TNMCM | Non-Normal | Equal | Wilcoxon | 0.0895 | 0.7648 | Accept | Not Significant |
| | MC | Non-Normal | Equal | Wilcoxon | 1.3103 | 0.2523 | Accept | Not Significant |

| Means Analysis | | | | | | |
|---|---|---|---|---|---|---|
| 22ARW | | Group | | Change | | Result |
| Variable | | Pre | Post | Desired | Actual | |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a |
| | FHA | 1562.8 | 2876.2 | ▲ | ▲ | Improved |
| | SFA | 389.5 | 5413 | ▲ | ▲ | Improved |
| | FSE | n/a | n/a | n/a | n/a | n/a |
| | MSE | 914 | 85.9 | ▲ | ▼ | Degraded |
| | HUTE | 56.1 | 73.0 | ▲ | ▲ | Improved |
| | SUTE | 13.5 | 13.7 | ▲ | ▲ | Improved |
| SORTIE PRODUCTION | FR | 59.2 | 38.7 | ▲ | ▼ | Degraded |
| | AR | 0.9 | 0.5 | ▼ | ▼ | Improved |
| | BR | 2.8 | 3.0 | ▼ | ▲ | Degraded |
| | CR | 13.1 | 9.6 | ▼ | ▼ | Improved |
| | RC | 0.8 | 19 | ▼ | ▲ | Degraded |
| | RP | 0.8 | 12 | ▼ | ▲ | Degraded |
| FLEET HEALTH | APA | 29.2 | 39.7 | ▲ | ▲ | Improved |
| | DD | 8.2 | 8.0 | ▼ | ▼ | Improved |
| | R/R | 15 | 2.8 | ▼ | ▲ | Degraded |
| | RCP | n/a | n/a | n/a | n/a | n/a |
| | MMH | 20.3 | 13.3 | ▼ | ▼ | Improved |
| | TNMCM | 10.3 | 9.9 | ▼ | ▼ | Improved |
| | MC | 85.0 | 84.7 | ▲ | ▼ | Degraded |

92ARW:

| 92ARW | | Means Comparison Test | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Variable | | Normality | Variance | Test Used | F-Ratio or $X^2$ | p-value | Null | Result |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | FHA | Normal | UnEqual | Welch | 37.5165 | 0.0001 | Reject | Significant |
| | SFA | Normal | UnEqual | Welch | 25.2683 | 0.0001 | Reject | Significant |
| | FSE | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | MSE | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | HUTE | Normal | UnEqual | Welch | 3.3255 | 0.0025 | Reject | Significant |
| | SUTE | Normal | UnEqual | Welch | 3.2087 | 0.0833 | Accept | Not Significant |
| SORTIE PRODUCTION | FR | Normal | Equal | ANOVA F | 1.5375 | 0.2213 | Accept | Not Significant |
| | AR | Non-Normal | Equal | Wilcoxon | 0.0153 | 0.9014 | Accept | Not Significant |
| | BR | Normal | Equal | ANOVA F | 0.1275 | 0.7227 | Accept | Not Significant |
| | CR | Non-Normal | Equal | Wilcoxon | 5.8220 | 0.0158 | Reject | Significant |
| | RC | Normal | Equal | ANOVA F | 0.9971 | 0.3232 | Accept | Not Significant |
| | RP | Normal | Equal | ANOVA F | 0.7368 | 0.3951 | Accept | Not Significant |
| FLEET HEALTH | APA | Non-Normal | UnEqual | Wilcoxon | 25.4292 | 0.0001 | Reject | Significant |
| | DD | Non-Normal | Equal | Wilcoxon | 23.7241 | 0.0001 | Reject | Significant |
| | R/R | Normal | Equal | ANOVA F | 1.5871 | 0.2141 | Accept | Not Significant |
| | RCP | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | MMH | Non-Normal | Equal | Wilcoxon | 2.9300 | 0.0870 | Accept | Not Significant |
| | TNMCM | Normal | Equal | ANOVA F | 13.0465 | 0.0007 | Reject | Significant |
| | MC | Non-Normal | UnEqual | Wilcoxon | 5.7261 | 0.0167 | Reject | Significant |

| Means Analysis | | | | | | |
|---|---|---|---|---|---|---|
| 92ARW | | Group | | Change | | Result |
| Variable | | Pre | Post | Desired | Actual | |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a |
| | FHA | 1106.5 | 1989.8 | ▲ | ▲ | Improved |
| | SFA | 239.8 | 370.6 | ▲ | ▲ | Improved |
| | FSE | n/a | n/a | n/a | n/a | n/a |
| | MSE | n/a | n/a | n/a | n/a | n/a |
| | HUTE | 42.7 | 56.2 | ▲ | ▲ | Improved |
| | SUTE | 9.2 | 10.4 | ▲ | ▲ | Improved |
| SORTIE PRODUCTION | FR | 54.4 | 47.9 | ▲ | ▼ | Degraded |
| | AR | 12 | 14 | ▼ | ▲ | Degraded |
| | BR | 5.4 | 5.6 | ▼ | ▲ | Degraded |
| | CR | 9.4 | 7.2 | ▼ | ▼ | Improved |
| | RC | 15 | 12 | ▼ | ▼ | Improved |
| | RP | 18 | 15 | ▼ | ▼ | Improved |
| FLEET HEALTH | APA | 26.8 | 36.0 | ▲ | ▲ | Improved |
| | DD | 4.2 | 6.3 | ▼ | ▲ | Degraded |
| | R/R | 3.2 | 2.8 | ▼ | ▼ | Improved |
| | RCP | n/a | n/a | n/a | n/a | n/a |
| | MMH | 19.5 | 16.6 | ▼ | ▼ | Improved |
| | TNMCM | 13.1 | 10.4 | ▼ | ▼ | Improved |
| | MC | 79.6 | 85.8 | ▲ | ▲ | Improved |

319ARW:

| 319ARW | | Means Comparison Test | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Variable | | Normality | Variance | Test Used | F-Ratio or $X^2$ | p-value | Null | Result |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | FHA | Non-Normal | UnEqual | Wilcoxon | 25.9392 | 0.0001 | Reject | Significant |
| | SFA | Normal | UnEqual | Welch | 44.3496 | 0.0001 | Reject | Significant |
| | FSE | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | MSE | Non-Normal | UnEqual | Wilcoxon | 16.8818 | 0.0001 | Reject | Significant |
| | HUTE | Normal | UnEqual | Welch | 11.8108 | 0.0019 | Reject | Significant |
| | SUTE | Normal | UnEqual | Welch | 4.7194 | 0.0380 | Reject | Significant |
| SORTIE PRODUCTION | FR | Normal | Equal | ANOVA F | 0.7848 | 0.3803 | Accept | Not Significant |
| | AR | Non-Normal | Equal | Wilcoxon | 7.8845 | 0.0050 | Reject | Significant |
| | BR | Normal | UnEqual | Welch | 0.1323 | 0.7182 | Accept | Not Significant |
| | CR | Non-Normal | UnEqual | Wilcoxon | 18.9475 | 0.0001 | Reject | Significant |
| | RC | Non-Normal | Equal | Wilcoxon | 0.0038 | 0.9505 | Accept | Not Significant |
| | RP | Non-Normal | Equal | Wilcoxon | 0.2665 | 0.6057 | Accept | Not Significant |
| FLEET HEALTH | APA | Non-Normal | UnEqual | Wilcoxon | 32.8713 | 0.0001 | Reject | Significant |
| | DD | Non-Normal | Equal | Wilcoxon | 2.3970 | 0.1216 | Accept | Not Significant |
| | R/R | Non-Normal | Equal | Wilcoxon | 0.1792 | 0.6720 | Accept | Not Significant |
| | RCP | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| | MMH | Non-Normal | Equal | Wilcoxon | 3.1831 | 0.0744 | Accept | Not Significant |
| | TNMCM | Normal | Equal | ANOVA F | 3.4697 | 0.0689 | Accept | Not Significant |
| | MC | Normal | Equal | ANOVA F | 8.1456 | 0.0065 | Reject | Significant |

| Means Analysis | | | | | | |
|---|---|---|---|---|---|---|
| 319ARW | | Group | | Change | | Result |
| Variable | | Pre | Post | Desired | Actual | |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a |
| | FHA | 1239.4 | 2346.7 | ▲ | ▲ | Improved |
| | SFA | 261.2 | 425.5 | ▲ | ▲ | Improved |
| | FSE | n/a | n/a | n/a | n/a | n/a |
| | MSE | 96.7 | 76.8 | ▲ | ▼ | Degraded |
| | HUTE | 46.2 | 60.2 | ▲ | ▲ | Improved |
| | SUTE | 9.1 | 10.8 | ▲ | ▲ | Improved |
| SORTIE PRODUCTION | FR | 41.0 | 46.7 | ▲ | ▲ | Improved |
| | AR | 0.6 | 1.3 | ▼ | ▲ | Degraded |
| | BR | 3.9 | 3.7 | ▼ | ▼ | Improved |
| | CR | 11.4 | 6.6 | ▼ | ▼ | Improved |
| | RC | 1.1 | 0.9 | ▼ | ▼ | Improved |
| | RP | 1.4 | 1.3 | ▼ | ▼ | Improved |
| FLEET HEALTH | APA | 27.6 | 39.6 | ▲ | ▲ | Improved |
| | DD | 6.0 | 5.7 | ▼ | ▼ | Improved |
| | R/R | 2.5 | 2.2 | ▼ | ▼ | Improved |
| | RCP | n/a | n/a | n/a | n/a | n/a |
| | MMH | 11.4 | 10.7 | ▼ | ▼ | Improved |
| | TNMCM | 12.5 | 10.7 | ▼ | ▼ | Improved |
| | MC | 81.0 | 84.3 | ▲ | ▲ | Improved |

# Appendix H - Qualitative Data Plots

F-16:

| F-16 | | Mean Focused Plot Summary | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | +M,+V | | | +M,=V | | | +M,-V | | | =M,+V | | | =M,=V | | | =M,-V | | | -M,+V | | | -M,=V | | | -M,-V | | |
| Variable | | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW |
| OVERALL BALANCE | DEV | X | | | | X | X | | | | | | | | | | | | | | | | | | | | | |
| | FHA | | | | | | X | | | | | | | | X | | | | | | | | X | | | | | |
| | SFA | | | | | | | | | | | | | | X | X | | | | | | | X | | | | | |
| | FSE | | | | | X | | | | | X | | | | | X | | | | | | | | | | | | |
| | MSE | X | | X | | | | | | | | | | | X | | | | | | | | | | | | | |
| | HUTE | | | | | | | | | | | | | X | X | X | | | | | | | | | | | | |
| | SUTE | | | | | | | | | | | | | X | X | X | | | | | | | | | | | | |
| SORTIE PRODUCTION | FR | | | | | X | | | | | | | | | | X | | | | | | | X | | | | | |
| | AR | | | | | | | | | | | | | | X | | | | | | | | X | | X | | | |
| | BR | | | | | | | | | | | | | | | | | | | | | | | X | X | X | | |
| | CR | | | | | | | | | | | X | | X | | X | | | | | | | | | | | | |
| | RC | | | | X | | | | | | | | | | X | X | | | | | | | | | | | | |
| | RP | | | | | X | | | | | | | | X | | X | | | | | | | | | | | | |
| FLEET HEALTH | APA | | X | X | | | | | | | | | | | | | | | | | | | | | | X | | |
| | DD | | | | X | | X | | | | | | | | | | | X | | | | | | | | | | |
| | R/R | | | | | | | | | | | X | | X | | X | | | | | | | | | | | | |
| | RCP | | | | | X | | | | | | | | X | | | | | | | | | | | X | | | |
| | MMH | | | | | | | | | | | | | | X | | | | | | | | | | X | X | | |
| | TNMCM | | | | | X | X | | | | | | | X | | | | | | | | | | | | | | |
| | MC | | | | | X | X | | | | | | | X | | | | | | | | | | | | | | |

| F-16 | | Variance Focused Plot Summary | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | +V,+M | | | +V,=M | | | +V,-M | | | =V,+M | | | =V,=M | | | =V,-M | | | -V,+M | | | -V,=M | | | -V,-M | | |
| Variable | | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW | 20FW | 27FW | 388FW |
| OVERALL BALANCE | DEV | X | | | | | | | | | | X | X | | | | | | | | | | | | | | | |
| | FHA | | | | | | | | | | | | X | | X | | X | | | | | | | | | | | |
| | SFA | | | | | | | | | | | | | | X | X | X | | | | | | | | | | | |
| | FSE | | | | X | | | | | | | X | | | | X | | | | | | | | | | | | |
| | MSE | X | | X | | | | | | | | | | | X | | | | | | | | | | | | | |
| | HUTE | | | | | | | | | | | | | X | X | X | | | | | | | | | | | | |
| | SUTE | | | | | | | | | | | | | X | X | X | | | | | | | | | | | | |
| SORTIE PRODUCTION | FR | | | | | | | | | | | X | | | | X | X | | | | | | | | | | | |
| | AR | | | | | | | | | | | | | | X | | X | | X | | | | | | | | | |
| | BR | | | | | | | | | | | | | | | | | X | X | | | | | | | X | | |
| | CR | | | | | X | | | | | | | | X | | X | | | | | | | | | | | | |
| | RC | | | | | | | | | | X | | | | X | X | | | | | | | | | | | | |
| | RP | | | | | | | | | | | X | | X | | X | | | | | | | | | | | | |
| FLEET HEALTH | APA | | X | X | | | | | | | | | | | | | | | | | | | | | | X | | |
| | DD | | | | | | | | | | X | | X | | | | | | | | | | | X | | | | |
| | R/R | | | | | X | | | | | | | | X | | X | | | | | | | | | | | | |
| | RCP | | | | | | | | | | | X | | X | | | | | X | | | | | | | | | |
| | MMH | | | | | | | | | | | | | | X | | | | X | | | | | | | X | | |
| | TNMCM | | | | | | | | | | | X | X | X | | | | | | | | | | | | | | |
| | MC | | | | | | | | | | | X | X | X | | | | | | | | | | | | | | |

KC-135:

| KC-135 | | Mean Focused Plot Summary | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | +M,+V | | | +M,=V | | | +M,-V | | | =M,+V | | | =M,=V | | | =M,-V | | | -M,+V | | | -M,=V | | | -M,-V | | |
| Variable | | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW |
| OVERALL BALANCE | DEV | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | FHA | | | | | | | X | X | X | | | | | | | | | | | | | | | | | | |
| | SFA | | | | | | | X | X | X | | | | | | | | | | | | | | | | | | |
| | FSE | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | MSE | | | | | | | | | | | | | | | | | | | | | | X | | | | | X |
| | HUTE | | | | | | | X | X | X | | | | | | | | | | | | | | | | | | |
| | SUTE | | | | | | | | | X | | | | | | | X | X | | | | | | | | | | |
| SORTIE PRODUCTION | FR | | | | | | | | | | | | | | X | X | | | | | | | X | | | | | |
| | AR | | | | X | | | | | | | | | | X | | | | | | | | | | X | | | |
| | BR | | | | | | | | | | | | X | X | X | | | | | | | | | | | | | |
| | CR | | | X | X | X | | | | | | | | | | | | | | | | | | | | | | |
| | RC | | | | | | | | | | | | | | X | X | | | | | | | X | | | | | |
| | RP | | | | | | | | | | | | | X | X | X | | | | | | | | | | | | |
| FLEET HEALTH | APA | | | X | X | | | | X | | | | | | | | | | | | | | | | | | | |
| | DD | | | | | | | | | | X | | | | | X | | | | | | | | X | | | | |
| | R/R | | | | | | | | | | | | | | X | X | | | | | | | X | | | | | |
| | RCP | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | MMH | | | | X | | | | | | | | | | X | X | | | | | | | | | | | | |
| | TNMCM | | | | | X | | | | | | | | X | | X | | | | | | | | | | | | |
| | MC | | X | | | | X | | | | | | | X | | | | | | | | | | | | | | |

| KC-135 | | Variance Focused Plot Summary | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | +V,+M | | | +V,=M | | | +V,-M | | | =V,+M | | | =V,=M | | | =M,-V | | | -V,+M | | | -V,=M | | | -V,-M | | |
| Variable | | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW | 22ARW | 92ARW | 319ARW |
| OVERALL BALANCE | DEV | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | FHA | | | | | | | | | | | | | | | | | | | X | X | X | | | | | | |
| | SFA | | | | | | | | | | | | | | | | | | | X | X | X | | | | | | |
| | FSE | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | MSE | | | | | | | | | | | | | | | | X | | | | | | | | | | | X |
| | HUTE | | | | | | | | | | | | | | | | | | | X | X | X | | | | | | |
| | SUTE | | | | | | | | | | | | | | | | | | | | | X | X | X | | | | |
| SORTIE PRODUCTION | FR | | | | | | | | | | | | | | X | X | X | | | | | | | | | | | |
| | AR | | | | | | | | | | X | | | | X | | | | X | | | | | | | | | |
| | BR | | | | | | X | | | | | | | X | X | | | | | | | | | | | | | |
| | CR | | | X | | | | | | | X | X | | | | | | | | | | | | | | | | |
| | RC | | | | | | | | | | | | | | X | X | X | | | | | | | | | | | |
| | RP | | | | | | | | | | | | | X | X | X | | | | | | | | | | | | |
| FLEET HEALTH | APA | | | X | | | | | | | X | | | | | | | | | | X | | | | | | | |
| | DD | | | | X | | | | | | | | | | | X | | X | | | | | | | | | | |
| | R/R | | | | | | | | | | | | | | X | X | X | | | | | | | | | | | |
| | RCP | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | MMH | | | | | | | | | | X | | | | X | X | | | | | | | | | | | | |
| | TNMCM | | | | | | | | | | | X | | X | | X | | | | | | | | | | | | |
| | MC | | X | | | | | | | | | | X | X | | | | | | | | | | | | | | |

## Appendix I - Trend Analysis Results

20FW:

| 20FW | | Slope Determination Results $y = \beta_0 + \beta_1 + \varepsilon$ | | | |
|---|---|---|---|---|---|
| | | Pre-Combat Wing Structure | | Post-Combat Wing Structure | |
| Variable | | $\beta_0$ | $\beta_1$ | $\beta_0$ | $\beta_1$ |
| OVERALL BALANCE | DEV | 10.823551 | -0.0257217 | 4.05577971 | 0.0748696 |
| | FHA | 2070.4185 | 13.071522 | 2394.0888 | -28.98243 |
| | SFA | 1247.7065 | 11.353478 | 1260.3007 | -3.767391 |
| | FSE | 75.966304 | 0.5266957 | 85.884058 | 0.0406087 |
| | MSE | 92.008333 | 0.084 | 97.720652 | -0.109652 |
| | HUTE | 24.464493 | 0.1311739 | 31.606159 | -0.315826 |
| | SUTE | 15.971739 | 0.1472609 | 16.473188 | 0.0034783 |
| SORTIE PRODUCTION | FR | 82.855072 | 0.1492609 | 83.397101 | -0.170435 |
| | AR | 4.623913 | -0.030913 | 4.8101449 | 0.0365217 |
| | BR | 10.857971 | 0.0526957 | 16.307246 | -0.232913 |
| | CR | 12.131522 | -0.276522 | 11.977899 | -0.245565 |
| | RC | 9.8804348 | 0.0895652 | 11.181159 | -0.247826 |
| | RP | 12.742754 | -0.166087 | 12.782609 | -0.362609 |
| FLEET HEALTH | APA | 84.541304 | 0.0796957 | 85.678986 | -0.666652 |
| | DD | 2.9105072 | -0.047174 | 1.8391304 | -0.02913 |
| | R/R | 4.9844203 | -0.017087 | 4.9981884 | -0.087522 |
| | RCP | 3.1605072 | 0.0148261 | 3.717029 | -0.024696 |
| | MMH | 40.73913 | -0.08133 | 71.48442 | -1.081087 |
| | TNMCM | 8.4648551 | 0.1114783 | 10.082246 | -0.016913 |
| | MC | 84.566304 | -0.066304 | 84.013768 | 0.0515652 |

| 20FW | | Trend Comparison Results $y = \beta_0 + \beta_1 + \alpha_0 + \alpha_1 + \varepsilon$ | | | | |
|---|---|---|---|---|---|---|
| Variable | | $\beta_0$ | $\beta_1$ | $\alpha_1$ | $\alpha_2$ | $\alpha_2$ p-value |
| OVERALL BALANCE | DEV | 7.4396739 | -0.091174 | 1.3083333 | -0.166043 | 0.0001 |
| | FHA | 2232.2536 | -7.955457 | 101.00208 | 21.026978 | 0.0171 |
| | SFA | 1254.0036 | 3.7930435 | 88.208333 | 7.5604348 | 0.1009 |
| | FSE | 80.925181 | 0.2836522 | -1.920833 | 0.2430435 | 0.0447 |
| | MSE | 94.864493 | -0.012826 | -1.645833 | 0.0968261 | 0.1588 |
| | HUTE | 28.035326 | -0.092326 | -0.7777083 | 0.2235 | 0.0792 |
| | SUTE | 16.222464 | 0.0753696 | 0.6479167 | 0.0718913 | 0.2634 |
| SORTIE PRODUCTION | FR | 83.126087 | -0.010587 | 1.7270833 | 0.1598478 | 0.1292 |
| | AR | 4.717029 | 0.0028043 | -0.514583 | -0.033717 | 0.0745 |
| | BR | 13.582609 | -0.090109 | -0.939583 | 0.1428043 | 0.0002 |
| | CR | 12.05471 | -0.261043 | -0.116667 | -0.015478 | 0.6607 |
| | RC | 10.530797 | -0.07913 | 1.4583333 | 0.1686957 | 0.1521 |
| | RP | 12.762681 | -0.264348 | 1.2083333 | 0.0982609 | 0.2525 |
| FLEET HEALTH | APA | 85.110145 | -0.293478 | 4.0958333 | 0.3731739 | 0.0002 |
| | DD | 2.3748188 | -0.038152 | 0.4229167 | -0.009022 | 0.2808 |
| | R/R | 4.9913043 | -0.052304 | 0.4333333 | 0.0352174 | 0.2534 |
| | RCP | 3.4387681 | -0.004935 | -0.03125 | 0.0197609 | 0.3519 |
| | MMH | 56.111775 | -0.581109 | -9.122917 | 0.4999783 | 0.0119 |
| | TNMCM | 9.2735507 | 0.0472826 | -0.00625 | 0.0641957 | 0.052 |
| | MC | 84.290036 | -0.00737 | -0.460417 | -0.058935 | 0.1155 |

27FW:

| 27FW | | Slope Determination Results $y = \beta 0 + \beta 1 + \varepsilon$ | | | |
|---|---|---|---|---|---|
| | | Pre-Combat Wing Structure | | Post-Combat Wing Structure | |
| Variable | | $\beta_0$ | $\beta_1$ | $\beta_0$ | $\beta_1$ |
| OVERALL BALANCE | DEV | 16.882971 | -0.192304 | 6.5271739 | 0.0038261 |
| | FHA | 1390.1467 | 11.014261 | 1640.9373 | -11.52865 |
| | SFA | 983.63768 | 7.4556522 | 1061.6739 | -1.893913 |
| | FSE | 68.123188 | -0.083522 | 80.136232 | -0.220565 |
| | MSE | 98.042754 | -0.172087 | 93.827536 | 0.2511304 |
| | HUTE | 21.563043 | 0.3089565 | 26.098551 | -0.155217 |
| | SUTE | 14.473913 | 0.260087 | 16.969565 | -0.001565 |
| SORTIE PRODUCTION | FR | 73.939493 | 0.0041739 | 81.130797 | -0.21013 |
| | AR | 6.2644928 | -0.013826 | 5.7369565 | 0.0390435 |
| | BR | 8.9916667 | -0.015 | 11.914855 | -0.128522 |
| | CR | 11.353261 | -0.008261 | 11.431884 | -0.159217 |
| | RC | 3.1532609 | 0.0427391 | 4.0956522 | -0.051652 |
| | RP | 2.8101449 | 0.0275217 | 2.517029 | -0.003696 |
| FLEET HEALTH | APA | 64.557609 | -0.496609 | 61.68587 | 0.2611304 |
| | DD | 5.8797101 | -0.123043 | 13.403986 | -0.541652 |
| | R/R | 5.9876812 | 0.0686522 | 6.6402174 | -0.056217 |
| | RCP | 3.9557971 | 0.0758696 | 2.0681159 | 0.1172174 |
| | MMH | 45.556884 | -0.832217 | 32.871377 | 0.5549565 |
| | TNMCM | 15.286594 | 0.0037391 | 11.135145 | -0.131478 |
| | MC | 77.719203 | -0.06187 | 81.489493 | 0.2391739 |

| 27FW | | Trend Comparison Results $y = \beta 0 + \beta 1 + \alpha 0 + \alpha 1 + \varepsilon$ | | | | |
|---|---|---|---|---|---|---|
| Variable | | $\beta_0$ | $\beta_1$ | $\alpha_1$ | $\alpha_2$ | $\alpha_2$ p-value |
| OVERALL BALANCE | DEV | 11.705072 | -0.094239 | 3.9520833 | -0.098065 | 0.0472 |
| | FHA | 1515.542 | -0.257196 | 15.497917 | 11.271457 | 0.0344 |
| | SFA | 1022.6558 | 2.7808696 | 19.41667 | 4.6747826 | 0.2084 |
| | FSE | 74.12971 | -0.152043 | -5.15 | 0.0685217 | 0.6204 |
| | MSE | 95.935145 | 0.0395217 | -0.5375 | -0.211609 | 0.0001 |
| | HUTE | 23.830797 | 0.0768696 | 0.6333333 | 0.232087 | 0.0061 |
| | SUTE | 15.721739 | 0.1292609 | 0.3875 | 0.1308261 | 0.0364 |
| SORTIE PRODUCTION | FR | 77.535145 | -0.102978 | -2.25625 | 0.1071522 | 0.2801 |
| | AR | 6.0007246 | 0.0126087 | -0.066667 | -0.026435 | 0.2065 |
| | BR | 10.453261 | -0.071761 | -0.752083 | 0.0567609 | 0.0873 |
| | CR | 11.392572 | -0.083739 | 0.9041667 | 0.0754783 | 0.2307 |
| | RC | 3.6244565 | -0.004457 | 0.11875 | 0.0471957 | 0.0198 |
| | RP | 2.663587 | 0.011913 | 0.3416667 | 0.0156087 | 0.4738 |
| FLEET HEALTH | APA | 63.121739 | -0.117739 | -3.3 | -0.37887 | 0.0001 |
| | DD | 9.6418478 | -0.332348 | -1.145833 | 0.2093043 | 0.0006 |
| | R/R | 6.3139493 | 0.0062174 | 0.4541667 | 0.0624348 | 0.0565 |
| | RCP | 3.0119565 | 0.0965435 | 0.6854167 | -0.020674 | 0.534 |
| | MMH | 39.21413 | -0.13863 | -2.327083 | -0.693587 | 0.0014 |
| | TNMCM | 13.21087 | -0.06387 | 2.9208333 | 0.0676087 | 0.2155 |
| | MC | 79.604348 | 0.0886522 | -3.766667 | -0.150522 | 0.0242 |

388FW:

| 388FW | | Slope Determination Results $y = \beta0 + \beta1 + \varepsilon$ | | | |
|---|---|---|---|---|---|
| | | Pre-Combat Wing Structure | | Post-Combat Wing Structure | |
| Variable | | $\beta_0$ | $\beta_1$ | $\beta_0$ | $\beta_1$ |
| OVERALL BALANCE | DEV | 10.321014 | 0.0206522 | 9.4960145 | -0.159348 |
| | FHA | 1161.1529 | 25.746435 | 1859.2928 | -2.294087 |
| | SFA | 794.39855 | 20.984783 | 1084.7536 | 4.7730435 |
| | FSE | 71.454348 | 0.1496522 | 72.061594 | 0.2877391 |
| | MSE | 86.559058 | 0.3346087 | 95.973551 | 0.0377826 |
| | HUTE | 21.832609 | 0.2413913 | 28.147826 | -0.038826 |
| | SUTE | 16.059783 | 0.1312174 | 16.388768 | 0.0745652 |
| SORTIE PRODUCTION | FR | 74.523913 | -0.264913 | 64.376449 | 0.6652174 |
| | AR | 6.6112319 | -0.073565 | 7.6413043 | -0.045304 |
| | BR | 9.6119565 | -0.049957 | 10.351812 | -0.031478 |
| | CR | 13.234058 | -0.239391 | 14.828623 | -0.340957 |
| | RC | 1.2547101 | -0.000043 | 1.667029 | -0.032696 |
| | RP | 1.0463768 | 0.0309565 | 1.857971 | -0.039304 |
| FLEET HEALTH | APA | 54.479348 | 0.4116522 | 68.152536 | 0.1621304 |
| | DD | 4.051087 | -0.037087 | 4.3634058 | -0.127739 |
| | R/R | 2.301087 | 0.030913 | 3.525 | -0.072 |
| | RCP | 3.2775362 | -0.04087 | 3.2514493 | 0.0622174 |
| | MMH | 46.584783 | -0.766783 | 48.766667 | 0.773 |
| | TNMCM | 19.340942 | -0.048609 | 16.834058 | -0.209391 |
| | MC | 71.835507 | 0.0738261 | 76.191667 | 0.354 |

| 388FW | | Trend Comparison Results $y = \beta 0 + \beta 1 + \alpha 0 + \alpha 1 + \varepsilon$ | | | | |
|---|---|---|---|---|---|---|
| Variable | | $\beta_0$ | $\beta_1$ | $\alpha_1$ | $\alpha_2$ | $\alpha_2$ p-value |
| OVERALL BALANCE | DEV | 9.9085145 | -0.069348 | 1.5375 | 0.09 | 0.1109 |
| | FHA | 1510.2228 | 11.726174 | -173.8167 | 14.020261 | 0.0858 |
| | SFA | 939.57609 | 12.878913 | -43.85417 | 8.1058696 | 0.0873 |
| | FSE | 71.757971 | 0.2186957 | -1.166667 | -0.069043 | 0.7622 |
| | MSE | 91.266304 | 0.1861957 | -2.852083 | 0.148413 | 0.1299 |
| | HUTE | 24.990217 | 0.1012826 | -1.40625 | 0.1401087 | 0.2507 |
| | SUTE | 16.224275 | 0.1028913 | 0.1895833 | 0.0283261 | 0.7038 |
| SORTIE PRODUCTION | FR | 69.450181 | 0.2001522 | -0.739583 | -0.465065 | 0.0001 |
| | AR | 7.1262681 | -0.059435 | -0.691667 | -0.01413 | 0.6679 |
| | BR | 9.9818841 | -0.040717 | -0.485417 | -0.009239 | 0.7496 |
| | CR | 14.031341 | -0.290174 | -0.1625 | 0.0507826 | 0.406 |
| | RC | 1.4608696 | -0.01637 | -0.002083 | 0.0163261 | 0.1193 |
| | RP | 1.4521739 | -0.004174 | 0.0333333 | 0.0351304 | 0.0028 |
| FLEET HEALTH | APA | 61.315942 | 0.2868913 | -0.5277083 | 0.1247609 | 0.0013 |
| | DD | 4.2072464 | -0.082413 | 0.4104167 | 0.0453261 | 0.1348 |
| | R/R | 2.9130435 | -0.020543 | 0.03125 | 0.0214565 | 0.0048 |
| | RCP | 3.2644928 | 0.0106739 | -0.63125 | -0.051543 | 0.048 |
| | MMH | 47.675725 | 0.0031087 | -10.71458 | -0.769891 | 0.003 |
| | TNMCM | 18.0875 | -0.129 | 2.2583333 | 0.0803913 | 0.1184 |
| | MC | 74.013587 | 0.213913 | -3.929167 | -0.140087 | 0.0198 |

22ARW:

| 22ARW | | Slope Determination Results $y = \beta 0 + \beta 1 + \varepsilon$ | | | |
|---|---|---|---|---|---|
| | | Pre-Combat Wing Structure | | Post-Combat Wing Structure | |
| Variable | | $\beta_0$ | $\beta_1$ | $\beta_0$ | $\beta_1$ |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a |
| | FHA | 1408.0801 | 12.381261 | 2946.1543 | -5.593348 |
| | SFA | 363.62681 | 2.0665217 | 509.40942 | 2.553913 |
| | FSE | n/a | n/a | n/a | n/a |
| | MSE | 97.243478 | -0.465478 | 85.246739 | 0.0552609 |
| | HUTE | 56.09058 | 0.003087 | 64.714855 | 0.6644783 |
| | SUTE | 13.85942 | -0.028087 | 10.968116 | 0.2192174 |
| SORTIE PRODUCTION | FR | 87.009058 | -2.226391 | 50.471739 | -0.945739 |
| | AR | 1.0539855 | -0.011652 | 0.1778986 | 0.0264348 |
| | BR | 2.5492754 | 0.0233913 | 1.0358696 | 0.1551304 |
| | CR | 9.1025362 | 0.3191304 | 13.496739 | -0.313739 |
| | RC | 0.7945652 | -0.003565 | 1.9210145 | -0.014348 |
| | RP | 0.9637681 | -0.013435 | 1.548913 | -0.036913 |
| FLEET HEALTH | APA | 25.892391 | 0.2626087 | 44.923188 | -0.420522 |
| | DD | 5.7213768 | 0.1949565 | 9.0300725 | -0.081739 |
| | R/R | 1.7583333 | -0.017 | 3.4699275 | -0.051261 |
| | RCP | n/a | n/a | n/a | n/a |
| | MMH | 14.918478 | 0.4315217 | 15.300362 | -0.160696 |
| | TNMCM | 7.4793478 | 0.2216522 | 8.0934783 | 0.1455217 |
| | MC | 84.31087 | 0.0541304 | 84.556522 | 0.0104783 |

| 22ARW | | Trend Comparison Results $y = \beta0 + \beta1 + \alpha0 + \alpha1 + \varepsilon$ | | | | |
|---|---|---|---|---|---|---|
| Variable | | $\beta_0$ | $\beta_1$ | $\alpha_1$ | $\alpha_2$ | $\alpha_2$ p-value |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a |
| | FHA | 2177.1172 | 3.3939565 | -656.6958 | 8.9873043 | 0.3941 |
| | SFA | 436.51812 | 2.3102174 | -75.9375 | -0.243696 | 0.8972 |
| | FSE | n/a | n/a | n/a | n/a | n/a |
| | MSE | 91.245109 | -0.205109 | 2.74375 | -0.26037 | 0.055 |
| | HUTE | 60.402717 | 0.3337826 | -8.445833 | -0.330696 | 0.1997 |
| | SUTE | 12.413768 | 0.0955652 | -0.1 | -0.123652 | 0.012 |
| SORTIE PRODUCTION | FR | 68.740399 | -1.586065 | 10.264583 | -0.640326 | 0.1074 |
| | AR | 0.615942 | 0.0073913 | 0.2 | -0.019043 | 0.1073 |
| | BR | 1.7925725 | 0.0892609 | -0.066667 | -0.06587 | 0.0083 |
| | CR | 11.299638 | 0.0026957 | 1.7583333 | 0.3164348 | 0.060502 |
| | RC | 1.3577899 | -0.008957 | -0.495833 | 0.0053913 | 0.706 |
| | RP | 1.2563406 | -0.025174 | -0.145833 | 0.0117391 | 0.337 |
| FLEET HEALTH | APA | 35.40779 | -0.078957 | -5.245833 | 0.3415652 | 0.0001 |
| | DD | 7.3757246 | 0.0566087 | 0.075 | 0.1383478 | 0.0001 |
| | R/R | 2.6141304 | -0.03413 | -0.641667 | 0.0171304 | 0.4487 |
| | RCP | n/a | n/a | n/a | n/a | n/a |
| | MMH | 15.10942 | 0.135413 | 3.5104167 | 0.2961087 | 0.0219 |
| | TNMCM | 7.786413 | 0.183587 | 0.16875 | 0.0380652 | 0.4621 |
| | MC | 84.433696 | 0.0323043 | 0.15 | 0.0218261 | 0.7523 |

92ARW:

| 92ARW | | Slope Determination Results $y = \beta0 + \beta1 + \varepsilon$ | | | |
|---|---|---|---|---|---|
| | | Pre-Combat Wing Structure | | Post-Combat Wing Structure | |
| Variable | | $\beta_0$ | $\beta_1$ | $\beta_0$ | $\beta_1$ |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a |
| | FHA | 1025.8543 | 6.4486522 | 965.91884 | 81.913826 |
| | SFA | 219.13406 | 1.6526087 | 181.22464 | 15.148696 |
| | FSE | n/a | n/a | n/a | n/a |
| | MSE | n/a | n/a | n/a | n/a |
| | HUTE | 38.855435 | 0.3105652 | 37.318478 | 1.5125217 |
| | SUTE | 8.1887681 | 0.0785652 | 6.9221014 | 0.2805652 |
| SORTIE PRODUCTION | FR | 71.42029 | -1.361957 | 57.092754 | -0.736087 |
| | AR | 1.0594203 | 0.013913 | 1.9202899 | -0.041957 |
| | BR | 6.6721014 | -0.105435 | 5.6521739 | -0.007174 |
| | CR | 9.9210145 | -0.039348 | 10.43442 | -0.261087 |
| | RC | 2.1539855 | -0.054652 | 1.2905797 | -0.005913 |
| | RP | 1.8688406 | -0.008174 | 2.0344203 | -0.040087 |
| FLEET HEALTH | APA | 26.919565 | -0.008565 | 30.327174 | 0.4548261 |
| | DD | 3.0231884 | 0.0944783 | 7.1721014 | -0.068435 |
| | R/R | 4.0228261 | -0.062826 | 3.325 | -0.046 |
| | RCP | n/a | n/a | n/a | n/a |
| | MMH | 18.230435 | 0.1045652 | 27.232246 | -0.851913 |
| | TNMCM | 15.313768 | -0.173435 | 9.7297101 | 0.0499565 |
| | MC | 67.042391 | 1.0046087 | 86.435145 | -0.053478 |

| 92ARW | | Trend Comparison Results $y = \beta0 + \beta1 + \alpha0 + \alpha1 + \varepsilon$ | | | | |
|---|---|---|---|---|---|---|
| Variable | | $\beta_0$ | $\beta_1$ | $\alpha_1$ | $\alpha_2$ | $\alpha_2$ p-value |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a |
| | FHA | 995.88659 | 44.181239 | -441.6896 | -37.73259 | 0.0001 |
| | SFA | 200.17935 | 8.4006522 | -65.39583 | -6.748043 | 0.0001 |
| | FSE | n/a | n/a | n/a | n/a | n/a |
| | MSE | n/a | n/a | n/a | n/a | n/a |
| | HUTE | 38.086957 | 0.9115435 | -6.74375 | -0.600978 | 0.0206 |
| | SUTE | 7.5554348 | 0.1795652 | -0.629167 | -0.101 | 0.0192 |
| SORTIE PRODUCTION | FR | 64.256522 | -1.049022 | 3.2520833 | -0.312935 | 0.3768 |
| | AR | 1.4898551 | -0.014022 | -0.08125 | 0.0279348 | 0.2188 |
| | BR | 6.1621377 | -0.056304 | -0.104167 | -0.04913 | 0.2439 |
| | CR | 10.177717 | -0.150217 | 1.1291667 | 0.1108696 | 0.219 |
| | RC | 1.7222826 | -0.030283 | 0.1270833 | -0.02437 | 0.1794 |
| | RP | 1.9516304 | -0.02413 | 0.1166667 | 0.0159565 | 0.4199 |
| FLEET HEALTH | APA | 28.62337 | 0.2231304 | -4.6 | -0.231696 | 0.006 |
| | DD | 5.0976449 | 0.0130217 | -1.05625 | 0.0814565 | 0.0021 |
| | R/R | 3.673913 | -0.054413 | 0.24375 | -0.008413 | 0.7598 |
| | RCP | n/a | n/a | n/a | n/a | n/a |
| | MMH | 22.731341 | -0.373674 | 1.4770833 | 0.4782391 | 0.0007 |
| | TNMCM | 12.521739 | -0.061739 | 1.3958333 | -0.111696 | 0.0435 |
| | MC | 76.738768 | 0.4755652 | -3.083333 | 0.5290435 | 0.0008 |

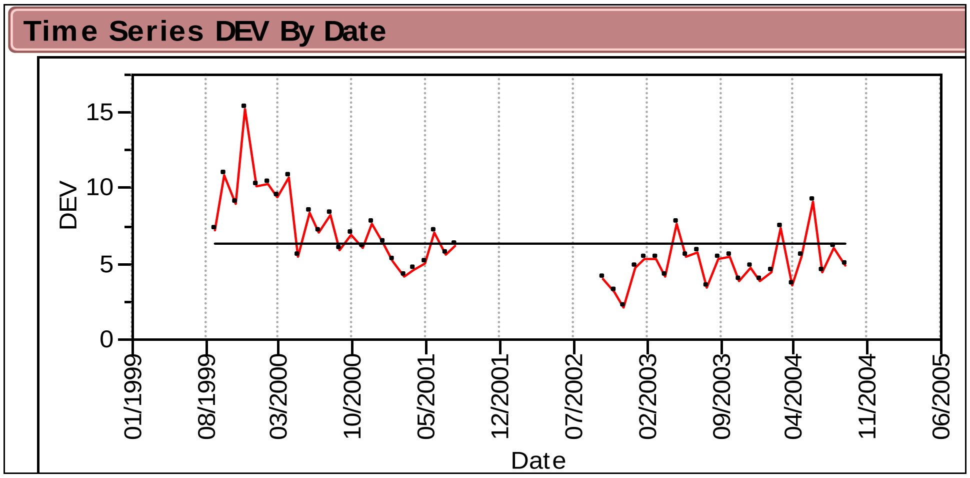
319ARW:

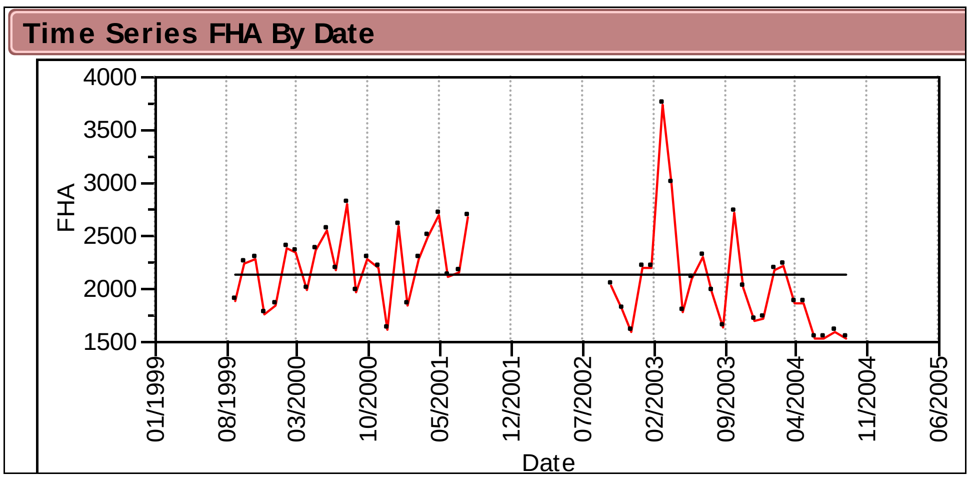
| 319ARW | | Slope Determination Results $y = \beta 0 + \beta 1 + \varepsilon$ | | | |
|---|---|---|---|---|---|
| | | Pre-Combat Wing Structure | | Post-Combat Wing Structure | |
| Variable | | $\beta_0$ | $\beta_1$ | $\beta_0$ | $\beta_1$ |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a |
| | FHA | 1253.3409 | -1.116609 | 1721.2272 | 50.039826 |
| | SFA | 251.81159 | 0.7517391 | 347.82246 | 6.2108696 |
| | FSE | n/a | n/a | n/a | n/a |
| | MSE | 90.798188 | 0.4714783 | 96.635507 | -1.587174 |
| | HUTE | 44.303623 | 0.1540435 | 46.027899 | 1.1374348 |
| | SUTE | 8.1304348 | 0.0795652 | 8.9971014 | 0.1405652 |
| SORTIE PRODUCTION | FR | 52.426449 | -0.916783 | 27.556522 | 1.5284783 |
| | AR | 0.4945652 | 0.0094348 | 1.3576087 | -0.008609 |
| | BR | 2.2003623 | 0.1323043 | 3.992029 | -0.025696 |
| | CR | 10.722101 | 0.0525652 | 8.390942 | -0.145609 |
| | RC | 0.6014493 | 0.0382174 | 1.0235507 | -0.011217 |
| | RP | 0.590942 | 0.0643913 | 1.6836957 | -0.031696 |
| FLEET HEALTH | APA | 29.216304 | -0.129304 | 39.77971 | 0.014043 |
| | DD | 6.3619565 | -0.025957 | 6.9927536 | -0.106087 |
| | R/R | 1.1923913 | 0.1026087 | 2.7072464 | -0.042913 |
| | RCP | n/a | n/a | n/a | n/a |
| | MMH | 8.467029 | 0.2323043 | 14.662681 | -0.315348 |
| | TNMCM | 9.6427536 | 0.228913 | 10.280435 | 0.0315652 |
| | MC | 82.563406 | -0.126739 | 84.255435 | 0.0055652 |

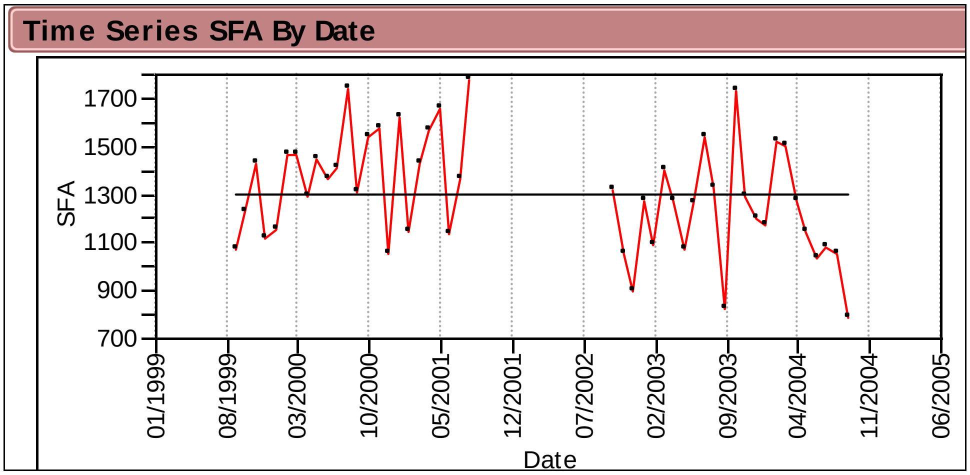
| 319ARW | | Trend Comparison Results | | $y = \beta 0 + \beta 1 + \alpha 0 + \alpha 1 + \varepsilon$ | | |
|---|---|---|---|---|---|---|
| Variable | | $\beta_0$ | $\beta_1$ | $\alpha_1$ | $\alpha_2$ | $\alpha_2$ p-value |
| OVERALL BALANCE | DEV | n/a | n/a | n/a | n/a | n/a |
| | FHA | 1487.2841 | 24.461609 | -553.6708 | -25.57822 | 0.006 |
| | SFA | 299.81703 | 3.4813043 | -82.125 | -2.729565 | 0.1145 |
| | FSE | n/a | n/a | n/a | n/a | n/a |
| | MSE | 93.716848 | -0.557848 | 9.9479167 | 1.0293261 | 0.0005 |
| | HUTE | 45.165761 | 0.6457391 | -7.008333 | -0.491696 | 0.0809 |
| | SUTE | 8.5637681 | 0.1100652 | -0.814583 | -0.0305 | 0.5653 |
| SORTIE PRODUCTION | FR | 39.991486 | 0.3058478 | -2.847917 | -1.22263 | 0.0074 |
| | AR | 0.926087 | 0.000413 | -0.31875 | 0.0090217 | 0.577 |
| | BR | 3.0961957 | 0.0533043 | 0.0916667 | 0.079 | 0.0262 |
| | CR | 9.5565217 | -0.046522 | 2.4041667 | 0.099087 | 0.1238 |
| | RC | 0.8125 | 0.0135 | 0.0979167 | 0.0247174 | 0.1427 |
| | RP | 1.1373188 | 0.0163478 | 0.0541667 | 0.0480435 | 0.0535 |
| FLEET HEALTH | APA | 34.498007 | -0.071674 | -6.002083 | -0.05763 | 0.4592 |
| | DD | 6.6773551 | -0.066022 | 0.1854167 | 0.0400652 | 0.0644 |
| | R/R | 1.9498188 | 0.0298478 | 0.1520833 | 0.0727609 | 0.0554 |
| | RCP | n/a | n/a | n/a | n/a | n/a |
| | MMH | 11.564855 | -0.041522 | 0.325 | 0.2738261 | 0.0208 |
| | TNMCM | 9.9615942 | 0.1302391 | 0.9145833 | 0.0986739 | 0.1551 |
| | MC | 83.40942 | -0.060587 | -1.672917 | -0.066152 | 0.4433 |

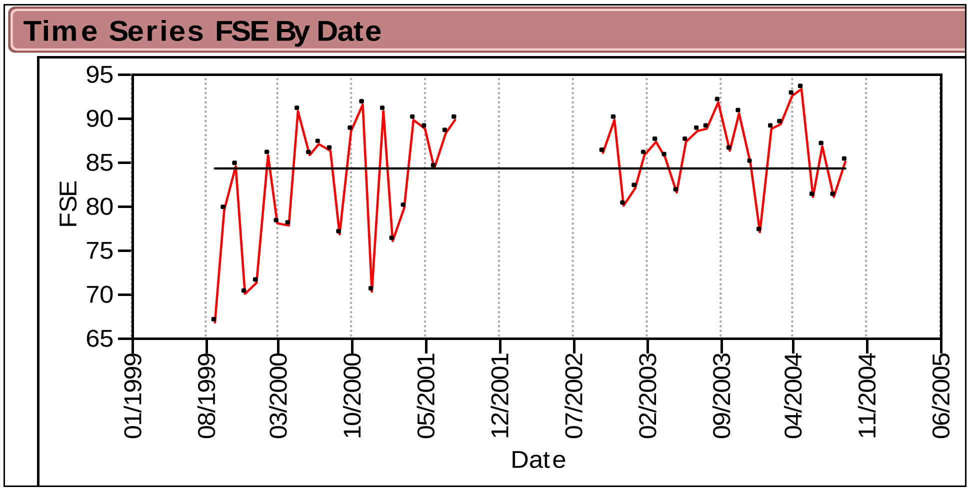
## Appendix J - Time Series Plots

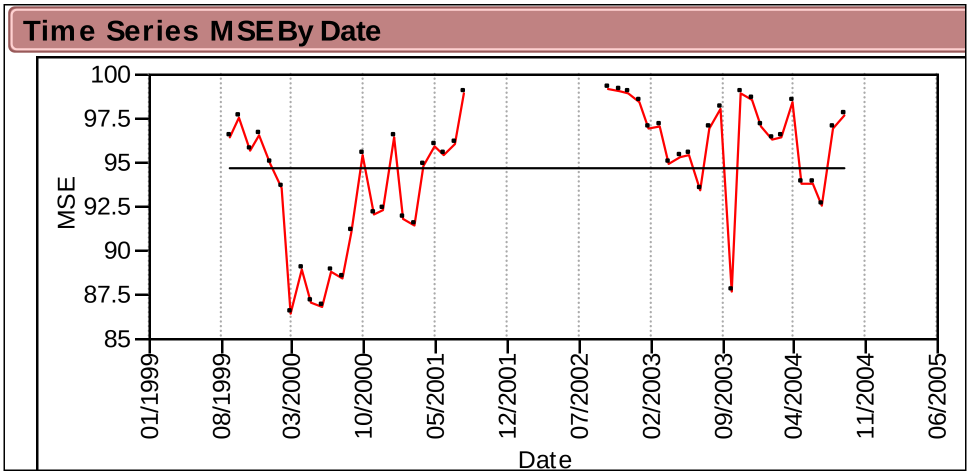
20FW:

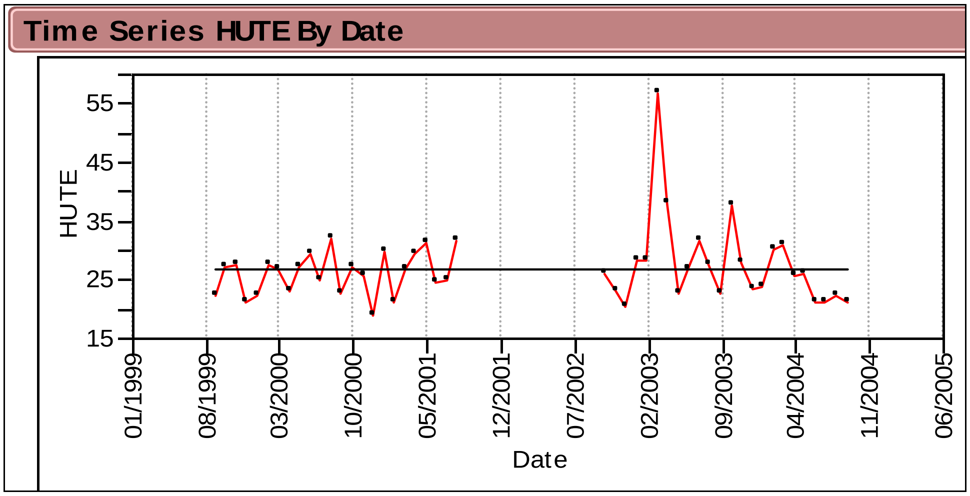


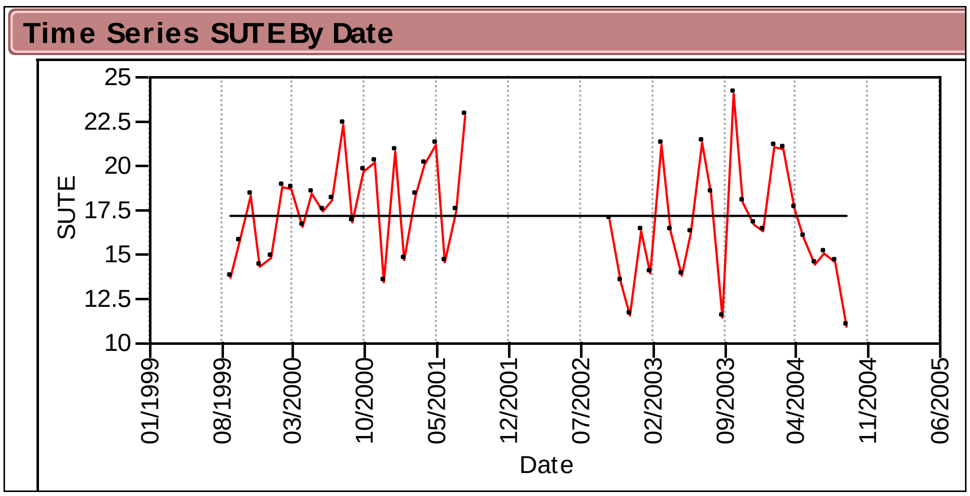



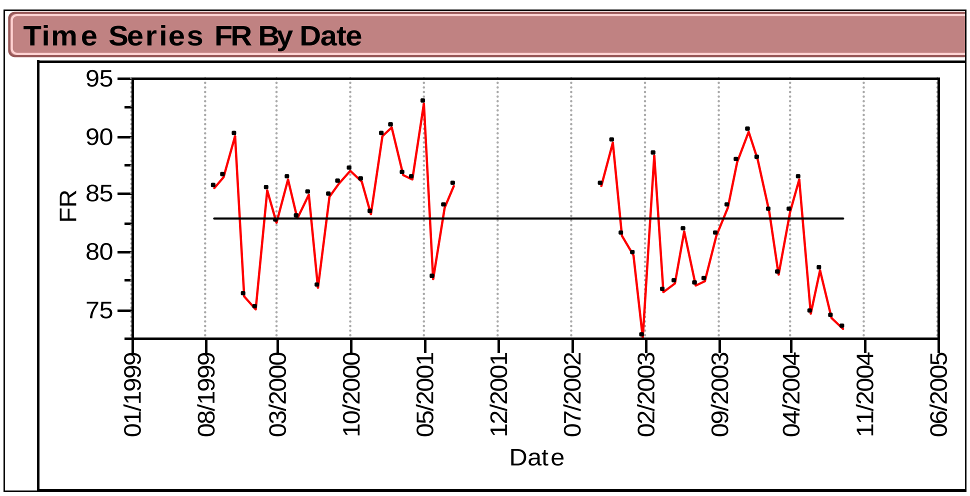

Time Series SFA By Date
SFA
1700
1500
1300
1100
900
700
01/1999
08/1999
03/2000
10/2000
05/2001
12/2001
07/2002
02/2003
09/2003
04/2004
11/2004
06/2005
Date

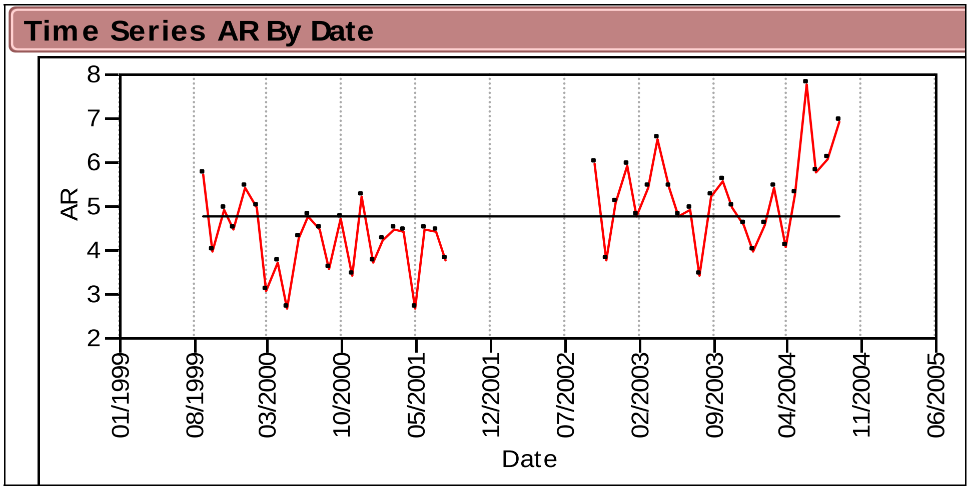

Time Series FSE By Date
FSE
95
90
85
80
75
70
65
01/1999
08/1999
03/2000
10/2000
05/2001
12/2001
07/2002
02/2003
09/2003
04/2004
11/2004
06/2005
Date


Time Series MSE By Date
MSE
100
97.5
95
92.5
90
87.5
85
01/1999
08/1999
03/2000
10/2000
05/2001
12/2001
07/2002
02/2003
09/2003
04/2004
11/2004
06/2005
Date


Time Series HUTE By Date
HUTE
55
45
35
25
15
01/1999
08/1999
03/2000
10/2000
05/2001
12/2001
07/2002
02/2003
09/2003
04/2004
11/2004
06/2005
Date


Time Series SUTE By Date
SUTE
25
22.5
20
17.5
15
12.5
10
01/1999
08/1999
03/2000
10/2000
05/2001
12/2001
07/2002
02/2003
09/2003
04/2004
11/2004
06/2005
Date


Time Series FR By Date
FR
95
90
85
80
75
01/1999
08/1999
03/2000
10/2000
05/2001
12/2001
07/2002
02/2003
09/2003
04/2004
11/2004
06/2005
Date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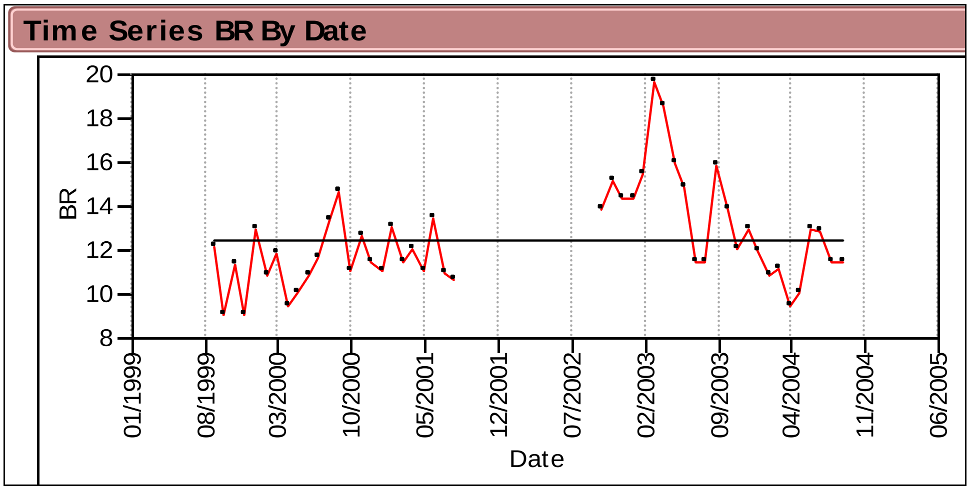
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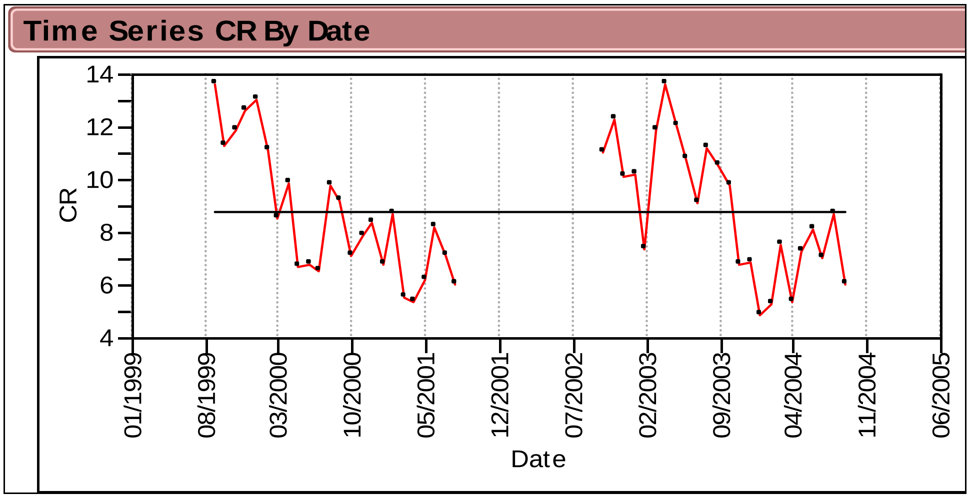
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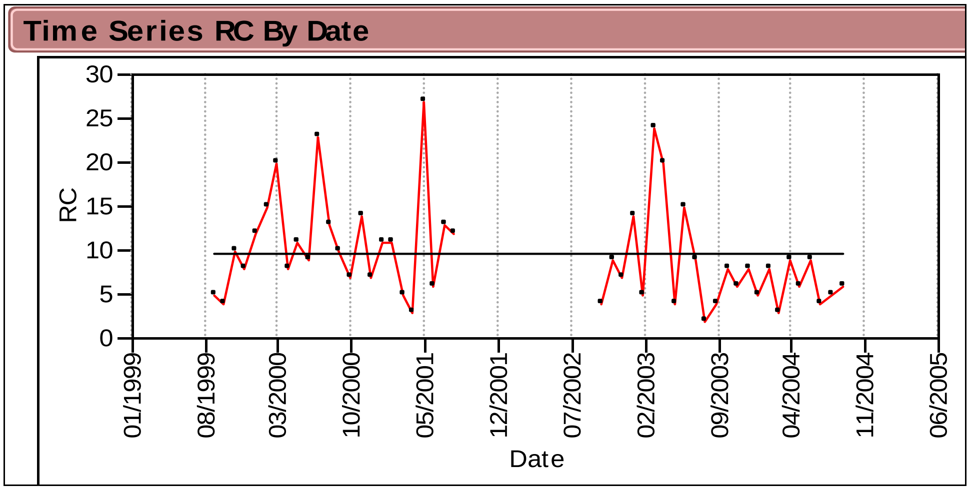
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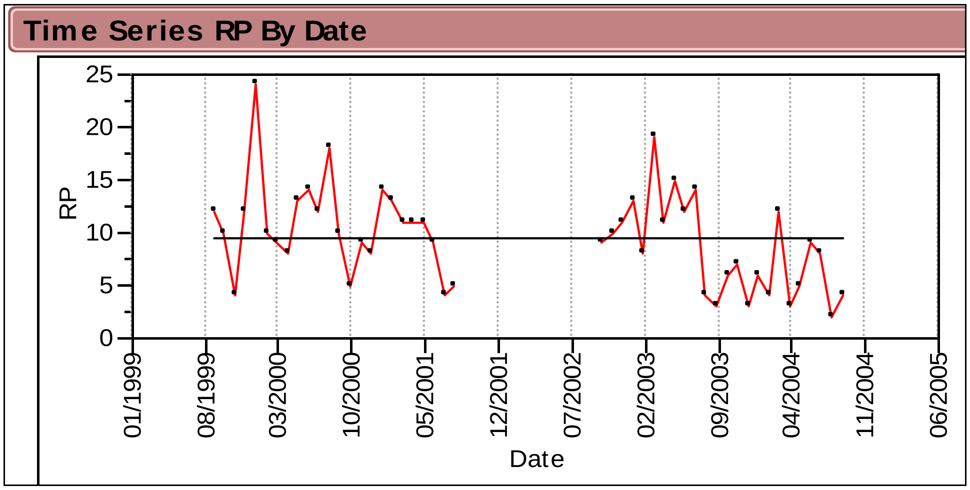
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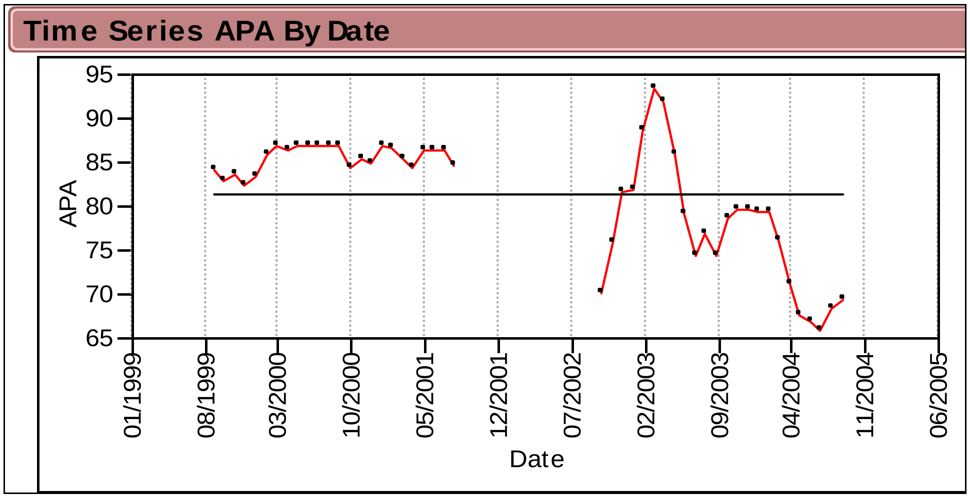
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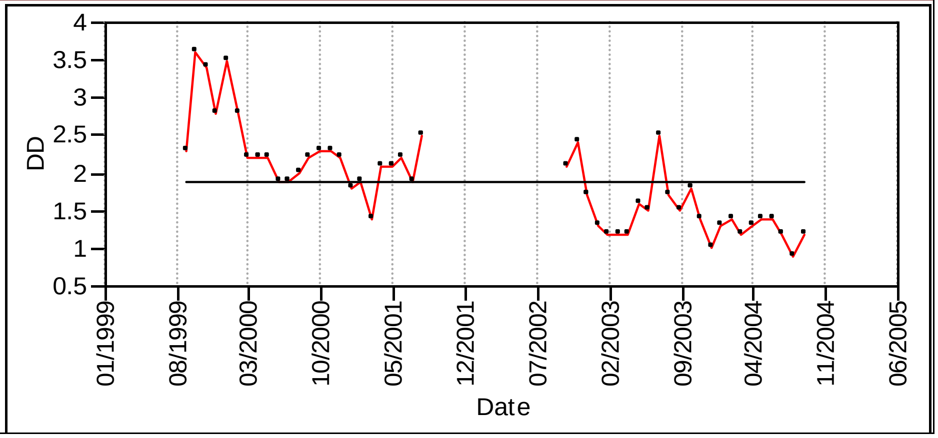
06/2005
Date

**Time Series DD By Date**

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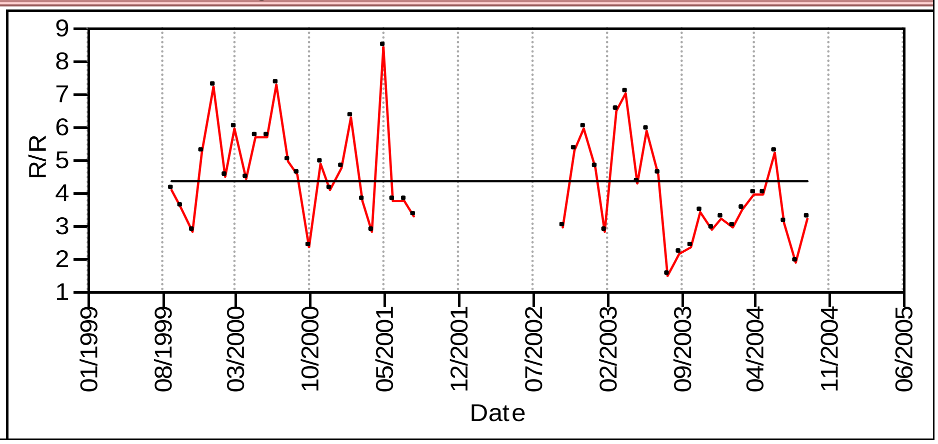


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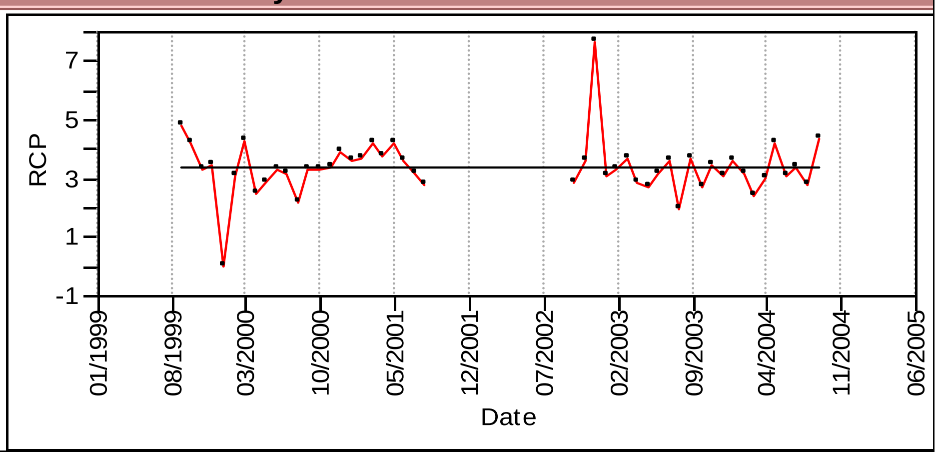

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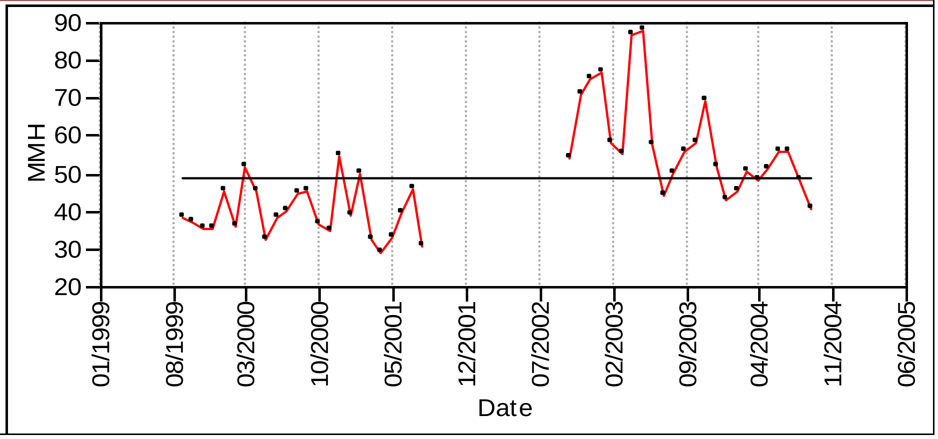


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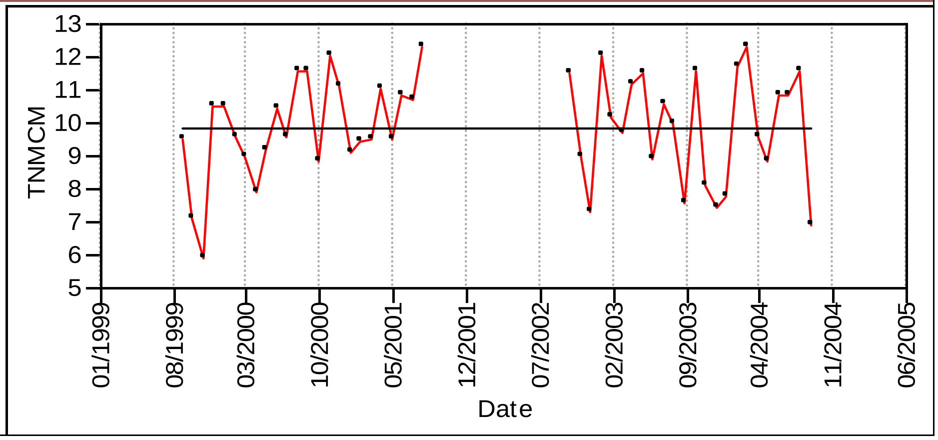


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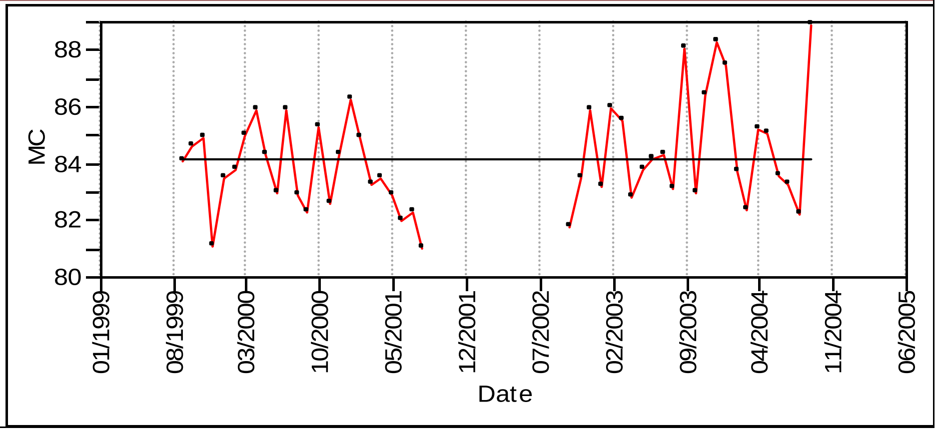

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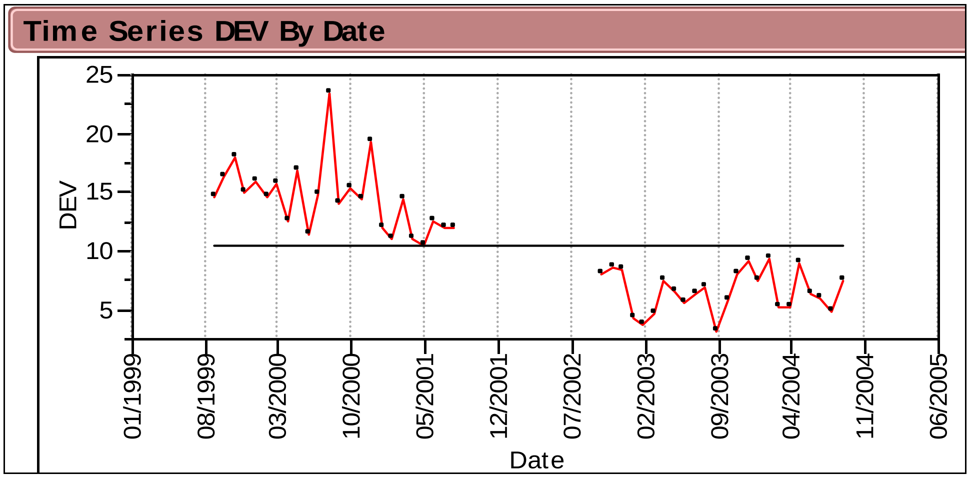

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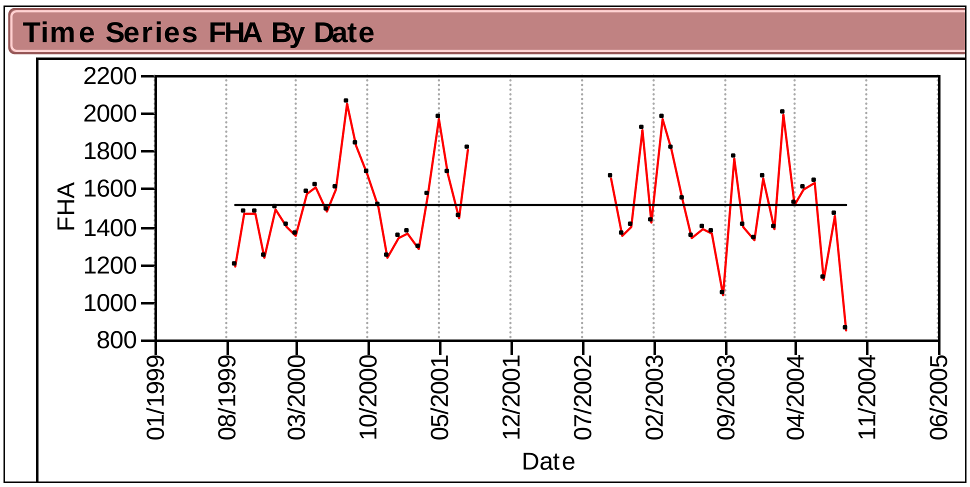
09/2003
04/2004
11/2004
06/2005
Date

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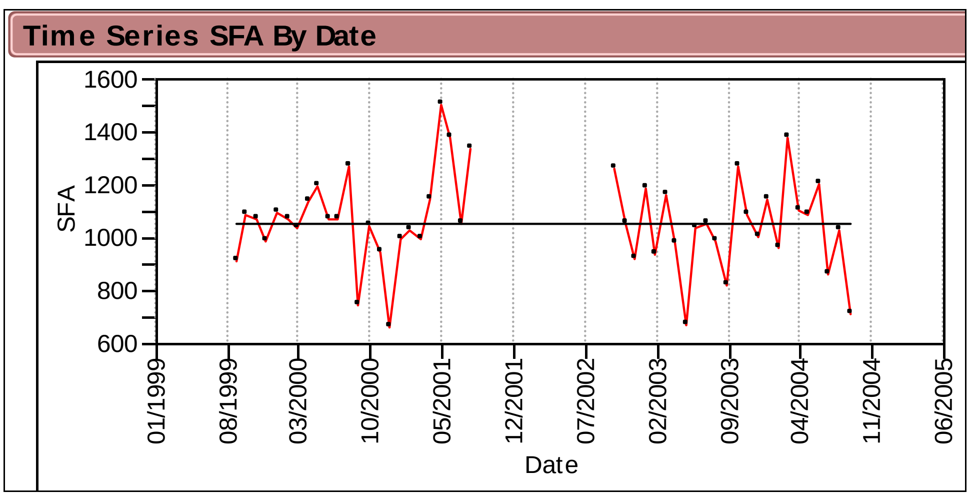
06/2005
Date

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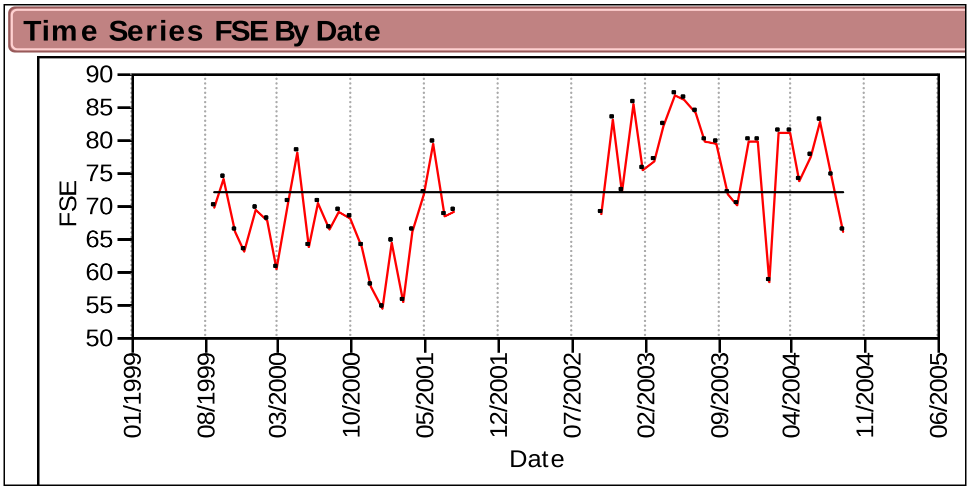
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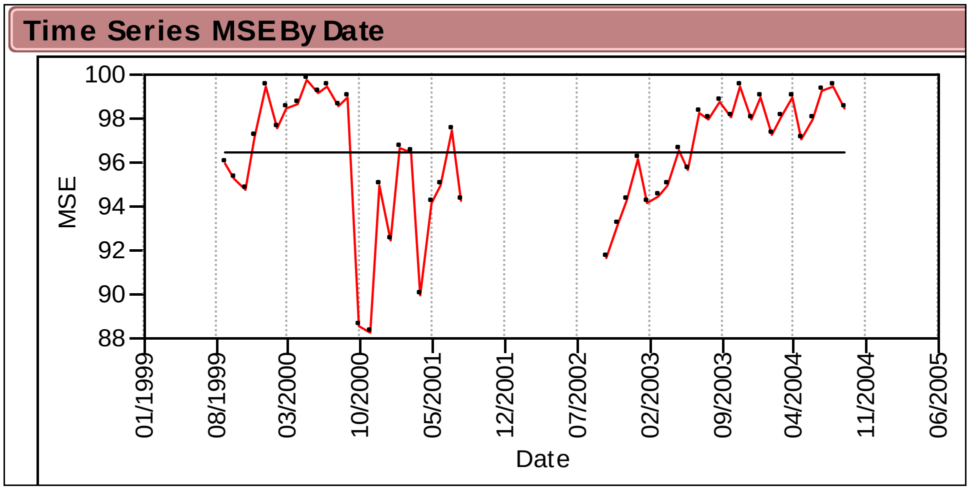
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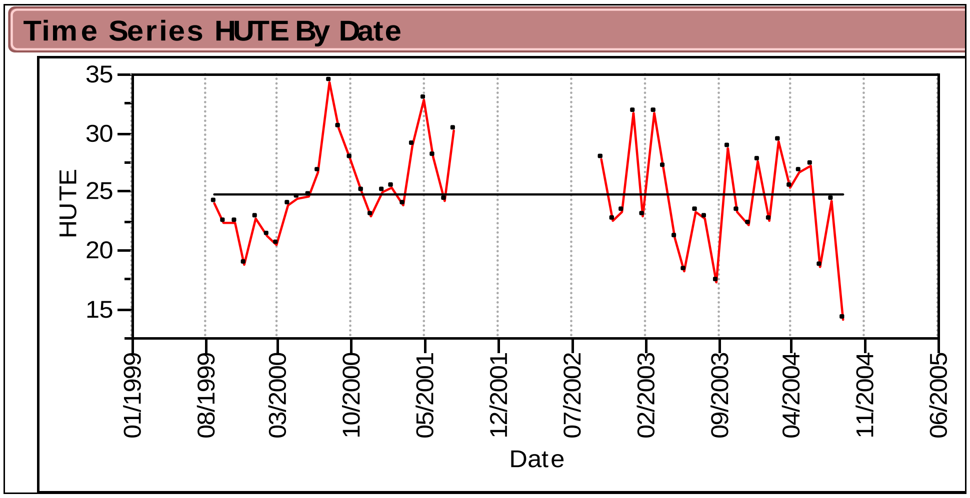
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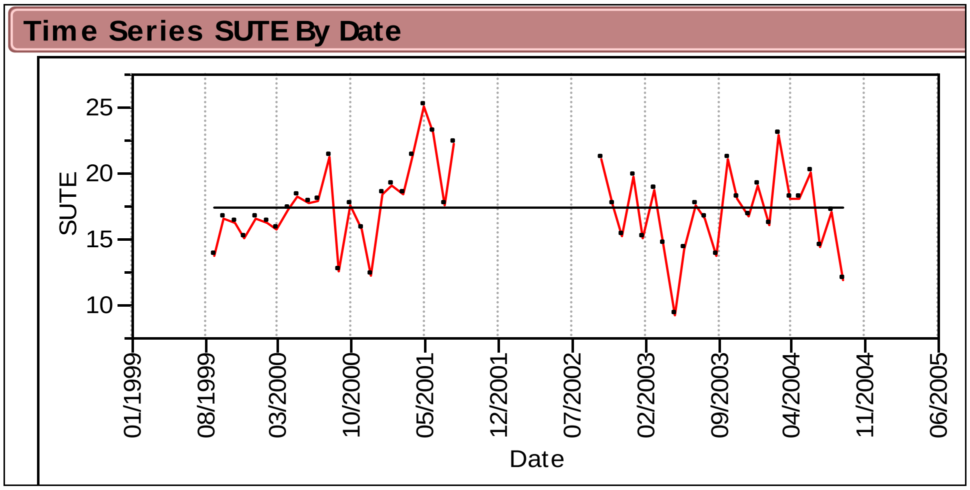
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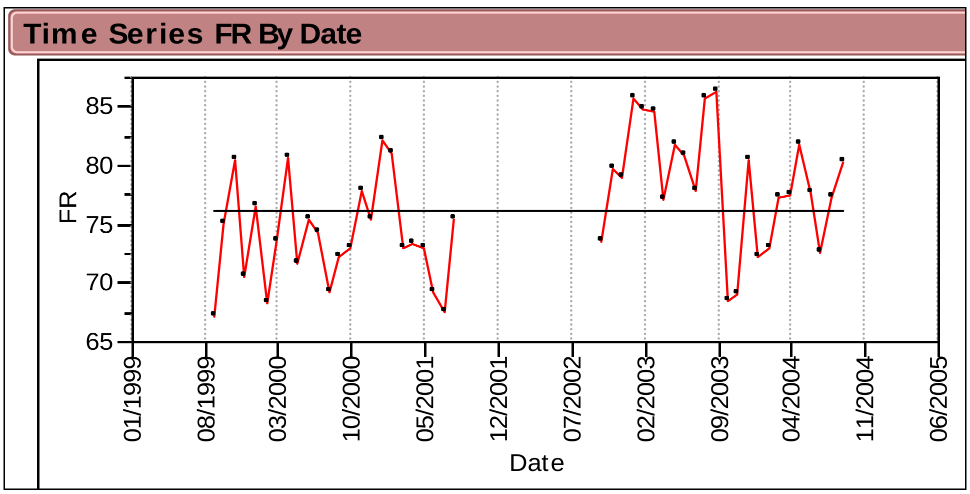
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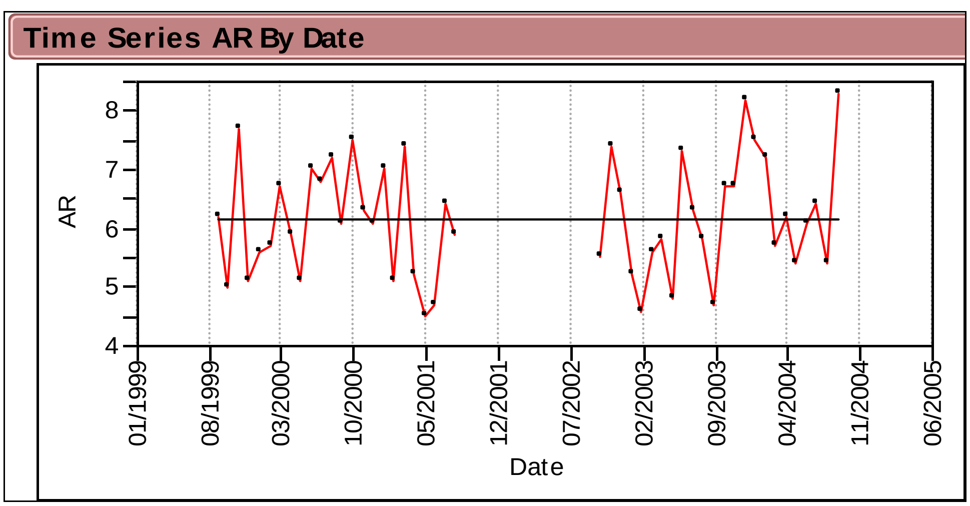
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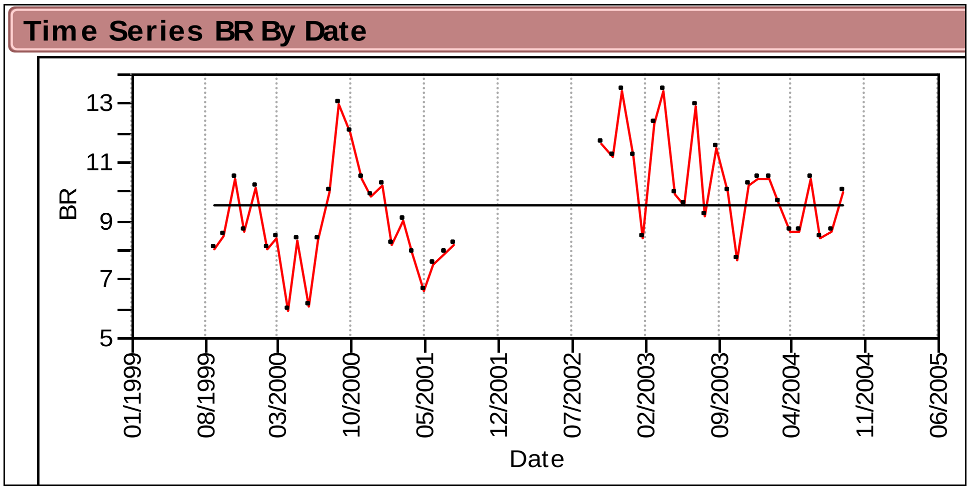

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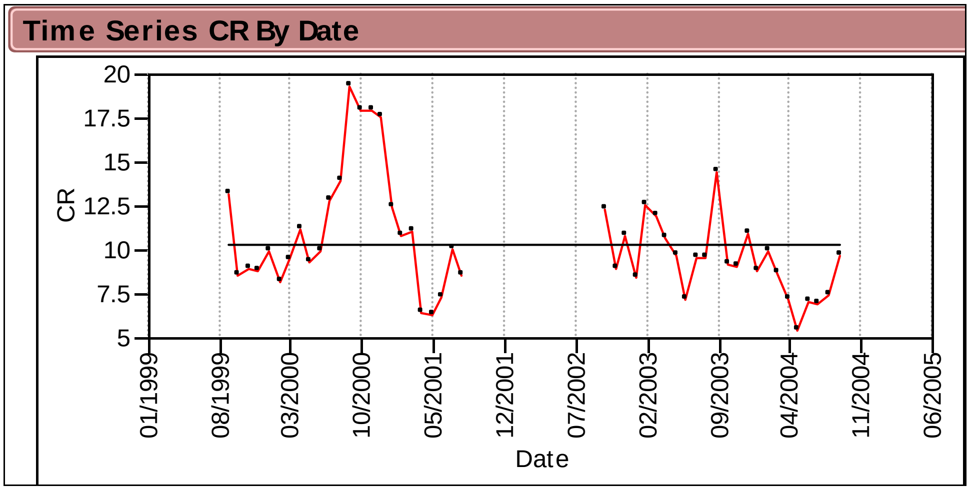

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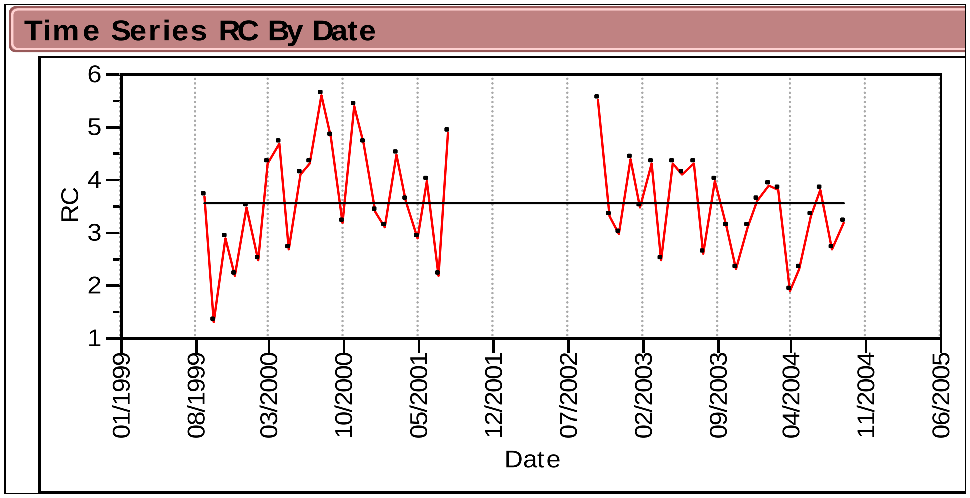

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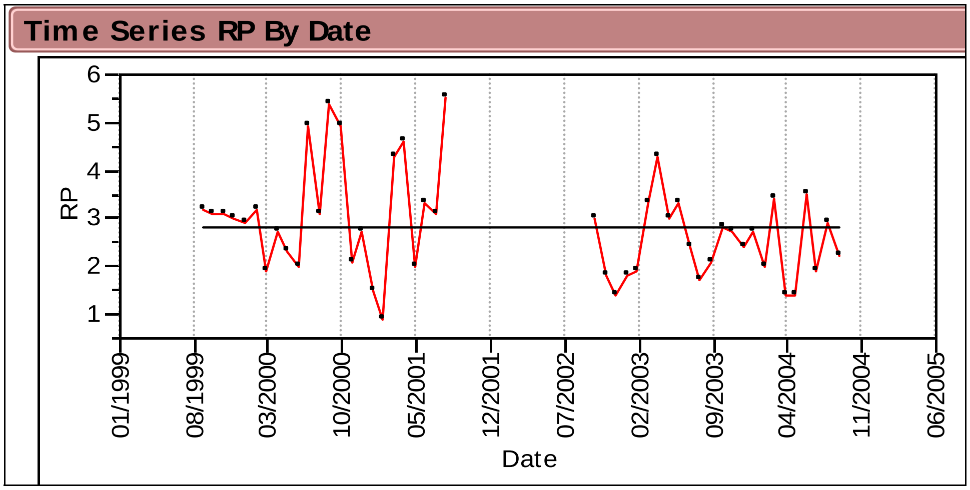
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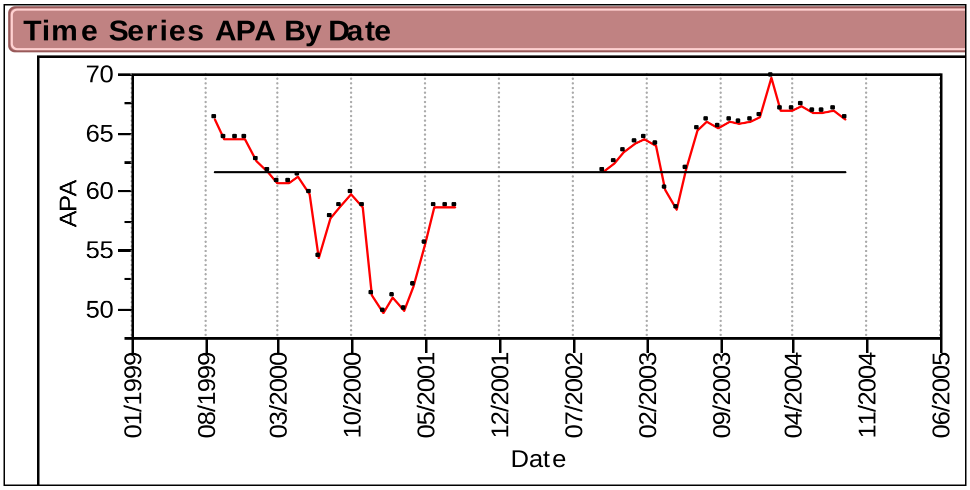
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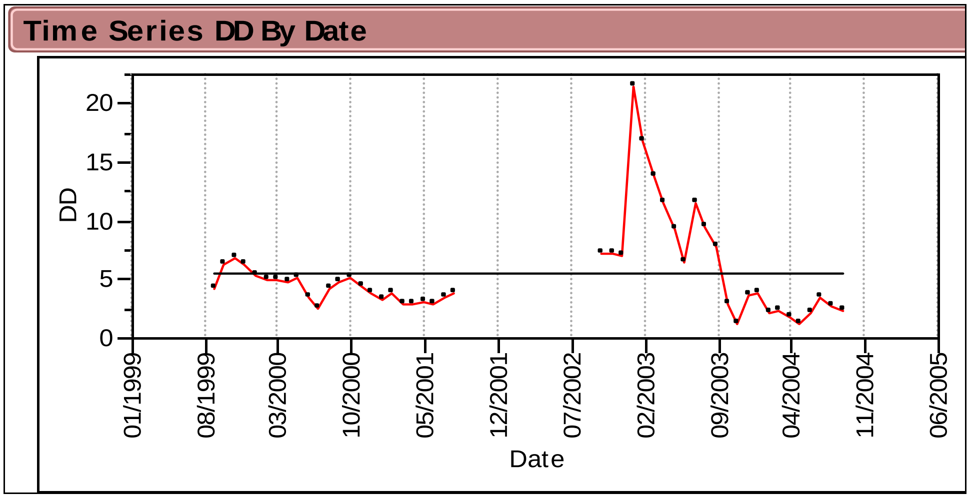
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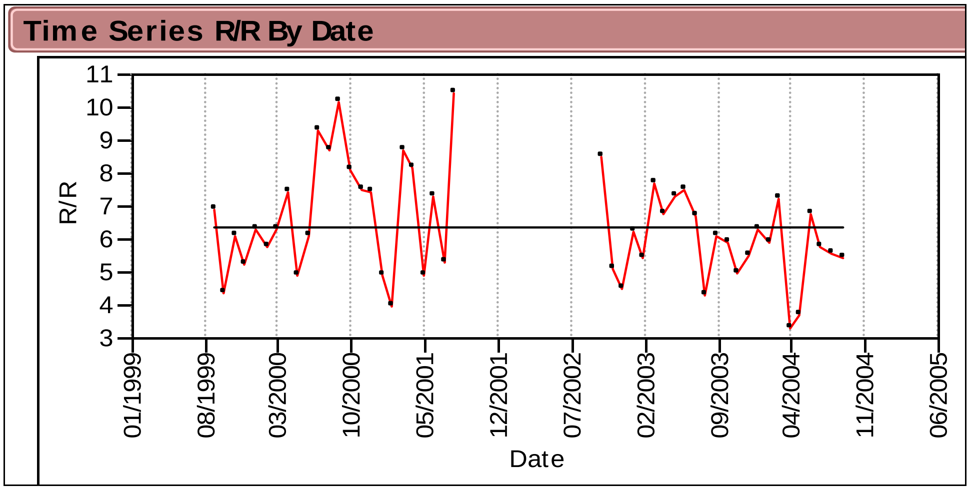

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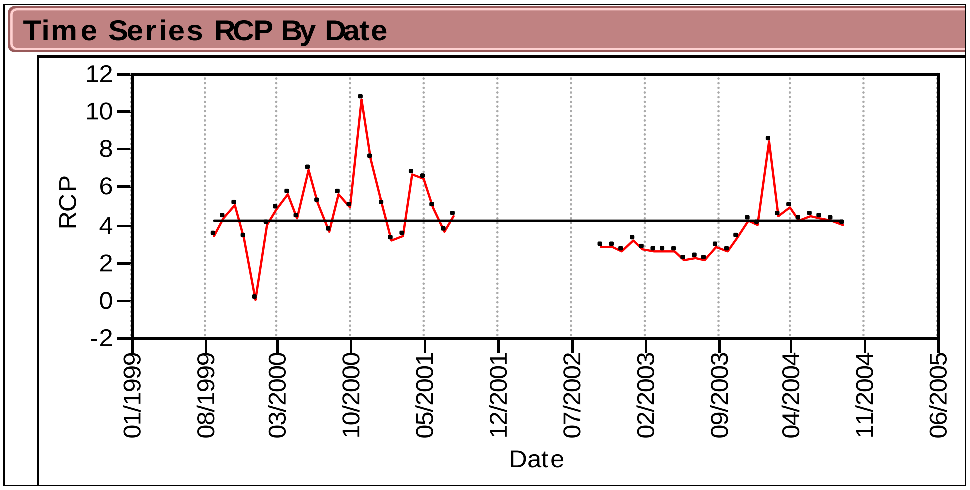

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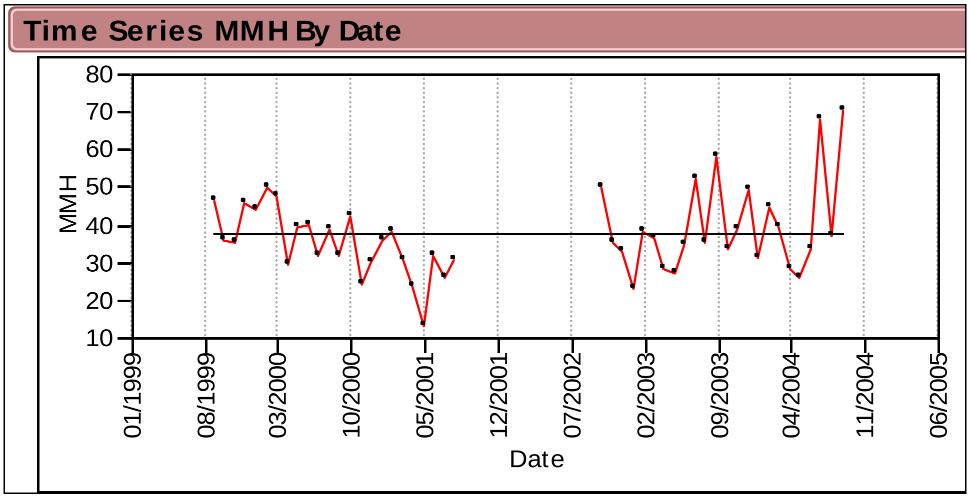

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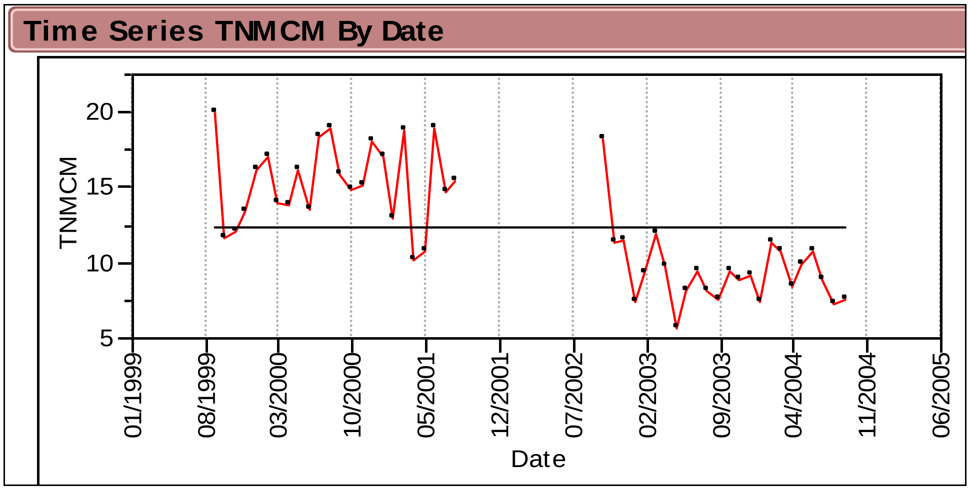
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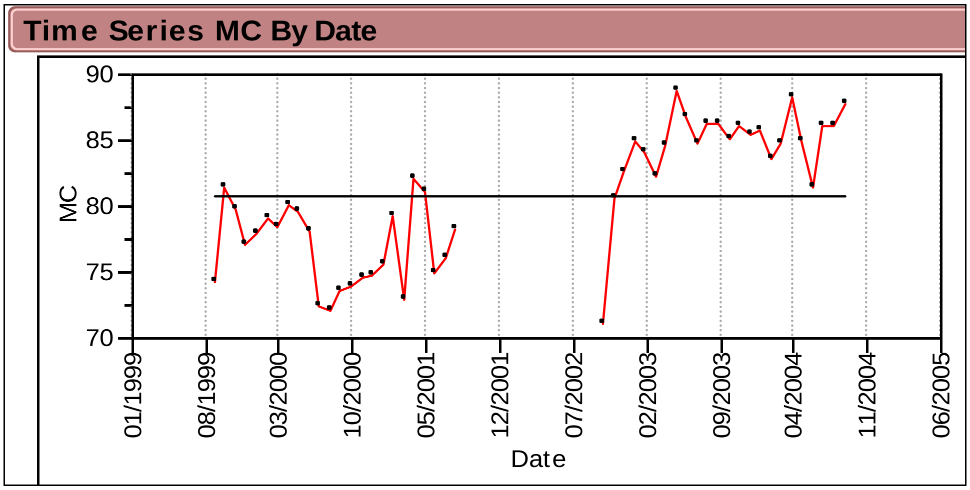
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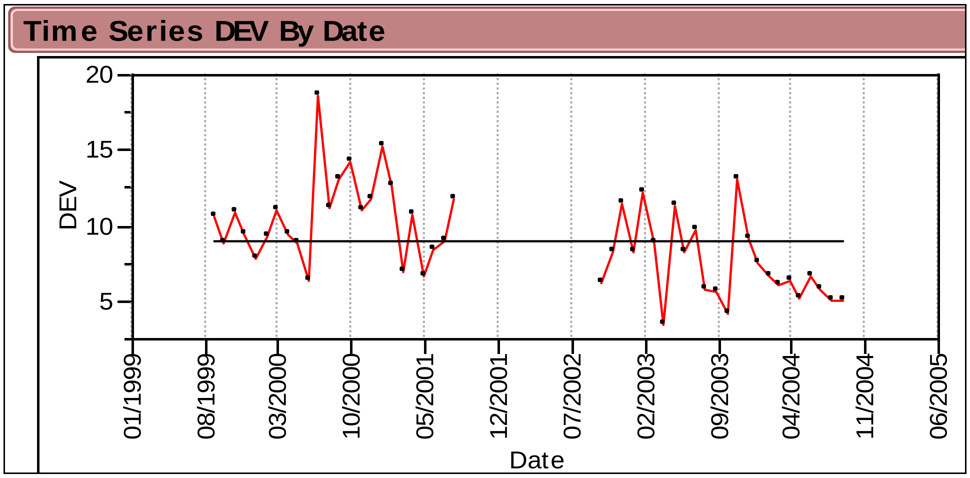
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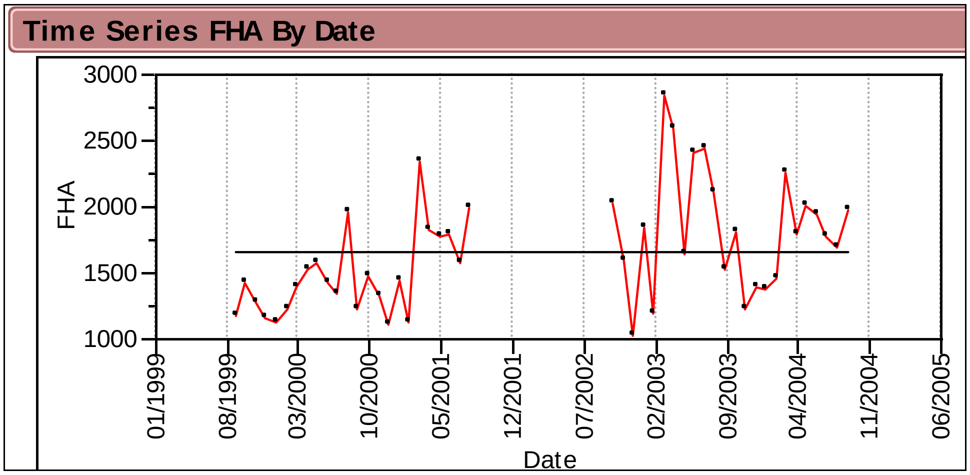
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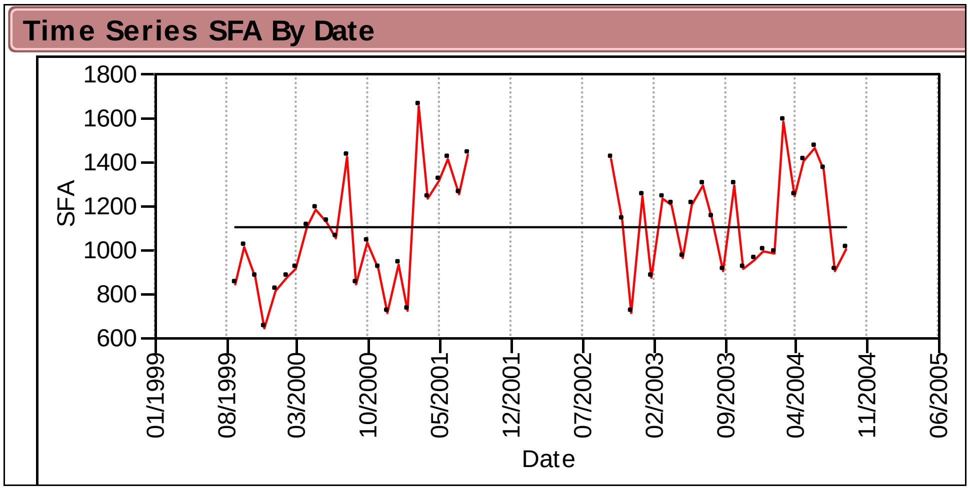
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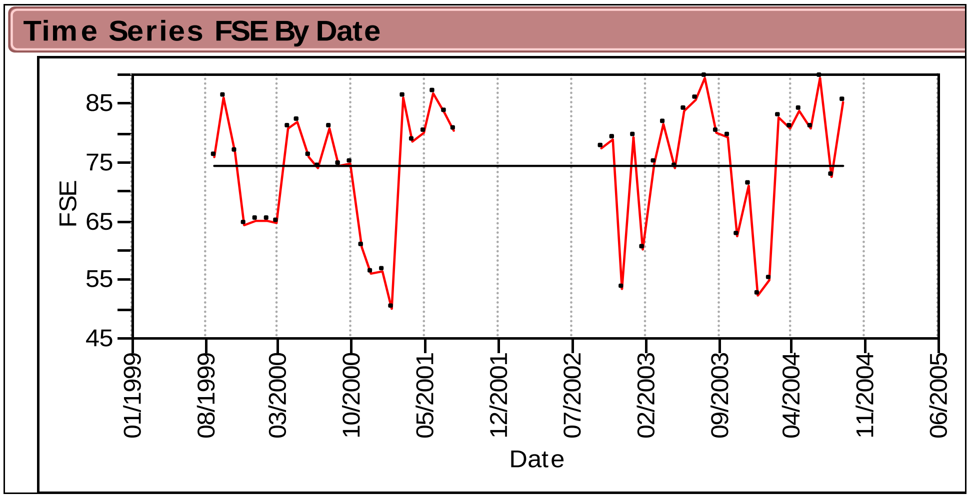
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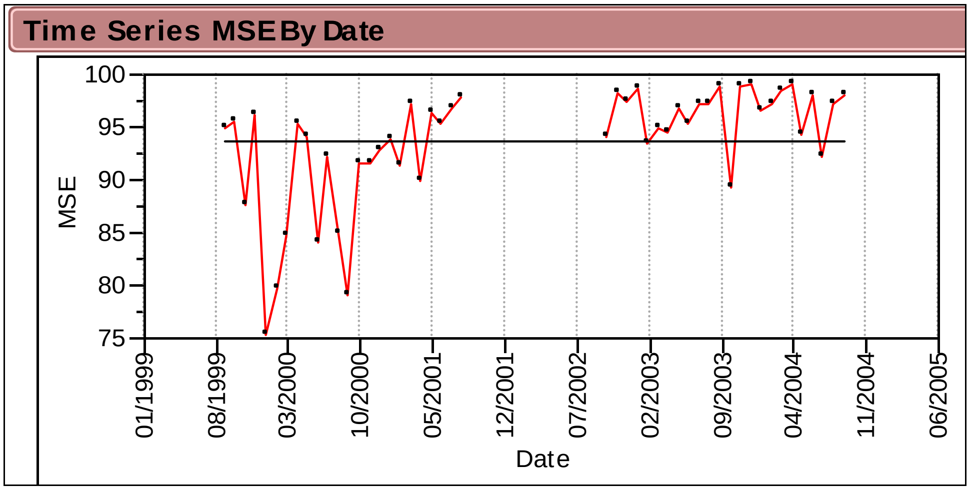
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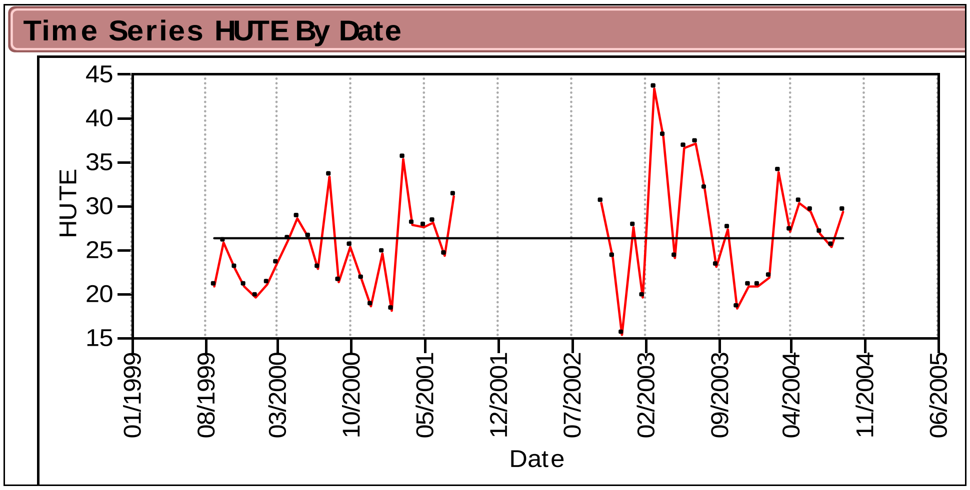
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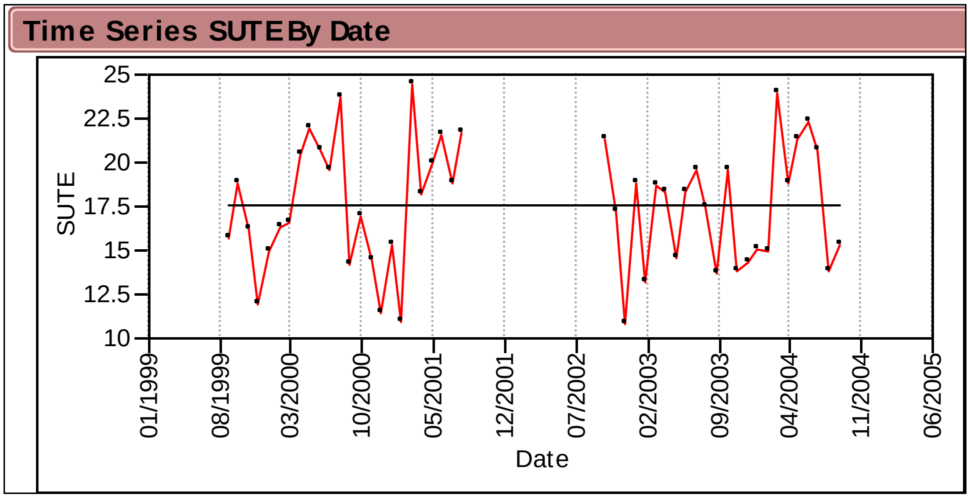
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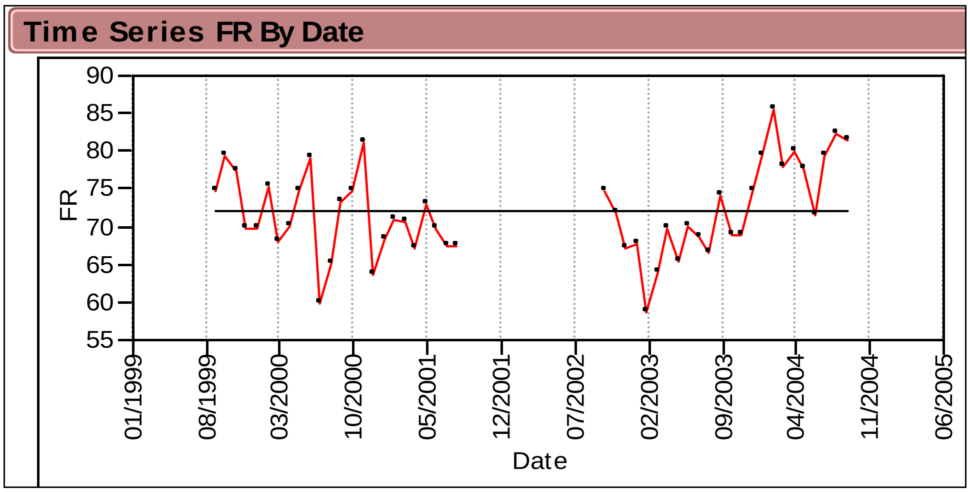
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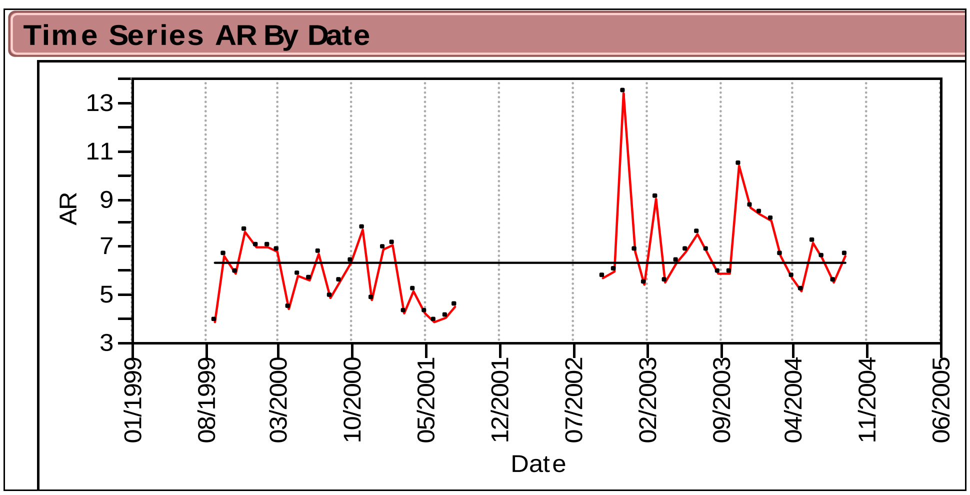
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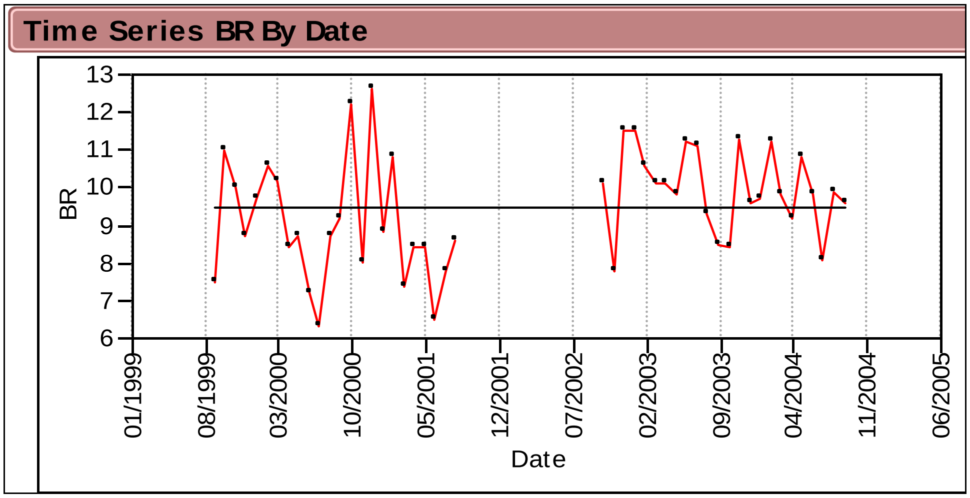
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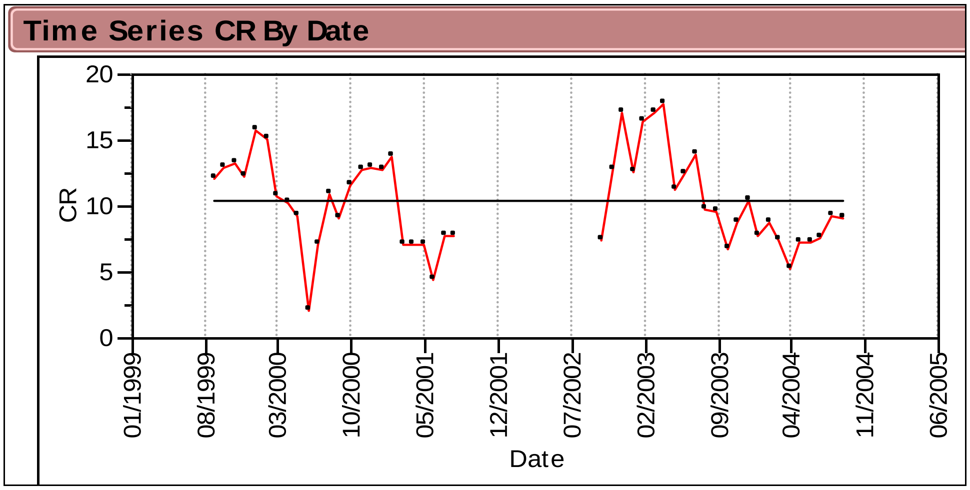
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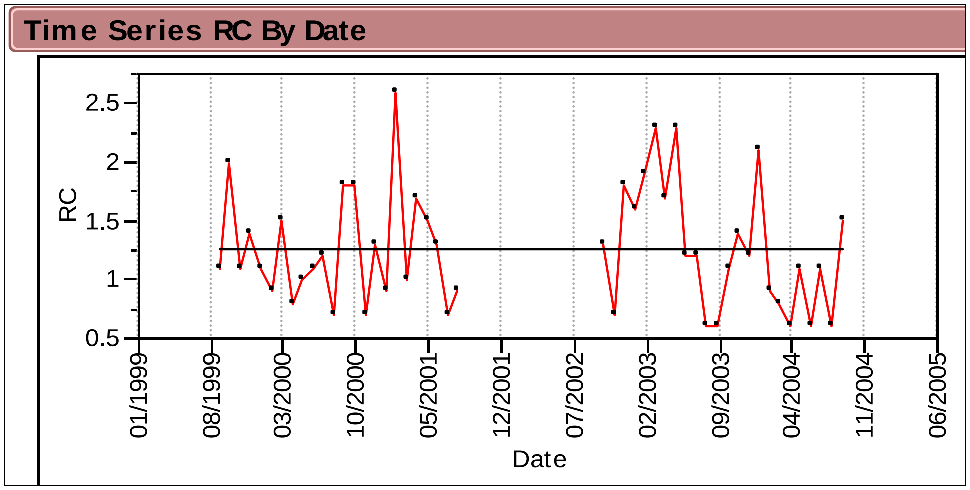
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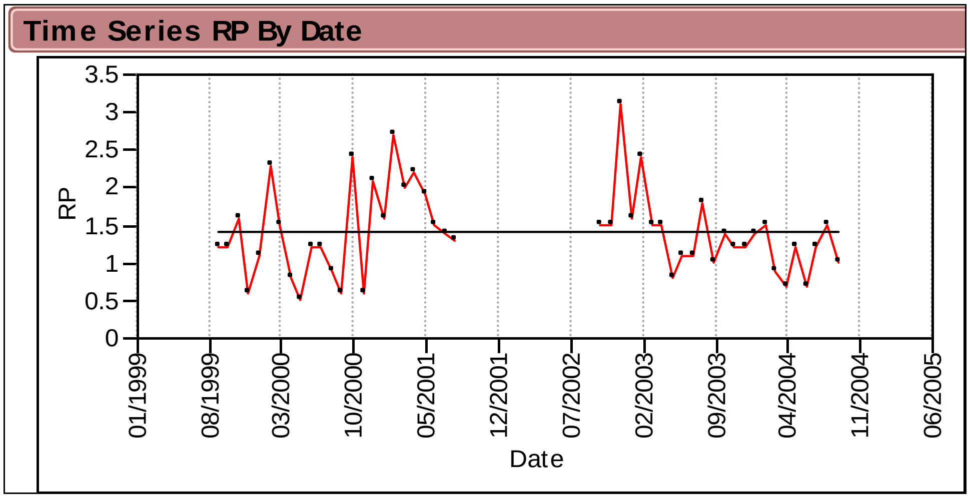
Date


Time Series RP By Date
RP
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0.5
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07/2002
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11/2004
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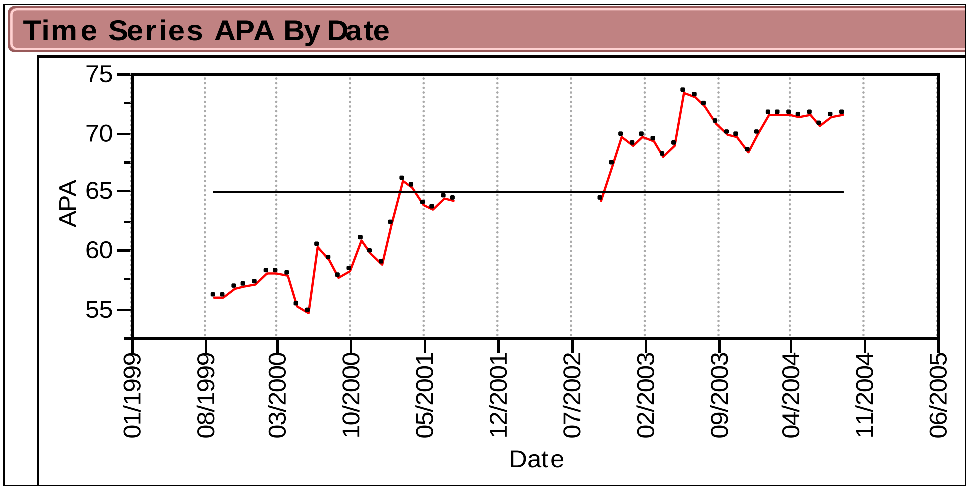
Date


Time Series APA By Date
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12/2001
07/2002
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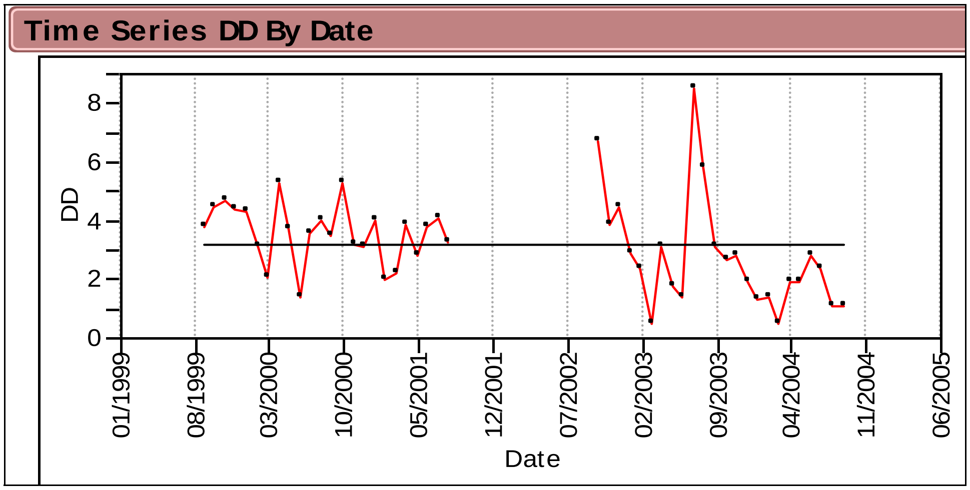
09/2003
04/2004
11/2004
06/2005
Date


Time Series DD By Date
DD
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12/2001
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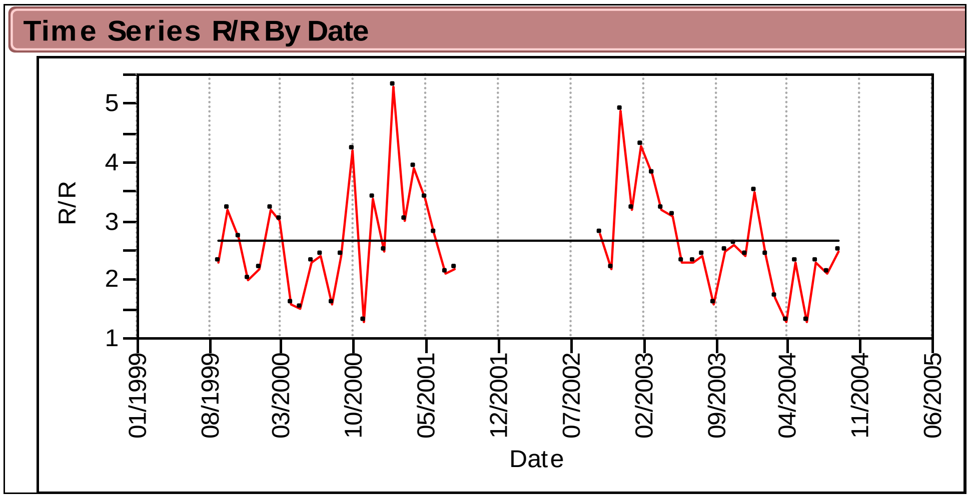
09/2003
04/2004
11/2004
06/2005
Date



Time Series R/R By Date
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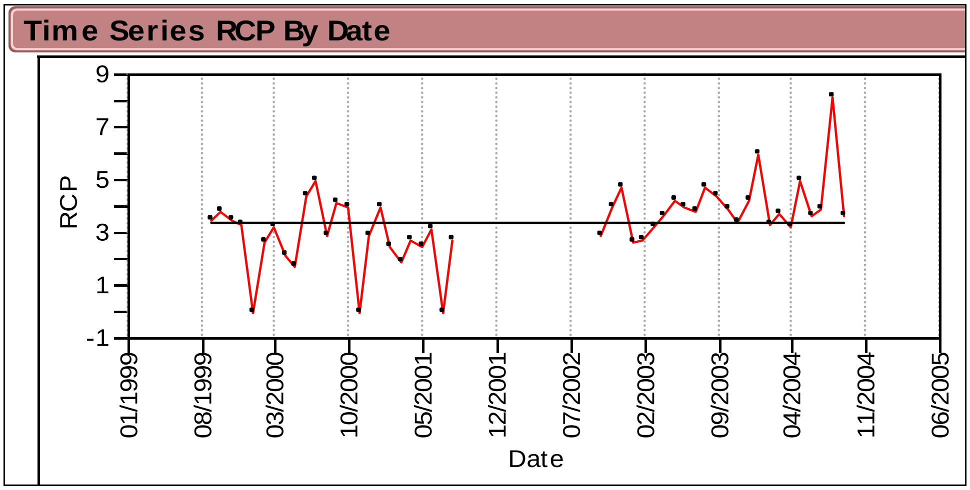
04/2004
11/2004
06/2005
Date

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RCP
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11/2004
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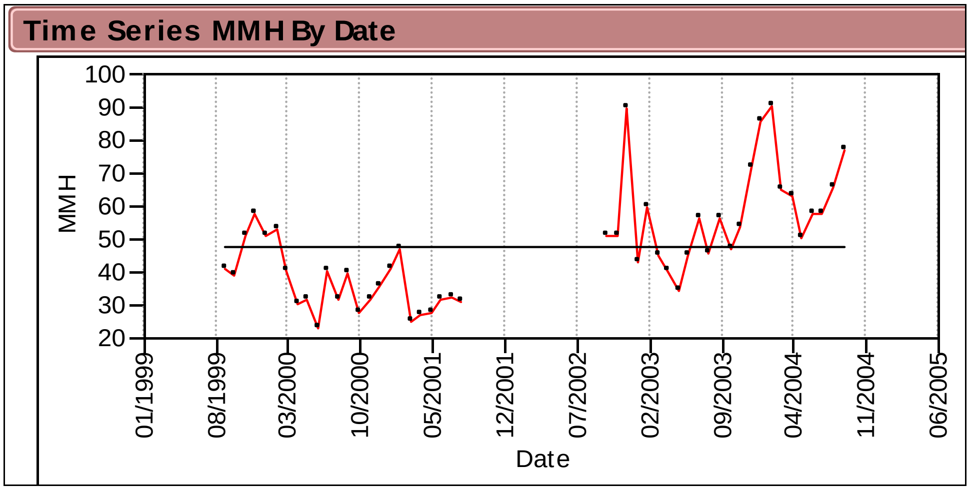
Date

Time Series MMH By Date
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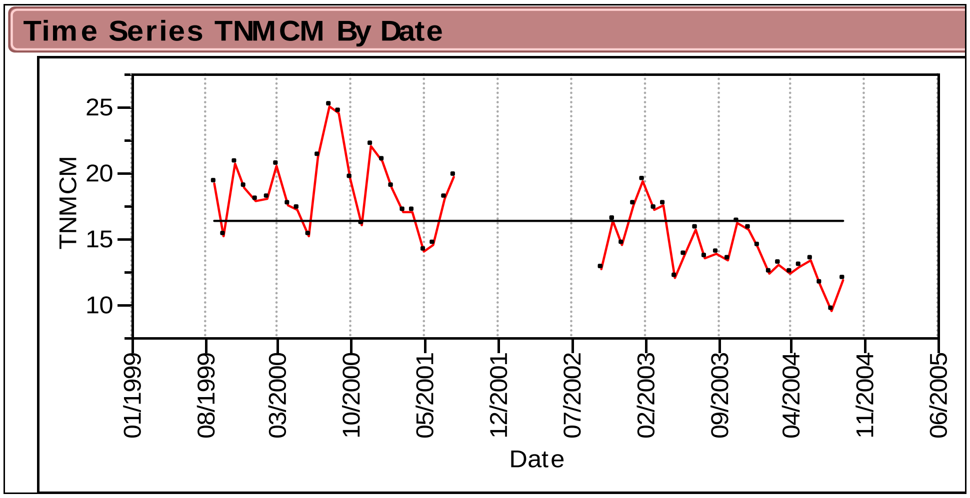
11/2004
06/2005
Date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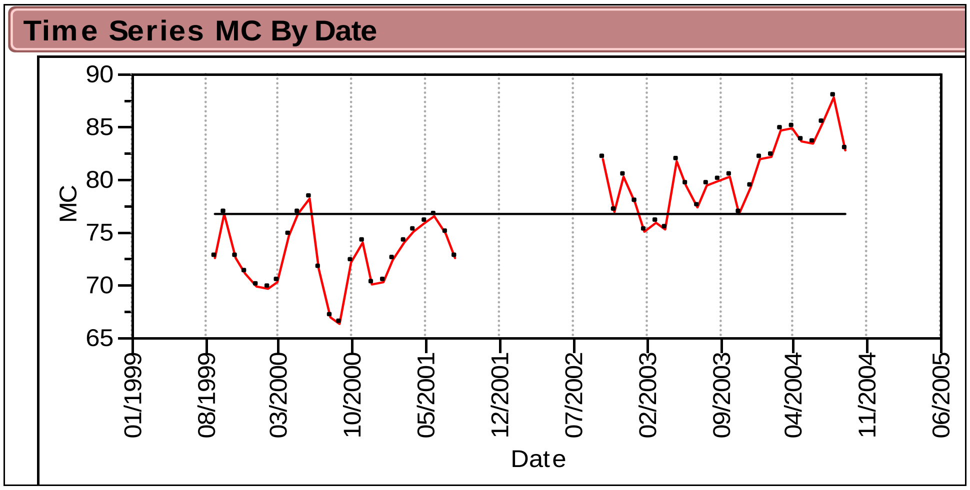
09/2003
04/2004
11/2004
06/2005
Date


Time Series MC By Date
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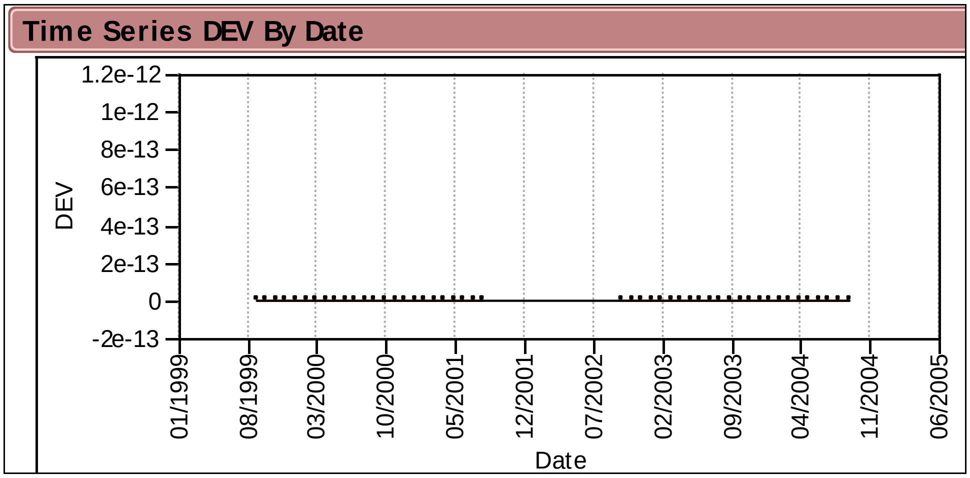
09/2003
04/2004
11/2004
06/2005
Date

22ARW:



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4e-13
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-2e-13
DEV
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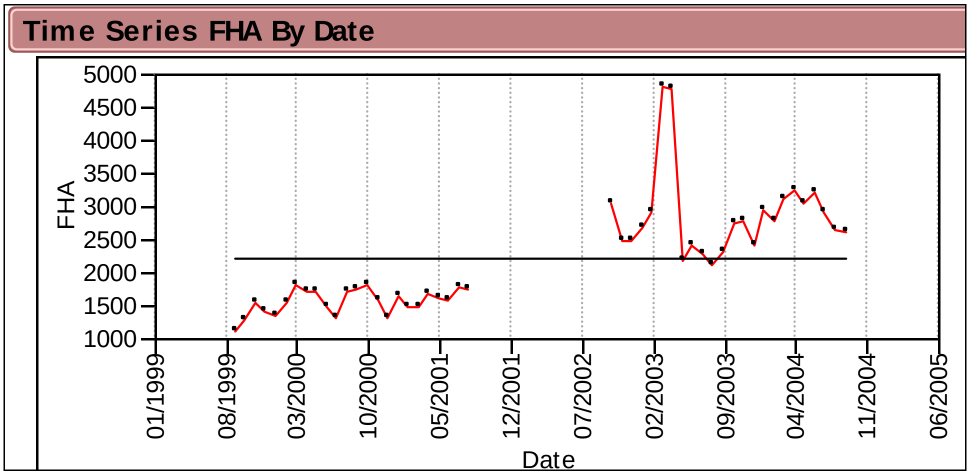
10/2000
05/2001
12/2001
07/2002
02/2003
09/2003
04/2004
11/2004
06/2005
Date

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2500
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1500
1000
FHA
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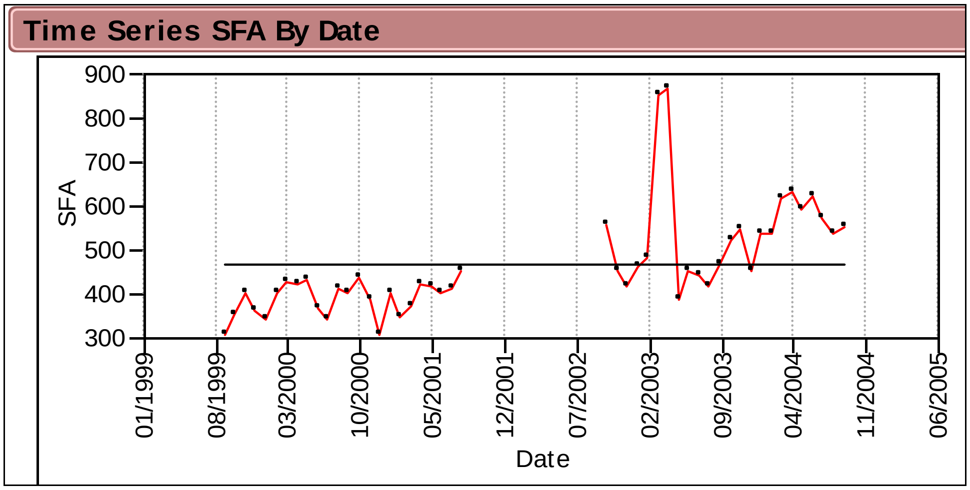
12/2001
07/2002
02/2003
09/2003
04/2004
11/2004
06/2005
Date

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300
SFA
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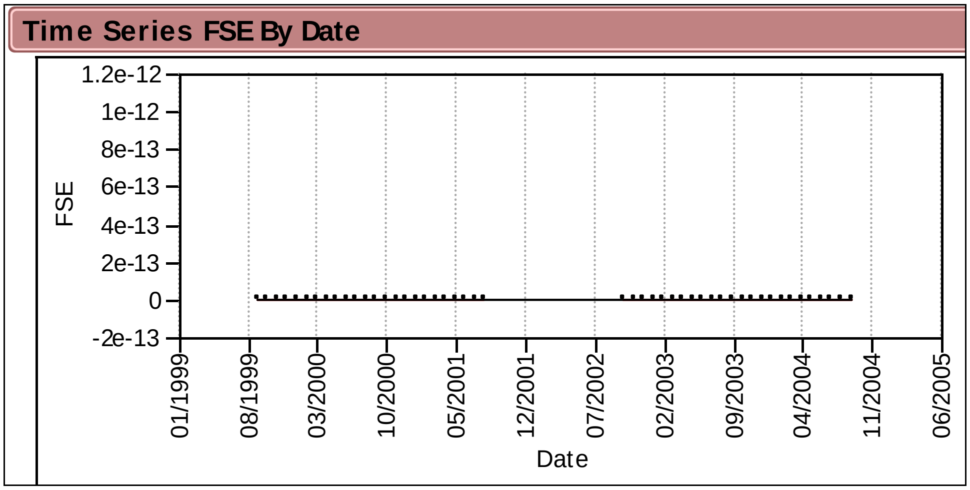
05/2001
12/2001
07/2002
02/2003
09/2003
04/2004
11/2004
06/2005
Date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8e-13
6e-13
4e-13
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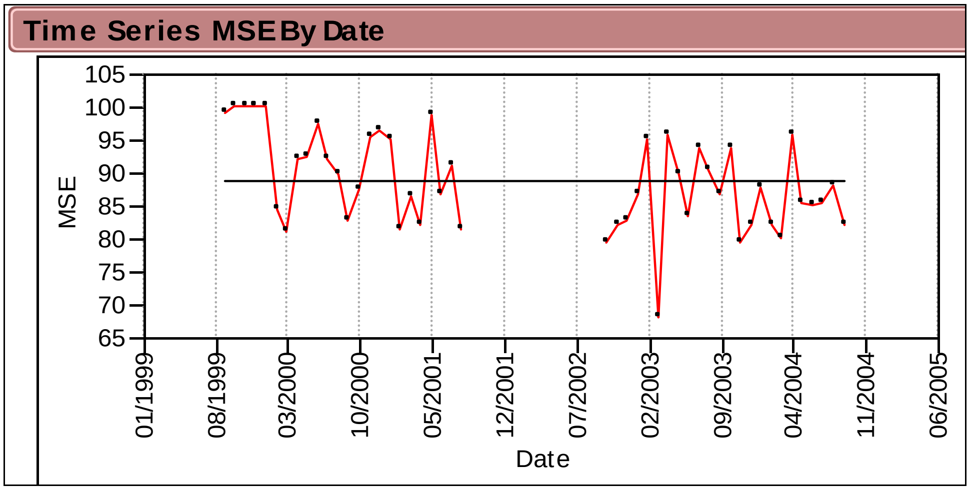
Date


Time Series MSE By Date
MSE
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65
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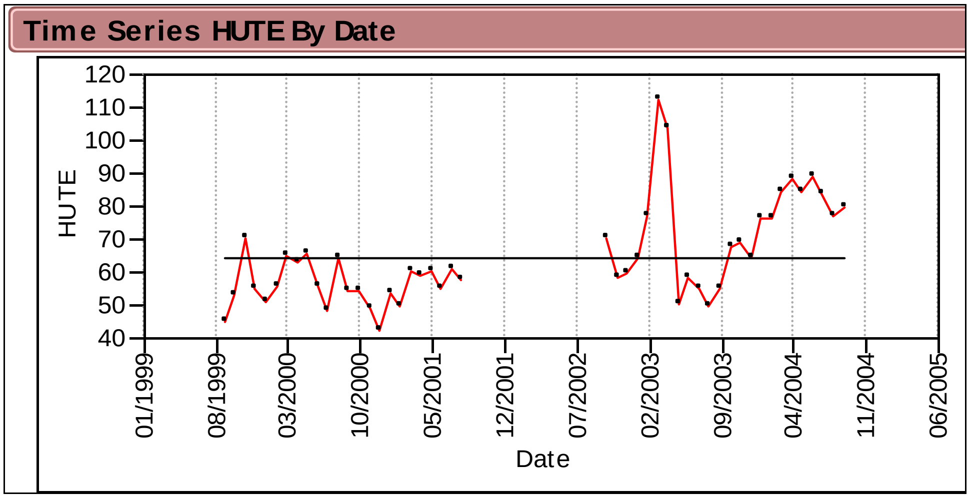
06/2005
Date


Time Series HUTE By Date
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40
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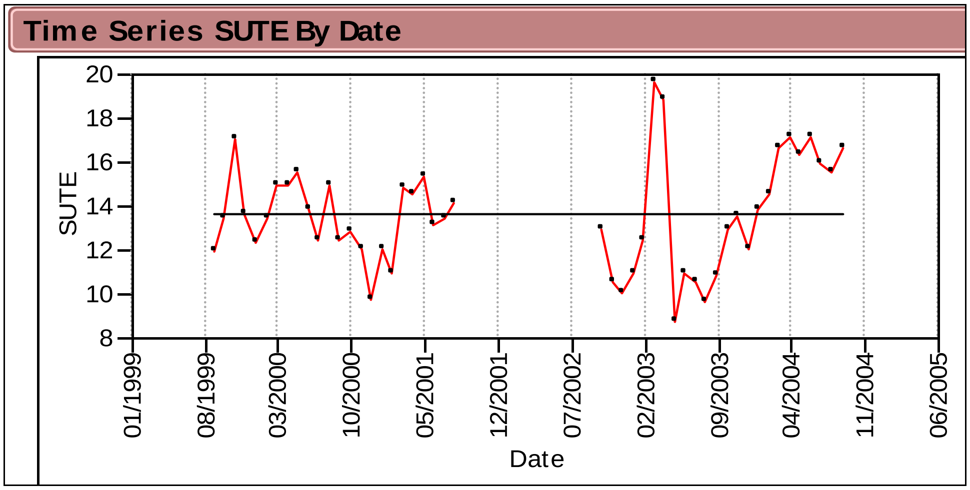
11/2004
06/2005
Date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8
SUTE
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09/2003
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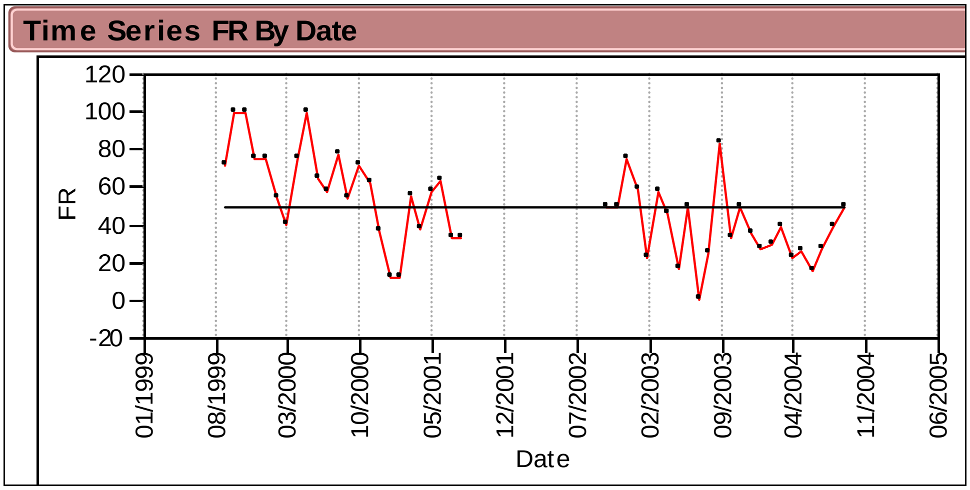
11/2004
06/2005
Date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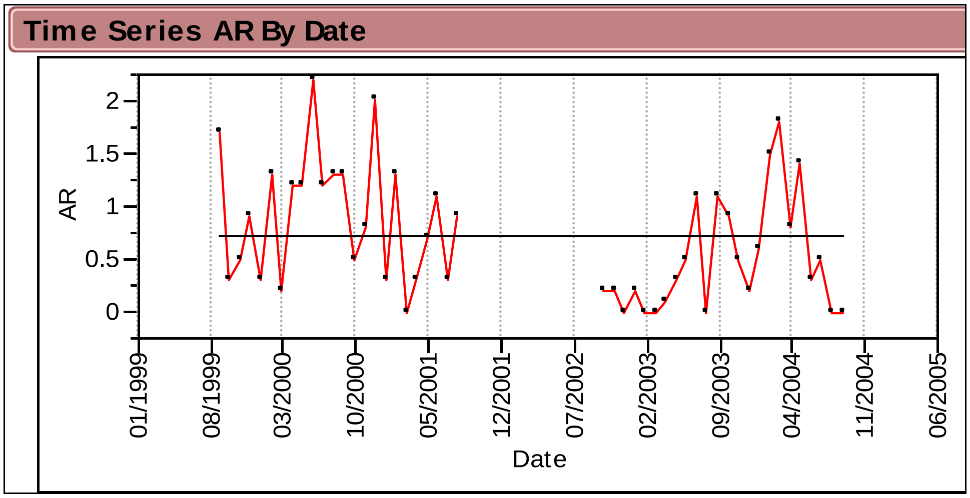
Date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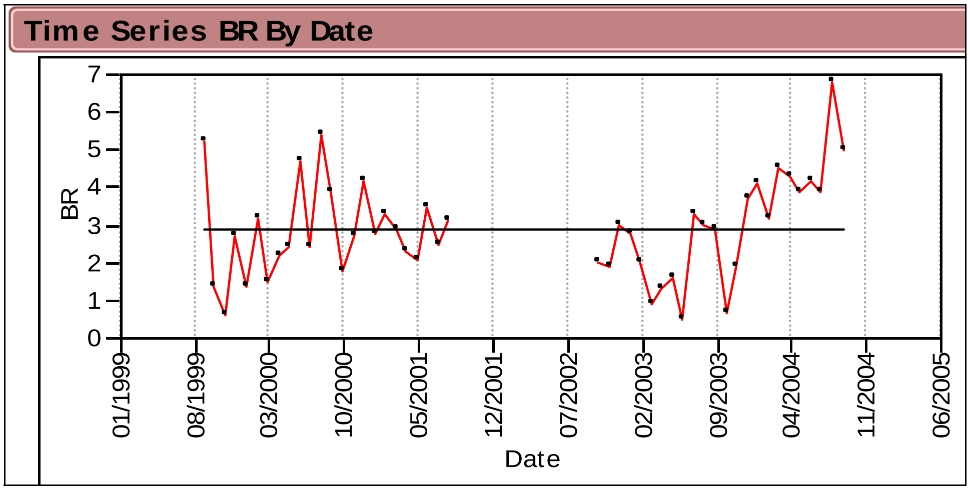
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BR
Date
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03/2000
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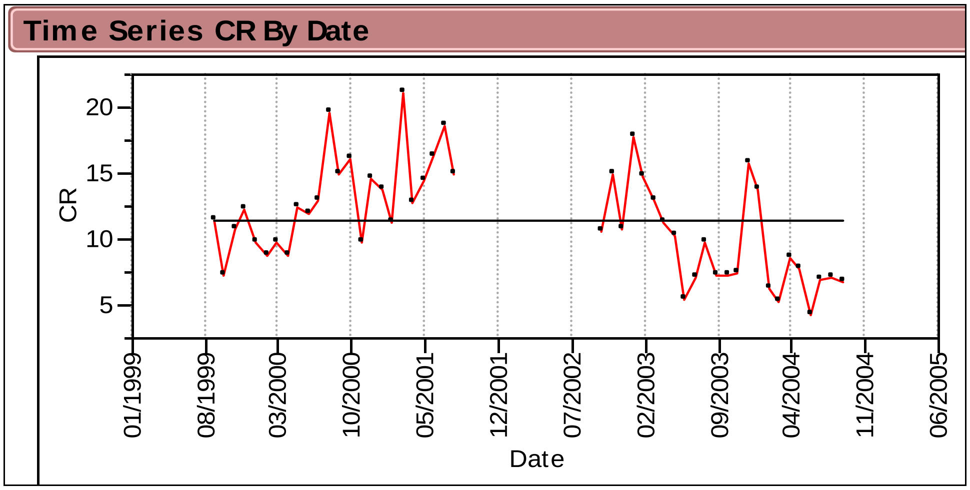
04/2004
11/2004
06/2005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CR
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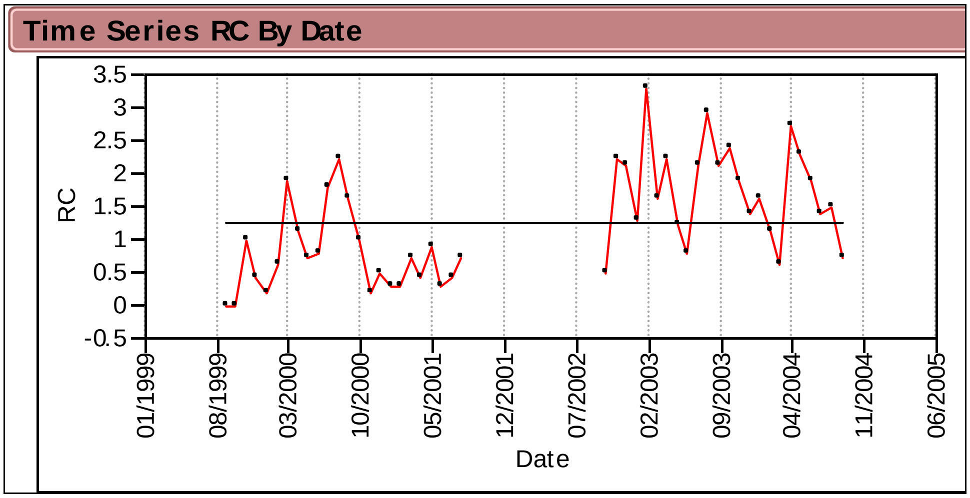
11/2004
06/2005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1.5
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3.5
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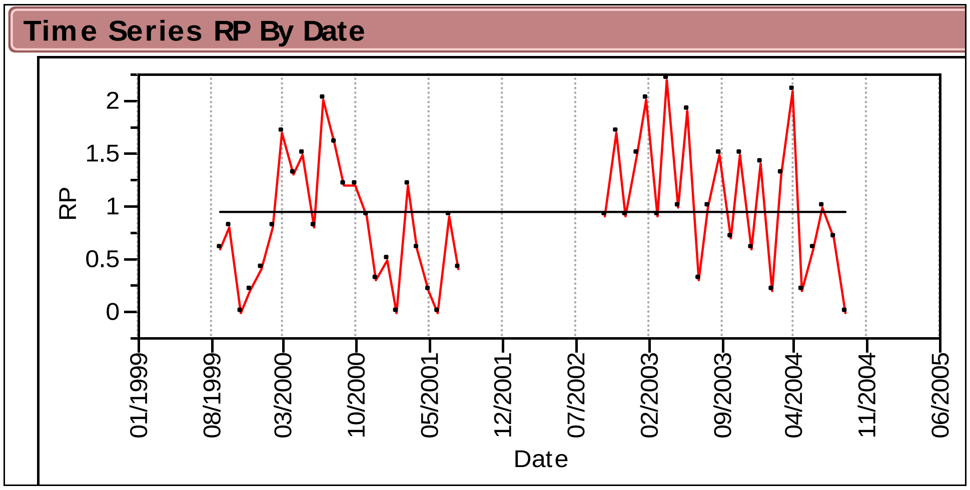
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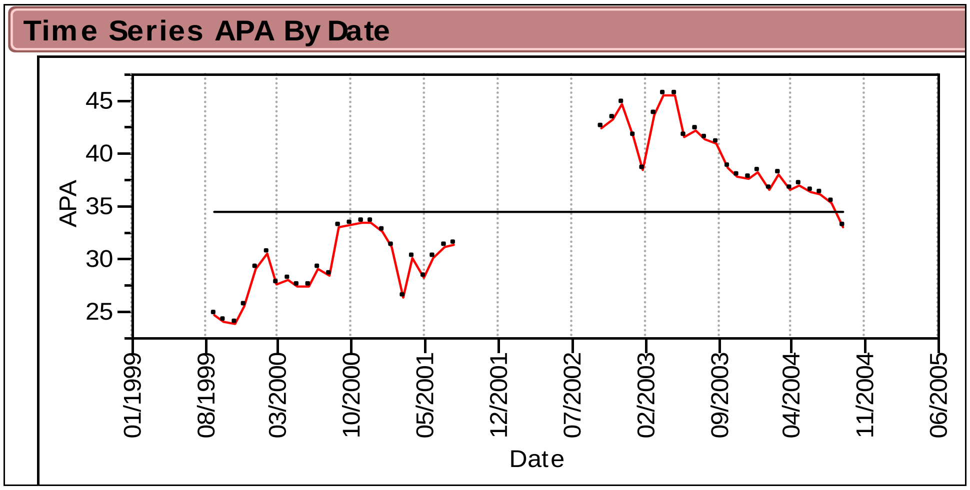
Time Series APA By Date
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11/2004
06/2005
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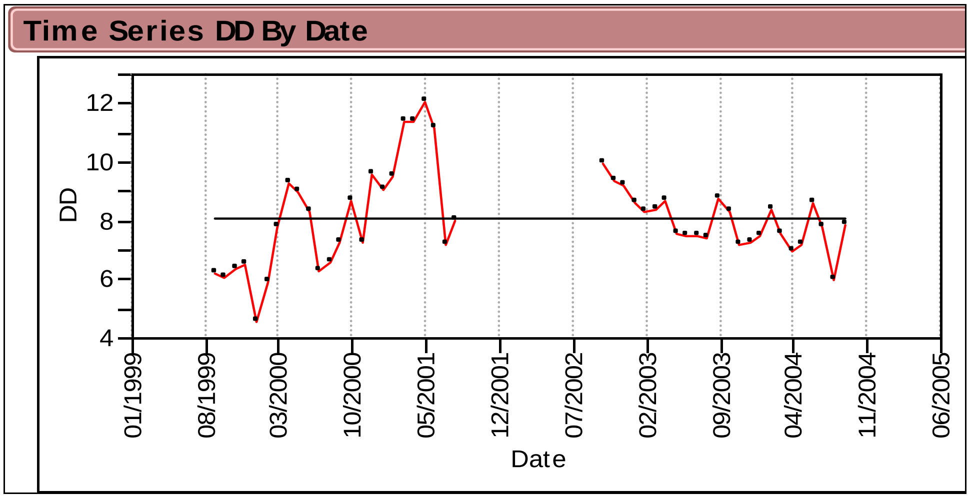
Time Series DD By Date
DD
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10
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12/2001
07/2002
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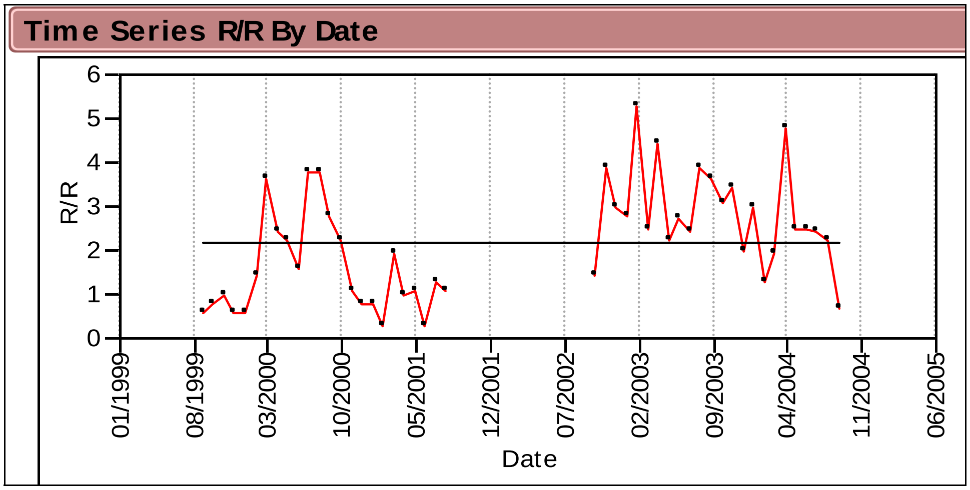
09/2003
04/2004
11/2004
06/2005
Date


Time Series R/R By Date
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04/2004
11/2004
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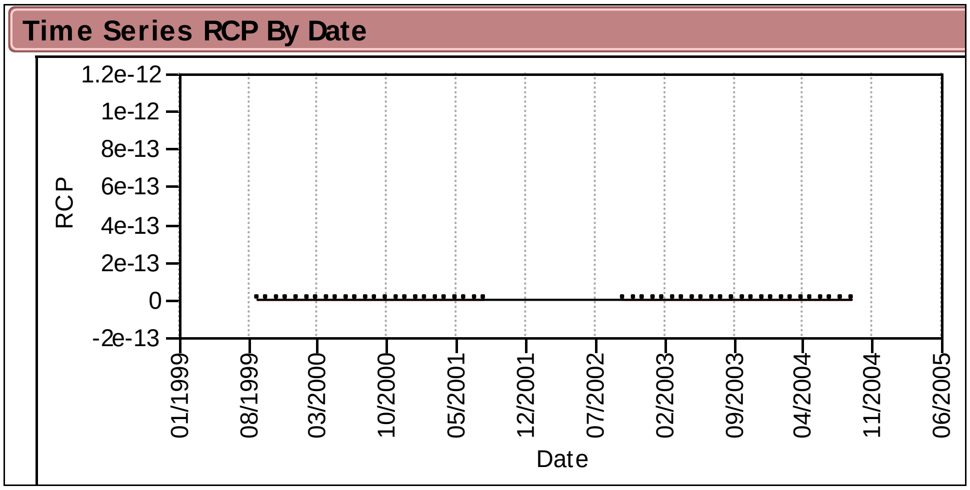
Date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2e-13
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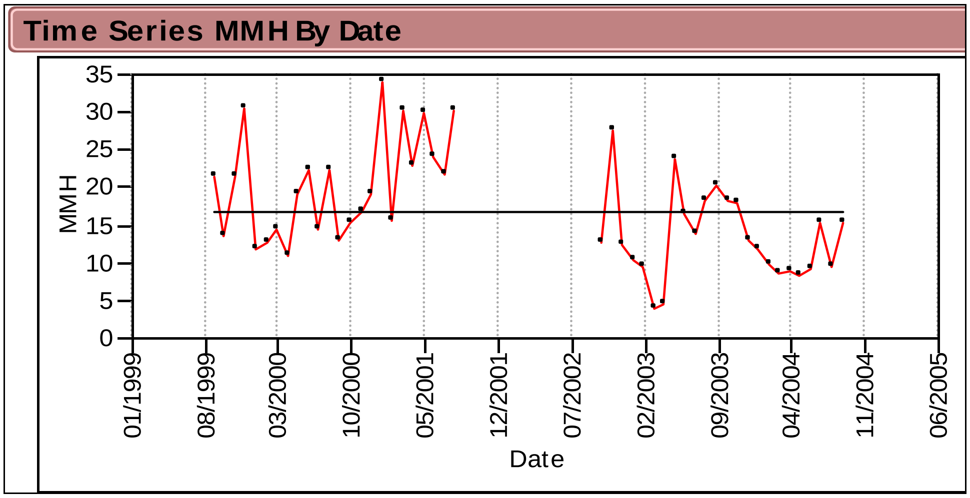
Time Series MMH By Date
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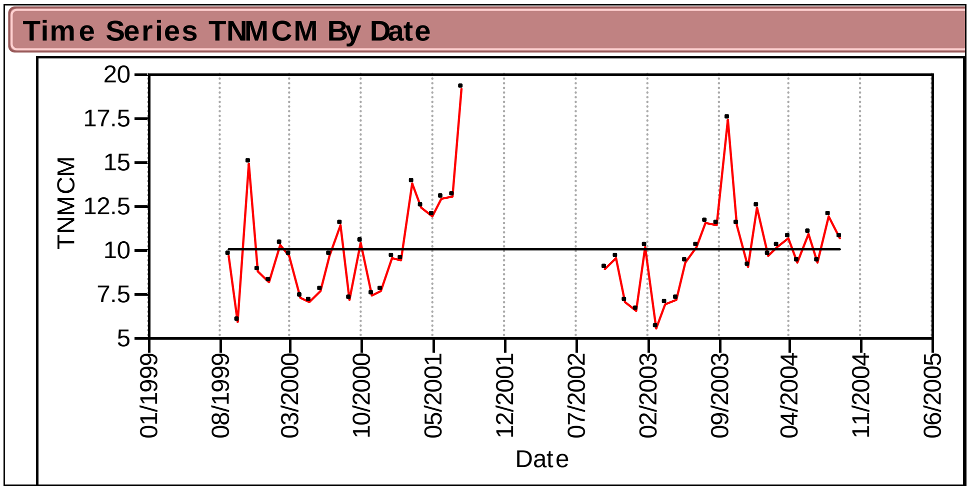
Date


Time Series TNMCM By Date
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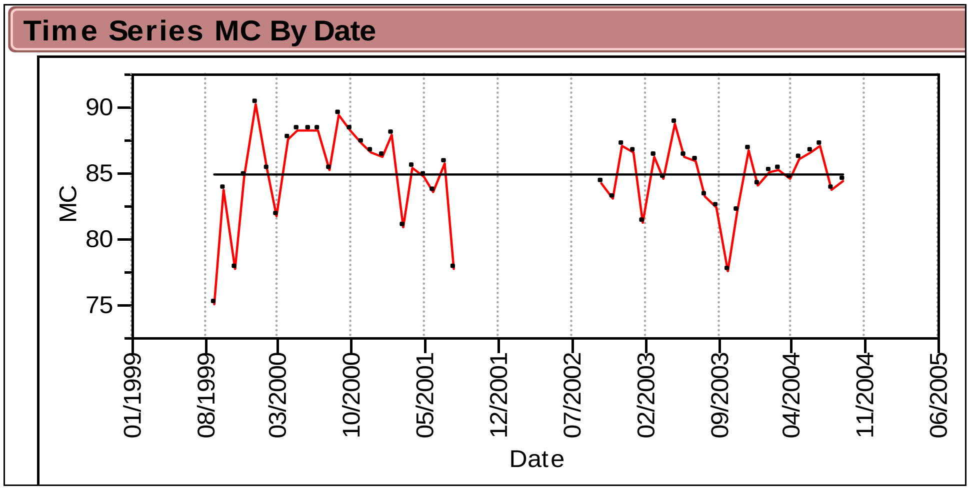
Date


Time Series MC By Date
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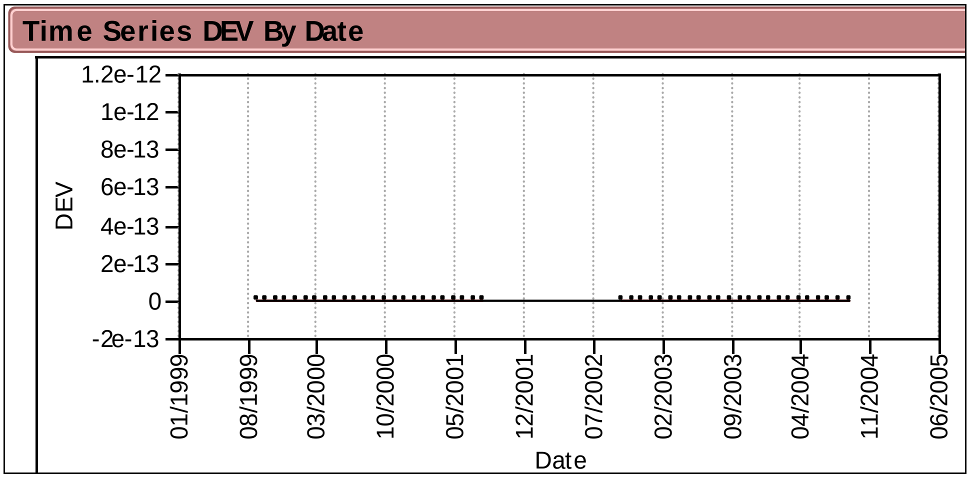
92ARW:


Time Series DEV By Date
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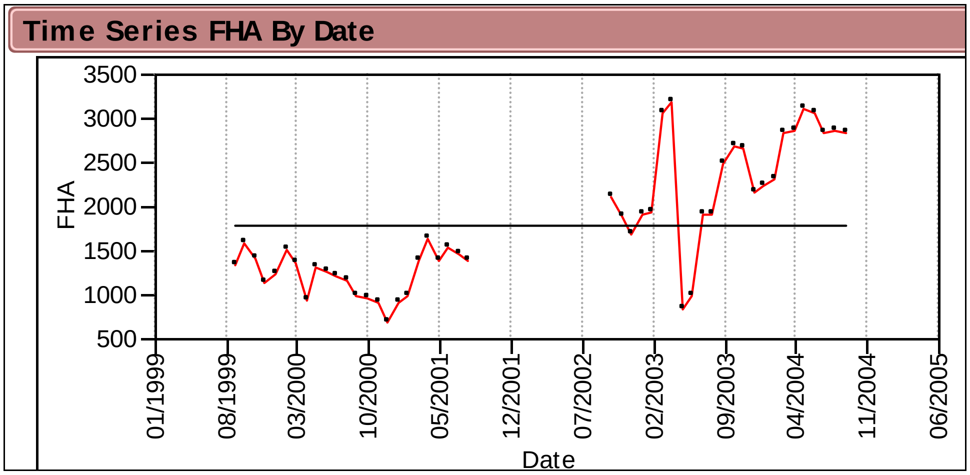
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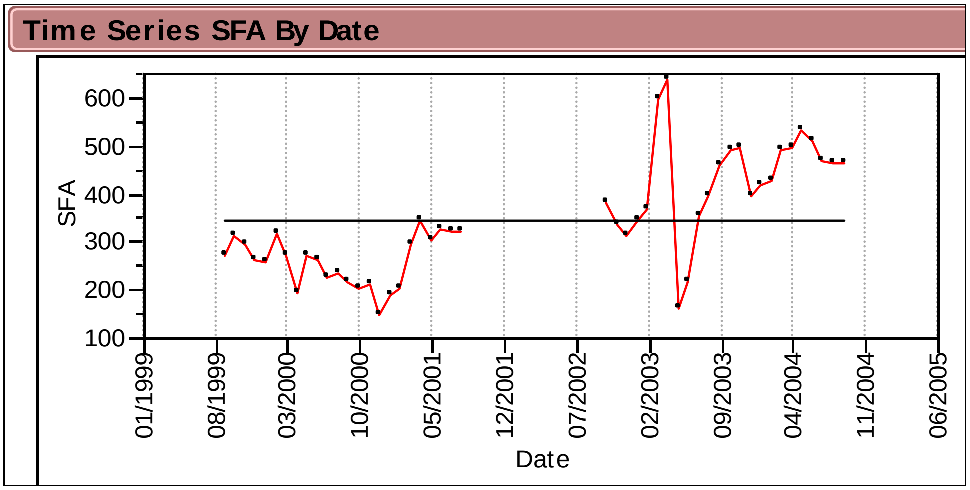
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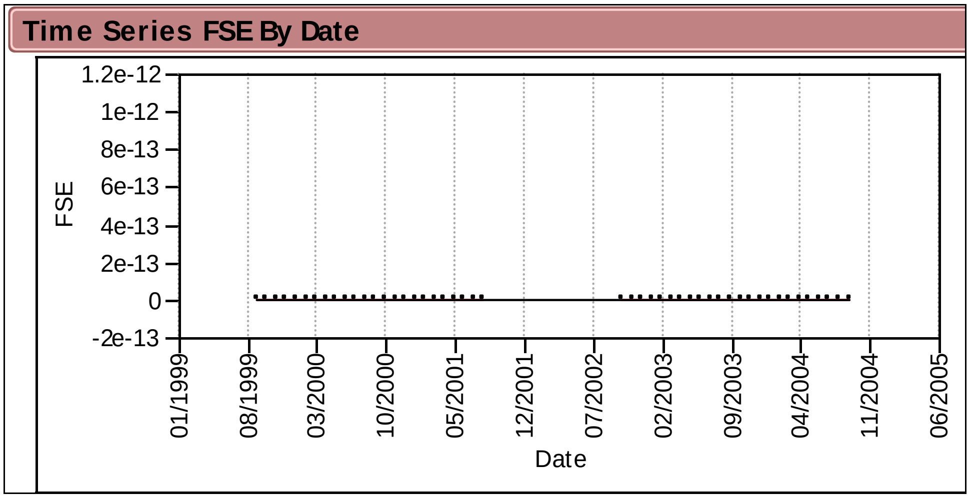
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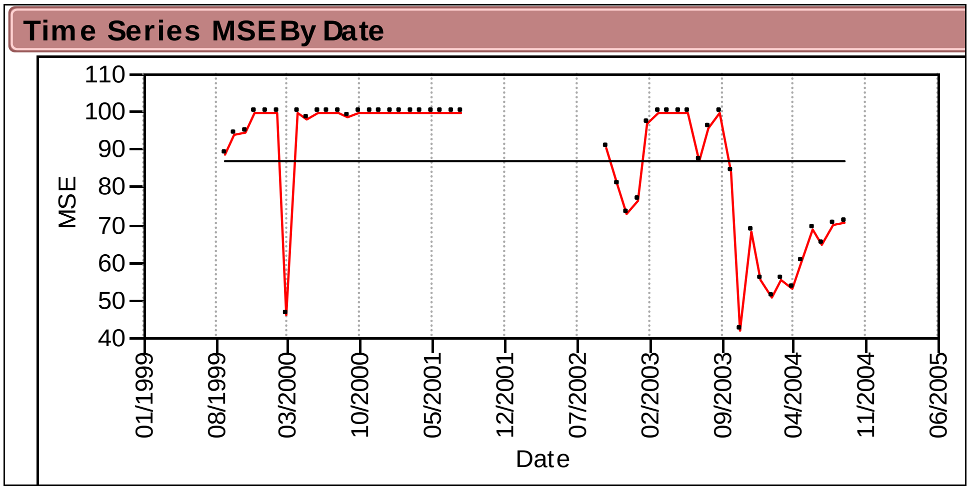
Time Series MSE By Date
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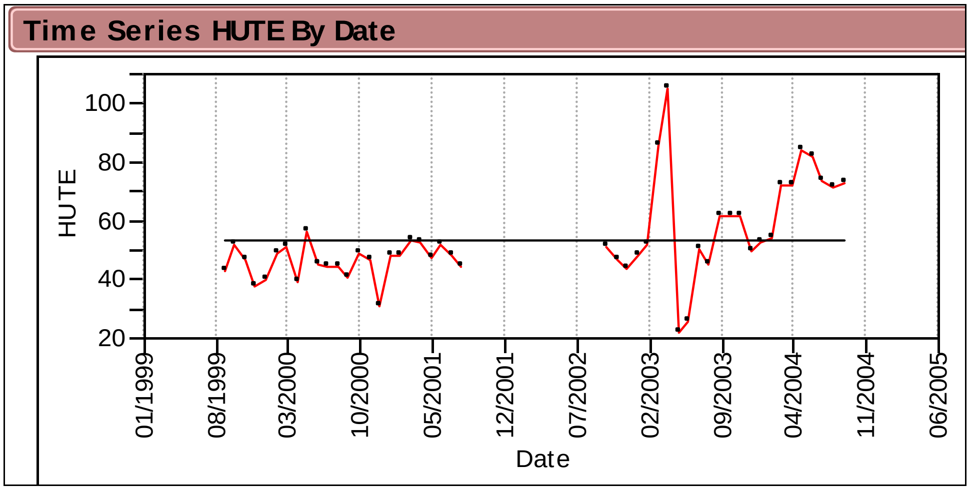
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11/2004
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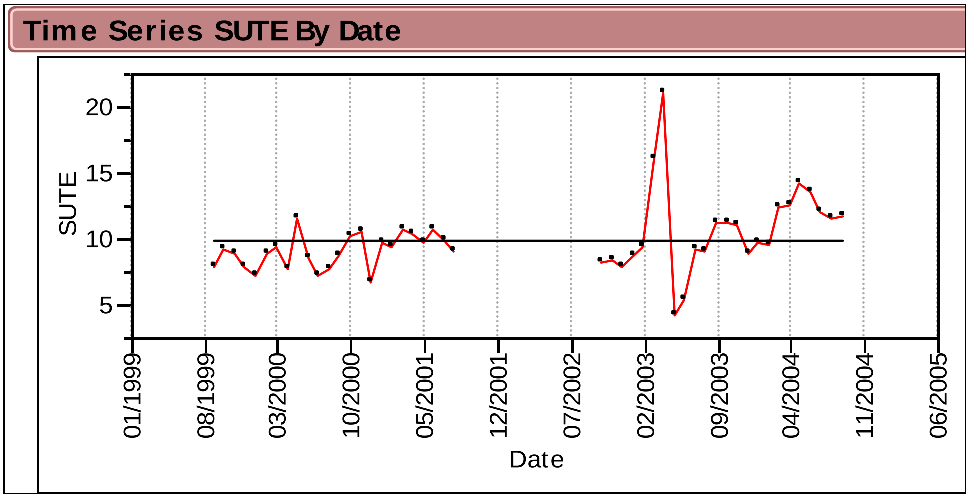
Time Series SUTE By Date
SUTE
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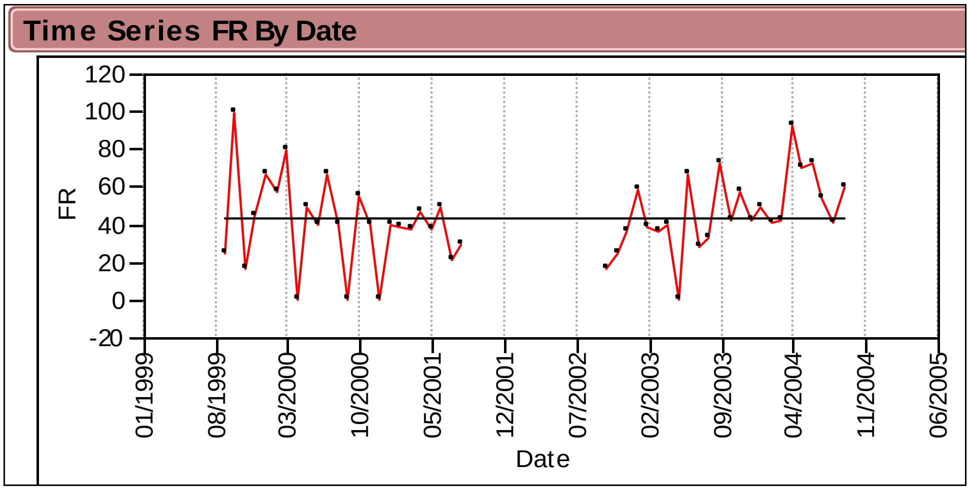
06/2005
Date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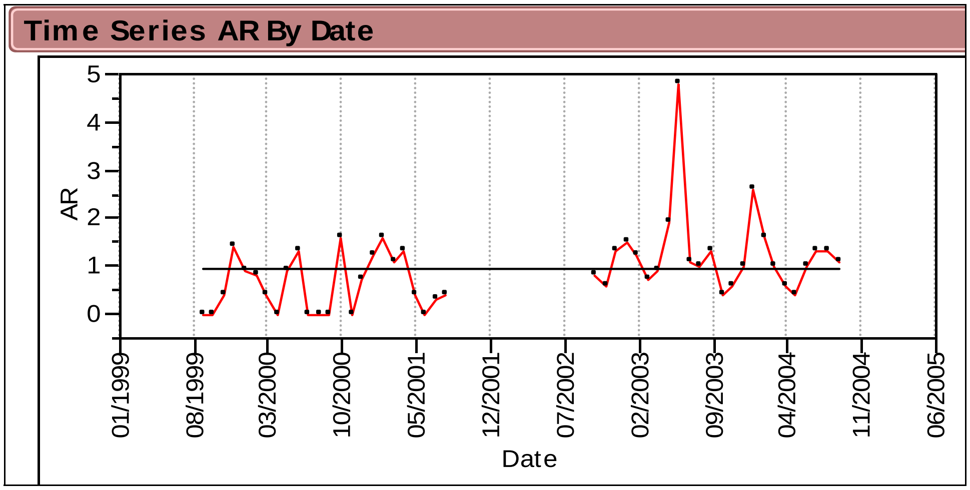
06/2005
Date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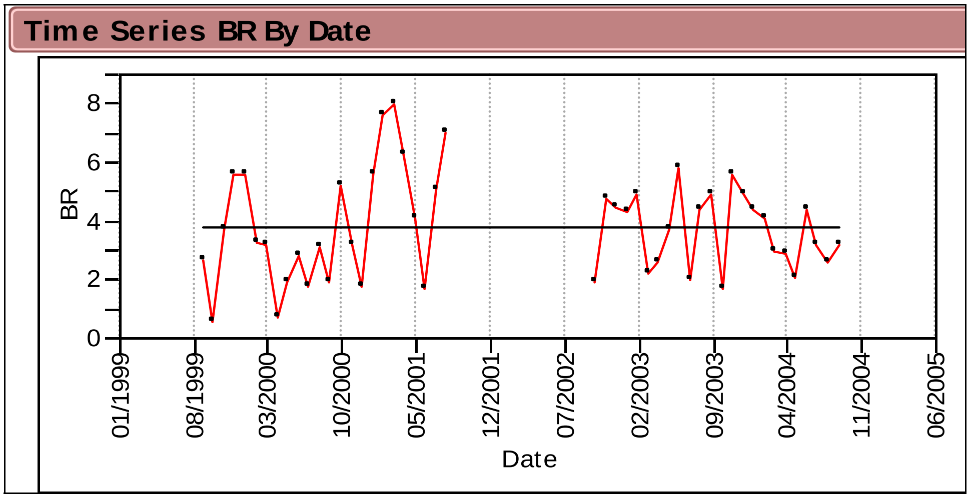
06/2005
Date



Time Series BR By Date
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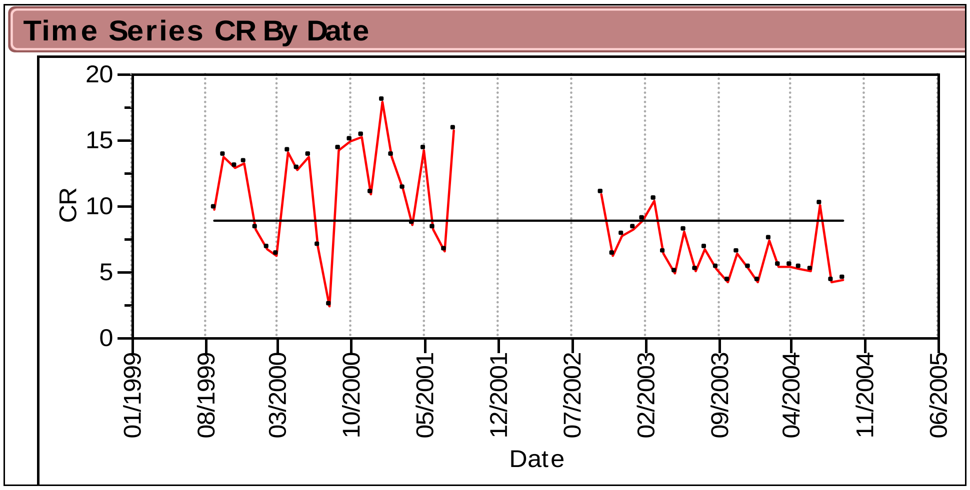

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11/2004
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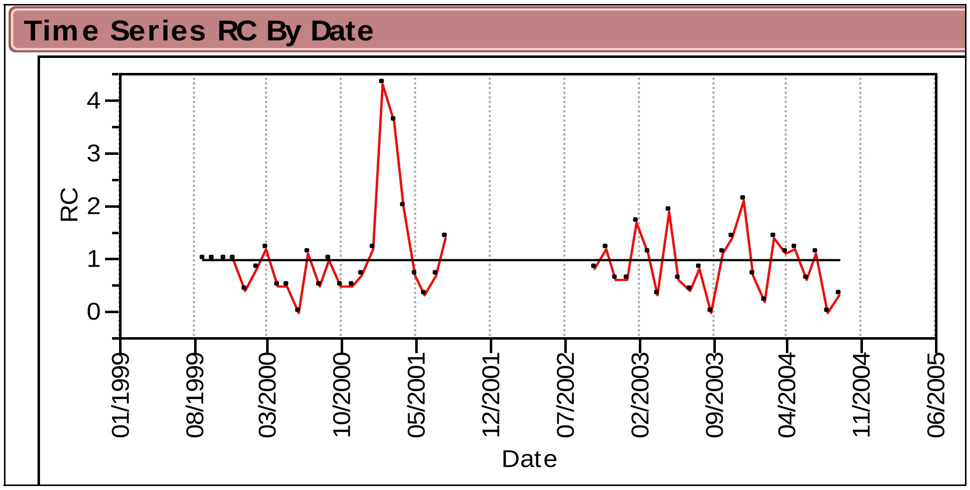

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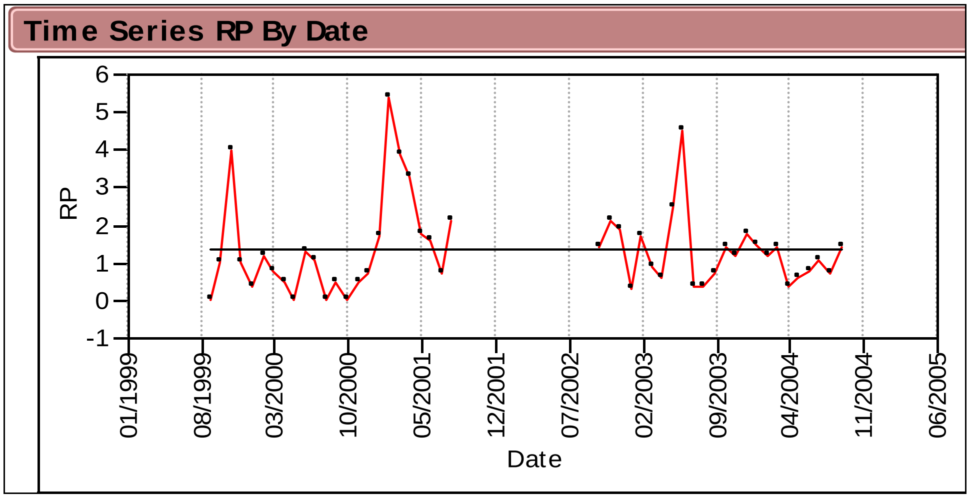
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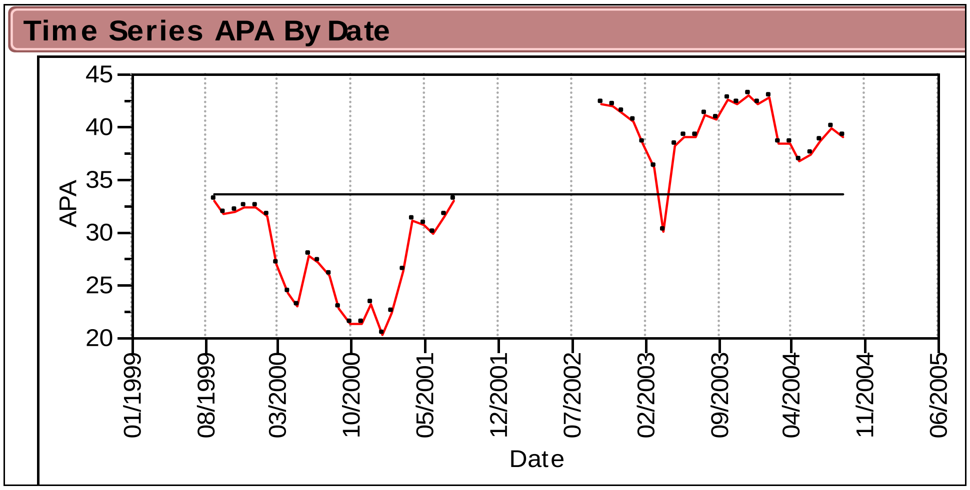
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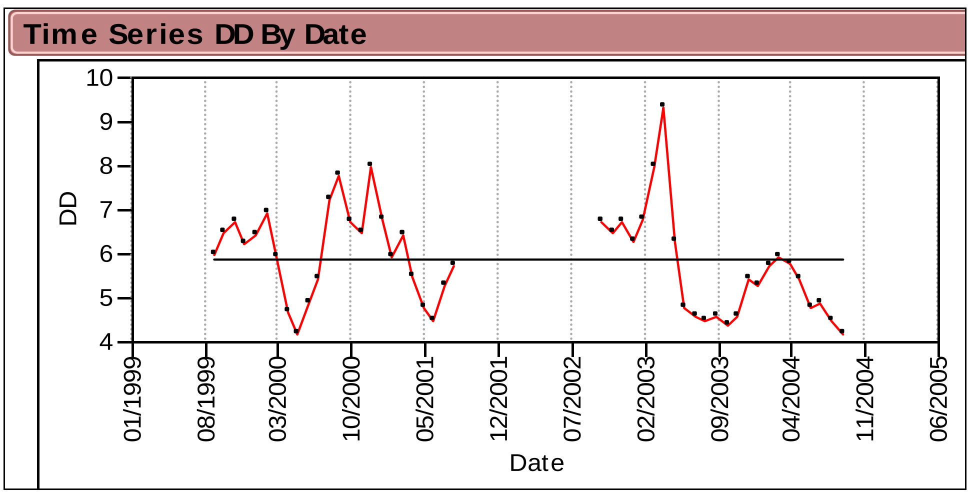
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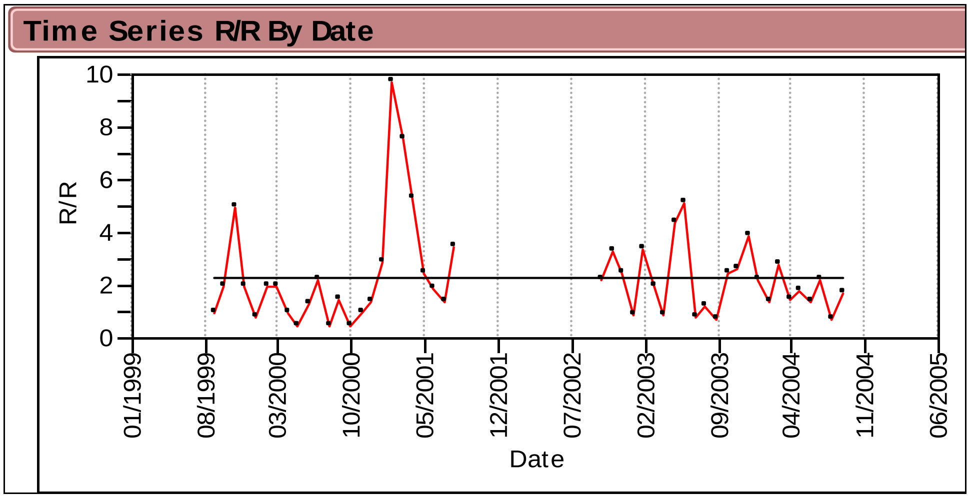
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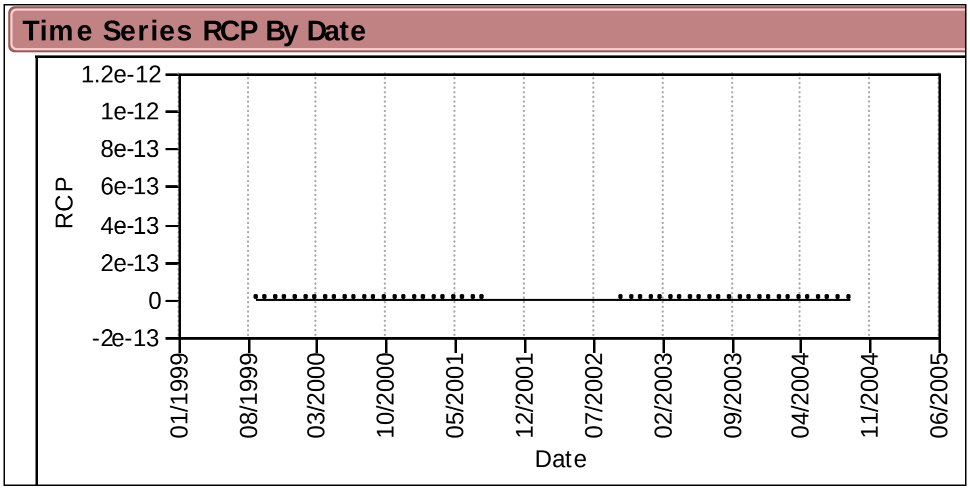
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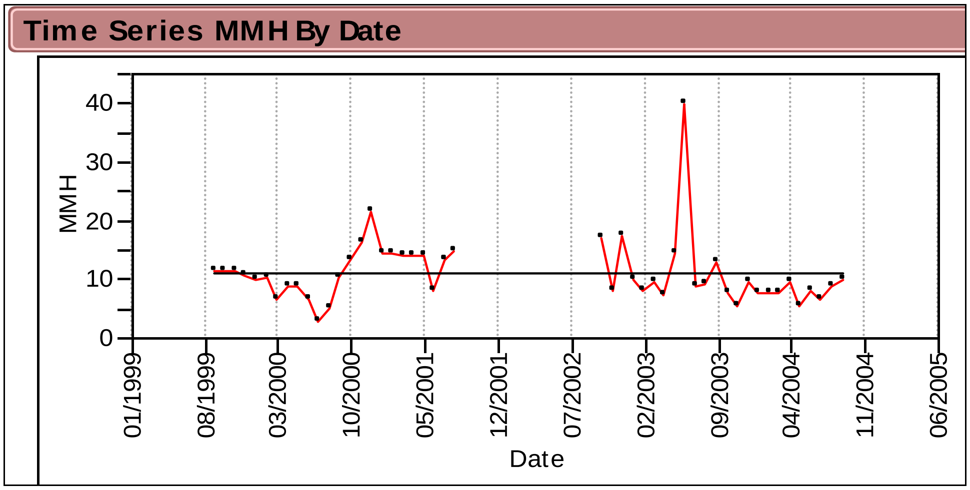
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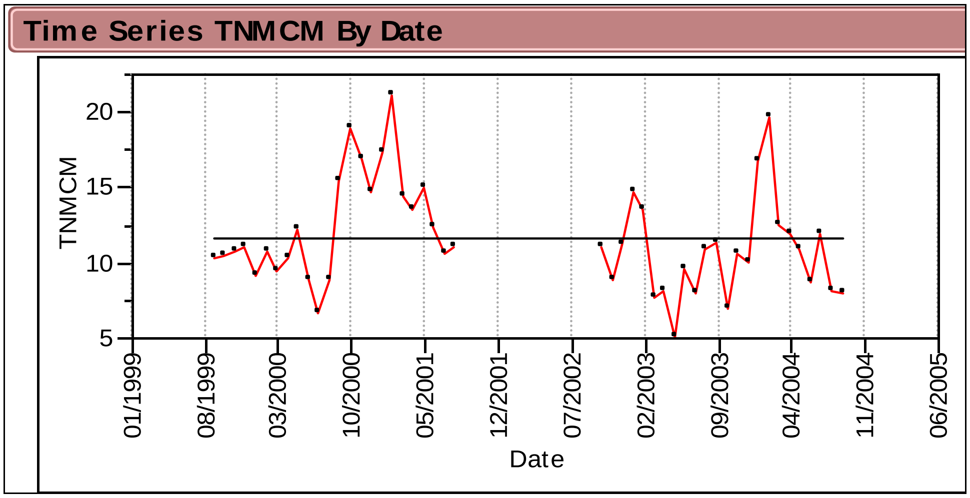

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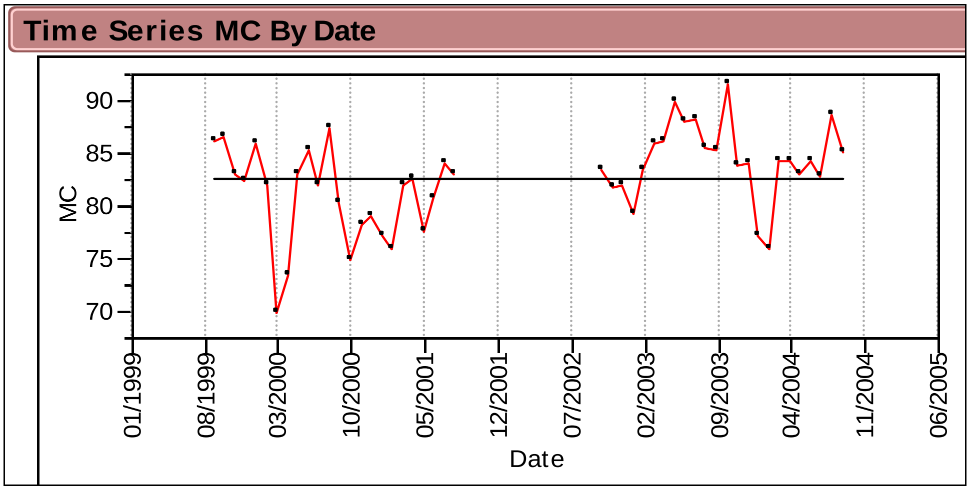

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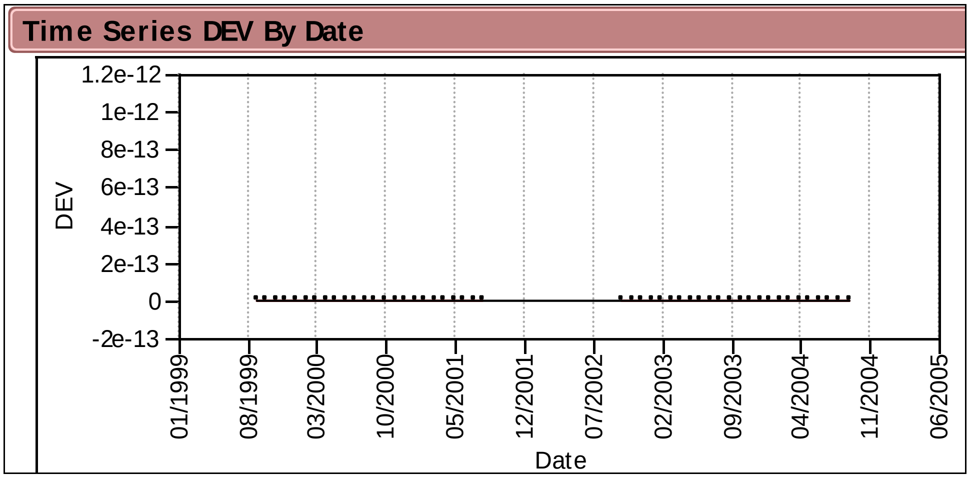
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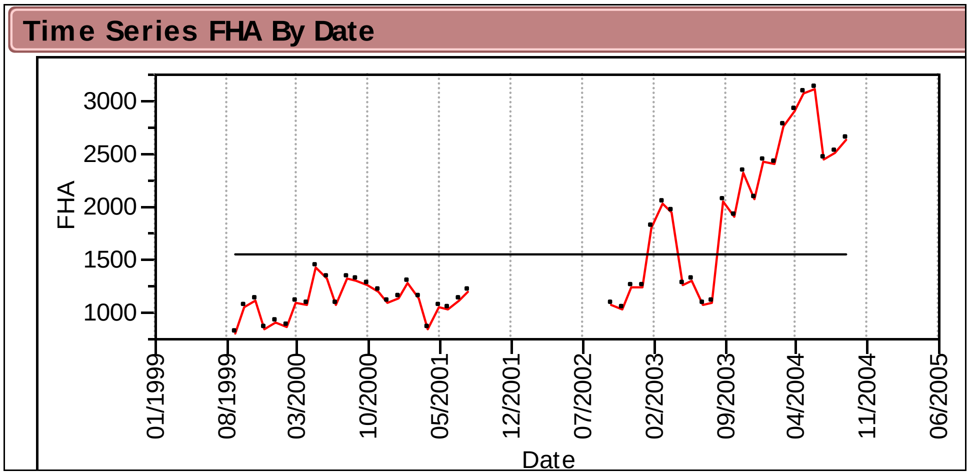
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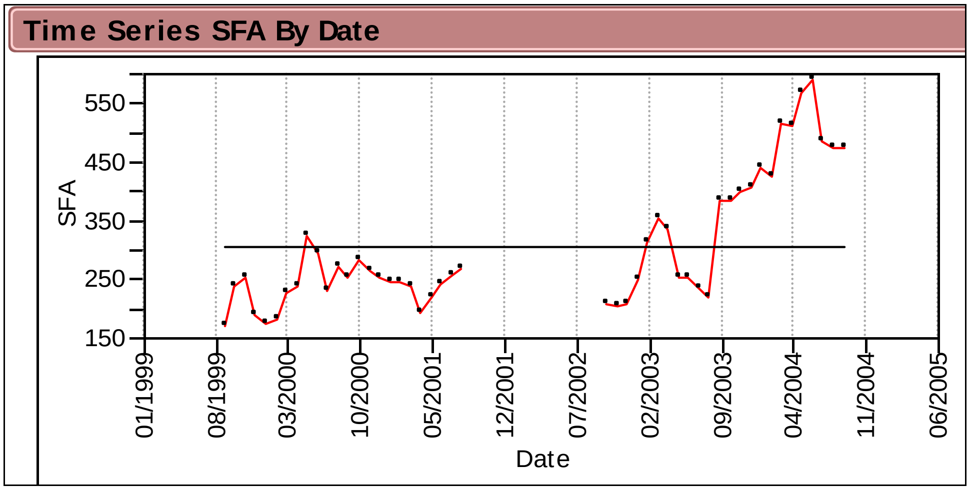
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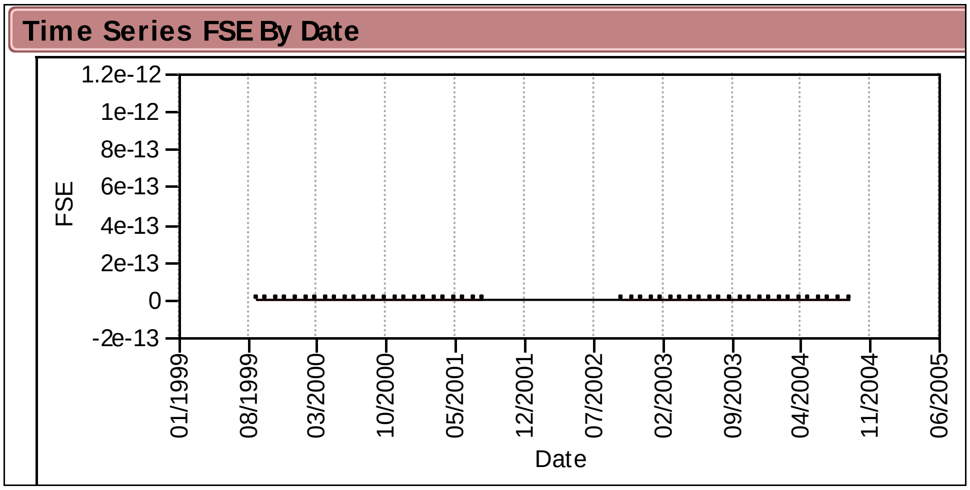
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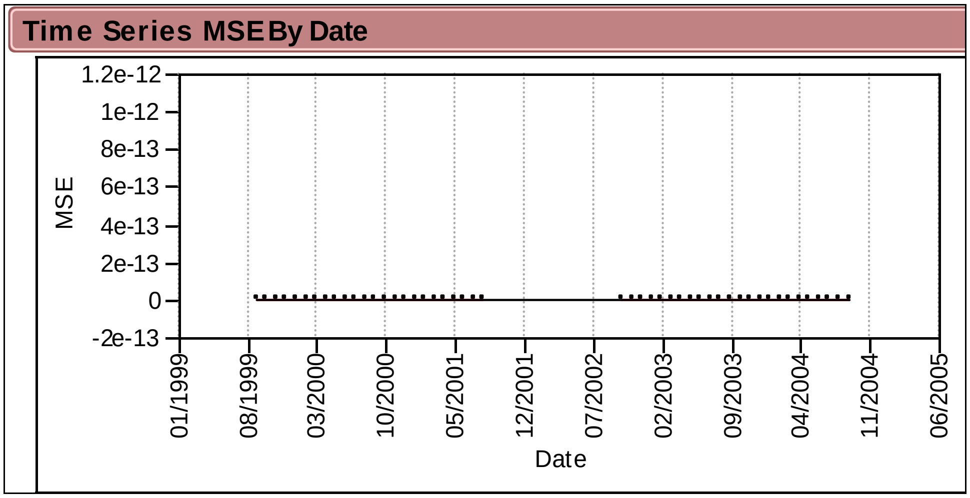
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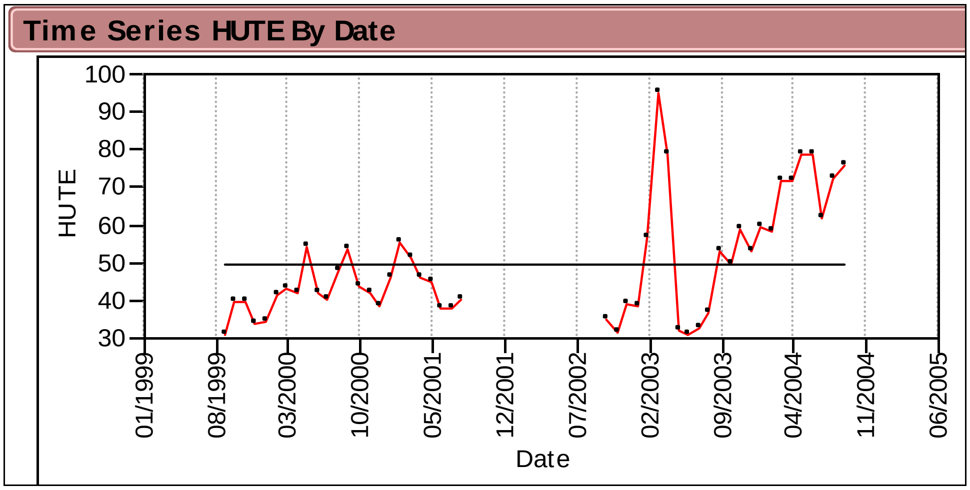
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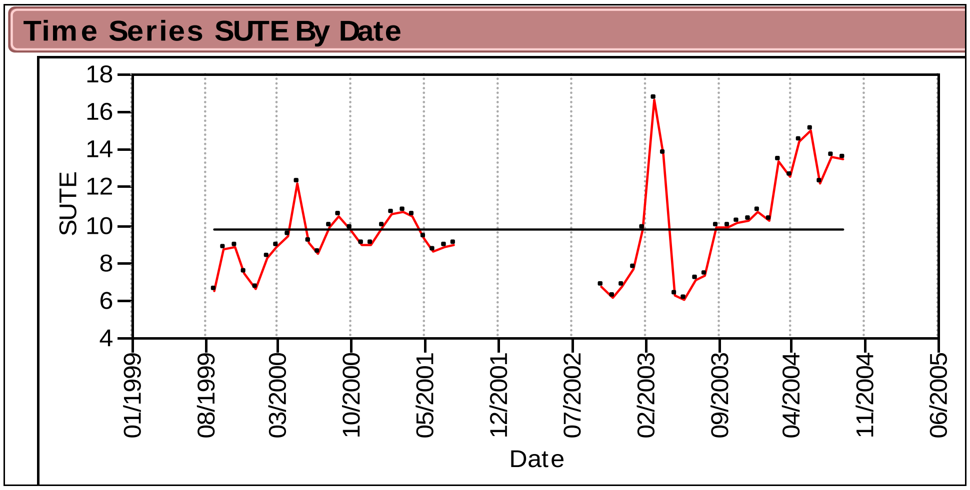
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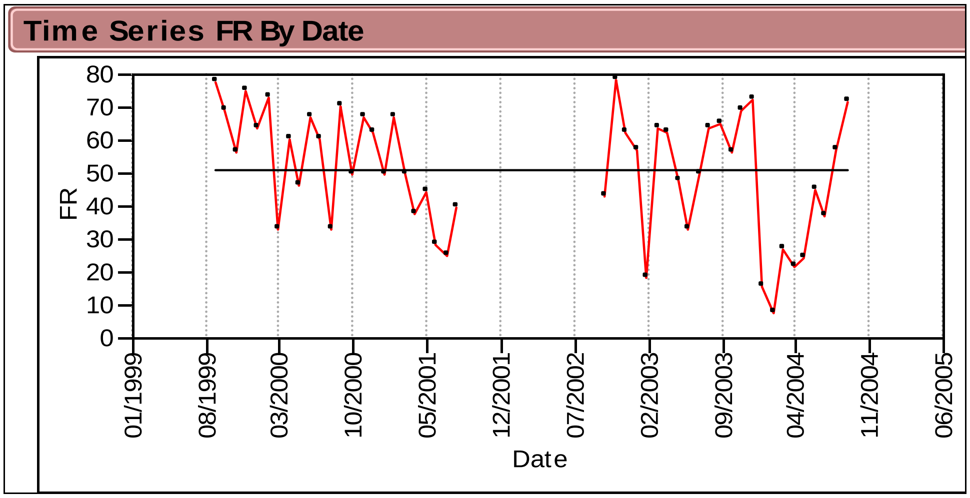
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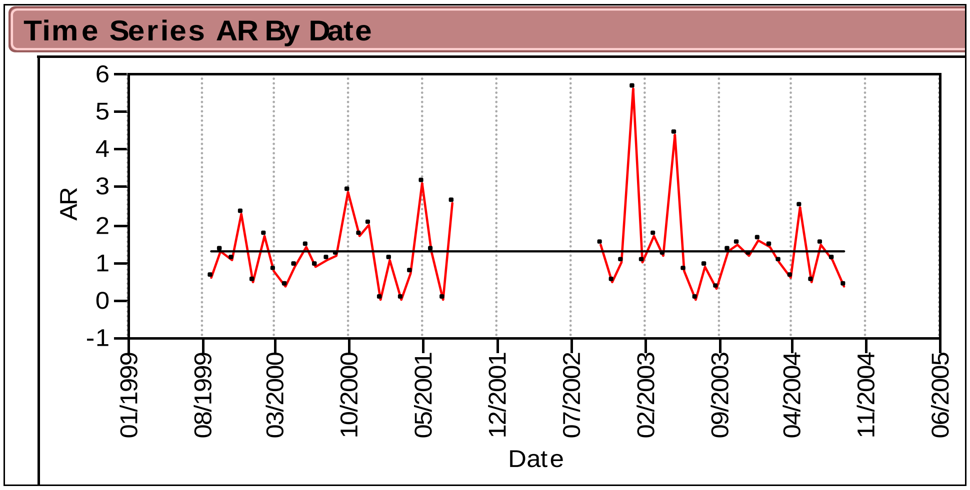
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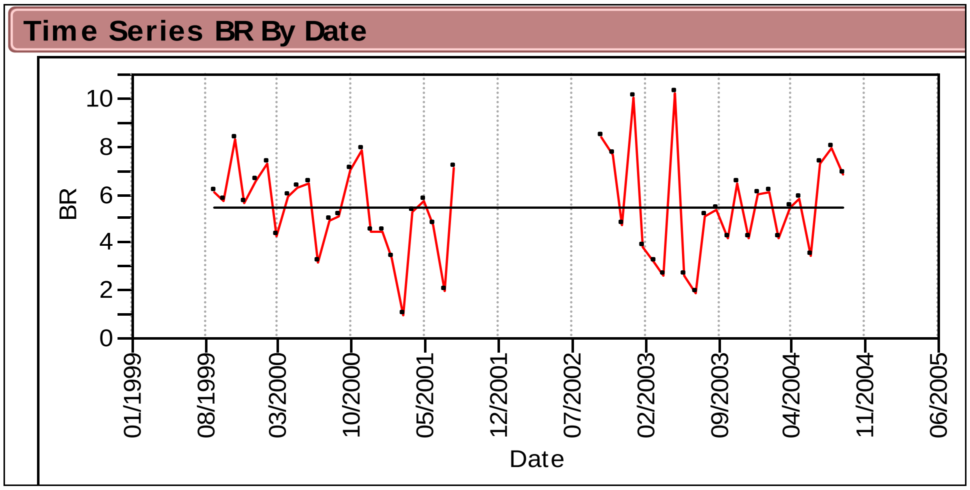
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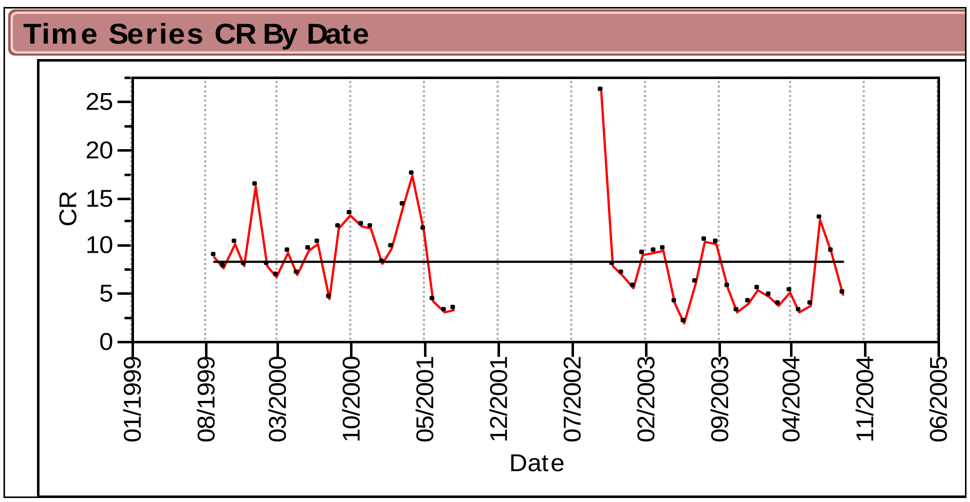
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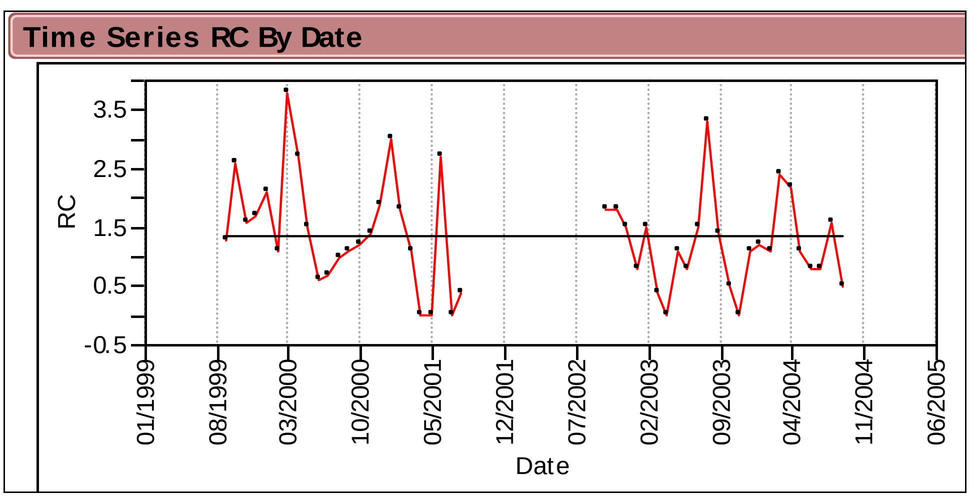
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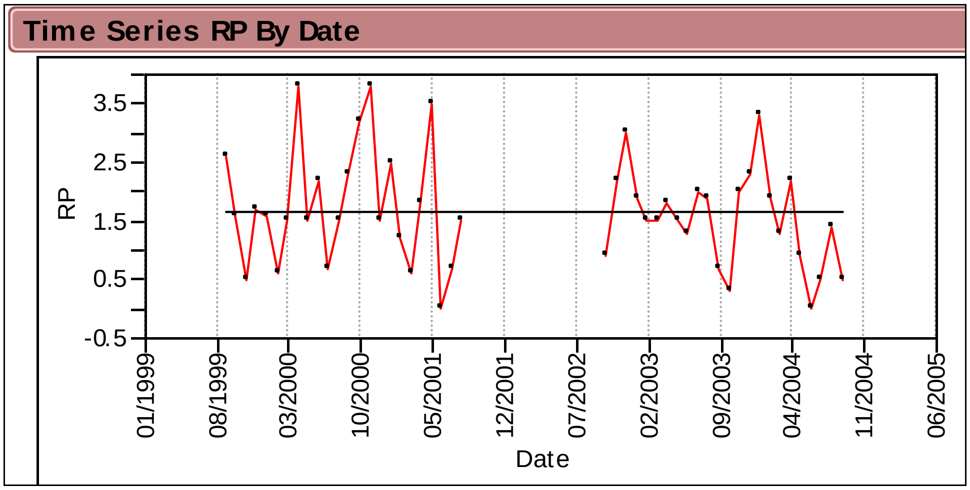

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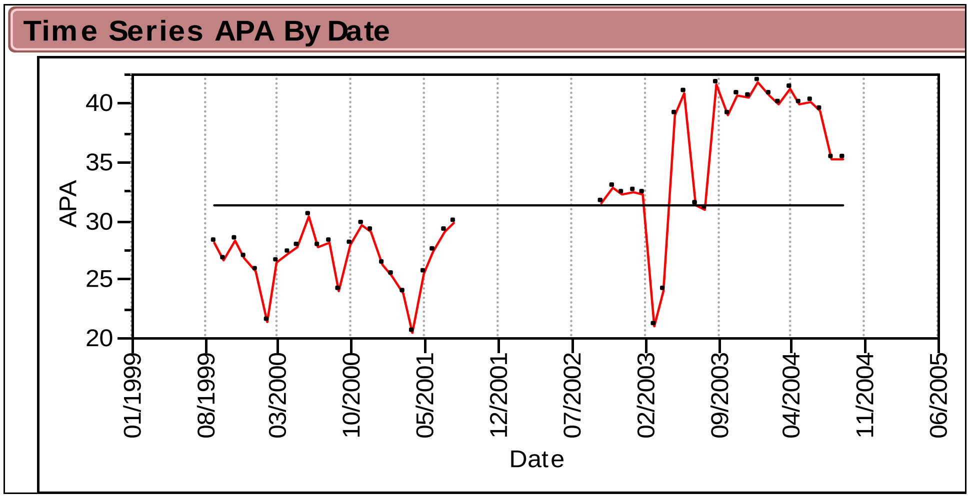

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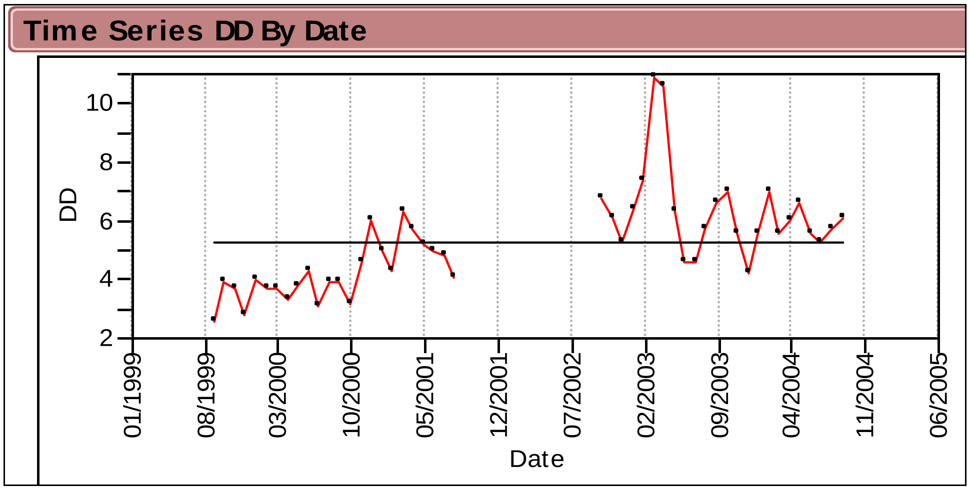

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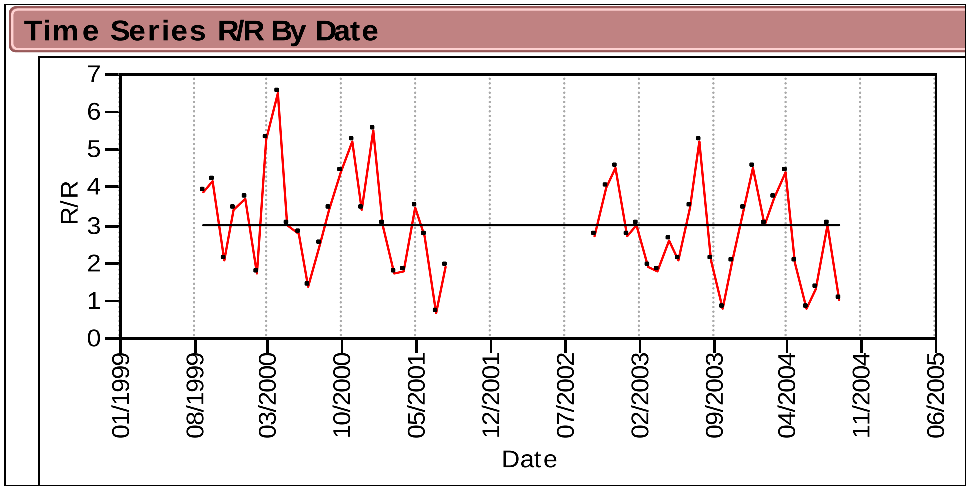
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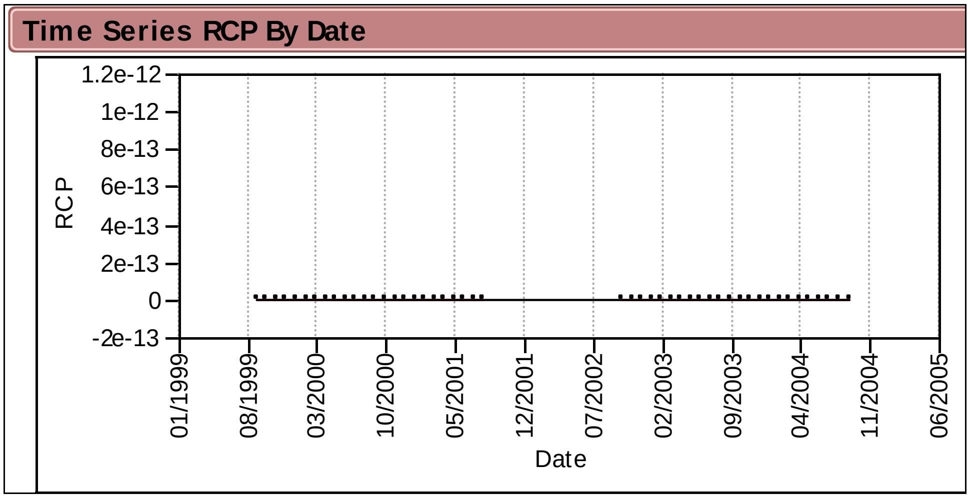
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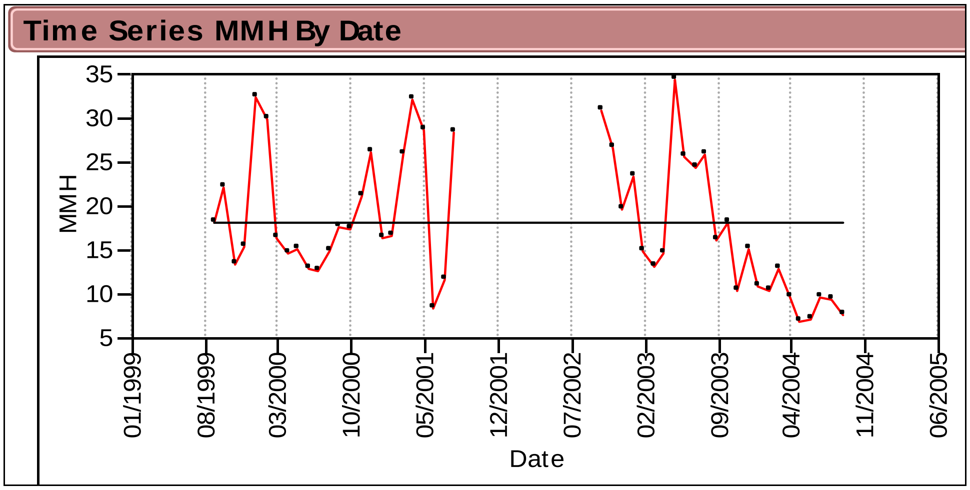
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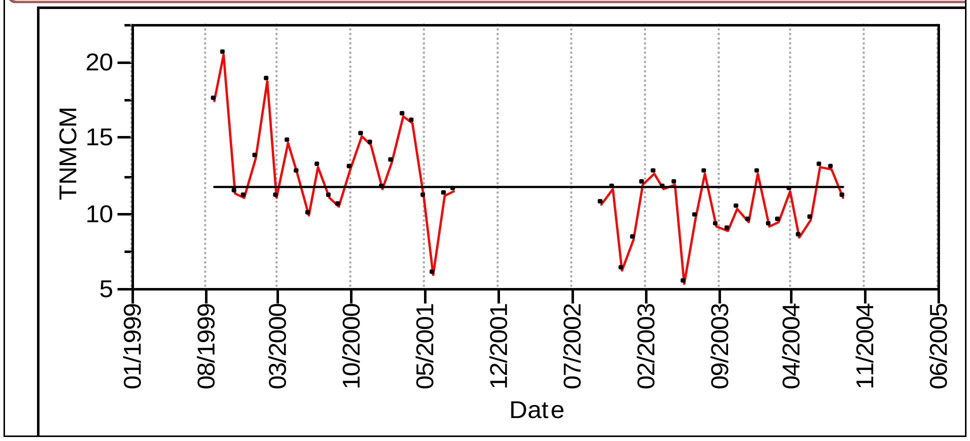


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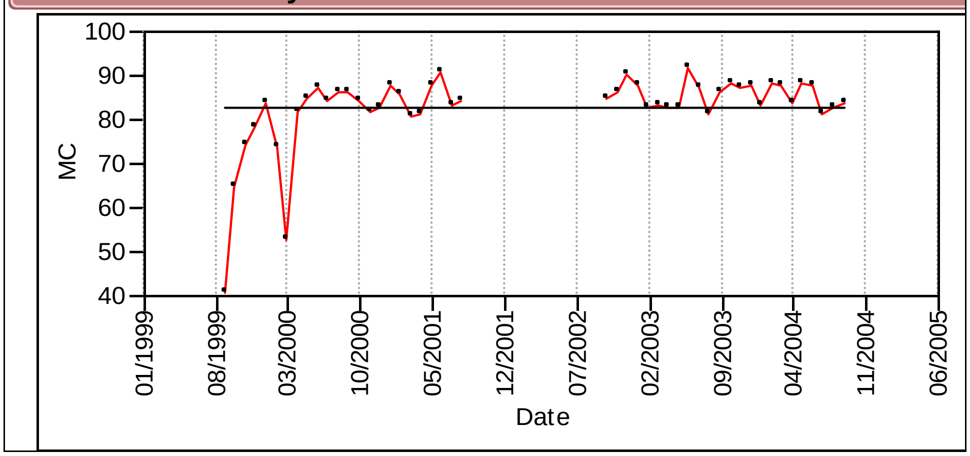

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## Vita

Captain Derrick R. Barthol graduated from Northampton Area Senior High School, Northampton, PA in 1988. He enlisted in the United States Marine Corps in October of that same year where he began his career as an avionics technician and later became an instructor and master training specialist. While serving, Derrick studied undergraduate courses through Southern Illinois University and graduated cum laude with a Bachelor of Science degree in Electronics Management in December, 1998. He accepted his commission as a lieutenant in the United States Air Force in September of 1999 and launched his officer profession in aircraft maintenance.

His duty assignments began with Marine Corps Recruit Depot Parris Island, SC where he attended basic training in October, 1988. Upon graduation, he attended technical school at Naval Air Station Millington, TN until July, 1989. He then reported to Marine Corps Air Station Cherry Point, NC where he was assigned to Marine Air Logistics Squadron (MALS) 32, MALS 14, and Marine Attack Training Squadron 203. In July, 1999, he attended Air Force Officer Training School at Maxwell Air Force Base, AL. Once commissioned, he was stationed with the 319th Logistics Group, Grand Forks Air Force Base, ND until July, 2003. In August of that year, he entered the Graduate School of Logistics and Management, Air Force Institute of Technology. Upon graduation, he will be assigned to the Air Force Research Laboratory, Wright-Patterson Air Force Base, Ohio.

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| AN ANALYSIS INTO THE EFFECTIVENESS OF AIRCRAFT MAINTENANCE UNDER THE COMBAT WING STRUCTURE | **5a. CONTRACT NUMBER** |
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**13. SUPPLEMENTARY NOTES**

**14. ABSTRACT**
Organizational structure builds the foundation from which organizations operate. To gain full potential of structural efficiencies in the current operating environment, public and private firms are continually modifying their organizational structure. The U.S. Air Force is no different and underwent its most recent reorganization in the fall of 2002 replacing the post-Gulf War format of the previous decade. Air Force leadership needs to understand how well the current structure is performing at achieving its intended objectives. This research investigates the effectiveness of the recent change to Air Force organizational structure on aircraft maintenance performance through an analysis of aircraft maintenance metrics. To observe effects both within and across the Air Force, four years of data were analyzed from three F-16 units and three KC-135 units representing two of the significant Air Force Major Commands (MAJCOMs). The analytical methods used for this research include testing assumptions of normality and variance of sample data. Next, homogeneity of variance and comparison of means tests were used to identify significant differences between data of pre- and post-combat wing structures. Then, the direction of any noted changes was made apparent and categorized for quantification using weighted factor analysis. Finally, trend analysis was performed to assist in determining overall effectiveness of the combat wing structure. Results of this analysis allowed the researcher to postulate an answer to the overall research question. This answer and other associated findings can assist Air Force leaders in understanding how to enhance operational performance.

**15. SUBJECT TERMS**
Organizational Structure; Aircraft Maintenance; Air Force maintenance metrics; Comparison of Means; Analysis of Variance; Weighted Factoring; Trend Analysis; Linear Regression.

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