

Audit



Report

DEFENSE CIVILIAN PAY
YEAR 2000 END-TO-END TESTING EVENT PLANS

Report No. 99-259

September 28, 1999

Office of the Inspector General
Department of Defense

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Acronyms

DCPS
DFAS
OSD
STANFINS
Y2K

Defense Civilian Pay System
Defense Finance and Accounting Service
Office of the Secretary of Defense
Standard Finance System
Year 2000



INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
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September 28, 1999

MEMORANDUM FOR DIRECTOR, DEFENSE FINANCE AND ACCOUNTING
SERVICE

SUBJECT: Audit Report on Defense Civilian Pay Year 2000 End-to-End Testing
Event Plans (Report No. 99-259)

We are providing this report for information and use. This is one in a series of reports that the Inspector General, DoD, is issuing in accordance with an informal partnership with the DoD Chief Information Officer to monitor the Defense Finance and Accounting Service efforts in addressing the Year 2000 computing challenge. We considered management comments on a draft of this report when preparing the final report.

The Defense Finance and Accounting Service comments conformed to the requirements of DoD Directive 7650.3. We continue to have some concerns about the depth of test results analysis that is possible; however, those issues are largely moot. As you know, we are reviewing the use of code scanners and other supplements to end-to-end testing, as well as contingency planning for all finance and accounting functions, in separate audits.

No further response to this report is required. We appreciate the courtesies extended to the audit staff. For additional information on this report, please contact Ms. Kimberley A. Caprio at (703) 604-9139 (DSN 664-9139) (kcaprio@dodig.osd.mil), Mr. Michael Perkins at (703) 604-9152 (DSN 664-9152) (mperkins@dodig.osd.mil), or Ms. Laura A. Rainey at (703) 604-9151 (DSN 664-9151) (lrainey@dodig.osd.mil). See Appendix D for the report distribution. Audit team members are listed inside the back cover.

A handwritten signature in black ink that reads "Robert J. Lieberman".

Robert J. Lieberman
Assistant Inspector General
for Auditing

Office of the Inspector General, DoD

Report No. 99-259
(Project No. 9FG-9025)

September 28, 1999

Defense Civilian Pay Year 2000 End-to-End Testing Event Plans

Executive Summary

Introduction. This is one in a series of reports that the Inspector General, DoD, is issuing in accordance with an informal partnership with the DoD Chief Information Officer to monitor DoD efforts in addressing the Year 2000 (Y2K) computer challenge. For a listing of audit projects addressing the issue, see the Y2K webpage on the IGnet at <http://www.ignet.gov>.

The mission of the DoD civilian pay functional area is to process payroll for DoD civilian employees. The Defense Civilian Pay System is the payroll system for civilian employees in DoD. The Defense Civilian Pay System makes payments via checks and electronic funds transfers, and provides entitlement information to disbursing systems, which then make the payments via checks and electronic funds transfers. The Defense Civilian Pay System processes the entitlements for 708,000 DoD civilian employees totaling approximately \$37.6 billion annually. The civilian pay functional area Y2K end-to-end event planners began planning for end-to-end testing in August 1998. The testing began in March 1999, and the event leader expects to complete the testing (including receiving confirmations from participating systems) in September 1999. The end-to-end testing will include the following critical civilian pay functions, or "threads":

- payment processing;
- garnishment;
- taxes and Social Security withholdings;
- bonds and sending electronic funds transfers to the Federal Reserve Bank;
- accounting;
- processing with Automated Time, Attendance and Production System (ATAAPS); and
- processing with Defense Civilian Personnel Data System – Modification (DCPDS-MOD).

Objective. The overall audit objective was to evaluate the effectiveness of the planned Y2K end-to-end testing in the DoD civilian pay functional area. Specifically, we reviewed the plans for conducting Y2K end-to-end testing within the civilian pay area.

Results. Civilian pay event planners took the initiative to develop end-to-end event plans well before requirements were defined for the Defense Finance and Accounting Service (DFAS) as a whole, and developed a sound methodology for end-to-end testing of civilian pay. However, DFAS Headquarters did not require revisions to the civilian pay event plan as overarching guidance was issued. The civilian pay event plan lacked requirements for data collection and data analysis.

The DFAS project office responded positively to suggestions made during the course of the audit. Although only one thread of the civilian pay end-to-end testing event has been completed (with confirmations received from all of the output partners in the thread), the civilian pay event planners have tested the DCPS segment for six of the seven threads. In view of the limited time remaining for end-to-end testing, as well as limited resources, a complete re-testing of these threads would be impractical. The civilian pay event planners need to take action to strengthen the remainder of the testing, as well as any re-testing due to testing failures or configuration management changes.

Summary of Recommendations. We recommend that the Director, DFAS require the civilian pay event leader, prior to the completion of testing and any re-testing, to document uniform, detailed data collection and data analysis procedures that allow for uniform, standardized testing between participating systems.

Management Comments. The Director, DFAS Information and Technology, concurred with the recommendation, and stated that the civilian pay data collection and analysis methodologies will be documented and provided to DFAS by October 29, 1999 (upon submission of the final end-to-end test analysis report). The Director stated that because the requirements for data collection and data analysis plans were published after the civilian pay end-to-end test had begun, the event plan does not contain those detailed plans. However, the Director believed that the civilian pay event planners met the spirit of the recommendation with actions they had already taken and planned to take. A discussion of management comments is in the Findings section of the report and the complete text is in the Management Comments section.

Audit Response. We consider the DFAS comments to be generally responsive. The civilian pay event planners did not document detailed data collection procedures, such as the specific data that should be collected by interface partners during testing. Without defining these detailed data collection procedures prior to testing, it is impossible for the event planners to verify that the tests were successful. Although the civilian pay event planners felt that they had developed steps that would allow for an appropriate analysis of the test results, we continue to have concerns that the data analysis will be based on incomplete information. The DFAS Y2K Project Office has recently informed us that the Joint Interoperability Testing Command, Defense Information Systems Agency, will review the civilian pay event test results in October 1999. This will help to alleviate our concerns. At this late stage in the conversion process, the use of code scanning tools and special emphasis on contingency plans would be prudent.

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Background

Addressing the Year 2000 Computing Challenge. This is one in a series of reports being issued by the Inspector General, DoD, in accordance with an informal partnership with the Chief Information Officer, DoD, to monitor efforts to address the Year 2000 (Y2K) computing challenge. For a listing of audit projects addressing the issue, see the Y2K webpage at <http://www.ignet.gov>.

Defense Finance and Accounting Service. The Defense Finance and Accounting Service (DFAS) is the principal agency responsible for DoD accounting and finance processes. DFAS is also responsible for disbursing payments by U.S. Treasury check, by cash, or by electronically transferring funds. In FY 1998, DFAS processed a monthly average of 9.8 million payments to DoD personnel; 1.2 million commercial invoices; 600,000 travel vouchers or settlements; 500,000 savings bonds; and 120,000 transportation bills of lading. The agency's monthly disbursements totaled approximately \$24 billion.

General Accounting Office Y2K Testing Guide. GAO/AIMD-10.1.21, "Year 2000 Computing Crisis: A Testing Guide," November 1998, presents a framework for managing all testing activities related to the Y2K problems. It provides guidance for establishing an organizational testing infrastructure, and designing, conducting, and reporting on end-to-end testing. The guide also describes test oversight and control activities.

DoD Y2K Management Plan. The "DoD Y2K Management Plan," version 2.0, December 1998, defines the DoD Y2K management strategy. Appendix I, "Guidelines to Support DoD Y2K Operational Readiness," of the Management Plan, provides guidance on planning, executing and evaluating activities required to assess Y2K readiness. These activities include functional area end-to-end tests. Appendix I of the Plan identifies roles and responsibilities, as well as defining requirements for developing end-to-end master plans, event plans, reporting, risk assessment, data collection and data analysis, execution, and management controls.

End-to-End Testing. The "end-to-end" process is the flow of data through a set of interconnected systems that perform a critical business process, function, or mission. Data flow begins with the initial input of data into the first system and ends with the final receipt of data in the last system and receipt of output by the user. The purpose of Y2K end-to-end testing is to verify that the set of interrelated systems supporting DFAS business processes, such as DoD civilian payroll, operates and appropriately processes Y2K related data. End-to-end testing can include mission-critical and non mission-critical systems; the Plan states that each mission-critical system must be included in at least one operational evaluation or end-to-end test, unless it has no interfaces or is not date dependent.

DFAS End-to-End Testing. DFAS identified its critical business processes, and developed plans to test those business processes. Critical processes are defined as those that, if not performed, would preclude or immediately impair the disbursement, pay, and accounting functions. Specifically, DFAS identified the following seven critical business processes: civilian pay, military pay, contract and vendor pay, transportation pay, travel pay, accounting, and disbursing.

DFAS has organized its end-to-end testing into seven testing events, one for each critical mission or business process. DFAS has further divided each event or business process into “threads.” A thread is a system or set of systems that performs the functions within the business process. Threads may span a series of systems owned by DFAS or other DoD organizations, as well as external interfaces, such as the Federal Reserve Bank, the U.S. Postal Service, and other organizations. Each event can include one or more threads that track to a critical business process. DFAS organized its events to include all 45¹ of its Y2K mission-critical systems, as well as certain non mission-critical systems that were essential to the critical business processes.

DFAS Y2K End-to-End Master Plan. DFAS issued the “DFAS Y2K End-to-End Master Plan,” revision 2.3, on June 21, 1999, specifically for accomplishing Y2K-related end-to-end testing of its critical business processes. The Master Plan identifies roles and responsibilities; assumptions and constraints related to testing; requirements for interfaces with non-DFAS organizations; and requirements for planning, testing, and reporting on test results.

Roles and Responsibilities. DFAS designated a Y2K project manager and functional proponent at DFAS Headquarters with overall Y2K testing responsibility. DFAS delegated assignment of event leaders and thread leaders to its functional proponents to execute the end-to-end testing. Also, DFAS assigned roles and responsibilities to system managers for controlling their segment of the end-to-end testing process.

Assumptions and Constraints. Because of limited time and resources, the DFAS Master Plan acknowledges constraints and identifies assumptions related to Y2K end-to-end testing. These include the assumptions that third-party software and computing platforms are Y2K compliant, that operations and compliance testing takes precedence over end-to-end testing, that partner organizations will conduct their own internal end-to-end tests and provide input for DFAS, and that all mission critical systems will have contingency plans in place.

¹We identified 42 DFAS mission critical systems in previous audit reports. DFAS recently added three systems to its mission critical list: the Standard Accounting and Reporting System – One Bill Pay (STARS-OP), the Standard Army Financial Inventory Accounting and Reporting System (STARFIARS), and the Standard Base Supply System (SBSS).

Interface Requirements. The DFAS Master Plan states that each test event will include critical automated interfaces with other Departments and agencies. However, because of sizing limitations within the DoD Megacenters that support testing, DFAS and the other DoD organizations may not be able to run true end-to-end tests simultaneously. Rather, each organization will maintain sufficient control of their segment of the end-to-end testing process to ensure the integrity of the data flow from one system to the other.

Planning, Testing, and Reporting. The DFAS Master Plan specifies requirements for the following:

- **Live Versus Simulation.** DFAS plans to test its business processes under normal operating conditions when possible. Otherwise, DFAS will use a “time machine” or simulated operating environment and document the reasons and the associated risks.²
- **Critical dates.** Although the Master Plan does not designate specific dates for testing, it recommends that testing cover the following five time periods: the fiscal year 2000 crossover, calendar year 2000 crossover, fiscal year 2001 crossover, calendar year 2001 crossover, and leap year (February 29, 2000). DFAS recommends that whatever dates each event tests should be consistent with dates being tested by interfacing systems.
- **Baselines.** The Master Plan states that after testing the dates, DFAS organizations should compare their test results to outcomes previously determined as the baseline. (The baseline is the set of known end-to-end test inputs and outputs extracted from systems that have been certified as Y2K compliant). Each DFAS organization will document the discrepancies between each of the tests and the baseline.
- **Data Analysis and Documentation.** The Master Plan requires that each DFAS organization develop, and document in their test plan, a data collection and analysis strategy that provides sufficient information to support end-to-end test design, results and analysis. The Master Plan leaves the details for data analysis or documentation to the organizations responsible for testing.

²A time machine test strategy involves setting system clocks to the year 2000 and operating under testing conditions. Simulation is a program that allows testers to simulate changing dates rather than actually changing the dates during normal operations.

Preliminary Assessment. On May 28, 1999, the Office of the Inspector General, DoD, provided DFAS with preliminary audit results in a memorandum regarding DFAS planning for end-to-end testing in general. On June 8, 1999, the Director, Information and Technology, DFAS, responded to the issues of roles and responsibilities, Master Plan checklists, interfacing systems, critical crossover dates, data collection and analysis, and the transportation pay event. Our initial assessment and DFAS comments, as appropriate to the civilian pay business area, are discussed in the finding section of this report. Appendix B contains a copy of our memorandum and Appendix C is the DFAS response.

Objective

The overall audit objective was to evaluate the effectiveness of the planned end-to-end testing in the DoD civilian pay area. This report addresses plans for conducting Y2K end-to-end testing for DoD civilian pay. Other reports will address other DFAS critical business processes. See Appendix A for a discussion of the audit scope and methodology, the management control program, and prior audit coverage related to the audit objective.

Civilian Pay Year 2000 End-to-End Testing Event Plans

The civilian pay Y2K end-to-end event planners took the initiative to develop an end-to-end event plan before requirements were defined for DFAS as a whole, and developed a sound testing methodology. However, DFAS Headquarters did not require revisions to the civilian pay event plan as overarching guidance was issued. The event plan lacked requirements for data collection and data analysis. Despite the actions taken by DFAS during the audit, some concerns remain about the level of assurance that can be derived from the test results.

Civilian Pay Functional Area

The mission of the DFAS civilian pay functional area is to process payroll for DoD civilian employees, culminating in a civilian payday. The Defense Civilian Pay System (DCPS) is the payroll system for civilian employees in DoD. DCPS maintains pay and leave entitlement records, deductions and withholdings, time and attendance data, and other personnel data, for use in processing bi-weekly payroll. DCPS provides standard interface support to various DoD accounting, financial, disbursing, and personnel systems. DCPS makes payments via checks and electronic funds transfers, and provides entitlement information to the disbursing systems, which then make the payments via checks and electronic funds transfers. DCPS processes the entitlements for 708,000 DoD civilian employees totaling approximately \$37.6 billion annually.

During normal processing, DCPS receives inputs from 46 systems and sends outputs to 67 systems belonging to the military Services, Defense agencies, the Office of Personnel and Management, the Social Security Administration, state and local taxing authorities, and other agencies. Civilian pay event planners determined that there were seven critical business processes, or threads, involved in civilian pay. Critical processes are defined as those that, if not performed, would preclude or immediately impair the civilian payments and entitlements. The seven threads involved in the civilian pay event are:

- payment processing;
- garnishment;
- taxes and Social Security withholdings;
- bonds and sending electronic funds transfers to the Federal Reserve Bank;

-
- accounting;
 - processing with the Automated Time, Attendance and Production System (ATAAPS); and
 - processing with the Defense Civilian Personnel Data System – Modification (DCPDS-MOD).

During end-to-end testing, DCPS planned to receive inputs from 9 systems and send outputs to 21 systems. DCPS also planned to conduct additional interface tests with 19 systems, receiving inputs from 14 systems and sending outputs to 16 systems (some systems send and receive information to/from DCPS). The civilian pay event planners selected the systems they considered most critical to timely and accurate payments for input/output testing. For those systems not included in the end-to-end or interface tests, the civilian pay event planners relied on the results of interface testing already performed by DFAS during the DCPS Y2K certification process.

Civilian Pay End-To-End Event Plan

The DCPS System Manager and personnel at the Systems Engineering Organization, Pensacola, FL, began developing the “Civilian Payroll Y2K End To End Test Plan” in August 1998, prior to issuance of the DFAS Y2K End-to-End Master Plan. According to event planners, the plan was based on testing experience and common sense. The event planners developed the test plan based on the June 1998 draft of the General Accounting Office’s “Year 2000 Computing Crisis: A Testing Guide,” which was finalized in November 1998.

As part of the planning, civilian pay event planners determined that there were seven critical business processes (threads) involved in civilian pay. The civilian pay event planners identified the major trading partners that are critical to timely and accurate payments, and planned to conduct end-to-end testing with those partners. The event planners also planned interface testing with other major interface partners, and accepted the risk of relying on validation testing results for the remaining partners. The event planners developed a sound testing methodology for the end-to-end testing of the civilian pay event. As part of the testing methodology, the civilian pay event planners included re-testing of systems and threads as necessary – for example, if there was a failure during the test, or if there were configuration management changes to systems involved in the event.

DFAS End-to-End Project Office Actions

As previously stated, event planners began developing the civilian pay event plan in August 1998, prior to the DFAS end-to-end project office issuing the first version of the Master Plan in May 1999. The civilian pay event leader met with the DFAS end-to-end project office concerning the need to modify the plans based upon the guidance issued subsequent to completion of the civilian pay event plan. DFAS project office officials stated that the civilian pay event plan did not need to be revised, but that the plan should adhere to the new requirements.

Effectiveness of Civilian Pay Event Plan

While the civilian pay event plan was comprehensive and employed an appropriate testing methodology, the plan had shortfalls regarding data collection and data analysis.

Data Collection and Data Analysis Plans. The DoD Y2K Management Plan, Appendix I, requires that Y2K event plans and procedures specify in detail what type of data must be collected, who will analyze it, how it will be analyzed, and the mechanism for sending the Y2K data to the analysis site. In addition, the DFAS Master Plan exit criteria for the test planning phase requires that each event identify pass/fail criteria for all of its tests and that data collection procedures be in place and mechanisms needed to capture data be installed prior to test execution. The Master Plan, however, does not provide guidance as to what types of data should be collected to ensure consistency in reporting test results. The Master Plan states that each DFAS organization will document the data collection process in the appropriate event plan.

Civilian Pay Data Collection Plan. Although the DFAS Master Plan states that plans for data collection should be written at the event level, the civilian pay event plan did not contain a data collection plan. During the planning phase of end-to-end testing, the civilian pay event planners and their interface partners defined the Y2K dates that would be tested, and ensured that time and attendance systems were matched with accounting systems; however, we could not document any other data collection planning. According to civilian pay event planners, they were not familiar with the requirements for a “data collection plan” and they felt that it was not within their authority to require the managers of systems participating in the event to follow their instructions. Instead, the event planners relied on the participating systems to provide the appropriate information. Consequently, results obtained from the participating systems during testing may not be consistent or appropriate for data analysis purposes. Without this organized approach, the civilian pay event planners will not have a standard group of test data from which to conduct their analysis to determine if civilian pay is able to function in a Y2K environment.

A plan for data collection is critical to define how the system provides input/output, interactions, and data to be recorded at all principal phases of the assessment. As such, the civilian pay event plan should be amended to define specific data collection procedures, including defining:

- necessary tools and instrumentation;
- required data elements for when, where, how, by whom, and in what format data should be collected; and
- how the data will be transferred, archived and controlled for entry into the centralized operational evaluation database.

Subject matter experts should review the requirements for each data element desired, and then determine how the data can be captured or recorded at each site. When multiple sites are used, requirements must be consistent for all of the sites to assure quality data collection and analysis.

Testing for the civilian pay event began March 1, 1999. As of July 20, 1999, event planners had tested the DCPS segment for six of the seven threads. However, event planners had received confirmations from all partners in the thread for only one of the seven threads; they had received partial confirmation from partners for three of the remaining six threads. Event planners stated that they do not plan to provide the final test reports to the DFAS project office until October 1999.

Civilian Pay Data Analysis Plan. The civilian pay event plan also did not include a data analysis plan as required by the DoD Management Plan. The data analysis plan should have been written during the planning process to identify an organized approach to understand data requirements; identify potential issues, conflicts, or difficulties; and to evaluate test data to determine whether the test was successful. The evaluation section should have indicated “who, what, where, when, how, and how much” to analyze the data collected through the data collection plan.

Civilian Pay event planners stated they planned to determine the success of each test by the correct passing of the data from the inputting system to DCPS, or from DCPS to the receiving systems. Event planners also stated that they received information from inputting partners (prior to the test) that indicated what data DCPS should receive, and would use that information to determine whether the data passed correctly. However, even with this information to use as a starting point, there was no way to uniformly and objectively analyze the test results or ensure that the data processed accurately.

Given the nature of end-to-end testing, with its large numbers of participating systems, it is prudent to ensure that the data collection is as consistent as possible for each test, and that the analysis of the test data is

objective. Without the definition of data collection and data analysis plans, this is impossible. The civilian pay event planners can strengthen the end-to-end testing by documenting uniform, detailed data collection and data analysis procedures.

Recent Management Actions Taken

Memorandum to DFAS. We sent a memorandum on May 28, 1999, to the DFAS Director, Information and Technology, on issues concerning DFAS Y2K end-to-end event planning (see Appendix B). The DFAS Director, Information and Technology, responded in a memorandum dated June 8, 1999 (see Appendix C). The areas of concern included issues identified in this report, including data collection and analysis. The DFAS Director, Information and Technology, generally concurred with the issues identified, and discussed actions underway and planned to correct deficiencies in the planning process for DFAS end-to-end testing.

Our memorandum suggested that DFAS event leaders ensure that detailed data collection, analysis, and reporting requirements are clearly defined prior to testing. The DFAS project office concurred with the suggestion, and stated that DFAS agrees that current plans lack specific exit criteria and that it is taking action to strengthen this area of the plans. The project office further stated that DFAS Regulation 8000.1-R, "Information Management Policy and Instructional Guidance," October 15, 1998, provides guidance concerning data collection and analysis. In addition, the project office stated that DFAS had contracted with the Joint Interoperability Test Command for an independent verification and validation analysis of DFAS end-to-end test planning and testing. DFAS believes that the Joint Interoperability Test Command analysis/evaluation will document specific risks associated with data collection and analysis procedures in sufficient time for the project office to take corrective action.

In order to mitigate the risks related to data collection and analysis, it is essential to the testing process to determine the data collection and analysis procedures before testing or re-testing begins, so that the collection and analysis may be conducted in a consistent, uniform manner, and ensure accurate results.

Meeting with Civilian Pay Event Leader. On July 16, 1999, we met with the civilian pay event leader to review a discussion draft of this report. The event leader provided clarification and comments regarding the facts in the discussion draft. We incorporated his comments into the draft report, which was issued on August 18, 1999.

Conclusion

The DFAS project office responded positively, in general, to suggestions made during the course of the audit, but the civilian pay events would have been more effective if event planners had developed plans for collecting and analyzing the test data in a standardized method across the participating systems.

Although only one thread of the civilian pay end-to-end testing event has been completed (with confirmations received from all of the output partners in the thread), the civilian pay event planners have tested the DCPS segment for six of the seven threads. In view of the limited time remaining for end-to-end testing, as well as limited resources, a complete re-testing of these threads would be impractical. Civilian pay event planners should take action to strengthen the remainder of the testing, as well as any re-testing due to testing failures or configuration management changes. Moreover, they should emphasize the use of code scanning tools to provide additional assurance that data processing vulnerabilities have been found, and continue efforts to ensure that sound contingency plans are in place.

Recommendations, Management Comments, and Audit Response

We recommend that the Director, Defense Finance and Accounting Service require the civilian pay event leader, prior to the completion of end-to-end testing and any re-testing, to document uniform, detailed data collection and data analysis procedures that allow for uniform, standardized testing between participating systems.

DFAS Comments. The Director, DFAS Information and Technology, concurred with the recommendation, and stated that the civilian pay data collection and analysis methodologies will be documented and provided to DFAS by October 29, 1999 (upon submission of the final end-to-end test analysis report). The Director stated that because the requirements for data collection and data analysis plans were published after the civilian pay end-to-end test had begun, the event plan does not contain the plans. However, the Director believed that the civilian pay event planners met the spirit of the recommendation with actions they had already taken and planned to take.

The Director stated that although the civilian pay event planners did not create a data collection plan, they met the spirit of the recommendation because the civilian pay and interfacing partners had defined many of the data collection requirements, including:

-
- the actual activities and employees that would be tested;
 - the Y2K dates that would be tested;
 - where possible, files were prepared and sent in the environment that would mirror current and Y2K environment; and
 - data files were of the standard format and standard data definition that are contained in the DCPS Interface Specifications.

The Director, DFAS Information and Technology also stated that although the civilian pay event planners had not created a data analysis plan, the test procedures for the civilian pay event include an appropriate review of the test results to determine whether the test was successful. The Director further stated that the test procedures would determine whether there are errors affected by the Y2K environment. The test procedures include verifying:

- correct format of files,
- correct processing of files,
- record counts, and
- correct processing of reports as is currently done by a payroll office.

The Director, DFAS Information and Technology stated that the data collection requirements and the test procedures would be documented in data collection and data analysis plans, and submitted to DFAS (as part of the civilian pay end-to-end final analysis report) by October 29, 1999. See the management comments section of the report for the full text of the management comments.

Audit Response. We consider the DFAS comments to be generally responsive, although some concerns remain. Although the civilian pay event planners defined the Y2K dates that would be tested in each scenario, and ensured that data files complied with the DCPS Interface Specifications, they did not document detailed data collection procedures, such as the specific data that should be collected by interface partners during testing. In addition, the event planners should have defined the format of the files to be tested and the number of files to be tested in each test (counts). Without defining these detailed data collection procedures prior to testing, it is impossible for the event planners to verify that the tests were successful. Although the civilian pay event planners felt that they had developed steps that would allow for an appropriate analysis of the test results, we are concerned that the data analysis may be based on incomplete information. For example, the Director, DFAS Information and Technology stated that the data analysis steps developed by the civilian pay event planners include verifying that the files processed correctly. We question how the event planners can determine whether a file processed correctly without knowing how the file should have processed, information that would have been developed as part of the data collection procedures.

The DFAS Y2K Project Office has recently informed us that the Joint Interoperability Testing Command, Defense Information Systems Agency, will review the civilian pay event test results in October 1999. This will help to alleviate our concerns.

We believe that DFAS should aggressively employ code scanning to detect date processing vulnerabilities not identified in system level or end-to-end tests. Acquiring the additional assurance that scanning techniques provide is especially prudent when the function involves as sensitive an activity as personnel pay. Likewise, intensive attention to contingency planning is essential. The extent to which DFAS is using code scanning and the viability of contingency plans are being reviewed in separate audits.

Appendix A. Audit Process

This is one in a series of reports being issued by the Inspector General, DoD, in accordance with an informal partnership with the DoD Chief Information Officer to monitor DFAS efforts to address the Y2K computing challenge. For a listing of audit projects addressing the issue, see the Y2K web page at <http://www.ignet.gov>.

Scope

Work Performed. We performed the audit at DFAS Headquarters and the Systems Engineering Organization, Pensacola, Florida. We reviewed DoD and DFAS end-to-end guidance, the civilian pay functional area event plan, and individual civilian pay thread test plans. We also interviewed key DFAS officials.

Limitations to Audit Scope. The audit was limited to a review of planning efforts for the civilian pay end-to-end tests. We did not review the test results because testing had not been completed.

DoD-wide Corporate Level Government Performance and Results Act Goals. In response to the Government Performance Results Act, the Department of Defense has established 6 DoD-wide corporate level performance objectives and 14 goals for meeting these objectives. This report pertains to achievement of the following objectives and goals.

- **Objective:** Prepare now for an uncertain future. **Goal:** Pursue a focused modernization effort that maintains U.S. qualitative superiority in key warfighting capabilities. **(DoD-3)**

DoD Functional Area Reform Goals. Most major DoD functional areas have also established performance improvement reform objectives and goals. This report pertains to achievement of the following functional area objectives and goals.

- **Information Technology Management Functional Area.**
Objective: Become a mission partner. **Goal:** Serve mission information users as customers. **(Information Technology Management-1.2)**
- **Information Technology Management Functional Area.**
Objective: Provide services that satisfy customer information needs. **Goal:** Modernize and integrate Defense information infrastructure. **(Information Technology Management-2.2)**

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- **Information Technology Management Functional Area.**
Objective: Provide services that satisfy customer information needs.
Goals: Upgrade technology base. (Information Technology Management-2.3)

General Accounting Office High Risk Area. The General Accounting Office has identified several high-risk areas in the DoD. This report provides coverage of the Information Management and Technology high-risk area.

Methodology

Use of Computer-Processed Data. We did not use computer-processed data for this audit.

Use of Technical Assistance. We met with technical experts in our Audit Follow-up and Technical Support Directorate to discuss issues relating to testing.

Audit Type, Dates, and Standards. We performed this program audit from March 1999 through July 1999, in accordance with auditing standards issued by the Comptroller General of the United States, as implemented by the Inspector General, DoD.

Contacts During the Audit. We visited or contacted individuals and organizations within DoD. Further details are available upon request.

Management Control Program. We did not review the management control program related to the overall audit objective because DoD recognized the Y2K issue as a material management control weakness area in the FY 1998 Annual Statement of Assurance.

Prior Audit Coverage

The General Accounting Office and the Inspector General, DoD, have conducted multiple reviews related to Y2K issues. General Accounting Office reports can be accessed over the Internet at <http://www.gao.gov>. Inspector General, DoD, reports can be accessed over the Internet at <http://www.dodig.osd.mil>.

Appendix B. Inspector General, DoD, Memorandum to DFAS on Y2K End-to-End Event Planning



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

MAY 28 1999

MEMORANDUM FOR DIRECTOR FOR INFORMATION AND TECHNOLOGY,
DEFENSE FINANCE AND ACCOUNTING SERVICE

SUBJECT: Status of Audits of Finance Functional Area Year 2000 End-to-End Tests

In April 1999, we initiated the following audit projects to evaluate the effectiveness of Y2K end-to-end testing by the Defense Finance and Accounting Services (DFAS). The projects were aligned by functional area in accordance with the functional break-out identified by DFAS.

Civilian Pay	Project 9FG-9025
Military/Retiree/Annuitant Pay	Project 9FG-9026
Vendor/Contractor Pay	Project 9FG-9027
Transportation Pay	Project 9FG-9028
Disbursing	Project 9FG-9029
Accounting	Project 9FG-9030
Travel Pay	Project 9FG-9031

Our review, to date, has focused on analyzing the adequacy of test plans for the seven areas. We evaluated the adequacy of the DFAS Y2K test plans using requirements contained in the DoD Y2K Management Plan, Version 2.1, Appendix I; the DFAS Y2K Management Plan, Version 1.0; the DFAS Y2K End-to-End Master Plan, Version 2.1; the DFAS Regulation 8000.1-R, "Information Management and Instruction Guidance," Version 5 0; and the GAO Operational Evaluation Assessment Tool. We anticipate future audits will assess test results and contingency planning efforts by DFAS.

Because of the urgency of Year 2000 efforts, our intent is to communicate potential areas of concern as quickly as possible so that management may address these issues in a timely manner. The attachment to this memorandum reports the initial results of our review. During our preliminary review, we identified concerns regarding the adequacy of DFAS planning efforts for functional end-to-end testing. If these concerns are not addressed, there is increased risk that DFAS end-to-end testing may not detect a significant Y2K problem. We may include these and any additional issues in a draft report at a later date. We request that you provide a response to this memorandum by June 8, 1999. If there are any questions, please contact Ms. Kimberley Caprio, Program Director at (703) 604-9139 or DSN 664-9139.

F. Jay Lane
Director

Finance and Accounting Directorate

DFAS has made significant progress in addressing testing requirements for its functional areas including the issuance of a Master Plan, identification of levels of responsibility, and checklists for test planning purposes. During our review, we identified the following concerns that should be addressed by DFAS. On May 27, 1999, we met with DFAS officials to discuss the concerns and actions to be taken.

1. **Roles and Responsibilities.** The DFAS Master Plan identified four levels of responsibility for end to end testing including Headquarters functional proponents, systems managers, event leaders, and thread leaders. The Plan defined roles and responsibilities for functional proponents and systems managers, but did not provide details on the responsibilities for either the event or thread leaders. During the May 27, 1999 meeting, DFAS Headquarters personnel, acknowledged the need for oversight and agreed to provide the details immediately.

In addition, the Master Plan was not issued until May 11, 1999, and in some cases had not arrived at the event leader level until May 18, 1999. However, functional event plans and allocation of responsibilities was already occurring. As a result, the individuals delegated the responsibilities may not have been appropriate. For example, for the Travel pay event, the same person was tasked as both the functional proponent and the event leader. As a result, it precludes the separation of duties by allowing one function to oversee the other function. To ensure that the 4 levels of responsibility are appropriately staffed, the DFAS Headquarters Project Office should review the assigned personnel and ensure that they are aware and understand their delegated responsibilities.

2. **Master Plan Checklists.** The DFAS Y2K Master Plan included four checklists to be used by DFAS Headquarters personnel, the functional area proponent, the event leader, and the tester. These checklists require DFAS personnel to assess the effectiveness of the end-to-end testing program at each designated level including such items as assessing the adequacy of testing staff, funds, and interface agreements. The DFAS Master Plan stated that these checklists would "provide independent auditors with evidence of compliance with the end-to-end test requirements," however, the Master Plan did not make completion of the checklists mandatory.

We believe the checklists should be mandatory and maintained at the functional level along with test results. The 2 to 3 page checklists provide an excellent means to ensure and document that essential steps were taken prior to performing end to end testing of DFAS functional areas. Completion of the planning section of these checklists provides a tool to help ensure compliance with the Master Plan requirements and allow for early corrections of deviations or omissions from the plan. Further, use of the checklist affords standardization of the process used throughout DFAS for end to end test planning efforts. Without the use of the checklists, DFAS lacks assurance that the testing was complete, adequate, and consistent. We also believe that a

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signature block or notation should be included in the checklists to establish accountability for the responses and to facilitate quick actions should a problem arise later.

3. **Interfacing Systems.** DFAS relies heavily on interfacing systems to provide the majority of data included in DFAS systems. As such, coordination and compatibility of data exchanged with interfacing systems is critical to ensuring successful Y2K end to end tests. If data from a non-compliant system feeds into a DFAS system, the potential exists for the DFAS system to not be able to function properly after Y2K. The level of assurance being obtained by DFAS functional area officials regarding Y2K compliance of interfacing systems varies from exchanging documentation to merely assuming that interfacing systems are compliant or relying on verbal responses.

Given the significant potential impact of interfaces on successful testing, we believe that DFAS functional leaders should take the extra step to validate that key interfacing systems are, in fact, compliant. Information on the compliance of each DoD mission critical system should be available in the OSD database. As such, DFAS personnel for the functional areas should be able to access the database and validate that those applicable interfacing partners are clearly designated as Y2K compliant before entering the end-to-end test. We discussed this matter with DFAS Headquarters officials who agreed that, while they are only testing with compliant interfacing partners, it is reasonable that DFAS review the database to ensure that interfacing partners are compliant prior to testing.

4. **Critical Crossover Dates.** The DFAS Master Plan identified 5 critical crossover dates as mandatory for inclusion during end-to-end tests. The dates are consistent with the 5 dates recommended by the Assistant Secretary Defense (Command, Control, Communications, and Intelligence). The dates are fiscal year 2000, calendar year 2000, leap year crossing (February 29, 2000), fiscal year 2001, and calendar year 2001. Developers of DFAS test plans have not planned to test all 5 dates. For example, the Marine Corp Total Force System is only testing the leap year 2000 crossover. The Computerized Accounts Payable System is not testing the fiscal year and the calendar year 2001 crossovers. The reduced number of dates being tested is a result of:

- The test plans being developed prior to the issuance of the DFAS Master Plan on May 11, 1999,
- Personnel pay systems, for example, not being impacted by fiscal year changes,
- Funding being allocated based on test plans developed prior to the Master Plan.

In order to ensure compatibility of interfacing systems, it is important that the same dates are tested, particularly where DFAS systems feed data to other systems. For example, data from systems within the Travel Pay test event feed into systems within the Disbursing test event. Further, once processed within disbursing, data is fed to both

accounting and back to travel systems. Incoming files to the Automated Disbursing System (ADS) (part of the Disbursing test event) plan to test all dates specified in the DFAS Y2K Master Plan. However, the Travel Pay test event does not plan to test the fiscal year 2000 to 2001 crossover. As a result, the potential exists that data relying on the fiscal year 2000 to 2001 crossover may not function properly. Meanwhile, DFAS may report a successful test based on the less than 5 dates being tested.

It is important that interfacing systems select test dates in a similar manner to ensure Y2K data flows through each system appropriately. DFAS functional leaders should ensure that critical crossover dates for each of the seven functional areas are compatible prior to testing.

5. **Data Collection and Analysis.** The DoD Y2K Management Plan states that Y2K event output products such as plans and procedures should specify in detail what data needs to be collected, who will analyze the data, and how it will be analyzed. Essentially, the requirement is to define expected test results. Consistent with the DoD Plan, the DFAS Master Plan requires, as exit criteria to the test planning phase, that responsible parties specify pass/fail criteria for all tests, that data collection procedures are in place, and mechanisms needed to capture data are installed. The DFAS Master Plan, however, does not specify:

- What types of data should be collected to ensure consistency in reporting test results.
- A methodology for each DFAS organization to document the data collection process in the appropriate Event Plan

For the 7 DFAS functional events, data collection and data analysis plans are either nonexistent or do not ensure the tests will be judged objectively. For example, the Defense Industrial Financial Management System (DIFMS) Test Plan, which is part of the Accounting Test Event, plans to review reports, queried data, and DIFMS screens to accomplish data analysis, but did not establish expected test results criteria or a baseline that could be used to determine the adequacy or accuracy of the reports, queries, and screens. As another example, the Civilian Pay Event lacks either a data collection plan or a data analysis plan. Instead, the Event Leader indicated that years of prior testing and DCPS experience will identify discrepancies should they arise

Both DoD and DFAS require the establishment of a structured approach to testing including identifying expected outcomes, test participants, and other details. Without such plans, there is no organized or standardized approach between the participating systems, nor any assurance that test goals are met and tests were successful. Given the nature of end-to-end testing, with its large numbers of participating or "partner" systems, it is prudent to ensure that the data collection is as consistent as possible for each event, and that the analysis of the test data is objective. Without the definition of data collection and data analysis plans before testing begins, this will be difficult.

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DFAS Functional Test Leaders need to ensure that detailed test collection, results, and analysis requirements are clearly defined prior to testing

6. **Transportation Pay Event.** DFAS identified Transportation Pay as one of the 7 functional areas for testing purposes. However, DFAS has not yet developed an end-to-end test plan for the event. There are two systems involved in transportation, the Defense Transportation Pay System (DTRS) and the Military Traffic Management Command - Financial Management System (MTMC-FMS). The Transportation Pay Event Leader stated that MTMC-FMS testing during Y2K conversion process accomplished the end-to-end requirements of the Master Plan. DFAS has subsequently contracted with the Joint Interoperability Testing Command (JITC) to independently verify and validate the prior testing. We plan to follow-up on this functional area

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Appendix C. DFAS Memorandum on Y2K End-to-End Event Planning



DEFENSE FINANCE AND ACCOUNTING SERVICE

1931 JEFFERSON DAVIS HIGHWAY
ARLINGTON, VA 22240-5291

JUN 8 1999

DFAS-HQ/S

MEMORANDUM FOR DIRECTOR, FINANCE AND ACCOUNTING DIRECTORATE
OFFICE OF THE INSPECTOR GENERAL, DEPARTMENT OF
DEFENSE

SUBJECT: Status of Audits of Financial Functional Area
Year 2000 End-to-End Tests

The attached outlines Defense Finance and Accounting Service (DFAS) response to the DoD Inspector General's (IG) initial review of and concerns about DFAS' End-to-End Test (E2E) Plans. DFAS recognizes that a great deal of work is still to be done to ensure all necessary requirements for E2E are accomplished. To meet this goal, DFAS has conducted meetings with event and thread leaders to review all E2E guidelines and requirements.

All concerns addressed in the DoD IG's memo are being addressed.

Roles and Responsibilities: Concur. Action to expand event and thread leader roles will be accomplished by June 25, 1999.

Master Plan Checklist: Non-concur. DFAS will not mandate the checklist.

Interfacing Systems: Concur. This action is considered completed, but with periodic updates.

Critical Crossover Dates: Concur. This action is completed.

Data Collection and Analysis: Concur. This is an ongoing action with no specific target date.

Transportation Pay Event: Concur. This is an ongoing action with a target completion date of June 30, 1999.


C. Vance Kauzlarich
Director for Information and Technology

Attachment:
As Stated

Roles and Responsibilities. Concur. DFAS acknowledges that testing and planning activities were occurring prior to the issuance of the Master Plan on 6 May. However, several coordination meetings had already occurred and guidance on developing Event Plans was issued on 31 March. DFAS also acknowledges the need to clarify and augment the roles and responsibilities of the event and thread leaders in the DFAS E2E Master Plan. We are currently making site visits and meeting with the testing teams to clarify roles and responsibilities and are updating the Master plan as well. It should be noted there may be an overlap in the area of responsibility, due to the fact that the internal DFAS support structure for each business process/application has a great bearing upon the specific breakout of roles and responsibilities. DFAS does not view this as a conflict or an inappropriate assignment of duties.

Master Plan Checklist. Non-concur. DFAS designed and issued these checklists as tools to assist DFAS personnel responsible for planning, tracking, and conducting end to end testing. Because each business area/application has a normal testing practice already established, DFAS did not make the checklists mandatory, and would prefer to keep the use of checklists optional. However, DFAS will encourage the use of the checklists whenever possible.

Interfacing Systems. Concur. DFAS agrees that coordination and compatibility of data exchange between DFAS systems and their interface partners is essential to a successful Y2K effort. DFAS has pursued this goal for the past two years. DFAS has established Interface Agreements with all of its interface partners. This effort generated in excess of 1400 agreements. In addition, DFAS has tracked and updated on a monthly basis the status of testing and compliance of each of its interface partners. DFAS system managers are well aware of the status of each of its partners. DFAS will continue to track and monitor the status of its interface partners mission critical and other.

Critical Crossover Dates. Concur. DFAS acknowledges the importance of testing as many dates as possible, and the coordination of these dates among partners. All DFAS managers have been encouraged to coordinate this initiative with all pertinent parties. It must be understood that dates do not necessarily play an important part in the relationship of one system to another. The DFAS E2E Master Plan has recently been updated to empower the Functional

Managers with determining which dates are critical for testing within their specific business process. We have also hired JITC to independently validate and verify our planning efforts.

Data Collection and Analysis. Concur. DFAS agrees that current plans lack specific exit criteria and we are taking action to strengthen this area of our plans. DFAS 8000.1-R, Part E, Chapter 3, Test and Evaluation provides guidance concerning data collection and analysis. Our central design activities normally plan and execute their tests, using this guidance, precluding the need for specific guidance to be issued relative to E2E testing.

Each testing agent within DFAS implements the regulation within their own construct, resulting in a non-standard, but successful, data collection and analysis process. Because Y2K E2E testing requirements are not system centric, but business process centric, we have hired JITC to independently validate and verify our E2E planning and testing efforts. The JITC analysis/evaluation will document specific risks associated with data collection and analysis procedures, in sufficient time for us to take corrective action.

Another measure of risk mitigation is to conduct site visits, where we meet with all thread participants. During these meetings we are emphasizing the need for adequate documentation of their data collection and analysis procedures, as well as documenting version control and configuration management procedures.

Transportation Pay Event. Concur. In addition to the Transportation Pay System, DFAS has identified several other systems, which claim completion of the end to end testing initiative. JITC will be used to verify that these systems indeed have met E2E requirements. If any system fails to pass the validation of JITC, steps will be initiated to complete all or any portion of the E2E process that needs to be completed.

Appendix D. Report Distribution

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition and Technology
Director, Defense Logistics Studies Information Exchange
Under Secretary of Defense (Comptroller)
Deputy Chief Financial Officer
Deputy Comptroller (Program/Budget)
Under Secretary of Defense (Personnel and Readiness)
Assistant Secretary of Defense (Command, Control, Communications, and Intelligence)
Deputy Chief Information Officer and Deputy Assistant Secretary of Defense (Chief
Information Officer Policy and Implementation)
Principal Director for Year 2000

Department of the Army

Inspector General, Department of the Army
Auditor General, Department of the Army

Department of the Navy

Assistant Secretary of the Navy (Financial Management and Comptroller)
Inspector General, Department of the Navy
Auditor General, Department of the Navy
Inspector General, Marine Corps

Department of the Air Force

Assistant Secretary of the Air Force (Financial Management and Comptroller)
Inspector General, Department of the Air Force
Auditor General, Department of the Air Force

Other Defense Organizations

Director, Defense Contract Audit Agency
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Director, Defense Information Systems Agency
Inspector General, Defense Information Systems Agency
United Kingdom Liaison Officer, Defense Information Systems Agency
Director, Defense Logistics Agency
Director, National Security Agency

Other Defense Organizations (cont'd)

Inspector General, Defense Intelligence Agency
Defense Systems Management College

Non-Defense Federal Organizations

Office of Management and Budget
Office of Information and Regulatory Affairs
General Accounting Office
National Security and International Affairs Division
Technical Information Center
Director, Defense Information and Financial Management Systems, Accounting and
Information Management Division, General Accounting Office

Congressional Committees and Subcommittees, Chairman and Ranking Minority Member

Senate Committee on Appropriations
Senate Subcommittee on Defense, Committee on Appropriations
Senate Committee on Armed Services
Senate Committee on Governmental Affairs
Senate Special Committee on the Year 2000 Technology Problem
House Committee on Appropriations
House Subcommittee on Defense, Committee on Appropriations
House Committee on Armed Services
House Committee on Government Reform
House Subcommittee on Government Management, Information, and Technology,
Committee on Government Reform
House Subcommittee on National Security, Veterans Affairs, and International
Relations, Committee on Government Reform
House Subcommittee on Technology, Committee on Science

Defense Finance and Accounting Service Comments



DFAS-HQ/S

DEFENSE FINANCE AND ACCOUNTING SERVICE

1931 JEFFERSON DAVIS HIGHWAY
ARLINGTON, VA 22240-5291

SEP - 2 1999

MEMORANDUM FOR DIRECTOR, FINANCE AND ACCOUNTING DIRECTORATE
OFFICE OF THE INSPECTOR GENERAL, DEPARTMENT OF
DEFENSE

SUBJECT: Audit Report on Defense Civilian Pay Year 2000
End-to-End Testing (Project No. 9FG-9025)

The attached outlines Defense Finance and Accounting Service (DFAS) response to the DoD Inspector General's (IG) Report on Defense Civilian Pay Year 2000 End-to-End Event Plans.

The recommendations in subject report are being implemented as outlined in the attached response. The Civilian Pay Project Officer began End-to-End test planning prior to DFAS being included in the OSD guidance to include all mission critical systems in at least one end-to-end test. Their planning was well on its way by the time the DFAS Y2K E2E Master Plan was published on May 6, 1999. The data collection and analysis methodologies used by the Civilian Pay Project Officer will be documented and provided by October 29, 1999.


C. Vance Kauzlarich
Director for Information and Technology

Attachment:
As stated

COMMENTS ON
DRAFT REPORT OF AUDIT
DEFENSE CIVILIAN PAY
YEAR 2000 END-TO-END EVENT PLANS
PROJECT NO. 9FG-9025

RECOMMENDATION:

The Director, Defense Finance and Accounting Service require the civilian pay event leader, prior to the completion of end-to-end testing and any re-testing, to document uniform, detailed data collection and data analysis procedures that allow for uniform, standardized testing between participating systems. Concur

RESPONSE:

Data collection Plan: Since the requirement for a data collection plan was published after the civilian pay end to end test had begun, and in some cases finished, the civilian pay event plan does not contain a document that is called data collection plan. However, the spirit of the requirement have been met since the civilian pay and the interfacing partners defined many of the data collection requirements including:

- The actual activities and employees that would be tested
- The year 2000 dates that would be tested
- Ensuring that time and attendance systems were matched with accounting systems
- All data being passed were created by Y2K compliant systems, operating where possible in a Y2K environment, not by files that were manipulated by changing dates.
- Where possible, files were prepared and sent in the environment that would mirror current and Y2K environment
- Data files were of standard format and standard data definition that is contained in the DCPS Interface specifications

Since the data collection plan is not in a single document, a data collection plan will be documented and submitted with other certification documents by October 29, 1999.

Data Analysis Plan: Since the requirement for a data collection plan was published after the civilian pay end to end test had begun, and in some cases finished, the civilian pay event plan does not contain a document that is called data analysis plan. However, the test procedures include the appropriate review of the test results to determine whether the test was successful and, more importantly, if there are errors affected by the Y2K environment. These steps include verifying:

- Correct format
- Files processed correctly
- Counts
- Reports as is currently done by a payroll office

Since the data analysis plan is not in a single document, a data analysis plan will be documented and submitted with other certification documents by October 29, 1999.

Audit Team Members

The Accounting and Finance Directorate, Office of the Assistant Inspector General for Auditing, DoD, prepared this report.

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