W September 9, 1999

TO: AO/Chief Information Officer

FROM: W/Assistant Inspector General for Auditing

SUBJECT: Final Report on the Year 2000 Date Conversion – Assessment Phase Summary
Assignment Number A9902500
Report Number IG-99-035

The subject final report is provided for your information and use. Please refer to the Executive Summary for overall audit results. The draft of this report contained no recommendations, and management was not required to and chose not to provide comments.

If you have questions concerning the report, please contact Mr. Brent Melson, Program Director, Information Assurance Audits, at (202) 358-2588, or Ms. Clara Lyons, Auditor-in-Charge, at (216) 433-8985. We appreciate the courtesies extended to the audit staff. The report distribution is in Appendix E.

[original signed by]

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IG-99-035

AUDIT REPORT

YEAR 2000 DATE CONVERSION – ASSESSMENT PHASE SUMMARY

September 9, 1999

National Aeronautics and
Space Administration

OFFICE OF INSPECTOR GENERAL

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Acronyms

IT	Information Technology
BCCP	Business Continuity and Contingency Plan
CIO	Chief Information Officer
COTS	Commercial-off-the-Shelf
DCAA	Defense Contract Audit Agency
DCMC	Defense Contract Management Command
GAO	General Accounting Office
JPL	Jet Propulsion Laboratory
OMB	Office of Management and Budget
Y2K	Year 2000

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NASA Office of Inspector General

IG-99-035 **September 9, 1999**
A9902500

Year 2000 Date Conversion Assessment Phase Summary Report

Executive Summary

Background. The Year 2000 (Y2K) date conversion problem could affect computer systems worldwide. Many computer systems and applications use a standard two-digit format (MM/DD/YY) to generate a date. The two-digit number representing the year may cause failures in arithmetic, comparisons, sorting, and input/output to databases or files as of January 1, 2000, because computers may not be able to distinguish between 1900 and 2000.

The Y2K assessment phase process includes identifying and evaluating all aspects of information systems that may be affected by date calculations. After identification, strategies to test for date compliance, correct identified problems, develop contingency plans, and estimate costs must be in place. NASA is using a management approach for its Y2K program that is consistent with, and supportive of, the Agency's framework for strategic and program management.

Objectives. The overall objective of our audit was to determine whether NASA has adequately assessed the magnitude of its Y2K efforts and accurately reported the results of its assessment to the Office of Management and Budget (OMB). Appendix A contains our specific objectives and additional information on scope and methodology. The Office of Inspector General has other ongoing audits addressing NASA's Y2K renovation, validation, and implementation efforts.

Results in Brief. Overall, NASA established demanding goals and processes to provide reasonable assurance that Y2K date conversion problems have been adequately identified. This report provides a summary of how seven NASA Centers[1] addressed the goals related to the Y2K Assessment Phase. The Centers we reviewed incorporated into their respective Y2K projects the processes for:

- identifying inventory items,
- classifying items by criticality,
- updating the Y2K inventory,
- developing conversion strategies,

[1] The Centers included Ames Research Center, Glenn Research Center, Goddard Space Flight Center, Jet Propulsion Laboratory, Johnson Space Center, Kennedy Space Center, and Marshall Space Flight Center.

- testing for compliance,
- identifying and evaluating data exchanges and interfaces, and
- developing strategies for contingency plans.

The processes in place generally allowed NASA to report adequate data to OMB on a quarterly basis.

However, we identified several opportunities for improving NASA Assessment Phase activities in a September 30, 1998, report, "Year 2000 Date Conversion – Assessment Phase" (Report Number IG-98-040). The report contains recommendations regarding NASA's Y2K assessment effort. See Appendix B for a summary of the report.

Recommendations. This report contains no recommendations for corrective action, and management did not provide comments.

Introduction

The President issued Executive Order 13073, "Year 2000 Conversion," February 4, 1998, to address the magnitude and potential effects of the Y2K problem in the Federal Government. The President directed Federal agencies to ensure that no critical Federal program would be disrupted because of Y2K problems. OMB Memorandum 97-13, "Computer Difficulties Due to the Year 2000 – Progress Reports," May 7, 1997, requires some Federal agencies, including NASA, to provide quarterly reports on progress in addressing the Y2K problem. OMB also established a standard reporting format for the quarterly reports. In addition, OMB Memorandum 98-02, "Progress Reports on Fixing Year 2000 Difficulties," January 20, 1998, outlined several new reporting requirements. As a result of the requirements, NASA must report, among other things, (1) progress in identifying and fixing mission-critical and nonmission-critical systems, (2) cost estimates for fiscal years 1996 through 2000, (3) efforts to identify data exchanges, and (4) the approach for contingency planning. In addition, the General Accounting Office (GAO) issued GAO/AIMD-10.1.14, "Year 2000 Computing Crisis: An Assessment Guide," in September 1997. The guide presents a structured approach and a checklist to aid Federal agencies in planning, managing, and evaluating their Y2K programs. It also outlines key processes for assessment activities including identifying, assessing, prioritizing, and analyzing an agency-wide inventory.

The NASA Administrator initiated the Y2K program in 1996 and is accountable for its overall success. He delegated overall accountability and responsibility for the Y2K program to the NASA Chief Information Officer (CIO). Further, a Y2K program manager, who reports directly to the NASA CIO, has day-to-day responsibility for managing the program. Enterprise Associate Administrators and NASA Center Directors are accountable for ensuring that Y2K program requirements are met within their respective areas of responsibility. Enterprise CIO representatives have been assigned and are responsible for coordinating Y2K progress at the Centers for which they have responsibility. Center CIO representatives have been assigned and are responsible for ensuring that all Y2K problems or deficiencies are identified, planned for, and resolved on schedule and within budget.

NASA's Assessment Process

NASA's Y2K Inventory Process

The Agency issued "The Year 2000 Problem; Planning and Data Collection," on August 9, 1996, requiring Center CIO representatives to identify, plan, and resolve Center Y2K problems. The NASA CIO requested that each Center CIO representative perform data collection in two phases. In the first phase, the CIO representatives were to complete a preliminary inventory of Center commercial-off-the-shelf (COTS)[2] and non-COTS products. The Center CIO representatives were to identify COTS and non-COTS software, the platforms on which the products operated, names and version numbers of the products, and the names and addresses of the vendors or contractors that supported the products. The CIO instructed the Centers to provide, by August 22, 1996, a preliminary inventory; a rough cost estimate, by fiscal year; and a prioritized list of all non-COTS products for change or replacement. The second phase, to be completed by October 1, 1996, was to ensure that the COTS and non-COTS inventory was comprehensive, complete, and accurate. In addition, the CIO asked the Centers to provide a reliable cost estimate, by fiscal year, and the dates by which the prioritized list of all non-COTS products would be changed or replaced.

The August 9, 1996, initiative also made Information Technology (IT) Lead Centers responsible for collecting, consolidating, and integrating the data for all COTS products within their areas of responsibility. The table shows the Lead Centers and their respective COTS products.

IT Lead Center Responsibilities

Center	Type of COTS Products
Ames Research Center	Supercomputers
Glenn Research Center	Workstation and file servers
Marshall Space Flight Center	Communication and mainframes

Johnson Space Center (Johnson) is responsible for identifying IT activities involving international partners, including data interface/exchange and communication equipment not covered by the Marshall Space Flight Center (Marshall) in its lead center role for communication and mainframe COTS products. The Headquarters Office of Management Systems is responsible for Agency-wide legacy systems. Each Center is responsible for evaluating its own non-COTS software for Y2K problems and for planning necessary corrective actions.

In April 1997, NASA incorporated the IT Lead Center approach in its first Y2K Project Plan, which outlined project goals, objectives, responsibilities, strategies, and reports. The project plan

[2] COTS products are hardware and software that can be purchased commercially.

also included Center-specific project plans based on OMB's required, Y2K, five-phase sequential approach: awareness, assessment, renovation, validation, and implementation. Details on the five-phase approach are in Appendix C.

In December 1997, the CIO and the Y2K Program Manager met with all Y2K project managers and Center CIO representatives to initiate a rebaselining[3] of the Y2K inventory. In addition to reworking various Y2K schedules to meet new OMB Government-wide goals, the rebaselining included adjustments to the Y2K inventory as a result of NASA-identified deficiencies in inventory reporting. For example, several Centers did not include business systems and various NASA aircraft as mission-critical inventory items for OMB reporting purposes. In addition, Ames Research Center (Ames) and Langley Research Center (Langley) were to perform significant reassessments of their respective inventories. NASA has followed up the rebaselining activities with continued assessments of Y2K effects on the Agency. The efforts have and continue to include a range of techniques from focused interviews and surveys of NASA personnel to structured workshops. NASA plans to continue to reassess its position through 1999.

Audit Results

The Centers organized individual Y2K project teams to identify potential Y2K problems with their respective inventories. Although the names and organizational structures of the Center Y2K project teams varied at the Centers we reviewed, it was evident that a concerted effort had taken place. For example, the Marshall CIO formed a Y2K Working Group consisting of representatives from every major Marshall Enterprise. The representatives were responsible for advocating, coordinating, and facilitating various Y2K activities for their respective organizations. In addition, the Enterprise's organizational components were responsible for identifying IT systems for inclusion in the Y2K inventory. The Jet Propulsion Laboratory (JPL) established the Y2K Implementation Integration Project and, similar to Marshall's efforts, staffed it with a Y2K Project Manager and directorate and office representatives.

The Center Y2K project teams used various strategies to identify inventory items. For the most part, the strategies involved the knowledge and expertise of hundreds of personnel NASA-wide. The personnel used configuration management systems, source code libraries, hardware inventories, and personal experience to identify items for inventory purposes.

One of the main variations among the Centers was the definition of a "system." We reviewed a judgmental sample of inventory items (Appendix D) to evaluate the processes the Centers used to identify all components of an item during the assessment phase. In some cases, a NASA inventory line item included hundreds of subsystems and components. In other cases, the line item was an application that was a component of a much larger system. The initial NASA definition of a system was subjective and allowed for a great degree of latitude when developing strategies to assess Y2K problems. This was further evidenced in July 1998, when the CIO

[3] Rebaselining refers to NASA evaluating Y2K progress and milestones in order to meet and be consistent with changes to OMB's Government-wide goals and requirements.

provided the following definition of an inventory item for the first time in the "NASA Y2K Test and Certification Guidelines and Requirements":

> A NASA inventory item may be an IT system, non-IT system, application, hardware component, software component, firmware, or COTS product. An inventory item may be a combination of custom software, hardware, and COTS products, or any component item.

The guidance made the Centers responsible for determining which inventory items were to be assessed, corrected, validated, or certified compliant for Y2K purposes.

We also reviewed the efforts of the NASA Lead Centers in identifying and communicating the compliance status of COTS products. Although the Lead Centers had unique processes in place for identifying COTS products, the Centers did not adequately communicate accumulated data to other Centers. Our audit report IG-98-040, "Year 2000 Date Conversion – Assessment Phase," September 30,1998, recommended that NASA share information on the status of COTS products and establish processes to reduce redundancy of evaluation efforts (see Appendix B).

Each Center we reviewed had staffed a team to manage the Y2K effort including the inventory process. NASA incorporated processes to adequately accumulate and report Y2K inventories to OMB. In addition, NASA generally developed and used processes consistent with the guidelines in GAO's "Year 2000 Computing Crisis: An Assessment Guide," dated September 1997.

Mission-Critical Classification

In January 1997, the Congress tasked the OMB to accumulate and report information summarizing Federal agencies' Y2K progress. Accordingly, OMB required some Federal agencies, including NASA, [4] to provide quarterly reports on progress in addressing the difficulties relating to the Y2K problem. As part of the OMB reporting requirements, NASA was to report its progress in identifying and fixing mission-critical systems. To meet this requirement, NASA reevaluated its initial COTS/non-COTS inventories. In the absence of an OMB Government-wide definition of mission critical, on April 23, 1997, the CIO provided the following definition as part of the Y2K metrics for measuring Y2K progress:

> At a minimum, the mission critical systems will include:
>
> - The major NASA computer programs and systems listed in Enclosure A.[5]
>
> - Any other IT or non-IT resources (facilities, bio-medical devices, and other electronic devices) which are identified as vulnerable to the Year 2000 problem and which Headquarters or Center CIO's determine could cause loss of life, serious injury, breach of security, compromise of a NASA mission, or significant disruption of services needed to carry out NASA's business.

In May 1997, NASA reported 453 mission-critical systems in its initial quarterly submission to OMB. NASA reduced this number by 301 as a result of its December 1997 rebaselining effort. The reduction was attributable to eliminating the Marshall business system COTS items that had been misclassified as mission critical. Accordingly, NASA reported 158 mission-critical items to the OMB in February 1998.

After its rebaselining efforts, NASA redefined mission-critical items through an April 1998 revision to its Y2K Program Plan. The Centers were to classify an inventory item as mission critical if it met one of the following criteria:

- Requires special management attention because of its importance to the Agency mission or impact on the administration of Agency programs, finances, property, or other resources.

- Involves functions that affect safety or human life.

- Is a high-risk or impact system in that a negative impact would place NASA at significant or irreparable damage.

- Has significant financial value.

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[4] OMB initially required 28 Federal agencies to report quarterly on the status of their Y2K efforts and later added selected small agencies.

[5] Enclosure A included a list of major NASA IT investments that require special management attention because of their importance to the Agency mission; or high-development, operating, or maintenance costs; or high risk or high return; or significant impact on the administration of Agency programs, finances, property, or other resources.

Although the revised definition was more specific for Center use, NASA reported the same 158 mission-critical items to OMB. As of May 15, 1999, the only change to the list was the retirement of one system, leaving the reported total of mission-critical items at 157.

Audit Results

NASA first classified applicable inventory items as mission-critical as a result of the OMB requirement for Federal agencies to report the status of mission-critical systems in May 1997. As discussed earlier, the NASA CIO defined mission critical for Center use. While the Centers had different interpretations of the definition, each had a process in place to evaluate the mission criticality of its inventory items. The Centers' evaluations addressed the mission criticality of each inventory item we reviewed in order to provide adequate input to OMB. The processes generally complied with guidelines on prioritizing conversion or replacement strategies outlined in GAO's "Year 2000 Computing Crisis: An Assessment Guide," dated September 1997.

Inventory Updates

NASA's Y2K Program Plan assigned various responsibilities including updating the inventory. Concurrent with this effort, the Centers developed individual project plans. The Center Y2K Project Manager, the Center CIO representative, and the Center Director reviewed the project plans. At the Agency level, the respective Enterprise CIO Representative and the Enterprise Associate Administrator having institutional management responsibilities reviewed the project plans. The Centers, in coordination with NASA CIO's office, designed the plans to define and schedule all activities (including the inventory process), allocate appropriate resources, and meet reporting and review requirements.

The Agency closely monitors changes to both the NASA Y2K Program Plan and any of the Center project plans. The NASA CIO reviews and approves, with the concurrence of each Enterprise, changes and updates to the NASA Y2K Program Plan. Further, the NASA CIO office collects, reviews, and verifies Y2K performance reports for all the Enterprises and Centers. The Y2K Program Manager completes validation and verification of performance reports through a variety of methods. Those methods include comparing performance reports with respective plans and schedules and continuous monitoring of performance through weekly teleconferences, reviews, and interaction with Y2K personnel.

Audit Results

To meet the performance goals outlined in the Agency and Center Y2K plans, each Center instituted various tracking methods for its Y2K inventory. Although varying in complexity, the Centers used inventory tools ranging from simple spreadsheets to complicated relational databases. To aid those efforts, NASA instituted various controls[6] to restrict access to the tools and accompanying data to individuals at the Centers responsible for tracking and evaluating the Y2K inventory. For the systems we reviewed, the Centers were updating the inventories on a regular basis. In addition, the Centers had processes in place to ensure that the appropriate level of management review occurred in order to provide adequate data for the Agency's quarterly progress report to OMB.

[6] NASA controls limit access to various control documents and electronic media. We did not evaluate the controls and do not express an opinion on their adequacy.

Conversion Strategies

A key follow-on activity to analyzing and testing inventory items for Y2K compliance is developing a strategy to resolve items that are not Y2K compliant. The CIO required all Centers, including IT COTS Lead Centers, to prioritize their efforts in developing strategies for corrective actions. The Centers reported the strategies to the CIO on a quarterly basis for inclusion in NASA's quarterly progress report to the OMB. The Centers reported an inventory item as being compliant, repaired, replaced, or retired. As part of the December 1997 rebaselining activities, the CIO published guidelines defining the various corrective action statuses:

- Compliant: an inventory item is treated as compliant if it meets one of four criteria: (1) it is in development and life cycle management will accommodate compliance requirements; (2) it is a new acquisition and compliance will be accommodated; (3) it has been tested and certified as Y2K compliant; or (4) it is not date affected.

- Repair: software, hardware, or firmware components will be modified, tested, and implemented.

- Replace/Upgrade: the inventory item will be replaced with a new Y2K compliant item that provides comparable functionality. For COTS items, upgrades are classified as replace/upgrade.

- Retire/Discontinue: the inventory item will leave the NASA inventory due to Y2K or other reasons. No replacement item is anticipated. For COTS items, the product will leave the NASA inventory with no anticipated upgrade.

Once the Centers determined a strategy, it began to identify validation strategies, interface/data exchange issues, and resource requirements.

Audit Results

We reviewed the Centers' processes for identifying conversion strategies. Specifically, we discussed the strategies with personnel accountable for the actions and reviewed applicable documentation. NASA had identified a conversion plan for each of the inventory items in our samples. The Agency's processes for identifying conversion strategies allowed for adequate OMB reporting and were generally consistent with guidelines outlined in GAO's "Year 2000 Computing Crisis: An Assessment Guide," dated September 1997.

External Data Interfaces/Exchanges

NASA initiated its efforts at identifying external data interfaces[7] related to mission-critical inventory items as part of its overall Y2K program established in 1996. The CIO's memorandum, "The Year 2000 Problem; Planning and Data Collection," August 9, 1996, outlined an overall approach for handling the Y2K problem. The CIO included directives that tasked (1) Johnson to identify data exchanges/interfaces with international partners and (2) the Centers to identify all software and data interfaces, both internal and external, and coordinate any necessary revisions with the appropriate parties. In early 1997, NASA identified about 100 date-sensitive data interfaces associated with mission-critical systems. For the most part, the interfaces NASA identified were with Federal agencies and involved NASA's business/administrative systems, such as systems that interface with the U.S. Treasury. By March 1998, NASA was to have contacted each external entity and develop transition plans.

OMB Memorandum 98-02, "Progress Reports on Fixing Year 2000 Difficulties," January 20, 1998, requires a report on the status of external interfaces in the quarterly report. NASA first reported the status of data interface activities in its February 1998 quarterly report to OMB. As of May 1999, NASA has reported progress related to its mission-critical items for the International Space Station, Space Science Enterprise, Earth Science Enterprise, and Aeronautics Enterprise inventories.

In addition to providing information to OMB, NASA provided data to the GAO regarding data interfaces. At the request of the Ranking Minority Member of the Subcommittee on Technology, House Committee on Science, GAO performed a Government-wide review to address the Y2K problem associated with electronic data interfaces. NASA submitted to GAO information related to Agency-wide data interfaces with Federal, state, and local governments. The information did not include international partners.

Audit Results

NASA personnel, including International Space Station, Earth Science, and Space Science program personnel, were responsible for identifying and evaluating external interfaces. Documentation identifying external parties, types of interfaces, and external points of contact showed that NASA personnel had contacted the external parties and were working with them to eliminate Y2K concerns. Overall, NASA had various processes for identifying and working with external entities that were consistent with GAO guidelines. In addition, NASA had mechanisms in place to continually track the status of external interfaces allowing adequate updating of information provided to OMB.

[7] An external data interface is a boundary across which two systems communicate. An interface may be a hardware connector used to link devices or a convention (tape file, real-time electronic data interchange transaction, etc.) that allows communication between software systems.

Contingency Plans

In addition to requiring agencies to report the status of external data interfaces, OMB Memorandum 98-02 requires agencies to report on contingency planning activities. In February 1998, NASA initially reported on several initiatives to address the requirement for contingency planning. As part of this effort, NASA identified two risk categories:

- failure of a mission-critical item due to an uncorrected processing problem or to corrective actions that have unforeseen operational consequences, or
- failure introduced by the Y2K failures of others (for example, contractors, international partners, and infrastructure service providers).

In June 1998, the CIO asked each Enterprise and Center, including Headquarters and the JPL, to provide a description of business continuity and contingency planning (BCCP) strategy, approach, and overall schedule by September 1998. The CIO required a completed BCCP by March 31, 1999.

Enterprises and Centers are responsible for preparing BCCP's to identify and assess Y2K risks to missions, programs, and core business processes. The Enterprise BCCP's address each major program or project. Center BCCP's address core business processes and include contingency plans for high-risk, mission-critical systems.

NASA issued the "NASA Year 2000 Business and Contingency Plan Guide," January 1999, which contains guidance on preparing BCCP's, including common planning assumptions and a standard planning template. The guidance requires Enterprise Associate Administrators to review and approve Enterprise BCCP's. In addition, the Center Directors must approve the Center BCCP, with concurrence by the Enterprise Associate Administrator who has institutional responsibility. NASA requires the review of the BCCP's on a quarterly basis, at a minimum, to ensure currency and applicability.

Audit Results

The Centers provided BCCP planning strategies, approaches, and overall schedules to the CIO on September 30, 1998. Although varying in design, the BCCP planning documents we reviewed indicated that strategies for developing contingency plans were in place. The plans were consistent with OMB reporting requirements and GAO guidelines for identifying contingency strategies. We are addressing contingency planning in more depth in another audit, Assignment Number A9900801, "Year 2000 Program - Implementation Phase."

Appendix A. Objectives, Scope, and Methodology

Objectives

The overall objective of the audit was to determine whether NASA has adequately assessed the magnitude of the Y2K effort and is accurately reporting to OMB the results of its assessment. Specifically, we evaluated whether Ames, Glenn Research Center (Glenn), Goddard Space Flight Center (Goddard), JPL, Johnson, Kennedy Space Center (Kennedy), and Marshall had processes in place to:

- conduct a comprehensive inventory of IT systems and non-IT systems,
- appropriately classify systems as mission critical,
- update the system inventory on a periodic basis,
- test to identify the magnitude of the Y2K problem,
- identify conversion strategies,
- identify data exchanges and establish dialog with external parties,
- reasonably estimate the cost of fixing the Y2K problem, and
- develop strategies for contingency plans.

Report IG-98-040 (see Appendix B) addresses issues related to Agency testing to identify the magnitude of the Y2K problem and estimating the cost of fixing the Y2K problem.

Scope and Methodology

In evaluating our specific objectives at the seven Centers, we:

- Reviewed the NASA Y2K Program Plan.
- Reviewed NASA, OMB, and GAO guidance addressing Y2K efforts.
- Reviewed NASA's OMB quarterly reports.
- Reviewed the Centers' quarterly reports submitted to NASA Headquarters for inclusion in the Agency's quarterly submission to OMB.

- Interviewed the NASA Y2K Program Manager and Center Y2K project managers at Ames, Glenn, Goddard, Johnson, JPL, Kennedy, and Marshall.

- Interviewed appropriate personnel at Ames, Glenn, Goddard, Johnson, JPL, Kennedy, and Marshall.

- Reviewed detailed inventories.

- Reviewed documentation supporting the assessment activities related to a specific sample of inventory items (see Appendix D).

- Reviewed cost estimates and supporting documentation where available.

- Reviewed documentation supporting the identification and analyses of external data exchanges, including GAO's January 1998 survey of NASA data exchanges.

- Reviewed strategies for developing contingency plans.

- Reviewed the "NASA Year 2000 Agency Test and Certification Guidelines and Requirements."

Audit Field Work

We performed field work from June 1998 through June 1999 at Ames, Glenn, Goddard, Johnson, JPL, Kennedy, and Marshall. The audit was performed in accordance with generally accepted government auditing standards.

Appendix B. Summary of Prior Coverage

The NASA Office of Inspector General has issued four reports relating to Y2K. These reports are summarized below. (Visit www.hq.nasa.gov/office/oig/hq/issuedaudits.html for a copy of the reports).

"**Exemptions for Year 2000 Testing, Johnson Space Center," IG-99-025, May 13, 1999.** The Financial Management Division completed testing of the Center Financial System before NASA issued the July 1998 guidance, but had not submitted a request for exemption from the guidance. The Johnson CIO had not established procedures to implement the exemption process. Without the exemption, the Johnson CIO lacks reasonable assurance that the Center Financial System will meet the minimum NASA testing requirements for Y2K compliance. We recommended that management establish and implement procedures for approving exemptions to NASA testing requirements. Management concurred with the recommendations.

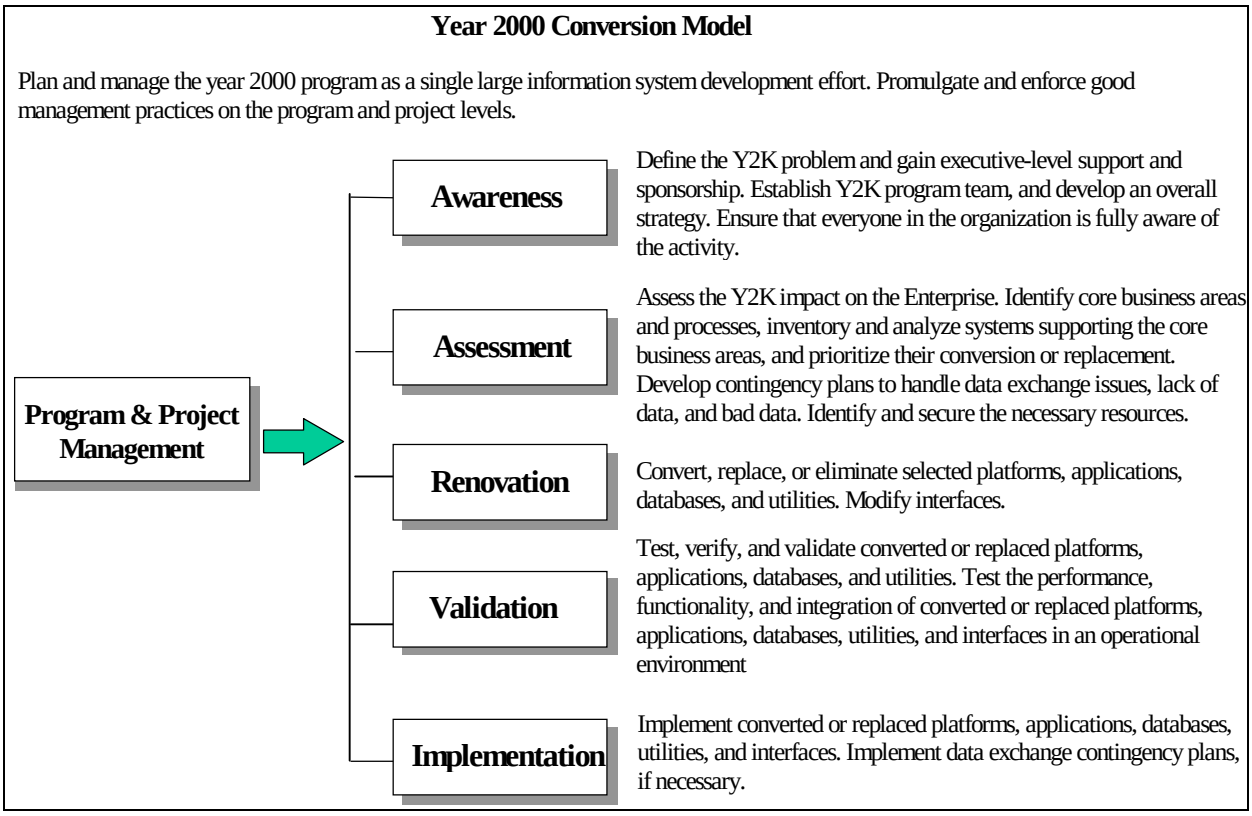
"**Year 2000 Program Compliance Requirements in NASA Information Technology-Related Contracts," IG-99-022, March 31, 1999.** NASA lacks reasonable assurance that its systems will be Y2K compliant on January 1, 2000. The Agency issued Y2K guidance for installations to follow when acquiring, operating, and maintaining information technology assets. The guidance required contracting officers to include a clause addressing Y2K in information technology solicitations and new contracts. Also, contracting officers were required to modify the statement of work to address Y2K in existing information technology operation and maintenance contracts. Each of the six locations audited had included the NASA-directed Y2K requirements in the solicitations and new contracts used to acquire information technology assets. However, JPL had not included the NASA-directed requirements in all its applicable information technology operation and maintenance contracts as of January 31, 1999. JPL management attributed its delay to other workload priorities. Untimely incorporation of the Y2K compliance requirements into NASA contracts adversely affects the Agency's ability to meet OMB's milestones for Y2K renovation, validation, and implementation phases and increases the potential for noncompliant Agency systems on January 1, 2000. Also, contractors may not be held accountable for ensuring Y2K compliance if the requirements are not incorporated. We recommended that the NASA CIO (1) coordinate with the NASA Management Office at JPL to establish a target date(s) for JPL completion and (2) monitor JPL's progress in meeting the target date(s). Management concurred with both recommendations. Corrective action was completed on the first recommendation and is pending on the second.

"Year 2000 Program Oversight of NASA Production Contractors," IG-99-004, December 17, 1998. NASA lacks reasonable assurance that its production contractors will provide Y2K-compliant data to support the Agency's key financial and program management activities. This condition occurred because NASA had not asked the two principal Department of Defense agencies, the Defense Contract Audit Agency (DCAA) and the Defense Contract Management Command (DCMC), which perform the contract administration and audit functions at NASA's contractor locations to conduct Y2K reviews at NASA's major contractor locations.

As a result, NASA risks using noncompliant data that may adversely affect the Agency's control, budgeting, program management, and cost accounting activities. We recommended that NASA request DCAA and DCMC to assess Y2K compliance at major NASA contractor locations and track corrective action on identified deficiencies. In addition, we recommended that NASA establish milestones for DCAA and DCMC progress in reviewing contractor Y2K compliance. Management concurred with the intent of the recommendations.

"Year 2000 Date Conversion – Assessment Phase," IG-98-040, September 30, 1998. Some NASA Centers did not have documented support for Y2K cost estimates that were reported to OMB, and Centers did not prepare the estimates using a consistent methodology. In addition, documentation did not always exist to support the manner in which Center assessments and decisions for Y2K compliance were conducted. The audit also showed that NASA Centers need to improve the sharing of information on the status of Y2K compliance associated with COTS products. We recommended that (1) NASA develop and issue guidance on the methodology the Centers should use in estimating and adjusting Y2K cost estimates and on maintaining supporting documentation, (2) direct the Centers to identify all IT and non-IT systems that have been assessed for Y2K compliance and ensure that documentation supports the work performed and conclusions reached, and (3) direct the Center Directors to share all information on the status of COTS products and to establish processes to reduce redundancy of evaluation efforts. Management did not concur with the recommendation concerning guidance for Y2K cost estimates, stating that adequate guidance on cost estimation had been provided to NASA Centers. We reaffirmed our position on this recommendation and requested additional comments in the final report.

Appendix C. Y2K Five-Phase Approach



Appendix D. NASA Inventory Items Reviewed

To meet the objectives of our audit, we judgmentally selected NASA Y2K inventory items for detailed review. We reviewed the items and supporting documentation to determine whether adequate processes were in place to identify all components[8] and to assess Y2K compliance. Our sample, based largely on high-risk systems, included the items listed below.

Ames Research Center

- Numerical Aerospace Simulation System
- FML Wind Tunnel
- National Full-Scale Aerodynamics Complex 80 x 120 Wind Tunnel Unique Systems
- Wind Tunnel Network
- Electrical Power Infrastructure
- Center Network Operations
- Center Gateway Services
- Business Systems
- Ames Communication and Data System for Space Station Hardware and Software

Glenn Research Center

- Business and Financial Applications
- Combustible Gas Detection System
- Proprietary Protective Signaling System

Goddard Space Flight Center

- Business and Administrative Systems
- X-Ray Timing Explorer Control System
- X-Ray Timing Explorer Flight Controller
- Gamma Ray Observatory Control System
- Gamma Ray Observatory Flight System
- White Sands Systems
- Mission Operations Support Area System

[8] Components are all aspects that make up a particular system or inventory item. Components generally consisted of hardware, operating systems and subsystems, COTS application software, and internally developed system and application software.

Jet Propulsion Laboratory

- The Ocean Topography Experiment (TOPEX/Poseiden) Ground System
- Deep Space Network and Multi-Mission Ground Data Systems

Johnson Space Center

- Software Production Facility
- Mission Control Center

Kennedy Space Center

- Checkout, Control, and Monitor Subsystem
- Kennedy Inventory and Management System
- Central Data Subsystem
- Shuttle Data Center
- Payload Data Management System
- Payload Checkout System
- Shuttle Processing Data Management System/Integrated Work Control Center
- Financial Management Systems
- Record and Playback System
- Microwave Scanning Beam Landing System
- Shuttle Operational Data Network

Marshall Space Flight Center

- Space Shuttle Data Base
- NASA Payroll/Personnel System
- X-34 Systems
- Computer Access Control Systems

Appendix E. Report Distribution

National Aeronautics and Space Administration (NASA) Headquarters

A/Administrator
AI/Associate Deputy Administrator
AO/Chief Information Officer
B/Chief Financial Officer
B/Comptroller
BF/Director, Financial Management Division
C/Associate Administrator for Headquarters Operations
G/General Counsel
H/Associate Administrator for Procurement
J/Associate Administrator for Management Systems
JM/Director, Management Assessment Division
L/Associate Administrator for Legislative Affairs
M/Associate Administrator for Space Flight
P/Associate Administrator for Public Affairs
Q/Associate Administrator for Safety and Mission Assurance
R/Associate Administrator for Aero-Space Technology
R/Chief Information Officer Representative
S/Associate Administrator for Space Science
U/Associate Administrator for Life and Microgravity Sciences and Applications
Y/Associate Administrator for Earth Science
Z/Associate Administrator for Policy and Plans

NASA Centers

Director, Ames Research Center
Director, John H. Glenn Research Center at Lewis Field
Director, Goddard Space Flight Center
Director, Lyndon B. Johnson Space Center
Director, John F. Kennedy Space Center
Chief Counsel, Kennedy Space Center
Director, George C. Marshall Space Flight Center
Director, NASA Management Office, Jet Propulsion Laboratory

Non-NASA Federal Organizations and Individuals

Assistant to the President and Chair, President's Council on Y2K Conversion
Assistant to the President for Science and Technology Policy
Director, Office of Management and Budget
Deputy Associate Director, Energy and Science Division, Office of Management and Budget
Branch Chief, Science and Space Programs Branch, Energy and Science Division, Office of Management and Budget
Associate Director, National Security and International Affairs Division, Defense Acquisitions Issues, General Accounting Office
Professional Assistant, Senate Subcommittee on Science, Technology, and Space

Chairman and Ranking Minority Member -- Congressional Committees and Subcommittees

Senate Committee on Appropriations
Senate Subcommittee on VA, HUD, and Independent Agencies
Senate Committee on Commerce, Science, and Transportation
Senate Subcommittee on Science, Technology, and Space
Senate Committee on Governmental Affairs
House Committee on Appropriations
House Subcommittee on VA, HUD, and Independent Agencies
House Committee on Government Reform and Oversight
House Subcommittee on National Security, Veteran Affairs, and International Relations
House Committee on Science
House Subcommittee on Space and Aeronautics

Congressional Member

Honorable Pete Sessions, U.S. House of Representatives

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