Office of Inspector General

Report of Review

MAJOR EPA INFORMATION SYSTEMS ARE VULNERABLE TO FAILURE DUE TO THE UPCOMING CENTURY CHANGE

MARCH 14, 1996

Audit Report E1NMB5-15-3038-6400036

Inspector General Division
   Conducting the Audit: ADP Audits and
                                      Assistance Staff

Region Covered: Agency-wide

Program Offices Involved: OARM
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                                      OECA
                                      OPPTS
                                      OSWER
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 1 4 1996

MEMORANDUM

SUBJECT: Report of Review - Major EPA Information Systems are
Vulnerable to Failure Due to the Upcoming Century Change
Report No. E1NMB5-15-3038-6400036

FROM: Patricia H. Hill, Director
ADP Audits and Assistance Staff (AAAS) (2421)

TO: Paul A. Wohlleben, Acting Director
Office of Information Resources Management (OIRM) (3401)

Attached is a special review report entitled "Major EPA Information Systems are Vulnerable to Failure Due to the Upcoming Century Change." The primary objectives of the review were to: (1) determine how major EPA application systems currently store date information; (2) determine which application systems will require modification; (3) determine if planning for upgrade of these systems is adequate; and (4) determine how vendors of major EPA platforms are addressing the century change in their operating systems.

My staff discussed these issues with your staff and were very pleased with the cooperation we received from them. Their assistance and suggestions have made this a better report. This special report describes problems and recommended corrective actions the Office of Inspector General (OIG) has identified. We ask that you provide us, within 90 days, a report on the actions you have taken as a result of our recommendations. If your proposed actions will not be complete, we ask that you describe the actions that are ongoing and provide a timetable for completions. We appreciate your positive response to the recommendations presented in the report and the many actions you and your staff have initiated to address the issues concerning the upcoming century change.

We have no objection to the further release of this report to the public. Should you or your staff have any questions regarding this report, please contact me at (202) 260-1072.

Attachment
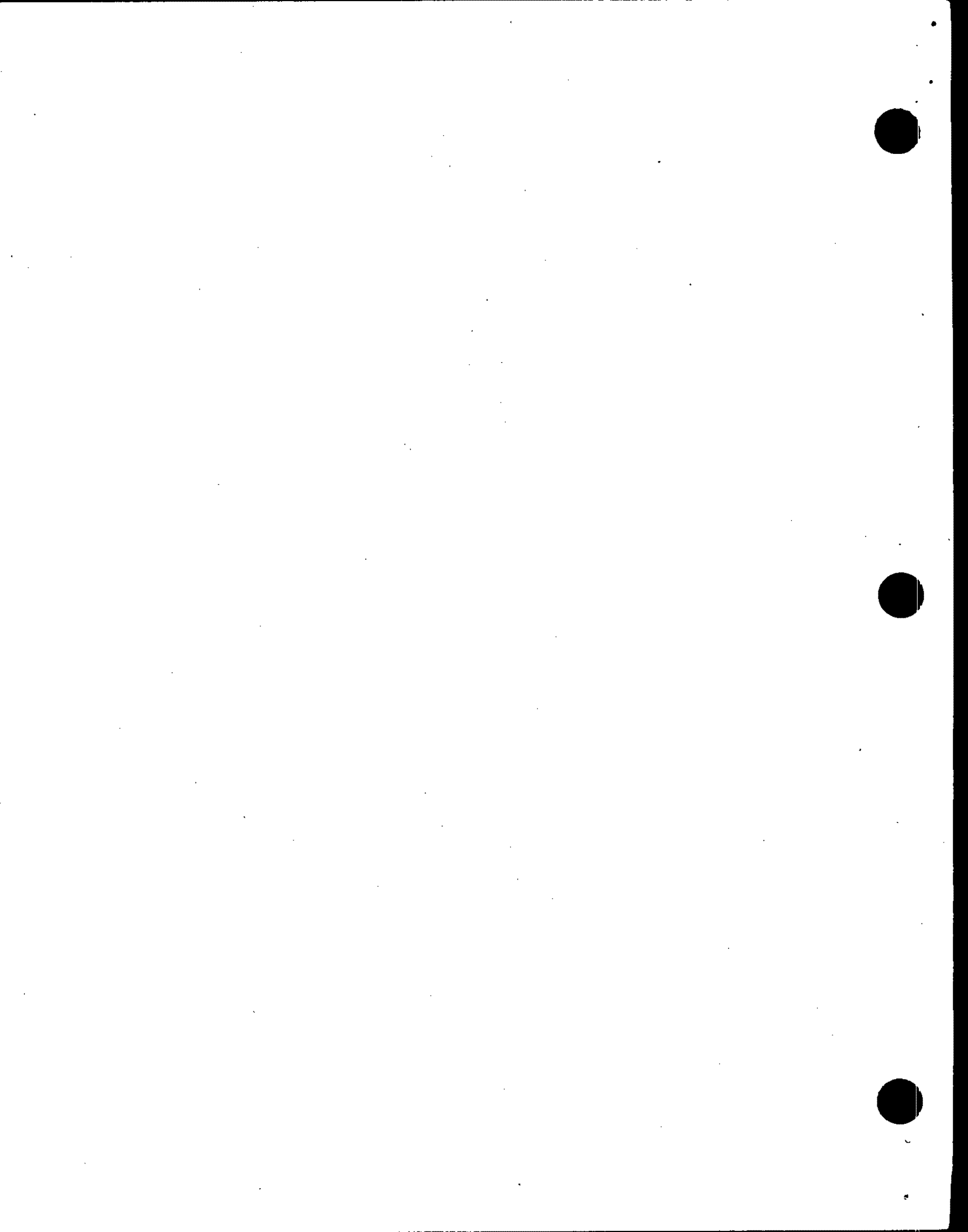
**Major EPA Information Systems are Vulnerable to Failure
Due to the Upcoming Century Change
Report No. E1NMB5-15-3038-6400036**

System managers within EPA are not fully prepared to address the problems associated with the year 2000. Although the scope of this review was limited to 22 major application systems and seven major hardware platforms, the potential effect of the problem within EPA is tremendous. EPA's Information Systems Inventory (ISI) describes approximately 300 systems, databases, models, modules, and other computer applications. EPA's Office of Information Resources Management (OIRM) must accelerate its Year 2000 campaign in order to ensure Agency preparedness for the century change. In order to reduce EPA's exposure to major system failure, a determination of the risks associated with each system in the year 2000 must be made. Once the risks have been evaluated, careful planning and budgeting must be conducted to ensure that all necessary changes are identified, performed, and tested in time to prevent system failure.

Purpose

The objectives of this survey were to: (1) determine how major EPA application systems currently store date information; (2) determine which application systems will require modification; (3) determine if planning for upgrade of these systems is adequate; and (4) determine how vendors of major EPA platforms are addressing the century change in their operating systems.

Background

The upcoming century change is considered to be one of the most critical problems facing data processing today. Because most computer systems were developed to maximize storage capacity, dates were often stored as 6-digit numeric fields, omitting the century identifier. This was an effective cost saving technique in the early days of computers. However, as the century change approaches, information resources management (IRM) is beginning to realize the potential impact of this methodology on major information systems. Because almost every system performs date calculations, almost every system is vulnerable to failure or production of unreliable information.

There are two basic problems associated with the year 2000: inverse dates and incorrect leap year assumptions. The first problem, inverse dates, primarily effects application systems and is caused by
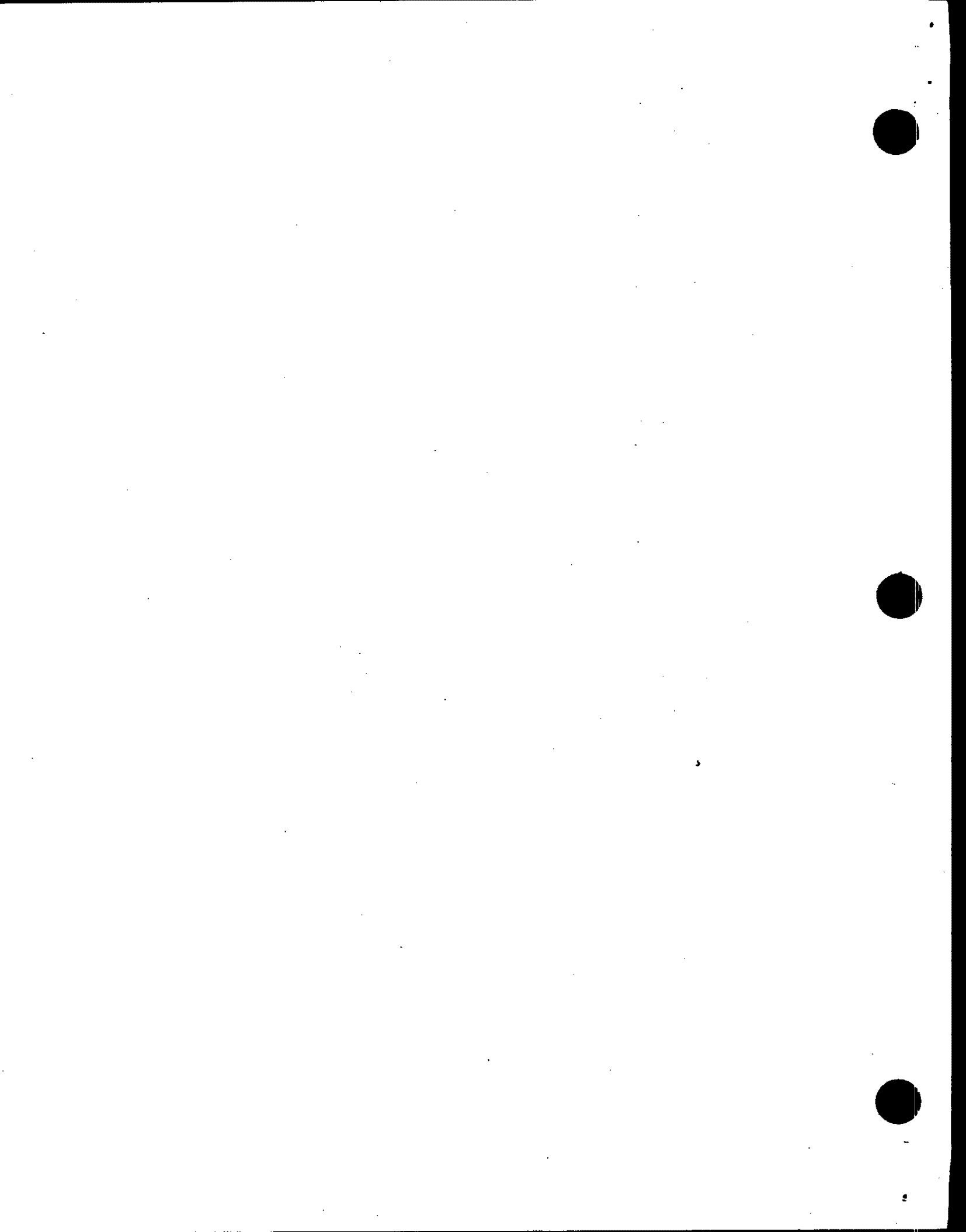
application logic interpreting "00" as occurring *prior* to "99". When this occurs, dates associated with "2000" will be interpreted as "1900", causing the system to either fail or return nonsensical dates. Either result would have extremely negative impacts on mission-critical Agency systems.

Example: A human resources system determines length of service by subtracting an employee's service computation date (SCD) from the current date.

Current Date: 11/15/05 - SCD: 11/15/70 =   Length of Service: -65 Years

The second problem, incorrect leap year assumptions, primarily effects the hardware platform's system software and occurs as a result of the inverse date problem. There are three leap year rules:

- If the year is divisible by four, it is a leap year unless -
- It is divisible by 100, in which case it is not a leap year.
- However, if it is divisible by 400, it is a leap year.

Because 2000 is divisible by 4 and 400, it is a leap year. The incorrect leap year assumption occurs when the system interprets "00" as "1900" and assumes it is not a leap year. This result could also have negative impacts on individual hardware platforms, as well as the processing of mission-critical systems.

Although the problems themselves are relatively simple, the solutions can be complex. In order to fully assess the magnitude of the problem in a system, several issues need to be addressed:

- *Sources of Data* - If an organization has complete control over the data entry process, this issue is less complicated. However, if data is imported in from other systems or organizations, the date format of those systems becomes critical.

- *Embedded Date Codes* - If a date, or part of a date, is used as part of another field, logic and sorting problems can occur. Two digit year codes are often used in numbering invoices, cases, permits, and other documents. In the year 2000, a tracking number of '001234' will incorrectly sort before '991234.'

- *Interfaces with Other Systems* - When systems interface, date codes are often exchanged. The number, location, and formatting of date fields exchanged with other systems should be known and coordinated in advance.

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- *Operating System Dependencies* - The year 2000 compliance status of the operating system and associated tools and utilities can have tremendous impact on the proper functioning of applications. Application logic would be adversely affected if the operating system provides an invalid date, incorrect day of year, or incorrect day of week.

- *Historical Data Requirements* - If all data is considered current, all data must be reformatted into the new date format. However, if some data is archived and seldom used, it may not need to be reformatted.

- *Effects on User Community* - Changes in field formats could have a profound effect on self-developed user programs, data retrievals, and reports. All changes should be communicated to users so they can modify their programs accordingly.

- *Changes in Output/Reports* - When field formats are changed, output record layouts and report layouts must also be modified to accept the expanded data. Additionally, lines associated with display screens and reports might exceed normal limits, causing data to unexpectedly move to a new line.

EPA's OIRM has begun an information campaign to make the IRM community aware of the problems and solutions associated with the year 2000. The Director of OIRM sent a memorandum to all Senior Information Resources Management Officials (SIRMOs), System Managers, and Regional IRM Chiefs informing them of the problem and advising them to expand all necessary date fields to prepare for the century rollover. As part of a monthly project status briefing, the Systems Development Center (SDC) evaluated the year 2000 status of 36 EPA systems being developed or modified at the center. Additionally, Enterprise Technology Services Division (ETSD) personnel developed several queries which will help managers of systems within the central database identify potential date codes that need to be modified. Finally, EPA will be participating as a member of the Federal IRM Policy Council (FIRMPOC) government-wide taskforce on the year 2000.

Scope and Methodology

The primary focus of this audit was to evaluate EPA's vulnerability to major system failure due to the upcoming century change. Fieldwork was conducted from June through October 1995, at EPA Headquarters, Washington, D.C., and the ETSD, Research Triangle Park, NC. We selected 22 major

application systems in 6 program offices for review to evaluate their planning for year 2000[1]. We requested data dictionaries and other forms of year 2000 documentation from system managers. We also discussed operating system preparedness and testing for seven major Agency platforms with ETSD representatives. This work was not conducted as part of an audit, and accordingly was not done in accordance with governmental auditing standards. Instead, the work represented a special review which was conducted in accordance with provisions of OIG Manual Chapter 150.

Year 2000 Requirements and Guidance

Office of Management and Budget (OMB) Circulars A-130, A-123, and A-127 respectively provide Government-wide policy and guidance for: (1) the management of Federal information resources; (2) the improvement of accountability and effectiveness in Federal programs and operations via management controls; and (3) the development, operation, evaluation, and reporting requirements of financial management systems. OMB Circulars A-130 and A-123 outline policy and guidance that define the basic responsibilities of Federal managers. They impact directly or indirectly on all managerial decisions and activities, including those that affect the threats associated with the year 2000. OMB Circular A-127 addresses the issue of IRM standards and has more direct influence on year 2000 solutions. Date standards are critical to the development of a successful strategy to combat the threats associated with the year 2000.

OMB Circular A-127 states "Standard data classifications (definitions and formats) shall be established and used for recording financial events. Common data elements shall be used to meet reporting requirements and, to the extent possible, used throughout the agency for collection, storage and retrieval of financial information." This circular also states "Common processes shall be used for processing similar kinds of transactions throughout the system to enable these transactions to be reported in a consistent manner."

EPA developed policies and guidance which augment these Federal directives. For example, the Information Resources Management Policy Manual contains policy statements that assign the primary functional responsibility for IRM policy development and overall management of the Agency's IRM program to the Director of the OIRM. Furthermore, the Agency Catalog of Data Policies and

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[1] The following systems were surveyed: AIRS, CFEIS, GMISS, CPS, EPAYS, FINDS, GICS, ICMS, IFMS, MATS, SCRIPS, CRIMDOCK, DOCKET, PCS, TRIS, CERCLIS, CLP, RCRIS, FRDS/SDWIS, IDEA, NEEDS, and STORET. The platforms reviewed included: PC Workstations, LAN servers, IBM Mainframe, DEC/VAX Cluster, Cray Supercomputer, UNIX Workstations, and Macintosh Workstations.

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Standards states that it is EPA policy to create and maintain consistency in the form of data elements that have more than one application within the Agency. This consistency will permit the cross media approach necessary to achieve environmental results. This catalog also acknowledges EPA's adherence to Federal Information Processing Standard (FIPS) 4-1, entitled "Representation for Calendar Date and Ordinal Date for Information Interchange," which states that the standard format for the year contains four digits.

EPA's Office of Administration and Resources Management (OARM) fiscal 1995 IRM Strategic Plan discussed "...a bold new course for information management at EPA." The plan states that "EPA will ensure its data can be integrated to support comprehensive environmental protection and public access to environmental information." The plan further states that "EPA commits to standardize its data, thereby increasing the value and usefulness of its information resources." This plan was developed by a team with broad representation including the Agency's Senior Management, program and IRM staff, external stakeholders, and partners.

Finally, in May, 1995, the Director of OIRM issued a memo regarding the year 2000 date change. In this memo, he reminded Agency management of the need for providing four digits for the year instead of two. To reiterate the point he stated again that,"in most circumstances, it would be better to change the year to four digits rather than try to formulate (and then maintain) logic work-arounds."

Major EPA Systems Are Not Fully Prepared for the Century Change

OIRM's awareness campaign has been successful in that nearly all system managers interviewed were aware of the year 2000 problem and understood the importance of addressing it. However, during the interview process, several system managers stated that they were unaware of some of the issues brought out by the questions asked (e.g., sources of data, embedded date codes, etc.). Additionally, several system managers expressed concern over the lack of detailed information from OIRM, stating that an electronic forum for posting information, questions, and answers would be helpful to them.

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Despite the general awareness of the problems associated with the century change, only three system managers (CLP, CERCLIS and SCRIPS) stated that their systems are currently year 2000 compliant[2]. As Table 1 indicates, the remaining systems are in varying states of readiness. The majority of these remaining systems are in the early stages of planning complete modernizations of their systems or expansion of date fields. It is generally believed that one of the more difficult tasks associated with this planning process is locating all date fields within complex systems. However, the queries developed by ETSD may help those systems within the central database environment locate potential date codes in need of modification. This should ease the burden on system managers just starting the process.

Status of Year 2000 Compliance for Major EPA Systems Surveyed		
Status	Number	Percentage
Year 2000 Compliant	3	14%
Partially Compliant	2	9%
Modernization Planned	5	23%
Planning Stage	5	23%
Logic Work-Around	5	23%
See No Need to Comply	2	9%
Totals	22	100%

Table 1

There is great variety in the way system managers have responded to the OIRM memorandum encouraging system managers to upgrade their information systems to handle dates beyond 2000. For example, 9% of the system managers interviewed felt that there was no need to make changes to their system. Additionally, while industry recommendations and the OIRM memorandum state that it is preferable to expand year fields to four digits rather than try to formulate and maintain logic work-arounds, 23% of the system managers interviewed are planning to implement some form of logic work-around in their system. The remaining 68% of system managers intend to expand all date fields to four digit years as recommended or are unsure of how they will address the problem.

Every system surveyed exchanges data with at least one other Agency system. Additionally, 54% of the systems exchange data with systems outside EPA (e.g., Federal, State, and Industry systems). However, only 15% of the system managers surveyed have addressed their systems' interfaces.

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[2] The term "year 2000 compliant" is used to describe a system where all date fields have been expanded to use 4-digit years.

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Table 2 provides a summary of how system managers planning to address the year 2000 problem intend to address their system interfaces. While 25% of system managers indicated that their interfaces would not be effected by year 2000 compliance, the remaining 60% of systems rely on date-sensitive interfaces and have few plans to ensure that these interfaces will continue to function at the century change.

Finally, the system software associated with EPA's hardware platforms (e.g. IBM Mainframe, UNIX workstations, Supercomputer, etc.) supporting most of these major information systems may not be completely year 2000 compliant. When we interviewed ETSD staff regarding the ability of EPA's major platforms to correctly process dates beyond 1999, the response was initially positive. Many of the Agency points of contact for these platforms indicated that they had performed, or were willing to perform, some level of testing to ensure that dates beyond 2000 were considered valid. However, there was no consistent test plan used to ensure that all idiosyncrasies of the operating systems were tested and some points of contact stated that they had not tested the validity of leap year processing in 2000.

Status of Year 2000 Interface Planning for Major EPA Systems		
Status	Number	Percentage
Addressed	3	15%
Planning Stage	4	20%
Not In Current Plan	4	20%
Unsure	4	20%
Not Necessary	5	25%
Totals	20	100%

Table 2

EPA Systems are Vulnerable to Year 2000 Problems

The effects of year 2000 related problems are generally described in terms of 'event horizons.'[3] In 1995, four major Agency systems experienced problems when processing permits and contracts with a five year event horizon. Because these systems would not accept dates beyond 1999 as valid, it was necessary for date information to be stored manually. This information will be re-entered into the

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[3] An application's event horizon is defined as the latest future date that will be processed in the application.

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systems as they are upgraded to accept future dates. In the mean time, these systems still contain improper dates that compromise the integrity of Agency data.

As time goes by, more systems will reach the point where their event cycle crosses the year 2000 boundary. This will cause increasing problems with the integrity and usability of Agency data. Although many systems are beginning to plan for modernization or upgrade of their systems, time is running short. A common industry recommendation is for year 2000 compliant systems to be fully implemented by the end of 1998, in order to allow for one full year of normal, year-end, and quarter-end processing. However, systems should be completely modified by the end of 1997 in order to accommodate the lengthy testing, training, and implementation processes. Based on the lack of detailed plans, current budget uncertainties, and time delays associated with contracting, it is questionable whether or not these systems will be fully compliant before their event horizon reaches 2000.

Additionally, the use of logic work arounds by several systems only postpones the general problem. Currently, all date dependent systems must deal with a failure date of 2000. However, as system managers decide to implement the logic work-around approach, they will choose the most appropriate cut-off date for their system. This will effectively hide the problem within the code of each application and scatter failure dates randomly across the Agency.

The large quantity of date-dependent interfaces within major Agency information systems further complicates EPA's vulnerability. Because system managers are using inconsistent methods of dealing with the year 2000, there is uncertainty regarding how well these systems will interact. One of the biggest interface concerns is the network of financial systems within EPA. IFMS, the main financial information system, is planning to implement a logic work-around approach to the year 2000. This approach will require systems supplying data to IFMS to strip off the first two digits of the year prior to sending the data to IFMS. IFMS will then use an algorithm to determine if the 2-digit year should be preceded by a '19' or a '20' and add the appropriate number. This same process will be reversed for systems pulling data from IFMS. This process is inefficient, contrary to the requirements of A-127, and could lead to incorrect century assumptions. Finally, while IFMS system management believes that the algorithm to determine the appropriate century will not fail, this belief is offset by the criticality of IFMS's and other financial system data.

As paper-based processes are replaced with system interfaces, the stability and integrity of those interfaces becomes critical. However, the majority of system managers have not yet begun to address the question of how their system will exchange data with other systems. Because of this, there is no guarantee that data will flow correctly from system to system. This situation reduces the integrity of shared data and jeopardizes the current Agency initiatives regarding electronic data interchange, data

sharing, and public access. These initiatives are totally dependent on exchanging correct data among EPA systems, as well as with other Federal Agencies and industry.

Regardless of the level of planning and upgrading done by system managers, each major application is ultimately vulnerable to the faults of the hardware platform on which it resides. Almost all system managers reported being dependent on the operating system to provide the correct date. Additionally, system managers listed several operating system tools and utilities which are necessary for their programs to function. There is no consistent approach to ensuring that the operating system will return the correct date in the years beyond 2000, and no methodology for evaluating software tools and utilities for year 2000 compliance. Because of this, system managers have no guarantee that their programs will continue to function as intended in the year 2000.

OIRM Needs to Accelerate Their Year 2000 Campaign

According to the IRM Policy Manual, OIRM is responsible for the development of IRM policy and overall management of the Agency IRM program, including development of data policies and standards. The framework provided by this policy invests OIRM with the right and responsibility to lead the Agency's effort to respond to the year 2000 threat. Although OIRM has launched an effective year 2000 awareness campaign, they have not stepped forward with specific policies, procedures, and methodologies. This has left system managers on their own to bring their systems into year 2000 compliance.

During audit interviews, several system managers stated that they were unaware of some of the anticipated problems. Unfortunately, date logic is pervasive, and some of the more serious problems will result because important aspects are overlooked during upgrades. Identification of these more obscure concerns need to be addressed during the planning stages of modifications so that solutions can be formulated. Retrofitting a solution can be both time-consuming and costly. Identification of these issues can be addressed through the dissemination of guidance, as well as interactive discussion with responsible management.

Contrary to OIRM's earlier memorandum, they have since determined that the existing Agency data standard, requiring a four-digit year date, is too restrictive. However, they have not introduced supplemental guidance to identify acceptable alternative solutions. At a time when so many systems are undergoing change, standards are necessary to ensure consistency for data integration and data sharing across the Agency. The use of standards can also cut costs. A reliable, comprehensible and portable date routine is an integral part of the overall 2000 solution, and would help lessen testing costs and save project dollars. As the Agency's manager for establishing IRM policy, OIRM has a responsibility to promulgate and enforce the use of data standards across the Agency.

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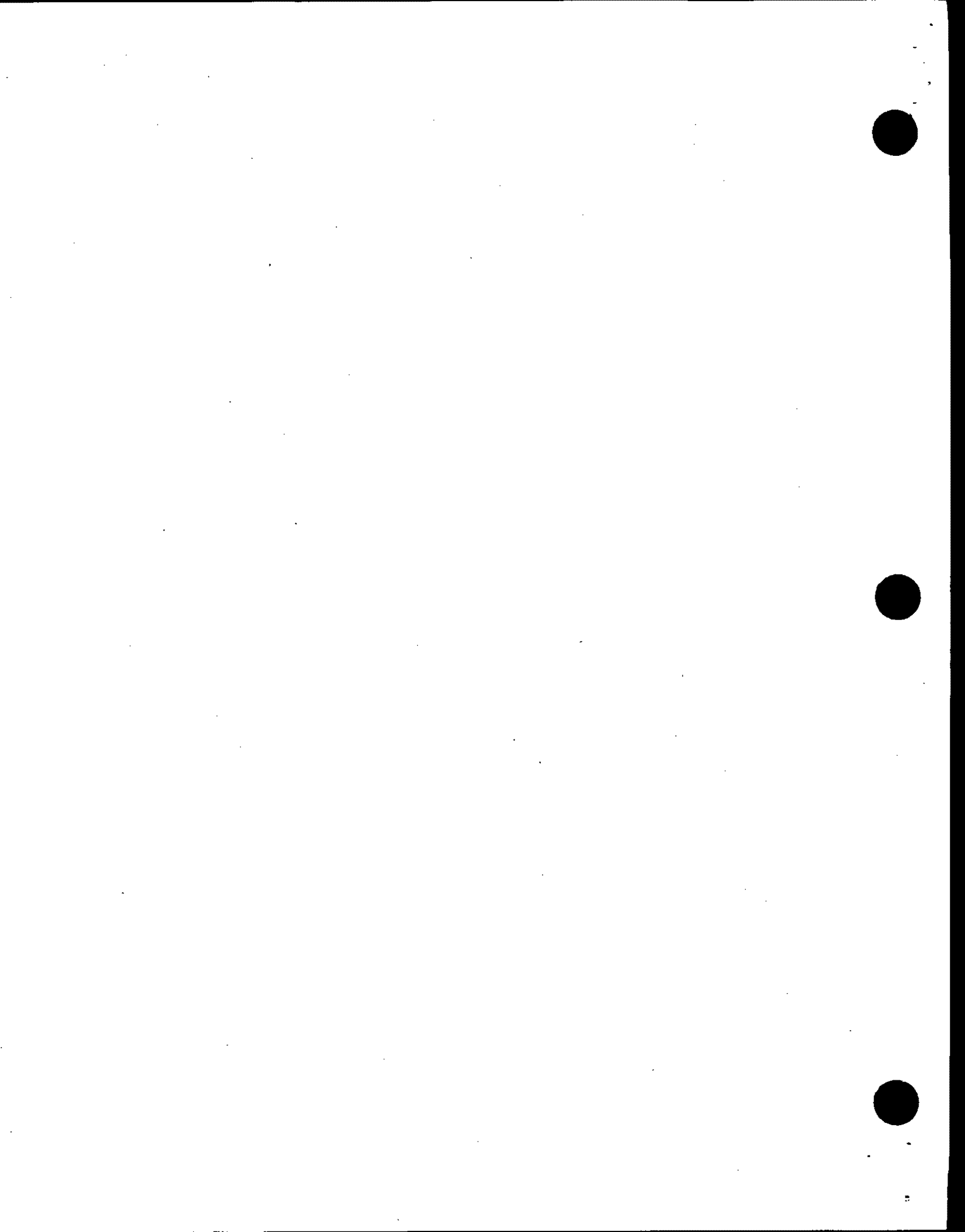
We recognize that year 2000 testing should be relative to the complexity of the individual application, the criticality of its data, as well as the particular system'senvironment. However, we discovered that certain common aspects of testing had not been adequately addressed within the Agency. For example, little emphasis had been placed on developing tests to: (1) ensure the accurate operation of date-sensitive interfaces; (2) detect operating system idiosyncrasies; or (3) validate leap year processing. In order to effectively address these common problems, OIRM needs to devise and disseminate a testing strategy which adequately addresses these and other concerns, and yet is flexible enough to permit creativity and customization, depending on each system's particular needs. This strategy should provide guidance and set milestones for system managers. Because the modification process is lengthy and deadlines are critical, strategic progress should be measurable and problems must surface as early as possible.

OIRM has acknowledged the need to assume a broader role. To successfully address the many challenges associated with year 2000 exposures, it is imperative that this effort is managed through a central focal point. This focal point should be responsible for critical project aspects, such as setting general milestone dates, coordinating commercial vendor actions, and establishing a consistent methodology through all project phases. During a recent discussion, OIRM representatives described their plan to embark upon a comprehensive year 2000 campaign which encompasses all of the aforementioned areas. Unfortunately, OIRM's plant is not scheduled to begin until fiscal 1997. Meanwhile, some Agency systems have already experienced year 2000 problems and system managers are actively seeking solutions. OIRM must begin immediately to analyze the extent of the Agency's problem and accelerate it's year 2000 campaign, accordingly. There is a problem now and there will undoubtedly be additional future repercussions, unless the time to act is moved forward rather than backward.

Recommendations

1. OIRM endorse the use of its existing four-digit year standard, and require the system managers to obtain a waiver if they choose a solution other than the standard.

2. OIRM expedite the development of guidance documents to direct ongoing and future efforts to overcome the year 2000 dilemma. At a minimum, guidance documents should: (1) identify common problematic concerns; (2) identify reliable methods for testing date fields for year 2000 compliance; and (3) identify tests designed to ensure compatibility between Agency applications systems.

3. OIRM employ one of its existing communications mechanisms to: (1) disseminate guidance to system managers; (2) serve as a central repository devoted to year 2000 issues; and (3) provide an avenue for the exchange of ideas and experiences among system managers.

Agency Comments and OIG Evaluation

In a memorandum dated December 12, 1995, the Acting Director for Information Resources Management responded to our draft report (see Appendix 1). In summary, the Agency partially agreed with all three of our recommendations. Discussions with OIRM representatives resulted in a revised set of recommendations which should alleviate some of OIRM's concerns and yet adequately address the conditions noted in our draft report. To provide a balanced understanding of the issues, we have summarized and commented on the Agency's general concerns regarding the draft report.

*   OIRM officials believe that the Agency should be evaluated on the current status of its planning efforts to achieve year 2000 readiness, rather than on a 1995 snapshot of major systems' status.

    The year 2000 date change is a time sensitive crisis and the status of OIRM's planning efforts do not reflect the urgency of the situation. We found little in the way of current plans or guidance to assist system managers who are actively pursuing year 2000 solutions. OIRM's May 22, 1995 memorandum regarding the Year 2000 Date Change stated that they will ensure proper attention to the year 2000 issue beginning with the fiscal 1997 IRM planning process. In our opinion, plans formulated or presented in fiscal 1997 will be of little benefit to those system managers who are currently addressing year 2000 issues. Furthermore, four EPA systems have already experienced year 2000 problems because they could not accept dates beyond 1999. By fiscal 1997, the number of systems experiencing similar problems is certain to increase.

*   OIRM management maintains that they demonstrated appropriate leadership in concert with current, year 2000 policy in the Federal Government, as well as with trends in the private sector.

    We acknowledge that OIRM demonstrated management leadership with its awareness campaign, and through ETSD efforts to identify date codes in various systems. However, our review reveals that continued and added support is necessary. EPA system managers expressed a desire for more direction from OIRM. In addition, we found that system managers were inconsistent in their methods to resolve year 2000 problems, and were not fully aware of concerns commonly associated with the century change. This type of Agency-wide effort requires central management. Central management should assume responsibility for overall

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scheduling by implementing and coordinating a consistent methodology throughout the entire process. In addition, central management is necessary to respond to problems which fall outside the authority of individual systems managers. It is central management's responsibility to set the overall objectives, identify acceptable solutions, direct their implementation, and determine when the objectives have been satisfied. In our opinion, OIRM has not exhibited this type of active involvement. OIRM needs a strategy that will allow them to become the focal point for directing this Agency-wide challenge. OIG recommendations were conceived to promote that objective.

The Agency's response noted inaccuracies and/or omissions in our draft report. We have addressed these concerns below:

- OIRM noted that the draft report did not mention that FIPS Publications 4-1 allows for a two-character date field as an alternative to a four-character date field.

  The FIPS Publication 4-1 option, permitting use of a two-digit date field, is the primary reason that we face a crisis with the upcoming century change. Continued use of this option is considered a temporary fix which will ultimately need to be replaced. Furthermore, when this option is exercised, it becomes necessary to develop logic and write additional code to sustain its use. OIRM is allowing individual system managers to develop this logic and generate additional code as they deem appropriate. However, OIRM has not provided formal guidance to advise managers of the consequences such a decision could have on data integrity or Agency data integration initiatives.

- OIRM stated that the draft report did not mention resources as a valid concern involved in selecting a year 2000 solution. The Agency's response states that the year 2000 solution must, to some extent, be driven by a cost benefit analysis of alternatives.

  Very few of the system managers interviewed cited a lack of resources as a major problem. Most systems were well beyond cost benefit analyses and management was actively engaged in implementing their solutions. The few system managers who voiced resource concerns had not developed any formal plans. Their resource concerns were more speculation about the possibility of resource problems, rather than hard facts based on analysis. Moreover, while the lack of resources is a genuine concern, it is not an acceptable excuse for declining to address the problem.

- The Agency disputed the number of EPA systems, databases, etc. stated in the draft report, and quoted "300" as the correct number.

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We obtained our number from the IG's Special Review, which relied on information from a previous version of the EPA's ISI. During the audit entrance conference, the Director for Information Resources Management expressed concern that because the ISI is self-reported, it might not effectively represent the most critical Agency systems. Therefore, he suggested that we rely of the IG's Special Review which ranked systems according to risk. The final report was changed to reflect 300 systems.

The following Agency comments relate to specific recommendations cited in the draft report. However, this final report contains a revised set of recommendations.

Recommendation 1. While OIRM officials agree that they should establish a standard for the date field, they maintain that the four digit approach is too restrictive. They stated that FIPS Publication 4-1 allows for the use of a four or a two digit date field. OIRM insists that system managers have the flexibility to build year 2000 compliance within their unique technology framework and in the most cost effective way. The Agency responded that, whatever standard is established, there "should be a requirement built into the IRM procurement process through the EPA Acquisition Regulations. This would require that all commercial software developers and providers assure year 2000 compliance in all future software development or enhancement products they provide to the Agency."

According to FIPS Publication 4-1 and EPA's Data Standards Catalog, the four-digit year is the existing Agency standard for the date field. As an existing Agency standard, it is already required by EPA Acquisition Regulations. However, we realize that to rigidly impose this standard on *all* existing systems would be impractical. There are a number of reasons why existing systems might be exempt from the standard. For example, expanding the date field is too costly a solution for systems nearing replacement or retirement. Our concerns are based on the fact that there are a number of alternative approaches being used throughout the Agency, but few of the system managers interviewed had plans to ensure that their system interfaces would operate properly.

We recommend the use of waivers to accommodate situations where systems are justifiably exempted from the standard. We contend that the use of waivers allows system managers ample flexibility in justified situations. In addition, the use of waivers would provide OIRM with a much needed mechanism for controlling, coordinating and acknowledging decisions to deviate from the Agency standard. Despite OIRM's objections to the use of waivers, we found that Agency Directive 2100 clearly advocates their use.

Recommendation 2. OIRM agreed that reliable methods for testing date fields for year 2000 compliance were necessary. However, the Agency suggested that the recommendation be reworded to use the phrase "test methods guidance document." In their opinion, this terminology would allow system managers more flexibility to choose a methodology appropriate and cost effective for their

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environments. In addition, OIRM anticipates that commercial vendors will modernize their operating system utilities and software tools to accommodate the century date change within the next one to two years.

We have no objection to modifying the wording of this recommendation. We agree with the need to have reliable methods for testing date fields for year 2000 compliance. In our opinion, these guidance documents will provide (1) consistency to the issues being contemplated when planning a solution and (2) uniformity in the approaches being taken to carry out those plans. We reiterate that these guidance documents should be completed in a timely manner, to allow adequate time for the implementation of suggested methodologies.

Recommendation 3. OIRM agreed that managers needed to be kept informed of relevant year 2000 policies, procedures and methodologies, but maintained that there are sufficient existing communication mechanisms to facilitate this process.

We concur that there is no need to establish a new forum. Our intention is to influence the Agency to utilize an existing forum to disseminate guidance or relevant information, as well as encourage an open exchange of ideas and experiences among system managers.

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KEEP AS SPACING FOR APPENDIX 1, PAGE 1 OF 3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 1 2 1995

OFFICE OF
ADMINISTRATION
AND RESOURCES
MANAGEMENT

MEMORANDUM

SUBJECT: Response to Draft Report of Review - Major Information Systems are Vulnerable
To Failure Due To Upcoming Century Change

FROM: Paul Wohlleben, Acting Director
Office of Information Resources Management

TO: Patricia Hill, Director
ADP Audits and Assistance Staff

We appreciate the opportunity to comment on your **Draft Report of Review** on "Major
Information Systems are Vulnerable To Failure Due To Upcoming Century Change".

General Comments:

We agree that the year 2000 issue is a serious problem. We do not agree with your
comment on page 8 of your report which states that "OIRM Has Not Provided Appropriate
Leadership In Addressing The Year 2000 Problem."   The Office of Information Resources
Management (OIRM) has demonstrated appropriate management leadership in concert with
current, year 2000 policy in the Federal government and with trends in the private sector.
OIRM's leadership is exemplified by compliance with current Federal Information Processing
Standard (FIPS) Publication 4-1; conduct of an OIRM-sponsored, Agency-wide information
awareness campaign to communicate on issues related to year 2000; and issuance of year 2000-
related memos to Agency Senior Information Resources Management Officials and to the IRM
community. In addition, OIRM has taken the lead in assessing the problem through EPA's
Systems Development Center efforts which checked on the year 2000 status of 36 Agency
systems; through the Enterprise Technology Services Division's work in identifying date codes in
systems; and through inclusion of a status question on year 2000 readiness in the recent Agency-
wide, IRM data call. To maintain our leadership role and stay in concert with other Federal
agencies on year 2000 planning, OIRM is an active member of a new Interagency Task Force on
the year 2000 issue.

We believe that the Agency should be evaluated on the current status of its planning
efforts to achieve year 2000 readiness, rather than on a 1995 snapshot of major systems' status.

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Like most government and private enterprises in 1995, EPA is analyzing the scope of the problem and planning a strategy that will place the Agency on track to handle the century change. We believe that the outcome of the year 2000 planning process will not result in a "one-size-fits-all" solution. Our current system environments are varied, and each needs to be closely examined to determine the best and most cost effective year 2000 solution. We recognize that for each system the year 2000 solution must consider the technical environment, expected system life, available resources, and any published, government-wide standards, as well as provide for successful data sharing and transfer.

Inaccuracies/Omissions Noted:

o The report fails to mention that the FIPS Publication 4-1 allows for a two-character date field as an option to a four-character date field.

o There is no mention of the resource concerns expressed by system managers during your interviews. As you know, the solution to the year 2000 problem must, to some extent, be driven by a cost benefit analysis of alternatives.

o The first paragraph on page 1 of your report mentions that there are "approximately 500 systems, databases, models, modules, and other computer applications" in EPA's Application Systems Inventory. The number 500 is incorrect. The correct number is 300.

Comments on Recommendations:

Recommendation #1: Establish an EPA standard requiring the use of 4-digit years in all applications by 1997.

Partially Agree. EPA should establish a standard for the date field, however we believe that the four digit approach is too restrictive. The FIPS Publication 4-1 allows the use of a four or a two digit date field. Our discussions with officials at the National Institute of Standards revealed that there are no current plans to update that publication. We are concerned that the issuance of a too-restrictive, Agency standard would force an unreasonable "one-size fits all" solution on existing Agency systems. We agree with the comments from the Agency's major system managers that they must have flexibility to build year 2000 compliance within their unique technology framework and in the most cost effective way. For example, one system manager pointed out that merely storing date in a packed hexadecimal *date format*, as opposed to alphanumeric or numeric *date field*, provides great flexibility on how the date information can be formatted for output or exchange by using *edit masks*. For other short-lived systems that are close to replacement or retirement, a logic work around may be the most cost effective solution. We also believe that whatever standard is established, it should be a requirement built into the IRM procurement process through the EPA Acquisition Regulations. This would require that all commercial software developers and providers assure year 2000 compliance in all future software development or enhancement products they provide to the Agency.

Recommendation #2: Establish a standard testing methodology to be used to ensure that all

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application systems, interfaces, operating systems, and tools/utilities are year 2000 compliant.

<u>Partially Agree.</u> We would prefer to modify this recommendation to change the words "a standard testing methodology" to "a test methods guidance document." A "test methods guidance document" would focus on good, reliable methods that can be used for testing date fields for year 2000 compliance. This would allow system managers using different hardware and software tools to be able to choose a methodology that is best suited and most cost effective for their environment. For operating systems, software tools, and utilities, we expect that in the next one to two years commercial software vendors providing those products must, by necessity, modernize and test their products to accommodate the century date change, and the Agency will benefit from those changes.

Recommendation #3: Establish a mechanism to (1) keep system managers informed of policies, procedures, and methodologies associated with year 2000 compliance and testing, and (2) allow system managers to ask questions and share information with each other.

<u>Partially Agree:</u> We agree that managers need to be kept informed of policies, procedures and methodologies associated with year 2000; however, we do not believe that new communication mechanisms are needed. There are currently numerous, existing forums for communication to take place, which include regular meetings of the Executive Steering Committee for IRM, Senior Information Resources Management Officials (SIRMOs), Regional IRM Branch Chiefs, PC Site Coordinators, LAN Administrators, System Managers, ADP Coordinators, etc. All of these forums present opportunities for communication on the year 2000 issue. In addition, we can continue to use the Agency's EMAIL system, LAN mail, mainframe UMAIL, and Washington Information Center and OIRM newsletters to communicate with the Agency on year 2000 matters. All of the existing communication forums encourage system managers to ask questions and share information.

If you have any questions about this response, please contact Michael Carpentier, OIRM Audit Coordinator, IRM Policy and Evaluation Division, on (202) 260-2415.

cc: Michele Zenon, Director IRMPED
Michael Carpentier, IRMPED

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Appendix 2

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