

Review of Year 2000 Project
Report No. 99-18, September 30, 1999

This report presents the results of the Office of Inspector General's (OIG) monitoring review of the Railroad Retirement Board's (RRB) Year 2000 project. This is the second report of the OIG's ongoing monitoring of the RRB's progress in implementing its Year 2000 project plan. The prior review determined that project management was administered and controlled adequately (Audit Report No. 98-22, dated September 24, 1998).

Background

The RRB pays retirement and survivor annuities, as well as unemployment or sickness benefits to railroad workers and their families. As such, the RRB has been designated the lead agency for the high impact federal program of retired rail worker benefits by the Office of Management and Budget (OMB). As the lead agency, the RRB is to take a leadership role by ensuring that the integral partners to program delivery have adequate Year 2000 plans, and that the program will operate effectively in the next millennium. The RRB has identified three integral partners with which it exchanges data: the Social Security Administration (SSA), the U.S. Department of the Treasury's Financial Management Service (Treasury), and the Health Care Financing Administration (HCFA).

The RRB's Year 2000 project, administered by the Bureau of Information Services (BIS), involves the conversion of all mainframe and personal computer (PC) application systems. The conversion provides for the use of a full four-digit year designation rather than a two-digit year designation in all computer programs. The project also involves ensuring the RRB operations are not disrupted due to Year 2000 problems with:

- vendor-purchased (proprietary) mainframe system software;
- data exchanges with outside parties;
- building service systems with date sensitive (embedded) computer chips; such as fire alarms, elevators, and telecommunications;
- personal computer hardware, software and peripherals; and
- local area network servers and operating systems.

The RRB has identified 160 mainframe and 70 PC systems requiring conversion. Additionally, 16 mainframe and 22 PC systems will either be retired or replaced. The RRB's goal was to convert all mission critical mainframe and all PC systems by December 31, 1998, and all non-mission critical mainframe systems by September 30, 1999. (Mission critical systems are directly related to paying benefits to the railroad public.)

The BIS has the responsibility of converting the mainframe systems, while the individual

user bureaus/offices have converted the PC systems. Both the BIS and user bureaus/offices share the responsibility for testing system changes. Each month, the BIS reports the conversion status of systems to the Automated Data Processing Steering Committee and the Board Members.

The conversion of mainframe systems includes program coding changes and testing of individual systems (unit testing). The RRB is also testing critical payment systems together in a job/processing stream using year 2000 dates (fully integrated future date testing). This testing is being performed at RRB headquarters and at the RRB's offsite disaster recovery facility in Wood Dale, Illinois. Once all testing is complete, systems are considered to have met 'final certification' for Year 2000 compliance.

Additionally, the RRB has contracted with an outside firm to conduct independent verification and validation (IV&V) of selected mission critical mainframe systems. The contractor is reviewing the RRB's program source code for critical systems to determine whether all date fields and references to date fields in other programs are Year 2000 compliant.

Scope and Methodology

The objective of the OIG monitoring is to ensure the RRB's Year 2000 project management continues to be adequately administered, controlled, and completed timely. The scope for this report is limited to the Year 2000 project status through August 1999. Additional reports will be released as the project and testing continues.

To accomplish the objective, we:

- reviewed Year 2000 project reports for mainframe, PC, proprietary system software, building services systems, and data exchanges with outside parties;
- reviewed staffing allocations, project hours, and costs reported for fiscal year 1998;
- reviewed unit test plans, procedures, and test results for 30 OIG judgmentally selected RRB mainframe systems and the 35 mission critical PC systems;
- participated in planning meetings and reviewed the test results for 76 OIG systematically selected retirement/survivor cases, and regression testing of unemployment/sickness cases included in the onsite integrated future date testing;
- participated in the planning meetings and offsite integrated future date testing, including the review of the test results for 90 OIG systematically selected retirement/survivor cases;
- reviewed and followed-up on the contractor's IV&V reports of potential flaws in RRB source code that may create Year 2000 discrepancies;
- reviewed and followed-up on the RRB's Business Continuity and Contingency Plan

(BCCP) for the Year 2000;

-- reviewed minutes of Automated Data Processing Steering Committee meetings, OMB reports and guidance on Year 2000 issues, and RRB administrative reports; and

-- interviewed RRB personnel.

The review was performed in accordance with generally accepted government auditing standards appropriate for the objective described above. The fieldwork was performed at the RRB headquarters office in Chicago, Illinois from October 1998 through September 1999 and the RRB's disaster recovery site in Wood Dale, Illinois in August 1999.

Results of Review

This review showed that the RRB's Year 2000 project management continues to be administered and controlled adequately. As of August 31, 1999, the RRB has remained on schedule for completing mainframe and PC system conversions. The RRB has successfully tested most of these systems. Proprietary system software and building services have been reported as fully compliant. Progress continues on ensuring data exchanges with outside parties are compliant, and that all computer equipment is Year 2000 compliant.

Despite agency efforts to date, the RRB has additional work to ensure that its operations will continue without serious Year 2000 disruptions. For example, the RRB still must upgrade or replace about 30 percent of the personal computers and over 80 percent of the local area network servers in headquarters.

It has come to our attention that the RRB is at risk for not meeting Year 2000 compliance by September 30, 1999 for some Medicare systems. We did not include Medicare-related systems in the our sample and did not review any test results relating to Medicare activities due to prohibition on this office's use of funds for any audit, investigation or review of the RRB's Medicare program. However, we attended RRB meetings where problems with Medicare activities were discussed. Also, the May 1999 report provided by the outside firm that conducted IV&V identified many program code discrepancies for one Medicare system.

During Fiscal Year (FY) 1998, the RRB directly applied 46 full-time equivalent (FTE) workyears and reported costs of \$5,170,401 for Year 2000 conversion efforts. Total expenditures from FY 1996 through FY 1998 have been \$8,098,879 (81 FTEs) and the RRB has budgeted expenditures of \$5,012,671 (50 FTEs) for FY 1999 and \$934,846 (10 FTEs) for FY 2000.

The details of our review are discussed below. RRB management generally agreed with the findings contained in this report. See Attachment 2 for the complete management's response.

System Conversions

Application Software Conversions

In fiscal year 1999, the RRB has continued to place Year 2000 conversions as the highest priority. Only mandatory system changes have taken precedence over the RRB's Year 2000 efforts. As a result, the RRB has continued to exceed the overall conversion schedule of mainframe systems by completing conversion of all mission critical systems in January 1999, and accelerating their completion of non-mission critical systems. Most PC systems were converted on schedule by December 31, 1998. Progress continues on completing the future date, final certification testing for both mainframe and PC systems. As of August 31, 1999, the RRB has completed conversions of 95% of the mainframe systems (63% have received final certification), and 100% of the PC systems. The following tables and chart in Attachment 1 show the status of these conversions as of August 31, 1999.

| MAINFRAME SYSTEMS | | | | | | |
|------------------------------|---------------|----------------|-------------------------|----------------|-----------------------------|----------------|
| STATUS | BOTH | | MISSION CRITICAL | | NON-MISSION CRITICAL | |
| | Number | Percent | Number | Percent | Number | Percent |
| Completed* | 167 | 95% | 89 | 100% | 78 | 90% |
| Work In Progress* | 6 | 3% | 0 | 0% | 6 | 7% |
| To Replace / Retire* | 3 | 2% | 0 | 0% | 3 | 3% |
| TOTAL* | 176 | 100% | 89 | 100% | 87 | 100% |
| Final Certification # | 100 | 63% | 54 | 61% | 46 | 64% |

Includes 16 systems to be replaced or retired.

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| PERSONAL COMPUTER SYSTEMS | | | | | | |
|----------------------------------|---------------|----------------|-------------------------|----------------|-----------------------------|----------------|
| STATUS* | BOTH | | MISSION CRITICAL | | NON-MISSION CRITICAL | |
| | Number | Percent | Number | Percent | Number | Percent |
| Completed | 92 | 100% | 35 | 100% | 57 | 100% |
| Not Completed | 0 | 0% | 0 | 0% | 0 | 0% |
| TOTAL | 92 | 100% | 35 | 100% | 57 | 100% |

Includes 22 systems that have been replaced or retired.

Proprietary Systems and Building Services

The RRB has reported that all 45 mainframe proprietary systems are Year 2000 compliant. However, six systems require testing for compatibility, and installation is still being performed on four of the six systems. The RRB is relying on compliance certifications from

the software vendors. The RRB is confident that the software is compliant when so certified, because it is being used for the processing of the RRB's future date application software testing currently being performed.

For building services, the RRB also is relying on compliance certifications from the vendors. The RRB has reported all building services systems are compliant, including telecommunications and electronic commerce. The RRB is not responsible for four field office telephone systems that are located in buildings with GSA-controlled equipment. GSA, however, has indicated that these systems are Year 2000 compliant. The RRB plans to test building services on January 1, 2000 and will do manual overrides if the services do not work.

In August 1997, the GSA suggested a clause in contracts for Year 2000 contract protection and warranty, but agencies are not required to use it. RRB management believes that building service contracts do not need this clause. RRB management advised that, for the RRB's current maintenance contracts, the vendors are not responsible for the embedded chips, which might be date sensitive. The installation contracts for major RRB building services were signed prior to 1997; therefore, these contracts would not contain the clause. A recent contract for the RRB's elevator system is a GSA contract; therefore, GSA is responsible for the language in the contract.

Computer Equipment

Currently, the RRB is continuing efforts on ensuring all computer equipment and peripherals are Year 2000 compliant. The RRB has adopted a standard Year 2000 compliant configuration for PC hardware and software. However, as of July 1999, the RRB had over 500 desktop personal computers that were not compliant. Most of the required PC upgrades have been purchased, and the RRB expects to procure the remainder by the end of fiscal year 1999. Configuration and installation of new Y2K compliant PCS are in progress.

The RRB is also continuing efforts on making all local area network servers compliant. All field offices are being equipped with a Year 2000 compliant server as a result of a communication equipment upgrade. Additionally, in July 1999, the RRB contracted with an outside firm for the assessment of all local area network servers in headquarters. The contractor reported that 39 of the RRB's 46 servers in headquarters have Year 2000 problems in their hardware and operating system. The contractor also noted that some of the RRB's printers, PCS, and software, and portions of the RRB's electronic mail system were not compliant. In August 1999, the Automated Data Processing Steering Committee voted to accept most of the outside firm's recommendations to upgrade or replace the servers in headquarters. They expect that the contractor will complete the necessary upgrades and replacements by November 1999.

Project Hours and Cost

As a designated lead agency for the high impact federal program of retired rail worker benefits, the RRB reported to OMB \$5,170,401 or 46 FTEs as actual obligations for the Year 2000 project in fiscal year 1998. This amount contains \$3,306,277 for personnel compensation and benefits, but excludes supervisory/managerial staff and other indirect support costs. BIS managerial support (approximately 6.5 FTEs) for the Year 2000 project totaled \$629,289 in FY 1998. Additional resources attributable to user testing and PC conversions have not been reported, but would further increase total project cost.

System Testing

The RRB continues to test converted mainframe and PC systems in both a stand-alone environment and in a system-to-system processing stream. Unit testing prior to implementation includes:

- regression testing which involves selective retesting to detect faults introduced during system modifications,
- integration testing of systems that share data files or other interfaces based upon current date test data to ensure those systems continue to work together as intended, and
- future date testing to ensure each system is capable of processing dates into the Year 2000. Future date testing is in progress for several systems.

For unit testing, the RRB typically performed automated comparisons of Year 2000-converted programs and regular production runs. Test results included:

- comparisons of counts of records processed,
- review of date fields,
- recomputation of amounts such as annuities, and
- review of edits.

The OIG judgmentally selected 30 RRB mainframe systems and 35 mission critical PC systems for review of Year 2000 conversion test plans, procedures, and test results. To date, the OIG has reviewed the test documentation or observed on-line testing performed by BIS and/or users for 29 of the mainframe and all PC systems. The OIG found processing exceptions for some mainframe systems and recommended a software patch for one PC system. RRB has made all required changes for systems that the OIG reviewed.

Integrated future date testing performed after implementation includes the use of selected future dates in major daily and monthly operations necessary for the payment of railroad retirement, survivor, unemployment, and sickness benefits. Test cases were created to

match major processing conditions generally encountered in day-to-day operations, and aged appropriately. These test cases were then processed using selected future dates, including:

- major dates for RRB processing – for example, July 1, 2000, which starts a new benefit year for the unemployment and sickness insurance program;
- the turn of the century dates - December 30, 1999 (last work day) and January 3, 2000; and
- leap year dates - February 28, 2000, February 29, 2000 and March 1, 2000.

The RRB conducted onsite testing from April through August 1999 and offsite testing at the disaster recovery center on August 5 and 6, 1999. While the integrated future date testing was generally successful, there were some problems and delays encountered with the Medicare-related systems. The OIG did not include Medicare systems in its sample or review any test results relating to Medicare-related activities due to prohibition on this office's use of funds for any audit, investigation or review of the RRB's Medicare program. However, the OIG was informed that the Medicare-related systems did not complete successful testing on two separate occasions. As a result, the RRB is at risk for not meeting Year 2000 compliance by September 30, 1999 for Medicare operations. Further testing of the Medicare programs are scheduled after the RRB completes program changes.

The OIG systematically selected 76 retirement/survivor cases for review of the onsite testing, and 90 retirement/survivor cases for review of the offsite testing. For each case selected, the OIG reviewed the application systems involved (including the initiating system and the related database system) to determine whether the processing condition under test produced the appropriate results. For example, the processing of a notice of death of the railroad employee annuitant should trigger a termination of the employee annuity and the subsequent calculation/payment of the widow's annuity. Additionally, the OIG reviewed the regression testing of unemployment and sickness cases performed onsite. This testing included automated comparisons of selected future dates with a baseline production run to determine whether processing produced accurate results. In both the retirement/survivor and unemployment/sickness tests, the OIG did not find any processing errors attributable to Year 2000 program changes.

End-to-End Testing with Integral Partners

The RRB has identified three integral partners who provide or process critical data affecting the payment of retired rail worker benefits. They are the SSA, Treasury, and HCFA. Pursuant to OMB guidance, the RRB contacted each of these agencies to coordinate end-to-end testing, focusing on future date data. Previously, the RRB had successfully conducted testing with these partners using current date data.

Test files with future dates have been sent to Treasury, who will work with the Federal Reserve Bank to test RRB benefit payments and cancellations. Additionally, test plans are being developed with SSA to test future date exchanges. Regular production files exchanged with HCFA already contain Medicare effective dates in the year 2000, so additional testing is not necessary.

Independent Verification and Validation

In April 1999, the RRB contracted with an outside firm to conduct IV&V of selected mission critical systems. The RRB provided the program source code for 14 critical systems (approximately 660,000 lines of code). The purpose of the IV&V was to determine whether all date fields, including references to date fields in other programs, have or can accept a four-digit century. The IV&V process combines automated software analysis with judgmental review of RRB source code.

In May 1999, the contractor provided a report citing 417 potential Year 2000 discrepancies to the RRB for review. RRB has analyzed these discrepancies and decided to make program changes for about half of them. Some errors identified by the contractor involved obsolete or unused code and therefore, the RRB did not correct these errors. The contractor based other identified discrepancies on misinterpretations of RRB code.

Testing is in progress for the required program changes. The RRB's error rate (number of errors found compared with lines of code reviewed) appears to be higher than the average of the contractor's other clients, but this was generally due to one Medicare system. Based on the results of this review, the RRB has released a second group of systems' source code (approximately 1.3 millions lines of code) to the contractor in August 1999. RRB management expects to complete all analyses and program changes by November 30, 1999.

Business Continuity and Contingency Plan

The RRB has developed a BCCP for the Year 2000. The BCCP focuses on alternative processing methods should service disruptions occur because of Year 2000 issues. This document is an adjunct to the RRB's disaster recovery plan, which focuses primarily on providing the resources necessary to continue mainframe computer and local area network operations during a disaster.

The OIG reviewed the BCCP and found it to be incomplete for some functions. The BCCP was revised and RRB management is currently testing the plan through review and rehearsal. The RRB expects to complete testing by October 1, 1999 and present a final BCCP by October 29, 1999.