Office of Telecommunications and Information Systems
Year 2000 Compliance Plan

June 16, 1997 to March 26, 1998

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State Auditor
The Honorable Christine Todd Whitman  
Governor of New Jersey

The Honorable Donald T. DiFrancesco  
President of the Senate

The Honorable Jack Collins  
Speaker of the General Assembly

Mr. Albert Porroni  
Executive Director  
Office of Legislative Services

Enclosed is our report on the audit of the Office of Telecommunications and Information Systems (OTIS), Year 2000 Compliance Plan, for the period June 16, 1997 to March 26, 1998.

If you would like a personal briefing, please call me at (609) 292-3700.

Richard L. Fair  
State Auditor  
May 4, 1998
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Office of Telecommunications and Information Systems
Year 2000 Compliance Plan

Scope

We have completed an audit of the Office of Telecommunications and Information Systems (OTIS), *Year 2000 Compliance Plan* relating to executive branch systems for the period June 16, 1997 to March 26, 1998.

OTIS has been given responsibility for the planning and implementation of Year 2000 actions for the executive branch information systems that it uses and/or maintains for the various agencies of state government, at the direction of those agencies. Individual agencies have responsibility for the planning and implementation of Year 2000 actions for agency-managed systems. These non-OTIS, agency-managed systems were not included in our audit.

The scope of the OTIS Year 2000 project as stated in OTIS’ *Year 2000 Compliance Plan* is limited to the systems OTIS maintains and uses, and the facilities that OTIS occupies. Specific systems areas include the following:

- OTIS-maintained applications
- Third-party software (e.g., database, word processing, spreadsheet, messaging)
- Hardware (e.g., mainframes, mini-computers, micro-computers, printers)
- Wide area network (e.g., routers, bridges, hubs)
- Local area networks (e.g., servers, network operating systems, multiplexors)
- Telecommunications (e.g., telephones, voice mail)
The judicial and legislative branches of the state government have information systems that they use, manage and maintain, and are covered in their respective Year 2000 Compliance Plans. These systems and plans are not included in the OTIS plan and therefore not included in the scope of this audit.

**Objectives**

The objectives of our audit were to determine the status and appropriateness of OTIS’ efforts to identify and correct the Year 2000 problems for systems which it maintains.

This audit was conducted pursuant to the State Auditor’s responsibilities as set forth in Article VII, Section 1, Paragraph 6 of the State Constitution and Title 52 of the New Jersey Statutes.

**Methodology**

Our audit was conducted in accordance with *Government Auditing Standards* issued by the Comptroller General of the United States. Additional guidance for the audit was provided by the *Year 2000 Assessment Guide* issued by the General Accounting Office (GAO) and standards set forth by the American Institute of Certified Public Accountants (AICPA) and the Information Systems Audit and Control Association (ISACA); The Year 2000 and 2-digit Dates: A Guide to Planning and Implementation issued by IBM Corporation.

In preparation for our testing, we interviewed the OTIS directors of the identified system areas including Client Services, Technical Services, Operations, Network-Wide, Network-Local and Facilities. We also interviewed the chairs of established sub-committees including planning, inventory, testing and certification.

Questionnaires for the 462 identified applications were distributed to the responsible project managers to determine individual project compliance with requirements set forth in the *Year 2000 Compliance Plan*. 
A nonstatistical sampling approach was used. Our samples of applications, program changes and software were designed to provide conclusions about adherence to requirements set forth in the Year 2000 Compliance Plan.

**Conclusions**

OTIS management has recognized the importance of solving the Year 2000 problem. They have developed a Year 2000 Compliance Plan which breaks down the project into ten key tasks, formed a Project Management Team, assessed the requirements for each system, and begun renovation of some applications.

While initial progress has been made, there are several critical issues facing OTIS, that if left unaddressed, could result in the failure of some systems to properly process transactions with a date of Year 2000 or beyond.

**Treasurer’s Response**

I am pleased that the audit concluded that OTIS management has recognized the importance of solving the Year 2000 problem and that progress has been made toward addressing Year 2000 issues. As you know, I have made the Year 2000 project the number one priority for OTIS and I have instructed that all OTIS application development resources be redirected to this effort. As such, I am confident that no critical issues related to OTIS’ Year 2000 project will be left unaddressed.

In conclusion, I want to express my appreciation for your interest and concern for this most urgent issue. Please be assured that your observations and advisements are being given the utmost consideration.
OTIS’ centralized inventory is not complete.

Centralized Systems Inventory

The creation of a comprehensive inventory system that includes all the elements necessary to identify, analyze and track the status of the Year 2000 project is still in the development phase. Although efforts to add data are ongoing, as of January 1998, 452 of 462 computer applications have not been entered. The Project Management Office initially collected much of the necessary inventory information and entered it on personal computer electronic spreadsheets. After researching alternatives, management decided in the summer of 1997 that a project of the magnitude of the Year 2000 effort would be better handled by a client-server database. It was then decided to develop an in-house, on-line inventory and tracking system to be resident on OTIS’ local area network and using Oracle client server software.

The GAO in its Year 2000 Assessment Guide identifies the conducting of a complete and accurate enterprise-wide inventory of all information systems to include links to core business areas or processes; systems platforms, languages, and database management systems; operating system software and utilities; telecommunications; internal and external interfaces; systems owners; and the availability and adequacy of source code and associated documentation.

Additionally, the inventory plays a critical role in the later stages of the Year 2000 project, which include renovation, validation, and implementation. For example, the inventory should be used in monitoring the status of each system; including assessing whether all OTIS maintained systems are receiving appropriate attention, determining needs for testing facilities, and identifying areas that may require additional resources.

The OTIS Year 2000 Compliance Plan identifies as a deliverable the development of a comprehensive inventory including standard reports and spreadsheets to aid in and be used for the tracking of project work.
Without a complete inventory, OTIS cannot adequately assess progress. OTIS may be unable to ensure that critical systems are receiving adequate attention, adequate testing facilities are available and adequate personnel resources are available.

**Recommendation**

We recommend OTIS management ensure the completion of the Oracle based Year 2000 Inventory System and include all OTIS maintained systems and their current Year 2000 status.

**Auditee’s Response**

OTIS agrees that a centralized systems inventory is important to properly manage its Year 2000 project(s). OTIS also agrees that its centralized inventory is not fully populated. The inventory database is operational, however, and information about all of the systems that OTIS maintains has been entered to the database system.

Several years ago, OTIS recognized a need for a comprehensive inventory of the systems that it maintains. In 1992, OTIS retained a vendor to conduct a study of its operations; one of the outputs of this study was an inventory of OTIS-maintained systems. This inventory served as a baseline from which OTIS began its planning for Year 2000. Initially, the basic systems information contained in the inventory was supplemented with data about Year 2000 impacts for the systems. Eventually, the systems inventory information was enhanced to include status data for Year 2000 activities. All this inventory information was kept in a spreadsheet format, which had limitations. As a result, OTIS management decided to develop a Year 2000 database for tracking project activity. Presently, OTIS’ Year 2000 database has been implemented. The database is actively being updated to include data for all OTIS-maintained systems. The audit report notes that at the time it was written that data for 452 of the 462 computer applications had not been entered to the database. At this time, however, information for every system has been input to the database. The volume of information that has entered to the database is such that the database is currently being used to generate system status reports that are being used internally and shared with client agencies. It is anticipated that as the database becomes more populated and as it becomes relied upon for project management, enhancements will be made to the database’s report generating features.

**Disaster Recovery**

OTIS needs to revise its disaster recovery plan to assure continued processing.

OTIS is currently in the process of updating their applications and systems for Year 2000 compliance. In conjunction with this work effort, OTIS has also consolidated the processing for its three data centers, the HUB, Barracks Street and River Road, into one
logical data center. The consolidation of the three OTIS data centers into one has eliminated the ability to use the other sites as backup for each other. As a result, the state does not have an alternate data center (hot site) available or a revised Disaster Recovery Plan currently in place for its IBM operating environment. Additionally, the pending BULL Operating System upgrade to a year 2000 compliant one will make it incompatible with its presently contracted hot site located in Billerica, MA.

Disaster recovery standards as stated in the GAO Year 2000 Assessment Guide dictate that all year 2000 compliant systems should have disaster recovery plans for the restoration of computer operations and data in case of an extended outage, sabotage or natural disaster. Also, the OTIS Year 2000 Compliance Plan states that backup and recovery testing as well as disaster recovery testing should be done for renovated and replaced systems.

In the event of an emergency or natural disaster, the state’s ability to restore computer operations and/or recover data will be substantially weakened and may result in the inability of OTIS to provide the required services.

**Recommendation**

We recommend that OTIS continue its efforts to revise its disaster recovery plan for its data center and contract for hot sites for the IBM and BULL operating environments.

**Auditee’s Response**

OTIS believes that this finding is outside the scope of the audit since disaster recovery planning is a critical issue regardless of the Year 2000. OTIS agrees that an up-to-date disaster recovery plan is extremely important on an ongoing basis. OTIS is actively working to ensure that its disaster recovery planning is current.

While it may be appropriate to treat the Year 2000 as an impending disaster and plan for it accordingly, mainframe disaster recovery is not a Year 2000 issue. The advent of the Year 2000 does not create the need for disaster recovery planning. Disaster recovery planning is an everyday, on-going concern.

The audit report noted that changes to current environments drive a need for revising disaster recovery plans. Specifically, the report noted that OTIS recently completed the consolidation its three data centers.
For the IBM/MVS environment, the consolidation has resulted in two physical sites (i.e., the HUB and River Road) that are logically connected and function as one data center. The BULL environment is limited to one physical site (i.e., the HUB).

To address disaster recovery issues for the IBM/MVS environment, OTIS developed a request for proposal (RFP) to address the issue of a back-up to the environment; the RFP stipulates that a comprehensive disaster recovery plan is a deliverable. OTIS finalized the RFP in March and transmitted it to the state’s purchase bureau for processing/release. It is anticipated that the RFP will be released shortly.

For the BULL environment, BULL/Integris is currently under contract to provide a disaster recovery facility (a.k.a., “hot site”). The existing hot site is located in Massachusetts. This hot site, however, will not be compatible with the OTIS system once the operating system of the OTIS system is upgraded for Year 2000 compliance. The existing contract contains provisions to address the upgraded system. The contract, however, is being further revised to address cost and configuration issues related to providing sufficient capacity to back-up the OTIS system. As a result of the revised contract, BULL/Integris will provide a hot site that is compatible with OTIS’ upgraded system. Presently, it is anticipated that BULL’s facility in Arizona will serve as the hot site for the upgraded system.

Regardless of the Year 2000, disaster recovery is a primary concern for OTIS. OTIS is cognizant of the need for adequate disaster recovery planning. Throughout its existence, OTIS has sought (and will continue to seek) to ensure that disaster recovery issues are addressed.

Comprehensive Year 2000 Plan

A comprehensive plan is a long term, high level plan that defines broad business goals and provides direction for their achievement. It is designed to specify the strategic and tactical objectives of management describing what is planned, why it is planned, by whom and how it will be gauged. A plan of this magnitude, therefore, is time dependent and will change at management’s direction. For the purposes of the Year 2000 project, the plan objective focuses on the turn of the century problem.

OTIS management has recognized the importance of solving the Year 2000 problem. This is evident in the initial Year 2000 Compliance Plan document dated
March 1997. The plan includes a number of positive actions that are consistent with the GAO’s assessment guide and standards set forth by The Information Systems Audit and Control Association (ISACA) and American Institute of Certified Public Accountants (AICPA). While there has been initial progress made, there are several critical planning issues facing OTIS that, if not fully addressed, may result in the failure of its systems to successfully operate in the Year 2000. As of January 1998 OTIS had not:

- centralized data on updated budgets and estimates of the cost of renovating or replacing systems;
- performed a complete risk assessment of its systems to determine the extent and type of the problems for each system, although critical systems and dates have been listed;
- consolidated the identification of all system interfaces, including those of external users who have established connections with OTIS maintained systems;
- ensured that testing resources will be available and ready when needed to determine if all operational systems are compliant before the year 2000; and
- implemented a Year 2000 certification program that defines the conditions to be met for automated systems to be considered compliant.

In addition to the comprehensive Year 2000 plan, which required each directorate and project team to develop and incorporate plans, our review of selected Year 2000 projects disclosed that all three directorates and two of the three applications reviewed did not have a complete Year 2000 plan. We distributed questionnaires for the 462 identified applications maintained by OTIS to the responsible project managers. The results of our questionnaires disclosed that 65 of the 462 responders did not have a year 2000 plan in place and 32 had no answer at all. Additionally, the answers to
the questionnaires disclosed that although 115 application systems have undergone logic testing and are ready for Year 2000 certification, a Year 2000 test environment is not in place and operational.

Without a perpetual comprehensive plan in place for the Year 2000 project, OTIS runs the risk that it will not have the information to make proper decisions or that necessary tasks will not be addressed in a timely manner. For example, it’s important that OTIS establish time frames for completing specific tasks under the Year 2000 project that can be used by OTIS Year 2000 managers as indicators to gauge the progress of individual systems. Equally important is the need to identify what OTIS managers expect to accomplish during each phase of the Year 2000 effort. For instance, if OTIS has made systems Year 2000 compliant, but planning was not conducted early in the process to ensure that adequate test resources or facilities would be available, OTIS runs the risk of systems failure if they are left untested, or may lose flexibility to pursue other alternatives before the year 2000.

**Recommendation**

OTIS management should evaluate the existing comprehensive plan for the Year 2000 project ensuring all critical steps associated with the project are implemented. Management will need to work with directors, project coordinators and agencies to ensure system and application projects and tasks are performed and monitored, interfaces are properly identified and include necessary interface agreements, and adequate and timely test environments are provided. Because the plan is a time dependent tool, it should be modified and updated regularly in order to be effective.

**Auditee’s Response**

OTIS agrees with the finding that a comprehensive Year 2000 plan that is regularly modified and updated is important for the effective management of its Year 2000 project. OTIS’ current approach to the Year 2000 project is consistent with this finding. It is also felt that OTIS’ Year 2000 database enhances the organization’s ability to fully achieve the goal(s) of the recommendation.

The finding identifies five critical planning issues. The finding states inaccurately that as of January 1998, OTIS had not addressed these issues. In fact, at that time, OTIS was in the process of addressing each
of these issues. To date, significant progress has been made on all of
the identified issues and conclusion is nearing for a number of the
activities.

Issue 1 - For every system that it maintains, OTIS has developed a
high-level cost estimate. These high-level cost estimates have been
presented to the client agencies. Since developing/presenting these
high-level estimates, OTIS has been refining the system cost estimates.
These refinements are performed for individual systems as the client
owners make decisions on the Year 2000 actions to be taken. All cost
estimates were initially input to a single spreadsheet. The spreadsheet
has been maintained and periodically updated for refined estimates.
Presently, cost estimate data is being input to a Year 2000 database that
provides greater project management capabilities.

Issue 2 - For every system that it maintains, OTIS has conducted a
high-level risk assessment. From a systems perspective, OTIS has
identified those systems that have date impacts. OTIS has also
identified the systems that are known to support that state’s mission
critical functions. Further, OTIS has identified critical start dates and
critical failure dates for all systems. The full extent and type of
problems that may be caused for a system by the Year 2000 are best
defined as individual systems analyses are conducted. Thus, detailed
systems impact analyses are being conducted on systems as clients
authorize the performance of Year 2000 work. To date, OTIS has
conducted system analyses for the state’s mission critical systems, as
well as for many other systems for which Year 2000 work has been
authorized. These analyses are being used for making decisions on the
actions to be taken to address Year 2000 impacts.

Issue 3 - To date, OTIS has identified the interfaces for the state’s
mission critical systems, as well as for many other systems for which
Year 2000 work has been authorized. On a system-by-system basis,
OTIS is identifying system interfaces. Like Issues 1 and 2, system
interfaces are fully identified as planning and work on individual
systems is performed. System interfaces is a data field in OTIS' Year
2000 database. Information on system interfaces is being input to this
Year 2000 database.

Issue 4 - The preponderance of OTIS-maintained systems operate in
IBM/MVS environment. OTIS is actively working to establish a
separate logical partition (LPAR) for its IBM/MVS systems. This
LPAR will serve as an integration test environment that is virtually
identical to the production environment that will exist come the Year
2000. This test environment is not needed until late 1998. Moreover,
the integration testing cannot take place until the vendors provide Year
2000 compliant operating software. The LPAR is scheduled to be
implemented in May 1998, in advance of its need. In addition to
establishing an isolated Year 2000 test environment, OTIS has recently
purchased sufficient direct access storage devices (DASD) to ensure
that testing resources will be available. Like the test environment,
Year 2000 DASD will be isolated so that current production data is protected
from contamination by Year 2000 test data. OTIS is currently
addressing the requirements of other test environments (e.g., BULL)
and will ensure and confirm that test environments are established in a timely fashion.

**Issue 5 -** OTIS has developed a Year 2000 certification process. The process is in a draft form. It is expected that the process will be finalized prior to compliancy testing.

In addition to the five critical planning issues, the audit report states that complete Year 2000 plans do not exist for three directorates and two of three applications that were reviewed. The finding suggests that planning is not being performed. In fact, all of the directorates have plans for allocating resources and performing systems work. The plans are at a level that is adequate and appropriate for the directors to track project activities and make resource assignments. At the time of the review, the higher-level directorate plans did not have a consistent format; this issue is being addressed through OTIS’ Year 2000 database.

With respect to systems plans, all systems for which Year 2000 work is being performed have a plan. No strict planning format has been prescribed. Thus, systems plans may vary in detail and format. A generic planning template for Year 2000 activities has been developed and distributed, however. This template is being used to guide the development of individual systems plans. Moreover, OTIS’ Year 2000 database will serve to standardize certain aspects of individual systems plans for Year 2000. It should also be noted, however, that planning for a project as large as the Year 2000 is dynamic. Throughout the life-cycle of the OTIS Year 2000 project, project plans at all levels will undergo updating, modification, refinement, adjustment, etc. so that better, more efficient and effective solutions can be incorporated into the project as they are discovered.

Finally, the audit report also states that although 115 application systems have undergone logic testing and are ready for Year 2000 certification, a Year 2000 test environment is not in place and operational. This statement is misleading. It suggests that inadequate testing is taking place. The fact is that application systems are being tested in existing environments to ensure application functionality (noted as logic testing). Once having gone through this testing, the application systems are being placed back into production. Subsequent integration testing in Year 2000 test environments will take place to determine if the application systems may be impacted by changed operating environments. This approach to testing, wherein the most significant amount of testing work occurs in logic testing, isolates application impacts from environmental impacts so that systems testers can more easily identify problems. Furthermore, this approach to testing allows the application to be placed back into production more quickly so that data conversion issues are minimized.
Contingency Plans

Contingency plans for many OTIS maintained applications do not exist. There is no statewide contingency plan that establishes policies, programs, and procedures and assigns responsibilities for the contingency planning process. There is no documented policy, issued by management, initiating actions to require contingency planning. Specifically this plan should address noncompliant systems that are at risk of not being replaced or converted prior to impact of the Year 2000 and systems being replaced or renovated as Year 2000 compliant that may not operate at the turn of the century.

Contingency plans are essential because they identify the alternative activities to be employed should systems fail to meet their Year 2000 deadlines. A statewide plan should require project managers and directors to develop realistic contingency plans, with client agencies, for information systems and activities to ensure the continuity of their core business processes. The plans should incorporate standards set by ISACA, the AICPA, and the GAO.

Based on the results of our questionnaires, OTIS has identified 362 systems that it plans to make compliant through renovation with the remaining 100 systems to be replaced. As of January 1998, we noted 24 systems were complete while 145 had been converted but not tested. Notably, our review disclosed that there are still eight systems in the analysis stage and 62 in the assessment stage.

Although the Year 2000 project calls for these systems to eventually be validated prior to implementation, even with a structured process for assessing compliance, many OTIS maintained systems are still at risk that unanticipated operational failures could occur.

Recommendation

OTIS should promulgate a statewide Year 2000 contingency plan in accordance with standards set forth by the ISACA, the AICPA and the GAO. The plan
should be designed to mitigate the risks the Year 2000 crisis presents to state information systems. In developing the plan, OTIS management should encourage client agencies to prepare risk assessments and realistic contingency plans that identify alternatives to ensure the continuity of core business processes in the event of a failure, and assist in their preparations. These plans should cover all OTIS maintained systems that may not be renovated or replaced by compliant systems prior to the year 2000 and those systems considered to be Year 2000 compliant that may not function properly at the turn of the century.

**Auditee’s Response**

OTIS disagrees with this finding as it pertains to development of contingency plans for the continuity of programmatic business processes. OTIS believes that it has a responsibility for contingency planning to ensure the availability of the systems it maintains. However, OTIS believes that individual state agencies have the responsibility for developing programmatic contingency plans to ensure that state services can be provided in the event that the systems supporting their business processes are not available. On another level, OTIS believes that it has responsibility for developing system-specific contingency plans for those systems that OTIS is remediating of Year 2000 problems. Such contingency planning involves the identification of alternative approaches to making Year 2000 fixes so that the Year 2000 deadline can be met.

This finding states that “OTIS management, in conjunction with client agencies, does not have a formal State-wide Contingency Plan...” As written, the narrative places the onus on OTIS to develop a contingency plan to ensure the continuity of the state’s core business processes in the event of an information systems failure. The finding makes no distinction between the core business processes of OTIS and those of state agencies. The core business process for OTIS is to operate the information systems it maintains for state agencies. The core business processes of the state agencies are programmatic in nature and vary from agency to agency. For one agency, a core business process may be the issuance of licenses. For another, it may be the issuance of checks. For these programmatic business processes, individual agencies have a need to develop contingency plans to address failures of the automated systems supporting the processes.

It is appropriate for OTIS to assist agencies in the development of contingency plans for their core business processes. However, it is primarily the responsibility of the agencies to develop these plans. Additionally, it should be noted that the GAO guide to which the audit report refers states that it is an agency responsibility to perform contingency planning. With respect to the systems supporting core business processes, it is appropriate for OTIS to take a lead role in developing contingency plans for making Year 2000 corrections to agency application systems. It is also the responsibility of OTIS to
ensure that its disaster recovery plan adequately addresses Year 2000 issues that may impact operating environments.