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table of contents

auditor general's comments

Year 2000 readiness has been a major focus of government activities for a number of years. However, to make the transition to the new millennium reasonably smooth in the short time left, these activities have been considerably increased since the latter part of 1998.

The government's responsibility in relation with the Year 2000 preparedness goes far beyond finding solutions to the Year 2000 problem in ministries. It must keep an eye on and, where needed, help the Crown corporations and other public bodies (such as health authorities) ensure that their computer systems and electronic devices would also be ready on time.

Serious disruption in the "chain of supply" —public and private suppliers and distributors of goods and services in Canada and elsewhere —could cripple government's service delivery. In 1999, like many other governments across the world, the government of British Columbia took notice of its dependency on significant systems outside its own operating responsibilities, and took the steps it felt were necessary to reduce the possibility of an unexpected disruption.

There are few, if any, areas of modern life that are not touched by information technology. Many computer programs which needed to be made ready for the new millennium are not well documented. This combined with the possibility that, in the evaluation and testing, shortcuts may have been taken, has resulted in some feeling of unease and hesitation among technology industry players regarding the effectiveness of the Year 2000 work undertaken. Therefore, although government management has given thoughtful consideration to all aspects of the Year 2000 problem, there still remains a degree of uncertainty as to whether their computer programming initiatives have been completely successful. It would be very costly—and in many ways impractical—to independently review all the work done for making significant computer applications and electronic devices Year 2000 ready. Most organizations know this and have recognized the need to develop, for each major function, a fall-back plan of action to ensure

business continuation. Reviewing these plans has been the main focus of this, my assessment at the end of August 1999, of government's Year 2000 initiative.

I have not audited the state of preparedness of the government and therefore do not express an opinion on it. In this report, however, I provide some assurance about matters considered by the government, and identify areas that still need attention. My observations and conclusions are based on information I collected directly from government organizations—including evidence of review and approval by senior management responsible for the organization's Year 2000 readiness—and information I received from central agencies. I have tested such information on a sample basis to ensure it is authentic and reasonable.

Overall, the government has been proactive in dealing with the Year 2000 problem. Nevertheless, while much work has been done by all levels of government, much still remains to be done to ensure that major service disruptions do not occur. Repair or replacement of systems troubled by the millennium bug must be completed, business continuation plans must be finalized, tested, and formally reviewed and approved by senior management. For significant systems, the Year 2000 readiness of systems must be, to the extent possible, independently verified.

Most government ministries have corrected and tested their important systems. They are now working on "all hazard" business continuation plans to ensure they will be able to restore their main functions in the event of unexpected failure caused by internal or external factors. The government's current plan is to put all business continuation plans to test by the end of November 1999. Because much self-assessment is built into the process of making a major system ready for the Year 2000, an oversight may result in failure of the system in which case a good business continuation plan could reduce the risk of disruption to services. I am concerned by the fact that, in some cases, I found no evidence that business continuation plans had been formally reviewed and approved by senior ministry management.

Many Crown corporations with important responsibilities have made their main business functions ready for the Year 2000, and have completed business continuation plans. The same cannot be said for all government organizations and public bodies. Unless, in

the very short time left for action, the government deals with this issue directly, it is a likely that several health authorities will not be able to complete their Year 2000 plans successfully before the end of the year.

The advanced educational institutions I looked at also were behind in completing their business continuation plans, my main concern being with universities. They were not willing to provide my Office with details nor allow my staff to verify their work for public reporting purposes. Information I did receive from universities was not adequate to allow me to evaluate their state of readiness. Considering the nature of the wide variety of programs, including scientific research, that universities are involved in, failure of any computer-controlled environments may have serious implications.

I have greatly appreciated the cooperation of the officials and staff of the ministries, central agencies, Crown corporations and public bodies in the preparation of this report. Their helpful assistance enabled me to complete this review in an efficient manner.

I also wish to acknowledge the outstanding work of my staff in completing this report and to thank them for their hard work, professionalism, and dedication.

George L. Morfitt, FCA
Auditor General

Victoria, British Columbia
October 1999

highlights

report on the preparedness of the government of british columbia in dealing with the year 2000 problem

How Real Is the Year 2000 Problem?

January 1, 2000, is a Saturday. For most people in government that day would not normally be a workday—and neither would the following Sunday or Monday. In the upcoming year, however, key staff are being asked to report for work on those days. They will be testing systems that are necessary to the operation of government, to ensure that they are still working as they should. If a failure has occurred, key persons will be expected to begin activating a business continuation plan that will allow services to be resumed on or before Tuesday morning.

The Year 2000 problem, otherwise known as the "millennium bug," arises because many computer systems refer to years by their last two digits rather than by all four. Consequently, computers and other electronic devices processing dates may, for example, assume that "00" means the year 1900 rather than 2000. The result could be that they produce meaningless information or fail completely.

In any organization, the Year 2000 problem extends beyond the organization's normal computer hardware and software. Other types of date-dependent electronic devices—such as building security systems, heating and air conditioning systems, elevators, printers, photocopiers and fax machines—may also be affected. Of a more serious nature are the many process control systems used in health care facilities. These include life-support equipment and other critical hardware components in which date-sensitive computer chips are embedded.

Another concern is the possible effect that the Year 2000 problem may have on what is usually referred to as the "supply chain." These are indirect threats. Suppliers, manufacturers and distributors all face Year 2000 risks. A serious Year 2000 problem anywhere in this chain of activity could disrupt the delivery of products and services to

The main impact of the millennium bug will come not from faulty computers, but from the measures that are being taken to avoid trouble. Indeed, many millennium bug watchers now worry most about the bug's effects on stockpiling and on financial markets.

Source: The Windsor Star, September 25, 1999

final users. This threat may cause organizations and the public to feel that they must stockpile supplies.

It is a challenging task to attempt to deal effectively with the direct and indirect threats that the century date change will pose. Some vulnerabilities, such as security, telephone and computer systems, are easy to identify. Others, such as those arising from events occurring elsewhere in the world, are not as simple. We know, for example, that finance, utilities and telecommunications are key international infrastructures. The failure of any one may cause business interruption. It is not difficult to perceive a threat. However, we cannot say how serious that threat may be—and that is where the uncertainty lies.

Management has been called upon to identify all parts of government's business that are critical: services, products, suppliers, and business processes. They have been directed to minimize the potential for damage should a failure of a critical system or business process occur. Doing this requires first identifying and managing the risk that interconnected systems will cease to function in the normal manner, or that some systems will cease to function at all. The dependence that one critical system or business process has on another must be understood before one can recognize the potential for ripple effects caused by a single system failure. Plans to minimize the ripple effect of each failure must be established.

The Year 2000 problem is very real. However, with adequate preparation we can reduce the likelihood of disruption to government's business and its provision of essential services.

Is the Government Ready to Deal with this Problem?

All governments realize that they will be affected to some degree by Year 2000-related failures. There is no doubt that the Year 2000 problem has challenged the ingenuity and resources of British Columbia's government, and resulted in the most widespread coordinated strategic effort in recent history. As we have reported on the Year 2000 remediation activities of the government over the past few years, we have seen the activities that are part of this effort evolve from initial assessment, through the development, testing and verification of systems, culminating in the development of business continuation plans.

As this is our final review of the state of preparedness for the Year 2000 before the end of 1999, our main focus is on business continuation planning and the verification of systems

as Year 2000 ready. The successful completion of these two phases will bring the Year 2000 remediation to a close, and increase confidence in the government's ability to continue its business and provide essential services with little or no disruption as we move into the new century.

In general, the government has been proactive in adopting a well-structured and organized approach to resolving the Year 2000 problem. Centralized government initiatives are now being directed towards the transition to the Year 2000. Ideally, all levels of government—ministries, Crown corporations, other government organizations and municipalities—must work towards reducing the potential effects of any failures due to the Year 2000. In this regard, a Year 2000 Transition Steering Committee was recently established to oversee and coordinate the Year 2000 transition process across government and the broader public sector operations. The committee's first tasks will be to coordinate the ability of central government's business continuation plans to work under an "all hazard" condition, and to prepare a high-level public sector Year 2000 Transition Plan.

Documentation is an important requirement both in a business continuation plan and in the certification or verification of the readiness of mission-critical systems. From an accountability point of view, sufficient information should be available to demonstrate that the government has applied due diligence in addressing the problem. In addition, all possible legal implications of the Year 2000 problem should be identified and steps taken to minimize the government's potential legal exposure.

The government recognizes the importance of addressing potential legal liabilities, developing and testing business continuation plans, and verifying systems as Year 2000 ready. Through the Risk Management Branch of the Ministry of Finance and Corporate Relations, the "Planning Guide for the Development of Business Continuation Plans" has been issued. It states that the objective of business continuation planning is to ensure the recovery, within an acceptable time frame, of business as a whole following an incident that causes major disruption to operations. A number of services provided by British Columbia government organizations are essential to external and internal clients. Disruption of any of these services for an extended time period could drastically affect the socio-economic well-being of a large number of British Columbians. The government must therefore be prepared to restore these services quickly.

The Action2000 Project Office has addressed the issues of documentation of the Year 2000 preparations and evaluation of potential legal liabilities by defining the term "ready" used in relation to Year 2000 activity, and by emphasizing that documentation is a crucial aspect of being Year 2000 ready and demonstrating due diligence. Likewise, ministries are encouraged to assess the completeness of documentation supporting Year 2000 readiness by performing a quality assurance review that takes into account their potential legal liability.

Review Purpose and Scope

This is our fourth in a series of public reports on the government's progress in dealing with the Year 2000 issue. The purpose of this review was to assess the progress made by the government of British Columbia in this area since our previous review in early 1999, and to report on the state of the government's preparedness to deal with the problem.

During August 1999, we conducted a review of mission-critical systems in ministries, public bodies (including the advanced education institutions we audit, health authorities and a number of other organizations) and Crown corporations. For our purposes, a system is considered mission-critical if failure of that system could result in:

- a potential life-threatening situation;
- economic hardship for British Columbians;
- serious damage to the environment; or
- a significant loss or liability to the Province.

For this review, we selected the ministries, government organizations and Crown corporations that had identified mission-critical systems during our last review. We also included all health authorities and eight advanced education institutions in the Province. In addition, we looked at the progress being made in the six specific program areas we selected for in-depth review in prior years. These are outlined in Exhibit 1.

There is no shortage of information about the Year 2000 initiatives in Canada and abroad. Our study of the literature dealing with the Year 2000 problem highlighted a number of key processes that can be considered part of Year 2000 project management best practices. These are:

Exhibit 1

List of Information Systems Selected for Detailed Review of Year 2000 Readiness

We looked at the work in progress on two corporate, two revenue, and two expenditure systems to examine their Year 2000 readiness

Function/Program	Ministry Responsible	$ Processed (in Billions)*	Systems Identified
Corporate Accounting	Finance and Corporate Relations	>80.0	Corporate Accounting System
Corporate Payroll	Office of the Minister Responsible for the Public Service	1.9	Corporate Human Resource Information and Payroll System
Social Service Tax	Finance and Corporate Relations	3.3	Social Service Tax Systems
Timber Sales	Forests	1.2	Harvest Database System
Medical Services Plan Claims	Health	1.9	Medical Services Plan Claims System
Social Assistance	Social Development and Economic Security	1.4	BC Benefits Program System

*Source: 1998/99 Public Accounts

1. development of a project management structure;
2. promotion of awareness of the Year 2000 problem;
3. assessments of risk;
4. adequate provision of resources;
5. project planning;
6. development of strategies for testing, validation and conversion;
7. project monitoring;
8. business continuation planning; and
9. certification / verification of systems as Year 2000 ready.

Our past reviews of Year 2000 projects in the government of British Columbia, have focused mainly on the first seven phases of the process. Now that these phases are nearing completion, in this review our focus turned to business continuation planning and the certification / verification of the systems as Year 2000 ready.

We surveyed the government organizations to establish the status of their mission-critical systems. We then selected a sample of these systems for further review. Where a system was categorized by the organization as Year 2000 ready, we

verified that the readiness of the system was appropriately reviewed and approved by a person or persons authorized to do so. We also wanted to substantiate that, both for systems that were Year 2000 ready and for those that were not, a business continuation plan had been produced, reviewed by senior management and approved.

To put the survey responses in a proper perspective, we collected information from the Action2000 Office, the Chair of the Year 2000 Implementation Task Force, ministry representatives on the task force, senior management in ministries, and other provincial audit offices.

Lastly, where it was available, we reviewed documentation associated with verification of Year 2000 readiness and business continuation planning for the six specific program areas noted above.

For our review, we relied on information we gathered from a number of sources. We have not audited all such information and, consequently, although we report on the state of readiness of the government in dealing with the Year 2000 problem, we do not express an audit opinion on that state.

Assessment and Key Findings

While much work has been done by all levels of government, much still remains to be done to ensure that major service disruptions do not occur. Remediation of systems and embedded devices must be completed, business continuation plans must be finalized and tested, and the Year 2000 readiness of systems must be verified.

Following is a summary of our key findings.

Ministries

According to responses we received to our surveys, we believe the majority of the mission-critical systems in ministries are Year 2000 ready. In most cases, ministries are working on "all hazard" business continuation plans that will direct restoration of mission-critical business functions in the event of unexpected failures from both internal and external sources.

The planned procedures for making sure business continuation plans are ready include the exercising of plans by all ministries by the end of November 1999. These procedures seem adequate and on track. However, we noted that in some cases there was no evidence of formal sign-off indicating senior management's review and approval of business

continuation plans. We believe that the final business continuation plans should be signed off by both ministry senior management and the business continuation plan coordinator.

While there are practical limitations in satisfying oneself that the efforts made have dealt successfully with the Year 2000 issue, we believe that certification or verification of Year 2000 readiness is needed. There should be evidence that the readiness of mission-critical systems was appropriately reviewed and approved by a person (or persons) authorized to do so. We have noted examples where ministries did not have a formal sign-off to document this review and approval process.

We believe that, overall, ministries are documenting their Year 2000 efforts, obtaining legal advice and completing business continuation planning in an orderly manner. In this report we have noted examples where some ministries are still remiss, but we are satisfied that there are continuing efforts by the central organizations of the government to ensure these ministries will comply in all material respects.

Government Organizations

Many Crown corporations with mission-critical functions have made their systems ready for Year 2000 and completed business continuation plans. However, the same cannot be said for all government organizations, including advanced education institutions and health authorities. Also, a number of Crown corporations and other government organizations have not yet sought legal advice about their potential liabilities in case of substantial failure of their mission-critical systems. This contradicts the government's standards of due diligence as they apply to ministries. If one of the essential systems of these organizations should fail, the Province will likely be faced with an unavoidable liability.

The Ministry of Health has reacted to concerns over the Year 2000 preparedness of the health authorities by establishing a comprehensive monitoring and reporting system. Many of the health authorities appear to be well on their way to successfully completing their Year 2000 plans before the end of the year. However, the ministry has identified several health authorities where there is a high probability that the Year 2000 initiative will not be completed as planned. Because the timeline for taking corrective action is quickly disappearing, we believe that the ministry should implement its remedial action plans and assist these health authorities in completing their tasks as soon as possible.

The two major colleges we surveyed have completed their remediation work and tested their mission-critical systems for Year 2000 readiness. However, documentation to support user and management endorsement of their systems' Year 2000 readiness in one college was not adequate. Neither college has documented its year-end rollover procedures. One college has not yet carried out business continuation planning and the other could not provide us with the documentation for such a plan.

We contacted six universities in our survey, and all except one responded. We found inconsistency in what these universities regarded as critical embedded systems, and none considered its research systems to be mission-critical. Four of the five respondents were unwilling to provide us details or allow us to undertake verification work for public reporting purposes. We were therefore unable to evaluate the state of their Year 2000 readiness.

An executive summary of our previous reviews is included in this report as Appendix A.

summary of recommendations

The recommendations made in this report are listed below for ease of reference. They should be regarded in the context of the report.

The Office of the Auditor General recommends that:

Part 2. Year 2000 Readiness: Ministry Initiatives

- *Final business continuation plans be signed off by authorized management and the plan coordinator as evidence that the plans have been reviewed and authorized and are considered to be thorough, reasonable and capable of implementation.*
- *One of the priorities of government should be to promote the completion and testing of business continuation plans within the set deadlines, as insurance against disruptions to service delivery and operations.*
- *The review and authorization of Year 2000 project activities and supporting documentation by a person or persons authorized to do so be evidenced with a formal sign-off as verification that the system is Year 2000 ready.*

Part 3. Year 2000 Readiness: Specific Systems

The Corporate Human Resource Information Payroll System (CHIPS)

- *The Public Service Employee Relations Commission seek legal advice to determine recourse should CHIPS not operate as anticipated at the turn of the century.*

The Harvest Database System

- *The final business continuation plan be signed off by authorized management and the plan coordinator as evidence that the plan has been reviewed and authorized and is considered to be thorough, reasonable and capable of implementation.*
- *If the library management system cannot be Year 2000 ready in time, management consider other options for code movement and tracking.*

Part 4. Year 2000 Readiness: Government Organizations

Year 2000 and the Health Authorities

- *The Ministry of Health immediately appoint Year 2000 managers and adequate resources to assist the several remaining high-risk health authorities with becoming Year 2000 ready, developing business continuation plans and ensuring that their supply chain will be Year 2000 ready.*

part 1
year 2000 readiness: centralized government initiatives

year 2000 readiness: centralized government initiatives

The Information, Science and Technology Agency (ISTA) is a central agency reporting to the Deputy Minister and Chief Information Officer (CIO), Ministry of Advanced Education, Training and Technology. Its mandate is to improve government processes through the better management of information and application technology. Its role, with regard to the Year 2000 problem, is to recommend a framework that will ensure service to the public is not disrupted and unwarranted expense to government is not incurred. Therefore, the majority of the centralized government initiatives originate from ISTA.

History of Centralized Government Initiatives

Organization and Focus

In dealing with the Year 2000 problem, the government established the following roles and responsibilities in 1996:

- The Chief Information Officer is responsible for overseeing government efforts to ensure systems are Year 2000 ready.
- ISTA is to provide a corporate perspective on government Year 2000 activities.
- The Advisory Council on Information Management is to collect Year 2000 testing and processing requirements on shared platforms, and pass on the information to the Information Technology Services Division of ISTA.
- The Information Technology Services Division is to provide ministries with adequate testing and production operating environments, along with available conversion tools.
- The ministry Executive Financial Officers are to provide leadership and take responsibility for Year 2000 initiatives in their ministry.
- The ministry Information Systems branches are to carry out initiatives to make all ministry systems (and forms) Year 2000 ready.
- Treasury Board is to provide fiscal advice and support to ensure that ministry systems become Year 2000 ready in a timely manner.

Also in 1996, ISTA established a Year 2000 Implementation Task Force to address all aspects of the problem and serve as a primary contact for Year 2000 information and support. A project coordinator from each ministry represents the ministry on the Task Force.

Since being established, the Task Force has made considerable progress, for example:

- A Year 2000 compliance definition, a Year 2000 readiness definition and a uniform "date" standard have been adopted for government.
- A government-wide inventory of computer applications has been taken to determine the scope of the government's Year 2000 problem.
- A preliminary estimate of costs and workload has been made.
- "Quarterly Task Force Reports" have been distributed to senior management within government.
- Year 2000 Testing Guidelines have been developed to provide ministries with guidance on how to ensure that software is Year 2000 ready.

In June 1998, more emphasis was placed on the monitoring of mission-critical applications and promoting public and private communications. To this end, ISTA established the following initiatives:

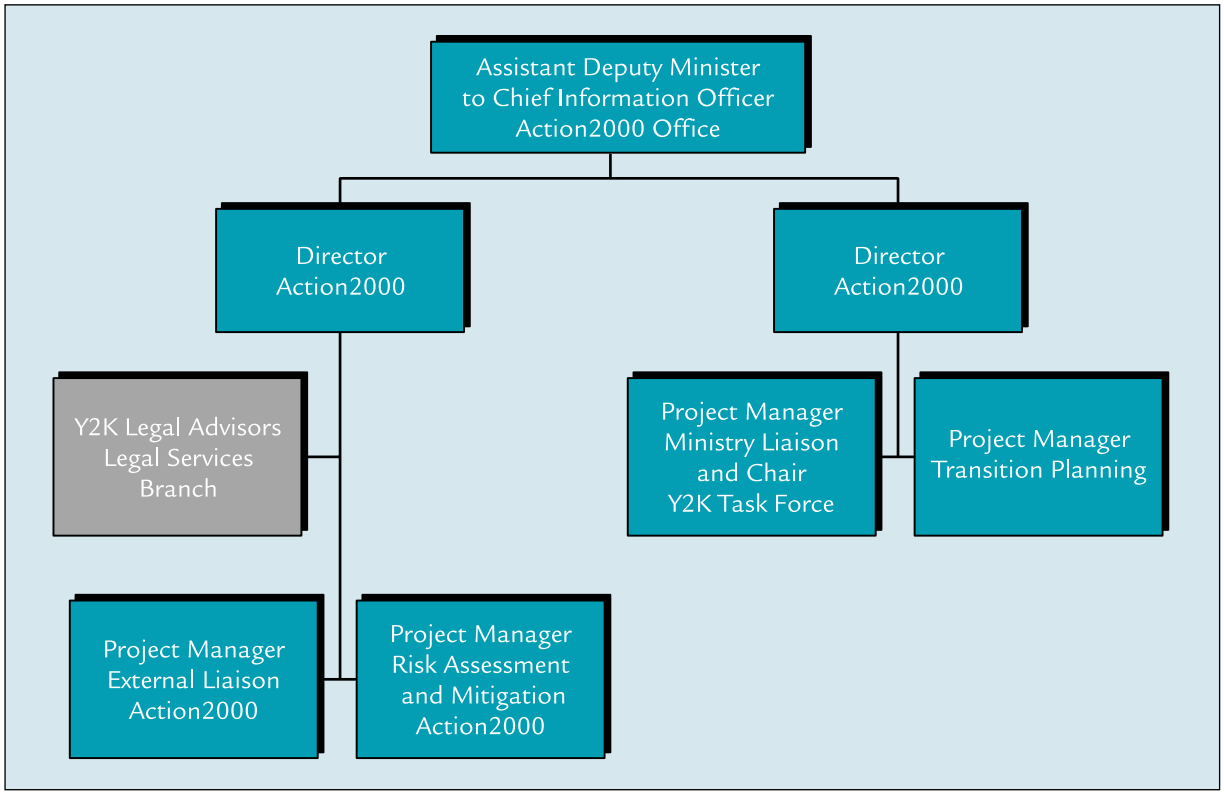
- The Action2000 Project Office was set up to take leadership in the facilitation of the Province's most mission-critical applications. Exhibit 2 shows the most recent organization chart for the Project Office.
- A communications network was formed to manage the recording and dissemination of Year 2000 information (including communications and coordination with the public, the media and the Provincial Emergency Preparedness initiative).

As of 1998, the Deputy Ministers—rather than the Executive Financial Officers who were, until then, responsible for the Year 2000 program—accepted responsibility for their ministries' Year 2000 activities. The Action2000 Project Office assumed responsibility for coordinating and monitoring overall efforts, and for advising the Deputy Ministers where further remedial action might be necessary to meet goals.

Effective January 15, 1999, ministries were asked to report monthly rather than quarterly to ISTA on their Year 2000 progress. The Chief Information Officer also reports monthly to the Deputy Ministers' Council.

Exhibit 2

Organization Chart for the Action2000 Project Office



Source: Action2000 Project Office, August 11, 1999

Issue Management

The Action2000 Project Office has partnered with various government bodies to manage issues surrounding the Year 2000 program.

- Acquisition

  In December 1998, the Purchasing Commission, in collaboration with the Task Force, initiated a Year 2000 procurement database and accelerated procurement method. The centralized database was developed to monitor the state of the Year 2000 contracting marketplace and help forecast and plan for shortages.

  Through this initiative, suppliers can register with the centralized database and ministries can select from the database to use an accelerated process for acquiring professional service and project requirements within established limits. We were told that as of August 31, 1999, there were 285 companies registered on the database.

Using the Year 2000 purchasing guidelines prepared by the Purchasing Commission, the Task Force has provided guidance on warranties.

- Microcomputer analysis

  In September 1998, concerns were expressed over the priority and cost of a proposed central initiative for the Year 2000 remediation of personal computers. In response, a strategy report for personal computers was released in November 1998. This report indicated that although a centrally managed approach was not widely supported, the Action2000 Project Office should facilitate a cooperative effort across government by developing a government-wide communication strategy and encouraging the sharing of evaluation information.

  Since then, the Action2000 Project Office has arranged for 10 Master Standing Offers, enabling ministries to purchase tools and services to assist in analyzing microcomputer hardware and applications for date-related problems. It has also assigned one staff member the task of providing evaluation information and support to the ministries, and assisting with microcomputer analysis when requested.

- Diagnostic and remediation tools and services

  In March 1999, the government issued an open Request for Proposal for a Master Standing Offer to purchase software products to perform Year 2000-related diagnostic and remediation functions for its principal mainframe, microcomputer and network computing environments. In July 1999, this Request for Proposal was revised to include Year 2000-related diagnostic and remediation services from vendors.

  These tools and services will provide additional assurance of Year 2000 readiness through the independent verification and validation of remediated code. As of the end of August 1999, the vendors had not been selected.

- Staffing

  The Public Service Employee Relations Commission has issued a notice to all Deputy Ministers stating that the operational requirements in relation to Year 2000 readiness and emergency preparedness must take priority when vacation schedules are approved. Given this directive, vacations at the end of 1999 will be limited as required.

- Documentation of Year 2000 projects

  Documentation supporting the planning and execution of Year 2000 activities, including testing records and user

acceptance, should be retained to provide evidence of the process followed.

In July 1999, the Assistant Deputy Minister of the Action2000 Project Office sent a memo to all ministry Executive Financial Officers encouraging them to perform a quality assurance review to assess the completeness of the documentation supporting Year 2000 readiness of their systems.

At the time of our review in August 1999, the Information and Data Management Branch of ISTA was drafting a government-wide record to ensure that support documentation was consistently identified and appropriately retained.

- Embedded systems

Some equipment used by the government is controlled by computers whose embedded operating systems may be affected by the Year 2000 date. Such equipment is used for a variety of purposes, and its failure could threaten public health, public safety and the environment.

British Columbia Buildings Corporation (BCBC) accepted Year 2000 responsibility for embedded systems in buildings under its management. The corporation is responsible for correcting Year 2000 problems associated with embedded systems such as physical access, fire alarms, lighting, heating, ventilation, and air-cooling.

By the end of August 1999, BCBC had completed an inventory of embedded systems for all managed buildings, noting the compliance status of each system. Testing of the Year 2000 date compatibility, and where necessary adjusting the embedded system to function in the Year 2000, has virtually been completed. The sites containing embedded systems have been rated on a “critical” to “normal” scale. This will aid the corporation in implementing its year-end monitoring process and in identifying where attendance at yearend would be required.

Ministries are responsible for funding the Year 2000 problem associated with their building security control systems. The corporation has assisted the ministries by including these systems in its inventory, identifying problem areas, and correcting deficiencies. Currently BCBC is conducting on-site visits to verify the Year 2000 readiness of the embedded systems.

The corporation also plans to have Emergency Operations Centres (EOCs) operating in all of its district

offices and service centres during the Year 2000 rollover weekend—December 31, 1999, to January 4, 2000. (Exhibit 6 in Part 2 outlines the government's definition of an EOC.) These centres will undertake a systematic check of all their buildings and respond to any problems that are reported. In turn, problems will be reported back to the Corporate EOC in Victoria. The prime function of the Corporate EOC is to monitor the overall situation and make executive decisions as needed. It will also be the focal point for communications to its clients and the media.

- Legal

  The Legal Services Branch of the Ministry of Attorney General (LSB) provides legal advice to the provincial government. Advice regarding Year 2000 matters is provided to ministries by the LSB solicitors assigned to advise those ministries. In addition, LSB solicitors are assigned to provide legal advice to the Action2000 Project Office and the Year 2000 Implementation Task Force.

  Legal advice and assistance has been (and continues to be) sought and obtained by the provincial government on a wide range of Year 2000 issues, such as:

  – providing advice on the potential risk or liability to the provincial government in the event of Year 2000 related disruptions;
  – identifying steps that may be taken to reduce the risk of potential liability;
  – reviewing Year 2000 related correspondence and documents, both internal and external;
  – drafting and reviewing contracts; and
  – monitoring Year 2000 legislation and litigation in other jurisdictions, including other provinces, the federal government and other countries.

  Ministries have also been asked to assess the risks associated with relationships with parties providing goods and services to government and relationships with parties providing services under contract on behalf of the government to third parties. In July 1999, the Assistant Deputy Minister of the Action2000 Project Office advised ministries to contact the LSB immediately for advice if this had not been done.

  Although we did not specifically investigate whether all ministries had consulted with the LSB, two of the 11 entities that we surveyed (10 ministries and the Information Technology Services Division) indicated that they had not

determined the extent of their potential liability in case of substantial failure of mission-critical systems. Responses from these two ministries—the Ministry of Children and Families and the Ministry of Health—are summarized in Exhibit 10 (in Part 2).

- Risks

The Risk Management Branch of the Ministry of Finance and Corporate Relations distributed a Business Continuation Plan Planning Guide and Outline to the ministries in the fall of 1996. Branch personnel, in the fall of 1998, trained the ministry's business continuation planning coordinators in the application of these documents to all emergencies or disasters, including the Year 2000 hazards. Currently the branch is involved in the evaluation of business continuation plans prepared by ministries for their mission-critical program areas. We discuss this in more detail under "Business Continuation Planning" in Part 2.

To establish overall government priorities—in the event of a disaster or disruption affecting more than a single entity in a single location (such as the Year 2000 hazard)—the Risk Management Branch is preparing a list of all mission-critical and business-priority program areas. This prioritized list will be based on the following program information:

- the criteria used to determine if the program area is mission-critical or business priority;
- the location of all buildings essential to house and operate the program area;
- whether the program faces a seasonal risk;
- the maximum allowable time to recover following an outage; and
- all information technology applications essential to operate the program area.

Each of the 21 ministries was to submit this information by August 16, 1999. At the time of our review, August 20, 1999, only nine ministries had responded. Others had indicated that the information was forthcoming.

Navy sailors provided valuable humanitarian-style aid to various metro agencies last week, as an extension of a Y2K preparedness exercise.

Practicing for worst-case scenario during the Y2K period, navy personnel were deployed to various community-based services to lend a helping hand to local charities.

Source: The Daily News (Halifax), September 27, 1999

- Provincial Emergency Preparedness program

The Ministry of Attorney General is leading the Provincial Emergency Preparedness program in consultation with the Action2000 Project Office,

ministries, essential service providers, regional and community emergency coordinators, and federal agencies such as the RCMP and Department of National Defence. By creating and testing business continuation plans, the government will be in a better position to respond to possible disruptions resulting from the Year 2000.

- The Non-profit sector

  The Province considers that, in many cases the risk of potential legal liability appears low with regard to the Province's relationship with non-profit societies and other organizations receiving grants from the provincial government. However, since disruptions in these organizations could hinder the public and ministry services, ministries have been encouraged to make non-profit organizations aware that the federal government is providing Year 2000 testing software and other support information directly to such organizations.

- Community awareness

  Since September 1998, the Action2000 Project Office has made presentations to various organizations outside the provincial government on aspects of the Year 2000 problem, particularly on the issue of embedded systems. The first such presentations were to the chambers of commerce of several British Columbia cities.

  In November 1998, the Action2000 Project Office started the Community Outreach Program by visiting the Comox Valley. In addition to a public forum, a session was held with the municipal representatives of Comox, Courtenay and Cumberland. An objective of these sessions was to convey assurance of Year 2000 readiness from Crown corporations such as BC Hydro. As well, business representatives were given the names of contacts within their local government (for example, the local emergency coordinator) should they require more information.

> *Anyone dealing with computerized systems knows that some mornings your system goes down, and you have difficulty finding out why. That is a fact of life. The federal government now is focusing much of its energies studying the state of readiness of Canada's major trading partners, as well as making sure Canadians are well informed and not panicked.*
>
> Source: OTTAWA (CP), August 10, 1999

  Between November 1998 and May 1999, all regions of the Province—20 communities—were visited. During these community visits, presentations were made by service sectors such as banking, insurance and supermarkets, telling local residents how prepared their community is.

In the fall of 1999, visits are planned to Salmon Arm, the Lower Mainland, Victoria, Prince George and Kelowna. It is anticipated that BC Hydro, BC Tel, BC Gas, Centra Gas and the Canadian Imperial Bank of Commerce will participate in these visits, along with representatives from the local health authority and municipality.

A number of items have been prepared by the Action2000 Project Office for distribution to the public and small business owners. These include a booklet titled "RU Y2K OK, BC? You, Your Business and the Year 2000 Problem," a "Millennium Bug Readiness Quiz" and a poster titled "B Y2K OK, BC!" which provides a Year 2000 checklist. The booklet provides a quick overview of the problem and some of the steps to take in fixing it. It contains worksheets for scheduling, taking inventory of equipment, software and embedded systems, and budgeting for repairs and testing. It also includes a list of Internet sites that can provide further information.

Testing and Disaster Recovery

During 1998, the government entered into an agreement with IBM for the latter to provide managed computing operation services for two major operating environments. The IBM agreement specifically outlines what hardware, software and firmware products it must make Year 2000 ready, and what materials remain the responsibility of the Province. IBM has sub-contracted these services to ISM-BC.

The mandate of the Information Technology Services Division requires the division to supply cost-effective information technology infrastructure services to ministries and other government agencies. Accordingly, it now oversees the delivery of the MVS and VM computing services by ISM-BC, and provides for the other operating environments, such as VMS, along with much of the government's network and security services. The division is ultimately responsible for ensuring that the mainframe computers and their operating software are Year 2000 ready.

As well, the division must ensure that ministries have an adequate testing environment and proper conversion tools when their systems are ready. Ministries need this environment for testing existing systems when they become Year 2000 ready, as well as for testing purchased applications.

The Information Technology Services Division (ITSD) has made testing arrangements for programs that are run in

the MVS computing environment. It is referred to as the MVS Year 2000 isolated test platform, or Year 2000 ITP. We discuss this later in the report, in Part 2 under "Development of Strategies for Testing, Validation and Conversion."

In case of a disaster that prevented the use of the computing facilities, ITSD has been working with ISM-BC to deliver a disaster recovery service. An agreement with SunGard Recovery Services Ltd. provides for a "hot site" service. SunGard will supply an operational system and networking capability at its facility at which the government's operating platforms can be restored. For this service to be successful, ITSD, ISM-BC and all government organizations must have appropriate back-up and recovery procedures in place to ensure all computer programs and data are backed up on a regular basis. These back-up files will be used to restore service within 72 hours of a disaster.

The disaster recovery plan is tested twice a year and government organizations are encouraged to participate. The most recent tests occurred on August 16–20, 1999. Year 2000 testing was not performed at that time. The objectives of the test were to:

- recover the mainframe operating systems (MVS, VM and Open VMS) and associated online systems;
- recover government organizations' programs and data;
- recover the connectivity to and management control of government's data network; and
- ensure that government organizations tested their applications.

Twelve ministry program areas participated in the test, and ITSD considered it to be generally successful.

Emphasis on Mission-Critical Systems

In the fall of 1998, a Risk Assessment Committee was formed to identify the top priority systems across government and monitor their progress. A system was considered "mission-critical" based on whether the potential impact of its failure could cause:

- loss of life (safety);
- personal hardship to citizens;
- major damage to the environment; or
- significant loss in government revenue.

A Year 2000 project has been defined as "an identified unit of work on a system or collection of systems which deals with assessing, remediating, testing and determining that the system(s) is Year 2000 ready." "Ready," which is the term used by ISTA, means that "identified Year 2000 problems have been fixed where required and/or Year 2000 business contingency plans and work-arounds are in place such that no disruption to normal business operations is expected." Exhibit 3 shows details of mission-critical projects that are ready.

As of August 15, 1999, the Action2000 Project Office reported that 65 of the 67 mission-critical projects identified by the Risk Assessment Committee were considered Year 2000 ready.

"Lots of things have changed since the beginning of the year," Culbertson (the Province's Chief Information Officer) said. "The whole management approach we have taken to Y2K has changed." All 67 provincial government systems identified as "mission critical," will be Y2K-ready by the end of September, he said. Sixty-three of those systems are ready now. Of the six critical systems focussed on in Morfitt's report, five are already Y2K ready, Culbertson said. The one remaining system of the six, the forests ministry's harvest database system, will be ready by September, he said. The system calculates stumpage billing and royalties earned from timber sales.

Source: Vancouver Sun, July 31, 1999

To provide the government with additional assurance about Year 2000 readiness, ISTA has offered ministries the funding, on request, to have their mission-critical systems reviewed by an independent consulting firm. The Internal Audit Branch of the Office of the Comptroller General is overseeing this review process. The purpose of these reviews is to provide ministry management with a report on:

- the system's state of readiness in relation to project plans and milestones; and
- whether due diligence is being carried out to make the system ready.

At the time of our review in August 1999, reports were being drafted on nine such systems and then presented to ministries for comment. It is expected that the final reports will contain "action plans" outlining how recommendations in the reports will be addressed.

In April 1999, the Deputy Minister to the Premier advised all the Deputy Ministers that mission-critical projects that were not ready by June 30, 1999, would be subject to mandatory independent reviews. In addition, reviews on other mission-critical systems could be ordered by the Deputy Minister to the Premier on the advice of the Chief Information Officer. Exhibit 4 shows details of the mission-critical projects that are not ready.

Exhibit 3

Ministry Mission-Critical Projects That Are Year 2000 Ready

Details about Year 2000 readiness and business continuation planning, as reported by ministries in response to our survey, August 1999

Ministry/Project	Description	Risk	Business Continuation Plan Completed and Approved by User Management
Attorney General			
Electronic Monitoring System	Used as an alternative form of adult custody. The system electronically monitors a person's presence or absence at a specific location 24 hours a day.	Safety	No[1]
Building Security Control System◆	Used to control security doors and lock-up in B.C. Corrections facilities.	Safety	No[1]
Protection Orders System	Provides access to civil and criminal protection orders 24 hours a day, 7 days a week, for police officers throughout B.C.	Safety	No[1]
Family Maintenance Enforcement Program	Enrols, monitors and enforces Maintenance Orders that require separated or divorced partners to continue providing financial support to their families.	Hardship	No[1]
Computer Assisted Trial Scheduling	Used by Supreme Court Trial Coordinators in scheduling Supreme Court trials.	Safety	No[1]
Crown Counsel System	A case tracking and charge approval system for the Crown Counsel Offices.	Safety	No[1]
Canadian Police Information Centre Interface◆	Used by law enforcement agencies to query driver's licence and vehicle information from ICBC.	Safety	No[1]
Justice Information System	A case tracking and charge approval system used by law enforcement agencies, Crown Counsel and Court registry staff to track the progress of criminal cases through the justice system.	Safety	Yes
Corrections Case File	An Integrated Corrections Branch operational system that supports the management of inmates and offenders who are under custodial or community supervision or assessment for court purposes.	Safety	No[1]
Automated Case Tracking	Used by law enforcement agencies, Crown Counsel and Court registry staff to track the progress of criminal cases through the justice system.	Safety	No[1]
Traffic Court	Used to track traffic charges and fines and to assist in scheduling traffic court cases.	Revenue	No[1]
Accounts Receivable and Collection	Used to record assessment and collection of fees, fines and court charges against individuals and corporations who owe a debt to the Province.	Revenue	No[1]
Jury Administration	Used to summons citizens for jury selection.	Hardship	No[1]
Risk Needs Assessments	Used to identify an offender's likelihood to re-offend, the appropriate custody or supervision level, the factors contributing to criminal conduct, and a focused offender management plan.	Safety	No[1]
Automated Land Titles System	System by which the Crown guarantees title to the land.	Revenue	No[1]
Children and Families			
MIS Social Workers System	Three sub-systems that provide different functions for social workers.	Safety	Yes
After Hours/ Community Information	Enables ministry and agency staff to formally alert After Hours staff about a situation with a child or family that may require their attention after the office is closed or over the weekend.	Safety	Yes

Ministry/Project	Description	Risk	Business Continuation Plan Completed and Approved by User Management
Energy, Mines and Northern Development			
Mineral Tax/ Resource Revenue	Ensures that coal and mineral taxes are calculated and verified, and that payments are collected.	Revenue	Yes
Mineral Land Tax	Ensures that mineral land tax is calculated, collected and verified.	Revenue	Yes
Royalty Management	Ensures that petroleum and natural gas royalties and freehold production taxes are calculated, collected and verified.	Revenue	Yes
Environment, Lands and Parks			
Water Quality Data Management	Captures and stores water quality data from automated monitoring stations established around the Province.	Environment	Yes
Environmental Monitoring	A data capture and retrieval system, designed to store results of physical, chemical and biological analysis performed on air, water and solid discharges at waste discharge sites and monitoring locations throughout the Province.	Environment	Yes
Air Data Management◆	Automated retrieval and messaging system for continuous data gathered from air quality monitoring stations.	Environment	Yes
Water Rights Information	Provides the ability to issue, locate, report and bill water licences.	Revenue	Yes
Finance and Corporate Relations			
Cash Flow Management	Facilitates the cash management process of managing cash inflows and outflows to maximize earnings, minimize borrowing costs and ensure liquidity on the Province's consolidated bank balances.	Revenue	Yes
Investment Portfolio	Records the investments of the Province and various pension clients. Failure of this system could lead to political embarrassment and/or the potential inability to invest funds efficiently and effectively.	Revenue	Yes
Liabilities Management	Manages the debt servicing payments associated with the debt portfolio.	Revenue	Yes
Loan Administration	Provides load administration functions for various government loan portfolios. A large component of this system is the collection activity of defaulted loans.	Revenue	Yes
Revenue Income Tax	Registers companies and collects taxes for corporate capital, fire, insurance, logging, mining and corporate income tax.	Revenue	Yes
Real Property Tax	Administers rural area property taxation, billing and receipts for the Province and local governments.	Revenue	Yes
School Tax Accounting and Reconciliation	Administers provincial school taxation levied within municipalities.	Revenue	Yes
Corporate Accounting (CAS)—Central Generic Interface (CGI)	Single point of entry into government's accounting system for ministry programs. The majority of government's program payments are made through this interface.	Revenue	Yes
Corporate Accounting System (CAS)◆	Government's accounting, reporting and financial management system. It currently processes general ledger, accounts payable and commitment management transactions.	Revenue	Yes
Oracle Corporate Accounting	The foundation for an enterprise-wide financial information system.	Revenue	Yes
Returns◆	Generates monthly returns to more than 90,000 vendors and operators registered under the Social Service Tax and Hotel Room Tax Acts.	Revenue	Yes

Ministry/Project	Description	Risk	Business Continuation Plan Completed and Approved by User Management
Finance and Corporate Relations (continued)			
BC Family Bonus	The information generated by the system must be passed to the Ministry of Social Development and Economic Security to be used to determine the income assistance monthly payment to families with children.	Hardship	Yes
Electronic Deposit Interchange	A monthly electronic tax filing and remittance program routed through ITSD, which electronically edits incoming transmissions and sends back receipt acknowledgements.	Hardship	Yes
Universal Contributor◆	A computer application used by the BC Superannuation Commission in tracking contributions and calculating pension benefits for members of eight pension plans in the Province's public sector.	Hardship	No
Forests			
Forests Tenure and Administration	Maintains and provides online support management of forest tenures and other land-based information.	Revenue and Environment	Yes
Integrated Silviculture Information	Captures, organizes and processes land-based information required for silviculture management in each district office throughout the Province.	Environment	Yes
Accounts Receivable Management	Manages accounts receivable for the ministry.	Revenue	Yes
Stumpage Appraisal and Scaling Administration	Determines stumpage rates to be charged on harvest lumber.	Revenue	Yes
Harvest Billing—VM—HBS	Transmits data between government systems. The system must be operational to prevent a breakdown of the harvest database and billing.	Revenue	Yes
Harvest Billing—VM—MBQ	A system critical to stumpage collection.	Revenue	Yes
Health			
Medical Services Plan Revenue and Premium Billing	Assesses eligibility for benefits, enrols B.C. residents for publicly funded health care, bills beneficiaries, maintains an accurate registry of clients and responds to queries.	Revenue	Yes
BC Ambulance Service	Applications that support service delivery, management information and financial functions. Vehicles, emergency communications, medical monitoring and treatment equipment are also used.	Safety	Yes
Pharmacare◆	Pharmacare and PharmaNet link community pharmacies, hospital emergency departments and physician offices to a centralized database. They also interact directly with pharmacies to determine the contribution for eligible prescription drugs and designated medical supplies.	Safety	Yes
Liquor Distribution Branch			
Stores Data Collection◆	Supports the collection and processing of liquor store sales data.	Revenue	Yes
Office of the Minister Responsible for the Public Service			
Personnel—CHIPS◆	Government-wide system that processes payroll for government employees and maintains human resource, leave and benefits information.	Hardship	Yes

Ministry/Project	Description	Risk	Business Continuation Plan Completed and Approved by User Management
Social Development and Economic Security			
BC Benefits◆	Provides income assistance benefits to residents of B.C. who are eligible.	Hardship	Yes
Daycare	Provides a subsidy for childcare services to qualifying parents for the Child Care Subsidy Program.	Safety and Hardship	Yes
Seniors Supplement	Issues payments to supplement the income of seniors receiving Old Age Security and the Guaranteed Income Supplement.	Hardship	Yes
Small Business, Tourism & Culture			
Government Agents Revenue Management	Essential link in Government Agents delivering hundreds of services to British Columbians in communities across the Province.	Revenue	Yes
Transportation and Highways			
Development Approvals	Investigates and issues approvals for property development on ministry right-of-ways.	Revenue	Yes
Oracle Corporate Accounting	The main financial system used by the ministry.	Revenue	Yes
Contract Risk Management Riskmaster	Software package that manages the ministry's insurance and claims operations.	Hardship	Yes
Information Technology Services Division			
NT Platform	Server for main desktop PC operating system.	All[2]	Yes
Network Services◆	Operates the government data network.	All[2]	Yes
Voice Services	Government voice telephone system.	All[2]	Yes
Electronic Mail	Government e-mail system.	All[2]	Yes
Electronic Commerce/ BC Online	BC OnLine provides businesses with electronic access to essential government information. Electronic Data Interchange enables the electronic exchange of essential commercial transactions.	All[2]	Yes
MVS Platform◆	Central MVS data processing computers supporting mission-critical and business priority systems.	All[2]	Yes
VM Platform	Central VM data processing computers supporting mission-critical and business priority systems.	All[2]	Yes
VMS Platform	Central VMS data processing computers supporting mission-critical and business priority systems.	All[2]	Yes
UNIX Platform	Central UNIX data processing computers supporting mission-critical and business priority systems.	All[2]	Yes

◆Indicates system we selected for review of the verification of Year 2000 readiness and the existence and authorization of a business continuation plan.

[1]Business Continuation Plan was in draft form at the time of survey response.

[2]Cross-government system, where failure can affect many program areas.

Exhibit 4

Ministry Mission-Critical Projects That Are Not Year 2000 Ready

Details about Year 2000 readiness and business continuation planning, as reported by ministries in response to our survey, August 1999

Ministry/Project	Description	Impact If System Fails	Estimated Completion Date	Business Continuation Plan Completed and Approved by User Management
Children and Families				
Medical Devices*	Include oximeters, feeding pumps, etc. for individual clients.	Failure of devices may cause the death of a client if the client cannot be brought to a hospital in time.	September 1999	Not indicated
Heating, Ventilation and Air Conditioning Systems, Intrusion and Fire Alarms and Electronic Locks in Facilities*	Building systems for security and health.	A worst case scenario is the evacuation of custodial institutions. In most situations additional staff would be required to deal with security issues.	September 1999	Not indicated
Forests				
Harvest Database and Billing—MVS◆	Tracks harvest billing.	Failure of system would delay the collection of stumpage fees for the government.	September 1999	Yes
Transportation and Highways				
Coquihalla Management Information/Point of Sale◆	Highway toll collection system used on the Coquihalla Highway.	Failure of system would cause loss of government revenue, as only cash transactions could be done.	September 1999	Yes

◆Indicates system was selected for review of the verification of Year 2000 readiness and the existence and authorization of a business continuation plan.

*These embedded systems were not included in ISTA's list of 67 mission-critical projects, but were included in the responses we received to our survey of ministries.

No such mandatory reviews had been performed as of the end of August 1999. The following four systems were being considered for such review and a decision was scheduled to be made in September 1999.

System:	Reason for Selection:
Harvest Database	■ The estimated completion date is September 30, 1999.
BC Benefits Program	■ The system serves a large client base.
Senior Supplement	■ The system has recently been moved from the Ministry of Finance and Corporate Relations to the new Ministry of Social Development and Economic Security.
An ITSD network application	■ The failure of a network application would have a cross-government impact.

Other than the mission-critical level, ISTA has also identified 531 "business priority" projects. A "business priority" project has been defined as a project involving a system which, although not mission-critical, could lead to the loss of a major business function were it to fail. The review of the state of readiness of business priority systems was not part of our review. However, according to the Action2000 Project Office, as of August 15, 1999, 88% of these systems were Year 2000 ready.

Preparing for the Transition to the Year 2000

As shown in Exhibit 5, ministries, other public sector organizations, local government and the private sector all provide essential services such as health care, electrical power, sewage services and water purification and distribution. Failure of computer software and hardware could result in disruption of these essential services, causing a public emergency.

All levels of government (ministries, Crown corporations, government agencies, municipalities), along with private industry, must work towards reducing any potential effects of a Year 2000 failure. Therefore, a high-level across-government coordination of these efforts is essential to make the transition to the Year 2000 as smooth as possible.

Exhibit 5

The Provision of Essential Services

Ministries, other public sector organizations, local government and the private sector all provide essential services to the public

	British Columbia Ministries	**Other Public Sector** (such as Crown corporations, municipalities, health authorities, federal government)	**Private Sector**
Examples of Essential Services Provided	Income assistance benefits Family bonus payments Court services Senior supplements payments Pension payments	Electrical power Water purification Sewage treatment Meteorological data Air/ground traffic & control Marine navigation & shipping	Oil & natural gas Food processing/ distribution Financial News service Radio Television
	Health care Prisons Continuity of government Police/emergency		Emergency broadcast Postal/courier Air Rail
	← Telecommunication →		

This has prompted the formation of a Year 2000 Transition Steering Committee. This committee consists of three Assistant Deputy Ministers and was created in June 1999 to oversee and coordinate the Year 2000 transition process across government and the broader public sector. The goal is to bring together risk assessment, risk management, business continuation planning, consequence management, emergency preparedness and system readiness. The two immediate tasks will be:

- to coordinate the ability of ministry all-hazard business

Large swaths of Asia will pull the plug seconds before the dawn of 2000—stopping planes, trains and even weapons systems—to combat the anticipated computer-crippling "millennium bug." Many countries will go back to basics and simply switch off critical systems as clocks tick toward midnight on Dec. 31. They will turn everything back on minutes into the new century.

Meanwhile, East Japan Railway, the biggest railway company in the world, will grind all the trains to a halt just before midnight and keep them there for 10 minutes "just in case," a spokesman said.

Source: Agence France-Presse, Tokyo, August 17, 1999

continuation plans to restore business functions in the event of unexpected Year 2000 failures from both internal and external sources; and

- to prepare a high-level, public sector Year 2000 Transition Plan.

The Transition Steering Committee is supported by the Year 2000 Transition Co-ordination Group, which is made up of directors from the Action2000 Project Office, Provincial Emergency Program and Risk Management Branch.

The Year 2000 Transition Co-ordination Group is required to:

- coordinate overall government planning and management of emerging Year 2000 issues; and
- address the need for a unified command structure in which all agencies that have jurisdictional responsibility contribute to the process.

At the end of August 1999, the above tasks were in initial stages and the Year 2000 Transition Plan was being developed. The Deputy Ministers' Committee on Emergency Preparedness was to look at this plan in mid-September 1999.

part 2
year 2000 readiness: ministry initiatives

year 2000 readiness: ministry initiatives

In general, the government has been proactive and has adopted a well-structured and organized approach to resolving its Year 2000 problem. The ministries report that all mission-critical systems will be Year 2000 ready in time.

Previously, we noted that the ministries were primarily concerned about:

- staff vacancies in the information technology departments;
- the uncertainty of funding availability;
- the sufficiency of shared facilities and tools available for testing and validation; and
- the availability of program staff to perform the significant amount of user testing required.

At least for the mission-critical systems, the ministries seem to have successfully worked around the potential shortages by using contractors or drawing staff from program areas. None of the ministries surveyed indicated in their response that they had inadequate resources for making the mission-critical systems Year 2000 ready in time.

Summary of Findings from Past Reviews and Status Updates

As explained earlier, in our previous reviews of the Year 2000 projects we examined mainly the first seven steps of Year 2000 project management. Following is a summary of our findings from prior reviews, along with updated information where appropriate.

Development of a Project Management Structure

The project management structure should be such that it provides an infrastructure to promote, lead and monitor the Year 2000 project activities. There should be executive sponsorship of the project activities and high-level ownership and direction.

We found that each ministry has appropriate project management structures in place and that Year 2000 project activities are directed and supported by senior executive of respective ministries.

Each ministry has representation on the central Year 2000 Implementation Task Force. Monthly reports outlining the status of the individual projects, estimates of work still to be

performed and the resource requirements to complete the work are filed with the Action2000 Project Office by the individual ministries.

Promotion of Awareness of the Year 2000 Problem

The Year 2000 problem is as much a business and managerial problem as it is a technical challenge. There needs to be an awareness and commitment by management and non-management staff to the Year 2000 issue, with an understanding of the potential impact and the need to address it on time.

We found that all ministries actively provide information to their staff and management. The normal methods used are briefings to ministry executive, e-mail broadcasts to employees, newsletter articles, postings to ministry Web sites, postings to other bulletin boards, presentations to staff, circulation of minutes, and publication of status and update reports.

Assessments of Risk

An inventory and subsequent assessment of all systems are necessary to allow sound decisions to be made on how to achieve Year 2000 readiness. The inventory should capture information on programs and their programming languages. It should also state whether the program is custom-designed or off-the-shelf software; it should list hardware with internal clocks, archived data, and other date-dependent equipment; and it should specify users of each application, including any external users.

Also, all external data exchanges should be recorded. Even if a ministry has made its own systems Year 2000 ready, its operations may fail if incorrect data entering from external sources contaminates the systems. The ministry may have to develop appropriate filters to maintain the integrity of systems and the data within them.

We found that all ministries have completed inventories of their systems and have ranked them in accordance with the risk associated with their failure. The inventories include systems of external entities on which the ministries rely. External entities with which the ministries were working include: federal government departments and regulatory and other public agencies; banks and other types of private companies; care and other service providers; the RCMP; and firms that provide software for industries, which in turn use the software to report to government. Obtaining confirmation that these external systems are Year 2000 ready, from the entities responsible for them, is in progress.

Adequate Provision of Resources

Projects to address the Year 2000 problem require considerable resources in terms of dollars and people. At the end of 1998, we noted that few ministries had encountered funding shortages for their projects. However, shortage of human resources was a serious concern. Some ministries reported vacancies in their key information systems' positions. Only two small ministries had adequate staff to deal with their Year 2000 activities.

The ministries with mission-critical systems now report that they have adequate resources to make those systems Year 2000 ready in time.

Project Planning

It is crucial that comprehensive plans be developed to deal with the varied and complex Year 2000 problems. In some cases, these plans have to evolve as circumstances dictate changes in priority or approach (e.g., making a decision to replace a system that was originally scheduled for modification).

All ministries with mission-critical systems have prepared detailed plans for their Year 2000 projects. These plans include schedules and milestones and have been approved as being comprehensive and realistic by appropriate project management personnel.

Though plans are constantly evolving, major changes are not common at this stage of the progress. Some of the unique reasons that necessitated rescheduling of some work are: the creation of new ministries with reassigned responsibilities for Year 2000 work; the expansion of the original plans to include additional areas (embedded systems, workstations, etc.); decisions to replace rather than repair systems and vice versa; and the early retirement of programming software at ITSD.

Development of Strategies for Testing, Validation and Conversion

Some ministries are using their own Year 2000 tools and facilities for testing. Others are sharing tools and test facilities, such as those provided by ITSD. Careful coordination of testing schedules is necessary to ensure that ministries have time available to meet planned deadlines.

The MVS operating system is a major mainframe computer environment. Approximately 38% of the high-risk ministry systems run in MVS. Therefore, ITSD has built a Year 2000 isolated test platform (Year 2000 ITP) to allow testing in a computing environment—or platform—where the system date

can be moved forward to key dates such as December 31, 1999, January 1, 2000 and February 29, 2000.

The "Year 2000 Isolated Test Platform Reference Guide" has been issued to provide information about the platform, such as hours of service, service levels, security issues, products supported and storage management. The division's Year 2000 Project Group coordinates with the ministry Year 2000 Project Offices to ensure that sufficient processing and data storage facilities are provided. At the end of 1998, neither the ministries nor the division were confident of the Year 2000 ITP's testing capacity.

These concerns prompted the establishment of a Year 2000 ITP Advisory Committee. Made up of representatives from ministries and ITSD, the committee deals with capacity, scheduling and other management issues. The division has also enhanced the Year 2000 ITP by adding more disk storage space and arranging for a standing order process with IBM for the rapid deployment of additional disk storage, if necessary.

In June 1999, ITSD believed that the Year 2000 ITP capacity was sufficient to meet ministries' projected demands. The committee will be monitoring the demand and capacity as time goes by.

The Year 2000 ITP is being used for final integration testing of systems that are considered Year 2000 ready. In August 1999 we noted that more systems had been scheduled for final integration testing on the Year 2000 ITP. This increased use of this testing platform is encouraging news. We note, however, at this late date there is a risk that the testing may reveal Year 2000 problems in programs—which were previously considered Year 2000 ready.

Project Monitoring

We noted in our previous review that all ministries have reporting procedures in place to monitor Year 2000 projects, and that their senior management receives project updates. In two small ministries the reporting is only on an as-needed basis.

Based on progress information reported by each ministry, the Chief Information Officer provides a consolidated monthly report to all Deputy Ministers. Each report provides an account of government-wide Year 2000 activities, describes ministries' accomplishments and makes recommendations.

In April 1999, the Deputy Minister to the Premier directed Deputy Ministers to submit an action plan for their ministries

to the Premier's Office. According to this directive, the action plans were to contain:

- a report on steps taken to address the Year 2000 issue;
- an assessment of the work that remains; and
- identification of any risks, and a description of the Year 2000 business continuation plans that will be put into place to address those risks.

A separate report has been requested on the ministries' plans to deal with mission-critical systems. The plans were to meet the following guidelines:

- the Year 2000 ready version was to be fully implemented by June 30, 1999; and
- business continuation plans for all critical programs were to be completed by May 31, 1999, and all external interfaces addressed.

We did not examine the ministry action plans in our current review. However, we did assess the status of their business continuation plans for mission-critical systems. In addition, we selected certain mission-critical systems and in each case looked for appropriate written approvals of the plans in the related ministries. The ministries' plans were rated by the Risk Management Branch. We looked at the evaluations, and our findings are discussed below.

Findings from Our Current Review

In the current review, our main focus was on the final two steps in Year 2000 project management, namely business continuation planning and the verification of the systems as Year 2000 ready.

Business Continuation Planning

Background

We believe that even in the most optimistic situations, it is unlikely that all systems will be Year 2000 ready in time. Contingency planning is therefore necessary. The importance of the services offered, the risks of disruption and the potential impacts to services must all be considered when a ministry is determining what is a reasonable contingency plan. The goals of each ministry should be the same—namely, to prevent any disruption of vital public service, and any loss of accountability for public resources.

> *The Government of Canada's attention will now shift to compiling data on how other sectors are faring in their remediation efforts, and what back-up plans are in place to deal with meltdowns.*
>
> Source: Canadian Press, Aug. 26/99

Business continuation plans should identify alternative ways that, when used, would ensure the continuation of core business processes even if a computer-based system failed. The alternatives should be subject to cost/benefit analysis and then the best contingent strategy identified for each core business process. Year 2000 business continuation plans should also be subject to the same identification, risk assessment, testing and certification process as any other plan.

Each ministry should establish its business continuation plans for solutions to be developed within the ministry, as well as for products and services to be provided by vendors. Possible system failures in the operation of service providers and key customers should also be considered and dealt with in the plans.

The Risk Management Branch of the Ministry of Finance and Corporate Relations was instrumental in having each ministry appoint a business continuation planner and in training most of the appointees one-on-one. At the date of our last review, however, ministries had completed little in the area of business continuation planning related to Year 2000. Only three ministries stated that business continuation planning was complete, but it was not clear to us how detailed their planning had been. Seven ministries stated that the plans were under development. Five ministries reported that no business continuation planning had been done. Two ministries stated that the conversions and fixes they were doing would mitigate all identified risks and, in any case, their projects were on target. Two others stated that their Year 2000 business continuation plans consisted of reverting to manual procedures. It seemed, then, that the government did not consider contingency planning as a priority.

We were encouraged to learn that the Year 2000 Implementation Task Force had identified business continuation planning as a priority and that the government supported this view. Steps have been scheduled to ensure that all ministries address the issue and that the process followed is thorough and complete.

The government's approach to business continuation planning requires that the plans be practical and that action-oriented documents be available, based on an all-hazards approach to the recognition of risks and threats to program operations. The plans should include recognition of and a response to the Year 2000 threat, but not be limited to it. Furthermore, the government set deadlines for program areas

with mission-critical systems, which included the development of business continuation plans by March 1999 and submission of these plans (with executive endorsement) to the Deputy Minister to the Premier by May 31, 1999.

An important distinction in the new approach was that the plans were to be developed for mission-critical "program areas," not mission-critical "systems." The new approach appropriately reflects that the government's goal is the recovery of the business process rather than just of the systems that contribute to the delivery of that process. Accordingly, in our current review, we examined the ministry's plan for the program area that included one or more mission-critical systems.

In July 1999, the government also reiterated the following deadlines:

- June 30—business continuation plans for business-priority program areas were to be completed and a prioritized list forwarded to the Risk Management Branch;
- September 30—business continuation plans for all other program areas were to be completed and a list of completion dates forwarded to the Risk Management Branch;
- September 30—plans of Emergency Operations Centres were to be completely developed (see definition in Exhibit 6); and
- November 15—exercising of all business continuation plans was to be completed and a list of exercise dates forwarded to the Risk Management Branch (details on exercising the business continuation plan are outlined in Exhibit 7).

Exhibit 6

The Definition of an Emergency Operations Centre

Emergency Operations Centre (EOC) is the term the government uses to describe its command, or crisis, centres.

Each EOCs' functions include assessing the damage after an emergency occurs, getting a recovery team together, and contacting relevant employees. Each ministry should have an EOC and the government, as a whole, will have one (through the Provincial Emergency Program).

"The four important elements of an EOC are: executive authority resides there; it is a centralized place to work; it is the focus of all communications; and it follows a set of pre-defined procedures. The result of activating an EOC is compression of the organization and implementation of a command and control structure."

Source: Article drafted for the AT RISK newsletter published by the Risk Management Branch, Ministry of Finance and Corporate Relations

Exhibit 7

Details on Exercising the Business Continuation Plan

Exercising the business continuation plan is the most important step after developing the plan. Exercising will reveal the plan's effectiveness in meeting recovery objectives and will allow for modifications that are necessary. There are five exercise activities:

- Orientation seminars—characterized by low stress, little attention to real time, less preparation time, and minimal attempts to simulate reality. The purpose is to evaluate the plan to resolve questions of co-ordination and to provide training and familiarization with roles, responsibilities and procedures.
- Drill—usually involves the activation of a single procedure (e.g., communications) that would be involved in an actual emergency.
- Tabletop—scenario is presented to the participants and they discuss the ways they would respond with the resources available. The focus is on problem-solving not on stress, time pressures or simulations of actual events.
- Functional—involves full simulation and the introduction of stress as a result of the number of messages and the coordination and decision-making required responding to the simulation.
- Full-scale—intended to evaluate the capability of the organization to respond to and recover from an emergency.

Source: The *Planning Guide for the Development of Business Continuation Plans* prepared by the Risk Management Branch of the Ministry of Finance and Corporate Relations

Evaluation

Our review of business continuation planning was directed towards evaluating the management control such plans were subjected to, by examining their approval. To determine whether a business continuation plan was thorough, reasonable and capable of implementation, we relied on the review by, and approval of, the senior authorized person or persons. We did this by examining documentary evidence that such review and approval had actually occurred. We also reviewed any external evaluation of the plan. Our focus was on the following:

- the preparation and approval of the plan in the ministry or the organization;
- the review of the plan by the Risk Management Branch against the 11 criteria outlined in Exhibit 8 (these criteria were based on government's general management operating policy and the Business Continuation Planning Guide and Outline distributed to ministries by the Risk Management Branch); and
- the anticipated process for ensuring that all areas were appropriately planned for and that the plans were completed.

Exhibit 8

Business Continuation Plan Evaluation Form

Listed below are the criteria that the Risk Management Branch (RMB) used to evaluate the plans submitted by the ministries

REQUIREMENT	MET
1. Does the plan follow the format defined on the Outline provided by RMB? 2. Is the plan Mission Critical (MC), Business Priority (BP) or Other (O)? 3. Does the plan contain an effective call out process? 4. Does the plan ensure someone is clearly in charge? 5. Does the plan provide for damage assessment? 6. Does the plan provide for initial security? 7. Does the plan contain effective Recovery Objective Procedure(s) as described in the Guide? 8. Does the plan establish a process for management to meet and assess the situation? 9. Does the plan effectively deal with all hazards? 10. Does the plan effectively deal with Y2K hazards? 11. What type of training/exercise has been performed relative to this plan in 1999? Orientation, Drill, Tabletop, Functional, Full Scale, Unknown	
Comments:	

We chose certain mission-critical, high-profile systems as samples for our evaluation. These systems were in the Ministry of Attorney General, the Ministry of Environment, Lands and Parks, the Ministry of Finance and Corporate Relations, the Ministry of Forests, the Ministry of Health, the Office of the Minister Responsible for the Public Service, the Ministry of Social Development and Economic Security, the Ministry of Transportation and Highways, and the Information Technology Services Division. Exhibits 3 and 4 provide information about the status of these specific systems.

Our review of documentation in the ministries revealed that for some business continuation plans, we were unable to obtain formal documentary evidence of authorized ministry management review and approval. We believe there are three main reasons for the lack of formal documentation of approval:

- It has been delayed until there is an indication that the plan meets centrally required standards.

- There is no requirement in government's operating policies that a formal approval is necessary.
- The plan is in a constant state of development and revision until it is to be used in an emergency or disaster.

In the interest of proving appropriate evidence that "due diligence" has been exercised, we believe that the final business continuation plan should be signed off (on the cover page with the date of last revision) by authorized ministry management and the plan coordinator.

We recommend that final business continuation plans be signed off by authorized management and the plan coordinator as evidence that the plans have been reviewed and authorized and are considered to be thorough, reasonable and capable of implementation.

The Risk Management Branch reviews of the business continuation plans, particularly the early versions, should not be regarded as a "Pass/Fail" process. The plans are documents in transition that will be molded into finished products once inconsistencies in approach, incomplete task descriptions, lack of clarity and other deficiencies likely in a first draft are removed. The branch's review of these early drafts is the first step in ensuring that the plans are effective documents. As discussed below, other steps will follow.

Very few of the early drafts submitted to the Risk Management Branch were evaluated as being effective plans. Exhibit 9 includes some of the comments noted in the branch's review. The following comments were among those we examined:

- Format poor, which will increase training time.
- Contains extraneous planning information.
- Tasks do not contain sufficient detail.
- Plan is focused on Year 2000 (rather than on all potential risks).
- Plan is directed to recovery of Information Technology Systems (ITS) instead of to program delivery.
- Time frames not shown.

Format was important to the branch because having a consistent business continuation plan format across government would reduce planning weaknesses and training time. Using consistent language and uniform response procedures is essential to the effective coordination and management of public resources during an emergency or disaster.

Exhibit 9

Mission-Critical Systems We Selected for Review

Details as reported by ministries in response to our survey, August 1999, and from a review of Risk Management Branch documentation

Ministry/Project[1]	Description	Business Continuation Plan Completed and Approved by User Management	Business Continuation Plan Reviewed by Risk Management Branch
Attorney General			
Building Security Control System	Used to control security doors and lock-up in B.C. Corrections facilities.	No[2]	Review pending.
Canadian Police Information Centre Interface	Used by law enforcement agencies to query driver's licence and vehicle information from ICBC.	No[2]	Review pending.
Environment, Lands and Parks			
Air Data Management	Automated retrieval and messaging system for continuous data gathered from air quality monitoring stations.	Yes	Yes—lacks detail, focuses on Year 2000 and ITS.
Finance and Corporate Relations			
Corporate Accounting System (CAS)	Government's accounting, reporting and financial management system.	Yes	Yes—good plan.
Returns	Generates monthly returns to more than 90,000 vendors and operators registered under the Social Service Tax and Hotel Room Tax Acts.	Yes	No plans were provided by ministry.
Forests			
Harvest Database and Billing–MVS	Tracks harvest billing.	Yes	Yes—good plan, but not in proper format.
Health			
Medical Services Plan Claims System	Processes payments to health care providers for claims submitted to the plan for services provided to B.C. residents.	Yes	Yes—lacking in detail, Year 2000 and ITS focus, not action oriented.
Pharmacare	Pharmacare and PharmaNet link community pharmacies, hospital emergency departments and physician offices to a centralized database. They also interact directly with pharmacies to determine the contribution for eligible prescription drugs and designated medical supplies.	Yes	Yes—unclear in certain aspects, does not follow format.
Office of the Minister Responsible for the Public Service			
Personnel–CHIPS	Government wide system that processes payroll for government employees and maintains human resource, leave and benefits information.	Yes	Yes—good plan.
Social Development and Economic Security			
BC Benefits	Provides income assistance benefits to residents of B.C. who are eligible.	Yes	Yes—much good work done, but not yet completed.

. . . continued

Ministry/Project[1]	Description	Business Continuation Plan Completed and Approved by User Management	Business Continuation Plan Reviewed by Risk Management Branch
Transportation and Highways			
Coquihalla Management Information /Point of Sale	Highway toll collection system used on the Coquihalla Highway.	Yes	Yes—lacks detail, focuses on ITS.
Information Technology Services Division			
Network Services	Operates the government data network.	Yes	Yes—Some revision needed.
MVS Platform	Central MVS data processing computers supporting mission-critical and business priority systems.	Yes	Yes—Some revision needed.

[1]A Year 2000 project has been defined as an identified unit of work on a system or collection of systems, which deals with assessing, remediating, testing and determining that the system (or systems) is Year 2000 ready.

[2]Business continuation plan was in draft form at the time of survey response.

We noted that although the deadlines of May 31 for mission-critical programs and June 30 for business priority have passed, at the time of our review in August 1999, some plans have not yet been submitted to the branch.

Plans have been submitted as a package for mission-critical programs and another for business-priority programs.

The branch has discussed their evaluations with the Executive Financial Officers and the plan coordinators of the evaluated ministries. The plans are currently being revised. In some cases, they will be resubmitted for new evaluation. In other cases, regular contact will be established between the branch and the ministry to ensure that efforts are on track and the deficiencies are being addressed.

There are two basic methods by which the effectiveness of the business continuation plans can be demonstrated in the future. As mentioned earlier, a deadline of November 15 for complete exercising of all plans has been set by the government. Thorough

They dealt with simulated problems, from a landslide that knocked out a transmission line in the Fraser Canyon to phones that couldn't get a dial tone and a reporter's questions about a possible terrorist attack. Message boards read, "Fort Nelson now in the dark" and "Vernon-Kelowna line down." No power was actually turned off in the drill. A staff member posed as an irate caller, phoning from Golden to say power was off, the temperature –15 C and his elderly, sick mother couldn't handle the cold.

It was all part of an elaborate exercise to get staff ready for anything Y2K can throw at them.

Source: Vancouver Province, September 9, 1999

exercising of the plan could show that it is practical, action-oriented and understood by affected personnel. Also, the Risk Management Branch and the Action2000 Project Office plan to contract a group to prepare test disaster scenarios. The group would declare a disaster scenario and have the ministry exercise its business continuation plan for a specific program area. The results of the exercise would be reported centrally. It is anticipated that this group will test all ministries. A Request for Proposals has been posted for this service.

The procedures to ensure the business continuation plans are ready for implementation (if needed) appear adequate. The one exception is that deadlines have not been met in most cases. The fact that some of the mission-critical programs did not yet have a completed business continuation draft plan by the end of August 1999 is troubling. The deadline for submission to the Risk Management Branch was almost three months past by then. Diligence will be required to get back on—and to stay on—track.

We recommend that one of the priorities of government should be to promote the completion and testing of business continuation plans within the set deadlines, as insurance against disruptions to service delivery and operations.

Certification/Verification of Systems as Year 2000 Ready

This is the last of the nine steps we identified as management best practices for the Year 2000 projects. Experts believe that it is not possible to certify any real-world, useful, computer system as "bug free" or as Year 2000 compliant. The reason, they suggest, is that the word "certification" is clearly defined as either "to confirm formally as true, accurate, or genuine," or "to guarantee as meeting a standard." In practice, one cannot formally prove that any program is bug free. And since there is no set definition of Year 2000 compliance, no one can guarantee that an application meets the compliance standards.

While there are practical limitations and difficulties in addressing the Year 2000 problem and in satisfying oneself that the efforts made have successfully dealt with the issue, there remains a pressing need for a Year 2000 certification process. This process, we believe, should be made up of two components:

- a standard of Year 2000 compliance or readiness that the organization will be measured against (such a standard for ministries has been set by the Year 2000 Task Force which has issued Year 2000 compliance and Year 2000 readiness definitions and a uniform "date" standard); and

- an organized evaluation of compliance by an organization with credibility and which bases its certification on hard evidence.

Appropriate verification procedures require the credibility of both the information technology expert and the applicable senior management of the user organization to ensure that:

- a user acceptance test plan was developed;
- comprehensive testing was carried out;
- all applications that interface with the Year 2000 ready system are also ready;
- the ready system has been successfully implemented into a Year 2000 ready production environment;
- management processes are in place to ensure continuing readiness after certification; and
- Year 2000 contingency plans have been developed to ensure business continuation.

We reviewed the government's efforts in obtaining certification to ensure systems are Year 2000 ready by selecting the following:

- the Building Security Control System and the Canadian Police Information Centre Interface of the Ministry of Attorney General;
- the Pharmacare program of the Ministry of Health;
- the MVS platform and Network Services at ITSD in the Ministry of Advanced Education, Training and Technology; and
- the Air Data Management System of the Ministry of Environment, Lands and Parks.

Ministry of Attorney General

The Building Security Control System (BSCS) controls doors and lock-up in corrections facilities in the Province. There are 18 provincial facilities, ranging from day-camps and minimum-security facilities, which have simplified security procedures in place (i.e., lock and keys), to seven correctional centres that require sophisticated lock-down systems.

British Columbia Buildings Corporation (BCBC) is responsible for the physical plant operation of the facilities. In four of the facilities, BCBC determined that the security door systems were non-compliant and could not be altered by the manufacturer to be Year 2000 compliant. It was decided that since replacement or modification of the security systems was cost prohibitive, the dates in the systems would be rolled back six years to a year that has a similar calendar as Year 2000. A

document referred to as "Exception for Year 2000 Compliance" was prepared and signed off. It states that the exception approval meets the needs of the correction facility and will remain in place until the system is either replaced or altered at some time in the future and will not cause any other government systems that are deemed compliant to fail, or cause any connected systems to fail.

The remaining three facilities are having modifications made to their existing systems. New systems are currently being installed at two of the facilities, with completion expected shortly. At the same time, BCBC is attempting to obtain vendor certification that the systems are Year 2000 compliant and no problems are anticipated in this regard. Testing will be done by the ministry or by BCBC unless the vendor provides separate certification that testing is unnecessary. The third remaining facility is expected to be ready (including testing) by early October 1999. If the modifications are not completed in time, then it is anticipated that the dates will be rolled back for this facility and another exception certification will be issued.

The purpose of the Canadian Police Information Centre Interface (CPIC) is to provide vehicle and driver licence information to the Police Services, either from remote terminals (police cars) or from a regional office of the police. Such a request is transmitted from a CPIC terminal to Police Services Regional Head Office in Vancouver, then to Ottawa, then to the Attorney General's Office in Victoria, then to the Insurance Corporation of British Columbia (ICBC) and ITSD. Once ICBC provides the vehicle information and ITSD the licence information, it is sent back to CPIC by the same route.

The ministry's testing and certifications relate only to the server in the Ministry of Attorney General that provides the gateway to ICBC and ITSD. The testing is to ensure the above-mentioned interface provided by the server is compliant. Both ICBC and ITSD are autonomous units and are therefore responsible for their own compliance testing. The ministry states that the interface has been thoroughly tested and is Year 2000 compliant, and both the ministry and the RCMP have provided sign-offs to signify acceptance of the process and the test results.

Our review indicates that, although the Building Security Control System is a mission-critical system that had been reported as being ready, three facilities have systems that remained in progress. As verification that the systems were Year 2000 ready, we did find formal sign-offs for the Building Security Control Systems in the four completed facilities and for the Canadian Police Information Centre Interface.

Ministry of Health

The Pharmacare program pays benefits under various programs, negotiates and monitors participation agreements, verifies and adjudicates benefit claims, and monitors drug utilization. It makes payments to individuals, agencies or other organizations for the full or partial cost of designated prescription drugs, dispensing fees and other approved items. The program's main system is PharmaNet, which links community pharmacies, hospital emergency departments and physician offices to a centralized database.

We examined certification procedures for the PharmaNet system and determined that documentation and approvals were in order.

Ministry of Advanced Education, Science and Technology –Information Technology Services Division (ITSD)

ITSD provides cross-government data and telecommunications services including data processing services, network services, desktop and office systems support services. These services are provided either directly or through contracts with private sector service providers.

We reviewed Network Services and the MVS platform for verification of Year 2000 readiness. Network Services provided by ITSD include services such as SPAN/BC (Shared Provincial Access Network) and PROVNET (Voice Services). The MVS platform is a central computing facility that ministries and Crown corporations engage for running application programs and storing data.

We found that both Network Services and the MVS group have conducted testing to determine whether the systems function the same when current or future dates are used. Functionality problems were detected in the testing performed and these problems have been addressed. Remediation plans and readiness were reviewed and reported to management.

The MVS group has been operating a test environment referred to as the Year 2000 isolated test platform for a considerable time. This environment is used for running application programs on a post-dated basis—that is, as if the century change is at the time of the test. Clients can use this utility to determine how programs will run through the millennium roll-over period of December 31 to January 1, as well as on various other important dates. (The test platform was discussed in more detail earlier in this report, under "Development of Strategies for Testing, Validation and Conversion.")

Our review indicates that the readiness of Network Services was appropriately verified by persons authorized to do so. We did not see a formal sign-off on the Year 2000 readiness of the MVS platform. As the MVS isolated test platform is used to test the data and programs of outside stakeholders (i.e., with ministries testing their Year 2000 programming on the platform), any problems associated with the environment would be brought to ITSD's or the ITP Sub-Committee's attention.

Ministry of Environment, Lands and Parks

The Air Resources Branch of the Ministry of Environment, Lands and Parks operates the Air Data Management System. This system monitors air quality through a network of permitted and ministry-operated meteorological and air quality stations located throughout British Columbia. The information collected from these stations is used to rate air quality according to the Air Quality Index (AQI). The Air Data Management System generates air quality information using the AQI on an hourly basis. This information is used by the regional offices to determine if it is necessary to issue or terminate public air quality (health) advisories and to evaluate air quality for regulatory compliance purposes.

The data collected from the instruments used to measure air quality is stored in "dataloggers" at each of the monitoring stations. The system uses three different types of dataloggers. Information was obtained from the vendors regarding the Year 2000 readiness of this equipment. A revised Year 2000 readiness statement by one vendor requires re-testing of its datalogger. This re-test was planned for completion in September 1999.

Testing of the Air Data Management System was done by the system users, with the assistance of the ministry's central Y2K Project Office. As a result of the Year 2000 testing, the data validation module was determined to be written using a non-compliant software version. Subsequently, the module was converted to a compliant version of the software, tested and determined to be Year 2000 ready.

We noted that management in the branch has signed off the system as Year 2000 ready. However, at the time of our review, we were unable to verify the existence of testing documentation to support the extent of the testing performed.

During September 1999, the operating system and database software used by the Air Data Management System were to be upgraded to the new ministry standard. Since the system is classified by the ministry as being mission-critical, the upgraded system will have to be tested for Year 2000 readiness.

Overall Recommendation for Ministries Reviewed for Evidence of Verification of Year 2000 Readiness

We recommend that the review and authorization of Year 2000 project activities and supporting documentation by a person or persons authorized to do so be evidenced with a formal sign-off as verification that the system is Year 2000 ready.

Exhibit 10

Summary of Survey Responses from Ministries With Mission-critical Programs

Question:	Yes	No	Comments Made by Organizations:
1. Has your organization adopted the government's definition of mission-critical systems?	11	0	
2. Has your organization determined a Year 2000 readiness strategy for each of its mission-critical software systems? (Examples of strategies: upgrade, retire, remediate, replace)	11	0	
3. Has your organization identified all its critical embedded systems and developed a strategy to make them Year 2000 ready? (Examples of embedded systems include: systems used to operate/manage ventilation systems, elevators, alarms, telecommunication devices, laboratory equipment and health and research related equipment.)	9	2	The two ministries with "no" responses indicated that BCBC is handling buildings and related components.
4. Has your organization made all its mission-critical systems Year 2000 ready?	9	2	The two ministries with "no" responses are listed in Exhibit 4.
5. Has your organization made all its critical embedded systems Year 2000 ready?	9	2	Three ministries (included under "yes" response) indicated that they do not have any critical embedded systems. One of the ministries with a "no" response indicated that embedded systems in the offices are the responsibility of BCBC.

Question:	Yes	No	Comments Made by Organizations:
6. Has your organization determined the extent of its dependence on critical goods and services provided to it by other organizations?	7	4	One ministry (included under "yes" response) indicated that this question was not applicable since none of their mission-critical systems are reliant on outside suppliers. For those with "no" responses: ▪ one ministry indicated that the process was decentralized and the responsibility of the system owners; ▪ one ministry indicated that both headquarters and the business continuation planning committee were examining the issue; ▪ one ministry indicated that divisional directors are verifying and prioritizing; and ▪ one ministry indicated that the process was in progress.
7. Has your organization determined the extent of its potential liability in case of substantial failure of its mission-critical systems (including applications and embedded systems)?	9	2	For those with "no" responses: ▪ one ministry indicated that its focus is on protecting clients and public; ▪ one ministry indicated that it is currently reviewing potential liabilities with the Attorney General.
8. Has your organization completed a plan to continue its business if a mission-critical system fails to operate?	9	2	Those with "no" responses stated that their plan was drafted.
9. Has your organization secured adequate resources to make itself Year 2000 ready on time? (Examples of resources include financial and human resources, such as that assigned to user testing.)	11	0	
(Note: Shortly after we sent out our survey, a new ministry—the Ministry of Social Development and Economic Security—was created. The above summary reflects the response from the old ministry, Ministry of Human Resources. At the time of our review, there was uncertainty over which mission-critical systems were the responsibility of the new ministry. However, we understand that this problem has been resolved.)			

part 3
year 2000 readiness: specific systems

year 2000 readiness: specific systems

Each year since 1997, we have reported the progress made in identifying and correcting the Year 2000 problems associated with six major ministry financial systems. Because each system is extensively automated and reliant on information technology, the Year 2000 problem poses a potential threat to the continued delivery of their respective business processes. These systems are:

- Corporate Accounting
- Corporate Human Resource Information and Payroll
- Social Services Tax
- Harvest Database
- MSP Claims
- BC Benefits Program

The Corporate Accounting System (CAS)

CAS is the government's main accounting, reporting and financial management system and, as of our prior review, processed general ledger, accounts payable and commitment management transactions. New functions added include accounts receivable, project management and asset management transactions. The government would not be able to process payments if this system failed.

Background

Last year, in our Report on Government Financial Accountability for the 1997/98 Fiscal Year, we noted that the "Walker" software used by CAS had been certified Year 2000 compliant by the vendor. However, later testing by the CAS team revealed that the system contained some non-compliant codes. This caused delays in the project. Compliance testing that was to be completed by July 1998 was rescheduled for completion by the end of January 1999.

Business Continuation Planning

A business continuation plan has been developed for CAS. Senior management reviewed the plan during May 1999. It lays out recovery procedures and estimated recovery times for critical business functions, providing staff with administrative guidance should service be disrupted as a result of the Year 2000 problem. Design and development on the broader (all hazard) disaster recovery and business continuation plan for CAS is continuing and will be finalized and tested in the fall of 1999.

Verification of the System as Year 2000 Ready

The CAS Office received system repair patches from the Walker software vendor in December 1998. The software modifications were applied and Year 2000 testing resumed. Testing was completed in January 1999.

The Year 2000 readiness deadline for CAS was April 1, 1999. This date is the start of the government's fiscal period that crosses the millennium change. Senior management of the CAS Office signed off the system as Year 2000 ready in February 1999.

Ministry programs not online with CAS process transactions through the CAS Generic Interface (CGI). These ministry programs were required to be Year 2000 ready by April 1, 1999. The CAS team worked with ministries in the testing of these systems and interfaces. At the time of our review, 28 ministry systems that interface through CGI had performed Year 2000 testing with CAS.

The CAS Office continues to work with ministries to provide testing opportunities. An additional 15 systems will be tested with CAS in September 1999. When completed, all ministry systems that interface through CGI will have performed Year 2000 testing.

Implementation of phase II of CAS began April 1, 1999. New functions have been added to the accounting system, including project accounting, accounts receivable and asset management. These were designed using Oracle Financials software and a date standard that is Year 2000 compliant.

The vendor has certified the Oracle software as being Year 2000 compliant. As with the Walker software, this claim has been verified as part of the project testing. The most up-to-date release of the Oracle software is being used and, as expected, the testing has confirmed the software's readiness. The implementation of the Oracle Corporate Accounting System was not part of our detailed review at this time.

As a result of CAS phase II, the CAS Custom Interface Year 2000 Project was initiated. The purpose of the project was to confirm that the custom interfaces between Oracle Financials and the Walker software were Year 2000 ready. The CAS Office completed testing of the interfaces during our review period. The Project Manager confirmed that the test results support the system as Year 2000 ready. These results will be summarized and submitted to senior management in the CAS Office for sign-off.

The Corporate Human Resource Information and Payroll System (CHIPS)

CHIPS processes payroll for government, tracks employee leave entitlements, and maintains human resource information for approximately 36,000 government employees. The Public Service Employee Relations Commission (PSERC) of the Office of the Minister Responsible for the Public Service, is accountable for managing CHIPS. Failure of this system could result in the government's inability to produce pay cheques and would contravene labour standards legislation.

The commission is aware that computer applications, hardware and operating systems used for CHIPS must be Year 2000 ready to avert business disruption, financial loss and—more seriously—potential litigation. External parties, such as ministries, will be relying on PSERC for data produced by CHIPS and data received through PSERC's interfaces.

Background

We have previously reported that the main application software used in developing CHIPS had vendor certification of Year 2000 compliance. However, PSERC had yet to test and validate the vendor's certification. The environment within which CHIPS operates had been upgraded and testing for Year 2000 compliance was in the planning stage. The expected date for all components to be Year 2000 ready had been set for July 1999, as compared to September 1998, the date originally reported.

The Year 2000 Compliance Project began in December 1998. The project initially focused on ensuring that the hardware and operating system were Year 2000 ready. After their upgrade, testing of the application software began.

Testing of the CHIPS software was completed in June 1999. The testing revealed three minor Year 2000 problems and the required changes have been made. Once the final sign-off from the production manager and director is received, the changes will be moved into the production environment. This has been scheduled for mid-September 1999.

Business Continuation Planning

The commission has identified that CHIPS will be subject to failure should external resources outside its control fail (such as electrical power), and it is committed to developing a business continuation plan. Since our last review, such a plan has been developed and approved by commission management and the

Risk Management Branch. The commission has scheduled a test of the plan in September 1999.

Verification of the System as Year 2000 Ready

The commission has committed to posting the test results on the Internet to allow users to evaluate them. It will also be providing certification that hardware, software, data and interfaces may be relied on to operate effectively with respect to Year 2000 concerns. In our last review, we commented that legal advice should be sought to determine:

- PSERC'S legal exposure should CHIPS fail to operate once the date changes to 2000; and
- the implications of PSERC's certification on CHIPS and its data.

As of August 1999, PSERC's legal counsel had not reviewed the software and hardware vendor's Year 2000 certification to ensure that legal recourse is available to PSERC should unforeseen problems result. In our view, this is important in determining PSERC'S legal exposure.

We recommend that the Public Service Employee Relations Commission seek legal advice to determine recourse should CHIPS not operate as anticipated at the turn of the century.

CHIPS interfaces with 13 external parties. Eleven of these did not include four digits to represent the century in all date fields. These interfaces provide data from CHIPS to other government and external systems, such as the data:

- to produce employee cheques and advices;
- to process employee pension benefits; and
- to report information to Revenue Canada.

Changes are not required for all the interfaces, as a technique called "sliding window" may be used for some systems. This technique handles two-digit year dates and properly determines which century a date belongs to. The commission informed all parties of the date field layouts of the system interfaces and requested that the recipient identify any modifications required by their systems. At the time of our review, expansion of the date fields had only been requested and made for three external interfaces.

A new workstation release for CHIPS is expected to be implemented in October 1999. The commission's change management procedures require testing for Year 2000 readiness prior to implementation. Therefore, the new version of the

workstation software will be subjected to Year 2000 testing. Meanwhile, PSERC has maintained the dedicated server used in the Year 2000 Compliance Project for any further Year 2000 testing requirements.

The Social Service Tax Systems

The Consumer Tax Branch of the Revenue Division of the Ministry of Finance and Corporate Relations is responsible for administering and enforcing the Social Service Tax Act. The Act imposes a tax on all tangible personal property and specified services purchased within British Columbia or imported for use. There are approximately 96,000 social service tax vendor accounts, with about 65,000 tax returns filed each month. In the fiscal year 1998/99, the Province collected $3.2 billion in revenue from Social Service Tax.

Background

In our Report on the 1996/97 Public Accounts, we noted that the Revenue Division had initiated two separate projects to simultaneously satisfy the Year 2000 problem and other management information needs. The "1999 Fixes Project" was to be a contingency to patch the existing systems and so prevent failures before the Year 2000. The "CTB21 Project" was to replace existing revenue systems with a Year 2000 compliant integrated system. However, delays in the CTB21 Project resulted in it no longer being a viable alternative for Year 2000 readiness. Therefore, at the completion of the "1999 Fixes Project," the "Y2000 Contingency Project" was initiated. The initial project completion date of December 31, 1998, was revised to March 31, 1999.

The objective of the Y2000 Contingency Project is "to mitigate, in a cost-effective manner, the impact of Year 2000 on the operations at the Revenue Division, and to ensure that the Division will be able to remain in business." The scope of the project includes all information systems used for the administration of taxation by the Revenue Division. Responsibility for the successful completion of the Year 2000 efforts of the Revenue Division resides with the Project Manager.

Business Continuation Planning

The Year 2000 project team has evaluated the business processes and its work will be incorporated into the Ministry of Finance Revenue Division's Business Continuation Plan. Completion of the plan, and approval by senior management, is expected by October 1999. Testing will be done after plan approval.

Verification of the System as Year 2000 Ready

The deadline for the consumer tax portion of the Y2000 Contingency Project was March 31, 1999. The project met this deadline, completing testing and implementation of the application modules in February 1999. At the time of our review, the production programs were Year 2000 ready and generally had been signed off by the managers of the Revenue Administration Branch and the Consumer Taxation Branch. However, three modules have since been removed from production. The modules, which prepare letters for the branch (i.e., delinquency letters to vendors) are considered low risk. They were scheduled for re-implementation in August 1999 and, at the time we were writing this report, we were told that they have been moved back to production.

Although modules are to be individually tested, the functionality of the whole system was not to be looked at until April 1999, when testing would be performed on the MVS isolated test platform (Year 2000 ITP) at ITSD. The Year 2000 project team completed testing of the consumer tax applications during April and May of 1999 on the Year 2000 ITP. The test results confirmed the Year 2000 readiness of the consumer tax applications and were appropriately signed off by various user test coordinators and business managers.

The Harvest Database System

The Ministry of Forests is responsible for managing British Columbia's wood fibre resources. As part of doing this, it is responsible for billing and collecting stumpage revenue on behalf of the Province. Calculation of stumpage billing and royalties earned from timber sales of about $1.2 billion is handled by the ministry's Harvest Database System (HDBS). If not ready in time, a significant loss in interest revenue may occur.

Background

In our Report on the 1996/97 Public Accounts, we noted that the system was expected to be Year 2000 ready by January 1, 1999. During 1998 there were some obstacles and changes and, at the time of our last review, completion was scheduled for December 30, 1999, one day before the deadline of January 1, 2000.

In its response to our Report on Government Financial Accountability for the 1997/98 Fiscal Year, the ministry shared our concern over the late completion deadline. The planned completion date, for all components of the system, has since been moved to September 30, 1999. The ministry anticipates that the planned dates for implementation will be met.

Business Continuation Planning

The ministry has developed a business continuation plan for the HDBS system. Although there is no evidence of formal approval of the plan, we believe it has been informally approved by the senior management, including the Assistant Deputy Minister. This plan includes the essential services performed by the HDBS and the key items required for recovery of the system. The business continuation plan aims to fully recover the system so that it is completely operational within four weeks.

In the plan, specific procedures are assigned to individuals and there is a list of the tasks to be followed in achieving recovery. Staff have been trained on the procedures to be carried out and informed of their roles. The business continuation plan follows the ministry's normal maintenance/repair process which, combined with staff's awareness, gives reasonable assurance that the plan will work.

We recommend that the final business continuation plan be signed off by authorized management and the plan coordinator as evidence that the plan has been reviewed and authorized and is considered to be thorough, reasonable and capable of implementation.

Verification of the System as Year 2000 Ready

In compliance with its revised deadlines, the ministry has converted and implemented all the high-priority components of the HDBS. However, before the system can bill beyond December 31, 1999, a date conversion must be completed to extend the dates of stumpage rates. These rates currently expire at the end of the year. The planned implementation date for the date conversion is September 15, 1999. This appears achievable, as the conversion is currently in the test phase.

Medium—and low—priority components remain to be implemented. These components facilitate reports and other non-essential functions of the system. These processes are at various stages of acceptance testing. We believe the September 30, 1999 completion date appears reasonable.

The ministry's Information Management Group (IMG) has been responsible for unit testing and its Revenue Branch responsible for user acceptance testing. At this point, all business processes have been tested by IMG. The testing, done in accordance with the ministry's standard, was documented and the test results saved.

The Revenue Branch, as part of its user acceptance testing, has designed the test strategy and cases. There is significant documented evidence of reviews and approvals of these test results.

The HDBS receives and sends information to several other systems. The ministry has communicated with the owners of the external applications to ensure that these are Year 2000 ready. The testing strategy was designed to incorporate testing of the HDBS side of these interfaces. The ministry has developed procedures in the event of failure of these interfaces.

The HDBS runs in the MVS environment, which is Year 2000 compliant. Revenue Branch must authorize the implementation of any changed application into this production environment. After the software is implemented, Revenue Branch performs a post-implementation test, using test data to ensure that the production environment produces expected results. The branch then signs off, indicating its acceptance of the changed application.

To control movement of code and track software changes, the ministry has been using a library management system. This system is not currently Year 2000 ready. Although it is not under the scope of the HDBS conversion, the ministry has been using the system as a tool to physically move the software and track the status and location of code. Without this tool the ministry will either have to manually move and control the software or develop a new program to carry out this function.

We recommend that, if the library management system cannot be Year 2000 ready in time, management consider other options for code movement and tracking.

The MSP Claims System

The Medical Services Plan (MSP) pays health care providers for most of the medical services provided to the residents of British Columbia. The plan operates under the Medical and Health Care Services Act and is administered by the Medical Services Commission of British Columbia. The MSP claims system is one of the Ministry of Health's more critical projects, encompassing 14 sub-systems, which have been broken down into 47 applications.

The claims system processes over 95% of the services funded through the plan, approximately $1.8 billion annually. Most medical practitioners input service and billing information by means of a computer network called Teleplan. Claims for

payment of services, received from over 4,000 locations around the Province, are processed centrally at the Medical Services Plan. All claims are validated electronically and, if accepted, are paid semi-monthly.

Background

At the time of our last review in early 1999, it was estimated that all components of the claims system would be ready by September 1999. The project was in the testing, validation and conversion phase and on schedule. A user acceptance test plan was in place. It had tests for Year 2000 readiness and for confirmation of the original systems' functionality. For each test, the plan included clearly identified test data, detailed procedures and details on expected results.

Business Continuation Planning

At the time of our last review in early 1999, a Year 2000 business continuation plan did not exist for the MSP claims system. To ensure this critical part of the project process is addressed, the newly structured Year 2000 office hired a Year 2000 contingency planning manager. A business continuation plan for MSP claims has been developed and the Emergency Planning Branch of the Ministry of Health has reviewed it (based on minimum standards for business continuation plans) and commented on it to the users. The plan was then updated on August 10, 1999. The primary component of the business continuation plan for MSP claims is the production of cheques payable to practitioners. As a precaution, an extra set of cheques will be produced in November 1999 for distribution in January 2000 to cover the January 15, 2000 payment, if needed.

Verification of the System as Year 2000 Ready

As of August 1999, most, but not all, of the 47 applications were reported Year 2000 ready, with all testing complete. A few of the completed applications were still to be signed off by the user. Only five applications were still in progress. They are expected to be ready by September 30, 1999. The detailed status of applications is shown in Exhibit 11.

The claims system is dependent on persons and systems that supply data to it (such as physicians, vendors and other claims systems, like those at the Workers' Compensation Board and ICBC). Detailed tests integrated all aspects of the operations of the claims systems, which also included the out-of-province interfaces (such as the reciprocal payment systems with other provinces and countries).

Exhibit 11

The Status of MSP Claims System Applications

As of August 1999, of the 47 applications, 2 had been retired, 3 were in the testing stage, 2 were in the conversion stage and 40 were considered Year 2000 ready

Type of Application	Retired	Replaced (with a Year 2000 Ready Application)	Remediated					Total
			Testing Stage	Conversion Stage	Year 2000 Ready			
					signed off*	not signed off*	total	
Business Priority	2	1	2	0	16	5	21	26
Other (Non-Business Priority)	0	0	1	2	12	6	18	21
Total Applications	**2**	**1**	**3**	**2**	28	11	**39**	**47**

* Indicates whether application has been signed off by the user as Year 2000 ready.

The BC Benefits Program System

The BC Benefits Program, administered by the newly created Ministry of Social Development and Economic Security, makes in the order of 200,000 payments per month to persons and families in British Columbia. This includes payments under the BC Benefits Act for income assistance and disability benefits and payments to child care providers.

The computer system that processes these payments is referred to as the BC Benefits Program System. It is used by over 2,000 ministry staff and controls approximately $115 million in payments per month. This is the most vital system within the ministry in terms of share of the ministry budget, the number of clients, and overall visibility. Failure of the benefits system would be a serious matter, not only to the people who rely on the BC Benefits Program, but also to the public's confidence in the government.

Background

The Ministry of Social Development and Economic Security, in partnership with the Ministry for Children and Families, has established this system as Year 2000 compliant. This conversion was completed on time and within budget as set out in a master project plan.

Business Continuation Planning

Although the BC Benefits system is in production, it is impossible to be 100% confident that all parts will function as designed once the Year 2000 begins. For this reason, the ministry has appointed a senior director to develop, test and implement a business continuation plan. The most important business function concerning the system, the preservation and restoration of the cheque run, is included in an initial business continuation plan. Two possible contingent scenarios are identified that would have to be implemented within 13 days, as the first cheque run of the year is scheduled for January 14, 2000. The ministry executive has approved this initial plan.

Interruptions to business resulting from incidents affecting the Information Technology Branch have been addressed in a Disaster Recovery Manual, which outlines recovery strategies, assignment of personnel, procedures and resources.

A final comprehensive business continuation plan will include plans for individual communities, regions, and departments of the ministry and will specifically include the continuation of the BC Benefits Program. This final plan is to be signed off by ministry executive and submitted to the Deputy Minister to the Premier by September 30, 1999.

Some areas of the business continuation plan have been tested and training sessions for all staff are to be completed in November 1999.

Verification of the System as Year 2000 Ready

"Final Year 2000 Compliance Testing" was completed on June 16, 1998. This was the final test phase before data conversion and the change to the new date format. The phase included testing of the system's internal and external interfaces.

The ministry prepared documentation that showed that the various phases of the testing were completed in accordance with the terms of the contract. This documentation was signed off by the various managers and directors involved in the project and, as required by Treasury Board, by the Deputy Minister. The documentation indicates that appropriate ministry staff approved all the contract deliverables.

A little over a year has passed since the Year 2000 compliant system was put into full production. A Project Management Office was established to:

- oversee the transition to the new system;

- establish an appropriate change management procedure to ensure no unauthorized or undocumented changes were made to the application after verification; and,
- monitor the compliant system and the outside interfaces.

Based on our discussion with project management and a review of documents provided by the ministry, we believe that the ministry has adequate controls in place for introducing changes to its information systems. All program conversions were subject to three reviews: by the senior project leaders, the technical architect and, finally, the ministry's quality assurance department. All changes within the project were documented and authorized by senior management.

part 4
year 2000 readiness: government organizations

year 2000 readiness: government organizations

The government delivers its services through ministries and various government entities such as Crown corporations, health care organizations and universities and colleges. Although it may not directly be involved in the daily operations of these entities, the government, through its ownership and control, has a responsibility to the public to ensure that the organizations will be Year 2000 ready.

Action2000 Project Office Expanded Its Scope

In his September 1998 quarterly report, the Chief Information Officer stated that, with the assistance of the Crown Corporations Secretariat, the scope of his review of Year 2000 readiness would be expanded to include major Crown corporations. He anticipated regular status reporting and independent risk assessments from the Crown corporations that provide essential services. A target date of early March 1999 was set for these Crown corporations to submit the Year 2000 status reports.

In early 1999, the Deputy Minister to the Premier directed Deputy Ministers to ask the Chairs of the major Crown corporations for formal Year 2000 plans that identify the corporation's critical systems and how they were to become Year 2000 compliant. Information received by the Action2000 Project Office from the Crown corporations on the mission-critical projects is regularly posted on the Action2000 web site.

The Crown Corporations Secretariat and the Action2000 Project Office have assessed Crown corporations' management processes regarding the Year 2000 issues and progress on mission-critical projects. The results indicate that all these corporations have project teams and offices in place, that all are aware of the problem and taking steps to deal with the issues, and that the focus is shifting to business continuation and disaster recovery plans.

In December 1998, the Action2000 Project Office initiated the review of Year 2000 activities and progress across universities and colleges, schools and health authorities. Accordingly, the participation of deputies whose Ministers were responsible for these areas was sought in defining the strategy for programs within each Minister's authority.

Following is a summary of activities that the Action2000 Project Office reported to have taken place.

- Municipalities

The Provincial Emergency Program (PEP) initiated a "Local Government Emergency Preparedness and Y2K Readiness Survey" in April 1999 and has received 107 responses as of August 31, 1999. The survey was developed to assist PEP in assessing the overall readiness of local government to deal with emergency situations. We have not reviewed the survey or the responses to it. However, we understand that the responses received represent a good cross-section of municipalities and, based on the responses, municipalities appear to be well aware of the Year 2000 issue and are taking appropriate steps to ensure their readiness.

- Universities and Colleges

Through the assistance of the Ministry of Advanced Education, Training and Technology, the Action2000 Project Office conducted a Year 2000 risk assessment of 25 post-secondary institutions in February 1999. Based on the 25 responses received, the Action2000 Project Office rated the institutions as low risk. An update on progress was received in June, and a third report is expected in September. (As Simon Fraser University, University of British Columbia and University of Victoria are self-insuring entities, they were not included in the Action2000 Project Office's survey.) We have not reviewed the results of the risk assessment.

In addition, an outreach program with one-on-one meetings between representatives of the Action2000 Project Office and the institutions has been initiated. We are told that these visits have supported the Action2000 Project Office's ratings of low risk.

- School Districts

The Ministry of Education surveyed the school districts in June 1999. It concluded that, for the most part, schools are well prepared, with much of the remaining work being completed over the summer when students are not at school. The ministry plans to do one more survey in September 1999 to ensure all activities that were postponed for the summer are complete. If it is found that a district has fallen behind in readiness, the ministry may intervene. We did not attempt to verify the results of the survey. However, based on our review of the survey and a summary of the responses, we noted that all 59 school districts responding had indicated that the critical Year 2000 issues for their district and schools were being managed appropriately and that the district will be Year 2000 ready by the end of the year.

Our Findings on the State of Preparedness of Government Organizations

Our Year 2000 review included a survey of 75 government organizations, including health authorities, advanced education institutions and Crown corporations. Our purpose was to determine those areas still needing significant attention. Following is summary of our findings.

Year 2000 and the Health Authorities

Responsibility for the delivery of certain health programs and the management of the Province's hospitals was decentralized in 1997. Through this decentralization, responsibility was delegated to 52 health authorities throughout the Province. Exhibit 12 outlines the three types of health authorities and their related responsibilities.

The Health Authorities Act and individual Funding and Transfer Agreements between the Province and health authorities assigns responsibility and delegates authority for delivery of health care services by health authorities. Inherent in the responsibilities delegated to the health authorities was that of ensuring that all systems and equipment under the agencies' authority are Year 2000 ready. These responsibilities were especially challenging because the health authorities faced the difficult task of identifying and remediating

According to the paper entitled "The Year 2000 Date Problem and Medical Devices" addressing the issue of non-Y2K compliant medical technology, only about 2,000 of 13,500 of the U.S. medical device manufacturers make products that are date sensitive. Makers of possible non-compliant medical devices have agreed to undertake a U.S. Federal Drug Administration review, the result of which will be released in October 1999.

Source: http://www.planetark.org

Exhibit 12

Types of Health Authorities and Their Related Responsibilities

Type	Number	Responsibilities
Regional Health Boards	11	Operation of acute care hospitals, continuing care facilities, and community health programs.
Community Health Councils	34	Operation of acute care hospitals, continuing care facilities, and home support agencies.
Community Health Services Societies	7	Provision of community health programs to a number of communities in a geographic region.

the numerous date-sensitive embedded systems in medical equipment. Equipment such as anesthesia and heart-lung bypass units, ventilators, defibrillators, incubators, apnea monitors, fetal monitors, radiographic units and ventilators are considered high risk because their failure may result in loss of human life.

Consistent with the model of delegated responsibility, the health authorities initially operated their Year 2000 projects with little involvement from the Ministry of Health. The ministry's role was limited to providing advice and support.

In late 1998, the ministry contracted a nationally recognized management consulting firm to assess the status of the Year 2000 projects at the health authorities. Based on a November 1998 survey, the firm concluded that the bulk of remediation and testing had not yet been done, and that there was a significant risk that some health authorities would not be Year 2000 ready.

In response to concerns raised by the consultant's report, the ministry reorganized its Year 2000 Project Office in late 1998 to become more proactive. The expanded role of the ministry was to:

- ensure awareness and understanding of the Year 2000 issue;
- provide a recommended Year 2000 process and activities for health authorities;
- monitor progress and assess the status of each health authority;
- ensure adequate funding for the health authorities; and
- initiate any required action to ensure the health authorities are Year 2000 ready.

The ministry Year 2000 Project Office responded to its expanded role by implementing a risk-based reporting procedure for the health authorities. Accordingly, the health authorities are required to report monthly on three fundamental aspects of their Year 2000 readiness—namely compliance, contingency planning, and supply chain. Details of these procedures were communicated to all health authorities.

The compliance aspect deals with the process of identifying and remediating all critical systems and equipment that could cause a Year 2000 failure. The contingency plan aspect provides a process for dealing with potential Year 2000 related disruptions and failures. The supply chain aspect addresses the risks to health authorities from external suppliers not being Year 2000 ready.

The health authorities submit monthly status reports detailing their progress against phases of these aspects and identifying percentage completion. Using data received from health authorities, the Year 2000 Office establishes risk ratings for each aspect of Year 2000 readiness.

The output of the risk assessment is a monthly report to the ministry's Year 2000 Executive Steering Committee, summarizing each health authority's risk assessments and, where applicable, providing recommended actions by the ministry. Exhibit 13 shows a summary of the Ministry of Health risk assessments of health authorities.

Exhibit 13

Summary of Risk Assessments by Type of Health Authority

Risk assessments, by aspect, for all health authorities, based on the July 1999 monthly status reports

Community Health Services Societies:

	Low risk	Medium risk	High risk	Total
Compliancy	4	2	1	7
Contingency	3	3	1	7
Supply Chain	4	2	1	7

Community Health Councils:

	Low risk	Medium risk	High risk	Total
Compliancy	18	14	2	34
Contingency	16	12	6	34
Supply Chain	20	12	2	34

Note: No response from one Community Health Council. Therefore all three aspects were assessed as high.

Regional Health Boards:

	Low risk	Medium risk	High risk	Total
Compliancy	10	5	2	17
Contingency	9	7	1	17
Supply Chain	6	11	0	17

Note: There are 11 Regional Health Boards. This assessment includes individual risk ratings for 7 operations within the Vancouver/Richmond Health Board, and consolidated ratings for the other 10 boards.

Source: Ministry of Health

Based on these computations, "high risk" indicates that the Year 2000 activities of the health authority appear to be significantly "off track" and there is a high probability that the Year 2000 initiative will not be completed in time.

The ministry has indicated its intention to place status information, as provided by the health authorities for their mission-critical activities, on a public web site. At the time we were writing this report, information on the current estimate of percentage completion and the planned (or actual) date for completion, by health authority, had just been posted.

An underlying limitation in the Ministry of Health risk model is that the risk ratings are generated from data which was not validated. To gauge the validity of its risk assessments, the ministry contracted the same management consulting firm that carried out the November 1998 survey of health authorities to conduct on-site assessments at a sample of the health authorities. At the time of our review in August 1999, draft reports for all the health authorities reviewed had been issued to the health authorities for comment. The following are the main findings from the consultant's reviews:

The Gartner Group's final World Status report released in mid-August 1999 warned that although many nations have shown "an unprecedented level of progress," the methods of assessment and self-evaluation of Y2K compliance may be suspect.

Source: http://www.infoworld.com

- All health authorities were providing reasonably accurate status reports to the ministry, with respect to estimated completion dates, percentage completion, and existence of deliverables. However, the project scope, level of detail, and degree of formality and authorization were not always consistent with the ministry guidelines. In certain cases it was noted that, although there was a lack of formality, it did not significantly increase the risk rating.
- The consultant identified four instances where its assessment of overall risk ratings differed from the ministry's risk model (three increased and one decreased). The main reasons for increasing risk were the volume of work remaining at the particular health authorities and the short period of time to complete remediation efforts for certain key systems.

We reviewed the nature and extent of work performed by the consultants, and assessed the consistency of its reported results against information provided to our Office from our independent survey of the 52 health authorities. We agree with the consultant's observations. Through our survey we

reviewed the Year 2000 readiness of mission-critical systems, continuity planning in the event that mission-critical systems fail, determination of critical suppliers, an assessment of liability in the event of substantial failures of mission-critical systems, and the adequacy of resources.

We received responses from 81% of the health authorities we surveyed, as shown:

	Surveys sent	Responses received
Community Health Services Societies	7	7
Community Health Councils	34	26
Regional Health Boards	11	9
Total	52	42

Although the quality of the responses varied, we were able to identify some common trends. The following is a summary of our key findings and observations:

- Community Health Services Societies had a lower inherent risk than any of the other health authorities of not being Year 2000 ready. Many indicated few or no mission-critical systems and few embedded systems.
- All health authorities indicated that they have identified all mission-critical software and embedded systems and have determined remedial actions.
- Of the health authorities responding, 19% indicated that their mission-critical software was Year 2000 ready; 65% indicated that their remediation efforts were still in progress; and 16% indicated they had no mission-critical software.
- Of the health authorities responding, 37% indicated that their mission-critical embedded systems were Year 2000 ready; 51% indicated that their remediation efforts were still in progress; and 12% indicated they had no mission-critical embedded systems.
- Many of the health authorities are relying heavily on vendor compliance letters and reviewing vendor web sites for Year 2000 assurances, rather than independently testing their equipment.
- Seventy-seven percent of respondents have determined the extent of their dependence on external suppliers for critical goods and services.

- Fifty-one percent of respondents have assessed their liability in the event of a substantial failure of a mission-critical system. Many of the respondents indicated they were working with the BC Health Care Risk Management Society in assessing their Year 2000 liability. The society provides health authorities with comprehensive insurance and risk management under the Health Care Protection Program.
- Business continuation plans have been completed by 44% of respondents. Another 42% indicated that their business continuation plans were in progress. The remaining respondents had no mission-critical systems, and therefore the planning was not applicable.
- Eighty-eight percent of respondents indicated they had secured adequate resources to make themselves Year 2000 ready, although some noted that they would need to secure additional funding through internal resources. Another issue noted was the challenge in obtaining skilled staff.
- Many of the smaller health authorities are relying on work performed by regional purchasing alliances or larger health authorities to assess their supply chain risks.

Funding for Capital Equipment

The Provincial government has made $100 million available to the health authorities to fund capital equipment for their Year 2000 projects. A process was established whereby all health authorities submitted funding requests to the Ministry of Health based on three categories of need. The highest category was equipment that poses a real threat to public health and safety. The second category was equipment that could cause potential disruption of direct care and services in hospitals. The third category was equipment that could cause a disruption in administrative services.

The process required that:

- health authorities submit funding requests to the Ministry of Health;
- a working committee in the Ministry of Health evaluate all funding requests based on established criteria;
- funding decision letters be issued to the health authorities in early June 1999; and
- the Ministry of Health establish financial procedures to ensure that payments are made only for approved equipment purchases.

As at the end of August 1999, $95.3 million had been allocated to the health regions. The remaining $4.7 million is being held in contingency for future requirements. The following is a summary of payments by health authority type:

	($ Millions)
Community Health Services Societies	1.34
Community Health Councils	12.00
Regional Health Boards	81.93
Total funds allocated	95.27
Contingency (to be allocated in future)	4.73
Total funds committed	100.00

The Work Ahead

The ministry has established the following escalating plan of action for health authorities identified as being at risk of not meeting their Year 2000 readiness:

1. through correspondence from senior ministry staff to the health authority Chief Executive Officer, assessing whether help is needed;
2. setting specific goals for deliverables to be provided to the ministry by a specified date;
3. reviewing the activities of the health authority independently;
4. appointing a Year 2000 manager for the health authority; and
5. appointing a Year 2000 manager and project team for the health authority.

Each month, the ministry reviews the risk ratings for each health authority and action plans are recommended for those considered high-risk. To date, the actions initiated by the ministry have been limited to correspondence with the Chief Executive Officers of certain health authorities and in some cases requesting documented evidence of progress.

Many low- and medium-risk health authorities appear to be well on their way to successfully completing their Year 2000 plans before the end of the year. However, there are several high-risk health authorities for which there is a high probability that the Year 2000 initiative will not be completed as planned. With only a few months remaining to ensure Year 2000 preparedness, the time available to assist high-risk health authorities with their implementation plans is limited.

If further escalation in the action plans is required—such as placing contract staff into the health authorities to manage or carry out the Year 2000 project—these actions will need to be implemented immediately.

We recommend that the Ministry of Health immediately appoint Year 2000 managers and adequate resources to assist the several remaining high-risk health authorities with becoming Year 2000 ready, developing business continuation plans and ensuring that their supply chain will be Year 2000 ready.

Year 2000 and the Advanced Education Institutions

In our December 1998 review, we surveyed the following colleges and universities to determine their Year 2000 readiness:

- British Columbia Institute of Technology
- Kwantlen University College
- Royal Roads University
- Simon Fraser University
- Technical University of British Columbia
- University of British Columbia
- University of Northern British Columbia
- University of Victoria

We reported the result of the survey in our Report on Government Financial Accountability for the 1997/98 Fiscal Year. In that report, we mentioned that while all of the institutions that were surveyed had responded, in all but one case their responses were in a summary form and provided little information to enable us to properly evaluate the state of their Year 2000 readiness.

In our current survey, conducted in August 1999, our focus was to review the key processes that the colleges and universities took in preparing their mission-critical systems and business continuation plans for Year 2000. We asked senior management of these institutions to provide us with specific information and documentation that we considered necessary to perform our review and verification work.

The scope of our survey covered the following three different groups of systems:

- financial and administrative (dealing with finance, human resources, student records, library and other such systems);
- facilities management (dealing with elevator, fire, security and heating systems); and

- academic and research (dealing with technical systems, such as those used by laboratories).

Colleges

The two colleges included in our survey confirmed that all the systems they had regarded as mission-critical—mainly, financial and administrative—were Year 2000 ready. Both identified unresolved problems with their fire alarm systems, and one college needed to carry out testing and other remedial work on an operating system and some of its embedded environmental control systems. It expected to complete this work by the end of September 1999.

The colleges also provided further detail and cooperated with us in our review of their processes for Year 2000 readiness. We found that both colleges had carried out testing of their systems for Year 2000 readiness, and there appeared to be a fair amount of involvement by management in the planning and evaluation of significant systems. At one college, however, there was inadequate evidence of user and management endorsement of the systems' Year 2000 readiness status.

We also found that significant effort had been made to obtain representations from suppliers whose equipment may be susceptible to problems due to the year-end date rollover. In some cases though, considerable reliance was placed on the vendor's assertions without the performance of adequate testing, and neither of the two colleges had documented year-end rollover procedures.

Concerning the business continuation planning in case of actual failure of specific mission-critical systems, one college had not yet carried out such planning and the other could not provide the documentation for such planning at the time of our visit.

Universities

Of the universities included in our most recent survey, five responded. One small university that did not formally respond has yet to develop and implement its own systems.

The five universities that responded to our survey advised us that their Year 2000 work had been going on for several years, and they confirmed the Year 2000 readiness of their major mission-critical systems. Two of the universities, having only been recently established, had relatively new systems said to be Year 2000 compliant at the time of purchase. All five respondents identified finance, administration, student registration, central computing and library administration as their major systems. Some respondents continued to indicate

target dates of September and October 1999 to complete the conversion and testing for a number of their systems. As we had stated in our earlier report, we believe that this timeline is extremely close and any delay will leave insufficient reaction time to address the Year 2000 problems.

There appeared to be some inconsistency in what these universities regarded as critical embedded systems, and in what they acknowledged as needing to be converted or replaced. None of these universities considered their research systems to be mission-critical. We found that management of these institutions had delegated to individual researchers and faculties the responsibility for ensuring their research systems for Year 2000 compliance. Considering the extent of research done by some of these institutions, it is not clear to us whether failure of any computer-controlled research environment could be a health hazard or a life-threatening event.

As for business continuation planning, our prior report had stated that all respondents had begun contingency planning. In this survey, we found that none of the respondents had stated that their business continuity and contingency plans were complete.

Of the five universities that responded to our most recent survey, only one small university provided detailed information about its systems and documentation relating to Year 2000 readiness. Others were unwilling to furnish the detail that we had requested or to allow us to undertake the necessary verification work for public reporting purposes. As a result of the limitation placed on the scope of our work, we were unable to properly evaluate the state of their Year 2000 readiness.

Year 2000 and Crown Corporations and Other Government Organizations

We surveyed the Crown corporations and other government organizations that had stated in our early 1999 review that they had mission-critical systems. Our survey included some key questions regarding the status of their mission-critical systems and requested details on documented evidence supporting senior management's review and approval of the systems' Year 2000 readiness and business continuation planning.

Responses to questions in our survey of these government organizations are summarized below in Exhibit 14. Note that the British Columbia Assessment Authority has not been included in the summary, as it now does not consider any of its systems to be mission-critical.

Exhibit 14

Summary of Survey Responses

Question:	Yes	No	Comments Made by Organizations:
1. Has your organization adopted the government's definition of mission-critical systems?	13	1	The one exception has a broader definition, identifying any system whose failure would cause significant business interruption or "work-arounds" as mission-critical. One organization had adopted both the government's definition and one specific to its industry. Four stated that only parts of the government's definition were applicable to their organization.
2. Has your organization determined a Year 2000 readiness strategy for each of its mission-critical software systems? (Examples of strategies: upgrade, retire, remediate, replace)	13	1	The one organization with a "no" response has now stated that it does not have any mission-critical systems that are not compliant, and therefore the question was not considered applicable.
3. Has your organization identified all its critical embedded systems and developed a strategy to make them Year 2000 ready? (Examples of embedded systems: systems used to operate/manage ventilation systems, elevators, alarms, telecommunication devices, laboratory equipment and health and research related equipment)	13	1	One organization indicated that its development of a strategy was in progress.
4. Has your organization made all its mission-critical systems Year 2000 ready?	6	8	Exhibit 15 gives details on mission-critical systems that are not ready.
5. Has your organization made all its critical embedded systems Year 2000 ready?	7	7	One organization (included under "yes" response) indicated that it had none.
6. Has your organization determined the extent of its dependence on critical goods and services provided to it by other organizations?	14	0	
7. Has your organization determined the extent of its potential liability in case of substantial failure of its mission-critical systems (including applications and embedded systems)?	6	8	Comments made by those answering "no" included: ■ Difficult to identify and quantify. ■ Contingency planning will include identifying third-party threats. ■ In progress. ■ Have inventoried suppliers and customers.
8. Has your organization completed a plan to continue its business if a mission-critical system fails to operate?	7	7	Exhibit 15 gives details on the status of business continuation plans.
9. Has your organization secured adequate resources to make itself Year 2000 ready on time? (Examples of resources: financial and human resources, including that assigned to user testing)	14	0	One stated that overall resourcing has been an issue but, by applying triage, the issue has been resolved.

The summary of survey responses highlighted the following areas of concern:

- Fifty-seven percent of the organizations indicated that they had not determined the extent of their potential liability in case of substantial failure of their mission-critical systems;
- Fifty-seven percent of the organizations have not made all their mission-critical systems Year 2000 ready;
- Fifty percent of the organizations have not made all their critical embedded systems Year 2000 ready; and
- Fifty percent of the organizations have not completed business continuation plans for all mission-critical systems.

With only a few months to the century rollover, little time remains to address potential legal exposures, develop and test business continuation plans and make the remaining mission-critical systems and devices Year 2000 ready.

"You're either ready or you're not ready: there is no middle ground. It's also not possible to collapse the time-scale, no matter what resources you throw at it."

Source: Action 2000, UK

Exhibit 15 indicates the mandate of each of the 15 government organizations surveyed, as well as their identification of mission-critical systems, their assessment of what will happen if those systems are not Year 2000 ready, the target date for Year 2000 readiness, and the status of their business continuation plans. This information suggest that much of the remaining work should be completed in September and October 1999.

Exhibit 15

A Sample of Crown Corporations and Other Government Organizations and Their Mission-Critical Systems

Information about target completion dates and business continuation plans, provided in response to our survey, August 1999

Entity	Mandate	Mission-Critical Systems As Identified by the Organization	Impact of Non-Compliance of Mission-Critical Systems According to the Organization	Target Completion Date	Business Continuation Plan Approved
British Columbia Assessment Authority	Establish and maintain assessments that are uniform in the Province.	Computer Assisted Property and Assessment System	Significant loss or liability to the Province	[1]	[1]
British Columbia Buildings Corporation (BCBC)	Provide accommodation and real estate services to the provincial government.	Primary business systems, desktop applications in specialized areas and hardware required to run these business and desktop systems	Impact for embedded systems: significant loss or liability to the Province	Ready	Yes (July 1999) —for all departments and districts
	Assume Year 2000 responsibility for embedded systems in buildings under their management.	Mission-critical embedded systems have been identified in buildings under the corporation's management and categorized as either owned or leased embedded systems.		Owned— August 1999 Leased— November 1999	
British Columbia Ferry Corporation	Provide safe, efficient, effective and reliable ferry transportation services.	Various mission-critical systems related to the vessels and the ramps such as:	Inconvenience only, as the systems are backed up by manual or other compliant systems		
		Loading Ramp◆ Controllers coordinate all movement of the ramp with ship movement		Ready	Yes
		Modis Engine Monitor Monitors system and reports on engine status		Ready	No
		Notifier Fire Detection◆ Determines the location of fire alarms		Ready	Yes
		Traffic Analysis Tracks ticket sales prior to each sailing to ensure total passenger numbers remain within regulatory licences	—low impact	November 1999	Yes

[1] Since our last review, BCAA has determined that this system is not considered mission-critical under the government's definition. Therefore, information was not provided.

◆Indicates system was selected for review of the verification of Year 2000 readiness and the existence and authorization of a business continuation plan.

Entity	Mandate	Mission-Critical Systems As Identified by the Organization	Impact of Non-Compliance of Mission-Critical Systems According to the Organization	Target Completion Date	Business Continuation Plan Approved
British Columbia Ferry Corporation (continued)		Dangerous Goods Provides information on the handling of dangerous goods presented for transportation on the vessels	—low impact	September 1999	Yes
		Payroll Coordinates employee information with time worked to produce gross pay figures	—moderate impact	September 1999	Yes
		Mirans Navigation◆ Integrates radar, GPS and auto-pilot into a navigation system	—low impact	August 1999	Yes
		Siemens Propulsion Control Monitors commands and controls between bridge and engine	—low impact	August 1999	No
		AIMS Gas Detection Units Help to ensure safety by monitoring car exhaust levels and other safe air levels	—low impact	October 1999	No
British Columbia Housing Management Corporation and Provincial Rental Housing Corporation	Develop, administer and manage social housing.	In-house systems (integrated financial, property management, tenant information system)	Economic hardship for clients	August 1999	Yes
		Shelter Aid For Elderly Renters' (SAFER) system		August 1999	Yes
British Columbia Hydro and Power Authority	Provide reliable electric energy to its customers.	Accounts Payable Pay suppliers	Significant loss or liability to the Province	Ready	All business continuation plans are completed and expected to be approved
		Customer Information System Bills customers		Ready	
		Live Line Logging System Registers contractors		Ready	September 1999
		Open Access Same-time Information System Posts transmission schedules		Ready	

Entity	Mandate	Mission-Critical Systems As Identified by the Organization	Impact of Non-Compliance of Mission-Critical Systems According to the Organization	Target Completion Date	Business Continuation Plan Approved
British Columbia Hydro and Power Authority (continued)		Power System Safety Protection System Records employee and contractor work site qualifications		Ready	
		Transmission Billing System		Ready	
		Transmission Scheduling System		Ready	
		Operational Control Devices ◆(include any devices that assist in the operation of the electrical system—3,427 identified)		Ready	
British Columbia Liquor Distribution Branch (branch of the Ministry of Small Business, Tourism and Culture)	Purchase liquor for resale and reuse in the Province in accordance with the Importation of Intoxicating Liquor Act (Canada).	Store Data Collection System ◆(includes the Product Flow System) Supports the collection and processing of liquor store sales data.	Significant loss or liability to the Province.	Ready	Yes (May 1999)—for all supply chain systems
		Embedded Systems		Ready	
British Columbia Lottery Corporation	Contribute significantly to government revenues and economic growth by providing top-quality entertainment to the public in a socially responsible manner.	Lottery Gaming System Includes sales, draws, validation and payment of prizes for on-line lottery tickets	Significant loss or liability to the Province.	Ready	In progress
		Casino Gaming System Includes slot and table sales and prizes and net win monitoring		September 1999	
		Electronic Bingo System An automated approach to traditional bingo game		Ready	
		Linked Bingo System A centrally controlled bingo game linked to halls throughout Province		Ready	
		Mail Subscription System		Ready	
		Prize Payout System Produces cheques for subscription winners and other prize claims		Ready	
		Critical support systems		Ready	
		Networking systems		Ready	

Entity	Mandate	Mission-Critical Systems As Identified by the Organization	Impact of Non-Compliance of Mission-Critical Systems According to the Organization	Target Completion Date	Business Continuation Plan Approved
British Columbia Railway Company	Provide efficient and integrated services in transportation, real estate and related services.	Revenue Management Yard Management Car Repair Information Billing Occupancy Control Payroll Car Order Car Information Intermodal Dispatching and Equipment Tracking Rail Traffic Control Car Cycle GRID YEMS 8 EDI applications	Significant loss or liability to the Province, reduction in efficiency of services, and/ or a potentially life-threatening situation	August 1999 August 1999 Ready Ready Ready Ready Ready Ready Ready August 1999 Ready Ready	In progress
Insurance Corporation of British Columbia	Provide universal auto insurance to B.C. motorists; also responsible for all driver and vehicle-related services.	17 claims systems used to indemnify accident victims Pay valid claims to claimants and to organizations such as auto repair shops, etc. 26 insurance and finance systems Includes a network of 900 brokers who provide Autoplan services 3 finance systems Handle collection of revenue on behalf of government 3 systems to manage driver licensing 2 systems to manage investments 1 finance system to handle collection of debt Building security systems HVAC systems Air Care emissions testing Photo Radar Weigh Scales Intersection Cameras	Significant loss or liability to the Province, reduction in efficiency of services, and economic hardship for British Columbians	Ready Ready Ready Ready October 1999 Ready Ready Ready Ready Ready August 1999	Yes— detailed contingency plans have been developed for all mission-critical business process and supporting systems

Entity	Mandate	Mission-Critical Systems As Identified by the Organization	Impact of Non-Compliance of Mission-Critical Systems According to the Organization	Target Completion Date	Business Continuation Plan Approved
Legal Services Society	Ensure that services ordinarily provided by a lawyer are afforded to individuals who would not otherwise receive them because of financial or other reasons, and that education, advice and information about law are provided for the people of British Columbia.	Case Management System (CMS) Takes applications from legal aid clients and grants referrals to lawyers JDE Financial System Handles payments to lawyers and other suppliers Duty Counsel Human Resource/Payroll	Economic hardship for British Columbians	CMS is built to be Year 2000 ready, but has not been tested. Vendor certified version is compliant; however customized code not tested. October 1999 Not provided	No—should be completed by end of October 1999
Public Trustee of British Columbia (branch of the Ministry of Attorney General)	Protect the legal rights and financial interests of children, vulnerable adults and deceased and missing persons.	The Computerized Office for the Management of Estates & Trusts System	Economic hardship for British Columbians	Ready	No—to be approved August 1999
Superannuation Commission	Administer superannuation funds.	The Universal Contributor System◆ Used in tracking contributions and calculating pension benefits The Pension Payment System◆ Used for processing payments of pension allowances	Economic hardship for British Columbians	Ready Ready	No
Workers' Compensation Board of British Columbia	Promote occupational health and safety; compensate for occupational injury, death or disease; and rehabilitate injured workers.	Wage Loss System Pays individual claimants Pensions System◆ Pays individual claimants Criminal Injury System Pays individual claimants Claims Registration◆ Registers new claimants Health Care Benefits Pays medical practitioners Medical Aid Pays medical practitioners Payroll system Pays employees Accounts Payable Pays suppliers Security Systems Facilities	Economic hardship for British Columbians	Ready Ready Ready Ready Ready Ready Ready Ready August 1999 September 1999	To be completed by early October 1999

West Coast Express Limited and the Vancouver operations of British Columbia Transit, including the Sky Train, were transferred to TransLink, the regional transportation network of Greater Vancouver. TransLink is not part of government and therefore not included in the above table. The two organizations —West Coast Express Limited and British Columbia Transit— have responded to our survey. We have included them in Exhibit 14.

Based on the responses to our survey, we selected a sample of mission-critical systems in government organizations. We reviewed documentation of the verification of Year 2000 readiness by senior management and the management approval of business continuation plans. Exhibit 15 lists the systems included in our sample. Following are our findings from our review of the government organizations selected for this purpose.

British Columbia Ferry Corporation

The mandate of the British Columbia Ferry Corporation (BC Ferries) is to provide safe, efficient, effective and reliable ferry transportation services. The corporation has identified various administrative systems and operational systems (related to its vessels and terminals) as mission-critical. As of the end of August 1999, the corporation anticipates that remediation activities related to mission-critical operational systems will be completed by the end of September 1999. Mission-critical administrative systems will be substantially completed by the end of October 1999.

We reviewed documentation supporting the verification of the Year 2000 readiness of the Notifier Fire Detection System (installed on four vessels) and the Loading Ramp Controller System (installed on six terminal loading ramps). There appears to be a reasonable communication and authorization process between the corporation's Year 2000 Project Office and its end users. In their survey response, the corporation indicated that the mission-critical projects would be subject to an independent review starting in mid-August.

On a monthly basis, the Year 2000 Project Manager is updating the Project Steering Committee (made up of three senior executives) of BC Ferries. The signing of the minutes of these meetings forms the executive authorization process. Accordingly, we did not find it necessary to view the authorization of the original business plan, the executive management's acceptance of the test plans, the application changes, or the comprehensive testing procedures carried out.

Business continuation plans have been prepared by respective terminal, vessel and administrative operational divisions and compiled by the Year 2000 Project Office. BC Ferries senior management approved the business continuation plans. The corporation anticipates that the continuation plans will be issued company-wide by the end of August 1999.

The operational divisions are to exercise the business continuation plans and provide a sign-off on their readiness on, or before, October 15, 1999.

British Columbia Hydro and Power Authority

The mandate for the British Columbia Hydro and Power Authority (BC Hydro) is to provide reliable electric energy to its customers. The authority has identified various financial and operational systems and a significant number of operational control devices as mission-critical.

BC Hydro has been proactive in managing its Year 2000 internal and external risks. This has been accomplished by ensuring the readiness of internal devices and systems and monitoring and assessing their inter-dependencies with key business partners. As of May 31, 1999, BC Hydro completed a systematic inventory, assessments and reviews, remediation and testing of all its critical systems in order to minimize Year 2000 risks. It is the expressed belief of the executive management that these risks are minimal and manageable. However, in cooperation with the North American Electric Reliability Council, BC Hydro has adopted a defensive approach in its strategy, which will require planning for unexpected events or contingencies.

In its efforts to mitigate the impact of those unexpected events, BC Hydro has created over 400 individual contingency plans, ranging from detailed plans for the smallest piece of common equipment right up to the System Control Centre Plan for the entity as a whole. The various plans are integrated up through four levels of authorization: from System / Devices, to Station / Facility, to Area Control Centre before being consolidated into the System Control Centre Plan. Technical Engineers were required to sign-off evaluation and remediation, if required, of the devices and systems; Facility Managers signed off for generation station and substation contingency plans, while Senior Vice Presidents were required to sign-off upper level contingency plans.

According to BC Hydro, the key objective of contingency planning is “to have resources and procedures in place to efficiently and effectively respond to Year 2000 induced

failures, whether internally and/or externally produced." To oversee the transition to the Year 2000, arrangements have been made to have about 600 extra staff on site as well as on standby, and to activate the Year 2000 Corporate Response Centre.

British Columbia Liquor Distribution Branch

The British Columbia Liquor Distribution Branch (LDB) has the exclusive right to purchase liquor for resale and reuse in the Province in accordance with the provisions of the Importation of Intoxicating Liquors Act (Canada). The branch has identified one system as mission-critical –the store data collection system.

We reviewed the documentation supporting the Year 2000 readiness of this system. The project was well defined and took into account both internal and external interfaces. Sign off on completion of each event was appropriate and persons authorized to do so verified the Year 2000 readiness of the system. However, forward date testing on the Year 2000 ITP is not scheduled to be completed and signed off until October 29, 1999.

An initial business continuation plan is in place, but it is undergoing improvements. It is an overall plan and not application-specific, and it only takes into consideration events that may happen in relation to the transition to the Year 2000. It does not address "all hazards." The Deputy Minister and the General Manager signed off the first version of the plan. The second version will be signed off when the revisions have been finalized. Testing of the plan will be done in September and October 1999.

The Risk Management Branch of the Ministry of Finance and Corporate Relations reviewed the business continuation plan. The branch found the plan lacked detail, was not in the proper format, and focused only on the Year 2000 issue rather than covering all hazards.

Superannuation Commission

The Superannuation Commission is responsible for administering the following public sector pension plans:

- College Pension Plan
- BC Rail Ltd. Pension Plan
- Teachers' Pension Plan
- Municipal Pension Plan
- Workers' Compensation Board Superannuation Plan

- Public Service Pension Plan
- MLA Pension Plan

In carrying out its responsibilities, the commission collects contributions from members and employers, maintains contributor accounts, processes and pays member pensions and maintains pension accounting systems. The system used by the commission for contributor information is the Universal Contributor System (UCS). The UCS will be replaced by the Integrated Pension Administration System (IPAS). Three of the pension plans will be converted to IPAS during September 1999.

During the period of our Year 2000 update, the commission was completing the final preparations for the implementation of IPAS. Year 2000 testing of IPAS was completed in June 1999. The results support the application as Year 2000 ready. Based on the Year 2000 and system functionality test results, commission executive gave approval for IPAS implementation in August 1999.

The UCS, although scheduled for replacement, was modified to be Year 2000 ready as a contingency plan to the IPAS project. This was initiated to ensure that the commission would have a Year 2000 ready system for processing contributor information. Therefore, with IPAS implementation occurring before the Year 2000, the commission will have two Year 2000 ready systems for contributor data.

The Pension Information Payment System is the system used for the processing of pensioner allowances. The commission identified the payment of pension allowances as a critical business function due to the potential impact of non-payment on pensioners. The system was developed with the Year 2000 in mind; however, testing was completed to ensure the system was Year 2000 ready. Minor issues were identified with reports generated from the system. The commission modified and tested the identified code. The business users have signed off the changes for implementation into production.

The Superannuation Commission has begun work on business continuation plans for each of its key business processes, and has developed plans for critical computer system disaster recovery and continuity, including alternative processes for pension payments. However, a comprehensive business continuation plan has yet to be completed and approved. The May 31, 1999 deadline for submission of mission-critical business continuation plans was missed by the commission. The Risk Management Branch had not been provided with a copy of the commission's plans for its mission-critical systems.

Workers' Compensation Board of British Columbia

The mandate of the Workers' Compensation Board of British Columbia (WCB) is to promote occupational health and safety, compensate for occupational injury, death or disease, and rehabilitate injured workers. The board has identified eight financial systems and several security and facility systems as mission-critical.

We reviewed the verification of the Claims Registration System and Pension Payments System as Year 2000 ready. As of August 1999, WCB's Year 2000 preparation consisted of:

- detailed test planning, authorized by the CEO and Vice Presidents of the board;
- proof of test plans and subsequent execution, authorized by their senior systems analysts and Year 2000 project staff; and
- proper change management procedures to ensure no unauthorized changes to the system applications.

Certain external interface projects remain outstanding. The TD Bank, Bank of Montreal and the Medical Services Plan have been sent test data. Once the test files have been processed successfully by the external organizations, WCB will get involved in the validation of the results.

The issue of business continuation planning has not been fully addressed. The Information Services department of WCB feels that its Disaster Recovery Plan will be sufficient in case of a computer technology failure. However, at the time of our review, WCB's "all hazard" business continuation plan was still under development.

response from the action2000 project office

response from the action2000 project office

The Action2000 Project Office is pleased to respond on behalf of the provincial government to the August, 1999 report by the Auditor General on government preparedness and progress on the Year 2000 problem.

The Auditor General's report is a review and assessment of government's progress on the Year 2000 issue as of August 1999. The BC government is making rapid progress on Year 2000, and for that reason this response updates some of the information supplied in the report, clarifies outstanding issues, and speaks to recommendations made in the report.

Status of Government Progress

Essential Services

Of the more than 1200 ministry computer systems affected by the Year 2000 problem, the provincial government identified 67 "mission-critical" systems as the top priority for Year 2000 remediation to ensure the delivery of essential services to British Columbians. In February, 1999 the Province's Chief Information Officer gave his word that all mission-critical systems would be ready by the end of September, 1999.

This promise has now been delivered. As of the end of September, 100 per cent of the provincial government's mission-critical systems were Year 2000 ready-a significant achievement to the credit of each ministry.

Status of provincial government mission-critical systems, major crown corporations' mission-critical systems and provincial health authorities is posted monthly on the Action2000 Office web site at: www.y2k.gov.bc.ca.

Business-Priority Systems

The provincial government also identified business-priority systems that needed to be Year 2000 ready. These systems were not identified as essential, but will help government to continue operating smoothly. As of the September 15 report, 91 per cent of these systems were Year 2000 ready, and another seven per cent were in final testing.

Current Emphasis

With all mission-critical systems ready and 98 per cent of business-priority systems either ready or in final testing, the provincial government's focus is now on evaluation and testing of business continuation plans, partnerships with essential service providers in both the public and private sectors, and development of a comprehensive transition plan to carry operations into the new year.

Business continuation planning (BCPs) continues to be coordinated by the Risk Management Branch of the Ministry of Finance and Corporate Relations, in partnership with the Action2000 Office and the Provincial Emergency Program. Final testing of BCPs is targeted for November 15.

Action2000 staff continue to meet and coordinate plans with essential service providers across the Province. These partnerships will help ensure consistent delivery of essential services as we move into the new year.

A Year 2000 Transition Steering Committee has been established to ensure that the transition from 1999 to 2000 occurs as smoothly as possible. This committee represents the three primary areas of responsibility:

- *Risk Management Branch, Ministry of Finance and Corporate Relations;*
- *Provincial Emergency Program, Ministry of Attorney General; and,*
- *Action2000 Office, Information, Science and Technology Agency.*

These three organizations share responsibility for managing the transition process and are working together to that end. A comprehensive transition plan for government is the responsibility of the committee, and will involve senior management across government in the planning process. A major piece of the transition plan will be a central communications centre that will include representatives of all key players who will be there to help protect the interests of British Columbians.

Response to Parts 1 and 2. Year 2000 Readiness: Centralized Government and Ministry Initiatives

Response to Recommendations

In these two sections, the report makes three recommendations- these are addressed as follows:

1. ***We recommend that final business continuation plans be signed off by authorized management and the plan coordinator as evidence that the plans have been reviewed and authorized and are considered thorough, reasonable and capable of implementation.***

The Planning Guide For The Development Of Business Continuation Plans provides for management input and approval at three stages:

- *planning phase-executive approval is to be obtained for the program charter, policy statement and communications strategy*
- *plan writing stage-management review and approval of essential services and recovery objectives is required, and*
- *plan review stage-plan is presented to senior management for final review and approval.*

2. ***We recommend that one of the priorities of government should be to promote the completion and testing of business continuation plans within the set deadlines, as insurance against disruptions to service delivery and operations.***

Meetings have been held with all ministries to review their submitted business continuation plans and promote their completion and testing according to the deadlines. Ministries have identified their mission-critical and business-priority program areas, and have completed plans for the majority. Mission-critical program areas are currently being prioritized across government. An independent contractor will evaluate and test the most critical plans.

3. ***We recommend that the review and authorization of Year 2000 project activities and supporting documentation by a person or persons authorized to do so be evidenced with a formal sign-off as verification that the system is Year 2000 ready.***

The provincial government concurs with the Auditor General's recommendation. In July, 1999 the Action2000 Office initiated work on a Y2K Preparedness Checklist for use by ministry program management in documenting Year 2000 readiness of their area. The Checklist was distributed to ministries in early October, 1999.

Response to Other Issues

Beyond the specific recommendations made to government in Parts 1 and 2, the Auditor General's report raised other issues in these sections. Ministry responses follow.

Incomplete Status of Two Embedded Systems—Response Prepared by the Ministry for Children and Families

Two "mission-critical" projects identified by the Ministry for Children and Families have been addressed:

- *Medical Devices: Suppliers have been contacted and the ministry has received confirmation that their devices are Year 2000 ready. The ministry is also advising all contractors to consult the CYNCH (Canadian Year 2000 National Clearinghouse for Health) web site*

located at www.cynch.lgs.ca/newsmenu.asp to ensure all devices used in their facilities are Year 2000 ready.

- *Heat/Ventilation/Air Conditioner (HVAC): As part of a detailed plan for the ministry, BCBC has checked all HVAC in ministry buildings and is replacing embedded chips. BCBC will conduct a re-check of these systems in all buildings, on January 1 - 3, based on a priority list. In addition, all ministry locking systems, including those in correctional facilities, have back-up manual locking capability.*

MSP Claims System—Response Prepared by the Ministry of Health

The Auditor General's August, 1999 report identified the MSP Claims System's business continuation plan as not action oriented and lacking in detail. While the plan may not appear to be "action oriented," it is based on manual workarounds, the essentials of which have been proven during business disruptions. Since the review was completed, the business continuation plan has been improved by the inclusion of the emergency payment process, the business dependencies work sheet, contract lists and a set of spreadsheets detailing the plan by sub-section.

Pharmacare business continuation plan found to be unclear and does not follow format —Response Prepared by the Ministry of Health

The Pharmacare plan is highly developed and is routinely tested. It was developed prior to the current required format and due to its complexity, the costs of changing the format are not justifiable in the short term. The format will be addressed in the longer term. Regarding the plan being "unclear in certain aspects", the document was designed for distribution to several groups, each only receiving those sections that are applicable to them. As a result, if an individual reviewing the document in its entirety were not aware of this approach, it would seem somewhat unclear and repetitive. This will be clarified in the plan's Overview to avoid any confusion.

Lack of Business Continuation Plans for some Ministry of Finance and Corporate Relations' Mission Critical Projects—Response Prepared by Ministry of Finance and Corporate Relations

Throughout the business continuation planning (BCP) process for Year 2000 and All Hazards, the ministry's goal has been to focus BCPs on mission-critical business processes that will encompass key resources, systems/applications and external interfaces.

At the time of the August, 1999 Auditor General's review, the ministry took a broader approach and proceeded with its in-depth planning and documentation process for selected mission-critical business processes, rather than only concentrating on the mission-critical business systems/applications as directed by central government. This resulted in the ministry's inability to provide a specific BCP for each of its designated mission-critical systems/applications in accordance with

government's schedule. However, the ministry is now able to provide both the Year 2000 and All Hazards BCPs for its mission-critical processes.

Legal liability—two of 11 respondents said they had not determined the extent of their potential liability in case of substantial failure of mission-critical systems. Responses prepared by appropriate ministry:

Ministry for Children and Families

The Ministry for Children and Families (MCF) has initiated activity with social ministries whose contractors provide similar services. As a result, MCF has sent a letter advising all contracted agencies of potential problems they may encounter. The letter also advises the contractors concerning Year 2000 resources, such as web sites of interest regarding hydro, telephone, medical equipment and general emergencies, and includes the 1-800 number for the Provincial Emergency Program.

In addition, the ministry will place an article in a stakeholder newsletter that will be sent to all ministry stakeholders during the latter part of October. As well, the ministry will continue its assessment of risk for key contractors to determine vulnerabilities that may exist but have not yet been planned for by these agencies/contractors. The largest group who appear to be at risk includes approximately 55 individuals who have some form of medical equipment with embedded chips. Suppliers have been contacted and the ministry has received confirmation that their devices are Year 2000 ready. Local back-up plans are also in place for the individuals involved.

Ministry of Health

The Ministry of Health is currently working with Ministry of Attorney General staff to determine the potential liability in case of failure of mission-critical systems. In addition, the ministry is completing a similar review of all the Agencies, Boards and Commissions that have a relationship with the ministry.

Prioritized listing of all mission-critical and business priority program areas—Response Prepared by the Ministry of Finance and Corporate Relations, Risk Management Branch

Risk Management has now received this information from all 21 ministries as requested for inclusion in the cross government summary.

Diagnostic and Remediation Tools and Services—Response Prepared by the Action2000 Office

Vendors to provide independent verification and validation of remediated code have now been selected and a contract is in place.

Independent reviews on selected mission-critical systems—Response prepared by Action2000 Office in partnership with the Internal Audit Branch, Office of the Comptroller General

As an update to the Report, to date, independent reviews have been initiated for the BC Benefits and Senior Supplement programs and ITSD voice and data networks.

Ministry of Attorney General has reported the Building Security Control System ready, although systems at three facilities remain in progress—Response Prepared by Ministry of Attorney General

This statement implies that the three facilities were not "ready." In fact, these three systems were Year 2000 ready in accordance with the Action 2000 definition. Their readiness was based on the same approach of rolling back the system date as with the other four Correctional Centre systems. BCBC was further updating the three systems to allow the actual date in the year 2000 (rather than just the accepted "date rollback" option). Since the time of the August, 1999 Auditor General report, two of these updates are now completed, and the third will be done by October 18.

Inability to verify the existence of testing documentation for the Air Data Management System—Response Prepared by the Ministry of Environment, Lands and Parks

Subsequent to August 31, 1999, documentation to support the Year 2000 readiness of the Air Data Management System has been forwarded to the Office of the Auditor General. The system has been Year 2000 ready since June 1999. The ministry has received updated year 2000 information from vendors which has been incorporated in the system, and the system is being fully re-tested.

The business continuation plan for the Air Data Management System has been used under live conditions in the past and proven to successfully address any potential system failures and business disruptions. Regardless, the plan is being reviewed under the guidance of Risk Management Branch, Ministry of Finance and Corporate Relations. Any improvements that may be determined will be implemented immediately.

Business Continuation Plans for Network Services and MVS Platform need some revision—Response Prepared by Information, Science and Technology Agency

Information Technology Services Division (ITSD) provided Year 2000 business continuation plans for mission-critical infrastructure services to Risk Management Branch, however the Branch was also expecting to receive ITSD's disaster recovery plans. The Branch informed ITSD of this requirement on August 16, 1999 and the

Network Services and MVS Platform disaster recovery plans were subsequently delivered as requested. More information on ITSD's disaster recovery plans can be found in the section titled History of Centralized Government Initiatives-Testing and Disaster Recovery.

No formal sign-off found on the Year 2000 readiness of the MVS Platform—Response Prepared by Information, Science and Technology Agency (ITSD)

Senior officials for the contractors (IBM and ISM-BC) formally signed off the Year 2000 readiness of the MVS/VM Platforms in letters dated May 3, 1999 and May 11, 1999. Responses to both contractors acknowledging receipt of these letters and clarifying contract language was sent on September 28, 1999.

Community Awareness—Response Prepared by Action2000 Office

In addition to the items noted in the Auditor General's report, the Action2000 Office would like to recognize the community awareness efforts of two ministries: (1) Ministry of Small Business, Tourism and Culture who played an integral role in ensuring the booklet titled RU Y2K OK, BC? reached a wide audience, distributing 5,000 copies of the booklet around the province; and, (2) the Ministry of Agriculture and Food who designed and distributed Y2K information brochures for the BC agriculture and food industry sectors.

Response to Part 3. Year 2000 Readiness: Specific Systems

The Corporate Human Resource Information and Payroll System (CHIPS) —Response prepared by the Office of the Minister Responsible for the Public Service, Public Service Employee Relations Commission (PSERC)

We recommend that the Public Service Employee Relations Commission seek legal advice to determine recourse should CHIPS not operate as anticipated at the turn of the century.

A legal review was conducted in September 1999.

While this is the only specific recommendation the August, 1999 Auditor General's report made with respect to CHIPS, PSERC would also like to respond to other comments in the report.

Payroll Operations and Information Management office has successfully completed the following CHIPS business continuation plan (BCP) tests:

- *BCP Team orientation-May 20, 1999: included a tabletop walkthrough of the BCP procedures with all team leaders*
- *Technical Drill of the Recovery Processing-September 19, 1999: included a real failure of the system to the Event Recovery server located at a secondary site*

- *Post Recovery Test Review-September 22, 1999: included a detailed review of the September 19 Recovery Test results. The BCP was adjusted accordingly*

In addition, the following BCP tests will be conducted:

- *Functional BCP Test of all recover activities-October 14, 1999: This will include a full functional walkthrough with all team members*
- *Functional test by Risk Management Branch is expected to be scheduled. This will include activities as defined by Risk Management Branch*

The report notes that a new workstation release for CHIPS is expected to be implemented in October, 1999, and that the new software will be subjected to Year 2000 testing. PSERC can now report that the Commission has successfully completed the Year 2000 testing of the workstation release. The new version of the CHIPS application was released on schedule on September 27, 1999.

Harvest Database System and use of the Library Management System to control movement of code and track software changes —Response Prepared by the Ministry of Forests

We recommend that the final business continuation plan be signed off by authorized management and the plan coordinator as evidence that the plan has been reviewed and authorized and is considered to be thorough, reasonable and capable of implementation.

The ministry will implement an approval process for the HDBS business continuation plan as per the recommendation.

If the library management system cannot be Year 2000 ready in time, we recommend management consider other options for code movement and tracking.

As of September 24, 1999, the Year 2000 ready version of the Harvest Database System (HDBS) was completely installed.

The library management system (LMS) is not part of HDBS, and is not required for HDBS to successfully meet the Year 2000 challenge. It is a tool used only by systems staff. The LMS is capable of running through the millennium change with no change to its code.

The Status of MSP Claims System Applications —Response Prepared by the Ministry of Health

There are a total of 39 Year 2000 ready applications. As of September 21, 1999 the number of signed off applications had increased to 36 from the 28 referred to in the Auditor General's August, 1999 report, leaving only three applications remaining to be signed off. These last three applications will be ready by the end of October.

Response to Part 4. Year 2000 Readiness: Government Organizations

Year 2000 and Health Authorities —Response Prepared by the Ministry of Health

We recommend that the Ministry of Health immediately appoint Year 2000 managers and adequate resources to assist the several remaining high-risk health authorities with becoming Year 2000 ready, developing business continuation plans and ensuring that their supply chain will be Year 2000 ready.

Since the August, 1999 Auditor General's report was compiled, the Ministry of Health has received and processed health authority status for activity in August 1999. Of the 59 health authorities, 30 have been identified as low risk. For the remaining 29 health authorities, the ministry has initiated the following actions:

- *Year 2000 liaison officers (Year 2000 managers) are in place for:*

  Vancouver Hospital

  Nelson Community Health Council

- *Four on-site reviews will be performed and assessed for further action for the following Community Health Councils:*

  Arrow Lakes

  Cranbrook

  Creston

  Queen Charlotte Islands

- *Twelve requests for documentation are being processed*
- *Eleven follow ups by the health authorities' regional teams are underway*

Problems with Liquor Distribution Branch's business continuation plan—Response Prepared by Liquor Distribution Branch

The Liquor Distribution Branch (LDB) submitted a business continuation plan to the Ministry of Finance and Corporate Relations' Risk Management Branch in spring, 1999. It was not designed to address all hazards at that time. The plan addresses the LDB's Year 2000 business continuation planning concerns. The increased requirement for an All Hazards Disaster Recovery Plan will be addressed in the near future.

The LDB submitted an update to its Year 2000 business continuation plan in early September 1999, which will address many of Risk Management's concerns. LDB is currently reviewing the document with input from Risk Management as to formatting and detail from a Year 2000 perspective.

Superannuation Commission's business continuation plan not yet submitted to Risk Management Branch, Ministry of Finance and Corporate Relations—Response Prepared by the Office of the Superannuation Commissioner

Year 2000 business continuity and back up and recovery planning has occurred for the continuation of key critical business, such as the payment of pensions, should business systems fail. However, planning is not yet consolidated into an appropriate comprehensive business continuity plan. This will be a priority once the Commission's critical new pension administration system (IPAS) is implemented.

School Districts—Response Prepared by Ministry of Education

The Ministry of Education has reviewed the comments in the Auditor General's August, 1999 report on the Year 2000. As noted in the report, the ministry surveyed school districts twice this year on the Year 2000 issue and is in the process of completing a final survey for October. In completing the survey, each district responded that it is managing the Year 2000 issue appropriately and will be ready by year end. As a cautionary note, without the benefit of a detailed audit, the ministry is unable to say with 100 per cent confidence that all 1,800 schools and 100,000-plus computers are Year 2000 ready. However, based on the information provided to the ministry from school districts, it is expected that all essential systems will be Year 2000 ready.

appendices

appendix a

Excerpts from 1999/2000: Report 2
Report on Government Financial Accountability
for the 1997/98 Fiscal Year, Province of British Columbia.

government financial and other information systems, and the year 2000 deadline: update

A review of the government's progress in preparing its financial and other information systems to handle the Year 2000 problem

About the Year 2000 Problem

What Is the Year 2000 Problem?

Historically, computer programs made use of dates represented by only two digits for the year. The century was not entered. This was an important programming technique, as it reduced data entry, storage space and processing time. However, since these programs cannot differentiate between year 1900 and 2000, incorrect results may be produced when the programs perform arithmetical calculations or comparisons based on dates.

To change all systems involving mainframe computers and microcomputers so that they accept a four-digit year format is an enormous task. Many of these systems are relatively old and are written in computer languages no longer used by modern programmers. The scarcity of skilled people to carry out the work is a worldwide concern of governments as well as private sector businesses. Further complication arises because governments and private businesses have to modify their programs while still using them to support their current activities. These challenges are often collectively referred to as the Year 2000 problem.

Why Is the Year 2000 Problem Significant to Government?

The Year 2000 problem could result in errors in calculations or possibly even in a complete failure of some government systems. For example, errors could occur when dates are used to calculate a person's age of eligibility for a pension or health care or social assistance benefit. Or, if the field that signifies the expiry date for data files is left blank, the program may interpret the blank to mean the two zeros indicating the Year 2000 and wipe off irreplaceable data. Complicating the matter is the fact that some computer systems will not recognize the Year 2000 as a leap year.

The provincial government's Year 2000 Project Office estimates that there are more than 1,200 government systems that could potentially be affected by the problem.

The deadline for modifying computer programs cannot be changed. In most cases for financial systems that meant March 31, 1999, as the government's fiscal year 1999/2000 began April 1, 1999. Date conversion should be completed in time to allow any changes made to systems to be adequately tested before the deadline.

The Year 2000 problem extends beyond mainframe and microcomputer hardware and software. Other types of date—dependent devices are affected by it too. Within government, every computing or electronic regulating device—for example, building security systems, heating and air conditioning systems, elevators, and office equipment such as printers, photocopiers and fax machines—may all be affected. Of a more serious nature are the many process control systems used in health care facilities. These include life support equipment and other critical hardware components in which date-sensitive computer chips are embedded. Many of these devices should become Year 2000 ready.

To successfully resolve the Year 2000 problem, the government must secure sufficient resources to allow ministries and other government organizations to remedy the problem and test solutions. Since the resources for this work are scarce, it is therefore important to make sure that they are applied to significant programs first. It is equally important to be realistic, and think ahead about fall-back plans if targets cannot be met on time.

Review Purpose and Scope

The purpose of this review was to assess the government's efforts in addressing the Year 2000 problem and to identify issues that require further attention. This is our third in a series of public reports commenting on how the government is doing in making the necessary system changes.

This year we once again conducted an overall review of ministry systems affected by the Year 2000 problem, and looked in more detail at systems in six major government programs. In addition, we surveyed the level of Year 2000 readiness in the "mission-critical" systems of Crown corporations, and other organizations we audit. For this purpose, a system is considered mission-critical if failure of that system could result in:

- a potential life-threatening situation;
- economic hardship for British Columbians;
- serious damage to the environment; or
- a significant loss or liability to the Province.

In this report, we describe the progress made by ministries and other government organizations.

For our review, we relied on information we gathered from a number of sources. We have not audited such information and consequently, although we report on the state of readiness of the government in dealing with the Year 2000 problem, we do not express an audit opinion on that state.

Our review is based on information we collected between October and December 1998. Dealing with the issues surrounding the Year 2000 has gathered certain momentum. Therefore, since the time we collected information for this review, significant events might have taken place. Where relevant we have tried to update this report. For information on other significant events we have asked that the government's Chief Information Officer provide an update. Clearly, the comments made in response to this request are not audited.

In this report we have not addressed the issue of government's interdependence with suppliers of goods and services to it.

Overall Assessment

Year 2000 Readiness—Centralized Government and Ministry Initiatives

Many significant financial and other information systems within government are not yet Year 2000 ready. As of December 1998, the list included such systems as the Social Service Tax system, the Medical Services Registration and Premium Billing system, the Pharmacare system, and the Forests' Harvest Database system. All of these (and many more such systems) are classified as "mission-critical," which indicates their importance to the continuity of government operations.

In general, the government has been proactive in adopting a well-structured and organized approach to resolving the Year 2000 problem. The ministries have been working towards mitigating the potential impact of the problem by first identifying and assessing susceptible systems and then finding a suitable remedy for each. Correcting mission-critical applications is receiving particular attention, and currently the ministries seem to be confident that all mission-critical systems

will be Year 2000 ready in time. However, as remediation of many of the systems is still in progress, we are concerned that the estimated completion dates leave a very short time for testing, particularly user testing.

At the time of our review, some ministries also expressed concern about the sufficiency of shared facilities and tools available for testing and validation when deadline pressures build up. As well, those with a heavy Year 2000 workload anticipate possible slippage of planned completion dates because of potential shortages in skilled personnel and funding constraints.

The Risk Management Branch of the Ministry of Finance and Corporate Relations was instrumental in each ministry appointing a business continuation planner and for training most of the appointees one-on-one. We found, however, that the ministries had completed little in the area of business continuation planning related to the Year 2000.

The Deputy Minister to the Premier has set a deadline for the Year 2000 contingency planning related to mission-critical systems. The ministries were to have their plans completed and approved by management by May 31, 1999.

To provide the government with assurance about Year 2000 readiness, the Information, Science and Technology Agency has also offered ministries the funding, on request, to have their mission-critical systems independently reviewed. It is expected that the outcomes of the reviews will assist ministries in ensuring that their systems are Year 2000 ready well before their respective deadlines.

Year 2000 Readiness—Specific Systems

We reviewed the government's progress in identifying and correcting the Year 2000 problems associated with the six major financial systems that we had looked at last year. Of the six, we found that one was completed on schedule and within budget. The remaining five systems had not achieved, and will not likely achieve, the estimated deadlines reported last year. At the time of our review, the completion date of one of these systems was very close to the ultimate deadline of January 1, 2000.

All of the six systems had incomplete Year 2000 contingency plans. In three cases, planning had not begun. Considering that, at the date of our review, three of the six projects had missed their initial completion deadline, the need for such plans is obvious.

Following is a summary of the progress for each system.

- *The Corporate Accounting System (CAS)* is the government's main accounting, reporting and financial management system. The software used by CAS has been certified Year 2000 compliant by the vendor. However, testing by the CAS team revealed that the system contained some non-compliant codes. This caused delays in the project. Compliance testing that was to be completed by July 1998 was re-scheduled for completion by the end of January 1999. We understand that the planned deadline for making CAS Year 2000 ready, April 1, 1999, has been met.
- *The Corporate Human Resource Information and Payroll System (CHIPS)* keeps track of human resource information and leave entitlements, and processes government payroll. The main application software used in developing CHIPS is certified by the vendor to be Year 2000 compliant. The Public Service Employee Relations Commission had yet to test and validate the vendor's certification. The environment within which CHIPS operates has been upgraded and testing for Year 2000 compliance was in the planning stage. The expected date for all components to be Year 2000 ready is now set for July 1999 as compared to September 1998, reported last year.
- *The Social Service Tax Systems* of the Ministry of Finance and Corporate Relations are used for collecting and recording social service tax. Many of them need to become Year 2000 ready. We reported last year that the ministry had initiated two separate projects to simultaneously satisfy the Year 2000 problem and other management information needs. The "1999 Fixes Project" was to be a contingency to patch the existing systems and so prevent failures before the Year 2000. The "CTB21 Project" was to replace existing revenue systems with a Year 2000 compliant integrated system. However, delays in the CTB21 Project resulted in it no longer being a viable alternative for Year 2000 readiness. Therefore, at the completion of the "1999 Fixes Project," the "Y2000 Contingency Project" was initiated. The project completion date of December 31, 1998, reported last year was revised to March 31, 1999.
- *The Harvest Database System* of the Ministry of Forests handles the calculation of stumpage billing and royalties earned from timber sales. We reported last year that a plan had been developed and the system was expected to be Year 2000 ready by January 1, 1999. Over the year there have been some obstacles and changes. At the time of our review, completion was scheduled for December 30, 1999, one day before the deadline of January 1, 2000. Responding to this

concern, the ministry assures us that the planned completion date is now set for September 30,1999.

- *The Claims System of the Medical Services Plan* processes over 90% of the billing for services of British Columbia's physicians and other health care providers. Last year we reported that a plan was in place for this system to be Year 2000 ready by March 31, 1999. Since then the ministry has experienced some delays and now estimates that all components of the Claims System will be ready by September 1999.
- *The BC Benefits Program System* of the Ministry of Human Resources processes payments under the BC Benefits Act. Last year we noted that a plan had been established to make the system Year 2000 ready. The project has been completed on time and within budget.

Year 2000 Readiness—Government Organizations

We surveyed the status of 55 government organizations outside the provincial ministries—including advanced education institutions and Crown corporations—with a view to determine areas needing significant attention.

We did not survey the various health authorities (HAs) now responsible for the delivery of most medical services throughout British Columbia. A consultant has been hired by the Ministry of Health for this purpose. We also noted that the ministry was in the process of reorganizing its Year 2000 Project Office to become more proactive in the HAs' Year 2000 efforts. We discussed the HAs' state of readiness with senior ministry personnel and reviewed relevant documentation. As of January 1999, the date of completion of our review, the HAs had not provided the Ministry of Health with inventories of their equipment and systems, nor with their plans to make them Year 2000 ready. As a result, the ministry did not have an accurate estimate of the funds required to address the problem.

While the HAs plan to complete the bulk of the testing and remediation of the systems and equipment in 1999, there is a risk that some will not complete their Year 2000 efforts in time. It will be the task of the Year 2000 Project Office in the Ministry of Health to ensure that mission-critical systems, at least, are Year 2000 ready.

We surveyed a number of advanced education institutions. The summary responses we received from most of them did not provide us with sufficient information to properly evaluate the state of their Year 2000 readiness. For these institutions, Year 2000 readiness would involve not only their administrative

and facilities management systems, but also their academic and research systems.

Our Year 2000 survey included 28 Crown corporations. In reporting on their Year 2000 readiness, our main focus was on mission-critical systems. We asked the Crown corporations to identify their mission-critical systems and to report on their progress in making them Year 2000 ready. Of the 28 Crown corporations surveyed, 9 responded that they had systems that are considered mission-critical according to the given definition. At the time of our survey, these entities expected all mission-critical systems to be Year 2000 ready before the required deadline. Anticipated completion deadlines varied from March 31, 1999, to the fourth quarter of the 1999 calendar year.

None of the corporations had completed contingency plans for their mission-critical systems to ensure business continuation.

At the time we were writing this report, the Deputy Minister to the Premier announced that the chairs of the Crown corporations were to be contacted with regard to Year 2000 readiness. Formal Year 2000 plans were to be requested—plans that identify critical systems and that include implementation plans for Year 2000 compliance. These plans are to be assessed by the Crown Corporations Secretariat, with support from the Information, Science and Technology Agency, in order to identify critical systems that are at risk of not being ready in time.

Some of the other organizations we surveyed still had the bulk of the testing and remediation to do. In some cases, the estimated completion dates for systems left little room for slippage and appropriate user testing. In most cases, little work had been done on the preparation of Year 2000 contingency plans.

We concluded that there is a risk that some of the mission-critical systems in these entities will not be Year 2000 ready. Also, many of these entities had not confirmed the readiness of their business partners' Year 2000 readiness.

a summary of the findings from our previous review

In October and November 1997, we interviewed various levels of government staff and surveyed ministries to ascertain their progress in identifying and managing Year 2000 related risks. In general, we found that the government was proactive and had a good, well-structured and well-organized approach to resolving the Year 2000 problem. Our main findings are summarized below.

- The majority of ministries reported that they would not be Year 2000 ready by the beginning of the 1998/99 fiscal year (see Exhibit 7.7 for their expected dates for readiness as of November 1998).
- Ministries expressed concern that the existing shared facilities and tools available for testing and validation may not be sufficient when deadline pressures build up.
- The ministries with a heavy Year 2000 workload recognized possible slippage of planned completion dates as a result of anticipated shortages in skilled personnel and possible funding constraints. They speculated that many systems might only become ready for testing close to the deadline.
- The lack of skilled staff resources in the local marketplace, the shortage of funding and the difficulty in retaining current staff levels for Year 2000 work were the leading challenges for most ministries.
- Not many ministries had thought to build a contingent condition in their plan to fall back on if things did not work out as desired. There was a general optimism that everything planned would be done.

As a result of these findings, we made the following recommendations:

1. For the ministries planning to achieve Year 2000 compliance in 1999, staffing and funding demands should be reassessed, as it will be more difficult to secure appropriate resources close to January 1, 2000.
2. Ministries should secure access to adequate testing tools and facilities soon to avoid delays when their systems become ready to be tested.
3. Where it looks likely that the Year 2000 compliance may not be achieved in time, ministries should place more emphasis on developing a contingency plan to minimize the effects of systems failure.

appendix b

Office of the Auditor General: 1999/2000 Reports Issued to Date

Report 1

1999 Follow-up of Performance Audits/Reviews

Report 2

Report on Government Financial Accountability
for the 1997/98 Fiscal Year

Report 3

Maintaining Human Capital in the British Columbia
Public Service: The Role of Training and Development

Report 4

Managing the Woodlot Licence Program

Report 5

A Review of the Fast Ferry Project:
Governance and Risk Management

Report 6

Forest Renewal BC:
Planning and Accountability in the Corporation
The Silviculture Programs

Report 7

Report on the Preparedness of British Columbia
in Dealing with the Year 2000 Problem

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