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Information Technology and Broadcasting Bureau

A follow-up review of the year 2000 problem

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A FOLLOW-UP REVIEW OF THE YEAR 2000 PROBLEM

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Summary and key findings

Introduction

A. In June 1998, Audit reported the overall slow progress in the preparedness for the year 2000 (Y2K) problem in government organisations and the private sector. The Public Accounts Committee made a number of recommendations in February 1999 to assist the Administration in tackling the Y2K problem (paras. 1.2 and 1.4).

Audit review

B. Audit conducted a follow-up review to examine the latest Y2K position across the whole-of-government and non-government organisations (NGOs) which provide essential services to the public. Audit conducted reviews at the Information Technology and Broadcasting Bureau (ITBB), eleven major government organisations and one NGO during the months of April to July 1999 (paras. 1.5 and 1.6).

Compliance position as at the deadline of 30 June 1999

C. As at 30 June 1999, government organisations reported to have achieved a compliance rate of 99.7% of all identified Y2K affected mission-critical computer systems and embedded equipment. The NGOs also reported to be well on the way to achieving full compliance before year 2000. The significant progress to date could be attributed to the joint efforts of the ITBB, the policy bureaux and individual organisations (both government and non-government) (paras. 3.8 and 3.9).

Audit observations

D. Notwithstanding the significant progress, Audit identified areas where attention and continued efforts were needed to effectively minimise the Y2K risk. The main observations included the need to: closely monitor systems that had missed the mid-1999 deadline; ensure the completeness of the inventory of embedded systems; and conduct independent validation of vendors' compliance statements (para. 4.3).

E. For some government organisations (mainly policy bureaux) that have a monitoring role for the Y2K readiness of NGOs under their portfolios, Audit's main observations included the need to: institute proper procedures for the verification of NGOs' Y2K compliance progress reported to the Government; closely monitor the progress of those NGOs that could not achieve Y2K compliance by 30 June 1999; and urge these NGOs to expedite their rectification work to avoid further slippage (paras. 5.5 and 5.6).

F. The audit findings were reported as and when they arose to the organisations to enable them to take early action. They accepted most of the audit recommendations (paras. 4.3, 4.5 and 5.4).

G. In addition, Audit has forwarded those audit observations that are common to the organisations examined to the ITBB for action. These include the need to: involve the internal audit in reviewing the organisations' Y2K programmes; control system changes after achieving compliance; and assess the Y2K readiness of business partners (paras. 4.6 to 4.11).

H. Audit has also identified two important issues that need to be addressed by the ITBB in the remaining months before year 2000. These two issues are: the need for a more structured independent quality assurance mechanism; and the need for continued efforts in contingency planning (para. 6.2).

I. With regard to small and medium enterprises (SMEs), a recent survey conducted by the Hong Kong Productivity Council shows significant progress in their Y2K preparedness. However, the survey also indicates that some SMEs might have overlooked the importance of contingency planning and conducting Y2K assessment of business partners (para. 7.6).

Audit recommendations

J. To address the common audit observations, the two important issues ahead and the Y2K preparedness of SMEs, Audit has recommended that the Secretary for Information Technology and Broadcasting should:

Common audit observations (para. 4.12)

(a) remind all government organisations that they should:

(i) require their internal audit units to participate actively in their Y2K programmes and submit timely internal audit reports;

(ii) consider the Y2K implications before proposing any new information technology requirements or system changes; and

(iii) critically review the risks arising from the Y2K non-readiness of their business partners and implement a corporate strategy for dealing with key business partners who are not Y2K compliant;

Independent quality assurance reviews (para. 6.13)

(b) critically review whether a more structured approach should be adopted for conducting independent quality assurance reviews and result reporting;

(c) take stock and critically assess the adequacy of the existing independent quality assurance programmes in government organisations and NGOs providing essential services;

(d) for those organisations which are found to have inadequate independent quality assurance programmes, take action to strengthen their programmes as far as possible in the remaining days of 1999;

(e) if time or resources do not permit the establishment of an overall independent assurance programme, consider focusing independent quality assurance efforts on Y2K contingency planning in the remaining days of 1999;

(f) as far as possible, consider obtaining and examining supporting evidence (e.g. test plans and test results) of the organisations' reported progress and consider setting up a mechanism for overseeing the performance of independent verification of the reported progress;

Business continuity and contingency planning (para. 6.23)

(g) continue to monitor the progress of the testing of the contingency plans in major government organisations (in particular, those organisations that have missed the deadline in their development of the Y2K contingency plans) and in NGOs to ensure that the plans are workable;

(h) set up a mechanism for assessing the quality of contingency plans submitted by government organisations, using guidelines similar to those used for assessing NGOs' contingency plans;

(i) expedite action in preparing and validating the territory-wide contingency plan; and

Y2K preparedness of SMEs (para. 7.9)

(j) intensify the Government's efforts in promoting to the SMEs the importance of contingency planning and the assessment of the Y2K readiness of business partners.

K. **Response from the Administration.** In his response of September 1999, the Secretary for Information Technology and Broadcasting accepted most of the audit recommendations which he indicated was in line with the ITBB's current practices or plan. With regard to independent quality assurance, he said that the fact that not every government bureau or department had engaged external assistance to provide quality assurance reviews of its Y2K programme was by no means a reflection of a haphazard approach. Rather, it was the outcome of careful consideration by individual bureaux and departments of the need for such external assistance, having regard to their in-house capabilities to tackle the Y2K problem, the support provided by the technical departments and the criticality of their systems (paras. 4.13, 5.11, 6.24 and 7.10).

PART 1: INTRODUCTION

1.1 This PART describes the background to the audit and outlines its objectives, methodology and scope.

Background

1.2 In Chapter 9 of the Director of Audit's Report No. 30 (June 1998), Audit reported the overall slow progress in the preparedness for the year 2000 (Y2K) problem in government organisations and the private sector, and warned about the potential consequences of the inability of computers and electronic equipment with embedded chips to handle the date change on 1 January 2000.

1.3 The Public Accounts Committee (PAC) issued its Report on the Y2K problem in February 1999 and recommended a number of solutions to assist the Administration in tackling the Y2K problem (the PAC's recommendations are set out in full in Appendix A).

PAC's recommendations to the ITBB

1.4 In its Report No. 30 (February 1999), the PAC recommended that the Information Technology and Broadcasting Bureau (ITBB) should, among other things:

— continue to monitor the progress and effectiveness of the whole-of-government Y2K compliance, accelerate the pace of compliance and ensure that government organisations will meet the strict target of completing all Y2K work by mid-1999;

— take all measures, including the development of contingency plans and testing of the plans, to ensure that the Government's key services and operations will continue to function properly and smoothly in year 2000;

— review and strengthen the existing regulatory control to ensure that essential service providers in the private sector are Y2K compliant; and

— submit by mid-1999 a report showing the overall assessment of Y2K compliance progress in both government organisations and the private sector, and a full list of essential service providers and information on whether their Y2K compliance programmes (Y2K programmes) have been fully tested and on their contingency plans.

In the Government Minute tabled before the Legislative Council in May 1999, the Administration responded positively to the PAC's recommendations.

Audit review

1.5 ***Audit objective, approach and scope.*** A follow-up audit review has been conducted to ascertain whether the Government is now better prepared to minimise the potential disruptions due to the Y2K problem. The audit examined the whole-of-government and the essential community service providers' latest actions in tackling the Y2K risks and in business contingency planning, in particular:

- the ITBB's whole-of-government coordinating and monitoring role;

- actions taken by the three technical departments, namely the Information Technology Services Department (ITSD), Electrical and Mechanical Services Department (EMSD) and Office of the Telecommunications Authority (OFTA), which provide technical support to the ITBB in addressing the risks associated with the Y2K problem;

- the latest progress of four selected major government departments and the Hospital Authority (HA) in addressing the risks associated with the Y2K problem; and

- monitoring by policy bureaux of the Y2K readiness of providers of essential community services.

1.6 ***Audit methodology.*** Audit conducted:

- a high level review at the ITBB, the ITSD, the EMSD and OFTA to assess how they addressed the whole-of-government risks associated with the Y2K problem;

- interviews and fieldwork at four major government departments and the HA to examine their Y2K programmes; and

- interviews and fieldwork at four government bureaux (which are responsible for overseeing public health, transport, aviation, energy supply and financial services) to examine their monitoring of the sectors under their purview. In addition, Audit also conducted fieldwork at OFTA, which operates under the policy direction of the ITBB, to examine its monitoring of the telecommunications sector.

1.7 The objective of the audit was to report on the progress of the Government's efforts in tackling the Y2K risks. **The audit was not intended to provide (and should not be perceived as providing) certification of the individual organisations' Y2K compliance.** The audit, however, aims to assist the Government in its tackling of the Y2K risks and to add value by identifying areas where further attention and continued efforts are required in the remaining days of 1999.

1.8 During the audit fieldwork from April to July 1999, audit findings had been reported to the senior management of the organisations concerned to enable them to take early action.

1.9 ***Y2K expenditure.*** In January 1999, the Government estimated that the expenditure on rectifying the Y2K problem in mission-critical systems (Note 1) in government departments (but excluding those expenditure on solving the problem in government-funded institutions) would be about $540 million. As at the end of June 1999, the estimated expenditure for these systems was about $527 million.

Note 1: *Mission-critical systems are mainly those systems which are related to: public health and safety; provision of critical services to the public; or payment and revenue collection. Whether a system is mission-critical or not is decided by the bureau or department concerned.*

PART 2: PUBLIC AND PRIVATE SECTOR Y2K COORDINATION AND MONITORING

2.1 This PART outlines the Government's roles in managing the overall Y2K problem in Hong Kong.

Background

2.2 The Y2K problem potentially affects everyone including businesses and the whole public sector. Action to overcome the problem is the responsibility of the Government and NGOs (in both the public and private sectors).

2.3 In the Government, government organisations have the primary responsibility for the implementation of their Y2K programmes. The Government also has a responsibility to ensure the continuity of essential public services such as health services, public transport and the provision of utilities.

ITBB's responsibility for monitoring the Y2K compliance progress

2.4 **One of the main roles of the ITBB is to centrally coordinate the Government's approach to the Y2K problem. The ITBB is responsible for monitoring, reporting and encouraging progress towards Y2K compliance at a whole-of-government level and at NGOs which provide essential services to the public.**

The Steering Committee on Year 2000 Compliance

2.5 In early 1998, a Steering Committee on Year 2000 Compliance (the Steering Committee) was established under the ITBB to monitor the Y2K compliance progress and to take an overall lead on Y2K issues within the Government and the NGOs. The Steering Committee, chaired by the Secretary for Information Technology and Broadcasting (Note 2), also has the responsibility for the promotion of awareness of the Y2K problem in the community.

2.6 The main tasks of the Steering Committee are to:

(a) review and oversee the progress of work related to Y2K compliance within the Government;

Note 2: *Membership consists of the Secretary and Deputy Secretary for Information Technology and Broadcasting; Principal Assistant Secretary for Information Technology and Broadcasting; Director of Information Technology Services; Director of Electrical and Mechanical Services; Director-General of Telecommunications; and representatives from other policy bureaux.*

(b) monitor (through the relevant policy bureaux and departments) the progress of work related to Y2K compliance undertaken by NGOs funded or regulated by the Government;

(c) identify any problems which may hinder the work mentioned above and consider solutions to address such problems;

(d) ensure as far as practicable that all necessary remedial work related to Y2K compliance within the Government and those undertaken by NGOs funded or regulated by the Government are completed on time; and

(e) work out and monitor implementation of a strategy for promoting awareness of the Y2K problem on a community-wide basis.

2.7 The ITBB's Y2K Division, established in April 1999, supports the Steering Committee and its Working Group on Y2K Contingency Planning (Note 3) in executing the Y2K tasks. In particular, the Y2K Division:

— monitors the overall Y2K compliance position of Hong Kong;

— formulates a community-wide contingency plan; and

— formulates publicity plans.

Mechanisms for monitoring and reporting Y2K compliance progress of government organisations

2.8 The ITBB uses two principal mechanisms for monitoring and reporting the government organisations' progress towards Y2K compliance. These mechanisms are:

— regular progress reporting by Heads of government organisations to the ITBB; and

— regular monitoring and reporting by the ITSD, the EMSD and OFTA (see paragraphs 2.11 and 2.12 below).

Note 3: *A Working Group on Y2K Contingency Planning was set up in January 1999 under the Steering Committee to monitor the progress of government organisations and essential service providers in the formulation of contingency plans.*

Regular progress reporting to the ITBB

2.9 In December 1997, the ITSD started to conduct quarterly surveys of the Y2K rectification progress of government organisations. The quarterly reporting requirement was revised to monthly reporting from January 1999 onwards.

2.10 The regular progress reporting process requires all government organisations to provide information on their progress, with focus on mission-critical systems, covering the following areas:

— target dates for achieving Y2K compliance;

— the overall progress towards achieving Y2K compliance;

— whether the Head of the government organisation is satisfied with the progress and if not, the follow-up action to be taken; and

— whether adequate contingency plans are in place to deal with possible system failure arising from non-compliance.

Monitoring and reporting by the ITSD, the EMSD and OFTA

2.11 The Government's Y2K rectification work is coordinated by the three technical support departments, namely, the ITSD for computer systems, the EMSD for embedded systems and OFTA for line communication systems. Government organisations reported quarterly/monthly the compliance progress of their systems to the three departments which then consolidated and reported the information to the ITBB for discussion by the Steering Committee.

2.12 To provide a third party assessment of government organisations' Y2K programmes, in April 1999 the ITSD set up a Y2K Task Force (Note 4) to conduct site visits to selected government organisations which provide essential services to the public. The Task Force visited eleven government organisations in April and May 1999. The EMSD and OFTA also paid on-site visits to government organisations as they supported the organisations in their Y2K rectification work.

Mechanisms for monitoring and reporting Y2K compliance progress of NGOs

2.13 For NGOs providing essential services to the public, the ITBB also uses two principal mechanisms for monitoring their Y2K compliance progress. These mechanisms are:

Note 4: *Membership includes a Chief Systems Manager and two Senior Systems Managers.*

— regular reporting of NGOs' progress by policy secretaries; and

— on-site inspections by an ITBB Y2K Task Force (see paragraph 2.16 below).

Regular progress reporting to ITBB

2.14 In May 1998, the ITBB requested policy secretaries to send out questionnaires once every two months to NGOs under their purview to ascertain their status of Y2K compliance. In August 1998, the ITBB strengthened the monitoring mechanism on NGOs by requesting policy secretaries to put in place a system whereby the Government can monitor the Y2K rectification progress of NGOs providing essential services under their purview. Since January 1999, NGOs have been required to submit monthly progress reports to the policy bureaux. Personal sign-off by the policy secretaries is required before they submit the NGOs' progress reports (in summary form) to the Steering Committee.

2.15 The regular progress reporting process requires all policy secretaries to provide information about the Y2K compliance progress of NGOs under their purview, covering areas similar to those mentioned in paragraph 2.10 above.

ITBB Y2K Task Force

2.16 In February 1999, the ITBB set up a Y2K Task Force (Note 5) for conducting site visits to selected NGOs which provide essential services to the public. The purpose of the site visits was to enable the Government to have a better understanding of the progress of Y2K compliance in the selected NGOs, and to ensure that their compliance procedures were consistent with the best practice in the industry. The Task Force examined the compliance progress of the NGOs, particularly in regard to impact analysis, inventory taking, the level of management involvement, progress of rectification, Y2K integrated testing, contingency planning and the Y2K readiness of business partners. As at the end of June 1999, the Task Force had visited 17 NGOs and would continue to identify more NGOs for on-site visits.

Note 5: *The ITBB Y2K Task Force is coordinated by the ITBB and includes three professional officers each from the ITSD, the EMSD and OFTA. Representatives from the respective policy bureaux/departments overseeing the selected NGOs are invited to join the visits.*

PART 3: OVERALL Y2K RECTIFICATION PROGRESS

3.1 This PART outlines the overall progress of the Government and NGOs which provide essential community services towards overcoming the Y2K threat.

Background

3.2 The ITBB has set out a programme of action to ensure that the whole-of-government's response to the Y2K threat is coordinated and coherent. The key milestones are:

— all government organisations should have all the mission-critical systems and embedded equipment Y2K compliant by **30 June 1999;**

— all government organisations should finalise and test their business continuity and contingency plans by **15 August 1999;** and

— the development of the territory-wide contingency plan should be completed by **September 1999.**

Compliance position as at the deadline of 30 June 1999

Government organisations

3.3 As at 30 June 1999, the monthly progress reports submitted to the ITBB indicated that, of all identified Y2K-affected mission-critical computer systems and embedded equipment, government organisations had achieved an overall compliance rate of 99.7%. The remaining 0.3% of the mission-critical computer systems and embedded equipment will be made compliant by 31 December 1999.

3.4 Table 1 below shows the Y2K compliance status of the Government's mission-critical computer systems and embedded equipment as at 30 June 1999.

Table 1

Government's Y2K compliance progress as at 30 June 1999

Types of mission-critical systems	Total no. of systems	No. of systems already Y2K compliant	No. of systems that can be clock reset or tolerable	No. of non-compliant systems
Administrative computer systems	364	360	3	1
End-user developed computer systems	238	238	nil	nil
Non-administrative computer systems	71	71	nil	nil
Embedded systems	5,089	5,033	46	10
Line communication systems	393	381	7	5
Total	**6,155 (100%)**	**6,083 (98.8%)**	**56 (0.9%)**	**16 (0.3%)**

Source: ITBB records

3.5 According to the ITBB's records, only three mission-critical systems were still Y2K non-compliant as at the end of August 1999. They were:

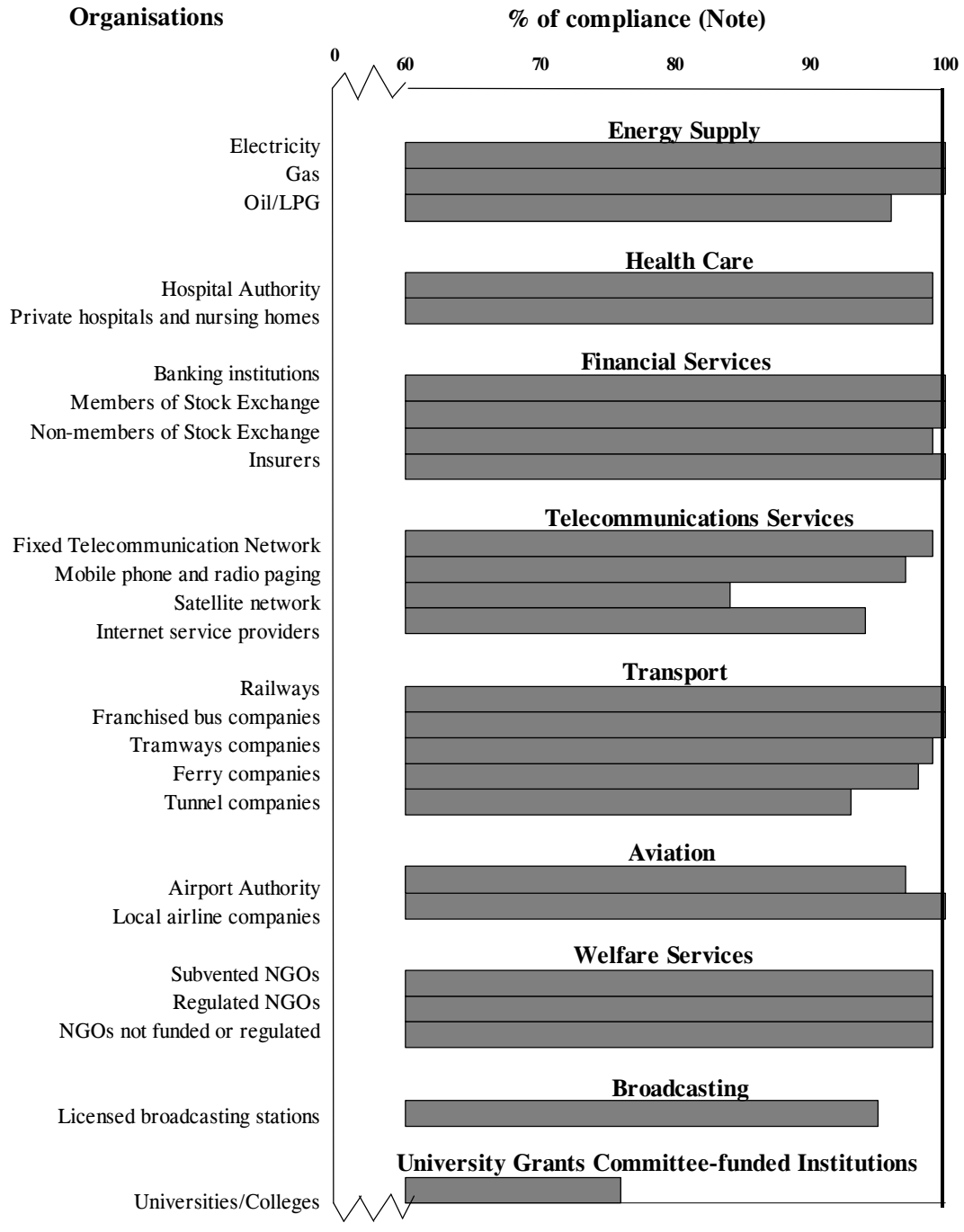
	Mission-critical systems	Target dates for Y2K compliance
(a)	The Regional Council's Computerised Booking System	October 1999
(b)	Toll Collection System, Tsing Ma Control Area	October 1999
(c)	Sailing Schedule Display System, China Ferry Terminal	October 1999

NGOs providing essential services to the public

3.6 According to the monthly progress reports submitted by policy bureaux, as at 30 June 1999, the Y2K compliance status of NGOs providing essential services to the public was as follows.

Figure 1

Y2K compliance position of NGOs providing essential services as at 30 June 1999



Source: ITBB records

Note: This represents the NGOs' compliance position reported to the Government as at 30 June 1999. The relative size of the NGOs, in terms of business activities or market share, was not taken into account in calculating the percentage of compliance.

3.7 Table 2 below shows that, as at 15 August 1999, some NGOs providing essential services had not yet achieved Y2K compliance.

Table 2

NGOs' Y2K compliance progress as at 15 August 1999

Sectors	Reported Y2K compliance progress
Energy Supply	Two oil companies were not yet Y2K compliant (with 99% and 97% of the rectification work completed). They expected to be fully compliant by September 1999.
Health Care	The HA had completed 99.9% of the rectification work. It expected to complete rectification work by September 1999. In addition, two systems were scheduled to be replaced in November 1999.
Financial Services	Thirty-four non-members of the stock exchange and the futures exchange (i.e. 7% of all non-members) were not yet Y2K compliant. Two of them aimed to achieve compliance by December 1999. The remaining ones aimed to achieve compliance by September 1999.
Telecommunications Services	Two satellite network operators expected to achieve full compliance by September 1999. Twenty-seven Internet service providers (i.e. 21% of the total number) were not yet Y2K compliant. According to the ITBB, these 27 service providers had only a small market share.
Transport	Two tunnel companies expected to be compliant by October 1999.
Welfare Services	3% of the subvented NGOs, 2% of the regulated NGOs and 5% of the non-funded/non-regulated NGOs expected to be fully compliant by end of 1999.
University Grants Committee-funded Institutions	All universities/colleges expected to be fully Y2K compliant by September 1999.

Source: ITBB records

Significant improvements made but challenge remains

3.8 Since Audit conducted the first review on the Y2K problem in early 1998, the Government's overall reported progress has shown significant improvements. As at the end of June 1999 (i.e. the Government's target date), of all identified Y2K affected mission-critical systems and embedded equipment, a compliance rate of 99.7% had been achieved. The NGOs providing essential services also reported to be well on the way to achieving full compliance before year 2000.

3.9 The significant progress to date can be attributed to the joint efforts of the ITBB, the policy bureaux and individual organisations (both government and non-government). Nevertheless, during the audit reviews on a sample of major government organisations and one NGO, Audit has identified areas where attention and continued efforts are needed to effectively minimise the Y2K risk. There are still a number of challenges ahead. These are discussed in Parts 4 to 7 below.

PART 4: EXAMINATION OF Y2K PROGRAMMES IN SELECTED GOVERNMENT AND NON-GOVERNMENT ORGANISATIONS

4.1 This PART summarises the main audit results of government and non-government organisations examined by Audit.

Background

4.2 The ITBB is responsible for ensuring that the whole-of-government's response to the Y2K problem is coordinated and coherent, that adequate support and advice is given to government organisations, that progress is monitored and that a territory-wide business contingency plan is in place. However, the sole responsibility for ensuring that computer systems and equipment with embedded chips in an individual organisation are Y2K compliant rests with the organisation.

Examination of the Y2K programmes of the ITSD, EMSD and OFTA

4.3 Audit examined the Y2K programmes of the three technical departments (i.e. the ITSD, the EMSD and OFTA). The audits were conducted from May to July 1999. Audit noted a considerable amount of work done by these departments. Audit also identified areas where further attention or continued efforts are needed in the remaining days of 1999. These areas included:

(a) the need to closely monitor those government systems that missed the Y2K rectification deadline of 30 June 1999;

(b) the need to ensure completeness and accuracy of the inventory list of government embedded systems;

(c) the need to take follow-up action on the ITSD's third party assessment programme (see paragraph 2.12 above);

(d) the need for independent quality assurance reviews of government organisations' Y2K programmes;

(e) the need for independent validation of vendors' compliance statements; and

(f) the need for continued efforts in contingency planning.

Audit reported the findings, as and when they arose, to the ITSD/EMSD/OFTA to enable them to take immediate actions. The departments accepted most of the audit recommendations. The audit findings are at Appendices B to D. The main audit recommendations and the departments' responses are summarised in paragraph 4.4 below.

Main audit recommendations to the ITSD/EMSD/OFTA and their responses

4.4 The following is a summary of the main audit recommendations and response from the Administration (more details of the audit recommendations and the Administration's response are at Appendices B to D).

Y2K rectification progress of government systems

(a) **Audit recommendations:** The ITSD/EMSD/OFTA should closely monitor the rectification progress of those mission-critical systems that have missed the government-wide target date of 30 June 1999. These included one administrative computer system, ten embedded systems and five line communication systems (see paragraph 3.4 above).

Response from the Administration: The ITSD/EMSD/OFTA accepted the audit recommendations. They also advised Audit that contingency plans were in place for these systems.

(b) **Audit recommendation:** The ITSD should closely monitor the implementation progress of those systems under redevelopment which have been scheduled to replace existing non-compliant mission-critical systems before they start to process dates beyond 31 December 1999.

Response from the Administration: The ITSD agreed with the audit recommendation.

Inventory checking

(c) **Audit recommendation:** The EMSD should take immediate action to ensure that its inventory of government embedded systems is complete and accurate.

Response from the Administration: The EMSD was confident that the critical embedded system inventory was complete. Nevertheless, it would request departments to recheck their inventory and inform the EMSD of any new findings as soon as possible.

(d) **Audit recommendation:** The EMSD should compile urgently a full inventory of the government embedded systems under the entrustment agreements with the Airport Authority (AA) in order to conduct impact assessment and contingency planning.

Response from the Administration: The EMSD advised Audit in August 1999 that very few embedded systems were involved under the other four entrustment agreements with the AA and the systems were not mission-critical (see paragraphs 10 and 13(h) in Appendix C).

Third party assessment programme conducted by the ITSD

(e) **Audit recommendations:** The ITSD should: conduct a post-implementation review of its third party assessment programme; take follow-up action on the Y2K Task Force's observations made during its site visits; and disseminate common observations to other government organisations for their information and action.

Response from the Administration: The ITSD accepted the audit recommendations.

EMSD's quality assurance programme

(f) **Audit recommendation:** The EMSD should monitor closely the progress of its quality assurance programme (which includes the audit of critical venues, the implementation of a higher quality standard for its Y2K work, and further audits by a newly established special internal audit team).

Response from the Administration: The EMSD advised Audit in August 1999 that: it would strengthen its internal audit programme on the audit of critical venues; it planned to complete the enhanced Y2K work and have the work reviewed by its internal audit team before September 1999; and it planned to complete the internal audit programme by October 1999.

Independent validation of vendors' compliance statements

(g) **Audit recommendations:** OFTA should monitor closely the progress of government organisations' validation tests of vendors' Y2K compliance statements to ensure that they complete the independent validation as soon as possible. OFTA should also provide necessary assistance and support to the government organisations to rectify those line communication systems found to be Y2K non-compliant from the validation tests.

Response from the Administration: OFTA accepted the audit recommendations. It advised Audit in its reply of July 1999 that the independent validation of essential line communication systems was completed on 30 June 1999 and no Y2K non-compliant systems were found.

Y2K contingency plan

(h) **Audit recommendations:** The ITSD should ensure the timely implementation of contingency measures for the ITSD's Central Computer Centre, and disseminate information about these measures to other government computer centres for their reference and actions. The EMSD should continue with its efforts on contingency planning to help departments ensure the continuity of their mission-critical operations.

Response from the Administration: The ITSD agreed with the audit recommendations. The EMSD informed Audit in August 1999 that it would continue to offer advice and support to departments on contingency planning.

Examination of the Y2K programmes of selected government organisations and the HA

4.5 In addition to the three technical support departments, Audit also examined the Y2K programmes of four major government organisations and one NGO. These are the Immigration Department (Imm D), the Hong Kong Police Force (Police), the Civil Aviation Department (CAD), the Housing Department (HD) and the HA. The audits were conducted during the period April to June 1999. During the course of the audits, the organisations' Y2K project management was compared against the good practice guides promulgated by leading overseas organisations (Note 6). Audit noted a considerable amount of efforts and work done by these organisations in addressing the Y2K problem. Audit also identified areas where further attention or continued efforts are needed in the remaining months to year 2000. **Audit reported the audit findings, as and when they arose, to each individual organisation for its immediate action. Most of the audit recommendations were accepted.** The audit findings are at Appendices E to I.

4.6 Some of the observations are common to the organisations examined. These include the need for an overall quality assurance reviews for some of the more critical organisations and the need to continue exerting efforts on contingency planning. These two issues are discussed in

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Note 6: *These good practice guides include three comprehensive Y2K guidelines issued by the United States General Accounting Office (GAO). They are the "Year 2000 Computing Crisis: An Assessment Guide" issued in September 1997; the "Year 2000 Computing Crisis: Business Continuity and Contingency Planning" issued in August 1998; and the "Year 2000 Computing Crisis: A Testing Guide" issued in November 1998. These guidelines are used in the United States by federal agencies and other organisations to help organise and manage their Y2K programmes. The guidelines are available on the GAO's Internet web site.*

PART 6 of this audit report. Other common observations are discussed in paragraphs 4.7 to 4.11 below. **In view of the general nature of these observations, Audit considers it necessary for the ITBB to disseminate the observations to all government organisations for information and action.**

The need to involve internal audit in Y2K work

4.7 An organisation's internal audit should play an important role in providing senior management with independent assurance of the organisation's Y2K compliance progress. In the Director of Audit's Report of June 1998, Audit recommended the use of internal audit in the quality assurance and monitoring process. **However, in some of the organisations examined, Audit noted that there was a need for increased internal audit involvement in reviewing the organisations' Y2K programmes, or more frequent or timely reporting of internal audit results to senior management. Audit also noted that one organisation had not involved its internal audit unit in the Y2K programme because the internal audit unit did not have the necessary expertise.**

Control of system changes after Y2K compliance has been achieved

4.8 New information technology (IT) requirements can introduce Y2K risk into systems that are already Y2K compliant. Therefore, according to the good practice guides, a management policy should be promulgated to allow only system changes that are considered absolutely necessary. This will significantly reduce the chance that errors will be introduced into systems that have already been made Y2K compliant.

4.9 In the five organisations examined, Audit noted that two organisations planned to implement system upgrades in the second half of 1999, and another one was rolling out a redeveloped system in the coming months before year 2000. These organisations assured Audit that they had proper change control procedures in force which would help safeguard Y2K compliance. They also agreed generally with Audit that they should remind users of those computer systems not centrally controlled at the corporate level (e.g. end-user developed systems) to follow the change control procedures.

4.10 In December 1998, the ITSD issued a circular to all government organisations inviting attention to the need to ensure that a Y2K compliant computer system does not become non-compliant as a result of routine system maintenance activities or system enhancements. **To date, most of the Y2K rectification work has been completed. In order to protect the Y2K compliance status, Audit considers it important to remind all government organisations that they need to consider the Y2K implications prior to proposing any new requirements or system changes. They also need to perform thorough Y2K re-testing if system changes are considered unavoidable.**

Y2K readiness of business partners

4.11 To ensure that an organisation's business operation will not be interrupted by the Y2K problems of external parties, an organisation needs to assess the Y2K readiness of its business partners. **In some of the organisations examined, Audit noted that some of their business partners either had not responded to their confirmation letters or were not Y2K compliant. The organisations generally agreed that there was a need to implement a corporate strategy for dealing with these business partners.**

Further audit recommendations to address the common observations

4.12 **In view of the general nature of the above observations, Audit has *recommended* that the Secretary for Information Technology and Broadcasting should remind all government organisations that they should:**

(a) **require their internal audit units to participate actively in their Y2K programmes;**

(b) **require the submission of more frequent and timely internal audit reports to the senior management, so as to allow timely actions to be taken on the reports;**

(c) **consider providing assistance and support to those internal audit units that do not have the necessary expertise in auditing Y2K programmes;**

(d) **for organisations without internal audit units, consider mobilising resources from other parts of the organisations to perform the internal audit function on the Y2K programmes;**

(e) **consider the Y2K implications before proposing any new IT requirements or system changes;**

(f) **if system changes are considered unavoidable, perform thorough Y2K re-testing to mitigate the Y2K risks; and**

(g) **critically review their risks arising from the Y2K non-readiness of their business partners, and implement a corporate strategy for dealing with key business partners who are not Y2K compliant, or who have not responded to the requests for Y2K confirmation.**

Response from the Administration to address the common observations

4.13 In his response of September 1999, the **Secretary for Information Technology and Broadcasting** said that:

The need to involve internal audit in Y2K work (see paragraphs 4.12(a) to (d) above)

(a) he agreed that importance should be accorded to quality assurance in carrying out Y2K compliance work. Internal audit units could play a useful part in this process;

(b) it would be for the bureaux and departments concerned to decide how best they could make use of this resource (if it existed in the organisation) or alternative means to effectively keep track of their Y2K compliance efforts;

(c) in response to Audit's recommendation to provide assistance to those internal audit units which did not have expertise in auditing their organisations' Y2K programmes, the ITBB had organised a joint seminar with Audit on 15 September for this purpose;

Control of system changes after Y2K compliance has been achieved (see paragraphs 4.12(e) and (f) above)

(d) he noted the audit recommendations. The ITSD had all along advised bureaux and departments to ensure that Y2K compliant computer systems would not become non-compliant as a result of routine system maintenance activities or system enhancements;

(e) it was also mandatory for bureaux and departments to include Y2K compliance tests as part of the acceptance tests for all new or upgraded systems; and

Y2K readiness of business partners (see paragraph 4.12(g) above)

(f) in the guidelines on Y2K contingency planning promulgated in May 1999, he had advised bureaux and departments to adequately cover the risks arising from business partners in their contingency plans. The risks posed by business partners who were not Y2K ready or who had not responded to requests for confirmation of their Y2K compliance status should have been assessed in the contingency planning process.

PART 5: GOVERNMENT'S MONITORING OF THE Y2K PROGRAMMES OF NGOs PROVIDING ESSENTIAL SERVICES

5.1 This PART summarises the audit results of the Government's monitoring of the Y2K compliance progress of those NGOs funded or regulated by the Government that provide essential community services.

Background

5.2 Although the sole responsibility for ensuring that an NGO can continue to run its business in year 2000 rests with the NGO, the Government has the responsibility for ensuring that the general community is not adversely affected by Y2K-induced failures. In this regard, the ITBB has directed government organisations to actively monitor the Y2K progress of those NGOs which provide essential services to the public. The key elements of the monitoring mechanisms are described in paragraphs 2.13 to 2.16 above.

Audit examination of Government's monitoring of six selected sectors

5.3 Audit selected six key sectors, namely ***health, energy, aviation, financial services, telecommunications and transport*** for review. Audit examined how the Government had monitored the Y2K progress of these six sectors. The records of five government organisations, mainly policy bureaux, were examined. They were the Economic Services Bureau (ESB), the Financial Services Bureau (FSB), the Health and Welfare Bureau (HWB), the Transport Bureau (TB) and OFTA.

5.4 The audit objective was to assess whether the Government had established proper mechanisms for effectively monitoring the Y2K compliance of NGOs in order to minimise the Y2K risks in those sectors. The audits were conducted during the period May 1999 to July 1999. **The audit findings were reported, as and when they arose, to each individual government organisation to enable it to take early action. Most of the audit recommendations were accepted.** The audit findings are at Appendices I to N below. The main audit observations and recommendations and the Administration's response are summarised in paragraphs 5.5 to 5.10 below.

Monitoring of Y2K compliance progress

5.5 **There is a need for the Government to closely monitor the progress of those NGOs that failed to achieve Y2K compliance by 30 June 1999, and to urge them to expedite their rectification work to avoid further slippage.** Examples of such NGOs are the AA, some NGOs

in the telecommunications sector, a number of tunnel companies and two of the oil/liquefied petroleum gas companies.

Supervisory controls over NGOs

5.6 A monitoring regime which includes a structured approach towards assessing and verifying the progress of the NGOs is necessary to minimise the risk of Y2K-induced failures in essential sectors. Audit recognises that the Government has strengthened its monitoring role since September 1998 through instituting a system whereby NGOs providing essential services have to forward progress reports which have to be signed off by the Chief Executive Officers (CEOs) of the NGOs. Individual government organisations have taken different control measures to ascertain and assess the Y2K readiness of NGOs under their purview. Such measures vary from relying on progress information provided by the NGOs and conducting site visits, to witnessing by government representatives of NGOs' Y2K testing and acceptance. **Notwithstanding the measures taken, Audit considers that there is generally scope for strengthening the Government's monitoring mechanisms. For example, there is a need to require NGOs that are still Y2K non-compliant to provide more information on their action plans. Government organisations need to conduct more on-site visits of these NGOs. There is also a need for intensified action to verify NGOs' reported progress by obtaining and examining supporting evidence such as test plans and test results.**

Independent quality assurance reviews

5.7 There is a need for the Government to encourage NGOs to conduct independent quality assurance reviews of their Y2K programmes and to review the results of the quality assurance reports. This issue is further discussed in PART 6 of this report.

Y2K contingency planning

5.8 There is a need for the Government to urge the NGOs to expedite the completion and testing of their business contingency plans. This issue is further discussed in PART 6 of this report.

Main audit recommendations on Government's monitoring of six selected sectors

5.9 **Audit has *recommended* that the relevant policy bureaux and OFTA should:**

(a) **continue to monitor the Y2K compliance progress of NGOs and urge those NGOs that have not achieved Y2K compliance to expedite their rectification work;**

(b) **strengthen the supervisory controls over NGOs through performing independent verification and validation of selected NGOs' Y2K rectification work;**

(c) **assess the need for, and if necessary conduct, independent quality assurance reviews of NGOs' Y2K programmes;**

(d) **ensure that the NGOs complete the development and testing of their Y2K business contingency plans as early as possible; and**

(e) **coordinate and monitor the formulation and testing of the sector-based contingency plans, and make increased efforts to ensure that adequate tests and drills of the plans are conducted in the remaining days of 1999.**

Response from the Administration

5.10 In their response (mainly in August 1999) to the audit recommendations, the relevant policy bureaux and OFTA had the following comments:

(a) ***Aviation sector.*** The ESB agreed with most of the audit recommendations. It also advised Audit that it had put in place measures to keep track of the AA's Y2K work and would visit the AA to have a better appreciation of the AA's compliance status. It would seek from the AA more information on its contingency planning process;

(b) ***Telecommunications sector.*** OFTA agreed with most of the audit recommendations. It advised Audit that it would continue to monitor the progress of the remaining Y2K non-compliant operators and would arrange on-site visits. It also aimed to complete the evaluation of the NGOs' Y2K test reports by the end of August 1999 and would consider issuing warning letters to those operators who did not submit the necessary information (such as test reports and contingency plans) to OFTA for examination;

(c) ***Health care sector.*** The HWB generally agreed with the audit recommendations. It advised Audit that it would continue to closely monitor the Y2K rectification progress and

would conduct visits to HA hospitals. As at August 1999, the HWB was actively formulating the sector-wide contingency plan in collaboration with relevant parties;

(d) ***Transport sector.*** The TB advised Audit that it would continue to endeavour to ensure the Y2K compliance of the mission-critical systems of the NGOs in the transport sector. The TB would consider the audit recommendations as soon as possible, having regard to its goals and the availability of resources;

(e) ***Energy supply sector.*** The ESB basically agreed with the audit recommendations. It agreed to continue with its efforts, with the EMSD's assistance, to monitor the Y2K compliance progress of the NGOs in the sector and urge those NGOs not yet fully compliant to expedite their Y2K work. It would also encourage the NGOs to conduct independent quality assurance review of their Y2K programmes and would review the results. The ESB had also asked the EMSD to evaluate the contingency plans of the NGOs and to attend drills/testing; and

(f) ***Financial services sector.*** The FSB accepted the audit recommendations and had taken measures to implement them as a matter of priority. As at August 1999, the sector-wide contingency planning work was in progress. The contingency plan would be rehearsed, improved and firmly put in place before year 2000.

5.11 In his response of September 1999, the **Secretary for Information Technology and Broadcasting** said that, while the audit recommendations in paragraph 5.9 were specifically made for consideration by the policy bureaux of the six sectors concerned, he had the following general comments:

— the Steering Committee had been monitoring closely, through policy bureaux, the progress of Y2K compliance work undertaken by NGOs providing essential services; and

— as at September 1999, the great majority of these essential service providers had already completed their rectification work. The Steering Committee would, as it had hitherto, closely monitor the progress of the outstanding rectification work to guard against any delays.

PART 6: IMPORTANT ISSUES AHEAD

6.1 This PART discusses the key issues ahead that the Government should consider in addressing the Y2K problem.

Background

6.2 Notwithstanding the good progress reported in PART 3 above, two key issues will need to be addressed over the coming months in order to minimise the potential disruptions from Y2K-induced failures. These issues are independent quality assurance and contingency planning.

Independent quality assurance mechanism

6.3 An organisation faces many Y2K uncertainties. Therefore, quality assurance is often regarded as an important and integral component of an effective Y2K programme. Quality assurance involves the independent validation and verification of the Y2K rectification and testing work to ensure that the work is complete and accurate and in conformity with the Y2K test plans. According to authoritative overseas good practice guides, such quality assurance is incorporated into essential phases of a Y2K programme. The quality assurance review should be conducted by an independent reviewer.

Overseas practices of quality assurance on Y2K programme

6.4 In the United Kingdom (UK), in order to provide the public with the assurance that there will be "no material disruption" for essential services, the Government set up a company, the "Action 2000" to implement an independent assessment programme throughout the nation, as follows:

— the aim of the independent assessment programme is to ensure that service suppliers' Y2K programmes have been properly carried out, and that claims of millennium readiness are credible;

— the "Action 2000", in close collaboration with the Cabinet Office of the UK, coordinates the overall assessment programme, establishes assessment standards and benchmarks, consolidates information to assess the continuity of essential services, and publishes the overall results as the assessments are completed;

— the independent assessing organisations may be industry experts, consultants, suitably qualified peer organisations, statutory auditors, statutory inspectors or regulatory bodies; and

— 25 sectors have been identified, with each sector having one or more delivery organisations. The "Action 2000" has identified a responsible body for each sector to

commission the assessment programme, assess the state of preparedness and disclose and publish the results at the sector level.

6.5 In the United States (US), all federal agencies are required to independently verify and validate Y2K testing results. No system is deemed to be compliant until it has been thoroughly tested. The agencies rely on their inspectors general, contractors and, in some cases, independent experts from other agencies to verify independently the test results. Such independent verification strategy would involve the review of an agency's Y2K compliance progress to:

— assess whether the agency has developed and is implementing a comprehensive and effective Y2K programme;

— provide an independent assessment of the agency's Y2K compliance reports to the Office of Management and Budget (OMB);

— assess whether the agency has a reasonable and comprehensive testing approach; and

— assess the completeness and reasonableness of the agency's business continuity and contingency planning.

Quality assurance reviews in Hong Kong

6.6 In its Report of February 1999, the PAC expressed concern that there was no independent and impartial input in assessing the progress of Y2K programmes in government organisations and that certification of progress by independent professionals had not been arranged (see paragraph (f) in Appendix A).

6.7 The ITBB and its three technical support departments, namely the ITSD, the EMSD and OFTA, recognise the need for conducting independent quality assurance reviews. Audit noted that some forms of quality assurance reviews had been performed on various activities of the Government's Y2K programmes. The following are examples:

ITSD's Y2K rectification work on government computer systems

(a) there is a standing quality assurance process for major computer projects. This process is applicable to major Y2K rectification work handled by the ITSD. In this process, Y2K rectification work performed by ITSD staff has to be reviewed by a second independent team of IT professionals within the department;

(b) in March 1999, the ITSD issued guidelines on quality assurance reviews to bureaux and departments. Bureaux and departments are encouraged to conduct quality assurance reviews as appropriate in their Y2K rectification work on all mission-critical computer systems;

(c) in April 1999, the ITSD set up a Y2K Task Force to conduct a third party assessment on the Y2K programmes of government departments. Up to May 1999, the Task Force had visited eleven IT-intensive departments. In its visits, the Task Force reviewed a number of areas including management involvement, project monitoring, and procedures for Y2K assessment, testing and rectification;

EMSD's Y2K rectification work on government embedded systems

(d) in October 1998, the EMSD commissioned two consultancy studies on its Y2K work. In one study, the consultants were required to conduct an audit of the Y2K work in a number of selected critical venues. In the other study, the consultants were required to review the EMSD's quality assurance procedures for its Y2K work; and

Independent quality assurance reviews conducted on specific areas by external consultants

(e) some government organisations have commissioned external consultants to assess specific aspects of their Y2K programmes. For example:

(i) the Imm D engaged a consultant to conduct a Y2K compliance review of all the building services systems installed at the Imm D's Headquarters and at the computer rooms of ten immigration control points;

(ii) in April 1999, the ITSD commissioned a contractor to review the Y2K risk assessment and contingency planning for its Central Computer Centre. This included an independent review of the adequacy of the Centre's Y2K rectification and testing plans;

(iii) in June 1998, as part of a service contract, an independent reviewer reviewed the service provider's rectification work on the HD's computer applications; and

(iv) in response to Audit's recommendation, the Police engaged in August 1999 a police expert from the UK to conduct an overall independent quality assurance review of its Y2K programme, including its Y2K contingency plan.

6.8 For NGOs that provide essential services to the public, Audit noted that the Government had taken various measures to obtain some independent assurance on the quality of the NGOs' Y2K work. For example:

(a) in the energy supply sector, the EMSD visited the two electricity companies and the gas company once in 1998 and again in 1999. It also visited the five oil and liquefied petroleum gas companies in May 1999. During the site visits, the NGOs presented their

Y2K programmes. Some NGOs demonstrated to the EMSD how their systems were tested;

(b) in the financial services sector, in April 1999, the FSB commissioned a consultant to review the adequacy of the Y2K external testing activities for the major shared financial systems in the sector;

(c) in the health care sector, the Department of Health (DH), as the authority for issuing hospital licences, inspected the private hospitals during the annual licence renewal exercise in 1998 and conducted follow-up visits in May 1999. It also advised the private hospitals to employ external consultants to validate their Y2K compliance work;

(d) in the aviation sector, in order to monitor the Y2K programme of the AA on 19 major systems that related to aerodrome licensing and security, the CAD required the AA to submit documents such as test plans, test results and contingency plans for review. The CAD representatives witnessed the AA's Y2K tests on these systems;

(e) other NGOs (e.g. banks and power companies) have employed consultants to conduct independent quality assurance reviews of their Y2K programmes; and

(f) since March 1999, the ITBB Y2K Task Force (see paragraph 2.16 above) has paid on-site visits to selected NGOs to obtain a better understanding of their Y2K compliance progress and to ensure that their compliance procedures are consistent with the best practice in the industry.

Audit observations on independent quality assurance

6.9 As can be seen in paragraphs 6.4 and 6.5 above, the UK and US governments have adopted a very structured approach to obtaining independent quality assurance for their Y2K programmes. The structured approach adopted by these governments has enabled a systematic and rigorous independent assessment of Y2K compliance work across essential service providers.

6.10 In Hong Kong, the approach is not entirely structured. While bureaux and departments are encouraged to conduct quality assurance reviews as appropriate (see paragraph 6.7 (b) above), there is no clear requirement for independent quality assurance reviews to be conducted within organisations and across essential service providers. There is also no clear requirement for reporting the review results to the ITBB or to the policy bureaux of the respective sectors (i.e. the monitoring bodies). **To provide the Government and the public with added assurance on Hong Kong's Y2K readiness, Audit considers that there is an urgent need for the ITBB to critically review the existing independent quality assurance programmes to assess if further work needs to be done in the remaining days of 1999.**

6.11 It is worth noting that a main objective of the independent assessment programme in the UK is to ensure that claims of millennium readiness are credible (see the first inset of

paragraph 6.4 above). In the US, the independent verification strategy would involve the review of an agency's progress to provide an independent assessment of the agency's compliance reports to the OMB (see the second inset of paragraph 6.5 above). In Hong Kong, the ITBB's assessment of the monthly status of the government organisations and NGOs is to a large extent based on the organisations' self-reported information. **To obtain added assurance, the ITBB needs to consider obtaining and examining supporting evidence (e.g. test plans and test results) of the organisations' reported progress, whenever practicable. The ITBB also needs to consider setting up a mechanism for overseeing the performance of independent verification of the organisations' reported progress.**

6.12 Furthermore, with the mission-critical systems largely rectified, organisations are necessarily shifting the focus of their Y2K efforts from rectification to planning for contingencies (see paragraphs 6.14 to 6.22 below) in the remaining months to year 2000. **Audit considers that, in assessing the need for independent quality assurance, it is important for the ITBB to accord high priority to the quality assurance of contingency planning.**

Audit recommendations on independent quality assurance

6.13 **Audit has *recommended* that the Secretary for Information Technology and Broadcasting should:**

(a) **critically review whether a more structured approach should be adopted for conducting independent quality assurance reviews and result reporting;**

(b) **take the lead to assess the existing position. This should include taking stock, and critically assessing the adequacy, of the existing independent quality assurance programmes in government organisations and NGOs providing essential services;**

(c) **for those organisations which are found to have inadequate independent quality assurance programmes, take action to strengthen their programmes as far as possible in the remaining days of 1999;**

(d) **if time or resources do not permit the establishment of an overall independent assurance programme, consider focusing independent quality assurance efforts on Y2K contingency planning in the remaining days of 1999; and**

(e) **as far as possible, consider obtaining and examining supporting evidence (e.g. test plans and test results) of the organisations' reported progress and consider setting up a mechanism for overseeing the performance of independent verification of the reported progress.**

Business continuity and contingency planning

6.14 Notwithstanding an organisation's efforts to thoroughly renovate, validate and implement Y2K compliant systems, the potential exists that systems will not operate as expected and the

organisation may still face disruptions to their business processes. Furthermore, given the high degree of interdependencies among organisations, the risk of failure is not limited to one organisation alone. For example, every organisation depends on services provided by the public infrastructure service providers, e.g. power, water, transportation, and data and voice telecommunications. It is imperative that government organisations and NGOs develop business continuity and contingency plans which safeguard their ability to produce a minimum acceptable level of output and services in the event of failures of internal or external mission-critical systems and services. While it does not offer a long-term solution to Y2K-induced failures, it will help an organisation prepare for a potential crisis, and may facilitate the restoration of normal service at the earliest possible time in the most cost-effective manner.

The Y2K business continuity plan

6.15 According to authoritative good practice guides, Y2K business continuity planning consists of the following phases:

Initiation	Establish a business continuity project work group and develop a high level business continuity planning strategy. Develop master schedule and milestones, and obtain executive support. Implement quality assurance reviews.
Business Impact Analysis	Assess the potential impact of mission-critical system failures on the organisation's core business processes. Define Y2K failure scenarios, and perform risk and impact analyses of each core business process. Assess infrastructure risks, and define the minimum acceptable levels of outputs for each core business process.
Contingency Planning	Identify and document contingency plans and implementation modes. Define triggers for activating contingency plans, and establish a business resumption team for each core business process.
Testing	Validate the agency's business continuity strategy. Develop and document contingency test plans. Prepare and execute tests. Update disaster recovery plans and procedures.

Audit observations on business continuity and contingency planning

6.16 As shown in paragraph 6.15 above, to properly prepare an effective business contingency plan requires substantial efforts and resources from an organisation. Therefore, it is important that organisations commence their contingency planning as early as possible. In April 1999, Audit noted that the ITBB, as the leading government body tasked with the responsibility for tackling the Y2K risks, was still in the process of drafting guidelines for government organisations and NGOs on the issue of Y2K contingency planning. In late April 1999, Audit urged the ITBB to

expeditiously issue clear guidelines to assist government organisations and NGOs in their Y2K contingency planning.

6.17 In May 1999, the ITBB finally issued guidelines on contingency planning for government organisations. The ITBB specified in the guidelines key components of the plans, including risk assessment, rollover plans, communication strategy, acceptable levels of degraded performance, resources required and key milestones for completion of the plans. According to the guidelines, organisations should complete their contingency plans by **15 July 1999** and have them fully tested by **15 August 1999.**

6.18 On enquiries in August 1999, the ITBB advised Audit that in taking forward the Y2K programme, the Government's plan was to first focus on the rectification of mission-critical systems. As the objective of Y2K contingency planning was to address residual risks, a realistic assessment of the risks faced by bureaux and departments must have regard to their own rectification progress and that of their business partners. In view of the Government's June 1999 target for completing rectification for mission-critical systems and the essential service providers' general progress in their rectification work, the promulgation of the guidelines on Y2K contingency planning in May 1999 was considered timely. The ITBB also advised Audit that the deadline of 15 July 1999 for bureaux and departments to submit their organisational contingency plans allowed them to take into account their compliance status as at the end of June 1999 before finalising their contingency plans. As bureaux and departments modelled their Y2K contingency plans on their existing business contingency plans, the deadline of 15 July was not unduly tight.

6.19 Some government organisations missed the deadline of 15 July 1999 set by the ITBB for the completion of their Y2K contingency plans. By the end of August 1999, the ITBB had received the Y2K contingency plans from all government organisations. However, Audit is concerned that some government organisations have delayed in their development of Y2K contingency plans. **Audit considers that there is a need for the ITBB to ensure that these organisations catch up with the remaining work (e.g. testing and drills) on their contingency plans as soon as possible and have their plans thoroughly validated before year 2000. It is also necessary for the ITBB to remind organisations to continue to update their contingency plans to take into account newly identified risks.**

6.20 Testing of the contingency plans is extremely important as it ensures that the plan is workable. An independent quality assurance review of the plan is also important because it helps ensure that the plan is complete and adequate, and that potential Y2K-induced risks have been identified and addressed. **For the reason given in paragraph 6.12 above, Audit considers that there is a need for the ITBB to accord high priority to the quality assurance of contingency planning.**

6.21 In May 1999, the ITBB issued a set of guidelines to all policy bureaux to assist them in assessing the adequacy of the Y2K contingency plans of NGOs under their purview. Audit notes the ITBB's efforts in this regard. **Audit considers it necessary for the ITBB to set up a mechanism for assessing the quality of contingency plans submitted by government organisations using similar guidelines.**

6.22 **It is the ITBB's target to produce a territory-wide contingency plan by September 1999. As at early September 1999, the ITBB was finalising the plan. Audit considers it necessary for the ITBB to expedite its action in preparing and validating the territory-wide contingency plan. Close liaison with key government organisations and NGOs is necessary to ensure coherence of the territory-wide plan with lower level contingency plans (e.g. plans at the sector level and organisation level).**

Audit recommendations on business continuity and contingency planning

6.23 **Audit has *recommended* that the Secretary for Information Technology and Broadcasting should:**

(a) **continue to monitor the progress of the testing of the contingency plans in major government organisations (in particular, those organisations that have missed the deadline in their development of the Y2K contingency plans) and in NGOs to ensure that the plans are workable;**

(b) **remind government organisations and NGOs to continue to update their contingency plans to take into account newly identified risks;**

(c) **set up a mechanism for assessing the quality of contingency plans submitted by government organisations, using guidelines similar to those used for assessing the NGOs' contingency plans;**

(d) **expedite action in preparing and validating the territory-wide contingency plan; and**

(e) **continue to liaise closely with key government organisations and NGOs to ensure that the territory-wide contingency plan is coherent and consistent with lower level contingency plans (e.g. plans at the sector level and organisation level).**

Response from the Administration

6.24 In his response of September 1999, the **Secretary for Information Technology and Broadcasting** said that:

Independent quality assurance (see paragraphs 6.3 to 6.13 above)

(a) he noted the approach adopted by the UK and US governments to obtaining quality assurance. The approach adopted by these governments was one possible way to address the issue of quality assurance, but not the only one;

(b) in formulating the Government's approach to Y2K compliance work, the ITBB had accorded importance to ensuring that all mission-critical systems, which were Y2K non-compliant, were identified and rectified in a timely and effective manner;

(c) the fact that not every government bureau or department had engaged external assistance to provide quality assurance reviews of its Y2K programme was by no means a reflection of a haphazard approach. Rather, it was the outcome of careful consideration by individual bureaux and departments of the need for such external assistance, having regard to their in-house capabilities to tackle the Y2K problem, the technical support provided by the ITSD/EMSD/OFTA and the criticality of their systems;

(d) the ITBB's preferred approach was a pragmatic one and had achieved sound results, as borne out by the international recognition of Hong Kong's satisfactory overall Y2K readiness (Note 7);

Business continuity and contingency planning
(see paragraphs 6.13(d) and 6.14 to 6.23 above)

(e) all government bureaux and departments would have completed the testing of their organisational Y2K contingency plans by the end of September 1999. In the guidelines on Y2K contingency planning, the ITBB had asked bureaux and departments to keep their contingency plans under review and to update them as necessary to take into account new risks identified;

(f) on quality assurance for Y2K contingency planning (see paragraph 6.13(d) above), the ITBB considered that, having regard to the imminence of the millennium rollover and the practical problems of engaging external consultants to effectively conduct quality assurance reviews of such contingency plans (e.g. unavailability of experts or the need to familiarise consultants with the operations of the organisations or sectors concerned), the best approach was to conduct tests and drills of these contingency plans by the Government itself;

Note 7: *Audit considers that the ITBB's approach lacks central coordination and is not entirely structured. There is no clear requirement for independent quality assurance reviews to be conducted by government organisations and NGOs and for reporting the review results. In comparison, the approach adopted by the UK and US governments in this respect is structured and a structured approach would provide added assurance to the Government and the public on Hong Kong's Y2K readiness. The audit observations and recommendations, mentioned in paragraphs 6.9 to 6.13 above, are intended to address this issue.*

(g) between September and November 1999, the Government would be conducting a series of tests, ranging from desk-top and command post exercises to territory-wide testing to ensure that the contingency plans at different levels adequately covered residual Y2K risks and that people involved in the implementation of such plans were conversant with their responsibilities when an emergency response was called for; and

(h) in drawing up the territory-wide contingency plan, the ITBB was working very closely with the 13 essential services sectors which encompassed all essential service providers both within and outside the Government. One of the ITBB's aims was to secure smooth coordination among individual service providers within the sector.

PART 7: Y2K READINESS OF SMALL AND MEDIUM ENTERPRISES

7.1 This PART examines the progress of small and medium enterprises (SMEs) in tackling the Y2K problem and the Government's support to them.

Background

7.2 In its Report of February 1999 (see item (e)(ii) in Appendix A), the PAC urged the ITBB to consider providing additional support to the private sector, particularly SMEs.

7.3 The ITBB has been working with the Hong Kong Productivity Council (HKPC) and various trade and industrial associations to enhance the Y2K awareness among the SMEs and provide assistance to them in resolving the problem. Various facilities have been provided to support SMEs in the private sector, such as:

— setting up the Y2K service centre which provides Y2K-related consultancy services, technical advice and support to businesses at cost;

— providing a Y2K helpline to answer public enquiries on the Y2K problem; and

— providing a "888 Bug-buster Programme" which provides practical assistance in Y2K compliance assessment and identification of appropriate rectification solutions on a non-profit making basis.

7.4 The ITBB and the HKPC jointly organised various Y2K publicity campaigns to disseminate to the business sector the Y2K compliance progress of essential service providers. SMEs were also urged to follow the lead of the essential service providers in proceeding quickly with their Y2K rectification.

HKPC's Y2K surveys

7.5 In order to keep track of the SMEs' progress in solving the Y2K problem, the HKPC conducted three surveys of the Y2K impact in Hong Kong during the period 1997 to 1999. The latest survey was conducted in mid-1999 which indicated that:

(a) the public awareness of the Y2K problem was very high and most organisations were aware of the impact of the Y2K problem;

(b) 83% of the Y2K affected organisations had undertaken Y2K projects to tackle the problem and most of them would complete the projects before the end of 1999;

(c) difficulties faced by the organisations included "lack of technical experts", "lack of manpower" and "lack of budget";

(d) nearly half of the organisations had no intention to assess the Y2K readiness of their business partners; and

(e) nearly 60% of the organisations had not developed their Y2K contingency plans.

7.6 Although the HKPC's survey shows significant progress in the SMEs' Y2K preparedness, the survey also indicates that some SMEs might have overlooked the importance of contingency planning and conducting Y2K assessment of business partners.

7.7 To promote the importance of contingency planning, the HKPC has been conducting seminars on the subject since March 1999. The HKPC also issued a guidebook on Y2K contingency planning in July 1999.

Audit observations and recommendations on the Y2K readiness of SMEs

7.8 **Audit notes with concern that some SMEs may have overlooked the importance of contingency planning and the assessment of the Y2K readiness of business partners.**

7.9 **Audit has *recommended* that the Secretary for Information Technology and Broadcasting, in collaboration with the HKPC, should:**

— **intensify the Government's efforts in promoting the importance of contingency planning and the assessment of the Y2K readiness of business partners; and**

— **continue to monitor the Y2K preparedness of the SMEs and provide them with necessary assistance in tackling the Y2K problem.**

Response from the Administration

7.10 In his response of September 1999, the **Secretary for Information Technology and Broadcasting** said that he noted Audit's recommendations which accorded with his current work plan.

Chapter 4 of the PAC's Report No. 30 on the Year 2000 Problem (February 1999)

In paragraph 18 of Chapter 4, the PAC made the following conclusions and recommendations. The PAC:

(a) noted that if the Y2K problem was not handled properly, there might be catastrophic impact on the community;

(b) expressed concern that despite the seriousness of the implications of the Y2K Problem, the Government's Steering Committee on Year 2000 Compliance was only set up in March 1998;

(c) urged the Secretary for Information Technology and Broadcasting, in consultation with the Director of Information Technology Services, to:

(i) proactively assist government organisations which are behind schedule to ensure that their mission-critical systems and equipment are Y2K compliant by the deadline;

(ii) continue to monitor the progress and effectiveness of the whole-of-government Y2K compliance, accelerate the pace of compliance and ensure that government organisations will meet the strict target of completing all Y2K work by mid-1999;

(iii) take all measures, including the development of contingency plans and testing of the plans, to ensure that the Government's key services and operations will continue to function properly and smoothly in year 2000;

(iv) include all the essential service providers, which are funded and regulated by the Government such as the HA and the AA, into the whole-of-government Y2K programme so as to ensure that they are also Y2K compliant by mid-1999; and

(v) in view of the substantial amount of expenditure to be incurred, closely monitor the use of Y2K funding to ensure that the principles of economy, efficiency and effectiveness are being observed;

(d) expressed serious concern that, prior to the establishment of the ITBB in April 1998, the Government had failed to address the Y2K problem in the private sector in a comprehensive, coordinated and systematic manner;

(e) urged the Secretary for Information Technology and Broadcasting to:

(i) strengthen the Government's role in educating the public to comprehend and manage the Y2K Problem;

(ii) consider providing additional support to the private sector, particularly small and medium-sized enterprises;

(iii) review and, if necessary, strengthen the existing regulatory control to ensure that essential service providers in the private sector are Y2K compliant; and

(iv) develop a counterparty assessment framework for the interface testing of essential service providers and to formulate contingency plans in order to avoid major disruptions to the community;

(f) expressed concern that there was no independent and impartial input in assessing the progress of Y2K programme in government organisations and that certification of progress by independent professionals had not been arranged; and

(g) requested the Secretary for Information Technology and Broadcasting to submit to the Committee by mid-1999 at the latest a report which should include:

(i) the overall assessment of Y2K compliance progress in both government organisations and the private sector and the remedial actions to be taken; and

(ii) a full list of essential service providers and information on whether their Y2K programmes have been fully tested and on their contingency plans put in place.

THE INFORMATION TECHNOLOGY SERVICES DEPARTMENT

INTRODUCTION

1. The ITSD assists the ITBB in coordinating the Government's Y2K programme and acts as a **technical adviser** to help government organisations ensure Y2K compliance of their computer systems. Audit conducted a review in July 1999 to assess whether the ITSD has established an effective mechanism for ensuring the Y2K compliance of computer systems in the Government. The following is a summary of the audit observations, recommendations and the Administration's response.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

Y2K rectification progress of mission-critical computer systems

2. Audit noted that, as at 30 June 1999, of the Government's 454 non-compliant mission-critical computer systems, 450 had already been rectified and 3 were classified as tolerable or could be dealt with by clock-reset. The only one mission-critical system that had not been rectified was the Regional Council's Computerised Booking System (RCCBS). The expected compliance date of this system was October 1999. The Regional Services Department (RSD) has drawn up a Y2K contingency plan and conducted testing of the plan. As this system is not maintained by the ITSD, the RSD is responsible for the rectification work. **Audit has *recommended* that although the ITSD is not directly responsible for the rectification work, as the Government's IT adviser, it should closely monitor the rectification progress of the RCCBS project and, if necessary, provide advice and assistance to the RSD to avoid further slippage.**

3. According to the June 1999 Y2K status reports furnished by bureaux and departments, a total of 42 mission-critical computer systems would be retired or redeveloped before starting to process dates beyond 31 December 1999. Mission-critical operations will be affected if the replacement systems are not available on time. **Audit has therefore *recommended* that the ITSD should closely monitor the implementation progress and, where delays are observed, take follow-up actions with the bureaux and departments to ensure that the replacement systems are in place as early as possible.**

Y2K rectification progress of non mission-critical computer systems

4. Audit noted that as at 15 June 1999, of the Government's 887 non mission-critical computer systems, 646 had already been rectified and 166 were classified as tolerable or could be dealt with by clock-reset. The rectification work of 75 non mission-critical computer systems had yet to be completed. Although these systems are not mission-critical, their failures will still cause inconvenience and additional work to the departments concerned. **Audit has *recommended* that the ITSD should make continued efforts to support bureaux and departments on the Y2K rectification work of non mission-critical computer systems, in order to achieve compliance before year 2000.**

5. In addition, Audit noted that 89 non mission-critical systems would be retired or redeveloped before starting to process dates beyond 31 December 1999. **Audit has *recommended* that the ITSD should closely monitor the implementation progress of the replacement systems to ensure that the systems are in place before year 2000.**

Site visits by the ITSD Y2K Task Force

6. In April 1999, the ITSD set up a Y2K Task Force to conduct a third party assessment of the comprehensiveness and effectiveness of departments' Y2K programmes. Eleven departments were selected for visit by the Task Force on the grounds that they provide essential services to the public through the use of mission-critical computer systems. The departments were: the Inland Revenue Department, the Civil Aviation Department, the Fire Services Department, the Hong Kong Police Force, the Immigration Department, the Radio Television Hong Kong, the Social Welfare Department, the Transport Department, the Water Supplies Department, the RSD and the Urban Services Department. The visits were completed in May 1999.

7. In June 1999, the ITSD advised the departments that they should rectify the inadequacies noted by the Y2K Task Force before the end of June 1999. Audit noted that, up to mid July 1999, only the Urban Services Department had given its written response to the ITSD. **Audit has *recommended* that the ITSD should follow up with the departments to ensure that proper actions have been taken to rectify the inadequacies identified during the visits.**

8. The objective of the ITSD's third party assessment was to ensure that departments had performed their Y2K rectification work thoroughly and properly. **Audit has *recommended* that the ITSD should conduct a post-implementation review of the third party assessment**

programme. In the post-implementation review, the ITSD should assess whether the programme has been successful and, if not, what further work has to be done. The ITSD should also assess whether, in addition to the eleven abovementioned departments, more departments need to be visited in order to provide an adequate coverage.

9. Audit also noted that some of the observations made by the Y2K Task Force were common to a number of the departments visited. These included: the need to tighten up the system change control procedures; the need for conducting independent quality assurance reviews; and the need to check the Y2K readiness of business partners. **Audit has *recommended* that the ITSD should consider disseminating these observations to bureaux and departments not visited by the Y2K Task Force. This would help them improve their Y2K programmes.**

Y2K risk assessment and contingency planning for the ITSD Central Computer Centre

10. As a service provider, the ITSD provides computing services to some 20 government departments via its Central Computer Centre (CCC). In April 1999, the ITSD engaged an information management company (the contractor) to conduct a Y2K risk assessment and contingency planning for the ITSD CCC. The contractor made more than 80 recommendations to the ITSD to tackle the potential Y2K risks and to help the ITSD continue the operation of the CCC in the event of a Y2K failure. These recommendations included: the setting up of an ITSD CCC Command Centre; the preparation of the CCC's preventive action plan and Y2K transition action plan; the conduct of Y2K disaster recovery drill; the performance of end-to-end integrated system testing; and the maintenance of a centralised repository of Y2K documentation.

11. Based on the proposed contingency plan produced by the contractor, the ITSD prepared a business contingency plan for the CCC. The contingency plan was incorporated into the ITSD's Y2K Master Business Contingency Plan which was forwarded to the ITBB in mid July 1999.

12. In the remaining months of 1999, the ITSD would need to implement the contractor's recommendations and subject the contingency plan to further testing. **Audit has *recommended* that the ITSD should ensure the timely implementation of the contractor's recommendations, so as to minimise the risk and impact of Y2K-induced failures. The ITSD should pay particular attention to the establishment of an ITSD CCC Command Centre which helps the**

ITSD handle the special set of circumstances that are likely to emerge during the period surrounding the change of the millennium.

13. Apart from the ITSD CCC, there are other computer centres being operated by various government departments (e.g. the Inland Revenue Department and the Urban Services Department). **Audit has *recommended* that the ITSD should disseminate the contractor's recommendations to the other government computer centres for their information and action. The ITSD should find out from the departments concerned whether they need the ITSD's support and assistance in conducting similar reviews on the Y2K work and contingency plans of their computer centres.**

Independent quality assurance

14. Quality assurance is often regarded as an integral component of an effective Y2K programme. According to the authoritative good practice guides, quality assurance reviews should be incorporated into the essential phases of a Y2K programme. The quality assurance reviews should be conducted by an independent reviewer.

15. Audit noted that, following its visits to eleven selected departments in May 1999, the ITSD Y2K Task Force had raised concern on the quality assurance issue with six departments. These departments either had not included quality assurance in their Y2K rectification work or had not arranged for an independent team to conduct the quality assurance review. **Audit has *recommended* that the ITSD should urge bureaux and departments to conduct independent quality assurance reviews on their Y2K programmes.**

RESPONSE FROM THE ADMINISTRATION

16. In his response of August 1999, the **Director of Information Technology Services** accepted most of the audit recommendations. With regard to the replacement of non mission-critical computer systems, he said that instead of monitoring the implementation progress, the ITSD would encourage bureaux/departments to replace those systems as soon as possible (see paragraph 5 above).

THE ELECTRICAL AND MECHANICAL SERVICES DEPARTMENT

INTRODUCTION

1. The EMSD assists the ITBB in coordinating the Government's Y2K programme and acts as a **technical adviser** to help government organisations ensure Y2K compliance of the embedded systems. In June 1999, Audit conducted a review of the EMSD's management of the Y2K compliance of embedded systems in the Government. The following is a summary of the audit observations, recommendations and the Administration's response.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

Inventory of embedded systems

2. Audit noted that the number of mission-critical embedded systems in the Government had increased from 3,190 (of which 230 were Y2K non-compliant) in June 1998 to 5,089 (of which 267 were Y2K non-compliant) in June 1999. The EMSD advised Audit that the majority of the changes occurred between June and December 1998 due to government departments' increased awareness of the Y2K problem and better understanding of the criticality classification.

3. The completeness and accuracy of the inventory, upon which rectification work is based, are crucial to the success of the EMSD's Y2K programme. The fact that the number of mission-critical embedded systems requiring Y2K attention has kept on changing, even in 1999, is a cause for concern that warrants particular attention. **Audit has *recommended* that the EMSD should take immediate action to ensure that its inventory of government embedded systems is complete and accurate. This may include advising departments to conduct internal audit reviews on their inventory and take action to ensure that all embedded systems have been identified.**

Y2K rectification progress of non-compliant mission-critical embedded systems

4. Audit noted that, by August 1999, of the 267 non-compliant mission-critical embedded systems, the EMSD reported that 262 systems had been rectified (or classified as tolerable/could be dealt with by clock resetting). The remaining five systems were scheduled to be rectified in the second half of 1999. **Given the late completion dates planned for these systems (e.g. the**

planned completion date of one system is as late as October 1999), there is very little time left for dealing with unexpected problems. Audit has *recommended* that the EMSD should closely monitor the situation to avoid further project slippage, and should ensure that proper contingency plans are available to support the business operations of user departments.

The EMSD's audit on Y2K work of critical venues

5. In October 1998, the EMSD commissioned a consultant to conduct an audit on the Y2K work in a number of selected critical venues. After the consultancy study, the EMSD used similar methodologies to audit additional critical venues. However, as at June 1999, Audit noted that of a total of 92 critical venues earmarked for audit, only 57 (62%) had been audited (Note 1). No target completion dates had been set for the audits of the remaining venues. Furthermore, the audit reports for a significant percentage (39%) of the 57 critical venues audited were still outstanding. **Audit has *recommended* that the EMSD should monitor closely the progress of the audits of critical venues and the timely submission of the audit reports.**

The EMSD's implementation of a higher quality standard for Y2K work

6. ***The need for detailed implementation plan.*** In another consultancy study, also commissioned in October 1998, the consultant recommended applying a higher quality standard to enhance the quality of the EMSD's Y2K work and to provide an adequate level of auditability. In April 1999, the EMSD Steering Committee, chaired by the Director of Electrical and Mechanical Services, accepted this recommendation. The EMSD Steering Committee required the Divisions within the EMSD to reassess the criticality of their critical systems in order to draw up a list of "super-critical" systems, where the quality of the Y2K work would be enhanced to meet the new quality standard. Audit noted that, up to June 1999 (i.e. the time of this audit review), the EMSD had not developed a detailed implementation plan for submission to the EMSD Steering Committee. **Audit has *recommended* that the EMSD should draw up a detailed action plan for the timely implementation of the higher quality standard.**

7. ***The need for clarification of intention.*** From the EMSD's records, it was not entirely clear whether the EMSD intended the new quality standard to be applicable also to those embedded

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Note 1: *The 92 critical venues included 68 priority one venues and 24 priority two venues. As at June 1999, 71% of the priority one venues and 38% of the priority two venues had been audited.*

systems maintained by the departments themselves. **Audit has *recommended* that the EMSD should clarify its intention and, having regard to quality assurance programmes in the departments, review the need to extend the EMSD's quality assurance programme to include those embedded systems not maintained by the EMSD.**

8. ***Other mission-critical systems.*** Audit further noted that the EMSD had focused its quality assurance efforts on the super-critical systems. By definition, all mission-critical systems are important because their failure would affect the provision of critical services to the public. **Audit has therefore *recommended* that the EMSD should critically review whether the higher quality standard should also be extended to the Y2K work on all mission-critical embedded systems (in addition to the super-critical systems).**

Special internal audit team

9. In addition to the above initiatives (i.e. the audit of critical venues and the implementation of higher quality standard), the EMSD Steering Committee decided in April 1999 that an internal audit be undertaken to ensure that there was adequate Y2K work and auditable documentation of Y2K effort for the embedded systems maintained by the EMSD. The Steering Committee decided that the internal audit, targeted to be completed in August 1999, should focus on reviewing the super-critical systems and the audit reports of the critical venues. A special internal audit team, headed by a Senior Engineer, was formed to perform the task. Audit noted that no detailed implementation plan had been submitted to the EMSD Steering Committee for monitoring the progress of the internal audit. **Audit has *recommended* that the EMSD should work out a detailed implementation plan to monitor the work of the internal audit team.**

Government systems under entrustment agreements with the AA

10. ***The need to compile full inventory.*** According to the EMSD's records, there were five entrustment agreements under which government departments had entrusted works (with embedded systems) in the Hong Kong International Airport to the AA. Under one of the five entrustment agreements, 152 embedded systems have been identified as mission-critical to the operations of eleven government departments in the airport. Audit noted from the EMSD's records that, as at June 1999, a full inventory of embedded systems pertaining to the other four entrustment agreements had not yet been drawn up. **Audit has *recommended* that, in order to conduct impact assessment and contingency planning, the EMSD should compile urgently an inventory of such systems and ascertain the status of their Y2K readiness.**

11. ***The need to conduct verification tests.*** With regard to the 152 systems which have been identified as mission-critical, the AA has informed the EMSD of their Y2K compliance status. During the course of audit, Audit made enquiries as to whether independent verification had been performed on these systems. The EMSD assured Audit that the necessary verification work for all the 152 systems had been completed and the departments concerned duly informed. For example, for those systems which were tailor-made for the dedicated use of government departments, the AA had conducted verification tests and submitted reports to the Government. All such verification tests were witnessed by the EMSD and the client departments.

Y2K contingency planning

12. As at June 1999, the EMSD was in the process of developing its Y2K contingency plans. The plans were still subject to test, amendment, retest and adoption. **Audit has *recommended* that the EMSD should continue with its efforts on contingency planning to help departments ensure the continuity of their mission-critical operations.**

RESPONSE FROM THE ADMINISTRATION

13. In his response in August 1999, the **Director of Electrical and Mechanical Services** said that:

(a) ***Inventory of embedded systems (see paragraph 3 above).*** As the central coordinator of the inventory of the Government's embedded systems, he would offer advice in order to better align the classification across departments. Nevertheless, he had to respect client departments' decision if they wished to reclassify the criticality of their equipment based on their operational requirements. He was confident that the inventory of critical embedded systems was complete. Nevertheless, he would request departments to recheck their inventory and inform the EMSD of any new findings as soon as possible;

(b) ***Non-compliant mission-critical embedded systems (see paragraph 4 above).*** For the remaining five systems, the EMSD would closely monitor their Y2K rectification work in the next few months to prevent further delay. Contingency measures for these five systems were already in place and had been tested to be viable;

(c) ***Audit of the Y2K work of critical venues (see paragraph 5 above).*** The EMSD would strengthen its internal audit programme in the coming months;

(d) ***The implementation of a higher quality standard (see paragraph 6 above).*** The EMSD had planned to complete the enhanced Y2K work and have the work reviewed by the internal audit team before September 1999;

(e) ***Embedded systems not maintained by the EMSD (see paragraph 7 above).*** The EMSD had little technical information on those systems. The EMSD could recommend the departments concerned to arrange for these systems to be audited by external consultants. Meanwhile, the EMSD would send the recommended quality assurance procedures to the departments for their attention;

(f) ***Other mission-critical systems (see paragraph 8 above).*** He would review and strengthen, if necessary, the Y2K work on mission-critical embedded systems other than the super-critical systems. Samples would be checked by the internal audit team to monitor compliance with the higher quality standard;

(g) ***Special internal audit team (see paragraph 9 above).*** The progress of the internal audit and implementation details were reported to the EMSD Steering Committee in July 1999. The programme was targeted for completion by October 1999;

(h) ***Government systems under entrustment agreements with the AA (see paragraph 10 above).*** Very few embedded systems were involved under the other four entrustment agreements with the AA and the systems were not mission-critical; and

(i) ***Y2K contingency planning (see paragraph 12 above).*** The EMSD would continue to offer advice and support to departments on contingency planning.

THE OFFICE OF THE TELECOMMUNICATIONS AUTHORITY

INTRODUCTION

1. OFTA assists the ITBB in coordinating the Government's Y2K programme and acts as a **technical adviser** to help government organisations ensure Y2K compliance of their line communication systems. Audit conducted a review in May 1999 of OFTA's management of the Y2K compliance of line communication systems in the Government. The following is a summary of the audit observations, recommendations and the Administration's response.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

Independent validation of suppliers' Y2K compliance statements

2. OFTA started in March 1998 to compile an inventory of line communication systems in the Government. To ascertain the Y2K compliance status of each inventory item, OFTA approached suppliers directly on behalf of various government organisations. In addition to obtaining Y2K compliance statements from suppliers, OFTA also obtain other information to support the suppliers' Y2K compliance statements. For example, OFTA compared on a selected basis the suppliers' compliance statements with the compliance assurance provided for other non-government systems. As a result of the assessment exercise, some 260 mission-critical line communication systems were assessed by OFTA as Y2K compliant.

3. During the course of audit, Audit noted with concern that OFTA had not performed independent validation on the suppliers' compliance statements. Such validation may be done by independent testing, joint testing with suppliers, or attending as witness to the suppliers' testing. Nevertheless, Audit noted that in May 1999, OFTA issued a circular memorandum requesting government organisations to conduct independent validation tests of selected line communication systems that were previously advised by suppliers to be Y2K compliant. Government organisations were requested to arrange the validation tests with the suppliers and to inform OFTA of the test results. Upon Audit's enquiry, OFTA advised Audit that it did not make the request earlier because there were changes to the line communication systems from time to time. Early validation would result in those components that were added afterwards being untested.

4. **In view of the late actions in this regard, Audit has *recommended* that OFTA should monitor and ensure that government organisations complete the independent validation as**

soon as possible. Audit has also *recommended* that OFTA should provide government organisations with the necessary assistance and support to rectify those systems found to be Y2K non-compliant from the validation tests.

Progress of Y2K rectification of non-compliant mission-critical systems

5. Audit noted that, by 15 April 1999 (the latest available progress report at the time of audit), of the 71 non-compliant mission-critical systems, 25 had already been rectified and seven were classified as tolerable/could be dealt with by clock resetting. Of the remaining ones, 37 were scheduled to be rectified by June 1999 and two would only be rectified after June 1999.

6. During the course of audit, Audit noted that, apart from the two systems scheduled to be rectified after June 1999, there were also potential delays for some of the 37 systems scheduled to be rectified before June 1999. This was because the rectification contracts for them had not yet been awarded. On enquiry in June 1999, OFTA advised Audit that a total of five systems (including the two originally scheduled after June 1999) would not meet the June 1999 target. **Audit has *recommended* that OFTA should monitor closely the rectification progress of these five mission-critical systems and, where necessary, provide assistance and support to the departments concerned to avoid further slippage.**

RESPONSE FROM THE ADMINISTRATION

7. In his response of July 1999, the **Director-General of Telecommunications** accepted the audit recommendations. He said that the independent validation of essential line communication systems (see paragraph 4 above) was completed on 30 June 1999 and no Y2K non-compliant systems were found.

8. Regarding the five systems that did not meet the target deadline of June 1999 (see paragraph 6 above), the Director-General said that two systems had been rectified by 18 July 1999. OFTA would continue to monitor closely the Y2K work of all the line communication systems.

THE IMMIGRATION DEPARTMENT

INTRODUCTION

1. The Immigration Department (Imm D) uses IT widely to support its day-to-day operations. In April 1999, Audit conducted a review of the Imm D's management of its Y2K programme. The following is a summary of the audit observations, recommendations and the Administration's response.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

Y2K management structure

2. In May 1998, the Imm D established a three-tier management structure to manage its Y2K programme: a Year 2000 Compliance Project Working Group to monitor the progress of the Y2K project; a Year 2000 Compliance Project Sub-working Group to support the Working Group; and an Information Systems (Special Project) Sub-division [IS(SP) Sub-division] to oversee all the Y2K rectification work of the Imm D's administrative computer systems. The IS(SP) Sub-division assumes a coordination role in dealing with the Y2K problem on the Imm D's non-IT or embedded systems.

3. According to the Imm D's records, the IS(SP) Sub-division would be disbanded in November 1999. **As the risk of Y2K-induced failures will remain up to and beyond year 2000, Audit has *recommended* that the Imm D should ensure that an effective management structure continues to exist after the disbandment of the IS(SP) Sub-division.**

Y2K rectification progress of computer systems

4. As at April 1999 (the latest available progress report at the time of audit), the Imm D reported having completed rectification work on only one of the nine non-compliant administrative computer systems which are mission-critical. Audit examined the Imm D's records to ascertain why eight administrative computers had not been rectified at such a late stage. Audit's examination indicated that as at April 1999, rectification work for these systems had largely been completed and the Imm D was in the process of rolling out these systems for use in the production environment. According to the Imm D's rectification plan, the Y2K rectification work would be completed before July 1999. **Audit has *recommended* that the Imm D should sustain its current efforts to complete its Y2K rectification work for the administrative computer systems before July 1999.**

System enhancement in the second half of 1999

5. Audit's examination of the Imm D's records indicated that, although the Imm D planned to complete the rectification work on all the administrative computer systems in the first half of 1999, the Imm D had plans to upgrade one of the major system software (the DataBase 2) and that the upgrading work would not be completed until August 1999. On enquiry, Audit was advised that the enhancement of the DataBase 2 was not a Y2K issue but it must be done as the current version of software would not be supported by the vendor with effect from December 1999.

6. **The enhancement of the DataBase 2 will affect all administrative computer systems. In order to ensure that the Imm D's Y2K compliance position is not compromised, Audit has *recommended* that the Imm D should take every precautionary measure (e.g. performing thorough Y2K re-testing) in handling the system enhancement.**

Y2K rectification progress of embedded systems

7. As at April 1999, the Imm D reported that the rectification work for one non-compliant mission-critical embedded system had not been completed. Audit's examination of the Imm D's records indicated that the EMSD was responsible for conducting the rectification work. According to the information obtained by the Imm D from the EMSD, the system was rectified in March 1999 and, as at May 1999, was still under EMSD's testing. In response to Audit's enquiries, Imm D staff informed Audit that the testing results so far were not satisfactory. **Audit has *recommended* that the Imm D, together with the EMSD, should intensify their actions to ensure that the system will be compliant before the mid-1999 target date.**

Y2K rectification progress of line communication systems

8. As at April 1999, the Imm D reported that none of its five non-compliant mission-critical line communication systems had their rectification work completed, and that the work would be completed in the first half of 1999. Audit's examination of the Imm D's records indicated that, as at April 1999, the Imm D had not yet awarded the contract for the necessary work. **With a view to completing the Y2K rectification work by mid-1999, Audit has *recommended* that the Imm D should, in consultation with OFTA, intensify its actions on the rectification work of the systems.**

Independent validation of Y2K compliance

9. In assessing the Y2K compliance status of its embedded systems and line communication systems, the Imm D relied on various parties as follows:

— ***Embedded systems.*** The Imm D had a total of 90 mission-critical embedded systems. In assessing the Y2K compliance status of these systems, the Imm D relied on the advice of the EMSD, the vendors or the AA (for Imm D's systems at the airport); and

— ***Line communication systems.*** The Imm D relied on OFTA to assess their Y2K compliance.

10. According to the good practice guides, an organisation should conduct an independent validation of the vendors' compliance statements. The Imm D advised Audit that it had not independently validated the various parties' compliance confirmation for a number of reasons. For example, user departments traditionally relied on the EMSD for technical advice and they did not have the expert knowledge to assess the Y2K compliance of embedded systems. For the systems maintained by vendors, before accepting the vendors' compliance statements, the Imm D had made efforts to clarify with them their definition of Y2K compliance and details of the embedded systems covered by the compliance statements.

11. **Audit has *recommended* that, for those mission-critical systems confirmed to be Y2K compliant by vendors and the AA, the Imm D should perform independent validation. For those mission-critical systems confirmed by another government department (i.e. the EMSD or OFTA), the confirming government department should advise the users of its efforts made in assessing compliance and, wherever possible, invite them to participate in its validation tests.**

Independent quality assurance reviews

12. Audit noted that the Imm D/ITSD had taken initiatives to obtain independent quality assurance of the Imm D's Y2K work, including the following:

— ***Administrative computer systems.*** The ITSD planned to conduct a formal independent quality assurance review in October 1999; and

— ***Embedded systems.*** In February 1999, the EMSD's supported the Imm D's proposal to employ a consultant to conduct a Y2K compliance review of the building services systems installed at the Imm D's Headquarters and at the computer rooms of ten immigration control points. In June 1999, the Imm D advised Audit that it was still working on the tender for the consultancy services.

13. **In order to allow sufficient time for follow-up action, Audit has *recommended* that the ITSD should consider bringing forward the time for the independent quality assurance**

review on computer systems. For the embedded systems, the Imm D should expedite action on the proposed compliance review.

Y2K contingency planning

14. Audit noted that the Imm D started, on its own initiative, Y2K contingency planning in March 1999. As at April 1999 (i.e. the time of audit), the Imm D had prepared its Y2K contingency plans in draft form. The plans would need to be tested, refined and retested before the planning process could be regarded as completed. **Audit has *recommended* that the Imm D should continue making its efforts on Y2K contingency planning including the preparation and implementation of proper contingency test plans.**

RESPONSE FROM THE ADMINISTRATION

15. In his response of July 1999, the **Director of Immigration** said that the audit review was comprehensive and had given the Imm D a valuable chance to examine its work from a third party perspective. Specifically, he had the following comments on the audit recommendations:

(a) ***Y2K management structure (see paragraph 3 above).*** After disbanding the IS(SP) Sub-division in November 1999, the residual work would be taken over by another sub-division. Furthermore, two centres (namely the Y2K Emergency Response Centre and the Y2K Emergency Command Centre) would be formed to prepare for the Y2K roll-over. These centres would provide prompt support to front-line staff in handling system failure and recovery and give directives in case of major system failures. This management structure should be able to effectively manage any Y2K-induced problems;

(b) ***Y2K rectification progress (see paragraphs 4, 7 and 8 above).*** By 30 June 1999, all rectification work had been completed;

(c) ***System enhancement in the second half of 1999 (see paragraph 6 above).*** The upgrading of the DataBase 2 had been well planned. Thorough user acceptance tests would be conducted from 28 June 1999 to 30 July 1999. Whilst this was not a Y2K issue, the same high standard and methodology as adopted in the user acceptance tests for Y2K work would be applied to ensure that the Y2k compliance position of the Imm D's computer systems would not be compromised;

(d) ***Independent validation (see paragraph 11 above).*** The critical systems maintained by vendors or entrusted with the AA would be covered by the consultant's quality assurance review, referred to in the second inset of paragraph 12 above;

(e) ***Independent quality assurance reviews (see paragraph 13 above).*** The consultancy contract for an independent quality assurance review on the building services systems of the Imm D's critical sites was awarded on 29 June 1999. The review commenced on 5 July 1999 and was targeted for completion by the end of August 1999; and

(f) ***Y2K contingency planning (see paragraph 14 above).*** The preparation of the Imm D's Y2K contingency plan was in good progress and would be completed according to the ITBB's directive.

16. The **Director of Information Technology Services** said in his response of July 1999 that quality assurance was a continuous process. The review scheduled to be conducted in October 1999 was to mark the final process and documentation of the overall project activities. He did not see the need for bringing forward the time for the quality assurance review (see paragraph 13 above).

17. On ***independent validation (see paragraph 11 above)***, the **Director of Electrical and Mechanical Services,** in his response of July 1999**,** had the following comments:

— in June 1999 the AA conducted validation tests, in the presence of EMSD staff, for all the Imm D's mission-critical embedded systems entrusted with it. On 21 June 1999, he informed the Imm D that the test results were acceptable; and

— he would invite users' participation in future Y2K tests. With over 3,000 mission-critical systems, it was impracticable to invite users' participation in the test for each system.

18. In his reply of July 1999, the **Director-General of Telecommunications** said that he agreed that OFTA should advise government organisations of the efforts OFTA had made in assessing the Y2K compliance of their mission-critical line communication systems (see paragraph 11 above).

THE HONG KONG POLICE FORCE

INTRODUCTION

1. The Hong Kong Police Force (Police) uses IT widely to support its day-to-day operations. In June 1999, Audit conducted a review of the Police's management of its Y2K programme. The following is a summary of the audit observations, recommendations and response from the Administration.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

Reporting of Y2K compliance progress

2. ***Reporting of quarterly/monthly progress.*** The Secretary for Information Technology and Broadcasting considers that the best way to demonstrate to the public that the Government has taken up the Y2K task at the highest level is for the Heads of Bureaux and Departments to "**personally sign off**" the quarterly/monthly statements of year 2000 compliance. However, Audit noted that the statements from the Police were signed by the Assistant Commissioner of Police (Information Systems) for the Commissioner. The only statement personally signed by the Commissioner was the September 1998 statement. **Audit has *recommended* that the Police should strictly follow the ITBB's requirement to submit statements personally signed by the Commissioner. Audit has also *recommended* that the ITBB should check the statements submitted by bureaux and departments and take action to ensure that the requirement has been followed.**

3. ***Reporting of non mission-critical embedded systems.*** The ITBB requires departments and bureaux to report the Y2K compliance progress of both mission-critical and non mission-critical systems in the quarterly/monthly returns. Audit noted that the Police did not report the Y2K compliance position of 43 items of non mission-critical communication equipment in its monthly progress reports submitted to the ITBB/ITSD. **Audit has *recommended* that the Police should strictly follow the ITBB's requirement to submit to the ITBB/ITSD a detailed progress report of the Police's non mission-critical systems.**

Y2K testing of Police's line communication systems

4. By June 1999, the Police had not yet started conducting independent validations on 71 mission-critical line communication systems which were reported to be Y2K compliant. **Audit *recommended* the Police to conduct as early as possible independent validation on the systems.** In August 1999, the Police advised that it had completed the independent validations.

Y2K readiness of Police's business partners

5. Audit noted that, apart from computer vendors, the Police did not assess the Y2K readiness of other business partners (Note 2) whose Y2K-induced failures may affect the Police's operations. **Audit has *recommended* that the Police should conduct a comprehensive exercise to identify the essential business partners and assess the Police's risks if these business partners are not ready for Y2K. The Police should also implement a corporate strategy for dealing with Y2K non-compliant business partners.**

Independent quality assurance

6. Audit noted that, although there were quality assurance reviews on some aspects of the Police's Y2K work, there was a lack of an overall independent quality assurance review. The ITSD Y2K Task Force made a similar observation in June 1999. **In view of the criticality of the Police's mission, Audit has *recommended* that the Police should consider conducting an overall independent quality assurance review of its Y2K programme. If time or resources do not permit an overall review to be conducted, the Police should consider focusing the review on its Y2K contingency plan.**

7. Audit also noted that the Police's Internal Audit Division was not involved in any Y2K audit. **Audit has *recommended* that the Police should require its Internal Audit Division to be more actively involved in the Police's Y2K work and to furnish timely and regular reports on the audit results to management.**

Y2K contingency planning

8. The Police submitted a Y2K contingency plan to the ITBB in July 1999. In the short time remaining before year 2000, the Police would need to conduct drills on its Y2K contingency plan and participate in the formulation of contingency plans at the sector and territory-wide levels. **Audit has *recommended* that the Police should make increased efforts on contingency planning to meet the challenges ahead.**

RESPONSE FROM THE ADMINISTRATION

9. In his response of September 1999, the **Commissioner of Police** said that:

Note 2: *The Police has a large number of business partners in various trades and occupations. They include telecommunications operators, electricity companies, fuel suppliers, suppliers for the Police's appliances and materials such as spare parts for its communication equipment, ammunition, spare parts for its patrol vehicles and vessels and security alarm systems installed at shops/banks.*

(a) ***Reporting of Y2K quarterly/monthly progress (see paragraph 2 above).*** He had interpreted the ITBB's requirement to mean that only the September 1998 statement would need to be personally signed off by the Commissioner of Police. In the light of the audit recommendation, he would ensure that all future statements of year 2000 compliance would be signed by the Commissioner;

(b) ***Reporting of non mission-critical embedded systems (see paragraph 3 above).*** He would report the progress of non mission-critical systems to the ITBB/ITSD;

(c) ***Y2K readiness of Police's business partners (see paragraph 5 above).*** The Police had identified and prioritised the core business functions (and the corresponding business partners). The priority list had been used to formulate contingency plans. Testing with essential business partners would be incorporated into the series of tests and drills to be conducted;

(d) ***Overall independent quality assurance review (see paragraph 6 above).*** The Police had engaged a police expert from the UK to conduct an overall independent review of the Police's systems and contingency plans;

(e) ***Police's Internal Audit Division (see paragraph 7 above).*** The Internal Audit Division's primary function was to ensure compliance with financial and accounting requirements. Given the enormity of the task and its lack of expertise in the Y2K issue, the Internal Audit Division could not be expected to make any meaningful assessment of the Police's Y2K work; and

(f) ***Y2K contingency planning (see paragraph 8 above).*** The first test on the contingency plans would be completed by September 1999 at the Division, District and Regional levels. A Force-wide communication test would also be conducted in the same month. Further desk-top communication testing would take place in October 1999, with a territory-wide exercise planned for November 1999.

10. In his response of September 1999, the **Secretary for Information Technology and Broadcasting** said that the ITBB had checked the statements of year 2000 compliance submitted by bureaux and departments, as recommended by Audit in paragraph 2 above. He confirmed that the "personally sign off" requirement had been strictly observed by all government bureaux and departments since September 1999.

THE HOUSING AUTHORITY/HOUSING DEPARTMENT

INTRODUCTION

1. The Housing Department (HD), as the executive arm of the Housing Authority, makes use of IT to improve work efficiency and customer service levels. In May 1999, Audit conducted a review of the HD's management of its Y2K programme. While the HD's overall progress in achieving Y2K compliance is considered satisfactory, the audit review has identified areas which require further attention and continued action. The following is a summary of the audit observations, recommendations and the response from the Housing Authority/HD.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

Y2K management structure

2. In April 1998, the HD Computer Committee (HDCC) (Note 3) assumed the role of overseeing the work related to the Y2K issue in the HD. A Working Group on Year 2000 Compliance Programme (Working Group) was later formed to support the HDCC in overseeing the HD's Y2K compliance activities (Note 4). The HDCC monitors the HD's Y2K work through a Y2K master schedule which includes programmes for promoting awareness, rectification and contingency planning.

Y2K compliance assessment

3. ***Computer systems.*** In July 1997, the HD conducted an inventory assessment of computer applications. In June 1998, an external service provider was engaged to rectify the HD's Y2K non-compliant computer applications. As part of this service contract, an independent reviewer was engaged to conduct quality assurance reviews on the work of the service provider.

4. ***Embedded systems.*** In July 1998, the HD engaged a consultant to help organise the approach for the Y2K work for embedded systems. In early 1999, two other consultants were engaged. One consultant was employed to conduct a pilot study at four estates and the

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Note 3: *The HDCC is made up of the Business Directors of all the branches, the Finance Director, the Head of Corporate Strategy Unit and the Director Corporate Services.*

Note 4: *The Working Group is chaired by the Chief Systems Manager of the Computer Division and comprises members from different branches of the HD. It meets and reports to the HDCC monthly on the Y2K rectification progress.*

Headquarters Building (Note 5) to establish the extent of the Y2K problem and to verify vendors' compliance statements. The HD used the result from this study to review the Y2K problem in other buildings. The other consultant was employed to conduct a Y2K compliance study on fire service equipment installed at ten housing sites (Note 6).

5. ***Line communication systems.*** In 1998, the HD assessed the Y2K compliance of its line communication systems. It relied on the advice of OFTA to assess compliance.

Progress of Y2K rectification work

6. According to the HD, it had completed rectification work on all mission-critical non-compliant systems by 15 June 1999 (i.e. before the government-wide target date).

Progress of redeveloped mission-critical systems

7. From the HD's records, Audit noted that some Y2K non-compliant mission-critical systems were to be redeveloped. These include an administrative computer system and two end-user developed systems. However, the progress of redeveloping the systems was not required to be reported to the ITBB and the ITSD. **In Audit's view, the ITBB/ITSD need information on the progress of implementation of the redeveloped systems to ensure that mission-critical operations are not affected over the millennium period (Note 7). To help the ITBB/ITSD monitor the progress, Audit has *recommended* that the HD should report the progress of implementation of such systems to the ITBB/ITSD.**

Note 5: *The installations in the four estates and the Headquarters Building selected for the consultant's on-site survey were considered by the building services engineers as representative of the installations of the HD's buildings.*

Note 6: *The consultant considered that this study would provide an adequate coverage of the Automatic Fire Alarm Installations being used by the HD.*

Note 7: *In response to Audit's recommendation in another audit report, the ITSD has agreed that it will monitor closely the implementation progress of the redeveloped systems and, where delays are observed, take follow-up actions with the bureaux or departments concerned to ensure that the systems are in place as early as possible.*

Reclassification of critical functions as non-critical

8. Audit noted that in respect of one mission-critical computer system, namely the Maintenance Information and Infrastructure Support System (MISIS) (Note 8), the MISIS user reclassified some 90% of the critical functions as non-critical at a late stage of the rectification process (i.e. in March 1999). The reclassification was made because the user considered that the work could be handled manually in case the computer functions would fail. The arrangement was accepted at a HDCC meeting held in March 1999. As a result, only about 10% of the functions originally classified as critical were tested for user acceptance. When handing over the MISIS to the HD, the service provider, who was responsible for the Y2K rectification of this system, indicated that he would not accept responsibility for any Y2K problems caused by this change of scope. Although the MISIS is considered Y2K ready by the HD, Audit is concerned that the reduction of test may increase the risk of Y2K-induced failures which, in turn, could affect the HD's efficiency in providing maintenance services to its tenants. **To obtain assurance on the Y2K readiness of the MISIS as a whole, Audit has *recommended* that the HD should re-examine the need to perform appropriate tests on those functions which the MISIS user has reclassified as non-critical.**

Control of system changes after achieving Y2K compliance

9. It is a good practice to have proper change control procedures to ensure that enhancements to a system after achieving Y2K compliance are avoided. Audit noted that the HD had plans to enhance its Housing Accounting and Financial Information System (HAFIS) (Note 9) towards the end of year 1999, as required by the vendor. In response to Audit's enquiry in July 1999, the HD assured Audit that, for those centrally controlled computer systems, there were proper change control procedures in force, and that it did not foresee any significant changes or enhancements other than those for the HAFIS in the remaining months to year 2000. While noting the HD's assurance, Audit is concerned that possible enhancements for other systems not under central control (e.g. end-user developed systems) may not be subject to the same degree of control. **Audit has *recommended* that the HD should promulgate the change control procedures to users of systems that are not centrally controlled, and remind users of the need to avoid system enhancements after achieving Y2K compliance. If system changes are considered unavoidable, as in the case of the HAFIS, the HD should perform thorough Y2K re-testing to mitigate Y2K risks.**

Note 8: *The MISIS was developed as a tool for the maintenance professionals and the front-line housing staff to help them provide reliable and efficient maintenance service to the tenants. The system provides comprehensive computing functions on programme and project scheduling, budgeting, works ordering, payment, and progress monitoring in the planning and execution of maintenance programmes.*

Note 9: *HAFIS is a comprehensive integrated accounting and financial information system that provides functions such as general ledger, cost allocation, project accounting and accounts payable. It interfaces with 19 computer systems.*

Independent quality assurance

10. ***Computer systems and embedded systems.*** The HD recognises the importance of quality assurance work and has commissioned different parties to conduct quality assurance work on various aspects of its Y2K programme. As part of the June 1998 service contract, an independent reviewer was engaged to conduct quality assurance reviews on the work done by the service provider on the rectification of computer applications (see paragraph 3 above). In early 1999, the HD engaged two other consultants to review its Y2K rectification work on embedded systems (see paragraph 4 above).

11. ***Line communication systems.*** In July 1999, the HD informed Audit that, upon advice from OFTA, the HD was conducting independent verification tests on some telephone systems and that the tests would be completed by the end of August 1999. **Audit has *recommended* that the HD should continue to monitor the progress and results of the testing and, if necessary, should reassess the Y2K risk of its line communication systems in the light of the testing results.**

HD Internal Audit's role

12. In August 1998, the HDCC discussed the need to engage a third party to audit the overall Y2K rectification work of the HD. The HDCC decided that there was no need for such a service because it considered that the Internal Audit Section (IA) would play the auditing role during the rectification exercise.

13. The role of the IA on the Y2K issue is to verify that the HD has taken a reasonable approach and action to minimise the risk of Y2K non-compliance and any consequential losses. According to an IA's action plan prepared in February 1999, the IA would submit a report around **July 1999** to a high level committee chaired by the Director of Housing (i.e. the HD's Steering Committee on Management and Audit Studies). In response to Audit's enquiry in July 1999, the IA advised Audit that it would issue a draft report in **mid September 1999**. Audit is concerned that the IA has deferred the submission of its report to the HD's Steering Committee on Management and Audit Studies. **Audit has *recommended* that, in order to allow timely senior management actions to be taken on the IA's recommendations, the HD should closely monitor the IA's work progress and require the IA to submit its report as early as possible.**

Y2K readiness of HD's business partners

14. The HD's business partners include banks, insurance companies, construction companies, property developers, suppliers and utility companies. To ensure that the HD's operation will not be interrupted by the Y2K problems of its business partners, the HD included the assessment of their Y2K readiness in its Y2K rectification master schedule.

15. At the time of the audit in July 1999, the HD business branches were assessing the Y2K readiness of their business partners through a confirmation exercise. To ascertain the progress of the exercise, Audit selected for examination the summary report, prepared in July 1999, by one business branch (i.e. the Development and Construction Branch) which had identified a large number of business partners. Audit noted that, of the 359 business partners to whom confirmations had been sent, 61 (i.e. 17%) had replied that Y2K rectification work was still in progress and 94 (i.e. 26%) had not responded. The Development and Construction Branch proposed to follow up by sending reminder letters and closely monitoring the status of the business partners. **Audit supports the Branch's proposed actions. Audit has *recommended* that the HD should critically assess the HD's risk and implement a corporate strategy for dealing with those Y2K non-compliant business partners, and those business partners who have not responded (e.g. stop placing orders).**

Y2K contingency planning

16. In March 1999, the HD prepared a draft framework on contingency plan. In July 1999, it submitted its Y2K contingency plan to the ITBB. In the remaining months to year 2000, the HD would need to subject the plan to testing, amendment and, where necessary, re-testing. **Audit has *recommended* that the HD should continue with its efforts on contingency planning to ensure the continuity of service over the millennium period.**

RESPONSE FROM THE ADMINISTRATION

17. In his reply of August 1999, the **Director of Housing** said that he had taken note of the audit observations and had already taken action on some of them. He also said that:

(a) ***Redeveloped mission-critical systems (see paragraph 7 above).*** The HD had reported the implementation progress of the redeveloped systems to the ITBB/ITSD;

(b) ***Reclassification of critical functions (see paragraph 8 above).*** The reclassification was the result of a comprehensive assessment of the criticality of the functions and the associated risks. As the likelihood of a breakdown was extremely low and there were contingency arrangements in place, a decision was made to reduce the scope of the testing;

(c) ***Control of system changes (see paragraph 9 above).*** The HD had drawn up and promulgated change control procedures for end-user developed systems. For any system changes which needed to be implemented between August 1999 and the end of 1999, Y2K re-testing would be a standard procedure;

(d) ***Line communication systems (see paragraph 11 above).*** The independent testing on the line communication systems had been completed. The testing results confirmed that the systems were Y2K compliant;

(e) ***HD Internal Audit's role (see paragraph 13 above).*** The audit plan prepared in February 1999 was based on the understanding that the HD's rectification work and contingency plan would be completed in mid-1999. A subsequent revision was considered necessary to cover the planned rehearsal of the contingency plan which the ITBB recommended should take place in August 1999. The IA was aware of the need for timely reporting and would work to issue the report as soon as possible. However, it should be noted that IA had, where appropriate, already raised its observations and recommendations on the Y2K programme through its participation in the Working Group and in writing to the management, so that action could be taken immediately and was not held up pending the issue of the report;

(f) ***Y2K readiness of business partners (see paragraph 15 above).*** The HD considered this to be an important area of work and had included it as one of the essential components of its Y2K exercise. The HDCC reviewed what actions were being taken to confirm the Y2K status of its business partners. It had agreed on an approach for dealing with them and the specific actions to be taken (e.g. terminating business with a business partner depending on the risk involved). For major business partners, even if their compliance status had been confirmed, the HD would ensure that contingency arrangements were in place as back-up. The HD would step up its efforts to pursue compliance with its business partners; and

(g) ***Y2K contingency planning (see paragraph 16 above).*** The HD would continue with its efforts on contingency planning. It had already arranged for the testing of the plan with a view to making adjustments to it as necessary.

RESPONSE FROM THE CHAIRMAN, HOUSING AUTHORITY

18. In her response in September 1999, the **Chairman, Housing Authority** assured Audit that the Housing Authority/HD regarded the Y2K problem as a priority action area which was included as a key initiative in both the 1998-99 and 1999-2000 Corporate Plans. She also said that the HD would remain vigilant, focusing particularly on refining the contingency plan. The contingency plan was tested in late August. The plan was also activated on 9 September and no adverse reports were received. Further trials would be conducted to familiarise staff with the contingency arrangements.

THE HOSPITAL AUTHORITY

INTRODUCTION

1. The Hospital Authority (HA) manages 44 hospitals and institutions and 50 specialist outpatient clinics. It uses IT and advanced technology widely to support its day-to-day operations. In June 1999, Audit conducted a review of the HA's management of its Y2K programme. The following is a summary of the audit observations, recommendations and the response from the HA.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

Y2K management structure of the HA

2. A Y2K Steering Committee, headed by a Deputy Director, was set up in January 1998 to formulate work plans for the timely resolution of all Y2K problems. It is supported by five Y2K Sub-Committees each responsible for one of the following areas: IT systems; X-ray equipment; non X-ray medical equipment and paging systems; engineering systems; and line communication equipment.

Y2K inventory taking

3. In early 1998, the HA started to compile an inventory of hospital equipment that required Y2K attention and sent the list to hospitals for verification. In November 1998, the HA produced a Y2K control list of all categories of equipment and systems.

4. In July 1999, the HA advised Audit that, after rounds of checking and rechecking and with increased Y2K awareness among its staff, the Y2K control list currently maintained should be complete and accurate. **Audit has *recommended* that the HA should continue to maintain a proper and complete inventory record.**

Progress of Y2K rectification

5. As at 30 June 1999, the HA had completed its Y2K rectification work on all mission-critical equipment and systems, with the exception of one administrative information system and one piece of X-ray equipment. The administrative information system had not been rectified, pending development by the vendor of the necessary software. The HA expected the software to be available in September 1999. As for the X-ray equipment, the replacement would only be ready for use in November 1999 because the installation process had to tie in with the building works of the hospital site. In response to Audit's enquiry in July 1999, the HA assured Audit that contingency measures were in place to cater for the event that the system/equipment

could not be rectified before year 2000. **Audit has *recommended* that the HA should closely monitor the rectification progress of the system/equipment to ensure that there is no further slippage.**

Redevelopment of the Pharmaceutical Supplies System

6. The Pharmaceutical Supplies System (PHS) is a Y2K non-compliant mission-critical system which is towards the end of its useful life. Because user requirements had changed, the HA decided to redevelop the system. The roll-out of the redeveloped PHS would be completed by mid November 1999. The HA assured Audit that the roll-out would be completed before year 2000 and the HA had contingency measures to cater for unexpected delays. **Audit has *recommended* that the HA should closely monitor the progress of the roll-out to avoid slippage. If slippage is observed, the HA should implement appropriate fall-back measures (e.g. converting the existing PHS into a Y2K compliant version) to ensure that hospitals and clinics get sufficient pharmaceutical supplies.**

Control of system changes after achieving Y2K compliance

7. It is good practice to have change control procedures in place to ensure that Y2K compliant computer systems do not become non-compliant as a result of routine system maintenance activities or system enhancements. Audit noted that the HA's IT Division had instituted change control procedures for handling system maintenance and enhancement after Y2K compliance was achieved. Audit also noted that users of non-corporate systems (e.g. end-user developed systems) might not be aware of the procedures. **Audit has *recommended* that the HA should promulgate the change control procedures to all system users, in particular the users of non-corporate systems. If system changes are unavoidable, the HA should take proper precautionary measures (e.g. through performing thorough Y2K re-testing) to ensure that the Y2K compliance status is not affected by the changes.**

Managing Y2K testing activities

8. Audit noted that, for 43 pieces of **X-ray equipment** and 90 pieces of **non X-ray medical equipment** (all confirmed by suppliers to be Y2K compliant), the HA or the EMSD (Note 10) had not conducted independent validation of their compliance status. This was due to a number of reasons. For example, the suppliers did not recommend users to test the equipment's Y2K status, or medical staff could not risk testing the equipment in situ as it could cause a critical failure. The HA advised Audit that, in the health care sector, sole reliance on the suppliers' Y2K certifications

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Note 10: *The EMSD handled the Y2K rectification work of the HA's non X-ray medical equipment and paging systems in hospitals and the HA's engineering equipment in Schedule 1 (i.e. ex-government) hospitals. These included the conduct of Y2K tests and liaison with suppliers for the rectification work.*

for some equipment was a universal phenomenon and, as the suppliers were internationally renowned corporations, their Y2K compliance statements should be reliable. The HA also advised Audit that risk mitigating measures would be implemented if necessary.

9. **Audit has *recommended* that the HA should, in liaison with health authorities abroad, keep track of the Y2K compliance status of these types of equipment and, if necessary, take action (e.g. rectify or replace the equipment) to mitigate the Y2K risks. If possible, the HA should also ask the suppliers to furnish their factory test data to support their Y2K compliance statements. With regard to the 90 pieces of non X-ray medical equipment, Audit has also *recommended* that the HA should reconfirm with the EMSD that, although not independently validated, the equipment will not pose any Y2K threat.**

10. From the records of four hospitals selected for audit review, Audit noted that the extent of Y2K compliance testing on X-ray equipment varied among the hospitals. The HA advised Audit that it had instructed hospitals to make reference to a set of standard testing guidelines, but individual hospitals had made local modifications while conducting the tests. Audit also noted that of the four hospitals reviewed, only two had kept proper records on the details of the Y2K compliance tests. **To ensure the proper performance of independent validations, Audit has *recommended* that the HA should remind hospitals of the methodology to be used for conducting the validations. Hospitals should also be reminded of the need to keep detailed testing records.**

11. Audit also noted that, as at June 1999, suppliers had still not confirmed the Y2K compliance status of about 100 pieces of non X-ray medical equipment. **Notwithstanding that the EMSD has conducted independent validation on these equipment, Audit has *recommended* that the HA should make continued efforts to obtain compliance confirmations from the suppliers.**

12. Audit noted that the Y2K status of seven hospital-based **paging systems** (confirmed by suppliers to be compliant) had not been independently validated by the EMSD. **Audit has *recommended* that the HA should monitor the EMSD's validation progress and results of these paging systems.** Audit also noted that the compliance status of another paging system (validated by the EMSD to be compliant) had not been confirmed by the supplier. **Audit has *recommended* that the HA should urge the EMSD to continue to seek the supplier's confirmation.**

Y2K readiness of business partners

13. To ensure that the HA's operation will not be interrupted by the Y2K problems of external parties (e.g. suppliers of pharmaceutical products and medical gases), the HA has conducted an exercise to ascertain their Y2K readiness. The HA has also formulated a strategy for dealing with those suppliers who are Y2K non-compliant or fail to give written confirmation (e.g.

stop placing orders). Audit noted that, by June 1999, 22 of the HA's 148 major pharmaceutical suppliers had verbally advised the HA that they were Y2K compliant. **Audit has *recommended* that the HA should continue to seek written confirmation from these suppliers and ensure that the strategy for dealing with Y2K non-compliant suppliers is properly implemented.**

Independent quality assurance review

14. Audit noted that the HA's Group Internal Audit (GIA) was involved in the quality assurance review of the HA's Y2K programme. Up to July 1999, the GIA had reviewed the Y2K work at the HA Head Office, the EMSD and 13 major hospitals and had plans to visit a few more in the coming months. The GIA would submit an interim audit report to the Audit Committee of the HA Board by August 1999 and a final report by January 2000. **Audit has *recommended* that the HA should review the audit coverage of the GIA and, if necessary, require the GIA to carry out audit work at more hospitals. To provide management with timely reports, the HA should also require the GIA to produce additional interim audit reports between September 1999 and January 2000.**

15. Audit noted that, apart from the GIA's work, there was other quality assurance work on various aspects of the HA's Y2K programme. For example, the EMSD had earmarked 20 hospitals as critical venues to be subject to its audit. In addition, the EMSD had also started an audit programme to enhance the quality of the Y2K work for "super-critical" systems (including the HA's paging systems). **Audit has *recommended* that the HA should follow up the EMSD's audit results on the critical venues and "super-critical" systems and, in the light of the EMSD's audit results, reassess the HA's Y2K risks.**

16. Notwithstanding the above quality assurance reviews, in July 1999, Audit discussed with the HA the need for an **overall independent quality assurance** review of the HA's Y2K programme. The HA advised Audit that they recognised the need for an overall independent quality assurance review but experts for such a task were unavailable in Hong Kong. **In view of the criticality of the health care sector, Audit has *recommended* that the HA should reconsider the need for an overall independent quality assurance review of its Y2K programme. To address the problem of unavailability of experts locally, the HA should explore the options of engaging experts from overseas (including the possibility of a quality assurance review by a suitably qualified peer organisation from an advanced country).**

Y2K contingency planning

17. Audit noted that, by the end of June 1999, individual hospitals had completed and submitted their contingency plans to the HA. A central drill for the HA Head Office and nine major hospitals was scheduled to be conducted in early September 1999. The HA advised Audit that it had held seminars to brief hospitals of the requirement to conduct drills of their Y2K contingency plans, but it did not expect every hospital to conduct drills on all their

Y2K contingency plans because of the operational disruptions that might be caused. At the sector-wide level, at the time of audit (June 1999), the HA was working with the HWB and the Department of Health (DH) on a sector-wide contingency plan which was scheduled to be ready by September 1999. The time schedule for the conduct of sector-wide drills had yet to be decided.

18. **Audit has *recommended* that the HA should remind hospitals of the need to conduct drills as far as possible and to provide staff with training/refresher training to familiarise them with the Y2K contingency arrangements. As the sector-wide Y2K contingency plan is still not yet ready, Audit has also *recommended* that the HA, together with the HWB and the DH, should accord high priority to the issue. The Y2K drills should be conducted as soon as possible, in order to allow sufficient time for making necessary adjustment to the Y2K contingency plan based on the results of the drills.**

Legal aspects of the Y2K issue in the health care sector

19. In January 1999, the Y2K Steering Committee issued some general guidelines to assist hospitals in making decisions on whether they should replace, rectify or tolerate a piece of Y2K non-compliant medical equipment with date-display errors. Up to June 1999, the HA had not yet issued further guidelines on the medical-legal implications of using non-compliant medical equipment. Upon Audit's enquiry in July 1999, the HA advised that it had been aware of the legal implications of the Y2K issue from the start of the Y2K programme and had made it a regular agenda item for the Y2K Steering Committee meeting. Following the enactment of Y2K-related legislation in some overseas countries, the HA considered that it was the opportune time to take further actions. **Audit has *recommended* that the HA should make continued efforts to explore the issue and to provide appropriate guidelines to hospitals.**

RESPONSE FROM THE HA

20. In his response of August 1999, the **Chief Executive, HA** said that Audit's findings and constructive recommendations would help the HA further assure the quality of its Y2K project. He also said that:

(a) ***Y2K inventory taking (see paragraph 4 above).*** HA hospitals had been reminded to continually update their inventory for newly acquired equipment. The independent audit currently underway by the HA's GIA would ensure that the corporate requirement to maintain complete and accurate database was being followed;

(b) ***Progress of Y2K rectification (see paragraph 5 above).*** Mechanisms were in place to monitor closely the rectification progress of the administrative information system and the X-ray equipment, which had not been rectified by 30 June 1999, and ensure that they would be rectified on or before the target date of completion;

(c) ***Redevelopment of the PHS (see paragraph 6 above).*** As at mid August 1999, the redeveloped PHS had been rolled out to 22 pharmacies. The PHS Steering Group was closely monitoring the progress of implementation and roll-out. The conversion of the existing PHS into a Y2K compliant version had been built into the PHS contingency plan and would be implemented if necessary;

(d) ***Control of system changes after achieving Y2K compliance (see paragraph 7 above).*** The HA had issued in early August 1999 control guidelines on IT systems to hospitals and project teams to remind them of the need to avoid system changes as far as possible;

(e) ***Independent validation on medical equipment (see paragraph 9 above).*** For the 43 pieces of X-ray equipment that had not been independently validated, Y2K certificates from the internationally renowned manufacturers were the best guarantee available. The HA was liaising closely with other health authorities abroad on the Y2K status of these equipment. The equipment vendors had been asked to submit Y2K test reports. For the 90 pieces of non X-ray medical equipment, the EMSD would validate their Y2K compliance status before October 1999;

(f) ***Consistent methodology for independent validation (see paragraph 10 above).*** The HA had a consistent methodology in place to perform independent validation of X-ray equipment based on international guidelines. From the professional point of view, the slight variation in practice should not affect the validity of the test results. Hospitals were reminded to keep proper record of the test reports. These records would be examined on a sample basis by the HA's GIA;

(g) ***Outstanding confirmations from suppliers (see paragraph 11 above).*** The EMSD would continue to urge the vendors to provide compliance certification for the 100 pieces of equipment as far as practicable;

(h) ***Paging systems (see paragraph 12 above).*** The EMSD had agreed to complete Y2K testing for the seven paging systems and obtain the vendor's Y2K confirmation on the remaining paging system by the end of August 1999;

(i) ***Y2K readiness of business partners (see paragraph 13 above).*** The HA would continue to liaise with the vendors to obtain written Y2K compliance confirmations. It would also ensure that the strategy for dealing with non-compliant suppliers is properly implemented;

(j) ***The work of the GIA (see paragraph 14 above).*** The GIA had plans to audit six more hospitals before the end of August 1999 and to audit the remaining hospitals by the end of September 1999. The GIA would continue to bring its observations to the attention of relevant subject officers as they arose. Further interim reports would be submitted to the Y2K Steering Committee, the Chief Executive of the HA and the Audit Committee of the HA Board in September and early December 1999;

(k) ***The EMSD's audit on critical venues and "super-critical systems" (see paragraph 15 above).*** The HA would continue to follow up closely with the EMSD on the results of the EMSD's audit and would ensure that the Y2K risks of medical equipment are mitigated;

(l) ***Overall independent quality assurance review (see paragraph 16 above).*** Various facets of the HA's Y2K programme had undergone independent assessment by relevant experts which included the GIA, the EMSD, external consultants (review of engineering systems in two selected hospitals) and the Audit Commission. The HA considered that effective measures had been put in place to provide reasonable independent assurance on its Y2K programme. These measures would continue over the coming months;

(m) ***Y2K contingency planning (see paragraph 18 above).*** The HA had given guidelines to hospitals to conduct drills on major utilities and clinical services. It would remind hospitals of the guidelines and would closely monitor the outcome of the drills. A centrally coordinated Y2K contingency drill would be conducted in early September. The HA would review and improve hospitals' contingency preparations in the light of the outcome of the exercise. The HA would work closely with the HWB and the DH in the development of the sector-wide contingency plan and would participate in the territory-wide Y2K drill to be organised by ITBB/HWB in the third or fourth quarter of 1999; and

(n) ***Legal aspects of the Y2K issue in the health care sector (see paragraph 19 above).*** A Y2K legal seminar was scheduled to be held in September 1999 and more specific advice and guidance on the medical legal issues would be provided to hospitals after the seminar.

THE AVIATION SECTOR

PART I: THE CIVIL AVIATION DEPARTMENT'S STATUS IN TACKLING THE Y2K PROBLEM

INTRODUCTION

1. The Civil Aviation Department (CAD) is the civil aviation authority in Hong Kong. In June 1999, Audit conducted a review of the CAD's efforts to address the Y2K problem in the aviation sector. The following is a summary of the audit observations, recommendations and the Administration's response.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

Progress of Y2K rectification

2. The CAD's systems mainly include (i) the air traffic control (ATC) systems that support ATC services to aircraft within the airspace for which the CAD is responsible; and (ii) safety and security related systems which support the CAD's operations.

3. As at the end of June 1999, the CAD reported that all critical systems were Y2K compliant, except the ATC Complex access control system (ACS) for which the rectification work had not been completed. This system forms part of the airport-wide ACS of the AA. The CAD advised Audit that the non-compliance of the ACS would unlikely have any impact on the ATC operation. Audit noted that the CAD had already developed manual access control procedures to be used as a contingency backup measure. **As the deadline of mid-1999 was not met, Audit has *recommended* that the CAD should, in close liaison with the AA, monitor closely the progress of the Y2K compliance tests of the ACS and, in line with the best practice, witness the conduct of the tests.**

Readiness of CAD's air traffic control systems

4. The ATC systems, which include radar, navigational aids and communication systems, support the CAD's ATC services within the airspace for which the CAD is responsible. The CAD advised Audit that, in the procurement of the ATC systems, the systems had been tested for Y2K compliance before they were accepted. Furthermore, in June 1998, prior to the opening of the airport, the CAD also conducted an overall Y2K integration test for all the ATC systems.

IATA's visit to CAD in November 1998

5. In November 1998, the Y2K Project Team of the International Air Transport Association (IATA) reviewed the Y2K readiness of the ATC services provided by the CAD. The IATA reported that it was satisfied with the CAD's organisation and execution of Y2K work. The CAD had adopted a sound Y2K rectification approach and methodology and strong testing method.

Further Y2K tests of ATC systems

6. In November 1998, the CAD decided to conduct further Y2K tests on the ATC systems. The Y2K tests of individual ATC systems were carried out jointly by representatives from the CAD's Air Traffic Management Division (system user), the CAD's engineering staff and the maintenance contractor.

7. Audit's review of two Y2K test reports indicated that the tests were conducted in a structured and disciplined manner. Except for a few minor deficiencies detected from the test, the test results were satisfactory. The CAD advised Audit that these deficiencies would not affect the normal operation of the ATC systems. As at July 1999, confirmation or advice to fix the minor deficiencies from six suppliers was still outstanding. **Audit has *recommended* that the CAD should pursue actively with the suppliers to clarify and fix those deficiencies identified during the Y2K compliance tests.**

Integrated testing of ATC systems

8. After the completion of the Y2K tests of individual ATC systems, the CAD conducted the integrated testing of the ATC systems in June 1999. A summary test report produced by the CAD in June 1999 showed that the integrated test result was satisfactory.

Independent quality assurance

9. Quality assurance is often regarded as an integral component of an effective Y2K programme. As the operations in the aviation sector rely heavily on IT and embedded systems, it is a good practice for an organisation in the aviation sector to seek independent experts to conduct an overall quality assurance review of its Y2K readiness. Audit noted that in the United Kingdom independent assessments of essential sectors (including the air transport sector) were conducted. Similarly, in the United States, the Federal Aviation Administration arranged for an independent verification and validation review by an outside contractor of its Y2K programme. Audit noted that there was no independent quality assurance review on the CAD's Y2K programme. **In view of the criticality of the CAD's work, Audit has *recommended* that the CAD should critically consider the need for an independent quality assurance review of its Y2K programme.**

Y2K interface tests with adjacent ATC authorities

10. Audit noted that the CAD had written to nine adjacent ATC authorities to make enquiries about their Y2K readiness and to arrange for the conduct of Y2K interface tests on communication circuits with them. The progress of these Y2K interface tests with adjacent ATC authorities as at June 1999 was satisfactory.

Y2K compliance of foreign aircraft flying to/overflying Hong Kong

11. Since April 1999, the CAD has issued some 100 letters to foreign airline companies to collect information about their systems' Y2K readiness and contingency planning. As at the end of July 1999, replies from nine scheduled airline companies, three non-scheduled airline companies and 14 airline companies with aircraft overflying Hong Kong were outstanding. The CAD was seeking advice from the International Civil Aviation Organisation (ICAO) whether operators of foreign aircraft should be required to disclose their Y2K compliance status in their flight plans.

12. **To maintain safe and smooth air traffic in Hong Kong, Audit has *recommended* that the CAD should actively follow up with those foreign airlines that have not advised the CAD of their Y2K status, and ascertain from the ICAO the international practices to be applied during the millennium change for dealing with foreign aircraft believed to be Y2K non-compliant. Audit has also *recommended* that the CAD should establish a mechanism in Hong Kong, in line with international practices, for dealing with foreign aircraft which are not Y2K compliant.**

Y2K readiness of CAD's local business partners

13. To monitor the Y2K compliance status and rectification progress of its local business partners, the CAD set up a Y2K Compliance Task Force in September 1998 with representatives of its local business partners, such as the Hong Kong Observatory, the AA and local airline companies, as members. In addition, the CAD, as the regulatory authority overseeing the safety and security related systems of key NGOs in Hong Kong's aviation sector, provides the ESB with assessments on the Y2K progress of the AA and the three local airline companies (see Part II below).

Y2K contingency planning

14. To ensure safe and smooth air traffic in the Asia-Pacific Region during the millennium change, the ICAO has issued guidelines for state members to prepare their Y2K contingency plans. State members of ICAO were expected to complete their Y2K contingency plans **not later than 1 August 1999** and have the plans tested with adjacent ATC authorities **by 1 September 1999.**

15. By the end of June 1999, the CAD had completed developing its Y2K contingency plan in accordance with the ICAO guidelines. The plan would need to be tested, drilled and refined. In addition, the CAD would also need to install the necessary contingency communication equipment and test the equipment with adjacent ATC authorities. **In view of the criticality of the Y2K contingency planning, Audit has *recommended* that the CAD should continue with its efforts to complete the remaining work on Y2K contingency planning as early as possible.**

RESPONSE FROM THE ADMINISTRATION

16. The **Secretary for Economic Services,** in his response of August 1999, said that he welcomed this audit review and that he agreed with most of the audit recommendations, some of which were in line with the on-going work of the ESB and the CAD. Specifically, with regard to the audit recommendation in paragraph 3 above, the **Director of Civil Aviation**, in his response of August 1999, said that in July 1999 the AA conducted Y2K site test on the ACS for the CAD's ATC Complex. The test was witnessed by CAD staff. With regard to the audit recommendation in paragraph 9 above, the Director said that there was no need for an independent quality assurance review on the CAD's Y2K programme because:

— he considered that the framework established for managing Y2K testing programme was adequate as all tests were carried out jointly by the system user, the CAD Engineering Section and the maintenance contractor (see paragraph 6 above). There was adequate quality control in place particularly with respect to the test plans and results which were reviewed regularly by a review group led by a senior officer in the CAD;

— on air traffic management, the importance of quality assurance was addressed among aviation authorities through regular Y2K Contingency Task Force Meetings organised by the ICAO. Apart from the industry, both the ICAO and the IATA also had a direct interest in seeing that the CAD's Y2K work was done properly. An example was the IATA's visit to the CAD in November 1998 (see paragraph 5 above); and

— the ITSD inspected the CAD's Y2K test programme and methodology. The ITSD's assessment was that the CAD Y2K rectification work was good and that the CAD handled the Y2K programme seriously and recorded the work with full details.

PART II: THE GOVERNMENT'S MONITORING OF NGOs IN THE AVIATION SECTOR FOR Y2K READINESS

INTRODUCTION

17. The ESB is the policy bureau responsible for monitoring the Y2K readiness of the aviation sector. These include the AA and the three local airline companies. The CAD, as Hong Kong's civil aviation authority, also has a role to play in monitoring the Y2K readiness of NGOs' systems that are related to aviation safety and security.

18. Audit conducted a review in June 1999 to assess whether the Government has established mechanisms for effectively monitoring the Y2K compliance of the AA and the three local airline companies in the aviation sector. The following is a summary of the audit observations, recommendations and the Administration's response.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

Y2K compliance progress as at 15 June 1999

19. As at 15 June 1999, the AA's reported Y2K compliance status was that it had achieved 87% compliance of its 124 systems and it expected to achieve 100% compliance by December 1999. In response to this audit observation, in August 1999, the AA informed the ESB that up to 31 July 1999, the AA had achieved 98% verified compliance of its systems.

20. For the three local airline companies, they confirmed that all their systems and aircraft had been tested and proved to be Y2K compliant.

Actions taken by Government to monitor the NGOs' Y2K progress

21. In May and July 1998, the ESB conducted surveys on the AA and the three local airline companies to ascertain their status of Y2K compliance. Starting from September 1998, the AA and the local airline companies were required to forward progress reports bimonthly (monthly from January 1999 onwards) to the ESB. The ESB then submits the summary progress reports to the Y2K Steering Committee.

22. Audit noted that, up to June 1999, the Government had taken various measures to monitor the Y2K progress of NGOs in the aviation sector. These included: the CAD established a

Y2K Compliance Task Force (Note 11) to oversee the Y2K compliance of safety and security related systems under the CAD's purview; the CAD conducted Y2K audits on the local airline companies and maintenance organisations; and the ESB received monthly progress reports from the AA and the local airline companies.

The ESB's monitoring of the AA's monthly progress reports

23. Audit noted that those progress reports submitted by the AA before February 1999 did not provide time schedules for key milestones of individual Y2K projects. In February 1999, the AA submitted a detailed Y2K rectification plan which showed the time schedules and key milestones of the AA's highly critical systems. In March 1999, the AA submitted another detailed plan for all the AA's systems. In March 1999, the ESB identified some schedule delays in the Y2K rectification work of some of the AA's systems and immediately urged the AA to speed up its actions.

24. **Audit noted the ESB's intensified actions in recent months. Audit has *recommended* that the ESB should continue to closely monitor the AA's rectification work and, if necessary, seek the assistance of the ITSD, EMSD and OFTA in assessing the quality of the work.**

Procedures for verification of Y2K compliance of AA's systems under CAD's purview

25. The CAD and the AA agreed that, as an additional safeguard, the CAD's representatives would witness the Y2K compliance tests on the AA's systems under the CAD's purview (this covers 19 of the AA's 124 major systems). Audit noted that there was no internal guideline to help the CAD representatives witness the AA's Y2K compliance tests. In the absence of guidelines, different staff adopted different procedures and practices. **Audit has *recommended* that the CAD should prepare internal guidelines to help its representatives witness the AA's Y2K compliance tests and, as part of the guidelines, require the representatives to prepare proper inspection reports on the tests they witnessed.**

26. When a system under the CAD's purview was considered Y2K compliant, the AA would forward to the CAD for examination the AA's confirmation certificate of the system (signed by its Chief Executive Officer), the contractor's compliance statement, the system test plan, the test completion report and the test data. Audit noted that, as at the end of June 1999, the AA had

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Note 11: *The Y2K Compliance Task Force, chaired by an Assistant Director of the CAD, includes representatives from the various divisions of the CAD, the Hong Kong Observatory, the ESB, the AA, local airlines, aircraft maintenance agents and other related parties (e.g. the Airline Operators Committee).*

completed Y2K compliance testing for 17 of the 19 systems under the CAD's purview. **Audit has *recommended* that the CAD should urge the AA to expedite actions with the Y2K testing work of the remaining two systems.** Audit also noted that, of the 17 systems for which the Y2K compliance testing had been completed, the AA had submitted the relevant documentation for 13 systems to the CAD. **Audit has *recommended* that the CAD should urge the AA to submit as soon as possible the outstanding documentation for the four systems (i.e. 17 less 13 systems) which have been tested.**

Procedures for assessing and verifying the NGOs' Y2K compliance progress

27. The AA has a total of some 26 critical business partners. The Government has to rely on the AA's efforts to assess and verify their Y2K readiness. However, the AA does not have access to its business partners' internal systems to verify their compliance. The AA could only assess its business partners' Y2K rectification progress through meetings of its Millennium Task Force and site visits. Although the AA's business partners did submit progress reports to the AA which in turn reported their progress to the Government, the AA indicated that it would not take responsibility for the information provided.

28. Audit considers that the ESB needs to obtain greater assurance on the Y2K readiness of the AA's business partners. One way to obtain greater assurance is to urge the AA to conduct thorough end-to-end testing, in conjunction with its business partners, on those core business processes that support the operation of the airport. **Audit has *recommended* that the ESB should urge the AA to take the lead to conduct such end-to-end testing with its business partners and to ensure that such end-to-end testing is subject to independent verification and validation.**

Independent quality assurance

29. Audit noted that the AA had engaged a consultant to advise on the development and implementation of its Y2K programme. The ESB had reviewed the consultant report for monitoring purpose. The AA's Internal Audit also reviewed the management of the Y2K programme such as testing and contingency planning.

30. As regards the Y2K programmes of the local airline companies and the AA's business partners, no detailed information was available as to whether quality assurance reviews had been conducted. **Audit has *recommended* that the ESB, in conjunction with the CAD, should encourage the local airline companies and the AA's business partners to conduct independent quality assurance reviews of their Y2K programmes so as to provide added assurance on their Y2K compliance status.**

Y2K contingency planning

31. The CAD's Y2K Compliance Task Force (see paragraph 22 above) at a meeting in May 1999 agreed that all members should have their initial contingency plans ready by 1 September 1999, conduct the drills in September 1999 and have the final contingency plans ready by mid October 1999.

32. The AA had set up a Y2K Contingency Planning Project Office to take up the overall responsibility for the preparation and implementation of the Y2K contingency plan for the airport operations. The AA identified the critical operational processes on five key airport operational areas (Note 12) for the preparation of contingency plans. The AA expected that a comprehensive and properly tested contingency plan would be available by the end of July 1999. Audit noted that a drill had yet to be conducted in a live operational environment to test the AA's contingency plan.

33. As regards the local airline companies, Audit noted that as at June 1999 the ESB was advised that the airline companies' contingency plans were available and would be tested and put in place by September 1999.

34. **Having regard to the particular criticality of the Y2K issue in the aviation sector, Audit has *recommended* that the ESB and the CAD should:**

- **urge all members of the Y2K Compliance Task Force to intensify their efforts on contingency planning and, where appropriate, endeavour to bring forward their target dates for completing the Y2K contingency plans;**

- **assess (with the support of the ITBB, ITSD and EMSD if necessary) the completeness of the AA's contingency planning in meeting Y2K-induced failures and urge the AA to prepare an airport-wide contingency plan; and**

- **remind the AA to conduct tests and drills of the Y2K contingency plans in a live operational environment.**

Note 12: *The five key airport operational areas are: arriving passengers and baggage movement; departing passengers and baggage movement; transfer and transit passengers and baggage movement; aircraft ground movement and ground servicing; and cargo and mail movement.*

RESPONSE FROM THE ADMINISTRATION

35. In his response of August 1999, the **Secretary for Economic Services** said that he agreed with most of the audit observations and recommendations. Specifically, he also said that:

— ***Monitoring of the AA's monthly progress reports (see paragraph 24 above).*** As an independent statutory body, the AA should be responsible for the quality of its own Y2K work. In this regard, the AA had already engaged independent consultants to provide guidance and assistance to its Y2K programme. However, as the AA was providing essential services to the public, the Administration had put in place measures to keep track of its Y2K work. For example, since April 1999, the CAD had been witnessing the Y2K compliance tests on the AA's systems relating to the safe and secure operation of the airport. Furthermore, the Administration's Y2K Task Force (including officers from the ITBB, EMSD, ITSD and OFTA) and officers of the ESB and the CAD would visit the AA. This visit would focus on three highly critical systems and would enable the Administration to have a better appreciation of the AA's compliance status and how it had tackled its Y2K work;

— ***Procedures for assessing and verifying the NGOs' Y2K compliance progress (see paragraph 28 above).*** He agreed that there should be proper testing to assess and verify the Y2K status of the critical systems of the AA's business partners. The AA had advised him that it had been conducting joint Y2K tests with its business partners. In some cases, end-to-end testing might impact on the normal operation of a system. Therefore, while he would encourage the AA to take the lead responsibility for ensuring that end-to-end testing of the core business and supporting systems was carried out as far as possible, he had to defer to the AA's judgement as to the feasibility and desirability of individual tests; and

— ***Y2K contingency planning (see paragraph 34 above).*** While it would not be practical for the ESB and the CAD to assess the contingency plan of the AA in a technical manner, it would be reasonable for them to assess the AA's contingency plan through seeking more information on its contingency planning process. In this regard, the ESB and the CAD had jointly prepared a questionnaire to request the AA to provide information on its contingency planning process. They would continue to keep track of the development in the next few months.

36. With regard to the outstanding Y2K testing documentation referred to in paragraph 26 above, the **Director of Civil Aviation**, in his response in August 1999, said that more documentation had been received from the AA since the audit was carried out. As at the end of July 1999, a total of 16 system testing documents had been received. For the remaining two systems

yet to complete Y2K testing, the AA had since completed Y2K testing on one system and expected to complete the other one in August 1999.

COMMENTS FROM THE AIRPORT AUTHORITY

37. At the request of the Secretary for Economic Services, the **Chief Executive Officer of the Airport Authority**, in August 1999, made the following comments on the audit report:

Procedures for assessing and verifying the NGOs' Y2K compliance progress (see paragraphs 27 and 28 above)

(a) the AA had held bilateral meetings with eight of its 26 critical business partners to exchange information on Y2K compliance and contingency planning. More bilateral meetings were being scheduled;

(b) in June 1999, the AA completed detailed and comprehensive Y2K data interface tests with all business partners whose systems were directly connected to the AA's IT systems;

(c) the AA had also identified the systems of major business partners that underpinned critical business processes at the airport, irrespective of whether they were connected to the AA's systems or not. Where the business partners' systems supported these processes, the AA had requested written confirmation in the form of a compliance checklist from the business partners that the relevant supporting systems had been verified as Y2K compliant. These responses had been tabulated and reviewed by the AA's end-to-end verification teams and were being consolidated into the test reports. The end-to-end verification teams' effort had significantly increased the AA's knowledge of and confidence in the critical business partners' Y2K readiness; and

Y2K contingency planning (see paragraph 34 above)

(d) the AA's contingency plan, which covered the core business processes that supported the operation of the airport, had been developed in conjunction with the relevant business partners. The AA conducted three desktop drills in June 1999 and one physical walkthrough in July 1999 to verify its contingency procedures. More drills would be conducted in a live operational environment during the period from August to December 1999 to refine the procedures and let operational and frontline staff familiarise themselves with the procedures.

THE TELECOMMUNICATIONS SECTOR

INTRODUCTION

1. The ITBB is the policy bureau responsible for monitoring (through OFTA) the Y2K compliance progress of the telecommunications sector. Audit conducted a review in July 1999 to assess whether OFTA has established mechanisms for effectively monitoring the Y2K compliance of NGOs in the telecommunications sector. The following is a summary of the audit observations, recommendations and the Administration's response.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

Y2K compliance progress of NGOs

2. As at June 1999, some NGOs had not yet achieved Y2K compliance. Some of these non-compliant NGOs have revised their target compliance dates to as late as the fourth quarter of 1999. **Given their late target compliance dates, there is very little time left for dealing with unexpected problems. Audit has *recommended* that OFTA should closely monitor the situation to avoid further slippage and take action to ensure that proper contingency plans are in place to support business continuity.**

3. Audit noted that the NGOs were not required to provide details about their action plans for Y2K rectification work to OFTA. As a result, it was difficult for OFTA to detect at an early stage possible delays in NGOs' Y2K compliance progress. **Audit has *recommended* that OFTA should require NGOs, in particular those with late target compliance dates, to provide more information on their action plans (including a time schedule for achieving key milestones of their rectification work) to OFTA, so that it can detect possible delays and take follow-up actions at an early date.**

4. Under the existing monitoring mechanism, the CEOs of NGOs are required to personally sign off their compliance progress reports to OFTA. Audit noted that some NGOs did not comply with this requirement. **Audit has *recommended* that OFTA should closely monitor the situation and take action to ensure compliance with this requirement.**

Evaluation of NGOs' Y2K test reports

5. OFTA required all major telecommunications operators to submit their Y2K test reports to OFTA for evaluation. In response to Audit's enquiry, OFTA informed Audit that it had originally planned to complete the evaluation exercise by July 1999. However, some operators had deferred the submission of their test reports and some test reports submitted to OFTA were found to contain insufficient details. As a result, OFTA could not complete the evaluation exercise in July 1999. OFTA would try to complete the evaluation exercise by the end of August 1999 and would report the results to the Task Force on Y2K Compliance of the Telecommunications Sector (OFTA Task Force) (Note 13). **Audit has *recommended* that OFTA should closely monitor the progress of the evaluation exercise to avoid further slippage and take vigorous actions against the operators to ensure that they submit their test reports in sufficient detail without further delay.**

6. Audit also noted that there were no laid down procedures to guide OFTA staff on how they should assess and verify the Y2K compliance test reports provided by the NGOs, apart from a checklist of all the major areas of concerns and the essential tasks which operators had to fulfil in the Y2K compliance testing and rectification exercise. **Audit has *recommended* that, for quality assurance purposes, OFTA should draw up formal procedures for the evaluation exercise.**

On-site examinations by OFTA

7. An effective way of monitoring the progress of Y2K compliance is to conduct site visits to selected NGOs. These visits would enable OFTA to identify delays and problems which might be encountered by NGOs in their Y2K work and provide support for resolving their problems. Audit noted that only one site visit to a selected NGO in the telecommunications sector had been conducted by the ITBB Y2K Task Force (including officers from OFTA). There was no further plan to conduct more site visits to NGOs in this sector. **Given the late target compliance dates of some NGOs (see paragraph 2 above), Audit has *recommended* that OFTA should conduct more site visits to NGOs.**

Note 13: *In August 1998, the OFTA Task Force was set up to oversee the progress of Y2K compliance work in the telecommunications sector and to coordinate sector-wide activities (e.g. joint testing across telecommunications networks). The OFTA Task Force, chaired by a Senior Assistant Director, includes representatives of all major telecommunications operators.*

NGOs' contingency plans

8. All major telecommunications operators were required to submit their contingency plans to OFTA . As at July 1999, OFTA was evaluating the adequacy of the contingency plans. In response to Audit's enquiry, OFTA informed Audit that it had originally planned to complete the evaluation exercise by July 1999. However, OFTA had to defer the completion date to the end of August 1999 because some contingency plans submitted to OFTA were found to lack essential information. **Audit has *recommended* that OFTA should closely monitor the progress of the evaluation exercise to avoid further slippage, and should continue to ensure that the contingency plans submitted by the operators will contain all the essential information. In the evaluation exercise, OFTA should give priority to those NGOs which have experienced delays in the completion of their Y2K rectification work.**

9. Audit also noted that OFTA had not required the submission of contingency plans from operators other than the major telecommunications operators. **Audit has *recommended* that OFTA should assess the need to require other operators to submit their contingency plans for evaluation.**

Sector-wide Y2K Coordinating Centre

10. In March 1999, the ITBB provided government departments and bureaux with a list of Y2K critical dates on which Y2K problems may occur. In May 1999, the OFTA Task Force set up a Y2K Coordinating Centre (Y2KCC) for the telecommunications sector to cope with unforeseen Y2K problems on a number of Y2K critical dates starting from September 1999 through March 2001. Audit noted that some of the critical dates on the ITBB's list were not included in the operation time schedule of the Y2KCC. The following dates were not included: 22 August 1999, 1 December 1999, 7 January 2000 (and all end of weeks of year 2000), 31 January 2000 (and all end of months of year 2000) and 31 March 2000 (and end of each quarter of year 2000). From OFTA's records, Audit could not ascertain the rationale for not including these dates in the operation time schedule of the Y2KCC. **Audit has *recommended* that OFTA should review its rationale for not including these dates and reconsider whether they should be included.**

RESPONSE FROM THE ADMINISTRATION

11. In his response of August 1999, the **Director-General of Telecommunications** said that:

Y2K compliance progress of NGOs (see paragraphs 2 to 4 above)

(a) OFTA would continue to closely monitor the progress of the remaining Y2K non-compliant operators. Major operators had already submitted the contingency plans to OFTA for evaluation. For those minor operators who were unable to fully rectify the Y2K problem by the end of September 1999, OFTA would also request them to submit their Y2K contingency plans;

(b) OFTA had discussed with the one fixed and one mobile network operators who were not yet Y2K compliant about the reasons for the delays in their Y2K programmes. OFTA had assessed the situation and considered that it would be unlikely that their Y2K programmes would be further delayed. For the two non-compliant satellite network operators, they were awaiting the upgraded software from their U.S. manufacturers. OFTA would closely monitor the situation and ensure that they would have the required contingency plans in hand to cope with the problem;

(c) though some of the Y2K compliance progress reports submitted by operators were not signed by their CEOs, they had been signed by the persons responsible for the Y2K rectification. However, OFTA would ensure that the compliance progress reports from the major operators would be personally signed by their CEOs in the next survey report;

Evaluation of NGOs' Y2K test reports (see paragraphs 5 and 6 above)

(d) OFTA would try to complete the evaluation exercise by the end of August 1999 and report the progress to the OFTA Task Force in September 1999;

(e) to avoid further delay, OFTA would consider issuing a warning letter to each uncooperative operator who did not submit test reports with the necessary details before the deadline;

(f) OFTA would review the need for more detailed procedures where necessary;

On-site examinations by OFTA (see paragraph 7 above)

(g) OFTA would make arrangement to visit some major operators, particularly those operators who were not yet Y2K compliant or had experienced slippage in their Y2K programmes;

NGOs' contingency plans (see paragraphs 8 and 9 above)

(h) OFTA had received the second submission of contingency plans from the operators, and would report the evaluation result to the OFTA Task Force in September 1999;

(i) if necessary, OFTA would consider issuing warning letters to those operators who failed to provide the required information in their contingency plans;

(j) OFTA would concentrate its effort on those operators who had experienced delays in achieving Y2K compliance;

(k) for those minor operators who could not fully rectify the Y2K problem by the end of September 1999, OFTA would request them to submit their Y2K contingency plans; and

Sector-wide Y2K Coordinating Centre (see paragraph 10 above)

(l) the OFTA Task Force had assessed carefully the Y2K critical dates and concluded that the dates included in the operation time schedule of the Y2KCC were critical and relevant to the telecommunications sector. It would not be necessary for the telecommunications sector to adopt the other dates.

THE HEALTH CARE SECTOR

INTRODUCTION

1. The Health and Welfare Bureau (HWB) is the policy bureau responsible for monitoring the Y2K compliance progress of the health care sector. It monitors the HA's progress directly. The DH oversees the progress of private hospitals, nursing homes and maternity homes and reports to the HWB. In May 1999, Audit conducted a review to assess whether the HWB has established mechanisms for effectively monitoring the Y2K compliance of NGOs in the health care sector. The following is a summary of the audit observations, recommendations and response from the Administration.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

Accuracy and completeness of inventory

2. From September 1998 to the first quarter of 1999, both the DH and HA had built up an inventory of medical equipment requiring Y2K attention. However, Audit noted that the reported number of systems or equipment requiring Y2K attention fluctuated in the monthly progress reports submitted by the HA and the DH. **The fluctuation could indicate an inaccurate and incomplete inventory upon which the NGOs' rectification work was based. Audit has *recommended* that the HWB should review, with the HA and the DH, the accuracy and completeness of the inventory. The review should also include an assessment of the basic framework in place for taking stock.**

Monitoring of NGOs' Y2K programme in the second half of 1999

3. A monitoring regime which includes a structured approach towards assessing and verifying the progress of the NGOs by the HWB is necessary to manage the impacts from possible Y2K-induced failures. On reviewing the monthly progress reports, Audit noted that 11 pieces of equipment in four NGOs under the purview of the DH would not be Y2K compliant at the end of June 1999. **Audit has *recommended* that the HWB should closely monitor the progress of outstanding rectification work to be performed in the second half of 1999 and take appropriate action, if necessary, to reduce the risks from possible Y2K-induced failures.**

Visits by the ITBB Y2K Task Force

4. The ITBB Y2K Task Force has conducted visits to NGOs to assess their compliance position, progress of compliance work and contingency planning. The Y2K Task Force had a sample of hospitals under the purview of the DH in its visit schedule but not hospitals under the HA's purview. **Audit has *recommended* that the HWB should include hospitals under the HA's purview in the visit schedule of the Y2K Task Force.**

Y2K contingency planning

5. Y2K contingency planning by individual hospitals in the health care sector was progressing well at the time of the audit. While the HA and DH were finalising their Y2K contingency plans, a sector-wide Y2K contingency plan was still outstanding. Upon enquiry, the HWB advised Audit that the sector-wide contingency plan was being formulated for completion by September 1999. **Audit has *recommended* that the HWB should monitor closely the completion of the sector-wide contingency plan and, if possible, bring forward the target completion date for contingency planning.**

RESPONSE FROM THE ADMINISTRATION

6. In her response of August 1999, the **Secretary for Health and Welfare** said that:

(a) ***Inventory (see paragraph 2 above).*** Basic frameworks were already in place for compiling the HA's and NGOs' inventories. While the possibility of inadvertent omissions could not be ruled out, the HWB, HA and DH would minimise the risk of such omissions through contingency planning and risk management measures;

(b) ***Outstanding rectification work (see paragraph 3 above).*** The HWB would continue to closely monitor the work progress and would take appropriate action to minimise the Y2K risks;

(c) ***Visits by the ITBB Y2K Task Force (see paragraph 4 above).*** The HWB would be conducting site visits to HA hospitals to get a better understanding of their Y2K readiness and the Task Force would be invited to join where appropriate; and

(d) ***Contingency planning (see paragraph 5 above).*** The HWB was scrutinising the sample contingency plans submitted by the HA and private hospitals. The HWB was also actively formulating the sector-wide contingency plan in collaboration with the HA, DH and private hospitals with a view to completing the plan by September 1999.

THE TRANSPORT SECTOR

INTRODUCTION

1. The Transport Bureau (TB) is the policy bureau responsible for monitoring the Y2K compliance progress of the transport sector. Audit conducted a review in May 1999 (with a follow-up review in July 1999) to assess whether the TB has established mechanisms for effectively monitoring the Y2K compliance of NGOs in the transport sector. The following is a summary of the audit observations, recommendations and the Administration's response.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

NGOs' Y2K compliance progress

2. As at 15 July 1999, six NGOs were unable to achieve Y2K compliance. According to the TB, most of them were close to completion of their rectification work and the systems not yet rectified were either non-critical or had problems that could be overcome by adjustment measures (e.g. rolling back the system date). The TB assured Audit that it had insisted that all the NGOs should have contingency plans drawn up and tested. The TB also assured Audit that the non-compliance of the six NGOs would not have major implications on public safety during the Y2K rollover. **Audit has *recommended* that the TB should closely monitor the progress of these six NGOs to avoid further slippage and consider taking appropriate actions, including strategic intervention if necessary, to ensure the continued operation of essential services during the transition to year 2000.**

Supervisory controls over NGOs

3. The TB advised Audit that the TB and the Transport Department (TD) had taken various actions to monitor the NGOs' Y2K compliance progress. The TB and TD issued guidelines to transport operators, held regular meetings with them and examined their contingency plans. A Task Force was also established to oversee the Y2K rectification work of government tunnels. Furthermore, government representatives (who were members of the managing boards of the transport operators) received detailed Y2K progress reports and requested the operators to take action if necessary.

4. Notwithstanding the Government's intensified actions since early 1999, Audit noted that both the TB and TD's assessment of the NGOs' Y2K rectification progress was predominantly based on the organisations' self-reported information. At an internal meeting in March 1999, the TD indicated that due to the limitation of expertise and resources, it could only take note of the Y2K status reported by transport operators, and that there was no audit or detailed assessment of the reported information. Audit considers that more needs to be done to obtain added assurance on the NGOs' Y2K rectification progress. **Audit has *recommended* that the TB should consider obtaining and examining supporting evidence (e.g. test plans and test results) from the NGOs to assess their Y2K readiness. In particular, the TB should consider requiring those NGOs which have missed the June 1999 deadline and those with late target compliance dates to provide more information on their action plans (including a time schedule for achieving key milestones of their rectification work) to the TB, so that it can detect possible delays and take follow-up actions at an early date.**

The conduct of on-site examinations by the TB

5. An effective way of assisting NGOs in tackling the Y2K problem is to conduct on-site reviews of the progress of Y2K projects. Audit noted that the TB, in conjunction with the ITBB Y2K Task Force, had plans to visit NGOs. **Given the late target compliance dates of some NGOs, Audit has *recommended* that the TB should conduct the planned visits to the NGOs as soon as practicable and, if necessary, provide assistance and support to enable these NGOs to speed up their Y2K programmes.**

Independent quality assurance

6. Quality assurance involves a structured independent validation and verification of the Y2K rectification work. Audit noted that the approach taken by the TB and TD in obtaining independent quality assurance for the NGOs' Y2K programmes was less structured. The TB and TD's approach was confined to the review of the regular progress reports furnished by the NGOs, the regular meetings with NGOs' senior management and the visits by the ITBB Y2K Task Force. **In view of the criticality of public safety, Audit has *recommended* that the TB should critically consider the need for a more structured independent quality assurance programme on the Y2K readiness of NGOs in the transport sector. In particular, the TB should assess the adequacy of the NGOs' existing independent quality assurance programmes. For those NGOs with inadequate quality assurance programmes, the TB should assess the need to strengthen their programmes. If time or resources do not permit an overall independent quality assurance programme, the TB should urge the NGOs to focus their quality assurance efforts on Y2K contingency planning.**

Business continuity and contingency planning

7. In the July 1999 report to the ITBB, the TB stated that 18 of the 22 NGOs under its purview had adequate contingency plans in place, and that the remaining four NGOs would have their business contingency plans in place in August and September 1999. **Audit has *recommended* that the TB should continue to monitor closely the progress of NGOs in the development of their contingency plans, and examine the NGOs' plans to ensure that they are properly prepared. The TB should also urge those NGOs that have lagged behind to complete their contingency plans as early as possible and, if necessary, provide them with assistance and support to speed up their contingency planning process.**

8. It was the ITBB's target to have the territory-wide contingency plan, which should include all the major sectors, ready by September 1999. In July 1999, the TB was in the process of drawing up a sector-wide contingency plan for the transport sector. **To facilitate the completion of the territory-wide plan on target, Audit has *recommended* that the TB should work closely with the NGOs in the transport sector to ensure that the contingency plan for the sector is thoroughly developed and tested as early as possible.**

RESPONSE FROM THE ADMINISTRATION

9. In his response of September 1999, the **Secretary for Transport** said that he would continue to endeavour to ensure the Y2K compliance of the mission-critical systems of the NGOs in the transport sector. With regard to the audit recommendations, he said that he was not in a position to state whether he could accept all of them. He would consider the recommendations as soon as possible, having regard to their relevance to his goals and the resources available to him.

THE ENERGY SUPPLY SECTOR

INTRODUCTION

1. The Economic Services Bureau (ESB) is the policy bureau responsible for monitoring the Y2K compliance progress of the energy supply sector. Audit conducted a review in June 1999 to assess whether the ESB has established mechanisms for effectively monitoring the Y2K compliance progress of NGOs in the energy supply sector. The following is a summary of the audit observations, recommendations and the Administration's response.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

Supervisory controls over NGOs

2. According to the ESB, as the NGOs in the energy supply sector are not funded or regulated by the Government, the ESB could only rely on their cooperation in providing information on their Y2K compliance progress. Since 1998, the ESB has requested the NGOs to report their progress of compliance and arranged meetings with their CEOs to discuss the progress. To assist the ESB in monitoring the Y2K readiness of the sector, the EMSD conducted site visits to the NGOs and attended the testing of the NGOs' contingency plan.

3. Audit noted that, in the absence of regulatory authority over the NGOs in the energy supply sector, the ESB could only obtain general information on the NGOs' Y2K programmes. **Audit has *recommended* that the ESB should, with the assistance from the EMSD, make continued efforts to monitor the Y2K readiness of the NGOs in the energy supply sector. Audit has also *recommended* that the ESB should encourage the NGOs to provide more detailed information about their Y2K programmes to the Government.**

Procedures for assessing and verifying the NGOs' Y2K compliance progress

4. NGOs in the energy sector, except two oil companies, reported to the ESB that they had achieved 100% compliance by July 1999. The two oil companies were expected to be Y2K compliant by August and September 1999 respectively. Audit noted that the ESB was unable to directly verify the Y2K compliance progress of the NGOs due to the lack of legal access power. It could only assess their Y2K compliance progress through continuous liaison with the NGOs and during the site visits conducted by the EMSD. **Audit has *recommended* that the ESB should urge**

the two NGOs which have not yet achieved 100% compliance to expedite their rectification work. Audit has also *recommended* that the ESB should encourage the NGOs to conduct independent quality assurance reviews of their Y2K programmes and submit the results to the ESB for its review.

NGOs' Y2K contingency plans

5. Audit noted that, while most of the NGOs reported that they had adequate Y2K contingency plans in place in July 1999, one energy supply company advised that its Y2K contingency plan would only be tested in August 1999. In addition, a sector-wide Y2K contingency plan had yet to be formulated to ensure that there would be no disruptions of energy supply to the community. **Audit has *recommended* that the ESB should urge the NGO to complete its Y2K contingency planning as early as possible. The ESB should also monitor the NGO's progress of contingency planning and provide support, if necessary. In addition, the ESB should coordinate with the appropriate NGOs to develop an energy sector-wide contingency plan and to ensure that the plan will be ready and fully tested before year 2000.**

RESPONSE FROM THE ADMINISTRATION

6. In his response of August 1999, the **Secretary for Economic Services** said that there could never be a 100% guarantee that there would be no Y2K-related problem notwithstanding all the advance preparations. All of the currently available information pointed to the conclusion that the NGOs in the energy sector already were, or soon would be, both Y2K compliant and prepared with Y2K contingency plans. With regard to the audit recommendations, he said that:

— ***Controls and procedures (see paragraphs 3 and 4 above).*** He basically accepted the audit recommendations on supervisory controls and on procedures for assessing NGOs' Y2K compliance progress; and

— ***Y2K contingency plans (see paragraph 5 above).*** He had asked the EMSD to evaluate the NGOs' contingency plans and continue to attend drills/testing with a view to flagging up concerns where appropriate. At the request of the ESB, the EMSD was discussing with the power companies the preparation of a sector-wide plan for electricity supply. The ESB would monitor the progress. In addition, the ITBB's territory-wide contingency plan would cover the energy supply sector.

THE FINANCIAL SERVICES SECTOR

INTRODUCTION

1. The Financial Services Bureau (FSB) is the policy bureau responsible for monitoring the Y2K compliance progress of the financial services sector. The Hong Kong Monetary Authority (HKMA), the Securities and Futures Commission (SFC) and the Office of the Commissioner of Insurance (OCI) are, respectively, the regulators of the banking, securities and futures and insurance industries. Audit conducted a review in June 1999 to assess whether the FSB with the regulators have established mechanisms for effectively monitoring the Y2K compliance of organisations in the financial services sector. The following is a summary of the audit observations, recommendations and the Administration's response.

AUDIT OBSERVATIONS AND RECOMMENDATIONS

Monitoring mechanism

2. In March 1998, the Secretary for Financial Services set up the Steering Committee on Year 2000 Compliance in the Financial Services Sector (the FSB Steering Committee) to oversee the sector's efforts in, among other things, ensuring that the core financial infrastructural systems achieve Y2K compliance in time. Membership of the FSB Steering Committee includes representatives from the regulators (i.e. the HKMA, SFC, OCI), the Stock Exchange of Hong Kong Limited (SEHK), the Hong Kong Futures Exchange Limited (HKFE), the Hong Kong Interbank Clearing Limited (HKICL) and the Hong Kong Securities Clearing Company Limited (HKSCC). To better coordinate and facilitate the progress of the Y2K work of the different industries in the financial services sector, three subcommittees were set up under the FSB Steering Committee, namely the Banking Subcommittee, the Securities and Futures Subcommittee, and the Utilities and Facilities Subcommittee.

3. Each institution is responsible for ensuring its readiness for Y2K. The regulators, in addition to managing their own Y2K programmes, also monitor the progress of the institutions under their supervision. Since May 1998, the HKMA, SFC, OCI, SEHK, HKFE, HKICL and HKSCC (the seven reporting organisations) were required to submit regular reports on the Y2K compliance progress of themselves and the institutions under their supervision to the FSB.

Supervisory measures taken by the regulators

4. The HKMA, SFC and OCI have taken various supervisory measures to monitor the Y2K compliance progress of the regulated institutions. These include conducting surveys, on-site inspections and regular reporting of progress. From the three regulators' monthly progress reports to the FSB, Audit noted that the results of the on-site examinations were not mentioned. **Audit has *recommended* that the FSB should ascertain from the HKMA, SFC and OCI the results of their on-site examinations and follow-up actions, in order to obtain added assurance that the regulated institutions had taken reasonable and prudent steps to address the Y2K problem.**

Y2K readiness of the financial services sector

5. Audit noted that, by December 1998, the HKMA, SFC, SEHK, HKFE, HKICL and HKSCC had achieved Y2K compliance. The OCI achieved Y2K compliance by March 1999. By June 1999, most of the regulated institutions in the financial services sector reported that their mission-critical systems were Y2K compliant. However, about 40 registered intermediaries (RIs) under the direct supervision of the SFC reported that they could only achieve Y2K compliance in the second half of 1999. Also, as at June 1999, six months after the deadline of December 1998 set by the OCI, some 12% of the insurance brokers still could not achieve Y2K compliance. The SFC and the OCI have advised the FSB that the non-compliant RIs and insurance brokers are not considered to pose a threat to market integrity or investor protection. **Audit has *recommended* that the FSB should urge the SFC and the OCI to ascertain the reasons why some of the regulated institutions in their respective industries still cannot achieve Y2K compliance and to offer them help and guidance to achieve compliance as early as possible.**

Consultancy review on external testing activities for major shared financial systems

6. Because of the high degree of interdependency among institutions, there is a need for conducting external end-to-end testing on an industry-wide basis. By June 1999, Audit noted that the HKICL, SEHK, HKFE and HKSCC had conducted several rounds of external end-to-end testing of their major shared financial systems. No major Y2K exceptions were encountered during the tests.

7. In April 1999, the FSB Steering Committee appointed an external consultant to review the adequacy and thoroughness of the Y2K external testing activities for the major shared financial systems, including those systems not operated by the HKICL, SEHK, HKFE and HKSCC. It was

scheduled that the consultant would deliver a final report in early August 1999. **To allow timely actions to be taken on the outcome of the consultancy review, Audit has *recommended* that the FSB should closely monitor the progress of the review to ensure that it is completed on schedule.**

Y2K contingency planning in the financial services sector

8. Audit noted that by March 1999, the seven reporting organisations had completed their own high level contingency plans. The regulated institutions were required to complete their individual contingency plans by June 1999. The deadline for regulated institutions in the securities and futures industry was subsequently extended to the end of August 1999. At the sector-wide level, the FSB was coordinating, with the assistance of an external consultant (the same consultant as referred to in paragraph 7 above), the development of a detailed Y2K contingency plan for the financial services sector as a whole. The target was to complete the sector-wide contingency plan and the necessary rehearsals by early September 1999.

9. Audit noted the efforts of the FSB and the seven reporting organisations in the Y2K contingency planning for the financial services sector. In the remaining months to year 2000, they would need to continue to develop, refine and complete the detailed contingency plans. **Audit has *recommended* that the FSB should:**

- **in conjunction with the regulators, closely monitor the regulated institutions' progress of contingency planning and make continued efforts to ensure that the institutions complete their contingency planning in time;**

- **urge the seven reporting organisations to continue to test and refine their own contingency plans and to make adequate rehearsal arrangements;**

- **closely monitor the progress of the consultancy review on the development of the sector-wide contingency plan, so as to ensure that the review is completed on schedule to allow timely actions to be taken on the outcome of the review; and**

- **continue with the efforts to minimise the risk and possible impact of Y2K-induced failures for the financial services sector.**

RESPONSE FROM THE ADMINISTRATON

10. The **Secretary for Financial Services**, in his response in August 1999, said that he accepted all the audit recommendations and had taken measures to implement them as a matter of priority. He had taken the Y2K problem most seriously and had adopted a cautious and best-effort approach to tackle it. He also said that:

— ***Results of on-site examinations (see paragraph 4 above).*** He had written to the regulators asking them to provide the FSB with the latest updates on the results of the on-site examinations and the follow-up work required;

— ***Readiness of RIs and insurance brokers (see paragraph 5 above).*** He had written to the SFC to seek its advice on the specific reasons for the RIs' delay in achieving compliance and the assistance which the SFC might offer them. With regard to the insurance brokers, the OCI had warned the two self-regulatory broker bodies (Note 14) that their members were required to achieve compliance by September 1999 or interventionary actions might be taken on them;

— ***Consultancy review on external testing activities (see paragraph 7 above).*** The FSB had set up a working group to closely monitor the progress of the consultancy review to ensure that the consultancy review was completed as quickly as possible; and

— ***Y2K contingency planning (see paragraph 9 above).*** At the institutional level, he had asked the financial regulators and the two Exchanges to provide, starting from July 1999, monthly updates on the progress of Y2K contingency planning work by the financial institutions under their respective supervision. At the sector-wide level, contingency planning work was in progress. With the setting up of the working group to monitor the progress of the consultancy review, he was confident that the sector-wide contingency plan would be rehearsed, improved and firmly put in place before the millennium.

Note 14: *Insurance brokers are not directly supervised by the OCI. They are supervised by two self-regulatory broker bodies under the OCI's delegated authority.*

Acronyms and abbreviations

AA	Airport Authority
ACS	access control system
ATC	Air traffic control
CAD	Civil Aviation Department
CCC	Central Computer Centre
CEOs	Chief Executive Officers
DH	Department of Health
EMSD	Electrical and Mechanical Services Department
ESB	Economic Services Bureau
FSB	Financial Services Bureau
GAO	General Accounting Office
GIA	Group Internal Audit
HA	Hospital Authority
HD	Housing Department
HKFE	Hong Kong Futures Exchange Limited
HKICL	Hong Kong Interbank Clearing Limited
HKMA	Hong Kong Monetary Authority
HKPC	Hong Kong Productivity Council
HKSCC	Hong Kong Securities Clearing Company Limited
HWB	Health and Welfare Bureau
IA	Internal Audit Section
IATA	International Air Transport Association
ICAO	International Civil Aviation Organisation
Imm D	Immigration Department
IS(SP)	Information Systems (Special Project)

IT	Information technology
ITBB	Information Technology and Broadcasting Bureau
ITSD	Information Technology Services Department
IVRS	Interactive voice response system
NGOs	Non-government organisations
OCI	Office of the Commissioner of Insurance
OFTA	Office of the Telecommunications Authority
OMB	Office of Management and Budget
PABX	Public automatic branch exchange
PAC	Public Accounts Committee
PHS	Pharmaceutical Supplies System
Police	Hong Kong Police Force
RCCBS	Regional Council's Computerised Booking System
RIs	Registered intermediaries
RSD	Regional Services Department
SEHK	Stock Exchange of Hong Kong Limited
SFC	Securities and Futures Commission
SMEs	Small and medium-sized enterprises
Steering Committee	Steering Committee on Year 2000 Compliance
TB	Transport Bureau
TD	Transport Department
UK	United Kingdom
US	United States
Y2K	Year 2000
Y2K programme	Y2K compliance programme
Y2KCC	Y2K Coordinating Centre