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**Review of the Departmental
Leave Information Management System
(LIMS)**

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Audit and Review

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Table of Contents

Executive Summary	1
1.1 Accomplishment of established objectives and goals for the system	2
1.2 Adequacy and effectiveness of the internal controls	2
1.2.1 Security Framework	2
1.2.2 Program Change management	3
1.3 Reliability and integrity of data	3
1.4 Compliance with Policies and procedures	3
1 Introduction	5
1.1 Authority for the Project	5
1.2 Objectives	5
1.3 Scope	5
1.4 Background	5
2 Issues Examined	7
2.1 Accomplishment of established goals and objectives	7
2.2 Adequacy and effectiveness of internal controls	7
2.3 Reliability and integrity of information	7
2.4 Compliance with Policies and procedures	7
3 Findings, Conclusions and Recommendations	8
3.1 Accomplishment of established goals and objectives	8
3.1.1 Comparison to original requirements	8
3.1.2 Ease of Use and Functionality	8
3.1.3 Management Reports	8
3.1.4 User Support	9
3.2 Adequacy and effectiveness of internal Controls	10
3.2.1 Security framework over LIMS application	11
3.2.2 LIMS recovery/backup process	12
3.2.3 Program Change Management	12
3.3 Reliability and integrity of data	13
3.3.1 Control framework data entry/ processing	13
3.3.2 Year 2000 readiness	13
3.4 Policies and procedures	14
3.4.1 Compliance to central agency/ departmental policies	14
3.4.2 Security Policies and Procedures	14

Executive Summary

Authority for the Project

The audit of the Leave Information Management System (LIMS) was identified in a review of work in progress and a determination that ARB had the capacity to undertake additional audit work in the 1998/99 fiscal year.

Objectives

To assess the adequacy of the management control framework for LIMS. The management control framework consists of those practices and systems for planning, execution and evaluation of activities that provide reasonable assurance that the specific objectives of the system have been achieved.

Scope

The review examined and evaluated the:

- adequacy and effectiveness of internal control;
- reliability and integrity of information;
- compliance with policies, procedures and regulations; and
- accomplishment of established objectives and goals for the system

The review was conducted in the National Capital Area.

Background

In 1996 PWGSC introduced an e-mail enabled Windows electronic application for the submitting, authorizing and reporting leave within the department. This application, LIMS, provides both managers and employees with on-line access to their specific leave history and balances, as well as, a mechanism to electronically review and approve leave requests to transfer information eliminating the need for paper. An electronic link between LIMS and the Human Resources Information System (HRMS) was established.

Key Findings

1.1 Accomplishment of established objectives and goals for the system

The majority of departmental employees and managers interviewed indicated a very high level of satisfaction with the LIMS application in terms of its functionality and effectiveness in tracking and providing leave information. Specific examples of the systems effectiveness included: forms reduction, ease of usage, currency of leave data and the ability to track and view leave occurrences over an extended period without requiring the assistance of compensation specialists. The system is also very easy to understand and in most cases employee indicated that they could operate it with minimal training.

Nearly all expected benefits of the system have been realized. Eighty two percent of departmental employees are using the LIMS application and an addition three hundred employees in Consulting and Audit Canada are slated to come on stream in June 1999. Certain departmental employees, such as the General Labour and Trades group, which do not have regular access to computers will continue to submit leave forms. As well, leave submission requiring pay calculations and leave without pay transactions are excluded from the system.

The application is also generating significant interest in other departments. Currently the Canadian Information Office (CIO), the Canadian Space Agency and the Economic Agency for Regional Development in Quebec have adopted LIMS. It is expected that the Public Service Commission and the Parliamentary Group will implement the system before the end of 1999.

1.2 Adequacy and effectiveness of the internal controls

1.2.1 Security Framework

User security profiles, consisting of an authorized user ID and password combination, provides two levels of identification and determines the information that can be accessed and types of functions that can be perform within the application. There are three levels of access (profiles): employee, manager and compensation specialist. One individual, the LIMS administrator, is responsible for these profiles and controls any modifications to their structure, release or deletion.

The audit noted that while there is a basic security framework in place, it is compromised by the lack of an overall security strategy/plan, informal procedures for requesting changes in security profiles and passwords, inadequate tools to monitor LIMS security, poorly documented security responsibilities, the need for formal security training for the LIMS Administrator, and inadequate application of desktop security guidelines, procedures and practices within the Human Relations and Compensation area.

The LIMS security framework could be strengthened by addressing the outstanding security issues that were identified in the Threat and Risk Assessment Report completed in 1997.

1.2.2 Program Change management

A framework is in place to manage changes to the LIMS application.

The overall management of system changes could be enhanced through a more comprehensive documentation of system changes and acceptance testing activities and the development of monitoring and audit tests to detect unauthorized changes to the application.

1.3 Reliability and integrity of data

Tests conducted to determine the effectiveness of the input control framework indicated that it was operating as designed, however, areas that could have a potential negative impact on the integrity of data in the LIMS application were identified including:

- little quality control on the input of leave forms submitted to and entered by Compensation Advisors;
- inadequate controls to restrict access to data in the production database by system maintenance and support personnel; and
- an absence of a comprehensive monitoring and or audit program to systematically verify the integrity of LIMS data.

Data integrity controls could be strengthened with the development of tests to verify the correctness and accuracy of system data on the entire client base as opposed to the ad-hoc sample testing on selected users and data fields currently being done.

1.4 Compliance with Policies and procedures

The LIMS application conforms with the general government practices relating to leave administration. The system is capable of generating annual leave information on all employees and producing required year end Treasury Board Secretariat reports. The system maintains leave records over a two year period as is required by the Public Service Compensation Act.

Recommendation¹

It is recommended that:

1. *The ADM, Human Resources Branch, with the participation of related GTIS areas such as Information Technology Security Directorate, ensure that security issues including those raised in the Threat and Risk Assessment, 1997 are fully addressed.*
2. *The, ADM, Human Resources Branch, ensure the development and implementation of a formal and documented process for the management of LIMS program changes and acceptance testing.*

¹ Additional recommendations addressed to the Director, Human Relations and Compensation Group and the LIMS Administrator are included in the body of this report only.

1 Introduction

1.1 Authority for the Project

The audit of the Leave Information Management System (LIMS) was identified in a review of work in progress and a determination that ARB had the capacity to undertake additional audit work in the 1998/99 fiscal year.

1.2 Objectives

To assess the adequacy of the management control framework for LIMS. The management control framework consists of those practices and systems for planning, execution and evaluation of activities that provide reasonable assurance that the specific objectives of the system have been achieved.

1.3 Scope

The review will examine and evaluate the:

- adequacy and effectiveness of internal control;
- reliability and integrity of information;
- compliance with policies, procedures and regulations; and
- accomplishment of established objectives and goals for the system.

The review will be conducted in the National Capital Area.

1.4 Background

In 1992 the Treasury Board Secretariat initiated a project across the public service to examine and seek major productivity improvements in the area of administrative services. A thirty percent reduction in resource levels dedicated to the compensation function was to be achieved over a five year period, (1994/95 to 1998/99).

As a departmental response to this initiative, and other pressures to achieve significant savings, nineteen Human Resource priorities were identified and an action plan was developed to meet the challenges of managing it's human resource base more effectively. These developments resulted in the department selecting and defining areas for future process redesign, and identifying key potential opportunities for transforming the delivery of compensation services. The results of this analysis were documented in the Re-engineering of Compensation, Scoping and Targeting Report released in February 1994.

The next stage in this undertaking was the Process Design phase. Recommendations on how to modify the areas selected in the Scoping and Targeting Report were prepared and implementation plans were drafted. The recommendations were presented for approval to the Departmental Executive Committee in March 1994 and incorporated into the Departmental

1998-720 Review of the Departmental Leave Information Management System (LIMS)

Migration Plan which addressed the process redesign activities of the newly created PWGSC entity. The final Re-engineering of Compensation, Process Design Document, issued August 1994, clearly identified that the leave requesting process would be automated.

A structured approach to system development was followed. System requirements were defined, goals and objectives were established, hardware and software requirements were identified and a system architecture was outlined. Staff were seconded from the Human Resources Branch Compensation Group to help define the system requirements related to various collective agreements and the Public Service Compensation Act. The project was submitted to the Business Information Technology Committee (BITASC) for review and to the Information Management Committee (IMC) for final approval and sign-off prior to development (March 1995).

LIMS is an e-mail enabled, Windows application, for the submitting, authorizing and reporting of leave occurrences. It provides both managers and employees with on-line access to their specific leave history and balances and a mechanism to electronically review and approve leave requests. It was first introduced as a two month pilot in the Spring 1996 and is now in its third release in full production. A fourth release of the application is slated to be rolled out in May 1999. An electronic link between LIMS and the Human Resources Information System (HRMS) dramatically reduces duplicate data entry and the volume of paper forms.

The e-mail function of LIMS has been temporarily disengaged (August 1998), pending the completion of the Office Infrastructure Renewal project and the replacement of mail and messaging software within the department.

The application is generating significant interest in other departments. Currently the Canadian Information Office (CIO), the Canadian Space Agency and the Economic Agency for Regional Development in Quebec have adopted LIMS. It is expected that the Public Service Commission and the Parliamentary Group will implement the system before the end of 1999.

2 Issues Examined

Within the broadly defined scope areas of this review, specific issues were examined to assess the internal managerial and administrative controls that impact upon the LIMS application. These issues are outlined below:

2.1 Accomplishment of established goals and objectives

- Comparison to original requirements
- Ease of use and functionality
- Management reports
- User Support
 - Training
 - Help Desk
 - Communications

2.2 Adequacy and effectiveness of internal controls

- Security framework over LIMS application
- LIMS recovery/backup process
- Program Change Management

2.3 Reliability and integrity of information

- Control framework data entry/ processing
- Year 2000 readiness
- Framework to maintain data integrity

2.4 Compliance with Policies and procedures

- Compliance to central agency/ departmental policies
- Security Policies and Procedures

3 Findings, Conclusions and Recommendations

Nearly all expected benefits of the system have been realized. Eighty two percent of departmental employees are using the LIMS application and an addition three hundred employees in Consulting and Audit Canada are slated to come on stream in June 1999. Certain departmental employees, such as the General Labour and Trades group, which do not have regular access to computers will continue to submit leave forms. As well, leave submission requiring pay calculations and leave without pay transactions are excluded from the system.

3.1 Accomplishment of established goals and objectives

3.1.1 Comparison to original requirements

It was not possible to identify the LIMS application planning strategy in the Departmental Migration Plan per-se, however, there is considerable documentation related to the Treasury Board Compensation Restructuring initiative. Internal departmental documents, as outlined in the Background Section of this report, clearly establish that an automated leave information system was to be established as part of the comprehensive re-engineering of all compensation services.

There was no documentation available to clearly demonstrate that the system had been reviewed against the original objective and goals that were identified. There was, however, evidence that the system analysts were continually checking the application for system problems and issues identified by system users.

3.1.2 Ease of Use and Functionality

Through our interviews with users, managers, compensation specialists and administrators, it was apparent that the functionality of the application met users needs and expectations. Users indicated that the application was very easy to use and required only minimal training and exposure to operate quickly. Audit test conducted on the application confirmed users comments.

The e-mail function of LIMS has been temporarily deactivated pending changes to the electronic mail and messaging process in PWGSC. This functionality should be reinstated as soon as it is feasible.

3.1.3 Management Reports

Managerial reports as described in the LIMS Operations Manual can be produced with no difficulty.

3.1.4 User Support

The review of user support services was focused on three areas: the LIMS training, Help-desk services, and the LIMS communication strategy. Each area will be commented upon separately.

LIMS training

With the announcement in June 1996 that LIMS would be made available to PWGSC organizations and individuals, a roll out, implementation and training plan was developed by the Compensation Group. Non-compulsory training sessions were provided to managers and employees of participating organizations. Each session consisted of a two hour demonstration of the application's functionality and user benefits. Over seventy percent of the department's employees participated in these sessions from June 1996 to March 1997.

To supplement the training sessions and to eliminate the necessity of further training sessions, information bulletins (both electronic and hard copy) were developed and distributed to all employees. Quick Reference Cards were designed to comprehensively walk a user through the application and are provided to all new employees as part of the orientation process.

Our interviews with departmental application users identified that employees were quite satisfied with the initial training provided. Several employees indicated that the application was so easy to use and comprehend, they felt extensive training beyond the initial offering was simply not required.

Help-Desk services

The Compensation Group, who has responsibility for the LIMS application, provides a bilingual Help-Desk service to all departmental users of the system both at headquarters and in the regions. Initially the Help-Desk received about sixty calls per day, according to logs that were maintained, however, this number has now declined to about fifteen calls daily. A manual log of calls, callers, times and assistance requested has been maintained for the entire period the system has been operational. The Help-Desk is able to respond to most calls within a twenty four hour period, meeting the standard that Compensation established for the function. There are no desk procedures for managing calls.

The current practice of recording all calls manually, diminishes the overall benefits that could be derived from the Help-Desk service. Further, there is no evidence that the logs have been systematically reviewed or analysed for application or system deficiencies.

The risks associated with not having an adequate mechanism to manage problems can result in:

- inadequate corrective action, allowing the problem to recur and possibly requiring action to be taken in crisis mode;
- failure to recognize the true source of the problem and only fixing symptoms; and
- inadequate metrics to support system analysis and management.

The management of the Help Desk could be more effective by implementing an automated approach to the recording and tracking of calls. In addition, an automated system would enable the information to be analyzed and used to assist in the preparation of system enhancements.

LIMS communications

LIMS communication to users has consisted of a series of bulletins announcing system revisions and new releases, as well as, e-mail and broadcast notices made from time to time. The Help-Desk assistant maintains a record of information releases and general announcements of system updates and minor revisions.

While most departmental users interviewed indicated that information and communication related to the LIMS application adequately met their needs, they felt that their ability to suggest system changes or modifications could be improved. Employees and managers were unaware of any process to explore or present suggestions for application modification or improvement.

Recommendations

It is recommended that:

1. *The LIMS administrator and the LIMS project manager, prepare desk top procedures and automate the Help Desk function to facilitate the capture of information now being processed manually.*
2. *The Director of the Human Relations and Compensation Group, implement a methodology and communication process to support feedback and system change proposals from system users.*

3.2 Adequacy and effectiveness of internal Controls

The review of internal controls over the LIMS application was focused in four areas: the security framework, recovery and back-up processes, the system for managing change to the application, and the control framework over the entry and processing of data.

3.2.1 Security framework over LIMS application

User security profiles, consisting of an authorized user ID and password combination, provides two levels of identification and determines the information that can be accessed and types of functions that can be performed within the application. There are three levels of access (profiles): employee, manager and compensation specialist. One individual, the LIMS administrator, is responsible for these profiles and controls any modifications to their structure, release or deletion.

The security features of log-on passwords, twenty minute log-off with inactivity, user data access profiles and transaction logging against a user account are basic and provide a degree of protection. Unfortunately, these measures are being somewhat compromised by practices that were noted during the review including:

- a LIMS Threat and Risk Assessment (TRA) produced in March 1997 which contain several recommendations to reduce security risks has not been adequately addressed;
- there is no overall security strategy/plan in place to provide a proactive focus on LIMS security activities;
- informal procedures are in place for requesting a change in security profiles and passwords;
- tools needed to monitor LIMS security are not adequate;
- security responsibilities of the LIMS administrator have not been adequately documented;
- the LIMS Administrator has not had formal system security training;
- topics relating to LIMS security are not adequately addressed in user training and documentation;
- there is no mandatory requirement to change user passwords on a regular basis; and
- inadequate application of desktop security guidelines, procedures and practices within the Human Relations and Compensation area.

The LIMS security framework could be strengthened by addressing the outstanding security issues that were identified in the Threat Risk Assessment Report completed in 1997.

3.2.2 LIMS recovery/backup process

Currently there is no formal backup and restore strategy that is specific to the LIMS application. There are, however, general standards for backing-up and restoring Oracle databases and these processes are being applied to LIMS. Network Operating System personnel perform incremental daily backups and full database backups are done daily by the Oracle Database Administrator. As a result, there is assurance that the LIMS database is being systematically backed up. The auditors noted that the LIMS database had been successfully restored within the past year.

3.2.3 Program Change Management

A framework is in place to manage changes to the LIMS application, however, the review team identified the following deficiencies:

- inadequate control of program changes introduced after user acceptance testing has commenced;
- insufficient documentation of the nature and extent of test performed on system changes; and
- lack of a comprehensive method of monitoring for unauthorized change into the LIMS production environment.

The overall management of system changes could be enhanced through more complete documentation of system changes and the introduction of a more formal/structured change management process.

Recommendations

It is recommended that:

1. *The ADM, Human Resources Branch, with the participation of related GTIS areas such as Information Technology Security Directorate, ensure that security issues including those raised in the Threat and Risk Assessment, 1997 are fully addressed.*
2. *The, ADM, Human Resources Branch, ensure the development and implementation of a formal and documented process for the management of LIMS program changes and acceptance testing.*
3. *The Director of the Human Relations and Compensation Group, ensure that the LIMS administrator is provided with adequate training in system security and application database management.*

3.3 Reliability and integrity of data

3.3.1 Control framework data entry/ processing

Tests were conducted to determine the effectiveness of the input controls indicated that the framework was operating as designed. Users profiles control the access rights and functions available to employees and managers. Business rules imbedded in the system guide the preparation of leave forms and indicate when an error has been made.

There are, however, areas related to access by privileged users that could have a potential negative impact on the integrity of data in the LIMS application including:

- little quality control on the input of leave forms submitted to and entered by Compensation Advisors;
- inadequate controls to restrict access to the production database by system maintenance and support; and
- an absence of a comprehensive monitoring and or audit program to systematically verify the integrity of LIMS data.

Data integrity controls could be strengthened with the development of tests to verify the correctness and accuracy of system data on the entire client base as opposed to the ad-hoc sample testing on selected users and data fields currently being done. Systematic testing of the database would also provide some assurance that personnel who currently have access to the database are not making changes that could go undetected in the current production environment.

3.3.2 Year 2000 readiness

As of this review the LIMS application had undergone the first two levels of compliance validation for Year 2000 preparation. Validation levels 1a and 1b checklists had been completed and signed. Testing and accreditation in the compliant Year 2000 Test Laboratory has not started, scheduled for June 1999. Although the application is not rated as Mission Critical, it is a PWGSC high priority and as such should be accredited as soon as possible.

3.4 Policies and procedures

3.4.1 Compliance to central agency/ departmental policies

The LIMS application conforms with the general government practices relating to leave administration. The system is capable of generating annual leave information on all employees and producing required year end Treasury Board Secretariat reports. The system maintains leave records over a two year period as is required by the Public Service Compensation Act. As indicate, LIMS is electronic linked to the Human Resources Information System (HRMS).

3.4.2 Security Policies and Procedures

As indicated above, there are areas where LIMS does not conform adequately with government security policy and procedures as outlined in the Technical Security Standards for Information Technology and the Small Systems Security Guidelines, as well as, PWGSC Security policies, procedures and practices. It should be noted, that in general, LIMS encompasses the security requirements identified for the paper based system is replaces.