Newfoundland & Labrador
PUBLIC HEALTH LABORATORY

Laboratory Medicine Program
Eastern Health

ANNUAL REPORT 2012-2013

MESSAGE FROM THE INTERIM ADVISOR

On behalf of the Public Health Laboratory (PHL), I am pleased to submit the 2012-2013 Annual Report to the Minister of the Department of Health and Community Services (DHCS). In keeping with the *Transparency and Accountability Act*, the PHL has been assigned category 2 status and is expected to develop business plans and reports. This report focuses on the progress made on the key issues identified in the 2011-2014 Business Plan as part of our commitment to ensure best practices and the highest level of integrity of our services. Our report also focuses on the progress made over the last fiscal year and key issues identified in our past annual reports in keeping with government's strategic directions. As Interim Advisor, I am accountable for the actual results reported in this document.

This year has led to some important changes to the administrative and reporting structure of the PHL. We began April 2012 as a division of the DHCS, and in an effort to clarify the reporting structure and to increase efficiencies, ended the fiscal year as part of Eastern Health. Due to this change, this will be the last annual report submitted by the PHL. In the future, the performance of the PHL will be reported within Eastern Health's annual performance report. In addition, the PHL has also experienced senior staffing changes.

Despite these changes, we have maintained our focus on quality and accountability. We have continued to restructure operations of the laboratory to position ourselves with enhanced focus on surveillance and outbreak response while maintaining our ongoing emphasis on acute patient care and population health needs as a priority. The PHL made significant investments in quality assurance practices and strived to provide high quality services to all our clients during the fiscal year. We have enhanced communicable disease surveillance and outbreak response capacity as part of our commitment to ensure the health of the people of our Province.

Throughout the year, our laboratory staff have continued to serve the people of Newfoundland and Labrador with a positive attitude, dedication and hard work, and we are proud of their resilience and commitment.

Dr. Sam Ratnam
Interim Advisor, NL Public Health Laboratory

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1. INTRODUCTION

Historically, the Public Health Laboratory (PHL) has played a leading role in provincial health through its contributions to acute care, communicable disease detection, prevention and control, surveillance activities, and research. PHL services are an integral component of the Public Health program in the province of Newfoundland and Labrador. Effective and timely patient care and public health responses depend on this critical role played by the PHL. Over the years the PHL has continued to be a key player, both provincially and federally, in various areas including routine and specialized diagnostic services, outbreak response, diagnostic test development and research, pandemic planning, and water safety.

This report documents the progress made on key issues identified in the 2011-2014 PHL Business Plan. The PHL Annual Report has been prepared under government's accountability measures as defined in *The Transparency and Accountability Act,* and is based on the 2011 - 2014 Business Plan. The 2012-2013 Annual Report demonstrates the commitment of the PHL to ensure the effective realization of its Core Functions and that all associated efforts reflect the values and principles of the organization while pursuing standards of excellence for all of its operations.

2.1 The Provincial Public Health Laboratory, Overview

The PHL has operated as a Division of the Department of Health and Community Services (DHCS) with financial, human resources, purchasing and infrastructure support provided by Eastern Health for many decades. In January 2013, the PHL was integrated with Eastern Health under its Laboratory Service program. Due to this change, this will be the last annual report submitted by the PHL. In the future, the performance of the PHL will be reported within Eastern Health's annual performance report.

The mandate of the PHL is at the population health level, supporting other related Divisions within government protecting and promoting the health and wellbeing of Newfoundlanders and Labradorians. The PHL's organizational structure assures ability to respond to emerging threats from any community within our Province, to proactively monitor and coordinate outbreak support, and to generate critical surveillance data. In addition to the provincial protection functions, the PHL provides specialized testing services for diseases where current Regional Health Authority capabilities are not available. This is to ensure equitable access for all communities throughout the province to sophisticated laboratory technology.

The PHL consists of the specialized service sections as shown at right. The PHL is supported by the **Purchasing and Inventory** section. The **Client Services**

section is responsible for interacting with all PHL clients from data entry operations to communications with healthcare providers and contacting physicians with critical results. The new **Molecular Epidemiology** laboratory allows for genetic fingerprinting analysis to assist the province in outbreak investigations and disease surveillance.

2.2 Core Functions

The PHL is an integral component of Newfoundland and Labrador's public health system. Linked to all sectors of the public health infrastructure such as disease control and prevention, environmental health, epidemiology, emergency preparedness and response, the PHL provides early detection of health risks associated with infectious agents, compiles data in support of outbreak investigations and identifies causative agents of infections and diseases to aid in treatment and prevention. The PHL offers the science and resources needed to promote and protect the health of our communities.

2.3 Contributing to Public Health Services

Significant contributions to public health services are delivered exclusively by the PHL; these contributions are delivered through PHL core functions in support of the DHCS mandate. A summary of PHL services is provided in Appendix A.

2.4 Mandate Supported

The mandate of the DHCS[1] is supported by ten PHL services that are delivered through the ten Core Functions.

Mandates of the DHCS supported by the PHL

1	**The Preservation and Promotion of Health**
2	**The Prevention and Control of Disease**
3	**Public Health and the Enforcement of Public Health Standards**
4	**Health Professional Education and Training Programs**
5	**The Control, Possession, Handling, Keeping and Sale of Food and Drugs**

[1] Mandate sourced from the *Executive Council Act*, Regulation 82/03

2.5 Lines of Business

2.5.1 Public health surveillance

- Developing and executing communicable disease surveillance
- Antimicrobial resistance surveillance
- Communicable disease outbreak investigations, including strain typing
- Data analysis for policy development and provincial guidelines

2.5.2 Reference service & support to regional microbiology laboratories

- Centre of expertise in disciplines of bacteriology, virology, parasitology, molecular microbiology, serology, and mycobacteriology
- Provide specialized testing for low-incidence, high-risk diseases
- Maintain the Biosafety level III laboratory for high-risk pathogen containment (e.g. tuberculosis, avian influenza, SARS, anthrax, etc.) and bioterrorism preparedness
- Antimicrobial susceptibility testing reference service

2.5.3 Environmental health monitoring

- Monitoring of municipal, rural, private-well, and recreational water quality
- Investigating and surveillance of environmental microbial contamination events

2.5.4 Food and dairy safety

- Investigate food and food purveyor related disease outbreaks
- Monitoring of dairy product microbial safety

2.5.5 Federal-Provincial-Territorial representation

- Represents the province at Federal-Provincial-Territorial committees, working- and advisory groups related to clinical and public health laboratory services
- Represents the province at public health networking groups involved with human, food, agriculture, veterinary and environmental health
- Acts as conduit for Provincial, National and International public health standards, committees and groups to regional microbiology laboratories; ensuring compliance and best practice in Newfoundland and Labrador

2.6 Resources

2.6.1 Human Resources

The services of the PHL during 2012-2013 fiscal year were provided by 28 full time employees, comprising 5 NAPE HS (Newfoundland & Labrador Association of Public and Private Employees, Hospital Support) staff, 15 NAPE LX (Laboratory and X-ray) staff, 1 Director, 6 Management, and 1 Non-union, Non-management staff members.

2.6.2 Budget

Item	$	Percent of Global
Wages and Benefits	2,123,085	45%
Laboratory Supplies	1,996,315	42%
Professional Fees	172,300	4%
Operating Supplies	184,400	4%
Repairs and Maintenance	102,800	2%
Travel	60,800	1%
Printing, Stationary, and Office	26,600	1%
Minor Equipment	79,300	2%
ANNUAL BUDGET	4,745,600	100%

The PHL ended the 2012-13 fiscal year in a **($176,481)** deficit position, largely related to costs associated with compensation and supplies, due to a 1.8 times increase in influenza testing during the flu season, processing changes and equipment and procedure validations.

3.0 SHARED PARTNERSHIPS

Stakeholder partnerships assure continuity of the PHL's contributions to Provincial Government's strategic directions, aimed at improving population health, improving accessibility to priority services, and ensuring accountability and stability of health and community services. The PHL received support in the areas of Human Resources; Occupational Health, Safety and Rehabilitation; Infrastructure Support (Dr. L.A. Miller Centre); BioMedical Services; Purchasing and various other collaborations. The laboratory relies on other organizations to set standards and regulations, enforce them, provide training for both the current and potential workforce, and to do the clinical and environmental work that results in requests for laboratory services.

The details of our partnerships can be found in **PHL Services Cross-walk (Appendix A)**.

4.0 HIGHLIGHTS AND ACCOMPLISHMENTS

The highlights and accomplishments during 2012/13 outlines PHL activities that support the Government's strategic directions aimed at improving population health, improving accessibility to priority services, and ensuring accountability and stability of health and community services.

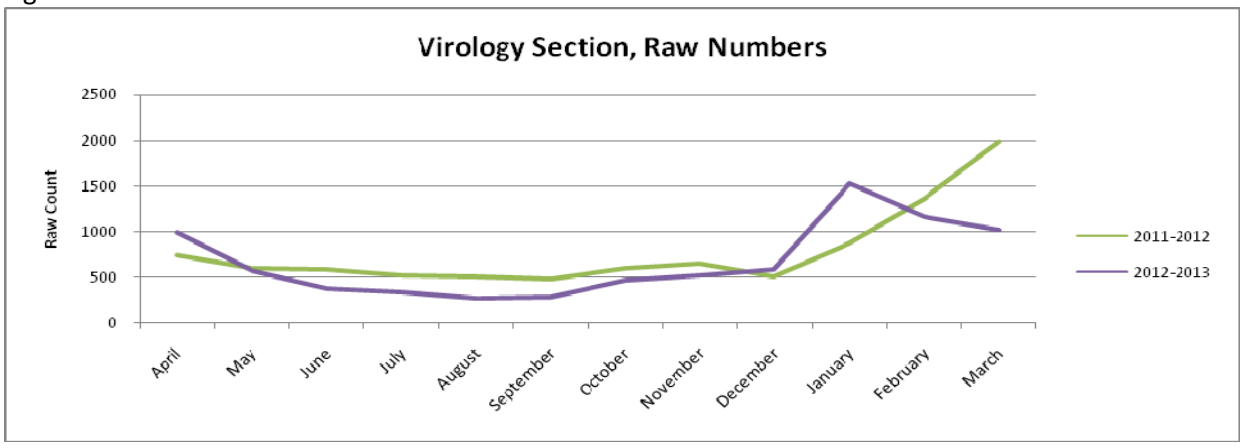
4.1 Initial Processing

The Initial Processing (IP) Laboratory received all the clinical specimens; ensured they were entered correctly in the laboratory information system (LIS) and sorted according to tests, labeled and processed before being delivered to the specialized laboratories at the PHL. Processing included the pre-analytical steps in testing such as viral culture inoculation, nucleic acid extraction, serum and plasma sorting, stool processing for ova and parasite exams, fungal culture and microscopy processing, etc. The IP laboratory was staffed by 2 employees with additional support from casual employees. Together, the IP laboratory processed 82,804 individual samples in 2012-2013. This represented approximately 226 samples per day.

4.2 Virology

The Virology Laboratory isolates and identifies viruses from various clinical specimens using specialized human cell lines and monoclonal antibodies to detect and identify viruses. In addition, the laboratory performs verotoxin testing for E.coli. The Virology laboratory is staffed by one bench technologist I and a shared lead technologist II to oversee quality and training. The virology laboratory performed 8,141 tests during the 2012-2013 year, (Figure 1) which is down from 9,469 in 2011-2012.

Figure 1[2].



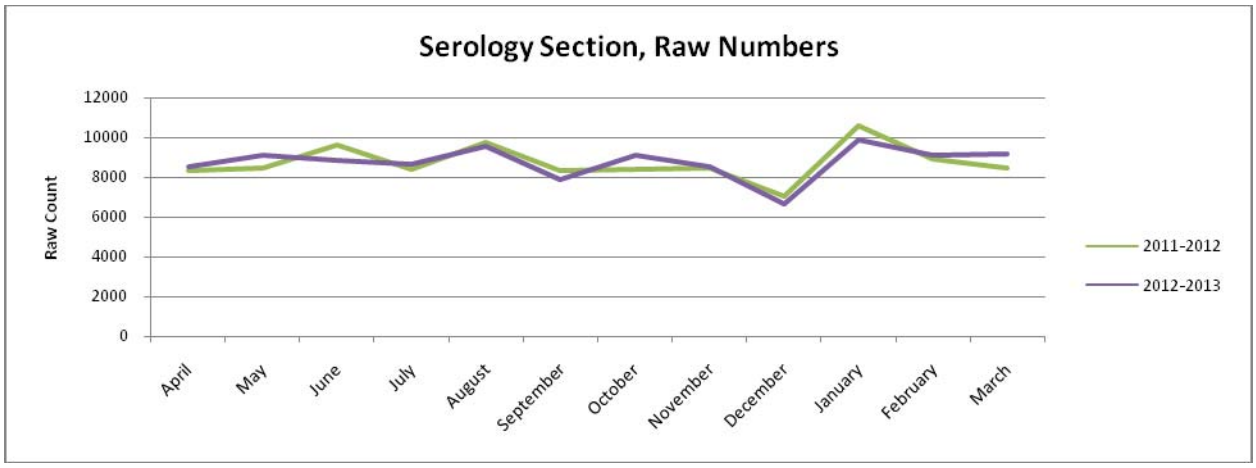
[2] Seasonal respiratory testing increases can be seen during Fall and Winter

The average yearly turn-around-times (TATs) for Virology ranged from 0.54 days – 2.76 days. All improvements to TATs directly support the DHCS strategic directions of Quality and Safety and Improved Access and Increased Efficiency.

4.3 Infectious Disease Serology

Infectious Disease Serology Laboratory is staffed by one bench technologist and a lead technologist II and a technologist III. This laboratory performs testing for antibodies and antigens of microbial agents to identify acute infection or previous exposures to disease-causing organisms and to assess protective immunity. The laboratory performed 105,037 tests in 2012-13 including screening tests for vaccine preventable diseases, prenatal care, sexually transmitted and blood borne infections to name a few (Figure 2). There was no significant change in test volumes in 2012-13 compared with 2011-12.

Figure 2.



Critical serological services were also provided for occupational exposure (*viz*. needlestick injury testing), and organ procurement/donor screening. On the whole, the Serology laboratory made further reductions in test turnaround time in the 2012-2013 year; the most notable decreases were seen for Varicella-zoster antibody testing. The Public Health Lab acquired a new analyzer, the EuroImmun Analyzer 2p, to process enzyme-linked immune sorbent (ELISA) assays. This analyzer enabled reduced hands-on technologist time for seven assays, improving staffing efficiencies, test turnaround time, testing quality and cost. These increased efficiencies and improved testing, directly support Government's strategic direction of Improved Access and Increased Efficiency.

4.4 Molecular Diagnostics

The Molecular Diagnostic Laboratory is a testing section employing real-time DNA and RNA amplification, and other nucleic acid detection methods. The laboratory is staffed with two technologist I's and a shared lead technologist II and III. The laboratory performed 41,580 tests including HIV viral load testing to monitor treatment response, human papilloma virus (HPV) testing in support of the cervical cancer screening program in NL, hepatitis C virus, chlamydia and gonorrhea, and influenza testing. Overall testing level were the same as in 2011-12.

To better serve public health through early detection and prevention of transmission, the Molecular Diagnostic Laboratory significantly decreased the turnaround time for *Chlamydia trachomatis* (CT) and *Neisseria gonorrhea* (NG) testing from 3.6 to 2.4 days and for Hepatitis C virus from 10.9 to 5.2 days. HCV RNA testing is used for the detection and confirmation of current infection with HCV. The majority of the other tests performed maintained a turnaround time of approximately one day.

4.5 Tuberculosis (Biosafety Level III)

The Tuberculosis Laboratory, a biosafety level III security containment facility, is staffed by a technologist I and shares a lead technologist II. The laboratory processed 1,623 specimens during the year representing a decline from last year by approximately 400 tests. There has been no significant change in the number of tuberculosis cases we identified in 2012-2013 when compared to the previous fiscal year.

4.6 Reference Laboratory

The PHL provides reference testing service for bacteriology to RHAs; this includes assistance with identification of bacterial agents and antibiotic resistance testing. In addition, the laboratory provides parasitology and mycology services to those RHA microbiology laboratories that do not provide this testing in-house. The laboratory is staffed by one technologist I and a shared lead technologist II. The Reference laboratory performed 764 bacteriology tests, 648 parasitology tests, and 1,711 mycology investigations during the 2012-2013 year. These numbers are comparable to those performed in 2011-12. The PHL provides support to dental clinics in NL, assisting with infection prevention and control by monitoring equipment sterilization effectiveness through performance of 879 sterilization tests. The Reference Laboratory has also seen additional reductions in test turnaround time of about 1 – 2 days.

The mycology section of the PHL was relocated to biosafety level III security containment facility. This change was made to improve operational conditions.

Matrix-Assisted Laser Desorption/Ionization-Time Of Flight (Maldi-Tof) technology was first introduced into the PHL in 2012-2013. This exciting technology has proven to be more accurate than our current biochemical based technology for microbial identification and will reduce setup and testing time considerably. The cost per identification will also be reduced to less than 1 dollar from between 10-20 dollars for traditional methods. This new method will be validated and implemented fully in 2013-2014.

4.7 Water and Food Laboratory

The Water and Food Laboratory plays an important role in assuring safe and clean drinking water in the province by providing bacteriological water quality testing for municipalities and local service districts. In addition, private water well owners access this service free of charge to ensure safety of private water sources. The PHL also performs water analysis for harbor and public pool facilities. The food testing service of the laboratory provides investigative support in cases of suspected food-borne diseases that might be traced back to retail or personal food items. The PHL provides sterility testing services on locally produced dairy products when submitted. The laboratory is staffed by a technologist I with a shared lead technologist II. The laboratory performed 14,899 tests during 2012-2013, of which 217 comprised food and dairy tests; this is down from 15,163 tests performed during 2011-2012 for an approximately 1.7% decrease.

The PHL implemented the Colitag water detection system province-wide during the fiscal year. This new water testing method is much more user-friendly, allows for quick batch processing, and has a detection level of <1 CFU/100mL. Interpretation of results is simple and quick with results available in less than 48 hours.

4.8 Molecular Epidemiology Laboratory

The PHL successfully created a Molecular Epidemiology Laboratory that performs genetic fingerprinting and analysis of microbial agents of public health significance, most notably agents associated with food and water borne diseases and infections and outbreaks in health care settings. The PHL continued its involvement in PulseNet Canada, participating in real-time national surveillance for early warning and source tracking of notifiable diseases.

It has been an active year for the molecular epidemiology laboratory with its involvement in several provincial clusters of *Salmonella enterica* and in the national *XL Foods E. coli* outbreak. The PHL was the first site outside of Alberta to identify a related case using Pulsed Field Gel Electrophoresis (PFGE) technology. By having the capacity to do genetic fingerprinting and analysis in-house, we were able to provide high level, molecular epidemiological data quickly and accurately.

4.9 MicroLabNet

MicroLabNet is a network of microbiology laboratories throughout the province to promote collaboration and sharing. The PHL provided 0.5 FTE funding for 6 PHL Liaisons, appointed by RHAs, who are involved with PHL's satellite site water testing, collaborate on surveillance, outbreak response and related efforts to serve patient care and public health functions. Teleconferences were held every month and the PHL Director completed a tour of each regional microbiology laboratory. To support the network, the PHL created, with assistance from the Public Health Agency of Canada, a web portal to share documents and communications. The MicroLabNet will continue into the future.

Our capacity for health emergency management has also been increased through our MicroLabNet. By maintaining a good forum for communication and information sharing all of the provincial microbiology labs are ready to act in case of a public health emergency.

MicroLabNet illustrates our support of Government's strategic directions; in particular, the population health strategic direction and its indicators "improved coordination for population health" and "continued work on a communicable disease information management system."

Through the MicroLabNet, Illumigene PCR based technology, used for *C. difficile* testing, was distributed by the PHL to the other regional microbiology laboratories to decrease turnaround time and increase infection control effectiveness. This introduction has been successful leading to a higher rate of detection in the regions that have implemented this technology.

4.10 Technology

The PHL strived to stay up to date in laboratory technology. Bio-Rad Unity quality control software was introduced to the laboratory in the last fiscal year. This allowed our technical staff members to more actively monitor our quality control trends and Westgard rule violations, thereby meeting laboratory accreditation standards. This development is consistent with the Quality and Safety strategic direction as communicated by the Provincial Government.

Scigene Wireless Temperature monitoring system was implemented and was in further development at the PHL. This system allowed the PHL to more closely analyze the temperatures of its incubators, refrigerators, freezers, and key room air temperatures. This system will eventually allow key people to receive notification after hours of temperature failures that may reduce reagent costs and loss of specimens. Introduction of this technology is consistent with Government's strategic direction of accountability and stability.

The implementation of new technology is directly related to one of strategic directions of Government.

1. Accountability and stability of health and community services: Through the introduction of our new quality control software we are better able to monitor and ensure the quality of tests for all our clients throughout the province. The introduction of the Scigiene Wireless Temperature monitoring system is a unique way to monitor any problems that may occur with specimen storage, reagent storage, and testing conditions and ensures the overall quality and integrity of all testing services offered by the PHL. These in turn contribute to the PHL's role in the strategic directions of the DHCS.

4.11 Website

The Public Health Laboratory's website, www.publichealthlab.ca, was officially launched on October 30, 2012. The major goal of the website is to provide up-to-date service information for the clients of the PHL. The website highlights testing guidelines, services offered, specimen collection instructions as well as electronic supplies ordering. These guidelines and instructions are based on international standards

and referenced. Any form or requisition required for a specific test is available on the website in a convenient PDF format. Since the launch, there have been 2,472 visitors to our site.

This new service was introduced to PHL stakeholders at Infectious Disease Rounds, to several working groups through informal presentations and to others by directing inquiries to the website.

The website is related to Government's strategic direction of access to priority services.

1. Access to Priority Services: Through the website we provide technical advice and related information which ensures all PHL reference and priority services are accessible to all clients throughout the province. This also aids in providing immediate, easily accessible information, when needed, when priority services are required. Further, this is highly useful to microbiology labs, as well as other healthcare providers, across the province as the PHL constantly updates the website to ensure the most up-to-date procedures are followed and clients are kept abreast of any current priority issues in public health.

4.12 Research

Several staff members were involved in various ongoing research projects. In September 2012, research scientist, Dr. Jean-Frederic Flandin, joined the PHL. He is a key player in many ongoing projects, as summarized in Appendix B.

In July 2012, Laura Gilbert presented the abstract *Stability of cervical specimens collected in SurePath® preservative fluid for use with cobas® 4800 HPV* (Gilbert, Oates, Robberts, Ratnam; 2012) at EUROGIN in Prague, Czech Republic. This research was completed entirely at the PHL with all technical work being completed by Elizabeth Oates. A manuscript of this work will be submitted to the Journal of Clinical Microbiology for publication in the 2013-2014 fiscal year.

Involvement in research is directly related to the three strategic directions of Government.

1. Population Health: The PHL is involved in various research projects, all of which focus on improving population health through improved technology, efficiency, and turnaround time. For example, for respiratory pathogens the ongoing research would provide a more sensitive, cost effective, rapid testing platform. The collaborative study on *Chlamydia trachomatis* should provide evaluation of the current quality of testing for *C. trachomatis* and offer insights on the comparative performance of the methodology used at the PHL. The MALDI technology should contribute to population health by providing a rapid and more accurate testing platform for a variety of microbial agents associated with human disease.

2. Access to Priority Services: The ongoing research projects should help improve the quality and turnaround time to a variety of essential reference and priority services offered by the PHL to the province.

3. Accountability and Stability: All ongoing research projects directly support the strategic direction of the DHCS as Health Research is a component area of the Accountability and Stability direction.

5. REPORT ON PERFORMANCE 2012-13

Vision

The vision of the PHL is for a province-wide microbiology laboratory service that is coordinated, collaborative and supporting in achieving public health testing and surveillance that is of the highest quality.

Mission

Accurate and rational diagnostic microbiology laboratory services should be delivered through coordinated provincial leadership ensuring local and regional services fulfill provincial mandates, aligned with Canadian national guidelines and consistent with best practise recommendations. The leadership role of the PHL, through its established federal, provincial territorial networks and expertise in diagnostic microbiology and public health surveillance, is needed to coordinate quality improvement throughout the province. The mission of the PHL will support the Government's strategic directions aimed at *population health* focussing on *communicable diseases*, improving *access to priority services*, and ensuring *accountability and stability of health and community services*.

By March 31 2017 the PHL will have enhanced its diagnostic microbiology services to improve patient care and public health surveillance by providing provincial leadership through specialized testing, collaborative support for routine testing and expert guidance to Regional Health Authority microbiology laboratories.

1. Increased number of test available at the PHL
2. Improved assay performance characteristics, including turn-around-time and service accessibility
3. Expanded surveillance capabilities
4. Improved quality management system
5. Developed RHA microbiology laboratory capacity

5.1 ISSUE 1: ACCREDITATION

The most effective way an organization can communicate its commitment to excellence is through achieving and maintaining accreditation. The PHL adheres to the requirements of the Ontario Laboratory Accreditation (OLA) program which is based on international standards ISO15189 – particular requirements for medical laboratories. The program uses the principles of quality management to help labs improve their processes and the accuracy of their test results

GOAL: **By March 31, 2014**, Public Health Laboratory will have implemented initiatives toward achieving ISO 15189 accreditation through OLA certification.

Objective: **By March 31, 2013**, Public Health Laboratory will have addressed issues identified in the on-site audit.

Measure: Addressed issues identified

Indicators Report:

Planned for 2012-13	Actual Performance for 2012-13
Complete on-site audit	Completed. OLA auditors visited PHL on June 18-19, 2012.
Developed an action plan for identified deficiencies	All major non-conformances (issues identified at the PHL during the on-site audit that did not comply with OLA standards) were completed and submitted by September 2012. Corrective action plans were developed and estimated dates of completion were developed and submitted.
Prepared a response to auditor's report	A response to the OLA auditors report was completed and submitted in September 2012.
Identified resources required to address deficiencies	Completed. Resources, plans, responsibilities were defined to address deficiencies.
Discussion of Results	
The on-site audit was completed and all major non-conformances have been addressed, as per OLA requirements. Corrective action plans were developed to address minor non-conformances identified in the on-site audit. Resources and responsibilities have been identified through our Quality Management team. Work continues to address minor non-conformances for the follow-up on-site visit. The Progress made supports the achievement of the goal for 2014.	
2014 Objective	
2014	As the PHL has been transferred to Eastern Health, any accomplishments by the PHL for this issue and all others will be reported in future Eastern Health annual reports.

5.2 ISSUE 2: MICROBIOLOGY SERVICE ENHANCEMENT

In 2012-2013, services available at the Regional Health Authority (RHA) microbiology laboratories were to be reviewed and reconciled with those offered at the PHL. This would have identified service gaps and redundancies in the province. Testing that was traditionally sent to National or reference laboratories required review to determine if improved efficiencies and/or increased local demand warranted development of local capacity. Enhancement of diagnostic strategies was pursued through application of state-of-the-art technology. Enhancement in microbiology laboratory services addressed the strategic direction of Access to Priority Services.

GOAL: **By March 31, 2014,** Public Health Laboratory will have addressed gaps identified in regional laboratory services to improve access to comprehensive microbiology laboratory services throughout the province.

Objective: **By March 31, 2013**, Public Health Laboratory will have identified gaps and redundancies on provincial microbiological services

Measure: Identified gaps and redundancies

Indicators Report

Planned for 2012-13	Actual Performance for 2012-13
Completed analysis of results	It took longer than anticipated to receive sufficient data to complete analysis of results.
Completed final report on provincial survey findings	The final report could not be completed because sufficient data to analyze and prepare the report took longer than anticipated.
Published Provincial standards for diagnostic microbiology of notifiable diseases	The PHL was not in a position, due to loss of senior staff, to determine the full scope of testing currently performed by RHAs as the data sampling was incomplete, therefore, the Lab was unable to identify gaps and redundancies in provincial microbiology services. However, the PHL website now contains a wide selection of standards. This will be expanded in the future once the PHL hires a new clinical microbiologist and director. The website is a more appropriate format given that it can be updated at any time as technology changes.

Discussion of Results

The PHL was not in a position to determine the full scope of testing currently performed by RHAs as the data sampling was incomplete. Through partnerships with the MicroLabNet, the PHL expects to revive the effort to complete a final report on provincial survey findings to reach its 2014 goal.

One positive step toward this goal was the competition of the PHL's online Guide to Services at www.publichealthlab.ca. This allows regional microbiology laboratories access to up to date standards and practice information used at the PHL.

Through the integration with Eastern Health, PHL can now draw upon more experience and expertise with microbiology testing and work collaboratively to improve microbiology laboratory services and standards provincially.

5.3 ISSUE 3: Antimicrobial Resistance Monitoring and Epidemiological Capacity

Reference susceptibility testing to identify antibiotic resistant organisms is a highly specialized discipline that requires equipment, reagents and expertise. Outbreaks of Antimicrobial Resistance (AMR) organisms, and food-borne diseases, such as Listeria and Salmonella, can be monitored through specialized technology. The newly established Molecular Epidemiology laboratory now provides real-time foodborne disease surveillance for the province, and has the capacity to detect and trace the spread of microbial agents associated with foodborne infections throughout the Province. Through the PulseNet Canada network of laboratories, Newfoundland and Labrador now actively contributes to national and international networks. This capacity enhancement supported the strategic direction of Population Health and the focus area of Communicable Diseases.

GOAL: **By March 31, 2014,** Public Health Laboratory will have created an Antimicrobial Resistance and Molecular Epidemiological Reference Service to improve public health surveillance and food-borne outbreak response capacity.

Objective: **By March 31, 2013,** Public Health Laboratory will have become proficient in providing reference antimicrobial susceptibility testing and molecular epidemiological techniques.

Measure: Become proficient in reference susceptibility testing and strain typing

Indicators Report

Planned for 2012-13	Actual Performance for 2012-13
Published regional and provincial antibiotic resistance profiles	There were a number of unanticipated concerns regarding the sharing of regional antimicrobial resistance data with the PHL which prevented us from developing provincial profiles. The PHL will be working with the RHAs to address these concerns.
Published trend analysis on antibiotic resistance	Unable to achieve this indicator due to the inability to complete indicator 1.
Published annual internal antimicrobial susceptibility report	This indicator was not achieved due to loss of senior staff.
Received PulseNet Certification	Completed. PHL has two people trained for performing Pulsed Field Gel Electrophoresis (PFGE) and one trained for analysis of results.
Received external proficiency test program positive assessment	Completed. PHL participated and received satisfactory performance reports in external proficiency programs, which determine the quality of various testing procedures at the PHL. This is an essential quality control assurance measure and required by OLA.

Discussion of Results

The PHL has been successful in the creation of the molecular epidemiology and antimicrobial reference testing laboratory. This laboratory has been involved in several small provincial clusters and the large national XL foods recall in Fall of 2012 since its creation.

The PHL, through its partnership with PulseNet Canada, is now actively participating in real-time Provincial and National enteric disease surveillance.

6.0 **The Year Ahead, 2013-2014:** Opportunities and Challenges

Challenges

Effective and timely patient care and public health responses depend upon the ability of health care systems to provide the required services and reliable and timely information for action. In this regard, the PHL plays a critical role that requires continued support of the PHL at the provincial and national levels. While the reorganization of the PHL under Eastern Health may pose challenges of change in management in the near term, with due recognition and careful alignment of its role, these can be overcome. The PHL has been without a Director since late January 2013, and it is anticipated that this position would be filled in the near future. In the interim Dr. Stephen Raab, Clinical Chief of Laboratory Medicine, and Dr. Sam Ratnam, Interim Advisor, have been responsible for oversight of the PHL.

Opportunities

The PHL continues to build local capacity and expertise in laboratory methods of surveillance and genetic fingerprinting investigations. This has created new opportunities to monitor and prevent the spread of disease and to aid in disease control and prevention.

The integration of the PHL with Eastern Health will continue to provide opportunities for the PHL to grow and for services to the province to improve. Through careful review and evidence-based decision making, the new integrated PHL and clinical microbiology laboratory services will strive to improve the overall lab services, reduce duplication of efforts, and find efficiencies. We optimistically look to the future and our continued role in protecting and promoting the health and wellbeing of Newfoundlanders and Labradorians.

APPENDIX A

PHL Services Cross-walk

Public Health Laboratory *Services* delivered through *Core Functions*

PHL SERVICE-1	**MONITOR HEALTH STATUS TO IDENTIFY COMMUNITY HEALTH PROBLEMS**	**Prevention and control of disease**
Core Function	**COMMUNICABLE DISEASE SURVEILLANCE, PREVENTION AND CONTROL**	
Client Groups	Regional Health Authorities: Infection prevention and control departments, communicable disease control nurses and medical officers of health, Diagnostic Laboratory Services; Primary care physicians; Municipalities and Local Service Districts; Service NL	
Service Description	**Surveillance: Influenza and Respiratory viruses detection and characterization**	
The PHL is the only clinical laboratory with the capability to isolate and identify viruses in NL. Viruses are isolated from specimens submitted by RHAs as part of routine acute care diagnostic testing in the Virology Laboratory of the PHL. Therefore, all Provincial respiratory virus surveillance data is generated by the PHL and provided to the Provincial Epidemiologist in the Division of Disease Control. The PHL is the provincial laboratory contributing to FluWatch, the Federal Influenza Surveillance Program. PHL performs genetic characterization of influenza viruses in the Molecular Diagnostic Laboratory. Antigenic characterization of influenza viruses isolated in NL provides surveillance data that is utilized in determining vaccine effectiveness information for Provincial immunization programs.		
Service Description	**Surveillance: Food and Waterborne Diseases**	
The PHL receives bacteria isolated from diseased individuals from the RHAs that may be linked to food and water sources viz. E. coli O157, Listeria, Salmonella, etc. The PHL is the only clinical laboratory with the capabilities to characterize these bacteria using serotyping and genetic fingerprinting to determine if cases seen in the Province across all the RHAs are linked to each other through a common source. Data generated in real time at the PHL provides the confirmatory and supportive evidence used by Environmental Health Officers and communicable disease control programs to identify sources of disease outbreaks. The PHL is a certified testing site of PulseNet Canada, the Federal Foodborne disease surveillance network that performs real-time National surveillance using genetic fingerprinting techniques to determine if disease cases seen in NL are linked to cases seen in other provinces and territories. PulseNet Canada is networked with PulseNet USA and other PulseNet partners across the globe to identify and track foodborne disease outbreaks globally. In addition to the laboratory techniques and capabilities, the PHL is a key partner in Provincial and Federal Foodborne disease outbreak management systems (FIORP). The PHL generates, through its routine acute care diagnostic service, and serotyping- and genetic fingerprinting characterization surveillance data for the Provincial Epidemiologist in the Division of Communicable Disease Control as well as providing surveillance data to the Federal Food- and Waterborne disease surveillance program (NESP).		

Service Description	**Infection Prevention and Control**
The PHL receives clinical specimens submitted by RHAs to detect and characterize disease causing agents that are of particular concern for infection prevention and control nurses and Departments in healthcare facilities, including hospitals, long term care facilities, etc. The PHL plays an active role in identifying possible outbreak situations through the provision of laboratory testing coordination service. Infection control practitioners are notified of laboratory testing results that have been deemed an infection control risk and are provided genetic fingerprinting services to aid in outbreak source tracking and identification.	

Service Description	**Drinking water quality monitoring**
The PHL provides water quality monitoring services for the Province in St. John's as well as six satellite testing sites across NL (Clarenville, Corner Brook, Gander, Grand Falls-Windsor, St. Anthony, Goose Bay). This service allows all cities, towns, municipalities and communities to monitor the safety and quality of their public water supplies. In addition, the PHL provides water quality and safety monitoring service to Service NL for all private water supply owners (private wells). Public swimming pool water and pools used in rehabilitation settings are monitored at the PHL.	

PHL Service-2	**DIAGNOSE AND INVESTIGATE HEALTH PROBLEMS AND HEALTH HAZARDS IN THE COMMUNITY**
Core Function	**OUTBREAK AND EMERGENCY RESPONSE TO COMMUNICABLE DISEASES**
Client Groups	Medical Officers of Health; Communicable Disease Nurses; Infection Prevention and Control Practitioners for all Healthcare- and Long Term Care facilities; Regional Health Authorities.
Service Description	**Outbreak Response**
The PHL leads laboratory investigations in the event of an outbreak extending beyond one RHA to ensure coordinated laboratory services. The PHL provides outbreak investigation testing for RHAs when specific tests are not available within a region. The PHL provides surge capacity for RHAs when routine diagnostic testing at the regional level is at risk of being affected by outbreak surge testing, and is available to RHAs in support of their business continuity plan. The PHL collects outbreak-related specimens and pathogens from the RHAs to characterize the cases to a more detailed level to determine if the genetic evidence supports the suspicion of active transmission in the community or in a healthcare/LTC facility. The PHL routinely subjects select agents from the Notifiable Disease List for genetic characterization to provide real-time monitoring for communicable disease programs in the RHAs to intervene before an outbreak emerges.	
Core Function	**ENVIRONMENTAL HEALTH AND FOOD SAFETY**
Client Groups	Environmental Health Officers; Municipalities and Local Service Districts; Water treatment facilities; Private residential water well owners; Public and recreational pool facilities
Service Description	**Water Quality Testing**
The PHL performs drinking water quality testing for Service NL to monitor public and semi-public water distribution. The PHL also performs water quality testing for private water well owners. These services are decentralized to six regional testing sites, under the authority and leadership of the PHL, for those clients outside the Avalon Peninsula (Clarenville, Corner Brook, Gander, Grand Falls-Windsor, St. Anthony, Goose Bay). For those on the Avalon, testing is performed at the PHL in St. John's. Recreational water quality testing of public pools is performed at the PHL. The PHL and the regional testing sites are mobilized in the event of a water-borne disease outbreak.	

Core Function	**REFERENCE TESTING, SPECIALIZED SCREENING AND DIAGNOSTIC TESTING**
Client Groups	RHA Diagnostic Laboratory Services
Service Description	**Reference and esoteric testing service**
The Reference Laboratory of the PHL performs esoteric and specialized testing for RHAs when disease causing agents cannot be accurately identified or characterized with local resources. Specialized screening programs are provided by the Serology Laboratory of the PHL including prenatal infectious disease screening; sexually transmitted and blood borne pathogen screenings; tuberculosis and latent tuberculosis infection screening; screening for occupational needlestick injuries and other exposures; fertility clinic screening, organ procurement and donor screening, pre-employment screen, immigration screening, etc. for the province.	
Core Function	**BIOSAFETY, CONTAINMENT AND BIOHAZARD SPILL RESPONSE PROGRAM**
Client Groups	Fire and Protection Services; First responders
Service Description	**Emergency Response**
The PHL houses the only Biosafety Level III (BSL III) clinical laboratory in NL, this level of biosecurity is required to safely and legally isolate- and manipulate Level III pathogens causing diseases such as novel influenza, SARS, tuberculosis, brucellosis, tularemia, histoplasmosis, etc. In addition to human testing, the PHL BSL III laboratory service is available to the Chief Veterinary Officer should a need arise to investigate such pathogens. The BSL III laboratory provides laboratory testing services in the event of accidental or intentional release of bioterrorism agents in NL.	
Core Function	**INTEGRATED COMMUNICABLE DISEASE DATA MANAGEMENT**
Client Groups	Provincial Epidemiologist & Division of Disease Control Medical Officers of Health, Communicable Disease Nurses, Infection Prevention and Control Practitioners for all Healthcare- and Long Term Care facilities
Service Description	**Real-time communicable disease monitoring**
Through surveillance and outbreak testing activities, the PHL provides daily and weekly data to communicable disease prevention and infection control partners in the RHAs and Government to assist in the prevention of outbreaks by mitigation of communicable disease transmission through early detection and data sharing. Data sharing agreements with federal agencies forms part of National surveillance activities, including tracking of food borne pathogens using genetic fingerprinting.	

PHL Service-3	INFORM, EDUCATE AND EMPOWER PEOPLE ABOUT HEALTH ISSUES	Health professional education and training programs
Core Function	**Training and education of health care and public health workers**	
Client Groups	Public Health Officials Researchers Legislators and elected officials Health care professionals; Professional graduate education- and training programs Professional Organizations/Association	
Service Description	**Education and Training**	
The PHL provides the only venue in NL for medical laboratory professionals to receive training and experience in the fields of diagnostic virology, infectious disease serology, tuberculosis, food and water testing, genetic fingerprinting of pathogens, outbreak investigations and surveillance testing. In addition, the PHL plays a significant role in training students of public health, nursing and medicine.		

PHL Service-4	**MOBILIZE AND STRENGTHEN COMMUNITY PARTNERSHIPS TO IDENTIFY AND SOLVE HEALTH PROBLEMS**
Core Function	**TRAINING AND EDUCATION OF HEALTH CARE AND PUBLIC HEALTH WORKERS**
Client Groups	MicroLabNet (provincial network of diagnostic microbiology laboratories) Communicable Disease Nurses Group Infection Prevention and Control Groups
Service Description	**Networking and collaboration**
The MicroLabNet-generated partnership plays a role in recognizing and addressing gaps in microbiology diagnostic services. The PHL is networked in partnership with Communicable Disease Control, Infection Prevention and Control services and RHA microbiology services to ensure early detection of disease cases through effective communication and laboratory testing coordination.	

Public health and the enforcement of public health standards

PHL Service-5	**DEVELOP POLICIES AND PLANS THAT SUPPORT INDIVIDUAL AND COMMUNITY HEALTH EFFORTS**
Core Function	**PUBLIC HEALTH POLICY DEVELOPMENT AND EVALUATION**
Client Groups	Physician/practise groups RHA Diagnostic Laboratories Services Public health programs Emergency/Protection Services Professional Organizations/Association
Service Description	Ensures utilization of best clinical- and laboratory practise guidelines

Canadian guidelines pertaining to infectious disease-related laboratory testing is typically developed as consensus documents representing and supported by federal, provincial and territorial stakeholders. As a member of the Canadian Public Health Laboratory Network (CPHLN), PHL provides NL's context and ensures that National guidelines are inclusive of our Province's perspective. In return, PHL is responsible, through CPHLN, for ensuring RHA public health related testing is aligned with National best practise guidelines and recommendations.

Through **CPHLN** membership, NL is represented on the following committees and working groups:

Laboratory Preparedness and Response (LPR): The purpose of the LPR is to build laboratory response capabilities for public health events important to Canada. The LPR works to expedite detection, prevention, and intervention strategies to counteract threats against public health. Testing, data collection and dissemination, and research work provided by federal, provincial, regional and private laboratories across the country are critical to the success of the LPR.

Water/Food safety and Enterics (WFSE): The WFSE was formed to address the fragmentation of responsibility for the microbiological safety of water and food in Canada. The purpose of the WFSE Issue Group is to continuously develop and maintain an integrated national network of laboratory experts. This network functions to develop methods for data and information sharing and assist in setting standards and developing protocols and policy.

Laboratory Standardization: Many laboratories across Canada provide diagnostic and reference tests for reportable and communicable diseases. With no standardization in place, the various public and private labs were using various testing methods to achieve a common goal. This created a complex set of results that were difficult to interpret. The purpose of the Laboratory Standardization Issue Group is to foster standards development based on best practices.

Reference Centre Advisory Group: The National Microbiology Laboratory (NML) is responsible for providing microbiological reference services, laboratory surveillance and outbreak investigation support to Canadian public health laboratories. In 2004, the NML and the CPHLN agreed to establish the Reference Centre Advisory Issue Group (RCA) to

Public health and the enforcement of public health standards

make recommendations for a policy framework supporting the provision of microbiology reference centre laboratory external to the NML.

Pandemic Influenza Laboratory Preparedness Network (PILPN): PILPN's main charge is to ensure that public health laboratories are able to respond effectively to an Influenza pandemic. PILPN has addressed this charge by providing leadership in laboratory preparations for pandemic Influenza which have been proven effective through the response to pH1N1 (2009).

Human Papillomavirus Task Group: The purpose of the HPV Task Group is to improve HPV detection for diagnostics through testing standardization and for surveillance and epidemiology.

Gonorrhoea and Chlamydia Task group: The purpose of the GC Task Group is to standardize testing, specimen handling, and reporting criteria for gonorrhoea and chlamydia as well as to establish roles and responsibilities for these tasks.

Syphilis Task Group: Diagnosis of Syphilis is more complicated than other diseases as it requires more laboratory input and clinical judgment. This factor combined with the significant increase in infections over the last decade led CPHLN members to form the Syphilis Task Group in 2008. The Syphilis Task Group is working diligently to develop straight forward algorithms that can be used to develop accurate and comparable data. The purpose of the Syphilis task group is to develop guidelines for Syphilis testing in Canada.

Hepatitis B Virus & Rubella Task Group: The external quality control monitoring program was initiated in 2006 to monitor diagnostic test behaviour in real-time. Anti-rubella IgG and anti-HBs analytes were chosen to pilot the program and the HBV-Rubella Task Group was formed to co-ordinate and lead the pilot.

Norovirus Task Group: The purpose of the Norovirus Task Group is to: develop an integrated national network of laboratory; develop methods and processes for sharing data and information; assist in setting laboratory standards and developing laboratory protocols and policy; develop laboratory support network in public health environmental microbiology; and work with partners in developing mechanisms for alerts/real-time surveillance for Norovirus.

PulseNet Canada: PulseNet Canada, created in 2000, is a virtual network which ties all provincial and two federal laboratories (the Public Health Agency of Canada's Laboratory for Foodborne Zoonoses and Health Canada's Bureau of Microbial Hazards) together by linking their computers and databases. The purpose of PulseNet Canada is to:

- Detect clusters of cases with matching DNA "fingerprints"
- Facilitate early identification and investigation of foodborne disease outbreaks
- Assist in epidemiological investigations to differentiate outbreak from sporadic cases and to identify the source of outbreaks
- Provide a rapid communications platform and link public health laboratories across the nation

Outside of CPHLN, NL is represented on the following committees and working groups:

Canadian Association of HIV Laboratory Specialists (CACHLS): The goals of CACHLS are

- Share expertise on establishment and maintenance of good diagnostic laboratory practices
- Encourage laboratory research and sharing of research information, as well as promoting research partnerships
- Share tangible resources with other similar organization, laboratories
- Promote continuing education and training of HIV laboratory technologists, nationally and internationally
- Develop partnerships and working supportive relationships with AIDS Community organizations

PHL Service-6	**ENFORCE LAWS AND REGULATIONS THAT PROTECT HEALTH AND ENSURE SAFETY**
Core Function	**BIOSAFETY, CONTAINMENT AND BIOHAZARD SPILL RESPONSE PROGRAM**
Client Groups	Fire and Protection Services, First responders, Federal partners
Service Description	**Emergency Response and Assistance Plan (ERAP)**
Emergency Response Assistance Plans (ERAPs) are required by the Transportation of Dangerous Goods Regulations (TDGR) for certain very harmful Dangerous Goods that necessitate special expertise and response equipment. The PHL is the Provincial ERAP laboratory approved by Transport Canada to be mobilized in the event of a transport accident involving a very harmful dangerous good. The ERAP assists local emergency responders by providing them with technical experts and specialized equipment at an accident site.	
Core Function	**ENVIRONMENTAL HEALTH AND FOOD SAFETY**
Client Groups	Food Premises Regulators
Service Description	**Food Safety Program**
Food Testing Laboratory at the PHL provides the laboratory support required by Environmental Health Officers of Service NL to effectively administer and enforce regulations for food, food handlers, and food premises for compliance with the Food Premises Regulations under the Food and Drug Act.	
Core Function	**ENVIRONMENTAL HEALTH AND FOOD SAFETY**
Client Groups	Public Pools and Regulators
Service Description	**Drinking and Recreational Water Quality**
The Water Testing Laboratory at the PHL provides the laboratory support required by Environmental Health Officers of Service NL to effectively administer and enforce regulations for private, semi-public, and public drinking water supplies. In addition, the PHL provides testing in support of regulation of water safety of public, recreational, and hydrotherapy swimming and pool facilities.	

Public Health and the Enforcement of Public Health Standards; Prevention and control of disease

Core Function	**ENVIRONMENTAL HEALTH AND FOOD SAFETY**
Client Groups	Department of Natural Resources, Service NL, Canadian Food Inspection Agency (CFIA), Health Canada, Public Health Agency of Canada (PHAC)
Service Description	**Foodborne Illness Outbreak Response Protocol (FIORP)**
The PHL Food Testing Laboratory participates in the identification and response to multi-jurisdictional (National) food-borne illness outbreaks in order to enhance collaboration and coordination among partners, establish clear lines of communication, and improve the efficiency and effectiveness of response, thereby protecting the health of Canadians.	

PHL Service-7	**LINK PEOPLE TO NEEDED PERSONAL HEALTH SERVICES AND ASSURE THE PROVISION OF HEALTHCARE WHEN OTHERWISE UNAVAILABLE**
Core Function	**REFERENCE TESTING, SPECIALIZED SCREENING AND DIAGNOSTIC TESTING**
Client Groups	Specialized physician practise groups RHA Diagnostic Laboratory Services
Service Description	**Reference Testing**
The PHL functions as the reference laboratory to the RHA diagnostic laboratory services. If specialized testing is not available within the Province, the PHL will send the specimen out of province or country, if needed. The more specialized testing required for rare, highly significant diseases is available to patients throughout the Province at the PHL. The PHL provides back-up service to any Regional Health Authority in the event of loss of functionality of a microbiology laboratory, or to serve a surge capacity role when resources become challenged during disease outbreaks, etc.	

The preservation and promotion of health

PHL Service-8	ASSURE A COMPETENT PUBLIC HEALTH WORKFORCE	Health professional education and training programs
Core Functions	**TRAINING AND EDUCATION OF HEALTH CARE AND PUBLIC HEALTH WORKERS**	
Client Groups	Professional organizations Laboratory professions training programs	
Service Description	**Training and Education**	
PHL provides the College of the North Atlantic training for laboratory technology students by serving as a laboratory training site. PHL provides curriculum support for the Masters in Public Health (MPH) degree program at Memorial University.		

PHL Service-9 Core Function	EVALUATE EFFECTIVENESS, ACCESSIBILITY, AND QUALITY OF DIAGNOSTIC MICROBIOLOGY SERVICES REFERENCE TESTING, SPECIALIZED SCREENING AND DIAGNOSTIC TESTING	Public health and the enforcement of public health standards
Client Groups	RHA Diagnostic Laboratory Services	
Service Description	**Public Health Standards**	
The PHL provides, through MicroLabNet, provincial guidelines for diagnostic microbiology standards from a public health perspective to ensure RHA diagnostic services are capable of detecting those diseases considered significant, and included in the Provincial Notifiable Diseases list. The PHL continuously evaluates new and emerging technologies for potential deployment to RHA laboratories to improve effectiveness and accessibility to quality microbiology services.		

APPENDIX B

Summary of Research & Development Activities

Newfoundland & Labrador Public Health Laboratory

2012/2013

Diagnosis of Shiga-toxin producing *Escherichia coli*

Shiga toxins 1 and 2 (Stx1 and Stx2) are bacteriophage-encoded proteins that have been associated with hemorrhagic colitis, hemolytic uremic syndrome and other severe disease conditions. Since many years, *E. coli* O157:H7 has emerged as a major pathogen and has been implicated in the emergence of many foodborne infections worldwide. However, Stx production is not restricted to O157 strains and more than 100 Shiga toxin-producing *E. coli* (STEC) have been found from individuals suffering with diarrheal illnesses. Globally, it is estimated that up to 50% of STEC illnesses are due to non-O157 serotypes.

In the laboratory, identification of non-O157 STEC is mostly done by culture. However, many STEC infections, especially the non-O157 serotypes, show similarities to viral infections, such as noroviruses, rotaviruses and enteric adenoviruses. Common symptoms may include watery diarrhea, vomiting, headache, fever and abdominal cramps.

In October 2009, the US CDC released its guideline on the detection of STEC in relation with community-acquired diarrhea and includes the specific testing of Shiga toxins or their genetic determinants. Furthermore, all stools submitted from patients with acute community-acquired diarrhea (for detection of enteric pathogens such as *Salmonella*, *Shigella* and *Campylobacter*) should be cultured for STEC O157 and simultaneously assayed for detection of Shiga toxins or their genes. The objectives are, 1) Develop and implement PCR diagnosis of Shiga toxins and 2) Evaluate prevalence of stx1 and stx2 in Newfoundland and Labrador.

Diagnosis of bacterial agents of atypical respiratory tract infections

Almost two thirds of all diagnosed bacterial pneumonias are caused by *Streptococcus pneumoniae*. However, less common agents of pneumonia, such as *Mycoplasma pneumoniae*, *Chlamydophila pneumoniae*, *Bordetella pertussis* and *Legionella pneumophila*, are diagnostically challenging and may account for a bigger part of respiratory tracts infections. At PHL, we are in the process of validating and implementing real-time PCR for the diagnosis of these pathogens.

Bordetella pertussis cause approximately 13% of persistent cough illnesses in adults and adolescents in developed countries. The majority of the population has been vaccinated against *B. pertussis* as children but as antibodies wane with time, people may get infected and experience cough for 2 or more weeks and occasional pneumonia. In unvaccinated or partially vaccinated populations, outbreaks of pertussis may occur in both adults and children with little or no classical whooping, making the disease difficult to distinguish from other agents of atypical pneumonia.

Legionella pneumophila is a pathogen believed to be responsible for up to 10% of community-acquired pneumonia. Most infections occur in patients who are middle-age or older, but this pathogen has a high virulence potential as up to 30% of patients may develop Legionnaires' disease and potentially die from it. Even though this disease usually occur as single, isolated cases, outbreaks of Legionnaires' disease receive significant media attention usually in the summer and early autumn, though cases may occur at any time of year.

M. pneumoniae and *C. pneumoniae* are the two most important atypical organisms causing community-acquired pneumonia. In general, they cause mild infections but their persistence in the mucosa of almost half of the population renders their identification difficult. Moreover, both are fastidious organisms, thus very difficult and time-consuming to culture in the laboratory. Hence, the utilization of PCR for their diagnosis will greatly improve healthcare. The objectives are, 1) Develop and implement PCR diagnosis of bacterial atypical pneumonia pathogens and 2) Evaluate prevalence of atypical bacterial pneumonia in Newfoundland and Labrador.

Diagnosis of respiratory viruses

Respiratory viral infections are one of the leading causes of morbidity and mortality, particularly in children, the elderly and immunocompromised persons. Rapid identification of viral etiology is critical in ruling out non-viral infections, initiating antiviral treatment and limiting the spread of the infection. Multiplex assays of more than one viral gene target in a single tube have the advantage of rapid screening of a large number of potential viral pathogens in a short time. The common respiratory viruses causing infections are influenza A and B viruses, respiratory syncytial virus (RSV), parainfluenza viruses (PIV), coronaviruses (CoV), and adenovirus (AdV). Newly emerging respiratory viral pathogens include human metapneumovirus (hMPV), and human bocavirus (hBoV) particularly in pediatric patients.

At PHL, we are in the process of validating a multiplex real-time PCR to diagnose influenza A, influenza B, PIV1, PIV2, PIV3, RSV, hMPV, hBoV, AdV and CoV NL63, OC43, HKU1 and 229E in a single run. This multiplex test will improve the sensitivity in detection of respiratory viruses and facilitate the investigation of the role of co-infections and viral load in respiratory virus pathogenesis. The objectives are, 1) develop and implement multiplex real-time PCR diagnosis of respiratory viral pathogens and 2) evaluate prevalence and co-infections of respiratory viral pathogens in Newfoundland and Labrador

Validation of MALDI-ToF technology for diagnosis of bacteria and fungi

The matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-ToF MS) is a technology that measures a whole cell proteins according to their mass to charge ratio, generating a spectral profile representing a fingerprint of bacterial proteins. The generated spectrum from an isolate is compared to a reference database for organism identification. Recently, many publications highlight the use of MALDI ToF as a rapid, inexpensive and accurate method for the identification of clinical isolates.

MALDI ToF technology provides a rapid, reliable and cost-efficient method for the identification of bacteria, mycobacteria and fungi. Furthermore, MALDI-ToF technology is increasingly used for other detection, such as for microbial virulence factors, strain typing, antimicrobial susceptibility testing and therapeutic drug monitoring.

The standard method for identifying and classifying filamentous fungi remains morphology (e.g. colour, shape, size and ornamentation of conidia and the length of the conidiophores) since, in general, filamentous fungi have more distinctive morphologies than, for example, single celled bacteria and yeasts. However, the literature provides extensive examples of problems. Unreliable morphological minutia to describe new species and variability within the morphological characters of accepted species are constant issues. The use of physiological and biochemical characters have also been attempted (e.g. colony colour, growth rates, secondary metabolites production) although these also are variable in many cases. Hence, microscopic identification of fungi requires highly qualified staff and a strong experience and expertise in differencing medically important fungi.

The use of MALDI ToF technology is currently being validated for the identification of bacteria and yeasts prior to its implementation in PHL. As a next step, PHL would need to validate the MALDI ToF for the identification of filamentous fungi. Furthermore, MALDI ToF technology has been recently identified as a possible tool for the identification of drug-resistance in filamentous fungi. This possibility will be explored at PHL. The objectives are, 1) assess the performance of Bruker MALDI Biotyper instrument at PHL and 2) use the Bruker MALDI Biotyper instrument for identification of drug-resistance.

Collaborations with Dr. Maxwell Chernesky (St. Joseph's Healthcare, Hamilton)

Comparison of current nucleic acid amplification tests to diagnose *Chlamydia trachomatis* in self-collected vaginal swabs and first void urine samples

Chlamydia trachomatis infections cause cervicitis, urethritis, pelvic inflammatory disease (PID), salpingitis, proctitis and endometritis in women and urethritis, epididymitis and proctitis in men. It is estimated that 70-80% of women and up to 50% of men who are infected experience no symptoms. The introduction of sensitive and specific nucleic acid amplification tests (NAATs) for the diagnosis of chlamydial infections has been an important advance in the ability to conduct population based screening programs to prevent complications. This combined with non-invasive sampling such as first void urine and vaginal self-collection has introduced broad based screening to include symptomatic and asymptomatic patients to control the rates of chlamydial infections in young adolescents.

Diagnostics companies have recently developed second generation assays for C. trachomatis on high throughput automated systems. The objectives are, 1) Comparison of the analytical sensitivity and inhibition rates of each assay for C. trachomatis, and 2) Head to head comparison of the clinical sensitivity, specificity and predictive values of Gen-Probe APTIMA® AC2 and ACT assays (TIGRIS®), BD ProbeTec™ (Qx), Roche Diagnostic Amplicor® (COBAS 4800) and Abbott Molecular RealTime (m2000) assays to detect C. trachomatis from self-collected vaginal and urine specimens.

Clinical Evaluation of APTIMA HPV Assay and the APTIMA HPV 16 18/45 Genotype Assay on the Tigris® DTS® system and PANTHER System with SurePath Liquid Cytology Specimens

In this study, the performance of the AHPV and AHPV-GT assays will be evaluated against a disease endpoint with both SurePath and urine specimens on both the TIGRIS and PANTHER systems.

Currently, the Cobas 4800 HPV DNA test is already approved by Health Canada for the in-vitro diagnosis of HPV and is considered as the gold standard for this research. All research samples will be collected in Hamilton, Ontario, and one sample will be sent to Newfoundland and Labrador Public Health Laboratory to be tested using the Cobas 4800 HPV DNA test. Our laboratory has used this system for some years and we have developed an expertise on its usage. We were thus selected by the research principal investigator as a gold standard site. The St. Joseph's Healthcare regularly uses TIGRIS and PANTHER systems and will be testing samples using these systems.

The APTIMA HPV Assay (AHPV Assay) and the APTIMA HPV 16 18/45 Genotype Assay (AHPV-GT Assay) are in vitro nucleic acid amplification tests for the qualitative detection of E6/E7 viral messenger RNA (mRNA) of human papillomavirus (HPV). The AHPV Assay detects 14 high-risk HPV types but does not differentiate the types. The AHPV-GT Assay detects the E6/E7 mRNA of HPV types 16, 18 and 45 and can differentiate between samples positive for HPV 16 from HPV 18 and/or 45-positive, but does not differentiate between HPV 18- and HPV 45-positive samples.

APPENDIX C

Audited Financial Statements

Financial Statements

Public Health Laboratory

March 31, 2013

STATEMENT OF MANAGEMENT RESPONSIBILITY

The accompanying financial statements of the **Public Health Laboratory** [the "Laboratory"] as at March 31, 2013 have been prepared by management in accordance with the Canadian public sector accounting standards and the integrity and objectivity of these statements are management's responsibility. Management is also responsible for all the notes to the financial statements.

In discharging its responsibilities for the integrity and fairness of the financial statements, management develops and maintains systems of internal control to provide reasonable assurance that transactions are properly authorized and recorded, proper records are maintained, assets are safeguarded, and the Laboratory complies with applicable laws and regulations.

The external auditor, Ernst & Young LLP, conducts an independent examination, in accordance with the Canadian generally accepted auditing standards, and expresses an opinion on the financial statements.

George Butt, CA
Vice President, Corporate Services

Chris O'Grady, CGA
Director of Financial Services

INDEPENDENT AUDITORS' REPORT

To the Department of Health of the Province of Newfoundland and Labrador

We have audited the accompanying financial statements of the **Public Health Laboratory**, which comprise the statement of financial position as at March 31, 2013, and the statements of operations, changes in net debt and cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's responsibility for the financial statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian public sector accounting standards, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditors consider internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained in our audit is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements present fairly, in all material respects, the financial position of the **Public Health Laboratory** as at March 31, 2013 and the results of its operations, changes in its net debt and its cash flows for the year then ended in accordance with Canadian public sector accounting standards. The Laboratory is a component of the Province of Newfoundland and Labrador and has no separate legal status or existence.

Ernst & Young LLP

St. John's, Canada,
September 24, 2013.

Chartered Accountants

Public Health Laboratory

STATEMENT OF FINANCIAL POSITION

As at March 31

	2013 $	2012 $
FINANCIAL ASSETS		
Cash	500	500
Accounts receivable *[note 3]*	35,169	25,236
Due from government/other government entities *[note 4]*	—	691,998
Due from Eastern Regional Health Authority *[note 4]*	226,988	—
Total financial assets	262,657	717,734
LIABILITIES		
Accounts payable and accrued liabilities *[note 6]*	118,390	133,755
Due to Eastern Regional Health Authority *[note 4]*	—	378,917
Deferred capital grants *[note 7]*	164,202	190,033
Accrued vacation pay	135,131	180,792
Accrued severance pay *[note 9]*	469,663	463,470
Accrued sick leave *[note 10]*	130,227	132,348
Total liabilities	1,017,613	1,479,315
Net debt	(754,956)	(761,581)
Non-financial assets		
Tangible capital assets *[note 5]*	497,977	402,414
Prepaid expenses	37,726	22,075
	535,703	424,489
Accumulated deficit	(219,253)	(337,092)

See accompanying notes

Approved on behalf of the Board:

Director

Director

Public Health Laboratory

STATEMENT OF OPERATIONS

Year ended March 31

	Budget	2013	2012
	$	$	$
	[unaudited] [note 13]		
REVENUE			
Provincial plan	5,159,096	**5,159,096**	5,403,500
Provincial plan capital grants	—	**242,131**	194,862
Other income	—	**1,731**	30,812
	5,159,096	**5,402,958**	5,629,174
EXPENSES			
Wages and benefits	2,202,885	**2,258,903**	2,641,488
Laboratory supplies	2,276,311	**2,253,693**	2,048,087
Operating supplies	262,200	**221,058**	274,715
Professional fees	163,500	**174,991**	193,484
Amortization of tangible capital assets	—	**146,568**	111,344
Repairs and maintenance	102,800	**93,128**	105,636
Travel	60,800	**79,396**	65,828
Printing, stationery and office	36,500	**39,171**	39,231
Minor equipment	40,000	**35,266**	29,005
Telephone	14,100	**24,534**	15,185
Accrued vacation	—	**(45,661)**	(264,886)
Accrued severance	—	**6,193**	(169,758)
Accrued sick leave	—	**(2,121)**	(498)
	5,159,096	**5,285,119**	5,088,861
Annual surplus of revenue over expenses	—	**117,839**	540,313
Accumulated deficit, beginning of year	(337,092)	**(337,092)**	(877,405)
Accumulated deficit, end of year	(337,092)	**(219,253)**	(337,092)

See accompanying notes

Public Health Laboratory

STATEMENT OF CHANGES IN NET DEBT

Year ended March 31

	Budget	2013	2012
	$	$	$
	[unaudited]		
Annual surplus of revenue over expenses	—	**117,839**	540,313
Changes in tangible capital assets			
Acquisition of tangible capital assets	—	**(242,131)**	(194,862)
Amortization of tangible capital assets	—	**146,568**	111,344
Increase in net book value of tangible capital assets	—	**(95,563)**	(83,518)
Changes in other non-financial assets			
Net change in prepaid expenses	—	**(15,651)**	55,867
Decrease (increase) in other non-financial assets	—	**(15,651)**	55,867
Decrease in net debt	—	**6,625**	512,662
Net debt, beginning of year	—	**(761,581)**	(1,274,243)
Net debt, end of year	—	**(754,956)**	(761,581)

See accompanying notes

Public Health Laboratory

STATEMENT OF CASH FLOWS

Year ended March 31

	2013 $	2012 $
OPERATING ACTIVITIES		
Annual surplus of revenue over expenses	**117,839**	540,313
Add (deduct) items not affecting cash		
Amortization of tangible capital assets	**146,568**	111,344
Provincial plan capital grants	**(242,131)**	(194,862)
Increase (decrease) in severance pay accrual	**6,193**	(169,758)
Decrease in sick leave accrual	**(2,121)**	(498)
Net change in non-cash working capital balances related to operations *[note 8]*	**(517)**	(387,177)
Cash provided by operating transactions	**25,831**	(100,638)
CAPITAL ACTIVITIES		
Deferred revenue - capital grants	**(25,831)**	100,638
Provincial plan capital grants	**242,131**	194,862
Purchase of tangible capital assets	**(242,131)**	(194,862)
Cash used by capital activities	**(25,831)**	100,638
Net change in cash during the year	**—**	—
Cash, beginning of year	**500**	500
Cash, end of year	**500**	500

See accompanying notes

NOTES TO FINANCIAL STATEMENTS

March 31, 2013

1. NATURE OF OPERATIONS

The purpose of The Public Health Laboratory [the "Laboratory"] is to act as the provincial reference laboratory centre for clinical and public health microbiology and infectious disease surveillance and control. The Laboratory offers specialized and reference laboratory services to all physicians, hospitals, clinics and health related agencies in the Province of Newfoundland and Labrador [the "Province"].

The Laboratory is a not-for-profit organization and is exempt from income taxes.

The Laboratory coordinates with the Eastern Regional Health Authority ["Eastern Health"] to provide the reference laboratory centre. Eastern Health is responsible for the distribution of operating funds and capital grants on behalf of the provincial government of Newfoundland and Labrador, and providing certain services to the Laboratory.

These financial statements include all of the assets, liabilities, revenues and expenses of the Laboratory. The Laboratory is not a separate legal entity; it is a component of the Province and these financial statements do not contain all the assets, liabilities, revenue, and expenses of the Province.

Subsequent to March 31, 2013, the operations of the Laboratory were transferred to Eastern Health.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND ADOPTION OF ACCOUNTING STANDARDS RELATED TO FINANCIAL INSTRUMENTS

A. SIGNIFICANT ACCOUNTING POLICIES

Basis of accounting

The Laboratory considers itself to be an Other Government Organization. Accordingly, the financial statements have been prepared in accordance with Canadian accepted accounting principles established by the Public Sector Accounting Standards Board of the Canadian Institute of Chartered Accountants ["GAAP"].

Basis of presentation

These financial statements include only the assets, liabilities, revenues and expenses relating to the operations carried on under the name of the Public Health Laboratory.

NOTES TO FINANCIAL STATEMENTS

March 31, 2013

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND ADOPTION OF ACCOUNTING STANDARDS RELATED TO FINANCIAL INSTRUMENTS [Cont'd]

Revenue recognition

Provincial plan revenue without eligibility criteria and stipulations restricting their use are recognized as revenue when the transfers are authorized.

Government transfers with stipulations restricting their use are recognized as revenue when the transfer is authorized and the eligibility criteria are met by the Laboratory except when and to the extent the transfer gives rise to an obligation that constitutes a liability. When the transfer gives rise to an obligation that constitutes a liability, the transfer is recognized in revenue when the liability is settled.

Other income includes other revenue that is recognized in the period services are provided.

The Laboratory is dependent on funding from the Department of Health and Community Services [the "Department"] for the total of its operating costs, after deduction of specified revenue and expenses, to the extent of the approved budget. The final amount to be received by the Laboratory for a particular fiscal year will not be determined until the Department has completed its review of the Laboratory's financial statements. Adjustments resulting from the Department's review and final position statements will be considered by the Laboratory and reflected in the year of assessment. There were no changes from the previous year.

Expenses

Expenses are recorded on the accrual basis as they are incurred and measurable based on receipt of goods or services and obligation to pay.

Asset classification

Assets are classified as either financial or non-financial. Financial assets are assets that could be used to discharge existing liabilities or finance future operations and are not to be consumed in the normal course of operations. Non-financial assets are acquired, constructed or developed assets that do not provide resources to discharge existing liabilities but are employed to deliver laboratory services, may be consumed in normal operations and are not for resale.

Cash

Cash consists of cash on hand.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND ADOPTION OF ACCOUNTING STANDARDS RELATED TO FINANCIAL INSTRUMENTS [Cont'd]

Tangible capital assets

Tangible capital assets are recorded at cost. Rates and bases of amortization applied to write off the cost of tangible capital assets over their estimated useful lives are as follows:

Equipment	15%, straight-line
Computer equipment	20%, straight-line

Gains and losses on disposal of individual assets are recognized in operations in the year of disposal.

Impairment of long-lived assets

Tangible capital assets are written down when conditions indicate that they no longer contribute to the Laboratory's ability to provide goods and services, or when the value of future economic benefits associated with tangible capital assets are less than their net book value. The net write-downs are accounted for as expenses in the statement of operations.

Accrued vacation pay

Vacation pay is accrued for all employees as entitlement is earned.

Employee future benefits

Accrued severance

Employees are entitled to severance benefits as stipulated in their conditions of employment. The right to be paid severance pay vests with employees with nine years of continual service with the Laboratory or another public sector employer. Severance is payable when the employee ceases employment with the Laboratory and the public sector. The severance benefit obligation has been actuarially determined using assumptions based on management's best estimates of future salary and wage changes, employee age, years of service, the probability of voluntary departure due to resignation or retirement, the discount rate and other factors. Discount rates are based on the Province's long-term borrowing rate. Actuarial gains and losses are recognized immediately through the statement of operations.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND ADOPTION OF ACCOUNTING STANDARDS RELATED TO FINANCIAL INSTRUMENTS [Cont'd]

Employee future benefits [Cont'd]

Accrued sick leave

Employees of the Laboratory are entitled to sick leave benefits that accumulate but do not vest. In accordance with GAAP for post-employment benefits and compensated balances, the Laboratory recognizes the liability in the period in which the employee renders service. The obligation is actuarially determined using assumptions based on management's best estimates of the probability of use of accrued sick leave, future salary and wage changes, employee age, the probability of departure, retirement age, the discount rate and other factors. Discount rates are based on the Province's long-term borrowing rate. Actuarial gains and losses are recognized immediately through the statement of operations.

Pension costs

Employees of the Laboratory are members of the Public Service Pension Plan and the Government Money Purchase Plan [the "Plans"] administered by the Government of Newfoundland and Labrador. Contributions to the Plans are required from both the employees and the Laboratory. The annual contributions for pensions are recognized as an expense and amounted to $121,169 for the year ended March 31, 2013 [2012 – $118,535].

Financial instruments

Financial instruments are classified in one of the following categories [i] fair value or [ii] cost or amortized cost. The Laboratory determines the classification of its financial instruments at initial recognition.

Use of estimates

The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenue and expenses during the year. Areas requiring the use of management estimates include assumptions used in the valuation of employee future benefits. Actual results could differ from these estimates.

NOTES TO FINANCIAL STATEMENTS

March 31, 2013

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES AND ADOPTION OF ACCOUNTING STANDARDS RELATED TO FINANCIAL INSTRUMENTS [Cont'd]

B. ADOPTION OF ACCOUNTNG STANDARDS RELATED TO FINANCIAL INSTRUMENTS

On April 1, 2012, the Laboratory adopted PS 3450 – Financial Instruments ["PS 3450"] and PS 1201 – Financial Statement Presentation. The standards were adopted prospectively from the date of adoption. The new standards provide comprehensive requirements for the recognition, measurement, presentation and disclosure of financial instruments.

Under PS 3450, all financial instruments are included in the statement of financial position and are measured either at fair value or amortized cost based on the characteristics of the instrument and the Laboratory's accounting policy choices [see note 2A – Significant Accounting Policies].

3. ACCOUNTS RECEIVABLE

Accounts receivable consist of the following:

	2013					
			Past due			
	Total	Current	1-30 days	31-60 days	61-90 days	Over 90 days
	$	$	$	$	$	$
Services to patients, residents, and clients	18,750	18,750	—	—	—	—
Other	16,419	—	—	—	—	16,419
Gross receivables	35,169	18,750	—	—	—	16,419
Net receivables	35,169	18,750	—	—	—	16,419

4. DUE FROM GOVERNMENT/OTHER GOVERNMENT ENTITIES

	2013	2012
	$	$
Government of Newfoundland and Labrador	—	654,000
Other government entities	—	37,998
	—	691,998

NOTES TO FINANCIAL STATEMENTS

March 31, 2013

4. DUE FROM GOVERNMENT/OTHER GOVERNMENT ENTITIES [Cont'd]

The amount due from the Government of Newfoundland and Labrador was a one-time budget adjustment regarding severance payouts incurred during the year ended March 31, 2012.

The Laboratory recorded $5,159,096 [2012 – $5,348,100] in provincial plan funding and $242,131 [2012 – $194,862] in capital grants from Eastern Health during the year. The Laboratory has an amount due from (to) Eastern Health of $226,988 [2012 – $(378,917)] as of March 31, 2013. The amount due from (to) related parties is non-interest bearing and has no set terms of repayment.

5. TANGIBLE CAPITAL ASSETS

	March, 31, 2013		
	Equipment $	Computer equipment $	Total $
Cost			
Opening balance	**2,247,894**	**618,870**	**2,866,764**
Additions	**242,131**	**—**	**242,131**
Closing balance	**2,490,025**	**618,870**	**3,108,895**
Accumulated amortization			
Opening balance	**1,858,744**	**605,606**	**2,464,350**
Amortization	**143,252**	**3,316**	**146,568**
Closing balance	**2,001,996**	**608,922**	**2,610,918**
Net book value	**488,029**	**9,948**	**497,977**

	March, 31, 2012		
	Equipment $	Computer equipment $	Total $
Cost			
Opening balance	2,069,612	602,290	2,671,902
Additions	178,282	16,580	194,862
Closing balance	2,247,894	618,870	2,866,764
Accumulated amortization			
Opening balance	1,750,716	602,290	2,353,006
Amortization	108,028	3,316	111,344
Closing balance	1,858,744	605,606	2,464,350
Net book value	389,150	13,264	402,414

NOTES TO FINANCIAL STATEMENTS

March 31, 2013

6. ACCOUNTS PAYABLE AND ACCRUED LIABILITIES

	2013 $	2012 $
Accounts payable and accrued liabilities	**21,255**	116,956
Salaries and wages payable	**97,135**	16,799
	118,390	133,755

7. DEFERRED CAPITAL GRANTS

Deferred capital grants represent government transfers received with associated stipulations relating to the purchase of capital assets, resulting in a liability. These grants will be recognized as revenue when the related assets are acquired and the liability is settled.

	2013 $	2012 $
Balance, beginning of year	**190,033**	89,395
Receipts during year	**216,300**	275,900
Adjustments	**—**	30,000
Recognized in revenue during year	**(242,131)**	(205,262)
Balance, end of year	**164,202**	190,033

8. NET CHANGE IN NON-CASH WORKING CAPITAL BALANCES RELATED TO OPERATIONS

	2013 $	2012 $
Accounts receivable	**(9,933)**	7,416
Due from government/other government entities	**691,998**	(633,132)
Due from Eastern Regional Health Authority	**(226,988)**	179,001
Accounts payable and accrued liabilities	**(15,365)**	(35,360)
Due to Eastern Regional Health Authority	**(378,917)**	378,917
Deferred revenue – operating	**—**	(75,000)
Accrued vacation pay	**(45,661)**	(264,886)
Prepaid expenses	**(15,651)**	55,867
	(517)	(387,177)

NOTES TO FINANCIAL STATEMENTS

March 31, 2013

9. ACCRUED SEVERANCE PAY

The Laboratory provides a severance payment to employees upon retirement, resignation or termination without cause. The actuarial valuation for accrued severance pay was performed effective April 1, 2010, and an extrapolation of that valuation has been performed to March 31, 2012 and 2013.

	2013 $	2012 $
Accrued benefit obligation, beginning of year	**463,470**	633,228
Benefit expense		
Current service cost	**24,021**	21,617
Interest cost	**17,536**	24,574
Actuarial loss	**4,616**	15,163
	509,643	694,582
Benefits paid	**(39,980)**	(231,112)
Accrued benefit obligation, end of year	**469,663**	463,470

The significant actuarial assumptions used in measuring the accrued severance pay and benefit expense are as follows:

	2013	2012
Discount rate – obligation	**3.60%**	3.85%
Discount rate – benefit cost	**3.60%**	3.85%
Rate of compensation increase	**4.00%**	4.00%

10. ACCRUED SICK LEAVE

The Laboratory provides sick leave benefits to employees that accumulate but do not vest. The actuarial valuation for accrued sick leave was performed effective April 1, 2010, and an extrapolation of that valuation has been performed to March 31, 2012 and 2013.

	2013 $	2012 $
Accrued benefit obligation, beginning of year	**132,348**	132,846
Benefit expense		
Current service cost	**15,530**	16,162
Interest cost	**4,933**	5,926
Actuarial loss	**1,387**	4,372
	154,198	159,306
Benefits paid	**(23,971)**	(26,958)
Accrued benefit obligation, end of year	**130,227**	132,348

NOTES TO FINANCIAL STATEMENTS

March 31, 2013

10. ACCRUED SICK LEAVE [Cont'd]

The significant actuarial assumptions used in measuring the accrued sick leave and benefit expense are as follows:

	2013	2012
Discount rate – benefit cost and obligation	**3.60%**	3.85%
Rate of compensation increase	**4.00%**	4.00%

11. RELATED PARTY TRANSACTIONS

The Laboratory had the following transactions with the Government and other government controlled entities:

	2013 $	2012 $
Grants from the Province	**5,375,396**	5,699,000
Transfers from other government entities	**131,711**	55,788
Transfers to other government entities	**(137,150)**	(185,682)
	5,369,957	5,569,106

Amounts due from (to) Eastern Regional Health Authority are non-interest bearing with no set terms of repayment.

12. FINANCIAL INSTRUMENTS AND RISK MANAGEMENT

Financial risk factors

The Laboratory has exposure to credit risk and liquidity risk. The Laboratory's Management Committee has overall responsibility for the oversight of these risks and reviews the Laboratory's policies on an ongoing basis to ensure that these risks are appropriately managed. The source of risk exposure and how each is managed is outlined below:

Credit risk

Credit risk is the risk of loss associated with a counterparty's inability to fulfil its payment obligation. The Laboratory's credit risk is primarily attributable to accounts receivable. Management believes that the credit risk with respect to accounts receivable is not material.

NOTES TO FINANCIAL STATEMENTS

March 31, 2013

12. FINANCIAL INSTRUMENTS AND RISK MANAGEMENT [Cont'd]

Liquidity risk

Liquidity risk is the risk that the Laboratory will not be able to meet its financial obligations as they become due. The Laboratory is dependent on funding from the Department.

13. BUDGET

The Laboratory prepares an initial budget for a fiscal period that is approved by the Management Committee and the Department [the "Original Budget"]. The Original Budget may change significantly throughout the year as it is updated to reflect the impact of all known service and program changes approved by the Department. Additional changes to services and programs that are initiated throughout the year would be funded through amendments to the Original Budget and an updated budget is prepared by the Laboratory. The updated budget amounts are reflected in the unaudited budget amounts as presented in the statement of operations [the "Budget"].

The Original Budget and Budget do not include amounts relating to certain non-cash and other items including capital asset amortization, the recognition of provincial capital grants and other capital contributions, adjustments required to the accrued benefit obligations associated with severance and sick leave, and adjustments to accrued vacation.

The following presents a reconciliation of budgeted revenue for the year ended March 31, 2013:

	2013 $ *[unaudited]*
Original budgeted revenue	**5,159,096**
Adjustments during the year for service and program changes, net	—
Revised original budget	**5,159,096**

14. COMPARATIVE FIGURES

Certain comparative figures have been reclassified to conform to the current year's presentation.