Confidence Building Measures

Canada

2015 Annual Report of
Confidence Building Measures
Biological and Toxin Weapons Convention

Government of Canada Gouvernement du Canada

Canada

Revised forms for the submission of the Confidence-Building Measures

At the Third Review Conference it was agreed that all States Parties present the following declaration, later amended by the Seventh Review Conference:

Declaration form on Nothing to Declare or Nothing New to Declare for use in the information exchange

Measure	Nothing to Declare	Nothing New to Declare	Last year of declaration if nothing new to declare
A, part 1 (i)			
A, part 1 (ii)	X		
A, part 2 (i)		X	Submission repeated verbatim from 2011
A, part 2 (ii)			
A, part 2 (iii)			
B			
C			
E			
F		X	Submission repeated verbatim from 2011
G			

(Please mark the appropriate box(es) for each measure with a tick, and fill in the year of last declaration in the last column where applicable.)

Date: 15 April 2015

State Party to the Convention: CANADA

Date of ratification/accession to the Convention: 18 September 1972

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Active promotion of contacts

The Third Review Conference agreed that States parties continue to implement the following:

> "Active promotion of contacts between scientists, other experts and facilities engaged in biological research directly related to the Convention, including exchanges and visits for joint research on a mutually agreed basis."

In order to actively promote professional contacts between scientists, joint research projects and other activities aimed at preventing or reducing the occurrence of ambiguities, doubts and suspicions and at improving international cooperation in the field of peaceful bacteriological (biological) activities, the Seventh Review Conference encouraged States parties to share forward looking information, to the extent possible,

- on planned international conferences, seminars, symposia and similar events dealing with biological research directly related to the Convention, and
- on other opportunities for exchange of scientists, joint research or other measures to promote contacts between scientists engaged in biological research directly related to the Convention, including through the Implementation Support Unit (ISU) within the United Nations Office for Disarmament Affairs.

CONFIDENCE BUILDING MEASURE A

Part 1: Exchange of data on research centres and laboratories

At the Third Review Conference it was agreed that States Parties continue to implement the following:

> "Exchange of data, including name, location, scope and general description of activities, on research centres and laboratories that meet very high national or international safety standards established for handling, for permitted purposes, biological materials that pose a high individual and community risk or specialize in permitted biological activities directly related to the Convention."

Modalities

The Third Review Conference agreed on the following, later amended by the Seventh Review Conference:

> Data should be provided by States Parties on each facility, within their territory or under their jurisdiction or control anywhere, which has any maximum containment laboratories meeting those criteria for such maximum containment laboratories as specified in the latest edition of the WHO[1] Laboratory Biosafety Manual and/or OIE[2] Terrestrial Manual or other equivalent guidelines adopted by relevant international organisations, such as those designated as biosafety level 4 (BL4, BSL4 or P4) or equivalent standards.
>
> States Parties that do not possess a facility meeting criteria for such maximum containment should continue to Form A, part 1 (ii).

[1] World Health Organization
[2] Office Internationale des Épizooties (commonly known as the World Organization for Animal Health)

CONFIDENCE BUILDING MEASURE A, Part 1 (i)

Exchange of Data on Research Centres and Laboratories - #1

1. Name(s) of the facility

National Microbiology Laboratory
Public Health Agency of Canada
Canadian Science Centre for Human and Animal Health

2. Responsible public or private organization or company

Public Health Agency of Canada

3. Location and postal address

Public Health Agency of Canada
1015 Arlington Avenue
Winnipeg, Manitoba
R3E 3R2

4. Source(s) of financing of the reported activity, including indication if the activity is wholly or partly financed by the Ministry of Defence

Canadian Government - Public Health Agency of Canada

5. Number of maximum containment units within the research centre and/or laboratory, with an indication of their respective size (m^2)

Level 4 - 1 unit (185 m^2)

6. Scope and general description of activities, including type(s) of micro-organisms and/or toxins as appropriate.

This laboratory is a national centre of expertise that provides diagnostic, reference and research services on human diseases mainly derived from biosafety level 3 and 4 micro-organisms.

Micro-organisms used and/or stored in this facility:

1) *Filoviridae*
2) *Bunyaviridae*
3) *Flaviviridae*
4) *Arenaviridae*
5) *Paramyxoviridae*
6) *Orthomyxoviridae*
7) *Coronaviridae*

Exchange of Data on Research Centres and Laboratories - #1

1. Name(s) of the facility

National Centre for Foreign Animal Disease

2. Responsible public or private organization or company

Canadian Food Inspection Agency, Science Branch

3. Location and postal address

1015 Arlington Street
Winnipeg, Manitoba
R3E 3M4

4. Source(s) of financing of the reported activity, including indication if the activity is wholly or partly financed by the Ministry of Defence

Canadian Government - Canadian Food Inspection Agency

5. Number of maximum containment units within the research centre and/or laboratory, with an indication of their respective size (m^2)

Level 4: 2 units ($65m^2$ and $35m^2$)

6. Scope and general description of activities, including type(s) of micro-organisms and/or toxins as appropriate.

The National Centre for Foreign Animal Disease within the Canadian Science Centre for Human and Animal Health conducts diagnostic testing and research on livestock and poultry diseases that are non-indigenous to Canada. The centre became operational in April 1998.

CONFIDENCE BUILDING MEASURE A, Part 1 (ii)

If no BSL4 facility is declared in Form A, part 1 (i), indicate the highest biosafety level implemented in facilities handling biological agents on a State Party's territory:

NOT APPLICABLE: Canada possesses two BSL4 laboratories

Biosafety level 3	yes / no
Biosafety level 2 (if applicable)	yes / no

Any additional relevant information as appropriate:

CONFIDENCE BUILDING MEASURE A, Part 2

Exchange of information on national biological defence research and development programs

At the Third Review Conference it was agreed that States Parties are to implement the following:

In the interest of increasing the transparency of national research and development programmes on biological defence, the States Parties will declare whether or not they conduct such programmes. States Parties agreed to provide, annually, detailed information on their biological defence research and development programmes including summaries of the objectives and costs of effort performed by contractors and in other facilities. If no biological defence research and development programme is being conducted, a null report will be provided.

States Parties will make declarations in accordance with the attached forms, which require the following information:

1) The objective and summary of the research and development activities under way indicating whether work is conducted in the following areas: prophylaxis, studies on pathogenicity and virulence, diagnostic techniques, aerobiology, detection, treatment, toxinology, physical protection, decontamination and other related research;

2) Whether contractor or other non-defence facilities are utilized and the total funding provided to that portion of the programme;

3) The organizational structure of the programme and its reporting relationships; and

4) The following information concerning the defence and other governmental facilities in which the biological defence research and development programme is concentrated;

a) location;

b) the floor areas (sqM) of the facilities including that dedicated to each of BL2, BL3 and BL4 level laboratories;

c) the total number of staff employed, including those contracted full time for more than six months;

d) numbers of staff reported in (c) by the following categories: civilian, military, scientists, technicians, engineers, support and administrative staff;

e) a list of the scientific disciplines of the scientific/engineering staff;

f) the source and funding levels in the following three areas: research, development, and test and evaluation; and

g) the policy regarding publication and a list of publicly-available papers and reports.

CONFIDENCE BUILDING MEASURE A, Part 2 (i)

National Biological Defence Research and Development Program Declaration

1. Is there a national program to conduct biological defence research and development within the territory of the State Party, under its jurisdiction and control anywhere? Activities of such a program would include prophylaxis, studies on pathogenicity and virulence, diagnostic techniques, aerobiology, detection, treatment, toxicology, physical protection, decontamination and other related research.

For CANADA, YES

CONFIDENCE BUILDING MEASURE A, Part 2 (ii)

National Biological Defence Research and Development Program

Defence Research & Development Canada (DRDC):

II. Description

1. The objective of the Canadian Biological Defence Program at Defence R&D Canada is to ensure that the Canadian Forces are provided with an adequate defence against biological warfare agents. No offensive studies of any kind are permitted by the Government of Canada. The Program is wholly funded by the Canadian Department of National Defence and Public Safety Canada on behalf of the Government. The principal research and development areas are the following:
   a. assessment of the hazards that may be faced by the Canadian Forces from biological agents and toxins;
   b. detection of biological agents and toxins using immunological, biochemical and physical detection methods;
   c. medical countermeasures against the infections or intoxications from biological agents and toxins;
   d. decontamination of biological agents and toxins;
   e. personal protection from biological agents and toxins;
   f. studies on the mode of action and toxicity of toxins and the mode of action and infectivity of biological agents; and
   g. provision of biological agent training for the Department of National Defence and the First Responder community.

2. In Canada, the biological and chemical defence programs are integrated; exact separation of the costs of the two programs would be very difficult without a detailed analysis of every purchase. It is estimated that in 2014, the amount spent on the Canadian biological defence program was $4,984,100 including salaries. The source of this funding was the Government of Canada.

3. Yes, contractor and other non-defence facilities are utilized.

4. About $ 876,700 was spent on contracts with industry and universities.

5. Contractors are used to support all of the various aspects of the program listed in paragraph 1 above.

6. In Canada, the research and development program in biological defence is the responsibility of the Defence R&D Canada (DRDC). Research and some development is carried out primarily at the Defence R&D Canada – Suffield (DRDC Suffield) and through contractors. The bulk of the development program is carried out from DRDC Corporate headquarters in Ottawa. A minor effort in the stand-off detection of biological agents is carried out at DRDC Valcartier. Organizational chart of those parts of DRDC

Suffield and DRDC Valcartier responsible for biological defence are included in Form A, part 2 (iii). Only those organisational elements working on Biological Defence are included.

CONFIDENCE BUILDING MEASURE A, Part 2 (ii)

National Biological Defence Research and Development Program

Canadian Safety and Security Program (CSSP):

1 and 2. The **Canadian Safety and Security Program (CSSP)** is a federally-funded program, which has been allocated $43.5 million annually to strengthen Canada's ability to anticipate, prevent/mitigate, prepare for, respond to, and recover from natural disasters, serious accidents, crime and terrorism through the convergence of science and technology (S&T) with policy, operations and intelligence.

The CSSP is led by the Defence Research and Development Canada, Centre for Security Science (CSS) on behalf of the Government of Canada and its partners across all levels of government, response and emergency management organizations, non-governmental agencies, industry and academia. The majority of the testing and evaluation component of the CSSP will be delivered through the Emergency Responder Test and Evaluation Establishment (ERTEE) in Regina, Saskatchewan.

CSSP funds are distributed amongst a number of Communities of Practice, including CBRNE projects that are engaged in research and development on Biological, Chemical and Radiological subjects. It is not possible to know exactly the percentage specifically allocated to biological research alone as many of the projects respond to more than one of the CBRNE hazards. A portion of the funds are for overhead and overall management of the program.

3. Yes, aspects of this programme are conducted under contract with industry, academic institutions, or in other non-defence facilities.

4. Funds are distributed to industry, government and academia through a Call for Proposals. Since 2002, the Chemical, Biological, Radiological-Nuclear and Explosives (CBRNE) Research and Technology Initiative (CRTI) and follow-on CSSP programs have conducted eleven Calls for Proposals through which it has implemented 166 research projects representing an investment of $391,000,000. The project partners have leveraged this investment by a similar amount of in-kind-contribution with a total, on a 10 years average, of a one-to-one the contribution ratio. However a number of projects have more than 1 to 1 leveraging, with the CSSP providing a greater proportion of the funds. The Biological Portfolio projects have been summarized in Annex 1.

5. The CSSP amalgamates the mandates of three former CSS-led programs, building on their successes, lessons learned and best practices:

- The CRTI, which focused primarily on CBRNE counter-terrorism;
- The Public Security Technical Program (PSTP), which expanded S&T efforts into other areas like critical infrastructure protection, cyber-security, surveillance, intelligence, interdiction, border security, emergency management systems (people, tools and processes) and interoperability; and
- The Canadian Police Research Centre (CPRC), which focused on harnessing S&T for the benefit of police, fire and emergency medical services across Canada.

6. The Biological portfolio projects and the participating departments and agencies have been summarized in Annex 1. All projects under the CRTI/CSSP are carried out in existing facilities that are covered in other sections of this report. The latest CSSP Call for Proposals resulted in 2 new projects being approved for implementation in 2014. Those projects related, either directly or tangentially, to the BTWC have been added to Annex 1. Of the CRTI/CSSP projects listed in Annex 1, investment in biological related projects is estimated to be $100M over ten years.

Annex 1: CRTI/CSSP projects, 2002-2014 (please see both legacy CRTI and new CSSP projects)

The participating departments, agencies and organizations are:

Agriculture and Agri-Food Canada
Canadian Food Inspection Agency
Canadian Grain Commission
Defence Research and Development Canada
Department of National Defence
Environment Canada
Health Canada
National Research Council of Canada
Public Health Agency of Canada
Royal Canadian Mounted Police
Royal Military College of Canada
Canadian Animal Health Coalition
Canadian Cooperative Wildlife Health Centre
Health Science Centre Winnipeg
Kent Imaging Inc.
TDV Global Inc.
The [Toronto] Hospital for Sick Children
United States Department of Agriculture

This table include the two remaining active CRTI projects and all CSSP funded projects of the Biological Portfolio.

Project Number	Project Title	Project Status	Lead Government Department	CSS Funds	In-Kind
CSSP-2013-CD-1057	Road mapping the way forward: Microbial Forensics in Canada	Completed in FY 13/14	Public Health Agency of Canada	$69,000.00	$17,000.00
CSSP-2013-CD-1058	International Microbial Forensics Workshop	Completed in FY 13/14	Public Health Agency of Canada	$23,000.00	$6,500.00
CSSP-2013-CD-1059	Evaluation of readily available materials for use as anti-freezing agents for subzero decontamination	Completed in FY 13/14	Canadian Food Inspection Agency	$50,000.00	$78,500.00
CSSP-2013-CD-1060	Bridging the Gap: A Federal-Provincial-Territorial Collaborative Study on the Impact of Supportive Care Therapies on Survival from High Containment Infections	Completed in FY 13/14	Public Health Agency of Canada	$55,720.00	$183,795.00
CSSP-2013-CD-	Joint Canada-US S&T Collaboration for Vector	Completed in FY 13/14	Canadian Food Inspection Agency	$70,000.00	$55,000.00

1061	Borne Diseases				
CSSP-2013-CP-1017	Current Good Manufacturing Practices of the Zaire Ebola virus monoclonal antibodies used for post-exposure treatment	Active	Public Health Agency of Canada	$395,000.00	$369,221.00
CSSP-2013-CP-1022	Centre for Emerging and Zoonotic Disease Integrated Intelligence and Response (CEZD-IIR)	Active	Canadian Food Inspection Agency	$1,150,000.00	$1,600,000.00
CSSP-2013-TI-1138	Enhancing the capability of the CFIA through Multilocus variable-number tandem repeat analysis (MLVA) subtyping as a member of PulseNet Canada towards an improved, integrated emergency response against biological threats to the food supply	Completed in FY 13/14	Canadian Food Inspection Agency	$170,000.00	$46,000.00
CSSP-2013-TI-1139	Application of genomics tool for emergency preparedness in response to an intentional microbial contamination of the food chain	Completed in FY 13/14	Canadian Food Inspection Agency	$160,000.00	$85,000.00
CSSP-2013-TI-1140	Acquisition of Next Generation Sequencing Capability for the CFIA Lethbridge Laboratory, National Centres for Animal Disease, to enhance Foodborne bioterrism and Agrobioterrorism response in Canada	Completed in FY 13/14	Canadian Food Inspection Agency	$120,000.00	$100,000.00
CSSP-2013-TI-1141	Acquisition of an open high throughput/high density array Polymerase Chain reaction platform for faster detection of toxigenic and pathogenic microorganisms in agricultural commodities	Completed in FY 13/14	Canadian Grain Commission	$175,000.00	$105,000.00
CSSP-2013-TI-1142	Facility for dry-fogging decontamination evaluation	Completed in FY 13/14	Royal Military College of Canada	$134,000.00	$0.00
CSSP-2013-TI-1143	Augmentation of high performance computing server capacity enabling efficient analysis of pathogen genomics data	Completed in FY 13/14	Canadian Food Inspection Agency	$110,000.00	$30,000.00
CSSP-2013-TI-1144	A Simplified Method for the immediate identification of an infectious agent during an outbreak	Completed in FY 13/14	Public Health Agency of Canada	$150,000.00	
CSSP-2013-TI-1145	Assessment of Platforms for Rapid Pathogen Virulence Typing	Completed in FY 13/14	Canadian Food Inspection Agency	$280,000.00	$150,000.00

CSSP-2014-TA-2047	Application of Next Generation Sequencing (NGS) methods for Plant Pathogen Diagnostics and Research at the Sidney Laboratory, Centre for Plant Health (CPH).	Active	Canadian Food Inspection Agency	$177,000.00	$0.00
CSSP-2014-TA-2048	FilmArray Biodefense Systems for Multiplexed Biological Detection and Identification	Active	Defence R&D Canada - Suffield	$124,520.00	$0.00
CSSP-2014-TA-2049	"Center for Excellence in Emergency Preparedness User-Management Tool (Membership Management System)"	Active	Public Health Agency of Canada	$50,000.00	$0.00
CSSP-2014-TA-2050	Acquisition of a MALDI TOF mass spectrometer (MS) to detect and type botulinum neurotoxins	Active	Health Canada	$143,000.00	$0.00
CSSP-2014-TA-2051	Atmospheric Pressure Plasma Decontamination System	Active	Public Health Agency of Canada	$80,000.00	$0.00
CSSP-2014-TA-2052	Acquisition of a Droplet Digital PCR (ddPCR) system for detection of foodborne pathogens	Active	Health Canada	$102,000.00	$0.00
09-0462RD	Next generation sequencing, direct detection and genotyping of fungi, bacteria and nematodes in the agri-food system	Active	Agriculture and Agri-Foods Canada	$1,999,000.00	$1,655,000.00
09-0481TD	An Optical Imaging Device for a Rapid Assessment of Tissue Viability and Wound Healing	Active	National Research Council of Canada	$1,810,328.00	$1,215,035.00
				$7,597,568.00	**$5,696,051.00**

CONFIDENCE BUILDING MEASURE A, Part 2 (iii)

National Biological Defence Research and Development Program

III. Facilities

1. Defence Research and Development Canada – Suffield Research Centre

   a. The facility is located in Buildings 1, 10, 60, 600, 610 and the Colin Watson Aerosol Layout (CWAL) and associated minor structures, all co-located with Canadian Forces Base Suffield near the village of Ralston, Alberta, Canada. The postal address is

      Centre Director
      DRDC Suffield Research Centre
      Box 4000 Station Main
      Medicine Hat, Alberta T1A 8K6
      CANADA

   b. Floor area of laboratory areas by containment level:

      BL2 - 492 m^2
      BL3 - 159 m^2
      BL4 - 0 m^2

      The total laboratory floor area in Building 1 used for biological defence work is 868 m^2. An Aerosol Test Facility containing 38 m^2 of lab space is located next to Building 1; another aerosol test facility containing 33 m^2 of lab space is located at the CWAL field site. Building 10 is a vivarium and includes general laboratory space. The area of the vivarium is 1134 m^2. Building 610 occupies 76 m^2 of space. Field facilities for biological agent training exist in the vicinity of Building 60.

   c. The organizational structure of each facility at 30 November 2014[3]:

      i. Total number of personnel 27.0

      ii. Division of personnel

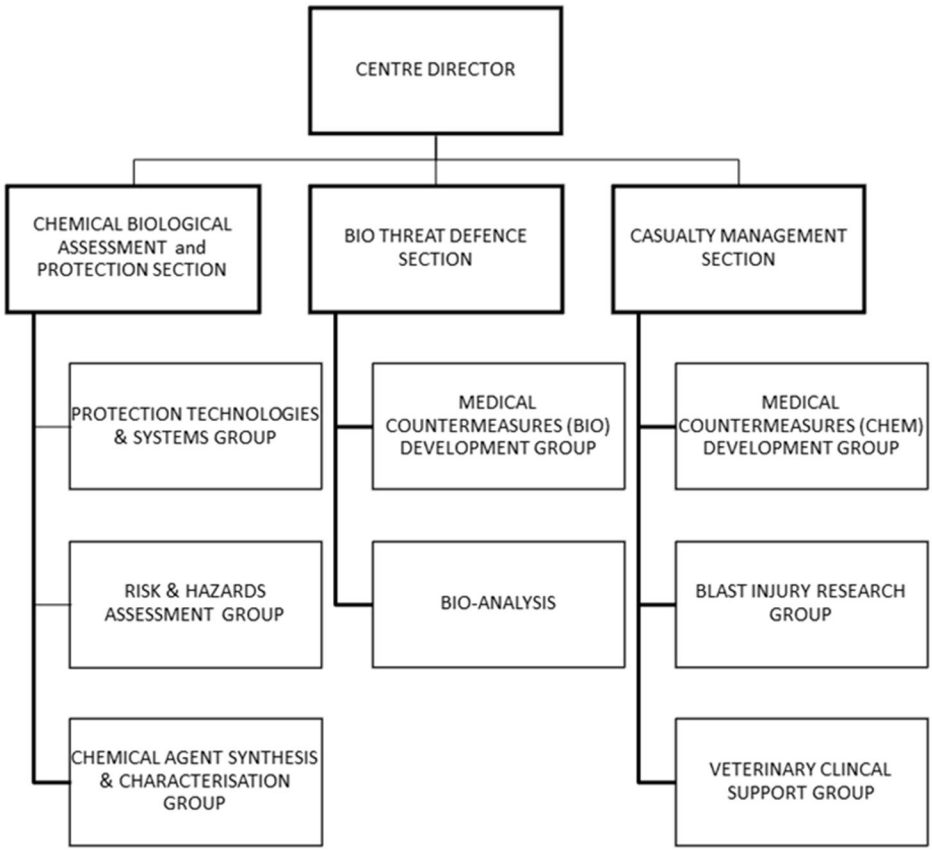
Military	2.0
Civilian	25.0

[3] The chemical and biological defence programs at this facility are fully integrated. The data presented herein is therefore a best estimate as to the portion that is affected to biological defence.

iii. Division of personnel by category

Scientists	14.5[45]
Engineers	0.0
Technicians	9.0
Admin. and support staff	3.5

iv. Organization Chart and disciplines represented in the DRDC Suffield research and development program in biological defence



Disciplines represented:

Bacteriology	Immunology
Microbiology	Virology
Chemistry	Biochemistry
Biotechnology	Veterinary Medicine
Medicine	Pharmacology

[4] The decimal represent the percentage of the workload of a full-time employee.
[5] There is a Natural Sciences and Engineering Research Council of Canada (NSERC) visiting fellow working in biological defence at this facility, working to develop medical countermeasures to BW agents.

v. The research in this facility is 100% funded by the Departments of National Defence and Public Safety Canada and under contract to, or through collaborative agreements, with other government departments and industry.

Funding level estimates (including salaries): $4,559,100

vi. Estimate of funding levels for the following program areas (excluding salaries):

Research	$1,235,600
Development	$550,500
Test and Evaluation	$190,000

vii. All staff members are encouraged to publish the results of their research in the open literature whenever not precluded by security or intellectual property considerations. There is also an internal publication system which is used for publications regardless of content. See attached list of publications (Form C).

d. The biological defence program at DRDC Suffield is outlined in Form A, part 2, (ii), paragraph 1 and additional details follow. Assessment of the hazards from biological agents and toxins involves research to understand the dispersion of such agents and is carried out by mathematical modelling techniques. Part of the work in detection involves R&D leading to the production of field portable biological agent detection systems. In medical countermeasures, research is carried out on new drugs and vaccines, for example humanized antibodies, antivirals, antibiotics and vaccines. Microorganisms other than Newcastle disease virus (NDV) and *Bacillus subtilis var. niger* (formerly *Bacillus globigii* (BG) which have been used in the biological defence program are *Bacillus anthracis*, *Brucella* species (*abortus*, *melitensis*, *neotomae*, *ovis* and *suis*), *Burkholderia* species (*mallei*, *pseudomallei*) *Francisella tularensis*, *Mycobacterium tuberculosis*, *Yersinia enterocolitica*, *Yersinia pestis*, various influenza virus strains, western equine encephalitis, eastern equine encephalitis,Venezuelan equine encephalitis, Highlands J virus, Sindbis virus and dengue virus (serotypes 1-4). Toxins used include botulinum toxin, staphylococcal enterotoxin B and ricin. In the early to mid-1980s, outdoor studies have involved only NDV middle through 1980's and BG.

2. Defence Research and Development Canada (DRCD) – Valcartier Research Centre

a. The facility is located in buildings 14 and 25 and an aerosol chamber for Lidar measurements is located at about 300 m from building 25 (also on the main laboratory area complex). The postal address is:

Centre Director
DRDC Valcartier Research Centre
2459 Boul. Pie XI Nord
Québec, Québec, G3J 1X5
CANADA

b. Floor area of laboratory areas in Building 14 and 25 by containment level:

BSL1 - 165 m^2

The aerosol chamber (2m x 2m x 22m) located outside of building 25 is used to characterize standoff biodetection systems under development with fluorescing aerosols simulating bioaerosols.

c. The organizational structure of the personnel contributing to this activity is:

i. Total number of personnel 3.5[6]

ii. Division of personnel

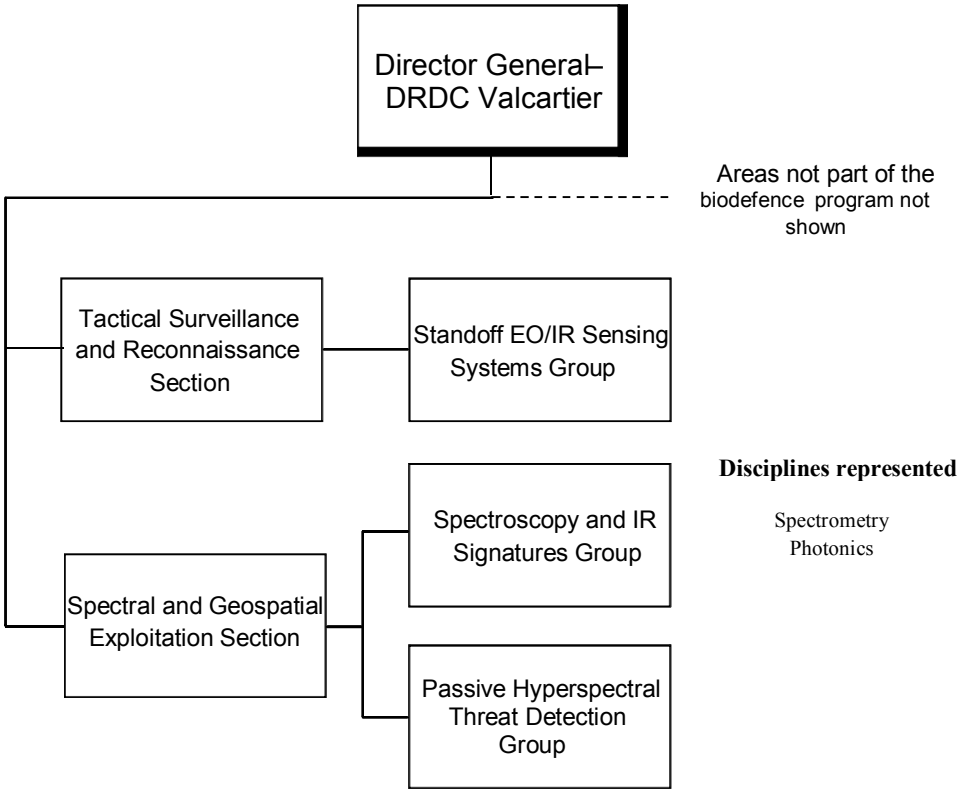
civilian	3.5
military	0

iii. Division of personnel by category

scientists	2
managers	0.5
technicians	1
admin. and support staff	0

[6] The decimal represent the percentage of the workload of a full-time employee.

iv. Organization Chart and disciplines represented in the DRDC Valcartier program in biological defence:



v. There are contractor staff working in biological defence at this facility. Contractors are working in technical support to the standoff biodetection program. A list of contractors carrying out R&D in biological defence is attached.

vi. The research in this facility is 100% funded by the Departments of National Defence.

vii. Funding level estimates (including salaries): $425,000

viii. All staff are encouraged to publish the results of their research in the open literature whenever not precluded by security or intellectual property considerations. There is also an internal publication system which is used for publications regardless of content. See attached the list of publications (Form C).

d. The biological defence program at DRDC Valcartier is focused on the detection of biological agents and toxins using photonic detection methods. This involves R&D leading to the production of field portable biological agent detection systems.

List of Contractors
Carrying Out Research and Development in Biological Defence
for the Department of National Defence of Canada – 2014

Contractor	Title of project
AEREX Avionics Inc. Breakeyville, QC	Improve the data base of spectral Laser Induced Fluorescence (LIF). Develop a tool to capture cloud trajectory and acquire measurements.
Altis Human Resources (Calgary) Inc. Calgary, AB	Review of Currently Available or Emerging Diagnostic Platforms for Detection of Host-Specific Biomarkers from Clinical Samples.
Banting Institute University of Toronto	Development of Electro-Impedance Spectroscopic Detection of Biological Agents using Toll-Like Receptors as Recognition Elements.
Biochemistry, Medical Microbiology and Immunology University of Alberta, Edmonton, AB	Characterization of rigid amphipathic fusion inhibitors against emerging and weaponizable viruses.
Defence Science and Technology Organization Australia	Preclinical testing of DEF 201 (an adenvovirus vector encoded with the gene for interferon alpha protein) in nonhuman primate model.
Dreyfus Toronto, ON	Preclinical development of a trivalent vaccine against Venezuelan, eastern and western equine encephalitis viruses.
Electrical and Computer Engineering University of Toronto Toronto, ON	Detection and Identification of Chemical and Biological Aerosols Using Optofluidic-Assisted Raman Spectroscopy.
Les instruments optiques du Saint-Laurent Inc., Mirabel, QC	Detection, monitoring and generation of a trajectory vector for bioaerosol clouds.
National Research Council, National Institute for Nanotechnology, Edmonton, AB	Use of nanopouros use films-based Electrical impedance spectroscopy (EIS) to facilitate whole bacterial pathogens capture and detection.
Transmedical For Life Canada, Sidney, BC	Construction of pseudotyped lentivirus for Ebola virus.
University of Calgary, Health Science Centre, Calgary, AB	Biomarkers of Injury and Infection.
University of Calgary, Calgary, AB	Characterization of self-assembled monolayer (SAM). Electrochemical sensor for bacterial lipopolysaccharides.
University of Guelph, Guelph, ON	Development of Plant-Produced Humanized Antibodies.

CONFIDENCE BUILDING MEASURE B

Exchange of information on outbreaks of infectious diseases and similar occurrences caused by toxins

At the Third Review Conference it was agreed that States Parties continue to implement the following:

> "Exchange of information on outbreaks of infectious diseases and similar occurrences caused by toxins, and on all such events that seem to deviate from the normal pattern as regards type, development, place, or time of occurrence. The information provided on events that deviate from the norm will include, as soon as it is available, data on the type of disease, approximate area affected, and number of cases".

The Seventh Review Conference agreed the following:

> "No universal standards exist for what might constitute a deviation from the normal pattern".

Modalities

The Third Review Conference agreed on the following, later amended by the Seventh Review Conference:

1. Exchange of data on outbreaks that seem to deviate from the normal pattern is considered particularly important in the following cases:

- when the cause of the outbreak cannot be readily determined or the causative agent[7] is difficult to diagnose;
- when the disease may be caused by organisms which meet the criteria for risk groups III or IV, according to the classification in the latest edition of the WHO Laboratory Biosafety Manual;
- when the causative agent is exotic to a given geographical region;
- when the disease follows an unusual pattern of development;
- when the disease occurs in the vicinity of research centres and laboratories subject to exchange of data under item A; and
- when suspicions arise of the possible occurrence of a new disease.

2. In order to enhance confidence, an initial report of an outbreak of an infectious disease or a similar occurrence that seems to deviate from the normal pattern should be given promptly after cognizance of the outbreak and should be followed up by annual reports. To enable States Parties to follow a standardized procedure, the Conference has agreed that Form B should be used, to the extent information is known and/or applicable, for the exchange of annual information.

[7] It is understood that this may include organisms made pathogenic by molecular biology techniques, such asgenetic engineering.

3. The declaration of electronic links to national websites or to websites of international, regional or other organizations which provide information on disease outbreaks (notably outbreaks of infectious diseases and similar occurrences caused by toxins that seem to deviate from the normal pattern) may also satisfy the declaration requirement under Form B.

4. In order to improve international cooperation in the field of peaceful bacteriological (biological) activities and in order to prevent or reduce the occurrence of ambiguities, doubts and suspicions, States Parties are encouraged to invite experts from other States Parties to assist in the handling of an outbreak, and to respond favourably to such invitations, respecting applicable national legislation and relevant international instruments.

Background information of nationally notifiable diseases: Animal Health

DEFINITION: Reportable diseases

These diseases are listed in the Health of Animals Act and Regulations and are usually of significant importance to human or animal health or to the Canadian economy.

The list of "reportable" diseases includes all of the previously called OIE List A diseases. Reportable diseases are transmissible diseases which have the potential for very serious and rapid spread, irrespective of national borders, which are of serious socio-economic or public health consequence and which are of major importance in the international trade of animals and animal products.

DEFINITION: Notifiable diseases

In Canada, there is a second list of diseases, called "notifiable", which also need to be reported to the veterinary administration (CFIA) on an immediate or annual basis. In general, immediately notifiable diseases are diseases exotic to Canada for which there are no control or eradication programs. Notifiable diseases are the transmissible diseases which are considered to be of socio-economic and/or public health importance within countries and which are significant in the international trade of animals and animal products.

The reports to OIE are posted on the new World Animal Health Information Database (WAHID) Interface website: http://www.oie.int/wahid-prod/public.php?page=home. Any additional written reports to the OIE will also be posted directly on the CFIA website.

CONFIDENCE BUILDING MEASURE B

Information on outbreaks of infectious diseases and similar occurrences, that seems to deviate from the normal pattern

Report from the Public Health Agency of Canada

Measles

Despite the achievement of measles elimination in Canada in 1998 and in the Americas Region in 2002, importations of measles cases and subsequent secondary spread continue as measles remains endemic in other parts of the world and as Canada has pockets within its population of unimmunized or underimmunized persons who are susceptible to measles.

British Columbia, March – April 2014

In 2014, a large outbreak of measles occurred in the Fraser Health Authority region of British Columbia. This outbreak occurred due to an importation of measles from the Netherlands into a religious community in Fraser, BC who object to vaccination. This community had ties with the Netherlands, including travel to and from the Netherlands. The outbreak resulted in 325 confirmed cases that were reported to the Agency. However, media reports indicated more than 400 cases, suggesting many probable cases. Washington State reported six cases of measles associated with this outbreak. Although no fatalities were associated with this outbreak, there were four hospitalizations associated with this outbreak. The genotype was determined to be D8. This is the same measles strain that was imported to Canada from the Netherlands multiple times during 2013, including the importation that sparked the outbreak in southern Alberta. The Fraser Health Authority outbreak was declared over at the end of April 2014.

Quebec, January 2015- ongoing at submission time

In late January 2015, Quebec reported an outbreak of measles cases in the Lanaudière region of Quebec in a religious community who object to vaccination. By the end of February, Quebec was reporting 26 cases of measles in the Lanaudière region (all genotype B3), all of whom were unimmunized. This outbreak is the direct result of measles importation from the California outbreak which began in December 2014. Twenty-five (25) of the 26 cases were epidemiologically linked.

Ontario, January 2015- ongoing at submission time

Between late January and the end February, Ontario had reported 19 cases of measles in five regions (all genotype D4). No index case has been identified, and an epidemiological link has not been established for 18 of the 19 cases. To date, 2 cases have been reported as hospitalized and no fatalities have been reported. The majority of cases were unimmunized or underimmunized.

Manitoba, January 2015
One case of measles from Manitoba occurred in January 2015. This case had travelled to India, and was determined to be genotype D8 which is endemic in India. This case occurred in a child too young to be offered routine measles immunization. At the time of writing this report, no secondary transmission has been reported.

Invasive Meningococcal Disease

Nova Scotia, January – February, 2015
In late January 2015, Nova Scotia declared an outbreak of invasive meningococcal disease at Acadia University in Wolfville, Nova Scotia. Two cases of invasive meningococcal disease (serogroup B) occurred within students attending the university, with one fatality and one hospitalization. A vaccination program against meningococcal B was implemented for students and staff at the university in February 2015. At the time of writing this report, no further cases had been identified. This prompted incident prompted Nova Scotia to announce a change in their routine invasive meningococcal vaccination program for grade 7 student from a monovalent meningococcal vaccine (serogroup C) to a quadravalent vaccine (serogroups A, C, Y, W135) starting in September 2015.

Pertussis

Prince Edward Island, February-November 2014
A pertussis outbreak began in late 2014 in PEI. Altogether 66 cases were identified including, four cases that were hospitalized. No deaths were reported. Prior to disease onset, 27% of cases were unimmunized, 9% of cases were under-immunized, and 64% of cases were immunized appropriately. The outbreak lasted for 48 weeks and was declared over in mid-November 2014.

Alberta, November 2014-ongoing at submission time
A pertussis outbreak was declared in 2014 in Alberta's Central Zone. As of December 4th, 2014, 107 confirmed cases were identified including seven cases that were hospitalized. No deaths have been reported. In response, Alberta increased the number of immunization appointments available in the region, focusing efforts on infants and pre-school aged children who weren't up-to-date, caregivers of infants, health care workers, and pregnant women.

Cyclosporiasis
Between July and September of 2014, 85 cases (2 hospitalizations, 0 deaths) of locally-acquired cyclosporiasis were investigated in British Columbia, Ontario, and Quebec. No common source was confirmed, although berries (specifically blackberries) and cilantro were food items of interest. This was the largest outbreak of cyclosporiasis in Canada since 1999. Cyclospora is not endemic in Canada. Illness due to Cyclospora is more frequent in the spring and summer months. Previous Canadian outbreaks of cyclosporasis have been linked to travel and fresh produce, imported from countries where Cyclospora is endemic. Approximately 150-220 cyclosporiasis cases are reported annually to national surveillance (2010-2012). Significant under-reporting to the public health surveillance systems occurs due to the health care seeking behaviour of individuals, physician requests for Cyclospora testing, and the testing practices of local laboratories. There are unique challenges in detecting and investigating outbreaks due to a lack

of laboratory sub-typing methods (no DNA fingerprint typing available) that limit the ability to link cases and food samples through molecular characterization.

Avian Influenza A(H5N1)

The first confirmed case of influenza H5N1 was reported in Canada on January 8, 2014. The onset of symptoms was December 27, 2013, followed by admission to hospital on January 1, 2014. The case died on January 3, 2014. The case travelled to China during December 2013, but did not visit any farms or markets. The source of exposure is unknown at this time. Close contacts at home or in the hospital have not shown symptoms.

There have been 649 human cases of H5N1 in 16 countries over the last decade, primarily in people who were exposed to infected birds. The risk to Canadians is very low, as there is no evidence of sustained human-to-human transmission.

General Trends in Sexually Transmitted Infections and Hepatitis

Trends in the rates of sexually transmitted infections and hepatitis have been changing recently for a variety of reasons, outlined below.

Chlamydia

Rates of reported cases of chlamydia have been increasing steadily since 1997, when more sensitive laboratory tests were introduced in Canada. Thus, part of the increase in rates can be attributed to improved detection of infections among those who are tested. Other postulated reasons for the increase in reported chlamydia rates include increased case finding (through contact tracing and improved screening), and an actual increase in incidence due to changes in behavior at the population level. Data to support any of these theories are limited. Chlamydia is endemic in Canada, with high rates of reported cases across the country, particularly among those under 30. There were 103,868 cases reported in 2013, for a rate of 295.7 per 100,000 population (preliminary data).

Gonorrhea

Trends in gonorrhea demonstrate an increase in rates of reported cases starting in 1997; reasons for this increase are similar to those for chlamydia. Since 2009, the rate of increase of new cases has begun to slow down. Antimicrobial resistance in gonorrhea is a serious concern, with recent data showing decreasing susceptibility to current first-line treatments. Resistant gonorrhea infections can result in treatment failure, with a possible consequent resurgence in cases. In 2013, 13,786 cases of gonorrhea were reported in Canada, with a corresponding rate of 39.2 per 100,000 (preliminary data).

Hepatitis B

Trends in acute hepatitis B (a better indicator of endemic transmission than overall cases) indicate a decrease in the rate of reported cases. Routine childhood immunization for hepatitis B in Canada has reduced the occurrence of large-scale outbreaks; occasional sporadic transmission of hepatitis B infections has been limited to small groups (e.g., a small 2006 outbreak limited to household transmission in several families in New Brunswick). There were 5,341 cases of

hepatitis B (acute and chronic combined) reported in 2013, for a rate of 15.2 per 100,000 (preliminary data).

Hepatitis C

Rates of reported cases of hepatitis C have decreased since 2005. Transmission within Canada is due primarily to sharing of contaminated injection drug equipment. In 2013, 10,379 cases of hepatitis C were reported in Canada, a rate of 29.5 per 100,000 (preliminary data).

Infectious syphilis

The reported rate of infectious syphilis was maintained below 1.0 per 100,000 for several years prior to 2002, when rates started to increase due to outbreaks in several jurisdictions. In recent years, sustained high reported rates of infectious syphilis have been documented in various regions across Canada, concentrated mainly in large urban centres, suggesting that syphilis is once again becoming endemic in much of the country. More recent outbreaks have occurred or are in progress in Nunavut, the Northwest Territories, Saskatchewan, Nova Scotia, and New Brunswick.

Outbreaks are often associated with travel between jurisdictions in Canada or outside of the country. Men who have sex with men are one of the most affected groups; however, outbreaks have also been seen in heterosexual men and women, with resulting increases in congenital syphilis in infants. Injection drug use and involvement in the sex trade have been implicated in some jurisdictions. Public health response to the increase in infectious syphilis has included communication to health care providers to raise awareness and increase testing, internet-based awareness campaigns directed at the general population, and testing "blitzes" among the populations most affected. In 2013, 2,129 cases of infectious syphilis were reported in Canada, for a rate of 6.1 per 100,000 (preliminary data).

Report from the Canadian Food Inspection Agency

In 2014, there were no outbreaks of animal diseases that deviated from normal patterns.

All information of detections and outbreaks of nationally regulated disease in animals in 2014 is available in the monthly reports on the CFIA web site, www.inspection.gc.ca and on the World Organization for Animals Health (OIE) web site for those diseases where Canada has an obligation to notify the OIE (www.oie.int).

CONFIDENCE BUILDING MEASURE C

Encouragement of publication of results and promotion of use of knowledge

At the Third Review Conference it was agreed that States parties continue to implement the following:

> "Encouragement of publication of results of biological research directly related to the Convention, in scientific journals generally available to States parties, as well as promotion of use for permitted purposes of knowledge gained in this research".

Modalities

The Third Review Conference agreed on the following:

- It is recommended that basic research in biosciences, and particularly that directly related to the Convention should generally be unclassified and that applied research to the extent possible, without infringing on national and commercial interests, should also be unclassified.
- States parties are encouraged to provide information on their policy as regards publication of results of biological research, indicating, *inter alia*, their policies as regards publication of results of research carried out in research centres and laboratories subject to exchange of information under item A and publication of research on outbreaks of diseases covered by item B, and to provide information on relevant scientific journals and other relevant scientific publications generally available to States parties.
- The Third Review Conference discussed the question of cooperation and assistance as regards the safe handling of biological material covered by the Convention. It concluded that other international forums were engaged in this field and expressed its support for efforts aimed at enhancing such cooperation.

CONFIDENCE BUILDING MEASURE C

Encouragement of Publication of Results and Promotion of Use of Knowledge

Publications :

Note: Publication and knowledge sharing is strongly encouraged and a cornerstone of the CSSP.

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CONFIDENCE BUILDING MEASURE E

Declaration of Legislation, Regulations and Other Measures

At the Third Review Conference the States parties agreed to implement the following, later amended by the Seventh Review Conference:

As an indication of the measures which they have taken to implement the Convention, States parties shall declare whether they have legislation, regulations or other measures:

> (a) To prohibit and prevent the development, production, stockpiling, acquisition or retention of the agents, toxins, weapons, equipment and means of delivery specified in Article I of the Convention, within their territory or anywhere under their jurisdiction or under their control anywhere;
>
> (b) In relation to the export or import of micro-organisms pathogenic to man, animals and plants or of toxins in accordance with the Convention;
>
> (c) In relation to biosafety and biosecurity.

States parties shall complete the attached form (Form E) and shall be prepared to submit copies of the legislation or regulations, or written details of other measures on request to the Implementation Support Unit (ISU) within the United Nations Office for Disarmament Affairs or to an individual State party. On an annual basis States parties shall indicate, also on the attached form, whether or not there has been any amendment to their legislation, regulations or other measures.

Relation to	Legislation	Regulations	Other Measures	Amended since Last Year
a) Development, production stockpiling, acquisition or retention of microbial or other biological agents, or toxins, weapons, equipment and means of delivery specified in Article I.	YES	YES	YES	NO
b) Exports of microorganisms* and toxins.	YES	YES	YES	NO
c) Imports of microorganisms* and toxins.	YES	YES	YES	NO

* Microorganisms pathogenic to man, animals and plants in accordance with the Convention.

For more information, please consult the Canadian reports to the Compliance Assessment pilot project, found in Documents BWC/MSP/2012/MX/WP.17 (from the 2012 Meeting of Experts) and BWC/MSP/2012/WP.6 (from the 2012 Meeting of States Parties).

On December 1st 2015, Canada will enact the *Human Pathogens and Toxins Regulations*. The objectives of the HPTR are to improve oversight of human pathogens and toxins in Canada,

establish national requirements for the safe handling of human pathogens and toxins, and provide assurance that individuals with access to a prescribed list of security-sensitive human pathogens and toxins would hold an appropriate security clearance.

CONFIDENCE BUILDING MEASURE F

In the interest of increasing transparency and openness, States parties shall declare whether or not they conducted any offensive and/or defensive biological research and development programmes since 1 January 1946.

If so, States parties shall provide information on such programmes, in accordance with Form F.

Declaration of Past Activities in Offensive and/or Defensive Biological Research and Development Programs

1. Date of Entry into Force - 26 March 1975 (Deposit 18 September 1972)

2. Past offensive biological R&D programs:

a. Yes.
b. 1 Jan 46 to 30 Jun 58
c. In the above period offensive work undertaken by Canada included: studies of improved procedures for production of certain toxins (eg. botulinum and diphtheria); studies on the use of insects as vectors for pathogenic bacteria and viruses; test and evaluation of munitions, including performance in cold weather; studies of weapon-produced aerosols of potential BW agents; fundamental work related to field trials, dealing with the dispersion and properties of solid particulates, preparation of finely divided solids for munitions charging and sampling of toxic particulates; development of tissue culture processes for large scale cultivation of viruses; and development of *Burkholderia mallei* and *Burkholderia pseudomallei* as new potential BW agents and continued work on *Brucella suis* and *Pasteurella tularensis* as BW agents. There was no large scale production, stockpiling or weaponization of BW agents. When necessary, BW agents were destroyed by autoclaving.

3. Past defensive biological R&D programs:

a. Yes.
b. 1 Jan 46 to present
c. A key factor in biological defence work is that it is only through a thorough understanding of the properties and behaviour of potential BW agents that the potential threat can be appreciated, and work on suitable defensive measures can be undertaken. Accordingly, in the past there was much basic research on such agents, as well as studies of their characteristics and behaviour as aerosols. The aerosol work included studies to delineate the factors responsible for the losses of viability in airborne bacteria and viruses during long-distance aerosol transport. The aim was to better understand the feasibility of large scale use of BW agents. Medical work in biological defence has covered research and development, and in some cases production of toxoids, antitoxins and vaccines for various potential BW agents including *Botulinum* toxin, Rinderpest virus, Newcastle Disease virus, *B. mallei*, *F. tularensis* and Diphtheria toxin. More recent work in biological defence is summarized in Form A, part 2.

CONFIDENCE BUILDING MEASURE G

Declaration of Production Facilities

To further increase the transparency of biological research and development related to the Convention and to broaden scientific and technical knowledge as agreed in Article X, each State party will declare all facilities, both governmental and non-governmental, within its territory or under its jurisdiction or control anywhere, producing vaccines licensed by the State party for the protection of humans. Information shall be provided on Form G attached.

List of Human Vaccine Manufacturing Facilities in Canada

Name of Facility	Location(s)	Activity
ID Biomedical Corporation of Quebec (GlaxoSmithKline Inc.)	Québec City, Québec	Manufacturer of vaccines for use in humans
Sanofi Pasteur Limited	Toronto, Ontario	Manufacturer of vaccines for use in humans
Medicago	Québec City, Québec	Manufacturer of vaccines (pending license to manufacture vaccine for use in humans)
Immunovaccine	Halifax, Nova Scotia	Manufacturer of vaccines (pending license to manufacture vaccine for use in humans)

List of Veterinary Biologics (vaccine) Manufacturing Facilities in Canada

Includes facilities that are currently licensed to manufacture veterinary biologics under a *Veterinary Biologics Establishment Licence*, issued by the Canadian Centre for Veterinary Biologics of the Canadian Food Inspection Agency, under the *Health of Animals Act and Regulations*.

Name of Facility	Location(s)	Activity
Artemis Technologies Inc. Can. Vet. Biol. Estab. Lic. No. 50	Guelph, Ontario	Manufacturer of veterinary vaccines for use in animals
Biovet Inc. Can. Vet. Biol. Estab. Lic. No. 49	Saint-Hyacinthe, Québec	Manufacturer of *in vitro* diagnostic test kits for diagnosis of animal diseases
Gallant Custom Laboratories Inc. Can. Vet. Biol. Estab. Lic. No. 45	Cambridge, Ontario	Manufacturer of autogenous veterinary vaccines for use in animals
Novartis Animal Health Canada Inc. Can. Vet. Biol. Estab. Lic. No. 40	Mississauga, Ontario	Manufacturer of veterinary vaccines for use in farm animals
Novartis - Aqua Health Can. Vet. Biol. Estab. Lic. No. 40	Charlottetown, PEI Victoria, PEI	Manufacturer of veterinary vaccines for use in aquaculture
Nutratech Inc. Can. Vet. Biol. Estab. Lic. No. 58	Winnipeg, Manitoba	Manufacturer of egg antibody products for use in animals.
Saskatoon Colostrum Co. Ltd. Can. Vet. Biol. Estab. Lic. No. 44	Saskatoon, Saskatchewan	Manufacturer of bovine colostrum products for administration to animals
Vacci-Vet Inc. Can. Vet. Biol. Estab. Lic. No. 59	Saint-Hyacinthe, Québec	Manufacturer of autogenous veterinary vaccines for use in animals
Vetech Laboratories Inc. Can. Vet. Biol. Estab. Lic. No. 23	Guelph, Ontario	Manufacturer of veterinary vaccines for use in poultry