Modification Form for Permit BIO-UWO-0165

Permit Holder: Bryan Neff

PLEASE ATTACH A MATERIAL SAFETY DATA SHEET OR EQUIVALENT FOR NEW BIOLOGICAL AGENTS. (None available)
PLEASE ATTACH A BRIEF DESCRIPTION OF THE WORK THAT EXPLAINS THE BIOLOGICAL AGENTS USED AND HOW THEY WILL BE STORED, USED AND DISPOSED OF. (Attached)

Approved Personnel
(Please stroke out any personnel to be removed)

Tim Hain

Jessica Van Zwol

Chandra Rodgers

Ross Breckels

Shawn Garner

Additional Personnel
(Please list additional personnel here)

Aimee Lee Houde, Department of Biology

	Please stroke out any approved Biological Agent(s) to be removed	Write additional Biological Agent(s) for approval below. Give the full name
Approved Microorganisms	E. coli DH5alpha	Paenibacillus thiaminolyticus
Approved Primary and Established Cells		
Approved Use of Human Source Material		
Approved Genetic Modifications (Plasmids/Vectors)	[Plasmid] P-Gem T Easy.	
Approved Use of Animals	Salmon, Bluegill sunfish, guppy fish	
Approved Biological Toxin(s)		

Approved Gene Therapy		
Approved Plants and Insects		

As the Principal Investigator, I have ensured that this project will follow the Western Biosafety Guidelines and Procedures Manual for Containment Level 1 2 Laboratories (and the Level 3 Facilities Manual for Level 3 projects). I will ensure that UWO faculty, staff and students working in my laboratory have an up-to-date Hazard Communication Form, found at http://www.shs.uwo.ca/workplace/newposition.htm

Signature of Permit Holder: _____

Current Classification: 1 **Containment Level for Added Biohazards:** 1

Date of Last Biohazardous Agents Registry Form: May 14, 2010

Date of Last Modification (if applicable): _____

BioSafety Officer(s)*: _____

***For work being performed at Institutions affiliated with Western University, the Safety Officer for the Institution where experiments will take place must sign the form prior to its being sent to Western University Biosafety Officer.**

Chair, Biohazards Subcommittee: **Date:**

Description of Work:

Rationale:

Atlantic salmon were once abundant in Lake Ontario but were extinct by 1900. One issue that may be impeding the restoration of Atlantic salmon in Lake Ontario is thiamine deficiency as a result of adult Atlantic salmon feeding on prey fishes that contain high levels of thiaminase (produced by *Paenibacillus thiaminolyticus*), an enzyme that breaks down the vitamin thiamine. Three populations of Atlantic salmon are being considered for reintroduction efforts into Lake Ontario comprising of LaHave River, Lac St. Jean, and Sebago Lake. It is unknown whether these candidate strains of Atlantic salmon have genetic adaptations to coping with diets high in thiaminase.

I would like to feed Atlantic salmon experimental diets low and high in thiaminase at the MNR Codrington Facility, Codrington, Ontario up to three years. Since Codrington does not have the capacity for water treatment, Environment Canada would like me to determine if the bacteria remains alive in water or feces, and if yes, how muchof the bacteria remains alive at the Fish Research Hatchery in the Duckhouse, where the water can be treated. This information would be require for an Environment Canada substance notification assessment.

Methods:

Manufactured feed (Dominique Bureau, Fish Nutrition lab, University of Guelph) will be mixed with bacterial thiaminase isolated from alewife gut contents (imported from Dale Honeyfield, Northern Appalachian Research Laboratory, Wellsboro, Pennsylvania) to become high thiaminase feed. Feed will be stored in a -20°C freezer at the until used. Ten rainbow trout will be kept in a circular tank with 100% recirculation in the the Fish Research Hatchery in the Duckhouse. Rainbow trout (as a model of Atlantic salmon) will be fed once a day the high thiaminase feed for one week.

I will examine water and fecal samples for thiaminase bacteria using a plate overlay of thiamine and peroxidine (Abe et al. 1986). If the thiamine is degraded, the bacteria should be present and I can validate and quanitify the bacteria using gram staining and light microscopy (Nakamura 1990). At the end of the experiment, there will be a planned decontamination using 200 ppm chlorine for 12 hours. Water samples will then be checked for the bacteria and the absence of bacteria will be confirmed before being released to the municipal drain.

References:

Abe M, Nishimune T, Ito S, Kimoto M, Hayashi R. 1986. A simple method for the detection of two types of thiaminase-producing colonies. FEMS Microbiology Letters 34: 129-133.

Nakamura LK. 1990. *Bacillus thiaminolyticus* sp. nov., nom. rev. International Journal of Systematic Bacteriology 40: 242-246.

Intended Start August 1, 2012

Subject: **Fw: thiaminase bacteria from US**
To: ahoude@uwo.ca

Date: 05/23/12 01:50 PM
From: Permit-Permis <permitpermis@phac-aspc.gc.ca>

Dear Aimee Lee Houde,

Thanks for your questions.

Paenibacillus thiaminolyticus is a risk group 1 human pathogen, an Import Permit is not required from PHAC.

Kind Regards

Josee Davies
Regulatory Technologist / Technologiste en réglementation
Public Health Agency of Canada / Agence de santé publique du Canada
Pathogen Regulation Directorate / Direction de la réglementation des agents pathogènes
100 ch. Colonnade Rd. AL: 6201A Ottawa, Ontario, Canada, K1A 0K9
Tel: (613) 957-1779/ Fax: (613)941-0596
http://www.phac-aspc.gc.ca/lab-bio/index-eng.php

The Pathogen Regulation Directorate turnaround time from receipt of a complete application or checklist to permit or compliance letter is on the order of 20 business days.
As part of the Public Health Agency of Canada's contribution to the Federal Sustainable Development Strategy, in compliance with the Federal Sustainable Development Act, please note that as of May 21st, 2012, all documents will be sent by fax ONLY and paper copies will no longer be mailed.

La Direction de la réglementation des agents pathogènes a un délai d'attente depuis la réception d'une demande complète jusqu'à l'émission du document approprié de 20 jours ouvrables.
Dans le cadre de la Stratégie ministérielle de développement durable de l'Agence de la santé publique du Canada et en accord avec la Loi fédérale sur le développement durable, veuillez noter que dès le 21 mai 2012, tous les documents seront envoyées par télécopieur SEULEMENT, les copies papier ne seront plus envoyées par la poste.
----- Forwarded by Permit-Permis/HC-SC/GC/CA on 2012-05-23 01:34 PM -----

----- Forwarded by Isabelle Robert/HC-SC/GC/CA on 2012-05-23 10:34 AM -----

thiaminase bacteria from US

Aimee Lee Houde
to:
biosafety.biosecurite
2012-05-23 09:59 AM

From:
Aimee Lee Houde <ahoude@uwo.ca>

Subject: **Re: thiaminase bacteria from US**
To: Aimee Lee Houde <ahoude@uwo.ca>

Date: 05/23/12 09:07 AM
From: ImportZoopath <ImportZoopath@inspection.gc.ca>

ImportZoopath.vcf (186bytes)

Dear Ms. Lee Houde,

We have performed a short risk assessment. This organism will be classified as level 1, as it is indirectly related to disease in animals. It is not pathogenic itself. Therefore, you will not require an import permit from our section. Please note that other regulations may apply, such as PHAC Human Pathogen Importation Regulation. You may wish to contact this agency for inquiry.

If you have any question, do not hesitate to contact our office.

Regards,

Cinthia Labrie

Office of Biohazard Containment & Safety, CFIA | Bureau du confinement des biorisques et de la sécurité, ACIA
Government of Canada | Gouvernement du Canada
1400 Merivale, Ottawa ON K1A0Y9
Phone/Tél.: (613) 773-6520
Fax/ Téléc.: (613) 773-6521
ImportZoopath@inspection.gc.ca

Please visit our website
http://www.inspection.gc.ca/english/sci/bio/bioe.shtml / Veuillez visiter notre site internet
http://www.inspection.gc.ca/francais/sci/bio/biof.shtml

>>> Aimee Lee Houde <ahoude@uwo.ca> 5/22/2012 10:44 am >>>
Hi Cinthia,

My name is Aimee Houde and I am a PhD student at Western University. I would like to import Paenibacillus thiaminolyticus from a research institution in Pennsylvania, USA. This bacteria is associated with thiaminase which induces thiamine deficiency in animals. I would be using the bacteria in a controlled diet experiment to examine whether there are genetic differences in thiaminase tolerance among three populations of Atlantic salmon that are being considered for reintroduction to Lake Ontario.

Subject: **FW: PNC No. 313 - Draft Meeting Minutes**
To: Aimee Lee Houde <ahoude@uwo.ca>
Cc: "Shahsavarani,Arash [NCR]" <Arash.Shahsavarani@ec.gc.ca>, George Arvanitakis <George.Arvanitakis@hc-sc.gc.ca>

Date: 06/14/12 09:19 AM
From: "Dugal,Francois [NCR]" <Francois.Dugal@ec.gc.ca>

Hi Aimee:

Please find below some draft minutes from our meeting on June 8th. Please let me know if you have any additions or revisions to make!

Sorry for the delay.

Regards,

François

Minutes of PNC No. 313 Meeting

Friday, June 8, 2012

10:00 a.m. via Teleconference

Attendees:

Environment Canada

François Dugal

Arash Shahsavarani

Health Canada

George Arvanitakis

University of Western Ontario

Aimee Lee Houde

1. *Overview of proposed activity by the University of Western Ontario*

The living organism in question, *P. thiaminolyticus*, is implicated in producing an enzyme that breaks down thiamine. Through a controlled diet, the University of Western Ontario plans to administer the living organism to three populations of predatory fish. The activity is planned to be conducted at the Ontario Ministry of Natural Resources' Research Hatchery in Codrington. The flowthrough system currently in place at the facility would have releases directly into the nearby creek. However, the bacteria is said to be present in the diet administered to the fish only in trace amounts. About 300 fish are planned to be submitted to the experiment with 50% of them exposed to the bacterial feed.

Researchers at the University of Pennsylvania have isolated the bacteria and the University of Western Ontario would like to import a sample from them. The bacteria has originally been isolated from an area that would qualify as in the same ecozone as to where the experiment is planned to be conducted.

2. *Containment and Notification under the NSNR(O)*

The New Substances Notification Regulations (Organisms) [NSNR(O)] have an exemption from notification for R&D. Unless a living organism requires level 2, 3 or 4 containment as identified in the Laboratory Biosafety Guidelines, a living organism is exempt from notification under the NSNR(O) if it is manufactured or present in a contained facility in a quantity of less than 1 000 L and it is imported to a contained facility in a quantity that, at the time of the import, is less than 50 mL or 50 g. Knowing this, it was indicated that a sample of the living organism in question could be imported from the University of Pennsylvania so long as it was imported under conditions that met our exemption for Research and Development. However, a notification needs to be made to Environment Canada prior to the living organism being released into the environment. In the case of the proposed experiment, releases could occur from water being released into the creek, even though the bacteria are administered only in trace amounts.

3. *Public Health Agency of Canada and Import Permits*

Under the *Human Pathogen Importation Regulations* (HPIR), the Public Health Agency of Canada (PHAC) issues import permits for human pathogens. According to the HPIR, every person importing a human pathogen in Risk Group 2, 3 or 4, or toxin, as identified in the Laboratory Biosafety Guidelines, must obtain an import permit. Thus, an import permit is not required for a human pathogen in Risk Group 1 prior to import. However, an application may still need to be submitted to the PHAC (see: http://www.phac-aspc.gc.ca/lab-bio/regul/reg-imp/h-patogen-importing-eng.php). Therefore, Environment Canada will not require that an import permit be issued prior to the notification of a Risk Group 1 organism and neither would it require that an import permit be issued for a Risk Group 1 organism prior to its import or manufacture under R&D conditions. See attached email from PHAC

4. *Next Steps*

In order to assess whether a notification will be necessary for the proposed experiment, it was suggested that the living organism be imported from the University of Pennsylvania by the University of Western Ontario under R&D conditions and that a preliminary experiment be conducted in a closed system in order to determine how much of the living organism can be detected in the effluent and, therefore, to determine whether releases would occur. Furthermore, in the eventuality that a notification needs to be made to Environment Canada, the data generated from this experiment in a closed system would be useful in preparing the notification.

As such, the University of Western Ontario will:

- Follow-up with Environment Canada and Health Canada regarding how much of the living organism can be detected in waters that would be released in the Environment.

- Provide literature on previous work done with the living organism in question.

Environment Canada and Health Canada will:

- Provide minutes from our June 8th meeting.

- Provide guidance regarding whether an import permit from the Public Health agency of Canada is required for the living organism in question.

- Once information regarding quantities of the living organism proposed to be released is received, provide guidance on whether a notification is necessary regarding the proposed activity.

François Dugal
Science and Technology Branch
Program Development and Engagement Division
Environment Canada
200 Sacré-Cœur, 8th floor
Gatineau QC K1A 0H3
Francois.dugal@ec.gc.ca
Telephone 819-934-5989
Government of Canada
Website: www.ec.gc.ca

François Dugal
Direction générale des sciences et de la technologie
Division de la mobilisation et de l'élaboration de programmes
Environnement Canada
200 Sacré-Cœur, 8e étage
Gatineau QC K1A 0H3
Francois.dugal@ec.gc.ca
Téléphone 819-934-5989
Gouvernement du Canada
Site Web: www.ec.gc.ca

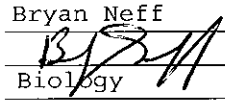
THE UNIVERSITY OF WESTERN ONTARIO
BIOHAZARDOUS AGENTS REGISTRY FORM
Approved Biohazards Subcommittee: September 25, 2009
Biosafety Website: www.uwo.ca/humanresources/biosafety/

This form must be completed by each Principal Investigator holding a grant administered by the University of Western Ontario or in charge of a laboratory/facility where the use of Level 1, 2 or 3 biohazardous agents is described in the laboratory or animal work proposed. The form must also be completed if any work is proposed involving animals carrying zoonotic agents infectious to humans or involving plants, fungi, or insects that require Public Health Agency of Canada (PHAC) or Canadian Food Inspection Agency (CFIA) permits.

This form must be updated at least every 3 years or when there are changes to the biohazards being used.

Containment Levels will be established in accordance with Laboratory Biosafety Guidelines, 3rd edition, 2004, Public Health Agency of Canada (PHAC) or Containment Standards for Veterinary Facilities, 1st edition 1996, Canadian Food Inspection Agency (CFIA).

Completed forms are to be returned to Occupational Health and Safety, (OHS), (Support Services Building, Room 4190) for distribution to the Biohazard Subcommittee. For questions regarding this form, please contact the Biosafety Officer at extension 81135 or biosafety@uwo.ca. If there are changes to the information on this form (excluding grant title and funding agencies), contact Occupational Health and Safety for a modification form. See website: www.uwo.ca/humanresources/biosafety

PRINCIPAL INVESTIGATOR	Bryan Neff
SIGNATURE	
DEPARTMENT	Biology
ADDRESS	204 Collip Building, UWO
PHONE NUMBER	519-850-2532
EMERGENCY PHONE NUMBER(S)	519-652-6844
EMAIL	bneff@uwo.ca

Location of experimental work to be carried out: Building(s) BGS Room(s) 3056, 3054

*For work being performed at Institutions affiliated with the University of Western Ontario, the Safety Officer for the Institution where experiments will take place must sign the form prior to its being sent to the University of Western Ontario Biosafety Officer (See Section 12.0, Approvals).

FUNDING AGENCY/AGENCIES: NSERC
GRANT TITLE(S): Molecular and Behavioural Ecology of Fishes

PLEASE ATTACH A BRIEF DESCRIPTION OF YOUR WORK THAT EXPLAINS THE BIOHAZARDS USED AND HOW THEY WILL BE USED. PROJECTS SUBMITTED WITHOUT A SUMMARY WILL NOT BE REVIEWED. A GRANT SUMMARY PAGE MAYBE ADEQUATE IF IT PROVIDES SUFFICIENT DETAIL ABOUT EACH BIOHAZARD USED.

Names of all personnel working under Principal Investigators supervision in this location:

Shawn Garner	Jessica Van Zwol
Tim Hain	
Scott Colborne	
Ross Breckels	
Chandra Rodgers	

*** DESCRIPTION MUST BE ATTACHED TO THIS FORM OR PROJECT WILL NOT BE REVIEWED***

1.0 Microorganisms

1.1 Does your work involve the use of biological agents? ● YES O NO
(including but not limited to bacteria and other microorganisms, viruses, prions, parasites or pathogens of plant or animal origin)? If no, please proceed to Section 2.0

Do you use microorganisms that require a permit from the CFIA? O YES ● NO
If YES, please give the name of the species. _____
What is the origin of the microorganism(s)? _____
Please describe the risk (if any) of escape and how this will be mitigated:

_____
_____
_____

Please attach the CFIA permit.
Please describe any CFIA permit conditions:

_____
_____
_____

1.2 Please complete the table below:

Name of Biological agent(s)*	Is it known to be a human pathogen? YES/NO	Is it known to be an animal pathogen? YES/NO	Is it known to be a zoonotic agent? YES/NO	Maximum quantity to be cultured at one time? (in Litres)	Source/ Supplier	PHAC or CFIA Containment Level
E. coli DH5α	O Yes ● No	O Yes ● No	O Yes ● No	0.01	Invitrogen	● 1 O 2 O 3
	O Yes O No	O Yes O No	O Yes O No			O 1 O 2 O 3
	O Yes O No	O Yes O No	O Yes O No			O 1 O 2 O 3
	O Yes O No	O Yes O No	O Yes O No			O 1 O 2 O 3

*Please attach a Material Safety Data Sheet or equivalent from the supplier.

2.0 Cell Culture

2.1 Does your work involve the use of cell cultures? O YES ● NO
If no, please proceed to Section 3.0

2.2 Please indicate the type of primary cells (i.e. derived from fresh tissue) that will be grown in culture:

Cell Type	Is this cell type used in your work?	Source of Primary Cell Culture Tissue	AUS Protocol Number
Human	O Yes O No		Not applicable
Rodent	O Yes O No		
Non-human primate	O Yes O No		
Other (specify)	O Yes O No		

2.3 Please indicate the type of established cells that will be grown in culture in:

Cell Type	Is this cell type used in your work?	Specific cell line(s)*	Supplier / Source
Human	O Yes O No		
Rodent	O Yes O No		
Non-human primate	O Yes O No		
Other (specify)	O Yes O No		

*Please attach a Material Safety Data Sheet or equivalent from the supplier. (For more information, see www.atcc.org)

2.4 For above named cell types(s) indicate PHAC or CFIA containment level required O 1 O 2 O 3

3.0 Use of Human Source Materials

3.1 Does your work involve the use of human source materials? O YES ● NO
If no, please proceed to Section 4.0

3.2 Indicate in the table below the Human Source Material to be used.

Human Source Material	**Source/Supplier /Company Name**	**Is Human Source Material Infected With An Infectious Agent? YES/NO**	**Name of Infectious Agent (If applicable)**	**PHAC or CFIA Containment Level (Select one)**
Human Blood (whole) or other Body Fluid		O Yes O No O Unknown		O 1 O 2 O 3
Human Blood (fraction) or other Body Fluid		O Yes O No O Unknown		O 1 O 2 O 3
Human Organs or Tissues (unpreserved)		O Yes O No O Unknown		O 1 O 2 O 3
Human Organs or Tissues (preserved)		Not Applicable		Not Applicable

4.0 Genetically Modified Organisms and Cell lines

4.1 Will genetic modifications be made to the microorganisms, biological agents, or cells described in Sections 1.0 and 2.0? ● YES O NO If no, please proceed to Section 5.0

4.2 Will genetic modification(s) involving plasmids be done? ● YES, complete table below O NO

Bacteria Used for Cloning *	Plasmid(s) *	Source of Plasmid	Gene Transfected	Describe the change that results
E. coli DH5α	P-Gem T Easy	Promega	MHC	Not expressed, no change to bacteria

* Please attach a Material Data Sheet or equivalent if available.

Per OSHA 29CFR1910.1200, Part IV of the Controlled Products Regulations (CPR) of Canada, this product does not require a Material Safety Data Sheet.
(http://www.promega.com/msds/nhlusa.htm)

4.3 Will genetic modification(s) involving viral vectors be made? O YES, complete table below ● NO

Virus Used for Vector Construction	Vector(s) *	Source of Vector	Gene(s) Transduced	Describe the change that results

* Please attach a Material Safety Data Sheet or equivalent.

4.4 Will genetic sequences from the following be involved?

- HIV O YES, please specify _____ ● NO
- HTLV 1 or 2 or genes from any Level 1 or Level 2 pathogens O YES, specify _____ ● NO
- SV 40 Large T antigen O YES ● NO
- E1A oncogene O YES ● NO
- Known oncogenes O YES, please specify _____ ● NO
- Other human or animal pathogen and or their toxins O YES, please specify _____ ● NO

4.5 Will virus be replication defective? O YES O NO No viruses will be used

4.6 Will virus be infectious to humans or animals? O YES O NO

4.7 Will this be expected to increase the containment level required? O YES ● NO

5.0 Human Gene Therapy Trials

5.1 Will human clinical trials be conducted involving a biological agent? O YES ● NO
(including but not limited to microorganisms, viruses, prions, parasites or pathogens of plant or animal origin)
If no, please proceed to Section 6.0

5.2 If YES, please specify which biological agent will be used: _____
Please attach a full description of the biological agent.

5.2 Will the biological agent be able to replicate in the host? O YES O NO

5.3 How will the biological agent be administered? _____

5.4 Please give the Health Care Facility where the clinical trial will be conducted:_____

5.5 Has human ethics approval been obtained? O YES, number: _____ O NO O PENDING

6.0 Animal Experiments

6.1 Will live animals be used? ● YES O NO If no, please proceed to section 7.0

6.2 Name of animal species to be used salmon, bluegill sunfish, guppies

6.3 AUS protocol # 2006-062 Neff

6.4 Will any of the agents listed in section 4.0 be used in live animals O YES, specify: _____ ● NO

6.5 Will the agent(s) be shed by the animal: O YES ● NO, please justify:
Animals not exposed to agents

*** DESCRIPTION MUST BE ATTACHED TO THIS FORM OR PROJECT WILL NOT BE REVIEWED***

7.0 Use of Animal species with Zoonotic Hazards

7.1 Will any of the following animals or their organs, tissues, lavages or other body fluids including blood be used?

- Pound source dogs O YES ● NO
- Pound source cats O YES ● NO
- Cattle, sheep or goats O YES ● NO
- Non-human primates O YES, please specify species _____ ● NO
- Wild caught animals ● YES, please specify species & colony # salmon, bluegill O NO
- Birds O YES sunfish, guppies ● NO
- Others (wild or domestic) O YES, please specify _____ ● NO

8.0 Biological Toxins

8.1 Will toxins of biological origin be used? O YES ● NO If no, please proceed to Section 9.0

8.2 If YES, please name the toxin(s)_____
Please attach information, such as a Material Safety Data Sheet, for the toxin(s) used.

8.3 What is the LD_{50} (specify species) of the toxin_____

8.4 How much of the toxin is handled at one time*? _____

8.5 How much of the toxin is stored*? _____

8.6 Will any biological toxins be used in live animals? O YES, Please provide detais:_____ O NO

*For information on biosecurity requirements, please see:
http://www.uwo.ca/humanresources/docandform/docs/healthandsafety/biosafety/Biosecurity_Requirements.pdf

9.0 Insects Requiring CFIA Permits

9.1 Do you use insects that require a permit from the CFIA? O YES ● NO
If no, please proceed to Section 10.0

9.2 If YES, please give the name of the species. _____

9.3 What is the origin of the insect? _____

9.4 What is the life stage of the insect? _____

9.5 What is your intention? O Initiate and maintain colony, give location: _____
O "One-time" use, give location: _____

9.6 Please describe the risk (if any) of escape and how this will be mitigated:
_____
_____
_____

9.7 Please attach the CFIA permit.

9.8 Please describe any CFIA permit conditions:
_____
_____

*** DESCRIPTION MUST BE ATTACHED TO THIS FORM OR PROJECT WILL NOT BE REVIEWED***

10.0 Plants Requiring CFIA Permits

10.1 Do you use plants that require a permit from the CFIA? O YES ● NO
If no, please proceed to Section 11.0

10.2 If YES, please give the name of the species. _____

10.3 What is the origin of the plant? _____

10.4 What is the form of the plant (seed, seedling, plant, tree...)? _____

10.5 What is your intention? O Grow and maintain a crop O "One-time" use

10.6 Do you do any modifications to the plant? O YES O NO
If yes, please describe: _____
_____

10.7 Please describe the risk (if any) of loss of the material from the lab and how this will be mitigated:
_____
_____
_____

10.8 Is the CFIA permit attached? O YES O NO
If NO, please forward the permit to he Biosafety Officer when available.

10.9 Please describe any CFIA permit conditions:
_____
_____
_____

11.0 Import Requirements

11.1 Will any of the above agents be imported? O YES, please give country of origin_____
If no, please proceed to Section 12.0 ● NO

11.2 Has an Import Permit been obtained from HC for human pathogens? O YES O NO

11.3 Has an import permit been obtained from CFIA for animal or plant pathogens? O YES O NO

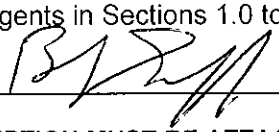
11.4 Has the import permit been sent to OHS? O YES, please provide permit # _____ O NO

12.0 Training Requirements for Personnel Named on Form

All personnel named on the above form who will be using any of the above named agents are required to attend the following training courses given by OHS:

- Biosafety
- Laboratory and Environmental/Waste Management Safety
- WHMIS (Western or equivalent)
- Employee Health and Safety Orientation

As the Principal Investigator, I have ensured that all of the personnel named on the form who will be using any of the biohazardous agents in Sections 1.0 to 9.0 have been trained.

SIGNATURE 

*** DESCRIPTION MUST BE ATTACHED TO THIS FORM OR PROJECT WILL NOT BE REVIEWED***

13.0 Containment Levels

11.1 For the work described in sections 1.0 to 9.0, please indicate the highest HC or CFIA Containment Level required. ● 1 O 2 O 3

13.2 Has the facility been certified by OHS for this level of containment?

O YES, permit # if on-campus_____

O NO, please certify

● NOT REQUIRED for Level 1 containment

14.0 Procedures to be Followed

14.1 As the Principal Investigator, I will ensure that this project will follow the Western Biosafety Guidelines and Procedures Manual for Containment Level 1 & 2 Laboratories (and the Level 3 Facilities Manual for Level 3 projects). I will ensure that UWO faculty, staff and students working in my laboratory have an up-to-date Hazard Communication Form, found at http://www.wph.uwo.ca/

SIGNATURE _____ Date: April 13, 2010.

14.2 Please describe additional risk reduction measures will be taken beyond containment level 1, 2, or 3 measures, that are unique to this agent.

No special containment needed

14.3 Please outline what will be done if there is an exposure to the biohazards listed, such as a needlestick injury:

None of the biohazards listed are human pathogens

15.0 Approvals

UWO Biohazard Subcommittee: SIGNATURE: _____
Date: 14 May 2010

Safety Officer for Institution where experiments will take place: SIGNATURE:_____
Date:_____

Safety Officer for University of Western Ontario (if different from above): SIGNATURE: _____
Date: May 14, 2010

Approval Number: B10-UWO-0165 Expiry Date (3 years from Approval): May 13, 2013

Special Conditions of Approval:

*** DESCRIPTION MUST BE ATTACHED TO THIS FORM OR PROJECT WILL NOT BE REVIEWED***

Research summary - Evolutionary and Ecological Functional Genomics

The genomic era has ushered in a new multiple disciplinary area of research called evolutionary and ecological functional genomics. This research focuses on the genes that affect ecological success and evolutionary (DARWINIAN) fitness in populations living in their natural environments. At the root of this discipline is the use of genomic tools such as MICROSATELLITES for mapping quantitative traits, MICROARRAYS for quantifying gene expression profile in the transcriptome, and MUTAGENESIS and RNAi for gene knock-out and functional analysis. These tools can now be applied to ecological and evolutionary model systems, and this application is a significant advancement because an individual's phenotype is determined by the interaction of genes and environment (G×E). Thus to understand the natural function of genes, they must be studied in their natural environment.

My lab and collaborators are conducting research on the evolutionary and ecological functional genomics of three fishes comprising bluegill, guppy and Chinook salmon. In bluegill, we are targeting genes involved in mediating the alternative male life histories, kin recognition, parental care, and foraging polymorphisms. In the guppy, we are examining immunity genes including those of the MAJOR HISTOCOMPATIBILITY COMPLEX, and genes involved in the alternative mating tactics (courting and sneaking). In Chinook salmon, we are examining genes involved in migration time, precocious maturation, and immunity. Some of this work will involve MICROARRAYS, but we also use CLONING to assess the genetic variation present in individuals and populations.

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product code 18265017
Product name Subcloning Efficiency ™ DH5alpha™ Competent Cells

Company/Undertaking Identification

INVITROGEN CORPORATON
5791 VAN ALLEN WAY
PO BOX 6482
CARLSBAD, CA 92008
760-603-7200

INVITROGEN CORPORATION
5250 MAINWAY DRIVE
BURLINGTON, ONT
CANADA L7L 6A4
800-263-6236

GIBCO PRODUCTS
INVITROGEN CORPORATION
3175 STALEY ROAD P.O. BOX 68
GRAND ISLAND, NY 14072
716-774-6700

24 hour Emergency Response (Transport): 866-536-0631
301-431-8585
Outside of the U.S. ++1-301-431-8585

For research use only

2. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous/Non-hazardous Components
The product contains no substances which at their given concentration, are considered to be hazardous to health. We recommend handling all chemicals with caution.

3. HAZARDS IDENTIFICATION

Emergency Overview
The product contains no substances which at their given concentration, are considered to be hazardous to health

3. HAZARDS IDENTIFICATION

Form
Liquid

Principle Routes of Exposure/
Potential Health effects

Eyes	No information available
Skin	No information available
Inhalation	No information available
Ingestion	May be harmful if swallowed.

Specific effects

Carcinogenic effects	No information available
Mutagenic effects	No information available
Reproductive toxicity	No information available
Sensitization	No information available

Target Organ Effects — No information available

HMIS

Health	0
Flammability	0
Reactivity	0

4. FIRST AID MEASURES

Skin contact	Wash off immediately with plenty of water. If symptoms persist, call a physician.
Eye contact	Rinse thoroughly with plenty of water, also under the eyelids. If symptoms persist, call a physician.
Ingestion	Never give anything by mouth to an unconscious person. If symptoms persist, call a physician.
Inhalation	Move to fresh air. If symptoms persist, call a physician.
Notes to physician	Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	Dry chemical
Special protective equipment for firefighters	Wear self-contained breathing apparatus and protective suit

6. ACCIDENTAL RELEASE MEASURES

Personal precautions	Use personal protective equipment
Methods for cleaning up	Soak up with inert absorbent material.

7. HANDLING AND STORAGE

Handling	No special handling advice required
Storage	Keep in properly labelled containers

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational exposure controls

Exposure limits

Engineering measures	Ensure adequate ventilation, especially in confined areas

Personal protective equipment

Respiratory Protection	In case of insufficient ventilation wear suitable respiratory equipment
Hand protection	Protective gloves
Eye protection	Safety glasses with side-shields
Skin and body protection	Lightweight protective clothing.
Hygiene measures	Handle in accordance with good industrial hygiene and safety practice
Environmental exposure controls	Prevent product from entering drains.

9. PHYSICAL AND CHEMICAL PROPERTIES

General Information

Form	Liquid

Important Health Safety and Environmental Information

Boiling point/range	°C No data available	°F No data available
Melting point/range	°C No data available	°F No data available
Flash point	°C No data available	°F No data available
Autoignition temperature	°C No data available	°F No data available
Oxidizing properties	No information available	
Water solubility	No data available	

10. STABILITY AND REACTIVITY

Stability	Stable.
Materials to avoid	No information available
Hazardous decomposition products	No information available
Polymerization	Hazardous polymerisation does not occur.

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Principle Routes of Exposure/ Potential Health effects

Eyes	No information available
Skin	No information available
Inhalation	No information available

Ingestion	May be harmful if swallowed.

Specific effects **(Long Term Effects)**

Carcinogenic effects	No information available
Mutagenic effects	No information available
Reproductive toxicity	No information available
Sensitization	No information available

Target Organ Effects No information available

12. ECOLOGICAL INFORMATION

Ecotoxicity effects	No information available.
Mobility	No information available.
Biodegradation	Inherently biodegradable.
Bioaccumulation	Does not bioaccumulate.

13. DISPOSAL CONSIDERATIONS

Dispose of in accordance with local regulations

14. TRANSPORT INFORMATION

IATA

Proper shipping name	Not classified as dangerous in the meaning of transport regulations
Hazard Class	No information available
Subsidiary Class	No information available
Packing group	No information available
UN-No	No information available

15. REGULATORY INFORMATION

International Inventories

U.S. Federal Regulations

SARA 313
This product is not regulated by SARA.

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)
This product does not contains HAPs.

U.S. State Regulations

California Proposition 65
This product does not contain chemicals listed under Proposition 65

WHMIS hazard class:
Non-controlled

This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR

16. OTHER INFORMATION

For research use only

The above information was acquired by diligent search and/or investigation and the recommendations are based on prudent application of professional judgment. The information shall not be taken as being all inclusive and is to be used only as a guide. All materials and mixtures may present unknown hazards and should be used with caution. Since the Company cannot control the actual methods, volumes, or conditions of use, the Company shall not be held liable for any damages or losses resulting from the handling or from contact with the product as described herein. THE INFORMATION IN THIS MSDS DOES NOT CONSTITUTE A WARRANTY, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

End of Safety Data Sheet