Institutional Biological Safety Committee decision form[1] to develop a low-risk genetically modified organism in containment

ERMA Office use only

Application Code:	GMD08038
Application Approval Code(s):	GMD004998-005020
BCH Number[2] (if applicable):	44596-618

Institutional Biological Safety Committee:	University of Auckland Biological Safety Committee
IBSC Institution Code:	GMO07 – UA019
Application type:	To develop in containment a genetically modified organism under section 40(1)(b) of the Hazardous Substances and New Organisms (HSNO) Act.
Applicant:	The University of Auckland
Purpose:	To characterize processes for transport and signalling in biological membranes.
Date application received:	5 December 2007.
Considered by:	Quorate Committee consisting of: Plant pathologist, molecular biologists, human immunologist, microbiologists, cellular and molecular biologist, Biological Safety Officer, Maori representatives, lay member.
Consideration date:	5 December 2007. Resubmitted 1 February 2008.

1. Summary of the decision:

The application to develop the following organism(s) is **approved, with controls** having been considered in accordance with the relevant provisions of the Hazardous Substances and New Organisms (HSNO) Act 1996, the Hazardous Substances and New Organisms (Low-Risk Genetic Modification) Regulations 2003, and the HSNO (Methodology) Order 1998.

The application was considered by the IBSC under delegation from the Authority as provided for under section 19(2)(a) of the HSNO Act.

2. Sequence of the consideration

In accordance with sections 42 and 42A of the HSNO Act (rapid assessment), the approach adopted by the IBSC was to identify the circumstances of the genetic modification(s), to evaluate these against the criteria set out in the HSNO (Low-Risk Genetic Modification) Regulations 2003 established under section 41 of the Act, and to

[1] This decision form should be used in conjunction with the checklist.
[2] Biosafety Clearing House record identification number.

consider whether there are any residual risks of significance that require further consideration (if so, see Annex A).

3. Organism description Table(s)

The organism description can be specific to individual GMOs or it can encompass a project description[3]. HOWEVER, the organism description needs to CLEARLY describe the full range of GMOs permitted by this approval so ERMA New Zealand can be satisfied that it conforms with the HSNO (Low-Risk Genetic Modification) Regulations 2003. For example: "not low-risk" modifications need to be clearly excluded from the vectors and donor nucleic acids if you are expressing uncharacterised nucleic acid sequences from pathogenic organisms, OR, for example, if using (non-pathogenic) *Escherichia coli* as a host, identify it as the non-pathogenic strains or strains K 12 or B.

The organism(s) for development are:

Name of the host organism:	*Escherichia coli* (Migula 1895) Castellani and Chambers 1919 (non pathogenic, auxotrophic, laboratory adapted strains) *Saccharomyces cerevisiae* EC Hansen (1883) - non pathogenic laboratory adapted strains *Pichia pastoris* – Guillerm Phaff (1956) non pathogenic laboratory adapted strains Mammalian Cell lines: *Homo sapiens* Linnaeus 1758 *Mus musculus* Linneaus 1758 (mouse) *Mus spretus* Latase 1883 (mouse) *Rattus norvegicus* Berkenhout 1769 (Norway or laboratory rat) *Rattus rattus* Linnaeus 1758 (Ship rat) *Cricetus cricetus* Linnaeus 1758 (European hamster) *Cricetulus griseus* Milne Edwards 1857 (Chinese hamster) *Canis familiaris* Linnaeus 1758 (dog) *Mesocricetus auratus* Waterhouse 1839 (golden hamster) *Chlorocebus aethiops* Linneaus 1758 (monkey) *Bos taurus* Linneaus 1758 (cattle) *Sus domestica* Linneaus 1758 (pig) *Didelphis virginiana* Linneaus 1758 (possum) *Cavia porcellus* (Linnaeus, 1758) (guinea pig) *Oryctolagus cuniculus* (Linnaeus, 1758) (European rabbit) *Ovis* aries Linnaeus, 1758 (sheep) Insect Cell lines: *Drosophila melanogaster* Meigen 1830 (fruit fly) *Trichoplusia ni* Hubner 1800-1803 (cabbage looper) *Spodoptera frugiperda* Smith 1797 (fall army worm) Fish Cell lines: *Danio rerior* Hamilton-Buchanan 1822 (established and primary cell lines)
Specify the category of **host organism** **e.g. Category 1 or 2[4]**	Category 1

[3] As described in our "Policy documents relating to New Organisms" (ER-PO-NO-01). For more guidance refer to ERMA New Zealand User Guide *"Making an application for Rapid Assessment to Develop in Containment a Project of Low Risk Genetically Modified Organisms".*

[4] According to the HSNO (Low-Risk Genetic Modification) Regulations 2003.

What the organism is modified with: Please specify vector and donor DNA	As modified by: • Standard *E coli* cloning and expression vectors. Most of which are non-conjugative but definitely not self transmissible. • Standard *Saccharomyces cerevisiae* cloning vectors. (including yeast 2-hybrid) which are not self transmissible. • Standard *Pichia pastoris* (including E coli/Pichia cloning vectors which are not self transmissible. • Standard mammalian expression vectors, including RNA interference sequences but excluding viral vectors • Standard insect and fish cell expression vectors, including RNA interference sequences. With Genes will be obtained from organisms listed as hosts. Genes for odorant receptors, odorant binding or odorant signalling proteins will be obtained from *Drosophila* species and the apple moth, *Epiphyas postvittana.* This work may be extended to include other insect species. In some cases, genes encoding transporters and other characterized genes of interest may be obtained from bacterial species other than *E.coli.* In all cases, the genes will be well-characterized by sequence analysis and bioinformatics, allowing the identification of genes to ensure they encode protein of interest and exclude genes encoding toxins. Genes will include both sense and anti-sense constructs, nucleotide deletions, insertions and substitutions, and modifications to encode epitope tags and fusion proteins as well as RNA interference sequences. encoding: • Proteins with known or predicted functions as transporter/receptors/ion channels • Proteins with know or predicted functions as insect odorant receptors, odorant binding or in odorant signalling. • Proteins with known or predicted to interact with transporter/receptors/ion channels to regulate their activity or targeting to specific regions of the cell • Proteins known to functionally complement the activity of a specific transporter/receptor/or ion channel • Proteins involved in the biosynthesis of neurotransmitters receptors and molecules involved in their intracellular sorting and targeting • Proteins mediating the actions of transporter/receptors/ion channels on cell growth, cell differentiation, cell energy metabolism, cell proliferation, cell plasticity, cell death and cell survival • Transcriptional and promoter elements associated with all of the above set of gene families • Proteins encoding RNA binding proteins • cDNA libraries Due to the nature of the study the following exceptions will apply: • Genes will not encode toxins with an LD50 < 100ug/kg • Sequences will not produce particles able to infect human, animals or plants • Genes will not be derived from CITES derived species. • Human genes will not be derived from persons of Maori descent.
Please specify the category of genetic modification e.g. **Category A or B**[5]	Category A

[5] According to the HSNO (Low-Risk Genetic Modification) Regulations 2003.

Containment level e.g. PC1/PC2[6]	PC1
Approved/declined	Approved.

4. Use of special genetic material

Human Genes or Native introduced flora and fauna:	YES	NO
Does the proposed development use genetic material from native flora and/or fauna; or flora and/or fauna valued by Māori?		N
Does the proposed development involve human cell lines or human genetic material of Māori whakapapa or origin?		N
If "YES" to either of the above please clearly record evidence that appropriate Māori consultation has occurred with local iwi regarding this approval (i.e. who was consulted, their status, and the results of the consultation).		

5. Identification and assessment of the significant risks and costs of the organism

Describe any significant (non-negligible) risks identified, along with the Committee's assessment of the risks. Describe and justify any additional controls applied to manage the risks.

The applicant has requested a wide range of genes from a wide range of donor organisms. However the risks are mitigated by:

- The use of low risk hosts
- The characterisation of genes before isolation by sequence and bioinformatics to ensure genes will only encode proteins with known or predicted functions as transporter/receptors/ion channels or phenomena associated with these functions
- Exclusion of toxins

6. Containment

Describe the containment system (physical and operational).

PC1 laboratory within MAF approved Containment facility (MAF Registration 395)

7. Controls

In considering all the matters to be addressed detailed in the Third Schedule Part I "*Containment Controls for Importing, Developing or Field Testing of Genetically Modified Organisms"* of the HSNO Act, this approval is subject to the following controls:

[6] As in the Australian/New Zealand Standard 2243.3:2002 with modifications referred to in the MAF Biosecurity Authority ERMA NZ Containment Standards.

1. The operation, management and construction of the containment facility[7] shall be in accordance with the:
   - The MAF Biosecurity Authority/ERMA New Zealand Standard *Facilities for Microorganisms and Cell Cultures: 2007* and
   - The Australian/New Zealand Standard 2243.3:2002 Safety in laboratories: Microbiological aspects and containment facilities, at Physical Containment Level PC1.
2. If for any reason a breach of containment occurs the applicant shall notify the facility Supervisor and ERMA New Zealand immediately the event is noticed (and at least within 24 hours of the breach being detected) and shall immediately implement a contingency plan for the recovery and eradication of any organisms or viable material that has escaped.
3. The Authority or its authorised agent or properly authorised enforcement officers, may inspect the facilities at any reasonable time.

Standard University of Auckland controls

1. The Biological Safety Officer will be notified of any accident or incident involving GMOs.
2. The Principal Investigator in charge of this project has the responsibility to ensure work practices in the laboratory meet AS/NZS 2243.3:2003 "Safety in the Laboratory: Microbiology".

Additional controls

Nil

Signed: ……..…… Date …….
(on behalf of the institution)

Name:

Position: Chair, The University of Auckland Biological Safety Committee

[7] Containment facility means a facility registered under section 39 of the Biosecurity Act 1993

Checklist

NB- this checklist should be completed by the IBSC, and signed and dated by the Chair of the IBSC and returned to ERMA New Zealand with the decision form.

- Sections referenced in the text below indicate sections of the Hazardous Substance and New Organisms Act 1996
- Clauses referenced in the text below indicate clauses of the Hazardous Substances and New Organisms (Methodology) Order 1998

		Yes/No/ N/A
1	***Legislative criteria for the application***	
1.1	The application was lodged pursuant to section 40(1)(b) of the Act.	Y
1.2	The application was considered in accordance with section 42 and 42A and matters relevant to the purpose of the Act.	Y
2	***Consideration of the application***	
2.1	The IBSC holds delegation from the Authority as provided under section 19(2)(a) of the HSNO Act.	Y
2.2	The purpose is provided for under section 39(1)(a) of the Act i.e. *The development of any genetically modified organism*.	Y
2.3	Does the IBSC consider the information provided by the applicant is relevant and appropriate to the scale and significance of the risks, costs, and benefits associated with the application (clause 8)?	Y
2.4	If NO – <please explain>	
2.5	Was any expert advice sought (clause 17)?	N
2.6	If YES – name of the expert(s) and the nature of the advice sought: <text in here>	N
2.7	If YES – was the applicant informed (clause 18)?	
3	***Assessment against the criteria for low risk genetic modifications***	
3.1	Is the IBSC satisfied that each of the genetically modified organisms described in the application meet the criteria for a low-risk genetic modification specified in the criteria made under section 41 of the Act, being the HSNO (Low-Risk Genetic Modification) Regulations 2003? <If not, give details>	Y

4	***Applications involving native flora and fauna***	
4.1	Does the application involve native or valued introduced flora and/or fauna as host organisms or as a source of genetic material? (Please ensure section 4 of decision form is complete.)	N
4	***Applications involving human genetic material or human cells***	
4.2	Does the application use any genetic material or cells obtained directly from human beings?	Y
4.3	If YES, has approval from an Ethics Committee been obtained? *Generic sources of DNA such as cDNA libraries obtained from overseas and well established tumour cell lines (also obtained from overseas) will be used*	N
4.4	Does the application involve the use of human cells or human genetic material sourced directly from individuals of Māori whakapapa or origin?	N
4.5	If YES, please record details in section 4 of the decision (who was consulted, their status and the results of the consultation).	
5	***Identification of significant risks[8]***	
5.1	Are there any significant risks or costs to the environment, including the sustainability of all native and valued introduced flora and fauna?	N
5.2	Are there any significant risks to the intrinsic value of ecosystems?	N
5.3	Are there any significant risks or costs to human health, including public health? *(refer Section 5 of the Decision)*	N
5.4	Are there any significant risks to Māori and their taonga?	N
5.5	Are there any significant economic risks or costs?	N
5.6	Are there any risks to New Zealand's international obligations, including DNA derived from CITES species or use of CITES species as host organisms?	N
	If YES is checked in any of 5.1-5.6, please list the significant risks identified in section 5 of the decision form and discuss how they were assessed in terms of likelihood and consequence, and what controls were imposed to manage them.[9]	

[8] See Annex A
[9] Clauses 12 and 13 of the Methodology.

6	***Containment of the organisms***	
6.1	Has the IBSC considered the adequacy of containment in accordance with section 42 or 42A, and whether the modification may result in (a) GMO(s) having a greater ability to escape from containment than the unmodified organism(s)? Please record details in section 6 of the decision. Please ensure the containment controls have been specified. Note that controls relevant to the physical containment level set in the Regulations cannot be removed.	Y
6.2	Are any additional measures proposed because of the particular nature of the organism(s)? If YES, please ensure additional controls are listed on the decision form.	N
6.3	Are there any other matters that may affect the adequacy of containment such as the expected time-frame for the project, and external matters such as the potential for sabotage? If YES, please explain.	N
7	***Decision*** In this section YES confirms approval – if any of the answers to 7.1-7.4 are NO, then the application is declined.	
7.1	The IBSC is satisfied that the application is for one of the purposes specified in section 39(1) of the Act, being section 39(1)(a): *The development of any genetically modified organism*?	Y
7.2	Based on analysis of the information provided, and having considered the characteristics of the organisms and the modifications and the criteria for low-risk genetic modification detailed in the HSNO (Low-Risk Genetic Modification) Regulations 2003, it is the view of the IBSC that the organism(s) meet the criteria for rapid assessment (as per section 42(2)).	Y
7.3	The IBSC is satisfied that the proposed containment regime together with any additional controls imposed will adequately contain the organism(s) as required by section 42(2) of the Act.	Y
7.4	In accordance with clause 36(2)(b) of the Methodology the IBSC records that, in reaching this conclusion, it has applied the relevant criteria from the Methodology.	Y
7.5	The application for development of a genetically modified organism (detailed) is thus approved with controls as detailed on the decision document.	Y

Signed: ……..…… Date …….
(on behalf of the institution)

Name:

Position: Chair, The University of Auckland Biological Safety Committee