Import into containment any new organism that is not genetically modified

Application title:

Importation of risk group 2 micro-organisms for research purposes and diagnostic method development

Applicant organisation:

Food Group, Christchurch Science Centre, Institute of Environmental Science and Research Ltd

Please provide a brief summary of the purpose of the application (255 characters or less, including spaces)

To import and hold in containment risk group 2 bacteria for laboratory based research and teaching purposes in order to develop and use diagnostic methods for diseases

Please clearly identify any confidential information and attach as a separate appendix.

Please check and complete the following before submitting your application:

All sections completed	Yes
Appendices enclosed	Yes/NA
Confidential information identified and enclosed separately	Yes/NA
Copies of references attached	Yes/NA
Application signed and dated	Yes
Electronic copy of application e-mailed to ERMA New Zealand	Yes

Signed: **Date:**

Section One – Applicant details

Name and details of the organisation making the application:	
Name:	Food Group, Christchurch Science Centre, Institute of Environmental Science and Research Ltd
Postal Address:	PO Box 29 181, Christchurch
Physical Address:	27 Creyke Road, Ilam, Christchurch 8041
Phone:	03 351 6019
Fax:	03 351 0010
Email:	Not applicable
Name and details of the key contact person *(if different from above)***:**	
Name:	Christopher Graham, Transitional and Containment Facility Manager
Postal Address:	PO Box 29 181, Christchurch
Physical Address:	27 Creyke Road, Ilam, Christchurch 8041
Phone:	03 351 6019
Fax:	03 351 0010
Email:	Chirs.graham@esr.cri.nz
Name and details of a contact person in New Zealand, if the applicant is overseas:	
Name:	
Postal Address:	
Physical Address:	
Phone:	
Fax:	
Email:	

Note: The key contact person should have sufficient knowledge of the application to respond to queries from ERMA New Zealand staff.

Section 2: Purpose of the application

Lay summary of the application (approximately 200 words)

Note: This summary should include a description of the organism(s), the purpose of the application or what you want to do with the organisms(s).

Use simple non-technical language

Environmental Science and Research Ltd (ESR) is a government owned New Zealand Crown Research Institute with four science centres based in Auckland, Kenepuru, Wallaceville and Christchurch.

Our mission is to protect people and their environments through science. ESR is the principal science advisor for the Ministry of Health, and science provider to the New Zealand Food Safety Authority, NZ Customs and Medsafe, a science partner of MAF Biosecurity and science advisor for local authorities, industry and the private sector. In these roles ESR is responsible for the identification and/or validation of suspected new and emerging diseases affecting the environment and human health.

ESR is also the national reference laboratory for medical microbiology and maintains the New Zealand Reference Culture Collection.

The purpose of this application is to seek permission to import and hold reference isolates of Risk Group 2 bacteria in containment to facilitate the development and implementation of testing procedures for the identification and detection of bacterial diseases affecting the environment and human health. For example, developing diagnostic tests for foodborne bacterial pathogens such as *Campylobacter* spp.

Risk group 2 bacteria are those that may cause disease in humans, animals, plants, or fungi but are unlikely to be a serious hazard to laboratory personnel, the community, animals, or the environment; and have effective treatment and preventative measures with respect to any infections that they may cause; and present a limited risk of the spread of infection.

The benefits of this research programme at ESR include:

- Improved surveillance programmes;
- Opportunity to increase scientific knowledge and expertise of researchers and diagnosticians;
- Improved import and export testing abilities;
- Protection and assurance of the disease-free status of the New Zealand; and
- Protection of the economy from a severe disease outbreak and consequently leading to a reduction in exports and more expensive imports; and
- Rapid diagnosis of suspected exotic diseases without having to be dependent on overseas laboratories

Taking account of the structure and operation of the ESR facilities, the training, qualifications and experience of ESR staff, and the proposed controls, we consider that it is **highly improbable** that the imported risk group 2 bacteria will escape from containment.

Describe the background and aims of the project

Note: This section is intended to put the organism(s) in perspective of the wider project(s) that they will be used in. You may use more technical language but please make sure that any technical words are included in the Glossary.

The types of experiments that will be conducted include, but are not restricted to, research into diagnostics (e.g. morphological identifications, and biochemical, serological and molecular tests, animal exposure), systematics and taxonomy.

Isolates will generally be imported from either recognised culture collections or experts in the field (including laboratories) and where possible, will be identified to species level prior to importation. In some instances isolates may require testing and examination in New Zealand to determine their taxonomic identity.

Pure isolates or defined mixtures of pure cultures will be imported as

- frozen or lyophilised liquid cultures;
- culture supernatants;
- bacteria growing on agar slopes; or
- sterile solid and liquid matrices.

There are a number of schemes that utilise pre-defined mixtures of organisms or organisms 'spiked' onto sterile sample matrix, for example (but not limited to) sterile cotton swabs.

These samples more closely reflect a 'real' sample and permit a more accurate appraisal of our diagnostic techniques and interpretation.

This will enable ESR to participate in a greater range of proficiency testing using more realistic simulated samples.

Appropriate controls will be in place to ensure viable bacteria are contained and do not leave the containment facility through any outlets including exhaust system, air filters and water discharge. All sub-culturing and the initial stages of DNA extraction will be done in a Class II biological safety cabinet (BSC).

While some organisms to be imported are capable of causing diseases, with the containment standards and conditions provided at ESR the likelihood of these organisms escaping from containment and infecting a susceptible plant or animal is essentially nil.

Section Three – Identification of the organism(s) to be imported

Complete this section separately for **each new organism** to be imported.

Identification of the organism to be imported

Latin binomial, including full taxonomic authority:	Where possible, all organisms will be identified to species level prior to importation. For more details refer to online NCBI taxonomy database: http://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?name=Eubacteria
Common name(s), if any:	Not relevant.
Type of organism (eg bacterium, virus, fungus, plant, animal, animal cell):	Bacterium
Taxonomic class, order and family:	Risk Group 2 species (as defined in the Australia/New Zealand Standard 2243.3:2002: Safety in Laboratories Part 3: Microbiological aspects and containment facilities, fifth edition, or any equivalent subsequent editions) belonging to the taxonomic groups currently known as Bacteria.
Strain(s) if relevant:	Not relevant.
Other information, including presence of any inseparable or associated organisms and any related organisms present in New Zealand:	We are not aware of any inseparable associated or related micro-organisms to the bacteria in this application. Risk Group 2 organisms on the Unwanted Organisms in the Ministry of Agriculture and Forestry Unwanted Organism Registry are excluded from this application Excluded from this application are any organisms that fall within Risk Group 3 or 4 of the Australian/New Zealand classification of risk groups, contained in the AS/NZS2243.3.

Section Four – The proposed containment system

Describe the containment facility and the proposed containment system (physical and operational)

Question	Answer
Which MAF/ERMA Standard is this containment facility approved under?	The organisms to which this application refers will be imported into a containment facility which operates according to the *MAF Biosecurity New Zealand and ERMA New Zealand Standard, Facilities for Microorganisms and Cell Culture: 2007* (the Standard). This containment regime contains clear guidelines for the safe handling and disposal of cultures.
What physical containment level (AS/NZS 2243: 2002) is this containment facility registered to (where relevant)?	All work using these organisms will be done in a PC2 registered laboratory at ESR campus sites (as defined by the AS/NZS 2243.3: 2002 Standard "Safety in Laboratories, Part 3 Microbiology") operated within a containment facility The ESR facilities are audited against the MAF/ERMA New Zealand Standard every 6 months.
What other physical measures do you propose to use to contain this organism?	The Risk group 2 bacteria to be imported will be: a) Pure cultures supplied: i) as frozen or lyophilised liquid cultures or culture supernatants or growing on agar slopes, or ii) in/on sterile solid or liquid matrices. b) Defined mixtures made from pure cultures, supplied: i) as frozen or lyophilised liquid cultures or culture supernatants or growing on agar slopes, or in/on sterile solid or liquid matrices. To reduce the risk of escape of viable airborne micro-organisms or propagules, the movement of potentially contaminated air is controlled by conducting all sub-culturing and the initial stages of DNA extraction in a Class II BSC. This provides environmental, personnel, and product protection. A centrifuge with either sealed rotors or safety cups will be used when large volumes or high

	concentrations of infectious materials are used. BSCs are decontaminated after use according to the AS/NZS 2243.3: 2002 Standard. Laboratory staff are required to remove their coats and gloves, and wash their hands and fingernails as the final step in safe microbiological practices. The BSCs at ESR are subject to an annual certification check. Specific physical measures we propose to use to contain the micro-organisms are outlined below. **Storage** Once imported the cultures of bacteria will be held on beads or in a glycerol containing broth in a sealed receptacle at -80^{0}C which will be opened only to remove material as required to do experiments **Access** Access to the PC2 laboratory at ESR is restricted to trained personnel. Maintenance and service personnel and visitors are only permitted entry provided if accompanied by trained personnel. A biological hazard symbol specifying restricted access is displayed near the entrance of the facility. Visits are recorded in a visitors' log book for security purposes, and all personnel are required to adhere to access procedures. Entrance to the facility is locked when not in active use. Facility doors are closed while work is in progress. Laboratory coats are removed when leaving the laboratory. **Treatment and Disposal of Biological Waste** All micro-organisms and biological waste are disposed of and/or treated according to the guidelines in the AS/NZS 2243.3: 2002 Standard which is by autoclaving and/or chemical sterilisation and/or incinerating **Animal Exposure Studies** Refer to Page 12

What procedural or operational measures do you propose to use to contain this organism?	**Training Programme** The micro-organisms will be handled only by staff with experience and training in bacteriology. The general requirements for handling of micro-organisms are covered in the Standard **Transfer (Import and Export) of Micro-organisms between Facilities** All approved organisms will be imported directly from laboratories internationally recognised as having expertise in the approved microorganism(s) or reputable type culture collections and where possible, will be identified to species level prior to importation. . Each imported species will be clearly labelled and packaged so that containment may not be breached accidentally during transit. The packaging and transportation of these micro-organisms from overseas and for transfers between remotely located (i.e. not located in the same building) facilities of equivalent containment, will be in accordance with Packaging Instruction No. 650 of the International Air Transport Association (IATA) Dangerous Goods Regulations The inner sealed (primary) package of each consignment shall only be opened within a Class II biological safety cabinet by a staff member with knowledge and expertise in managing the biological safety requirements of the organisms within the package. No viable bacteria will be removed from the facility unless approved by a MAF inspector to be transported to an appropriate containment facility A register will be kept of all imported samples including the number of importations, their identity, origin (source, country) and fate. **Contingency Plans** In the event of failure of the containment of these micro-organisms (e.g. following a spill, through personal contamination, fire, sabotage or theft), there is a small but finite risk that some pathogens may be released. (see section 5). Our Containment Manual has specific procedures that are followed if containment were to be

	breached. This involves notifying the MAF Supervisor of the laboratory within 24 hours of noticing breach of containment. Spills management is also covered in section 5 of the AS/NZS 2243.3: 2002 Standard. Security measures (e.g. locked access, security alarms) applying to the building and facility in which these micro-organisms are housed are designed to minimise the chance of sabotage and the risk of escape following an earthquake is considered small. Therefore, the likelihood of breaching containment is considered negligible. If we become aware of any new information on the pathogenicity of any of the organisms we will: i) Notify ERMA New Zealand and the MAF Inspector within five working days; and, ii) Cease work on the organism until notified by ERMA New Zealand that the work may continue; and, iii) Hold any such organism in secure storage; and, iv) Destroy any such organism within the year of the date ERMA New Zealand was notified in accordance with this control unless a new application has been formally received by ERMA New Zealand.
Any other information relevant to the containment of the organism.	This application allows small scale fermentation of the organisms. Fermentations of the imported organisms in liquid culture will not exceed 10 L in a single vessel. The use of these risk Group 2 organisms for infection studies using primary and/or mortalised eukaryotic cells does not increase the ability of the bacteria to escape containment.

Describe the characteristics of the organism to be imported that may influence its ability; to escape from containment, to form a self sustaining population, or to cause adverse effects. *Refer to sample applications for guidance on how to answer these questions.*

Question	Answer *attach copies of the references used in an appendix*
What are the characteristics of the organism that may prevent/enable it to escape from containment? *eg size, spore production, infectivity, seed/pollen characteristics etc.*	**Bacteria** The kingdom Bacteria represents a large number of genetically diverse organisms that occupy a wide range of environmental niches, utilise various organic compounds for energy, have many structural forms and reproduce in many ways. All bacteria are prokaryotes, that is they have no true nucleus or membrane bound organelles reproduce through binary fission in which cells are 'pinched off' forming clones. Many diseases are caused by bacteria. They exist primarily as single cells, mainly reproducing asexually. They can be transmitted by various means, i.e. passively in water droplets, windborne aerosols, by insects, person to person; and on contaminated food.
How could this organism escape from containment? *ie what are the possible pathways for escape?* *How does the proposed containment regime address these pathways?*	Theoretically escape from containment could occur by: • release of viable air- or water-borne micro-organisms or propagules; or • release of contaminated equipment or clothing To address these risks: • all work is done in a PC2 registered laboratory; • access to the facility is restricted to trained personnel; • all staff are required to be trained about the particular hazards associated with each pathogenic microorganism that they work with e.g. susceptible population, route(s) of infection, infectious dose, type of disease and symptoms; • masks will be worn for all spore-producing organisms; • any sub-culturing and the initial stages of DNA extraction is done in a Class II BSC. Cabinets are decontaminated after use according to the AS/NZS 2243.3: 2002 Standard; • Cell line assays will be conducted in sealed multi-well plates which are placed inside a further sealed container (extra precautions against accidental spills). • staff are required to remove their coats and gloves, and wash their hands and fingernails after working with these organisms; • all cultures of imported micro-organisms are stored in sealed receptacles (e.g. petri dish, culture bottle, vial

	etc.); • all micro-organisms and biological waste are disposed of and/or treated according to the guidelines in the AS/NZS 2243.3: 2002 Standard; and • no viable bacteria will be removed from the laboratory unless transfer to an appropriate containment facility is approved by a MAF inspector. All organisms moved into/out of the laboratory to a remotely located facility will be packaged and transported from the laboratory in accordance with Packaging Instruction No. 650 of the IATA) Dangerous Goods Regulations (refer to section 8.8.4 of the Standard). • All packages of organisms will be clearly labelled with the HSNO Act approval code and the direction that the primary package must not be opened prior to delivery to a containment facility. The labelling documentation must be attached to the package in such a way that the primary package does not have to be opened to access it. • The name and address of the institute or individual that supplied the approved organisms will be recorded in the register of culture collection (as defined in the microorganism standard). • ESR will ensure that overseas laboratories and type culture collection organisations exporting the approved microorganisms are advised that: a) Documentation accompanying each consignment; b) shall fully describe the identity and Risk Groups[1] of the approved microorganisms.
If it were to escape, could this organism establish a population outside of containment in New Zealand? *ie what conditions are required for growth and reproduction? And are those conditions present in New Zealand? What factors might prevent this from occurring?*	Establishment of a self-sustaining population and ease of eradication of a particular micro-organism would depend on its pathogenicity and presence of a suitable host and vector in New Zealand. The micro-organisms will be held in a high level of containment at all times in a PC2 laboratory. All 'open container' manipulations of organisms will be performed in a BSC in accordance with the requirements of the AS/NZS Standard unless documented evidence is provided that aerial dispersed propagules are not formed by that organism. In the unlikely event of an incident or accident that may lead to an escape, the ESR PC2 laboratory has a micro-organism (all organisms within the scope of this

[1] As defined in the AS/NZS 2243.3.

	application are micro-organisms) release contingency plan. This involves notifying the MAF Supervisor of the laboratory as soon as possible and at least within 24 hours of noticing breach of containment. Procedures to manage spillage of any micro-organisms within and outside the facility and for fire, personal decontamination, theft and sabotage are also addressed in this containment manual. Given that most of the bacteria we will be importing are associated with human health and will not be on the unwanted organism list it is likely that they are already present in the population in NZ. Therefore, in the unlikely event that the Risk Group 2 Bacteria escaped from containment, they would be able to establish in NZ.
If a population did establish could it be eradicated? How? Would it be noticed immediately? How would such a population be identified?	Eradication of such species if containment were breached would depend on the micro-organism causing significant detectable symptoms and the availability of a specific and sensitive laboratory test for detection of an infection. The latter requirement is, of course, one of the reasons for this application.
Additional information	The AS/NZ 2243.3:2002 Table 3.2 lists bacteria of risk group 2 requiring special precautions. These precautions will be followed if these organisms are imported We will notify ERMA New Zealand of the name and unique identifier of any organism imported within three months of importation. In the future, the approved risk group 2 micro-organisms maybe used for research involving: 1. Co-infection with endoparasites (organisms that live inside another organism) in PC2 containment. The co-infection of risk group 2 bacteria with endoparasites does not increase the ability of the bacteria to escape containment. 2. Laboratory animal exposure studies. These experiments will be performed within PC2 facilities registered to the MAF /ERMA New Zealand Standard: *Containment Facilities for Vertebrate Laboratory Animals* or the MAF /ERMA New Zealand Standard: *Transitional and Containment Faculties for Invertebrates.* These provisions within these standards, and adherence to PC2 containment and operational procedures are adequate to ensure that the animals exposed to the approved micro-organisms are fully contained.

Section Five – Identification and assessment of effects

Identify and assess the effects of the organism. Look primarily at the effects if the organism remains in containment, but also consider what might happen if the organism were to escape. If the organism were to escape think about what additional things would need to occur for these effects to be realised.

What are the beneficial effects of the organism(s) and the application? *These benefits must be relevant to the purpose and scope of the application*

- Improved surveillance programmes;
- Opportunity to increase scientific knowledge and expertise of researchers and diagnosticians;
- Improved import and export testing abilities;
- Protection and assurance of the disease-free status of the New Zealand
- Protection of the economy from a severe disease outbreak and consequently leading to a reduction in exports and more expensive imports
- Rapid diagnosis of suspected exotic diseases without having to be dependent on overseas laboratories.

What adverse effects could this organism have on the environment? *For all stages of the life cycle*

There is no additional risk with importing mixtures of risk group 2 bacteria being sent since the mixtures will be pre-defined mixtures of pure cultures that have been identified by the sending laboratory. In addition, there will be no additional risk associated with the microorganism(s) being sent in sterile sample matrix as the sample matrix will only contain the pure culture or pure cultures as defined mixtures inoculated by the sending laboratory. The sterile matrix could be liquid such a liquid cultures or culture supernatants. However, at this stage we can't necessarily anticipate all the types of sterile matrix and the volumes we may receive in future. In terms of liquid samples being received, we believe there is no additional risk as all samples will be packaged and transported under IATA guidelines.

The only possible events that might trigger adverse effects are improper handling, incorrect disposal or accident during use. MAFBNZ /ERMA standards , AS/NZS 2243.3:2002 and PC2 requirements ensure all staff are trained before conducting experiments and SOPs are adhered to at all times.

Potential adverse effects on the environment and people were only identified in this application if a micro-organism escaped containment by improper handling, incorrect disposal or accident during use. These potential adverse effects were:

- disease and
- deterioration of ecosystems if the disease-causing agent could not be eradicated from the environment

However, as described earlier, the standards (MAFBNZ /ERMA and AS/NZS 2243.3:2002) and the PC2 requirements ensure all staff are trained before conducting experiments and standard operating practices are adhered to at all times. Therefore, the nature of containment is such that the risk of escape and subsequent infection are essentially nil.

It is possible that the organisms we will import are already present in the NZ environment and therefore no major new adverse effects will be noted.

What adverse effects could this organism have on public health? *For all stages of the life cycle*

Staff working with these organisms in the PC2 laboratory are required to be trained on the risks involved in working with these microorganisms including the immuno-suppressed and immuno-compromised (e.g. diabetics) or pregnant women and as a result are prudent with their actions. Thus the risks of adverse affects on public health are minimal.

Many risk group 2 bacteria cause infection mainly by ingestion of contaminated food. No eating is allowed in the laboratory. Therefore the risk is much reduced.

Allergic or toxic reactions to some species covered in this application are identified as a potential adverse effect on human health. In this case, laboratory workers are at most risk as they are more likely to come into direct contact with such organisms. Measures to prevent contact with such micro-organisms are a requirement of working in the containment laboratory, e.g. wearing protection clothing such as eye wear, face masks and laboratory coats. In addition, all sub-culturing and the initial stages of DNA extraction is done in a Class II BSC, this ensures personnel protection.

If in the unlikely event an allergy-producing organism escaped containment to cause an adverse effect on public health it would first have to find suitable environmental conditions to survive and establish. It would have also to be present in amounts sufficient enough to cause harm to humans. The risk posed to humans from these micro-organisms is considered negligible.

What adverse effects could this organism have on the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, valued flora and fauna and other taonga (taking into account the principles of the Treaty of Waitangi)?

Since this work will be in conducted in containment under strict controls, we have not identified any potential adverse effects on the relationship of Maori and their culture and traditions with their ancestral lands, water, sites waahi tapu, valued flora and fauna and other taonga.

Are there any other potential adverse effects (including effects on New Zealand's international obligations, society and community or the market economy)?

No other potential adverse effects were identified since all this research is conducted in containment under strict guidelines.

Are there any ethical considerations associated with the organism(s) to be imported or the proposed research?

Ethical approval from an appropriate body will be sought if organisms are intended to be used in animal exposure experiments.

Section Six – Additional information

Additional Information	Y/N	If yes, explain
Do any of the organism(s) need approvals under any other New Zealand legislation?	Y	A MAF Import Permit is required under the Biosecurity Act 1993. Any animal exposure research will have received animal ethics approval
Does New Zealand have any international obligations relating to (any of) the organism(s)?	N	
Have any of the new organism(s) in this application previously been considered in New Zealand or elsewhere? What was the outcome?	Y	NOC07006 allows AgReSearch to import some similar Risk Group 2 anaerobic microorganisms into NZ for research purposes. NOC04012 allows NCID to import risk group 1, 2 and 3 microorganisms into NZ.
Is there any additional information that you consider relevant to this application that has not already been included?	N	Based on the containment standards, there are sufficient procedures in place to cover all aspects of laboratory management including operation and management of the facility, control of access, vermin control, waste disposal, and staff training. In teaching laboratories, students wear laboratory coats and handle organisms on agar petri dishes or small liquid volumes. Their exposures to risk group 2 microorganism are very limited. Approval NOC07006 did not restrict the use of approved organisms in teaching laboratories

Provide a glossary of scientific and technical terms used in the application:

BSC	Biological safety cabinet
ESR	Environmental Science and Research Ltd
Risk Group 2	May cause disease in humans, animals, plants and fungi but unlikely to be a serious hazard to laboratory personnel, the community, animals or the environment since there is a limited risk of the spread of infection and effective treatment and prevention measures are available
SOP	Standard Operating Practices

List of appendices:

Not applicable.

List of references:

Not applicable.