



DECISION

Amended under section 67A of the HSNO Act on 30 June 2014, and 22 August 2014

Date signed	28 April 2014
Application code	APP202089
Application type	To release any new organism with controls under s 38A of the Hazardous Substances and New Organisms Act 1996
Applicant	Micreos Limited
Date application received	10 April 2014
Consideration	28 April 2014
Considered by	The Chief Executive of the Environmental Protection Authority (EPA)
Purpose of the application	To import and release with controls, <i>Listeria</i> phage P100 (Listex™)
Organism	<i>Listeria</i> phage P100

1. Summary of decision

- 1.1 The application to release with controls *Listeria* phage P100 was lodged under s 38A of the Hazardous Substances and New Organisms (HSNO) Act 1996 (the Act).
- 1.2 The application was considered under s 38BA of the Act, in accordance with the relevant provisions of the Act and of the HSNO (Methodology) Order 1998 (the Methodology).
- 1.3 I **approved** the application to release *Listeria* phage P100 subject to the controls set out in Appendix 1, in accordance with s 38BA(2) of the Act.

2. Application and consideration process

Receipt of the application

- 2.1 The application was formally received for processing on 10 April 2014.
- 2.2 The applicant is Micreos Limited, the manufacturer of Listex™.

Purpose of the application

- 2.3 The application sought the release with controls of *Listeria* phage P100 in the form of the product Listex™, for use as a processing aid to eradicate or decrease *Listeria monocytogenes* on various ready to eat food products for human consumption.

- 2.4 P100 is permitted as a processing aid under Clause 11 of Standard 1.3.3 - Processing Aids, of the Australia New Zealand Food Standards Code (the Code), and any use of P100 in food or the processing of food must comply with the Code.

Legislative criteria for the application

- 2.5 The application was lodged under s 38A of the Act, for the release of a new organism, *Listeria phage P100*, with controls.
- 2.6 *Listeria phage P100* has been approved in the form of the product Listex™ by FSANZ for use as a processing aid, but contains a live organism that has been determined to be a new organism (APP201584), therefore a new organism approval is required for the importation of this product.

Information available for consideration

- 2.7 The information available for the consideration comprised of the application and references provided therein, and comments received from the Department of Conservation (DOC) and the Ministry for Primary Industries (MPI).
- 2.8 In accordance with s 53 of the Act the application was not publicly notified.

Comments from MPI and DOC

- 2.9 As required by the Act and Methodology, DOC and MPI were advised and provided with the opportunity to comment on the application.
- 2.10 DOC advised that they do not consider this application to be of significant interest to the DOC mandate.
- 2.11 MPI advised that they do not have concerns about the importation and release of P100 into New Zealand.

Matters considered

- 2.12 The application was considered in accordance with s 38BA of the Act, taking into account the matters specified in s 35(2)(b), relevant matters in Part 2 of the Act, and the Methodology.
- 2.13 Each of those matters is addressed in the following sections of this decision.

3. Assessment of the organism

The organism

- 3.1 *Listeria phage P100* belongs to the order *Caudovirales*, the family *Myoviridae* (phages with contractile tails), the subfamily *Spounaviridae* and the genus Twort-like virus.

- 3.2 P100 is a virulent bacteriophage, which means that it is strictly lytic, and will always be lethal to a bacterial cell once infection has been established. It is known to infect the following *Listeria* species *L. monocytogenes*, *L. ivanovii*, *L. innocua*, *L. welshimeri* and *L. seeligeri*.
- 3.3 Bacteriophages require a host for replication. Bacteriophages are non-motile; therefore they cannot actively seek bacterial host cells but rely on passive diffusion to locate and attached to receptor sites on target bacterial cells.

Unwanted organism status

- 3.4 P100 is not listed as an unwanted organism as defined by the Biosecurity Act 1993.

Potential for establishment in New Zealand

- 3.5 In considering the potential for P100 to establish self-sustaining populations anywhere in New Zealand, I noted that P100 requires a susceptible *Listeria* host to replicate, and such hosts are available in New Zealand. I also noted that *Listeria* phages similar to P100 have been found in New Zealand, indicating that it would be possible for P100 to establish in the New Zealand environment. I consider that the potential for establishment would be limited by the controls restricting the purposes of which P100 may be used and the disposal of P100, as provided for under s 38D of the Act.
- 3.6 Control 2 specifies that *P100 may only be used as an anti-Listeria treatment on the surface of the following ready-to-eat foods: meat and meat products, fish and fish products, fruit and fruit products, vegetables and vegetable products and cheese, where the foods are solid, and not wholly or partly covered in a liquid.* Guenther (2009) examined the effect of P100 and closely related *Listeria* phage A511 on the growth of *L. monocytogenes* and found that for liquid food such as chocolate milk the bacteriophage resulted in an ongoing reduction in the bacteria. However for solid food, *L. monocytogenes* growth resumed after several days. Guenther found that while P100 and A511 are not inactivated by food, and numbers on the solid food remained relatively stable, they were immobilised soon after being added to solid food, thus limiting their on-going ability to infect *Listeria*. This indicates that P100 is immobilised in solid food matrices, and will not be able to 'escape' from the food. I consider that by limiting the use of P100 to the specified solid foods, the potential for P100 to establish in New Zealand is significantly reduced.
- 3.7 Control 3 specifies that any unused P100 and any container used for holding P100 must be treated with heat, pH, or hypochlorite, prior to disposal in general waste streams. This control will prevent any unused viable P100 escaping from food production facilities to places that it might find a suitable *Listeria* host for replication and establishment.
- 3.8 I concluded that, when subject to the controls set out in Appendix 1, it is highly improbable that P100 could form self-sustaining populations anywhere in New Zealand.

Potential for adverse effects

- 3.9 I considered the potential for P100 to: displace or reduce a valued species; cause deterioration of natural habitats; be disease causing, or be a parasite, or be a vector or reservoir for human, plant, or animal disease; and have adverse effects on human health or safety or the environment.
- 3.10 I noted that P100 can only infect bacteria belonging to the genus *Listeria*, and cannot infect human, animal, or plant cells.
- 3.11 *Listeria* species are not considered to belong to the normal micro-flora of healthy humans or animals. Some *Listeria* species can cause potentially fatal disease in humans. Therefore I do not consider that *Listeria* species are valued species.
- 3.12 Carlton et al (2005) reported that P100 has no obvious undesirable properties and is safe for use in foods. This was based on bioinformatics analysis of gene products against known and suspected toxins and other factors involved in regulation of virulence and pathogenicity of *Listeria* and other organisms, and repeated dose oral toxicity studies in rats.
- 3.13 I concluded that it is highly improbable that P100 could displace or reduce a valued species, cause deterioration of natural habitats, be disease causing, be a parasite, or be a vector or reservoir for human, plant or animal disease, and have adverse effects on human health or safety or the environment.

4. Decision

- 4.1 After reviewing all of the information contained in the application, I am satisfied that the application met the requirements of s 38BA of the Act. In any event, in accordance with s 59(3)(a)(ii), I waive any information requirement that has not been met as requested by the applicant in its application.
- 4.2 I took account of all the available information and considered the application in accordance with s 38BA of the Act, taking into account the matters specified in s 35(2)(b), relevant matters in Part 2 of the Act, and the Methodology. I concluded that the application met the criteria for approval under s 38BA(2) of the Act, therefore I decided to exercise my discretion and **approve** the application to release *Listeria* phage P100.
- 4.3 I am satisfied that this decision is consistent with the purpose of the Act.

28 April 2014

Rob Forlong
Chief Executive
Environmental Protection Authority

Date

Amendment: June 2014

This approval was amended in June 2014, at the request of MPI, to add controls 4 and 5 requiring notification to MPI of all approval users and intended approval users, and notification of intended approval users of the requirements of this approval. These controls were added to enable MPI to identify approval users, and ensure those users are in compliance with this approval.

30 June 2014

Rob Forlong
Chief Executive
Environmental Protection Authority

Date**Amendment: August 2014**

This approval was amended in August 2014, to record the correct approval number for the new organism approved for release.



22/08/14

Rob Forlong
Chief Executive
Environmental Protection Authority

Date**Organism approved****Approval code***Listeria* phage P100

NOR100083

References

- Carlton RM, Noordman WH, Biswas B, de Meester ED, Loessner MJ 2005. Bacteriophage P100 for control of *Listeria monocytogenes* in foods: Genome sequence, bioinformatics analyses, oral toxicity study, and application. *Regulatory Toxicology and Pharmacology* 43: 301-312.
- Guenther S, Huwylar D, Richard S, Loessner M, 2009. Virulent Bacteriophage for Efficient Biocontrol of *Listeria monocytogenes* in Ready-To-Eat Foods. *Applied and Environmental Microbiology* 75: 93-100.

Appendix 1: Controls

The import and release of *Listeria* phage P100 is subject to the following controls:

1. The organism approved for importation and release is *Listeria* phage P100 in the form of the product Listex™. P100 may not be imported or released in any other form.
2. P100 may only be used as an anti-*Listeria* treatment on the surface of the following ready-to-eatⁱ foods: meat and meat products, fish and fish products, fruit and fruit products, vegetables and vegetable products and cheese, where the foods are solidⁱⁱ, and not wholly or partly covered in a liquid.
3. Before disposal P100 and any container used for holding P100 must be treated in one of the following ways to kill the P100:
 - heat treated (at greater than 50°C for 60 seconds)
 - pH treated (with pH less than 3 for 60 seconds)
 - hypochlorite treated (at greater than 20ppm for 60 seconds).
4. Any person using this approval for the first time must notify the Ministry for Primary Industries (MPI) of their intention to do so prior to receiving the approved organism.
5. Any person supplying the approved organism to other users must, prior to supplying the organism, notify:
 - (a) MPI of the name and contact details of any intended recipients; and
 - (b) the intended recipients of the requirements of this approval.

ⁱ Food that is ordinarily consumed in the same state as that in which it is sold and does not include nuts in the shell and whole, raw fruits and vegetables that are intended for hulling, peeling, or washing by the consumer.

ⁱⁱ Food that are solid hold their shape and do not flow when placed on a flat table. For example cut melon is a solid food; fruit puree is not a solid food.

