

Interpretations and Explanations of Key Concepts

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Preface

This Protocol is part of the ERMA New Zealand Policy Series.

Section 9 of the HSNO Act requires the Environmental Risk Management Authority to develop a decision-making methodology, which includes an assessment of monetary and non-monetary costs and benefits, and to apply it consistently. This Methodology has been approved by the Government and established as an Order-in-Council.

To supplement the Methodology additional information is published in the ERMA New Zealand Policy Series. The existing Protocols are a subset of this series they indicate how the Authority proposes to confront some of the more problematic issues it is likely to face in its decision making; they also outline how the Authority interprets some of the key concepts found in the Act.

The general Policy Series is published in conjunction with the Protocols to describe further policy positions adopted by the Authority. This particular Protocol outlines how the Authority will interpret some of the key concepts found in the Act and the Methodology.

In preparing this Protocol the Authority has been aware both of its needs as a decision-maker, and the needs of its stakeholders. As decision-maker the Authority recognises the value of this Protocol as a means of assisting it to produce high quality decisions consistently over time. Similarly, stakeholder groups can benefit from additional clarification of the way in which the Authority makes decisions.

Approved by: 

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Authority Chairperson
1 December 2003

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Change Log

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Interpretation of “ New organism ”	Updated section	May 06
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Identification of New Organisms replaces New Organisms – Identification	New Section	Jan 08
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1 Interpretations and Explanations of Key Concepts

Introduction

This Protocol includes explanation of the key concepts relevant to the Authority's decision making. It provides further explanation of both definitions in Section 2 of the Hazardous Substances and New Organisms (HSNO) Act and the important concepts introduced in the Methodology but not described in the Act. Additional concepts will be included in subsequent versions of this Protocol.

Policy on interpretations

Wherever possible, terminology will be used in a way that is consistent with its use by other agencies with related functions, or organisations that use similar methods and techniques.

In this regard, the Authority is conscious of the fact that many of the concepts used in the HSNO Act and/or the Methodology are also found in:

- the Resource Management Act
- the Biosecurity Act
- the Agricultural Compounds and Veterinary Medicines Act
- national guidelines and standards (including MAF standards)
- international treaties and agreements including standards organisations
- documents issued by the USEPA and Science Advisory Board
- other sources such as industry guidelines, codes of practice etc.

Clearly, consistency in the use of terminology assists in the presentation of the Authority's decisions and in communication generally (though interpretations must be consistent with the HSNO Act first and foremost).

Schedule of Regulations and Standards

HSNO Regulations

- Hazardous Substances and New Organisms (Low-Risk Genetic Modification) Regulations 2003
- Hazardous Substances and New Organisms (Methodology) Order 1998
- Hazardous Substances and New Organisms (New Organisms Forms and Information Requirements) Regulations 1998
- Hazardous Substances and New Organisms (Organisms Not Genetically Modified) Regulations 1998
- Hazardous Substances and New Organisms (Personnel Qualifications) Regulations 2001
- Hazardous Substances (Minimum Degrees of Hazard) Regulations 2001
- Hazardous Substances (Classification) Regulations 2001
- Hazardous Substances (Forms and Information) Regulations 2001
- Hazardous Substances (Exempt Laboratories) Regulations 2001
- Hazardous Substances (Classes 6, 8, and 9 Controls) Regulations 2001
- Hazardous Substances (Packaging) Regulations 2001
- Hazardous Substances (Disposal) Regulations 2001
- Hazardous Substances (Tracking) Regulations 2001
- Hazardous Substances (Fireworks) Regulations 2001
- Hazardous Substances (Emergency Management) Regulations 2001
- Hazardous Substances (Identification) Regulations 2001

MAF/ERMA Standards

- Facilities for Microorganisms and Cell Cultures: 2007
- Containment Facilities for Plants: 2007
- 154.02.08 Transitional and Containment Facilities for Invertebrates
- 154.03.03 Containment Facilities for Vertebrate Laboratory Animals
- 154.03.04 Containment Facilities for Zoo Animals
- 154.03.06 Containment Standard for Field Testing of Farm Animals
- 155.04.09 Containment Facilities for New Organisms (including genetically modified organisms) of Plant Species

Australian and New Zealand Standards

- AS/NZS 2243.3:2002: Safety in laboratories – Microbiological aspects and containment facilities
- AS/NZS 2243.10:2004: Safety in laboratories – Storage of chemicals

2 General

2.1 Benefits and costs: admissibility for HSNO decision-making

In determining the admissibility of costs and benefits to be factored into decision making, it is considered that all costs and benefits are potentially relevant so long as they can be related to the purpose of the Act. In particular admissible costs and benefits are all those that are relevant to matters that are to be “taken account of” or “given effect to” in the Act. All elements of Part II of the Act are especially relevant, but also included are those specific elements referred to in sections of Part V.

Given the scope of costs and benefits to be considered the distribution of these becomes important in decision-making. The need to focus on the distribution of costs and benefits is spelt out in the Methodology. Clause 13 states that when evaluating the assessment of costs and benefits associated with the substance or organism in an application, the Authority must take into account –

- (c) *The distributional effects of the costs and benefits over time, space and groups in the community.*

Thus, it is important to know how costs and benefits are spread and in this regard the reference to groups in the community is especially relevant. Relevant considerations may, for example, include:

- The extent to which costs and benefits fall together or not. Thus, if for example the benefits all accrue to one group but the costs (or risks) are all borne by another, that is likely to influence the decision.
- The extent to which benefits and costs are widely shared or sharply focussed. Thus, if the benefits largely accrue to the applicant rather than to the wider community that may influence decision-making as well.

2.2 Biological preparations

Preparations made using biological agents can cover a range of products including:

- fungal-based soil pathogen biocontrol preparations
- live vaccines
- attenuated (modified and non-viable) vaccines
- viral-based biocontrol/biocidal reagents (e.g., RCD-Zen)
- biological pesticides (e.g., the Bt series of products).

Many of these biological products will trigger the HSNO thresholds for toxic and ecotoxic properties in many cases due to the adjuvants or excipients¹ in the preparation. In particular the ecotoxicity threshold for biocidal action will apply to most of these products. The term ‘biological product’ is used here to refer to a preparation manufactured for sale using a biological agent.

The HSNO Act defines a substance as, among other things, “[any] ..compounds, or defined mixture of compounds, either naturally occurring or produced synthetically”. The term ‘compound’ is defined as ‘any chemical combination of chemical elements’. An organism which is in the form of a viable culture, without the addition of any material apart from that associated with the culturing process, is considered to be a substance in terms of the HSNO Act when it is presented as a product for uses such as for ‘biocidal action’². It is possible for a biological preparation to be a hazardous substance, and to contain a new organism. The issue is then whether an application may be required under both aspects of the Act or whether one type of application will cover all aspects.

The Authority’s interpretation on this matter is as follows:

- Any hazardous substance containing an organism requires an application for a hazardous substance approval irrespective of whether the organism is new or not new.
- If a manufactured product containing an organism triggers a hazardous property threshold, it must be the subject of a hazardous substance application irrespective of whether it is the biological or chemical ingredients which create the hazardous property in the finished product.
- If the hazardous substance application is for release of the substance (sections 28 or 28A of the Act) then the new organism must be the subject of a new organism release application, a conditional release application, or a qualifying organism application (sections 34, 35, 38A, 38I of the Act)
- If the hazardous substance application is for contained use of the substance (section 30) then the new organism must be the subject of **at the least** an application for a new organism in containment.
- An application to import, develop, field test, or manufacture a new organism in containment (Section 40 of the Act) may not be used to deal with the open distribution and sale of a biological preparation containing a new organism.

¹ Other ingredients or components – for example preservatives.

² Meeting of the Authority 3 August 2006.

- Any controls imposed on the release of the new organism through the conditional release or qualifying organism pathway will be in addition to controls placed on a hazardous substance approval for a biological preparation and will seek to avoid duplication by focusing on managing risks arising from the ‘newness’ of the organism.
- Where more than one control is applied to address the same matter, the more stringent controls will take precedence.
-

2.3 Containment

The HSNO Act defines containment as restricting an organism or substance to a secure location or facility to prevent escape.

For further information on the containment of an organism or a substance please refer to their relevant sections under New Organisms and Hazardous Substance below.

2.4 Future generations

The HSNO Act requires the Authority to take into account the capacity of people to provide for the reasonably foreseeable needs of future generations. The Authority acknowledges that there is some difficulty in interpreting how exactly present generations can do this – given, for example, the degree of uncertainty about what might be valued by future generations.

Adverse effects that are most likely to require consideration of the foreseeable needs of future generations are those that involve serious or irreversible damage to non-substitutable resources. Examples include the loss of rare ecosystems or irreversible contamination of the environment generally. The effect on future generations of the present day use of toxic substances such as organochlorines that may take centuries to break down in the environment is an example of something that must be considered.

Note, however, that the concept of ‘the capacity of people to provide for the reasonably foreseeable needs of future generations’ is not limited to the consideration of adverse effects. Its incorporation into Section 5(b) of the Act implies that any effects which might enhance the capacity of future generations to provide for their own economic, social and cultural well-being are also relevant.

Note also that this concept should not be confused with the concept of intergenerational equity; the idea that the present generation should not use resources or degrade the environment so as to leave future generations in a worse position than the present generation³. It is more appropriate to consider the ‘reasonably foreseeable needs’ requirement of the HSNO Act as a caution to ensure that, at the very least, one generation does not significantly reduce the options available to future generations.

The Authority will take account of case law arising from the Resource Management Act in considering ‘the reasonably foreseeable needs of future generations’.

³ B. Boer. 1994. “Environmental Law after Rio”. 1 NZELR 21,22

2.5 Intrinsic value of ecosystems

Value is a relational concept; it involves both a valuer and something that is valued. Value can be broadly categorised as either instrumental or intrinsic. Instrumental value refers to the capacity of something, *when used*, to satisfy a want or preference. Instrumental, or use value, can be further divided into direct value, indirect value, and option value.

Intrinsic value, in contrast, is the value ascribed to something over and above the benefit gained by putting it to some use. In this sense, the value is inherent. Intrinsic, or non-use value, is also sometimes referred to as existence value. Empirical measures of existence value have been obtained through questionnaires (the contingent valuation method).

At a practical level, the Authority will take into account the intrinsic value of ecosystems by considering whether the organism or hazardous substance is likely to destabilise the natural evolution of ecosystems which are valued for their own sake, i.e., irrespective of any instrumental value they may have. The Authority will also have regard to any case law established under the Resource Management Act with respect to this concept.

2.6 Public notification

Under Section 53 of the HSNO Act applications are required to be publicly notified if they are to:

- import or manufacture any hazardous substance for release
- import any new organisms for release, or to release any new organism from containment
- field test a genetically modified organism
- import, release or use a hazardous substance or new organism in an emergency.

The Authority may also publicly notify any application to develop a genetically modified organism in containment if it believes that there is likely to be significant public interest. This test will be applied by the Authority on a case-by-case basis, but in the context of a set of pre-determined criteria.

The Act requires a notice to be published in one or more daily newspapers circulating in the main metropolitan areas. Where an application has a particular local or regional aspect, local newspapers may also be used.

In addition, all applications will be notified on the Authority's website, and in the Authority's Bulletin.

2.7 Reassessment

Under Section 62(1) of the HSNO Act any person or the Chief Executive of ERMA may request the Authority to decide if there are grounds for the reassessment of a substance, or a new organism in containment.

Reassessment is an option when the substance or organism has previously been considered by the Authority, is deemed to be approved through the transitional provisions, or is currently subject to the transitional provisions. If an application for a substance or organism has previously been considered by the Authority and declined, any further consideration requires a new application.

Circumstances where the Authority may decide to reassess an organism or a substance are set out in the Act. They include if significant new information relating to the effects has become available, or, for substances, if another substance with similar or improved beneficial effects has become available, or if information showing a significant change of use or a significant change in the quantity manufactured, imported or developed has become available. However, other grounds may also provide cause for allowing a reassessment, provided that those grounds are similar in character to those set out in section 62(2) of the Act. The key is that there must have been some kind of substantive change in circumstances. It would be insufficient, for example, to seek a reassessment simply because someone disagrees with an approval.

If the Authority decides a substance or organism in containment should be reassessed, then the reassessment is treated in the same manner as a normal application. Where a substance is being reassessed, and the Authority believes that there may be significant actual or imminent danger to health or safety or the environment, then further use of the substance may be prohibited until the reassessment has been decided (section 64).

If the substance or organism being reassessed has been transferred under the transitional provisions of the Act, the type of Part V application used for the reassessment will be that under which the substance or organisms was deemed approved (e.g. section 29 for substances). The results of the reassessment then become a normal approval, i.e. they supersede the Regulation.

Where the original approval for a hazardous substance is by way of rapid assessment (section 28A), a reassessment cannot take the form of rapid assessment but must be determined under section 29. While this is not logical it is the way that the Act is currently framed, and there is no discretion available.

A decision may on occasion need to be made on whether there are grounds for reassessment of an organism that has been given containment approval by an Institutional Biological Safety Committee (IBSC) under delegation from the Authority. In this case decisions cannot be made by the IBSC, only by the Authority. The normal delegation to IBSCs does not cover determining whether there are grounds for reassessments. Since a reassessment itself is considered a normal application (section 63), once it has been determined that grounds for reassessment exist, this reassessment itself may be either by the Authority or an IBSC, depending on the original approval.

Reassessment may result in the Authority approving the application (with the same or with changed controls) or declining the application. Controls on approvals may become more stringent or more relaxed depending on the change or circumstances or information that triggered the reassessment. If as the result of the reassessment, the Authority decides that there can be no further importation, manufacture, or development of the substance, it can issue a direction prohibiting further use of the substance and requiring it to be disposed of at the owner's expense (section 66).

2.8 Sustainability

Section 6 of the HSNO Act (matters relevant to the Purpose of the Act) require that the sustainability of all native and valued introduced flora and fauna be taken into account.

This or like terms are found in other pieces of New Zealand legislation. For example, the purpose of the Resource Management Act refers to the sustainable management of natural and physical resources. The purpose of the Fisheries Act (1996) is ‘to provide for the utilisation of fisheries resources while ensuring sustainability’. In that Act ‘ensuring sustainability’ is defined in terms of maintaining the potential of resources to meet the needs of future generation and avoiding, remedying and mitigating adverse effects on the aquatic environment.

In the Resource Management and Fisheries Acts, sustainability is linked to avoiding, remedying or mitigating adverse effects on the (relevant) environment. Although the HSNO Act does not define sustainability, its purpose (to protect the environment by managing adverse effects) means that it is relevant to draw on other resource management legislation.

At a practical level, indicators of sustainability may include biodiversity measures (such as loss of species) complemented by considerations related to the long term viability of the ecosystem or its constituent parts (particularly with mono-cultures where, for obvious reasons, indicators of biodiversity are of limited value).

2.9 Transshipment

An approval under Section 51 of the Act is required for all hazardous substances and new organisms that will be transhipped through New Zealand.

Transshipment refers to the importation of a hazardous substance or new organism to New Zealand solely for the purpose of export within 20 working days of entry. If the substance or organism will be in New Zealand for longer than 20 days then a full approval is required.

Transshipment approvals apply only to substances or organisms that are in transit. Processing, repackaging or any form of use is not permitted and would require a full approval.

An example of a transshipment application would be for a hazardous substance being shipped from Sydney to Los Angeles that needed to be moved from one ship to another in Auckland.

Applications for transshipment of any prohibited new organisms as listed in the Second Schedule of the Act will not be accepted.

When an application for transshipment is lodged, the Authority has ten working days to approve the transshipment or decline the application on the grounds that the substance or organism cannot be contained adequately to ensure the environment will not be exposed either to the substance or organism itself or to any adverse effects. Transshipment approvals may specify controls.

3 New Organisms

3.1 New organism

A new organism is defined in the HSNO Act as:

- (a) *An organism belonging to a species that was not present in New Zealand immediately before 29 July 1998:*
- (b) *An organism belonging to a species, subspecies, infrasubspecies, variety, strain, or cultivar prescribed as a risk species, where that organism was not present in New Zealand at the time of promulgation of the relevant regulation:*
- (c) *An organism for which a containment approval has been given under this Act:*
- (ca) *An organism for which a conditional release approval has been given:*
- (cb) *A qualifying organism approved for release with controls:*
- (d) *A genetically modified organism*
- (e) *An organism that belongs to a species, subspecies, infrasubspecies, variety, strain, or cultivar that has been eradicated from New Zealand.*

An amendment to the HSNO Act in 2003 has further defined organisms that are not new organisms in the following manner.

- (a) *The organism is not a genetically modified organism and-*
 - (i) *An approval is granted under section 38 to release an organism of the same taxonomic classification; or*
 - (ii) *The organism is a qualifying organism and an approval has been granted under section 38I to release an organism of the same taxonomic classification without controls; or*
 - (iii) *An organism of the same taxonomic classification has been prescribed as not a new organism; or*
- (b) *The organism is a genetically modified organism and-*
 - (i) *An approval is granted under section 38 to release an organism of the same taxonomic classification with the same genetic modification; or*
 - (ii) *The organism is a qualifying organism and an approval has been granted under section 38I to release an organism of the same taxonomic classification with the same genetic modification without controls; or*
 - (iii) *An organism of the same taxonomic classification with the same genetic modification has been prescribed as not a new organism; or*
- (c) *The new organism was deemed to be a new organism under section 255 and other organisms of the same taxonomic classification were lawfully present in New Zealand before the commencement of that section and in a place that was not registered as a circus or zoo under the Zoological Gardens Regulations 1977.*

A new organism does not cease to be a new organism because-

- (a) It is subject to a conditional release approval; or*
- (b) It is a qualifying organism approved for release with controls.*

Human Cells

The amendment of the HSNO Act in 2003 extended the meaning of ‘organism’ to include human cells (but not human beings). The current definition of an “organism” is as follows:

An “organism”:

- (a) Does not include a human being:*
- (ab) Includes a human cell:*
- (b) Includes a micro-organism:*
- (c) Includes a genetic structure, other than a human cell, that is capable of replicating itself, whether that structure comprises all or part of an entity, and whether it comprises all or only part of the total genetic structure of an entity:*
- (d) Includes an entity (other than a human being) declared to be an organism for the purposes of the Biosecurity Act 1993:*
- (e) Includes a reproductive cell or developmental stage of an organism.*

Importation of genetically modified human cells not already present in New Zealand, and genetic modification of human cell lines and tissue cultures in New Zealand, require approval under the HSNO Act. “Human cells”:

- (a) Means human cells, human cell lines, or human tissues that are being grown or maintained outside the human body; and*
- (b) Includes human reproductive cells or human embryonic cells that are being grown or maintained outside the human body.*

Proposals regarding research involving human cells, including those of human embryos outside of the human body should be discussed with ERMA New Zealand at an early stage so that advice may be given on appropriate consultation.

Taxonomic classification

Taxonomic classification, in relation to an organism means:

The genus, species, subspecies, infrasubspecies, variety, strain, cultivar, or other appropriate classification that the organism belongs to.

Section 27A of the HSNO Act allows for the Authority to approve a new organism at any taxonomic classification that the Authority thinks fit. For non-genetically modified organisms such approvals apply to all the organisms in the taxonomic classification. For example, if an approval is given at the genus level to release a plant, all the sub-generic levels (i.e. sub-genera, species, subspecies, infrasubspecies, variety, strain, cultivar) as well as any hybrid crosses between organisms belonging to the sub-generic taxonomic levels, would no

longer be considered new organisms. This situation would also apply to hybrid crosses between generic levels if the genera involved had been approved as new organisms.

An approval that is granted for a genetically modified organism in a taxonomic classification applies only to organisms in the taxonomic classification with the same genetic modification as specified in the approval. This means an identical nucleic acid sequence inserted (or deleted or modified) at the same site within the genome⁴ as the organism that has been approved.

An approval may exclude any organism or groups of organisms from its scope.

The granting of approvals at “the most appropriate taxonomic classification” allows ERMA New Zealand to consider applications for approval to import or release new organisms at the most appropriate taxonomic level for risk assessment.

For example, in considering applications for approvals for bacteria or other micro-organisms, the Authority may consider the taxonomic level most appropriate for risk assessment to be the level of sub-species or strain. An example is the species *E. coli* which has many strains. Strain K12 is not pathogenic to humans while strain O157 is. On the other hand, some plants may be assessed at the genus level. For example, the nature of orchid breeding and nomenclature means that it is usually difficult and sometimes virtually impossible to identify the full range of species that orchid cultivars have been bred from.

The prohibition on the importation of a new organism without approval under the HSNO Act does not apply to biological material of the organism that cannot, without human intervention, be used to reproduce the organism. However, regeneration of a new organism from biological material of an organism that cannot, without human intervention, be used to reproduce the organism does require approval as a development (see definition of ‘Development of New Organisms’ in this document). Prohibition on the importation of a new organism without approval does apply to a new organism that is the subject of an innovative agricultural compound application or an innovative medicine application.

Other matters

Special considerations apply to ‘risk species’ and ‘prohibited organisms’ (see definitions of ‘risk species’ and ‘prohibited organisms’).

At times, water and soil samples are imported into laboratories for testing for, and analysis of, known or suspected micro-organisms, or physical contaminants. These samples are typically imported into transitional facilities under MAF permits, and are generally destroyed or sterilised after completion of the analyses. Where the purpose of the importation is to analyse micro-organisms, and these micro-organisms are known or suspected to be new, then the importer must also apply for a new organism approval under the HSNO Act. Where the presence or absence of micro-organisms (that are not new organisms) is irrelevant to the intended analysis an application under the HSNO Act for importation of a new organism is not required, although approvals or permits from other agencies may be required.

⁴ The “same site within the genome” is required for an approval of a release of a genetically modified organism, but is not required for an approval of a development of a genetically modified organism

‘Prions’ are not organisms under the HSNO Act⁵. Biologically they are misfolded proteins, which are ‘infectious’ in that they are able to convert the normal cellular form of protein into more of the misfolded form resulting in a detrimental cellular response. As such, they do not fall within the general bounds of the HSNO Act definition of organism or new organism.

Section 26 of the Act provides for the Authority to determine (by notice in the Gazette) whether or not any organism is, or is not, a new organism. Where there is doubt, the Authority will determine whether an organism is a new organism under the HSNO Act, using the criteria above and drawing on the best advice from its own staff, other agencies, and scientific experts in specialist areas. Over time, determinations will be able to be guided by precedent.

⁵ Prions would be organisms under the HSNO Act if they were *declared by Order-in-Council* to be organism under section 2 of the Biosecurity Act. However no such order has taken place. The fact that prions are *defined* in the Biosecurity Act as “organisms” is not sufficient to make them organisms under the HSNO Act.

3.2 Alternative research objectives

The Hazardous Substances and New Organisms (Genetically Modified Organisms) Amendment Act 2002 introduced a new section into the HSNO Act.

Section 44A(2)(b) - “In deciding whether to approve or decline an application, the Authority must take into account—

...
 (b) *any alternative method of achieving the research objective that has fewer adverse effects on the matters referred to in paragraph (a) than the development or field test”.*

There are two matters that information to be provided in the application need to address.

The first matter that must be identified is **the research objective**. In the first instance this will be provided by the applicant and should be reasonably well linked to the purpose statement for the application. In other words, it is not acceptable for the research objective to be quite different from the purpose statement. As it does for other information, ERMA New Zealand will evaluate this with particular attention paid to the rationale for selecting that purpose, particularly by considering the overall context of the application.

The second matter is then to identify any **alternative method** of achieving that objective. There are two possible sets of questions that can be asked to assist this. The questions are posed in terms of risks (both the probability and magnitude of consequences) so it is clear that both aspects can be considered.

1. (a) Can the research objectives be achieved by non-transgenic methods?
 (b) If “yes” will these methods have lower overall risk than the transgenic method proposed?
2. (a) Can the research objective be achieved using alternative transgenic methods?
 (b) If “yes” will these methods have lower overall risk than the transgenic method proposed?

The matters specified by the Act (paragraph (a) of this subsection) to be considered in examining risk are “human health and safety” and “the environment, in particular ecosystems and their constituent parts”. However, the meaning of “environment” in the HSNO Act is very broad. The Authority will thus give some consideration to the other matters set out in Part II of the Act. When considering how material the differences are the Authority will take into account the impact of containment controls on these risks in the same way as it considers matters in applying section 45 of the Act.

If the combined impact of the risks from any alternative method is significantly less than the risks of the application at hand then the Authority will give consideration as to whether the application should be declined. In so doing, the Authority will consider the following other factors:

- The extent to which the application is a coherent part of the overall work of a programme of research that is of significant public benefit, and thus the extent to

which loss or disadvantage to that programme could be created by declining the particular approach being sought.

- The extent to which it is practicable for the alternative method to be adopted by the applicant or any other person or institution and thus the potential loss of opportunity to derive the benefits that would be associated with the approval of the application if no research was done at all. Practicability might be influenced by technical, economic or locational factors.

3.3 Antibiotic Resistance Genes in Genetically Modified Organisms

Antibiotic resistance in human and animal pathogens is a problem of increasing global importance, and is known to arise from a number of common practices. The major cause of antibiotic resistance is the use of antibiotics in humans and animals. The use of antibiotic resistance genes in GMOs contributes little if anything to the development of resistance. However, it is considered prudent to avoid adding to antibiotic resistance by refraining from the use of antibiotic resistance genes where other marker genes are a practicable alternative.

At the stage of either development or field testing of a GMO it is accepted that there is no concern, because exposure to the GMO will be limited. However, it will normally be expected that applicants will remove or inactivate antibiotic resistant marker genes in GMOs that are:

- Food or feed crops to be commercially released (whether through full or conditional release).
- Viable GM food microorganisms to be released (whether through full or conditional release).

If the applicant has particular reasons for not removing or inactivating any antibiotic resistant marker genes in GMOs in these circumstances, they should provide the rationale for leaving these genes active in the organism.

In the instances where an antibiotic resistance gene is included, risks associated with the use of antibiotic resistance genes will be assessed on a case-by-case basis. The outcome of risk assessments for the presence of a particular antibiotic resistance gene in a GMO will differ according to the nature of the resistance gene, the organism that is genetically modified and the circumstances in which the organism will be used.

3.4 Antisense oligonucleotides and peptide nucleic acids (PNAs), Use of

Antisense oligonucleotides and peptide nucleic acids (PNAs) are synthetic molecules that can be used to control gene expression. Antisense oligonucleotides bind messenger RNA (mRNA) with a complementary sequence and inhibit translation of the protein. PNAs are structural mimics of DNA or RNA that have a pseudopeptide backbone and these molecules may be used to inhibit transcription and translation of genes.

The use of chemically synthesised oligonucleotides or PNAs for antisense applications is not considered to be the development of a GMO under the HSNO Act. In this particular case the oligonucleotides affect protein expression in the cell but not by modifying the organism's genome⁶.

⁶ See also “Genetically Modified Organism” and “Use of Ribonucleic Acid (RNA) Interference Technology and Development of a GMO” for further explanation of the definition of genetically modified organism in the HSNO Act

3.5 Conditional Release of New Organisms

The Act (sections 38A through 38H) provides for conditional release approval of a new organism.

Consideration of release applications as conditional release applications (section 38B)

With the agreement of the applicant section 38B provides for the Authority to treat release applications (section 34) as conditional release applications (section 38A).

The Act does not specify the time frame in which such a decision to change application type can be made. However, the Authority should consider the amount of information available, the right of the public to have sufficient information on the application being notified, and whether sufficient analysis has been undertaken to enable such a decision to be made.

Although advice on the most appropriate application type will have been offered during the pre-application stage, and as no evaluation of the risks of the organism will be undertaken, there may still be a need to consider what approval type is most appropriate once the application has been formally received.

Both release and conditional release applications are required to be publicly notified. Relevant information for notification includes the proposed controls for a conditional release. As notification occurs within 10 working days of receiving the application it is important to make the decision to change application type before public notification of the application.

As noted earlier the Authority can only treat a release application as a conditional release application with the agreement of the applicant. If the applicant wishes to continue with a full release application then the Authority is bound to proceed accordingly.

Should an applicant decide, after public notification, but before the hearing, that a conditional release would be more appropriate, the Authority will consider the conditions but will require the application to be re-notified to provide a fair opportunity for submitters to re-submit. If the request is lodged after the start of the public hearing, the application will be withdrawn, and a new application must be made. Where an applicant requests a change to the application type the applicant will be liable for all additional fees and charges applying as a result of the change.

It is possible that a full release application and a conditional release application could be made simultaneously. However, in any full release approval given, the approval would be specified that it would be inactive until the expiry of the conditional approval. Further, there are few, if any, circumstances under which such a dual approval would be considered appropriate. If conditions were considered to be warranted, then this in itself would indicate that a simultaneously given a full release would be unwarranted.

All applications for full release will be examined as to whether they would be more appropriately considered for conditional release. Therefore all full release application should provide evidence as to why a full release application is appropriate.

Deciding on controls (section 38D(1)) including the review of controls (section 38G)

The decision making criteria for conditional release approvals are set out in section 38C of the Act. It is noted that amongst other things, the impact of controls must be considered when deciding if the minimum standards (section 36) can be met.

Section 38D(1) sets out an indicative list of possible controls although, there is flexibility to consider any type of control under section 38D(2). However, the final decisions on controls will be informed by section 38D(1). A control should not be imposed simply because it is listed in section 38D(1). As a matter of prudent practice, controls must manage risks or meet other defined objectives. If applicants do not consider the controls to be appropriate they must explain why they are not applicable.

Duration of conditional release approvals (section 38E)

The interpretation of section 38E is that if an approval is silent on the duration of the approval, it will expire on the earlier of either five years after the date of approval, or the close of the date on which the last control expires.

It is not always possible to stipulate exactly the date on which the last control will expire, for instance many controls will not have expiry dates (such as reporting, personal qualifications or even location and limited use controls). These controls will simply set out the requirements and will not normally be linked to a particular date. The risk is that such approvals could automatically, and unnecessarily, expire after five years.

The following options are a practical and workable approach to expiration dates are considered consistent with the legislation:

Option 1: Where an expiry date is warranted then an expiry date will be explicitly set as part of the approval. Any expiry date will take into account the need for post approval monitoring requirements.

Option 2: Where there is no need to set an expiry date, in accordance with section 38E(1), the controls will explicitly state that the approval does not expire. This position adopts an interpretation of 38E(1) where controls that do not have any specific time requirements will not expire. In the situation where an approval contains a mix of time bound (eg monitoring and reporting controls), and non-time bound controls, the approval will be deemed to have expired when the last control is no longer required ie the approval is left open until such time as the last condition has expired. To make this clear, the controls that are not time bound will be explicitly stated to apply in perpetuity.

Disposal of the organism (section 38F)

Section 38F requires that, on the expiry of an approval and unless another approval has been granted in the interim, the new organism concerned must be disposed of.

However, section 39(3) provides for an application to be made to put an organism into containment, if an application has already been made for a conditional release approval.

These can be made simultaneously, and this may be especially appropriate if the intention of the applicant is to place the organism(s) subject to conditional release into containment at the end of any conditional release approval. Under these circumstances:

- (a) The applications will be considered in tandem, that is, decisions on both applications will be prepared simultaneously.
- (b) In the event that both applications are approved simultaneously, the conditional release approval will provide for the return of the organism(s) into containment upon expiry, as an acceptable alternative to disposal.
- (c) However, the conditional release application must still contain information on disposal of the organism(s) to cover the possibility that a containment approval is not granted.

It is possible that a containment approval may already exist for the organism. In that case a condition of a conditional release approval may be that it is returned to containment at the expiry of the approval, and disposal will not be required.

Where a conditional release approval is set to expire, and upon expiry the organism will either be disposed of or returned to containment, conditions will be set that ensure, to a high level of probability, that all of the new organisms concerned can be identified and located at the time of expiry of the approval. This will also include disposal of viable heritable material.

3.6 Containment (including genetically modified organisms)

Containment may be described as establishing barriers (physical and procedural) to prevent release of the organism to the uncontrolled environment. Containment approvals (see below) include field testing and fermentation of genetically modified organisms⁷. An application for approval for containment will specify the secure location or facility where the organism is to be contained. A secure location or facility is one that is under the supervision of the facility manager; who must be able to manage the security of the organism, and of material and people within the boundaries of the containment zone. If this is not possible, the application should be for release.

For field testing⁸ of genetically modified organisms, the Authority will need to be assured that the genetically modified material will be contained. In cases where crops are not permitted to flower or form seed, the only requirements may be physical distance from other similar crops. In other circumstances, tents to prevent movement of pollen and/or may be needed. Spatial and temporal separation may be permitted as barriers.

With respect to specific containment facility performance parameters, MAF and ERMA New Zealand have developed a number of standards (see MAF/ERMA Standards at the front of this document) relating to containment requirements. These standards range from guidelines for fencing for containment of different types of animals to specifications for laboratories.

⁷ See also 'Fermentation'

⁸ See also 'Field tests and developments of genetically modified organisms'.

3.7 Containment structure

The Hazardous Substances and New Organisms (Genetically Modified Organisms) Amendment Act 2002 introduced a new term into the HSNO Act.

*Section 2(1) – “**containment structure** means a containment facility that is a vehicle, room, building, or other structure, set aside and equipped for the development of genetically modified organisms”.*

The Authority has interpreted the term “containment structure” as follows.

The dictionary definition of structure is:

structure⁹, **1** **(a)** a whole constructed unit, esp. a building. **(b)** the way in which a building etc. is constructed (has a flimsy structure); **2** a set of interconnecting parts of any complex thing; a framework (the structure of a sentence; a new wages structure).

Based on this it could be argued that a “structure” is not required to be a building, and could conceivably be a set of yards, or a fenced area. However, such an interpretation would not be consistent with Parliament’s intention, which was to distinguish between developments occurring in field trial like conditions, as compared to development work in a laboratory.

Therefore the Authority interprets “containment structure” as a fully enclosed 6-sided (four walls, roof and floor) entity that is a subset of “containment facility”.

Examples of “containment structures” include structures which conform with the physical containment (PC) requirements referred to in the HSNO (Low-Risk Genetic Modification) Regulation.

⁹ The Concise® Oxford Dictionary, 8th Edition. (c) © Oxford University Press. All rights reserved.

3.8 Delegation of decision-making for low-risk GMOs

Decision making for developments of low-risk GMOs is routinely delegated by the Authority to Institutional Biological Safety Committees (IBSCs) or the Chief Executive (CE) of ERMA New Zealand. The HSNO Amendment Act (2003) amended the scope of the IBSC and CE delegations to encompass the ability to grant approvals to develop GMOs as part of a project (section 42A) and to import low-risk GMOs into containment (section 42B).

3.8.1.1 Delegation of decision making of projects for low-risk GMOs to IBSCs

Under section 19(2)(a) the Authority may delegate the power to conduct a rapid assessment under section 42A of the Act to IBSCs or the CE.

The criteria for rapid assessment of project approvals is described in subsection 42A(2) and the regulation made under section 41(c). This regulation, the HSNO (Low-Risk Genetic Modification) Regulations, give the range of low-risk developments that can currently be approved by IBSCs or the CE.

3.8.1.2 Delegation of decision making for imports of low-risk genetically modified organisms to IBSCs

Under section 19(2)(a) the Authority may delegate the power to conduct a rapid assessment under section 42B of the Act to IBSCs or the CE.

The criteria for rapid assessment are described in section 42B and the HSNO (Low-Risk Genetic Modification) Regulations.

Subsection 42B(3) states that section 25(4) does not apply if an application is approved under this section by a person acting under delegated authority from the Authority under section 19(2)(a). This means that an approval to import a low-risk GMO into containment is only valid for the institution which sought the approval if the approval is granted by an IBSC or the CE. In contrast, approvals made by the Authority to import GMOs into containment are valid nationally. The change to import approvals will result in approvals being more restricted, as are development approvals granted by IBSCs.

3.9 Developments occurring other than in a containment structure

The Hazardous Substances and New Organisms (Genetically Modified Organisms) Amendment Act 2002 introduced a new section into the HSNO Act.

*Section 44A(1)(a) - “This section applies to an application—
(a) to develop a new organism in containment that is a genetically modified organism, to the extent that the development does not take place in a containment structure”.*

In this interpretation the Authority clarifies how development applications that do, or might, include both indoor and outdoor containment stages are to be treated. The indoor stages, i.e. those stages carried out within a “containment structure” will, in most cases, be able to be approved by an IBSC if they meet the requirements of the HSNO (Low-Risk Genetic Modification) Regulations but outdoor stages can only be approved by the Authority. The key issue here therefore is how this division of (possible) responsibility is managed.

The approach adopted by the Authority is as follows:

- The Authority is not prepared to consider an application which is only for the outdoor components of development, unless a prior approval exists for the indoor components (normally this approval will be given by the institution’s IBSC).
- The preference is for the Authority to be able to consider the whole of the development sequence as a single application.
- An applicant for the outdoor components of development (where an approval is held for the indoor components) need not be the same as the approval holder for the indoor components of the development.
- Where the indoor components have been already approved, strong consideration will be given (but not necessarily insisted upon) to treating the outdoor component as a field trial rather than a development. However, the approach preferred will depend on the circumstances of the case.

3.10 Development of New Organisms

The HSNO Act defines ‘Develop’ to mean:

- Genetic modification of an organism;
- Regeneration of a new organism from biological material, that cannot, without human intervention, be used to reproduce the organism;
- Fermentation of a microorganism that is a new organism.

This definition of ‘Develop’ excludes field testing.

‘Develop’ has the same meaning as development, regeneration (see interpretation in this Protocol), creation and recreation of a new organism, and includes development of a hybrid as explained in the interpretation of ‘Hybrids’ in this Protocol.

3.11 Developments and field tests of genetically modified organisms

Statutory definition

‘Field test’ is defined in the HSNO Act as:

‘the carrying on of trials on the effects of the organism under conditions similar to those of the environment into which the organism is likely to be released, but from which the organism, or any heritable material arising from it, could be retrieved or destroyed at the end of the trials’.

The definition of ‘Develop’ in the HSNO Act includes the genetic modification of an organism but does not include field testing.

Explanation

Genetically modified organisms (GMOs) are developed through genetic modification which involve a series of steps such as:

- identification and isolation of the desired gene in a particular organism
- purification and establishment of a delivery mechanism
- transformation of the organism concerned that then is termed a GMO.

These steps are normally carried out in laboratories, glasshouses or other facilities that meet containment standards commensurate with the level of risk and uncertainty involved in the transformation or development of GMOs. To reduce the chances of the GMO coming in contact with organisms other than those directly involved in the experiment, developmental laboratories, glasshouses and similar facilities are normally designed to prevent ingress or egress of other organisms, including disinfecting of any waste arising from the modified organisms. However, the facility has to match the nature of the organism. If the organism being developed, for example, is a large animal, then the containment facility will be rather different from that required for a microorganism or plant.

If the desired outcome of the transformation and development is achieved, the GMO may be taken out of the laboratory or glasshouse and into the environment for further evaluation. This evaluation outside the contained laboratory or glasshouse constitutes a *field trial* because it is evaluating the organism *under conditions similar to those of the environment into which the organism is likely to be released* as stipulated in the definition of *field test*. The Act requires a greater level of public involvement with field trial decisions because field trials represent inherently less contained conditions, i.e. no physical laboratory and a larger scale.

If an applicant intends to undertake all of the steps identified above the Authority will expect the applicant to submit both a development and field trial application or a combined application.

Boundary between field trial and development

The Authority recognises that the definitions of field trial and development mean that both application types will not always be required. In such circumstances, the boundary between field trial and development assumes practical importance.

The starting point is the nature of the experiment. If an experiment that has the characteristics and purpose of a development is proposed to be carried out in an environment more characteristic of a field trial, the work will be regarded as a *development* for the purposes of the application i.e., the nature of the experiment is prime.

If the experiment is neither a development nor a field trial, in the strict sense (defined by the nature of the experiment), then the key consideration is the nature of the environment. Thus a proposal to ‘manufacture’ products biologically from genetically modified animals kept in a field trial like environment would be treated as a field trial.

The exception (for practical reasons) is where evaluation of a developed organism is performed within the confines of the contained laboratory or similar facility. These conditions hardly meet the criterion of ‘conditions similar ...’. Indeed, the strict containment regime would prevent exposure of the organism to environmental conditions similar to those into which the organism is likely to be released. On both counts field trial consideration would not need to be invoked.

Public notification

If the application is for a field trial then it must be publicly notified.

If the application is for a development the Authority has discretion to publicly notify or not. The test in the Act for the exercise of this discretion is that of public interest. This test will be applied by the Authority on a case-by-case basis but in the context of a set of predetermined criteria.

3.12 Development or field test – end of

The Hazardous Substances and New Organisms (Genetically Modified Organisms) Amendment Act 2002 introduced a new section into the HSNO Act.

Section 45A(2)(a) and (b) An approval—

- (a) must include controls to ensure that, after the end of the development or field test, the organism and any heritable material from the organism is removed or destroyed; and*
- (b) may include controls to ensure that, after the end of the development or field test and after heritable material is removed or destroyed, some or all of the genetic elements remaining from the organism are removed or destroyed.*

What is meant by “the end of the development or field test?”

Section 45A(2)(a) requires the Authority to set a mandatory control requiring the removal or destruction of heritable material at the end of the development or field test. Section 45A(2)(b) gives discretion to the Authority to set a control to remove or destroy some or all of the genetic elements remaining from the organism. Therefore it is necessary to unambiguously define when the **end point** of such work should be.

Outdoor developments and field tests can have various discrete parts as they may be ongoing over time and may use a number of different physical locations under the one approval. It is important then that the control that is set is explicit about when the end point of that development or field test is and therefore when clean-up of the site is required.

The Authority considers that the term “*end of the development or field test*” should be related to the completion of any part of the research at a particular site rather than only at the expiry of the approval or completion of the full research programme. Therefore any approval should state that the removal or destruction of heritable material and/or genetic elements as the case may be applies at the time when the research activity at a particular site or location is completed.

An example would be where a plant field test is to be undertaken in a number of locations over a number of years under the one ERMA New Zealand approval. In general the approval will specify that the controls would be given effect immediately after the research in one field or site is completed, i.e. the plants have grown and experiments completed, even though other testing stages of the research may be continued in the next season in a different location. In cases where the development or field test is only to be undertaken in one field site over one season then the control may specify a date when the development or field trial ends. If the research requires multiple seasons on the same site then the controls may need to be implemented at the end of each season.

3.13 Eradication and Extinction of New Organisms

Organisms belonging to species that were not present in New Zealand immediately prior to 29 July 1998 are deemed to be new organisms. This includes any organism that belongs to a species, subspecies, infrasubspecies, variety, strain, or cultivar that has been eradicated from New Zealand.

Based on a review of other New Zealand legislation, ERMA New Zealand has concluded that eradication is the result of a deliberate act, or a specified, systematic, funded programme with a stated goal or purpose of eliminating an organism from New Zealand.

ERMA New Zealand has developed the following definitions for extinct organisms –

- “Extinct” means of a species no longer existing or living, which has died out in New Zealand. For the purpose of this discussion extinction is confined to dying out naturally, not deliberately caused by humans. That is, there is a distinction between organisms that have been eradicated and organisms that are extinct.
- All organisms that have been eradicated and organisms that were extinct at 29 July 1998 are new organisms. However, organisms that were present in New Zealand immediately prior to 29 July 1998 but which have become extinct since that time (without deliberate human intervention) are not captured by these definitions, and are not new organisms. These organisms are deemed to be “recently extinct”.

3.14 Fermentation of microorganisms

The HSNO Act 1996 includes “*fermentation of microorganisms that are new organisms*” in its definition of “*develop*”. Therefore, applications for fermentation of microorganisms are dealt with under the procedures to develop new organisms in containment. Fermentation refers to the liquid culturing or ‘bulking up’ of micro-organisms rather than strictly to the anaerobic biochemical process.

Amendments to the HSNO Act in 2003 removed the term “large-scale” from fermentation. This introduced greater flexibility without necessarily capturing all liquid cultures of microorganisms irrespective of the volumes involved (e.g. 5 ml culture of bacteria). The definition of ‘develop’ encompasses 3 separate concepts – genetic modification, regeneration and fermentation. Fermentation is therefore a different activity from genetic modification. As such, any ‘fermentation’ that occurs incidentally to a genetic modification approval (for example as part of creating a gene library) is unlikely to require a separate approval.

New organisms grown in liquid culture in New Zealand should already have either an import approval (if they were developed overseas) or a development approval (if they were developed in New Zealand). An additional approval is not required if the activity being undertaken is already covered by another ERMA approval.

Volumes

As fermentation volumes being handled increase, risk management practice changes. Greater precautions are needed to prevent or contain spills, and hence to prevent unintended release. In many countries including Australia, the United States, OECD and EU countries, a maximum container size of 10 litres is used for fermentations of microorganisms in strictly contained laboratory conditions.

The HSNO Act does not specify volumes in respect of fermentation. However the 10 litre cut-off is a useful indicator as part of overall risk management. Fermentation of over 10 litres for example, is unlikely to be occurring incidentally to genetic modification and so requires a separate approval.

Rapid assessment

Fermentations of organisms that meet the requirements of Category A or B of the HSNO (Low-Risk Genetic Modification) Regulations may be rapidly assessed under section 42 of the HSNO Act and dealt with by Institutional Biological Safety Committees (IBSCs).

Fermentations of new organisms that are “not low-risk” according to the Low-Risk Genetic Modification Regulations, are not eligible for rapid assessment. Such applications must be considered by the Authority and cannot be delegated to IBSCs. Fermentations involving “not-low risk” GMOs may be publicly notified if there is likely to be significant public interest.

3.15 Genetically modified organism

The HSNO Act states that:

‘Genetically modified organism’ means any organism in which any of the genes or other genetic material –

- (a) have been modified by in vitro techniques; or*
- (b) are inherited, or otherwise derived, through any number of replications, from any genes or other genetic material which has been modified by in vitro techniques.’*

This definition includes organisms produced by either intra- or inter-specific gene transfer, and all offspring of these for an unlimited number of generations.

Regulations made under the Act narrow the definition by listing types of organism that are not considered to be genetically modified. Under these regulations, plants regenerated from organs such as tubers and bulbs, or organisms developed through tissue culture techniques are not genetically modified organisms.

Animals produced solely from artificial insemination, superovulation, embryo transfer or embryo splitting are not genetically modified organisms. These techniques are based on normal sexual reproduction.

Some other organisms considered not to be genetically modified are those resulting from random changes in genes (mutations) or random rearrangement of the genetic material. This applies even when the cells are irradiated or treated in other ways known to promote these genetic changes. Similarly, organisms produced by protoplast fusion, where the contents of the cells of two different organisms are physically mixed are not considered to be genetically modified organisms.

3.16 Genetic element

The Hazardous Substances and New Organisms (Genetically Modified Organisms) Amendment Act 2002 introduced a new term into the HSNO Act.

Section 2(1) – “genetic element, in relation to a new organism, means—

- (a) heritable material; and*
- (b) any genes, nucleic acids, or other molecules from the organism that can, without human intervention, replicate in a biological system and transfer a character or trait to another organism or to subsequent generations of the organism”.*

Given suitable circumstances some bacteria can take up genetic elements (any genes, nucleic acids, or other molecules) without human intervention and if these elements confer selective advantage, the bacteria can keep them. The bacteria may then subsequently transfer the elements to their next generation and also to other organisms given opportunities. To provide clarity to this situation the Authority has adopted the following interpretations.

Replicate

A dictionary definition of the term “replicate” is:

“to undergo replication: produce a replica of itself <virus particles replicating in cells>”.

This implies that the gene or sequence or molecule itself has the ability to **copy itself**, rather than it being copied. For example transposable elements, viruses, and plasmids can replicate themselves, while most genes in a chromosome **are replicated or copied**. Similarly, prions produce an effect not by replicating themselves but by changing the conformation of other molecules.

In considering the term “replicate” the Authority has adopted a broad definition that encompasses “can be copied” as well as “copies itself”.

Transfer a character or trait

There is also an important qualification in the new definition – that the genes, nucleic acids or molecules must be able to transfer a character or trait to the organism that acquires it *or to subsequent generations of the organism*. This could exclude transfer of nucleic acids that may produce no phenotypic effect. It is likely that the intent of the definition of genetic material, as opposed to heritable material, was to include any nucleic acid regardless of whether it produced an effect. The effect of such transfer is considered in the evaluation of the application.

Therefore the Authority has determined that all genetic material is to be considered and once this has been done it will then assess whether the genetic element is likely to produce an effect from the transfer of a character or trait to the acquiring organism or subsequent generations.

3.17 Genetic elements - effects from

The Hazardous Substances and New Organisms (Genetically Modified Organisms) Amendment Act 2002 introduced a new section into the HSNO Act.

Section 44A(2) - “In deciding whether to approve or decline an application, the Authority must take into account—

...

(c) any effects resulting from the transfer of any genetic elements to other organisms in or around the site of the development or field test”.

Section 44A(2)(c) is considered to apply to horizontal gene transfer (HGT) as opposed to vertical gene transfer which is addressed in section 45A(2)(a). Applicants will be expected to consider and address in their application the likelihood of HGT and the effects that may arise from it. In other words the impact of the amendment is to make the occurrence and consequence of HGT a matter that must be explicitly considered, irrespective of the likelihood of the occurrence of HGT. Any effects that may arise from HGT will then be considered in the normal course of the consideration process.

3.18 Genetic elements - removal/destruction

The Hazardous Substances and New Organisms (Genetically Modified Organisms) Amendment Act 2002 introduced a new section into the HSNO Act.

*Section 45A(3) In subsection (2), **destroyed** includes leaving genetic elements to break down or become inactive at the site of the development or field test.*

Who makes the decision whether or not to leave genetic elements at the site?

Section 45A(3) provides some further clarification of what the term “*destroyed*” means in relation to heritable material (section 45A(2)(a)) and genetic elements (s.45A (2)(b)). While this section helps interpretation a further question remains about who determines if material should be removed or destroyed from a field test or development site. Because of the quite significant implications of removing material versus destroying material, the Authority will be explicit when specifying the control what option is to be used. This will no doubt vary on a case-by-case basis so no hard and fast rules need apply.

The Authority will explicitly state in its decision what means of site clean up should be employed rather than leaving this discretion to approval holders or enforcement officers.

3.19 Horizontal Gene Transfer and Development of a GMO

Horizontal gene transfer (HGT) is the transfer of genetic material from one organism to another that is outside the context of parent to offspring reproduction. It has been demonstrated to occur widely in natural bacterial populations.

HGT of nucleic acid molecules that have not been created by in vitro manipulation (including of prior generations) is not considered to be the development of a genetically modified organism under the HSNO Act. Organisms modified solely by the movement of these types of nucleic acids using physiological processes are excluded from the definition of a GMO under clause 3(1)(d)(i) of the HSNO (Organisms Not Genetically Modified) Regulations 1998.

HGT of transgenic constructs (i.e. nucleic acid molecules produced using in vitro techniques) may be considered as a development of a GMO if the purpose of the research is to intentionally induce and detect horizontal gene transfer. For example, the manipulation of experimental conditions to induce HGT of transgenes to soil bacteria or the deliberate feeding of GM plant material to experimental organisms in order to investigate HGT. In both of these cases, the purpose of the project involves HGT, the actions taken are to increase the likelihood that HGT will occur and organisms that have acquired the genetic material by HGT will be selected for and isolated. Even if HGT does not eventuate, section 40 of the Act operates at the intention stage (every person intending to develop any new organism), which makes it prudent for a researcher to apply for a development approval.

HGT is a physiological process that can occur independently of human activity. Therefore, other experimental work where new organisms may be incidentally created as part of other research projects will not normally be considered developments if no deliberate action has been taken to induce or increase the likelihood of HGT and there is no intention to detect and select for organisms that have acquired the transgenic material. For example, feeding trials of insects with GM plant material to study toxicity will not require a development approval as there is no deliberate action to create a new organism (or to cause HGT) and isolate organisms that have acquired the genetic material.

3.20 Hybrids

A hybrid is an organism resulting from a cross between genetically different parents. Hybrids can arise from crosses between closely related species (interspecific hybrids) or by crosses between different types (subspecies, varieties, cultivars) within a species (intraspecific hybrids).

Hybridisation occurs naturally, but is also widely used in selective breeding programmes for both plants and animals. The mule is an interspecific hybrid between the horse and the donkey, bred to combine some of the favourable characteristics of each parent. Interspecific hybrids often show ‘hybrid vigour’ (heterosis), growing more vigorously and yielding more than in-bred lines. Most commercial maize crops are hybrids, produced by crossing two in-bred lines. This effect is also exploited in breeding livestock.

Many interspecific hybrids such as the mule cannot produce offspring. Intraspecific hybrids are usually fertile, but will not ‘breed true’. Their offspring will be highly variable, some resembling one parent, some the other, and others showing a whole range of characteristics and combinations between the two. It is possible, however, to multiply some plant hybrids vegetatively – by bulbs, corns, or tubers, or by taking cuttings, budding, grafting or tissue culture. In these cases the new plants produced are clones of the original hybrid, genetically identical to it and to each other.

ERMA New Zealand’s policy is that *intraspecific* hybrids will not be classified as new organisms provided that the species was present in New Zealand before 29 July 1998, unless they are defined as a risk species. This recognises that the characteristics of the hybrid and any offspring are likely to be intermediate between the two parents, apart from increased hybrid vigour in the first generation.

With one exception (see below) *interspecific* hybrids will be classified as new organisms. The hybrid cannot be included in either of the parent species, and therefore must be a new organism. It is also more difficult to predict whether the hybrid will be able to reproduce sexually, what the off-spring will be like, and whether (if it is a plant) it will have the ability to reproduce and spread vigorously.

The one exception to the above is interspecific hybrids for which neither of the parents are new organisms. The fact that both parents are already in New Zealand means that the additional risk is generally less than would otherwise be the case. Furthermore, as the development of these interspecific hybrids may occur within New Zealand outside the scope of the HSNO Act, there is little practical point in regulating their importation.

3.21 Identification of new organisms

The HSNO Act (section 20) requires applications to import, develop, field test, conditionally release, or release a new organism to contain “sufficient description” to uniquely identify the organism. It defines (section 2) identification to mean the provision of any information about an organism which, amongst other things, “clearly identifies the biological nature of the organism” and “specifies the nature and degree or type of hazard intrinsic to the organism”.

The Act (section 27A) provides for approvals to be granted at the most appropriate taxonomic classification. However, the identification of the organism will include as complete a taxonomic classification of the organism as possible, including (where available) its family, genus, species and sub-species etc, the taxonomic authorities and year of publication. This is especially so for those organisms that will be the subject of applications for conditional and full release.

For applications for organisms (particularly GMOs) held in containment (including for outdoor developments or field tests in containment) a full taxonomic description may not be feasible. In these situations the organism can be identified in other ways, for example by describing the host and the modifications to which it has been subjected.

This policy, as applied to specific situations, is discussed in more detail in the sections below.

The identification of hybrids is discussed in more detail in the interpretation of ‘Hybrids’.

Identification of new organisms (including GMO organisms) in applications to release or conditionally release a new organism

For non-GMOs the identification will be as described in the section above. A particular requirement for micro-organisms is identification of any host specificity, whether pathogenic or symbiotic, and where appropriate, any potential to be pathogenic.

For GMOs intended for conditional release or full release this information should, in most cases, include specification of the host organism that has been modified, the vector system (including its components) used to modify the organism, the nature of the modification (eg deletion, insertion, site directed-mutagenesis) and the source of the genetic material (including the taxonomy, source, strain and functional characteristics of the organism donating the genetic material) and function of any genetic sequences inserted into the organism. Where the donor nucleic acid material is a copy gene or has been synthetically produced, the details of the equivalent natural source of the donor material should be provided). However, this may vary on a case-by-case basis.

Particular requirements for GM micro-organisms are the reproductive cycle and capacity for genetic transfer.

For a GMO proposed for full or conditional release, the specific transformation event(s), ie the site(s) in the host organism’s genome where the transgene has been inserted or the host’s genome has been modified, is a key consideration for risk assessment. The specific transformation event can have distinct effects on the biological characteristics of the GMO

depending on whether an endogenous gene function has been disrupted or enhanced by the site of transformation in the genome.

Therefore, for all applications involving the release of a GMO (including qualifying organisms and conditional releases) it will be required that the identification of the organism include the specific transformation event(s) so that each GMO is able to be identified on an event-by-event basis to assist in the assessment of risks on a case-by-case basis.

Identification of new organisms in applications to develop a GMO in containment or to import a GMO into containment, including applications to develop outside of a containment structure or field test a new organism in containment

For applications for developments of low risk GMOs in containment (excluding applications to develop a GMO outside of a containment structure or to field test a GMO), the Act allows for project approvals. Project approvals are discussed in more detail in the interpretation for ‘Project approvals for low-risk genetically modified organisms’.

An application for the importation or development of low-risk GMOs can be considered where the identification of the GMO is described in terms of a specific low-risk host organism or organisms, a range of low-risk vector systems and a specific range of low-risk donor organisms, and where the resulting GMOs will meet the requirements of the HSNO (Low-Risk Genetic Modification) Regulations.

The description of organisms to be imported should be sufficiently detailed to enable a MAF import permit to be issued for their importation, and to demonstrate that they do meet the requirements of a low-risk organism.

Note that the following paragraphs covering ‘generic’ organism descriptions can apply to both low-risk project approvals and other outdoor containment approvals.

A single application covering a variety of GMOs may be acceptable if the boundaries of the range of modifications envisaged are well defined. In identifying the range of modifications, the following parameters will need to be described: the taxonomy of the host organism, the type of vector to be used and a detailed description of the source and function of any donor genetic material, the range of regulatory sequences and (any) selectable markers.

In other cases, the application will be for a gene library, that is, for a host organism eg *E. coli*, of a particular strain containing a variety of plasmids carrying a variety of genes and will invariably be used for multiple purposes. These organisms may be intended to be used in the development of other organisms. In these cases the information provided should include the identity of the organism (eg the specific strain of the micro-organism, including, for example, its characteristics and behaviour), qualified by the range of genetic material contained within it. In the case of gene libraries, microsatellites and diagnostic probes, that contain genetic material that is not expressed, a description of the host organism (eg *Escherichia coli* K12 and B strains), the vector used and the species of origin of the genes will suffice.

In all cases, the information provided for the component parts, namely hosts, vectors and donors, will be sufficiently precise to enable ready determination of whether a specific GMO is covered by the organism description. The description may also exclude certain groups of

hosts, vectors and donors where these exclusions will provide further certainty as to what is or is not covered. ERMA New Zealand can provide suggestions for how to limit the scope of a project to a certain level of risk (Category A and/or B).

Non-low risk GMOs and approvals other than those in a containment structure

GMOs to be imported or developed, including organisms developed outside of a containment structure or organisms being field tested in containment must be clearly and unambiguously identified. Information must be provided that specifies the host organism, the genetic modifications and the phenotypes of the GMOs involved. The specific genetic modifications of the organism to be imported or developed should be described fully in terms of the organism that the nucleic acid was sourced from, the type of vector (eg non-conjugative plasmid vectors or *Agrobacterium* binary vectors), the functional characteristics of the gene constructs, and the range of marker genes and regulatory sequences used. The degree of specification will depend on the inherent characteristics of the organism. More detailed descriptions of the GMO(s) will be required for modifications involving pathogenic microorganisms, toxin-producing organisms or viruses and their gene products. More generic descriptions will be acceptable for groups of GMOs which do not involve pathogenic microorganisms, toxin-producing organisms or viruses and their gene products. In addition, all use of DNA from humans or native species should be explicitly stated so that requirements for Māori consultation can be clearly identified.

As a part of the decision making process, the scope of the organism descriptions may be constrained, that is, constraints over and above those suggested by the applicant may be imposed to provide an acceptable level of risk management. Additional controls may be imposed to require users of the approval to provide specific information to ERMA New Zealand on hosts, vectors and donors for GMOs under that organism description so that verification of compliance with the organism description can be made by ERMA New Zealand.

Applications for broadly specified GMOs are unlikely to be accepted for consideration by the Authority, unless the information provided allows for the reasonable identification and assessment of all of the effects of the organism(s).

Identification of new organisms in applications to import a new organism (not a GMO) into containment

The information required to identify organisms that are not GMOs in an application for importation into containment is, in general, similar to that required for an application for release. **However, there will be cases where the organism has not been classified.** In this case the organism will be identified in such a manner as to clearly define the bounds of what is included and what is not. While this may vary on a case-by-case basis the information should include available information on the type of organism (eg a fungus), the source of the organism (eg geographic location), the nature of any substrate (eg soil) or host material (which may be an organism or from an organism, eg wood), any potentially associated organisms (eg parasites), and any information about the risk presented by the organism based on its behaviour or effects in its usual environment.

3.22 Injection of Recombinant DNA Vaccines into Animals

The injection of vaccines containing naked recombinant DNA into animals requires clarification as to whether the vaccinated animal becomes a genetically modified organism. The Authority has considered this issue in conjunction with the interpretation of genetically modified organism in the Act, and has determined the following:

The injection of naked recombinant DNA vaccines into an animal, where the injected DNA does not replicate in the host, nor incorporate into the host genome, does not create a genetically modified organism as defined in the Act. However, in cases where the injected DNA either replicates in the host, or incorporates into the host genome, the host would be deemed to be a genetically modified organism under the Act.

3.23 Inseparable organism

An inseparable organism is defined in the HSNO Act as ‘any organism which is unable to be separated from any other organism’. In its general sense, ‘to separate’ means to detach, disunite or make a division between two things.

The interpretation of inseparable organism will be influenced by the context of the application. For example, at an individual organism level, two organisms (such as a camel and the foot and mouth virus) might to all intents and purposes be inseparable. However, at a species level these organisms are separable in the sense that it is possible to have camels without the foot and mouth virus.

The practical significance of this concept lies in the precise nature of the interface between the HSNO Act and the Biosecurity Act. In this regard, the Authority will consider the extent to which risks associate with inseparable organisms can be managed independently under the Biosecurity Act.

For those ‘inseparables’ that will be managed independently under the Biosecurity Act (such as the foot and mouth virus in the example above) the Authority will not seek to duplicate Biosecurity Act functions but focus on the risks, costs and benefits associated with the organism that is the primary subject of the application (i.e. the camel). If independent management under the Biosecurity Act is not possible, the Authority will focus on all the risks, costs and benefits including those associated with the ‘inseparables’.

3.24 Low-risk genetic modification

The HSNO (Low-Risk Genetic Modification) Regulations specify the circumstances in which the genetic modification of an organism is considered low risk. Any genetic modification that clearly conforms to the circumstances set out in Category A or B, but not the Schedule to the Regulations is considered low risk. ‘Low-Risk’ GMOs are organisms that are seen as presenting minimal risks to both people and to the environment.

Typical examples of low-risk modifications performed within a containment structure include the expression of non-conjugative vectors containing human genes in non-pathogenic strains *Escherichia coli* such as strain K12 or B derivatives or *Saccharomyces cerevisiae* (Category A); production of knockout mice (Category B); or production of transgenic plants by *Agrobacterium*-mediated transformation with binary vectors containing genes that alter plant flowering (Category B).

Not low-risk (formerly Category C) modifications such as the expression of vertebrate toxin genes, virulence or pathogenic determinants, viruses that infect human cells expressing regulators of mammalian cell growth, production of infectious viral particles or transfer of viral genomes from microorganisms able to cause disease in humans, plants or animals, are **not** low-risk genetic modifications and hence cannot be delegated to IBSCs.

All applications to import or develop GMOs that are not low risk must be referred to ERMA New Zealand.

For low-risk genetic modification applications the risk assessment requirement of the approval process will reflect the low-risk nature of the GMOs and their containment regime. Many of the risks identified for low-risk genetic modifications will be negligible¹⁰ because the host organisms modified or the nature of their genetic modifications are well characterised and documented by decades of research and the organisms will be contained in either PC1 or PC2 level laboratories. For example, genetically modified *Escherichia coli*, *Saccharomyces cerevisiae*, plant and animal cell lines, *Arabidopsis thaliana* and mice have a record for being used safely in research within laboratory containment. In these types of situations a comprehensive risk assessment is unnecessary.

However, modifications involving viruses, poorly characterised and/or pathogenic host organisms or genetic modifications involving nucleic acids derived from pathogenic microorganisms will require further analysis in order to ensure that the GMO is clearly within the confines of a low-risk modification.

In the case of imports of GMOs, the GMO has already been developed, and therefore the details of the genetic modification and the phenotype of the GMO are characterised. This means that the nature and effect of such modifications on the organisms will be largely predictable prior to their importation. Therefore, there will be considerably less uncertainty associated with GMO imports than that associated with GMO developments.

¹⁰ Negligible risks in the “ERMA New Zealand Annotated Methodology 1998” are defined as risks which are of such little significance in terms of their likelihood and effect that they do not require active management and/or after the application of risk management can be justified by very small levels of benefits.

The field-testing and outdoor containment of GMOs are not considered low-risk activities under the regulations, as these activities are not carried out and contained within a containment structure.

3.25 Native, endemic, introduced, and valued introduced organisms

Section 6(a) of the HSNO Act refers to “native and valued introduced flora and fauna” and section 36(a) refers to “native species”, however neither of the terms *native* or *valued introduced* is defined in the Act.

Definitions of *native*, in the context of organisms, are variously ‘originating naturally’ ‘belonging naturally’ or ‘naturally occurring’ with respect to a particular region or place’. The term *native* is inclusive of the terms ‘indigenous’ and ‘endemic’, which are defined either as being synonymous with *native* or as more restrictive concepts¹¹. An organism that is *endemic* to New Zealand is one that does not occur naturally anywhere else, for example the kiwi.

A *native* organism is thus deemed to be one that lives or grows naturally (i.e., unassisted) in a particular region. *Native* organisms have an established population and breed in a region, however they are not necessarily unique to that region. Organisms that are *native* to New Zealand include organisms that have originated in New Zealand or were present at the time of the first human occupation. A clear example of a native organism is the kiwi, which meets both of those criteria. An example of an organism that is *native* to both Australia and New Zealand is the silvereye (*Zosterops lateralis*).

Introduced organisms are organisms that have been brought into New Zealand by humans, or that have self-introduced since the first human occupation. The term *introduced* includes ‘exotic’ and ‘naturalised’ organisms.

Examples of *introduced* organisms include the kumara, Radiata pine, possums and rabbits (brought by humans), and the spur-winged plover (self-introduced).

Therefore organisms that are present in New Zealand can be separated into two broad groups, *native* and *introduced* organisms, that is, they can either be *native* or *introduced*, but cannot be both. *Endemic* organisms are then a subset of *native*.

Valued introduced flora and fauna are a subset of introduced flora and fauna. Species may be valued for symbolic, spiritual and utilitarian values, and particular plants and animals may be valued for aesthetic, symbolic, economic or historic reasons.

¹¹ Note that there is some variation between dictionary definitions.

3.26 Present in New Zealand

This note provides guidance on interpreting the circumstances when an organism can be regarded as being present in New Zealand for the purpose of making section 26 determinations and the nature of the evidence required.

The Authority will adopt the following approaches:

For the purposes of making section 26 determinations an organism is considered to be present in New Zealand if it can be established that the organism was permanently existing in New Zealand, and was not present solely by way of being contained in a recognised safekeeping facility, immediately prior to 29 July 1998.

The key phrases are “permanently existing”, “recognised safekeeping facility” and “immediately”.

Permanently existing means that the organism is either in New Zealand all year round, irrespective of whether it is at large in the uncontrolled environment or held in an unofficial controlled environment (see definition below). Therefore transient organisms (for example migratory¹², adventive, vagrant, and visitor species), which do not become established or are not permanently in New Zealand all the year round, are all considered to be new organisms for the purposes of HSNO, as are organisms that have been eradicated.

While this interpretation is effective for species such as butterflies, birds and marine snakes, it is not possible, without continuous sampling, to determine whether or not small and elusive species including microorganisms are present all year round. In the case of the small and elusive species including microorganisms a valid record is sufficient to determine that these organisms are permanently existing and thus present in New Zealand.

Immediate, as in immediately prior to 29 July 1998 is taken to mean that there is evidence that the organism existed in contemporary time, i.e. within a time period during which extinction (see note on Eradication and Extinction of New Organisms) would have been very unlikely to have occurred, without evidence to the contrary. Thus, if there is evidence of an organism existing within a time span prior to 1998 significantly less than the normal life span or viability period (for example of spores or cysts) of the organism, that would be taken as sufficient evidence of being in New Zealand immediately before 29 July 1998.

Recognised safekeeping facility is the term used to capture all the pre-HSNO official (mainly CRI) facilities where organisms were deliberately held for reference or safekeeping purposes. This includes a range of registered microorganism, fungi, seed and herbarium containment facilities. These facilities for the most part are now approved containment facilities for the purposes of the HSNO Act and the organisms held in them are approved new organisms in containment. A recognised safekeeping facility does not include unofficial but controlled environments such as glasshouses, aquariums, butterfly houses, bird cages, hothouse plants, and seeds in short-term storage etc, where the purpose was simply to keep the organism. All organisms held in these types of unofficial controlled environments prior to

¹² Excludes organisms that migrate between a breeding area and a feeding area either annually or for some other time period where one of these areas is outside of New Zealand”.

29 July 1998 are regarded as being present in New Zealand and are not new organisms unless their original import was contrary to the Animals Act or Plants Act.

Evidence in support of the presence of an organism in New Zealand includes import documentation, sales or exhibition catalogues, signed (preferably witnessed) statements from persons in possession of the species, statements from authoritative experts, or published books and scientific papers.

3.27 Prohibited organisms and their cell lines

The importation, release or development of any organism specified in the Second Schedule to this Act is prohibited (section 50 of the HSNO Act).

The Second schedule does not however prohibit cell lines from prohibited organisms¹³. Consequently, cell lines from prohibited organisms may be considered for importation, release or development.

However, in considering any applications for cell lines from organisms listed in the Second Schedule, the Authority will take into account the characteristics and behaviour that have resulted in the parent organism being declared prohibited, and the risk of a prohibited organism being developed from cell lines from that organism.

¹³ The HSNO Act defines an “Organism” as including “a genetic structure, ... capable of replicating itself, whether that structure comprises all or only part of an entity, and whether it comprises all or only part of the genetic structure of an entity”. This definition means that cell lines from organisms are organisms under the Act in their own right. Consequently restrictions on organisms listed in the Second Schedule do not flow through to cell lines from those organisms.

3.28 Project approvals for low-risk genetically modified organisms

The Act (section 42A) provides for applications to develop low-risk genetically modified organisms (GMOs) within a containment structure to be assessed on a project rather than an organism basis.

The aim of this section is to streamline the approval process for low-risk genetic modification research and to improve flexibility in approvals.

A project can be defined as “a programme of work with defined objectives involving genetic modifications or GMOs, which is carried out within a containment structure, comprises the use of defined ranges of host organisms, vectors and donor material, and providing a sufficient description of the GMOs which will be produced to confirm that they conform with any prescribed constraints imposed on project approvals”.

A project description must contain sufficient information to provide positive confirmation that the proposed development will conform to the Low-Risk Regulations.

The project based work is made up of three key components, the nature of the project, identification of the host organisms, and range of proposed genetic modifications which are further discussed below.

Nature of the project

The project description represents a particular line of scientific inquiry or programme of work (such as development of GMOs for commercial purposes) and is closely related to (and will include) the purpose statement that describes why the GMOs are being developed.

Identification of new organisms

Requirements for the identification of new organism are covered in the interpretation ‘Identification of New Organisms’.

3.29 Public display purpose (New Organisms)

Section 39(1) of the HSNO Act states that:

The Authority may approve the importation, development, or field-testing of any new organism into containment for the following purposes:

...
 (e) *The public display of any organisms including, but not limited to, display in a circus or zoological garden:*

The Concise Oxford Dictionary defines the adjective ‘public¹⁴’ as “of, or concerning the people as a whole, open or shared by all the people, and done or existing openly”. ‘Display¹⁵’ is defined as the act of displaying, an exhibition or show, or thing or things intended to be looked at.

Display refers to exhibiting or showing an object in such a way that it can be looked at, thus introducing the purpose of the activity (to display), implying that the object should be available to be seen or viewed¹⁶ by people in an open and inclusive sense.

Section 39(1)(e) refers explicitly to circuses and zoos as examples of public display. In many cases (though not necessarily) these are likely to charge a fee for viewing. Public display in this context does not therefore mean that the ‘object’ is to be available to be viewed free of charge, or extrapolating from that, in an unrestricted manner. Similarly, a circus or zoo will usually have set hours or performance times as well as a fee that will also limit access.

While the level of fee charged, or the hours of opening may act as a rationing mechanism to reduce the number of people able to view the object, common sense, reasonableness and the aspect of purpose associated with display dictate that it should not be such that it severely limits the number of people able to view the object.

There is a commonly accepted notion of a ‘public place’. Consideration of the characteristics that most people would attribute to a public place are such that it can be described as a physical area, to which the public has some rights of access, through public ownership. Examples of areas that are public places through ownership are civic centres, botanical gardens, national and regional parks, and municipal zoos. However, public display is not restricted to public areas, since there are many examples of facilities such as zoos, art galleries, farm parks and gardens that are privately owned, but where objects are available for public viewing during specific times.

From this discussion it is proposed that the following criteria of purpose and accessibility be used to define public display.

For an organism to meet these criteria, its object should be;

- presented for the purpose of viewing; and

¹⁴ **Public** (Adj & Noun) **1** of or concerning the people as a whole. **2** open or shared by all the people, **3** done or existing openly.....

¹⁵ **Display** n. **1** the act or an instance of displaying. **2** an exhibition or show. (b) a thing or things intended to be looked at. **3** ostentation; flashiness. **4** the distinct behaviour of some birds and fish, esp. used to attract a mate.

¹⁶ In some particular circumstances ‘display’ may include the concept of ‘touching’.

- accessible to a wide cross-section of the community (under ‘reasonable’ conditions, which do not preclude rationing devices such as entry fees and time restrictions¹⁷).

Public display does not imply that the object is displayed in a public place – only that it is available to the public.

Given this interpretation of “public display”, there are a number of circumstances where an application would not be considered acceptable under the purpose of public display.

Some examples are applications to import –

- an animal (such as a monkey) to be kept as a pet in a private home – while it might be argued that the animal meets the accessibility criterion (at a stretch) in that it is physically available to the public (if it were known), it does not meet the purpose criterion;
- an organism (e.g. a specialist plant collection) to be located in an area where there is no reasonable public access (such as restricted entry laboratory) – in this case the purpose criterion might be met but the accessibility one is not;
- an aquarium of exotic tropical fish to be kept in a private home that would be open to the public for two days a year – this example clearly fails the criteria on grounds of lack of reasonable access, but does not address the issue of how many days would be considered ‘reasonable’.

A more complex example might be an application to import camels. If the purpose of the application were to keep camels for people to view (and there was reasonable public access, such as in a zoo or botanical gardens), then this would meet the criteria for public display, and an application could be lodged under s39(1)(e). However, if the purpose of keeping the camels was for people to ride the camels, then this would not meet the purpose criterion of ‘public display’ and an application could not be lodged under s39(1)(e).

Notwithstanding these criteria it is accepted that in some cases there may be restricted public access to some animals, for example, very young animals in a zoo may not be on display, and there may be restricted access to animals that are part of breeding programmes. These restrictions will usually be for a fixed (notified) time period.

Containment

Under the provisions of the HSNO Act, a new organism must either be kept in containment, or approved for release.

Section 39(1) refers to the “*importation, development, or field testing of any new organism into containment*”. Thus, an application for a new organism under section 39(1)(e) must also meet appropriate containment criteria.

Using animals as an example, previously MAF has adopted the perspective that new organisms kept as pets needed to be kept in a zoo. This means that in order for a new

¹⁷ The concept of ‘reasonable conditions’ is open to interpretation, and may require bounds to be placed on it. These bounds can be derived using common sense and exploring examples.

organism to be kept in a home as a pet, that home must have been registered as a containment facility under the MAF/ERMA Standard ‘Containment Facilities for Zoo Animals’.

A new organism in containment must be kept in an approved containment facility. In some cases the organisms may be taken out of the approved facility, for example, for an animal to receive veterinary treatment. Special conditions will apply to this circumstance and the organism is deemed to remain in containment. Similarly animals in circuses (also covered by the Zoological Gardens Regulations) may move from one physical location to another. In this case the containment facility is considered to be a moveable facility.

Containment is not necessarily a fixed physical location, but is defined by the structural and non-structural controls that are placed on the containment of organism. Controls apply to the organism rather than the facility. Facilities may be registered according to particular Standards (joint ERMA and MAF) that are used to define a level of containment suitable for particular types of organisms. An ERMA approval will specify particular controls based on the nature of the organism, which may include being confined to a facility registered to a particular Standard.

In summary, section 39 of the HSNO Act refers to the “*Importation or development of new organisms in containment*” and defines the purposes for which the Authority may approve a new organism in containment. This includes (s39(1)(e)) “*The public display of any organism including, but not limited to, display in a circus or zoological garden.*”

Grey areas

‘Grey’ areas exist. Consider an application under s39(1)(e) for the importation of an animal to be part of a travelling circus. The application also asks for approval for the animal to live as a pet with members of the circus.

The two criteria for public display outlined above are purpose and access. For the animal to meet these criteria, it would need to be shown that it was an active member of the circus, and that the primary purpose of the importation was for its ability to contribute to the circus. If this were demonstrated, then the Authority might give an approval subject to specific containment provisions.

If this same animal grows old and is no longer able to perform (i.e. it is now solely a pet), neither the purpose nor the accessibility criteria are met, the animal would not be ‘approved’ under the original approval and would need to gain approval under different criteria (e.g., transferred to a zoo, or a research programme).

3.30 Qualifying Organisms

The Act (sections 38I, J, K and L) provide for the rapid assessment of a qualifying organism that is to be released as a medicine or veterinary medicine. It also provides for rapid assessments to be delegated to the Chief Executives of ERMA New Zealand, the Ministry of Health (in the case of a medicine) and the New Zealand Food Safety Authority (in the case of a veterinary medicine).

Highly improbable and significant

Section 38I(3) uses the terms “highly improbable” and “significant” as threshold descriptors for deciding on whether or not an organism can be rapidly assessed and released as a qualifying organism. These descriptors are best interpreted in accordance with the HSNO Methodology Order risk assessment framework. In this context the term “highly improbable” is concerned with the likelihood of risk and “significant” the magnitude. Together the two concepts provide the commonly accepted definition of risk.

Qualitative descriptors for different levels of likelihood and magnitude of consequence have been developed (see Technical Guide: Decision Making). In terms of likelihood seven categories ranging from “highly improbable” through to “extremely likely” are recognised. The term “highly improbable” is described as: *“Almost certainly not occurring but cannot be totally ruled out.”*

“Highly improbable” represents the most remote or unlikely scenario in the range of descriptive criteria (see Technical Guide: Decision Making). The situation where an event may be described as “not occurring ever” may be theoretically possible but is considered to be unrealistic and inappropriate in the real life situations. An example of a situation where the dose and route of administration of a qualifying organism is “highly improbable” to cause an adverse effect is the intramuscular injection of a vaccine that is imported and distributed in sealed single dose ampoules.

An example of a situation where it may not be “highly improbable” that the dose and route of administration of a qualifying organism will cause an adverse effect is the oral dosing of animals using a veterinary medicine containing an organism that will survive passage through and be excreted from the animal into the environment. In this situation because the “highly improbable” test could not be met, further assessment of the effects of the organism would be required. Therefore, depending on the controls that might be applied, the medicine may not be suitable for rapid assessment under the provisions of section 38I.

In terms of magnitude the qualitative descriptors range from “minimal” through to “massive” (see Technical Guide: Decision Making). Using these descriptors a “significant adverse effect” on the matters set out in section 38I(3)(a)(ii) and (b)(ii-iv) means any effect on valued species that is: *“Measurable long term damage to local plant and animal communities, ... medium term individual ecosystem damage.”*

Effects that are more severe than these obviously are also regarded as “significant”. Key aspects for deciding on whether the qualifying organism will cause significant adverse effects to valued species should consider both short and long term issues.

In regard to long term issues, aspects that should be considered are firstly whether the organism can establish a self-sustaining population and secondly, if it is self-sustaining the extent to which this population affects the ecosystem in which it establishes. For this to be determined the applicant will need to provide sufficient relevant information on the biological characteristics of the organisms.

For short term issues the key aspects to be considered are the biological hazards (such as pathogenicity, virulence, or predator characteristics) and the pathways by which local ecosystems may be exposed. Where the organism possesses biological characteristics that may adversely affect local ecosystems (for example pathogenic infection of fish) then the likelihood (see above) that the proposed dose and route of administration will lead to fish being exposed to the qualifying organism needs to be considered.

Section 38I(4)(b) also indicates that while adverse effects to target individuals or organisms are excluded, effects on non-target animals would be included in this assessment.

A “significant adverse effect” on public health set out in section 38I(3)(a)(i) and (b)(i) is interpreted as meaning: *“Minor irreversible adverse health effects to individuals and/or reversible medium term adverse effects to a larger (but surrounding) community (requiring hospitalisation).”*

Effects that are more severe than these obviously are also regarded as “significant”. Key aspects for determining these effects will be obtained from information on the toxicity and pathogenicity of the organism to humans. This information will cover aspects such as biological activity, stability and bioavailability, dose range for toxicity, host range, target tissues and organs, virulence, infectivity, and the nature of any side effects in humans.

An example of a medicine that may be considered not to cause significant adverse effects on public health is the cholera vaccine Orochol®. This vaccine contains the viable bacterial strain, *Vibrio cholerae* CVD 103-HgR which is genetically modified so that it can't produce the cholera toxin. This organism may be considered low-risk because it cannot cause disease and is not harmful to people who may be accidentally exposed to the vaccine based on data from clinical trials. In addition, the likelihood of the GM bacteria regaining the ability to produce the cholera toxin via gene transfer from toxin-producing bacteria present in the environment is improbable. If this particular hazard were to be realized, it would not pose any risks additional to those posed by cholera-toxin producing bacteria already present in the environment.

An example of a medicine that may be considered to potentially cause significant adverse effects on public health is the smallpox vaccine. This vaccine is not genetically modified and contains the live vaccinia virus which is infectious, able to spread within the body of the vaccinated person and to other non-vaccinated people (inadvertent inoculation) within the community and may cause severe complications in some people to whom the virus has spread eg people with weakened immune systems (ie HIV positive, transplant recipient or cancer patients), skin conditions (eg eczema or atopic dermatitis), or heart conditions. It is known that these effects can occur as potentially life-threatening reactions to the small pox vaccine have been observed in 14-52 out of every 1 million people vaccinated for the first time in the past.

Relevant Controls

Section 38I(3) states “*The Authority...may determine that a qualifying organism is or is contained in a qualifying medicine or a qualifying veterinary medicine only if satisfied that, taking into account all the controls that will be imposed (if any)...*”

With respect to medicines the key factors which influence the environmental and public health risks they pose are the dose and routes of administration. For both human medicines and veterinary medicines, these factors can be controlled by the requirements of the principal legislation regulating these products, ie the Medicines Act 1981, and the Agricultural Compounds and Veterinary Medicines (ACVM) Act, 1997.

Medicines cannot be legally used without an appropriate regulatory approval and such approvals will have mandatory controls imposed to regulate their use. Therefore the impact of these use related controls when considering the risk of the organism to the environment and public health should be considered medicine when making decisions under sections 38I(3)(a) and (b).

HSNO Act Controls

The key factor influencing risks to the environment and public health of an organism that is, or is contained, in a medicine, is how the medicine is to be used, ie the route of administration and dose. These factors will initially be managed by controls set under the Medicines or ACVM Acts (see *Relevant Controls* above) but unless a HSNO Act control is placed on the approval, there will be no mechanism for reassessing or reviewing the environmental or public health risks of the organism if the use controls of the qualifying organism are changed under these other pieces of legislation. This is because under the HSNO Act, the organism becomes an unregulated organism if no controls are placed on the approval ie it is an uncontrolled release.

As neither the Medicines nor the ACVM Act consider environmental or public health effects of medicines in the process of approval, it is necessary to assure that such risks are adequately managed through-out the lifecycle of the organism including when any change in use of the medicine is contemplated.

To provide this assurance a control relating to the methods of administering the qualifying medicine or qualifying veterinary medicine will be imposed. Such a control will have a review provision included pursuant to section 38L(1)(b) of the HSNO Act.

Controls relating to the storage and disposal of the qualifying organism will also be set. There are two important lifecycle components where wider effects to the environment and public health may not be adequately covered by a normal Medicines or ACVM Acts approval. As the setting of such controls is discretionary in section 38K(2) the default position is that they will be set unless information is provided as to why they are not necessary.

3.31 Regeneration of new organisms

Regeneration of new organisms (including GMOs) from regenerative cells or tissues (i.e. "cloning" such as nuclear transfer) is regulated as a development by the HSNO Act. Regenerative tissue is "biological material of the organism that cannot, without human intervention, be used to reproduce the organism". Vegetative propagation of plant material and natural regeneration of species are not considered new organisms or developments under this amendment. The cloning of humans and other human reproductive technologies is addressed separately in proposed human assisted reproductive technology legislation.

Approval for the development of a new organism from regenerative tissue may be delegated to IBSCs or the Chief Executive of ERMA New Zealand provided the development satisfies the criteria for rapid assessment. If a proposed development (or import) does not satisfy the low-risk GMO criteria (thus, is ineligible for rapid assessment), an application under section 40 of the HSNO Act 1996 must be made to Authority, who will consider the application as set down in section 45 of the HSNO Act.

3.32 Ribonucleic Acid (RNA) Interference Technology and Development of a GMO, Use of

RNA interference (RNAi) is a process whereby RNA molecules suppress or knockdown the expression of specific genes at the post-transcriptional level by interfering with the function of messenger RNA (mRNA). These molecules may include antisense RNA, short interfering RNAs (siRNAs), short hairpin RNAs (shRNAs), micro-RNAs and double stranded RNA (dsRNA). RNAi was first observed in natural plant defence systems against viral pathogens where the mechanism was described as post-transcriptional gene silencing (PTGS). Consequently, the molecules listed above are types of nucleic acids used by researchers to induce gene silencing. The following indicates when the use of these molecules for RNAi would require consideration under the HSNO Act.

siRNA, antisense RNA, shRNA, micro-RNAs and dsRNA molecules that have been produced and purified are not genetic material **but** they can affect gene expression by interfering with the function of mRNA. These oligonucleotides may be products of a GMO or they may be synthesised chemically or by *in vitro*¹⁸ transcription. Treatment of organisms with these molecules affects protein expression in the cell but not by modifying the organism's genome. The use of RNAi technology is therefore not considered to be the development of a genetically modified organism under the HSNO Act as the genes of the host organism are not modified, although, it is acknowledged that the pattern of gene expression in the host is modified.

The introduction of recombinant DNA molecules or plasmids into organisms for the purpose of expressing RNAi molecules is considered to be the development of a genetically modified organism under the HSNO Act. This is because the activity of introducing a DNA molecule modified by *in vitro* techniques into a cell means that the resulting organism is genetically modified¹⁹.

¹⁸ i.e. synthesised in a cell-free system

¹⁹ See also "Genetically Modified Organism" for a further explanation of the definition of genetically modified organism in the HSNO Act and "Genetic Element" for an explanation of genetic material.

3.33 Risk species

The HSNO Act defines ‘risk species’ as:

‘... any species, subspecies, infrasubspecies, variety, strain or cultivar prescribed as a risk species under section 140 ...’

Section 140(1)(h) enables regulations that prescribe-

- (i). *Any species as a risk species where any subspecies, infrasubspecies, variety, strain, or cultivar of that species may have adverse effects on the health and safety of people or the environment; or*
- (ii). *Any subspecies, infrasubspecies, variety, strain, or cultivar as a risk species where that subspecies, infrasubspecies, variety, strain, or cultivar may have adverse effects on the health and safety of people or the environment.*

The definition of risk species provides for situations where a species is already present. For example, all members of the species are not new organisms, regardless of whether all those members are present or not in New Zealand, but subspecies, etc, may have special characteristics which make them undesirable.

3.34 Time Limits for New Organisms Approvals

This interpretation relates to conditional release approvals, approvals for release of qualifying organisms, approvals for field tests, and approvals for activities in a containment structure or an outdoor containment facility. Approvals for release of a new organism do not have controls and therefore time limits cannot be imposed. However, the Act (section 38(3)) provides for approvals to lapse if they are not taken up.

The Act (section 38E) provides for approvals for conditional release of new organisms to be terminated. The Act does not specify a requirement for time limits on approvals for qualifying organisms, for activities in a containment facility²⁰, or for field tests. It is, however, logical and appropriate that a time limit to such approvals should be considered. The reason for setting time limits will be, in most cases, to manage identified risks.

Some containment approvals are for activities related to long term research where the imposition of a time limit would not serve any useful purpose or be required as it would not lead to improved management of risk.

For consistency in circumstances where the Act does not require specific consideration of time limits for new organisms, there should be explicit case-by-case consideration of whether or not a time limit is required. While in most cases the reason for setting a time limit will be to manage identified and assessed risks, there may be circumstances where a time limit may be considered desirable, for example, where the purpose of the application is for a logically time limited activity.

Qualifying organisms, as a special case of conditional release, may be considered for a time limiting control if it is appropriate or necessary using section 38E as guidance. Also see the interpretation 'Conditional Release of New Organisms'.

For approvals for activities in a containment facility, and for field tests, the issue of time limits will be considered in the Evaluation and Review Report on a case-by-case basis.

²⁰ Containment facilities include indoor and outdoor containment.

3.35 Venomous animal (spiders)

Schedule 2 prohibits new organisms that are venomous reptiles, venomous amphibians, venomous fish, or venomous invertebrates. It defines ‘venomous’ to mean ‘capable of inflicting poisonous wounds harmful to human health’.

In the case of spiders, ERMA New Zealand has interpreted this to mean spiders of the eight genera²¹, listed below, known to contain species that are dangerous/medically important to humans and therefore are covered by the prohibition of the Schedule 2 of the HSNO Act. However, exceptions will be made where experimental evidence can be produced to show that a desired species in a prohibited genus is not ‘capable of inflicting poisonous wounds harmful to human health’.

Families containing poisonous species	Genera containing poisonous species
Agelenidae	<i>Tegenaria</i> (hobo spiders)
Araneidae	<i>Latrodectus</i> (widows)
Clubionidae	<i>Cheiracanthium</i> (sac spiders)
Ctenidae	<i>Phoneutria</i> (banana spiders)
Hexathelidae	<i>Atrax</i> , <i>Hadronyche</i> (Australian funnel-webs)
Sicariidae	<i>Loxosceles</i> (violin, fiddleback or recluse spiders)
Theridiidae	<i>Steatoda</i> (false widows)

This policy does not address any other groups of potentially venomous new organisms which will be dealt on a case by case basis.

²¹ Vetter, R S, Visscher, PK 1998. Bites and stings of medically important venomous arthropods. *International Journal of Dermatology* 37:481-496.

3.36 Viable Material

Viable material is biological material that can be resuscitated to grow into tissues or organisms. It can be defined to mean biological material capable of growth even though resuscitation procedures may be required, for example when organisms or parts thereof are sublethally damaged by being frozen, dried, heated or affected by chemicals.

4 Hazardous Substances

4.1 Hazardous substance

The HSNO Act gives definitions (Section 2) for both ‘substance’ and ‘hazardous substance’. The definition of substance is very broad and provides considerable flexibility as to what exactly the subject of an application might be. For example:

- (a) A substance may be given a very narrow definition, with a precise description of its components.
- (b) A substance may have a broad definition where there is a range of possible compositions of the components.
- (c) A substance may have a narrow definition (or be essentially a single component) but may vary in the nature and level of impurities.
- (d) A substance may also be a combination of defined mixtures of compounds. The definition could include the hazardous substance in its pure form as well as its use forms where these are able to be defined.

In general, the Authority will leave the definition of the subject of the application to the applicant in the first instance.

However, if the applicant chooses to seek approval for a very broadly defined substance (including for example a range of different forms or concentrations) to the extent that the substance spans more than one hazard classification level, the Authority will determine whether it is practical to manage the different possible manifestations of that substance under different control regimes. If it is not, the controls attached will be those required to manage the substance in the most hazardous manifestation allowed by the definition used.

4.2 Containment

Containment approvals for hazardous substances are covered by sections 30 to 32 and Schedule 3 of the HSNO Act. These cover:

- acceptable purposes, or the purposes for which a containment approval can be sought (Section 30) , and
- the provision of adequate containment

Most hazardous substances approved for general release will have conditions attached, in the form of packaging, labelling, and use requirements. These conditions do not constitute containment since the substance will not be constrained to any particular physical location.

Section 33 provides an exemption for small scale uses of hazardous substances²².

Acceptable purposes for which containment approval can be sought

Section 30 of the Act states that acceptable purposes for a hazardous substance in containment are:

- use of small amounts as an analytical standard where approval to import or manufacture that substance has been declined (Section 30(a))
- research aimed at preparing assessments to be used in making an application under any section of Part V of the Act (Section 30(b))
- research and development on any hazardous substance (Section 30(ba))
- use in an emergency (Section 30(c))
- use in such other purposes as the Authority thinks fit (Section 30(d)).

An example of an acceptable purpose under Section 30(a) would be the use of polychlorinated biphenyl (PCB) standards in testing laboratories while PCBs are prohibited substances (retained provision from the Toxic Substances Regulations 1983).

Examples of acceptable purposes pursuant to Section 30(b) include:

- further characterisation of the substance (including its formulations)
- testing for the effects of the substance (both positive and negative)
- evaluating different methods of managing risks
- evaluating methods and options for disposal of the substance.

Note that this ‘purpose’ is to do with preparing assessments to do with a substance, i.e. by implication it applies to a specific substance, however the applicant might wish to define the substance.

²² See also ‘Small scale uses (exemptions for hazardous substances)’.

Examples of acceptable purposes pursuant to Section 30(ba) include:

- research and development other than in circumstances that conform with the exemption provided by s33
- field tests of chemicals, especially agrichemicals
- product development

An example of an acceptable purpose for Section 30(c) would be an application to import a hazardous substance into containment in readiness for use in the case of an oil spill, in which case a further application to release that substance from containment would be required in the event of an emergency.

Section 30(d) also provides for applications to be made for such other purposes as the Authority thinks fit. The Authority will interpret the provision to include any purpose with the following characteristics:

- the purpose for which the substance is to be used is inherently consistent with the application of containment i.e. it would be inconsistent with the purpose for the substance to be released out of a contained situation, and/or
- the use of the substance for the purpose is time limited, and all quantities of the substance will after that period of time be either destroyed or held in secure containment until an application for release is approved.

Even if the purpose is accepted, the application must still satisfy the Authority that the substance can be adequately contained (section 32 (1)).

Activities, which meet the interpretation of purpose set out above, might include:

- the development of alternative formulations to test properties and evaluate costs
- the distribution of test quantities of a new product to selected users to confirm market acceptability.

The interpretation set out above may preclude the use of a containment approval in some situations where containment might otherwise seem applicable. In particular an application for **release** would usually be required in both the following cases:

- Where a hazardous substance is imported for the purpose of making another substance (or a formulation) for immediate re-export²³. This is irrespective of the degree to which the imported substance is kept contained during the process of import/manufacture/export.
- Where a hazardous substance is imported purely for the purpose of manufacturing another substance and is not released in the imported form²⁴. (note, however, that if the product which is released is a mixture containing the imported material as a constituent it may be possible to include both substances in one approval by ‘broad-banding’ the specification of the substance).

²³ Note, this would also fall outside the scope of a transshipment approval – as it involves a process over and above simply importing and exporting.

²⁴ The manufactured substance may itself be hazardous or non-hazardous.

Provision of adequate containment

In considering an application for a hazardous substance in containment, the Authority must be satisfied that the substance can be adequately contained (Section 32(1)). The Authority may set controls to provide for each of the matters specified in the 3rd Schedule to the Act (Section 32(2)). This means that the issue of the adequacy of containment cannot be separated from the matters that may be subject to controls.

The interpretation of the Authority is that the containment situation must be one which lends itself to consideration of the matters listed in the 3rd Schedule, rather than (in a more narrow sense) those matters defining necessary attributes of the containment (or facility) itself.

An example:

The 3rd Schedule refers to the requirements for treatment to prevent escape by way of expelled air. This does not mean that the facility must have a contained atmosphere (from which air might be expelled). It does mean that the possibility of air-borne escape of the substance must be considered, and controls able to be instituted which will reduce risks arising from that to an acceptable level. If the substance is not volatile and it is in solid form, i.e. no dusting, then there may be no need for any controls in this respect.

If the substance is in dust or aerosol form and is capable of being entrained in and transported by air, then it may be sufficient for there to be sufficient distance to the boundary of the facility so that concentrations may fall to a level which poses negligible risks.

If, on the other hand, the substance poses substantial risks, even in very low concentrations, the facility may need to be fully enclosed with equipment for cleaning all expelled air.

In some cases, the 'facility' required for containment will be in the form of a structure that provides physical containment. Guidance in these situations may come from Health and Safety in Employment Act requirements (e.g. *Code of Practice on the Management of Substances Hazardous to Health*), Resource Management Act consent conditions, Building Code requirements, guides such as ISO Guide 25, and standards (eg *AS/NZS 2243 Safety in Laboratories, ISO 9002*).

In other cases, an adequate facility may have boundaries that are non-structural, an example being field trials on pesticides and other similar chemicals. An application to spray a chemical in a secure location (or one of a number of possible pre-determined locations) approved by the Authority (based on requirements as specified in the 3rd Schedule) is an example of an application for use in containment. However, an application to spray a new pesticide in Canterbury only, without any other constraints, would be an application for release since it would not be possible to adequately ensure the control of any possible adverse effects.

4.3 Hazardous wastes

Section 140(1)(p) of the HSNO Act allows for regulations ‘prescribing controls for by-products with hazardous properties, which result from the manufacture of a substance’. The Authority has been advised by the Ministry for the Environment that they do not intend to implement any regulations under this section.

By-product wastes that have no use or value in themselves will not require a separate HSNO approval where neither the main product nor the raw materials are hazardous (i.e. do not themselves need an approval). Instances of this kind, such as aluminium dross, will be addressed through the Wider Hazardous Wastes Programme being developed by the Ministry for the Environment.

Where a hazardous substance is produced in the process of manufacturing or using a hazardous substance (i.e. one that requires Part V approval), the Authority will consider the degree of hazard represented by the wastes, when considering the application for the original substance.

If an application of this kind is approved, then the waste will be covered by controls set against the approval to the extent that this is possible or appropriate under the control regulations (made under Section 140(1)(c), (e), and (f) of the HSNO Act).

Where a by-product is not a waste and has some value or use in itself, the by-product will need an approval under the HSNO Act. In some circumstances a process may produce a number of products.

4.4 Importation and manufacture of hazardous substances

Section 28 of the HSNO Act applies to applications for approval to import or to manufacture a hazardous substance, other than in containment.

The controls placed on an approval to import or manufacture a hazardous substance will be specified so as to manage the effects of the substance on the health and safety of people and the environment. These controls will be the same regardless of whether the substance is imported into New Zealand, or manufactured in New Zealand.

Therefore, an approval to manufacture a substance in New Zealand will also be considered an approval to import the substance into New Zealand, and *vice versa*.

4.5 Labelling – information on hazardous substance labels

Background

The provisions for hazardous substance labelling are contained in three sets of HSNO regulations.²⁵ One consequence of this is that there is a degree of overlap, duplication, and inconsistency in how similar requirements are presented.

The Authority has identified five areas requiring guidance:

- identification of components on labels and application of the GHS approach;
- non-New Zealand contact details;
- use of single indicators to convey more than one information requirement;
- labelling of small packages; and
- positioning of required information on labels.

Labelling requirements for toxic substance components

Regulation 25(e) and 25(f) of the Hazardous Substances (Identification) Regulations 2001 state that if a toxic substance contains a component which by itself would give the substance a hazard classification of 6.1A, 6.1B, 6.1C, 6.1D, 6.5, 6.6, 6.7, 6.8, or 6.9, the label must identify this component and its concentration in the substance.

While there are no concentration cut-offs given in the regulation for this requirement, the Authority considers that the concentration levels used for the classification of the substance apply. This can lead to a proliferation of components being identified on the label even when they are present in the substance at very low levels. Such a level of identification of components is not generally consistent with international practice and has raised a number of objections from time to time from industries.

The Globally Harmonized System of Classification and Labelling of Chemicals (GHS) provides for the balancing of the public 'right to know' principle with the issue of confidential business information as follows:

“in relation to chemical hazard communication, the safety and health of workers, consumers and the public in general, as well as the protection of the environment, should be ensured while protecting confidential business information, as prescribed by the competent authorities”

The GHS allows competent authorities the discretion to allow consumer product labelling providing information based on the likelihood of harm (ie. risk based labelling). Risk based labels provide targeted information on identified risks (e.g. acute toxicity) but may not include all the information on other (e.g. chronic) health effects that would appear on a label based on hazard alone. Under this approach, the GHS provides discretion for the use of higher cut-off concentrations for the required identification of components. For example, while a concentration cut-off of 1% may apply to the classification of a target organ systemic

²⁵ Hazardous Substances (Identification) Regulations, Hazardous Substances (Emergency Management) Regulations and the Hazardous Substances (Disposal) Regulations.

toxicant, it may not be necessary to identify this component on a label unless its concentration is over 10%.

Similarly, the GHS allows discretion, in the case of substances supplied exclusively for workplace use, for the identities of components to be supplied on safety data sheets (down to classification cut-off concentrations) only and for the requirement for them to be included on labels to be waived.

In appropriate applications and group standards the Agency will recommend that new controls are substituted for the regulations (using section 77A(1) for example). The controls would be based on the GHS system as described above, and the concentration cut-off levels listed below.

Concentration Cut-offs for Identification of Components on Labels and Safety Data Sheets

Hazard Category	Classification Cut-off (%)	Label Identification Cut-off (%)³	Safety Data Sheet Cut-off (%)³
6.5A	0.1	0.1 ¹	0.1
6.5B	0.1	0.1 ¹	0.1
6.6A	0.1	0.1	0.1
6.6B	1	1	1
6.7A	0.1	0.1	0.1
6.7B	0.1	1	0.1
6.8A	0.1	0.3	0.1
6.8B	0.1	3	0.1
6.8C	0.1	0.3	0.1
6.9A ²	1.0	10	1
6.9B ²	1.0	10	1

Notes:

1. The label warning for sensitizers between 0.1% and 1.0% (0.2% for gaseous respiratory sensitizers) may differ from the label warning for sensitizers $\geq 1.0\%$ (0.2%). In special case, identification may be required below the 0.1% level if a lower value has been used for classification.
2. Applies to both single exposure and repeat exposure target organ systemic toxicants.
3. The use of these concentration cut-offs can be subject to variation depending on the outcome of a substance specific risk assessment.

Use of non-New Zealand Contact Details

Regulation 18(b) of the Hazardous Substances (Identification) Regulations states that a hazardous substance must be identified by ... “enough information to enable its New Zealand importer, supplier, or manufacturer to be contacted, either in person or by telephone.” This appears to mean contact details in New Zealand, which is seen by industry as unnecessarily restrictive because of current business practices which see companies operated on a regional or global basis rather than locally.

The Authority's view is that a free-call number (such as 0800) that diverts to an offshore location is an acceptable means of compliance with this regulation, provided that the NZ details are available from that location. Such an approach to centralised information services is commonly adopted elsewhere in industry and commerce.

Single Indication can Convey Several Matters

The HSNO regulations split labelling requirements into two provisions: priority identifiers (information available within two seconds) and secondary identifiers (available within 10 seconds). Currently the regulations allow for a single indication on a label, such as a pictogram, to be used to cover several pieces of information for priority identifiers for a given hazardous property.

While the regulations do not contain a similar provision for secondary identifiers, the Authority considers that a number of requirements for secondary identifiers can collectively be met by a single indication.²⁶

This approach will simplify the generation of labels and reduce the amount of overlapping information provided. A similar approach has been applied to Group Standards.

Labelling of Small Packages – Toxic Substances

The labelling of small packages is a subject that is not particularly addressed in the regulations and, to the extent that it is, it is not done in a consistent manner. For example, in the 'Emergency Management' and 'Disposal' regulations there are package size cut-offs given, below which labelling is not required. However, there are no similar provisions in the 'Identification' regulations which means that the labelling requirements must be supplied with packages of any size.

These 'labelling' requirements do not have to be placed on a label and may, for example, be given on a product information sheet inserted into outer packaging.

The Authority has adopted the following approaches to the labelling of small packages of toxic substances.

When a container is too small to carry all the required information, it shall be sufficient for the required secondary identifier information to be provided on a separate information sheet supplied with the substance, as long as the required priority identifiers are provided on the main label of the container together with a statement such as *'Read accompanying instructions before use'*.

If a substance is low enough in toxicity that either 500ml/500grams, or the total contents of the container would be unlikely to cause a toxic dose to a child, it may not be necessary for the container to carry warning, precautionary and first aid statements.

²⁶ For, example, regulation 19(a) requires an indication of the general degree and general type of corrosiveness of a substance, while regulation 19(d) requires an indication of the kind and extent of harm it is likely to cause to skin or eye issue. The single statement "Highly corrosive to skin" can meet both these requirements.

These approaches are consistent with the requirements of the previous Toxic Substances Regulations and can be considered in relation to the requirements of the Hazardous Substances regulations. For example, if the size of a container was such that the contents were not sufficient to cause harm then it would not be necessary to address the regulatory requirements to provide indications of the circumstances which may lead to harm or the type of harm which might occur.

Under the HSNO Act these approaches must be applied on a case-by-case basis, using the control variation provisions under section 77A(1) (for example). In each case the Authority must be satisfied that the proposed control is more effective (or cost-effective) or more likely to achieve its purpose.

Positioning of information on label

As noted previously labelling requirements are split into priority identifiers (information available within two seconds) and secondary identifiers (available within 10 seconds). The Authority interprets this to mean that prominent warning information, such as pictograms, will be placed on the main²⁷ or ‘front’ label (priority) and more extensive information in the ‘fine print’ on subsidiary or ‘back’ labels.

However, there is an argument that information provided on secondary labels can in most cases be accessed within two seconds and some companies therefore intend to place at least some of the required priority identifiers, such as pictograms, there. The Authority is of the view that, at least in the case of acutely toxic or corrosive substances, it is not acceptable that there should not be any hazard warning information prominently presented on the ‘main’ label of a container. Therefore the Authority has recommended to industry that where priority identifier information such as pictograms and hazard statements are placed on ‘back’ labels, then information at least of the standard previously required under the Toxic Substances Regulations be provided on the main label. This would mean statements such as *Harmful – Keep out of reach of children* would be needed on the front (main) label.

²⁷ Main label is defined in the Group Standards to mean (in part), ‘where there are two or more labels on a container or a label is divided into two or more portions: (a) that label or portion of the label on which the name of the product is most prominently shown and which is primarily designed to attract attention..’

4.6 Manufactured articles as hazardous substances

Manufactured articles containing or incorporating hazardous substances with properties other than explosiveness are not considered to be substances under the HSNO Act. In this context, the Authority has adopted the following as a working definition of manufactured article:

‘something for which its intended use is primarily to do with its physical shape, rather than its chemical composition’.

To avoid as much doubt as possible, the following section sets out an expanded explanation of the working definition and how it will be interpreted and applied.

However, there will continue to be ‘fuzziness’ at the boundary between substance and article. No matter how precise the boundary definition is, there will continue to be room for interpretation. Common sense should prevail in dealing with difficult boundary cases. To assist this some examples are given at the end of this statement, and these examples will be extended as more cases are brought forward.

Expansion of definition

An item is an article if it satisfies **each** of the following criteria:

- (a) The item is deliberately formed to a specific shape or design during manufacture.
- (b) The item has an end use function wholly or partly dependent on its shape or design.

A solid substance which is manufactured or imported, formed to a particular shape with particular end uses in mind, and which undergoes only further limited processing into a finished article, is considered to be itself an article. ‘Limited processing’ covers cutting, bending, surface chemical reaction, etc, but excludes processes such as pulverising, melting, pelletising, etc, where the formed shape is completely destroyed.

- (c) An article undergoes no change of chemical composition during end use, except as an intrinsic part of that end use. (Items such as matches in which the chemical composition is altered as a result of combustion are examples of articles where the change of chemical composition is intrinsic to the intended use.)

Status of fluids and particles

In accordance with these criteria, fluids and particles are not normally considered to be articles, regardless of shape or design. ‘Fluids’ refers to liquids (including suspensions and solutions) and gases. ‘Particles’ refers to any solid chemical substance or mixture of chemical substances which is in discrete aggregations of unspecified size, which may take the form of dust, powders, dispersions, granules, pellets, beads, lumps and flakes. Substances in a form in which the bulk properties and usefulness of the substance are dependent only in part on the particle’s shape are not regarded as articles.

Fluids or particles contained within a vessel serving simply to store, transport and dispense its contents are considered to be chemical substances. In general, all fluids and particles, such as cleaners, solvents, fuels, glues, sealants, inks, paints and other coatings, are chemical substances if they are merely contained in some form of packaging.

The contents of containers, such as bottles, jars, cans, aerosol cans, drums, barrels, tanks, bags, tubes and sachets are chemical substances or mixtures of chemical substances.

However, for items where it is intended that the fluid or particulate contents remain in their container during normal use of the item, and that they serve an intrinsic part of the end purpose of the item, then the fluids and particles are considered to be an integral part of the article. Thus, a lubricant in a bottle, drum or aerosol can is a chemical substance (or mixture of chemical substances) and will require an approval (if it is above a HSNO threshold), but a lubricant in a motor vehicle or other piece of mechanical equipment is part of an article and does not require a HSNO approval.

For certain items, the end use function involves release of the fluid or particulate contents in a specific manner which is dependent on the shape or design of the item. It follows that the fluid or particulate substance or mixture of substances, contained in such items cannot fulfil the end purpose of the item in isolation from the unit as a whole. If the normal release of the fluid or particles is in a controlled and non-dispersive manner, then these fluids and particles are considered to be an integral part of an article, and are therefore not chemical substances which need an approval. Examples of articles meeting these criteria are ballpoint pens, inked stamp pads, typewriter ribbons and carbon paper.

In practice, it will only be for imported items containing fluids and particles that a decision needs to be made whether the fluid or particles constitute a chemical substance (or a constituent of a mixture of chemical substances) and therefore needs an approval (if above the HSNO thresholds), or whether the fluid or particle is to be considered as an integral part of an article. The constituents of items which are locally manufactured will initially be present as individual chemical entities prior to packaging or assembly and therefore must have a HSNO approval, if they are above the hazardous property thresholds.

Examples

There are a number of examples from the plastics industry, although it is emphasised that most finished plastics/polymers used for 'articles' will be non-hazardous and so not captured by the HSNO Act.

For example, a bag of polymer granules which is the raw material for an injection moulding process, to produce finished products or components of a particular physical shape, is a substance. Likewise, a sheet of polymer material that is the raw material for a vacuum thermoforming process, to produce products of a particular shape, is also a substance. Similarly, a block of polymer material, of no particular shape, which can be machined into articles of a particular physical shape, would also be considered a substance. The same line could be followed in respect of metallic materials.

However, a sheet of composite materials which has been specifically manufactured as (say) a cladding would be classified as a manufactured article. This would make little difference if

the composite was manufactured in New Zealand, because the material components would still be covered by HSNO. However, the same sheet imported would not be covered by HSNO. (This example is right on the borderline.)

A similar approach would be taken to pipes made out of a single material and imported for use in carrying fluids. The imported pipe would be a manufactured article, but if the material for manufacture was imported, it would potentially be covered by HSNO.

Manufactured products such as glues, paints, pesticides, etc (or granules or liquid formulations produced as a feedstock for some further manufacturing operation) however are not manufactured articles for the purpose of the HSNO Act regardless of how they are packaged or presented (i.e. they are substances). If they exceed the hazard thresholds, they will be considered to be hazardous substances within the jurisdiction of the Act.

4.7 Mating disruption

Insect pheromones and other chemical substances are sometimes used as mating disruptors, providing alternative strategies for managing insect pests such as the painted apple moth. Where pheromones and similarly used substances do not have specific inherent hazardous properties, they are not hazardous substances.

However, there is still the question of whether the substance is designed for biocidal action. Biocidal action triggers the HSNO Act Class 9 threshold, and is defined in the Hazardous Substances (Minimum Degrees of Hazard) Regulations as:

“... in relation to a substance means the substance causes mortality, inhibited growth or inhibited reproduction in an organism.”

While the use of insect pheromones as mating disruptors may be considered to trigger the threshold for biocidal action, the Authority considers that this goes outside the intentions of the HSNO Act, since the substance is not directly acting on the reproductive function (it is simply confusing the male insects).

The Authority considers that since mating disruption (using pheromones or other substances) does not directly impact on the reproductive function but simply alters the behaviour of the target organism, such substances do not trigger the biocidal action threshold under the HSNO Act.

4.8 Maximum tolerated dose

The design of standard toxicological and ecotoxicological repeat dose studies has four dose levels - 0 (control), low dose, medium dose and high dose. The high dose is based on pilot studies to determine the level that results in a 10% decrease in bodyweight and is therefore likely to result in an effect in a repeat-dose assay. The medium dose should show a lesser effect and the low dose should show no effect. The low dose value is normally used as the No Observed Effect Level (NOEL).

Standardised test methodologies also include an upper dose limit for testing. For example, 90-day studies in rodents and non-rodents specify an upper dose limit of 1000 mg/kg bodyweight/day. This limit recognises that effects seen at very high doses in animal studies very rarely lead to classification, unless other information indicates that humans may be more susceptible than animals to the substance.

4.9 Rapid Assessment for Importation or Manufacture of Hazardous Substances for Release - Criteria for Determining Eligibility

Introduction

Rapid assessment provides a streamlined application process for those situations where the hazardous properties of a new substance are low, or where the proposed substance has similar composition and similar hazardous properties to an approved substance or where the proposed substance has been formulated to have a lesser hazard than an approved substance. The Agency advises that an applicant should submit a Status of Substance request (form HS-6) in the first instance for advice from ERMA New Zealand on whether rapid assessment is applicable.

This policy applies to applications under the rapid assessment provisions allowed for by section 28A of the HSNO Act. The power to determine such applications has been delegated to the Chief Executive of ERMA New Zealand. The Chief Executive is expected to exercise his/her delegation in the context of this policy. Where the Chief Executive is unable to determine an application in accordance with this policy, the matter must then be referred to the relevant committee of the Authority for consideration.

Overall Legislative Criteria

Section 28A(1) specifies the criteria for applications to be accepted for rapid assessment. It states that:

When the Authority receives an application under section 28 in respect of a hazardous substance, and the applicant has verified the information contained in the application by statutory declaration, the Authority may make a rapid assessment of the adverse effects of importing or manufacturing the substance.

Substances that meet these criteria and are accepted for rapid assessment under section 28A are not required to be publicly notified.

The rapid assessment route available under section 28A is discretionary. In other words, the guidelines set out in this policy do not preclude the exercise of the discretion afforded to the Authority (or delegated decision-maker) under section 28A to decline to approve a hazardous substance under the rapid route in any particular case. In such circumstances the applicant may choose to submit an application for full assessment under section 28 of the Act.

Section 28A(2) specifies the three routes for considering rapid assessment.

- (2) *The Authority may approve a hazardous substance under this section if the Authority is satisfied that: -*
- a substance having a similar composition and similar hazardous properties has been approved; or*
 - the substance has one or more hazardous properties and each hazardous property has the least degree of hazard for that property; or*
 - the substance has been formulated so that 1 or more of its hazardous properties has a lesser degree of hazard than any substance that has been approved under this Act.*

These are discussed separately below.

Dealing with Applications on the Grounds of Similarity

Section 28A(2)(a) allows rapid assessment of a proposed substance if the Authority is satisfied that a substance having a similar composition and similar hazardous properties has been approved under the HSNO Act. For this application route to be used there must be:

- a reference substance with a HSNO approval; and
- a proposed substance with similar composition **and** similar hazardous properties to the reference substance.

The Reference Substance

Rapid assessments on the grounds of similarity require comparison with a reference substance that has already been approved. More than one reference substance may be applicable.

In section 28A(2)(a), **‘approved’** means approved under the HSNO Act, by the Authority. This means the reference substance has either been approved in an earlier Part V HSNO approval or it has obtained a ‘deemed approval’ through the process for the transfer of existing substances under (now expired) Parts XI to XV of the Act. The Authority (or the Chief Executive) must be satisfied that one of these criteria has been met.

The reference substance should have a similar life cycle and use to that of the proposed substance. For example, if the proposed substance is a veterinary medicine, then the reference substance should also be a veterinary medicine

A reference substance may be legally adequate as the basis for an application, but may be technically deficient, ie. may not be considered by the decision maker to be a robust reference. This may on occasion lead to a ‘decline’, even if the similarity criteria are met.

Legally, reference substances can include substances which have been approved by ‘similar’ substance rapid assessment. In practice, however, there may be difficulties in using such references and there will generally be a requirement to ‘look behind’ the proposed reference to the original reference substance. There is otherwise the risk of ‘creep’ occurring in the degree of similarity required. If a satisfactory match with the original reference substance cannot be obtained, the application may be declined.

General Interpretation of ‘Similar’

The key issue in relation to section 28A(2)(a) is the interpretation of ‘similar’. ‘Similar’ is not defined in the Act and it therefore must take its ordinary, everyday meaning for which the Authority has accepted the Shorter Oxford English Dictionary definition - “of the same nature or kind”.

The issue of “same nature or kind” has to be addressed in respect of both the composition and the hazardous properties of the substance under section 28A(2)(a). There is a natural correlation between the composition of a substance and its properties and these two aspects cannot be considered entirely in isolation of each other. Composition includes the chemical components making up the substance and also its physical form. The properties of the

substance include any hazardous properties and also other properties such as boiling point and physical state.

For substances coming under similar substances criteria, the new substance should lead to similar effects to the reference substance or, more importantly, should not lead to any adverse effects not found with the reference substance²⁸. There is very little scope for flexibility, when the decision maker is making judgements about similarity, in the direction of increased adverse effects. There is more scope for flexibility where adverse effects are reduced.

Criteria for Similar Composition

The guidelines provided below on limits to variation of composition only apply when the overall hazardous nature of the substance is not increased, ie. there is no increase in any hazard classification and no introduction of a hazard classification that was not previously triggered.

In considering similarity of composition, aspects to consider will include: number of components; concentration of components; type (elemental composition, chemical class, molecular weight) of components; and physical form, although arguably the latter is a property.

The Major Hazardous Components

The major hazardous components are those that determine the hazardous properties of the substance and are important to the intended use of the substance. For the composition to be similar, the major hazardous components of the substance should desirably be the same as the major hazardous components in the existing substance.

However, there may be variations in the proportions of the major hazardous components, and one or more of the components may be excluded, provided in each case that the general nature and character of the substance are not changed in a material way. For example, similarity would be considered to be maintained in the following cases:

- (a) The proportion of all major hazardous components making up the substance is not increased by more than 10% above the proportion in the reference substance; for example, if the major hazardous components make up 30% of the substance then they may not increase to more than 33%. This tolerance may generally be increased when the total percentage of major hazardous components is low, for example, less than 10%.
- (b) The proportion of major hazardous components may decrease without limit, provided that there is evidence that decreasing proportion does not lead to an increase in hazardous properties, ie. dilution is acceptable.
- (c) Provided that (a) is also met, the proportion of any one major hazardous component does not increase by more than 25%; for example, an increase from 20% to 25% for any one such component is acceptable. This tolerance may generally be increased when the proportion of the component is low, for example, less than 5%.

In addition, new major hazardous components may be introduced as substitutions for or additions to existing components provided:

²⁸ See section at end 'Circumstances under which a substance which meets the criteria for similar or reduced hazard may nevertheless be declined'

the hazard classification of the substance is not increased; and
the new major hazardous component does not produce adverse effects different in character to those already presented by the reference substance²;
the new major hazardous component is listed on the ERMA New Zealand Inventory of Chemicals; and
the guidelines (a)-(c) continue to be met.

The Minor Hazardous or Non-hazardous Components

It is permissible to introduce new minor components if they are hazardous but are introduced only at a level that does not increase the overall hazard. There is no quantity limit on the concentration of non-hazardous components that may be introduced.

An example would be a change from a 5% pesticide active in 95% kaolin (inert mineral) to a 5% pesticide active in 95% talc. This could be considered for rapid assessment approval as it meets the ‘same nature and kind’ test. For example, kaolin and talc are of the same general type of component, of the same form, have a similar lack of hazardous properties, and perform the same function in the substance.

Changes in Physical Form

Generally a change in physical form will derive from a significant change in composition and the new substance will fail the ‘same nature and kind’ test. Some discretion can be allowed where there is clearly a reduction in adverse effects as a result of the physical change; for example, the reference substance is liquid and the proposed substance is granular and adverse effects are reduced through reduced exposure.

Similar Hazardous Properties

A substance may be regarded as having similar hazardous properties to a previously approved substance if it:

- does not exceed a hazardous property threshold for any hazardous property not triggered by the reference substance, ie. a new hazard class or subclass may not be introduced in the proposed substance; and
- does not have a higher hazard classification to the reference substance in respect of any hazardous property, ie. there cannot be an increase of hazard category within a hazard subclass. However exceptions to this may be allowed where it is considered that an increase in hazard classification would not result in any significant increase in adverse effects; for example, an increase from 6.3B to 6.3A.

The reduced hazard route (section 28A(2)(c)) may be the more appropriate route if the proposed substance is less hazardous than the reference substance.

Variation of Controls

In general the controls for the new substance should be the same as those for the reference substance and this is a good “cross check” on similarity. There may, however, be circumstances in which a change of controls could be acceptable. This would be applicable for minor changes, and would not apply to any major change or variation to controls as this would not be consistent with the intent of sections 77 and 77A. Reasons for allowing changes could include:

Reductions in controls resulting from reduced hazardous properties. For example, an acceptable variation could be changes in the requirements for label statements resulting from a drop from severe skin irritant to minor skin irritant.

A situation where the controls on the reference substance require revision due to changes; for example, changes in the application of classification criteria since the approval of the reference substance.

Circumstances under which a substance which does not meet the criteria may nevertheless be considered

A substance that does not meet the similarity of composition criteria because the increase in the proportion of all the major hazardous components, or the increase in concentration of any one major hazardous component, exceeds the limits described above in the criteria for major hazardous substances may still be considered if the variation is relatively minor and generally applies to one of the criteria, e.g. a new component makes up 30% rather than 25% of the total major hazardous components, but all other guidelines are met. Marginal cases like this are more likely to be considered favourably if there is a clear reduction in risk of the new substance compared with the reference substance. Such situations will be evaluated on a case-by-case basis.

Dealing with Applications on the Grounds of Least Degree of Hazard

Section 28A(2)(b) allows rapid assessment of a proposed substance if the Authority is satisfied that the substance has one or more hazardous properties and each hazardous property has the least degree of hazard for that property.

Least Degree of Hazard

In the first instance, eligibility for this assessment route is determined by direct evaluation against the criteria for the lowest classification levels contained in the Hazardous Substances (Classification) Regulations.

The Authority has, however, further determined that only certain of the classification classes and sub-classes are automatically appropriate for consideration by this rapid assessment route. This is because not all of the least degrees of hazard can be considered as representing equivalent degrees of severity of the hazardous property concerned. For instance, classification 6.7B, suspected human carcinogen, represents rather more of a level of concern than does classification 6.3B, mild skin irritant. Also, some classification subclasses are composed of only one degree of hazard – thus the least degree of hazard is also the greatest degree of hazard.

This discretion by the Authority is allowed by the wording of the Act, which provides (section 28A(2)):

“The Authority may approve a hazardous substance under this section if the Authority is satisfied that –
(b) the substance has one or more hazardous properties and each hazardous property has the least degree of hazard for that property...”

The least degrees of hazard considered appropriate for rapid assessment under this policy are as follows:

Explosive articles	classification 1.4S	
Flammable gases	classification 2.1.1B	
Flammable aerosols	classification 2.1.2A	
Flammable liquid	classification 3.1D	
Readily combustible solid	classification 4.1.1B	
Self-reactive substances	classification 4.1.2G	
Dangerous when wet substances	classification 4.3C	
Organic peroxides	classification 5.2G	
Acute toxicity	classification 6.1E	
Skin irritant	classification 6.3B	
Eye irritant	classification 6.4A	(Note 1)
Sensitisation	classifications 6.5A, 6.5B	(Note 2)
Mutagenicity	classification 6.6B	
Target organ/system toxicity	classification 6.9B	
Metallic corrosives	classification 8.1A	
Ecotoxic	classifications 9.1D, 9.2D, 9.3C, 9.4C	

Note 1: There is only one degree of hazard for the toxic subclass of eye irritancy. This essentially represents the lowest degree of hazard for the property of adverse effects to the eye as the classification criteria for this level relate to reversible effects. More severe irreversible effects are covered by classification 8.3A, eye corrosive.

Note 2: The Authority has adopted the Globally Harmonised System for Classification and Labelling of Chemicals (GHS) cut-off levels of 0.1% for both respiratory and contact sensitisers.

There is only 1 degree of hazard for respiratory and dermal sensitisers. Substances that contain respiratory and/or dermal sensitisers require a consideration of the severity of the allergic manifestations in humans or animals, as well as frequency in exposed populations. The Authority will consider for rapid assessment under the least degrees of hazard criteria substances containing respiratory and/or dermal sensitisers provided the following conditions are met:

- (1) (a) there is a low or moderate frequency or severity of occurrence within an exposed population; or
 - (b) there is a probability of occurrence of a low to moderate sensitisation rate in humans based on animal or other tests; and
- (2) the sensitiser is not “released” from the substance during use.

The caveat in (1) is to differentiate between substances that are strong sensitisers, and substances that are low to moderate sensitisers. Substances that meet the criteria in 1(a) and (b) may be considered to be low to moderate sensitisers.

The caveat in (2) is to prevent increased exposure through certain uses, such as aerial spraying. The idea of “release” of the sensitiser relates to the substance being used in a wide dispersive manner where there is potential for increased risk of an effect to non-target people or the environment.

It is sufficient to show that only classifications from the above list have been triggered in order for rapid assessment to be applicable. All of the least degree of hazard properties triggered will be considered in making a decision on an application.

Dealing with Applications on the Grounds of Reduced Hazard

Section 28A(2)(c) allows rapid assessment of a substance if the Authority is satisfied that it has been formulated so that one or more of its hazardous properties has a lesser degree of hazard than a substance which has been approved under the HSNO Act. For this application route to be used there must be:

- a reference substance with a HSNO approval; and
- a proposed substance with a lesser degree of hazard in at least one of the hazardous properties compared with the reference substance.

This allows for the rapid assessment of substances which have been formulated to be less hazardous than existing similar substances, with the overall aim of encouraging the use of lower hazard chemistry. In line with this, the Authority would normally expect there to be a basis for comparison between the substances in terms of composition and use.

It is the responsibility of the applicant to provide evidence for these points in a clear and transparent manner so that a rapid assessment under s28A(2)(c) can proceed.

The Reference Substance

Rapid assessments on the grounds of reduced hazard require comparison with a reference substance that has already been approved. More than one reference substance may be applicable.

In section 28A(2)(c), ‘**approved**’ means approved under the HSNO Act, by the Authority. This means the reference substance has either been approved in an earlier Part V HSNO approval, including those approved under the rapid route, or it has obtained a ‘deemed approval’ through the process for the transfer of existing substances under (now expired) Parts XI to XV of the Act. The Authority (or the Chief Executive) must be satisfied that one of these criteria has been met.

The reference substance should have a similar life cycle and use to that of the proposed substance. For example, if the proposed substance is a veterinary medicine, then the reference substance should also be a veterinary medicine.

Proposed Substance with a Lesser Degree of Hazard

A proposed substance may be regarded as having a lesser degree of hazard to a reference substance if it:

- does not exceed a hazardous property threshold for any hazardous property not triggered by the reference substance. For example, the proposed substance cannot be classified as a 9.1 aquatic ecotoxicant if the reference substance has no 9.1 classification; and
- does not have a higher hazard classification to the reference substance in respect of any hazardous property, ie. there cannot be an increase of hazard category within a hazard subclass; and

does have a lesser degree of hazard compared to the reference substance in at least one hazardous property. This may include removal of a classification that was present in the reference substance, for example, the reference substance triggers a flammability classification and the proposed substance does not.

If the proposed substance meets the rapid (least degrees of hazard) criteria in accordance with section 28A(2)(b), the application should be processed by that route.

Basis for Comparison between the Substances

As part of the consideration of an application via this route, the decision maker must be satisfied that the overall risks posed by the proposed substance are the same as, or less than, those posed by the reference substance. This provides the context for the comparison between the two substances.

Composition

The same approach to composition as outlined above in the sections ‘Criteria for Similar Composition’ and ‘The Major Hazardous Components’ will also apply to the rapid/reduced hazard route. However, more variation in composition may be acceptable under this route than is acceptable under the rapid/similar route, provided there is a reduction in at least one hazardous property of the proposed substance relative to the reference substance.

Changes in Physical Form

A change in physical form may well occur as a result of the proposed substance being formulated to have a lesser hazard, and this is acceptable, provided it does not result in an increase in overall risk. For example, while a change from a powder to a granule may be acceptable; a change from a granule to a powder might not be acceptable because of possible additional risks associated with inhalation or solvency etc.

Variation of Controls

As the proposed substance has a lesser degree of hazard, the controls for the proposed substance are likely to be varied from those applied to the reference substance. Reasons for changes may include reductions in controls resulting from the reduced hazardous properties. For example, an acceptable variation could be removal of the flammability controls, as the proposed substance has been reformulated to be non-flammable.

Circumstances under which a substance which meets the criteria for similar or reduced hazard may nevertheless be declined

The proposed substance introduces additional adverse effects

Consideration of additional adverse effects will only come into play when the substance has not already been screened out from rapid assessment by higher-level differences in composition or hazardous properties.

The significance of the adverse effects will be considered in light of the uses of the proposed substance, and whether the residual risks are significant with the controls that apply to the reference substance in place. If the adverse effects of the new substance are significantly

different in kind or increased in level compared to the reference substance, then the application may be declined.

A situation where this might arise is when both reference and proposed substances are classified as 9.1A (very ecotoxic in the aquatic environment) but within this hazard category the proposed substance is ecotoxic to different taxonomic groups to the reference substance or the proposed substance is persistent whereas the reference substance is not. In this case, the hazardous properties would likely not be considered to be similar, and as such the substance should not be considered for rapid assessment except on a special case-by-case basis.

The proposed use is significantly different

Another circumstance is where the use of substance is significantly different, e.g. the reference substance was intended for contained use, while the new substance is intended for widely dispersive use. If the variation in use is essential to the application, ie. it cannot be dealt with by applying use related controls; again the application may be declined.

4.10 Reproductive/Developmental Toxicity

In general, if on testing a substance in a reproductive study, greater than 10% mortality is observed, then maternal toxicity is likely to occur and even if developmental effects are observed (for example, structural malformations, embryo/foetal lethality and significant post-natal functional deficiencies), these effects would not normally lead to classification for reproductive/developmental toxicity (sub-class 6.8) due to the developmental effect being a secondary consequence of maternal toxicity. If on the other hand, developmental effects are observed at less than 10% mortality in a dose-responsive manner, greater weighting is given to the effect as being a “true” developmental effect caused directly by the substance.

4.11 Small scale uses (exemptions for hazardous substances)

Section 33 of the Act (as amended by the HSNO Amendment Act 2000) provides for the exemption of small scale uses of hazardous substances in research and development, or teaching. The experiments have to be carried out in a laboratory that meets the prescribed requirements, and it is not permissible for these experiments to use or produce a substance for which an application has already been declined. In addition, neither the substance, nor any substance created from its use, may be sold as a substance or in a product containing or derived from that substance.

The Authority will interpret the exemption to include stocks of requisite laboratory supplies as well as the experiments themselves.

The exemption is also interpreted to cover importers where they hold a purchase order for a hazardous substance from an institution or laboratory meeting the requirements of this section. Correspondingly, the importation, storage, and transportation of such hazardous substances, for the purposes of supply to an exempt laboratory, are also subject to the exemption in section 33, provided each of those meets the prescribed requirements.

The prescribed requirements referred to, in the case of laboratories, are contained in the Hazardous Substances (Exempt Laboratories) Regulations. These regulations do not, however, cover the prescribed requirements in respect of importation, storage and transport. It is expected these will be added to the regulations, by way of amendment, in the future.

In the interim, the Authority will expect suppliers of laboratory chemicals to comply with the relevant provisions, for the storage and handling of these chemicals, of the Hazardous Substances Identification, Emergency Management, Packaging, Tracking, Class 1 to 5 Controls and Class 6, 8, and 9 Controls Regulations. Requirements relating to identification, emergency management and packaging may be met by compliance with international and/or New Zealand transport requirements.

The HSNO Amendment Act 2000 defines laboratory as “*a vehicle, room, building, or any other structure set aside and equipped for scientific experiments or research, for teaching science, or for the development of chemical or medicinal products*”.

In making a judgment on a ‘small scale use’ in the case of experiments in a standard contained laboratory, applicants are referred in the first instance to *AS 2243. 10 Safety in Laboratories: Storage of Chemicals* as a means of interpreting ‘small scale’.

The exemption can also apply to large pilot scale experiments undertaken in a contained laboratory where quantities may be greater than outlined in the above Standard. In such cases no quantity is specified but it is expected that in order for such research to be exempt the quantity involved would need to be in keeping with the nature of the pilot experiment. The pilot laboratory must still meet the prescribed requirements, however, and these must be no sale of the substances or any substances or products derived from their use. Over time, more detailed guidance on small-scale use will be provided.

The Authority will interpret the reference to teaching to mean activities for which the primary purpose is to transfer existing knowledge or understanding from one party to another by

means of instruction, training or lessons. It is acceptable for the teaching to have a different secondary purpose e.g. to serve commercial objectives.

Obvious examples of teaching are the activities of schools, universities, polytechnics and other educational institutions when carrying out laboratory classes or workshops. However, the interpretation also covers commercial entities that are transferring information about their products or processes to staff, suppliers or clients for training purposes.

The Authority will interpret the definition of “*research and development*” in the HSNO Amendment Act 2000 as meaning:

- “*systematic investigation*”, or
- “*experimentation activities that involve innovation or technology transfer for the purpose of gaining knowledge about the properties or uses of that substance*”.

Thus any activity that meets either one of these criteria will be deemed to be research and development.

The original section 33 referred to “*scientific investigations*”, which was interpreted as investigations that are carried out according to scientific rules for performing observations and testing the soundness of conclusions. By nature, scientific investigations are systematic, accurate, relating to science and assisted by expert knowledge. The change to “research and development” does not change the intent of Section 33, which is to allow the use of small quantities of hazardous substances that do not have an approval under section 28 or section 30, for experimental, analytical and teaching purposes, provided that the substance meets the criteria in section 33(a)-(d). Thus, the activities of commercial analytical and diagnostic laboratories can be covered by the section 33 exemption, provided the work is done in a laboratory that meets the prescribed requirements and there is no sale of the substances or substances or products derived from the substance.

Such investigations and experimental activities do not have to be carried out by a scientific institution. They can be carried out by other organisations and individuals provided they meet the criteria specified and are carried out in a laboratory that meets the prescribed requirements.

4.12 Tolerable exposure limits (TELs)

The Authority has the power to set controls on hazardous substances with toxic properties to control effects from any potential routes of exposure during the lifecycle of the substance. The primary control is through the establishment of an Acceptable Daily Exposure (ADE). Tolerable Exposure Limits (TELs) are enforceable controls that can be established to ensure that the total exposure to the substance by these exposure routes will be less than the ADE.

The calculation of a TEL makes assumptions based on the following parameters:

- whether exposure is voluntary or involuntary
- whether exposure is a worst-case or other scenario
- the average bodyweights of people likely to be exposed (adult or child)
- the rates of potential exposure (inhalation, dermal or ingestion)
- the potential exposure parameters (inhalation rate, dermal exposure area, likely consumption).

When it is available the Authority will use New Zealand data for setting the TEL. Where New Zealand data is not available, the Authority will use data from the United States Environmental Exposure Factors Handbook 1997. When attaching TELs to a substance the Authority will clearly describe, in the reasons for the decision, the exposure assumptions and scenarios considered.

4.13 Toxicology and eco-toxicology data for hazardous substances

The Authority has adopted the following positions with respect to data requirements and testing methodologies for toxicity and eco-toxicity data. These are expanded in more detail in the User Guide to the HSNO Thresholds and Classifications of Hazardous Substances.

Acceptable Testing Methodologies

International harmonization of testing methodologies for toxic and, to a limited extent, ecotoxic endpoints has been ongoing since the early 1980s. The HSNO threshold and classification system is based predominantly on the OECD testing methodologies. Similar testing methodologies have been and are being used by the US Environmental Protection Agency Office of Pollution, Prevention and Toxic Substances, (USEPA OPPT) and Office of Pesticide Programs (USEPA OPP), and the European Community.

Therefore, the Authority will consider testing methodologies from these sources acceptable for assessing toxic and ecotoxic effects.

Reliable Information

The term “reliable information” is used in several thresholds. Although the definition in the HSNO Regulations does limit interpretation of data, standard practice links this to evident toxicity. Evident toxicity means clear signs of toxicity following administration of a test substance sufficient for hazard assessment and such that an increase in the dose administered can be expected to result in the development of more severe toxic signs and/or probable mortality. Therefore the weighting given to an effect observed only at the low dose group is less than the weighting given to an effect with a clear dose-response observation.

The use of reliable information is particularly important for classification of substances as sensitizers. The threshold criteria for sensitisation effects refer to both animal and human data sources. With respect to the phrase “data for the substance in the opinion of an expert indicates evidence in humans”, this phrase should be linked to the “reliable information” definition. That is this evidence is either from an epidemiological study in humans that is statistically sound and has undergone peer review; or any other study whose relevance and validity can be demonstrated according to internationally accepted criteria and scientific practice. This therefore provides guidance as to the level of proof of effect that is required for classification of this effect.

Necessity for direct testing

In the interests of animal welfare, direct testing of substances (including substances as mixtures) is not mandatory.

The data used for classification of a substance (including substances as mixtures) can be either directly measured, calculated or estimated. For example, calculation of the acute toxicity or ecotoxicity of a substance as a mixture uses a formula that incorporates directly

measured LD₅₀²⁹ () values for individual components and their relative concentrations, to calculate the likely LD₅₀ of the mixture as a whole. With respect to other toxic endpoints, if a component in a substance as a mixture triggers one of these thresholds, then, if the concentration of the component is above the hazard cut-off level, it is assumed that the substance as a mixture will also have that toxic effect.

As part of the Globally Harmonised System the OECD has coordinated the development of *Detailed Review Documents* for the classification of chemicals for all the toxic endpoints and the aquatic endpoints. These documents form the basis of how data will be interpreted internationally to allow harmonisation of classification and labelling of hazardous substances.

Mitigating Factors

For each toxic and ecotoxic effect there are mitigating factors that negate the need to test for that effect in certain circumstances. These mitigating factors are based on previous international experience, and are incorporated in the Detailed Review Documents, such that the testing of the effect would not add anything to the overall classification of, or controls on the substance and result in the needless testing and suffering of organisms. For example, if a substance has a high pH (a biological skin corrosive), this mitigating factor obviates the need for acute dermal, skin or eye irritation testing. Therefore, these mitigating factors, as identified through the Globally Harmonised System, are accepted.

Minimum data sets

Under common international practice the level of risk posed by the substance can dictate the need for certain types of data to be generated. Therefore, there are minimum data sets required for different types of end-uses for a substance. These minimum data sets reflect how contained the substance will be when used, the likely volume of substance manufactured and how many people/organisms will be exposed during use.

The generation of minimum data sets for a substance is compatible with the Protocol on Information Requirements for Applications to Import or Manufacture a Hazardous Substance for Release. For example, a full data package is required for substances of high risk in terms of likely toxic/ecotoxic effects and/or likely exposure. This equates to Information Category C in the protocol. Likewise a low hazard/low risk substance is likely to have a limited data package generated and this equates to Information Category A.

The Authority acknowledges the international regulatory acceptance of these minimum data sets and notes that data will not normally be generated for endpoints outside these data sets. Therefore, the Authority will recognise and adopt these minimum data sets.

Weight-of-evidence approach to lack of ecological data

The deliberations by the OECD on harmonization of ecotoxicity endpoints in 2000, under the auspices of the Globally Harmonised System, have previously concluded that the aquatic compartment is the most vulnerable ecosystem, given that it is the final receiving environment

²⁹ Lethal dose capable of causing mortality in 50% of the test animals

for many harmful substances and contains sensitive organisms. It is also the compartment most likely to have data for many substances. Therefore in the absence of data for the terrestrial environment (soil, vertebrates and invertebrates), a weight-of-evidence approach can be used such that if data for a substance indicates it is not hazardous to the aquatic environment, and no other information in the data package indicates a terrestrial hazard (such as corrosiveness), then it may reasonably be considered not hazardous to other ecotoxic endpoints. Similarly if an aquatic hazard is identified and no terrestrial data is available, a precautionary approach would imply that that a similar hazard applies to the terrestrial environment.

Following best international practice, the Authority will adopt these positions in the absence of data on the direct effect of the substance in the terrestrial environment.

Sentinel species

Standard test methodologies recommend testing in sentinel species. It is not possible to directly test every substance in every animal/organism in every ecosystem to determine the hazard posed by the substance. Similarly, there is no one animal/organism analogue whose response to the hazardous substance is identical to humans, or generally to flora and fauna. Therefore sentinel species have been selected in international test methodologies based on sensitivity to the hazard being tested, ease of breeding, animal husbandry, speed of growth/development and handling under experimental conditions. These sentinel species act as representatives for testing toxic and ecotoxic endpoints and allow a general comparison of effect of different hazardous substances.

The table below shows the recommended species. The Authority will acknowledge and adopt these sentinel species as general indicators of toxic and ecotoxic effects. However, the Authority is conscious of the unique character of many New Zealand native species and intends, when data is available, to provide a verifiable link between the testing of sentinel species and the sensitivity of relevant New Zealand species.

Human Toxicity				
Species	Rat	Mice	Guinea pig	Rabbit
	Dog			
Ecotoxicity				
Fish	Brachydanio rerio (Zebra-fish)	Pimephales promelas (Fathead minnow)	Cyprinus carpio (Common carp)	Oryzias latipes (Ricefish)
	Lepomis macrochirus (Bluegill sunfish)	Oncorhynchus mykiss (Rainbow trout)	Poecilia reticulata (Guppy)	
Crustacean	Daphnia magna			
Algae	Selenastrum capricornutum	Scenedus subspicatus	Chlorella vulgaris	
Avian	Anas platyrhynchos (mallard duck)	Colinus virginianus (Bobwhite quail)	Columba livia (pigeon)	Coturnix coturnix japonica (Japanese quail)

	Alectoris rufa (red-legged partridge)	Phasianus colchicus (ring-necked pheasant)		
Earthworm	Eisenia foetida (earthworm)			
Honeybee	Apis mellifera (bee)			

It should also be noted that a broad selection of plants are also identified in Test Guideline 208 Terrestrial Plants, Growth Tests. The selection of the above species acknowledges that there may be more sensitive species in the environment and in order to compare chemicals, some standardisation is required.

In terms of control for variation in sensitivity, the ADE and the calculation of the EEL take into account factors of up to 10 for both intraspecies variation (within) and interspecies variation (between). This 100-fold factor is accepted internationally as addressing this sensitivity concern. It should also be noted that acceptance of data generated on these sentinel species does not preclude studies being undertaken in New Zealand to test the sensitivity of native species to various chemical groups compared to the standard sentinel species.

Hazard Cut-off Levels

The Globally Harmonised System for classification of toxic and ecotoxic effects acknowledges that there are certain concentrations of a substance below which a toxic or ecotoxic effect is highly unlikely to be realised. For example, a substance which is a mixture and contains an eye irritating component that is present at less than 1% (w/w) for solids/liquids is highly unlikely to be irritating. These concentrations are also identified in the *Detailed Review Documents* and are essential for the classification of the toxic/ecotoxic effects of substances as mixtures.

These internationally accepted regulatory levels have been in use for many years and are supported by sound scientific testing and in some instances, epidemiological studies in humans. Therefore, unless there is good evidence of likely effects below these levels the Authority will adopt the Globally Harmonised System cut-off levels for estimation of likely toxicity/ecotoxic effects of mixtures.

4.14 Unique identification of a substance

Section 20(2)(b) of the HSNO Act requires the Authority to keep a register of applications containing a sufficient description of the substance or organism to uniquely identify that substance or organism.

For single component substances, the chemical name and the Chemical Abstracts Service (CAS) registry number (if available) will be considered in the first instance to be sufficient. Where the applicant believes that for reasons of commercial sensitivity, disclosure of the CAS Registry number would be detrimental, the applicant will be invited to provide an alternative identification of the substance³⁰. This would also be the case where a CAS number is not available (for polymers for example). In these cases, an adequate and unique identification may be provided by the chemical name, the manufacturer's code, and a description of the chemical type, e.g., ERMAFLO-98, an unsaturated polyester resin.

For multi-component substances 'unique identifier' may include a specific product name and description and the components (as defined for single component substances) that comprise the substance, e.g., ERMAFILM-2000, a plastics polymer comprising:

- ERMAF10-98
- Styrene
- Copper naphthenat

³⁰ Nevertheless, final responsibility for unique identification rests with the Authority.

5 Hazardous Substances Compliance
