GM1

**University of St. Andrews**

**Notification of Genetic Modification Project**

(**N.B.** A GM1 Form should be completed for each Distinct Project Undertaken)

1. School / Unit ...............

2 Workplace(s) if different from Section (1) .................................

3. Name of Project Leader ...........

4. Title of Project:

5. Name(s) and Signatures of **ALL** other Worker(s) Involved (which includes those in other Units who may be affected by the work eg SMAU)

 **Name(s) Signature(s)**

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6. Name and Signature of Project Supervisor

**Name** …………………....... **Signature** ........................................ **Date** ……….

7. Approval of the Project by the School / Unit Safety Committee

Signed on behalf of the School / Building Safety Committee

**Name** …………………....... **Signature** ........................................ **Date** ……….

8. Approval of the Project by the School / Unit Safety Committee where the work is undertaken if different from Section (7)

Signed on behalf of the School / Building Safety Committee

**Name** …………………....... **Signature** ........................................ **Date** ……….

9. Ratification of the Project by the Chemical and Biological Hazards

Sub-Committee - Signed on behalf of the Chemical and Biological Hazards Sub-committee (which acts as the Genetic Modification Safety Committee for the University)

**Name** …………………....... **Signature** ........................................ **Date** ……….

The Genetically Modified Organisms (Contained Use) Regulations 2000, requires that all genetic modification projects must be assessed for the risk to human health and to the environment. This form (GM1) should be used to record your risk assessment. To perform a risk assessment you should identify the hazards associated with the procedures, determine the probability that the hazards will cause harm to human health or the environment (i.e. the risks) and then detail the control measures necessary to minimise the risks to human health and the environment.

 You should complete each section putting in as much detail as is practicable.

A genetic modification procedure is defined by the ACGM as:

1. Recombinant techniques consisting of the formation of new combinations of genetic material by the insertion of nucleic acid molecules, produced by whatever the means outside an organism, into any virus, bacterial plasmid or other vector system and their incorporation into a host organism in which they do not naturally occur but in which they are capable of continued propagation;
2. Techniques involving the direct introduction into an organism of heritable material prepared outside the organism including micro-injection, macro-injection and micro-encapsulation;
3. Cell fusion or hybridisation techniques where live cells with new combinations of heritable genetic material are formed through the fusion of two or more cells by means of methods that do not occur naturally.

This University deem other procedures to be classed as Genetic Modification projects. These include:

i. Use of an organism with modified DNA, even though the organism has not been created at this University;

ii. The generation of transgenic animals/plants using modified DNA as defined by the ACGM (in (a));

1. Site directed mutagenesis.

Techniques not considered to result in genetic modification include:

1. *in vitro* fertilisation;
2. Natural processes including conjugation, transduction, or transformation;
3. Polyploidy induction.

Techniques for which the Genetic Modified Organisms (Contained Use) Regulations 2000 do not apply are:

1. Random mutagenesis (e.g. by chemicals like methyl nitroso-urea);
2. Cell fusion (including protoplast fusion) or prokaryote species which can exchange genetic material through homologous recombination;
3. Cell fusion (including protoplast fusion) of cells of any eukaryotic species, including production of hybridomas and plant cell fusions.

**Work With Animals**

**NOTE:** All work with genetically modified animals requires a Home Office Personal **AND** Project licence. All projects using genetically modified animals or infection of animals with genetically modified micro-organisms **MUST be approved** by the Chemical and Biological Hazards Management Group **AND** by the management of the animal welfare facilities **as well as** approval by the Home Office (Contact the University Home Office Liaison Officer - e-mail: holo@st-andrews.ac.uk )

**Background to Project**

**NOTE:** You should include a detailed background to the project here (e.g. using the Abstract from the original grant application). It is important to provide as much background as reasonably practicable so that the University’s Chemical and Biological Hazards Management Group (which acts as the University’s Genetic Modification Safety Committee) can have an informed judgement of the project.

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**Risk Assessment**

**NOTE:** It is important to provide as much detail as practicable so that the University’s Chemical and Biological Hazards Management Group (which acts as the University’s Genetic Modification Safety Committee) can have an informed judgement about the project. This Management Group will not ‘Ratify’ a project unless enough detail about the project has been provided.

**(a) Details of the Genetically Modified Constructs**

**(i) List of recipient strain(s)**

Cover the name of the strain of micro-organis(s) and/or animals and/or plants should be provded, as well as the name of the wild-type organism from which it is derived and the extent to which it is disabled.

**(ii) If a micro-organism, what other organism(s) (e.g. animals, plants) will the recipient strain infect**

**(iii) List of vector(s)**

Cover names and any disabling mutations.

**(iv) List of genes to be inserted and function of inserted gene(s)**

In doing this genes should be identified in such a way that an outside reviewer will have a general idea of their function i.e. providing a three-letter name may not be sufficient. Where the function of a gene is unknown, it may help to provide details of any known homologues.

**(b) Hazards to Human Health**

**(i) Hazards associated with the recipient organism (e.g. bacterial host or viral vector, animal, plant etc)**

Factors to consider include whether the recipient microorganism is listed in ACDP hazard groups 2, 3 or 4. Other relevant factors may be the microorganism’s mode of transmission, disease symptoms, host range, and tissue tropism as well as an indication as to whether vaccines or chemotherapeutic agents are available. Information should also be provided on any disabling mutations and whether there is any possibility of any disabling mutations being complemented or reverting. If an animal or plant, are these organisms inherently dangerous (e.g. toxic plants, production of allergens etc)

**(ii) Hazards arising directly from the inserted gene product (e.g. cloning of a toxin gene or oncogene)**

Consideration should be given to whether the inserted DNA encodes a toxin, an oncogenic protein, an allergen, a modulator of growth or differentiation (hormone or cytokine) or any other protein, which may result in potentially harmful biological activity. Where the function of the inserted gene is unknown, it may help to describe the function of any known homologues. Please note that even a normal human gene may be harmful if overexpressed, especially if the overexpression is in tissues that do not normally express the protein.

**(iii) Hazards arising from the alteration of existing traits (e.g. alteration of pathogenicity, host range, tissue tropism, mode of transmission or host immune response)**

One factor to consider is whether the inserted gene encodes a pathogenicity determinant, such as an adhesin, a penetration factor or a surface component providing resistance to host defence mechanisms. Another important consideration is whether the inserted gene encodes a surface component, envelope protein or capsid protein that might bind to a different receptor to that used by the recipient microorganism. Consideration should also be given to whether the inserted DNA (or the plasmid sequence) encodes resistance to a drug or antibiotic that might be used for the treatment of a laboratory-acquired infection. If an animal or plant, will the inserted gene affect the tropism of human pathogens, will the modified organism act as a new ‘reservoir’ for a human pathogen etc.

**(iv) The potential hazards of sequences within the genetically modified organism being transferred to related organisms**

Factors to consider include whether widespread dissemination of the inserted gene as a result, for example, of either gene transfer or recombination of the GMM with a wild-type microorganism, would be a matter of concern. If this is the case an important consideration will be whether, in the event of a breach of containment could the genetically modified organism could survive in the environment for long enough for such a gene transfer to take place.

**(v) Any other relevant information.**

**(c) Assignment of a Provisional Containment Level that is Adequate to Protect Against Hazards to Human Health**

This step will involve considering the containment level necessary to control the risk of the recipient organism (e.g. the ACDP Hazard Group of the recipient microorganism) and making a judgment about whether the modification will result in the genetically modified organism being more hazardous, less hazardous, or about the same.

**(d) Identification of Any Hazards to the Environment**

**(i) Hazards associated with the recipient organism (e.g. bacterial host, viral vector animal, plant)**

Factors to consider include whether the recipient microorganism is capable of infecting any plants, animals or insects in the environment and whether there is any possibility of any disabling mutations being complemented or reverting. In particular it should be ascertained whether the recipient microorganism is a pathogen that is controlled by DEFRA. If it is an animal or plant, are these organisms inherently hazardous to any population in the environment. List all such groups even though they may not exist in the UK

**(ii) Hazards arising directly from the inserted gene product**

Consideration should be given to whether the inserted DNA encodes a toxin, an oncogenic protein, an allergen, a modulator of growth or differentiation (hormone or cytokine) or any other protein, which may result in potentially harmful biological activity. Where the function of the inserted gene is unknown, it may help to describe the function of any known homologues. Please note that even a normal gene may be harmful if overexpressed, especially if the overexpression is in tissues that do not normally express the protein. You should also indicate if the protein produced by the gene may affect other organisms in the environment (e.g. expression of antibiotics etc)

**(iii) Hazards arising from the alteration of existing traits (e.g. alteration of pathogenicity, host range or tissue tropism)**

One factor to consider is whether the inserted sequence encodes a pathogenicity determinant, such as an adhesin, a penetration factor or a surface component providing resistance to host defense mechanisms. Another important consideration is whether the inserted gene encodes a surface component, envelope protein or capsid protein that might bind to a different receptor to that used by recipient microorganism. If an animal or plant, will the modified organism act as a ‘reservoir’ for an organism that would not have been present in that species before.

**(iv) The potential hazards of sequences within the genetically modified organism being transferred to related organisms**

Factors to consider include whether widespread dissemination of the inserted gene as a result, for example, of either gene transfer or recombination of the genetically modified micro-organisms with a wild-type micro-organism, would be a matter of concern. If an animal or plant, what would happen if wild type organisms organisms mated with the genetically modified version (e.g. escape of plant pollen, escape of fish eggs/sperm etc). If this is the case an important consideration will be whether, in the event of a breach of containment the organism could survive in the environment for long enough for such a gene transfer to take place.

**(v) Any other relevant information.**

**(e) Who is at Risk**

You should identify all those at risk. This should include the support services who may have access to the laboratories e.g. cleaners, maintenance staff etc. You should also clearly identify those who may be at especial risk e.g. pregnant women, immune compromised workers etc.

**(f) Control Measures Required to Minimise the Risks of the Work**

**(i) What level of containment facilities and procedures will be required for this work?**

Details of the physical and procedures requirements for different levels of containment can be obtained in the ACGM Compendium of Guidance (website: http://www.hse.gov.uk/htdir/noframes/acgmcomp/acgmcomp.htm )

All workers should be informed on how to obtain these details of these containment requirements.

**(ii)Are any of the work procedures likely to generate aerosols?**

If so, should the work be undertaken in a safety cabinet or isolator?

**(iii) How will waste materials be disposed of?**

Include both solid and liquid laboratory waste and waste from experiments with infected animals.

**(iv) Will it be necessary to use sharps?**

e.g. does work involve glass Pasteur pipettes? How will sharps be disposed of?

**(v) If the work involves the experimental infection of animals is it known whether the animal will shed the GMM?**

**(vi) If the work involves the experimental infection of plants what is known about the likely route of transmission of the GMM?**

For example, is the microorganism insect-borne or carried in run-off water? This will have important implications for the type of glasshouse used.

**(vii) In the case of organisms whose multiplication involves a complex life-cycle will the work involve the propagation of organisms that are in stages in that life-cycle that are particularly hazardous?**

Examples include the propagation of the infective stages of parasites or the release of spores from fungi. Consideration should be given to all potential routes of transmission including those that might not be used naturally.

**(viii) Have any disinfectants been validated under the actual conditions of use?**

For example, if disinfectant is being used for the treatment of virus in tissue culture medium, is it known that the disinfectant is effective in the presence of high levels of protein?

**(ix) Does the nature of this work preclude it being undertaken by any workers who have a serious skin condition (e.g. eczema) or other health problems that might make them more susceptible to infection (e.g. some kind of immunological defect)?**

**(x) Will workers require any vaccinations or health surveillance?**

**(g) Consideration of whether there is a need to assign additional measures over and above the provisional level of containment.**

Additional measures may be necessary in any of the following circumstances:

1. to take full account of any properties of the GMM that may be hazardous to human health.
2. to protect the environment.
3. to provide additional safeguards for particular work procedures.

**Part 3. Final assignment of containment measures and risk class**

**The following aspects of this project are assigned to class 1.**

**The following aspects of this project are assigned to class 2.**

**The following aspects of this project are assigned to class 3.**

**The following aspects of this project are assigned to class 4.**