| Insert BA Categorisation (Hazard Group 1 or 2/ or GMO Class 1): |
|---|
| HG2/GMO Class 1 |

Loughborough University

| Health & Safety Unit Use Only | |
|---|---|
| Ref No: | |
| **Department Use Only** | |
| Ref No: | CBE/BRA/046 |

# RISK ASSESSMENT OF WORK WITH BIOLOGICAL AGENTS

**Please note the following before completing this form:**

1. University Health and Safety Policy requires that risk assessment of all work with biological agents (BAs) must be carried out in advance of work commencing. A key requirement of The Control of Substances Hazardous to Health Regulations (COSHH) is to assess the risks associated with any work activity involving the use of biological materials may contain biological agents.
2. YOU SHOULD COMPLETE ALL OF PART A, THE APPROPRIATE SECTIONS OF PART B, AND ALL OF PART C. WHERE HAZARD GROUP 2 BIOLOGICAL MATERIAL IS INTENDED TO BE USED THE RISK ASSESSMENT MUST BE REVIEWED BY THE DEPT/SCHOOL BIOLOGICAL SAFETY ADVISOR AND EXPLICIT APPROVAL IS ALSO REQUIRED FROM THE UNIVERSITY BIOLOGICAL SAFETY OFFICER. THIS FORM SHOULD BE SUBMITTED TO THE HEALTH, SAFETY & ENVIRONMENT UNIT FOR REVIEW VIA YOUR DEPARTMENTAL BIOLOGICAL SAFETY ADVISOR.
3. It is the responsibility of the Principal Investigator/Supervisor to ensure compliance to these requirements and that this risk assessment remains valid.
4. This risk assessment form **IS NOT** for assessing the risks associated with **Genetically Modified Organism activities.**

| | | | |
|---|---|---|---|
| Date Submitted: | 21 May 2012 | Date Approved: | 07/06/2012 |
| Version Number: | 1.0 | Supersedes *(insert version number if applicable)* | N/A |

## **PART A:** Please provide the following general information:

| **School/Department** | | | |
|---|---|---|---|
| Centre for Biological Engineering, Wolfson School of Mechanical and Manufacturing Engineering | | | |
| **Title of Project** | | | |
| Studies Underpinning a Human Stem Cell Bank – A short term pilot scale-up study to automate a manual iPSC culture process | | | |
| Project Reference Number: | PhD Award – Collaboration between University of Cambridge and Loughborough University | | |
| **Person responsible for this work (*Principle Investigator*)** | | | |
| Name: | D. J. Williams | Position: | Professor, Healthcare Engineering |
| Department: | Wolfson School of Mechanical and Manufacturing Engineering | University School: | Wolfson School of Mechanical and Manufacturing Engineering |
| **Person conducting this assessment** | | | |
| Name: | Filipa Soares | Position: | PhD Student |

Review History: *required at least once a year or immediately following any significant change to the project. Significant revisions must be detailed on a revision form. The person responsible must ensure that this RA remains valid*

| | Review 1 | Review 2 | Review 3 | Review 4 | Review 5 |
|---|---|---|---|---|---|
| Due Date | N/R | | | | |
| Date Conducted | | | | | |

| | | | |
|---|---|---|---|
| Department: | Anne McLaren Laboratory for Regenerative Medicine, MRC Centre for Stem Cell Biology and Regenerative Medicine, University of Cambridge | Date Risk Assessment Undertaken: | 10 May 2012 |
| Proposed Project Start Date: | 1 June 2012 | Proposed Project End Date: | 31 December 2012 |

## A1 PROJECT SUMMARY

### A1.1 Scientific Goals of the Project.

*This provides a useful background for the reviewer and reader. It need only be brief and should provide an overview of the scientific goals.*

In collaboration with Cambridge University, this is a short-term translational pilot project to transfer a bench-scale manual cell culture expansion process for human induced pluripotent stem cells (iPSC) to an automated, scaled process using the CompacT SelecT system (TAP Biosystems) and to demonstrate feasibility of standardising a cell banking process . It is a key part of a wider ongoing project at Cambridge, aiming to establish the biological and technological basis for creation of a clinically-compatible bank of human induced pluripotent stem cells (iPSC) with homozygous HLA haplotypes [with the following objectives: 1. to identify patient populations suitable for use as donors. Candidate donor groups include participants in the British Bone Marrow Registry as well as those in the Cambridge BioResource; 2.to identify which cell types are capable of being expanded into master cell banks and are efficiently reprogrammable into iPSCs using non-integrative methods. Candidate cell types include fibroblasts, skin keratinocytes and peripheral blood mononucleated cells; 3. to establish clinical compatible methods (optimized, serum-free, animal product-free, reproducible, traceable culture conditions) for expanding and banking iPSC and 4. to demonstrate proof of concept for the approach by banking one or more donor cell lines that are homozygous for favourable HLA haplotype(s)].

Human induced pluripotent stem cell lines will be transferred from the Anne McLaren Laboratory at Cambridge University. The induced pluripotent stem cell lines ((BBHX8 and A1ATD) have been derived (at Cambridge) from human adult skin fibroblasts (obtained from skin biopsies after donor consent). IPSC were derived by transduction of a replication deficient retrovirus expressing OCT4, SOX2, KLF4 and C-MYC. The established iPSC cell lines (in continuous culture; > 20 passages) and associated manual cell culture process will be transferred (maintained under the ownership of FS; Cambridge) to Loughborough for automated scale up activities using the CompacT SelecT.

### A1.2 Description of the Experimental Procedures

*Describe laboratory procedures to be used and highlight any non-standard laboratory operations. This may need cross reference to supporting documentation i.e. protocols.*

Induced pluripotent stem cells will be transferred from the Anne McLaren Laboratory in Cambridge to the CBE as live cells in flask/vessels transported in sealed secondary containers or frozen vials. Cells will be expanded to grow to a confluent monolayer in T-175 flasks and the growth medium will be aspirated and replenished to provide the cells with fresh nutrients.

The following reagents/biological will be used:

a. Cells: iPSC derived in Cambridge
b. Iscove's Modified Dulbecco's Medium
c. Ham's F-12 Nutrient Mix (+GlutaMAX)
d. Chemically defined lipid concentrate
e. 1-thyoglycerol
f. Insulin
g. Transferrin
h. Penicillin/Streptomycin
i. Poly(vinyl alcohol)
j. Dispase/Colagenase
k. Gelatine
l. Knockout DMEM
m. Foetal bovine serum
n. Glutamine
o. Phosphatise buffered saline
p. DMSO

q. Knockout Serum replacement

The following disposable plastic ware will be used:

a. Nunc/BD T-25/T-75/T-175 flasks
b. Pipettes

Steps to be followed:

- Cells are transferred as frozen vials or cultured in T-flasks coated with gelatine
- Cells will be expanded to T-175 flasks and allowed to grow to confluence.
- The medium will be aspirated and the cells will be rinsed with PBS.
- Collagenase/dispase solution is added to the cell layer and incubated for 30-45 minutes.
- Medium will be added to dilute the colagenase/dispase solution and cells will be left to settle by gravity.
- A second wash is performed. Fresh medium is added and cell clumps broken to appropriate size. Cell clumps can be counted using the cell counter.
- Cell clumps are transferred to new flasks and medium is changed every other day.
- This process is repeated again when the flask are confluent (around a week later).
- Leftover cells might be frozen down in LN2.

*All of the work performed during this project will be carried out in the Centre for Biological Engineering Containment Level 2 laboratory unit. All procedures will be conducted in accordance with the laboratory Quality Management System requirements, Good Cell Culture Practice, Good Aseptic Technique, the local Code of Practice and the University Biological Safety Policy. All SOP's available (authorised access only) for review at: https://internal.lboro.ac.uk/restricted/wolfson/CBE_SOP/5_SOPs/SOPs.html.htm*

**PART B:** Please provide information in one or more of the following sections, as appropriate. Only sections which you complete should be submitted:

*Section 1 micro-organisms (prions, viruses, bacteria, fungi, parasites in ACDP category 2 and pathogens controlled by the Department for the Environment, Food and Rural Affairs). [Work with ACDP category 3 and 4 pathogens is not currently permitted in the University.]*

*Section 2: cell cultures, tissues, blood, body fluids or excreta*

*Section 3 plants and plant material*

*Section 4 animals and animal tissues*

# SECTION 2: CELL CULTURES, TISSUES, BLOOD, BODY FLUIDS OR EXCRETA

## B2.1 HAZARD & RISK IDENTIFICATION : NATURE OF CELLS, TISSUES OR BODY FLUIDS

*This information gives an indication of the **potential** harm that the biological material may cause*

**B2.1.1 List all cells or tissues to be used. *For cells indicate if primary, continuous or finite.***

| Indicate in the adjacent box if Not Relevant (N/R) | | | |
|---|---|---|---|
| Cell or tissue type and ID | Organ Source | Species | From where will it be obtained? |
| BBHX8<br>In continuous culture. | Skin biopsy | Human | Derived in Cambridge at the Anne McLaren Laboratory and passaged for P20+ |
| A1ATD<br>In continuous culture. | Skin biopsy | Human | Derived in Cambridge at the Anne McLaren Laboratory and passaged for P20+ |

**B2.1.2 List all blood, body fluids or excreta to be used**

| Indicate in the adjacent box if Not Relevant (N/R) | | N/R |
|---|---|---|
| Material type | Species | From where will it be obtained? |
| | | |
| | | |
| | | |

**B2.1.3 Has any material listed in section B2.1.1 been genetically modified in any way?**

| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | Yes |
|---|---|
| Genetically Modified Organisms (GMO) Risk Assessment Form completed (Ref: CBE/GMO/046) | |

**B2.1.4 Will material be screened for infectious agents? (if from a cell culture collection answer B2.1.6 instead)**

| Indicate in the adjacent box as: Yes, No or Not Relevant (N/R) | Yes |
|---|---|
| If Yes, provide details of the types of screening and agents screened for:<br><br>Donors were screened for the usual blood born viruses (HIV, HepB and HepC). All cell lines provided by Cambridge have been tested for mycoplasmas – see attached. | |

**B2.1.5 Will any clinical history (if relevant) be provided with this material?**

| Indicate in the adjacent box as: Yes, No or Not Relevant (N/R) | No |
|---|---|
| If yes give details: | |

| |
|---|
| If yes, will a policy of rejection of samples from diseased patients be adopted? Explain |
| If yes, how will the information be disseminated in the course of the project? |
| If yes, will this information be anonomised? |

**B2.1.6 If obtained from a cell culture collection, is safety information provided?**

| | |
|---|---|
| Indicate in the adjacent box as: Yes, No or Not Relevant (N/R) | N/R |
| If Yes, summarise here: | |

**B2.1.7 Has any of the material listed in section B2.1.1 been identified in the list of cross-contaminated or misidentified cell lines, available on HPA website**
(http://www.hpacultures.org.uk/media/E50/3B/Cell_Line_Cross_Contaminations_v6_0.pdf

| | |
|---|---|
| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | No |
| If Yes, provide details of the route of provenance back to the originator of the cell line, together with a Certificate of Analysis; identifying the methods used to qualify the cell type. | |

## B2.2 RISK TO HUMANS

**B2.2.1 What is the likelihood of infection of this material? Indicate as None, Low Risk, Medium Risk, High Risk, Known Infected***

| Cell type and ID | Risk Category | Justification for Selection |
|---|---|---|
| iPSC - BBHX8 | Low | Derived from skin biopsy donated by patient undergoing plastic surgery after full informed consent. Study approved by Addenbrooke's Hospital NHS Trust Local Research Ethics Committee (LREC 05/Q0108/146). Patient was screened for the usual pathogens (HIV, HepB and HepC) and thus the derived iPSCs considered low risk of contamination. However, the presence of unscreened and/or unknown pathogens in the initial primary tissue cannot be excluded. For operational purposes this cell line is classified as Hazard Group 2; requiring handling at baseline containment level CL2 as a precautionary |
| iPSC – A1ATD | Low | Derived from skin biopsy donated by patient undergoing plastic surgery after full informed consent. Study approved by Addenbrooke's Hospital NHS Trust Local Research Ethics Committee (LREC 08/H0311/201). Patient was screened for the usual pathogens (HIV, HepB and HepC) and thus the derived iPSCs considered low risk of contamination. However, the presence of unscreened and/or unknown pathogens in the initial primary cannot be excluded. For operational purposes this cell line is classified as Hazard Group 2; |

| | | |
|---|---|---|
| | | requiring handling at baseline containment level CL2 as a precautionary measure. |
| | | *If none proceed to section B2.2.4* |

***see The Managing the risks in laboratories and healthcare premises – available at** http://www.hse.gov.uk/biosafety/biologagents.pdf

**B2.2.2 If low, medium or high risk (section B2.2.1), name and classify the Biological Agents this material could be infected with. List the biological agents and indicate the ACDP hazard group classification***

| Name of Agent | Classification |
|---|---|
| Low risk of unknown agents present – see B2.2.1 | N/A |
| | |

***see The Approved List of Biological Agents – available on the Health & Safety website or** http://www.hse.gov.uk/pubns/misc208.pdf.

**B2.2.3 Describe the route(s) of infection (in humans) for these adventitious agents (place a 'X' in the relevant box)**

| Percutaneous | Mucocutaneous | Inhalation | Ingestion | N/R |
|---|---|---|---|---|
| x | X | x | x | |
| Details: Cannot exclude any route | | | | |

**B2.2.4 Are there any other biological hazards (other than adventitious infectious risk) associated with the materials e.g. aggressive tumourogenic cell lines**

| Indicate in the adjacent box as: Yes, No or Not Relevant (N/R) | No |
|---|---|
| If Yes, describe:<br><br>NOTE: The retrovirus used is replication defective and thus do not represent a risk for human health at the iPSC stage. The viral vector was integrated in the cell genome at the time of derivation and does not replicate with cell culture (see the associated GMO risk assessment; Ref: CBE/GMO/046). | |

## B2.3 HUMANS AT INCREASED RISK OF INFECTION

**B2.3.1 Do any of the agents listed in section 2.1 present an overt risk to humans at increased risk (including immunocompromised workers, pregnant workers, breast feeding mothers)?**

| Indicate in the adjacent box as: Yes, No or Not Relevant (N/R) | Yes |
|---|---|
| If yes, Occupational Health must be consulted:<br><br>Immunocompromised workers exposed to pluripotent stem cells may be at an increased risk of developing teratoma. | |

## B2.4. PROPAGATION OR CONCENTRATION OF ADVENTITIOUS AGENTS

**B2.4.1 Will any culturing of this material take place?**

| Indicate in the adjacent box as: Yes, No or Not Relevant (N/R) | Yes |
|---|---|
| Manual and scaled automated culture protocols | |

**B2.4.2 If culturing, will CD4+ cells be present. Describe what cells and for how long these cultures will be allowed to grow**

| Indicate in the adjacent box as: Yes, No or Not Relevant (N/R) | No |
|---|---|
| If yes, explain: | |

**B2.4.3 If culturing, what is the maximum volume of culture grown?**

| Indicate in the adjacent box if Not Relevant (N/R) | |
|---|---|
| Per flask:<br>Cells grow in clumps and therefore are not counted. However from experience from other cell types that also grown in colonies but can be re-suspend in single cells we expect around $5x10^6$ cells per T175 flask. | Per experiment:<br>Plan to split T175 flask in 5 x T175 for 3 passages.<br>Max volume/flask = 50mL |

**B2.4.4 Will the cells be manipulated in any way that could result in a concentration of any adventitious biological agent present?**

| Indicate in the adjacent box as: Yes, No or Not Relevant (N/R) | No |
|---|---|
| If yes, explain: | |

## B2.5 WORKING WITH MATERIAL DONATED BY YOURSELF OR COLLEAGUES : Persons MUST NOT work with their own cells.

**B2.5.1 Will any cells be donated by persons working in or has access to the lab?**

| Indicate in the adjacent box as: Yes, No or Not Relevant (N/R) | No |
|---|---|
| If yes, explain what precautions are to be taken to prevent that person being exposed to the cells: | |
| If yes, where will this material be collected: | |
| If yes, provide justification for not using a safer source: | |
| If yes, how will confidentiality be assured: | |

| If yes, has Ethics Committee approval been obtained: |
|---|

## B2.6 ENVIRONMENTAL CONSIDERATIONS:

**B2.6.1 Are any of the agents capable of causing disease or other harm in animals, fish or plants?**

| Indicate in the adjacent box as: Yes, No or Not Relevant (N/R) | No |
|---|---|
| If yes, describe:<br><br>See GMO Risk Assessment for evaluation (Ref: CBE/GM)/046) | |

**B2.6.2 Will there be any other environmental risks?**

| Indicate in the adjacent box as: Yes, No or Not Relevant (N/R) | No |
|---|---|
| If yes, describe:<br><br>See GMO Risk Assessment for evaluation (Ref: CBE/GM)/046) | |

## B2.7 OTHER HAZARDS

**B2.7.1 Are there any other hazards associated with this work?** For example, hazardous chemicals (especially carcinogens, mutagens, substances toxic to reproduction, cytotoxins), cryogenic gases ionising radiation.

| Indicate in the adjacent box as: Yes, No or Not Relevant (N/R) | Yes |
|---|---|
| If yes, identify these:<br><br>Trypan Blue – essential for manual cell counting – will be used and disposed in accordance with CBE COP, COSHH RA CBE020 and SOP029 *"Safe Handling and Disposal of Trypan Blue"*<br><br>DMSO – Cryoprotectant added to media to inhibit cell death during freezing, COSHH RA CBE 035<br><br>[ADD COSSH for all hazardous chemicals] → Covered A. Chandra 11 June 2012 | |
| If yes, have these been risk assessed and any necessary approval obtained?<br><br>COSHH RA CBE020<br>COSHH RA CBE035 A. Chandra 11 June 2012 | |

# PART C: CONTROL MEASURES

## C1. CONTROL MEASURES

The risk of exposure must be prevented or adequately controlled to minimise the chance of harm arising. COSHH Regulations require minimum containment measures for laboratories handling organisms from the different ACDP hazard groups (http://www.hse.gov.uk/pubns/misc208.pdf)
The hazard group number typically indicates the level of containment (includes physical measures & working practices) that must be used for its handling).

### C1.1 Preventing Exposure

#### C1.1.1 Substitution with a Safer Alternative

*Is substitution with a safer alternative practical, by for example, replacement of a clinical strain or pathogen with one that is lab adapted? Provide reasons for your answer:*

No other alternatives available.

#### C1.1.2 Isolation/Segregation

*(i) Is/Are the laboratory(s) to be used for this work to be shared with other workers not directly involved in this activity?*

| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | Yes |
|---|---|

If yes, provide details:

Work will be conducted in the CBE laboratories, which is a multiuser facility, with shared equipment. After each culture all shared equipment will be cleaned and decontaminated according to procedures detailed in CBE equipment SOPs. Cultures will be incubated in closed flasks. Risk of cross contamination will be minimal.

Access to the Containment Level 2 CBE Laboratory Unit is restricted to authorised laboratory workers with appropriate training in accordance with documented local Code of Practice (COP) and Quality Management System (QMS) requirements for Containment Level 2 work activities involving biological materials (CL1 & 2).

*(ii) Is access to the laboratory(s) to be used for this work restricted?*

| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | Yes |
|---|---|

If yes, provide details:

Access to CBE laboratories is restricted to authorised users only. The laboratories are locked at all times outside of normal working hours to ensure safe storage of biological agents and unauthorised entry. Keys to the laboratories are only issued to authorised users. Access is also restricted to the building (swipe card) and CBE (key entrance) during normal working hours. Out of Hours/Lone working is logged and permitted subject to risk assessment.

No cleaning personnel are permitted in the CBE Laboratory Unit. Access by other Non-Laboratory or maintenance personnel is subject to risk assessment and Permit-to-Work system documented in the local COP.

| C1.2 Controlling Exposure |
|---|

**C1.2.1 Are sharps (needles, blades, scissors, forceps, glass or capillary tubes) to be used at any stage during this activity?**

| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | No |
|---|---|
| If yes, list the sharps: | |
| If yes, justify there use – is there an alternative? | |
| If yes, describe there use and disposal: | |
| If yes, describe any additional precautions employed to reduce risk: | |

**C1.2.2 Containment and Ventilation**

| *(i) Is the use of BSC required for the protection of the worker i.e. do the work procedures generate aerosols or splashes that pose a risk to workers?* | |
|---|---|
| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | Yes |
| If yes, specify the type(s) and when they will be used:<br><br>Aerosols may be generated when manually pipetting or manipulating solutions. A Class II Biological Safety Cabinet will be used for all manipulations that may produce aerosols or splashes primarily to ensure protection of cell lines from contamination as part of a quality assurance discipline. Procedures to be carried out according to the following SOPs:<br><br>1) SOP009, "Use and Maintenance of HERASAFE KS Class II BSC"<br>2) SOP104 "Use and Maintenance of HERASAFE KS Class II re-circulating BSCs" | |
| *(ii) Are there any requirements for room ventilation e.g. negative pressure, temperature control?* | |
| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | No |
| If yes, specify: | |

**C1.2.3 Transport and Storage within the laboratory**

*How and where are materials to be stored?*

Material listed in B2.1.1 will be stored in a cryobank or temporary storage in designated cell culture incubators according to the following SOPs:

1) SOP005, "Storage and Transport of Biological Materials"
2) SOP008, "Receipt of Hazardous Biological Material"
3) SOP013, "Use and Maintenance of Liquid Nitrogen Stores"
4) SOP017, "Use and Maintenance of the Galaxy-R Incubator"
5) SOP031, "Cryopreservation and Storage of Mammalian Cell Lines"
6) SOP053, "Use and Maintenance of the Sanyo CO2 Incubator

Storage units are located in Laboratories H21 and H23 of the CBE Laboratory Unit

*How will this material be transported within the laboratory e.g. between BSC and incubator? Detail the containment measures which will be used to prevent or contain accidental splashes or spills.*

CBE, however if cells were to be removed flasks/vessels containing cells will be contained in sealed secondary containers. In the event of an accidental breakage, resulting in a biological spill, this will be cleaned up immediately according to SOP038 - Biological Spill Response.

Cells (in flasks/other lidded vessels) will always be transferred in sealed secondary containers large enough to carry the designated material to ensure that material is contained in the event of accidental breakage or leakage. Appropriate spill response procedures are posted in the lab and documented in detail in the following SOPs:

1) SOP005, "Storage and Transport of Biological Material"
2) SOP038, "Biological Spill Response"

**C1.2.4 Local transport out of the laboratory**

*How will this material be transported on-site (e.g. research material between labs on campus or movement of waste containing viable agents e.g. to a remote autoclave? Detail the containment measures which will be used to prevent or contain accidental splashes or spills*

Local transfer outside the CBE Laboratory Unit is not anticipated but any requirement is likely to be constrained within the University site. All transport will be subject to controlled procedures according to the local COP and SOP005 (see below). For example, if necessary, transfers will use double containment procedures Transport of research material between laboratories is done using sealed containers which are put into tube racks and trays and transported using trolleys according to the following SOPs. Waste potentially containing viable agents is not removed from the laboratories until it has been autoclaved.

1) SOP003, "Disposal of Biological Waste"
2) SOP005, "Storage and Transport of Biological Material"
3) SOP038, "Biological Spill Response"

**C1.2.5 Shipment of Biological Material**

| *Will this material be shipped elsewhere in the UK or abroad?* | | | | | | |
|---|---|---|---|---|---|---|
| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | | | | | | Yes |
| If yes, give details to support compliance to the relevant regulation (e.g. category of material, correct packaging instruction):<br><br>Samples of cultured cells will be shipped back to Cambridge for analysis; noting that the material is maintained under the ownership of FS; Cambridge and no MTA is required). Shipping of this 'Category B' material will follow packaging compliance procedures detailed in SOP005; 'Storage and Transport of Biological Material', the local COP and the full guidelines found at the HSE website. In short this includes a leak proof inner receptacle (eg hermetically sealed flask), a secondary container secured in cushioning and absorbent material sufficient to absorb the entire contents of the inner receptacle, and an outer container. The packaging will be robust enough to withstand a drop of at least 1.2 metres and will be marked externally with a black diamond containing the identifier 'UN 3373'. | | | | | | |
| Description of material to be shipped (*indicate in available boxes*). | | | | | | |
| Category A | | UN2814 | | UN2900 | | *Packaging instruction 602 or 620 must be followed* |
| *Or?* | | | | | | |
| Category B | x | UN3373 | x | | | *Packaging instruction 650 must be followed* |

*Or?*

| | | |
|---|---|---|
| Non-hazardous | | *Should be packaged to protect sample* |

**C1.2.6 Receipt of material**

*If material will be received from other sites or organisations, what precautions are being taken to ensure that the material is shipped correctly?*

The material listed in B2.2.2 will be shipped from the Anne McLaren Laboratory in Cambridge according to their own Quality Management procedures. The procedure for the safe receipt of packages containing potentially biohazardous material and their delivery to the appropriate recipient or other designated personnel in the CBE is documented in SOP008; "Receipt of Hazardous Biological Material". This SOP is intended to minimize the consequences that could result from the failure of packaging methods and materials used to ship biohazardous materials.

**C1.2.7 Centrifugation**

*(i) If material is to be centrifuged will sealed buckets and rotors be used?*

| | |
|---|---|
| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | Yes |

*(ii) Where will these rotors/buckets be opened?*

Sealed buckets will be opened within the Containment Level 2 (CL2) Laboratory Unit, unless there is evidence of a potential spillage, in which case the sealed buckets will be opened in the BSC).

The centrifuge is operated and maintained according to the following SOP:
1) SOP088 "Use and Maintenance of Eppendorf 5804 centrifuge"

*(iii)Describe the procedures in place to deal with leaks and spillages in the centrifuge*

Procedures to prevent, contain and respond to leakages and spillages in the centrifuge are detailed in the following SOPs:

1) SOP088 - Use and Maintenance of Eppendorf 5804 centrifuge
2) SOP038, "Biological Spill Response"

Labelled Biological Spill kits are located in each laboratory within the CBE Laboratory Unit. Signs are posted throughout the Laboratory Unit to enable workers to locate the nearest biological (and chemical) spill kits. Posters are also displayed in each laboratory where a centrifuge is located to advise on spill response and reporting procedures.

**C1.2.8 Incubators**

*If incubators are to be used, what type of incubator (e.g. shaking, static) is used and describe procedures to prevent and contain spillages.*

Static incubators are used. Procedures to prevent, contain and respond to spillages in the incubators are detailed in the following SOPs:

1) SOP079– Use and Maintenace of Heracell $CO_2$ Incubator
2) SOP053, "Use and Mantenance of Sanyo CO2 Incubator"
3) SOP038, "Biological Spill Response"

### C1.2.9 Disinfection

Specify the type and concentration of disinfectants to be used:

The disinfectants were carefully chosen for effectiveness in use. The number of disinfectants in use is strictly limited to avoid errors and ambiguities in use and accidental mixing of compounds that may give rise to hazardous reactions or the formation of toxic products. Unless there are compelling reasons to do otherwise, Virkon (1% w/v) is the sole disinfectant used in the laboratories other than 70% IMS which is used for general disinfection cleaning (SOP004) where Virkon cannot be used; for example stainless steel surfaces.

Virkon has a wide range of bactericidal, virucidal, fungicidal and sporocidal activities. Representative viruses from all the major virus families are inactivated by Virkon. Working solutions of 1% w/v have low toxicity and no irritancy. Selection and procedures detailed in the following SOPs:

1) SOP004, "General Laboratory Housekeeping"
2) SOP006, "Selection and Use of Virkon Disinfectant"
3) SOP039, "Storage, Handling and Disposal of Chemicals"

COSHH Risk Assessment reference for Virkon CBE/39

| Have these disinfectants been validated for use with the recipient biological material? | |
|---|---|
| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | Yes |

If yes, describe the procedure:

For Hazard Group 1 and 2 Biological agents it is normally be sufficient to rely on the manufacturer's data, providing the recommended concentrations and contact times are used. Independent studies have reported that 1% Virkon completely destroys a wide spectrum of organisms within a contact time of 10mins. Hence Virkon (1%) is used as per manufacturers instruction and according to standard procedures detailed in the COP and the following SOP:

1) SOP006, "Selection and Use of Virkon Disinfectant"

### C1.2.10 Personal Protective Equipment (PPE)

*(i) What type of lab coats will be worn and where will they be stored?*

Side fastening *howie type* lab coats will be worn at all times within the CBE facility. They are stored outside the laboratory in a dedicated change area. Guidance on the proper use of PPE will be in accordance with the following SOP:

1) SOP037 *"Use of Personnel Protective Equipment".*

*(ii) What type of gloves will be worn and where will they be stored?*

1) Autoclave gloves, which will be stored in close proximity to the autoclave equipment in the Autoclave Room (H31) and the Automated Cell Culture Suite (H21/H22). As directed by SOP025 *"Use and Maintenance of Systec VX-95 Autoclave CBE045"*
2) Cryogenic gloves, which will stored in close proximity to the Liquid Nitrogen storage containers located in Gas Pod 3, Analytical Lab (H23). As directed by SOP013 *"Use and Maintenance of Liquid Nitrogen Stores"*
3) Disposable latex powder free Nitrile gloves for general use will be worn at all times when in the CBE facility;stored in the change rooms and point of entry to each laboratory within the CBE Laboratory Unit. As directed by SOP037 *"Use of Personnel Protective Equipment"*

Correct use of PPE is described in SOP037, "Use of Personal Protective Equipment (PPE)"

*(iii) Describe any other PPE to be used:*

1. Laboratory Safety Glasses will be worn as directed by relevant SOPs when working within the CBE.
2. Face shield (primarily for handling liquid nitrogen) will be worn when retrieving the cell vial from storage in the CBE as directed by SOP013 "Use and Maintenance of Liquid Nitrogen Stores"
3. Full Length Aprons will be worn for extra protection when retrieving the cell vial from Liquid Nitrogen stores in the CBE as directed by SOP013 "Use and Maintenance of Liquid Nitrogen Stores" and when operating the autoclave as directed by SOP025 "Use and Maintenance of Systec VX-95 Autoclave CBE045".
4. Shoe covers when necessary, in case of a spillage

Correct use of the above PPE is described in SOP037, "Use of Personal Protective Equipment (PPE)"

**C1.2.11 Hygiene Measures**

*Describe the hygiene facilities available and where they are located*

1. Designated hand washing facilities are located in each laboratory change room and in the Analytical Laboratory (H23).
2. Eye Wash stations are located next to each 'hand washing only' sink in each laboratory change room and in the Analytical Laboratory (H23).

**C1.2.12 Vaccination**

| Are effective vaccines available against any of the agents listed in Section1, 2, 3, or 4 of Part B? | |
|---|---|
| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | N/R |
| If yes, describe: | |

**C1.2.13 Waste Treatment before Disposal**

*How must waste to be treated before disposal and how has it been validated as being effective?*

| Type of Waste | Treatment before disposal | Validation of this treatment |
|---|---|---|
| *Liquid waste* | Virkon Decontamination according to SOP 003 *"Disposal of Biological Waste"* | According to manufactures instructions, see section C2.1.9 |
| Solid waste | Autoclave Decontamination according to SOP 003 *"Disposal of Biological Waste"* | Treatment cycle is validated according to SOP024 "Maintenance of Systec VX- |

| | | |
|---|---|---|
| | | 95 Autoclave CBE044" and SOP025 "Maintenance of Systec VX-95 Autoclave CBE045". Annual validation is conducted by an external contractor. |

**C1.2.14 Autoclave sterilisation**

| *If waste is treated by autoclave sterilisation then this section must be completed. If this section is not relevant then hatch the box* | | | |
|---|---|---|---|
| Type of Waste | Composition of waste | Autoclave cycle (temp, cycle time) | Treatment monitor |
| Liquid waste | Cell cultures in flasks | Minimum 121C for 15 mins. Cycle # 5 | Designated Autoclave tape monitors, Operational performance verification charts |
| Solid waste | Disposable cell culture consumables/ Labware | Minimum 121°C for 15mins (under clinical vacuum) CYCLE # 4 | Designated Autoclave tape monitors, Operational performance verification charts |
| | | | |
| Location of autoclave | Servicing details | Location of back-up autoclave | Designated area for storage of unsterilised waste |
| Autoclave CBE-044 in Autoclave Room (H31) within the CBE Laboratory Unit i.e. same location as intended work | Annual | Autoclave CBE-045 in Autoclave Room (H31) or Systec Autoclave in CBE Tissue Culture Suite, Wolfson School, T.2.08B | In secure cage within the Autoclave Room (H31) |

**C1.2.15 Liquid Waste Disposal**

| *How will liquid waste be disposed of?* |
|---|
| To the drain?<br><br>Aspirated cell culture media will be chemically destroyed: Aspirated into virkon (1% final) and decontaminated for 24hrs before disposal down the drain followed by copious amounts of water. Refer to SOP003 "Disposal of Biological Waste". |
| As solid waste?<br><br>Liquid cell culture waste (in flasks) will be autoclaved. |
| Other?<br><br>Waste trypan blue will be disposed as per SOP029. Large quantities of trypan blue with dead cells from the Cedex are disposed by the method described in SOP041, Use and Maintenance of the Cedex. |

**C1.2.16 Solid Waste Disposal**

Describe the waste category and disposal route. *(For guidance refer* to http://www.environment-agency.gov.uk)

| Colour Code | Categorisation | *Hatch relevant box(es)* | Disposal Method |
|---|---|---|---|
| Yellow | Sharps (not contaminated with cytotoxic/cytostatic material) | | Yellow Sharps bin > autoclave sterilisation if known or potentially infected > clinical waste disposal (incineration) |
| Purple/Yellow Special case, contact DSO | Sharps (contaminated with cytotoxic/cytostatic material) | | Purple/Yellow lidded Sharps bin > clinical waste disposal (incineration @ 1000C) |
| Yellow | Human body parts, organs, including blood bags and blood preserves and excreta (unless identified as medium or high risk or known infected in Section 2.2.1 of this RA in which case they must be pre-treated before disposal) | | Yellow rigid one way sealed tissue bins > clinical waste disposal (incineration) |
| Yellow | Animal body carcasses or recognisable parts ((unless identified as medium or high risk or known infected in Section 2.2.1 of this RA in which case they must be pre-treated before disposal | | Yellow rigid one way sealed tissue bins > clinical waste disposal (incineration) |
| Special Case – Contact DSO | Potentially or known infected lab wastes (including sharps) of HG2, GM Class 2, DEFRA Cat 2 or higher, that have not been pre-treated before leaving the site. | | This is not a route of preference and is subject to special requirements |
| Orange | Infected or potentially infected lab wastes that have been pre treated before leaving the site | ✓ | Disinfection or sterilisation (as identified in C1.2.14) in the laboratory suite > orange clinical waste bags > clinical waste disposal (incineration) |
| Yellow | Infected or potentially infected animal or human body parts, organs or excreta that have been pre treated before leaving site | | Disinfection or sterilisation (as identified in C1.2.14) in the laboratory suite > yellow one way sealed tissue bins > clinical waste disposal (incineration) |

**C1.2.17 Work with Animals or Vectors (if none proceed to Section C1.2.18)**

| | |
|---|---|
| (i) Are animals or vectors to be infected with any of these biological agents? | |
| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | N/R |
| If yes, describe the procedure and describe where this aspect of the work will be conducted: | |
| (ii) Is shedding of infectious materials by the infected animals possible or expected? | |
| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | N/R |
| If yes, describe the routes of shedding, risk periods for such shedding and the additional precautions required to control exposure: | |
| (iii) Who will perform the inoculations of animals/vectors? What training have they received? | |

| | |
|---|---|
| Indicate in the adjacent box if Not Relevant (N/R) | N/R |
| Provide details of the training required: | |

**C1.2.18 Bioreactor/Fermenters (if none proceed to Section C1.2.19)**

| | |
|---|---|
| Will a bioreactor/fermenter be used to culture a biological agent? | |
| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | No |
| If yes, describe the size, and type of the bioreactor/fermenter. | |
| (ii) Are any supplementary containment measures required, for example, the use of a BSC or spill tray. | |
| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | N/R |
| If yes, describe: | |

**C1.2.19 Other Control Measures Required?**

| |
|---|
| None |

**C1.3 Emergency Procedures**

**C1.3.1 Describe the procedures in place for dealing with spillages** *(specify disinfectants and any special containment for large volumes)*

| |
|---|
| Within the BSC:<br><br>Local procedures for dealing with small and large spillages are described in the following SOPs:<br><br>1) SOP006 – Selection and use of Virkon disinfectant<br>2) SOP009 – Use and Maintenance of Herasafe KS Class II BSC<br>3) SOP104- Use and Maintenance of HERASAFE KS Class II re-circulating BSCs<br>4) SOP038 – Biological Spill Response<br><br>Labelled Biological Spill kits are located in each laboratory within the CBE Laboratory Unit. Signs are posted throughout the Laboratory Unit to enable workers to locate the nearest biological (and chemical) spill kits. Posters are also displayed in each laboratory within the Unit where a BSC is located to advise on spill response (inside the BSC) and reporting procedures |
| Within the laboratory but outside the control measure e.g. BSC, spill tray<br><br>Procedures for dealing with small and large spillages are detailed in the following SOPs:<br>1) SOP006, "Selection and use of Virkon Disinfectant"<br>2) SOP038, "Biological Spill Response"<br><br>Labelled Biological Spill kits are located in each laboratory within the CBE Laboratory Unit. Signs are posted throughout the Laboratory Unit to enable workers to locate the nearest biological (and chemical) spill kits. Posters are also displayed in each laboratory within the Unit to advise on spill response (ouside the BSC) and reporting procedures. |

Outside the laboratory e.g. during transport

Unlikely that cells will be transported outside the CBE Laboratory Unit, except for shipment see section C.1.2.5

Procedures for dealing with small and large spillages outside the CBE are covered in the COP and the following SOPs:

1) SOP005, "Storage and Transport of Biological Material"
2) SOP006, "Selection and use of Virkon Disinfectant"
3) SOP038, "Biological Spill Response

*Describe the procedures in place for an accidental exposure (if necessary describe different procedures for different types of exposure e.g. eye splash or percutaneous inoculation)*

1) Procedures to respond to accidental exposure are detailed in SOP038, "Biological Spill Response" and the local COP. These are detailed in spill response posters located in each laboratory within the Unit. Accident procedures in the case of glass or sharps injury are described in the local COP and displayed in posters located in each laboratory within the Unit
2) Designated hand washing facilities are located in each laboratory change room and in the Analytical Laboratory (H23).
3) Eye Wash stations are located next to each 'hand washing only' sink in each laboratory change room and in the Analytical Laboratory (H23).
4) A First Aid Kit is located outside the Laboratory Unit. Signs are posted throughout the Laboratory Unit to enable workers to locate the nearest Medical Kit. Contact details for First Aiders are posted in each laboratory within the Unit
5) Essential and Emergency Contact details are posted in each laboratory within the Unit.

## C2 ASSIGNMENT OF CONTAINMENT LEVEL

*The laboratory Containment Level is directly related to each of the 4 Hazard Groups; organisms categorised as HG1 (lowest hazard rating) should normally be handled in CL1 facilities (minimum level of containment), and likewise up to HG4 (highest hazard rating) in CL4 facilities (maximum level of containment). Where the identity or presence of a biological agent is not known the following rules apply: a) where uncertainty exists over the presence of pathogenic biological agent – minimum of CL2; b) where the presence of a pathogenic biological agent is known or suspected – minimum of Containment Level appropriate to the agent, where the assessment is inconclusive but where the activity might involve serious risk – minimum CL3*

**C2.1. What containment level is required for this work?** (see COSHH Schedule 3, Part II for a list of criteria)

The work activities within this project involve biological agents (BAs) assessed as Hazard Group 2, requiring Containment Level 2. All procedures will be carried out under Containment level 2 (CL2) within the CL2 CBE Laboratory Unit for reasons in addition to worker protection; this includes the need to ensure research material protection (i.e. use of class II BSC) and to impose the CBE quality assurance discipline under the local COP.

**C2.2. Describe extra controls or derogation from certain controls**

None

## C3 FACILITIES

**C3.1 Where will this work take place?**

| Room(s) | Building | Campus | Person in Control of area |
|---|---|---|---|
| Most of the cell culture work will be carried out in the Cell Culture Automation Laboratory, H-20-22.<br><br>Cryostorage samples will be kept in the cryostorage banks in the room H-31.<br><br>Waste disposal in Autoclave Room, H-31.<br><br>The store room, H-18 and cold room H-19 will be used to store consumables | Area GH, Garendon Wing, Wing | Holywell Park | *Lab Manager:*<br>C. L. Kavanagh<br>K. Sikand<br><br>*DSO:*<br>R. I. Temple<br><br>*Local Biological & GM Safety Advisor:*<br>Professor C. J. Hewitt |

## C4 PERSONNEL

**C4.1 Names of Personnel involved in the Project**

| Surname | Initials | University ID | Position |
|---|---|---|---|
| Soares | F | B129892 | PhD Student |
| Chandra | A | 5002714 | Research Associate |
| Thomas | R | 5007730 | Senior Lecturer |
| | | | |
| | | | |

**C4.2 Information, Instruction and Training**

*Describe the training that will be given to all those affected (directly or indirectly) by the work activity. Instruction should include the 'Local Rules' or 'Local Codes of Practice' which focus on the working instructions to be followed by all persons involved in the work activity to control or prevent exposure to hazardous biological agent(s). These should be written and readily available to all workers working at Containment Level 2. A formal record of training should be kept for all individuals working at Containment Level 2.*

Access to CBE laboratories is restricted to authorised users. In order to obtain authorised user status, operators must satisfy minimum training requirements set by CBE management and Health and Safety Committee. Basic training modules include a detailed review of the current Code of Practice (COP). This document details specific aspects of CL2 working in relation to handling biological agents, waste management, training requirements of lab equipment and emergency procedures inc. spill responses. All training is documented in a personal training file, which is held in the CBE office at all times. Prior to being granted access to CBE labs, each training file is reviewed and signed off by both lab management and the departmental safety officer (DSO).

Once authorised access has been granted, it is the responsibility of the operator to identify specific training needs prior to the start up of new projects. SOPs and risk assessments relevant to project equipment and/or procedures can be used as training aids. Training files are live documents and are continually updated to record all training acquired. They can be audited by the lab management and the DSO at any time.

For this project, F. Soares and A. Chandra carry out the practical aspects of the project while R. Thomas and D. Williams will take a supervisory role. F..Soares will be trained to local procedures before authorisation to commence work in the CBE Laboratory Unit under the supervision of AC (according to the above CBE processes). A. Chandra is a fully trained, authorised user of the CBE Laboratory Unit, equipment and processes. His training will be supplemented by specific 'on the job' training (by FS) re execution of culture protocols described in this risk assessment.

**C4.3 Relevant Experience/Training:**

| Surname | Experience/Training |
|---|---|
| Soares | Will be trained in using the CBE before starting any work at the laboratory.<br><br>Has 5 years of tissue culture experience at CL1 and 1 year at CL2 including iPS/GMO cells. |
| Chandra | Has been trained in using the CBE laboratory right from the time it was setup. His training file has been authorised by his supervisor (P. Hourd), the Lab Manager (C. Kavanagh) and the DSO (R. Temple). It is up-to-date and it shows that his training is adequate to run the protocols described in the risk assessment.<br><br>Has culture GMO cells in the past as part of another project. |

**C4.4 Other people who may be at risk from the activity e.g. cleaners, maintenance workers or other workers in shared laboratory**

Details:

NONE: Cleaners and Maintenance workers are not authorised to enter the laboratory. All laboratory cleaning is undertaken by authorised personnel (ie CBE staff). Access for non-laboratory workers is subject to a local permit-to-work procedure. If access is needed for essential maintenance of equipment for example a clean down and decontamination of the laboratories will be performed. This will be documented with decontamination certificates and the maintenance worker fully supervised according to SOP004 "General Laboratory Housekeeping" and the local Code of Practice. Two laboratory shut downs occur every year for a week for maintenance work to be done in the CBE Laboratory Unit. Prior to these shut down weeks a full deep clean decontamination will be performed in the all laboratory areas. All other workers in the CBE Laboratory Unit are authorised personnel.

## C5 OCCUPATIONAL HEALTH

**C5.1 Vaccination**

Is an effective vaccination available for any of the pathogens associated with this work? Advice can be obtained from the Occupational Health Adviser (OHA) if required. All workers involved with handling unscreened blood, blood products and other tissues are recommended to have Hepatitis B immunization

Immune for Hepatitis B. Certificate and status of Hepatitis B immunization documented in personal training file of all named personnel.

**C5.2 Health Surveillance**

| |
|---|
| Is health surveillance required? (Health surveillance is typically applied if working with a hazardous substance that: a) produces an identifiable disease or adverse health effect that can be related to exposure; b) there is a reasonable likelihood that the disease or effect may occur under the conditions of work, and c) there are valid techniques for detecting indications of the disease or effect).<br><br>N/R |

## C6. NOTIFICATIONS: Human Tissue Act

**C6.1.1 Relevant material covered by the Human Tissue Act**

| *Are any of the cells, tissues or fluids to be used covered by the Human Tissue Act?* | |
|---|---|
| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | No |

**C6.1.2 Does This Work Have Ethical Approval? If Yes, Provide Details**

| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | | | Yes** |
|---|---|---|---|
| Approval number: | LREC 05/Q0108/146 for BBHX8 cell line (**at Cambridge end) | | |
| Date obtained: | 2008 | Ethics committee name: | Addenbrooke's Hospital NHS Trust Local Research Ethics Committee |

| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | | | Yes |
|---|---|---|---|
| Approval number: | LREC 08/H0311/201 for A1ATD cell line (**at Cambridge end) | | |
| Date obtained: | 16th Jan 2009 | Ethics committee name: | Addenbrooke's Hospital NHS Trust Local Research Ethics Committee |

**C6.1.3 Are other registrations/notifications required for this work? For example HSE notification under COSHH, Home Office notification under anti-terrorism, crime and security act etc**

| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | No |
|---|---|
| | |

## 7. LICENSING REQUIREMENTS FOR ANIMAL PRODUCTS

**C7.1.1 Are there any licensing requirements for this work?**

| Indicate in the adjacent box as No, Yes or Not Relevant (N/R) | N/R |
|---|---|

The regulations covering the import of animal products (including tissue cultures, tissues, body fluids or fractions thereof) are in a state of flux. Current procedures to be followed:

- If you wish to import any animal products that you know are not infected with an animal pathogen, or have good reason to expect that they are not infected with an animal pathogen, from within or outside of the EC you must apply for a Research Sample Licence using the Defra form IAPPO1. Follow this link to download the form http://www.defra.gov.uk/corporate/docs/forms/ahealth/iapppo1.htm

- If you wish to import such an animal product but it is known or suspected of being infected with an animal pathogen then you must use DEFRA form IM137. Follow this link to download the form http://www.defra.gov.uk/corporate/docs/forms/ahealth/inttrade/im137.htm

- If you wish to import an animal pathogen listed under the Specified Animal Pathogens Order then you must use DEFRA form PATH1. Follow this link to download the form http://www.defra.gov.uk/corporate/docs/forms/ahealth/path1.htm

In all cases the instructions for their submission is stated on the forms themselves.

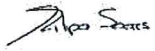
ALL APPLICATIONS SHOULD BE REVIEWED BY THE DEPARTMENTAL SAFETY OFFICER AND THE UNIVERSITY BIOLOGICAL SAFETY OFFICER BEFORE SUBMISSION.

## 8. DECLARATION

*The declaration must be signed **before** submitting this assessment to the Departmental Safety Officer and University Biological Safety Officer*

I, the undersigned:

- confirm that all information contained in this assessment is correct and up to date
- will ensure that **suitable and sufficient instruction, information and supervision** is provided for all individuals working on the activity
- will ensure that no work will be carried out until this **assessment has been completed and approved** and that all necessary control measures are in place
- that all information contained in this assessment must remain correct and up to date (the assessment should be **reviewed once a year** and whenever any **significant changes** to the work activity occur)
- will re-submit the assessment for approval if any significant changes occur

| **Name:** Person conducting assessment | **Signature:** | **Date:** |
|---|---|---|
| **F. Soares** |  | **24 May 2012** |
| **Name(s):** All named persons involved in the project *(add additional rows below, as required)* | **Signature:** | **Date:** |
| **A. Chandra** |  | **24 May 2012** |
| **Name:** Principal Investigator/Supervisor/Line Manager | **Signature:** | **Date:** |
| **R. Thomas** |  | **24 May 2012** |

## 9.APPROVAL

For work involving **Hazard Group 1** biological agents: Review and approval is required by authorised and designated members of CBE staff before the work begins

For work with **Hazard Group 2** biological agents: Explicit approval is required from the Departmental Biological Safety Advisor and the University Biological Safety Officer before work begins.

If the biological agent has been **Genetically Modified** this form, (approved by the relevant authority, as above) should be submitted with the GMO risk assessment to the Departmental Biological Safety Advisor and both forms forwarded to the LU GM Safety Committee for final approval.

| **Name:** Authorised CBE Personnel (please indicate position) | **Signature** | **Date** |
|---|---|---|
| **P.Hourd** CBE QUALITY MANAGER | P Hourd | **24 May 2012** |
| **Name:** Departmental Biological Safety Advisor | **Signature** | **Date** |
| **C. Hewitt** | CMH | 25/5/12 |
| **Name:** University Biological Safety Officer (or Deputy) | **Signature** | **Date** |
| C.M. MOORE | C.M Moore | 7/6/12 |