Risk Assessment Form
Cardiff School of Biosciences

IMPORTANT: Before carrying out the assessment, please read the Guidance Notes

1. General Information

Department	Cardiff School Of Biosciences	**Building**	Sir Martin Evans (BIOSI 2)	**Room No**	E/0.03
Name of Assessor	Dr Anthony J Hayes	**Date of Original Assessment**	12/5/2022	**Assessment No or practical module No**	1

Status of Assessor: Staff ☒ Postgraduate ☐ Undergraduate ☐ Other: (Specify) .....

2. Brief Description of Procedure/Activity including its Location and Duration

Operation and use of the Zeiss Celldiscoverer7 automated live cell imaging system.

The Zeiss Celldiscoverer7 is designed and manufactured to comply with all applicable performance standards for electrical, LED and Class 3B laser products. In summary, the equipment meets the requirements of the following standards:

- DIN EN 61010-1 (IEC 61010-1) "Safety Requirements for Electrical Measuring, Control, and Laboratory Equipment.
- The device meets the requirements of the EC Directive 98/79/EC Annex 1 regarding ivd products and the RoHS Directive 2011/65/EC,
- DIN EN 60825-1 (IEC publication 60825-1) "Safety of laser equipment",
- 21 CFR 1040.10: "Performance Standards for light emitting products – laser products",
- DIN EN 61326-1 "Electrical equipment for measurement, control and laboratory use – EMC requirements",
- Low voltage directive: 2006/95/EC,
- EMC directive: 2004/108/EC

Description of equipment.

The Celldiscoverer7 system is a 'closed box', turn-key, automated live cell imaging system installed and maintained by Zeiss via fully comprehensive service cover and housed in a dedicated low light, air-conditioned microscopy suite (E/0.03).

LED specifications:

LED fluorescence excitation wavelength at 385nm, 420nm, 470nm, 511nm, 567nm, 590nm, 625nm.

Laser specifications:

- 405nm diode laser, 5mW class 3B
- 488nm diode laser, 10mW, laser class 3B
- 561nm diode laser, 10mW, class 3B
- 640nm diode laser, 5mW, laser class 3B

All lasers are fully enclosed within the Celldiscoverer7 equipment housing and there is no open beam path – samples are loaded into the instrument for imaging internally. Warning labels and safety notes are positioned around the microscope for maximum visibility to the user. Laser illumination is supplied to Celldiscoverer7 system via shielded fibres. All relevant service panels are interlocked. Lasers are activated via key switch and software control. The key is kept in a secure key cabinet in E/0.03, with a duplicate in a second key cabinet in E/0.14 (staff office). All system maintenance is performed by Zeiss service engineers. All users are trained by hub technical support staff and have evaluated the risks associated with using this equipment for their specific imaging applications.

Live cell imaging applications

A separate risk assessment is required from users planning live cell imaging applications involving pathogenic, GM or any other potentially hazardous samples. All contact areas and points of entry into the microscope must be alcohol disinfected and the imaging chamber UV disinfected following use (see below).

The Celldiscoverer 7 system is supplied with CO2 for longitudinal live cell imaging applications – a separate risk assessment covers the use/changing of gas cylinders.

Loading samples into the Celldiscoverer7 system.
Samples are loaded into the Celldiscoverer7 system via a motorised sample carrier. The loading frame accepts a number of different insert plates that accommodate a variety of different sample formats (*e.g.,* histology slides, chamber slides, 35mm dishes, 60mm dishes etc).

- Microwell plates **do not** require an insert plate and can be inserted directly into the loading frame with the A1 well correctly positioned *below the white reference coordinates marked on the loading frame (i.e., A1).* **N.B. Only microwell plates to SBS standard should be used.**
- Insert plates should be correctly positioned into the loader so that their protruding lug locates with the notch in the surrounding mounting frame. To avoid obstructions during loading, please ensure that samples are properly seated on the thin metal supporting lamina located at the base of each insert plate, and securely held in place via the attached restraining clips.
- Care should also be taken when loading inserts and samples to avoid pinching fingers or lacerating them on sharp edges.

UV disinfection of imaging chamber.
The sample chamber of the Celldiscoverer7 must be UV disinfected after imaging of any pathogenic or GM samples. This is an automated procedure carried out by Hub technical staff and uses a UV disinfection unit which is loaded into the Celldiscoverer7 system. To perform this procedure, the UV disinfection unit must be properly loaded into the sample carrier so that its electrical contacts marry up with those of the surrounding loading frame and the text 'UP' is uppermost. The UV disinfection procedure is initiated from the touchscreen display. UV disinfection is only launched once the unit has been internalised and lasts 18 minutes. It can be aborted at any time by pressing stop and then eject on the touch screen.

Further details can be found in the following manuals (available through the Bioimaging Hub's protocol repository):

- Zeiss Celldiscoverer7 automated microscope system for live and fixed samples. Notes on instrument safety and installation conditions.
- Zeiss Celldiscoverer7 automated microscope system for live and fixed samples. Operating manual.

2a. Is your work governed by specific legislation i.e.:
(Tick as appropriate, see guidance notes)

Human Tissue (HTA-work involving human tissue):	☐	Approval compliance obtained ☐
GM (any genetically modified organism including plant and animals):	☐	Approval compliance obtained ☐
Radiation (radioisotopes, sealed sources):	☐	Approval compliance obtained ☐
Controlled Drugs:	☐	Approval compliance obtained ☐
Non ionising radiation (lasers, magnetism):	☒	Approval compliance obtained ☐
Use of human subjects (Ethics):	☐	Approval compliance obtained ☐

N.B. Work requiring imaging of HTA, GM or other potentially hazardous samples MUST be accompanied by a separate risk assessment.

3. Persons at Risk		Are they		Notes
Staff	☒	Trained	☒	Trained staff/students (unsupervised) and staff/students undergoing training (supervised) are potentially at risk. Untrained users are not permitted access to the instrument.
Visitor	☐	Disabled	☐	
Contractor	☐	Inexperienced	☐	
Students	☒	Competent	☐	
Vulnerable groups	☐			

4. Level of Supervision	Notes
None ☐ Constant ☐ Periodic ☐ Training Required ☒	Training is required for independent usage of the equipment. Untrained users are not permitted independent access.

5. Will Protective Equipment Be Used? Please give ***specific*** details of PPE

Head ☐ Eye ☐ Ear ☐ Body ☒ Hand ☒ Foot ☐	For live cell imaging applications (see below), the use of a lab coat and protective gloves are essential.

6. Is the Environment at Risk? Notes

Yes ☒ No ☐	Specimens should be sealed before observation under the microscope and handled with care using the appropriate level of protection (see above). Leaky or cracked samples must not be examined. Samples on glass histology slides must be mounted under coverslips with hard-set mountant, or sealed with nail varnish to prevent leakage. Live cells grown within tissue culture plastics should be sealed with Parafilm to prevent spillage in transit to and from the facility. Any spillages should be cleaned up immediately and the area swabbed with 95% alcohol. Broken glass slides should be disposed of in the contaminated sharps bin – broken fragments of glass should be brushed on to paper and disposed of in a similar fashion.

7. Will Waste be generated? If 'yes' please give details of disposal

Yes ☒ No ☐	All biological samples and hazardous waste must be appropriately disposed of by the user. Potential risks associated with the waste material should be addressed by the user in a separate risk assessment form.

8. Hazards involved

Work Activity / Item of Equipment / Procedure / Physical Location	Hazard	Control Measures and Consequence of Failure	Likelihood (0 to 5) ×	Severity (0 to 5) =	Level of Risk
Routine use of the Zeiss Celldiscoverer7 microscope	Class 3B laser radiation; Eye strike	**1. Physical measures:** The system is housed in dedicated microscopy suite, with clearly labelled door signage to prevent unauthorised access. The microscope has a closed-box design with no open beam paths. Lasers are supplied via shielded cables. All relevant service compartments are interlocked. Laser power is adjusted to the minimum necessary to produce a signal. **2. Administrative measures:** Safety notices and precautions on and around the microscope should always be observed before and during operation. Standard safety procedures are compulsory for all users and must be incorporated into all experimental protocols All users are properly trained by experienced Bioimaging Hub technical staff. A register of users is maintained, and the use of the equipment is restricted to: Trained staff (unsupervised) Staff under training (supervised). Training includes safety provisions based on information supplied by Zeiss; Lasermet, OSHEU and AURPO. A laminated Emergency information card in room	0	4	0

		E/0.03 gives information for emergency medical treatment.			
	Broken glass	Broken glass from histology slides or coverslips should be disposed of in the contaminated sharps bin.	2	2	4
Observation of live cells/tissues	Biological contaminants	For individual research applications involving live cells/tissues, appropriate control measures should be in place to reflect the potential risk of the organism/tissue under study. *These must be evaluated by the user and the resultant risk assessment approved by the Technical Support Manager & Safety representative*. A copy of the risk assessment should be filed within the room E/0.03 and subject to periodic review. All samples should be clean and sealed to prevent leakage/spillage during observation on the Celldiscoverer7 microscope. Leakages and spillages should be cleaned up immediately and the area swabbed with 95% alcohol. All live samples should be removed from E/0.03 after microscopical observation and disposed of in an appropriate way by the user.	*	*	*

** application dependent (requires additional risk assessment)*

9. Chemical Safety (COSHH Assessment)

Hazard	Control Measures	Likelihood (0 to 5) ×	Severity (0 to 5) =	Level of Risk
Seepage of mountant or hazardous chemicals from broken or leaky sample preparations. Aqueous mountants often contain DNA-binding probes (e.g., DAPI; 4',6-diamidino-2-phenylindole) used for counterstaining of cell nuclei.	Users should use hard-set mountant, or seal sample preparations with nail varnish to prevent leakage. Gloves recommended for use with aqueous mountants. Sample preparations should be handled with care and disposed of appropriately (see above).	2	2	4
N.B. chemical hazards associated with individual imaging applications must be identified in the user's specific risk assessment.				

Scoring Criteria for Likelihood (chance of the hazard causing a problem) Likelihood
Scoring Criteria for Severity of Injury (or illness) resulting from the hazard

	Likelihood					
5	Almost Certain	5	10	15	20	25
4	Very Likely	4	8	12	16	20
3	Likely	4	6	9	12	16
2	Unlikely	2	4	6	8	10
1	Very Unlikely	1	2	3	4	5
	Severity	No Injury / Illness	First Aid Required	Minor Injury	Major Injury	Death
		1	2	3	4	5

Score Action to be taken:

0-5	Low Risk	No further action needed.
6-9	Medium Risk	Appropriate additional control measures should be implemented
10-25	High Risk	Additional control measures **MUST** be implemented. Work **MUST NOT** commence until such measures are in place. If work has already started it must **STOP** until adequate control measures are in place

10. Source(s) of information used to complete the above e.g Supervisor, Web etc….

Zeiss safety guidance notes in Celldiscoverer7 user manuals; Lasermet laser safety course notes; AURPO guidance Note 7: Guidance on the safe use of lasers in education and research; Cardiff University OSHEU Guidance document NIRP2: Working with lasers and other optical radiations.

11 Additional Control Measures – Likelihood and Severity are the values with the additional controls in place

Work Activity / Item of Equipment / Procedure / Physical Location	Hazard and Existing Control Measures	Additional Controls needed to Reduce Risk	Likelihood (0 to 5) ×	Severity (0 to 5) =	Level of Risk

After the implementation of new control measures the procedure/activity should be re-assessed to ensure that the level of risk has been reduced as required.

12. Action in the Event of an Accident or Emergency

Report to Supervisor/Manager immediately: Dr Anthony J. Hayes (E/0.14A; ext 76611). Follow OSHEU guidance (ext 74910). Provide details of the laser(s) in use to medical staff.

13. Arrangements for Monitoring the Effectiveness of Control

Ad-hoc visual checks and periodic review of existing risk assessments. School Safety inspections, internal and external safety audits.

14. Review: This assessment must be reviewed by (date):

Name of Reviewer:		Date of Review:	
Have the Control measures been effective in controlling the risk?			
Have there been any changes in the procedure or in information available which affect the estimated level of risk?			
What changes to the Control Measures are required?			

15. Signatures for printed copies:

Assessor:	Dr Anthony J. Hayes	Signature:	A J. Hayes	Date:	12.05.2022
Approved by: If assessor inexperienced		Signature:		Date:	
Reviewed by:		Signature		Date:	
Reviewed by:		Signature		Date:	
Person involved on risk assessment or issued to		Signature		Date:	