

<b>Health Physics</b>	 <b>diamond</b>	<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 1 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016



## Diamond Light Source

# Local Rules for the Protection of Persons from Ionising Radiations

## Radio-chemical Laboratory (DR, G142)

These Local Rules are important for your safety and well-being. All Diamond Light Source personnel, users, visitors and contractors must follow these Local Rules whilst working in the Diamond Controlled and Supervised Radiation Areas.

Disciplinary action will be taken against anyone found tampering with the Personnel Safety System (PSS) or radiation shielding or deliberately failing to follow an effective search procedure.

These Local Rules will be reviewed biennially or whenever significant changes are required.

This issue of the Radio-chemical Laboratory Local Rules supersedes all previous issues.

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 2 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

**Document Approval:**

Health Physics holds the electronic master copy with digitally approval record on the SharePoint.

Name	Position
Andy Dent	Science Director (acting) (Physical Science)
Richard Doull	RPA & HP Team Leader
Guy Thomas	Head of Safety, Health and Environment (SHE) Group
Jean Lane	Experimental Hall Manager
Fred Mosselmans	Principal Beamline Scientist (I18) & Lab Manager (Radio-chemical lab)

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 3 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

Index	Contents	Page
1.	<a href="#">Introduction</a>	5
2.	<a href="#">Radiation Safety Organisation and Responsibilities</a>	5
3.	<a href="#">Dose Investigation Level</a>	6
4.	<a href="#">Areas to Which these Rules Apply</a>	6
5.	<a href="#">Routine Monitoring and Maintenance</a>	6
6.	<a href="#">Systems of Work</a>	7
7.	<a href="#">Access / Working Instructions</a>	11
8.	<a href="#">Classified/ Non-classified workers</a>	11
9.	<a href="#">Incidents, Accidents and Contingency Plans</a>	12
	<a href="#">Appendix 1 – Names of Nominated People</a>	14
	<a href="#">Appendix 2 – Designation of Areas</a>	15
	<a href="#">Appendix 3 – Contingency Plan for radioactive contaminated individuals</a>	16

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 4 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

## 1. [Introduction](#)

- 1.1 These Local Rules are a requirement of Regulation 17 (1) of the Ionising Radiations Regulations 1999 (IRR99) and they set out the key arrangements for restricting radiation exposure in the Diamond Radio-chemical laboratory which is designated as a Supervised Radiation Area. They define the principles and working procedures to be adopted to ensure safe operations in the Diamond Light Source (DLS) Radio-chemical lab. All Diamond Light Source staff and Users working in the Radio-chemical lab must read these Local Rules before entering those areas covered by these Rules. All persons supervising contractors or guiding visitors in the Supervised Radiation Area must ensure that they are familiar with and obey the access conditions described in section 7.
- 1.2 Separate Local Rules are available for the DLS Controlled Radiation Areas not covered by this document, and links to these documents will be found on the Health Physics: Local Rules area of the Diamond Intranet. Written procedures are provided where appropriate for all Supervised Radiation Areas not covered by this document.
- 1.3 A glossary of Health Physics terms used in this document can be found on the Health Physics intranet page (Radiation Safety FAQs).

## 2. [Radiation Safety Organisation and Responsibilities](#)

- 2.1 The Chief Executive Officer (CEO) of DLS Ltd has overall responsibility for the health and safety of all staff, users, contractors and visitors at Diamond Light Source. The CEO may delegate authority for certain health and safety functions to other people, however, he may not delegate his responsibility. Safety responsibility then devolves down the management and supervisory chains.
- 2.2 A Radiation Protection Adviser (RPA) has been appointed under Regulation 13 of the IRR99. The RPA has been provided with appropriate terms of reference. DLS is obliged to consult the RPA on those matters which are specified in Regulation 13(1) and Schedule 5 of IRR99. The RPA's name is listed in Appendix 1.
- 2.3 The Health Physics (HP) Team Leader has responsibility for overseeing all aspects of radiation safety. For those matters specified in Regulation 13(1) and Schedule 5 of IRR99, the Health Physics Team Leader must consult with the RPA. The name of the Health Physics Team Leader is given in Appendix 1.
- 2.4 Radiation Protection Supervisors (RPSs) have been appointed by the Science Director under Regulation 17 (4) of the IRR99. They are responsible for ensuring compliance with the Local Rules and have been given appropriate terms of reference. The Experimental Hall Coordinators have been appointed RPSs for the Radio-chemical lab and their names and contact details are given in Appendix 1.

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 5 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

2.5 The Radio-chemical lab is for the users of Diamond Light Source, The Principal Beamline Scientist (PBS) of Beamline I18 has overall responsibility for the safe use of the Radio-chemicals and all associated equipment. This includes:

- Ensuring that the procedures defined in the Local Rules and relevant Method Statements are followed.
- Reviewing risk assessments submitted by Users.
- Ensuring that all necessary safety equipment is supplied, including portable contamination monitors.
- Ensuring that any emergency exits are free from obstruction.
- Ensuring that all Users have been given suitable training and are competent to work in the Radio-chemical lab.

2.6 The Experimental Hall Manager is responsible for all operational aspects of safety in the Experimental Hall area. The Experimental Hall Manager must be informed of the intention to undertake hazardous operations within the DLS Experimental Areas, and has been authorised by the Science Director to halt any operation which they consider hazardous to personnel or equipment. The Experimental Hall Manager's name is given in Appendix 1.

### 3. Dose Investigation Level

3.1 If the dose recorded by any DLS employee exceeds 0.8 milliSieverts (mSv) for the first time in any calendar year, the Health Physics Team Leader will initiate a formal investigation to make sure that exposure is being restricted as far as is reasonably practicable. The RPA must be consulted about this investigation.

3.2 If there is evidence to suggest that the dose received by any DLS employee may reach the investigation level before the end of the calendar year, the Health Physics Team Leader will initiate a review of working conditions with the aim of restricting further exposure before the investigation level is reached.

### 4. Areas to Which These Rules Apply

4.1 These Local Rules apply to work in the DLS Radio-chemical Lab, Diamond Synchrotron Building room DR, G142, which has been designated as a Supervised Radiation Area. This is indicated by appropriate signs on the door.

### 5. Routine Monitoring and Maintenance

5.1 All contamination monitors are calibrated annually and checked weekly by the Health Physics Team.

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 6 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

- 5.2 Contamination monitoring of the laboratories is performed after each user session by HP or the RPS, recorded and kept in the laboratory's radiation safety file. [TDI-HP-PRC-FRM-0005<sup>1</sup>](#)
- 5.3 Stock check of all stock solutions and contents of waste bins is performed by Health Physics Team before and after each user session and update waste records on [TDI-HP-PRC-FRM-0002<sup>2</sup>](#) for liquid and on [TDI-HP-PRC-FRM-0001<sup>3</sup>](#) for solid.

## 6. [Systems of Work](#)

- 6.1 Detailed procedures covering the use of sources at DLS are given in the document "Use of Radioactive Sources at Diamond", [TDI-HP-PRC-0002<sup>4</sup>](#) This document should be considered part of the Local Rules.
- 6.2 All persons intending to use DLS owned radioactive sources on the Diamond premises must provide copies of the method statements and risk assessments to the Health Physics Team Leader or Health Physicist at least 5 working days before the work is intended to start.
- 6.3 Users must not bring radioactive material to DLS without prior agreement from the Health Physics Team Leader or Health Physicist. Users intending to bring radioactive material to site must state this in their application for beam time. Radioactive material includes radioactive sources, experimental samples and Naturally Occurring Radioactive Materials (NORM). Copies of the risk assessments and method statements must be submitted to the Health Physics Team Leader or Health Physicist at least 1 month before the sources are required on site. The Health Physics Team Leader or Health Physicist may refuse permission for certain radioactive materials to be brought onto site. Users wishing to work with any radioactive material on site, whether owned by their employer or by DLS, must provide a certificate from their employer indicating their competence to work with radioactive materials.
- 6.4 Detailed procedures covering the use of user owned sources at DLS are given in the document "Procedures for the use of radioactive samples on the Diamond Beamlines", [TDI-HP-PRC-0006<sup>5</sup>](#). This document should be considered part of the Local Rules.
- 6.5 No radioactive material or source, may leave the DLS site without prior approval of the Health Physics Team Leader or Health Physicist.

<sup>1</sup> [http://diamvdocs13.diamond.ac.uk/TECHNICAL%20DIVISION%20\(TEC\)/Health%20Physics%20HP/Procedures%20\(PRC\)/Forms/TDI-HP-PRC-FRM-0005.pdf](http://diamvdocs13.diamond.ac.uk/TECHNICAL%20DIVISION%20(TEC)/Health%20Physics%20HP/Procedures%20(PRC)/Forms/TDI-HP-PRC-FRM-0005.pdf)

<sup>2</sup> [http://diamvdocs13.diamond.ac.uk/TECHNICAL%20DIVISION%20\(TEC\)/Health%20Physics%20HP/Procedures%20\(PRC\)/Forms/TDI-HP-PRC-FRM-0002.pdf](http://diamvdocs13.diamond.ac.uk/TECHNICAL%20DIVISION%20(TEC)/Health%20Physics%20HP/Procedures%20(PRC)/Forms/TDI-HP-PRC-FRM-0002.pdf)

<sup>3</sup> [http://diamvdocs13.diamond.ac.uk/TECHNICAL%20DIVISION%20\(TEC\)/Health%20Physics%20HP/Procedures%20\(PRC\)/Forms/TDI-HP-PRC-FRM-0001.pdf](http://diamvdocs13.diamond.ac.uk/TECHNICAL%20DIVISION%20(TEC)/Health%20Physics%20HP/Procedures%20(PRC)/Forms/TDI-HP-PRC-FRM-0001.pdf)

<sup>4</sup> [http://diamdocs/sites/default/TECHNICAL%20DIVISION%20\(TEC\)/Health%20Physics%20HP/Procedures%20\(PRC\)/TDI-HP-PRC-0002.pdf](http://diamdocs/sites/default/TECHNICAL%20DIVISION%20(TEC)/Health%20Physics%20HP/Procedures%20(PRC)/TDI-HP-PRC-0002.pdf)

<sup>5</sup> [http://diamdocs/sites/default/TECHNICAL%20DIVISION%20\(TEC\)/Health%20Physics%20HP/Procedures%20\(PRC\)/TDI-HP-PRC-0006.pdf](http://diamdocs/sites/default/TECHNICAL%20DIVISION%20(TEC)/Health%20Physics%20HP/Procedures%20(PRC)/TDI-HP-PRC-0006.pdf)

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 7 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

6.6 If the person responsible for a source or waste knows or suspects it is missing or damaged, they should immediately inform the RPS, Experimental Hall Manager and the Health Physics Team.

6.7 **Working Constraints:**

6.7.1 Personal Protective Equipment (PPE) must be worn when working with radioactive isotopes. This includes a properly fastened laboratory coat (closed at the neck and elasticated at the wrist) together with laboratory gloves and eye protection.

6.7.2 Personal **optically stimulated luminescence** (OSL) dosimeters should be worn while working with radioactive materials together with extremity (finger) dosimeters if issued.

6.7.3 Avoid ingestion of contamination; pencils, pens and fingers must not be sucked. Never eat, drink, smoke or apply cosmetics in the radioactive laboratory. Mouth pipetting is NOT permitted. Use paper tissues, not personal handkerchiefs.

6.7.4 Health Physics approval is required for any changes in the techniques from ERA and also changes in the methods of storage from ERA or location of radioactive materials.

6.7.5 The RPA needs to be consulted, and approval obtained, for any new procedures involving radiation or modifications to the safety systems.

6.7.6 Keep radionuclide stocks and solutions in a locked cupboard (fire resistant) or locked (spark-proofed) and appropriately labelled refrigerator in the lab.

6.7.7 All radioactive solutions and materials should be clearly labelled where reasonably practicable to indicate the radionuclide, activity, date, and owner.

6.7.8 Work with radioactivity must **not** be performed outside of normal working hours (9:00 to 17:00, Monday to Friday) unless appropriate authorisation obtained (Group Leader and Health Physics team leader or Health Physicist), there are at least two people present and appropriate risk assessments are written and approved.

6.7.9 Access to radioactive user samples at all times including outside of normal working hours (9:00 to 17:00, Monday to Friday) must be supervised by an EHC.

6.7.10 If laboratory coats, personal clothing or skin becomes contaminated, the Operations Shift Leader in the Control Room must be informed immediately. Details of the contamination, decontamination procedure adopted and its efficiency must be recorded (see contingency plans, Appendix.3).

6.7.11 If a radiation worker has a pregnancy confirmed she should inform either her Line Manager or the RPA as soon as possible. The working practices of the individual may

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 8 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

need to be altered depending on the results of a risk assessment looking particularly at risks to the foetus.

## 6.8 Purchasing / ordering/ installation.

- 6.8.1 All purchases of radioactive material must be made by the Health Physics Team. This may require application for an amendment to the Environmental Permit, which can take several months to be granted.
- 6.8.2 Approval is required from the RPA for changes in the nature or amount of radioactivity ordered, amounts must be within the limits of Diamond's Environmental Permit.
- 6.8.3 If any person intends to install or use X-ray generators in the lab, they must seek approval from the RPA in advance. They will need to obtain approval for the shielding and interlock systems, showing that they are not susceptible to being circumvented. X-ray generators used at Diamond must comply with the Generic Prior Authorisation for the Use of Electrical Equipment Intended to Produce X-rays, issued by the HSE.

## 6.9 Delivery of isotope:

- 6.9.1 Only members of the Health Physics Team should pick up radioactive packages from stores/ delivery point.
- 6.9.2 Users bringing their own samples should submit them to the Health Physics Team for contamination monitoring and secure storage.
- 6.9.3 User samples delivered to stores must immediately be moved to the radiochemical laboratory for contamination monitoring and placed in a secure store.
- 6.9.4 An appropriate calibrated contamination monitor should be used to check the contamination (see section 6.10).
- 6.9.5 Always assume that the contents of radioactive packages arriving from suppliers are contaminated until confirmed otherwise.

## 6.10 Unpacking of radioactive isotopes:

- 6.10.1 Choose a contamination monitor and check it is suitable for use, record background response and check that the work area is not contaminated before starting to work and record results.
- 6.10.2 Place package behind Perspex screen, and:
  - i. Wear PPE (gloves, apron etc)
  - ii. Open packaging (bag or can).
  - iii. Wipe test interior for leakage.
  - iv. Wipe test lead pot or stock solution container.



<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 9 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

- v. If clear, open lead pot / container and monitor inside of lid
- vi. Using forceps/ gloves, remove vials/ samples and wipe test.
- vii. If contamination is detected, then make safe and investigate. Follow the procedure as detailed in section 9.4.
- viii. If vials/ sample are clean, take a photo of each source for record; store it ready for use either in lead shielding or within Perspex vial shield.

6.10.3 Complete log book. The isotope identification number (the same as the order number) must be written on the outer pot of the isotope.

6.10.4 If you do not plan to use the radioisotope immediately then store it in a locked fridge or other secure location designated for storing radioactivity.

## 6.11 Preparation

### **Prior to any work involving unsealed radioactive isotopes.**

6.11.1 Put on PPE and personal dosimetry.

6.11.2 Check the contamination monitor:

- i. Is instrument appropriate for isotopes being used?
- ii. Check visually for signs of damage.
- iii. Is the battery charged?
- iv. Is instrument within test date (annually tested and calibrated)?
- v. Although the monitors are checked weekly, it is advisable to test the instrument is working (function test) prior to use.
- vi. Check background response.

6.11.3 Monitor the work area prior to use to ensure that it is clean and record results on the log sheet [TDI-HP-PRC-FRM-0004<sup>6</sup>](#). If any contamination is found, make safe and report to the RPS. Contamination should be cleared, cause investigated, recommendations made and incident recorded, if required.

## 6.12 Working with radioactive isotopes

6.12.1 The appropriate shielding equipment and engineered controls (as indicated in the risk assessment) should always be used to minimise radiation dose.

- i. Work with liquids over trays (spill tray).
- ii. Use forceps/ tongs to pick up vials/ samples of high-energy beta/gamma emitters. Place unshielded vial in a vial shield for dispensing operations. Avoid handling stock solution directly on bench. Use anaerobic chamber for volatile isotope samples.
- iii. Use high Z, high density materials such as lead to shield gamma emitters.

<sup>6</sup> [http://diamvdocs13.diamond.ac.uk/TECHNICAL%20DIVISION%20\(TEC\)/Health%20Physics%20HP/Procedures%20\(PRC\)/Forms/TDI-HP-PRC-FRM-0004.pdf](http://diamvdocs13.diamond.ac.uk/TECHNICAL%20DIVISION%20(TEC)/Health%20Physics%20HP/Procedures%20(PRC)/Forms/TDI-HP-PRC-FRM-0004.pdf)

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 10 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

iv. Use low Z materials such as Perspex of appropriate thickness to shield beta emitters, bremsstrahlung X-ray production is greater from high Z materials such as lead.

6.12.2 Monitor hands and work-areas frequently and after concluding each specific work period. Always assume that gloves are contaminated during and after handling radioactive materials. Prior to handling items e.g. pens, notebooks, telephones, door handles etc check for contamination using the contamination monitor next to door.

6.12.3 If contamination is detected, make safe by changing the gloves, washing hands several times and investigate the possible location of the primary contamination. Seek RPS's help if required. Follow the procedures for a spill detailed in the contingency plans (Section 9.5).

6.12.4 All apparatus and equipment used with radioactive materials must be clearly labelled.

6.12.5 Monitor all items before removing them from the laboratory.

### 6.13 When leaving the laboratory

- Monitor work surfaces and equipment used (record on log sheets [TDI-HP-PRC-FRM-0004<sup>6</sup>](#)).
- Monitor gloves, remove and dispose. If contamination is found, follow procedures for a minor spill detailed in the contingency plans (Appendix 3).
- Monitor hands and wrists in case gloves have been punctured.
- Monitor laboratory coat fronts, cuffs and sleeves, and shoes.
- Wash and dry hands.
- Monitor hands and leave laboratory.

### 6.14 Disposal of radioactive waste

- **RADIOACTIVE LIQUID WASTE MUST NOT BE DISPOSED OF VIA THE SINK.**
- The activity of each item of solid waste must be assessed before being placed in a bin.
- All radioactive waste needs to be disposed of via the designated disposal route using appropriate waste containers.
- Liquid and solid waste lockable containers have properly labelled. Additional waste containers are available for sharps if required. Non-radioactive waste should be disposed in white bin provided.
- Record forms ([TDI-HP-PRC-FRM-0001<sup>3</sup>](#) & [TDI-HP-PRC-FRM-0002<sup>2</sup>](#)) accompany each radioactive waste container. It is a legal requirement that all radioactive material can be accounted for at all times, therefore these record forms must be kept accurate with clear writing and up to date. Any error should be rectified by crossing out the error entry making sure it is still readable. Obscuring / overwriting of any, wrong entry is not

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 11 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

acceptable. An initial above the cross out line should be provided to make sure who is correcting the entry. Correct entry should be written in new line.

## 7. Access / Working Instructions

- 7.1 All staff, users and contractors entering the Supervised Radiation Areas covered by these Local Rules are required to attend a Health Physics radiation safety training session dealing with the radiation hazards present around the laboratory and the contents of these Local Rules.
- 7.2 All staff, Users and contractors are required to obey all safety signs displayed at the doors and inside the laboratory.

## 8. Classified/ Non-classified Workers

- 8.1 All classified radiation workers employed by DLS are issued with personal dosimeters. These dosimeters should be worn for the period indicated on the dosimeter. Classified workers in the employment of another radiation employer who are visiting DLS (other than as outside workers) will have appropriate dosimetry issued by their employer. Classified workers must wear their dosimeters at any time that they enter any DLS Controlled or Supervised Radiation Areas. All classified workers employed by DLS will receive training in radiation safety before commencing work with radiation.
- 8.2 Classified workers have a duty of care to their dosimeter – information on use and care of dosimeters is provided to all Diamond staff when they become classified workers – see the DLS Health Physics leaflet “[Wear Your Dosimeter<sup>7</sup>](#)”.
- 8.3 Non-classified Workers
- 8.4 Some Non-classified workers at Diamond have been chosen to be part of a ‘control group’. They are issued with personal dosimeters on a quarterly basis. The purpose of this practice is to ensure that Diamond’s working areas have been correctly designated for radiation protection purposes. All workers in the ‘control group’ must wear their dosimeters at any time that they enter any DLS Controlled or Supervised Radiation Areas.

## 9. Incidents, Accidents and Contingency Plans

- 9.1 The possibility of radioactive spill, contamination, accidents and incidents involving radioactive samples cannot be eliminated totally.

<sup>7</sup> <http://intranet.diamond.ac.uk/dms/DiamondDocs/HealthPhysics/Wear-your-dosimetry/Wear%20your%20dosimetry.pdf>

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 12 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

9.2 If the fire alarm sounds, lock away any radioactive materials and follow DLS FIRE AND EMERGENCY ARRANGEMENTS ([HAS-PRC-0011<sup>8</sup>](#)).

9.3 During a Site Emergency, anaerobic chamber should be switched off if this does not pose a radiological or other hazard with the work being carried out in the hood. If work requires the use of an anaerobic chamber, then stop work and make safe any materials being handled by storing in appropriate containers prior to switching off anaerobic chamber. Close all external windows exit the lab but stay inside the building and follow any instructions given out over the Tannoy.

9.4 If contamination is detected when unpacking stock:

- Repack and store securely.
- Ensure contamination has not spread using an appropriate monitor.
- Contact the RPS.

9.5 In the case of a spillage or leak of radioactive solution notify the RPS, if safe to do so or shout for someone else to do so; do not leave the laboratory to contact the RPS. Check for personal contamination and if contamination is not regarded as being significant e.g. only small spots on sleeves or the body of the lab coat, then proceed as follows:

- Examine gloves to ensure they are intact, changing gloves and monitoring hands as necessary.
- Place absorbent material around the spill to contain and absorb the spilled liquid.
- Place soiled absorbent material in designated plastic bags and arrange for disposal as radioactive solid waste.
- Monitor the affected area and decontaminate using dry or wet tissues.
- Repeat monitoring and decontamination as required until area is below background counts. Use Decon 90, alcohol or detergent if required. Initially use a mild detergent rather than Decon solution (or similar).

If personal contamination is found, follow the contingency plan in Appendix 3.

9.6 If a source is not in the expected location, then proceed as follows:

- Check the source is not currently being used.
- Ask other users if they moved the source to a different location.
- Check other designated laboratories

If the source cannot be located inform the RPSs.

- The RPS will conduct an investigation and inform the RPA/ Health Physics Team.

<sup>8</sup><http://diamdocs/sites/default/HEALTH%20AND%20SAFETY/Documentation/Forms/AllItems.aspx?RootFolder=%2fsites%2fdefault%2fHEALTH%20AND%20SAFETY%2fDocumentati on%2fProcedures&FolderCTID=&View=%7b381D203D-C8E5-4490-8814-548F15AF42FD%7d>

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 13 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

- If necessary, the RPA will contact the appropriate authorities as required.

9.7 A contingency plan (Appendix 3) has been written to cover reasonably foreseeable accidents involving persons being contaminated with an unsealed radioactive material.

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b>
		<b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 14 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

## Appendix 1 – Names of Nominated People

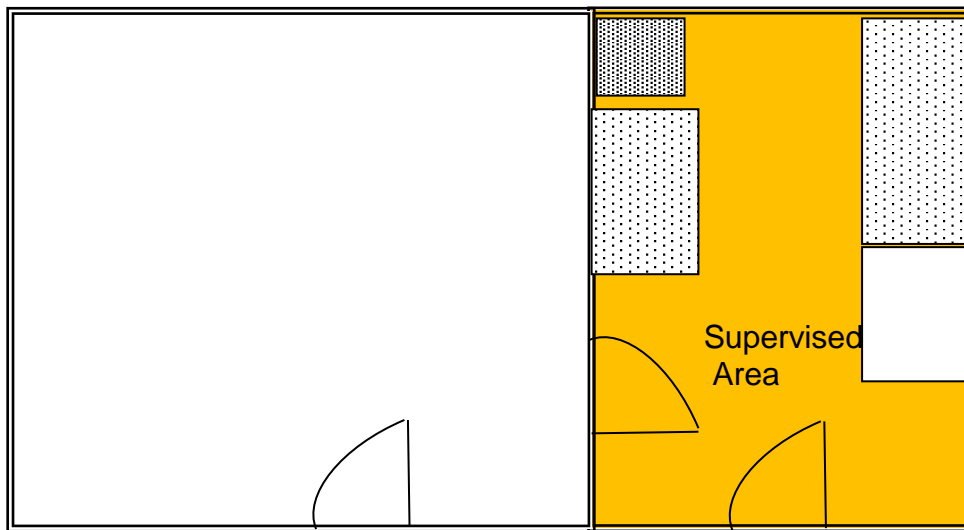
<b>Position</b>	<b>Name</b>	<b>Tel Ext.</b>
Science Director (Physical Sciences) (Acting)	Andy Dent	8984
Science Director (Life Sciences)	Professor David Stuart	8877
RPA & HP Team Leader Health Physicist	Richard Doull Sanjeev Faruk	8269 8875 8605 (HP Team)
Experimental Hall Manager	Jean Lane	8642
Principal Beamline Scientist (I18) & Lab Manager (Radio-chemical Lab)	Fred Mosselmans	8568
RPSs: All Experimental Hall Coordinators (EHCs) as listed below have been appointed RPSs:		
	EHC General Number	8787
	Edward Cassidy	8738
	Leslie Clinker	8737
	Alistair Donaldson	8751
	Nicholas Gorringe	8732
	Douglas Scott	8724
	Nathan Sear	8733
	Paul Symes	8731
Operations Shift Leader	Control Room	8899 (01235 778899 from a mobile phone)

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 15 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

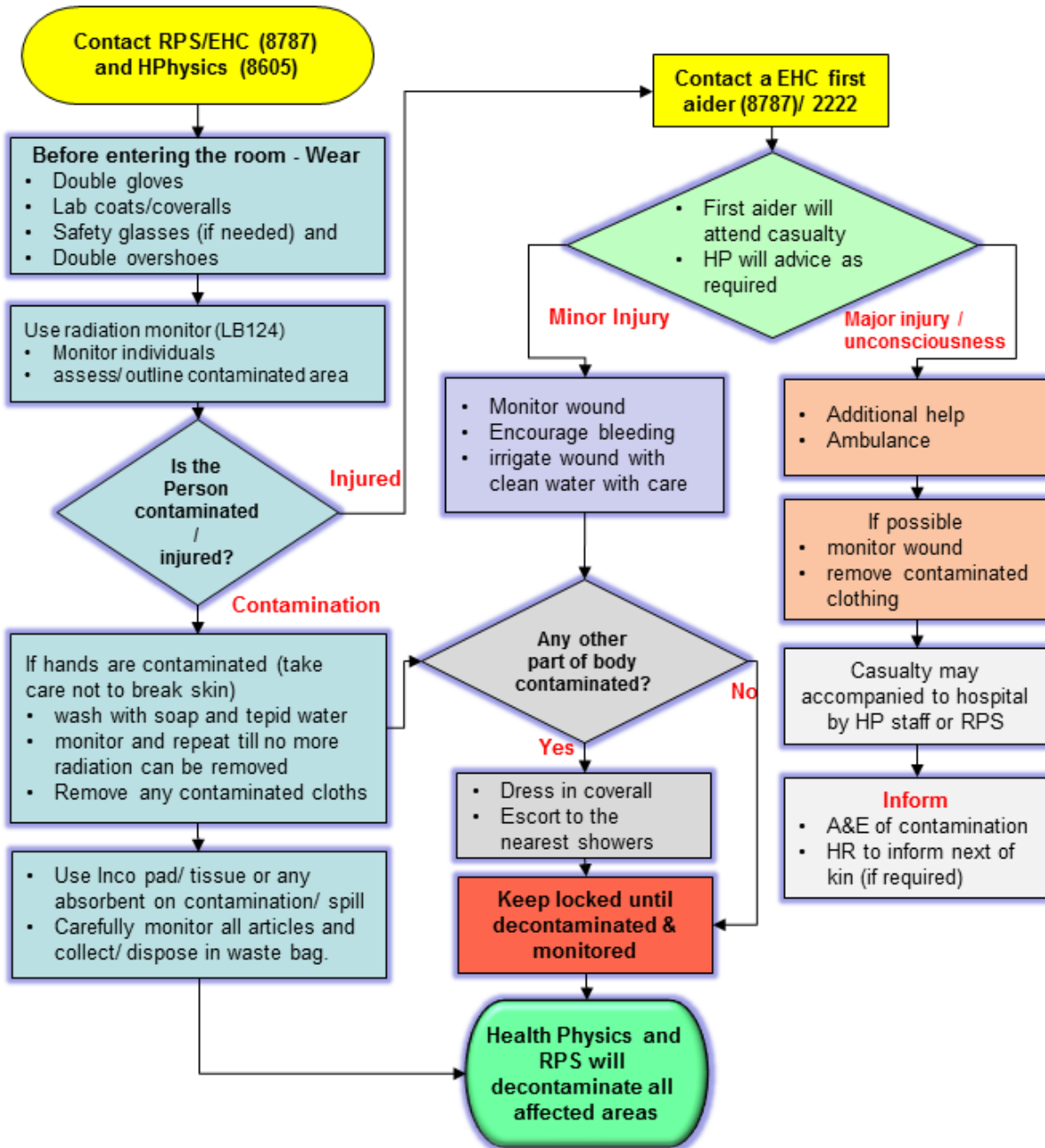
Appendix 2 – Designation of Areas

Designation	Area
Supervised Radiation Area	Radio-chemical Laboratory, DR G142

Fig. 1: Lay out of radio-chemical lab supervised area.



## Appendix 3 – Contingency Plan for radioactive contaminated individuals





<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 17 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

Users of unsealed radioactive sources at Diamond Light Source may as a result of an accident become contaminated.

Where a person believes they have been contaminated with unsealed radioactive material the following steps should be taken:

1. Contact an RPS (8787) and Health Physics Team (8605) as soon as practicable.
2. On arriving the attendees should wear a lab coat or coverall, gloves, safety glasses and over shoes.
3. Before entering the room RPS/ Health Physics should assess the extent of the contamination using contamination monitors in the 'emergency spill kit'.
4. If there is contamination on the floor, contain it by inco-pad, tissue or any other absorbs material to stop the contamination being spread.
5. The contaminated individual should be monitored, with the assistance of the RPS. Clothing/shoes should be removed and placed in a bag, labelled with a trefoil and the words 'RADIOACTIVE'.
6. If the person's hands are contaminated they should be washed with soap and tepid water (do not use hot water, as this opens pores, therefore there is a risk of inner epidermis contamination which is more difficult to remove). Help turning on taps and applying soap may be required to avoid spreading contamination.
7. Monitor the hands after washing and repeat as necessary, wash gently making sure not to damage/ break skin and repeat as many times required to the point no more radiation is possible to remove.
8. If contamination to the skin is widespread, dress the casualty in a disposable coverall and overshoes (available from the emergency spill kit), and escort them to the nearest showers (ground/1st floor diamond house).
9. A sign "**DO NOT ENTER, POSSIBLE RADIATION CONTAMINATION, RING (8269/8875) HEALTH PHYSICS FOR FURTHER ENQUIRY**" must be placed on the shower cubicle and be put out of use until it can be radiation monitored and decontaminated if needed.
10. A sign "**RADIATION CONTAMINATION, DO NOT ENTER, CHECK WITH RPS / HEALTH PHYSICS**" must be placed on the laboratory door and if left unattended, locked.
11. Clean up of the laboratory can be carried out by Health Physics and the RPS.

Where a member of staff is discovered injured and has been working with unsealed radioactive material in addition to the above the following steps should be taken:

1. Contact a first aider as well as the RPS and Health Physics.
2. The first aider should attend to the casualty using standard first aid practice and taking advice from Health Physics as to the radiological hazard. (In this situation life saving measures take precedence over radiological concerns).

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 18 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

If the casualty is unconscious not all the steps above can be followed, it is important to remember that in most cases life saving measures take precedence over radiological concerns, but take advice from the RPA/RPS.

If an ambulance is required:

Consult document [TDI-GEN-PRC-0009<sup>9</sup>](#) for information required by the receiving hospital.

- Follow standard first aid practice.
- When the ambulance arrives give them all the information including the nature of the radiological hazard. (Some ambulance services have been trained in dealing with radioactive contaminated casualties and have procedures in place).
- A member of staff may accompany the casualty to hospital, during office hours this could be preferably be the RPS. John Radcliffe (JR) is the nearest A&E and has radiation emergency procedure in place. Out of office hours the EHCs (who are all trained as RPSs) should ring JR via switch board (01865 741841) to alert emergency physicist/ RPA regarding the incident and seek their assistance.

In the case of skin cut or puncture wounds internal exposure is a hazard for the casualty:

#### *Minor injury*

- Call first aider (8787/2222), directly monitor the wound and the article causing the injury for contamination.
- Encourage bleeding and irrigate the wound with clean water as practicable.
- Cover the wound after a few minutes irrigation and seek medical advice.
- Arrange for analysis of the injuring article or a wipe taken from it. This will help determine if there has been any significant internal radiation exposure to the individual.

#### *Serious Injury*

- Immediately summon first aid assistance (8787/2222) and treat any life-threatening condition with priority. Lives saving measures take precedence over radiological concerns.
- If possible, directly monitor the wound but in any event arrange for a wipe to be taken from the injuring article. This will later help determine if there has been any significant internal radiation exposure to the individual.
- If the person requires removal to a hospital and he/she is heavily contaminated then, provided medical considerations allow for it, attempts should be made to remove any contaminated clothing from the person. Subject to medical advice, contaminated areas of skin should be cleaned with moist swabs
- Place contaminated clothing in a plastic bag and arrange for the bag to be marked with a trefoil and the words 'RADIOACTIVE'.
- If the person requires removal to a hospital, then a member of staff may accompany them if needed. Provide information to JR A&E as they have radiation emergency procedure in place to deal with radiation incidents.

<sup>9</sup> [http://diamdocs/sites/default/TECHNICAL%20DIVISION%20\(TEC\)/Health%20Physics%20HP/Procedures%20\(PRC\)/TDI-HP-PRC-0009.pdf](http://diamdocs/sites/default/TECHNICAL%20DIVISION%20(TEC)/Health%20Physics%20HP/Procedures%20(PRC)/TDI-HP-PRC-0009.pdf)

<b>Health Physics</b>		<b>Doc No: TDI-HP-LR-0006</b> <b>Issue: 6</b> <b>Date: 17<sup>th</sup> Oct 2016</b> <b>Page: 19 of 19</b>
Author: RDoull	Reviewed by: SFaruk	Issued on: 2016

- In the case of an emergency occurring out-of-hours, Activate the DLS emergency plan, notify RAL security (2222) and the RPA.

This contingency plan is intended to cover only the emergency phase of the incident. The plan will end when the Operations Shift Leader has formally declared the situation safe and is satisfied that in the short term a repetition of the incident is not possible. The Science Director(s) will then decide if an inquiry should be established to investigate the incident.