# University Health and Safety Form

# RADIATION RISK ASSESSMENT

The University of Strathclyde has moral and legal obligations to protect its staff, students, visitors and contractors from the potentially harmful effects arising from its use of ionising radiations. A radiation risk assessment must be undertaken for any work involving ionising radiations before the work commences.

For guidance on undertaking a Radiation Risk Assessment please see here – [Guidance for completing a Radiation Risk Assessment.](https://www.strath.ac.uk/media/ps/safetyservices/campusonly/standards/ionisingradiation/Radiation_Risk_Assessments.pdf)

**The Data Protection Act 1998 requires the University to inform you that the data on this form will be used for the purposes of improving the management of Health and Safety in the University and in accordance with legislative requirements.**

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| **1. ACTIVITY** | | | | | | | | |
| **1.1 Description of work** | | | | | | | | |
| **Title of Project or Task:** | |  | | | | | | |
| Brief Description of the work to be undertaken: | | | | | | | | |
| **1.2 Location of work** | | | | | | | | |
| **Faculty:** | |  | | | **Department:** | |  | |
| **Building:** | |  | | | **Room(s):** | |  | |
| **1.3 Principal Investigator / Laboratory Supervisor / Line Manager** | | | | | | | | |
| **Title:** |  | | **Name:** |  | | **Position:** | |  |
| **1.4 Person conducting this assessment** | | | | | | | | |
| **Title:** |  | | **Name:** |  | | **Position:** | |  |

**All information contained in this document must be included, where relevant, within a formal Safe System of Work, which must be in place before the work may commence.**

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| **2. SOURCE OF RADIATION** | | | | | | | | |
| **2.1 Please detail the sources of radiation that are to be used** | | | | | | | | |
| **Sealed Sources (Sect 2.2)** | | | | | **Yes / No** | | | |
| **Unsealed Sources (Sect 2.3)** | | | | | **Yes / No** | | | |
| **X-Ray Generator Incl. SEMs (Sect 2.5)** | | | | | **Yes / No** | | | |
| **2.2 If using sealed radionuclides, provide specific details of those that will be in use.** | | | | | | | | |
| **Nuclide** | **Number of Sources to be held** | | | | **Total activity of all sources combined**  **(MBq)** | | | |
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| **2.3 If using unsealed radionuclides, provide specific details of those that will be in use.** | | | | | | | | |
| **Nuclide** | **Total volume of material to be held** | | **Form material to be held in** | | **Total activity of sources to be held (MBq)** | | | |
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| **2.4 Is there a foreseeable risk of a build-up of gases or fumes / vapours from the radiation source? (e.g. Radon etc.)** | | | | | | | Yes / No | |
| Where there is a reasonably foreseeable risk of a build-up of gas or vapour, details of the measures to be taken to prevent a build-up must be detailed in Section **6. Contingency Planning** | | | | | | | | |
| **2.5 If using X-ray generating equipment, provide specific details of equipment that will be in use.** | | | | | | | | |
| **Device Manufacturer** | | **Device Model** | | **Device Target Material** | | **Device Maximum Voltage** | | **Device Maximum Amperage** |
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| **2.6 If X-rays will be generated by bespoke devices, or situations, please give details below.** | | | | | | | | |
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| **Task** | **Persons at risk** | **Estimated doses and dose rates to which persons could be exposed during ROUTINE WORK** | | | | | | | | |
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| **EXAMPLE** | | | | | | | | | | |
| Pipetting of radioactive Phosphorus 32 (32P) fluid from stock container to experimental container | * Research Staff | **Description of task**  This task involves the use of a 500**µ**l pipette to transfer 300µl (3.7MBq) of stock radioactive 32P fluid from the stock container, by hand, to the experimental container. This task is to be conducted once per experiment, and will take approximately 20 seconds to be completed by a suitably competent member of research staff.  Dose information taken from RP Data Handbook 2002  **Exposure duration must be based on the maximum expected time for detection.** | | | | | | | | |
| **Whole Body** | **0** | **Extremities / Skin** | **3.49x10‑5uSv** | **Eyes** | **0** | **Internal** | | **0** |
|  |  | **Description of task:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** | |  |
|  |  | **Description of task:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
|  |  | **Description of task:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
|  |  | **Description of task:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
|  |  | **Description of task:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
|  |  | **Description of task:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
|  |  | **Description of task:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
|  |  | **Description of task:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
|  |  | **Description of task:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
|  |  | **Description of task:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
| Total estimated dose(s), per year, based on the frequency of use (i.e. approx. number of experiments carried out per year) and the dose per procedure (i.e. sum of all routine tasks above). | | **Whole Body (µSv):**  **Extremities/skin (µSv):**  **Eyes (µSv):**  **Internal (µSv):** | | | | | | | | |

| **Potential Accident Scenario** | **Persons at risk** | **Estimated doses and dose rates to which persons could be exposed during an ACCIDENT SCENARIO** | | | | | | | | |
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| **EXAMPLE** | | | | | | | | | | |
| Mishandling of micropipette during aliquoting leads to droplet of radioactive Phosphorus 32 (32P) liquid on staff members skin | * Research Staff | **Description of accident scenario**  There is the possibility of a droplet becoming deposited on the skin of the research staff should all PPE not be worn appropriately. This could be present on the skin for an extended period (60 sec) prior to discovery and removal. A droplet is assumed to be, at worst, 0.1% of the original quantity in the micropipette.  Dose information taken from RP Data Handbook 2002  **Exposure duration must be based on the maximum expected time for detection.** | | | | | | | | |
| **Whole Body** | **0** | **Extremities / Skin** | **4.921mSv** | **Eyes** | **0** | **Internal** | | **0** |
|  |  | **Description of accident scenario:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
|  |  | **Description of accident scenario:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** | |  |
|  |  | **Description of accident scenario:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
|  |  | **Description of accident scenario:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
|  |  | **Description of accident scenario:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
|  |  | **Description of accident scenario:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
|  |  | **Description of accident scenario:** | | | | | | | | |
| **Whole Body** |  | **Extremities / Skin** |  | **Eyes** |  | **Internal** |  | |
| Total estimated dose(s), per year, based on the frequency of use (i.e. approx. number of experiments carried out per year) and the dose per procedure (i.e. sum of all routine tasks above). | | **Whole Body (µSv):**  **Extremities/skin (µSv):**  **Internal (µSv):** | | | | | | | | |

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| **3. The use of sealed or unsealed materials** |
| **Provide details on the likelihood of contamination arising as a result of this work and how the contamination may be spread.** |
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| **Provide details on the levels of contamination that could be encountered as a result of this work.** |
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| **Provide details of how the spread of contamination (loose, fixed or airborne), will be prevented.** |
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| **Provide details of your planned radiation monitoring regime (including details of the monitor to be used).** |
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| **Provide details of your planned contamination monitoring regime (include details of the monitor to be used).** |
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| **Provide details on the extent to which access is possible to areas where the unmitigated dose rate or contamination levels are potentially significant.** |
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| **Where available, provide details of previous dosimetry results or area monitoring, related to this work.** |
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| **Where they are to be installed, or where they are already installed, provide details of all mechanical or installed controls which will be used to reduce the likelihood of exposure or reduce the dose received from such an exposure.** |
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| **Provide details of all PPE that is required during this work.** |
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| **Give details of how you will ensure the security of the radioactive materials, including details of security measures and how access to the materials will be controlled.** |
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| **Give details of how you will manage radioactive waste generated during the work, including solid, liquid or gaseous emissions, volumes and activities.** |
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| **4. The use of X-ray Generators** |
| **Where available, provide details of previous dosimetry results or area monitoring, related to this work.** |
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| **Provide details of any advice, training or information that will be provided by the manufacturer or supplier in the safe use of the device.** |
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| **Where they are to be installed, or where they are already installed, provide details of all mechanical or installed controls which will be used to reduce the likelihood of exposure or reduce the dose received from such an exposure.** |
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| **Provide details of all PPE that is required during this work.** |
|  |
| **Provide details on the extent to which access is possible to areas where the unmitigated dose rates are potentially significant.** |
|  |
| **Provide details of your planned radiation monitoring regime (including details of the monitor to be used).** |
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| **Give details of how you will ensure the security of the radiation generator.** |
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| **5. General radiation safety considerations** |
| **Where new work is being considered, where new or equipment is being installed or constructed, is there a requirement to establish a specific dose constraint to ensure that doses external to the working area are kept as low as reasonably practicable** |
| *(Please note, the University Dose Investigation Limit is set at 0.1mSv over a three-month period. No work will be approved where a person is considered reasonably likely to exceed this)* |
| **What steps will be taken should someone conducting the work notify that they are pregnant or breastfeeding?** |
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| **Detail the frequency of all checks that will be carried out to ensure the efficacy of all safety systems and how these checks will be recorded.** |
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| **Detail all training that will be required by all personnel who will be working under this risk assessment.** |
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| **Detail all information that will be provided to those who may be affected by the work that is being done, even where not directly associated with the work.** |
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| **From the information provided above, is it necessary to designate the area or space inside the equipment as either “Supervised” or “Controlled”** |
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| **Where the area has been designated as “Controlled” is there a requirement to designate any workers are “Classified”?** |
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| **Where persons are designated as “Classified” describe what measures will be taken to ensure that doses will be kept under review.** |
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| **Where the area has been designated as controlled, what written arrangements will be in place for access non-classified personnel?** |
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| **Where an area has been designated as “Supervised” or “Controlled” give details of all additional building security measures and safety controls that will be put in place to restrict access.** |
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| **Where Unsealed or Sealed radioactive sources are going to be used, give details of how you will ensure the integrity of the source container (this must also include devices where a sealed source is built in).** |
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| **Likelihood** | | **Severity** | |
| ***(1)***  ***Very Unlikely*** | Rarely happens or may occur but only in exceptional circumstances. | ***(1)***  ***Negligible*** | * No injury/pain or minor injury requiring first aid. * Any doses received are likely comparable to background radiation doses/dose rates. |
| ***(2)***  ***Unlikely*** | Unlikely sequence of events and or multiple failures. | ***(2)***  ***Minor*** | * Minor injury, illness, loss possible. For example, cuts and bruises requiring first aid * External/Internal dose above background but likely below investigation level(s) (i.e. <0.1mSv in a three-month period). |
| ***(3)***  ***Possible*** | Foreseeable under normal circumstances.  May have occurred previously. | ***(3)***  ***Moderate*** | * Moderate injury, illness or loss possible such as a flesh wound, bruising etc. * Internal/External dose could exceed investigation levels or constraints. |
| ***(4)***  ***Likely*** | Easily foreseeable circumstances.  Strong possibility of occurrence. | ***(4)***  ***Major*** | * Reportable to HSE. * External/Internal doses potentially in excess of legal limits (over-exposure). |
| ***(5)***  ***Very Likely*** | Common occurrence. Known or common past occurrences. | ***(5)***  ***Extreme*** | * Extreme loss, single or multiple fatality, disaster or long-term disability. * Doses in excess of deterministic dose thresholds. |

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| **Risk Rating** | **Severity** | | | | |
| **Likelihood** | **(1) Negligible** | **(2) Minor** | **(3) Moderate** | **(4) Major** | **(5) Extreme** |
| ***(1) Very Unlikely*** | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** |
| ***(2) Unlikely*** | **(2)** | **(4)** | **(6)** | **(8)** | **(10)** |
| ***(3) Possible*** | **(3)** | **(6)** | **(9)** | **(12)** | **(15)** |
| ***(4) Likely*** | **(4)** | **(8)** | **(12)** | **(16)** | **(20)** |
| ***(5) Very Likely*** | **(5)** | **(10)** | **(15)** | **(20)** | **(25)** |

| 4. Reasonably Foreseeable Accident Scenarios | | | | | | | | | | | | | | | |
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| # | Process Step | Potential Accident Scenario | Who may be affected | Unmitigated radiation dose rate | Exposure duration (seconds) | Unmitigated potential dose | Likelihood | Severity | Unmitigated Risk (H/M/L) | Steps to prevent accident or limit its consequences (safeguards / safety features / procedural controls, etc) | Normal exposure duration (seconds) | Mitigated radiation dose | Mitigated Risk (H/M/L) | Comments / Notes / Recommendations / Actions | Contingency Plan  Required? |
| EXAMPLE | | | | | | | | | | | | | | | |
|  | Insert key into X-Ray set control panel and hold / press the “door open” button. | X-Rays emitting when door is opened. | X-Ray operator | 1Sv/h | 60 | 17mSv | 2 | 3 | 6 | Door interlock switches will cut power to X-Ray set when door is opened.  Routine testing and maintenance of door interlock systems.  Dose rate measurement by operator to confirm no X-Ray emissions.  Trained / appointed operators. | 60 | Back-ground only | 2 |  |  |
| EXAMPLE | | | | | | | | | | | | | | | |
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For all reasonably foreseeable accident scenarios, a suitable contingency plan must be prepared.

This plan must be designed to ensure the health and safety of all personnel (whether involved in the work or not).

Details of any required contingency plan must be detailed in **Section** **6. Contingency Planning**

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| **6. Contingency Planning** | |
| **For every potential accident scenario, give details of the proposed plans to restrict the potential exposure to as low as reasonably practicable and ensure the health and safety of all who may be affected** | |
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| **7. Radiation Risk Assessment Approval and Review** | | | | | | | |
| **7.1 Radiation Risk Assessment Approval** | | | | | | | |
| **The URPO has reviewed the document, and is satisfied that the risk assessment is suitable to be submitted for review by the URPA.** | | | | | | |
| **University Radiation Protection Officer** | | **Signature:** | | | **Date:** | |
| **The URPA has reviewed the risk assessment and is satisfied that it meets the requirements of a radiation risk assessment as required by IRR17** | | | | | | |
| **University Radiation Protection Advisor** | | **Signature:** | | | **Date:** | |
| **7.2 Periodic Review** | | | | | | | |
| **1st Review** | | | | | | | |
| **Date of 1st Review** |  | | **Name of Person Reviewing** |  | | | |
| **Provide details of any changes since initial writing** | | | | | | | |
| **Do you believe any of the changes noted above require review by the URPO / URPA** | | | | | | **Yes / No** | |
| **The URPO has reviewed changes above, and is satisfied that the risk assessment is suitable to be submitted for review by the URPA.** | | | | | | |
| **University Radiation Protection Officer** | | **Signature:** | | | **Date:** | |
| **The URPA has reviewed the changes above and is satisfied that the assessment meets the requirements of a radiation risk assessment as required by IRR17** | | | | | | |
| **University Radiation Protection Advisor** | | **Signature:** | | | **Date:** | |
| **2nd Review** | | | | | | | |
| **Date of 2nd Review** |  | | **Name of Person Reviewing** |  | | | |
| **Provide details of any changes since initial writing** | | | | | | | |
| **Do you believe any of the changes noted above require review by the URPO / URPA** | | | | | | **Yes / No** | |
| **The URPO has reviewed changes above, and is satisfied that the risk assessment is suitable to be submitted for review by the URPA.** | | | | | | |
| **University Radiation Protection Officer** | | **Signature:** | | | **Date:** | |
| **The URPA has reviewed the changes above and is satisfied that the assessment meets the requirements of a radiation risk assessment as required by IRR17** | | | | | | |
| **University Radiation Protection Advisor** | | **Signature:** | | | **Date:** | |