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| HS017 |
| HS Risk management form  |



For additional information refer to HS329 [Risk Management Procedure](https://www.gs.unsw.edu.au/policy/documents/HS329.pdf)

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| Faculty/Division: DCV Research | School/Unit: X-ray Diffraction Laboratory, Mark Wainwright Analytical Centre |
| Document numberHS-DVC (Research)-MWAC-XRD-04 | Initial Issue date11. 08. 2016 | Current versionV 3.1 | Current VersionIssue date 19 Mar 2021 | Next review date19 Mar 2023 |

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| **Risk management name** | **Radiation Safety and X-ray Diffraction Operation by XRD users** |

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| Form completed by | Ruoming Tian | *Signature*  | *Date* 19 Mar 2021 |
| Responsible supervisor/ authorising officer | Yu Wang | *signature* | *Date* 19 Mar 2021 |

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| **Identify the activity and the location of the activity** |
| **Description of activity** | Using X-ray diffractometer to perform Diffraction analysis on various types of materials, including powder, bulk and thin films samples, to determine phases and crystal structure. |
| **Description of location** | Room G65, Chemical Science Building (F10) |

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| **Identify who may be at risk from the activity:** This may include fellow workers, visitors, contractors and the public. The types of people may affect the risk controls needed and the location may affect the number of people at risk |
| **Persons at risk** | XRD instrument users working in the laboratory |
| **How they were consulted on the risk** | XRD induction and training session |

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| **List legislation, standards, codes of practice, manufacturer’s guidance etc used to determine control measures necessary** |
| Work Health and Safety Act 2011Work Health and Safety Regulation 2017NSW radiation control regulation 2013Fundamentals for protection against ionising radiation (2014)Guide for radiation protection in existing exposure situations (2017) |

| **Identify hazards and control the risks**.1. An activity may be divided into tasks. For each task identify the hazards and associated risks. Also list the possible scenarios which could sooner or later cause harm.2. Determine controls necessary based on legislation, codes of practice, Australian standards, manufacturer’s instructions, safety data sheets etc. 3. List existing risk controls and any additional controls that need to be implemented4. Rate the risk once all controls are in place using the risk rating matrix (below and in HS329 Risk Management Procedure)SHADED GREY AREASIf you need to determine whether it’s reasonably practicable to implement a control based on the risk, complete the shaded grey columnsFeel free to resize the boxes to suit your situation/the amount of text you need to use |  |
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| Task/Scenario | Hazard andAssociated harm | Existing controls | Any additional controls required? | Risk Rating  | Cost of controls (in terms of time, effort, money) | Is this reasonably practicable Y/N |
| Consequences | Likelihood | Risk |
| Radiation | X-ray radiation is harmful to the human body. A localised dose is sufficient to cause a severe radiation burn (human tissues are killed). Doses are also accumulated in the human body by long-term exposure to radiation that produces irradiated cells. The hazards include an increased risk of leukaemia, cancer and genetic or hereditary effects | * The X-ray cabinet is manufactured from stainless steel and lead-containing glass, both impermeable to X-rays from this generator.
* The X-ray cabinet has a lamp indicating when the X-ray shutter is open inside the cabinet. Check shutter indicator each time approaching the door of the chamber. **If the indicator light is on, do not open the door of the chamber**
* Power to X-ray generator shuts off automatically when cabinet is opened.
* Instruments are safety interlocks are serviced regularly. Check the service notification
* Use radiation monitor to check radiation level in surrounding area

Follow standard operation procedures for each instrument. | N | 5 | E | M | No additional cost | Y |
| Data collection at variable temperatures | Contact with the enclosed sample chamber on the skin may result in hot or cold burns when collecting data at variable temperatures  | * When loading or unloading a sample, set the temperature as 300K via the software and wait till the sample stage reach 300K.
* During the measurement, the instrument chamber will be automatically locked.
 | N | 2 | D | L | No additional cost | Y |
| Samples and handling | Samples containing volatile or hazardous substances | Hazardous or volatile sample should be handled in a fume cupboard in G64, and properly sealed in a special sample holder, prior to measurement. | N | 3 | D | M | No additional cost | Y |
| Lab general activities | 1. Chemical spills2. Shape knife and microscope slides3. Contaminations of chemicals and materials4. Electric shock5. Gas use (N2) | 1. Chemical spill kit2. Take precaution in sample preparation, first aid box3. Report to Lab Manager immediately 4. Refer to specific RMF and SOP5. Refer to specific RMF and SOP. | N | 2 | D | L | No additional cost | Y |

**Risk Rating Matrix**

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| **RISK RATING METHODOLOGY AND MATRIX** |
| **Consider the Consequences**Consider: What type of harm could occur (minor, serious, death)? Is there anything that will influence the severity (e.g. proximity to hazard, person involved in task etc.). How many people are exposed to the hazard? Could one failure lead to other failures? Could a small event escalate? | **Consider the Likelihood**Consider: How often is the task done? Has an accident happened before (here or at another workplace)? How long are people exposed? How effective are the control measures? Does the environment effect it (e.g. lighting/temperature/pace)? What are people’s behaviours (e.g. stress, panic, deadlines) What people are exposed (e.g. disabled, young workers etc.)? | **Calculate the Risk**1.Take the consequences rating and select the correct column2.Take the likelihood rating and select the correct row3. Select the risk rating where the two ratings cross on the matrix below.**VH = Very high, H = High, M = Medium, L = Low**

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|  | **CONSEQUENCES** |
|  | **1** | **2** | **3** | **4** | **5** |
| **LIKELIHOOD** | **A** | **M** | **H** | **H** | **VH** | **VH** |
| **B** | **M** | **M** | **H** | **H** | **VH** |
| **C** | **L** | **M** | **H** | **H** | **VH** |
| **D** | **L** | **L** | **M** | **M** | **H** |
| **E** | **L** | **L** | **M** | **M** | **M** |

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| **5. Severe:** death or permanent disability to one or more persons**4. Major:** hospital admission required**3. Moderate:** medical treatment required**2. Minor:** first aid required**1. Insignificant**: injuries not requiring first aid | **A. Almost certain:** expected to occur in most circumstances**B. Likely:** will probably occur in most circumstances**C. Possible:** might occur occasionally**D. Unlikely:** could happen at some time**E. Rare:** may happen only in exceptional circumstances |

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| **Risk level** | **Required action** |
| **Very high** | **Act immediately**: The proposed task or process activity must not proceed. Steps must be taken to lower the risk level to as low as reasonably practicable using the hierarchy of risk controls |
| **High** | **Act today:** The proposed activity can only proceed, provided that: (i) the risk level has been reduced to as low as reasonably practicable using the hierarchy of risk controls and (ii) the risk controls must include those identified in legislation, Australian Standards, Codes of Practice etc. and (iii) the document has been reviewed and approved by the Supervisor and (iv) a Safe Working Procedure or Safe Work Method has been prepared and (v) the supervisor must review and document the effectiveness of the implemented risk controls  |
| **Medium** | **Act this week**: The proposed task or process can proceed, provided that: (i) the risk level has been reduced to as low as reasonably practicable using the hierarchy of controls and (ii) the document has been reviewed and approved by the Supervisor and (iii) a Safe Working Procedure or Safe Work Method has been prepared. |
| **Low** | **Act this month:** Managed by local documented routine procedures which must include application of the hierarchy of controls. |

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| **List emergency procedures and controls****List emergency controls for how to deal with fires, spills or exposure to hazardous substances and/or emergency shutdown procedures** |
| 1. Emergence button for power shut down2. Fire distinguish 3. Chemical spills Kit. |

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| **Implementation** |
| **Additional control measures needed:** | **Resources required** | **Responsible person** | **Date of implementation** |
| No |  |  |  |

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| **REVIEW** |
| Scheduled review date:  | 23 Mar 2021 |  |  |
| Are all control measures in place? | yes |  |  |
| Are controls eliminating or minimising the risk? | yes |  |  |
| Are there any new problems with the risk? | No |  |  |
| **Review by: (name)** | Chris Marjo |  |  |
| **Review date:** | 23 Mar 2021 |  |  |

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| **Acknowledgement of Understanding** All persons performing these tasks must sign that they have read and understood the risk management (as described in HS329 Risk Management Procedure).**Note:** for activities which are low risk or include a large group of people (e.g. open days, BBQ’s, student classes etc), only the persons undertaking the key activities need to sign below. For all others involved in such activities, the information can be covered by other methods including for example a safety briefing, induction, and/or safety information sheet (ensure the method of communicating this information is specified here)  |

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| **Risk management name and version number: I have read and understand this risk management form** |
| Name | Signature | Date |
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