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1. **PURPOSE**
   This procedure sets out the appropriate measures that must be taken to control the radiation exposure of any pregnant or breastfeeding staff member or student working with ionising radiation at Monash University.

2. **SCOPE**
   This procedure applies to staff and students at all the Australian campuses of Monash University.

3. **ABBREVIATIONS**
   - mSv: Millisieverts
   - OHS: Occupational Health and Safety
   - OH&S: Monash Occupational Health & Safety
   - RPO: Radiation Protection Officer
   - RSO: Radiation Safety Officer
   - TLD: Thermoluminescent dosimeter

4. **DEFINITIONS**
   A comprehensive list of definitions is provided in the Definitions tool. Definitions specific to this procedure are provided below.

   **4.1 BREASTFEEDING RADIATION WORKER**
   A breastfeeding worker is a person that is breastfeeding their child and still continues their duties as a radiation worker.

   **4.2 OCCUPATIONAL EXPOSURE**
   Occupational exposure is exposure of a person to radiation that occurs in the course of that person's work or study.

   **4.3 RADIATION PROTECTION OFFICER**
   The Radiation Protection Officer is the OH&S staff member responsible for providing and coordinating radiation protection services at Monash University.

   **4.4 RADIATION SAFETY OFFICER**
   A radiation safety officer is a designated staff member in a unit responsible for approving and supervising the ionising radiation work and study of staff and students.

   **4.5 RADIATION WORKER**
   A radiation worker is a staff member or student who is occupationally exposed to ionising radiation source(s).

   **4.6 PREGNANT RADIATION WORKER**
   A pregnant radiation worker is a radiation worker who has declared their pregnancy or their intention to become pregnant to their supervisor, RSO, head of administrative unit or to a member of OH&S.
5. SPECIFIC RESPONSIBILITIES

A comprehensive list of OHS responsibilities is provided in the document OHS Roles, Committees and Responsibilities Procedure. A summary of responsibilities with respect to this procedure is provided below.

5.1 HEAD OF ACADEMIC/ADMINISTRATIVE UNIT AND SUPERVISOR

The head of academic/administrative unit and supervisor are responsible for:

- providing this procedure to all women who may be exposed to ionising radiation and who begin work within the academic/administrative unit;
- informing all pregnant radiation workers of the work options available to them during their pregnancy;
- keeping the details of any pregnancy confidential to the greatest possible extent, if requested by the pregnant worker.
- informing all breastfeeding radiation workers of the work options available to them at work;

5.2 RADIATION SAFETY OFFICER

The RSO is responsible for:

- providing any pregnant radiation worker who wears a TLD for their work with 4 weekly TLD monitoring for the duration of their pregnancy;
- assisting the pregnant or breastfeeding radiation worker with implementing any agreed changes to their work environment or practices;
- working with the RPO to investigate the dose obtained by a pregnant radiation worker, if necessary.

5.3 RADIATION PROTECTION OFFICER

The RPO is responsible for:

- providing technical advice on ionising radiation safety issues to the pregnant or breastfeeding radiation worker;
- routinely inspecting their workplace;
- examining the pregnant radiation worker’s 4 weekly TLD results and instigating investigation when needed.

5.4 PREGNANT OR BREASTFEEDING RADIATION WORKER

The pregnant or breastfeeding radiation worker must follow the procedures outlined below, as it applies to them, for the duration of their pregnancy.

6. PROTECTING THE UNBORN OR BREASTFED CHILD FROM THE EFFECTS OF IONISING RADIATION

6.1 HEAD OF ACADEMIC/ADMINISTRATIVE UNIT AND SUPERVISOR

The head of academic/administrative unit and supervisor must:

6.1.1 Ensure that all people who work with ionising radiation, particularly women, understand the requirements of this procedure.

6.1.2 Ensure that women who work with ionising radiation feel comfortable declaring their pregnancies or their intention to become pregnant at an early time.

6.1.3 Ensure an environment where there is not impediment to career progression or continuation due to pregnancy or interruption of work involving ionising radiation.

6.1.4 Ensure that pregnant and breastfeeding radiation workers can choose whether or not they continue working with radiation (subject to satisfaction
on the part of Monash University that the child and the mother are not at significant risk). Monash University strongly encourages and supports pregnant radiation workers to seek alternative duties at Monash while they are pregnant.

6.1.5 Ensure that both male and female co-workers and supervisors understand the special needs of an unborn or breastfed child in relation to ionising radiation safety. Co-workers or supervisors of the pregnant or breastfeeding woman must not engage in work practices that may endanger her child e.g. expecting a pregnant woman to carry her normal share of duties in relation to disposal of radioactive waste.

6.1.6 Ensure that the special needs of women who choose to continue to work with ionising radiation during their pregnancy or while they are breastfeeding are considered, and in conjunction with her supervisor, the RPO and the Occupational Health Physician, any additional measures deemed necessary to protect the unborn or breastfed child are put in place without delay. If satisfactory control measures cannot be put in place from the declaration of pregnancy, then the woman must be provided with suitable, alternative duties until they can.

6.1.7 In the event that the pregnant or breastfeeding radiation worker elects not to continue working with ionising radiation, make arrangements to modify the worker’s duties so that essential ionising radiation related work normally performed by the pregnant woman can be continued by other radiation workers in the unit. Every effort must be made to place the pregnant or breastfeeding woman in a job of similar status and standing and with similar pre-requisites of training and experience within the university.

6.2 RADIATION SAFETY OFFICER

The RSO must:

6.2.1 in conjunction with the RPO, determine whether or not a pregnant radiation worker’s internal and external exposures to ionising radiation might exceed the relevant dose limits, and if so, modify her duties in order to maintain exposures below those limits.

6.2.2 In conjunction with the RPO, determine whether or not a breastfeeding radiation worker’s exposure to unsealed radioactive material might result in ingestion or inhalation of a significant amount of radioactive material, and if so, modify her duties to reduce this exposure.

6.2.3 review intended work practices with the pregnant radiation worker at least once per month for the duration of the pregnancy.

6.2.4 monitor the pregnant radiation worker’s exposure to ensure her external and internal exposures to ionising radiation do not exceed relevant dose limits during her pregnancy. This shall include a 4 weekly change of her TLD badge rather than the routine 12 weekly change.

6.2.5 examine measured dose results, investigate any quantifiable dose and communicate the findings to the RPO and the pregnant or breastfeeding radiation worker.

6.2.6 assist the supervisor and pregnant or breastfeeding radiation worker to implement improved work practices to ensure ionising radiation doses remain as low as practicable.
6.3 RADIATION PROTECTION OFFICER

The RPO must:

6.3.1 in conjunction with the RSO, determine whether or not a pregnant radiation worker’s internal and external exposures to ionising radiation might exceed the relevant dose limits, and if so, modify her duties in order to maintain exposures below those limits.

6.3.2 in conjunction with the RSO, determine whether or not a pregnant or breastfeeding radiation worker’s exposure to unsealed radioactive material might result in ingestion or inhalation of a significant amount of radioactive material, and if so, modify her duties to reduce this exposure.

6.3.3 maintain a copy of all 4 weekly dose results.

6.3.4 offer to visit the workplace of a pregnant or breastfeeding radiation worker continuing to work with ionising radiation, on a 4 weekly basis, or when requested to do so.

6.4 RADIATION WORKER

A radiation worker who is pregnant or intends to become so, is encouraged to declare their pregnancy or their intention to become pregnant to their supervisor, RSO, head of administrative unit or Monash Occupational Health & Safety at the earliest possible time, on the understanding that the matter will be kept as confidential as possible.

6.5 PREGNANT RADIATION WORKER

6.5.1 Available evidence suggests that unborn children may be more susceptible to the effects of exposure to ionising radiation than the mother. The unborn child is particularly susceptible in the first trimester of pregnancy. Where pregnancy or the intention to become pregnant is declared early by the woman concerned, there is the greatest opportunity to protect her unborn child and to reduce the possibility of any ill-effect occurring.

6.5.2 During pregnancy the unborn child should be afforded the same level of protection as is required for a member of the public. Where effective, the external dose should be measured by a TLD worn on the abdomen and limited to the member of the public limit of 1mSv/annum. Badges should be changed on a four weekly basis. Dose as measured at the surface of the abdomen provides a conservative estimate for the dose to the foetus, as it does not take into account the shielding provided by the mother’s abdominal area.

6.5.3 Intakes of radioisotopes into the mother’s body may also result in harm to an unborn child. Monash University strongly discourages pregnant radiation workers from continuing any radiation work that may carry significant risk of inhalation or ingestion of radioisotopes e.g. iodination where the iodine is in a volatile form.

6.5.4 In the case where a pregnant radiation worker does continue work that may result in radioisotope intake a risk assessment must be completed in consultation with the supervisor, RPO and the Occupational Health Physician. Control measures must then be implemented to ensure that the pregnant radiation worker will receive no more than 50 microsieverts of internal dose for the duration of the pregnancy, totalled over all radionuclides to which she may be exposed. The determination of internal dose in equivalent units of microsievert is a process that must consider the pharmacokinetics and target organ/s of the specific radioisotope. Any pregnant radiation worker who is at risk of inhaling or ingesting radioisotopes...
should discuss this with their RSO in the first instance. The 50 microsievert limit is based on protecting the foetus to 1/20th of the maximum allowed internal intake for a member of the public (ICRP 60, 61 and 68).

6.5.5 In electing to risk internal exposure to radionuclides, it must be remembered that internal doses are not as easily measured as an external dose. Hence, pregnant women need to take particular care to minimise the risk of inhaling or ingesting any radioactive material. The pregnant worker has the option to request the involvement of the RPO or members of Monash Occupational Health & Safety at any time during their pregnancy.

6.5.6 The pregnant radiation worker should minimise their dose by complying with all agreed alterations to their work practices.

6.5.7 The pregnant radiation worker must report immediately any suspected unplanned exposure to their RSO, supervisor, Monash Occupational Health & Safety or the RPO.

6.5.8 The pregnant radiation worker should contact their supervisor, RSO, Monash Occupational Health & Safety or the RPO with any concerns they may have about working with ionising radiation.

6.5.9 Pregnant women can elect to have the Monash University Occupational Physician consult with their attending physician.

6.6 BREASTFEEDING RADIATION WORKER

6.6.1 In some cases, intakes of radioisotopes into the mother’s body may pass to their child via breast milk.

6.6.2 In the case where a breastfeeding radiation worker does continue work that may result in radioisotope intake a risk assessment must be completed in consultation with the supervisor, RPO and the Occupational Health Physician.

6.6.3 In electing to risk internal exposure to radionuclides, it must be remembered that internal doses are not as easily measured as an external dose. Hence, breastfeeding women need to take particular care to minimise the risk of inhaling or ingesting any radioactive material. The breastfeeding worker has the option to request the involvement of the RPO or members of Monash Occupational Health & Safety at any time during their pregnancy.

6.6.4 The breastfeeding radiation worker should minimise their exposure to radioactive material by complying with all agreed alterations to their work practices.

6.6.5 The breastfeeding radiation worker must report immediately any suspected unplanned exposure to radioactive material to their RSO, supervisor, Monash Occupational Health & Safety or the RPO.

6.6.6 The breastfeeding radiation worker should contact their supervisor, RSO, Monash Occupational Health & Safety or the RPO with any concerns they may have about working with ionising radiation.
7. RECORDS

<table>
<thead>
<tr>
<th>Record to be kept by</th>
<th>Records</th>
<th>To be kept for:</th>
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<tbody>
<tr>
<td>Academic/administrative unit</td>
<td>Surveys of laboratories for contamination</td>
<td>10 years</td>
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<tr>
<td>OH&amp;S</td>
<td>Ionising Radiation dose results (including TLD results)</td>
<td>30 years after the last dose assessment and at least until the person reaches, or would have reached, the age of 75 years</td>
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<td>OH&amp;S health team (confidential files)</td>
<td>Bioassay and internal exposure results (where collected by OH&amp;S)</td>
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8. COMPLIANCE

This procedure is written to meet the requirements of:

8.1 LEGISLATION

Radiation Act 2005 (Vic)
Radiation Safety Regulations 2007 (Vic)

9. REFERENCES

9.1 CODES OF PRACTICE AND RELATED DOCUMENTS

Recommendations for Limiting Exposure to Ionizing Radiation (Printed 1995 - Republished 2002)

9.2 MONASH UNIVERSITY OHS DOCUMENTS

Procedures for disposal of radioactive waste
Guidelines for the development of safe work instructions
Ionising radiation dosimetry procedures
OHS Roles, Committees and Responsibilities procedure
Ionising radiation sources: Purchase and licensing procedures
Training records
Using ionising radiation at Monash University

9.3 AUSTRALIAN STANDARDS

AS 2243.4:1998 Safety in Laboratories: Ionizing radiation
### 10. DOCUMENT HISTORY

<table>
<thead>
<tr>
<th>Version number</th>
<th>Date of first issue</th>
<th>Changes made</th>
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<tbody>
<tr>
<td>2</td>
<td>November 2010</td>
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| 3              | August 2013         | 1: Title: changed from “Procedures for protecting the unborn child from the effects of ionising radiation  
2: Removal of some definitions not specific to this procedure  
3: Addition to the procedures  - to acknowledge the possible risk to a breastfed child from intake of radioactive material by the mother  - to require review of a breastfeeding woman’s radiation work  - to assign responsibility for implementing any identified changes to a breastfeeding radiation worker’s duties. |
| 4              | August 2016         | 1. Removal of visitors and contractors from the scope of the procedure  
2. Recognition that radiation workers do not wear a TLD where there is low external hazard  
3. Updated section 5 to reflect that the RSO and RPO have a joint responsibility for the determination of potential exposure  
4. Updated Records section  
5. Added a definition for breastfeeding radiation workers and included references to breastfeeding radiation workers where it was relevant. |