

# RP COP013: Working with Radiation when Pregnant or Breastfeeding

VERSION CONTROL	
Document Author:	Colin Farnery
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## 1. Introduction

This Code of Practice explains the risk to expectant and breastfeeding mothers from working with ionising radiation. It applies to any type of radiation, and from any source, whether sealed, unsealed or electrically generated. It also explains what arrangements the University has made to identify and introduce any special precautions that might be needed to ensure the protection of the foetus.

## 2. Risk

The foetus is known to be particularly sensitive to damage by radiation. Therefore it is important that its radiation exposure is kept low. This should already be the case because of the controls that the expectant mother will be working to, including the overriding requirement to keep all doses as low as reasonably achievable. However, in the case of potential or actual pregnancy this is backed up by two special dose limits - see the section below. There is no special dose limit for breastfeeding mothers. The only extra risk is where there is the possibility of the uptake and subsequent transfer of radioactive material to a child through the mother's milk.

Within the University, the work done with radiation is not particularly high risk. In most cases therefore the doses that could be received by the expectant mother should already be below the special dose limit. However, in order to check that this is the case, there are particular control measures that are introduced once the University has been informed that a radiation worker is pregnant. In order that these particular control measures can be activated, it is of course important that the University, usually through the line manager, **is told as soon as possible**, when a radiation worker is pregnant. When a mother returns to work, it will be assumed, unless she informs her line manager otherwise, that she is breastfeeding for six months after birth.

The University does not have any radiation applications that will give rise to a risk to expectant or breastfeeding mothers who are not actually working with radioactive material or radiation sources.

### 3. Legal Requirements

Once a pregnancy is confirmed the dose to the foetus must not exceed 1 milliSievert (mSv) for the rest of the pregnancy. This is regardless of whether the worker is classified or not. Since the foetus could be irradiated before pregnancy is known, the dose to the abdomen of workers of reproductive capacity is also restricted to 13 mSv per quarter. (Note that is not a dose **reduction** but a spread of the annual dose more equally over the year.) It is however difficult to determine the actual dose to a foetus. The Guidance Notes that accompany the regulations advise in the case of external radiation that the dose to the abdomen of the expectant mother should be limited to 2 mSv for the rest of the pregnancy. This should ensure that the foetal dose does not exceed 1 mSv. In the case of internal radiation there is the possibility of certain radionuclide intakes giving rise to a higher dose to the foetus than to the expectant mother, and this has to be allowed for – see below.

The annual dose to an infant must be limited to not more than 1 mSv per year.

It is of course the radiation employer's (i.e. the University's) responsibility to manage the control of radiation doses to its employees and other affected persons. The law is however quite clear that if a pregnant worker does not tell her employer that she is pregnant, the radiation employer is not required to introduce any special measures.

### 4. Controls

- In order to ensure that there is no especial risk to the expectant mother or the foetus, pregnant workers must inform their line manager that they are pregnant, in writing, as soon as possible. They might wish to talk to the Occupational Health Unit about their condition, but note that any such conversations will be treated as medically confidential and must not be regarded as a formal notification to the University. Notification given in writing to the Human Resources Department for other purposes can also be considered as notification for radiation protection purposes, but the University's Maternity Benefits Policy requires the pregnant worker to inform her relevant line manager. Further information on the University's Maternity Benefits policy can be found on the Human Resources website.
- Once he/she has been informed, the line manager will then arrange a review of the relevant radiation risk assessment. This should be done in conjunction with the University Radiation Protection Adviser. As part of the review, any relevant dose records will be checked.
- The review of the risk assessment will identify any changes or restrictions that are needed. These will be communicated back to the expectant mother as soon as possible. It is of course important that she co-operates with her line manager in complying with any of these changes or restrictions, and seeks further advice if unsure about anything.

- A review of the risk assessment will be undertaken for all relevant workers. However, the following guidelines give some indication of what might be required.

### **Exposure to external radiation only**

This applies to exposure arising from radiation sources such as sealed sources, veterinary, medical and analytical x-ray sources, and neutron sources, synchrotron radiation and the like. The following guidelines apply to such exposure:

- If the worker is classified due to the risk from external radiation exposure, then it is likely that the work that warrants classification will have to cease for the remaining duration of the pregnancy.
- If the worker is not classified, but is working in an area designated as Controlled due to the external radiation risk, then work may continue and (if not already the case) she should wear a whole-body personal dosimeter (four-weekly wearing period) for the rest of the work with radiation whilst pregnant.
- If the worker is working in an area designated as Supervised due to the external radiation risk, then work may continue and (if not already the case) she should wear a whole-body personal dosimeter (four-weekly wearing period) for the rest of the work with radiation whilst pregnant.
- If the worker is working in a non-designated radiation area, it is most unlikely that any further controls or restrictions are necessary.
- No additional controls or restrictions are necessary for breastfeeding mothers.

### **Exposure to external and/or internal radiation**

When working with unsealed radionuclides, the risk of uptake of the radioactive material will nearly always be of far greater importance than any exposure to external radiation. For example,  $\beta$  radiation from an external source will not even penetrate through to the womb. The majority of the University's work with unsealed radionuclides does not present any significant risk of inhalation, and is covered by Generic Radiation Risk Assessments, RP/RA2 to 6. The following guidelines apply to such work:

- Most work can go ahead as normal. However, pregnant workers and breastfeeding mothers must not work with activity values in excess of those shown in columns 2 and 3 respectively of the table below for the corresponding radionuclides shown in column 1. Note that this means actually handling the radioactive material. Provided that normal contamination controls are being complied with, there should not be a significant risk from working alongside other persons using higher activity levels.

Radionuclide	Maximum Activity Value (MBq) for Pregnant Workers	Maximum Activity Value (MBq) for Breastfeeding Workers
H-3	800	<b>800</b>
C-14	50	<b>100</b>
Na-24 *	80	
P-32	1.0	<b>15</b>
P-33	6.0	
S-35	40	<b>100</b>
Cl-36	40	
Ca-45	2.5	<b>20</b>
Cr-51	900	
Co-57	150	
Fe-59 *	20	<b>500</b>
Zn-65 *	10	<b>40</b>
Se-75	10	<b>10</b>
Rb-86 ^	10	
Tc-99m *	1500	<b>1500</b>
Ru-106	5.0	<b>150</b>
In-111	100	
I-123	150	
I-125	1.0	
I-131 ^	0.5	<b>0.5</b>
<b>Tl-201 *</b>	<b>350</b>	

- These values have been worked out to take account of (a) any increased dose to the foetus relative to that to the mother per unit

intake, and (b) the ratio of the dose to a breastfeeding mother to that of her child per unit intake. Where there are no values in the table, these will be determined at the time of the review of the radiation risk assessment.

- Due to the higher risk of contamination, pregnant workers and breastfeeding mothers should not assist with the clean up of spillages of radioactive material.
- No additional personal monitoring should be necessary, except for those radionuclides marked with an asterisk (\*) in the table above. For those radionuclides, if not already the case, pregnant workers should wear a whole-body personal dosimeter (four-weekly wearing period) for the rest of the work with radiation whilst pregnant. Those radionuclides marked ^ are also significant gamma emitters, but at the activities concerned it is unrealistic to expect that they could expose the abdomen of the worker to a dose of 2 mSv during the period of pregnancy. There is no need for breastfeeding mothers to have additional personal monitoring.
- There is no general guidance for work not considered in Generic Risk Assessments RP/RA2 to 6; any extra precautions will be considered at the time of the review of the risk assessment.

## 5. Further Information

Further information on the risk to pregnant and breastfeeding workers from radiation can be obtained from the University Radiation Protection Adviser. Information on other occupational risks to pregnant and breastfeeding workers can be obtained from the Occupational Health Unit, [Occupational.Health@ed.ac.uk](mailto:Occupational.Health@ed.ac.uk).

For advice on any of the above topics please contact the Radiation Protection Unit, [radiation@ed.ac.uk](mailto:radiation@ed.ac.uk).