

Breast Imaging Service

Local Rules for the protection of persons against ionising radiation arising from the use of diagnostic X-ray equipment

In accordance with the Ionising Radiations Regulations 2017

<https://www.gov.uk/government/publications/ionising-radiation-medical-exposure-regulations-2017-guidance>

Responsibilities relating to Breast Imaging Local Rules:	
Ensuring the required Local Rules are in place	Worcestershire Acute Hospitals NHS Trust (WAHT)
Authorisation of Breast Imaging Local Rules	Clinical Director of Breast Imaging
Development, review and amendment to this document	Superintendent Radiographer
Assisting in development, review and amendment to this document	Radiation Protection Supervisors
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Breast Imaging Local Rules

Amendment log			
Issue	Date	initials	Description
2	April 2016		Update to location and equipment Worcestershire Breast Unit
3	August 2016		Appendix III. RPS and RPA details updated
4	January 2018		Update to location and equipment on the Alexandra hospital site. RPS details updated. Update to location of specimen x ray cabinet on the Worcestershire Royal Hospital site.
5	October 2018		Appendix III. RPS details updated.
6	August 2020		Update to equipment on mobile screening trailers, specimen cabinet at Kidderminster and mammography equipment at POWCH
7	February 2022	LMS	Update to all equipment and site information, including new mobiles/x-ray equipment and specimen cabinets and RPS/RPA Details amended
8	25.11.22	DF JB	Update of equipment and RPS/RPA information
9	1.5.2024	JB	Update of equipment and RPS
10	10.1.2025	JB IRS	Clarification of contingency procedure Clarification of oversight of staff dose records

Premises to which these local rules relate:

Breast Imaging Department Worcestershire Breast Unit, Worcestershire Royal Hospital, Worcester
 Breast Imaging Department, Kidderminster Treatment Centre
 Breast Imaging Department, Alexandra Hospital, Redditch
 Mobile Breast Screening Units

Effective from: April 2009

Amended: 25th November 2022 - All previous versions should be withdrawn after the effective date

Rules prepared in collaboration with:
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Breast Imaging Local Rules

SECTION 1:	INTRODUCTION.....	4
SECTION 2:	RESPONSIBILITIES AND PERSONNEL	4
2.1	STAFF RESPONSIBILITY	4
2.2	RADIATION PROTECTION SUPERVISOR (RPS)	4
2.3	RADIATION PROTECTION ADVISER (RPA).....	5
SECTION 3:	CLASSIFICATION OF AREAS.....	5
3.1	CONTROLLED AREAS.....	5
3.2	SUPERVISED AREAS	5
3.3	WARNING SIGNS	5
SECTION 4:	BREAST IMAGING DEPARTMENT SYSTEM OF WORK	5
SECTION 5:	OPERATIONAL PROCEDURES	7
5.1	GENERAL FEATURES.....	7
5.2	SUPPORT OF PATIENTS	7
5.3	RADIOGRAPHY	8
SECTION 6	MODIFICATIONS TO EQUIPMENT	8
SECTION 7	NEW X-RAY INSTALLATIONS OR PROCEDURES	8
SECTION 8	CONTINGENCY PLAN	8
SECTION 9	SUSPECTED HIGH EXPOSURE/RADIATION INCIDENT	9
SECTION 10	RADIATION MONITORING AND RECORD KEEPING	9
SECTION 11	INFORMATION FOR PREGNANT STAFF	10
APPENDIX I - DUTIES OF THE RADIATION PROTECTION SUPERVISOR		11
APPENDIX II - COMPLETE LIST OF DESIGNATED AREAS.....		12
APPENDIX III - APPOINTED OFFICERS		13
APPENDIX IV- PARTICULAR FEATURES OF CERTAIN ROOMS		14
APPENDIX V- IRR 17 DOSE LIMITS		15

SECTION 1: INTRODUCTION

1. The Trust has an agreed Radiation Safety Policy which states that it is committed to keeping your exposure to ionising radiation as low as reasonably achievable. In addition, the Policy lists individuals with specific responsibilities within the radiation protection programme, describes procedures for implementing the policy and lists relevant publications. A copy of the Policy should be available in all Departments.
2. These local rules have been prepared to satisfy the Ionising Radiations Regulations 2017 (IRR 17). By following these rules you will be able to work safely and comply with IRR17. Your annual radiation doses should be well below legal limits for adult workers and in most cases will be less than the limit for members of the public (see APPENDIX V - IRR 17 Dose Limits). The Trust has separate procedures relating to medical radiation exposures which have been prepared to comply with the Ionising Radiation (Medical Exposures) Regulations 2017.
3. All members of staff who may be exposed to ionising radiation during the course of their work must be familiar with those sections of the Local Rules which apply to them and should sign a statement to this effect.

SECTION 2: RESPONSIBILITIES AND PERSONNEL

2.1 STAFF RESPONSIBILITY

1. If you work with ionising radiation, you have a duty to work carefully and safely, exposing neither yourself nor other persons to radiation unnecessarily. For this reason, you must become familiar with the local rules. Please read them carefully. You will be required to sign a statement agreeing to act in accordance with them.
2. You must
 - not intentionally misuse X-ray equipment
 - not interfere with X-ray equipment unless you have good reasons for doing so.
 - use the protective equipment, or clothing, and personal dosimeters provided
 - report any defects in protective equipment, or malfunctions in radiation equipment, to the Radiation Protection Supervisor (see 2.2) or line manager as soon as possible in line with departmental procedures.
3. If you become pregnant, it is important that you notify your Department Manager in writing as soon as possible (see section 11).
4. Staff employed by Private Contractors working on the Trust's premises must also obey these Local Rules unless some other local rules have been specifically agreed. The Local Rules will be discussed with such contractors prior to them starting work within the department

2.2 RADIATION PROTECTION SUPERVISOR (RPS)

1. The Trust must appoint an RPS to assist it in complying with the IRR 17. In particular, the RPS should ensure that, as far as possible, the protective measures laid down in the Local Rules are followed by any staff working with ionising radiation.
2. The names of the Radiation Protection Supervisor(s) relating to X-ray work for this Trust are given in APPENDIX III - Appointed Officers.
3. See APPENDIX I - Duties of the Radiation Protection Supervisor.

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2.3 RADIATION PROTECTION ADVISER (RPA)

The Trust has to consult an RPA on matters relating to IRR17 such as controlled areas, periodic examination of engineering controls, prior risk assessments, local rules, quality assurance programmes and radiation incidents etc. Details of the RPA appointed by the Trust are given in APPENDIX III - Appointed Officers.

SECTION 3: CLASSIFICATION OF AREAS

3.1 CONTROLLED AREAS

1. The Trust must identify areas on its premises where people need to follow special working procedures to ensure that they do not receive significant radiation doses. These areas are called controlled areas. You can only enter a controlled area if you are following these procedures (see SECTION 4: BREAST IMAGING DEPARTMENT SYSTEM OF WORK), or if you have been designated as a classified person (See APPENDIX V - IRR 17 Dose Limits).
2. All permanent X-ray rooms are controlled areas. Further details are given in APPENDIX II - Complete List of Designated Areas.

3.2 SUPERVISED AREAS

1. The Trust must also identify areas where, although not controlled, it is necessary to keep the conditions in the area under review. These areas are called supervised areas. Further details are given in APPENDIX II - Complete List of Designated Areas.

3.3 WARNING SIGNS

1. Entrances to permanent Controlled Areas are marked with appropriate warning signs.

SECTION 4: BREAST IMAGING DEPARTMENT SYSTEM OF WORK

If you need to enter or remain in a Controlled Area you must follow this System of Work. Please read the appropriate sections.

General (All persons)

1. Only those **persons whose presence is essential** for the procedure or for training may remain in the controlled area when radiological examinations are being carried out.
2. **Warning lights and notices** at the entrances to X-ray rooms must be observed.
3. Persons who are not trained in the use or maintenance of X-ray equipment must not enter a Controlled Area, except under the **supervision of an appropriately trained person**, unless it has been ascertained that the electricity supply to the X-ray generator is switched off.
4. Persons whose duties require them to be in an X-ray room whilst X-rays are being generated should be **behind the protective screen** whenever possible. If they need to be outside the protected area of the screen, they must wear correctly fastened protective clothing (e.g. **lead aprons**), should stand as far from the radiation beam as possible and minimise the time spent in the unprotected area.
5. A **personal dose monitor** (pdm) should be worn in the approved manner by anyone who is closely involved in the use of X-rays. The pdm should be attached to the uniform at the chest / abdominal level, so that the window is facing outwards. Where a protective apron is worn, the monitor should be worn underneath.
6. No one should operate X-ray equipment unless they are adequately trained to do so.

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Breast Imaging Local Rules

Relatives or Visitors

1. Relatives or visitors must be supervised by a member of the radiographic staff.

Cleaning & General Maintenance Staff

1. When the room in use light is not illuminated indicating that the electricity supply to the equipment is disconnected (or a room in use light, if present, is not illuminated), access is no longer restricted, and it is safe to enter the room. If in doubt, contact the Superintendent Radiographer.
2. If it is necessary for cleaning or maintenance to be carried out while the electricity supply to the X-ray equipment is still connected (in order to maintain electromagnetic locks for example), radiographic staff must give clear instructions to the other staff to avoid inadvertent initiation of exposure.
3. Non-approved operators must not interfere with any of the controls of the X-ray equipment.

Personnel involved with the maintenance of X-ray equipment

1. Any person who will be carrying out maintenance work on the equipment should report to the superintendent radiographer or designated deputy before commencing work and then follow the PROCEDURE FOR HAND-OVER/HAND-BACK DURING MAINTENANCE OF X-RAY EQUIPMENT.
2. During the time the engineer etc. has charge of the equipment, they will be responsible for radiation safety precautions and the associated controlled area.

Outside Workers

1. Any "outside worker", as defined by the Ionising Radiations Regulations 2017 (IRR 17), must
 - a) make their radiation passbook available to a designated person (Radiation Protection Supervisor, Head of Department or Radiation Protection Adviser (RPA)) before commencing work in a Controlled Area and
 - b) collect the passbook when work activities are complete.

See Outside Worker information sheet for further information.

Staff operating X-ray equipment

1. It is the responsibility of the operator of X-ray equipment to ensure that:
 - a) all settings are correct before carrying out an exposure.
 - b) no one other than the patient will be in the primary (unattenuated) beam.
 - c) when necessary, verbal notification is given to indicate when X-rays are about to be emitted, thus enabling all appropriate personnel to retire to safe areas.
 - d) entrance doors to X-ray rooms are closed prior to and during the generation of X-rays unless the patient's clinical condition or safety dictates otherwise.
 - e) at the cessation of activities, the equipment is disconnected from the electrical supply to allow safe access for cleaning and maintenance, and so on. If a room in use light is not available, a reversible sign on the X-ray room door should be set to indicate that the electricity supply to the X-ray equipment is off.
 - f) any keys (which enable operation) are removed after use.
2. Appropriate operational procedures must be followed by all staff (see Section 5). For procedures specific to particular equipment see APPENDIX IV - Particular Features of Certain Rooms.

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SECTION 5: OPERATIONAL PROCEDURES

5.1 GENERAL FEATURES

1. X-ray examinations should be carried out in rooms designed for the purpose (and designated as Controlled Areas)
2. X-ray rooms should not be used for more than one X-ray procedure at a time, unless so designed.
3. It is the duty of all staff who use protective clothing (lead aprons, gloves, thyroid shields etc.) to
 - a) store them correctly - they should not be folded or placed on the floor
 - b) handle the closure devices carefully
 - c) visually inspect prior to use and report any faults.
4. Lead aprons of at least 0.35 mm lead equivalence should be worn if tube voltages greater than 100 kV are regularly used.
5. The operator should always have a clear view of the patient.

5.2 SUPPORT OF PATIENTS

1. Manual support of sick, weak or anaesthetised patients for X-ray examinations should not be performed regularly by any one person. Mechanical devices should be used for immobilisation whenever possible.
2. Any person (whether staff or e.g. an adult carer) supporting a patient who is being examined radiographically, or anyone holding films, should
 - been clearly instructed on the procedure by the radiographer involved
 - wear protective clothing and
 - be positioned so that their hands are outside the primary beam and their bodies are as far as possible from the primary beam.
 - be adequately informed of the level of risk involved by the radiographer involved. This is particularly important if the carer is a pregnant. The dose and hence risk will usually be very small. For example, even for a relatively large exposure such as lateral lumbar spine (95 kV, 30 mAs) to an adult, the effective dose to someone only 0.3 m (1 foot) from the patient *but wearing a lead apron* will be less than 10 μ Sv. Similarly, someone staying close (0.3 m) to the patient during a CT examination (350 mAs per slice or rotation) might receive about 10 μ Sv per tube rotation. This dose is small compared with the 2000 μ Sv each member of the UK receives on average each year from background radiation. (For more information, please see Information sheet - scattered doses from X-ray examinations). Please note that as it is most unlikely that any person accompanying a patient for simple radiographic procedures will receive a dose of more than 1 mSv (1000 μ Sv) these people do **not** need to be classified as a "comforter & carer" as defined in the IRMER 17.
3. If there is a serious likelihood that the person supporting a patient will receive a significant whole-body dose, e.g. they remain close to the patient for more than 5 exposures of 80kV, 100mAs or for 20 CT slices/rotations, a personal dosimeter or pocket dosimeter should be worn.
4. A record should be kept of persons holding a patient including either the dose measured or details of their positioning and the examination so that a retrospective dose can be calculated. There is a "patient holding book" available for this purpose.
5. Patients and carers should not be left unattended in an X-ray room, unless the equipment has been left in a "safe" condition where hand and footswitches will not produce X-rays

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5.3 RADIOGRAPHY

1. Adjustable beam limiting devices, or cones, should be used to restrict the beam to the minimum size necessary for a satisfactory examination.
2. In all instances when working in a mammography room, the operator should stand behind the protective screen when making exposures.

SECTION 6 MODIFICATIONS TO EQUIPMENT

1. The RPS should be informed of any maintenance undertaken on, or modifications to, X-ray equipment which might alter the X-ray output, beam quality or protection of the tube.
2. Such details should be entered in a log kept for this purpose for each piece of equipment.
3. Details of any change in output, beam quality or protection of the tube, should be fixed to the equipment by the person responsible for the change.
4. Staff should pay due attention to such notices.

SECTION 7 NEW X-RAY INSTALLATIONS OR PROCEDURES

1. The RPS and manager must be informed of any proposed new X-ray installation or change in technique which might significantly alter the dose that staff receive. The manager should ensure that plans of new installations are submitted to the RPA for advice and approval and a **critical examination, commissioning tests and prior risk assessment** are completed **before** the new facility or techniques begins operation. The RPA should be informed when new tubes are to be fitted so that the appropriate tests can be arranged before the unit is used. Risk assessments should be reviewed annually to highlight any service changes.

SECTION 8 CONTINGENCY PLAN

1. A warning indicator, e.g. on the control panel, will indicate that X-rays are being emitted and there may also be an audible signal.
2. **X-ray set is producing X-rays at a time when X-ray emission is not intended**

If you notice that the X-ray set is producing X-rays at a time when X-ray emission is not intended, you must

- a) **switch off power to the unit immediately** using emergency stop or mains isolator from behind the control panel.
- b) attach a notice to the control panel saying that it must not be used
- c) inform the RPS or your manager as soon as possible

3. **Any doubt regarding the safe exposure of an X-ray set**

Similarly, if you have any doubt regarding the safe exposure of an X-ray set, you should stop using the equipment immediately until you have reported and discussed the problem with the RPS or your manager. They may decide to take the unit out of service it must not be used again until the fault has been investigated.

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M:\TeamShare\TS0040_BreastImaging\Radiation Protection			

Breast Imaging Local Rules

If the unit produces diagnostic error messages and, provided it is safe to do so, it is better **not** to turn off the equipment until the fault has been discussed with the service engineers and perhaps the Medical and healthcare Products Regulatory Agency (MHRA).

4. These incidents may need to be reported - see separate PROCEDURE FOR RADIATION INCIDENTS.
5. Although it is unnecessary to rehearse these contingency arrangements **any staff who operate the X-ray equipment must establish the location of the main power switch before using the equipment.**

SECTION 9 SUSPECTED HIGH EXPOSURE/RADIATION INCIDENT

1. If any member of staff believes that they, or any other person including the patient, may have been involved in an incident, they should report the incident to an RPS/the superintendent immediately.
2. The RPS should carry out an immediate investigation - in conjunction the Radiation Protection Adviser if necessary. The Health and Safety Executive (HSE) or Care Quality Commission (CQC) will need to be informed if the dose received was above certain values. See separate procedure for Breast Imaging *Radiation incident flowchart* (Appendix VI) and *WAHT Radiation Safety Programme* (Key document available on Trust intranet)

3. Local investigation level

In addition, most staff should routinely receive very small doses. The Trust has therefore set the following local investigation levels:

Staff involved with mammography work

1mSv in a year

The department manager must carry out a formal investigation if the effective dose received in a calendar year exceeds the above level.

SECTION 10 RADIATION MONITORING AND RECORD KEEPING

1. If you have been issued with a personal radiation dosimeter you
 - a) **MUST**
 - i) wear it in the correct position. Whole body dosimeters should be positioned either at chest or waist level, under a protective apron if worn. You will be told where to wear extremity dosimeters.
 - ii) wear it the correct way round.
 - iii) keep it away from excessive heat, moisture or chemical fumes.
 - iv) be responsible for the proper use and its replacement at the specified time.
 - a) **MUST NOT**
 - i) wear it whilst you are undergoing a medical radiation exposure yourself.
 - ii) wear a dosimeter which has been specifically issued to someone else.

Further information is available in the leaflet "Your personal dosimeter" and instructions relating to extremity dosimeters issued by the dosimetry service.

2. Lost or damaged dosimeters

- a) Inform the person who distributes the dosimeters if you suspect that
 - i) Your dosimeter (or the holder) is damaged, accidentally exposed to radiation or has been exposed to excessive heat, moisture or chemicals.
 - ii) You have lost or misplaced your dosimeter.

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M:\TeamShare\TS0040_BreastImaging\Radiation Protection			

Breast Imaging Local Rules

- b) Giving details of when you suspect the loss or damage happened so that the dosimetry service can be advised accordingly. Also provide any additional information such as possible location where it may have been lost or any actions you have taken to find it.
- c) You should not continue your work with radiation until a replacement dosimeter has been issued.

3. Found dosimeters

- a) If you find a dosimeter (e.g. in an x-ray room) that has presumably been lost, you should hand it into the person who distributes the dosimeters advising them where and when it was found.

4. Records

Records of doses received are kept by RPS. Superintendent accesses dose reports each month, checks and saves the report in the admin drive and staff may ask to see their records.

SECTION 11 INFORMATION FOR PREGNANT STAFF

1. As an employee in this Trust your work may require you to enter areas where radiation may be present because X-ray equipment is in use. The IRR 2017 require employers to inform all their staff who are engaged in work with ionising radiation of the possible hazards arising from radiation exposure, particularly to an unborn child.
2. The risks to the unborn child are very small. If you wear a film badge, your dose will already be known. If you do not normally wear a film badge, this is because your work involves either negligible amounts of radiation, or no radiation at all, and your dose will be much less than for film badge wearers. For many years it has been the practice to minimize the radiation dose to staff during pregnancy to avoid any unnecessary risk to the baby. In hospitals there are few staff, whether pregnant or not, who would be likely to exceed 1 mSv, even in a whole year. For comparison, on average, each member of the UK receives more than 2 mSv every year from natural background radiation. During pregnancy, your baby will receive about 1 mSv from background radiation. The added exposure at work should be no more than this, and in practice, is likely to be considerably less.
3. **If your work involves the use of X-rays (i.e. you have to be in a controlled or supervised area) and you become pregnant it is important that you notify your Departmental Manager (and hence your employer) in writing as soon as possible.**
4. Once notified, your Departmental and line managers must take steps to ensure that the dose to your baby from radiation received at work will be less than 1 mSv. In most cases you will be able to continue your normal duties. You should not take on any extra duties that would increase your whole-body dose during pregnancy.
5. Further information is available online:

[Working safely with ionising radiation Guidelines for expectant or breastfeeding mothers \(hse.gov.uk\)](https://www.hse.gov.uk/working-safely-with-ionising-radiation-guidelines-for-expectant-or-breastfeeding-mothers/)
[Pregnancy and Work in Diagnostic Imaging Departments, Second edition \(rcr.ac.uk\)](https://www.rcr.ac.uk/pregnancy-and-work-in-diagnostic-imaging-departments/)

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Breast Imaging Local Rules

APPENDIX I - Duties of the Radiation Protection Supervisor

Duties

1. Supervise the work with X-ray equipment so that, as far as possible, it is in accordance with these local rules.
2. Be familiar with the requirements of the local rules and relevant parts of the IRR 17, Approved Code of Practice and non-statutory guidance.
3. To ensure that on relinquishing the post of RPS, the Trust is informed.

Additional Tasks undertaken by the RPS but which remain the responsibility of the manager

4. To assist the line manager in ensuring that the Local Rules are read and understood by those persons to whom they apply, and as far as possible, to ensure compliance.
5. To organise and administer the assessment of doses to staff by means of personal dose monitors by
 - a) ensuring that dosimeters, when issued, are worn in the approved manner, and changed at agreed times by all the appropriate staff.
 - b) preparing and reviewing a list of staff to be monitored in conjunction with the RPA.
 - c) retaining records of the dose assessment in the department for 2 years (for non-classified persons).
 - d) keeping the doses received by staff under review and if necessary, notify the RPA and Directorate Manager if any staff exceed the local dose investigation level (see SECTION 9 SUSPECTED HIGH EXPOSURE/RADIATION INCIDENT).
 - f) any staff will need to be classified (see APPENDIX V - IRR 17 Dose Limits).
 - g) informally investigate any effective doses received by individuals in a single monitoring period greater than 0.5 mSv.
6. To report to the Directorate Manager, the Radiation Protection Committee and the RPA details of any excessive doses received by personnel, to carry out investigations in conjunction with the RPA when appropriate, and to make special reports of potential hazards or of incidents.
7. To assist the Department Manager with prior risk assessments.
8. To review doses received by persons supporting children or infirm patients during radiography, to ensure that no one is receiving significant exposures.
9. To assist the Department Manager in maintaining a log of details of any maintenance undertaken on, or modifications to, X-ray equipment which might alter the X-ray output, beam quality or protection of the tube. Where significant changes in X-ray output or protection of the tube might occur, the RPS should inform the department staff and the RPA.
10. For any proposed new X-ray installation or new techniques, to assist the Department Manager in arranging
 - a) for the RPA to have plans of the change for the appropriate advice and approval.
 - b) the completion of a prior risk assessment and
 - c) for a radiological survey before bringing new equipment into operation.
11. To ensure that warning lights are operating correctly and that warning notices are correctly displayed.
12. To ensure that on relinquishing the post of RPS, the Trust is informed.

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APPENDIX II - Complete List of Designated Areas

1. CONTROLLED AREAS

1.1 PERMANENT - the whole room is controlled unless stated otherwise

Location

Equipment

Mobile vans

Molly	GE Senographe Pristina
Pippin	GE Senographe Pristina
Bluebell	GE Senographe Pristina

Kidderminster Hospital, Kidderminster

Mammography Room	GE Senographe Pristina 2D
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Worcestershire Breast Unit, Worcester

Room 1	GE Senographe Essential
Room 2	GE Senographe Pristina 2D + 3D
Room 3	GE Senographe Pristina 2D 3D + CESM

Alexandra Hospital, Redditch

Breast Imaging unit	GE Senographe Pristina 2D 3D + CESM
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Faxitrons- controlled area is contained within the unit

Worcester Breast Unit	Hologic CoreVision (Room 3)
Kidderminster Hospital	Hologic Biovision (Theatre)
Alexandra Hospital Redditch	Hologic Trident HD (Theatre) Hologic CoreVision (Breast Unit)

2. SUPERVISED AREAS

No supervised area exists outside the X-ray rooms and mobile vans listed in 1.1 above.

APPENDIX III - Appointed Officers

APPOINTED DOCTOR

None appointed.

The Trust has not requested that the HSE appoint an appointed doctor because it does not employ any classified workers. Staff who need to be designated as classified workers or who receive an overexposure must be under the medical surveillance of an appointed doctor. Contact details of a suitable appointed doctor can be obtained from the HSE website <http://www.hse.gov.uk/>

The Trust's Occupational Health Physician can give general medical advice and can liaise with appointed doctor.

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Breast Imaging Local Rules

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APPENDIX IV - Particular Features of Certain Rooms

Worcestershire Breast Unit Mammography Room 1

If there is more than one person present in the room, they must ensure that they are positioned so that they are afforded protection by the lead screen when an exposure is made.

APPENDIX V - IRR 17 Dose Limits

Person	Annual dose limit in mSv		
	Whole body	Hands, feet, skin	Eyes
1.Employee aged 18 yrs or over	20	500	20
2.Trainees <18 years	6	150	15
3.Public	1	50	15

Additional dose limits

Abdomen of employee of reproductive potential 13 mSv in any 3-month period

Classified Persons

Staff must be designated as classified persons if they are likely to receive more than 3/10 of the employee (aged 18yrs or over) limits. There are no classified persons employed by the Trust

All staff to sign **Local Rules Sign off sheet** to confirm that they have read, understood and will abide by these local rules. Staff will be notified by Radiation Protection Supervisors of subsequent changes and amendments to the document.

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Breast Imaging Local Rules

APPENDIX VI Radiation Incident procedure

Unintended dose or over-exposure, including accidental exposure, incorrect patient, equipment failure, vetting error or incorrect timing etc

