Local rules for the protection of persons against ionising radiations arising from the use of Diagnostic x-ray equipment

In accordance with the Ionising Radiations Regulations 1999

Premises to which these local rules relate:

Birmingham Heartlands Hospital
Solihull Hospital
Birmingham Chest Clinic
Good Hope Hospital

Effective from:

All previous versions should be withdrawn after the effective date

Rules prepared in collaboration with:
RRPPS
63 Melchett Road
Kings Norton Business Centre
Birmingham B30 3HP
Record Form for Logging Amendments:

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SECTION 1: INTRODUCTION

1.1 The Trust has an agreed Radiation Protection Policy which states that it is committed to keeping your exposure to ionising radiation as low as reasonable 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.

1.2 These local rules have been prepared to satisfy the Ionising Radiations Regulations 1999 (IRR 99). By following these rules you will be able to work safely and comply with IRR99. 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 99 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 2000.

1.3 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

2.1.1 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.

2.1.2 You must
   • not intentionally misuse x-ray equipment
   • not interfere with x-ray equipment unless you are authorised to do 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.

2.1.3 If you become pregnant, it is important that you notify your Department Manager in writing as soon as possible (see section 11).

2.1.4 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)

2.2.1 The Trust must appoint an RPS to assist it in complying with the IRR 99. 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.
2.2.2 The names of the Radiation Protection Supervisor(s) relating to x-ray work for this Trust are given in APPENDIX III - Appointed Officers

2.2.3 See APPENDIX I - Duties of the Radiation Protection Supervisor

2.3 RADIATION PROTECTION ADVISER (RPA)

2.3.1 The Trust has to consult an RPA on matters relating to IRR99 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.

2.4 OTHER RESPONSIBILITIES

2.4.1 Employing Authority
The Chief Executive is the accountable Director for the Trust and has the responsibility for ensuring compliance with IRR 99 for all work with ionising radiation. These Local Rules have been written as part of that responsibility.

2.4.2 The HR Director
Has overall responsibility for ensuring that an appropriate management structure for the implementation, monitoring and review of compliance with IRR 99 is in place.

2.4.3 The Radiation Protection Committee
Is responsible for monitoring the implementation of Radiation Protection within the Trust.

2.4.4 Head Of Department
The Head of Department is responsible to the Chief Executive for compliance with IRR 99 in the local department. He/she or his/her deputy may delegate the day-to-day supervision of safe radiation practices to the RPS.

2.4.5 Appointed Doctor
If any member of staff becomes a classified person (see APPENDIX V – IRR 99 Dose Limits), the employer must inform the Health and Safety Executive to appoint an appointed doctor. The HSE appoints the Appointed Doctor who is responsible for medical supervision of Classified Persons. (See APPENDIX III - Appointed Officers.)
SECTION 3: CLASSIFICATION OF AREAS

3.1 CONTROLLED AREAS

3.1.1 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: X-RAY DEPARTMENT SYSTEM OF WORK) or if you have been designated as a classified person (See APPENDIX V-IRR 99 Dose Limits).

3.1.2 All permanent x-ray rooms are controlled areas. There are also controlled areas around mobile and dental x-ray equipment whilst it is in use. Further details are given in Error! Reference source not found.

3.2 SUPERVISED AREAS

3.2.1 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.

3.2.2 Supervised areas exist within a room such as a ward or operating theatre which is not designated wholly as a controlled area, but where mobile x-ray equipment is used in part of the room.

3.3 WARNING SIGNS

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

3.3.2 Controlled and supervised areas around mobile and dental x-ray equipment do not usually have such signs.
SECTION 4: X-RAY 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.

4.1 General (All persons)

4.1.1 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.

4.1.2 Warning lights and notices at the entrances to x-ray rooms must be observed.

4.1.3 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.

4.1.4 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.

4.1.5 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 pdm should be worn underneath.

4.1.6 No one should operate x-ray equipment unless they are adequately trained to do so.

4.2 Relatives or Visitors

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

4.3 Cleaning & General Maintenance Staff

4.3.1 When a notice is posted at the entrance to an x-ray room 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 Duty Radiographer.

4.3.2 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.

4.3.3 Non-approved operators must not interfere with any of the controls of the x-ray equipment.

4.4 Personnel involved with the maintenance of x-ray equipment

4.4.1 Any person who will be carrying out maintenance work on the equipment should report to the Site Lead radiographer or designated deputy before commencing work and then follow the PROCEDURE
4.4.2. During the time the engineer etc. has charge of the equipment; they will be responsible for radiation safety precautions and the associated controlled area.

4.5 **Outside Workers**

4.5.1 Any outside worker, as defined by the Ionising Radiations Regulations 1999 (IRR 99), 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.

4.6 **Staff operating x-ray equipment**

4.6.1 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.

4.6.2 Appropriate operational procedures must be followed by all staff (see Section 5). For procedures specific to particular equipment see APPENDIX IV- Additional Safety Precautions when using Certain Rooms.

4.7 **Additional requirements for the use mobile equipment on wards & theatres etc**

4.7.1 A temporary controlled area exists during the (temporary) use of mobile x-ray equipment on the wards, theatre and other departments. When x-rays are about to emitted and during the exposure, the controlled area normally extends for a distance of 2 metres (see Error! Reference source not found.) in any direction from the x-ray tube or patient, and within the primary beam until it has been sufficiently attenuated by material or distance. All staff whose presence in the controlled area is not essential should retreat as far as is practicable. The further the distance the smaller the radiation dose will be, but it is not necessary to leave a large ward or room provided you can get at least 3 m from tube and the patient. See Footnote 1

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1 This distance has been evaluated on the assumption that the radiographic workload at any particular location will be less than 20 radiographs (90% chests, 5% abdominal and 5% lateral lumbar spine) or 40 minutes screening per week. Unless the x-ray examinations are being carried out in a dedicated area (e.g. a pacing room) which has radiation shielding included in its design the radiation protection supervisor or adviser (RRPPS, 0121 627 2091) should be informed if the workload is greater. Such a workload may not...
4.7.2 Patients in adjacent beds do not need to be moved unless they will be in the main x-ray beam and no mobile lead screen is available.

4.7.3 When using mobile x-ray equipment, it is the responsibility of the operator to ensure that
a) No-one enters the Controlled Area unless they are wearing protective clothing, or are protected by other suitable means.
b) The main beam is pointed in a safe manner - i.e. towards a solid brick, lead lined or concrete floor or wall, an unoccupied area or towards a mobile protective screen.

4.7.4 Those persons who remain in, or enter, the controlled area must
a) wear correctly fastened lead aprons
b) should stand as far away from the x-ray beam as their duties permit. Under no circumstances should they be within the direct line of radiation.
c) wear, in an approved manner, any personal dose monitor that have been issued to them.

4.8 Dental Radiography

4.8.1 Under normal conditions no-one, other than the person undergoing authorised radiological investigation, is permitted to enter the controlled area.

4.8.2 The X-ray film or detector should normally be placed in a holder or held by the patient. If this is not possible, e.g. when a child or handicapped person can not hold it for themselves, the accompanying adult will need to enter the Controlled Area to hold the film or detector and possibly to support the patient. The following restrictions apply:
a) The film or detector should be held by using a pair of forceps to avoid direct irradiation of the fingers. It should not be hand held.
b) The accompanying person should be positioned so that they will not be in the direct beam, and should ideally stand as far away from the patient and tube as possible.
c) Manual support should not be regularly provided by any one person.
d) It is not essential for the person supporting the patient to wear a protective apron, provided that the number of films taken does not exceed 10.
e) It is not necessary for the person supporting the patient to be issued with a personal radiation monitor, provided that steps a) to c) are followed.

For clarification or additional guidance contact:
The Radiation Protection Supervisor (SH) for Dental Radiography;
Mr Tom Lowbridge (Bleep 0614) Tel 0121 424 4271
Mrs. Marie Peplow (Bleep 2442) Tel 0121 424 3279
Principle Dental Nurse Manager (SH); Mrs. Sue Rogers.
Mrs Rachael Hinchliffe Tel 0121 424 9761
Ms Gill Tomlinson
Mrs Helen Withers 0121 424 9753

SECTION 5: OPERATIONAL PROCEDURES

5.1 GENERAL FEATURES
5.1.1 X-ray examinations should be carried out in rooms designed for the purpose (and designated as Controlled Areas), unless the condition of the patient makes it essential for the examination to be carried out in a Ward or Operating Theatre with suitable protection.

5.1.2 X-ray rooms should not be used for more than one x-ray procedure at a time, unless so designed.

5.1.3 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.

5.1.4 Lead aprons of at least 0.35 mm lead equivalence should be worn if tube voltages greater than 100 kV are regularly used.

5.1.5 The operator should always have a clear view of the patient.

5.2 SUPPORT OF PATIENTS

5.2.1 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.

5.2.2 Child patients should normally be held only by their parents, or other accompanying adult, unless that adult is known to be pregnant.

5.2.3 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 woman. 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 µSv. Similarly someone staying close (0.3 m) to the patient during a CT examination (350 mAs per slice or rotation) might receive up to 40 µSv per tube rotation. This dose is small compared with the 2000 µSv 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 µSv) these people do not need to be classified as a “comforter & carer” as defined in the IRR 99.

5.2.4 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 10 CT slices/rotations, a film badge or pocket dosimeter should be worn.

5.2.5 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.

5.2.6 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.
5.2.7 Examinations or circumstances where carers regularly hold patients are given in APPENDIX IV – Additional Safety Precautions when using Certain Rooms.

5.3 **RADIOGRAPHY**

5.3.1 Adjustable beam limiting devices, or cones, should be used to restrict the beam to the minimum size necessary for a satisfactory examination.

5.3.2 In all instances when working in a general radiography room, the operator should stand behind the protective screen when making exposures.

5.4 **FLUOROSCOPY**

5.4.1 All fluoroscopic examinations should be conducted as rapidly as possible using the largest field size setting (i.e. reduced magnification) consistent with a satisfactory diagnostic result but with the beam collimated as much as possible. This will result in a lower entrance surface doserate.

5.4.2 The image intensifier should be positioned as close to the patient as possible.

5.4.3 During fluoroscopic procedures, equipment for protecting the operator against scattered radiation from the patient should be in position. All persons present must wear protective aprons or stand behind a protective screen.

5.4.4 During fluoroscopy, placing the hands in the direct x-ray beam should be carefully avoided. Protective gloves must be worn if there is any chance of the hands entering the useful beam.

5.4.5 Palpation with the hand should be kept to the minimum and only undertaken on the image receptor side of the patient. A protective glove with a lead equivalence of at least 0.25 mm lead should be used.

5.4.6 Whenever possible the x-ray tube should be on the side of the patient furthest from the operator and other staff.

5.4.7 Any local recommendations affecting the use of the automatic brightness control should be displayed on, or near, the x-ray equipment in question and should be followed.

5.4.8 Pulsed fluoroscopy beams and image storage facilities should be used whenever possible.

5.5 **DENTAL RADIOGRAPHY**

5.5.1 Approved beam limiting devices must be used for all radiographic exposures. The beam size should not exceed the size of the film. Equipment for intra-oral radiography must be provided with the correct field defining spacer cone; for equipment operating above 60 kV, the focus-skin distance must be 20 cm minimum, while for equipment operating at lower voltages, the focus-skin distance must be 10 cm minimum. In addition, the field diameter at the patient end of the cone should not exceed 6 cm.

5.5.2 All persons should stand as far away as practicable from the patient and tube - at least; the distance 1.5 m, unless protective screens or aprons have been provided.
5.5.3 All staff involved in the routine use of dental X-ray equipment should be provided with personal
dosemeters (film badges) if their individual combined workload of intra -oral and OPG films is more
than 50 per week.

5.5.4 Care should be taken to avoid pointing the x-ray tube directly at the interior partitions and doors
(Orthodontics room).

5.6 CT SCANNERS

5.6.1 Although the CT scanner may have an exposure switch which does not have to be pressed
throughout the exposure, the control panel should be manned during the scan sequence.

5.6.2 Persons should not normally be allowed to enter or remain in the scanning room during the "warm-
up" or detector calibration exposures.

5.6.3 If it is necessary for anyone to remain in the CT room during scanning, they will receive less dose by
standing in the "shadow" of the gantry rather than by just standing as far as possible from the
isocentre.

5.6.4 Remote injection facilities and appropriate spacers should be used whenever possible.

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.

1. Such details should be entered in a log kept for this purpose for each piece of equipment.

1. 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.

1. Staff should pay due attention to such notices.

SECTION 7 NEW X-RAY INSTALLATIONS OR PROCEDURES

7.1 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 RRPPS should be informed when new tubes are to be fitted so
that the appropriate tests can be arranged before the unit is used. Prior risk assessments should be
reviewed annually to highlight any service changes.

SECTION 8 CONTINGENCY PLAN

8.1 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.
8.2 **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 of the mains supply immediately** (or get help to do so if necessary) without standing in any direct beam,

b) attach a notice to the control panel saying that it must not must not be used and

c) inform the RPS or your manager as soon as possible

8.3 **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 inform the RPS immediately and the equipment taken out service until the fault has been investigated. If the unit produces any 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).

8.4 **These incidents may need to be reported - see separate PROCEDURE FOR RADIATION INCIDENTS.**

8.5 **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 a generator.**

**SECTION 9    SUSPECTED HIGH EXPOSURE/RADIATION INCIDENT**

9.1 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 the RPS immediately. The RPS should carry out an immediate investigation - in conjunction the Radiation Protection Adviser if necessary. The Care Quality Commission (CQC) will need to be informed if the dose received was above certain values. See separate PROCEDURE FOR RADIATION INCIDENTS.

9.2 **Local investigation level**

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

- **All staff involved in interventional x-ray work** 2 mSv in a year
- **Other staff involved with other diagnostic x-ray work** 1 mSv 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**

10.1 If you have been issued with a personal radiation dosemeter you

a) **MUST**
i) wear it in the correct position. Whole body dosemeters should be positioned either at chest or waist level, under a protective apron if worn. You will be told where to wear TLD dosemeters

ii) wear them the correct way round. Dosemeters usually have a side which should face the radiation

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

v) inform the RPS if you suspect that

   a) your dosemeter (or the holder) is damaged, accidentally exposed to radiation or has been exposed to excessive heat, moisture or chemicals

   b) you have lost or misplaced your dosemeter (so another one can be issued)

b) MUST NOT

i) wear it whilst you are undergoing an medical radiation exposure yourself.

ii) wear a dosemeter which has been specifically issued to someone else

Further information is available in the leaflet "Your personal film dosemeter" and instructions relating to TLDs issued by the dosimetry service.

10.2 Records of doses received are kept at RRPPS. Monthly and annual records are sent to the x-ray department and staff may ask to see their records.

SECTION 11 INFORMATION FOR FEMALE AND PREGNANT STAFF

11.1 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 1999 require employers to inform all their female staff who are engaged in work with ionising radiation of the possible hazards arising from radiation exposure, particularly to an unborn child.

11.2 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.

11.3 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.

11.4 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.

11.5 Staff involved with heavy interventional workloads may need to alter their working patterns.
11.6 Further information is available in the HSE leaflet "Working safely with ionising radiation: Expectant and Breast Feeding Mothers". A copy of this is available in the department and on the internet at http://www.hse.gov.uk/pubns/indg334.pdf; and Pregnancy and Work in Diagnostic Imaging Departments (2nd edition), Published by the BIR.
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 99, 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 dosemeters, 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 Manger if
      (i) any staff exceed the local dose investigation level (see SECTION 9 SUSPECTED HIGH EXPOSURE/RADIATION INCIDENT)
      (ii) any staff will need to be classified (see APPENDIX V- IRR 99 Dose Limits)
   e) 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. To arrange for the protective clothing in the x-ray department to be examined at regular intervals, both visually and radiographically, and to record the findings.

11. 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.
12. To ensure that warning lights are operating correctly and that warning notices are correctly displayed.
13. To ensure that on relinquishing the post of RPS, the Trust is informed.
APPENDIX II - Complete List Of Designated Areas

1. CONTROLLED AREAS

2. 1.1 PERMANENT - the whole room is controlled unless stated otherwise

Location Equipment

**Birmingham Heartlands Hospital**

- X-ray Room 1 AE Siemens Multix TOP (March 2008)
- X-Ray Room 2 AE -Philips Digital Diagnost VM
- Dental Room AE -Xograph OPG Planeca Proline XC
- X-Ray Room 2 -Philips Medio 65 CPH
- X-Ray Room 3 Siemens AXIOM ARISTOS MX (March 2008)
- X-Ray Room 5 -Siemens Polydorus LX50
- X-Ray Room 8 -Philips Eleva VF (FPD)
- X-Ray Room 9 -Philips Allura FD 20  Cardiac Catheter Lab1 – GE Innova 2121 (Bi-Plane)
- Cardiac Catheter lab 2 – GE Innova 2100
- CT 1 – Toshiba Aquilion one
  (Controlled area excludes the control room)
- CT2 -Aquillion 16-slice
  (Controlled area excludes the control room)
- Nuclear Medicine Symbia T2
- Toshiba GCA-7100A Gamma camera
- Daxa scan room MIDRU.

**Birmingham Chest Clinic**

- Birmingham Chest Clinic - Siemens Multix TOP (March 2008)
- Chest Radiology Centre -GE AMX4+

**Solihull Hospital**

- Room 1 - Siemens CR Multix
- Room 2 -Philips Digital Diagnost VM
- Room 3 -Siemens Polydorus LX50
- Room 5 -- GE Senograph and Dax Bioptics
- OPG -X-Ograph Planmeca Proline XC
- Room 6 -Siemens Axiom Artis MP
- CT -Toshiba Asteion VF
  (Controlled area excludes the control room)
- Catheter Lab -GE Innova 2000 system
- Dental -Takara Belmont Toshiba d 081B (x3)
- OP; BMD -GE Lunar Prodigy Bone MD

**Good Hope Hospital**

- X-ray Room 1 -Philips Bucky Diagnost
- X-ray Room 2 -Philips Bucky Diagnost
- OPG -X-ograph OP-100
- X-ray Room 4 -Siemens Axiom Aristos
- X-ray Room 5 -Siemens Multix
- Fluoroscopy Room 7 -Philips MultiDiagnost Eleva C arm
- CT1 -Philips Brilliance
  (Controlled area excludes the control room)
- CT2 – Toshiba CXL
  (Controlled area excludes the control room)

<table>
<thead>
<tr>
<th>Version 2 Review April 2014</th>
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<th>Active Date: September 2012</th>
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<tbody>
<tr>
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<td>Authorised by: Dr L Morus – CD Radiology</td>
<td></td>
</tr>
</tbody>
</table>
1.2 TEMPORARY CONTROLLED AREAS

Birmingham Heartlands Hospital Solihull Hospital

AMX Plus (Mob 8, 9) AMX4 (3)
AMX 700(DR, Mob 19)
Shimadzo Mobilart (1, 2) Philips Endura(3)
Philips bv Pulsera (2)
GE OEC 9900 (Main theatres)
Xograph Ziehm Vista Mobile Image

Intensifier

Birmingham Chest Clinic

AMX 4+

Good Hope Hospital

AMX 700(DR, Mob 19)
AMX4+ (Mobs16,17,18)
AMX4 (Mob 15)
Philips BV Libra Image Intensifier x 2 (GF Theatre & Pain Clinic)
GE OEC 9900 Elite Image Intensifier (CCU)

APPENDIX IV- Additional Safety Precautions when using Certain Rooms

BHH Room 8
Entrance to the room from the patient’s toilet is not possible as the door must be pulled from inside the toilet and there is no door handle in this direction. Should patients require assistance they will be directed to use the nurses call facility. The door into the examination room from the corridor must be locked during a procedure to maintain patient privacy and dignity.

BHH Room 9
This room must not be used as a thoroughfare to access the old CT scan room. While the room is in use the door leading to the equipment room should be locked and care should be taken on opening the door.

BHH Cardiac Catheter Lab 1 + 2
A permit to work is required for any work on the roof above the Cardiac Catheter labs as this is a restricted access area.

SH CT Scanner VF
Care must be taken during warm up and calibration to ensure persons are not accidentally irradiated.

GHH Angiography Rooms 1 & 2
Before tube warm up all staff must leave controlled area and lock the entrance door to restrict access.

GHH CT
All staff should check with control room operator before entering scan room. When warming up scanners the QA tests in progress signs should be displayed clearly on the doors.

GHH Rooms 1, 2, 5, 7 and CT 1 - Brilliance

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These rooms can all be accessed by 2 entrances, these rooms should not be used as thoroughfares.

1.2 TEMPORARY CONTROLLED AREAS

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<td>OEC 9900 Mobile II</td>
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<tr>
<td>Xograph Ziehm Vista Mobile Image Intensifier</td>
<td></td>
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</table>

**Birmingham Chest Clinic**

AMX 4+

**Good Hope Hospital**

AMX 700(DR, Mob 19)
AMX4+ (Mobs16,17,18)
AMX4 (Mob 15)
Philips BV Libra Image Intensifier x 2 (GF Theatre & Pain Clinic)
GE Stenoscop 9000 Image Intensifier (CCU)

A temporary controlled area exists during the (temporary) use of x-ray equipment listed in 1.2 above e.g. on the wards, theatre and other departments. When x-rays are about to emitted and during the exposure, the controlled area extends for a certain distance, d, in any direction from the x-ray tube or patient, and within the primary beam until it has been sufficiently attenuated by material or distance. See diagram. The value of d is given below for different types of equipment.

![Diagram of primary x-ray beam and controlled area](image)

**Routine mobile radiography and fluoroscopy equipment**

\[ d = 2 \text{ m} \]
These distances has been evaluated on the assumption that the radiographic workload at any particular location will be less than 20 radiographs (90% chests, 5% abdominal and 5% lateral lumbar spine) or 40 minutes screening per week. Unless the x-ray examinations are being carried out in a dedicated area (e.g. a pacing room) which has radiation shielding included in its design the radiation protection supervisor or adviser should be informed if the workload is greater. Additional restrictions might be imposed.

Mobiles whilst being used for neonatal exposures

d= 1.0 m

Dental intra-oral or OPG equipment


d= 1.5 m

(This distance applies provided the workload is less remains less than 100 intra-oral films or 50 OPG films per week and one piece of X-ray equipment in the room is operated at any one time. If these conditions are not met, the RPA should be consulted. Additional restrictions might be imposed)

2. SUPERVISED AREAS

Parts of wards, theatres and departments, outside the Controlled Areas outlined in 2 above, when mobile x-ray equipment is being used in that area.

No supervised area exists outside the controlled area with dental equipment.

No supervised area exists outside main x-ray rooms etc 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. In the event of, e.g., an employee receiving an overexposure the Trust would need to notify the HSE which can be done through the Employment Medical Advisory Service (EMAS). If requested, EMAS can then arrange for the services of an appointed doctor or medical adviser.

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

RADIATION PROTECTION SUPERVISORS

Mrs. M Peplow    BBH/SH/BCC    Page 2442    Tel 0121 424 3279
Mr T Lowbridge   SH          Page 0614    Tel 0121 424 4271
Mrs L Manton     BCC         Tel 0121 424 1920
Mr L Skermer     BHH         Page 2501    Tel 0121 424 0280
Ms T Duffy       BHH (Interventional)  Tel 0121 424 2282
Mr M Wilson      BHH/SH (Cardiology) Tel 0121 424 0419
MsG Tomlinson    GHH         Page 8402    Tep 0121 4247181
Mrs R Hinchliffe GHH         Tel 0121 424 7170
Mr E McGlynn     GHH         Tel 0121 424 7263
Mrs H Withers    GHH         Tel 0121 424 9753

RADIATION PROTECTION ADVISER

Dr D Temperton and Mrs E Larkin
RRPPS
P.O. Box 803
Birmingham B30 3HP
Tel: 0121-697 8461
APPENDIX IV- Additional Safety Precautions when using Certain Rooms

BHH Room 8
Entrance to the room from the patient’s toilet is not possible as the door must be pulled from inside the toilet and there is no door handle in this direction. Should patients require assistance they will be directed to use the nurses call facility. The door into the examination room from the corridor must be locked during a procedure to maintain patient privacy and dignity.

BHH Room 9
This room must not be used as a thoroughfare to access the old CT scan room. While the room is in use the door leading to the equipment room should be locked and care should be taken on opening the door.

SH CT Scanner VF
Injections are prepared in the scan room, therefore care must be taken during warm up and calibration to ensure persons are not accidentally irradiated.

GHH Angiography Rooms 1 & 2
Before tube warm up all staff must leave controlled area and lock the entrance door to restrict access.

GHH CT
All staff should check with control room operator before entering scan room. When warming up scanners the QA tests in progress signs should be displayed clearly on the doors. The double doors to CT scan room 2 should be locked.

GHH Rooms 1, 2, 5, 7 and CT 1 - Brilliance
These rooms can all be accessed by 2 entrances, these rooms should not be used as thoroughfares.

GHH CCU Pacing Room
Ensure entrance X-ray warning light is illuminated before fluoroscopy is performed. The doctor and assisting nurse should be provided with a dose meter before fluoroscopy commences. The patient's name, dose meter wearer's names and total screening time should be recorded in logbook located with Image Intensifier.

In exceptional clinical emergencies where it would be life threatening to transfer the patient to the CCU pacing room the temporary pacing procedure can occur elsewhere e.g. A&E Shock room or ITU providing that all reasonable measures are taken to safeguard the radiation protection of all staff and patients within the surrounding area (i.e. The use of Lead coats, screens etc)

GHH Pain Service Theatre (Endoscopy)
Ensure “Room in use light” is lit and that the Temporary Controlled area sign is attached to the outside of the door before Fluoroscopy is performed. All essential staff present must take all reasonable measures to minimise their radiation exposure utilising the lead aprons, thyroid shields and the dose meters.
APPENDIX V- IRR 99 Dose Limits

<table>
<thead>
<tr>
<th>Person</th>
<th>Whole body</th>
<th>Annual dose limit in mSv</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Employee aged 18 yrs or over</td>
<td>20</td>
<td>500</td>
</tr>
<tr>
<td>2. Trainees &lt;18 years</td>
<td>6</td>
<td>150</td>
</tr>
<tr>
<td>3. Public</td>
<td>1</td>
<td>50</td>
</tr>
</tbody>
</table>

Additional dose limits

Abdomen of female employee of reproductive capacity 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 currently no classified persons employed by the Trust.