RADIATION SAFETY POLICY

<table>
<thead>
<tr>
<th>Reference</th>
<th>CPG-TW-IRSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approving Body</td>
<td>Radiation Safety Committee</td>
</tr>
<tr>
<td>Date Approved</td>
<td>19th September 2018</td>
</tr>
<tr>
<td>Issue Date</td>
<td>26th September 2018</td>
</tr>
<tr>
<td>Version</td>
<td>3.0</td>
</tr>
<tr>
<td>Summary of Changes from Previous Version</td>
<td>Complete re-write</td>
</tr>
<tr>
<td>Supersedes</td>
<td>• Ionising Radiation Safety Policy, v2.0, Issued 15th June 2015 to Review Date Sept 2018 (ext)</td>
</tr>
<tr>
<td></td>
<td>• Protocol for personal and environmental dose monitoring (locally held by Radiology)</td>
</tr>
<tr>
<td></td>
<td>• Protocol for the protection of female, pregnant or breastfeeding staff version 3 (locally held by Radiology)</td>
</tr>
<tr>
<td>Document Category</td>
<td>• Clinical</td>
</tr>
<tr>
<td>Consultation Undertaken</td>
<td>Radiation Safety Committee</td>
</tr>
<tr>
<td>Date of Completion of Equality Impact Assessment</td>
<td>May 2018</td>
</tr>
<tr>
<td>Date of Environmental Impact Assessment (if applicable)</td>
<td>TBC</td>
</tr>
<tr>
<td>Legal and/or Accreditation Implications</td>
<td>Regulatory requirement</td>
</tr>
<tr>
<td>Target Audience</td>
<td>Trustwide</td>
</tr>
<tr>
<td>Review Date</td>
<td>September 2021</td>
</tr>
<tr>
<td>Sponsor (Position)</td>
<td>Divisional General Manager, D&amp;O – Elaine Toor</td>
</tr>
<tr>
<td>Author (Position &amp; Name)</td>
<td>Jayne Burkitt, Radiography Services Manager</td>
</tr>
<tr>
<td></td>
<td>Donna Staples, Clinical Governance Coordinator D&amp;O</td>
</tr>
<tr>
<td>Lead Division/ Directorate</td>
<td>Diagnostics and Outpatients</td>
</tr>
<tr>
<td>Lead Specialty/ Service/ Department</td>
<td>Radiology</td>
</tr>
<tr>
<td>Position of Person able to provide Further Guidance/Information</td>
<td>Radiography Services Manager</td>
</tr>
<tr>
<td>Associated Documents/ Information</td>
<td>Date Associated Documents/ Information was reviewed</td>
</tr>
</tbody>
</table>

Not Applicable

Not Applicable
## CONTENTS

<table>
<thead>
<tr>
<th>Item</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>INTRODUCTION</td>
<td>3</td>
</tr>
<tr>
<td>2.0</td>
<td>POLICY STATEMENT</td>
<td>3-4</td>
</tr>
<tr>
<td>3.0</td>
<td>DEFINITIONS/ ABBREVIATIONS</td>
<td>4</td>
</tr>
<tr>
<td>4.0</td>
<td>ROLES AND RESPONSIBILITIES</td>
<td>4-7</td>
</tr>
<tr>
<td>5.0</td>
<td>APPROVAL</td>
<td>7</td>
</tr>
<tr>
<td>6.0</td>
<td>DOCUMENT REQUIREMENTS</td>
<td>7-8</td>
</tr>
<tr>
<td>7.0</td>
<td>MONITORING COMPLIANCE AND EFFECTIVENESS</td>
<td>9</td>
</tr>
<tr>
<td>8.0</td>
<td>TRAINING AND IMPLEMENTATION</td>
<td>10</td>
</tr>
<tr>
<td>9.0</td>
<td>IMPACT ASSESSMENTS</td>
<td>10</td>
</tr>
<tr>
<td>10.0</td>
<td>EVIDENCE BASE (Relevant Legislation/ National Guidance) and RELATED SFHFT DOCUMENTS</td>
<td>10</td>
</tr>
<tr>
<td>11.0</td>
<td>APPENDICES</td>
<td></td>
</tr>
<tr>
<td>Appendix A</td>
<td>Radiation Safety Committee – Terms of Reference</td>
<td>11-14</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Procedure for Optimising Medical Exposure</td>
<td>Awaited</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Procedure for Personal and Environmental Dose Monitoring</td>
<td>15-21</td>
</tr>
<tr>
<td>Appendix D</td>
<td>Procedure for the Protection of Pregnant and Breastfeeding Staff</td>
<td>22-27</td>
</tr>
<tr>
<td>Appendix E</td>
<td>Best Available Techniques for the Management and Discharge of Radioactive</td>
<td>28-36</td>
</tr>
<tr>
<td>Appendix F</td>
<td>Procedures for the Receipt, Accumulation and disposal of Unsealed Radioactive Materials</td>
<td>37-44</td>
</tr>
<tr>
<td>Appendix G</td>
<td>Radiation Incident Reporting Process</td>
<td>45</td>
</tr>
<tr>
<td>Appendix H</td>
<td>Training Requirements for Radiation Users</td>
<td>46</td>
</tr>
<tr>
<td>Appendix I</td>
<td>Management Procedure for X-ray Equipment</td>
<td>47-49</td>
</tr>
<tr>
<td>Appendix J</td>
<td>Equality Impact Assessment</td>
<td>50-21</td>
</tr>
<tr>
<td>Appendix K</td>
<td>Environment Impact Assessment</td>
<td>52</td>
</tr>
</tbody>
</table>
1.0 INTRODUCTION

The Trust uses ionising radiation from X-ray equipment, and radioactive substances in order to benefit patients; directly through diagnostic X-ray tests, interventional radiology and Nuclear Medicine procedures, as well as indirectly in the maintenance and calibration of associated equipment.

The general principles by which the Trust manages risk are set out in the Trust’s Risk Management Policy. The “Ionising Radiations Safety Policy” (IRSP) supports supplements and clarifies those principles in relation to the use of ionising radiations.

It is supported by a number of documents that give detailed instruction on the means whereby ionising radiation risks are managed.

2.0 POLICY STATEMENT

This policy applies to any use of ionising radiation across the Trust. It does not apply to non-ionising radiations, such as lasers, ultraviolet, visible and infra-red light, ultrasound, microwaves, or electromagnetic fields. Alternative arrangements for the safety of non-ionising radiation sources are managed by the Medical Equipment Management Department. Due to the specialist nature of the policy the consultation has predominantly been drafted by the Radiation Safety Committee, RPS’s and the Trust’s advisers.

The Trust Board of Directors is committed to minimising risks to patients, staff, visitors, members of the public and contractors from any of the Trust’s uses of ionising radiations, adopting the principle of ensuring radiation doses are as low as reasonably practical.

To this end the Board of directors will ensure that adequately resourced structures and systems and processes are in place, and regularly reviewed, in order that:

a. The Trust complies with current legislation and best practice;

b. Only justified practices involving ionising radiations are undertaken (i.e. the benefits to the patient or society outweigh the associated risk);

c. Medical and non-medical exposures are individually justified and optimised (i.e. a medical exposure will be of net benefit to the individual or society, as appropriate, and the dose will be the minimum required to achieve the intended outcome), IR(ME)R must be enforced for all medical exposures;

d. All radiation sources are used appropriately and safely;

e. Radiation doses to staff, contractors and members of the public arising out of work activities are restricted to as low as is reasonably practicable, and within dose limits.

f. There is an appropriate exchange of information with other radiation employers.

The Trust operates x-ray equipment with permission from the HSE who receive notification and registration consent applications.
The Trust stores and uses radioactive material, and accumulates and disposes of radioactive waste under environmental permits from the Environment Agency and with permission from the HSE following applications as above. In undertaking these activities the Trust will use best available techniques to minimise the activity, volume and radiological effects on the environment and members of the public, of any disposal.

3.0 DEFINITIONS/ ABBREVIATIONS

Definitions used in this policy:

<table>
<thead>
<tr>
<th>The Trust</th>
<th>Means the Sherwood Forest Hospitals NHS Foundation Trust.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff</td>
<td>Means all employees of the Trust including those managed by a third party organisation on behalf of the Trust. Staff who work in the Trust as part of a SLA and agency staff.</td>
</tr>
<tr>
<td>Ionising radiations</td>
<td>Means X-rays generated by electrical means i.e. diagnostic or therapeutic X-ray equipment, or the radiations from radioactive substances.</td>
</tr>
<tr>
<td>Radiation</td>
<td>Means all ionising radiations as far as this policy is concerned</td>
</tr>
<tr>
<td>RPA</td>
<td>Radiation Protection Advisor</td>
</tr>
<tr>
<td>RPS</td>
<td>Radiation Protection Supervisor</td>
</tr>
</tbody>
</table>

This policy does not apply to non-ionising radiations, which include; lasers, ultraviolet, visible and infra-red light, ultrasound, microwaves and electromagnetic fields including the fields associated with magnetic resonance imaging (MRI) scanners.

4.0 ROLES AND RESPONSIBILITIES

Chief Executive

Although the Chief Executive retains overall responsibility for ensuring that systems are in place to manage risks arising out of the use of radiations, this responsibility is discharged through designated individuals.

Within this framework the Medical Director is responsible for this policy, delegating responsibility for the preparation and implementation of the Ionising Radiations Safety Policy and the associated procedures, structures and processes as follows.

The Responsible Manager

The Responsible Manager is the General Manager, Diagnostic & Outpatients Division and will appoint: Medical Physics Experts, Radiation Protection Advisers (RPA’s) and Radioactive Waste Advisors, who advise on all aspects of radiation safety. The suitability of appointments will be ensured by seeking the advice of the Trust’s External Medical Physics Expert

The Responsible Manager will arrange for services in support of radiation safety to be available through the appointed experts and their colleagues.
The Responsible Manager will ensure that Heads of Service in departments where there is a radiation facility have been authorised to sign off employer procedures under this policy.

Additionally, the Responsible Manager delegates responsibility for the formulation of an ionising radiation equipment replacement programme to the Head of Clinical Engineering, (MEMD) and the Service Leads for the Department where such equipment is located.

The Responsible Manager is advised of the health of workers exposed to radiation by the Occupational Health Medical Adviser.

**Service Leads / Heads of Service**

Control of radiation facilities and departments using ionizing radiation: Service Directors in Divisions where there is a radiation facility or radiation practices are undertaken are responsible, where relevant for ensuring that safety the required safety and protection measures are carried out.

Their responsibilities include ensuring that:

i. Explicit provision for the risk management of radiation and/or radioactive materials is made within their areas governance arrangements.

ii. Risk assessment is carried out before the introduction of any new practice involving ionising radiation or before the modification of an existing one. Risk assessments are reviewed regularly in line with the Trusts Risk Management Policy

iii. Systems for radiation safety, including up-to-date local rules and procedures, and appropriate equipment and security measures, are in place. The advice of the RPA must be sought when updating any radiation systems, procedures or local rules and during planning new or modified facilities.

iv. Any department where exposures are made or services utilise ionizing radiation must have a clear documented IR(ME)R framework. Procedures for the exposure of research study participants are followed, and comply with Trust requirements, ensuring that patient doses are recorded.

v. Systems are in place to ensure the safety of carers, visitors and the control of contractors.

vi. There is appropriate cooperation between employers in circumstances where Trust employees may undertake radiation work at other establishments or there are external radiation workers visiting the Trust working inside a Trust-designated radiation area.

vii. A suitably trained and experienced person(s) is appointed as Radiation Protection Supervisor (RPS), with the advice of the RPA for all areas using ionizing radiation. A copy of the appointment letter must be sent to the RPA. The RPS must also receive periodic update training, at a frequency identified by the Radiation Safety Committee. RPS’s will ensure staff comply with protection measures as required by dose and environmental monitoring policies.
viii. An inventory of radiation equipment is maintained by the Radiography Services Manager. New, replacement, or re-sited radiation equipment must undergo a critical examination and commissioning tests prior to first use.

ix. Areas in which radioactive substances are used meet the requirements of the Trust procedures for the control of radioactive substances as part of the Trust’s implementation of “Best Available Techniques” for the minimisation of radioactive waste disposal. The Trust will maintain a document identifying these techniques.

x. Where radioactive products are administered to patients that a site ARSAC (Administration of Radioactive Substances Advisory Committee) certificate is in place to cover the work.

xi. An ARSAC certificate holder acts as the responsible person under IR(ME)R for every administration of a radioactive substance to a patient for medical or research purposes.

xii. Staff who take responsibility for, or undertake medical exposures, or supervise the use of radioactive substances are identified, authorised, adequately trained and periodically updated and at a frequency agreed by the Committee. An up-to-date list of their names, training scope and their scope of practice is maintained.

xiii. A programme of clinical and compliance audit is carried out, covering management arrangements and all aspects of ionising radiation legislation.

xiv. Staff are adequately trained to fulfill their radiation-related duties and training records are maintained. Those Directors who have significant responsibility for radiation facilities, medical exposures or the use of radioactive substances:

- Must appoint one or more individuals to take an operational lead with respect to radiation issues if it is inappropriate for the Service Director to do so personally because of the commitment required;
- Notify the names of lead individuals to the Radiation Safety Committee, who will inform the RPAs. These individuals will act as points of contact for management issues within relevant areas.

**All Staff**

Staff are required to co-operate with the Trust in implementing this policy. All staff must carry out only activities involving radiation and radioactivity for which they have had appropriate training and only undertake the responsibilities for radiation work outlined in their job descriptions.

**Radiation Safety Committee**

As part of its Risk Management Policy and to implement its Health and Safety Policy the Trust has convened a group of relevant specialist advisers and representatives of ionising radiation users as a sub-committee of the Patient Safety & Quality Group, which in turn reports to the Quality Committee, and thereby to the Trust Board.
The Radiation Safety Committee has the remit of:

- Developing and maintaining a list of roles within the Trust and their range of responsibilities associated with ionising radiations, for the PSQG to approve
- Drafting, reviewing and improving Trust documentation relating to ionising radiation compliance and practice,
- advising the PSQG generally on issues relating to ionising radiation,
- monitoring compliance with Trust policies and procedures in relation to ionising radiations.

Detailed Terms of Reference of the Radiation Safety Committee are attached at Appendix A

5.0 APPROVAL

This policy (v3.0) has been approved by the Radiation Safety Committee.

6.0 DOCUMENT REQUIREMENTS

Documentation and supporting procedures

All written procedures relating to radiation work must be controlled documentation within an appropriate quality system, with a version, issue date and authorising signature on them. All written procedures relating to radiation work must be audited at least once every 3 years, and the results of the audit recorded and reviewed.

Implementation of the Radiation Safety Policy is supported by detailed Trust wide procedures. Appropriate procedures will be developed under the direction of the Radiation Safety Committee and will be ratified by the Patient Safety and Quality Group (PSQG).

Incident Reporting

Incidents must be reported according to the Trust Incident Reporting Policy and reported on the Trust incident reporting system: Datix. Incidents that are initially deemed to carry a moderate harm or above rating must be scoped using the 72 Hours scoping report and be presented at the weekly scoping meeting. Any incidents which are deemed serious will require further investigation as per the Incident Reporting Policy. Any IR(ME)R Reportable incidents must be investigated by the Division where the incident originated and reported to the Trust Sign Off Meeting as per the process flowchart at Appendix G.

Radiation incidents must also be reported to the RPA as soon as possible, who will advise the Trust on the need for external reporting.

The loss or uncontrolled release of radioactive substances may require prompt reporting to the Police and the Environment Agency. Users of radioactive substances must ensure that they are aware of and follow supplementary procedures in their local rules for these circumstances.

A 6-monthly summary of incidents related to the use of ionising radiation is provided to
PSQG. A table of the process required for reporting radiation safety incidents can be found at Appendix G.

**External Audit and Inspection**

External audits and inspections by the Care Quality Commission, the Health & Safety Executive (HSE) and the Environment Agency may take place from time to time. The outcomes of these audits and inspections will be discussed at the Radiation Safety Committee and reported to the PSQG.

**Audit**

Radiology are responsible for ensuring that clinical audit is undertaken to confirm that good standards practice are demonstrated and to improve the quality and outcome of patient care. Other areas with the responsibility for radiation equipment will ensure they have a robust audit programme in place to monitor and improve practice.

There will be an annual RPA audit of radiation departments that will include the RPS and management representatives and the outcomes from audits will be reported to the Trust Radiation Safety Committee. In addition to the annual RPA audits the department has a yearly audit programme combined with both radiation and clinical audits.

**Research Exposures**

Exposures carried out for the purposes of research studies require the authorisation of a Medical Physics Expert, prior to the study starting. It is the responsibility of the Chief or Principal Investigator to obtain such authorisation.

Procedures for the governance of radiation within research are held by the R&D Department. Chief and Principal Investigators are responsible for ensuring that these procedures are followed.

The Policy will be published on the Trust Intranet site. Additionally, areas designated as operating a radiation facility will ensure that all relevant staff are made aware of the policy, with local managers ensuring that distribution and awareness is commensurate with the level of knowledge required regarding specific policy areas.
7.0 MONITORING COMPLIANCE AND EFFECTIVENESS

Compliance will be monitored by the Trust’s Radiation Safety Committee who will commission internal audits to give the Patient Safety & Quality Group assurance that the policy is being complied with. An annual report will be produced by the Radiation Safety Committee to demonstrate compliance and identify risk issues.

<table>
<thead>
<tr>
<th>Minimum Requirement to be Monitored</th>
<th>Responsible Individual</th>
<th>Process for Monitoring e.g. Audit</th>
<th>Frequency of Monitoring</th>
<th>Responsible Individual or Committee/Group for Review of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff dose</td>
<td>Radiation Protection Supervisor</td>
<td>Audit</td>
<td>Annual</td>
<td>Risk Committee</td>
</tr>
<tr>
<td>Management Review</td>
<td>Radiation Protection Advisor</td>
<td>Audit</td>
<td>Three yearly</td>
<td>Patient Safety &amp; Quality Group</td>
</tr>
</tbody>
</table>
8.0 TRAINING AND IMPLEMENTATION

The policy and changes to it will be communicated to all staff via the weekly Staff bulletin and Team briefing mechanisms.

All new members of staff within Radiology, Endoscopy, Theatres, Pathology and Surgery must receive appropriate instruction on radiation protection and safety procedures as part of their induction training. This training will be refreshed at intervals decided by the RSC.

Staff working in designated radiation areas are required to sign a statement that they have read and understood the local rules and other associated relevant procedures.

All staff using radiation or with responsibility for radiation protection shall receive appropriate training prior to undertaking such work, and shall receive regular update training. It is the responsibility of relevant Heads of Service to ensure staff receive such training and that records of such training are kept. Practitioner and operators as defined by IR(ME)R must have training to demonstrate their competence to act in these roles.

The Radiation Safety Committee will ensure that a training strategy for this policy is developed, identifying who should be trained and to what level.

9.0 IMPACT ASSESSMENTS

Delete/ amend as applicable:

- This document has been subject to an Equality Impact Assessment, see completed form at Appendix J
- This document is not subject to an Environmental Impact Assessment
- This document has been subject to an Environmental Impact Assessment, see completed form at Appendix K

10.0 EVIDENCE BASE (Relevant Legislation/ National Guidance) AND RELATED SFHFT DOCUMENTS

Evidence Base:

This policy is written to ensure compliance with statutory legislation and best practice and taking into account evidence of audits and professional body recommendations.

- The Environmental Permitting (England and Wales) Regulations 2010 & (Amendment) 2014
- The Carriage of Dangerous Goods by Road Regulations 2009
- The Ionising Radiations Regulations 2017
- The Ionising Radiation(Medical Exposure)Regulations 2017 IR(ME)R

Related SFHFT Documents:
- Risk Management Policy
- Incident Reporting Policy and Procedures

11.0 APPENDICES

- Listed as per contents table
Appendix A

Radiation Safety Committee Terms of Reference

| Division: | Trust | Date of review: | 20/12/18 |

1. Purpose

The Trust’s Radiation Safety Committee is established as a sub-committee of, and accountable to the Trust’s Performance Standards and Quality Group (PSQG). The Trust has an obligation to protect patients, staff and members of the public against all hazards arising from the Trust’s work activities with ionising and non-ionising radiations.

The principle pieces of statute are:

- Ionising Radiation Regulations 2017 (1RR17)
- Ionising Radiation (Medical Exposure) Regulations 2017 which will change to (IRMER17)
- Environmental permitting Regulations 2016

The meeting will assure the following:

- Provide leadership and foster greater awareness of Radiation Safety across the divisions at all levels.
- To advise the Trust on statutory requirements and guidance relating to the use of ionising radiation.
- Ensure that areas of concern or risk are raised appropriately through the Trust’s Governance structures, reporting to the Patient Safety and Quality Group (PSQG).
- Monitor performance and compliance with legislative documents and radiation safety policies.

2. Membership

Membership is expected to be multi-professional and be representative of all of the Specialties within the Trust where procedures using ionising radiation are undertaken. It should be made up of the following:

- General Manager for Diagnostic and Out-Patients (Chair)
- Radiology Services Manager (Deputy Chair)
- Radiation Protection Adviser
- Consultant Radiologist
- Divisional Clinical Governance Co-ordinator
- Clinical Governance Support for Diagnostic and Out-patients
- Representative from Cardiology
• Representative from Operating Theatres
• Head of Clinical Engineering
• QA Radiographer
• Health and Safety Manager

The Chair may also extend invitations to other personnel with relevant responsibilities or expertise as necessary to deal with the business on the agenda. Members, having read all of the papers beforehand will act as ‘champions’, engaging with colleagues and peers to disseminate the information discussed and agreed.

3. Monitoring Attendance and Minutes

Members have a responsibility to attend at least 75% of meetings; a running total of attendance will be maintained in the meeting minutes. All meetings of the Radiation Safety Committee must produce minutes and action logs following each meeting which must accurately capture the discussion, decisions and actions agreed. The minutes and action log will be sufficiently detailed as to provide a clear audit trail of issues discussed.

Minutes should be ratified at the subsequent meeting for accuracy. Copies of the draft and ratified minutes will be circulated to the core members and the Clinical Quality and Governance Committee.

The minutes and action log should be circulated no later than 14 days following the meeting to afford those individuals enough time who have a responsibility to complete an action.

4. Quorum

The meeting will be deemed quorate with a minimum of four attendees out of the membership ensuring reasonable representation in addition to either the Chair or the Deputy Chair, but it is expected that this will not be a regular occurrence. An appropriate deputy should be nominated to attend in the absence of each member, but it is expected that this will not be a regular occurrence. Deputies will count towards the quorum and must be fully briefed before attendance. No business should be conducted unless the meeting is quorate.

5. Frequency

Meetings will be held quarterly and dates will be provided for the calendar year in advance. Additional or extended meetings can be called at the request of the Chair subject to issues being identified.
6. Reporting Requirements

The agenda template produced by the Governance Support Unit will be used for meetings; this agenda has been adapted and agreed to suit the requirements of the Radiation Safety Committee.

The Radiation Safety Committee should provide a highlight report to PSQG on a 6 monthly basis. This should include areas covered in the agenda identifying risks, information concerning reportable radiation incidents, quality issues and specific concerns for noting, consideration or decision.

Items to be placed on the agenda should be sent to the Radiology Secretaries no later than 7 working days in advance of the meeting.

Agenda items and supporting papers should be sent to the Radiology Secretaries. Correspondence in relation to meetings e.g. minutes, papers, room bookings, meeting invites and cancellations will be sent by the Radiology Secretaries.

For issues that require escalation, the Chair will ensure that at each meeting these items are recorded in the minutes and ensure it is identified who is responsible for this.

The Divisional Governance meeting will appoint appropriate members to sit on relevant Trust Committees as required. The appointed members will ensure that all relevant issues are communicated back to the Divisional Governance Meeting.

7. Duties

The duties outlined below are intended to ensure that the Trust meets its’ obligations in respect of the safe treatment and high quality care provided to patients through the Divisional Governance meetings.

- To promote radiation safety throughout the Trust.

- Review measures taken to ensure compliance with relevant health and safety legislation relating to the use of ionising radiation.

- Review measures taken to ensure the health and safety at work of employees relating to the use of ionising radiation.

- Review measures taken to ensure the health and safety of patients and visitors relating to the use of ionising radiation.

- Review measures taken to minimise any effects on the environment and comply with relevant environment legislation. Ensure that radioactive waste that leaves the Trust, does so safely.

- Review and revise policy as necessary or required.

- Review reports/information from enforcing authorities.

- Review any incidents/accidents involving radiation with an aim of ensuring corrective action is taken.
• Review the training needs of staff including that required by legislation.
• Commission annual audit reports on ionising radiation.
• Ensure that there are action plans from audits and inspections from regulators and that these action plans are actively monitored to completion.
• Control the importation of any new device into the Trust.
• To oversee the performance and delivery against compliance of any relevant essential standards, national guidance and mandatory practice; this will include but is not restricted to
  ✓ Care Quality Commission (CQC)
  ✓ Monitor
  ✓ NHS Litigation Authority (NHSLA)
  ✓ Clinical Negligence Scheme for Trusts (CNST)
  ✓ National Institute for Health and Care Excellence (NICE)
  ✓ Medicines and Healthcare Products Regulatory Agency (MHRA)
  ✓ Royal Colleges

8. Monitoring Effectiveness

The Radiation Safety Committee will formally review on an annual basis that:

• Members have attended 75% of meetings annually and the quorum is consistently met.
• A 6 monthly highlight report is provided to PSQB.
• The agreed number of meetings (annually) have taken place.
• The Terms of Reference are reviewed and are up-to-date being fit for purpose for the Radiation Safety Committee.

Any changes to the Radiation Safety Committee Terms of Reference (except those which are local Divisional variations) will be managed by the Chair.
Appendix B

Procedure for Optimising Medical Exposure - awaiting
Appendix C:

PROCEDURE FOR PERSONAL AND ENVIRONMENTAL MONITORING

1. Introduction / Background
2. Aims / Objectives / Purpose (including Related Trust Documents)
3. Roles and Responsibilities
4. Procedure Details (including flowcharts)
5. Monitoring
6. Evidence Base / References

1 Introduction / Background

Employers have a legal duty to ensure a safe working environment for employees, patients and visitors. Part of this duty is, where staff are working with ionising radiation, to ensure that the doses received by staff are as low as reasonably achievable and do not exceed any legal limits. (“Staff” is taken to mean employees of the various hospital Trusts and other personnel working on the site.) In addition, employers have a legal duty to set investigation levels, which if exceeded, require the employer to carry out a formal investigation.

The employer, in conjunction with the RPA, should carry out the investigation immediately whenever the recorded doses for an individual exceed the specified dose level. To that end a programme of personal monitoring to ascertain radiation doses is undertaken. The monitors and administration are provided by the Medical Physics Department at Nottingham City Hospital NHS Trust (the ‘Radiation Monitoring Service’). This document describes the principles that are used to decide how, where and when such monitoring is undertaken, along with a schedule of monitoring and the dose level that trigger a formal investigation.

Within a given directorate or department the various duties related to personal monitoring may be assigned amongst a variety of people. Therefore, this protocol does not in general seek to specify who will carry out which task within a division/department. It is the responsibility of the Heads of Service and Operational Service Leads to ensure that the required duties are undertaken and that details of the relevant individuals are passed to the Head of Radiation Protection, Medical Physics, Nottingham University Hospitals, to facilitate communications.

2 Aims / Objectives / Purpose (including Related Trust Documents)

- To ensure that an appropriate dose monitoring programme for ionising radiations is carried out, and that significant findings of the programme are acted upon.

3 Roles and Responsibilities

3.1 The Head of Radiation Protection Section, Medical Physics, Nottingham University Hospitals will ensure that a suitable Radiation Protection Adviser:
- advises on the appropriate monitoring regime for each staff groups and radiation area;
• provides advice as required by this procedure;
• produces an annual report to the Trust Radiation Safety Group (section 10).
• Will recommend to Heads of Service and Operational Service Leads, when appropriate, that employees be designated as ‘classified persons’.

3.2 Clinical Chairs and Service Managers will:
Ensure that:
• Staff for whom they are responsible are monitored according to the procedure given in Section 4;
• Staff are trained in the departments monitoring arrangements and the care and use of dosemeters. Records of this training must be kept
• Their duties relating to “classified persons” are undertaken (Section 5).
• Incidents, lost or damaged dosemeters are investigated (Section 6).
• Pregnant staff are appropriately monitored (Section 7).
• Environmental monitoring of the doses in the vicinity of sources of ionising radiation is undertaken (Section 8).
• Monitoring results are reviewed and acted upon (Section 9).
• Appropriate records are kept (Section 10).
They will also, with reference to the procedures in the relevant sections of this protocol:
• ensure that compliance with these procedures is monitored;
• report to the Head of Radiation Protection their arrangements for implementing and monitoring these procedures.

NB Implementation will require that managers identify key workers to carry out particular tasks and it is likely that the Radiation Protection Supervisors (RPS) will undertake a significant role in this context.

4 Procedure Details (including Flowcharts)

The relevant investigation levels are given in Table 1 and the monitoring regimes for particular staff groups are in Table 2. Dosemeters are to be provided by a dosimetry service (ADS) approved as such by the HSE. The provision of dose meters will be organised through the Radiation Monitoring Service, Nottingham University Hospitals City Campus.

Records are to be kept by a dosimetry service (ADS) approved for such record keeping by the HSE, and organised through the Radiation Monitoring Service, Nottingham University Hospitals City Campus.

Personal dose monitoring must be considered for all staff groups who work with ionising radiation. An RPA is responsible for determining whether monitoring is necessary for a particular staff group. Usually, monitoring will be required for staff routinely entering controlled or supervised areas. Monitoring may be carried out simply to reassure staff, if this is deemed appropriate.
If new work is undertaken, or there are changes to working practice or there is a significant change in workload, then an RPA must be consulted (the RPS will bring the changes to the notice of the RPA). The RPA is responsible for determining whether personal monitoring for staff who undertake this work should be commenced or changed. Also a change in legislation may also result in changes in personal monitoring for some staff groups.

The relevant RPS will monitor compliance with the advised dose monitoring regime and report any significant non-compliance, either by individuals or groups, to the relevant line manager and notify the RPA. It is expected that for each monitoring group i.e. identified by a separate site code the percentage of monitors are returned as follows:

- at least 80% returned within two weeks following the end of the relevant monitoring period
- at least 90% returned within 1 month following the end of the relevant monitoring

Monitoring will normally be carried out (as shown in Table 2):

**Continuously** – for groups who are likely to receive greater than 1/10th of any relevant dose limit and/or spend a significant proportion of their working time within a Controlled Area; or

**On an sample basis** (for example for one month each year) – for low risk groups who only need occasional confirmation of continued acceptable working practice; or

**On an ad hoc basis** to assess doses in a particular situation, or for reassurance.

The RPA may vary the actual monitoring regime according to circumstances where he considers it appropriate.

A single dosemeter worn to represent whole body dose (whole body monitoring) will be adequate to assess radiation dose for most staff. The relevant RPA may require that additional monitoring is carried out if, in his opinion, the nature of the work warrants it. Whole body monitoring will be carried out using film badges worn at waist height, under a lead apron if used. If required, dose to the fingers will be assessed using appropriate thermoluminescent dosimeters (TLDs). Doses to the index fingers of both hands will be measured unless indicated otherwise. If required, dose to the eyes will be assessed either using a suitably positioned film badge or appropriate TLD.

After personal monitoring has taken place the Radiation Monitoring Service will notify the results to key staff of the results (nominated by the Heads of Service and Operational Service Leads) and to the relevant RPA (see Section 8 for review procedure).

Staff who work in more than one establishment may be monitored separately at each establishment. The systems in place in Nottingham will ensure that an appropriate monitoring and merging of data is undertaken and that the relevant RPA for each establishment is aware of such staff's total radiation dose.

Instruction and training in the use and care of dosemeters must be given to all users. An appropriate record must be kept of this training. However, this training may form part of a broader training package in which case there is no need to record the training separately.
The designation and surveillance of classified persons

A) The Ionising Radiations Regulations 2017 (IRR17) Reg. 20 requires that an employer “shall designated as classified persons those of his employees who are likely to receive an effective dose in excess of 6mSv per year or an equivalent dose which exceeds 3/10ths of any relevant dose limit” or an equivalent dose 15mSv to the lens of the eye of greater than 150 mSv for skin or extremities.

B) When appropriate a Radiation Protection Adviser will recommend to a Head of Service and Operational Service Lead that an employee be designated as classified, according to the criteria in paragraph 5.3 and taking into account the results of any review undertaken. He will also notify the Chair of the Radiation Safety Committee and the Trust director with responsibility for health and safety.

An employer has a legal duty to ensure that classified workers have:

- their designation as classified immediately notified to them;
- adequate medical surveillance, which will consist of at least pre-classification and annual medicals carried out by an HSE Appointed Doctor: and
- dose monitoring and record keeping undertaken by an ADS.
- Appropriate access to their personal dose records

C) A worker must be designated as classified if:

- a radiation risk assessment indicates the likelihood that the threshold referred to in IRR17 will be exceeded, either during routine work or as a result of a reasonably foreseeable incident; or
- (for staff who are routinely monitored) his annual accumulated effective (whole body) dose is 4mSv or more, or accumulated equivalent dose is 2/10ths or more of any relevant dose limit (see Table 3) (on the presumption that at this level of recorded dose, there is the strong potential for the levels referred to by IRR17 to be exceeded); unless it is clearly demonstrated upon investigation that the recorded dose, or a significant part of it, was:
  - not actually received by the individual concerned; or
  - was the result of planned work (i.e. not an incident) which has now ceased or will cease within the relevant calendar year.

Before an employee is designated as classified on the basis of historical dose, the relevant risk assessments and working practices must be reviewed to ensure that doses are as low as reasonably practicable. A written summary of the findings of any such investigation or review must be sent to the Head of Radiation Protection.

If a classified person, as part of their employment by the Trust, works in the controlled area of another employer, then the classified person is considered to be an “Outside Worker” to whom special dose assessment provisions apply (IRR17 Regulation 22). If a classified person my potentially work in the controlled area of another employer advice should be taken from the relevant RPA on the required action.
Table 1. Investigation levels

<table>
<thead>
<tr>
<th>Monitor Position</th>
<th>Method</th>
<th>Staff Group</th>
<th>Investigation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Body (inside apron)</td>
<td>Film badge</td>
<td>All other whole body wearers.</td>
<td>Annual: 1, Wear Period: 0.5</td>
</tr>
<tr>
<td>Eye/Thyroid (outside apron)</td>
<td>Film badge</td>
<td>All wearers</td>
<td>Annual: 10, Wear Period: 5</td>
</tr>
<tr>
<td>Extremity e.g. Feet &amp; Ankles</td>
<td>TLD</td>
<td>All other extremity wearers</td>
<td>Annual: 20, Wear Period: 5</td>
</tr>
</tbody>
</table>

Table 2. Monitoring Regime

<table>
<thead>
<tr>
<th>Staff group</th>
<th>Activity</th>
<th>Monitoring period</th>
<th>Whole Body</th>
<th>Eye/Thyroid</th>
<th>Extremity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac Technicians</td>
<td>Interventional</td>
<td>Quarterly</td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cardiologists</td>
<td>Interventional</td>
<td>Monthly</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Imaging assistants, assistant practitioners, health care assistants.</td>
<td>X-ray</td>
<td>Quarterly</td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nuclear Medicine</td>
<td>Radiopharmacy</td>
<td>Monthly</td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nurses</td>
<td>Cardiology, X-ray</td>
<td>Monthly</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Radiographers</td>
<td>Interventional, Fluoroscopy</td>
<td>Monthly</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Others</td>
<td>Quarterly</td>
<td></td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Radiologists</td>
<td>Interventional</td>
<td>Monthly</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Fluoroscopy</td>
<td>Monthly</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>Others</td>
<td>Quarterly</td>
<td></td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

The above monitoring regime should be followed unless advised by an RPA.
N.B Where a member of staff carries out more than one activity the most frequent monitoring regime will prevail.

Table 3. Dose Limits (Ionising Radiations Regulations 1999)

<table>
<thead>
<tr>
<th>Annual Limit</th>
<th>Employees (aged 18+)</th>
<th>2/10th of dose limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective dose (whole body)</td>
<td>20mSv</td>
<td>4mSv</td>
</tr>
<tr>
<td>Equivalent dose to the lens of the eye</td>
<td>150mSv</td>
<td>30mSv</td>
</tr>
<tr>
<td>Equivalent dose to hands, forearms, feet and ankles.</td>
<td>500mSv</td>
<td>100mSv</td>
</tr>
<tr>
<td>Equivalent dose to the skin averaged over 1cm².</td>
<td>500mSv</td>
<td>100mSv</td>
</tr>
</tbody>
</table>
N.B different dose limits apply to the following groups

- Trainees aged under 18
- Pregnant employees
- Women of reproductive capacity
- Members of the public

### 6 Evidence Base/References

- IRR 17
Appendix D

PROCEDURE FOR THE PROTECTION OF PREGNANT OR BREASTFEEDING STAFF

1. Introduction / Background

This protocol forms a part of the Trust Ionising Radiations Safety Policy. It should be read in conjunction with other Trust family-centred employment guidance and in particular the Trust protocol “Health and Safety Provisions for New and Expectant Mothers at Work”.

2. Aims / Objectives / Purpose (including Related Trust Documents)

To ensure that instruction and training are given, and action is taken to appropriately control, the exposure to ionising radiation of female, pregnant or breastfeeding staff.

3. Roles and Responsibilities

Employers have a legal duty to ensure a safe working environment for employees, patients and visitors ensuring that the dose from ionising radiations to the fetus or baby of an employee is as low as reasonably practicable. The working conditions for females of childbearing capacity should ensure that any fetal dose received is not significant in the time before a pregnancy can be confirmed and is then appropriately controlled for the remainder of the pregnancy within a limit of 1mSv. Breast-feeding mothers who work with radioactive substances may need to have their work restricted.

The phrase “ionising radiation(s)” refers to X-rays and radiations from radioactive substances.

The Radiography Services Manager and Lead Radiographers

Must ensure that:

- this procedure is implemented, where relevant, in their department;
- all female members of staff (who work with ionising radiations) are given information as detailed in section 4;
- pregnant or breastfeeding mothers have an individual risk assessment carried out by their line manager as soon as he is made aware of their pregnancy or intention (see section 5);
- all actions identified by individual risk assessments are implemented.
The Head of Radiation Protection Section, Medical Physics

Will ensure that a suitable Radiation Protection Adviser:
- provides advice as required by this procedure;
- provides advice and reassurance to individual staff when requested to do so;

The Radiation Protection Supervisors (RPS)

Will (acting on behalf of the Radiography Services Manager):
- supervise any restrictions to the work of the staff member; and
- inform the RPA of any changes in working practices or workload for any pregnant or, if working with radionuclides, breastfeeding staff.

All female employees

Must:
- notify the Radiography Services Manager in writing as practicable after they become aware that they are pregnant or intend to breastfeed or discontinue breastfeeding.

All relevant members of staff

This section applies particularly to RPSs, RPAs and those involved in dose monitoring. It will also apply to any person handling information according to this procedure. They must, within the constraints of carrying out their legal obligation:
- respect the confidentiality of any information given to them under this procedure;
- take all reasonably practicable steps to maintain that confidentiality;
- respect the wishes of the female staff concerned.

Provision of information to all female staff

All female employees engaged in work with ionising radiations (x-rays or radioactive substances) must be informed:
- of the potential risk to the foetus, or to a nursing infant, arising from exposure to ionising radiation;
- of the need to notify their line manager, in writing, as soon as possible after they become aware of their pregnancy;
- that all reasonably practicable steps will be taken to maintain the confidentiality of their condition, within the constraints imposed by the law.

The information must be given:
- in full as part of the induction process for a new member of staff;
- the main points re-iterated at intervals as part of update training;
- the relevant points included in Local Rules.
**Action required when notification of pregnancy or breastfeeding has occurred**

**Pregnancy**

N.B. If the only work an expectant mother carries out is plain film radiography within Sherwood Forest Hospitals NHS Trust and she **always** remains behind the control screen during exposures, then restrictions are not required, the RPA need not be consulted and no additional personal monitoring is needed.

When notified that an employee is pregnant their manager must ensure that an individual risk assessment is carried out as soon as practicable and certainly within 2 weeks of notification. The risk assessment must include the following information:

- details of the type of work the expectant mother carries out (including out of hours on-call and work for other employers);
- details of the dose levels likely to be received whilst carrying out the duties required while pregnant including the potential doses resulting from accidents (this information will usually be contained within the original risk assessment for the area); any actions required by the original risk assessment that have not been completed, should also be noted;
- details of the likelihood of inhalation or ingestion of radioactive material (this information will usually be contained within the original risk assessment for the area);
- details of potential external personal contamination (this information will usually be contained within the original risk assessment for the area);
- the results of any measurements of inhaled or ingested activities;
- dose levels recorded during personal monitoring of the individual;
- dose levels recorded for employees carrying out similar work; and
- dose levels measured as part of any other dose monitoring exercise.

If the work is with radioactive substances dose assessments must include details of the likelihood of inhalation or ingestion of radioactive material and the relevant activities (this information will usually be contained within the original risk assessment for the area).

Once the above information has been obtained the relevant RPA should be consulted regarding the potential dose to the foetus, any restrictions required to the working patterns of the mother and any additional personal monitoring which may be needed.

**Breastfeeding (only for mothers who work with radioactive substances)**

When notified that an employee is, or intends to be, breastfeeding the manager must carry out an individual risk assessment which must include the following information:

- details of the type of work the mother carries out (including out-of-hours on-call and work for other employers);
- details of the likelihood of inhalation or ingestion of radioactive material and the relevant activities (this information will usually be contained within the original risk assessment for the area);
details of potential external personal contamination (this information will usually be contained within the original risk assessment for the area);
• the results of any measurements of inhaled or ingested activities.

Once the above information has been obtained the relevant RPA should be consulted regarding the potential dose to the nursing infant, any restrictions required to the working patterns of the mother and any additional personal monitoring which may be needed.

Restrictions to working practices
The manager should inform the employee of any restrictions to their duties, in writing. The RPS should also be informed of any restrictions imposed.

Where it is necessary to apply restrictions the manager will follow the procedure laid out in the Trust “Health and Safety Provisions for New and Expectant Mothers at Work” to determine how the employee’s duties may be redefined.

Information for pregnant or breastfeeding staff
• The leaflet “Working safely with ionising radiation: Guidelines for expectant or breastfeeding mothers” produced by the HSE should be issued to all members of staff working with ionising radiation when they inform the employer that they are pregnant or, if working with radioactive substances, are or intend to be breastfeeding.
• The employee should be informed that complying with the Local Rules will restrict the dose to the baby and she should be asked to re-familiarise herself with the contents of the Local Rules. She should be informed of any specific restrictions following her individual risk assessment.
• The employee’s attention should be drawn to the fact that any necessary changes to their monitoring procedure or working practices may cause their colleagues to surmise that they are pregnancy or breastfeeding. However, the protection of the staff member, foetus or child is paramount.

<table>
<thead>
<tr>
<th>Investigation Level</th>
<th>Wear Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>All staff monitored for whole body exposure.</td>
<td>0.2mSv</td>
</tr>
</tbody>
</table>

• Staff monitored more often than monthly will have the investigation level for the wear period determined at their individual risk assessment.
4 Procedure Details (including Flowcharts)

Information for female staff
- Risks
- Need to inform manager when pregnant

Employee notifies manager of pregnancy or breastfeeding

Manager ensures risk assessment carried out and HSE guidance document issued

Manager consults RPA re. potential dose, restrictions and monitoring arrangements

RPS supervises activities of employee

Manager informs employee and RPS of restrictions

Manager reviews monitoring results on receipt and informs RPA of unexpected dose levels

5 Education and Training

Training is given as part of the Local Rules and IR(ME)R.

6 Monitoring

Monitoring arrangements for pregnant staff
- The manager should ensure that the personal monitoring regime identified by the individual risk assessment is carried out and brings to the attention of the RPA any further changes to working practices of the pregnant member of staff which may affect the monitoring regime.
- Where staff work in more than one establishment the results of any monitoring carried out at all sites should be combined to give the total dose received. If the risk assessment indicates that the member of staff works at other sites the manager should make arrangements to obtain the dose records for that staff member at all sites and provide a copy of the information to the RPA.
- The relevant manager responsible for the staff member must ensure that a timely review of the monitoring results is carried out. The review must ensure that any doses exceeding
the investigation levels or any unusual doses are brought to the attention of the relevant RPA, when the manager and RPA should investigate and review the restrictions.

**Monitoring regime / investigation levels for pregnant staff**

All pregnant staff who are routinely monitored using a whole body badge should be monitored monthly (whole body) unless:

- the staff member only works with x-rays and will not at any time during their pregnancy be required to enter the unprotected area (i.e. work outside the protective screen or work wearing a lead apron) during an exposure when the monitoring regime need not be changed;
- based on the findings of the individual risk assessment the RPA advises that a specific monitoring regime is carried out.

N.B. If the person is not advised to wear a whole body monitor routinely then monitoring during pregnancy is not required. The monitoring of other parts of the body e.g. hands, eye, thyroid, etc may remain the same during pregnancy although it may be more convenient to issue all the monitors at the same frequency.

### 7 Evidence Base/ References

Appendix E

BEST AVAILABLE TECHNIQUES FOR THE MANAGEMENT OF THE DISCHARGE OF RADIOACTIVE MATERIALS FROM NUCLEAR MEDICINE AT KING’S MILL HOSPITAL

1. Introduction

King’s Mill Hospital (KMH) of Sherwood Forest Hospitals NHS Foundation Trust (SFHT) provides acute healthcare services for 420,000 people across Mansfield, Ashfield, Newark, Sherwood and parts of Derbyshire and Lincolnshire. Located in Sutton in Ashfield, the site has 600 hospital beds providing services including intensive care, day cases, maternity and neo-natal intensive care. The buildings on the site are diverse in age and layout.

2. How are Radioactive Materials used or generated?

Appendix 1 summarises the administered activity and disposal of aqueous radioactive materials in 2011. The main uses for radioactive materials on the campus are:

2.1 Nuclear Medicine. A range of imaging and non-imaging Nuclear Medicine investigations are undertaken. Radioactive materials are delivered from the Radiopharmacies at Queen’s Medical Centre (QMC) or the City Hospital in Nottingham. Other stock radioactive materials (e.g. $^{51}\text{Cr}$, $^{75}\text{Se}$ capsules) are held for other investigations. There is 1 gamma camera.

2.1.1 $^{99m}\text{Tc}$ aerosols are also used for ventilation imaging in a closed, filtered system that does not release $^{99m}\text{Tc}$ to the atmosphere.

2.1.2 Use of Iodines. Whilst $^{123}\text{I}$, $^{125}\text{I}$ and $^{131}\text{I}$ have not been used at KMH over the past 3 years, the radiological impact assessment has assumed that there is the potential to image one patient using $^{123}\text{I}$ per month for imaging thyroid metastases or for thyroid uptake imaging and undertaking one plasma volume measurement using $^{125}\text{I}$ per month. This will allow for flexibility for future use of Iodines in imaging.

2.1.3 Other isotopes. $^{75}\text{Se}$ capsules are used for bile salt absorption tests. Each capsule contains 0.4MBq of $^{75}\text{Se}$. $^{51}\text{Cr}$ is used for the measurement of glomerular filtration rate. Up to 3MBq is given per investigation. $^{111}\text{In}$ has not been used at KMH over the past 3 years but there is the potential to use it for imaging gastrointestinal tumours and has been included in the radiological impact assessment.

2.2 Radioactive check sources used for calibration, markers in Nuclear Medicine and to test equipment and building shielding. These were included in our current Sealed Source Registration BV6544. An application to change this into a Standard Conditions permit has been submitted.

3. Justification for the Use of Radioactive Materials

Radioactive materials are used for the diagnosis and treatment of disease and for research and development. Sealed Radioactive sources are used to calibrate and test equipment.

4. Management system for the control of radioactive materials

4.1 Management. An Executive Director of the Trust has responsibility for the safe use of radiation and radioactive materials within the Trust.

4.2 The Trust has an Ionising Radiations Safety Policy, demonstrating the commitment of the management of the Trust to radiation safety.

4.3 The Trust Radiation Safety Committee brings together the managers responsible for the safe use of radioactive materials and reviews risk assessments, policies and procedures and receives
regular audit reports from RPA audits of Nuclear Medicine. The committee reports through the Trust’s Clinical Governance Committee and onwards to the Trust Board.

4.4 A Radiation Protection Adviser have been appointed with expertise in the use of radioactive materials. A Radioactive Waste Adviser (RWA) will be appointed once the individuals currently acting in this capacity have obtained RWA certificates.

4.5 A Radiation Protection Supervisor has been appointed.

4.6 ARSAC licensing. All patient administrations of radiopharmaceuticals will be carried out under a valid ARSAC license. This provides assurance of the training of clinical staff involved in supervising patient administration and the suitability of the facilities for handling radioactive materials.

4.7 Ionising Radiations (Medical Exposure) Regulations 2000 (IRMER). These ensure that adequate standard operating procedures are in place for patient imaging and that staff are adequately trained in any procedure that directly affects the radiation dose to the patient (dispensing, checking, administering or imaging).

4.8 Research. Research exposures are approved by the Trust R&D department, a Research Ethics Committee and ARSAC.

4.9 Local Rules. As required by the Ionising Radiation Regulations 17, local rules are in place. Controlled and supervised areas are designated as appropriate.

4.10 Risk assessments are in place that demonstrate that the controls currently in place reduce the risk of external dose rate to a level below the 300 μSv per annum dose constraint for members of the public.

4.11 Building design. Areas where radioactive materials are designed so that radioactive and non-radioactive activities are clearly separated. The layout is such to prevent casual access to rooms where radioactive materials are being used.

4.12 Finishes to laboratories and patient areas using radioactive materials within the Trust generally conform to the Environment Agency Guidance On Standards For Radiochemical Laboratories In Non-Nuclear Premises

4.13 Engineering & procedural controls.

a. Containment in dispensing laboratory laminar flow cabinet with HEPA filtered extract
b. Appropriately shielded benches are used in the dispensing area
c. Secure storage is provided for all radioactive materials
d. Radioactive clinical waste is decay stored within the secure dispensing laboratory.
e. Procedures for handling radioactive materials are in place

4.14 Control of Incoming Radioactivity

Ordering procedures are in place to ensure that the minimum amount of radioactivity is ordered. Deliveries come to the dispensing laboratory during the working day. Deliveries are not accepted out of hours. All open source material is received from QMC or the City Hospital between 9.15 and 9.45 on a weekday morning. The driver parks in an old ambulance bay near to the department and accesses the department down an internal corridor. He knows the code to the digital lock on the door into the department and enters. The driver is an employee of Nottinghamshire Healthcare Trust (Estates and Facilities) rather than Sherwood Forest Hospitals NHS Trust. The driver is met at the reception office or outside the laboratory by a member of the department. Packages are not left unattended and the driver always waits until someone is available to sign for the package. The contents of the package and consignment notes are checked by Nuclear Medicine staff, an entry is made in the Receipt and Disposal Log and a
signature entered. This represents the point of legal handover of ownership of the package to the permit holder.

4.15 Management of Solid Waste

See attached procedure.

Canisters for the Smartvent delivery system and aerosol dispensers, which are reuseable items, are also stored in the shielded waste cupboard whilst the activity on them decays.

4.16 Recording keeping

Comprehensive records of radioactive materials will be held except that the Trust will not record Tc-99m held as accumulated radioactive waste for decay purposes.

5.0 **What stock of radioactive materials is required?**

<table>
<thead>
<tr>
<th>Radionuclide</th>
<th>Current Maximum Registered Activity</th>
<th>Proposed Maximum Registered Activity</th>
<th>Justification of change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tc-99m</td>
<td>20GBq</td>
<td>30GBq</td>
<td>Increase in nuclear medicine activity</td>
</tr>
<tr>
<td>Xe-133</td>
<td>12GBq</td>
<td></td>
<td>No longer in use</td>
</tr>
<tr>
<td>I-123</td>
<td>500MBq</td>
<td>500MBq</td>
<td>Allows for a limited number of imaging studies to be carried out for thyroid metastases at 400MBq per administration</td>
</tr>
<tr>
<td>In-111</td>
<td>300MBq</td>
<td></td>
<td>Include in others. Potential use for gastrointestinal tumour imaging at 150MBq per administration.</td>
</tr>
<tr>
<td>Th-201</td>
<td>300MBq</td>
<td></td>
<td>No longer in use</td>
</tr>
<tr>
<td>Ga-67</td>
<td>200MBq</td>
<td></td>
<td>No longer in use</td>
</tr>
<tr>
<td>Se-75</td>
<td>200MBq</td>
<td></td>
<td>Include in others. Current use for bile salt absorption at 0.4MBq per administration</td>
</tr>
<tr>
<td>Cr-51</td>
<td>20MBq</td>
<td></td>
<td>Include in others. Current use for GFR at 3MBq per administration</td>
</tr>
<tr>
<td>Other beta/gamma emitting radionuclides</td>
<td>500MBq</td>
<td>500MBq</td>
<td>Adequate on current activity levels</td>
</tr>
</tbody>
</table>

6.0 **How much radioactivity will be discharged to the environment?**

Disposal routes leading to a release to the environment are shown in below.

6.1 Solid waste.

Solid $^{99}$Tc$^{m}$ waste is in the form of disposable tubing, needles, liquid waste in vials and materials used in the dispensing of radiopharmaceuticals will be decay stored in a sharps bin in the Nuclear Medicine laboratory and disposed of as non-active waste via the dustbin. All non-active waste will be monitored to ensure before disposal.

Solid $^{99}$Tc$^{m}$ waste from patient administrations. Clinical waste from patient administrations or decontamination will be decay stored and then disposed of as non-active waste to the dustbin.

Se-75 and In-111 (for whole bowel transit) are supplied as capsules and do not generate any solid waste at King’s Mill. Cr-51 (for GFR), all non-administered material is returned to QMC as part of the test; no solid waste is generated at King’s Mill.
Solid waste from longer lived radioactive isotopes is stored in a segregated sharps bin and will be disposed of as VLLW or by transfer to a SRCL for incineration. In recent years there has been no need to use this route, but the Trust would like to retain the flexibility of using this route if there is a demand for the use of longer lived isotopes. A letter of intent from SRCL is attached.

6.2 Liquid waste from the use of radioactive materials in the dispensing laboratory

A small amount of liquid waste is generated in the dispensing laboratory. Good laboratory practice will be used to minimise the quantity of this waste. In an emergency, it may be necessary to decontaminate staff by washing, releasing liquid waste to the environment. The amount of liquid waste will be derived by calculation.
6.3 Liquid waste from patient administrations. The percentage of administered dose appearing in liquid waste will be calculated using the current Environment Agency Guidance.

6.4 Liquid waste environmental impact assessment.

The Trust is seeking to increase its authorisation as follows:

<table>
<thead>
<tr>
<th>Nuclide</th>
<th>Amount MBq/month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current authorisation limits:</td>
<td></td>
</tr>
<tr>
<td>Tc-99m</td>
<td>18000</td>
</tr>
<tr>
<td>I-123/125/131</td>
<td>500</td>
</tr>
<tr>
<td>other beta/gamma</td>
<td>250</td>
</tr>
<tr>
<td>Limits applied for</td>
<td></td>
</tr>
<tr>
<td>Tc-99m</td>
<td>18000</td>
</tr>
<tr>
<td>I-123</td>
<td>500</td>
</tr>
<tr>
<td>other beta/gamma</td>
<td>400</td>
</tr>
</tbody>
</table>

The changes proposed are to retain the $^{99}$Tc$^{m}$ disposal limit at 18GBq, increase the ‘other beta/gamma limit to 400MBq and retain $^{123}$I at 500MBq. Occasional use of $^{125}$I and $^{131}$I will be dealt with in the other beta/gamma limit.

The assessment has used the Environment Agency methodology as contained in their document “RSR permitting – Prospective radiological assessments for human health and wildlife (habitats)”. A copy of the spreadsheet used is attached to this application.

Flow rates in the River Maun and at the King’s Mill Outlet gauging station were obtained from the Environment Agency. The mean flow in the River Maun is 18,600m$^3$/day or 0.22m$^3$/s, effectively double the outflow from the sewage treatment works (9,300m$^3$/day). The brook option was used allowing calculation of doses to a child playing in the brook. The input criteria were:

<table>
<thead>
<tr>
<th>Radionuclide</th>
<th>Discharge Bq/y</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium-51</td>
<td>1.2E+08</td>
<td>10MBq/month GFR</td>
</tr>
<tr>
<td>Cobalt-57</td>
<td>1.2E+07</td>
<td>1MBq/month Vit B12 malabsorption</td>
</tr>
<tr>
<td>Indium-111</td>
<td>4.8E+09</td>
<td>400MBq/month GI tumour imaging</td>
</tr>
<tr>
<td>Iodine-123</td>
<td>4.8E+09</td>
<td>400MBq/month thyroid imaging</td>
</tr>
<tr>
<td>Iodine-125</td>
<td>1.2E+07</td>
<td>1MBq/month plasma volume</td>
</tr>
<tr>
<td>Selenium-75</td>
<td>1.0E+08</td>
<td>10MBq/month bile salt absorption</td>
</tr>
<tr>
<td>Technetium-99m</td>
<td>2.2E+11</td>
<td>18GBq/month at limit of permit</td>
</tr>
</tbody>
</table>
The results are shown below.

<table>
<thead>
<tr>
<th>Population group</th>
<th>Total dose</th>
<th>Food Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>STW worker dose at STW</td>
<td>1.5E+00</td>
<td>1.6E+00</td>
</tr>
<tr>
<td>Farming family dose (sewage sludge to land)</td>
<td>1.4E+00</td>
<td></td>
</tr>
<tr>
<td>Child playing in brook</td>
<td>1.8E+00</td>
<td></td>
</tr>
<tr>
<td>Angler dose (river)</td>
<td>4.5E+00</td>
<td>7.5E-01</td>
</tr>
<tr>
<td>Irrigated food consumer dose (river water)</td>
<td>6.0E-03</td>
<td>6.0E-03</td>
</tr>
<tr>
<td>Fisherman dose (estuary/coastal)</td>
<td>1.4E-01</td>
<td>1.4E-01</td>
</tr>
<tr>
<td>Worst</td>
<td>4.5E+00</td>
<td>1.6E+00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wildlife Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>River wildlife - Worst affected</td>
<td>1.6E+00</td>
</tr>
<tr>
<td>Estuary wildlife - Worst affected</td>
<td>7.4E-02</td>
</tr>
</tbody>
</table>

All doses to population groups are below 20μSv/year. The critical dose group is the Angler dose (river). This is driven by the external dose rate from In-111 (58% or the dose) and Tc-99m (18% of the dose). Extensive use of In-111 is unlikely so that this can be viewed very much as worst case.

The radiation doserate to the river wildlife group is greater than 1μGy/h at 1.6μGy/h. This is driven by the exposure to Tc-99m (75% of the doserate) and In-111 (22% of the doserate). These are very much worst case values. Substituting the actual disposal values for 2011 from Appendix 1 into the spreadsheet the radiation doserate to the river wildlife group falls to 0.7μGy/h.

In summary, all doses to population groups are below 20μSv/year and the radiation doserate to river wildlife is below 1μGy/h if actual discharges are modelled.

6.5 Gaseous waste

Ventilation lung scanning uses a $^{99m}$Tc aerosol system that traps the exhaled air without releasing radioactivity to the atmosphere. There is no requirement to permit gaseous waster.

6.6 Waste sealed sources

Waste sealed sources are disposed of under the Radioactive Substances (Waste Closed Sources) Exemption Order 1963.

7.0 How is radioactive waste minimised?

- By routine maintenance of equipment involved in procedures using radioactive materials
- By decay storage of solid waste
- By only ordering the required amount of activity for each procedure
- By administering no more than the ARSAC maximum activity into each patient.
- By using the minimum level of activity necessary to achieve the desired outcome in research.
- By segregation of waste
8.0 **Summary of requirements**

8.1 Radioactive material - open sources

\[
\begin{align*}
\text{99}^\text{Tc}^m & : 30\text{GBq} \\
\text{123}^\text{I} & : 500\text{MBq} \\
\text{Other betas and gammas} & : 400\text{MBq}
\end{align*}
\]

8.2 Accumulation of Radioactive waste

**Solid waste**

\[
\begin{align*}
\text{99}^\text{Tc}^m & : 30\text{GBq} & 1\text{m}^3 & 21\text{days} \\
\text{123}^\text{I} & : 100\text{MBq} & 0.1\text{m}^3 & 21\text{days} \\
\text{Other beta/gammas} & : 250\text{MBq} & 0.1\text{m}^3 & 5\text{months}
\end{align*}
\]

8.3 Disposal of liquid waste

- \[
\begin{align*}
\text{99}^\text{Tc}^m & : 18\text{GBq per month} \\
\text{123}^\text{I} & : 500\text{MBq per month} \\
\text{Other beta/gammas} & : 400\text{MBq per month}
\end{align*}
\]

8.4 Disposal of solid waste by transfer to a contractor

Letter of intent from SRCL is attached.

- \[
\begin{align*}
\text{123}^\text{I} & : 120\text{MBq per year} \\
\text{Other beta/gammas} & : 240\text{MBq per year}
\end{align*}
\]

8.5 Disposal of VLLW

VLLW is sent to the normal waste stream for disposal and is diluted with all the other waste from the Trust

8.6 Waste sealed sources

Waste sealed sources are disposed of under the terms of the Environmental Permitting (England and Wales) (Amendment) Regulations 2011

8.7 Further modification requested: The accumulation of Technetium 99m in glass vials is exempted from the requirement to maintain records of accumulation
## Administered Activity (MBq)

<table>
<thead>
<tr>
<th></th>
<th>Total Activity Admin</th>
<th>Tc-99m</th>
<th>I-125</th>
<th>Tl-201</th>
<th>In-111</th>
<th>I-123</th>
<th>I-123 MBq</th>
<th>Ga-67</th>
<th>Co-57</th>
<th>Cr-51</th>
<th>Se-75</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30% 100% 30% 100% 60% 30% 100% 100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>31743 31739.83</td>
<td>2.8</td>
<td>0.37</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>33375 33375</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>35135 35135</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>34875 34874.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>34334 34330.46</td>
<td>2.8</td>
<td>0.74</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>39145 39144.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July</td>
<td>32786 32784.89</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>35449 35445.09</td>
<td>2.8</td>
<td>1.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>September</td>
<td>28860 28859.63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>34030 34030</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>33867 33865.52</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>32936 32934.89</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>406535</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Waste Disposal

### Liquid Waste Via Sewer

<table>
<thead>
<tr>
<th></th>
<th>TC-99m</th>
<th>TI-201</th>
<th>In-111</th>
<th>Se-75</th>
<th>Ga-67</th>
<th>Co-57</th>
<th>Cr-51</th>
<th>I-125</th>
<th>I-123</th>
<th>I-131</th>
<th>Total Others</th>
<th>Total Iodine</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LIMIT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>/Month</strong></td>
<td>18GBq</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>January</strong></td>
<td>9.522GBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.4MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>2.8MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>3.2MBq</td>
<td>0.0MBq</td>
</tr>
<tr>
<td><strong>February</strong></td>
<td>10.013GBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
</tr>
<tr>
<td><strong>March</strong></td>
<td>10.541GBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
</tr>
<tr>
<td><strong>April</strong></td>
<td>10.462GBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.4MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
</tr>
<tr>
<td><strong>May</strong></td>
<td>10.299GBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.7MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>2.8MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>3.5MBq</td>
<td>0.0MBq</td>
</tr>
<tr>
<td><strong>June</strong></td>
<td>11.743GBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.4MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
</tr>
<tr>
<td><strong>July</strong></td>
<td>9.835GBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>1.1MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>1.1MBq</td>
<td>0.0MBq</td>
</tr>
<tr>
<td><strong>August</strong></td>
<td>10.634GBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>1.1MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>2.8MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>3.9MBq</td>
<td>0.0MBq</td>
</tr>
<tr>
<td><strong>September</strong></td>
<td>8.658GBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.4MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.4MBq</td>
<td>0.0MBq</td>
</tr>
<tr>
<td><strong>October</strong></td>
<td>10.259GBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
</tr>
<tr>
<td><strong>November</strong></td>
<td>10.160GBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>1.5MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>1.5MBq</td>
<td>0.0MBq</td>
</tr>
<tr>
<td><strong>December</strong></td>
<td>9.880GBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>1.1MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>1.1MBq</td>
<td>0.0MBq</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>121.956GBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>7.03MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>8.4MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>0.0MBq</td>
<td>15.43MBq</td>
<td>0.00MBq</td>
</tr>
</tbody>
</table>

### Waste Disposal Limit

- **18GBq (600MBq pa)**
- **<25MBq**
- **500MBq (1500MBq pa)**
- **Via Sewer**
- **Via Sewer**

---

**Title:** Radiation Safety Policy  
**Version:** 3.0;  
**Issued:** September 2018  
**Page:** 35 of 52
Appendix 2. Site map of King’s Mill Hospital

Nuclear Medicine is situated in the older part of the hospital next to Main X-ray (shown in green). The route to the main sewer is shown in green.
Appendix F

PROCEDURES FOR THE RECEIPT, ACCUMULATION AND DISPOSAL OF UNSEALED RADIOACTIVE MATERIALS

Nuclear Medicine Section
X-ray Department
King’s Mill Hospital.

Author: David Pye, RPA/Derek Pearson RPA
Medical Physics & Clinical Engineering, NUH

1.0 Introduction

In order to comply with the Ionising Radiations Regulations 1999, Environmental Permits granted under the Environmental Permitting Regulations (England & Wales) 2010 (EPR2010) it is necessary to be able to account for the receipt and eventual disposal of all radioactive materials used by the Department.

EPR2010 also imposes limitations on the activities of material which may be held or disposed of, set out in specific certificates of registration and authorisation granted to an establishment.

The receipt of all radioactive materials must be recorded.

The amounts and means whereby all radioactive waste materials leave the site must be recorded.

These records must be sufficient to enable compliance with the relevant registration/authorisation to be demonstrated to inspectors if so required.

A Standard Conditions Environmental Permit is required to hold sealed source radioactive materials.

An Environmental Permit is required to hold unsealed source radioactive materials and accumulate and dispose of, radioactive waste. This permit must be displayed in those areas where radioactive materials are used.

2.0 Summary of limits.

Table I: Holding of unsealed sources (exc. waste)

<table>
<thead>
<tr>
<th>Radionuclide</th>
<th>Maximum permitted activity held</th>
</tr>
</thead>
<tbody>
<tr>
<td>$^{99}\text{Tc}^m$</td>
<td>30GBq</td>
</tr>
<tr>
<td>$^{123}\text{I}$</td>
<td>500MBq</td>
</tr>
<tr>
<td>Other betas and gammas</td>
<td>400MBq</td>
</tr>
</tbody>
</table>

Accumulation of solid waste prior to disposal: solid waste may be accumulated according to the following limitations.

Table II: Accumulation of solid waste

<table>
<thead>
<tr>
<th>Radionuclide</th>
<th>Max activity</th>
<th>Volume</th>
<th>Max time held</th>
</tr>
</thead>
<tbody>
<tr>
<td>$^{99}\text{Tc}^m$</td>
<td>30GBq</td>
<td>1m$^3$</td>
<td>21days</td>
</tr>
<tr>
<td>$^{123}\text{I}$</td>
<td>100MBq</td>
<td>0.1m$^3$</td>
<td>21days</td>
</tr>
<tr>
<td>Other beta/gammas</td>
<td>250MBq</td>
<td>0.1m$^3$</td>
<td>5 months</td>
</tr>
</tbody>
</table>

Limitation on aqueous waste disposed of via the drains (includes patient excreta).
Table III: Aqueous waste disposed of via drains

<table>
<thead>
<tr>
<th>Radionuclide</th>
<th>Maximum disposal permitted (MBq/month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tc-99m</td>
<td>18,000</td>
</tr>
<tr>
<td>I-123</td>
<td>500</td>
</tr>
<tr>
<td>Other beta/gammas</td>
<td>400</td>
</tr>
</tbody>
</table>

Limitation on solid waste disposed of by transfer to SRCL (for incineration).

Table IV: Solid waste transferred

<table>
<thead>
<tr>
<th>Radionuclide</th>
<th>Maximum transfer permitted (MBq/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-123</td>
<td>120</td>
</tr>
<tr>
<td>Other beta/gammas</td>
<td>240</td>
</tr>
</tbody>
</table>

Limitation on disposal of solid very low level waste as ordinary waste.

Waste in solid form together with non-active waste which at the time of removal from the premises:
1. contains no alpha emitters;
2. total activity per 0.1 m³ of waste does not exceed 400kBq;
3. total activity in any one item does not exceed 40kBq.

3.0 Ordering Radiopharmaceuticals

3.1 The Radiopharmacy Services Department at the Queens Medical Centre Campus currently supply this trust with radiopharmaceuticals
3.1.1 A technical agreement between Nuclear Medicine and QMC exists and can be found in the department.
3.2 Ordering of products for administration are to be carried out by staff in Nuclear Medicine. The list is then checked by the Radiographer in charge on the day of ordering.
3.3 The Radiopharmacy order is generated weekly from the CRIS system. The appointments are made from vetted requests by a radiologist.
3.4 An order is made by completing the order form supplied from QMC which lists
   1. Product type
   2. Activity required
   3. Volume required
3.5 The order is sent no later than Friday 12 noon for the following week. This enables QMC to prepare for Monday delivery
3.6 If urgent requests are made that were not made in the weekly order; then additional products can be ordered using the ‘additional products’ order form supplied by QMC
3.7 All forms are e-mailed to the Radiopharmacy Department and followed up with telephone confirmation if required
3.8 Levels of activity ordered should correspond to workload and delivered products should also match the order.

3.9 Any discrepancies or problems that occur at any point of the ordering process is the responsibility of the senior Radiographer in charge of Nuclear Medicine on duty.

3.9.1 Any problems with the delivery, ordering or the radiopharmaceuticals must be brought to the attention of the Radiographer in charge, who can then alert the Radiopharmacy at QMC.

4.0 Receipt and storage of radioactive sources

A record must be kept of all radioactive sources which enter the Department.

**Open sources**

All unsealed radioactive sources arrive into the Department from Queen's Medical Centre via the East Midlands by the Nottinghamshire Healthcare Trust Transport Service.

Materials should be received into the Radiopharmacy area.

Check that the entries on the accompanying consignment note match the numbers and descriptions on the outsides of the delivery containers. Once this is verified the consignment note may be destroyed.

When the individual source containers (vials) are unpacked the details of each item must be entered on the “Open Sources Register” record sheet (OSR01) for the appropriate week. The relevant details are:

- the day’s date;
- the radionuclide (eg Tc-99m);
- the time of receipt;
- the material’s batch number;
- other details (eg “MAA stock vial”);
- the reference date and time for the activity;
- the activity in MBq at the reference time.

When a stock vial is expired or exhausted and is transferred to a disposal bin or the Waste Store for eventual disposal, the date of transfer must be entered alongside its original record of receipt.

Stock materials (except Tc-99m) should be reviewed on a monthly basis and any unnecessary or expired materials disposed of according to the appropriate procedure.

Stock Tc-99m vials are transferred to the relevant sharps-bin on the morning following their expiry.

Compliance with the Hospital’s Registration for maximum permitted holdings of specific radionuclides or groups may be ascertained by totalling the appropriate entries on the “Open Sources Register” (taking into account decay), for items which have not been transferred to waste at a given date.

All stock materials are to be stored in the lead lined lockable refrigerator designated for this purpose.

**Sealed sources**

All closed sources must be recorded in the Sealed Sources Register. Accompanying documentation must be filed. Details of transfer or disposal of any closed sources must be recorded alongside their entries in the Sealed Sources Register. A letter must be sent to the Environment Agency every January confirming that the hospital is complying with the conditions of its Standard Conditions Permit.
Disposal of sealed sources will be carried out by return to the supplier under the The Environmental Permitting (England and Wales) (Amendment) Regulations 2012.

5.0 Segregation, accumulation and storage of radioactive waste

Radioactive waste for disposal may be stored for up to five months as permitted by the Trust's Authorisation, to allow decay. In practice, materials will be held in the Waste Store for no more than approximately three months in order to allow for time spent in transfer to and from the store.

Decay storage for this period allows significant reduction in the activities which need to be handled by staff and which are eventually released to the environment (most radionuclides in common use in the Department have a half life of less than seven days; giving at most 0.0006% of original activity, at disposal).

The waste is segregated by radionuclide as follows:

- Tc-99m;
- all others.

Two sharps incineration bins, housed in a purpose made lead shield, take the two waste streams. Care must be taken to avoid cross contamination.

Sealed sharps bins are moved to the Waste Store for accumulation. Stock vials are held in the open sources store until they are deemed to have expired at which point they are transferred to the appropriate sharps bin before it is sealed and moved to the Waste Store. A Waste Store Register (WSR01) records all waste in the store.

6.0 Waste Store organisation

All waste in the store must be recorded on the Waste Store Register (WSR01).

Each item must have a unique identifying mark (bin number, batch number, etc) which links its register entry to the item.

The store has four nominal sections. One upper section is reserved for “Tc-99m only” sharps containers, to reduce the risk of cross contamination.

One lower section is reserved for “other” sharps bins, which must be placed into one or more spill trays. The remaining lower section is for the storage of bulky contaminated objects.

All sections must be labelled according to their respective purpose.
### Summary

**Tc-99m**
- **Tc-99m:** sharps, syringes, small contaminated items
  - as generated
- **Tc-99m:** stock vials
  - daily; from previous day

**Other**
- **other:** sharps, syringes, small contaminated items
  - as generated
- **other:** stock vials
  - monthly

**Waste Store:**
- **Tc-99m:** sharps bin (content need not be recorded)
  - weekly
- **Tc-99m:** stock vials
  - 2 weeks decay storage
- **Tc-99m:** sharps bin (content must be recorded)
  - as generated
daily; from previous day
- **Other:** sharps bin
  - 3 months decay storage

**Other**
- **Non-active clinical waste**
  - transfer to waste disposal contractor for incineration
- **Temporary Storage**
  - monthly

**Clinical Waste Disposal:**
- **Transfer to waste disposal contractor for incineration**

---

Title: Radiation Safety Policy
Version: 3.0; Issued: September 2018
7.0 Accumulation and disposal of Technetium-99m solid waste

This procedure applies to expired stock materials, all syringes used for the administration of radiopharmaceuticals, and other small items which are likely to bear contamination e.g. swabs used on vials and during removal of the needle from the vein.

This procedure is based on that approved by the Environment Agency Small Users’ Liaison Group (3-6-97) (copy attached).

Do not dispose of items contaminated with other radionuclides by this route. Avoid cross-contamination.

A sharps bin specifically for the disposal of Tc-99m waste is made available. Successive bins must be marked with consecutive numbers throughout the year (e.g. 1, 2, 3 ... etc). The current bin is located in one position of the sharps container shield which is reserved specifically for Tc-99m waste.

8.0 Disposal cycle

A WEEKLY cycle is to be followed. At the start of a cycle a sharps bin is labelled as follows:

“Tc-ONLY”;
Bin No;
date opened; and placed in the allocated position in the sharps container shield.

All contaminated syringes and small items (e.g. swabs) are to be placed into the designated sharps bin. The activity of individual items need not be recorded.

At the end of the weekly cycle – or when the bin is approximately two thirds full – it must be closed and sealed. The total activity contained in it must be determined by measurement, using a suitably calibrated scintillation monitor.

In a low background area, place the monitor probe at 1m from the bin (a greater distance may be required if stock bottles with significant activity have just been placed in the bin); note the count rate and subtract any background count. The following must be recorded on the Waste Store Register record sheet (WSR01):

- date;
- bin number;
- background subtracted count-rate;
- measurement distance (metres);
- estimated activity calculated according to the given formula.

The following must be recorded on the bin:

- date closed;
- measured activity at date of closure;

No date for disposal is entered as the bin must be checked for residual activity immediately prior to being placed in the non-active waste stream.

The bin is then placed in the lockable accumulation store in the part reserved for Tc-99m, for two weeks.

Before a bin is finally disposed of it must be checked with a contamination monitor for residual activity which would indicate the presence of isotopes other than Tc-99m. The person performing the check should sign and date the respective bin record in the Waste Store Register confirming that the check has been carried out. A ‘nil’ entry should be made if appropriate.

If any residual activity is detected the bin must be treated as other radioactive waste and disposed of accordingly (see “0 9.0 Residual activity in Tc-99m waste”, below).

 Containers verified as Tc-99m waste only must be disposed of promptly as clinical waste for incineration. **No radioactive warning tape/labels should remain on the outside of the container.**
9.0 Residual activity in Tc-99m waste

A single contaminating isotope may be identified either from prior knowledge (as very few different isotopes are handled) or using the energy spectrum display facility on the gamma camera. A list of the main energy peak(s) is given in the table at the bottom of WSR02.

The activity of the isotope must be estimated. The item should be placed 1m from a calibrated contamination monitor. If the reading is A cps above background then the activity can be calculated as (A x MCF)MBq; where the MCF (meter calibration factor) may be found in the table on sheet WSR02 (non-Tc residual activity estimation). The activity must be recorded on the record sheet.

The bin is then handled as for “other” waste isotopes, with a bin number of “Tc-xx” (where xx is the number used on the Tc-99m Waste Store Register) entered on the relevant record sheet. It must be stored in the appropriate area of the accumulation store.

10. Stock vials

These should be transferred to the appropriate bin daily, on the morning after their expiry. Any residual contents are NOT flushed to the drain (since decay will effectively “remove” them).

11.0 Accumulation and disposal of “other” solid waste

This procedure applies all “other” radionuclides (i.e. with the exception of Tc-99m and Xe-133): expired stock materials, all syringes used for the administration of radiopharmaceuticals, and other small items which are likely to bear contamination e.g. swabs used on vials and during removal of the needle from the vein.

Avoid cross-contamination.

A sharps bin specifically for the disposal of “other” waste is made available. Successive bins must be marked with consecutive numbers throughout the year (e.g. 1, 2, 3 ... etc). The current bin is located in one position of the sharps container shield which is reserved specifically for other radionuclide waste, and labelled “Other”.

12.0 Disposal cycle

A MONTHLY cycle is to be followed. At the start of a cycle a sharps bin is labelled as follows:

- “Other”;
- Bin No;
- date opened;
- and placed in the allocated position in the sharps container shield.

A new record sheet (OthR01) is prepared for use with the bin and is kept within its immediate vicinity.

All contaminated syringes and small items (e.g. swabs) are to be placed into the designated sharps bin. The activity of each item must be estimated and entered on the contents record (OthR01) sheet.

Estimation of the residual activity of contaminated items:

Syringes: approximately 0.05ml of ‘dead’ space remains in all syringes. Each syringe disposed of should be entered onto OthR01.

The activity may be calculated as–

\[
\text{Activity (MBq) } = \frac{0.05 \times (\text{dose MBq})}{(\text{volume of dose in ml})}
\]

Example: If the dose drawn from the stock vial was 200MBq in approximately 2ml, then the activity disposed of in the syringe is–

\[
\text{Activity (MBq) } = \frac{0.05 \times 200}{2} = 50\text{MBq}
\]

This activity must be entered on the record sheet.
Small items: if significant contamination of swabs etc is suspected (eg. blood from injection site) they should be compared to the empty syringe using a scintillation monitor at a fixed distance. The estimated activity is entered onto the record sheet.

Otherwise the contamination is considered negligible and the item disposed of into the sharp bin without record.

The activity of any item may be estimated by noting the count rate (A cps) at a distance of 1m from a calibrated scintillation monitor and then applying a suitable meter calibration factor (MCF) (activity MBq = A x MCF). Calibration factors at 1m for Mini Instruments type 44A scintillation probes are given on worksheet WSR02.

At the end of the monthly cycle – or when the bin is approximately two thirds full – it must be closed and sealed. The total activity contained in it may be determined by summing the decay corrected entries on its record sheet. The entries may be decay corrected according to the formula:

\[ \text{final activity} = \text{initial activity} \times e^{-0.693 \times D / T} \]

where:
- \( D \) is the number of days elapsed since the entry was made
- \( T \) is the half life given in the table below

<table>
<thead>
<tr>
<th>Radionuclide</th>
<th>Half life (days)</th>
<th>Radionuclide</th>
<th>Half life (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(^{51}\text{Cr})</td>
<td>27.7</td>
<td>(^{123}\text{I})</td>
<td>0.55</td>
</tr>
<tr>
<td>(^{111}\text{In})</td>
<td>2.80</td>
<td>(^{125}\text{I})</td>
<td>59.9</td>
</tr>
<tr>
<td>(^{75}\text{Se})</td>
<td>119.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The bin is due for collection by the Estates Department not sooner than two months after, and not more than three months after its date of closure. The dispose-after date is recorded on the bin record sheet.

The bin is then placed in the lockable accumulation store in the part reserved for “Other”. The following must be recorded on the Waste Store Register record sheet for “Other” (WSR04):

- date;
- bin number;
- estimated activity;
- dispose-after date.

The following must be recorded on the bin:

- date closed;
- estimated activity at date of closure.

“Other” sharps bins are held in the Waste Store for between 2 and 3 months. At the end of this period a bin is collected by the Estates Department for transfer to the waste disposal contractor for whom the Trust has an Environment Agency Authorisation. The date of collection and estimated activity at that date must be entered on the Waste Store Record sheet (WSR04). The Estates’ staff receiving the waste should sign for the relevant bin(s). The activity should be decay corrected according to the formula and table given in §8.1.5.

### 13.0 Stock vials

These should be transferred monthly to the appropriate bin just before it is closed.
Appendix G

SFHT Radiation Incident Reporting Process

Examples of these are:

Patient related
- wrong site or wrong patient x-rayed/scanned-CT only
- duplicate ICE request (resulting in patient x-rayed again)
- selecting wrong patient on ICE (referrer)
- patient receives exposure much greater than intended (e.g. very over exposed image), wrong protocol settings on CT scanner.

Staff or equipment related
Exposure fails to terminate (e.g. AEC failure or exposure switch failure)
Unintended exposure
- someone exposes unintentionally e.g. steps on a pedal or unauthorised person makes an exposure
- person walks into controlled area during exposure / not complying with local rules.

This list is only a brief guide – if in doubt check with Radiation Protection Advisor (RPA)-0115 8754500

**Radiation incident**
Staff member involved or supervising Radiographer reports to Radiography Services Manager (RSM), or Line Manager

Images which have been obtained in error must be sent to PACS for reporting and a note added to CRIS

Incident put on to Datix by staff member involved in incident or supervising Radiographer – to include patient name, DOB and exposure factors (especially the units of the dose - this is available from Radiology)

Datix incident comes to or copied to RSM. Details of incident emailed to RPA by RSM.

For low dose examinations check with RPA who will use Much Greater than Intended Guidance. Refer to Ionising Radiation (Medical Exposure)

High dose (eg CT, Cardiology, Interventional, Nuclear Medicine) Must be reported to RPA. Immediately. Who will advise if reportable to

Chief Executive, Executive informed by RSM

RSM reports incident to CQC and if attributes to Radiology the RSM will perform or delegate RCA. If not Radiology advice available from GSU Governance Co-ordinator in the division where the incident occurred

It is investigated by a clinician within that division within 60 days and should go to Serious Incident Sign off meeting. The RSM then sends to CQC. RSM updates IRMER tracker

**If in doubt about the incident, speak to the Radiation Protection Advisor**

Report formulated by RPA, recommendations followed

Incident discussed at:
- Radiation Safety Committee Meeting (RSC)
- Radiation Protection Supervisors Meeting (RPS)
- Clinical Governance Meeting

Reportable incident added to Radiology IRMER tracker by RSM (reports to D&O Divisional Clinical Governance Meeting)
Incident/IRMER Datix reference added to the serious incident investigation divisional tracker

Report (bi-annually) from RSC and sent to the Patient Safety & Quality Meeting (meets monthly).
## TRAINING & APPOINTMENT REQUIREMENTS FOR RADIATION USERS AND THOSE WITH RADIATION PROTECTION RESPONSIBILITIES

<table>
<thead>
<tr>
<th>Staff Group/QE</th>
<th>Initial Training</th>
<th>Update Training</th>
<th>Compliance Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPA- NUH requirement</td>
<td>RPA2000 RPA Certificate, HCPC</td>
<td>RPA2000 renewal every 5yrs</td>
<td>HoMPCE checks; biennial HCPC check; RPA2000 checks</td>
</tr>
<tr>
<td>MPE-NUH requirement</td>
<td>As defined by the syllabus in the EU MPE Guidelines; HCPC</td>
<td>Ongoing evidence of CPD</td>
<td>Line Manager who signs off CPD tells HoMPCE; biennial HCPC check</td>
</tr>
<tr>
<td>RWA-NUH requirement</td>
<td>RPA2000 RWA Certificate; HCPC</td>
<td>RPA2000 renewal every 5 years</td>
<td>HoMPCE checks; biennial HCPC check; RWA certificate check</td>
</tr>
<tr>
<td>Radiation Protection Supervisor</td>
<td>Formal RPS course (as recommended by relevant RPA), Relevant RPA approval</td>
<td>3 yearly refresher run by RPAs Ongoing evidence of CPD</td>
<td>Radiography Services Manager checks training dates; RPA Audits</td>
</tr>
<tr>
<td>IRMER Practitioner</td>
<td>Relevant specialist training (+ IRMER training where required for non-FRCR or non-Radiographer); Appropriate statutory registration</td>
<td>Ongoing evidence of CPD</td>
<td>Lead clinician in clinical area/ Head of Service checks relevant CPD and registration status</td>
</tr>
<tr>
<td>IRMER Operator</td>
<td>Relevant specialist training (+ IRMER course where required for non-FRCR or non-Radiographer)</td>
<td>Ongoing evidence of CPD, informal updates or following changes</td>
<td>Lead clinician in clinical area/ Head of Service checks relevant CPD.</td>
</tr>
<tr>
<td>IRMER Referrer</td>
<td>Info via relevant induction; appropriate statutory registration</td>
<td>Ongoing evidence of CPD, Annual reminder via yearly letter</td>
<td>Radiography Services Manager ensures this is sent out</td>
</tr>
</tbody>
</table>
Appendix I

Management Procedure for X-ray Equipment

This procedure forms a part of the Trust Ionising Radiations Safety Policy and is written to be complementary to the Management of Medical Devices Policy.

This procedure only covers the additional requirements above and beyond the requirements of the following Trust Policies

- Medical Equipment User Training Policy
- Management of Medical Devices Policy
- The Control of Contractors Policy

The general requirements of the above policies must still be followed.

1. Aims
To ensure that benefits to patients from the use X-ray machines are maximised and that the risks to patients and staff from their use are minimised. This includes the procurement, commissioning and maintenance of any such machine throughout its life cycle.

2. Definitions
Any reference to a “patient” within this document is to be understood to be a reference to any individual undergoing a medical exposure as defined by the Ionising Radiation (Medical Exposure) Regulations 2017. Under appropriate circumstances “patient” may then refer to a healthy individual.

X-ray machines are all X-ray emitting devices used to perform medical exposures as defined by IRMER2017. This includes exposures for both diagnostic and therapeutic purposes and undertaken on patients.

Exclusions
Specimen Cabinets e.g. faxitrons.
Electron Microscopes
RPA – Radiation Protection Adviser
MPE – Medical Physics Expert

3. Introduction
The Department Clinical Lead or Head of Service will put systems in place to ensure the procedures below are complied with and ensure that adequate resources (staff time etc) are available to support them.

4. Procedures

4.1 Selection and procurement
An RPA and an MPE must be consulted regarding the potential purchase of X-ray machines prior to award of business and ideally at project inception. This is to ensure that the units can be installed and operated safely and that the risks and benefits to patients, staff and public are controlled. Both should be involved in the specification and the MPE involved in the selection.
4.2 Installation
At the contract stage advice on the radiation safety of the installation should be sought from the relevant RPA. The responsibility for radiation safety in the installation area must be included at the contract stage using a control of contractors' [or ‘Co-operation of Employers Agreement’] agreement.

4.3 Commissioning (inc. critical examination, acceptance and baseline testing).
Prior to clinical use the following processes must have taken place.

Critical examination – The RPA will advise on the nature of the critical examination of the safety features of the X-ray unit. The critical examination is the installer’s responsibility; however, they may contract with another employer to carry out this task.

Acceptance – advice from the MPE must be sought on the nature and scope of any tests required.

Baseline testing/initial commissioning – advice from the MPE should be sought to define what tests are required at this stage. These will normally be performed by MPCE under the direction of the MPE.

4.4. Optimisation
It is essential that the exposures used to image patients are optimised. Advice on the optimisation of exposures should be sought from the MPE.
This may well be an iterative process involving MPE, users and the manufacturer of the equipment.

5. Servicing and maintenance
The Trust Control of Contractors' policy must be followed whenever service agents from external organisations are working on site.

5.1 Quality assurance
Advice on the quality assurance(QA) programme must be sought from an MPE. The system must document the following requirements
- The roles and responsibilities for each element of the QA programme
- The test protocols to be used and the frequencies of the tests to be carried including patient dosimetry
- Tests to be carried out following routine servicing and the requirement to take advice from an MPE when a repair has been carried out.
- The tolerances to be applied to each test
- The action to be taken in the event of a test failure
- The calibration of equipment

5.2 Managing faults
For each piece of equipment a log of faults should be available to the users. The fault log should be able to track a fault from discovery through to closure and document the dates and actions taken to achieve this.

5.3 Handover
Handover arrangements for occasions when an X-ray machine is to be operated for the purposes of repair or maintenance must be in place. The arrangements should be agreed with an RPS. The “AXrEM” form for handover and return to use should be used unless another method has been agreed with an RPA. The handover procedures should be documented in the local rules for the relevant area.
5.4 Equipment inventory and replacement
An equipment replacement programme should be in place for every unit of X-ray equipment. Where the unit’s performance has deteriorated or the RPA has advised that replacement should be considered a risk assessment for the continued use must be completed. RPA advice on the risk scores must be obtained. An equipment inventory must be maintained. The inventory must contain name of manufacturer,
- model number
- serial number or other unique identifier,
- year of manufacture
- year of installation

5.5 Decommissioning
Any X-ray equipment to be decommissioned should either be removed by the manufacturer/supplier or specialist advice on disposal should be obtained e.g. by estates as the unit may contain hazardous materials. Please note that the RPA is not able to provide this advice.

6. Training and competence
All staff required to operate X-ray equipment must be trained to use the equipment or be directly supervised.

7. Incidents
Incidents involving X-ray equipment should be reported using the standard trust reporting policy. Where there is the potential for the incident to have resulted in increased staff, public or patient dose or the image quality obtained using the equipment may have been sub-optimal the incident should also be reported to the RPS for the area who will in turn inform the RPA according to the local rules. Incidents may also be reported to the MHRA – the RPS should seek RPA guidance on this.

8. Record Keeping
The following records must be kept.

<table>
<thead>
<tr>
<th>Record</th>
<th>Minimum retention period</th>
</tr>
</thead>
<tbody>
<tr>
<td>QA records</td>
<td>2 years</td>
</tr>
<tr>
<td>Handover documents</td>
<td>2 years</td>
</tr>
<tr>
<td>Commissioning documents</td>
<td>2 years beyond decommissioning date</td>
</tr>
<tr>
<td>Incidents</td>
<td>Variable – RPA to advise</td>
</tr>
<tr>
<td>Training and competence records</td>
<td>2 years beyond decommissioning date is suggested</td>
</tr>
<tr>
<td>Equipment inventory</td>
<td>Ongoing record</td>
</tr>
<tr>
<td>Fault log</td>
<td>2 years beyond decommissioning date</td>
</tr>
</tbody>
</table>
**APPENDIX J – EQUALITY IMPACT ASSESSMENT FORM (EQIA)**

**Name of service/policy/procedure being reviewed:** Ionising Radiation Safety Policy  
**New or existing service/policy/procedure:** Existing  
**Date of Assessment:** May 2018

For the service/policy/procedure and its implementation answer the questions a – c below against each characteristic (if relevant consider breaking the policy or implementation down into areas)

<table>
<thead>
<tr>
<th>Protected Characteristic</th>
<th>a) Using data and supporting information, what issues, needs or barriers could the protected characteristic groups’ experience? For example, are there any known health inequality or access issues to consider?</th>
<th>b) What is already in place in the policy or its implementation to address any inequalities or barriers to access including under representation at clinics, screening?</th>
<th>c) Please state any barriers that still need to be addressed and any proposed actions to eliminate inequality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race and Ethnicity</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Gender</td>
<td>None-see below</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Age</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Religion</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Disability</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Sexuality</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Pregnancy and Maternity</td>
<td>It should be noted that there are certain requirements of the regulations, principally related to radiation dose limitation, which may require different treatment of men and women, due to potential for harm to those pregnant/breast-feeding</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Gender Reassignment</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>---------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Marriage and Civil Partnership</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Socio-Economic Factors (i.e. living in a poorer neighbourhood / social deprivation)</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

What consultation with protected characteristic groups including patient groups have you carried out?
- N/A

What data or information did you use in support of this EqIA?
- N/A

As far as you are aware are there any Human Rights issues be taken into account such as arising from surveys, questionnaires, comments, concerns, complaints or compliments?
- None

Level of impact

From the information provided above and following EQIA guidance document Guidance on how to complete an EIA [click here], please indicate the perceived level of impact:

Low Level of Impact

For high or medium levels of impact, please forward a copy of this form to the HR Secretaries for inclusion at the next Diversity and Inclusivity meeting.

Name of Responsible Person undertaking this assessment: Donna Staples

Signature:

Date: May 2018
APPENDIX K – ENVIRONMENTAL IMPACT ASSESSMENT

The purpose of an environmental impact assessment is to identify the environmental impact, assess the significance of the consequences and, if required, reduce and mitigate the effect by either, a) amend the policy b) implement mitigating actions.

<table>
<thead>
<tr>
<th>Area of impact</th>
<th>Environmental Risk/Impacts to consider</th>
<th>Yes/No</th>
<th>Action Taken (where necessary)</th>
</tr>
</thead>
</table>
| Waste and materials | • Is the policy encouraging using more materials/supplies?  
• Is the policy likely to increase the waste produced?  
• Does the policy fail to utilise opportunities for introduction/replacement of materials that can be recycled? |        |                               |
| Soil/Land | • Is the policy likely to promote the use of substances dangerous to the land if released? (e.g. lubricants, liquid chemicals)  
• Does the policy fail to consider the need to provide adequate containment for these substances? (For example bunded containers, etc.) |        |                               |
| Water | • Is the policy likely to result in an increase of water usage? (estimate quantities)  
• Is the policy likely to result in water being polluted? (e.g. dangerous chemicals being introduced in the water)  
• Does the policy fail to include a mitigating procedure? (e.g. modify procedure to prevent water from being polluted; polluted water containment for adequate disposal) |        |                               |
| Air | • Is the policy likely to result in the introduction of procedures and equipment with resulting emissions to air? (For example use of a furnaces; combustion of fuels, emission or particles to the atmosphere, etc.)  
• Does the policy fail to include a procedure to mitigate the effects?  
• Does the policy fail to require compliance with the limits of emission imposed by the relevant regulations? |        |                               |
| Energy | • Does the policy result in an increase in energy consumption levels in the Trust? (estimate quantities) |        |                               |
| Nuisances | • Would the policy result in the creation of nuisances such as noise or odour (for staff, patients, visitors, neighbours and other relevant stakeholders)? |        |                               |