

<b>Reference Number: UHB 464</b> <b>Version Number: 1</b>	<b>Date of Next Review: 25 Jul 2022</b>  <b>Previous Trust/LHB Reference Number: N/A</b>
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## Radioactive Substances Risk Management Procedure

### Introduction and Aim

The Cardiff and Vale University Health Board (UHB) uses radioactive materials for a variety of clinical and other applications; this use results in the production of radioactive waste. The radiation emitted by radioactive substances (including radioactive waste) has the potential to present a hazard to people and to living organisms in the environment. In addition, individuals may be exposed to airborne naturally occurring radon gas on the UHB's premises.

The UHB has a Radioactive Substances Risk Management Policy whose aim is to ensure that we manage our use of radioactive substances and exposure to radon in a safe manner and in such a way as to minimise their impact on people and the environment.

This Procedure supports the Policy and translates its aim into practical implementation measures.

### Objectives

The UHB will achieve its aim by:

- Providing a robust framework and using best available techniques (BAT) to manage radioactive substances
- Ensuring that radioactive substances management is safe and compliant with current legislation, standards and guidance in order to protect the UHB, patients, staff, members of the public and the environment
- Ensuring that managers and staff are aware of their roles in the safe management of radioactive substances
- Keeping radiation doses and dose rates as low as reasonably practicable (ALARP)
- Limiting the amount of radioactive substances kept on our premises by only procuring material for work that is justified
- Optimising radioactive substances management processes in order to reduce the amount of radioactive waste that is produced
- Where practicable and within terms of permit, reducing the amount of radioactive waste disposed to the environment by accumulating and storing it securely and allowing it to decay
- Disposing of radioactive waste in compliance with Environmental Permits issued by Natural Resources Wales and other statutory and regulatory requirements
- Ensuring that arrangements for the transport of radioactive materials satisfy the requirements of the Office for Nuclear Regulation

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- Monitoring the concentration in air of radioactive radon gas on its premises and taking remedial action to limit exposure where necessary
- Demonstrating compliance through record keeping and audit
- Appointing Radioactive Waste Adviser(s), Dangerous Goods Safety Adviser(s), Radiation Protection Adviser(s) and Radiation Protection Supervisors

### Scope

This procedure applies to all of our staff in all locations including those with honorary contracts.

<b>Equality Impact Assessment</b>	<i>An Equality Impact Assessment has/has not been completed. (please delete as necessary) Where it has not been completed indicate why e.g. 'This is because a procedure has been written to support the implementation the ..... Policy. The Equality Impact Assessment completed for the policy found here to be a negative/positive/no impact.</i>
<b>Health Impact Assessment</b>	<i>A Health Impact Assessment (HIA) has / has not been completed [delete as necessary] and this found there to be a positive/negative/ no impact [delete as necessary]. Key actions have been identified and these can be found in...../or incorporated within this policy/supporting procedure. Note: if a HIA has not been completed indicate why</i>
<b>Documents to read alongside this Procedure</b>	<ul style="list-style-type: none"> <li>• Radioactive Substances Risk Management Policy</li> <li>• Best Available Techniques for the Management of Radioactive Substances</li> <li>• Ionising Radiation Risk Management Policy</li> <li>• Exposure of Patients to Ionising Radiation Procedure</li> <li>• Exposure of Staff and Members of the Public to Ionising Radiation Procedure</li> <li>• Health and Safety Policy</li> <li>• Waste Management Policy</li> <li>• Waste Management Operational Procedures</li> </ul>
<b>Approved by</b>	Radiation Protection Group
<b>Accountable Executive or Clinical Board Director</b>	Executive Director of Therapies and Health Science
<b>Author(s)</b>	

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**Summary of reviews/amendments**

<b>Version Number</b>	<b>Date of Review Approved</b>	<b>Date Published</b>	<b>Summary of Amendments</b>
1	25/07/2019	04/09/2019	New Document

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## 1 Definition of terms

### Activity

The rate of decay or disintegration of a radionuclide (i.e. the number of nuclei decaying in unit time).

### Alpha radiation

Particulate ionising radiation in the form of helium-4 nuclei (a combination of two protons and two neutrons) emitted by nuclei during radioactive decay.

### Aqueous waste

Liquid radioactive waste in a continuous aqueous phase with any entrained solids, gases and non-aqueous liquids.

### Atomic number

The number of protons in the nucleus of an atom of an element.

### Becquerel (Bq)

The unit of activity (equal to one decay or disintegration per second).

### Beta radiation

Particulate ionising radiation in the form of electrons or positrons emitted by nuclei during radioactive decay.

### Flood-field source

A large area radioactive source that is used to test the uniformity of a gamma camera.

### Gamma camera

A device that produces an image of the distribution of a radiopharmaceutical within an individual.

### Gamma radiation

Ionising radiation in the form of photons emitted by nuclei during radioactive decay.

### GBq

Giga becquerel ( $10^{12}$  Bq).

### Half-life

The time taken for the activity of a radionuclide to decrease to half its original value.

### Ionising radiation

Radiation that is sufficiently energetic to cause ionisation through the release of inner electrons in atoms of high atomic number.

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kBq

Kilo becquerel ( $10^3$  Bq).

Low Level Waste (LLW)

Solid radioactive waste, including any immediate packaging, with a maximum activity of 4 GBq per tonne (equivalent to 4 kBq per gram) of alpha emitting radionuclides and 12 GBq per tonne (equivalent to 12 kBq per gram) of all other radionuclides

MBq

Mega Becquerel ( $10^6$  Bq).

Nuclide

A particular nuclear species in which all the atomic nuclei are identical (i.e. they contain the same number of protons and the same number of neutrons).

Open source

A radioactive source that is not in the form of a sealed source.

Organic liquid waste

Liquid radioactive waste, not being aqueous waste, containing one or more organic chemical compounds.

Photon

A unit (quantum) of electromagnetic radiation.

Radioactive decay or disintegration

The transformation of one nuclide (a radionuclide) into another with the emission of ionising radiation.

Radioactive source

An object that comprises or contains radioactive substances and is the origin of ionising radiation emitted by radionuclides.

Radioactive substance (material)

Substance (material) that contains one or more radionuclides.

Radioactive generator

A device that produces a short-lived radionuclide from a longer-lived parent radionuclide.

Radioactive waste

Any material that is either radioactive in its own right or is contaminated by radioactive substances and for which no further use is envisaged.

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### Radioactivity

The phenomenon associated with radioactive decay or disintegration.

### Radionuclide

A radioactive nuclide.

### Radon

A naturally occurring radioactive gas that is present in air.

### Sealed source

A radioactive source whose structure is such as to prevent, under normal conditions of use, any dispersion of radioactive substances to the environment.

### Very Low Level Waste (VLLW)

Solid radioactive waste in which each 0.1 m<sup>3</sup> total volume of waste contains a total activity less than 400 kBq and an activity of any single item less than 40 kBq.

### X-radiation

Ionising radiation in the form of photons emitted by electron interactions in atoms, possibly as a consequence of radioactive decay.

## 2 Use and regulation of radioactive substances

Radioactive substances pose a hazard as a result of the ionising radiation that they emit. The UHB as an employer uses radioactive substances at the University Hospital of Wales (UHW) and at University Hospital Llandough (UHL).

The UHB uses or may use radioactive substances in the following practices:

- Manufacture of radioactive products (including radiopharmaceuticals and radioactive sources)
- Application of radioactive tracers (for medical and biological techniques)
- Medical diagnosis
- Medical treatment
- Occupational health screening
- Health screening
- Medical and biomedical research and development
- Medico-legal procedures
- Non-medical imaging using medical radiological equipment
- Teaching and training
- Ionising radiation metrology

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- Transport of radioactive material

All these practices are justified [1-3] i.e. they produce sufficient benefit to individuals exposed to ionising radiation or to society in general to offset the detriment that they cause. Justification is one of the basic tenets of radiation protection [4].

The majority of the above practices are associated with nuclear medicine, which involves the administration of radioactive substances (in the form of radioactive medicinal products or radiopharmaceuticals) to humans, usually for medical diagnosis, medical treatment or medical or biomedical research. Nuclear medicine is practised at UHW and UHL.

Radiopharmaceuticals may be administered to humans only by a person who holds a licence from Health Ministers or someone acting under the authority of such a person; the premises on which the administration takes place must also be licensed [5-7]. The relevant regulations are enforced by the Medicines and Healthcare products Regulatory Agency (MHRA) [6-7].

Furthermore, exposures of humans to ionising radiation in nuclear medicine must be individually justified by an identified practitioner or an operator acting under written guidance from the practitioner [5-7]. This aspect is enforced by Healthcare Inspectorate Wales (HIW).

Radiopharmaceuticals are prepared in a specialised radiopharmacy at UHW under a regime [7-11] that is regulated by the MHRA. These products are transported to UHL (and other sites in south-east Wales) in a manner [7,12-13] that is consistent with the requirements of the Office for Nuclear Regulation (ONR), which includes the appointment of a Dangerous Goods Safety Adviser (DGSA).

Radioactive substances are used for biochemical radioimmunoassay (RIA) at UHW. They are also used at both UHW and UHL for the quality control and calibration of radiation equipment and for teaching and training in radiation sciences.

Radioactive sources are kept and used as sealed sources or open sources in accord with the stipulations of the Environmental Permitting Regulations (EPR) 2016 [14-15] and under conditions that are specified in separate Environmental Permits issued by Natural Resources Wales (NRW). These permits are also site-specific for UHW and UHL and EPR require the appointment of a Radioactive Waste Adviser (RWA).

Sealed sources are solid objects and typically they are used for equipment quality control or calibration. Open sources, on the other hand, are usually in liquid or gaseous form (although they may be solid). If treated inappropriately,

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they may release radioactive substances to the environment causing radioactive contamination. Open sources are typically used for administration to patients as part of nuclear medicine tests or treatments.

By their very nature, radioactive substances and their applications are governed by general legislation and guidance [7,16-18] that apply to the use of ionising radiation, in particular the Ionising Radiations Regulations (IRR) 2017 [17]. This is enforced by the Health and Safety Executive (HSE) and requires the appointment of Radiation Protection Adviser(s) (RPA) and one or more Radiation Protection Supervisors (RPSs) and the writing of Local Rules.

### **3 General arrangements for the management of radioactive substances**

The majority of the UHB's work with radioactive substances is done by Radiology and Medical Physics departments. The remainder is done by the Biochemistry department within the Laboratory Services Directorate. All departments are part of the Clinical Diagnostics and Therapeutics Clinical Board. The UHB's use of radioactive substances is subject to formal consent from the HSE. Their management is co-ordinated by Medical Physics in association with the RWA (Appendix 1), the RPA and the DGSA (Appendix 2).

The UHB procures radioactive materials for specific purposes. Most are purchased for clinical use in nuclear medicine as radiopharmaceuticals; in this case, the majority of the radionuclides have relatively short half-lives ranging from several seconds to several days. In some cases, the radionuclide that is procured (the parent) is not used directly and it is the daughter radionuclide that has clinical application. The most widely used example takes the form of a radioactive generator in which molybdenum-99, which decays to the clinically useful technetium-99m. Some clinical radionuclides and most radionuclides obtained for test and calibration purposes have relatively long half-lives ranging from weeks to years.

On receipt, radioactive materials are recorded and securely stored e.g. in a locked safe or a locked cupboard in a locked room. During storage, the materials are kept in shielded containers made of a suitable material of a suitable thickness and the store is labelled to indicate its contents. Records are kept of the removal of radioactive sources from the store and their return to the store. When a radioactive source is no longer required, its residual activity (following clinical or other use and/or radioactive decay) becomes radioactive waste.

It is inevitable that the use of open radioactive sources produces some radioactive contamination on surfaces and protective clothing. There are

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routine monitoring programmes to detect such contamination and procedures for decontamination where necessary.

Risk assessments are made of all aspects of the use of radioactive substances [17-18]. In addition, there are contingency plans to deal with incidents such as a spillage of liquid radioactive material and the loss of a radioactive source. If the activities are sufficiently great, such incidents are reported to the HSE.

The UHB has established a Radiation Protection Group (RPG) that reports to the Quality, Safety and Patient Experience Committee and onwards to the Executive Board. The RPG discusses all aspects of radiation safety including the management of radioactive substances.

#### **4 Transport of radioactive materials**

In the course of its work, the UHB transports radioactive materials by road. This poses a potential hazard to staff, members of the public and the environment and in the governing regulations [12-13], radioactive materials are categorised as Class 7 dangerous goods. Since the regulations are made under the Health and Safety at Work Act 1974 [16], they are enforced by the Health and Safety Executive. In practice, however, compliance is assessed by the ONR.

Radiopharmaceuticals are transported from UHW to a number of other hospitals each working day for clinical nuclear medicine procedures. Sometimes radioactive waste is transported for storage and disposal at another site, radioactive patient samples (such as blood or tissue) are transported for analysis at another hospital and radioactive calibration and other sources are transported from one site to another. Patients to whom radioactive substances have been administered are not subject to the road transport regulations. It is also the case that the regulations do not apply to radioactive materials that are moved from one place to another within a single site (such as a hospital). The material is usually transported in a vehicle designated for this purpose, although a private car may be used under some circumstances; public passenger transport may not be used.

Radioactive materials are packaged in such a way as to minimise the external radiation hazard and the risk of damage to the contents or radioactive contamination. In order of increasing hazard, the packages used by the UHB are designated as exempt, excepted or Type A. Packages are labelled to indicate their contents and there are written procedures to ensure package security, minimise the risk of untoward events and manage incidents if they arise. Transport vehicles carry placards and a fire-proof cab notice to indicate the radioactive nature of the goods and what to do in the event of an accident.

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Specific duties are assigned to the consignor (sender of the goods), the carrier (transporter), the vehicle driver and the consignee (recipient). Typically, the UHB is the consignor and the carrier and a member of its staff is the driver; the consignee may be the UHB or another organisation. Shipments are accompanied by documents and records such that they are traceable to the consignor. Furthermore, there are training and quality assurance systems for the staff (vehicle drivers in particular), equipment and processes associated with the transport of the materials. There are also contingency plans that are tested periodically either in the field or as a 'desk-top' exercise.

## **5 Generation and regulation of radioactive waste**

The use of radioactive substances by the UHB inevitably generates radioactive waste which, in general, may be solid, liquid or gaseous. In addition, the UHB receives radioactive waste from Cardiff University's Heath Park site.

Solid radioactive waste mainly takes the form of items (such as vials, syringes and test tubes) that contain residual radioactive substances and items (such as gloves, swabs, linen and clothing) that are contaminated by radioactive substances. These items are mainly produced as a result of:

- Radiopharmaceutical preparation
- Nuclear medicine tests and treatments
- RIA

Solid radioactive waste also includes sealed sources that have reached the end of their useful life.

The UHB produces solid radioactive waste as Low Level Waste (LLW) and Very Low Level Waste (VLLW).

The UHB produces aqueous liquid radioactive waste mainly in the form of:

- Unused radiopharmaceuticals, RIA ingredients and related products
- Gamma emitting nuclear medicine and RIA samples that have been measured
- Human excreta following nuclear medicine tests and treatments

Organic liquid waste is mainly produced as a result of the measurement of beta emitting samples in nuclear medicine using the method of liquid scintillation counting. This type of waste takes the form of liquid in a closed vial or other container.

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The UHB does not produce gaseous radioactive waste. Radioactive gas (krypton-81m) is used in nuclear medicine for lung ventilation imaging but its half-life (13 seconds) is so short that no waste is produced.

The receipt, accumulation and disposal of radioactive waste are subject to the same legislation (EPR) [14-15] and regulatory framework as the keeping and use of radioactive substances. These aspects of radioactive waste management are incorporated into the same Natural Resources Wales environmental permit as applies for the keeping and use of open sources. In addition, there is a requirement [19-21] to appoint a suitable RWA.

## **6 General arrangements for the management of radioactive waste**

The majority of the UHB's radioactive waste is generated by the work of the Radiology and Medical Physics departments; some waste is also generated by the work of the Laboratory Services Directorate. Other directorates may be involved with radioactive waste, especially those who deal with nuclear medicine in-patients and day cases.

The management of radioactive waste is co-ordinated by Medical Physics in association with Waste Management (Facilities Directorate). This includes the provision of a dedicated secure room that can be used as a radioactive waste store. It is located in Medical Physics at UHW. Radioactive waste is discussed by the RPG.

The UHB uses Best Available Techniques (BAT) for the Management of Radioactive Waste in order to minimise its impact on people and the environment. This includes keeping radiation doses and dose rates as low as reasonably practicable (ALARP) and optimising processes to reduce the amount of radioactive waste produced. There is a separate BAT procedure. The keeping of radioactive substances and the accumulation, storage and disposal of radioactive waste by the UHB should be in accordance with the conditions of the relevant Environmental Permits. Incidents involving non-compliance with Environmental Permits should be reported to NRW.

## **7 Accumulation, segregation and disposal of radioactive waste**

Solid radioactive waste containing short-lived radionuclides (half-lives less than 7 hours) should be placed in a suitable container as it is produced. The container should not be the same as that used to keep long-lived waste and it should be labelled to indicate that it contains radioactive substances.

At the end of the period of waste accumulation, containers of short-lived solid waste should be sealed and placed in the dedicated radioactive waste store

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or other suitable location. After a period of one week the radioactivity has decayed to such an extent that the waste may be classified as VLLW. It should be disposed of as contaminated non-radioactive waste after the removal of all labels indicting the presence of radioactivity.

Organic liquid waste and solid radioactive waste containing long-lived radionuclides (half-lives equal to or greater than 7 hours) should be placed in suitable separate containers as it is produced. Neither container should be the same as that used to keep short-lived solid waste and both should be labelled to indicate that they contain radioactive substances. A record should be made of the accumulation of waste in the containers.

After an accumulation period of no longer than three months, containers of organic liquid waste and long-lived solid waste should be sealed and transferred to the dedicated radioactive waste store together with the record of accumulated waste. The contents of the radioactive waste store should be kept securely at all times [22].

At the end of their period of storage, containers of organic liquid waste and long-lived solid waste should be suitably packaged and transferred to a contractor for removal and disposal by incineration (or possible burial at a designated land-fill site) as LLW. A record of the transfer should be made.

Small-sized sealed sources that are no longer required should be regarded as solid radioactive waste. They should be immediately disposed of as VLLW [23] or placed in the radioactive waste store and disposed of as LLW.

In general, large area sealed sources (gamma camera flood-field sources) and radionuclide generators that are no longer required should not be treated as radioactive waste by the UHB. By prior arrangement, they should be transferred as radioactive sources to the provider of a replacement source or generator at or near the time of delivery of the replacement. A record of such transfers should be made.

If transfer as radioactive sources is not possible, large area sealed sources and radionuclide generators that are no longer required should be taken to the dedicated radioactive waste store and disposed of as LLW or VLLW [23].

Individuals to whom radiopharmaceuticals have been administered will excrete some of the administered activity, mainly in urine. While they are on UHB premises, such individuals should be instructed to use designated toilets. These toilets should be identified by notices indicating that they may be used for this purpose.

The excreta are regarded as aqueous liquid waste which eventually reaches the sea via drains, sewers and sewage works. Much of the radioactivity in

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this waste will decay before it is diluted in sea water. A record should be made of the estimated activity of aqueous waste disposed of in this manner.

Aqueous radioactive waste that is produced in clinical and laboratory settings should be disposed of by pouring down designated sinks or sluices and flushing with a copious amount of water. Such sinks and sluices should be identified by notices indicating that they may be used for this purpose.

The waste eventually reaches the sea via drains, sewers and sewage works and some of the radioactivity in this waste will decay before it is diluted in sea water. A record should be made of aqueous waste disposed of in this manner.

Since the UHB does not produce gaseous radioactive waste, it does not make any disposals of radioactive waste to air.

## **8 Exposure to radon**

The element radon is a naturally occurring noble gas that only exists in radioactive form [24]. In common usage, the term radon means its most abundant isotope, radon-222, which decays with the emission of alpha radiation. Although its half-life is relatively short (3.8 days), it originates from uranium-238 in the natural environment. This radionuclide is much longer-lived, which means that radon is continuously produced.

Radon mixes with air and is therefore inhaled by all organisms including humans. It is colourless, odourless and tasteless and therefore its presence cannot be detected by human senses. Outdoors, the concentration of airborne radon is very small but it is possible for indoor concentrations to represent a radiation hazard. The main concern is the exposure of the lungs to alpha radiation and the associated risk of lung cancer. The air concentration of radon tends to be greatest in basements and other poorly ventilated areas. It also tends to be greater in winter than in summer, when buildings are better ventilated.

The concentration of radon in a specific room or location is usually measured with a passive detector, which is left in situ for a three-month period, and a risk assessment of radon exposure is made based on the results. If the annual average activity concentration of radon in air exceeds  $300 \text{ Bq m}^{-3}$ , remedial action should be taken [17-18]. The UHB's premises are not located in radon-affected areas and so it is unlikely that measures need to be taken to reduce radon concentration. However, radon concentration is monitored every ten years and risk assessments updated as appropriate.

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## 9 Duties

Responsibility for implementing the Radioactive Substances Risk Management Policy and its supporting procedures lies with the UHB as radiation employer, with the Executive Director of Therapies and Health Science being the responsible officer. This responsibility is fulfilled by assigning the duties described here.

The duties of the Executive Director of Therapies and Health Science include:

- Taking overall responsibility for the management of radioactive substances on behalf of the UHB as the holder of Environmental Permits relating to radioactive substances and radioactive waste
- Providing assurance to the UHB Board that radioactive substances are managed in compliance with the UHB's policies and procedures and relevant Environmental Permits issued by Natural Resources Wales
- Ensuring that the UHB provides suitable management arrangements, including sufficient resources and competent persons, to comply with relevant Environmental Permits
- Providing assurance to the UHB Board that radioactive materials are transported in accordance with legislation and guidance
- Informing the UHB Board about issues related to radioactive substances management
- Appointing the UHB's RWA and RPA in writing
- Delegating duties to other managers as appropriate

The duties of Clinical Board Heads of Operations and Delivery include:

- Providing assurance to the Executive Director of Therapies and Health Science that radioactive substances are managed in compliance with policies and procedures and regulatory requirements
- Communicating and liaising with the RWA, RPA, Clinical Directors and other managers about issues related to radioactive substances and radioactive waste
- Appointing RPSs in writing
- Delegating duties to other managers as appropriate

The duties of the Chair of the UHB Radiation Protection Group (RPG) include:

- Reviewing relevant UHB policies and procedures at least every three years and ensuring that they are amended and updated as necessary
- Reviewing reports from the RWA, RPA and other members of the RPG and taking action as necessary

The duties of the Head of the Health, Safety and Environment Unit include:

- Acting as the UHB's primary contact with NRW as the regulator for the keeping of radioactive substances and the accumulation and disposal of radioactive waste

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- Reporting incidents of regulatory non-compliance with respect to radioactive substances (including those associated with Environmental Permits) to the appropriate external regulatory body such as NRW, the Health and Safety Executive or the Office for Nuclear Regulation
- Ensuring that the Executive Director of Therapies and Health Science, the Chair of the UHB Radiation Protection Group and the relevant Clinical Director and Clinical Board Head of Operations and Delivery are aware of all reports made to external regulatory bodies
- Ensuring that the UHB's premises are monitored for radon every ten years, reviewing the results of such monitoring and updating radon risk assessments
- Liaising with the Head of Estates as regards remedial work to reduce the concentration of airborne radon
- Delegating duties to other managers as appropriate

The duties of the Radioactive Waste Adviser (RWA) include:

- Preparing applications for relevant Environmental Permits from NRW
- Liaising with NRW as regards radioactive waste management and matters such as site inspections and environmental permit variations
- Providing NRW with an annual inventory of the disposal of radioactive waste
- Performing, reviewing and updating environmental impact assessments for the discharge of aqueous liquid waste
- Promoting the use of BAT for the management of radioactive substances including radioactive waste
- Advising on the optimisation of processes to reduce the amount of radioactive waste produced
- Advising on the commissioning, calibration and quality assurance of contamination monitors and other equipment for the measurement of radioactivity
- Undertaking regular audits of compliance with relevant policies, procedures and Environmental Permits (to include the accumulation and disposal of solid and organic liquid waste and the disposal of aqueous liquid waste) and recommending remedial actions as necessary
- Providing quarterly reports to the Executive Director of Therapies and Health Science, the Chair of the Radiation Protection Group and relevant Clinical Board Heads of Operations and Delivery
- Providing advice to managers, Radiation Protection Supervisors and members of staff as regards compliance with relevant UHB policies and procedures and the stipulations of Environmental Permits

The duties of the Dangerous Goods Safety Adviser (DGSA) include:

- Giving direct advice on all aspects of the transport of radioactive materials

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- Visiting sites to conduct safety audits and to review regulatory compliance as regards the transport of radioactive materials

The duties of the Radiation Protection Adviser (RPA) include:

- Providing advice on the safety of staff and the public as regards exposure to ionising radiation from radioactive substances and radioactive waste
- Providing advice on the safety of staff and members of the public as regards exposure to radon

The duties of the Head of Estates include:

- Co-operating with the Head of the Health, Safety and Environment Unit in performing monitoring for radon every ten years
- Undertaking any remedial work that is required to reduce the concentration of airborne radon at identified locations on the UHB's premises

The duties of Directorate Clinical Directors include:

- Ensuring that all aspects of the management of radioactive substances and radioactive waste (including procurement, storage, security, transport and disposal) comply with policies and procedures and regulatory requirements
- Ensuring that quality management system exists for all aspects of radioactive substances and radioactive waste
- Identifying and ensuring the appropriate training of individual members of staff as RPSs
- Ensuring that Local Rules and Standard Operating Procedures (SoPs) are written to implement the requirements of this UHB procedure
- Ensuring that relevant members of staff are adequately trained and have the resources to comply with the Local Rules and SoPs
- Maintaining records of staff training
- Putting in place measures to monitor staff compliance with SoPs
- Liaising with and seeking advice from the RWA, RPA and DGSA
- Making risk assessments and taking mitigating action as necessary
- Liaising with the Clinical Board Head of Operations and Delivery about the appointment of RPSs and issues related to the management of radioactive substances
- Reporting incidents of regulatory non-compliance (including those associated with Environmental Permits) to the Head of the Health, Safety and Environment Unit and informing the Executive Director of Therapies and Health Science, the Chair of the UHB Radiation Protection Group and the Clinical Board Head of Operations and Delivery
- Delegating duties to other managers as appropriate

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The duties of the Head of Ionising Radiation (Medical Physics) include:

- Writing and updating relevant UHB policies and procedures
- Providing a secure dedicated room that may be used as a radioactive waste store
- Designating suitable members of staff as manager and RPS of the radioactive waste store
- Providing and maintaining a suitable computerised system ( see Appendix 2) for recording radioactive substances and radioactive waste
- Retaining records of the disposal of radioactive waste until informed by NRW that records no longer need to be retained
- Ensuring that the transport of radioactive materials to and from the radiopharmacy at UHW complies with policies and procedures and regulatory requirements
- Liaising with the Executive Director of Therapies and Health Science as regards the appointment of RWA and RPA to the UHB
- Delegating duties to members of staff as appropriate
- Reporting incidents or potential incidents involving non-compliance with Environmental Permits and other concerns about radioactive substances management to the RWA and the Clinical Director
- Reporting incidents or potential incidents involving radioactive substances (other than those related to Environmental Permits) to the Clinical Director

The duties of the Head of Waste Management include:

- Procuring the services of an external contractor (see Appendix 3) for the disposal of long-lived solid and organic liquid radioactive waste
- Ensuring that the external contractor has appropriate Environmental Permits for the receipt, accumulation and disposal of radioactive waste
- Delegating duties to members of staff as appropriate

The duties of the manager of the radioactive waste store include:

- Receiving solid and organic liquid radioactive waste into the store from the UHB and Cardiff University on the Heath Park site
- Ensuring the security of the store and its contents
- Maintaining the record of radioactive substances and radioactive waste on the computerised system
- Arranging for the regular transfer of organic liquid waste and solid LLW to the external contractor in association with the Head of Waste Management
- Reporting incidents or potential incidents involving non-compliance with Environmental Permits and other concerns about radioactive waste management to the RWA and the Clinical Director

The duties of Radiation Protection Supervisors include:

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- Ensuring compliance with arrangements for radiation safety and supervising the arrangements set out in the Local Rules
- Reporting incidents or potential incidents involving non-compliance with Environmental Permits and other concerns about radioactive substances management to the RWA and the Clinical Director
- Reporting other incidents to the Clinical Director
- Seeking advice from the RWA and RPA as required

The duties of individual members of staff include:

- Placing solid and organic liquid radioactive waste in the appropriate containers as it is produced
- Disposing of aqueous liquid radioactive waste via designated sinks
- Making a record of the production of organic liquid waste and long-lived solid waste and the disposal of aqueous liquid radioactive waste
- Disposing of short-lived solid radioactive waste as VLLW
- Transferring organic liquid waste and long-lived solid waste to the dedicated radioactive waste store
- Packaging and labelling radioactive materials for transport
- Preparing vehicles for the transport of radioactive materials
- Monitoring and recording radioactive contamination and taking remedial action as required
- Following SoPs and Local Rules pertinent to radioactive substances management
- Reporting incidents or potential incidents involving non-compliance with Environmental Permits and other concerns about radioactive substances management to the RPS

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## Appendix 1

### Role Profile for Radioactive Waste Adviser (RWA)

#### Qualifications:

- MSc in Medical Physics
- Registered Clinical Scientist (HCPC)
- Certificated RWA (RPA 2000)

#### Competences:

- Measurement of environmental activity and dose rates
- Calculation of radiation dose to individuals or groups
- Use, quality assurance and calibration of radiation monitors

#### Duties

- Preparing applications for Environmental Permits
- Liaising with the regulator regards matters such as site inspections and environmental permit variations
- Providing the regulator with an annual inventory of the disposal of radioactive waste
- Performing, reviewing and updating environmental impact assessments for the discharge of aqueous liquid waste
- Promoting the use of Best Available Techniques (BAT) for the management of radioactive waste
- Advising on the optimisation of processes to reduce the amount of radioactive waste produced
- Advising on the commissioning, calibration and quality assurance of contamination monitors and other equipment for the measurement of radioactivity
- Undertaking regular audits of compliance with relevant policies, procedures and Environmental Permits (to include the accumulation and disposal of solid and organic liquid waste and the disposal of aqueous liquid waste) and recommending remedial actions as necessary
- Providing regular reports to management
- Providing advice to managers, Radiation Protection Supervisors and members of staff as regards compliance with policies and procedures and the stipulations of Environmental Permits

## Appendix 2

### Role Profile for Dangerous Goods Safety Adviser (DGSA)

#### Qualifications

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- Vocational Training Certificate issued by the Scottish Qualifications Agency to act as a DGSA for road transport

#### Competences

- Detailed knowledge of legislation and guidance in relation to the transport of dangerous goods
- Ability to conduct and report on the findings of safety audits

#### Duties as regards the transport of radioactive substances

- Giving direct advice on legislation and related matters
- Visiting sites to review the existing standards of regulatory compliance
- Performing comprehensive safety audits
- Giving assistance with matters such as packaging, labelling, consignment procedures, documentation and vehicle marking
- Advising on the carriage, loading, unloading and handling of radioactive materials and associated safe working practices
- Developing procedures and emergency arrangements if required
- Providing safety training for staff if required

### Appendix 3

#### Computerised system for recording radioactive substances and radioactive waste

System: IsoStock

Supplier: Gillett Partnership

Address: PO Box 4544  
Sheffield  
S17 9BP

Contact: Technical support  
Tel: 0844 736 2660 option 2  
Fax: 0844 736 2660  
E-mail: [support@gillett.co.uk](mailto:support@gillett.co.uk)

### Appendix 4

#### External contractor for the disposal of organic liquid radioactive waste and long-lived solid LLW

Contractor: SRCL

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Address: Indigo House  
Sussex Avenue  
Leeds  
LS10 2LF

Contact: Customer support  
Tel: 0333 240 4400  
E-mail: [support@srcl.com](mailto:support@srcl.com)