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**VIVA : R .PROTECTION**

**ANS 1**

**Role of the Radiation Protection Officer in radiology department.**

A Radiation Protection Officer (RPO) is a specialist in radiation safety and compliance matters and is an appointed position within University Health and Safety Services.

The role of the RPO is to support the University’s work with ionising radiations by ensuring arrangements are in place to manage radiation risks, so that work is carried out safely and in compliance with Regulations and so that University employees and the public are protected from harmful effects.

The role involves:

1. Acting as the point of contact within the University for the external Radiation Protection Adviser (RPA).

2. Acting as the point of contact within the University for Regulators relevant to ionising radiations compliance i.e. the Environment Agency (EA) and the Health and Safety Executive.

3. Preparing periodic status reports on radiation safety and management for purposes of University governance.

4. Managing Environment Agency Permits including:

• Make application for new or variation to existing EA Permits.

• Manage the collation of waste records and make Pollution Inventory returns to EA on behalf of the University.

• Advise on the use of Exemptions under the Environmental Permitting Regulations 2011.

• Advise on routes of radioactive waste disposal.

5. Monitoring site activity against Environment Agency Permit conditions; including

• Expert inspection and auditing of storage and disposal facilities.

• Auditing holdings and usage records.

• Auditing waste accumulation in stores.

• Performing waste sampling when required by the Regulator.

• Performing measurements to check radiation doses, dose rates and activity.

6. Arranging for disposal of radioactive waste to authorised contractors.

7. Managing the security of radioactive sources according to current national requirements and carry out periodic security audits.

8. Managing facility or site decommissioning.

9. Applying and managing maintenance of a Best Practicable Means (BPM) culture in management and operations including :.

• Advising on design standards for laboratories and designation of areas.

• Providing site specific information to the RPA (for BPM, risk assessments etc.).

• Contributing to the production of local rules and local radiation safety policy.

• Assessing that BPM is being applied.

• Advising Radiation Protection Supervisors.

10. Managing a system for the provision of personal dosimetry and associated record-keeping.

11. Advising on selection of monitoring equipment and manage a system for the periodic calibration of radiation and contamination monitors and associated record-keeping.

12. Managing an inventory of equipment capable of emitting x-rays.

13. Investigating incidents and report incidents when appropriate to the relevant regulatory authority.

14. Advising on training in radiation safety.

**ANS : 4**

Radiation is part of our life. Background radiationHelpBackground radiationRadiation that is always in the environment. The majority of background radiation occurs naturally and a small fraction comes from man-made elements., coming primarily from natural minerals, is around us all the time. Fortunately, there are very few situations where an average person is exposed to uncontrolled sources of radiation above background. Nevertheless, it is wise to be prepared and know what to do if such a situation arises.

One of the best ways to be prepared is to understand the radiation protection principles of time, distance and shielding. During a radiological emergency (a large release of radioactive material into the environment), we can use these principles to help protect ourselves and our families.

Time, distance, and shielding actions minimize your exposure to radiation in much the same way as they would to protect you against overexposure to the sun:

Protecting Yourself

Time: For people who are exposed to radiationHelpradiationEnergy given off as either particles or rays. in addition to natural background radiation, limiting or minimizing the exposure time reduces the dose from the radiation source.

Distance: Just as the heat from a fire reduces as you move further away, the dose of radiation decreases dramatically as you increase your distance from the source.

Shielding: Barriers of lead, concrete, or water provide protection from penetrating gamma raysHelpgamma raysA form of ionizing radiation that is made up of weightless packets of energy called photons. Gamma rays can pass completely through the human body; as they pass through, they can cause damage to tissue and DNA. and x-raysHelpx-raysA form of ionizing radiation made up of photons. X-rays are capable of passing completely through the human body. Medical x-rays are the single largest source of man-made radiation exposure.. This is why certain radioactive materials are stored under water or in concrete or lead-lined rooms, and why dentists place a lead blanket on patients receiving x-rays of their teeth. Therefore, inserting the proper shield between you and a radiation source will greatly reduce or eliminate the dose you receive.

Emergencies

In a large scale radiological release, such as a nuclear power plant accident or terrorist incident, the following advice has been tested and proven to provide maximum protection.

If a radiation emergency occurs, you can take actions to protect yourself, your loved ones and your pets: Get Inside, Stay Inside and Stay Tuned. Follow the advice of emergency responders and officials.

In a radiation emergency you may be asked to get inside a building and take shelter for a period of time.

This action is called "sheltering in placeHelpshelter in placeAn emergency response instruction meaning get inside a building right away. If you can get to a brick or concrete multi-story building or basement within a few minutes, go there.."

Get to the middle of the building or a basement, away from doors and windows.

Bring pets inside.

Stay Inside.

**ANS : 2**

**RSO Responsibilities.**

* implement and oversee the orerationnl asrects of the
* Ensure (for lhe licensee) that radiation safety accordance licensee-arproyvd
* Review and approve (with licensee management) RPP changes before implementation
* Help identify arid investigate radiation safety problem«
* Initiate, rccommend. or provide corrective problems
* Verify implementation of corrective actions
* Stop operations identified a• umafe4
* Notify management of radiation safety probiems. unsafe operations, and corrective actiotus

• Serve a.s a memter of the RSC (if applicable) and attend Ibe meeting«

* Provide a link the RSC and the users of ionizing radiation
* movide the contact between the licensee and ille regulatory agencies
* Be available ror c«ltact by facility staffrvt regulations ami license ctmditions
* Sign scmmannual sealed-source leak tests and inventories of sealed sources tegulalion.

**ANS : 3**

1 Radiation decomposition i.e. splitting or water into and OH\* and also splitting ofother solvents of the body.

2 kinetic energy of the incident photons heats up the molecules ofthe living tissues

 3 Incident radiation when traveling through the body tissues knock out the bound electrons free from their parent atoms or molecules. These free electrons are highly unstable andinteract with otheratoms and molecules within the irradiated system.

• Ionization is another process where the radiations interact with matter to form ions;

 High-energy electromagnetic radiation and particle radiation are capable of producing ions in their passage through matter.

Types ofionizing radiation include alpha and beta particles, X-Rays, gamma rays, etc. X-Ray machines and Radioisotopes the two important and potential sources of ionizing radiation.

• Indirect effects:

Since 80% of the biological tissue is water

Most of the incident radiation Energy is absorbed by the water molecules and these are broken into very unstable and reactive components. These then react with body molecules and cause the cell damage.

Due to generation of Hand OH radicals subsequent to many series 01 reactions hydrogen peroxide is formed which is highly reactive oxidizing com pou nd and break chemical bonds in macromolecules of the body such as proteins lipids and other nucleic acids etc causing cellular damage, celi dcalh and mutations.

 The biological effects are enhanced by the presence oroxygen which is always present in the cells,

•Lymphoid cells. Epithelial cells of the small intestine, Haemo Oietic cells, Germinal cells, Epithelial cells of the sycin, Connective tissue cells. Cartilage and growing bone cells, Cells of the brain and spinal cold, Cells of the skeletal muscles and mature bone 

•The earl effect of radiation result of direct injury to the Issues. Simultaneous and considerable

destruction to the radiosensitive cells lead to radiation sickness. This effects appea with thin days or weeks after exposure and include nausiea 'vomating, malaise, diarrhea. fever; hemorrhage, loss of appetite. fall o(hairand death etc are dangrous effect of radiation,

* The dalyead effect of radiation includes shorting of life spam. Leukaemia malignant tumour and catrat. These appear after month's or even many years of exposure.