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PAPER

RADIATION
PROTECTION

SUBMITTED TO

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Question No: 1

Describe the role of radiation protection officer in radiology department?

ANSWER :-

ROLE of the Radiation protection officer :-

A radiation protection officer (RPO) is a specialist in radiation safety and compliance matters and is appointed positions 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 with in 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 purpose 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.
- 5 - Monitoring site activity against Environment Agency permit Conditions; including
- Expert inspection and auditing of storage and disposal facilities.
 - Auditing holdings and ~~using~~ usage records.
 - Auditing waste accumulation in stores.
 - performing waste sampling when required by the Regulator.
- 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.

Responsibilities of Radiation protection officer:-

- The responsibility of radiation protection officer that radiation safety activities are being performed in accordance with license approved procedures and regulatory requirements.
- Investigate the radiation safety problems.
- Provide corrective actions for identified safety problems.
- Stop operation identified as unsafe.
- Serve as a member of RSC and attend the meetings.
- Provide the contact between the license and regulatory agencies.

Duties of Radiation protection officer:-

The duties of these officers at a medical faculty are at the discretion of the license.

There are duties or

tasks that must be performed in order for the facility to comply with regulations and license conditions.

Such delegations are made, the RSO helps ensure that the duties are properly performed. License management must clearly identify what duties are to be performed by the RSO and what duties are to be performed by the RSO or another individual or job function.

Question No: 2

Elaborate the radiation protection measures in a safe radiology department?

Protection from Radiation:-

also known as
Radiation protection
Radiological protection
International atomic
energy agency (IAEA)
define as a protection
of people from harmful
effect of exposure
to ionizing radiation.

Exposure situation:-

1) Planned exposure
Radiological protection
planned in advance

2) Emergency Exposure
unexpected
situation urgent protection
required.

3) Existing Exposure
occur
from naturally occurring
Radioactive isotopes.

Personal Dosimeter Devices

These devices
measures the personal
dose which is

taken by a person
in radiation department.
Examples - (Radiation protection)
a) film badge pre-dosimeter
b) Thermoluminescent dosimeter

General principles of Radiation protection

International
Commission on Radiological
Protection advocates the
principle of "as low
as reasonably available"
and also recommend
that radiation exposure
should base on the
principle of time,
distance, shielding,
justification, optimization
and dose limit.

Objective of Radiation protection

→ The overall
objective of radiation protection
is to provide an
appropriate standard of
protection for a man
without unduly limiting
the beneficial practice
give rise to a radiation
protection.

→ The NCRP in 1993 issued that the goal of radiation protection is to prevent the occurrence of serious radiation induce (Acute and chronic) deterministic effect in exposed person to a degree that is acceptable in relation to the benefits to the individual and to society from the activity that generate such exposure.

Radiation protection from Radiation Exposure :-

1) TIME :-

→ The total dose receive by a radiation worker is directly proportional to the total time spend near the radiation source.

→ lesser the time spend lesser will be dose.

2) DISTANCE ~

Increasing the distance between

the individual and source of radiation is an effective method of reduce exposure to radiation.

Shielding :-

The material that attenuates the radiation called shield. And a shield will reduce the exposure to the patient and public.

→ Lead electrolytic Shielding
Non-lead or lead free Shielding.

The high density of lead makes it useful shield against X-rays and gamma rays radiation.

General Guidelines of Dose Limitation :-

- 1) Individual doses due to combination of exposure from all relevant practices should not exceed specified dose limit for occupational of public exposure.
- 2) Different dose limits are specified for the

radiation workers

→ As they expected benefits from them. Do while handling radiation will outweigh the small increasing risk.

pregnant radiation worker has to protect so that fetus and embryo is protected giving the same radiation protection as given to public.

→ Dose limits are not applicable for medical exposure as the benefits gained outweigh the harm.

Radiation protection accessories ~

- lead eye glass
- lead gloves
- lead thyroid collar
- lead aprone

The radiologist or radiological technicians protect themselves to follow the Cardinal principles.

Question No: 3

What are radiation hazards that one should be beware of?

ANSWER :-

RADIATION HAZARDS :-

- Radiation causes changes in the living tissues causing radiation sickness.
- Radiation decomposition splitting of water into H^+ and OH^- and also splitting of other solvents of the body.
- Kinetic energy of the incident photons heats up the molecules of the living tissues.
- Ionization is the another process where the radiation with atoms to form ions.
- 80% of the biological tissue is water. Most of the incident radiation energy is absorbed by water molecules and broken into unstable and reactive components.

These reacts with body molecules and cause cell damage.

→ Due to the generation of H and OH radical highly reactive oxidizing compound and break the macromolecules such as protein lipids or nucleic acids cell death and mutation occur.

→ Thyroid gland is one of the most radiation sensitive part.

High radiation dose can cause thyroid cancer.

→ The delayed effect shortening of life span, leukemia, malignant tumor and cataract these appear after the month or many years of experience.

Question No: 4

How a radiation technologist can protect himself/herself from radiation, what is annual occupational dose?

ANSWER :-

Commandments of Radiation protection :-

- 1- understand and apply the cardinal principles of radiation protection of radiation control time, distance and shielding.
- 2- Do not allow familiarity to result in false security.
- 3- Never stand in primary beam.
- 4- Always wear protective apparel when not behind a protective barrier.
- 5- Always wear an occupational radiation monitor and position it outside the protective apron at the collar.
- 6- Never hold a patient during radiographic.

- 7) The person who is holding the patient must always wear a protective apron and if possible protective gloves.
- 8) use gonadal shields on all people of childbearing age when such use will interfere with the examination.
- 9) Examination of the pelvis and lower abdominal of ~~to~~ pregnant patients should be avoided whenever possible, especially during the first trimester.
- 10) Always collimate to the smallest field size appropriate for the examination.

ANNUAL EXPOSURE

Activity	Typical Dose
→ Smoking	280 millirem/year
→ Radioactive materials use in a um lab	< 10 millirem/year
→ Dental x-ray	10 millirem per x-ray
→ chest x-ray	8 millirem per x-ray
→ Drinking water	5 millirem /year
→ Cross country round trip by air	5 millirem per trip
→ Coal Burning power plants.	0.165 millirem / year