

Radioactive Pollution.

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Radioactive pollution is a special form of physical pollution of air, water and soil with radioactive materials. Its nature of contamination and effects are different from those of the other kinds of pollution. Though people have been exposed to low level of radiations from natural sources for several millions years, but the danger danger from radiation exposure have increased in recent times.

Radioactivity - Radioactivity is a property of certain elements (radium, thorium, uranium etc) to spontaneously emit positrons (alpha particles) electrons (beta particles) and gamma rays (shortwave electromagnetic wave) by disintegration of their atomic nuclei (nuclides)

Sources of Radioactive Pollution -

Sources of Radioactive pollution are both natural and man made.

- (1) Natural (background) Sources - They include cosmic rays from space and terrestrial radiations from radio nuclides present in earth's crust such as radium 224, uranium 238, thorium 232, Potassium-40 and carbon 14.
- (2) Man made Sources - They includes mining and refining the plutonium and thorium and explosion of nuclear war weapons, nuclear power plants and fuels and preparation of radioactive isotopes.

(1) Atomic explosion (Nuclear fall out) Atomic explosions are performed to test the nuclear arms. The nuclear arms use uranium 235 and Plutonium 239 for fission and hydrogen

or lithium as fusion material. Atomic explosions produce radioactive particles that are thrown high up into the air as huge clouds. These particles are carried to long distances by wind and gradually settle over the earth as fall out or are brought down by rain. The fall out contains radioactive substances such as Strontium-90, Cesium 137, iodine-131 and some others. From the soil these materials are absorbed by plants and reach animals and man through food chains from land radioactive material are washed to water bodies.

The explosion of first atomic bomb was done in Nagasaki and second in the Hiroshima in Japan 1945, which caused large scale destruction of human, animal and plants.

Reactors and nuclear fuels - Radioactive isotopes such as Uranium 235 are used as fuel to bring about disintegration of other atoms. The process releases large amount of energy as heat which is used to produce steam for long turning large turbines to produce electricity. Both the fuel elements and coolants contribute to radiation pollution. The biggest problem is the disposal of radioactive waste, which contains excess of fission and activation products. The radioactive wastes are dumped in underground tanks for natural decay. If they escape they pose grave public health hazards. Inert gases and halogens escape as vapours and becomes potential pollutants of the environment by settling on ground or reaching surfaces waters by rain.

people working near nuclear reactors, fuel processors power plants or living nearby are vulnerable to radiation exposure.

(iii) Radioactive isotopes - A large no of radioactive isotopes such as ^{14}C , ^{125}I , ^{32}P and their compounds are used in scientific research. The radioactive materials reach water sources with waste water from laboratories. Some of these isotopes such as radioactive iodine and phosphorus enter human body through food chains.

Radiation therapy - Human beings voluntarily receive radiations from diagnostic X rays and radiation therapy for cancers.

Effects of Radioactive pollution - The effect of radioactive pollutants depend upon (i) half life (ii) energy releasing capacity (iii) rate of diffusion and (iv) rate of deposition of the pollutant. Various environmental factors such as wind, temperature, rainfall also influence their effects.

Radiations are of two types with regard to the mode of their action on cells

① non ionising

② Ionising

1) Non ionising radiations - They include Shortwave radiations such as ~~also~~ ultraviolet rays which forms a part of solar radiation, they have low penetrating power and become harmful to multicellular organisms only after long exposure. They affect the cells and molecules which absorb them.

2) They injure the cells of skin and blood capillaries producing blisters and reddening called sunburns.

(iii) They inactivate biomolecules including DNA and RNA and increase the incidence of cancer and mutations.

(2) Ionising radiation :- They include X-rays, cosmic rays and atomic radiation. They have penetrating capacity. The molecular damage may produce various effects such as burns, impaired metabolism, dead tissues and death of the organisms. It also causes mutations, tumours and cancer, shortening of life span and developmental changes; They may affect the progeny also. Radiation also affect the diff. dividing cells and embryos also.

Control of Radiation Pollution -

- 1) Prevention of leakage from radioactive sources such as reactors, laboratories etc.
- 2) Safe disposal of radioactive waste.
- 3) Regular monitoring of the sink areas.
- 4) Safety measures against nuclear accidents.
- 5) Complete ban on nuclear explosions and nuclear weapons.
- 6) Taking appropriate steps to prevent occupational exposure.

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