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An Review Article on Radioactive Pollution

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ABSTRACT

Radioactive pollution is defined as the increase in the natural radiation levels caused by human activities. The human activities that can release radiation involve activities with radioactive materials such as mining, handling and processing of radioactive materials, handling and storage of radioactive waste, as well as the use of radioactive reactions to generate energy (nuclear power plants), along with the use of radiation in medicine (e.g. X-rays) and research.

KEYWORDS: *Radioactive pollution, radioactive waste, radioactive materials, natural radiation*

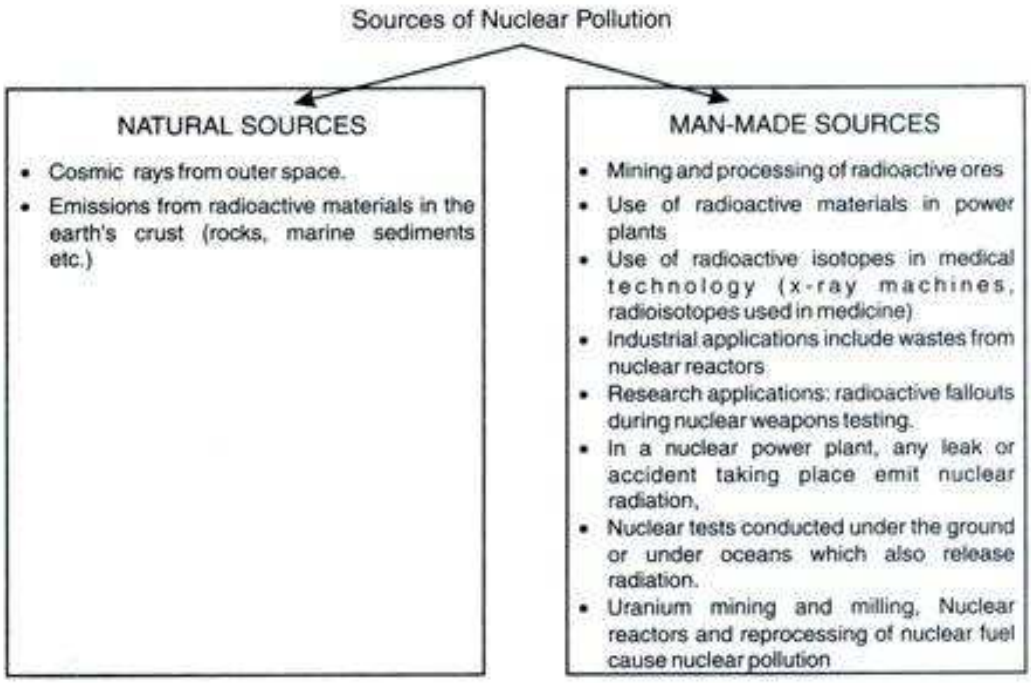
Radiation is basically of two types:

1. **Non-ionizing radiations:** These are electromagnetic waves of longer wavelength from near ultraviolet rays to radio waves. These do not have enough energy to ionize them.
2. **Ionizing radiations:** These are electromagnetic radiations having high energy, such as short wavelength ultra violet radiations, x-rays and gamma rays. The energetic rays produced in radiocative decay can cause ionization of atoms and molecules of the medium through which they pass and convert them into charged ions.

Radiations are (γ) gamma, (β) beta, (α)Alpha produced by the process called radioactive decay. It can affect other non-radioactive atoms to become radioactive and give out radioactive radiations.

Sources of Radioactive Pollution

A nuclear power plant. Mining for nuclear fuel, nuclear waste, nuclear power plant mishaps, Nuclear Tests, Diagnostics, Biological research and nuclear weapons are all possible sources of radioactive pollution. On average, 82% of this radiation comes from natural sources and 18% from anthropogenic sources (i.e., those associated with human activities). The major natural source of radiation is radon gas, which accounts for about 55% of the total radiation dose. The principal anthropogenic sources of radioactivity are medical X-rays and nuclear medicine.




Hazards of Radioactive Pollution

1. Genetic mutations

It leads to damage of DNA strands leading to genetic break up. The resulting mutation makes one highly susceptible to cancer. For pregnant women, kids born have adverse defects caused by genetic mutations like low weight during birth. Effects such as disfigured births and impairment like blindness in children have also been reported. Infertility has also been mentioned as an effect of radiation.

2. Diseases

Cancer is the most dominant radiation related disease. Others include leukemia, anemia, hemorrhage, premature aging and premature deaths as well as others such as cardiovascular complications. Leukemia, for instance, is caused by radiation in the bone marrow.

3. Soil infertility

Exposure of radiation to the atmosphere means it is present even in soils. Radioactive substances leading to destruction of nutrients, thus rendering the soil infertile and highly toxic. Such soil leads to the harvest of crops that are riddled with radiation and thus, unfit for consumption by both humans and animals.

4. Cell destruction

Radioactive pollution_has diverse effects such as the alteration of cells. Radiation distorts the cells present leading to permanent damage of the various organs and organ systems. In the face of too much radiation, permanent illnesses and death are inevitable.

5. Burns

Radiation is not easy to feel but it is easy to realize that you have been affected by it. The immediate presence of burns, red lesions and sores is evidence. This can lead to skin cancer.

6. The flora and fauna are also damaged with altered patterns of growth observed in various plants and animal species.

Radiation Prevention

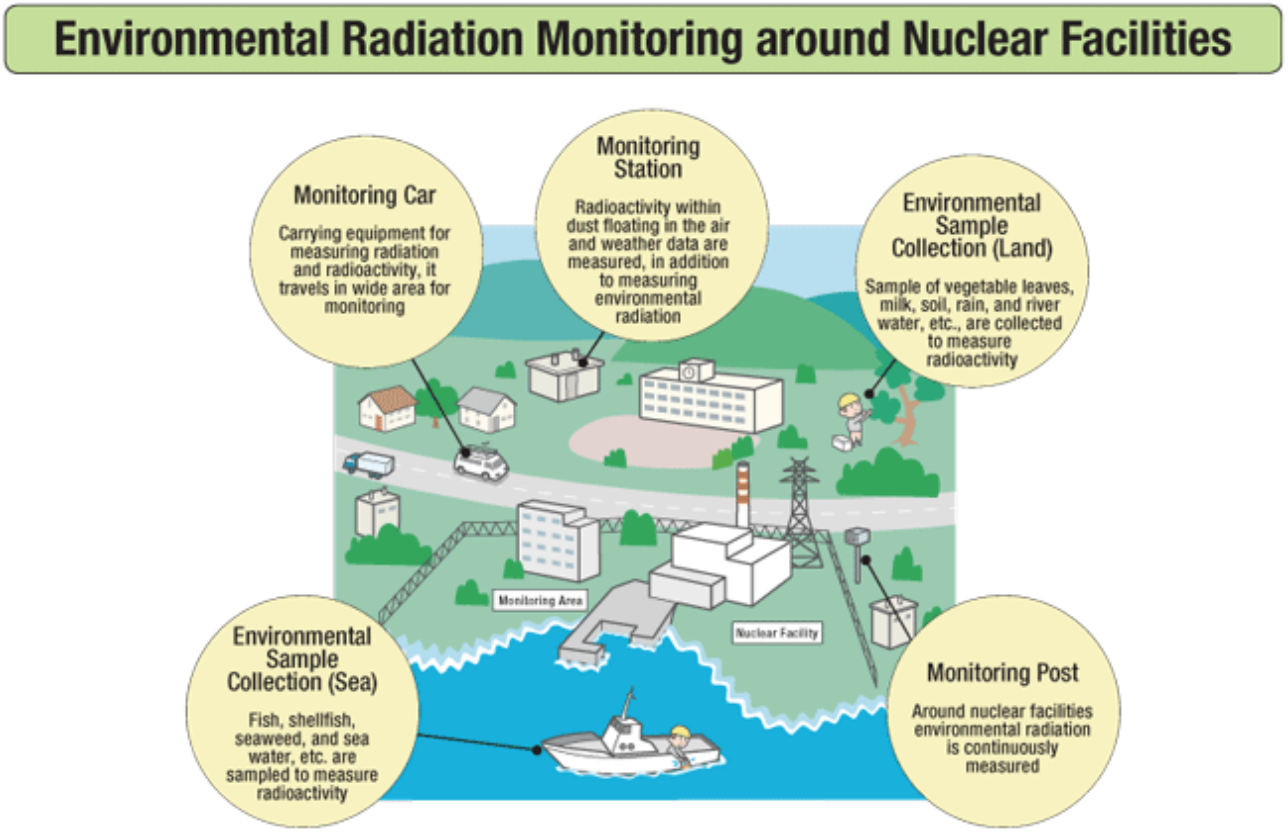
Radiation Pollution can be controlled and prevented at various levels, including the handling and treatment of radiation waste, the control and mitigation of nuclear accidents, as well as the control and minimization of personal exposure to radiation at an individual level.

- Containment of the waste in radiation-shielded containers usually buried underground
- Isolation of radiation waste in remote locations such as remote caves or abandoned mines ,which may also involve the use of some kind of barriers (shields),
- When the first two alternatives are not possible, the waste may be diluted until background values are achieved.
- The heat increases the amount of radiation and thus may increase the health risk. The higher the heat, the higher the energy of radiation produced (e.g., UV rays are produced by hot bodies such as the sun). This is why radiation waste should be stored in cold places, away from any heating source.

Individual Prevention Measures

At individual levels, there are measures you may take to prevent and/or reduce radiation pollution that may affect you and your family:

- First, testing of your home for radon may be done by each person using inexpensive testing kits or by specialized consulting services. If radiation seems to be an issue (a higher than background value of radon in the home is found), a preferred radon reduction technique is the installation of a special system called active soil depressurization (**ASD)**.
- Also, a good way of avoiding radiation exposure is to choose an appropriate location for your home, away from the main sources of radiation pollution sources.



As we all know that the degradation of such radioactive waste is difficult, but there are some biological solutions that would mitigate this problem. Many microbes like bacteria and fungus could help in degradation of such radioactive pollutants. The red-coloured bacterium ***Deinococcus radiodurans*** can resist 1.5 million rads of gamma radiation, about 3,000 times the amount that would kill a human. The bacterium survives and reproduces in environments that would be lethal for any other organism and it also resists high doses of ultraviolet radiation. The most important component of this radiation resistance is the ability of the bacteria to repair damage to its chromosomal DNA. Researchers hope that they can manipulate it in such a way that it will be able to detoxify the thousands of toxic waste sites which contain radioactive material.