GOVERNMENT OF INDIA
DEPARTMENT OF ATOMIC ENERGY
LOK SABHA
UNSTARRED QUESTION NO - 1692
ANSWERED ON 29.07.2026

RADIOACTIVE WASTES

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Will the PRIME MINISTER be pleased to state:-

(a) the details of the total volume of radioactive waste generated annually along with the radioactive waste management facilities available in India since 2019, State-wise and year-wise;
(b) the details of the advanced technologies that are being adopted for the treatment and disposal of radioactive waste to minimize environmental impact;
(c) the steps taken by the Government to ensure safe and effective management of radioactive waste by strengthening its disposal mechanisms;
(d) the steps taken by the Government to ensure that India's radioactive waste management aligns with international best practices and the Government's broader vision for nuclear safety and environmental protection; and
(e) whether the Government has any long-term plans for the permanent disposal of high-level radioactive waste and any initiatives being taken for deep geological repositories and if so, the details thereof?

ANSWER

THE MINISTER OF STATE FOR PERSONNEL, PUBLIC GRIEVANCES & PENSIONS AND PRIME MINISTER'S OFFICE (DR. JITENDRA SINGH)

(a) Typically, radioactive solid waste arising from nuclear power plants, including waste generated during the operational life and decommissioning of the plants, is within 0.15 cubic meters/year/MW. Records relating to the quantity and location of radioactive waste disposed of are regularly filed with the Atomic Energy Regulatory Board (AERB).

(b) & (c) Safe management of nuclear waste has been accorded high priority right from the inception of our nuclear energy programme. Government of India has promulgated the Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987 which establishes the legal requirements for safe management and disposal

of radioactive waste. As per these Rules, all facilities generating radioactive waste are required to have an Authorization from AERB to discharge radioactive effluents. The authorization specifies the volume and activity of the waste that can be disposed by the facility through designated routes. The limits for radioactive effluent discharges specified by AERB are based on the internationally followed norms and safe practices. The radioactive waste handling, treatment, storage and disposal are required to be carried out as per the well laid down procedures and guidelines stipulated by AERB.

As a waste management philosophy, no waste in any physical form is released / disposed to the environment unless the same is cleared, exempted or excluded from regulations. A comprehensive radioactive waste management is established for the management of radioactive waste from nuclear power plants and back-end fuel cycle. Nuclear waste in the form of gaseous, liquid and solid is generated during operation & maintenance activities of nuclear power plants. (a) Gaseous waste is treated at the source of generation. The techniques used are adsorption on activated charcoal and filtration by high efficiency particulate air filter. (b) Liquid waste streams are treated by various techniques, such as filtration, adsorption, chemical treatment, evaporation, ion exchange, reverse osmosis etc. depending upon the nature, volume & radioactivity content. (c) The radioactive solid wastes generated during operation and maintenance of nuclear power plants are segregated and volume reduced prior to its disposal. Disposal of waste is carried out in specially constructed structures such as stone lined trenches, reinforced concrete trenches, and tile holes. These disposal structures are located both above and under-ground in access-controlled areas and are designed based on multi barrier principle for ensuring effective containment of the radioactivity. The areas where the disposal structures are located are kept under constant surveillance with the help of bore-wells laid out in a planned manner by routinely monitoring the underground soil and water samples to confirm effective confinement of radioactivity present in the disposed waste. Till date the surveillance of the disposal areas at different sites has confirmed the high degree of effectiveness of the disposal system for the containment of the disposed wastes. There has been no incident of release of radioactivity from such disposed wastes. No effect of radiation from the disposed wastes on the public or the environment has been observed.

High level radioactive waste generated during reprocessing of spent fuel is converted into glass through a process, called vitrification. The vitrified waste is stored for an interim period in a Solid Storage Surveillance Facility at par with international practices as per the guidelines of International Atomic Energy Agency (IAEA).

Technological advances based on partitioning of the waste enables separation and recovery of useful radio-isotopes such as Cesium-137 (Cs-137), Ruthenium-106 (Ru-106) and Strontium-90 (Sr-90), for health care applications. Apart from the recovery of valuable radionuclides, partitioning technology enables separation of long-lived radioisotopes including actinides prior to immobilizing in glass matrices. Partitioning technology has significantly reduced the quantity of residual waste to be stored.

(d) Department of Atomic Energy (DAE) is committed to ensure safe management of radioactive wastes, in accordance with best practices. Nuclear wastes are safely managed/disposed as per the provisions of Atomic Energy (Safe Disposal of Radioactive Wastes) Rules 1987. The regulatory frameworks for waste management in the country are aligned with international best practices and are at par with guidelines of IAEA.

Further, Environmental Survey Laboratories (ESLs) are established at all atomic power plants to regularly monitor various environmental matrices and compare with baseline radiation level recorded prior to operation of nuclear facility. The effluents from the facilities are treated and monitored before discharging to ensure compliance of regulatory limits.

(e) DAE is pursuing closed fuel cycle where spent fuel from domestic source is considered as a material of resource. Most of the useful components of spent fuel are reprocessed as fuel for future reactors. High level radioactive waste generated during the reprocessing is converted into vitrified glass through a process called vitrification. With advent of partitioning technologies, segregation of long-lived radioactive constituents including actinides and extraction of useful radioisotopes from high level radioactive waste for societal application can result in significant reduction of waste-volume prior to vitrification eliminating the need of deep geological repository in near future.

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