

GOVERNMENT OF INDIA  
DEPARTMENT OF ATOMIC ENERGY  
**LOK SABHA**  
**UNSTARRED QUESTION NO. 4052**  
TO BE ANSWERED ON 17.07.2019

**RADIOACTIVE WASTE**

4052. SHRI VINOD KUMAR SONKAR:  
DR. SUKANTA MAJUMDAR:  
SHRI MANICKAM TAGORE B.:  
SHRI RAJA AMARESHWARA NAIK:  
SHRI KHAGEN MURMU:

Will the PRIME MINISTER be pleased to state:

- (a) whether there has been incidents of exposure to radioactive waste causing public health hazard and if so, the details thereof;
- (b) whether guidelines to set up Chemical Biological Radiation and Nuclear Cell in hospitals has not been heeded to and if so, the reasons therefor;
- (c) whether Department of Atomic Energy(DAE) has developed a low-cost handheld 12-channel Tele-ECG machine which records all 12 ECG channels simultaneously and if so, the details thereof;
- (d) whether International Panel on Fissile Materials reported that liquid sodium cooled FBRs experienced sodium leaks resulting in fires and if so, the details thereof;
- (e) whether lack of container security poses threat of nuclear smuggling in the country and if so, the details thereof and the action taken in this regard;
- (f) whether the Government has upgraded technicality for dumping of nuclear waste within the country and undertaken any study on the possibility of radiation in case of dumping nuclear waste and if so, the details thereof; and
- (g) the steps taken by the Government for application of atomic energy in social welfare?

**ANSWER**

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

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- (a) No, Sir.
- (b) No, Sir. The guidelines issued by the National Disaster Management Authority (NDMA) are being followed. National Disaster Management Plan-2016(NDMP-2016) issued by NDMA provides guidelines for Capacity Development in the area of Nuclear and Radiological Emergencies. NDMP-2016 stipulates establishment of tertiary care hospitals for treatment of radiation injuries and establishment of primary and secondary care hospitals of adequate capacity at selected cities.
- (c) Yes, Sir. Bhabha Atomic Research Centre (BARC) has developed a low-cost handheld 12-channel Tele-ECG machine. The machine is battery operated, small

size (3.5"X2.5"X0.5") weighing 100 gms and connectable to mobile phone through Bluetooth and records all 12 channels of ECG simultaneously. It generates report in image / PDF format that can be transmitted to medical expert's mobile through any file sharing apps. The machine eliminates need of carrying patient to ECG room and it is most suitable for rural health care to save crucial time.

- (d) The International Panel on Fissile Materials in their research report titled "Fast Breeder Reactor Programs: History and Status" released in Feb 2010 mentions various incidents of sodium leaks in international liquid sodium cooled fast breeder reactors (Russia, France, Japan, United Kingdom, India) based on data available in published literature. In all the cases, the resulting sodium fire was extinguished by plant operators using the sodium fire-extinguishing systems provided and these incidents did not affect reactor safety. In fast breeder reactors, diverse leak detection systems are provided (two different methods) for all sodium pipelines and equipment. Emphasis is placed on early detection of sodium leaks by providing sensitive instrumentation to detect and alert the operator for taking necessary safety action. Dry-chemical powder / inerting with inert gas is used to extinguish sodium fire.
- (e) Radiation Portal Monitors (RPMs) are installed at various sea-ports around the country for detecting movement of radioactive materials through in-bound or out-bound cargo. These equipment are owned by respective ports (Ministry of Shipping) and operated by Central Industrial Security Force (CISF). Similar systems are also installed/being installed at all major Airports. Land Ports Authority of India (LPAI), Ministry of Home Affairs (MHA) is procuring RPMs from Electronics Corporation of India Limited (ECIL) for installation in 5 land border points.
- (f) 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. The radioactive solid wastes generated during operation and maintenance of nuclear power plants are segregated and volume reduced prior to its disposal. Disposal of these waste is carried out in specially constructed engineered modules such as reinforced concrete trenches and tile holes. These engineered 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. The practice is at par with international practices following the guidelines of International Atomic Energy Agency (IAEA).

(g) Department of Atomic Energy (DAE) and Bhabha Atomic Research Centre (BARC) in particular has significantly contributed towards application of atomic energy for several societal applications. Some of the areas in which DAE has contributed are mentioned below:-

1. Agriculture by developing high yielding varieties of rice, pulses and oilseeds using nuclear techniques.
2. Promoting food preservation through irradiation.
3. Municipal waste Sludge Hygienisation through radiation.
4. Health Care.

1. Agricultural research:

Mutation breeding using radiation and allied techniques has significantly contributed to release of high yielding varieties in pulses and oilseeds over last 6 decades. Using radiation induced mutagenesis along with cross breeding, BARC has developed 44 varieties in oilseeds (groundnut, mustard, soybean and sunflower), pulses (urdbean, mungbean, pigeonpea, cowpea), rice and jute, which have been released and notified for commercial cultivation across the country. Many State agricultural Universities including Konkan Krishi Vishva Vidyalay, Dapoli, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, University of Agricultural Sciences, Raichur, University of Agricultural Sciences, Dharwad, Rajasthan Agricultural University, Bikaner, Indira Gandhi Krishi Vishva Vidyalay, Raipur, G. B. Pant University of Agriculture and Technology, Pantnagar have been actively collaborating with BARC. The Indian Council of Agricultural Research (ICAR) and State Agricultural Krishi Vidnyan Kendras have interactions with BARC for multiplication of breeder seeds and reaching to farmers.

2. Food preservation:

Preservation of food forms another important area for National Food Security. Feasibility of food irradiation for preservation has been studied for a number of agricultural and food commodities for several years. There are several commodities cleared under New Atomic Energy (Radiation Processing of Food & Allied Products) Rules 2012 in Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011.

3. Municipal waste Sludge Hygienisation:

BARC has established a Sludge Hygienisation Research Irradiator (S.H.R.I) at Vadodara, Gujarat, where sewage is irradiated at 3 kGy dose of gamma radiation emitted from Cobalt-60 source. The sludge is hygienized due to inactivation of pathogens by radiation effects and can be safely used for intended applications in

agriculture. Recently a Memorandum of Understanding (MoU) has been signed between BARC and Ahmedabad Municipal Corporation to set up a 110 ton/day dry sludge hygienisation facility. This would enable use of safe sludge for agricultural applications.

4. Health Care:

(i) Radioisotopes

The Radiation Medicine Centre (RMC), Parel, Mumbai, started in 1963 is in the forefront of practicing Nuclear Medicine for health care.

Nuclear Medicine uses radioactive isotopes (radio-isotopes) for the non-invasive diagnosis of several human diseases, including cardiology, oncology (cancer), neurology, psychiatry and infectious diseases and for the treatment of thyrotoxicosis, thyroid cancer, neuroendocrine tumours, neural crest tumours, bone-pain palliation etc. The benefit to the patient from an early and improved diagnosis and treatment far outweighs the risk from the radiation exposure due to the administered radiopharmaceutical.

(ii) Imaging:

PET-imaging has revolutionized cancer diagnosis by making possible early detection. Several thousand patients are referred to RMC each year. This includes PET-imaging for cancer diagnosis, staging, therapy planning and management. The cost to the patient is the lowest, compared to any other nuclear medicine centre in India. RMC has the largest registry in India for radio-isotope therapy for thyroid cancer and neuroendocrine tumours.

(iii) Bhabhatron:

Bhabhatron is an indigenous tele-cobalt machine developed by BARC for cancer treatment with High Source Capacity of 250 RMM (Roentgen/min. at 1 meter). The design of machine is as per the requirements of International Electrotechnical Commission (IEC) and the extensive clinical trials at Tata Memorial Centre have been carried out successfully.

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