



**Bhabha Atomic Research Center
(BARC)
Department of Atomic Energy, Govt.
of India**



&

**University Institute of Engineering and
Technology
Chhatrapati Shahu Ji Maharaj University, Kanpur**

Organize a seminar cum Exhibition on

“Many Dimensions of Indian Atomic Energy Programme”

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**Exhibition on BARC Technologies
(25th February, 2015)**

EXHIBITION ON BARC TECHNOLOGIES

Under Diamond Jubilee Celebrations of Department of Atomic Energy, Nationwide massive outreach programmes have been planned by Bhabha Atomic Research Centre, Mumbai. A BARC Outreach Programme is scheduled at University Institute of Engineering and Technology, CSJM University, Kanpur on February 25, 2015. The programme includes seminar on theme "Many Dimensions of Indian Atomic Energy Programme". Eminent speakers from Bhabha Atomic Research Centre and Nuclear Power Corporation of India will be delivering talks on various topics.

Shri R.K. Singh, Head, Media Relations and Public Awareness Section, BARC will be coming with a team of scientists from BARC, Mumbai. Exhibition on BARC Technologies will be organised. Exhibition will be open for all. All are invited to visit exhibition which is being organised first time in this part.

Exhibition on BARC Technologies will include-

‘Exhibition on BARC Technologies’ will include Poster Gallery, Interactive models, LCD displays, information kiosks and AV presentations depicting applications of atomic energy.

Gallery of Posters:

The poster gallery covered a variety of domains like Agriculture, Food Preservation, and Land Utilization; Health and Bio-medical Instrumentation, Desalination, Drinking Water,

Rural Empowerment, Industrial Application and Electricity Generation; and National Security.

Interactive Models/Exhibits:

Exhibition will showcase various interactive models and exhibits to let the students and visitors have a first-hand experience of technologies to cover a spectrum of BARC projects in the areas of science, technology, and societal initiatives.

KRUSHAK: KRUSHAK is the acronym for 'Krushi Utpadan Sanrakshan Kendra', literally translated in English as 'agricultural produce conservation centre'. The facility is located at Lasalgaon in Nashik District, 250 km east of Mumbai and is operational since 2003. Radiation processing brings benefits to consumers in terms of availability, storage life, distribution, and improved hygiene of food. Radiation processing can have a stabilizing effect on market price of commodities by reducing storage losses resulting in increased availability of produce. The KRUSHAK irradiator is a specially designed technology demonstration unit, primarily for controlling sprouting in stored onions.

Nuclear Desalination: Desalination is removal of salt and other minerals from saline water to produce drinking water. BARC has established the largest nuclear desalination plant in the world based on hybrid technology-Multi Stage Flash Reverse Osmosis technology. The plant built at Kalpakkam is integrated with existing Madras Atomic Power Station. It produces distilled water of 4.5 Million Litres per day.

Bhabhatron: Bhabhatron delivers radiation therapy for the treatment of cancer patients. It is a teletherapy machine indigenously developed by BARC. This low-cost machine makes the treatment affordable and accessible to the patients, particularly from rural areas.

Hydrogel: Dressing for wounds caused by fire and wound using the radiation processing technology. Hydrogel is ready to use, sterile, cooling, transparent, mechanically strong, cushioning, flexible, non adherent, contour forming, water absorbing hydrogel dressing. The hydrogel reduces depth of burning by cooling the wound when applied immediately after the burn. It provides humid environment to the desiccated wound, form layer of growth promoting biochemicals (exudates), keeps new skin intact (non adherent) and provides sterile cover resulting in early and clean healing. The application and removal of dressing is painless.

It hydrates sloughy wounds by first softening and then sucking out the slough and making them clean. These dressings have also been observed to reduce pain and is effective in difficult to heal wounds like leprosy, diabetic foot ulcers, pressure ulcers etc. Further, it prevents scar formation and is very useful on donor areas in plastic surgery. Recently, it has been observed to be useful in treating animal bites. Burn injuries from firework, chemical, petrol, electrical appliances, road accidents can be treated using hydrogel. The hydrogel contains about 90% water, yet has capacity to absorb more water, almost equal to its weight. It is not medicated and does not contain any extraneous, synthetic chemicals which could leach out into the wound and interfere with natural wound healing process.

Crop seed varieties: Sample seeds of crop varieties developed by [Nuclear Agriculture and Biotechnology Division](#), BARC using radiation induced mutation and cross-breeding. Over 41 varieties of crops have been developed by the [Bhabha Atomic Research Center](#) (BARC) under its nuclear agriculture programme. The [BARC](#) had developed 15 varieties of groundnut, eight of mung bean (greengram), five of urad bean (blackgram), four of tur (pigeonpea), three of mustard, two of soybean and one each of chavali (cowpea), sunflower, rice and jute. These 41 varieties of different crops developed by BARC's [Nuclear Agriculture and Biotechnology Division](#) at Trombay, in collaboration with some of the agriculture universities in different states, have been gazette-notified by the Union Ministry of Agriculture for commercial cultivation by farmers in different states. These varieties are endowed with improved characters such as higher yields, earliness, large seed size along with resistance to biotic and abiotic stresses.

Irradiated samples of vegetables, food grains, spices and other: Samples of radiation processed vegetables, cereals, spices. Radiation processing is a physical process in which food and agricultural commodities are exposed to controlled doses of radiant energy to achieve desirable effects such as inhibition of sprouting and ripening, and destroying insect pests, parasites, pathogenic and spoilage bacteria. The technology is very effective for elimination of pests, parasites and pathogens. It can be applied to pre-packaged commodities even under frozen conditions. Radiation brings its effects through direct deposition of energy on the large biomolecules and indirectly through radiolysis of water when free radicals so produced interact with other molecules. Gamma rays from radioisotope cobalt-60 and electron beams or X-rays from machine based radiation sources can be used for processing food commodities. Food security is essential for enhancing economic well being and security of a nation.

A significant amount of agricultural produce is lost due to insect infestation, microbial attack and other biological and physical damages during postharvest handling and storage. Prevention of postharvest losses using appropriate technologies can plug the widening gap between food production and demand. The chemical fumigants used for the control of insect pests, and microbial decontamination of food commodities are being phased out on account of their harmful effects on human health and environment. Radiation processing provides an effective alternative.

Nuclear Medicines: Nuclear medicines make use of radiation emitted by radioisotopes. Detecting these emissions and transforming them into images is the basis of nuclear medicines. Scientists have identified a number of chemicals that are absorbed by specific organs. With this knowledge, several radiopharmaceuticals have been developed. These are compounds that are tagged with radioisotopes for diagnostic or therapeutic purposes which are injected into the patient's body.

Radiopharmaceuticals injected into a patient produce a signal which can be seen using a gamma camera- a device that detects gamma radiation. It is possible to show both organ function and possible to show both organ function and the development of the disease within it.

Nuclear medicine is used for controlling or eliminating cancerous growths formed by rapidly dividing cells.

Domestic Purification (Drinking water technologies) developed by BARC: Availability of safe drinking water is a major concern for the people as well as the government. BARC has contributed towards this goal, by developing and transferring to industry, water purification technologies. BARC has developed and demonstrated several types of thermal and membrane based desalination and water purification technologies. Few sets of water purifiers developed by BARC are kept in the exhibition.

Master-Slave Manipulator (Robotic Arm): Master-Slave Manipulators (MSMs) are the most widely used general-purpose remote handling tools in nuclear industry. An MSM consist of two arms: the master arm and the slave arm. The slave arm is usually placed in the hostile area (hotcell) and the master arm in a safe area (operating area). The arms, which are placed on either side of a thick concrete wall, are connected at the top through a through-tube. From the operating area, when the operator moves the handgrip of the master arm, the motion gets reproduced on the tong of the slave arm in the remote area. For the operator to view the hotcell from outside, lead glass shielding window is used. BARC has developed many models of MSMs with different payloads and ranges. They are used in various hot cells in BARC and other DAE units. Extended Reach Master Slave Manipulator and Sealed Type Three-Piece Master Slave Manipulator are the recent addition to this list. ERM has 6 independently controlled joints (6 DOF) for arbitrary positioning and orienting the object. Power is transmitted from the master to the slave through stainless steel wire ropes, stainless steel tapes and a parallelogram mechanism. To reduce the operator's effort, the manipulator joints are mechanically balanced in all configurations. The first 3 axes of the manipulator are provided with electrical indexing motions. It increases the range of slave arm, improves operator ergonomics, provides better viewing, and helps to orient the slave for insertion of the manipulator into the hot cell. It is used in Remote handling of radioactive materials in hot cells

Indian Radiation monitoring Network: Countrywide environmental radiation/radioactivity monitoring network for the assessment of natural and fallout radioactivity has been established through a network called IERMON (Indian Environmental Radiation Monitoring Network). It is a solar powered system for online monitoring of environmental radiation with multiple detectors which uses Multiple GM tube detectors. Online data communication using GSM based and direct LAN based communication has been incorporated. Options for use of power supply from mains powered and battery powered have been enabled. Care has been taken to make it weather-proof, compact, elegant and reliable. It is a part of the ongoing program of country-wide deployment of radiation monitors under "Indian Environmental Radiation Monitoring Network (IERMON).

Radiation Protection Gear for workers working in radiation: Personal Protective Equipment (PPE) used by personnel working in a Radiation environment. The clothing and/or equipment worn by workers to prevent or mitigate serious job-related illness or injury.

Dummy Fuel Assemblies:

The Nuclear Fuel Complex (NFC), established in the year 1971 is responsible for the supply of nuclear fuel bundles and reactor core components for all the nuclear power reactors operating in India. It is a unique facility where natural and enriched uranium fuel, zirconium alloy cladding and reactor core components are manufactured under one roof starting from

the raw materials. The zircaloy clad enriched uranium oxide fuel elements and assemblies for these reactors are fabricated at NFC starting from imported enriched uranium hexafluoride. Dummy nuclear fuel assemblies and components and other products being manufactured by Nuclear Fuels Complex, Hyderabad are displayed in the exhibition.

Dip N Drink membrane pouch: The membrane pouch is based on Osmosis process to get sterile drinkable solution from biologically contaminated water, especially during disaster conditions like flood, cyclones, tsunami, earthquakes and the useful concentration of high value low volume product in food, pharmaceutical, chemical industries. It can also be used in Oral Rehydration Therapy in remote areas and villages.

Glass to metal seals: Glass to metal seals are vacuum tight assemblies, in which metallic wires, tubes, eyelets or flanges are firmly bound in a glass material. These are normally used as insulated feed-through for electrical connections in hermetically sealed devices and UHV systems as well as mounts for electrodes, filaments etc. The materials chosen have the properties of wettability by glass, matched temperature coefficients of expansion and low outgassing rates even at elevated temperatures making them suitable for application in ultra-high vacuum systems. This technology has been developed for various types of glass to metal seals-like flat bead seals, circular based seals, eyelet type seals, tubular seals, wafer base seals and glass to metal feedthroughs for high pressure applications.

Information KIOSK and AV Presentations:

Various Audio-visual presentations were made as the part of Exhibition on BARC Technologies. The students and visitors showed keen interest in browsing the contents rolled out on touch-screen information KIOSK. Interested visitors made themselves aware of BARC's scientific and societal deliveries to the nation by the presentations played on large LCD screens.

Radiation Sterilized medical products: The gamma radiation sterilization plant for medical products is situated at Trombay, Mumbai. Sterilization of medical and healthcare products using gamma radiation is now a well-established and efficient technology. ISOMED - was set up in 1974 by the Department of Atomic Energy to provide gamma sterilization services to the manufacturers of healthcare products in the country. The advantages of radiation sterilization over conventional methods have prompted a large number of manufacturers to use this technology. A wide range of healthcare products sterilized at ISOMED are displayed. Many Other R&D Products

All are cordially invited to visit Exhibition.