

BRIT : Looking Ahead

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In recent years, the Board of Radiation & Isotope Technology (BRIT) has been leading the resurgence of isotope applications and radiation technology across industry, healthcare, research and agricultural sectors. It is focused on bringing the benefits of India's vast resources available with the robust R & D efforts of Bhabha Atomic Research Centre and large irradiation capacities available with the Nuclear Power Corporation to create technologies, applications and services which cannot be replaced by conventional techniques. Harnessing the spin offs from the mainstream programmes of DAE, BRIT has independently created a separate visible area of contribution to the society.

To widen these activities and to enable the commercial exploitation of the results of R & D, BRIT was carved

out of BARC as an independent constituent unit of the DAE in March 1989. The production of radioisotopes, which had begun with the research reactor APSARA, got a boost with the commissioning of research reactors CIRUS and DHRUVA. Later, production of cobalt-60 was initiated in the power reactors. The Rajasthan Atomic Power Project Cobalt Facility (RAPPCOF) located at Kota is the mainstay of the cobalt based programme of BRIT.

As a constituent unit of DAE, BRIT is unique in more than one way. It deals with radioactivity from microcurie to million curie levels. The complexities of the tasks involved in the day-to-day operations can be understood by a few examples like handling of huge casks with thousands of curies of cobalt to the laser welding of miniature steel

capsules for making brachy-therapy sources. BRIT has a vast network of customers which ranges from major industrial units, ports, big hospital chains and sophisticated research laboratories to humble diagnostic laboratories. Consequently, BRIT has created expertise to cater to the exacting demands from such a diverse set of clientele.

Radiation Processing

A major impact of radiation technology has been in the field the sterilization of medical products, which over the years has gained tremendous popularity and acceptance in society due to its simplicity and reliability. Though the first radiation processing plant for the sterilization of medical products - ISOMED was commissioned in the country in the year 1974, the Radiation Processing Technology has established firm roots only now with the commissioning of four plants fully in the private sector. BRIT's other plant at Vashi, Navi Mumbai has also been performing very well and now has enabled the introduction of radiation processed food products for domestic, and more importantly, export markets. India being a large producer of agricultural commodities, strategies for food safety and security are of vital importance. Fully indigenous gamma radiation processing plants are going to play a very important role in this regard in the years to come. The recent acceptance of radiation processing as a mode of quarantine treatment for mangoes will enable Indian exporters to re-enter the large US market. Radiation processing of marine products is going to gain importance in the days to come. BRIT has already developed an all metal batch irradiator called Install & Operate irradiator which can undertake such jobs. It is planned to offer this design to private entrepreneurs in near future.

DAE has included the setting up



Rajasthan Atomic Power Plant Cobalt Facility (RAPPCOF), Kota, Rajasthan



ISOMED Plant at Trombay, Mumbai

of Radiation Processing Plants in the country as one of its major missions. It is planned to set up more than 50 large irradiators by 2020 so that harmful fumigants used for sterilization and hygienization could be phased out from the country. BRIT is determined to achieve this mission for the welfare of the public,

particularly farmers.

While the major thrust will be on the indigenous Cobalt-60 based technology, expansion of Electron Beam (EB) facilities is also underway. BRIT is managing the operation of a 2 MeV EB machine and will support this technology in a big way once the indigenous machines mature.

Radiopharmaceuticals & Immunodiagnostic kits

Production of Radiopharmaceuticals, Immunoassay kits and Labeled Compounds constitute a significant part of the day-to-day activities of BRIT. Radiopharmaceuticals have revolutionized the medical field by their ability to provide static as well as dynamic images of internal organs in a non-invasive manner as well as by offering efficacious therapy for certain diseases. Growth in the quantity of consignments has been accompanied by the expansion in the range of products.

Radiopharmaceuticals based on technetium are used in over 80 per cent of nuclear medicine centres and form the workhorse of diagnostic nuclear medicine. BRIT, in conjunction with BARC, shoulders the responsibility of the development, production and supply of radiopharmaceuticals to about hundred nuclear medicine centres in



Radiation Processing Plant at Vashi, Navi Mumbai

India and the number is growing. RIA and IRMA kits are supplied to about 400 laboratories in India. BRIT is routinely manufacturing about 25 radiopharmaceuticals and apart from catering to domestic requirements exporting to some of the neighbouring countries like Nepal, Sri Lanka etc.. BRIT has introduced Carbon-14 urea capsules used for diagnosis of helicobacter pylori infection which is mainly responsible for peptic ulcer and gastritis in human beings. BRIT is shortly going to introduce P-32 Samarium Phosphate colloid synovectomy injection for which multi-centric clinical trials are going on. Work is in progress for introducing therapeutic radiopharmaceuticals like I-131 MIBG and certain new cold kits for technetium labelling.

BRIT operates the 16.5 MeV Medical Cyclotron Facility in the Tata Memorial Hospital Building at Parel, Mumbai. This cyclotron produces special radiopharmaceuticals like ¹⁸F¹⁸FDG for Positron Emission Tomography (PET) studies and supplies are already being made to major private hospitals in Mumbai. Another 30 MeV medical cyclotron is planned to be set up in Kolkata jointly with VECC to cater to the hospitals in the eastern region with wider range of isotopes. Introduction of PET-CT has already revolutionized medical imaging scene and demand for it is going to grow very fast.

Battle Against Cancer with Radiotherapy

BRIT contributes significantly to the battle against cancer by supplying Cobalt-60 teletherapy sources to cancer hospitals all over the country. BARC has recently introduced its indigenously developed teletherapy machine – Bhabhatron to enable its deployment in big way. BRIT will do its bit by manufacturing and supplying the Co-60 sources for the same. It also takes care of the needs of Platinum coated Iridium-192 wires for

brachytherapy treatment in the country. Work has already been undertaken for development of state-of-the art HDR Remote Afterloading Equipment which will revolutionize cancer treatment activities in the country.

Furthering contribution to NDT Sector

A major contribution of BRIT to Indian industry is the development of gamma radiography cameras both with Iridium-192 and Cobalt-60 sources. The ROLI camera developed by BRIT today enjoys more than thirty per cent market share amongst industrial users for non-destructive testing (NDT) applications. BRIT is able to meet the demand of all the NDT Centres in the country for their requirement of Iridium-192 as well as Cobalt-60 radiography sources. There is a plan to enter the export market to the nearby countries. Servicing of radiography devices and source replenishment is carried out throughout the year on a regular basis by BRIT. Advanced models of radiography devices are under development to provide the domestic customers with improved features at economical rates.

Laboratory Irradiators

A much needed equipment for the medical users, Blood Irradiator, was launched a few years back and is used in specialty and cancer hospitals. Patients who are immunocompromised cannot be given normal blood transfusion. A condition termed post-transfusion graft-versus-host disease occurs which can only be averted by eliminating the T-lymphocytes in the donor's blood. This can only be done by low dose irradiation. BRIT has developed the blood irradiator unit which can process blood bags. BRIT plans to lease out such Blood Irradiators so that these could be utilized in more effective manner.



Blood Irradiator

In order to facilitate laboratory scale research in diverse radiation related areas, BRIT has developed different models of compact self-shielded gamma chambers, which have been supplied to industries, research laboratories, and academic institutions around the country and quite a few units also have been exported to countries abroad. BRIT plans to come out with much more compact table top Cesium-137 based Laboratory Irradiators for similar purposes.

Custom Synthesis in Drug Discovery

The strengths nurtured over the years in BRIT with respect to radiolabelling technology and trained manpower has opened up interesting new business prospects. Labelled Compounds Laboratory, BRIT has entered the Compounds Synthesis Outsourcing business in Pharmaceuticals industry. Utilising the in-house strengths of highly experienced synthetic chemists and state-of the art infrastructure, BRIT offers development of novel routes and purification methods for clients interested in outsourcing part of their synthesis of new molecules. Rallis