

Executive Summary

Board of Radiation & Isotope Technology (BRIT), the unit of DAE, has shown remarkable growth in the year 2014 in providing socio-economic benefits derived from the use of radiation and radioisotope products and services in a variety of areas such as medicine, industries, radiation processing services, radioanalytical services and other isotope applications for industrial services. It celebrated its Silver Jubilee on March 1, 2014. The celebration was graced by the presence of eminent scientists of DAE, Dr. Anil Kakodkar, Former Chairman Atomic Energy Commission & Secretary to DAE and Dr. Sekhar Basu, Director, BARC & Chairman BRIT Board.



BRIT celebrated its Silver Jubilee on 1st March, 2014

Healthcare Applications

Radiopharmaceuticals Production (RPhP)

More than 23000 consignments of ready to use radiopharmaceuticals of Na¹³¹I for diagnosis and therapy of thyroid disorders, ¹³¹I-mIBG for neuroendocrine cancers, ³²P, ¹⁵³Sm and ¹⁷⁷Lu for bone pain palliation were supplied to various nuclear medicine centres and hospitals all over India.

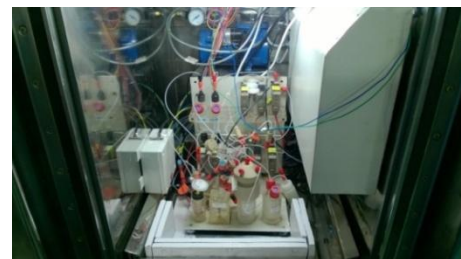
Milestone production of 3Ci per batch of Na¹³¹I could be achieved with the product of denomination of 25mCi, 50mCi, 100mCi and 125mCi.

Total number of therapeutic treatments, based on supplies, are estimated to be 18960. This includes therapeutic doses of Na¹³¹I for the treatment of thyroid cancer and hyperthyroidism.

More than 73500 cold kits for formulation of ^{99m}Tc radiopharmaceuticals (15 Products; BRIT Code-TCK) were supplied to nuclear medicine centres.

A separate GMP compliant cold storage facility for *in-vivo* TCK cold kits is commissioned at RPhP, BRIT in June 2014.

Approx. 195Ci of ⁹⁹Mo, in form of Sodium Molybdate solution, for solvent extraction generator, and ⁹⁹Mo-^{99m}Tc Gel Generator were supplied. Approximately 400Ci of ⁹⁹Mo (1150 generators) in the form of Sodium Molybdate were supplied as alumina column generator (COLTECH). COLTECH generator of 1Ci capacity is also introduced.



Module for sterile, injection grade [F-18]NaF

More than 2,08,245 *In-vivo* diagnostic investigations are estimated to have been carried out this year with varied diagnostic radiopharmaceuticals, the major are, ^{99m}Tc based on cold kits and ^{99}Mo - ^{99m}Tc generator systems.

Medical Cyclotron Facility (MCF), Parel continued the supply of PET radiopharmaceuticals such as ^{18}F -FDG, ^{18}F -FLT, ^{18}F -NaF and ^{18}F -FMISO to various hospitals in and around Mumbai. **Approx. 14444 patients benefitted with PET investigations.**

Approx. 5575 radioimmunoassay (RIA) and immunoradiometric assay (IRMA) kits amounting to carry out about **5,72,000 in-vitro investigations**, were supplied to various hospitals, research centres and immunoassay laboratories throughout India.

RIA products and RIA Laboratory are certified for ISO 9001:2008 and ISO 13485:2008 from United Kingdom Accreditation Services (UKAS).

QA, QC and Allied Services

Around 700 routine radiopharmaceuticals samples were analysed by QC. Cold kits for preparation of ^{99m}Tc -DMSA, ^{99m}Tc -MAA, ^{99m}Tc -Myoview and ^{99m}Tc -Exametazime were analysed **for outside agencies**, M/s DraxImage and GE Healthcare.

94 batches of TCK products were released after scrutiny of production & QC documents before their despatch.

Regional Centres at Delhi, Bengaluru, Kolkata, Jonaki Hyderabad continued supply of radiopharmaceuticals to surrounding Nuclear Medicine hospitals.

Labelled Compounds (LC)

Labelled Compounds Programme of BRIT continued the synthesis & supply of a variety of ^{14}C , ^3H and ^{35}S -labelled products and various types of Tritium Filled Self-luminous sources (TFS). More than 59500 TFS sources were supplied to defence establishments.

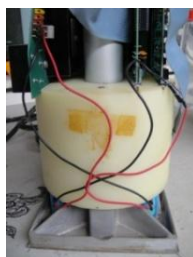
Radioanalytical Laboratory Services (RAL)



Radioanalytical Laboratory carried out more than 12000 tests on domestic commodities and 1100 tests on water samples (gross alpha, gross beta, ^{228}Ra & ^{226}Ra). Nearly 5300 water samples received from Punjab State were analyzed for the certification of uranium content alone. Five steel surveys were conducted for certification of surface radiation dose of ^{60}Co . 40 food samples were monitored for the presence of ^{137}Cs & ^{134}Cs , which were received from Japan.

Engineering Applications

Contract with Los Alamos National Laboratory USA for identification of source to repatriate US origin sources was completed for the five institutes in India.

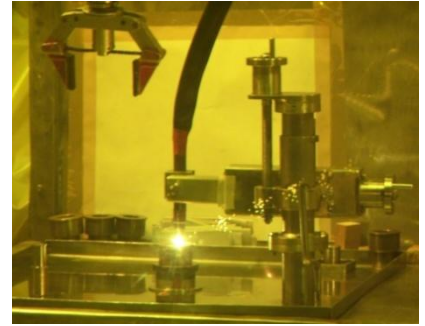


RAPPKOFF, Kota continued processing, production and transportation of Cobalt-60 sources. Total activity of Co-60 processed in the year 2014 was 63.52 PBq (1717KCi).

Ten **Co-60** teletherapy sources (CTS) were supplied to different cancer hospitals India and also to Cancer Hospital, Zambia.

Fifty eight Irradiator sources were supplied with total activity of 12,59,593 Ci. Eight **absorber rods** were unloaded and transferred to RAPPKOF pool for irradiators and teletherapy sources.

More than 1200 Ir-192 and Co-60 Radiography sources were supplied to NDT users. Sc-46 and Cs-137 CMR sources were supplied to various organisations.



Sealed source fabrication using tig welding inside hot cell

Radiation Technology Equipment

60 radiography cameras, ROLI-2 and ROLI-3 were supplied.

3 each of Gamma Chamber 5000 and Blood Irradiator 2000 are supplied to different universities and hospitals for various applications.

Engineering Design Development

Syringe Shield: BRIT has developed a syringe shield to be used as a protective gear in hospitals while administering $^{99m}\text{TcO}_4^-$ or its products (or any radioactive injectables) to patients.

Gamma Scanning Simulator Column (GSSC): A scale down model of Crude Distillation Units (CDU) as GSSC has been constructed at BRIT to simulate anomalies such as flooding, weeping, missing tray, tray misalignment and light foam / heavy foam formation and to train in finding out the faults.



Syringe Shield



Gamma Scanning Simulator Column

Gamma Radiation Processing Services (GRPS)

Radiation Sterilization Plant for Medical Products (ISOMED):

ISOMED facility has acquired the OHSAS 180001: 2007, EMS 14001:2004 and WHO-GMP certifications during 2014. It has designed and validated bar-coded, GMP Complaint computerised application package for commercial products from BRIT. **Cumulative volumetric figures for the current fiscal was 7370 Cubic Mtrs from the contract radiation processing services for terminal sterilization of healthcare products.**

Radiation Processing Plant, Vashi (RPP, Vashi):

About 2700 MT of spices and other products like nutraceuticals and colour pigments were processed. Since its inception, this facility has processed 30550 tons of products.

A facility which is approved by AERB has been set up for calibration of Nuclear Radiation Survey Meters and portable radiation monitoring of instruments at Vashi Complex.

BRIT in overseas market

BRIT participated in construction of Blood Irradiator for IAEA's Southern Tsetse Fly Eradication Project (STEP) at Addis Ababa, Ethiopia jointly with M/s. Symec. BRIT supplied 60 kCi Co-60 source and provided other services such as dosimetry, source loading pattern design etc.



Southern Tsetse Fly Eradication Project (STEP), Ethiopia

Order from IFRB, Bangladesh was executed for supply of 55 kCi Co-60 source for PANBIT Irradiator and expert services provided for refurbishment of plant.

MOU for Radiation Processing Plants (RPP):

MoU was signed with M/s Raghuvansh Agrofarms Ltd and M/s Archon Healthcare Pvt. Ltd, for setting up Radiation Processing plant at Indore and Bavla, Ahmedabad respectively.

Two Radiation Processing plants, namely M/s Impartial Agro Tech (P) Ltd., and M/s Gujarat Agro Industries Corporation Ltd (GAIL), were commissioned at Unnao, Lucknow and Bavla, Ahmedabad in 2014.



Inauguration of M/s GAIL, Bavla, Gujarat by Chief Minister, Gujarat



M/s Impartial Agro Tech (P) Ltd., Unnao inaugurated by Secretary, MoFPI

Total number of Radiation Processing Plants commissioned in the private sector in the country under MoU with BRIT is now 12.

Isotope Application Services

AERB has granted Type B(U) Approval of ISOMED Cask Package and MHC cask was obtained.

BRIT in collaboration with BPCL could troubleshoot Catalyst Cracking Unit (CCU) by combining Gamma Scanning with ^{60}Co and Radiotracer Technique. It helped BPCL to take corrective actions immediately and avoid losses. Leakage detection in Mumbai-Pune Pipeline of Hindustan Petroleum Corporation Limited (HPCL) was carried out by using ^{99}Mo .

Supporting Services

Customer Support Services Cell (CSSC) and Customer Relations Cell (CRC)

Customer Support Services Cell (CSSC) continued to provide various kinds of support for the regular and uninterrupted supply of radioisotopes and allied products, radiation technology equipments to ~2000 user institutions in the healthcare, industries, research and agricultural sectors. The transportation of nearly ~100,000 consignments in a year of radioisotopes and allied products, majority of them by air was carried out successfully in an absolute safe manner. CRC at Radiopharmaceuticals Production, BRIT, Vashi found an increase in sales of ~ 35-40% as compared to the sales of radiopharmaceuticals in the past years.

Plan Projects

Project: DAE Medical Cyclotron Project : Radiopharmaceutical Facility.

Civil construction work is nearing completion and work for HVAC, electrical work, etc. are completed. It is expected that the installation of the Medical Cyclotron will start by June 2015.

Project: Integrated Facility for Radiation Technology

The project has been completed. A Hot cell has been constructed to handle 300 kCi Co-60 source.

Project: Indigenous HDR Brachytherapy Equipment (IHDR)

Progress: Two numbers of HDR treatment unit "KARKNIDON" installed at TMH & ACTREC for cold evaluation. Actual HDR source wire rope assembly fabricated at RLG with desired accuracy and production process is standardized. Purchase order for Treatment Planning Software has been placed.

Project: "Setting up of Fission based ⁹⁹Mo Production Facility"

Project envisaged for setting up of a production facility for producing 300Ci (6 day pre-calibrated) /week ⁹⁹Mo, utilizing LEU targets. Order for plant and machinery has been placed and civil construction is in advanced stage.

Project : Advanced Facilities for Radiopharmaceuticals Production

The project scope comprises building of Advanced Radiopharmaceutical Manufacturing and testing facility for new generation Radiopharmaceuticals and enhancement of present production capacity. Civil drawings has been finalized and process of procurement of equipment/machinery is in progress.

Project : Technology Development for Radiation Technology Equipment

Specifications for I-125 seed manufacturing plant have been finalized. Tender for the civil construction has been raised.

BRIT website provided regular updates on various programs and activities related to developments in BRIT. Customer oriented reports were uploaded on website almost on daily basis enhancing co-ordination and communication with the customers.

BRIT is expected to meet its targeted turnover of Rs. 90 crores during 2014-15 as against Rs. 80.02 crores achieved last year.

