

**Annual Report 2007 - 2008**  
**Board of Radiation and Isotope Technology**

**Executive Summary**

**CH 4 Radiation Technologies & Applications**

During 2007-2008, more than 51,000 consignments of various isotope products and round the clock radiation processing services were provided to customers across the length and breadth of the country as well as some located abroad bringing in a sales turnover of Rs. 4500 lakhs.

**Healthcare**

14000 consignments of ready to use radiopharmaceuticals of  $^{131}\text{I}$ ,  $^{32}\text{P}$ ,  $^{51}\text{Cr}$  and  $^{153}\text{Sm}$  were supplied to various Nuclear Medicine centers. Majority of these contained  $^{131}\text{I}$  radiopharmaceuticals, which amounted to about 500 Ci and consisting of 12000 consignments. 455 Ci of  $^{99}\text{Mo}$  (TCM-2) was supplied for extraction of  $^{99\text{m}}\text{Tc}$  at hospitals. In addition to this various accessories of  $^{99\text{m}}\text{Tc}$  Solvent extraction generator system and other products were supplied. About 48,000 Cold Kits for the formulation of  $^{99\text{m}}\text{Tc}$  radiopharmaceuticals (Code-TCK; 11 products) were supplied to various Nuclear Medicine centers worth Rs. 2.5 crore.

A very important product useful in the treatment of joint disease has been developed namely  $^{32}\text{P}$  Samarium Phosphate colloid-injection and its multi-center clinical trials are over .

The ongoing work of monoclonal antibody (ch TNT 1/B) labeling with  $^{131}\text{I}$  for M/S. Peregrine Pharmaceuticals Inc., USA is continuing. During 2007, labelling services worth USD 150,000 were made. In 2007, for the production and supply of  $^{131}\text{I}$  mIBG (therapeutic doses) infrastructure and logistics preparation have been completed and the first therapeutic dose trial consignment supplied to RMC, BARC.

More than 9688 kits of RIA and IRMA were supplied during the year to **300** immunoassay laboratories throughout the country.

## **Nuclear & Biotechnological Tools**

Labelled Compounds Group is engaged in the synthesis and supply of a variety of  $^{14}\text{C}$ ,  $^3\text{H}$  and  $^{35}\text{S}$ -labelled products and oligonucleotides (DNA primers). In addition, the group has been concentrating on the production and supply of tritium filled sources of various types as per the orders received. This work is a defence oriented programme especially undertaken to cater to the demand and requirements of defence establishments and army workshops in the country for the illumination of various types of military gadgets and instruments. Tritium Labelling Service (TLS) was carried out to meet the specific requirements from a few researchers .

## **Sealed Radiation Sources.**

During April-December 2007, sealed radiation sources of total activity of about 600 kCi were fabricated, processed, supplied and loaded for use in various types of industrial applications. Cobalt-60 sources were supplied for Blood Irradiators, Gamma Chambers and industrial irradiators. Co-60 Teletherapy sources were also fabricated and supplied to number of hospitals.

## **Gamma Radiation Processing Services**

ISOMED processed more than 5400 cubic meters of different types of products between April 2007 and November 2007 generating a revenue of Rs. 240 lakhs. By March 2008, the plant is expected to process around 8200 cubic meters of medical products yielding a revenue of Rs. 3.5 crores. The low dose loop of ISOMED has been commissioned and has got license for onion & potato irradiation.

Radiation stability testing of materials and equipment carried out at PANBIT for various DAE units such as NPCIL, BARC, ECIL etc. to assess their suitability for use in various nuclear installations.

Radiation Processing Plant, Vashi, continued offering its radiation processing services to all its customers from all over the country. More than 1000 MT of spices and allied products were processed during April to November 2007 earning a revenue of Rs. 60 lakhs. It is expected to earn a total revenue of Rs. 1.0 crore during 2007-2008.

**KRUSHAK** (Krishi Utpadan Sanrakshan Kendra) carried out radiation processing of mangoes for export to USA after the clearance from USDA. 160 tons of mangoes were processed during May-June 2007 yielding a revenue of about Rs. 3.7 lakhs.

## **Radiation Processing Plants in Private Sector**

3 new plants have been commissioned during the period of this report namely Microtrol Sterilization's plant at Bangalore; Agrosurg Irradiators plant at Vasai and Gamma Agro Medical Processing Plant at Hyderabad.

## **Technology Transfer of Hydrogel**

Hydrogel Burn & Injury dressing technology was transferred to another party namely M/s. VIRIDIS Bio-pharma Pvt. Ltd., Mumbai

## **Customer Support Services Cell**

During the year 2007-08, Customer Relationship Cell (CRC) continued serving customers and made it more convenient to customers to interact with the officials of BRIT and regulatory authorities in matters relating to procurement and use of radioisotope products and equipment. The retail outlet for supply of cold kits set up for the benefit of nuclear medicine user institutions in and around Mumbai continued serving customers bringing in a revenue of approximately Rs. 8 lakhs.

The transportation of about 41,000 consignments of radioisotope and allied products, majority of them by air, was carried out in a safe manner till December 2007. Major transportation activities carried out during the year includes movement of kilocurie amounts of radioactive sources from RAPPCOF, Kota to Mumbai; Mumbai to Vadodara and Mumbai to Ambarnath ; teletherapy sources from Mumbai to various cancer hospitals in the country and Gamma Chamber and Blood Irradiator units to various research centres and hospitals.

### **Radioisotopes and allied products supplied by BRIT**

Sr.No	Item	Actual between April-December2007	Expected to be achieved April 2007 – March 2008
1	Consignments	40996	≈ 51000
2	Activity	733 kilo curies	≈ 1300 kilo curies
3	Sale Value	Rs. 2795 lakhs	Rs. 4500 lakhs

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**Descriptive Part**

**CH 4 Radiation Technologies & Applications**

Board of Radiation & Isotope Technology (BRIT) continued its mandate towards progress by regular production and supply of a vast array of high quality radioisotope products which include sealed radiation sources of activity ranging from few microcuries to millions of curies mainly for medical and industrial use; radiation technology equipment such as gamma radiography camera, gamma chamber units, Blood irradiators; radiopharmaceuticals, immunoassay kits, radiochemicals, labelled compounds, labelled biomolecules,  $^{99m}\text{Tc}$  generators, cold kits, oligo nucleotides, self-luminous compounds, etc. As a service provider, BRIT also operates plants for radiation sterilization of medical products (ISOMED) at South Site, BARC ; Radiation Processing Plant at BRIT Vashi Complex for radiation processing of spices and allied products, KRUSHAK for low dose products and runs Co-60 handling facility (RAPPCOF) at RAPS, Kota ; JONAKI Laboratory at Hyderabad and Regional Centres (RCR) located at Bangalore, Delhi, Kolkata and at Dibrugarh.

The various activities carried out by BRIT related to the production and supply of radioisotope and allied products and radiation technology equipment for use in Healthcare, Industry, Agriculture and Research during the period of this report are as follows:

**4.5 Healthcare**

**4.5.1. Radiopharmaceuticals**

14000 consignments of ready to use radiopharmaceuticals of  $^{131}\text{I}$ ,  $^{32}\text{P}$   $^{51}\text{Cr}$  and  $^{153}\text{Sm}$  were supplied to various Nuclear Medicine centers. Majority of these contained  $^{131}\text{I}$  radiopharmaceuticals, which amounted to about 500 Ci; 12000 consignments. 455 Ci of  $^{99}\text{Mo}$  (TCM-2) was supplied for extraction of  $^{99m}\text{Tc}$  at hospitals. In addition to this various accessories of  $^{99m}\text{Tc}$  Solvent extraction generator system and other products were supplied. About 48,000 Cold Kits for the formulation of  $^{99m}\text{Tc}$  radiopharmaceuticals (Code-TCK; 11 products) were supplied to various Nuclear Medicine centers worth Rs. 2.5 crore.

A very important product useful in the treatment of joint disease has been developed namely  $^{32}\text{P}$  Sm Phosphate colloid-injection and its multi-center clinical trials are over; and the proposal for regular production and supply is submitted to the Radiopharmaceuticals Committee for approval.

The ongoing work of monoclonal antibody (ch TNT 1/B) labelling wing with  $^{131}\text{I}$  for M/S. Peregrine Pharmaceuticals Inc., USA, is continuing. During 2007 the labelling services worth USD 150,000 were provided.

In 2007, for the production and supply of  $^{131}\text{I}$ -mIBG (therapeutic doses) infrastructure and logistics preparation have been completed and the first therapeutic dose trial consignment supplied to RMC, BARC.

Under the Xth plan RAIF project, a new automated remote liquid dispensing system, for dispensing radioactive consignments into vials has been commissioned in IOM-1 production plant. Till now more than 2000 consignments have been supplied to users, which were processed using this automated system and the performance has been found to be error-free.

#### **$^{99\text{m}}\text{Tc}$ Column Generator Production Facility (TcGPF)**

252 Geltech generators were produced in 26 batches at fortnightly intervals. The generators were supplied to hospitals in Mumbai, Ludhiana, Ahmedabad, Coimbatore, Visakhapatnam and the Regional centers of BRIT in Bangalore and Delhi. Recycling of generators was implemented thus factoring in significant savings of cost.

#### **4.5.2 Nuclear Medicine : Diagnostic & Treatment Service**

More than 9688 kits of RIA and IRMA were supplied during the year to 300 immunoassay laboratories throughout the country.

A feasibility study for the development of a solid phase RIA for the total T4 was carried out. Coated tubes with direct immobilization of T4 antibody on the polystyrene tubes and tubes coated through antibody were found to be suitable with respect to various parameters such as serum matrix, sensitivity, stability, etc. The method is simple involving the addition of only two reagents to the coated tubes with an incubation of two hours at room temperature. The developed assay is being validated by various quality control parameters and the feasibility of taking it to a production is being worked out.

Correlation of LH values in several human serum samples estimated by the developed assay with a commercial kit has been completed following the standardization of the assay. All the reagents have been formulated into kits. Three kits have been evaluated and have given satisfactory results. Compilation of data for RPC and protocol preparation has been initiated.

To establish the normal range of ferritin using the already developed kit, samples from various hospitals were collected and assayed. The validation of the assay

with respect to all the quality control parameters has been completed. The compiled data and a copy of the sample protocol have been submitted to RPC for approval for regular production and supply.

Nine batches of  $^{131}\text{I}$ -ch TNT-1/B were analysed for relative potency with respect to  $^{125}\text{I}$ -chTNT-1/B. A total of 16 assays were performed including assays for the determination of stability of the product. Five batches of reference standards ( $^{125}\text{I}$ -chTNT-1/B) were also prepared during this period.

The Regional centres located at Bangalore and Delhi processed ready-to-use  $^{99\text{m}}\text{Tc}$  radiopharmaceuticals for use in the host medical centres apart from supplying the products to other hospitals in the region. RCR, Bangalore carried out 3715 RIA investigations and supplied 65000 mCi of ready-to-use  $^{99\text{m}}\text{Tc}$  formulations. 1364 blood bags were also irradiated.

RCR, Delhi produced 67266 mCi of ready-to-use  $^{99\text{m}}\text{Tc}$  radiopharmaceuticals. R & D studies on development of new method for  $^{99\text{m}}\text{Tc}$  recovery from low/medium specific activity  $^{99}\text{Mo}$  using tiny Ion-Exchange column were carried out successfully in collaboration with Regional Center, Kolkata. R & D studies on new column based  $^{99\text{m}}\text{Tc}$  Generator based on novel chemistry utilizing Solid Phase Extraction Technology yielded good results. RCR, Delhi filed a patent on "Surface labeling of insoluble crystals, granules, colloids, aggregates and other particulate material for diagnostic and therapeutic purposes". This was filed jointly with INMAS, DRDO, Delhi. Another patent entitled "Formulations and methods thereof for making Radiolabeled Dry Powder inhalation preparation containing Micronized Salbutamol" has been filed jointly with INMAS, DRDO, Delhi and CIPLA, Mumbai.

At the Regional Center, Kolkata a prototype generator using a novel method of separation of  $^{99\text{m}}\text{Tc}$  from  $^{99}\text{Mo}$  using Dowex 1 column is being fabricated to prepare  $^{99\text{m}}\text{Tc}$  in a radiopharmacy unit. Dry distillation of radioiodine from irradiated  $\text{TeO}_2$  was carried out and the technique was standardized. Preliminary work for the development for Ge68-Ga68 generator has been initiated.

The building layout of Medical Cyclotron facility has been finalized. Letter of intent has been issued to the contractor for work to start in January 2008. A report on the design aspects of Hot Cells and other radioisotope handling facilities has been prepared for AERB for the purpose of obtaining clearance.

Regional Center, Dibrugarh, provided RIA & IRMA diagnostic service for the needy patients of the entire North-Eastern region. More than ten thousand patients of the region avail the services from this center. Apart from medical colleges, patients also come from the nearby tea garden hospitals, Civil hospitals etc. For the ICMR national project on Hypertension & salt intake, 600 assays of serum, Aldosterone and Renin activity were carried out.

## 4.3.2 Nuclear & Biotechnological Tools

### 4.3.2.1 Labelled Compounds

Labelled Compounds Group is engaged in the synthesis and supply of a variety of  $^{14}\text{C}$ ,  $^3\text{H}$  and  $^{35}\text{S}$ -labelled products and oligonucleotides (DNA primers). Ready-to-use non-radioactive (cold) kits are also assembled here for supply to users as and when required, through JONAKI, BRIT, Hyderabad. These kits are essentially used for labelling DNA and RNA to make  $^{32}\text{P}/^{33}\text{P}$ -radiolabelled probes. All these products are powerful and versatile tools for fundamental research and are used as radiotracers in diverse investigations in the fields of biology, agriculture, medicine and chemistry. In addition, the group has been concentrating on the production and supply of tritium filled sources of various types as per the orders received. This work is a defence oriented programme especially undertaken to cater to the demand and requirements of defence establishments and army workshops in the country for the illumination of various types of military gadgets and instruments. Tritium Labelling Service (TLS) was carried out to meet the specific requirements from a few researchers also.

Details of the products despatched during the year 2007 is given below. (corresponding data for the year 2006 is also given for comparison).

Sl.No.	Product Category	Total No. of Consignments	
		Year 2007*	Year 2006
1.	$^{14}\text{C}$ -products	53	76
2.	$^3\text{H}$ -products	69	56
3.	$^{35}\text{S}$ -products	103	98
4.	Cold Kits	63 kits	28 kits
5.	Oligonucleotides	33 (416 nos)	25
6.	Custom synthesis/TLS	10	01
7.	TFS&TTS (Tritium Sources)	18 (4459 nos)	06 ( 572 nos)
9.	$^{14}\text{C}$ -urea capsules	01 (50nos)	01 (50 nos)
10.	Taq DNA Polymerase	10 (11250 U)	01

\*figure upto November

### Highlights

As part of the contract manufacturing job with M/S. Peregrine, USA, the quality control assay of the  $^{131}\text{I}$ -labelled antibody was carried out with respect to its ion contents. Some more batches were successfully made during the period earning a revenue of USD150,000.

Collaboration was carried out with BSF, Gwalior, for setting up of a laboratory for the replacement of tritium filled sources in gun sights (before setting up of this laboratory, they used to carry out this work at Dehradun, which was very time consuming and the delay was affecting the operational preparedness). The process of signing of MOU with BSF for future supply of TFS has been initiated.

The custom synthesis of two  $^{35}\text{S}$  labelled compounds ( $^{35}\text{S}$  thiourea and  $^{35}\text{S}$  thioglycolic acid) were carried out.

The supply of enzyme, Taq DNA Polymerase, prepared at Jonaki Hyderabad, was continued and sales showed a steady increase during the year.

During the year, a few tritium labelled compounds were custom-synthesized and supplied as per orders received. Some of the compounds custom-synthesised are tritiated  $\alpha$ -hydroxy acid, serotonin-T(G), guanosine monophosphate-T(G), ampicillin-T(G) etc.

#### **4.3.2.2 JONAKI Laboratory Hyderabad**

JONAKI, Labelled Biomolecules Laboratory, BRIT situated in CCMB campus, Hyderabad is associated with the production of  $^{32}\text{P}$  and  $^{33}\text{P}$  labeled nucleotides. The laboratory meets the requirement of researchers of about 100 research institutes all over the country in the field of molecular biology and biotechnology. In addition to the radionucleotide programme, a beginning has been made to expand the activities of JONAKI into the fields of molecular diagnostics and ELISA based immunodiagnostics. In this year, agarose gel based PCR kits for the diagnosis of *Mycobacterium tuberculosis* was sent for test evaluation by user hospitals, and it is in the final stage of evaluation before introduction into the market. Development of this kit was taken up in collaboration with LNMS, BARC. The first batch of test kit for ELISA based estimation of thyroid hormone T3 has been sent to some of the users. The enzyme Taq DNA polymerase required for polymerase chain reaction (PCR) and PCR kits has been put into regular supply list and has been supplied to major institutes like CCMB, ITC, IRR and ICAR. Further, there has been increase in the revenue for the current year in comparison to the previous year by approximately Rs. 15 lakhs. In addition, the retail outlet, which was started in this year, has done well and has registered a sale value of Rs 6.27 lakhs.

	April'07 June'07	July'07 Sept'07	Oct'07 Dec'07	Total
<b>P-32 Qty (mCi)</b>	303.0	261	293.5	<b>1154</b>
<b>P-32 Consignments</b>	490	461	522	<b>2016</b>
<b>P-33 Qty (mCi)</b>	Nil	13	8.0	<b>57</b>
<b>P-33 Consignments</b>	Nil	26	9	<b>69</b>
<b>Kits supplied</b>	16	18	13	<b>57</b>
<b><sup>32</sup>P pi supplied (mCi)</b>	156.0	112	137	<b>502</b>
<b>S-35 Qty (mCi)</b>	72.5	83.5	60.5	<b>304.5</b>
<b>S-35 Consignments</b>	23	25	24	<b>99</b>
<b>Cost of 32P material supplied</b>	Rs.25,35,300/-	Rs.25,00,940/-	Rs.28,66,673/-	<b>Rs.106,94,123/-</b>
<b>Cost of 33P material supplied</b>	Nil	Rs.4,01,000/-	Rs.2,29,000/-	<b>Rs.9,84,800/-</b>
<b>Cost of 35S material supplied</b>	Rs.2,39,000/-	Rs.2,82,000/-	Rs.2,08,500/-	<b>Rs.11,55,000/-</b>
<b>packing/forwarding</b>	Rs.2,08,000/-	Rs.2,11,620/-	Rs.2,33,430/-	<b>Rs.9,16,750/-</b>
<b>Freight</b>	Rs.1,38,778/-	Rs.1,42,275/-	Rs.1,71,024/-	<b>Rs.6,33,597/-</b>
<b>Retail outlet for TCK cold kits</b>	Rs.1,54,700/-	Rs.2,00,475/-	Rs.1,50,570/-	<b>Rs.6,27,200/-</b>
<b>Total</b>	<b>Rs.32,75,778/-</b>	<b>Rs.37,38,310/-</b>	<b>Rs.38,59,197</b>	<b>Rs.15011470/-</b>

### **Quality Control Program**

Quality control testing and analysis was carried out on all ready to use radiopharmaceuticals, generator based products, RIA/IRMA kits, inactive raw materials and active raw materials. Up-gradation of the facilities was constantly done by installation of the latest state-of-the-art equipment wherever possible and also by preparing up-to-date monographs for all products being tested.

### **4.5.3. Radiation Therapy: Cancer diagnostic & treatment services**

5 nos. of teletherapy sources had already been sold upto December 2007 and it is expected that another 11 sources will be supplied to Cancer Hospitals in India fetching a sale value of Rs. 3.8 Crore by March 2008. 14 units of <sup>192</sup>Ir-Pt

wire is expected to be prepared and supplied to various hospitals and medical research centres for the treatment of cancer.

## **Industrial Applications:**

### **4.7.1. Sealed Radiation Sources.**

During April-December 2007, sealed radiation sources of total activity of about 600 kCi were fabricated, processed and supplied for use in various types of industrial applications. The following customers were served :

100 kCi for VINAGAMMA Irradiator, Vietnam  
100 kCi for AVPL, Ambarnath  
200 kCi for Microtrol, Bangalore  
100 kCi for OGFL, Kolkata  
100 kCi for Agrosurg, Vasai

Cobalt-60 sources were also supplied for loading Blood Irradiators and Gamma Chambers.

During this period, decayed sources from various Teletherapy units, Blood Irradiators, Gamma Chambers, HDR sources, Iridium and cobalt radiography cameras were removed and disposed/stored.

### **4.7.2. Gamma Radiation Processing Services (GRPS)**

#### **4.7.2.1. Radiation Sterilization Plant for Medical Products (ISOMED)**

ISOMED continued to offer prompt and efficient gamma sterilization services to large number of customers spread all over the country. More than 5400 cubic meters of different types of products were processed between April 2007 and November 2007 generating a revenue of Rs. 240 lakhs. By March 2008, the plant is expected to process around 8200 cubic meters of medical products yielding a revenue of Rs. 3.5 crores. The plant availability factor and plant utilization factors were maintained well above 85% and 80% percent respectively through meticulous planning of operation and regular servicing/maintenance schedule of the facility by a team of experienced and dedicated staff members. With a view to enhance the revenue of ISOMED and for catering to products in the low dose range, an Auxiliary Conveyor Loop has been made operational. AERB approval has been obtained for this to process onion & potato.

Radiation stability testing of materials and equipments was carried out at PANBIT for various DAE units such as NPCIL, BARC, ECIL etc. to assess their suitability for use in various nuclear installations.

Ceric-cerous sulphate dosimeters for routine dosimetry and dose mapping studies and biological indicators using *Bacillus pumilus* spores for microbiological monitoring were produced at ISOMED. These products were also supplied to other irradiation facilities in the country. ISOMED provided the manpower training to those organizations who are in the process of setting up new radiation processing facilities in the country.

The development work for the preparation, standardization and calibration of 3mm ceric-cerous dosimeters has been taken up to facilitate the dosimetry of products exposed to low radiation dose (for eg., Mangoes).

Local Safety Committee meetings were held periodically to discuss, review and improve the radiation and operational safety status of the plant.

#### **4.7.2.2. Radiation Processing Plant, Vashi (RPP, Vashi)**

The plant continued offering its radiation processing services to all its customers from all over the country. More than 1000 MT of spices and allied products were processed during April to November 2007 earning a revenue of Rs. 60 lakhs. It is expected to earn a total revenue of Rs, 1.0 crore during revenue year 2007-2008.

Renovation work is being undertaken in the plant with addition of infrastructural facilities to meet the mandatory requirements for the proposed mango irradiation in the coming season.

#### **4.7.2.3 . KRUSHAK Irradiation Facility (Lasalgaon, Nashik)**

KRUSHAK (Krishi Utpadan Sanrakshan Kendra) is a technology demonstration plant of Department of Atomic Energy for the radiation processing of agricultural produce. Radiation processing of mango was carried out for export to the USA. 160 tons of mangoes were processed during May-June 2007 yielding a revenue of about Rs. 3.7 lakhs. Export of fresh mango was not permitted since last 18 years due to quarantine issues related to fruit fly and seed weevil. Recent export of Indian mangoes to the US has given a fillip to the radiation processing of food in a big way. The KRUSHAK facility that was being mainly used for radiation processing of onions, garlic, ginger and potato for sprout inhibition was upgraded to meet USDA-APHIS on April 26, 2007. It is the first and the only cobalt-60 facility outside USA that has been approved.

#### **4.7.2.4. Radiation Processing Plants in Private Sector**

Considerable progress has been achieved in the setting up of Radiation Processing Plants in Private Sector. 3 new plants have been commissioned during the period of this report :

1. Microtrol Sterilization Services, Bangalore
2. Agrosurg Irradiators Pvt. Ltd, Vasai, Mumbai
3. Gamma Agro-Medical Processing Plant, Hyderabad

#### **4.7.2.5 Accelerators**

The ILU-6 EB accelerator at BRIT continued to provide R & D services to academic and scientific institutions. Commercial irradiation of poly-ethylene O-Rings as well as diamond irradiation also have been commenced in this facility.

#### **4.7.3. Radiation Technology Equipment**

##### **4.7.3.1. Gamma Chamber GC 5000:**

During the current year, 3 nos. of GC 5000 was supplied to the following customers :

1. Nuclear Research Institute, Dalat, Vietnam
2. Manipur University, Imphal
3. Defence Food Research Laboratory , Mysore

By March 2008, the following orders are expected to be executed :

1. NPCIL, Tarapur
2. Defence Lab, Jodhpur
3. Pondicherry University
4. Abhishek Enterprises, Jaipur
5. IAEA order for San Jose, Costa Rica

1 no. of GC 1200 was supplied to Rajasthan Agricultural University, Bikaner and 1 no. of GC 900 was supplied to RPP, Vashi Complex.

##### **4.7.3.2. Radiography Camera ROLI-1**

BRIT supplied 26 nos. of ROLI-1 radiography exposure devices in 2007. It is expected to sell another 30 cameras by March 2008. BRIT also supplied 631 replacement sources during the year. Another 230 sources are expected to be sold between January-March 2008.

250 ROLI cameras were serviced during the year. Another 80 cameras will be serviced before March 2008. 485 decayed sources were removed between April- December 2008. Another 160 sources will be disposed off by March 2008.

140 imported cameras were inspected by December 2007. By March 2008, another 120 imported cameras will be inspected .

Development of new versions of ROLI-1 in stainless steel has been progressing well. A portable version ROLI-3 is undergoing prototype testing.

#### **4.7.3.3. Blood Irradiator**

The programme of production & supply of Blood Irradiator (BI 2000) has been pursued further. During the year 1 blood irradiator was supplied to Life Cell, Chennai and 2 more are to be supplied to the following customers before March 2008 :

1. Dinanath Mangeshkar Hospital, Pune
2. National Center for Biological Sciences, TIFR, Bangalore

#### **4.7.3.4. Install & Operate Irradiator**

The civil work including the construction of the building is expected to be completed by May 2008. Work on the electro-mechanical as well as control systems are in the advanced stage.

#### **4.7.3.5. QA of Sealed Sources, Radiometry Scanning and Irradiation Services**

Interpretation of the radiographs of welds of GC 5000, BI 2000 and BLC flasks were carried out.

ROLI 1 cameras were tested at the REPF workshop and the Radiological lab of BARC. Density measurements were carried out on cobalt-59 pellets and slugs and also chemical analysis and XRF analysis were carried out for the acceptance of the material for irradiation.

### **4.14. Supporting Services**

#### **4.14.1. Customer Support Services Cell**

As the nodal agency for sales and supply, marketing and customer relations, Co-ordination & logistics support were continued to be provided for the regular and uninterrupted supply of radioisotopes & allied products and radiation technology equipment to about 2000 user institutions in the healthcare, industrial, research and agricultural sector.

During the year 2007-08, Customer Relationship Cell (CRC) continued serving customers and made it more convenient to customers to interact with the officials of BRIT and regulatory authorities in matters relating to procurement and use of radioisotope products and equipment. The retail outlet for supply of cold kits set up at Project House for the benefit of nuclear medicine user institutions in and around Mumbai continued serving customers bringing in a revenue of approximately Rs. 8 lakhs.

The transportation of about 41,000 consignments of radioisotope and allied products, majority of them by air, was carried out in a safe manner. Major transportation activities carried out during the year includes movement of kilocurie amounts of radioactive sources from RAPPCOF, Kota to Mumbai, Mumbai to Vadodara and Mumbai to Ambernath, teletherapy sources from Mumbai to various cancer hospitals in the country and Gamma Chamber and Blood Irradiator units to various research centres and hospitals.

**Radioisotopes and allied products supplied by BRIT**

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**4.14.2. Engineering Services Unit**

Engineering Services Group provided the vital infrastructural and utility services to BRIT and BARC facilities at Vashi Complex. Provision of uninterrupted electrical power, air conditioning and ventilation services on continuous basis to the radioactive laboratories, civil and public health services and communication services in Vashi complex are the major challenges faced. Quality service provided by this group has enabled the production units to meet the production and supply schedules as planned.

## Status of the plan projects

### X Plan Projects

BRIT has taken up several projects for execution under the plan project scheme. All these projects have been aimed to enhance its capacity for the development of new products, improvement in quality and also development of infrastructural facilities. Under the Xth plan three major projects were initiated for the execution. These are :

- Integrated facility for Radiation Technology ( IFRT)
- Revamping and Augmentation of Infrastructural Facility ( RAIF)
- DAE Medical Cyclotron at Kolkata

#### **1) Project : Integrated facility for radiation Technology ( IFRT)**

Objective of the project is to set up a Hot cell at BRIT Vashi complex for handling, storage and fabrication of sealed sources up to 300 kCi of Co-60. The financial outlay of the project is Rs 1519 lakhs and completion date is Dec 2009. This project is in advance stage as design for Civil construction and mechanical systems have been completed. Major mechanical components have also been procured and civil construction has started.. It is expected that project will be completed in next 18 months.

#### **2) Project : Revamping & Augmentation of Infrastructural Facilities (RAIF)**

The project is proposed for Revamping & Augmentation of Infrastructural Facilities of BRIT at Vashi to enhance infrastructural support for production facility. The major activities of project is to procure instruments and equipment for revamping and augmenting production, quality and safety of operations and personnel. Financial outlay of the project is Rs 1592 lakhs and completion date is March 2010.

Major works of the project which include civil construction have been completed (approximately 90 %) and also procurement of some of the major equipment such as liquid handling system of RIA coated tube, multi channel analyzer <sup>131</sup>I dispensing system etc. has been completed.

The scope of the project has been enhanced to include construction of Mobile hot cell also. It is expected that project will be completed as per schedule.

### **3) Project : DAE Medical Cyclotron Project : Pharmaceuticals Facility**

A medical cyclotron facility is being installed at VECC, DAE, Kolkata for the production of PET & SPECT radioisotopes to be used for diagnostic and therapeutic purposes.

Order for the equipment have been placed and the fabrication of equipment is in advanced stage of completion. Tendering process for the civil work is in progress.

### **XI plan projects**

Apart from the Xth plan project there are 5 more projects which are proposed for execution under XI th plan. These projects are aimed towards development of new products, improvement in quality of existing products and improvement in manufacturing processes. Financial sanction for four of these projects have been received except for the project, Construction of State-of-the Art Immunoassay Facility. Brief description of the XI plan projects is given below.

#### **1) Project : Integrator Irradiator Development Project**

**Estimated Cost : Rs 300 lakhs**

#### **Objectives**

To upgrade safety and security features in the RPP, Vashi & ISOMED facilities and to set up an Irradiator Training facility for training of personnel for operation of irradiator.

**Progress :** Soil testing where the water pool has to be located is under progress. Conceptual design of the Facility has been done

#### **2) Project : Production Facility for $^{99}\text{Mo}$ - $^{99\text{m}}\text{Tc}$ column Generators of High specific Activity $^{99}\text{Mo}$**

**Estimated Cost : Rs 750 lakhs**

#### **Objectives**

Setting up of a new automated facility for production of  $^{99}\text{Mo}$ - $^{99\text{m}}\text{Tc}$  Column Generators using high specific activity  $^{99}\text{Mo}$ .

**Progress :** A two part tender has already been raised. Evaluation of technical proposal is in progress.

### **3) Project : Construction of State-of-the Art Immunoassay Facility**

**Estimated Cost : Rs 205 lakhs**

#### **Objectives**

- a) Development and building up of infrastructure for coated tube technology & state of the art Laboratory with GMP/GLP compliance with a special focus on contract manufacturing.
- b) Development and building up of infrastructure for Immunoassay based on non-isotopic labels.
- c) Development of diagnostic kits for infectious diseases.

**Progress :** Work order for refurbishing of Anti Body Coating lab has been issued and the material has also been received.

### **4) Project : Construction of State-of-the Art GLP & GMP compliant Lab**

**Estimated Cost : Rs 340 lakhs**

#### **Objectives**

Upgradation of the laboratory for GLP and GMP compliance by following:

- a) removal of the existing corroded 20 years old fume hoods, cut and disposal through WMD
- b) Installation of new fume hoods.
- c) Wear resistant laboratory flooring of laboratory.
- d) Furnish the labs and facelift office for aesthetic look
- e) Introduce the state-of-the-art synthesis facility, enhance the analytical evaluation, quality control of the labeled compounds. Introduction of microwave synthesis and introduction of instrumental analysis.
- f) Augmentation of oligonucleotides synthesis facility
- g) Setting up of state-of-the art lab for <sup>14</sup>C urea capsule production and
- h) Setting up of low background counting lab for food analysis.

**Progress :** Action has been initiated for the procurement of some of the major equipment of lab and also vendors have been identified for the up-gradation of subsystems of the laboratory.

**5) Project : Indigenous HDR Brachytherapy Equipment (IHDR)**

**Estimated Cost : Rs 800 lakhs**

**Objectives**

- a) Establishing the complete process and facilities for fabrication of  $^{192}\text{Ir}$  HDR sources for regular production.
- b) Development of indigenous, remote operated high dose rate (HDR) brachytherapy equipment including necessary treatment.

**Progress :** A two part tender has been raised and after the evaluation of Technical bid Price bid is being scrutinized.