Technology Transfer to Industries

During the period between December 2015 and March 2016, BARC has transferred fourteen technologies to various industries. Technology Transfer & Collaboration Division (TT&CD) co-ordinated these technology transfers. The details are given below:

A. “Bicycle Mounted Water Purification (Ro/Uf) Unit Driven by Hybrid Power System” Technology was transferred to M/s Oasis Aqua Ventures Pvt. Ltd., Andheri (E), Mumbai, on December 3rd, 2015

This technology is an adaptation of conventional RO & UF. The unit is an off-grid, stand-alone, bicycle mounted brackish water reverse osmosis (BWRO) system of 10 - 20 litres/hr (lph) capacity which can treat water contaminated with, salinity (up to 1000 mg/l), toxic elements, pathogens & turbidity. It can be operated throughout the day with the help of the dual energy systems provided. The same unit can be modified by incorporating an Ultrafiltration (UF) membrane, for removing only pathogens & turbidity from the raw water. In such case, the production will be increased to 120-200 lph.

B. “Dustline Respirator and Airline Respirator” Technology was transferred to M/s. Venus Safety & Health Pvt. Ltd., Navi Mumbai on December 14th, 2015

BARC has developed Dust respirators and airline respirators as an import substitutes to meet the stringent requirements needed for use in highly toxic environment. Dust respirator is an air-purifying respirator. It is a half-mask respirator, which covers nose and mouth. Normally the mask is fitted with a pair of high efficiency filters to provide protection in an environment contaminated with fumes, mists, highly toxic particulates including radio nuclides. Respirator can also be fitted with a pair of combination (impregnated charcoal + HEPA) filter cartridges to remove organic and iodine vapours in addition to particulates from breathing atmosphere.

Airline respirator is a continuous flow air-supplied respirator. It has a half-face mask to which respirable air at the rate of 120 l/min is continuously fed by means of an air-hose. Positive pressure inside the face-piece gives very little possibility for outside contaminated atmosphere to leak in. Airline respirators are mainly used in conjunction with plastic suits to provide air for breathing, the latter to prevent skin contamination in all the nuclear facilities.

C. “Compact SMPS Based Triode Sputter Ion Pump Power Supply” Technology was transferred to M/s ECIL, Hyderabad on January 13th, 2016.

This technology of was developed by Technical Physics Division, BARC. This supply can be used with Triode Sputter Ion Pumps having pumping speeds up to 140 lps and for Thin film deposition by DC magnetron sputtering technique. Sputter ion pumps find extensive use in high vacuum systems where a “clean” vacuum is
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desired. They are used in scanning probe microscopy and other high-precision apparatuses.

Conventional Sputter ion pump power supplies tend to be heavy and bulky as they operate on the mains frequency viz. 50Hz. The compact switched mode triode sputter ion pump power supply made in BARC is based on a half bridge dc to dc converter operating at 20kHz resulting in a drastic size reduction of around 75% over conventional mains frequency operated ion pump power supplies. Our compact SMPS triode sputter ion pump power supply is rated for an open circuit voltage in the range of -6kV to -7kV with a short circuit current rating of 200mA. This supply can power triode sputter ion pumps of ratings up to 140 liters / second. A microcontroller circuit is used to display the various parameters, implement the Trip logic and provide a PC interface.

D. “Soil Organic Carbon Detection Kit (SOCDK)” Technology was transferred to M/s Precixon, Nashik, (Maharashtra), on January 20th, 2016.

The technology of “Soil Organic Carbon Detection Kit (SOCDK)” has been developed by Nuclear Agriculture and Biotechnology Division, BARC. This kit analyses organic carbon content of soil directly on the field. This kit has been devised to help farmers to understand the carbon status of his field which ultimately decides the yield of crop. It gives quick results and thereby enables farmer to take corrective measures for maintaining soil fertility especially before sowing and at the harvest of any crop. The detection method works on the basis of organic matter extraction from the soil. The extraction is enhanced by addition of chemicals provided in the kit. The colour developed after extraction shall be compared with chart provided for estimation of organic carbon content of the soil. Estimation of soil organic carbon content becomes easy to perform, giving immediate results and useful to farmers for their own use.

E. “Peripheral Pulse Analyzer” Technology was transferred to M/s Balaji Electronics & Solutions, Mumbai on January 27th, 2016

This Technology has been developed by Electronics Division, BARC. It is a computer based system for the study of physiological variabilities. It has unique feature that it yields heart rate variability, respiration rate variability, cardiac output variability/ peripheral blood flow variability from a single data acquisition session from the patient. The picture shows Peripheral Pulse Analyzer system in operation developed at BARC. The data acquisition is controlled by the PC, serially connected to the acquisition unit. The variability analysis and transfer to database is performed by the PC with the help of Peripheral Pulse Analyzer package in post processing module.

F. “Handheld 12 Channel Tele ECG Instrument” was transferred to M/s Cardea Biomedical Technologies (P) Ltd., New Delhi on February 1st, 2016

Electronics Division, BARC has developed a Handheld 12-Channel Tele-ECG Instrument operated with the help of a mobile phone via Bluetooth. It records all the 12-leads of ECG simultaneously and displays the same on mobile screen. After complete recording, the report is generated in the form of an image that can be sent to the expert’s mobile through Multimedia Messaging Service (MMS) or any other file sharing apps. The device is ideally suited...
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Photograph after signing the agreement with M/s Cardea Biomedical Technologies (P) Ltd., New Delhi, seen from left to right, Shri. Vinit Sinha, ED, Shri. R. K. Jain, ED, Dr. D. Das, Head, ED, Shri. Abhinav, M/s Cardea, Shri. B. S. V. G. Sharma, Head, TT&CD, Smt. Smita S. Mule, TT&CD and Smt. Soniya Murudkar, TT&CD

for rural health care. In city hospitals, the machine can be operated through Laptop/Desktop and report can be shared on Local Area Network (LAN). ECG report in standard graphical format can be taken on a blank A4 size paper.

This has provided virtual instantaneous ECG diagnostic service to a villager at his home/village thus, proving the philosophy – “Cardiac Care – Just a Click Away”.

Photograph after signing the agreement with M/s. Ponalab Biogrowth Private Ltd, Bangalore seen from left to right, Shri Naresh Yavvara, Production Supervisor, M/s. Ponalab Biogrowth Pvt. Ltd., Shri Sharan Basava Sadashivappa, Production in Charge, M/s. Ponalab Biogrowth Pvt. Ltd., Dr. S. T. Mehetre, NA&BTD, Shri BSVG Sharma, Head, TT&CD, Smt. Smita S. Mule, TT&CD and Smt. Soniya Murudkar, TT&CD

G. Automated Alpha Particle Irradiator – Bio Alpha” Technology was Transferred to M/s Anden Mechstronics Pvt. Ltd., Mumbai on February 8th, 2016

H. “Mass multiplication medium of bio-fungicide Trichoderma spp.” and “A purely organic, seed dressing bio-fungicide formulation of an improved Trichoderma Virens Mutant Strain” technologies were transferred to M/s. Ponalab Biogrowth Private Ltd, Bangalore on February 9th, 2016

• “Mass multiplication medium of bio-fungicide Trichoderma spp.” Technology:

Nuclear Agriculture and Biotechnology Division, BARC has developed a low cost mass multiplication medium for faster growth of Trichoderma spp. This material supports better growth of biofungicide compared to existing methods and addition of synthetic sticker is not required while making its formulation. The process is cheaper than the existing methods and is based on the material which is inexpensive and available locally. Hence, in true sense this technology generates wealth from waste.

• “A purely organic, seed dressing bio-fungicide formulation of an improved Trichoderma Virens Mutant Strain.” technology:

Biological control is an integral component of organic farming, but almost all the commercial Trichoderma formulations contain synthetic additives like the carboxy-methyl cellulose (CMC). Nuclear Agriculture and Biotechnology Division, BARC has developed a purely organic, granular, seed treatment formulation of an improved Trichoderma Virens Mutant Strain. A mutant strain of Trichoderma virens produces more antibiotics than the wild type. The purely organic (no chemical additive) granular, seed dressing formulation, named as “TrichoBARC” is suitable for packaging in small quantity (5 g for treatment of 1 kg seeds, per pouch), thus reducing the cost of seed treatment, making it economical for even small and marginal farmers.

Photograph after signing the agreement with M/s. Ponalab Biogrowth Private Ltd, Bangalore seen from left to right, Shri Naresh Yavvara, Production Supervisor, M/s. Ponalab Biogrowth Pvt. Ltd., Shri Sharan Basava Sadashivappa, Production in Charge, M/s. Ponalab Biogrowth Pvt. Ltd., Dr. S. T. Mehetre, NA&BTD, Shri BSVG Sharma, Head, TT&CD, Dr. Dinesh Shetty, Managing Director, M/s. Ponalab Biogrowth Private Ltd., Dr. S. P. Kale, Associate Director, Bio Science Group, (A), Dr. P. K. Mukherjee, NA&BTD and Shri G. R.

I. 3kJ/s, 30kV Capacitor charging Power Supply’ Technology was transferred to M/s Artech Welders, Pune on February 16, 2016

This technology was developed by Accelerator and Pulse Power Division, BARC. Capacitor charging supplies differ from conventional DC supplies in that the output current is fixed and not variable, allowing the load capacitor to be charged in the fastest possible time, with no requirement for series current limiting resistors. Capacitor charging power supplies are specifically...
designed to efficiently charge capacitive loads to high voltages with excellent pulse to pulse repeatability at very high repetition rates. The largest application for this type of supply is in the laser industry. In addition it also has applications in areas as diverse as medical sterilization and rock crushing. Capacitor charging power supply is used in various accelerators, pulse forming line, RF systems, capacitor banks, magnet supply etc. It can act as a power source of arc lamps, flash lamps, and flash x-ray systems. It can be used as a charging source for various kinds of repetitive laser system like excimer lasers, free electron lasers. It has various uses in repetitive pulse power systems like electromagnetic forming, repetitive Marx based pulse power systems, magnetic switch based repetitive pulse power system. It has inherent safety features from over current and short circuit protection. Irrespective load it supplies constant current to the load at prescribed charging rate.

J. “Triode Sputter Ion Pump” Technology was transferred to M/s Tulasi Engineering Works, Patancheru, Telangana, on February 18, 2016.

This technology was developed by Technical Physics Division, BARC. Sputter Ion Pumps are to produce very low pressures (typically < 10-9 mbar) in closed and clean vacuum systems without any hydrocarbon contamination. These pumps are mainly used in applications involving transportation of charged particle beams (electrons, ions) in particle accelerators, storage rings for generation of synchrotron radiation, analytical equipment such as mass spectrometers, x-ray photoelectron spectrometers, etc. as well as in semiconductor industry. It provides clean and completely oil-free ultrahigh vacuum. The pumps can be connected in any orientation and require very low power to operate under stable static conditions. This ensures that the pumps has very long working life (typically > 50,000 hours), virtually maintenance free and are easy to install and operate unattended for long periods of time. Inherent protections in the power supply enable the prevention of arcing and high discharge current at high pressures. Sputter ion Pumps with pumping speeds 35 lps, 70 lps, 140 lps and 270 lps have been developed and are included in the technology transfer.

K. “Partially Hydrolyzed Guar Gum for Dietary Fibre Application” Technology was transferred to M/s Adachi Natural Polymer Pvt. Ltd., Ahmedabad on March 14th, 2016

L. Nisargruna Biogas Technology based on biodegradable waste has been developed by NA&BTD. The plant processes biodegradable waste into biogas and weed free manure. It was transferred to the following parties:

- M/s Excellent Renewables Pvt. Ltd., Gujarat on 30.12.2015

M. BARC through its Centre for Incubation of Technology has signed the MoU with with M/s Larsen & Toubro Limited (L&T), Bangalore For Incubation Of “Development Of Residual Gas Analyzer (RGA)” on February 8th, 2016

Residual Gas Analyzer (RGA) is a compact, usually flange mounted mass spectrometer, typically designed for process control and contamination monitoring in
vacuum systems. Based on an electron impact ion source and a quadrupole mass analyzer, RGAs are used in high vacuum applications such as research chambers, surface science setups, accelerators, scanning microscopes, etc.

RGAs are used in most cases to monitor the quality of the vacuum and detect trace impurities in the low-pressure gas environment. RGAs possess sub-ppm detection capability in the absence of background interferences and impurities can be measured down to 10-14 Torr levels. RGAs can also be used as sensitive in-situ, helium leak detectors. With vacuum systems pumped down to lower than 10-5 Torr - checking of the integrity of the vacuum seals and the quality of the vacuum - air leaks, virtual leaks and other contaminants at low levels may be detected before a process is initiated.

M/s Larsen & Toubro Limited is interested in jointly developing the RGA technology for industrial use. A possible offshoot of this technology is the coupling of RGA to a Gas Chromatograph Mass Spectrometer (GCMS) system being developed for Defence Research &Development Establishment (DRDE) to detect warfare/explosive agents.

As per this incubation MoU, R&D efforts will be undertaken at Technical Physics Division, (TPD), to develop suitable technology. Initial experiments carried out at Technical Physics Division, have been encouraging and further work is in progress with active participation of the incubatee (M/s Larsen & Toubro Limited).