

## IV. PUBLIC SECTOR ENTERPRISES

### IV-A. NATIONAL RESEARCH DEVELOPMENT CORPORATION

#### 1. INTRODUCTION

The National Research Development Corporation (NRDC) is a premier organisation, under the Department of Scientific & Industrial Research (DSIR), Ministry of Science & Technology, engaged in the development, promotion and commercialisation of the R&D results/technologies emanating from Research Institutes/ Universities/ Industries, etc. The Corporation provides comprehensive technology transfer services and acts as a catalyst for transforming innovative research into marketable industrial products. NRDC is a unique organisation because it is the only public enterprise wholly dedicated to transfer of technologies from R&D laboratories to industry. During the past five decades of its existence, the Corporation has developed strong links and network with various R&D organisations in the country as well as abroad for transfer of technologies. Its operations cover the entire spectrum of industrial technologies ranging from chemicals to metallurgy, mechanical engineering, electrical engineering, electronics, biotechnology and so on.

The Corporation continued to maintain its good overall performance in all areas of its operations during the year 2006-07. During the year, the Corporation's income from its principal source of revenue i.e. Lumpsum Premia and Royalty on the licensing of technologies to industry was Rs. 412.37 lakhs, as compared to Rs. 380.40 lakhs in the previous year.

#### 2. PROFIT

A motivated strategic drive coupled with the

dedication of officers and staff of the Corporation has resulted in an enhanced Surplus before Tax of Rs. 33.76 lakhs as compared to Rs. 26.05 lakhs in the previous year, an increase of 30 %. Efforts are being made to clean up the non-performing assets of the Corporation by writing off the outstanding loans and equity provided to the licensee companies for development and commercialisation of technologies. Accordingly, during the year 2006-07, the Corporation had written off such loans and equity amounting to Rs. 54.23 lakhs.

The Gross Income of the Corporation from all sources, including premia and royalties, but excluding Grants-in-Aid, was Rs. 534.91 lakhs as compared to Rs. 501.59 lakhs in the previous year. The Department of Public Enterprises has given an 'Excellent' rating to your Corporation for its MOU performance during last year (2005-2006), an improvement over its rating of 'Good' in the previous year.

#### 3. PROCESSES ASSIGNED AND LICENCE AGREEMENTS CONCLUDED

The Corporation continued its efforts to identify new technology resources by nurturing long-term relationships with R&D laboratories, industries, universities, IITs, and individual inventors. As a result, 39 new processes were assigned to the Corporation for commercialisation as compared to 30 processes during the previous year. Some of the commercially important processes assigned to the Corporation during the year are:

- Removal of Arsenic and Iron from Ground water
- Formulation for Fruit and Vegetable (apple, plum, orange, sweet lime, grape, lemon, tomato, brinjal, capsicum) Coatings and Application Protocols
- UV Absorbent for Skin Care Formulations
- A Novel Organic Seed Protectant of Plant Origin
- New Anti-Cancer Formulation based on Methyl Glyoxal
- Multipurpose Design Cutting Machine
- Process for Preparation of Probiotic Dahi
- Synthetic Milk Detection Kit
- Cholesterol Biosensor
- XYLANASE – Enzyme for Paper and Pulp Industry
- Process for Production of Red Palmolein and Zero Shortening
- Process for Physical Refining of Rice Bran Oil

#### **4. MAJOR TECHNOLOGIES LICENSED**

Due to the aggressive marketing of technologies, the Corporation signed 44 licence agreements during the year as compared to 39 in the previous year. Some of the major technologies licensed by the Corporation during the year are:

- Seri Gold - A Powerful General Disinfectant for Sericulture used for the Disinfection of Rearing Houses and Rearing Equipments
- Mulberry Leaf Health Drink
- Pithplus
- Magnesium Silver Chloride Seawater Activated Battery

- Bio-Larvicide
- Porus Conducting Carbon Paper
- Night Time Highway Systems for Automobiles (Auto Dipper)

#### **5. ROYALTY AGREEMENTS SIGNED BY THE CORPORATION FOR PROJECTS SUPPORTED BY DEPARTMENT OF SCIENTIFIC & INDUSTRIAL RESEARCH (DSIR)**

DSIR has been supporting technology development projects under its “Technology Development and Demonstration Programme” (earlier known as Programme Aimed at Technological Self Reliance) involving industry, research institutes and consultants. The Corporation has been entrusted to manage all matters connected with the intellectual property rights generated in these projects, as also to collect the royalty revenues accruing from the utilisation of the technology by the collaborating Company and also from third party licensing. The following major projects were undertaken during the year:

- Development of Piezoelectrically Actuated Micro Mechanical Switches of RF Application
- Design and Development of 6 DoF Electrical Motion Platform
- Identification, Development & Utilization of Natural Dyes from Forest Plants, Weeds and Agricultural Waste
- Demonstration of CRRI Technologies for Construction of 750 m Demonstration Stretch Road Using Marble Slurry Dust in Rajasthan
- Nano Labelled DNA / RNA Compounds
- Microbial Production of Arachidonic Acid

## **6. INTELLECTUAL PROPERTY RIGHTS (IPR) CONSULTANCY SERVICES**

During the year 2006-07, the Corporation in its pursuit to protect inventions and technologies has filed 86 patent applications in India in various sectors of technologies for individual inventors, universities, R & D institutes and industries. During the year six Indian patents and three foreign patents have been granted.

The Corporation has been catering to requests received from various R&D institutes and industries for conducting state-of-the art searches, the result of which is being utilized in many cases for submitting research projects or even initiating research projects at university level so that the project subject coverage should be novel and not a mere repetition of R&D work already done. This is in addition to the usage of these search results for filing patent application in India and abroad. During this financial year, 35 state-of-the art searches have been conducted on diverse fields, utilizing the databases like Dialog and STN.

Collaborative efforts of the Corporation with Patent Offices, Universities, R & D Institutes, State Science & Technology Councils, etc have gained momentum and resulted in enhanced demand for organizing IPR Awareness and Training Programs. During the year, the Corporation has collaborated with various organizations and organized the 23 seminars and training programs in different parts of the country.

All these seminars, workshops and training programs were widely appreciated and rated excellent.

The Corporation has reached out to various R&D institutions and universities for

educating intellectuals about the importance of protection of IP assets in the knowledge era by delivering lectures on focal areas of importance such as Patenting System in India, The Rationale of Protection of Geographical Indications of Goods, State-of-the art Searches, Trade Marks Registration Procedure, IP Valuation and Management, Agricultural Biotechnology and many more.

## **7. PRIZE AWARD**

To promote and encourage the spirit of inventiveness amongst scientists, workers, students and inventors, the Corporation continued its programme of giving awards upto Rs.2.00 lakhs for the development of novel processes, products, and inventions. During the year, the Corporation announced cash awards amounting to Rs.5.00 lakhs for the following inventions:

- Development & Commercialization of Novel Process Technology for Removal of H<sub>2</sub>S and Mercaptans from LPG through Continuous Film Contactor (CFC)
- Full Garlic Peeling Machine
- Vivek Thresher for Mandua (Finger Millet)/ Madira (Barnyard Mill)
- Membrane Oxygenator, a Medical Device for Cardiac Surgery
- Guard for Protecting Padlock and the Strip

The Corporation also announced one WIPO Gold Medal for the best invention of the year “Development & Commercialization of Novel Process Technology for Removal of H<sub>2</sub>S and Mercaptans from LPG Through Continuous film Contactor (CFC)” to Dr. R.P.Verma and Associates.

## **8. DEVELOPMENT & PROMOTION OF RURAL & HOUSEHOLD TECHNOLOGY**

The Corporation continued to pursue its program of Development and Promotion of Rural & Household Technology to use modern science and technology for the following:-

The methodology adopted by the Corporation is to demonstrate the utility of its rural technologies and ensure their faster dissemination by setting up Rural Technology Demonstration cum Training (RTDT) Centres in collaboration with voluntary agencies in various regions of the country. Pursuant to following this approach, the Corporation has strengthened 7 Centres at Faridabad (Haryana), Tirupathi (AP), Ghazipur (UP), Chickballapur (Karnataka), Mandhar (J&K), Jagdishpur (Jharkhand) and Kundrakudi (Tamil Nadu) with new emerging technologies as per the need of the specific area. Training Programmes on live stock development, blue green algae, soya and bio-fuel processing, coir retting and electronics design up-gradation were conducted in collaboration with local NGOs. Further, the Corporation has participated in various exhibitions, rural fairs and Pashu Kisan Melas.

## **9. EXHIBITIONS AND PUBLICITY**

Participation in exhibitions, seminars, workshops and entrepreneurship development programmes are of vital importance for the creation of awareness about the role of the Corporation in technology transfer. With this end in view, the Corporation participated in exhibitions, seminars and get-togethers in India and abroad organised by various agencies as detailed below:

- Hannover Fair, Germany  
24-28<sup>th</sup> April, 2006

- 7<sup>th</sup> SAARC Trade Fair, Karachi Pakistan;  
16-18<sup>th</sup> June, 2006
- 9<sup>th</sup> Rwanda International Trade Fair,  
Rwanda, Kigali; 25<sup>th</sup> Aug-4<sup>th</sup> Sept., 2006
- Made in India Show, China  
8-11 Sept. 2006
- Minerals, Metals, Metallurgy & Materials,  
New Delhi; 11-14 Sept. 2006
- CSIR Rural Exhibition, Dhanbad,  
Jharkhand; 26-31 Oct., 2006
- Pashu Kisan Mela, Bareilly  
28-30 Oct. 2006
- Technology Summit, New Delhi  
6-7 Nov. 2006
- 10<sup>th</sup> India Tech 06, India International  
Trade Fair, New Delhi; 14-27 Nov. 2006
- Dairy Expo, Chandigarh; 1-4 Dec. 2006
- Mind to Market, New Delhi  
4-6 Dec. 2006
- Science Congress, Chidambaram  
3-7 Jan 2007
- Consultancy Congress, New Delhi  
15-16 Jan. 2007
- Mint To Mint, Kanyakumari; 18 Jan. 2007
- Pharm Expo 2007, Mumbai  
6-10 Feb. 2007
- Technovation, New Delhi  
13-16 Feb. 2007
- Vendor Dev. Programme Cum Indus.  
Exhibition, Hubli; 22-26 Feb. 2007
- Commercialisation of Chemical  
Technologies, Mumbai  
16-17 March. 2007

## **10. PUBLICATIONS**

Dissemination of information on new processes to industry, entrepreneurs and the

general public plays an important role in the process of technology transfer. One of the means of doing so is through publications of various types. During the year, the Corporation continued to bring out the regular publications *Awishkar* (Monthly in Hindi) and *Invention Intelligence* (Bi-monthly in English). Apart from this, during the year, the Corporation has also brought out special publications viz. NRDC-Your Technology Partner, NRDC Meritorious Invention Awards and a Folder on Technology Trade Facilitation Centre being operated by the Corporation.

## 11. MARKET SURVEYS

Detailed market information makes the technology package more attractive to entrepreneurs. With this end in view, the Corporation commissioned professional market surveys in respect of the following technologies:

- Probiotic Food
- Anti Reflective Coating on Circular Glass Lens
- Anti Glare Coatings on Sheet Glass
- Auto Dipper
- Porus Carbon Paper for Fuel Cell Applications
- Low Cholesterol Ghee
- Shelf Life Extenders for Fruits and Vegetables

## 12. TECHNOLOGY AND PROJECT EXPORT

Our technologies are appropriate to the needs of many other developing countries. The Corporation, therefore, considers it an important part of its charter to seek out and seize opportunities in those countries for technology and project exports. The

Corporation's concerted and energetic efforts to export Indian Technologies have resulted in excellent contacts in Africa and signing of several Agreements. Strategic alliances have been made with local consultants in the countries of potential business to secure business in those countries. A few such agreements are listed below:

- Agreement for setting up of Demonstration Centre for Small & Medium Machines with Social fund for Development, Cairo, Egypt
- Representative Agreements with (a) Rahimafrooz Renewable Energy Ltd., Dhaka, Bangladesh, (b) Bangladesh Development Resource Group. Dhaka, Bangladesh, (c) Millis Consult, Ethiopia, (d) Rwanda Pvt. Sector Federation, Rwanda
- Cooperation Agreement with Serviva Gmbh, Germany
- Agreement for transfer of technologies with Agricultural, Industrial Finance Group of Democratic Republic of Congo

During the year several delegations from other developing countries were received and the Corporation was able to generate interest of major international companies in indigenous technologies.

## 13. FOREIGN EXCHANGE EARNINGS

The foreign exchange earnings of the Corporation amounted to Rs. 18.47 lakhs in 2006-07 as compared to Rs. 0.38 lakh during the previous year.

## 14. KNOWLEDGE MANAGEMENT SYSTEM (KMS) FOR TECHNOLOGY PROMOTION

The commercialization of unproven lab scale indigenous technologies involves high risk

and therefore, the entrepreneurs are generally not keen on endeavouring a venture based on such technology. In order to overcome this difficulty, the Corporation has introduced the Knowledge Management System (KMS) in 2004-05. It is a self-propelled mechanism for systematic evaluation of the technologies, by a team of experts for value addition to the extent possible for making a complete technology package for setting up commercial plant and the chances of its success become high. The Expert Panels also suggest strategies for marketing of technologies and sources for scouting of new technologies.

#### **15. TECHNOLOGY DEVELOPMENT PROGRAMME FOR PRIORITY PROJECTS**

The Corporation has been promoting and financing in collaboration with industry and R&D institutes, technology development projects for further development, setting up pilot, semi-commercial or demonstration plants. The progress on the major technology development projects is given below:

##### ***In-vivo evaluation and further development work on Targeted Gene Delivery System***

The know-how for virosome based Targeted Gene Delivery System, a platform technology, was developed by University of Delhi. It is highly target (liver cell) specific and has a strong potential to develop various therapeutics for a number of diseases originating from liver cells- Hepatitis, Liver cancer, Hemophilia, Malaria, etc. This process know-how has a very good opportunity for licensing in other countries, provided *in-vivo* data is available on the process.

##### ***Optimization of New Anti-Cancer Formulation using Methylglyoxal as a lead compound***

An anti-cancer formulation using Methylglyoxal as a lead compound for the

treatment of cancer has been developed by Indian Association for the Cultivation of Science, Kolkata. The formulation has broad applications and it can cover many aspects using imino acid conjugates of methylglyoxal. Methylglyoxal acts selectively against malignant cells. Its effects can be significantly augmented with natural compounds, ascorbic acid and other vitamins. Methylglyoxal is a potent anti-cancer agent through both *in-vitro* and *in-vivo* routes. The work is going on satisfactorily and results are expected during the current financial year 2007-08.

#### **16. NEW INITIATIVES TAKEN DURING THE YEAR**

All out efforts are being made to expand the area of operations of the Corporation. Further, services of a few Experts and Consultants are being utilised to avail higher degree of technical expertise for evaluation and value addition of various technologies. Some of the initiatives undertaken by the Corporation during the year are:

##### ***Basic Engineering Design Package (BEDP)***

During the financial year 2006-07, the Corporation has initiated developing Basic Engineering Design Packages (BEDP) for up-scaling the lab scale technologies; it will add immense value to technologies. Initially, the Corporation has been availing the services of consultants for developing BEDP; simultaneously, the Corporation has been developing skill and knowledge amongst its own officers on the software used for development of BEDP.

##### ***Angel Funding by way of Equity***

In order to promote fruitful utilization of the results of research work carried out in the country and to enlarge the technological entrepreneurial base in the country, the Corporation with the support from the

Administrative Ministry initiated a new activity, viz. Angel Funding for financing by way of equity, the small and medium size companies.

The financial presence of the Corporation in the venture not only lends credibility to the project but also instills confidence in the promoters, industry and other financial institutions in the prospects of the technology.

During the year 2006-07, the Corporation subscribed Rs. 30 lakhs in the share capital of M/s Dess Computer, Mumbai a software product based company. The Corporation proposes to expand this activity in the coming years.

### **17. TECHNOLOGY TRADE FACILITATION CENTRE (TTFC)**

The Corporation under the support from the Administrative Ministry has been successfully running the TTFC at the Corporation's registered office, to facilitate the exports of technology intensive products, technologies, services and projects. TTFC is truly helping SMEs to identify potential importers, in the international market for their products. During the year 2006-07, several foreign dignitaries and business delegations visited the Centre and a large number of enquiries have been generated from them. The Corporation along with its TTFC supported companies participated in various international fairs. Enquiries received during the fairs are at various stages of maturity.

### **18. HUMAN RESOURCE**

The real asset of any company is its human resource. The total manpower of the Corporation as on 31<sup>st</sup> March 2007 was 98 viz. (Group A-29, Group B-37, Group C-24 and Group D-8). The employee-management relationship was cordial throughout the year.

During the year under review, there were no employees receiving remuneration of or in excess of Rs. 24 lakhs per annum or Rs.2,00,000 per month, requiring disclosure as per the Provisions of Section 217(2A) read with the Companies (Particulars of Employees) Rules 1975.

### **19. HUMAN RESOURCE DEVELOPMENT**

Training and development at all levels of employees was given due priority by the Corporation to increase effectiveness. Special emphasis was given to organisation building and shaping right attitudes, team building and work culture, besides preparing employees to understand the trends in fast changing technology and switching over to latest technology for achieving higher results in productivity and profitability. During the year 34 executives and 4 staff of the Corporation were deputed to various training programmes to further develop their skill in various areas of management, communication, vigilance and advancement of technology.

The thrust for better utilisation of Human Resource and improvement in work practice continued during the year.

### **20. TECHNOLOGY ABSORPTION, ADAPTATION AND INNOVATION**

While a major objective of the corporation is the development and commercialisation of indigenous technology, the Corporation itself does not carry out any R&D. However, it promotes and finances R&D on a selective basis in both laboratories and industry. Hence the requirement to furnish information in respect of Technology Absorption, Adaptation and Innovation under Rule 2(B) of Companies (Disclosure of Particulars in the Report of Board of Directors) Rules, 1988, is not applicable to the Corporation.

## **21. IMPLEMENTATION OF OFFICIAL LANGUAGE**

The Corporation continued to make efforts to fulfil the targets prescribed by Govt. of India in the Official Language Act and Rules framed there in with regard to increase the use of Hindi Rajbhasha in office during the year 2006-07. Employees were motivated to use their working knowledge of Hindi in day-to-day official work. All the Standard Forms, Files, etc are bilingual. Significant progress has been made in the field of correspondence, noting and drafting in Hindi. All Hindi letters are being replied in Hindi only. The Annual

Report of the Corporation is being published in diglot form in both Hindi & English since 1986-87. The Corporation also publishes a popular Science & Technology monthly magazine in Hindi, entitled 'Awishkar'. To popularise the use of Hindi, the Corporation organised a Hindi Workshop. During the workshop, information was given regarding Official Language Act, Rules, and drafting & noting. To enrich Hindi vocabulary of the employees of the Corporation as well as visitors, an English word with its Hindi meaning is written daily on a writing board as 'Today's word' at the reception of the Corporation.



