IV. PUBLIC SECTOR ENTERPRISES

IV A. NATIONAL RESEARCH DEVELOPMENT CORPORATION

1. INTRODUCTION

National Research Development Corporation (NRDC) is the principal organisation established by the Government to act as a link between scientific laboratories and industrial establishments for transferring technologies. It is a unique organisation in that it is the only public enterprise wholly dedicated to transfer of technologies from R&D laboratories to industry. What is more, its operations cover the entire spectrum of industrial technologies ranging from chemicals to metallurgy, mechanical engineering, electrical engineering, electronics, biotechnology, etc.

The Corporation has overcome the retarded market growth and general economic recession and faced the challenge successfully with its dedicated endeavour and sustained hard work. The Corporation has been able to reverse the downward trend in profit and increased the turnover as well as the profit. The Corporation has earned a record lumpsum premia and royalty of Rs. 273.65 lakhs from licensing and commercialisation of indigenous technologies as compared to Rs. 179.28 lakhs in the previous year.

2. PROFIT

Due to sustained, hard and dedicated work of its executives and staff, the Corporation continued to earn profits. After a temporary drop in the profits in the last year, the profit has again started showing an upward trend. During the year the Corporation earned a gross profit of Rs. 33.51 lakhs against Rs. 16.15 lakhs in the previous year.

The gross income of the Corporation from all sources, including premia and royalties, but excluding Grants-in-Aid, was Rs. 408.58 lakhs as compared to Rs. 304.70 lakhs in the previous year. The unsecured loan at the end of the year stood at Rs. 93.55 lakhs as compared to Rs. 111.55 lakhs at the end of 2000- 2001.

3. PROCESSES ASSIGNED AND LICENCE AGREEMENTS CONCLUDED

To enlarge its portfolio of technologies, the Corporation continued its efforts to increase the inflow of the processes from various R&D laboratories. As a result, 27 new processes were assigned to the Corporation for commercialisation as compared to 22 processes during the previous year. Some of the commercially important processes assigned to the Corporation during the year were:

- A device for dialysis for purification and concentration of Proteins
- An improved process for making steel in electric arc furnace using molten and high carbon ferrous metal
- A process for preparing furniture and decorative items from moulded rubber, rubber or tyres and tubes and allied wastes
- A process for preparation of Fatal Bovine Serum (FBS)
- A process for preparation of Human Serum Albumin (HSA) kit
- An improved vertical prop with high setting load useful for storing mine and tunnel roofs
- A process for producing a targeted gene or drug delivery carrier
- Coco-lawn – a readymade lawn

- A process for the preparation of ultra and nearly mono-disposed inorganic nano-particles as novel non-viral vectors for efficient gene delivery
- Endotrachial & tracheostomy tube
- New and/or modified polyamide resins, their precursors and modified phenolic resins and development of their new applications.
- Ladle Heating System
- Profilometer

4. MAJOR TECHNOLOGIES LICENSED

Due to aggressive marketing of technologies, the Corporation signed 30 licence agreements during the year as compared to 16 agreements signed in the previous year. Some of the major technologies licensed by the Corporation during the year were:

- Instant Gel
- Resham Keet Oushadh
- Neem Based Pesticide Formulation
- Extraction of Azadirachtin from Neem Seed
- A Formulation for Iron Chelation for Thalassemia Patients
- Particle Board from Rice Husk
- NUTRID- Artificial Diet for Silkworm
- A Process for Targeted Gene/Drug Delivery Systems
- A Process for the Manufacture of Balarasayan Tablets
- Bio Active Compounds from Methi

5. TECHNOLOGY DEVELOP-MENT PROJECTS

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

5.1 Thrombinase – a blood clot dissolving agent

Thrombinase, a novel blood clot dissolving agent has been isolated, identified and purified for the first time from a Bacillus species at the Vector Control Research Centre, Pondicherry. The Corporation in collaboration with Malladi Research Centre, Chennai has been carrying out joint development work for further development of Thrombinase at a cost of Rs. 80 lakhs. A sum of Rs.18.94 lakhs each towards the Corporation's share of grant and loan has already been released. The Corporation has filed patent applications for the process in India, USA, EPO (Germany, Switzerland, Liechtenstin, Belgium and UK) and patents in USA (US 5434059) & EPO (EP 0624642) have already been granted. The patent granted by European Patent Office has been assigned and registered in the name of the Corporation and the process is on for registering the European Patent Grant in the respective designated countries. The experiments on rabbits and toxicological studies on dogs have been completed. The physico-chemical studies, stability studies and animal toxicological studies have been completed. Action has been initiated for clinical trials on animals. Necessary documentation is ready for the submission to the Drug Controller for obtaining approval for carrying out clinical trials at AIIMS and three other hospitals.

The Corporation has also initiated

negotiations with a few major companies abroad for licensing of the know-how and patent rights.

5.2 Lithium-Lithium Ion Battery Project

The manufacture of Polymer Lithium Battery is a multi-agency-funded developmental project of M/s Twenty First Century Battery Limited, Chandigarh costing around Rs. 27 crores based on the patented know-how of M/s. Telcordia Technology Inc., a subsidiary of Bellcore Laboratories, USA. The Polymer Lithium Batteries have many applications particularly in Cellphones, electric automobiles, photo voltaics, etc. Keeping in view the vast potential of this battery technology, the Corporation has invested Rs.50 lakhs as equity in M/s. Twenty First Century Battery Limited, Chandigarh. The trial production has commenced in October 2002.

5.3 Setting up of a Technology Information Related Portal – Techknowhub.com

Internet, being a powerful medium for conducting business, is fast catching up the imagination of business community in India resulting in the mammoth development dot.coms. However, Internet lacks contents on technologies of Indian interest and relevance. NRDC being a premier institute involved in technology transfer desires to move in and fill the gap by setting up a technology information related portal which shall provide complete information related to the technology developments required by the small & medium entrepreneurs, etc. This shall be first international portal of its kind covering the following aspects of information needs of the Industry, R&D Institutes, Universities, Researchers, etc.

- Indigenous & foreign technology
- Intellectual Property Rights (IPR)
- Certification/testing Organisation
- Awards Information
- Quality Control
- Technology Funding Agencies
- Technical barriers to Trade
- R & D Institute/University
- Individual Experts
- Short term Training Programmes leading to technology transfer

The Corporation is setting up this Portal in joint collaboration with M/s Team Cube and the Corporation has signed an agreement with them for joint development of the Portal. The total cost of the project shall be shared equally by the Corporation and M/s Team Cube. A Joint Venture company would be set up to take up the operations of the project/portal. The Portal is expected to be launched in the year 2003-2004.

5.4 Intellectual Property Rights Consultancy Services

In order to provide an effective tool for training on IPR for the benefit of industry, R&D institutes, Government departments, Educational institutes, Patent Attorneys/ Judiciary, Individuals etc., the Corporation has launched an Interactive Multimedia IPR Training Package on CD on Technology Day i.e. May 11, 2001. The Corporation

has already marketed about 80 Nos. of CDs to a large section of R&D Organisations, Industry and Universities. Some of the major buyers of the CD are IIT, Chennai; Administrative Staff College of India, Hyderabad; Tata Steel Jamshedpur; HAL, Bangalore; CMC Ltd., New Delhi; ISRO Satellite Centre, Bangalore; Karnataka Judicial Academy, Bangalore. This would help in creating awareness and spreading the message of importance of IPR and provide training on IPR issues to R&D institutes, Government Departments, Educat-ional Institutes, Industry, Patent Attorneys/Judiciary, Individuals, etc. The Corporation has already initiated the process for timely up-gradation of the CD.

The Corporation has started providing IPR consultancy to R&D Institutes & Industries to formulate the strategy for filing and registration of IPR and formulating their patent policy and handling infringement cases. The Corporation is also guiding and assisting the industry and entrepreneurs to secure Indian and foreign market by providing financial, technical, and legal assistance for patenting not only the processes or manufacturing technologies but also the product itself under its National and Foreign Patent Protection Scheme (augmented by online International Patent Search facility). During the year, the Corporation filed 50 patent applications on behalf of individual inventors and 100 patent applications on behalf of different R&D organisations.

6. PROJECTS SUPPORTED BY DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

DSIR has been supporting technology development projects under its "Programme Aimed at Technological Self Reliance (PATSER)" involving industry, research institutes and consultants. The Corporation has been identified as the agency 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. During the year 2001-2002, the Corporation has earned Lumpsum Premia and royalty amounting to Rs. 98.91 lakhs from PATSER Projects. A few of the major projects undertaken during the year under PATSER were:

- Development of stable oil in water ink emulsion based upon water reducible Nigrosine Dyes for Inkjet computer printer
- Enzymes for Bleaching and Softening
- Integrated Pilot Scale Fruit Process Unit
- Development of Next Generation Amino Silicane Based Cu Hydrosilation Technology
- Development of (i) Water based flexomks used for absorbent stock (craft paper) and coated stock (art paper etc.) and (ii) UV radiation curing inks used for stock and non-absorater as PVC Polyster etc.
- Upscaling and demonstration of Technology related to manufacture. of Cellulore Lignin Precipated Silica and Hemi Cellulise (Protein richfied etc.)
- Development of Technology for design and manufacture, calibration

and use of processor based moisture and density
- ☞ Development and demonstration of technology for the manufacture of Tetra-Bromo Bisphenol-A (TBBA Pilot Plant level)
- ☞ Design, Development & fabrication of Mini Dry Gas Cotton Seed De-liniting Plant (0.5 TPH capacity)
- ☞ Upgradation of the Process Technology
- ☞ Development of fully automated high speed blood chemistry analyser for throughput of around 1000 tests per hour
- ☞ Development of MAK World Tracker, which is a Global positioning system, data logging communication module and related subsystems.

7. MARKET SURVEYS

The Corporation has been adding value to the technologies assigned to it by carrying out market surveys, which also helps in assessing the potential of the technologies and realistic price for licensing. Market surveys not only make the technology to be licensed more complete and credible, but also help in assessing the realistic price at which the technology can be licensed. The Corporation carried out market surveys on following commercially important technologies through professional market survey agencies:

- ☞ Injection system of coke breeze in Electric Arc Furnace
- ☞ Production of low phosphorous steel in Electric Arc Furnace
- ☞ Determination of wear in a roll – Profilometer
- ☞ Laser based thickness measuring system for flat plates
- ☞ Keyless drill chuck
- ☞ Automatic recessing head
- ☞ Thread rolling head
- ☞ Cam indexing unit
- ☞ New Design of ballnose end-mill
- ☞ Ayurvedic drugs
- ☞ Unani drugs
- ☞ Portable thermoelectric vaccine chest/cooling box
- ☞ Anti-dusting powder
- ☞ Semisolid metal processing

8. INVENTION PROMOTION PROGRAMME

The Corporation continued to promote and encourage inventive talent amongst scientists, engineers, industrial workers and students by awarding prizes for meritorious inventions and providing financial assistance for fabricating prototypes setting up pilot plants to prove such inventions.

During the year 2001-2002, the Corporation received 29 proposals for prize awards.

The Corporation announced, on Technology Day 2001, cash awards amounting to Rs. 2.45 lakhs for six inventions.

World Intellectual Property Organisation (WIPO) Gold Medal has been awarded for the invention on "*Novel Spary Formulation based on Xanthen Dyes for Detecting Latent Finger Prints*" and "*SITRA Enerspin Drive System for Ring Spinning & Doubling Machines*".

Some of the meritorious inventions recognised through awards during the year were:

- ☞ Low squint non-responant wave guide slotted array antenna for surveillance Radar

- ☞ Chemical detectors for toxic gases-detector strips, short term detector tubes & dosimeter tubes
- ☞ Technology on Pollution control in Brick Kilns
- ☞ Pilfer-proof closure for containers
- ☞ Arecanut dehusking tool
- ☞ A versatile tactile drawing board for blind education

9. DEVELOPMENT & PROMOTION OF RURAL TECHNOLOGY

The Corporation continued to pursue the programme of Development and Promotion of Technologies appropriate for rural areas. The programme is aimed at bringing the key elements of the innovation chain e.g. development on a carefully selected basis, of new and innovative technologies for use in rural areas, demonstrating them under actual field conditions and interest stimulation through publications and mass media etc.

The Corporation proposed to establish a National Rural Technology Development Centre in Delhi in collaboration with IIT to showcase the various technological developments at one place to various visiting foreign delegates, dignitaries and also to demonstrate these for the benefit of the people within the country. The centre is likely to be established in 2002-2003.

10. TECHNOLOGY AND PROJECT EXPORT

10.1 Technology and Projects

The technologies offered by the Corporation 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 worldwide economic recession has affected the Corporation's efforts for export of technologies. However, the Corporation could evince interest in its technologies in several African nations. Several delegations from other developing countries were received by the Corporation during the year. Visits to industries of their interest were also arranged for establishment of projects in their own countries based on technology offers made by the Corporation. As per the agreement with Social Fund for Development (SFD), Egypt for setting up two Science & Technology Entrepreneurs Parks (STEPs) in Egypt, the Corporation has sent the reports on the proposed organisational structure of STEPs, draft MOU's to be signed between the agencies involved and has so far received US$ 125,041 out of the total contract value of US$ 462,990.

The Corporation has submitted a report to M/s Industrial Promotion Services (IPS), Abidjan, and Cote d'Ivore on transfer of technologies related to cotton farming, processing and by-product utilisation at a contract value of US $ 5000. After studying the report IPS's three-member delegation visited the Corporation from August 15-25, 2001 and visited Ahmedabad, Mumbai, Aurangabad, Jalgaon and Nagpur. The delegation expressed their satisfaction on the various technologies and it is expected that the Corporation would generate substantial business with IPS for transfer of technologies in the above

fields. The Corporation has charged US $ 15000 for the same.

The Corporation has signed a MoA with Ethiopian Maize Agro Industrial Share Company, Addis Ababa, Ethiopia for providing consultancy services for Pharmaceutical Product Registration Dossier for oral liquids (14 nos.) with contract value of US$ 9800.

10.2 Foreign Exchange Earnings

The foreign exchange earnings of the Corporation amounted to Rs. 13.32 lakhs in 2001-2002 as compared to Rs. 10.90 lakhs during the previous year.

11. PUBLICATIONS

An important activity of the Corporation is to disseminate information on new processes to industry, entrepreneurs and the general public for the promotion and commercialisation of technologies. One of the means of doing so is through publications of various types. During the year, the Corporation continued to bring out the following regular magazines and publications:

- Awishkar – (Monthly in Hindi)
- Invention Intelligence – (Bi-monthly in English)
- NRDC at Your Service
- Technological Opportunities from NRDC
- Catalogue of Technological Opportunities from India through NRDC (English)
- Catalogue of Technological Opportunities from India through NRDC (Spanish)
- Taking Ayurveda and Unani from laboratory to industry

12. EXHIBITIONS AND PUBLICITY

Participation in exhibitions, seminars, workshops, entrepreneurship development programmes etc. are of vital importance for the creation of awareness about the role of the Corporation in technology transfer. The Corporation has participated in 12 exhibitions, seminars and get-togethers in India and 1 exhibition abroad, organised by various agencies:

- International Forum for SMEs, (April 12-14, 2001 at Hotel Hyatt Regency, New Delhi)
- Asia Interprise, (April 19-20, 2001 at Ashok Hotel, New Delhi)
- Inventions Awards, (May 11, 2001 at Ashok Hotel, New Delhi)
- Shimla Knowledge.com, (Hotel Peter Hoff, Shimla)
- India-Tech 2001, (July 18-21, 2001 at Caracas, Venezuala)
- International Exhibition on Bio-technology & Food Processing, (October 6-9, 2001 at Isfahan, Iran)
- India International Coir Fair, (October 10-13, 2001 at Le Meridien Int. Convention Centre, Cochi)
- Technology Trade Pavillion, (November 14-27, 2001 at Pragati Maidan, New Delhi)
- Technology Vision, (January 3-7, 2002 at Lucknow University, Lucknow)
- Swadeshi Aarogya Mela, (February 7-12, 2002 at J.N. Stadium, New Delhi)
- WISITEX-2000 – A Complete Technology Show, (March 19-22, 2002 at Pragati Maidan, New Delhi)

13. HUMAN RESOURCE DEVELOPMENT

The thrust for better utilisation of Human Resources and improvement in work

practice continued during the year. In the drive to improve work culture and productivity, employees were exposed to need based training and development programmes. During the year 44 executives and 1 staff of the Corporation were deputed to various training programmes. Several other in-house training programmes were also conducted for various executives and staff of the Corporation

14. TECHNOLOGY ABSORPTION, ADAPTATION & 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. The details of the major development projects financed by the corporation during the year are given in the section of this report entitled "Technology Development Projects". 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.

15. IMPLEMENTATION OF OFFICIAL LANGUAGE

The Corporation continued making efforts to implement the provisions of the Official Language Act and Rules framed there under to ensure the continued use of Rajbhasha in its day to day working. Significant progress has been made in the field of correspondence, noting and drafting in Hindi. The Annual Report of the Corporation is being published in diglot form in Hindi & English since 1986-87. The Corporation also publishes a popular Science & Technology monthly magazine in Hindi, entitled 'Awishkar'. To promote Rajbhasha "The Comprehensive Glossary of Administrative Terms (Eng.-Hindi)" was distributed among the employees. English-Hindi Dictionaries were also distributed among the officers and staff in this regard. To popularize the use of Hindi, the Corporation celebrated the "Rajbhasha Pakhwara" from September 14-29, 2002. During the "Pakhwara" different types of competitions like Hindi essay writing, Hindi drafting & noting, Hindi typing, Short Speech and Hindi poetry were organized. Certificate, cash award and mementoes were given to the winners. Corporation has also participated in many Hindi competitions organized by other Undertakings. 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.