

AN OVERVIEW

1.1 The formation of the Ministry of Science and Technology was announced through a Presidential Notification dated January 4, 1985 (74/2/1/8. Cab.) contained in the 164th Amendment of the Government of India (Allocation of Business) Rules, 1961; the Department of Scientific and Industrial Research (DSIR) forms a part of this Ministry.

During 1998-99 the Minister In-charge is Dr. Murl Manohar Joshi, Union Minister for Ministry of Human Resource Development and Ministry of Science and Technology.

1.2 The Department of Scientific and Industrial Research (DSIR) comprises of the activities of the Council of Scientific and Industrial Research (CSIR), Departmental Schemes viz. Research and Development by Industry (RDI), Programme Aimed at Technological Self Reliance (PATSER), Scheme to Enhance the Efficacy of Transfer of Technology (SEETOT) and National Information System for Science and Technology (NISSAT) and two Public Enterprises viz. National Research Development Corporation (NRDC) and Central Electronics Limited (CEL).

1.3 Council of Scientific and Industrial Research

The CSIR is the national R&D organisation providing scientific industrial research for India's economic growth and human welfare. It has a country-wide network of forty laboratories and eighty field centres covering fundamental and applied R&D in all areas of science and technology barring atomic research, developing and nurturing S&T human resource for the country through extra mural support and promoting scientific talent through awards, fellowships etc.

As CSIR reorients itself to be market driven and move on the path of self-financing, its performance would be conditioned by the performance of the Indian industry and economy. Thus the rate of ECF generation from contract R&D and consultancy came down from 15 to 10%, the actual ECF going up from Rs. 190 crore to Rs. 209 crore. The contribution to creation of new knowledge was satisfactory, patent filings increased significantly, rising from 71 to 91 in the year for foreign patents and from 209 to 264 for Indian patents. The quality of papers contributed also showed a healthy upward trend although the number remained nearly static. CSIR's all round performance during the year was satisfactory. Most significant among its activities has been the winning initiative for revocation of US patent on turmeric, which besides confirming CSIR's pioneering efforts to successfully

safeguard traditional Indian knowledge, created an unprecedented positive public goodwill for the CSIR. More importantly this success had some far-reaching effects viz: it demonstrated that CSIR and other Indian institutions were acquiring capabilities to fight the complex techno-legal issues of IPR, both defensively and aggressively, to meet the challenges under the WTO regime; it showed the importance of appropriate documentation and public availability of records of traditional knowledgebase in a systematic manner, which can be provided as evidence of prior knowledge; it reassured the Indian people of the fair and transparent operations of the IPR system.

Some of the recent achievements of CSIR covering a wide spectrum are as follows:

The significant scientific achievements are:

In the field of Bio-sciences Including Therapeutics: regulation of cell growth, liposome entrapped mite allergen, functional studies of lectins, tumor biology, brain cytochrome p450(s) enzymes, new approaches in chemotherapy of malaria, rapid screen for anti-TB drugs, molecular epidemiology of cholera, drug induced gastric hyperacidity, molecular studies on cytoplasmic male sterility, plant pathogens, DNA marker for papaya sex identification, somatic embryogenesis in mango, azadirachtin and limonoids in the Indian neem tree, antibacterial activity of Indian tree species and marine fouling & corrosion studies; **in the field of Chemical Sciences & Technology:** liquid membrane modelling, pillaring of ion-exchanged clays, transition metal complexes with designed ligands, new chemical entities and Synthesis of N-protected precursors of synthetic sweetener Aspartame; **in the field of Electronics & Instrumentation:** electron cyclotron resonance source plasma, chemical composition of rainfall monitor and high performance CPU without secondary cache; **in the field of Engineering:** Control of Fly-rock due to blasting, Rural roads in Andhra Pradesh, Wind tunnel studies on structural models, Studies on vibration control of structures and foundations, Finite element analysis of large structures using parallel processing, Fatigue investigations of offshore structures, Creep damage and life assessment, Mining machinery Components and Industrial roofing system using cold forming steel section; **in the field of Food Processing:** Lipase catalysed esterification, Spices as nutraceuticals and Biofumigants for the control of insect pests; **in the field of Information Products:** Mathematical Models for Assessment of stability and Benchmarking the best practices of Research and Technology Organisations (RTOs); **in the field of Material Sciences & Technology:**

RF-SQUID effect in borocarbide superconductors, Thermal modelling of DC continuous casting and Foaming behaviour of FeO in slags during reduction; **in the field of Physical Sciences & Earth Resources:** Modelling of Biogeochemical cycles of the Indian ocean, Crustal deformation using global positioning system, in-situ stress measurement, Earthquake Studies and Oceanographic Studies and **in the field of Societal & Human Welfare:** Neuroendocrine Regulation of Silk Protein biosynthesis.

The significant technological achievements are:

In the field of Bio-sciences Including Therapeutics:

Universal polymer support for synthesis of oligoribonucleotides, Diagnostic probe for leishmaniasis, Assay for Acute Lymphoblastic Leukemia (ALL), Human trial of a non-toxic cholera vaccine, Novel usage of di-tert-butyl polycarbonate (DTBP), Isovitamin C by a genetically altered organism, Mini Chrysanthemum – CV. Mother Teresa, Application of chloro choline choride for bulb production of Tulips, Ocimum carnosum, a potential source of natural elemicin, New varieties of damask rose, Production technology for rose oil and rose water, Tissue Culture for Licorice & Ashwagandha, Plant transformation Technology, Biodegradation of endosulfan from contaminated soils and Wildlife management by genetic fingerprinting; **in the field of Chemical Sciences & Technology:** Foam as a reaction medium, Clay supported new reagents, Chiral template for enantiomers, Membrane/ Adsorptive separation, Oxidative Coupling of Methane (OCM) to C₂-Hydrocarbons, Isomerization of O-dichlorobenzene to M-dichlorobenzene, CFC-113a technology for pyrethroids, Electro-chemical systems of naphthoquinone, Pyridine based chemicals, Cardanyl Acrylate and Poly Acrylate, Pervaporation Technology, Conversion of Methane to Syngas, Conversion of Natural Gas to Lower Olefins, Menthol Manufacture, Soaker visbreaking technology, Mini Refinery, Reaction Engineering Laboratory and State-of-art system for chemical reaction studies; **in the field of Electronics & Instrumentation:** Electrical double layer capacitors (EDLC), Solid state room temperature gas sensor, Speed indicating and recording instrument for locomotives, Instrumentation for Microelectronics, RF Hyperthermia system for cancer therapy, Receivers for optical communication, Land based Digital Seismic Data Telemetry System, Inclinator probe with digital indicator and PC based data acquisition system for thermo physical studies; **in the field of Engineering:** Supersonic combustor development, Development of powered hang glider, Wide Stall Mining Without Stowing, Multiblend cement, Natural rubber latex based cement concrete, Epoxy concrete for machine bed, Corrosion resistance of fly ash cements, Composition for Quick Setting of Cement, Flyash for highway embankment construction, Bio-energy for brick kilns, Cold forming of aluminium bicycle hubs, Improved iron removal for potable water, Decorticator for groundnut

seeds, Remotely operated vehicle, Draft Tube (DT) Cone, Lignin from paper mill effluents, Bioremediation for Crude Oil contaminated soil and Eco-friendly coke-less cupola for Agra foundries; **in the field of Food Processing:** Modified atmospheric packaging, Technology protocols for mango export, Dehydrated green pepper, Dehydration of meat and Salt from the brines of Jambusar - quality improvement; **in the field of Information Products:** Software for fragment analysis, Software for electromagnetic design, Software for cathodic protection in off-shore platforms, Software for the Analysis of Deflection Data, Engineering database on landslides, Multi-media database creation, CD-ROM Activities, Publication of research journals, Special Publications, Popularisation of Science, Documentation centre for RGNDWM and Electoral Roll Database; **in the field of Material Sciences & Technology:** High temperature superconducting wires/tapes and tube conductors, Carbon fibre epoxy prepregs, Ultra low expansion transparent glass-ceramic, Radiation Shielding Windows (RSW) glass, Flotation column for industrial applications, Tiles from ferro-chrome and other industrial wastes, Improvement in efficiency of ferro-chromium process, Masonry cement from industrial wastes and Transmittance Standards for the infrared; **in the field of Physical Sciences & Earth Resources:** Green house gas inventory, Laser Heterodyne System in Antartica, Identification of deep seated weak zones, Gravity anomaly map and Comparative assessment of clean coal technologies; Studies and **in the field of Societal & Human Welfare:** Leather Technology (LTM), Rehabilitation of tanners in Tamil Nadu, Value added products from tannery wastes, Ethnobotanical investigations of Kangra Valley in Himachal Pradesh, Improvement in rose oil distillation unit, Mechanisation of tea plucking, New propagation technology for tea, Banana Fibre, Fresh water prawn cultivars, Habilitation of the mentally challenged people and Floriculture Industry in H.P.

1.4 The major programmes of Department Of Scientific and Industrial Research (other than CSIR) have been grouped as under:

I Research and Development by Industry (RDI) consisting of:

- (a) In-house R&D by corporate/ commercial sector of Industry.
- (b) R&D by Scientific and Industrial Research Organisations (SIROs).
- (c) Fiscal Incentives for Scientific Research.

II Programme Aimed at Technological Self-Reliance (PATSER) consisting of:

- (a) Development of new or improved technologies.
- (b) Development of special/custom built capital Goods.

- (c) Absorption and Adaptation of imported technology.
- (d) Studies and interactions concerning Technology Evaluation and pre-industry feasibility of major sectors/products.

III Scheme to Enhance the Efficacy of Transfer of Technology (SEETOT) consisting of:

- (a) National Register of Foreign Collaborations (NRFC).
- (b) Industrial Technology
- (c) Transfer and Trading in Technology (TATT).
- (d) Promotion and Support to Consultancy Services (PSCS) which also include the Consultancy Development Centre (CDC).

IV Linkages with International Organisations

V National Information System for Science and Technology (NISSAT).

VI Public Enterprises viz.

- (a) National Research Development Corporation (NRDC).
- (b) Central Electronics Limited (CEL).

1.5 Research and Development by Industry (RDI)

DSIR is the nodal department for granting recognition to In-house Research and Development centres; there were 1222 units having valid recognition as on 31 December 1998. 250 In-house R&D centres incurred an annual expenditure of over Rs.1 crore and above. During the year, 59 in-house R&D centres were accorded fresh recognition and 447 centres were accorded renewal of recognition. During the year 1998, Twelfth National Conference on In-house R&D in industry was organised; DSIR National Awards were presented to 6 industrial units; Compendium on in-house R&D Centres (1998), Outstanding in-house R&D Achievements (1998) and 4 issues of In-house R&D in Industry Update were brought out.

Scientific research foundations in the area of medical, agriculture, natural and applied sciences and social sciences seek DSIR approval as Scientific and Industrial Research Organisations (SIROs) under the DSIR scheme of granting recognition to Scientific Industrial Research Organisations (SIROs). SIROs approved by DSIR are eligible for the notification under 35(1)(ii)/(iii) of I.T.Act 1961 and for availing customs duty exemption on import of equipment and excise duty assumption on the purchase of essential scientific and technical instruments, apparatus, equipment (including computers), accessories and spare parts thereof and consumables required for research and development activities and programmes. During the year, 19 new SIROs have been accorded DSIR recognition and 165 SIROs have been accorded renewal.

Government has introduced a few incentives to encourage investments in R&D by industry. These include depreciation allowance on plant and machinery set up based on indigenous technology, Customs duty exemption on goods imported for use in Government funded R&D projects, Customs & Excise duty exemption to recognised SIROs. During the year 1998, 11 certificates involving Rs. 2744 lakhs on cost of plant and machinery, 18 certificates for import of capital equipment and consumables/materials for R&D projects supported by DSIR, 700 essentiality certificates for claiming customs duty exemption amounting Rs. 35 crores, 53 essential certificates for claiming excise duty exemptions amounting Rs. 153.63 lakhs were issued by DSIR.

DSIR is nodal department for registration of Public funded research institutions/universities/ IITs / IISc., Bangalore/RECs other than a hospital for availing Customs Duty Exemption in terms of Notification No.51/96 dated 23, July 1996. During the year, 175 such institutions were registered with DSIR.

1.6 Programme Aimed at Technological Self Reliance (PATSER)

Under the "Programme Aimed at Technological Self Reliance" (PATSER) the Department has so far supported about 85 R&D projects of Industrial units. These projects cover products and processes in various important industries such as metallurgy, electrical, electronics, instrumentation, mechanical engineering, earth moving and industrial machinery, chemicals and explosives. The projects in progress include those of M/s Semiconductor Complex Limited, (SCL), Chandigarh and C- DAC, Pune for development of ASIC (Application Specific Integrated Circuit) for Indian languages computing system GIST-II and the related card; M/s Semiconductor Complex Ltd. (SCL), Chandigarh and M/s Bharat Heavy Electricals Ltd. (BHEL), Bangalore for development of the ASIC and ASIC based 3 Phase multifunctional electronic energy meter for industrial applications; M/s Turbotech Precision Engineering Pvt. Ltd. (TPEL) and National Aerospace Laboratories (NAL), Bangalore for the development of low cost gas turbine (LCGT) generator set of 500 KW power class, with multi fuel capability (biogas, piped natural gas and diesel fuel); M/s Andrew Yule & Co. Ltd., Calcutta for development of rough top rubber conveyer belting; M/s Bharat Earth Movers Ltd.(BEML), Bangalore for the design and development of 460 HP Wheel Dozer; M/s ACE Designers Ltd. and CMTI, Bangalore for development of PC Based CNC System.

The completed technology development projects supported under PATSER Scheme have resulted in significant technological and commercial returns to the industries concerned such as cost reduction, higher quality, improved products and processes as well as foreign exchange savings, while building up the R&D capabilities of the industrial units.

The on-going projects are expected to result in high commercial / societal impact and will lead to commercialisation and utilisation of 'state-of-the-art' technologies.

A new programme called 'Technopreneur Promotion Programme' (TePP) which aims to support individual innovators be they be housewives, artisans, farmers, students etc., in their attempts to commercialise their innovations has been introduced by PATSER alongwith 'Home Grown Technology Programme' of TIFAC(DST). 5 proposals have been financially supported so far and the others are in process.

1.7 Scheme to Enhance the Efficacy of Transfer of Technology (SEETOT)

The Department continued its activities relating to the scheme on National Register of Foreign Collaborations & Technology Management (NRFC & TM). A compilation of primary data on FCs for the year 1997 was brought out. Computerisation of data collected on foreign collaborations for 1997 has been completed. During the year, reports on Market and Development prospects of Fruits and Vegetable Processing industry in the Eastern and North Eastern Regions was finalised. A status study covering the performance of the DSIR national award winning technologies and companies is also being completed. With a view to enhance capabilities in the area of Technology Management, a number of programmes have been initiated and are in progress. These include case studies on Technology Management, bringing out bibliographies on various areas of technology management and others. Interaction meets were organised covering inter-alia awareness programmes on Intellectual Property System, technology acquisition and other related issues.

Under the Scheme on Transfer and Trading in Technology, activities carried out include: setting up of a Technology Exports Pavilion at India International Trade Fair' 1998 (IITF'98), in Pragati Maidan, New Delhi in which 12 organisations including industrial companies and research laboratories participated and displayed their technological capabilities; organisation of a "Seminar on Technologies from India" covering 3 sectors, viz. Drugs & Pharmaceuticals, Chemicals & Petrochemicals and Food Processing & Packaging; release of 3 quarterly issues of a Newsletter on Technology Exports; printing and release of a publication on Non-Conventional Technology Based Services- Capabilities & Export Opportunities; printing of a Compendium of Technology Exports from India covering data on technologies and services exports during 1995-96; printing of a brochure on Transfer and Trading in Technology Scheme; and launching of "Technology Exports Development Organisation", an institutional mechanism to promote technology exports, as recommended by the Task Force on Technology Exports.

The scheme relating to promotion and support to consultancy services essentially aims to strengthen consultancy capabilities for domestic and export markets. During the period under review the main activities have been towards setting up of design and engineering service centre for Food Processing Industry at Kanpur and a Consultancy Clinic for Textile Industry at Bhilwara primarily to help small and medium industries. Besides, Studies on. (i) Status of Consultancy services in India, and (ii) Policies and Incentives for Consultants in various countries were carried out, and institutional and programme support to Consultancy Development Centre (CDC) was provided.

CDC was promoted in January 1986 as a non-profit society, primarily with a view to implement some of the programmes of DSIR. CDC is implementing a programme on Consultancy Development, Promotion & Assistance (CDPA) scheme, maintains a computerised database of consultants, organises training particularly on ISO-9000 and ISO-14000 and Human Resources development Programmes for promoting consultancy, conducts programmes sponsored by other agencies. DSIR is providing recurring and non-recurring support to CDC. First National Consultancy Congress was conceptualised and organised on 15th January 1998, the foundation day of CDC and National Awards for Excellence in Consultancy were given away. Second Conference was organised on 15th January 1999, with the theme of "Project Management & Financing". To enhance technological and managerial capabilities of consultants as well as export capabilities, interactions with international organisations such as World Bank, APCTT, ITC and ESCAP were organised by CDC. Under the post graduate degree (MS) programme in Consultancy Management in association with BITS, Pilani 17 trainees of the 4th batch were undergoing training.

1.8. Linkages with International Organisations

During the year, the Department continued to participate in the activities of various international organisations such as UNCTAD, WIPO, UNIDO, ESCAP and APCTT at various levels and forums on issues related to Technology Development and Technology Transfer in coordination with other concerned Ministries.

DSIR participated in the Fourteenth Technical Advisory Committee meeting of Asian Pacific Centre for Transfer of Technology (APCTT) and the Thirteenth session of the Governing Board of APCTT held in Manila, Philippines.

1.9. National Information System for Science & Technology (NISSAT)

National Information System for Science & Technology (NISSAT) promotes and supports the development of a compatible set of information systems on science and

technology and interlinks these into a network to facilitate the effective transfer of latest information to users in all parts of the country.

NISSAT programme continued support to information centres to meet information needs of scientists, technologists and decision makers. The activities of the NISSAT centres were augmented and their services and revenue generation improved. The NISSAT Access Centres on International Databases Services continued services on full cost recovery basis. Five metropolitan library networks in Calcutta, Bombay, Pune, Ahmedabad and Mysore continued their services related to interlinking of information resources in a metropolitan area. NISSAT established Value Added Patent Information System (VAPIS) at NCL, Pune and CMTI, Bangalore to offer specialised value added information services. Selective Dissemination of Information (SDI) is provided by institutions by using databases like ADONIS, BIOSIS, BNB, BOOKFIND, COMPENDEX, CHEMBANK, DISCOVER, IFIS, INSPEC, NTIS, TTD, World Research Database and ISDS. Library automation software programmes viz. SANJAY and TRISHNA were maintained. The quarterly NISSAT Newsletter viz. Information Today & Tomorrow (ITT) is produced in cooperation with NISSAT centre at CLRI, Madras for dissemination of information related activities.

1.10. Public Enterprises

Two public enterprises namely, National Research Development Corporation (NRDC) and Central Electronics Limited (CEL) attached to the DSIR were engaged in important activities of development and commercialisation of indigenously developed technologies.

Some of the major technologies licensed by NRDC during 1997-98 include Biodegradable plastic, Liposomal

Amphotericine-B, Vijetha (Silkworm bed Disinfectant), Silver Impregnated Graphite, Rice Husk Particle Board, NIM76 – A Spermicidal formulation from neem oil, Dental varnish etc. The Corporation has successfully completed the preparation of 40 project profiles for industrial projects and services for Industrial Project Services, Etheopia.

Central Electronics Limited (CEL) holds a unique position among the family of Public Sector Enterprises in electronics, with its emphasis on indigenous technology inducted both from its in-house developments and from the National Laboratories, for its production programme in diverse high-technology areas of national importance. The activities of CEL are sharply focused in three thrust areas:

- (i) Solar photovoltaic cells, modules and systems for a variety of applications.
- (ii) Selected Electronic Systems-Equipment for Railway Signaling and Safety, Cathodic Protection Equipment for Oil Pipelines, Switching Systems and Very Small Aperture Terminals (VSATs).
- (iii) Selected Electronic components-professional (Soft) Ferrites, Electronic Ceramics, Piezo Electric Elements and Microwave Components.

CEL has been the pioneer in the country in the areas of solar photovoltaics, ferrites and piezo ceramics. Today, it enjoys the international status of being among the top producers of single crystalline silicon solar cells in the world.

2. During the year 1997-98, there was an all-round progress and growth in the activities under different programmes of DSIR.