

II A. RESEARCH AND DEVELOPMENT BY INDUSTRY

1. OBJECTIVES

The activity pertaining to Research & Development by Industry (RDI) is an important component of the plan scheme "Technology Promotion, Development and Utilisation (TPDU)".

The broad objectives of RDI are:

- ☞ to bring in-house R&D into sharper focus;
- ☞ to strengthen R&D infrastructure in industry and Scientific and Industrial Research Organisations (SIROs);
- ☞ to promote R&D initiatives of the industry and SIROs;
- ☞ to ensure that the contributions made by the in-house R&D centres and SIROs dovetail adequately in the overall context of technological and industrial development.

2. AREAS OF COVERAGE

The specific areas covered under the component are:

- ☞ In-house R&D in Industry
- ☞ Scientific and Industrial Research Organisations (SIROs)
- ☞ Fiscal Incentives for Scientific Research

The activities and achievements in each of the above areas are presented below:

3. IN-HOUSE R&D IN INDUSTRY

3.1 Recognition of In-House R&D Units

A strong S&T infrastructure has been created in the country. This includes

a chain of national laboratories, specialised R&D centres, various academic institutions and training centres, which continuously provide expertise, technically trained manpower and technological support to the industry. Various policy measures have been introduced from time to time, to meet the changing industrial and technological requirements of the industry. The Government has been giving special attention to promotion and support to industrial research in industry. Several tax incentives have also been provided which encourage and make it financially attractive for industrial units to establish their own in-house R&D units.

A scheme for granting recognition to in-house R&D units in industry is operated by the Department of Scientific & Industrial Research. The incentives and support measures presently available to recognised in-house R&D units include:

- ☞ Income-tax relief on R&D expenditure as per Income-tax Act; weighted tax deduction for sponsored research programs in approved national laboratories, universities and IITs;
- ☞ weighted tax deduction on in-house R&D expenditure in chemicals, drugs, pharmaceutical (including clinical drug trials), bio-technology, electronic equipment, computers, tele-communication equipment and manufacture of aircrafts and helicopters;
- ☞ accelerated depreciation allow-

ance on new plant and machinery set up based on indigenous technology;

- ☞ customs duty exemption on goods imported for use in Government funded R&D projects;
- ☞ excise duty waiver for 3 years on goods designed and developed by a wholly Indian owned company and duly patented in any two countries from amongst India, USA, Japan and any country of the European Union;
- ☞ 10 years tax holiday to commercial R&D companies;
- ☞ financial support for R&D projects;
- ☞ National Awards for outstanding in-house R&D achievements and commercialisation of results of public funded R&D, besides other indirect benefits.

The in-house R&D units qualifying for recognition are expected to be engaged in research and development activities related to the line of business of the firm, such as, development of new technologies, design and engineering, process / product / design improvements, developing new methods of analysis and testing; research for increased efficiency in use of resources, such as capital equipment, materials and energy; pollution control, effluent treatment and recycling of waste products.

The R&D activities are expected to be separate from routine activities of the firm, such as, production and quality control. The in-house R&D units should have staff exclusively engaged in R&D and headed by a full-time R&D manager who would

have direct access to the chief executive or to the board of directors depending upon the size of the unit.

Number of in-house R&D units recognised by DSIR has increased steadily from about 100 in 1973 to about 275 by 1975, to over 700 by 1980, around 925 by 1985, over 1100 in 1990 over 1200 in 1995 and thereafter is hovering around 1200; and was 1175 in December 2002. Of these, nearly 1090 are in the private sector and the remaining units are in public/joint sector. A revised and updated '*Directory of Recognised in-house R&D Units*' was brought out during December 2002. This directory lists 1175 recognised in-house R&D units, giving registration number, name and mailing address of the company, location of the in-house R&D unit(s) and validity of DSIR recognition.

For the purpose of recognition, the R&D units have to apply to DSIR as per a prescribed proforma. The proforma and other details about the scheme are provided to the interested companies on request. The proforma and details of the scheme are also available at DSIR website (<http://www.dsir.nic.in>). The applications, after initial scrutiny in the DSIR, are circulated for comments to various other departments/ agencies such as concerned administrative ministries, DCSSI, CSIR, ICAR, ICMR, ICAS, DBT, DCPC, DoT, DRDO, MIT and NRDC. The units seeking recognition are visited, if need be, by expert teams comprising of representatives of DSIR, as well as outside agencies, like, administrative ministries, CSIR, NRDC, ICAR,

ICMR, DRDO, DOE, DoT, IITs and local educational and Research Institutions before they are taken up for consideration. In order to obtain first hand information on R&D activities of the applicant firms, discussions with the chiefs of the R&D units and executives of the firm are also held in DSIR in many cases. During such discussions, outside experts are invited and their comments are sought. The applications along with comments from outside agencies, visit reports, and the Department's own an Inter-Departmental Screening Committee constituted by the Secretary, DSIR, considers evaluations. The Committee meets every month to consider the applications and makes recommendations to the Secretary, DSIR based on its evaluation of R&D infrastructure and R&D activities of the applicant firms.

During the year 2002, the Screening Committee met 12 times and considered 136 applications for recognition; 104 R&D units were granted fresh recognition and 32 applications were rejected.

The pendency at the end of December 2002 was 33. A statement giving month-wise receipt, disposal and pendency of applications for recognition of in-house R&D units is given at *Annexure 1*.

During the year 2002, over 350 discussions / meetings were held with heads of in-house R&D units. A number of in-house R&D units, wherever necessary, were visited by expert teams to obtain first hand assessment of the R&D work, infrastructural facilities and other

claims made by the in-house R&D units.

3.2 Renewal of Recognition

Recognition to R&D units is granted for a period ranging from 1 to 3 years. The R&D units are advised to apply for renewal of recognition well in advance (3 months prior to the date of expiry of the recognition). Applications received for renewal of recognition are circulated to CSIR, NRDC and/or the concerned administrative departments of Government of India for comments. The applications are examined in DSIR taking into account the inputs received from other agencies. During the year 2002, 275 in-house R&D units were due for renewal of recognition beyond March 31, 2002; of which 238 applications were received. Based on the evaluation of the performance of the R&D units, renewal of recognition was granted to 228 R&D units. Recognition granted to 9 companies could not be renewed as their R&D performance was not up to the mark and one application is pending for want of additional information. A statement showing month wise receipt, disposal and pendency of the cases of renewal of recognition of the R&D units is given at *Annexure 2*.

3.3 Zonal Distribution of In-House R&D Units

The in-house R&D units are distributed throughout the country. There are around 185 units in the Northern Zone (Delhi, Haryana, Punjab, Uttar Pradesh, Jammu & Kashmir), around 100 units in Western Zone (Rajasthan and

Gujarat), around 450 units in the Central Zone (Maharashtra, Madhya Pradesh and Orissa), around 350 units in the Southern Zone (Andhra Pradesh, Karnataka, Kerala and Tamil Nadu) and around 90 units in the Eastern Zone covering Bihar, West Bengal, Assam and other north eastern states.

3.4 R&D Expenditure

The expenditure incurred by in-house R&D units in industry has steadily increased. During 1980-81, it was of the order of Rs. 300 crores. In 1985-86, it was of the order of Rs. 500 crores. It is estimated that the present R&D expenditure of the 1175 recognised R&D units is of the order of Rs. 2650 crores. The share of public and joint sector is about 21% and that of private sector about 79%. As many as 90 in-house R&D units spend over Rs. 5 crore each on R&D, 219 in-house R&D units spend between Rs. 1 crore to Rs. 5 crore each per annum on R&D. The list of these R&D units is given in *Annexure 3* and *4* respectively.

3.5 R&D Infrastructure

The in-house R&D centres have created impressive infrastructural facilities for R&D including sophisticated testing facilities, laboratory equipment and pilot plant facilities. Analytical facilities such as HPLCs, IR spectrophotometers, UV-Vis spectrophotometers, NMR spectrometers, electron microscope, particle size analyzers, high temperature test and evaluation facilities, CAD-CAM facilities, EDM's, greenhouse and tissue culture laboratory facilities are

available with many in-house R&D units.

3.6 R&D Manpower

There has been a steady increase in R&D manpower employed by the in-house R&D units. By 1975-76 about 12,000 R&D personnel were employed by recognised in-house units, and by 1981-82, the figure was over 30,000. The present estimated manpower for the 1175 in-house R&D units is around 50,000, out of which around 17,500 R&D personnel are employed in public sector in-house R&D units and around 32,500 R&D personnel in the private sector in-house R&D units. Of the total 50,000 R&D personnel, around 2700 are PhD's, 16,500 post-graduates, 14,000 graduates and the rest are technicians and support staff.

3.7 Sectorwise Break-Up of In-House R&D Units

A broad sector-wise break-up of the recognised in-house R&D units is as below:

Chemical and Allied industries	450
Electrical and Electronic industries	290
Mechanical Engineering industries	200
Processing industries (Metallurgical, Refractories, Paper, Cement, Ceramics, Leather and others)	155
Agro and food processing industries and others	80

3.8 In-House R&D Units: Output

Some of the R&D achievements reported by the recognised in-house R&D units are listed below:

3.8.1 Chemical and Allied Industries

- ☞ Development of products, such as, C-reactive protein (CRP) antigen for breast cancer (CA15-3), ovarian cancer (CA 125) and Hepatitis B surface antigen (Hbs Ag).
- ☞ Development and commercialization of single flow through anti-HCV/spot immuno dot test kit, para HIT-F Malaria Test Kit and modified Widal test kit.
- ☞ Development and commercialization of atrovastatin calcium, leflunomide, cefotaxime, proxitil, didanosine, celastatin and nateglinide
- ☞ Development of rifabutin capsule for treatment of multi-drug resistant tuberculosis and 4-drug combination of anti tuberculosis drugs as per WHO recommended formulation.
- ☞ Development of process for Zeaxanthin 95%; aescin 95% from *Aesculus hippocastanum* and anti-amylase principle from *Phaseolus Vulgaris*
- ☞ Development of bulk drugs such as gliciazide, ebastine, tenazepam, moclobemide and intermediates sertralone for sertraline hydrochloride and zolpidic acid for golpiden tartrate.
- ☞ Development of I.V. Gama immunoglobulin (Human), snake venom anti-serum and amphoterecin-B (Lipid complex)
- ☞ Development of candesartan cilexetil, roxithromycin granules, clarithromycin granules, zidovudine and clopidogrel hydrogensulphate
- ☞ Development and commercialization of manufacturing processes for bulk drugs, such as, celecoxib, rofecoxib, abacavir, glimipiride, tibolone, tamsulosin and moxifloxacin.
- ☞ Development and commercialization of S-Adenosyl-methromine in different dosage forms.
- ☞ Development of technology for controlled release formulation and mouth dissolving tablets of nimesulide.
- ☞ Development of new antidepressant molecule citalopram hydrobromide
- ☞ Development and commercialization of 2-Amino-4-picoline; Phenyl pyridyl aceto-nitrile; Cyclo pentyl mandelic acid; Sodium tertiary butoxide and 2-Amino-6-methyl pyridine.
- ☞ Development of technology of metallized high barrier biaxially oriented polypropylene (BOPP) film
- ☞ Development of improved eco-friendly process for the manufacture of quinoxalinol an intermediate for quinalphos.
- ☞ Development of process for the manufacture of propiconazole; tricyclazole and Q-grade profenofos (95% pure)
- ☞ Development of perfumery products, such as, supersantol; mohanol; safranal; ISO damascone
- ☞ Development of a water stable gel for the purpose of transporting aqua-culture

- additives as top dressing of fish or shrimp.
- ☞ Development of process for the manufacture of melamine based flame retardant for polyolefin surface coating of nylon-6/poly propylene composites
- ☞ Development of products, such as, sweetening catalyst for LPG and additive for pour point depression / cutter stock reduction, in oil refineries.
- ☞ Development of recombinant human interferon alpha-2 for therapeutic use
- ☞ Development of reference material for uranium oxide
- ☞ Conceptualisation & implementation of “Zero Discharge” scheme of capacity 150KL/hr at Chennai Petroleum Corporation Ltd.
- ☞ Development of an innovative use of hydrogen peroxide in wastewater treatment in a large scale petroleum refinery

3.8.2 *Electrical and Electronics Industries*

- ☞ Development of "LED TV" based true color day/night video compatible waterproof electronic display system for outdoor operation.
- ☞ Development of a cost effective digital loop carrier for fiber SDH, STM-1 Ring
- ☞ Development of an auto pilot field tester “UPPA-2”; clock tester “PPCH-7M”; fuel flow tester “UPR-4A”; test panel for ASP PF “KPA-PF”; test set for accelerometer and ‘G’ sensors “KPA-ADP” for aeronautical application.

- ☞ Development of interactive small arms training simulator and hand grenade training simulator.
- ☞ Commercialization of multiplexer interface digital (MID-4A) technology for bulk encryption equipment developed by LRDE, Bangalore and low cost jammer station and DF monitoring and analysis U/VHF terminal, based on technology developed by DLRL, Hyderabad.
- ☞ Development and commercialization of air frame wires & cables for MIG, LCA, Dornier, PTA, ALH, civil aircraft and missiles; Launcher cables for IAF-7 BRD; Space wires & cables for satellites; Electron beam irradiated insulated cables for locomotives and Shipboard cables for naval applications.
- ☞ Development of tactical data link software for Indian Navy; software for computerized automation of cooling system and knowledge based engineering software kernel.
- ☞ Development of microprocessor based resistivity meter for scanning surface formations and microprocessor-based Automatic Voltage Regulation for standard alternators.
- ☞ Development of digital cable fault locator for low insulation cables; portable cable fault locator; Universal fault locator; optical fiber laser light sources of 1310 nm and 1550 nm wavelength.
- ☞ Design & fabrication of special purpose coil winding setup to wind double pancake super conducting excitation coils for quadrupole & sextupole magnets; Coil winding setup to wind

super-conducting magnets for cyclotron project and coil winding setup for making super conducting race track coil magnets.

- ☞ Design and development of an on-line ultrasonic test system for zirconium alloy thin walled small diameter tubes and ultrasonic crack detector test system for shells
- ☞ Development and commercialization of an electronic voting machine with automatic dependent surveillance system
- ☞ Design and development of an upgraded version of LED based solar powered hybrid traffic signals
- ☞ Design and development of split power supply source for aircraft testing
- ☞ Development of alternators with cylindrical rotor construction suitable for high speed turbine prime movers and development of AC induction motor for hybrid electric vehicle
- ☞ Development of an advanced technology for the manufacture of high energy density lead acid batteries.
- ☞ Design, development and commercialization of ultra-thin primary lithium battery
- ☞ Development of CTV models with key features such as hyper band, Internet TV, golden eye and golden ear and development of Internet TV.

3.8.3 Mechanical Engineering Industries

- ☞ Design, development and manufacture of CNC perforating machine (automatic) for perforating holes in thin and

large area flexible aluminized polyester film for space applications

- ☞ Development of planetary gearboxes for sugar mill drive
- ☞ Design and development of a low-pressure extraction system for sugar cane milling
- ☞ Design & development of landing gear systems for Light Combat Aircraft (LCA), Advanced Light Helicopter (ALH), Saras Light Transport aircraft and HJT-36 Inter-mediate Jet Trainer
- ☞ Indigenous development of fuel-efficient engines of 65, 49 and 40 hp range for upgrading existing HMT 5911; HMT 4511 and HMT 3522 tractors
- ☞ Design and development of high speed vertical machining centre; High speed horizontal machining centre; 5 Axis CNC gear tooth chamfering machine; Special purpose horizontal duplex machining centre and Special purpose vertical fine boring machine
- ☞ Development of injection moulding machines (40T-150T), thermoset 150 T machine and high speed digital signal processor based control system for plastic industry.
- ☞ Design & development of load tolerant tandem hydraulic gear pump for loader and excavators for mining and construction sites
- ☞ Design & development of high pressure mobile air compressor
- ☞ Design, development and commercialization of high power density engines for gen-set application and export worthy engines for tractors with reduced

emission to meet US tier-1 emission norms.

- ☞ Design and development of number of models of two/three wheeler vehicles
- ☞ Development of an advanced occupant restraint system for enhanced occupant safety in accidents on Tata Safari vehicles to meet basic requirements of European and Australian market
- ☞ Design and development of a multi-energy X-ray baggage inspection system
- ☞ Development of chain with chromised pin for better wear resistance and sigma chain with modified geometry for improved wear life
- ☞ Indigenous development of film type sulphur burner for sugar industry.
- ☞ Development of portable shelters for defence electronic systems
- ☞ Indigenous development of induction ladle refining furnace (INDU-LRF)

3.8.4 Processing Industries

- ☞ Development of aluminium-zinc-magnesium alloy with high weldability & strength; G57S alloy aluminium flooring sheets; indigenous non-staining hydraulic oil and high quality polishing grades of alumina.
- ☞ Process development and commercialisation of extremely high purity aluminium chloride for application in silicon chip industry and high purity tin tetrachloride
- ☞ Development of a process for fully automatic gas based cotton seed delinting plant based on acid hydrolysis using HCL gas

- ☞ Commercialisation of detonation spray coating technology (DSC) for coating of various components for aviation turbine blades technology developed by Advanced Research Center for Powder Metallurgy and New Materials, Hyderabad
- ☞ Process development for preparation of emulsified fuel oil and LPG maximisation in fluidised catalytic cracking unit (FCCU)
- ☞ Development of an improved process for *Lactobacillus sporogenes* (a probiotic)

3.8.5 Agro and Food Processing Industries

- ☞ Development of moisture stress tolerant hybrids of sunflower for drought prone areas of Karnataka, Andhra Pradesh, and Maharashtra; high yielding non - aromatic white fluffy hybrid rice for coastal agri-eco-systems and under developed regions of Orissa, Bihar and West Bengal
- ☞ Development of CMS hybrid seeds of cabbage & cauliflower (an import substitute)
- ☞ Development of cabbage and cauliflower hybrids for cultivation during summer season
- ☞ Development of new hybrids of vegetables for export market
- ☞ Development of tissue culture methods for cultivation of selected clones of *Coleus forskholii*, soil-less culture method for enrichment of organic selenium in garlic
- ☞ Development of a new bio-fertiliser for sugarcane (*A.diazotrophicus*) and Studies on diazotrophic associations of

Acetobacter diazotrophicus and *Herbarillum* spp., in sugarcane to economise usage of inorganic nitrogen.

3.9 Imports Made by R&D Units

The recognised in-house R&D units have imported a variety of equipments, raw materials and samples for their R&D activities. These include: NMR, GLC, IR Spectro Photometer, HPTLC, high speed centrifugal counter current and droplet counter current chromatographs; GC-FTIR system, FT-NMR spectrometer, inverted phase contrast fluorescence microscope, microsheen digital opacity reflectometer, colour image analysis system, laser based particle size analyzer, digital distortion analyser, dielectric loss analyser, X-ray spectrophotometer, ASIC development system, CAD system; stereo zoom microscope, auto titrator, UV-Vis dual beam spectrophotometer, trinocular phase contrast microscope, cryptometer, computer for colour matching, CO sensor and filter, total organic carbon analyser, rapid prototyping machine, EDM, microprocessor double ended inertia dynamometer, logic analyser, fibre optics evaluation kit, intelligent universal programmer.

3.10 Other Benefits Availed by the Recognised R&D Units

The Department provides assistance to recognised in-house R&D units in a number of ways, such as assistance to industrial R&D units requiring allotment of special controlled materials for R&D, permission to export specialised products reserved

for small scale industries by medium scale industries for test marketing in other countries and disposal of imported R&D equipment/instruments and pilot plant. Such cases are examined for making suitable recommendations to concerned agencies.

A number of cases regarding locational clearance with respect to expansion of R&D have been dealt with. A number of applications regarding disposal of R&D equipment and also, pilot plant produce; and permission for allotment for controlled materials required for R&D were examined and the decisions of the Department conveyed.

3.11 Computerisation of Data on In-House R&D Units

Names, addresses and also location of in-house R&D units as well as validity of recognition of the recognised in-house R&D units are computerised and updated. As on 31 December 2002, there were 1175 in-house R&D units recognised by DSIR.

3.12 Conference, Awards and Publications

3.12.1 16th National Conference on in-house R&D in Industry

Department of Scientific & Industrial Research (DSIR) organised the Sixteenth National Conference on in-house R&D in Industry, in association with the Federation of Indian Chambers of Commerce and Industry (FICCI) on December 9-10, 2002 at New Delhi. The theme of the

Conference was: "Creating University - Industry Knowledge Alliance". The Conference had four technical sessions viz. "Industry-University Co-operation: Building Bridges and Creating Networks"; "The Golden Triangle: Research Institutions-Universities-Industry"; "University-Industry Co-operation: Learning from experiences abroad"; and "Industry - University Partnership: IPR Protection". Attended by over 400 delegates from industry, national laboratories, IITs and universities, scientific and industrial research organisations (SIROs), consultancy organisations, Government departments, the Conference was inaugurated by Shri Bachi Singh Rawat, Minister of State for S&T on December 9, 2002 in FICCI Golden Jubilee Auditorium. The Minister presented the DSIR National Awards for outstanding in-house R&D achievements (2002) to 8 industrial units. The Minister also released the DSIR special publication "*Outstanding in-house R&D Achievements - 2002*".

3.12.2 National Awards for Outstanding In-house R&D Achievements

In order to provide recognition to the efforts of industry towards innovative research and technological development, the National awards for outstanding in-house R&D achievements by Industry were instituted in 1987 by the Department of Scientific & Industrial Research.

These awards are in the form of silver shields and are presented along with citations at the inaugural session of the annual National Conference on

in-house R&D in Industry. So far, 131 companies have won the DSIR National R&D Awards for outstanding in-house R&D achievements. The list of the award winners in the year 2002 is as follows:

Chemical and Allied Industries

☞ Sami Labs Ltd., Bangalore

Electrical Industries

☞ Patel's Analog & Digital Measurement Co. Pvt. Ltd., Pune

Electronic Industries

☞ MIC Electronics Limited, Hyderabad

Mechanical Engineering Industries

☞ Digital Utilities (I) Pvt. Ltd., New Delhi

Processing Industries

☞ Indian Aluminium Company Ltd., Kolkata

Agro and Food Processing Industries

☞ Nuziveedu Seeds Ltd., Hyderabad

Technology Absorption (of imported technologies)

☞ Saba Powerdex Pvt. Ltd., Kochi
☞ Shri Vighnagar Sahakari Sakhar Karkhana Ltd., Pune

3.12.3 *Outstanding in-house R&D Achievements - 2002*

The DSIR publication "*Outstanding in-house R&D Achievements (2002)*" covering the award winning achievements of 8 companies was released during the inaugural session of the 16th National Conference on in-house R&D in Industry on December 9, 2002.

3.12.4 *In-house R&D in Industry - An Information Update*

As the number of in-house R&D centres has increased while the activities of DSIR have also diversified significantly with respect to in-house R&D units, it was felt appropriate to devise a quick communication system between DSIR and in-house R&D units. Accordingly, the DSIR has been bringing out a quarterly information update on in-house R&D in industry on a regular basis since April 1988. The information update is intended to provide a communication link between DSIR, in-house R&D units and SIROs and disseminates useful and important information relevant to R&D in industry. During the year 2002, four issues of updates entitled "*In-house R&D in Industry*" were brought out in January, April, July and October 2002. These have been widely disseminated to industry, SIROs, and Government departments.

3.12.5 **Research and Development in Industry : An Overview**

A publication entitled "*Research and Development in Industry : An Overview*" was brought out during

the year 2002. The publication gives details of resources devoted to scientific and technological activities, international comparison of S&T indicators, fiscal incentives and support measures available for research in India, promotional schemes for R&D operated by DSIR and other Government departments and important achievements of in-house R&D units.

4. **SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATIONS**

4.1 **Recognition Of Scientific And Industrial Research Organisations (SIROs)**

The DSIR launched a scheme of granting recognition to Scientific and Industrial Research Organisations (SIROs) in 1988. SIROs recognised by DSIR are eligible for Customs Duty Exemption and Excise Duty Waiver in terms of notification Nos. 51/96-Customs dated 23.7.1996 and 10/97-Central Excise dated 1.3.1997 respectively.

The DSIR has brought out Guidelines for Recognition of Scientific and Industrial Research Organisations (SIROs), which give procedural details and application proforma for seeking recognition under the SIRO Scheme. Functional SIROs having broad based governing council, research advisory committee, research personnel, infrastructural facilities for research, well defined, time bound research programmes and clearly stated objectives of undertaking scientific research, are considered eligible for recognition by DSIR. The investments of surplus funds not

needed for immediate research should be in accordance with the Income-tax Act, 1961.

Applications for seeking recognition under the SIRO scheme are considered in DSIR by an Inter-Departmental Screening Committee with members from Council of Scientific and Industrial Research (CSIR), Indian Council of Medical Research (ICMR), Indian Council of Agricultural Research (ICAR), Indian Council of Social Sciences Research (ICSSR) and University Grants Commission. The recognition is effective from the date of approval by the Secretary DSIR based on the recommendations of the Screening Committee. Retrospective approval is not granted.

During the period January 2002 to December 2002, the Screening Committee met 4 times and recommended 20 cases for recognition as Scientific and Industrial Research Organisations under 1988 Scheme of DSIR. These include 20 cases in the natural and applied sciences, agricultural and medical sciences. List of these SIROs is furnished at *Annexure 5*.

Recognition granted to SIROs is for duration ranging from 1 to 3 years. The SIROs are advised to apply for renewal of recognition well in advance (3 months prior to the date of expiry of recognition). Such applications received for renewal of recognition are examined by Research Review Groups by involving representatives from ICAR, ICMR, CSIR and ICSSR depending on the area. Based on the evaluation made by the Research

Review Groups, renewal of recognition is granted to SIROs.

At present there are 554 SIROs duly recognised by DSIR; of these, 193 are in the area of natural and applied sciences, 155 are in the area of medical sciences, 40 are in the area of agricultural sciences, 114 are in the area of social sciences and 21 are universities/colleges. Of these 554 SIROs, the renewal of recognition beyond 31.3.2002 of 31 SIROs is under consideration for want of further information/ clarification. DSIR has brought out a directory of recognised Scientific & Industrial Research Organisations in December 2002.

The SIROs have employed qualified scientists and researchers and have also established good infrastructural facilities for research. They have developed new processes, procedures, techniques and technologies and also filed several patents. They have also organised seminars/ symposiums/ workshops and published research papers / reports / books.

5. FISCAL INCENTIVES FOR SCIENTIFIC RESEARCH

5.1 Introduction

Government has announced, from time to time, fiscal incentives and support measures to encourage R&D in industry and increased utilisation of locally available R&D options for industrial development. New incentives to encourage investments in R&D by industry are announced in the Union Budget.

Fiscal incentives and support measures presently available include:

- ☞ income-tax relief on R&D expenditure;
- ☞ weighted tax deduction for sponsored research and on in-house R&D expenditure;
- ☞ customs duty exemption on capital equipment, spares, accessories and consumables imported for R&D by approved institutions/SIROs;
- ☞ excise duty waiver on indigenous items purchased by approved institutions/ SIROs for R&D;
- ☞ ten year tax holiday for commercial R&D companies;
- ☞ excise duty waiver for 3 years on goods produced based on indigenously developed technologies and duly patented in any two of the countries out of India, European Union (one country), USA and Japan;
- ☞ accelerated depreciation allowance on plant and machinery set-up based on indigenous technology;
- ☞ customs duty exemption on imports for R&D projects supported by Government.

5.2 Depreciation Allowance on Plant and Machinery Setup Based on Indigenous Technology

Secretary, Department of Scientific & Industrial Research, Ministry of Science and Technology, is the Prescribed Authority to certify expenditures where higher rate of depreciation is to be allowed for the plant and machinery using indigenous know-how as per provisions of rule 5(2) of IT Rules. Guidelines have been issued for making applications for obtaining the

aforesaid certificate. All such applications received are examined in the department, and discussions and visits by experts to verify the claim are made to the plants by expert teams. Based on a detailed examination, certificates in deserving cases are issued for eligible expenditure.

During the year 2002, 8 certificates involving Rs. 4731.51 lakhs on cost of plant and machinery were issued by DSIR. Details are given at *Annexure 6*.

5.3 Reference Under Section 35(3) Of Income-Tax Act, 1961 Regarding Scientific Research

In the implementation of various incentive schemes for the promotion of research and development, the Income-tax Act, inter-alia, provides that expenditure made on capital equipment and related to research activities is allowed to be written off 100% in the year in which the expenditure is incurred. The Government has provided that if a question arises under section 35 of Income-tax Act, 1961 as to whether and, if so, to what extent any activity constitutes or constituted or any asset is or was being used for scientific research the Central Board of Direct Taxes would refer the question to the Prescribed Authority. Director General Income-tax (Exemptions) in concurrence with Secretary, DSIR is the Prescribed Authority for deciding such cases. However, w.e.f assessment year starting 01-04-2000, the prescribed authority for such reference pertaining to sub-sections 35(1)(ii) and 35(1)(iii) is Central Government. On receipt of the

reference in DSIR, the department collects information/ background regarding the description of the activity claimed as scientific research, date of commencement of the relevant projects, date of completion of research work as also the results obtained from the specific project. After obtaining all these details, the matter is examined in DSIR. In case, where it is considered necessary, a team of technical experts is constituted for on the spot appreciation of the research work done at the premises of the company. After receiving the technical assessment report from the visiting team, a discussion is also normally held so that the point of view of the Company is taken into account before arriving at a decision. After completing the processing of the case in the above fashion, the case file is placed before the Secretary, DSIR for giving a decision. The Secretary, DSIR gives his decision by setting out a reasoned order duly signed by him, which is communicated, to Director General (Income-tax Exemptions).

During the year, recommendations of Secretary were sent to DG (ITE) in 2 cases namely Cancer Care Trust & Research Foundation, Indore (for the period before the assessment year beginning 01-04-2000) and Central Cables Ltd., Nagpur.

5.4 Approval of Commercial R&D Companies

In order to promote research and development activities in the commercial research and development companies, the Finance Act, 2001 provided for a ten-year tax

exemption from income-tax under section 80-IB(8A) of the Income-tax Act, 1961, to approved companies, whose main objective is scientific and industrial research. Secretary, Department of Scientific & Industrial Research is the Prescribed Authority vide Gazette notification no. S.O.85 (E) dated 31 January, 2001, issued by Department of Revenue, Ministry of Finance for granting approval under section 80IB(8A) of the IT Act.

The approval to commercial R&D companies is given initially for a period of 3 years, which can be extended up to 10 years based on evaluation of its performance.

The tax exemption is available to a company, which is accorded approval by the Prescribed Authority at any time after the March 31, 2000 but before April, 1 2003.

During the year 2002, 6 R&D companies have been approved and requests of 6 more companies are under consideration.

5.5 Excise Duty Waiver for Patented Products

The notification no. 15/96 dated July 23, 1996, introduced the provision of exemption of all goods falling under the Schedule to the Central Excise Tariff 1985 (5 of 1986) from the whole of the duty of excise leviable thereon provided such goods are manufactured by a wholly Indian owned company, such goods are designed and developed by such Indian company, the goods so designed and developed are patented by such Indian company in any two countries from amongst India, USA,

Japan and any one country of the European Union, for a period of 3 years from the date of issuance of certificate to the effect by DSIR.

During the year 2002, two requests received from the industrial R&D units were considered.

5.6 Customs Duty Exemption to Recognised SIROs

All Scientific and Industrial Research Organisations recognised by DSIR are eligible for Customs Duty Exemption on the import of scientific equipment, instruments, spares, accessories as well as consumables for research and development activities and programmes.

The procedure for issuing the essentiality certificates to SIROs for obtaining the customs duty exemptions has been formalised. A Committee has been set up in DSIR to examine the applications received from SIROs. The committee meets periodically to examine the requests.

During the year 2002, around 670 essentiality certificates were issued for claiming customs duty exemption on import of scientific equipment, accessories and components, including consumable items. The value of imports covered by the certificates was nearly Rs. 34 crores.

5.7 Excise Duty Exemption to Recognised SIROs

All Scientific and Industrial Research Organisations (SIROs) recognised by DSIR are eligible for Excise Duty Exemption on purchase of scientific and technical instruments, apparatus,

equipment (including computers); accessories and spare parts thereof and consumables; computer softwares, CD-ROMs, recorded magnetic tapes, micro films, microfiches; and prototypes for research and development activities and programmes.

This provision was introduced by Ministry of Finance (Department of Revenue) vide notification No. 10/97-Central Excise dated 1 March 1997. A Committee has been set up in DSIR to examine the applications received. The Committee meets periodically and essentiality certificates are issued on the basis of the recommendations of the Committee.

During the year 2002, 76 essentiality certificates for a total amount of Rs. 150 lakhs were issued for claiming excise duty exemptions.

5.8 Registration of Public Funded Research Institutions, Universities, Etc.

Public funded research institutions, universities, IITs, IISc, Regional Engineering Colleges (RECs), (other than a hospital) are eligible for availing customs duty exemption on import of equipment, spares and accessories and consumables for research purposes. The passbook scheme which was hitherto operated by the Department of Science and Technology and the Ministry of Human Resources Development is superseded by a simple registration with DSIR. The ceiling on the value of goods imported for R&D is also removed and the head of the public funded research institutions/

organisations duly registered with DSIR can certify the R&D goods for duty free import as per the notification No. 51/96-Customs dated July 23, 1996. As per the Government notification No. 10/97-Central Excise dated March 1, 1997, the Public Funded Research Institutions, universities, IITs, IISc, and RECs, registered with DSIR are also eligible for Central Excise Duty Waiver on purchase of indigenously manufactured items for scientific research purposes.

The procedure for registration of above institutions has been reviewed during the year and an inter-departmental Screening Committee has been constituted for recommending the registration. The Committee met 2 times during the year and considered 24 applications from various public funded research institutions.

Coinciding with the presentation of Union Budget for the year 2002-03 the Department of Revenue issued customs & central excise notifications on March 1, 2002 incorporating changes in the duties & related exemptions, etc. As per the amendment, a minimum customs duty of 5% across the board has been imposed on all imports covered under the notification. Prior to this, all imports for research purposes, by public funded research institutions/universities/ IITs/ IISc./ RECs and non-commercial research organisations other than a hospital, were exempted from the whole of the customs duty if they are registered with DSIR. The Department of Revenue has also amended the procedure for exemption of customs

duty on import of 'live animals'. In the case of public funded research institutions and others, the institutions have to produce a no objection certificate issued by the Committee for the Purpose of Control and Supervision of Experiments on Animals and a certificate from the Head of the Institution stating that the live animals are required for research purposes, for clearing the consignment free of duty. In the case of non-commercial research organisations, the importers have to produce a no objection certificate for the import from the Committee for the purpose of Control and Supervision of Experiments on Animals and a certificate from an officer not below the rank of Deputy Secretary to the Government of India in the said Department stating that live animals are required for research purposes, for clearing the consignment free of duty.

During the year 2002, 21 registration certificates were issued to such public funded research institutions, universities, IITs, IISc, and RECs for availing customs duty exemption on import of scientific equipment, spares and accessories, consumable items and central excise duty exemption on indigenous purchases for scientific research purposes.

The registration to public funded research and other institutions mentioned in the notification is granted for maximum period of 5 years. The institutions are advised to apply for renewal of registration well in advance of the date of expiry of the registration. During the year 2002, 87 institutions were due for

renewal of registration. The department received 130 renewal applications including 80, which were due for renewal in year 2001. These were processed on individual files and approval of Secretary was obtained. Registration to 22 institutions could not be renewed as it was found that some of the institutions were no longer fulfilling the criteria as per the notifications, or their research performance was not satisfactory.

5.9 Approval of In-House R&D Centres under Section 35(2AB) of I.T. Act 1961

Finance Bill 1997 introduced a sub-section (2AB) in Section 35 of the I.T. Act 1961. This sub-section was introduced in order to encourage research & development in drugs, pharmaceuticals, electronic equipment, computers, telecommunication equipment, and chemicals. The sub-section provided for weighted tax deduction of a sum equal to one and one-fourth times of any expenditure incurred on scientific research (not being expenditure in the nature of cost of any land building). The weighted tax deduction was further raised to 150% by the Finance Act, 2000. The in-house Research and Development Facilities of the companies engaged in the business of manufacture or production of the above said items should be approved by the 'Prescribed Authority' i.e. Secretary, DSIR. Also, the company should enter into an agreement with the Prescribed Authority for co-operation in such research and development facility and for audit of the accounts maintained for that facility. Through a separate

notification no. 11112 (F.No.225 / 192 / 99 / ITA.II) dated October 27, 1999, manufacture of aircrafts and helicopters was included in the list eligible under this section.

The provision was introduced for expenditure on R&D incurred up to March 31, 2000. The Ministry of Finance, Department of Revenue, Central Board of Direct Taxes, notified the provision vide Notification No. S.O.259 (E) dated March 27, 1998. Finance Bill 1999 introduced in Lok Sabha on February 27, 1999 extended this provision till March 31, 2005. The sub-section was further amended by the Finance Bill 2001, to include expenditure on in-house R&D by units engaged in the business of biotechnology, as well as cover expenditure on clinical trials, filing of patents under Indian Patent Act (1970) and obtaining regulatory approvals, for weighted tax deduction @ 150% under section 35(2AB) of Income Tax Act.

During the year 2002, 22 applications were received from eligible companies. Secretary, DSIR who is designated as the Prescribed Authority under section 35(2AB) of Income-tax Act, 1961, approved in-house R&D centres of 14 companies and approval was communicated in Form 3CM. Agreements of cooperation for research & development were signed with these companies on behalf of the Secretary, DSIR. Further, the detailed R&D expenditures of the approved companies have also been examined by DSIR and 31 reports have been sent to DG, ITE in Form 3CL as required under the I.T. Act.