NATIONAL CHEMICAL LABORATORY

PUNE

Journey of Six Decades

DIAMOND JUBILEE

1950–2010

Knowledge • Innovation • Experience


1950


2010

Journey of Six Decades : Sustained Excellence and Contributions to Nation Building

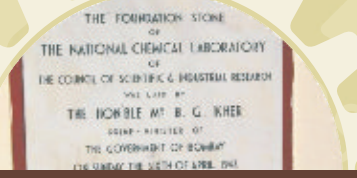
National Chemical Laboratory (NCL), a constituent Laboratory of the Council of Scientific and Industrial Research, New Delhi was formally declared open on January 3, 1950. Conceived from the vision of the great makers of modern India, will celebrate its 60 years of growth during the year 2009-10, culminating in the Diamond Jubilee of its Foundation on January 3, 2010.

Sixty years is a significant milestone in the history of an institution. NCL has had a lineage of distinguished leaderships who have guided its destiny at various milestones of this journey. With its rich tradition of excellence in scientific research, it has nurtured the best minds of India. It has contributed over the years in myriad ways to the development of the chemical industry in India. It has partnered research with some of the largest chemical companies of the world. The mission and goals of NCL, as stated by its founding fathers, has continued to stay relevant to the needs of India. It has continually transformed and reinvented itself to meet the new challenges at the turn of every decade.

The following pages, chronicle sixty significant events of the past six decades which have left a lasting imprint on this historic journey. While the past is our heritage, the future is our destiny. NCL is poised to face this future with ever more commitment and passion to ensure that India is counted amongst the front ranking nations of the world.

Happy reading

S. Sivaram



THE BIRTH OF AN IDEA

"It was as early as September 1941 that I submitted my proposals to the Government of India regarding the desirability of establishing in India a National Chemical Laboratory. The proposal was finally accepted by the Government of India and the Board of Scientific and Industrial Research under the Chairmanship of Sir A. Ramaswamy Mudaliar in their tenth meeting held in July 1943 and proceeded to appoint a planning committee for the National Chemical Laboratory."

Shanti Swarup Bhatnagar (1894-1955)

- Government of India allocates a sum of Rs. 25 lakhs for the building and other capital expenditure in 1944.
- In the spirit of the institution being created, Government asks CSIR to seek support of industry in the setting up of NCL.
- Dr. D. G. Karve, Principal, Brihan Maharashtra Commerce College (BMCC) appointed as Chairman, Local Advisory Committee for the establishment of NCL.

4th meeting of G. B. held on 14th July 1943
POLICY / IMPORTANCE DECISION

1. Proposed representation of the Forest Research Institute on Board of Scientific and Industrial Research.
2. Plans and estimates for National Chemical Laboratory.
3. Patent right in respect of Researches partly finances by Council of Scientific and Industrial Research.

9th meeting held on 21st September 1946
POLICY / IMPORTANCE DECISION

1. A menagment to bye-lays and rules and regulations of the Council of Scientific and Industrial Research.
2. Consideration of the ''proposed plan of the National Chemical Laboratory.''

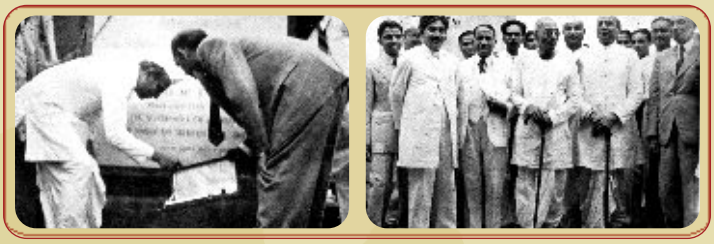
National Chemical Laboratory

The D.C.I.R. informed the members that the architects had been appointed for designing and planning the National Chemical Laboratory and the final terms were being settled. The acquisition of land was being notified in the Gazette of the Bombay Government after which the land would be placed at the disposal of the Council.

FUNCTIONS AND OBJECTIVES OF NCL (1945)

- Embrace all applications of chemistry with due attention to the advancement of the fundamental science
- To serve as a link between university, the state, the scientific institutions and industry
- To undertake fundamental research directed towards the acquisition of knowledge which is likely to help overall industrial development
- Applied and development work will be concerned with improvement of existing processes, efficient utilization of raw material resources and the discovery of new processes and products

- Plans for building on a 475 acre land completed in 1945.
- Mr. B. G. Kher, Prime Minister of Bombay State in pre-independent India lays the Foundation Stone on April 6, 1947.



A VISION FOR THE FUTURE

"There are hardly any new lands which Indian can hope to exploit. The only new lands on which we may have our eyes must lie in the domain of mind and have to be created in the research laboratory. It is on these sources which will emerge from the national laboratories that we may have to depend now and in the future for the means to maintain and raise our standard of living and to keep abreast amongst the best nations of the world."

S.S. Bhatnagar
6th April 1947

- Construction of laboratory begins in 1948 under the supervision of architects Master, Sathe and Bhuta, Bombay. The Main Building of NCL consisting of 130,000 sq.ft. of laboratory space is built at a total cost of Rs. 35 lakhs.

ANOTHER ACT OF MUNIFICENCE FROM THE HOUSE OF TATAS

"The Tata organization have taken much interest in the establishment of NCL and have generously placed a sum of Rs. 8,30,000 at the disposal of the CSIR for this purpose. I take this opportunity of offering our grateful thanks to the House of Tatas for this munificent donation."

S.S. Bhatnagar
6th April 1947

- Research activities commence in the main building in March 1949.
- NCL is set up with the objective to undertake research in chemistry in areas of importance to industrial development, to collaborate with other scientific and academic institutions and develop technologies that can be commercially exploited by Indian industry.

- The first Director of NCL, Professor J.W. McBain, FRS, Professor of Chemistry, Stanford University, USA assumes office (1949-52).

"Therefore, the National Chemical Laboratory must not only apply existing knowledge to the beneficiation of Indian natural resources but it must also produce its own share of pure fundamental science. India must not only copy and adapt what is known elsewhere but it must make fundamental advances of its own in order to take its proper place amongst the nations.

You and we, have this day dedicated a National Laboratory and its staff, with the assurance that its work will grow and serve this country and the world and continue for generations to come.

It is with these high hopes that we have dedicated the National Chemical Laboratory of India."

Professor J.W. McBain, FRS
January 3, 1950

- NCL formally declared open and dedicated to nation on 3 January 1950 by the first Prime Minister of India, Pandit Jawaharlal Nehru. The inaugural ceremony attended by six Noble laureates and several distinguished luminaries from around the world.

FUNCTIONS AND SCOPE (From the address of Sir S.S. Bhatnagar)

- One of the most important functions of this Laboratory will be to bridge the serious gulf between scientific research and its industrial applications
- It will work out ways and means for the application of scientific knowledge to practical problems of human welfare
- NCL will stand or fall according to the quality of its scientific staff. It must achieve national and ultimately international recognition
- The Laboratory will try to improve old processes in the light of new scientific knowledge and discover new processes
- In short, the National Chemical Laboratory will be a living and vital link with the universities, scientific institutes and industry

- Another principal objectives of this Laboratory will be to undertake fundamental research to extend the frontiers of knowledge. Fundamental research has always had a stimulating influence upon research workers and has attracted to the laboratory men who worked for ideals and whose motto is "it is better to have wisdom than gold"

"There is talent in our country. But the question is how to tap that talent and give opportunities to the young men and women of India, who had the requisite ability. I hope that so far as these laboratories are concerned they would help to some extent at least in opening the doors to a large numbers of young men and women and give them opportunity to do good work for the country in the cause of science and in application of science for the public good.

With these words I declare this Laboratory open."

Pandit Jawaharlal Nehru
January 3, 1950

"I would like to stress the practical value of scientific researches to be carried out at in the National Chemical Laboratory, although I do not believe that utility is the main incentive to scientific work. It is in man's attempts to study nature and to understand her secrets that science finds its best motive. For this reason, I believe that good laboratories alone are not sufficient to produce scientific work but it is the ability of the individuals who work in the laboratory that counts.

I am sure that individuals of exceptional ability will work in the NCL and work for the advancement of science."

Sir C.V. Raman, NL
January 3, 1950

- Professor McBain states the mission of the laboratory which is enshrined in the spacious podium of the main building *"The purpose of this laboratory is to advance knowledge and to apply chemical science to the good of the people".*

The building of western design and magnificent propositions make an impressive picture set in a natural amphitheatre of hills, four miles from Poona. It is well equipped for scientific research in chemistry in both pure and applied fields. It will provide the possibility of effective cooperation between scientific research and industrial production, a cooperation which is essential to a sound economy.

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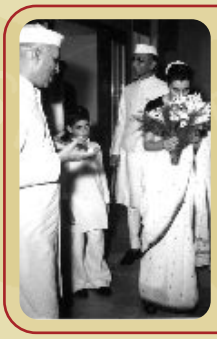
- NCL structured into discipline-wise Divisions, namely, Physical Chemistry, Inorganic Chemistry, Organic Chemistry, Biochemistry, Plastics and High Polymers, Chemical Engineering and Survey & Information.

- Professor George I. Finch, FRS, Professor of applied physical chemistry, Imperial College, London, UK takes over as the second Director of NCL (1952-57).
- NCL establishes deep connections with the emerging chemical industries in independent India. Over 65 industries are served by NCL. NCL secures 46 Indian Patents during this period.
- NCL quickly establishes its credibility as a major centre for research in chemical sciences in India. During the decade 350 publications emerge from NCL and 22 students are granted Ph.D. degree.
- Shri Pandit Jawaharlal Nehru, Prime Minister of India visits NCL again in 1953 accompanied by his daughter Ms. Indira Gandhi and his grandson Shri Rajiv Gandhi.



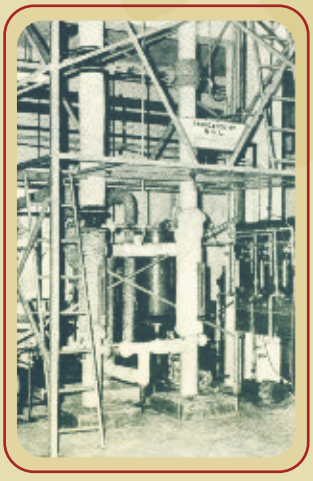
- Professor K. Venkataraman, a distinguished scientist with seminal contributions to organic chemistry and chemistry of synthetic dyes, from UDCT, Bombay assumes office as the third Director of NCL (1957-66).
- Professor K. Venkataraman firmly establishes NCL as a major center for research in organic chemistry with emphasis on synthetic dyes, drugs and pharmaceuticals, perfumery chemicals, flavonoids, terpenoids and wood phenolics.

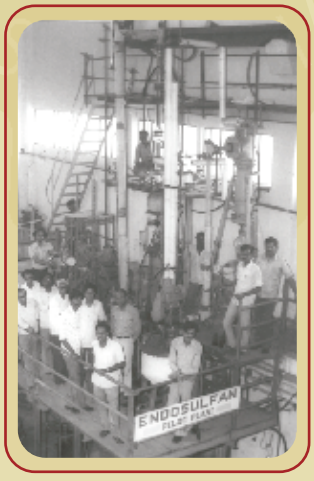
- Professor B.D. Tilak, a distinguished organic chemist and joint Director of NCL, assumes office as the fourth Director of NCL (1966-78).

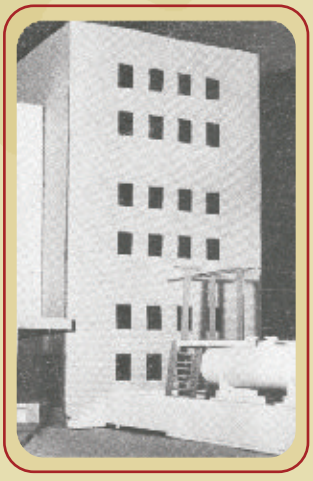
- NCL creates new functional departments to meet the needs of the time, namely, Division of Organic Intermediates and Dyes and Process Development Division.

- NCL establishes R&D in the area of agrochemicals in response to a call from Government to achieve self sufficiency in food production and the advent of Green Revolution; Efforts spearheaded by Mr. C. Subramanian who is appointed as the Chairman of National Commission of Science and Technology (NCST) (and also Union Minister for Agriculture). Professor B.D. Tilak, Director, NCL, as a member of NCST plays a pivotal role in formulating plans for agrochemicals R&D in CSIR laboratories.

- NCL, RRL-Jorhat (NEIST) and RRL-Hyderabad (IICT) develop process chemistry, scale up as well as design engineering and offer processes to industry on a turn key basis. NCL/CSIR gives birth to the domestic agrochemical industry. A public sector company Hindustan Insecticides Limited is set up by the Government to produce agrochemicals based on CSIR developed technologies. Even today several of the first generation pesticides are manufactured by NCL/ IICT/ RRLJ technologies.







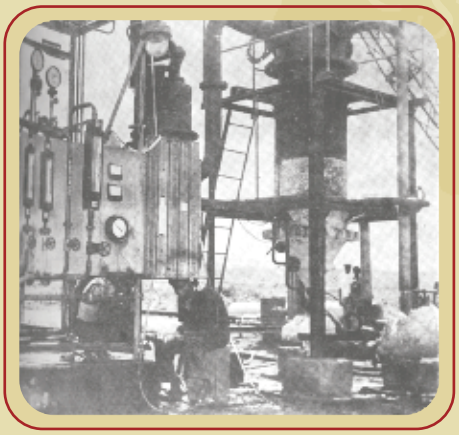
- NCL combines the skills of chemistry and chemical engineering for industrial applications – the first foray into translational research which will continue to be the hallmark of excellence for NCL in the decades to come.

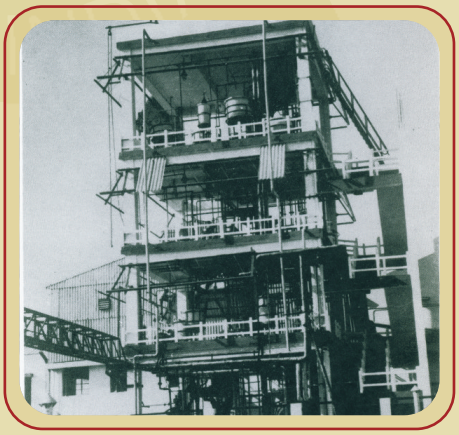
- NCL develops process chemistry and engineering as well as plant designs for building blocks for organic chemicals, namely, acetalinide, chlorobenzene, nitrobenzene, aniline, etc. In addition, NCL contributes to the establishment of commercial production of benzoic acid, titanium tetrachloride and calcium hypophosphite for the first time in India.

- NCL establishes pilot plant facilities for Vitamin C and D-Sorbitol. NCL operates a continuous fluidized bed reactor for the chlorination of methane for the production of carbon tetrachloride and chloroform. This process is successfully transferred to M/s. Standard Mills Limited, Mumbai who established the first commercial production of these chemicals in India. These are some of the earliest instances of pilot plant facilities in India for fine chemicals.

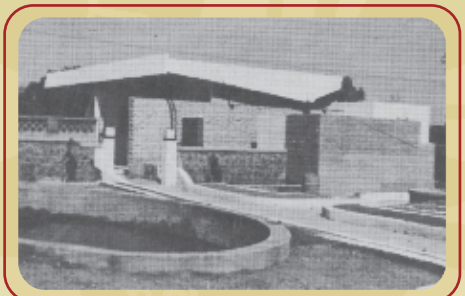
- Based on technologies developed by NCL, Government of India sets up the first Public Sector Company for the manufacture of organic chemicals in India, Hindustan Organic Chemicals Limited (HOC) at Rasayani, about 100 km away from Pune. Director, NCL is appointed Chairman of HOC. NCL gives birth to the first Indian organic chemical industry.

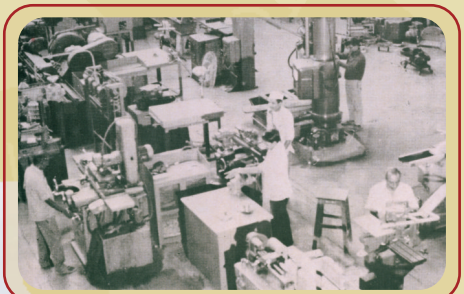
- Several process and product technologies developed at NCL are transferred to industry for a fee. NCL begins to undertake sponsored research funded by industry.





- NCL expands its research infrastructure. Important facilities like Mechanical and Glass Blowing Workshops are created. A Canteen, a Cooperative Store, a building to house NCL Post Office, a Student Hostel and several extensions to NCL housing colony are added.



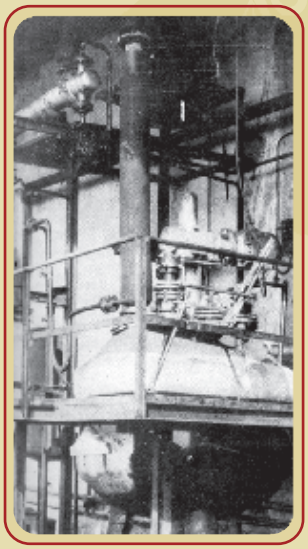


1970 – 1980

- NCL marks the Silver Jubilee of its founding in 1975. Prime Minister Mrs. Indira Gandhi inaugurates the Silver Jubilee Celebration on February 1, 1975.

- NCL pioneers the concept of an industry-academic interaction in terms of a "Process Release Committee" which ensures all processes developed at NCL are ready for transfer to industry. The Committee is provided access to all information related to the process including demonstration of the working of the process.

- NCL focus shifts predominantly to development of indigenous technologies for the Indian chemical industry. Import substitution and conservation of foreign exchange becomes a dominant theme in the context of India's precarious economic conditions prevailing in the early seventies.



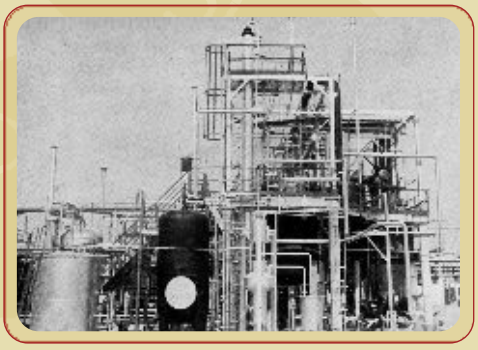
- The interface of chemistry and engineering is strengthened by the creation of a combined Chemical Engineering and Process Development Division.

- NCL gives birth to the low cost generic API industry in India. With the advent of Indian Patent Act 1970, India withdraws recognition of product patent, enabling Indian companies to produce molecules discovered elsewhere using innovative process chemistry. NCL builds a programme of research aimed at developing efficient chemistries for producing cost effective drugs for Indian consumers. This research continues at NCL/IICT for three decades (1970-2000), slowly tapering off, thereafter, with India joining WTO (TRIPS) and Indian Patent Act 2005, which reintroduces recognition of product patents.

- NCL gives birth to a new industry for generic drugs in India. Cipla Limited is the torch bearer, which sets up collaboration with NCL in the early seventies. Several drugs are introduced in the market. Cipla Limited emerges as the largest drug company in India in the nineties and introduces drugs at the lowest prices in the Indian market. Cipla also successfully faces challenges from innovator companies in Africa for introducing HIV/AIDS drugs at a fraction of global cost.

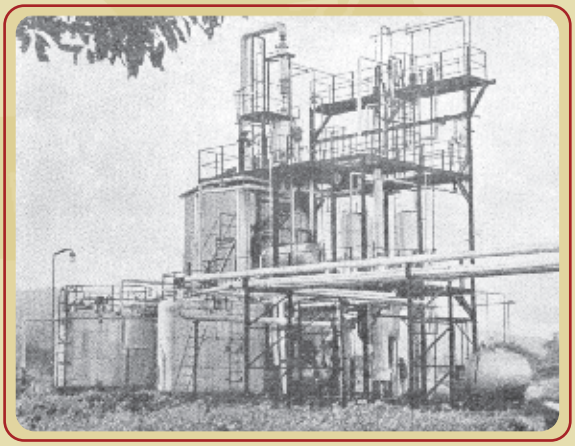
- Dr. Y. K. Hamied, Chairman, Cipla Limited in his speech at IICT, Hyderabad delivered on 2 April 2005, says, *"This was the start of a very useful and productive partnership between NCL and the pharmaceutical industry. Our collective effort in the post Indian Patents Act 1970 era laid the foundation on which was built the API manufacturing industry as it exists today".*

- Over 60 industries utilize the know-how developed by NCL. The number of licensees of NCL technologies is around 90. Approximately 46 processes are in production during the decade with an estimated value of Rs. 6.5 crore.



- NCL offers turn key technologies for fine chemicals to industries. This includes, process chemistry, pilot plant experimentations, process, equipment and plant design. Two major processes that were successfully transferred to industry during this decade are Acetanilide (2,000 tones per annum) to HOC, Rasayani and Acrylic Esters (10,000 tones per annum) to Indian Petrochemicals Corporation Limited (IPCL), Baroda.

- Dr. L.K. Doraiswamy, Head of the Chemical Engineering and Process Development Division of NCL takes over as the fifth Director of NCL (1978-89).



- NCL emphasizes a balanced growth of both basic sciences and engineering with excellence as the guiding spirit. The leadership of NCL encourages pursuit of the highest quality science and development of globally competitive technologies.

- NCL establishes the first ever catalysis research group devoted to petrochemicals and chemicals. Catalysis, a class of advanced materials, is critical to the chemical industry. NCL, for the first time establishes the triangular link between catalyst development, catalyst manufacturing and catalyst users.

- IPCL, commercializes a molecular sieve based shape selective catalyst for xylene isomerization at Baroda. This catalyst was at that time a monopoly of one company, namely, Mobil Corporation, USA. This establishes NCL as a foremost center for catalysis research in this part of the world. NCL/CSIR and IPCL jointly fight off an IP challenge by Mobil.

- NCL develops a unique process for direct alkylation of benzene with ethanol to produce ethyl benzene, a precursor to styrene. This process is commercialized at Hindustan Polymers at Vishakapatnam.

- NCL pioneers the Tissue Culture Processes. NCL establishes a group under the leadership of Dr. Jagannathan, a distinguished biochemist who spearheads the effort. The first protocols for in vitro culture of plants were established at NCL. Several micropropagation technologies are developed and transferred to industry, namely, cardamom, eucalyptus, bamboo, teak, salvadora, sugarcane, banana, turmeric and ginger, NCL gives birth to a new industry. Tissue culture industry grows and matures by late 1990's.

- NCL establishes an integrated group, largest in India for polymer science and engineering. NCL wins laurels for its contributions to polymer melt rheology and non-Newtonian fluid mechanics. Fundamental advances in polymer reaction engineering creates new understanding on modeling and prediction of the behaviour of industrial reactors producing polyesters. The know-how is practiced in several industries in India.

- NCL substantially expands its advanced analytical facilities. Equipment such as, SEM, XPS, XRD, Raman Spectrometer and Solid and Liquid State NMR become operational in a separate building called Sophisticated Instrumentation Laboratory (SIL).

- Two new laboratory buildings are created to house the Polymer Science and Engineering Group as well the Biochemical Sciences Division.

- Dr. R.A. Mashelkar, FRS, Head, Chemical Engineering and Process Development Division assumes office as the sixth Director of NCL (1989-95).

- NCL confronts a grim economic environment in the early nineties. Steep appreciation of Rupee against foreign currency and declining support from CSIR to laboratories poses a formidable challenge to sustain the activities of the laboratory. India is on the throes of an economic reform resulting in the transformation of the Indian chemical industry. The focus shifts from import substitution to manufacture of products which are globally competitive.

- NCL focuses on highest quality scientific research leading to innovation and generation of intellectual property. In view of the weak sentiments in the Indian chemical industry NCL aggressively forays into R&D partnership with global multinational companies.

- NCL coins the slogan "patent, publish or perish". Pioneers the culture of patenting before publishing, a culture which will come to pervade all - CSIR post 1995.

- NCL files several patents in the US and are granted. This attracts the attention of the global majors who come to NCL looking for research partnerships. This marks the start of the era of CSIR as "exporters of knowledge". This also marks the beginning of India emerging as a global hub for R&D, leading to increasing interest amongst global companies to use India as knowledge partner.

- NCL forays into the area of polycondensation chemistry for polycarbonates. Files and secures several seminal patents in the area of solid state polycondensation, which attracts GE, the world's largest producer of polycarbonates to NCL. This marks the beginning of a collaboration, which holds the record of the longest sustained collaboration between CSIR and industry, from 1993 to present. This collaboration sets new paradigm in public-private partnership, eventually resulting in the setting up of the J. Welch Technology Center at Bangalore.

- To augment the resources of the laboratory and to inject quickly capital for modernizing several of NCL's ageing infrastructure, NCL boldly accepts the challenge to take a loan from World Bank, repayable with interest from the income earned by the laboratory from commercial sources. The money is used to build new research capabilities in polymer science and engineering, process development and scale up of catalysts. NCL successfully repays the loan and interest amount to World Bank over a ten year period ending in 2005, entirely from the surplus in earnings from industrial / contract research.

- NCL continues its tradition of leadership in catalysis R&D. It becomes the second institution in the world to develop a titanosilicate catalyst, TS-1, heretofore, a monopoly of Enichem, Italy. The catalyst is scaled up to kilogram level at NCL and is supplied to global companies for several years.

- NCL signs landmark research agreements with global companies such as, GE, DuPont, Dow, BASF, Lyondell, Lanxess, Solvay, J&J, P&G, UOP, Invista, Eastman, Alcoa, Nestle, Unilever, Honeywell, etc. and ventures aggressively into contract research. Scientists of NCL learn the rigors of competitive R&D and are exposed to the best practices in business driven R&D from the world's leading companies. Contract research also bring much needed financial resources to the laboratory in a decade where public funding from Government to CSIR was on the decline.

- NCL Research Foundation (NCL-RF), a unique experiment in managing private funds within a publicly funded organization takes root. NCL-RF is based on generous contributions from corporate entities/individuals and is managed by a respectable and independent Board of Trustees. NCL-RF recognizes excellence, by individuals as well as groups, in all walks of endeavours within the laboratory. NCL-RF has grown in strength over the years and supports several activities such as distinguished lectures, overseas travel grants to students and fellowships to financially needy wards of NCL staff.
- Dr. Paul Ratnasamy, Head of Inorganic & Catalysis Division of NCL assumes charge as the Seventh Director of NCL (1995-2002).

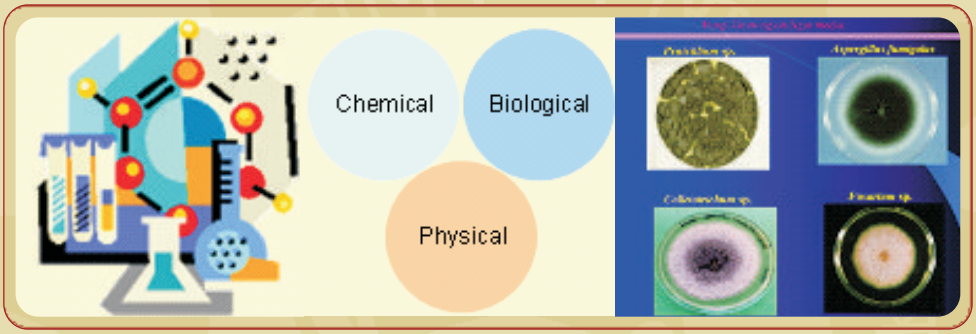
2000...

- NCL marks the Golden Jubilee of its founding on January 3, 2000. The occasion is graced by Shri Atal Behari Vajpayee, the Prime Minister of India and Dr. Murali Manohar Joshi, Minister for Science and Technology, Government of India.

- NCL creates several physical infrastructure in its campus. A new building to house the digital information resources of NCL is built in 2003. This building also functions as the IT hub for NCL. Major investments are made to make NCL's function fully IT-enabled. Several service oriented activities at NCL are designated as Resource Centers. The Sophisticated Instrumentation Laboratory is re-designated as Center for Materials Characterization.

- NCL forges strong public private partnership in the areas of utilization of waste agricultural biomass as a resource for fuels, chemicals and materials for a fossil fuel deficit world and R&D in the area of alternative energy sources (Fuel cells).

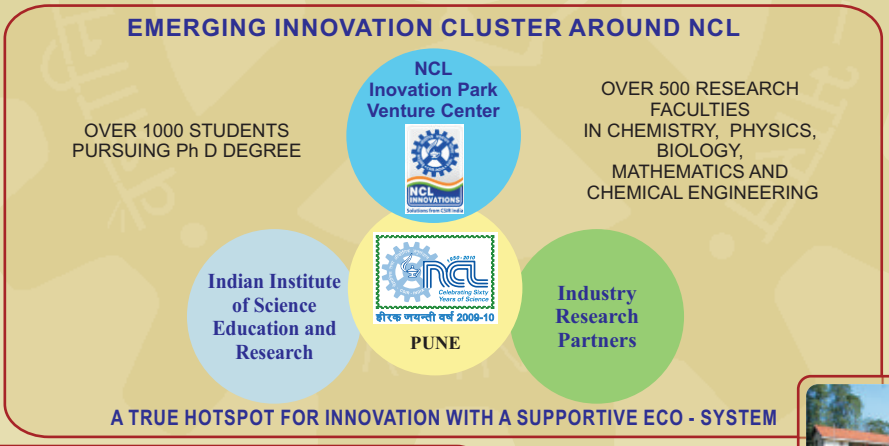
- NCL begins the creation of a strong scientific group on advanced materials including nano-materials; integrating biology, chemistry, physics and engineering. Two Centers of Excellence, namely, Scientific Computing and Microreactor Engineering are established to pursue interdisciplinary research cutting across Divisions. A close partnership between NCL and Institute of Genomics and Integrative Biology is formally established in the form of a joint research initiative to promote research in the area of chemistry and biology. NCL becomes a major center for Ph.D. research in chemical and life sciences. Over 80 students are awarded Ph.D. degree in 2007.



- NCL's expertise in polymer science, especially in the area of membranes and porous polymers lead to innovation in applications, namely, nano-filtration for drinking water free of virus and bacteria, new high temperature membranes for fuel cells, polymers for enzyme immobilization and adsorbent materials and biomedical polymers for ocular implants.

- A new 65000 sq.ft. laboratory building to house the research functions of polymers and advanced materials is created, the first comprehensive laboratory buildings to come on NCL campus in over twenty five years.

- NCL successfully transfers several technologies from the laboratory to industry. These include, proprietary processes for the manufacture of THPE, ATBS, epichlorohydrin, recovery of cellulose from bio-mass and chiral active pharmaceutical intermediates.
- A new Resource Center called the "NCL Innovations" is created to promote synergistic and productive relationship between business enterprises and NCL with a clear focus on innovation and technology development for value creation.
- NCL floats a company under Section 25 of the Companies Act called "Entrepreneurship Development Center" to manage a technology business incubator. A separate 25 acres campus to house the NCL Innovations as well as the Entrepreneurship Development Center is developed which includes offices, lecture rooms, library, cafeteria and ready to use modular laboratories.
- CSIR donates 100 acres of green field land in NCL campus to the Indian Institute of Science Education and Research (IISER), Pune to build its permanent campus. NCL gives birth to IISER in Pune which commences operation from NCL campus in August 2006. NCL and IISER-Pune will be collocated on adjacent campuses building a strong synergy between teaching and research.
- Dr. S. Sivaram, Head of Polymer Chemistry Division of NCL assumes office as the eighth Director of NCL (2002 to present).



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