ANNUAL REPORT 2015-16

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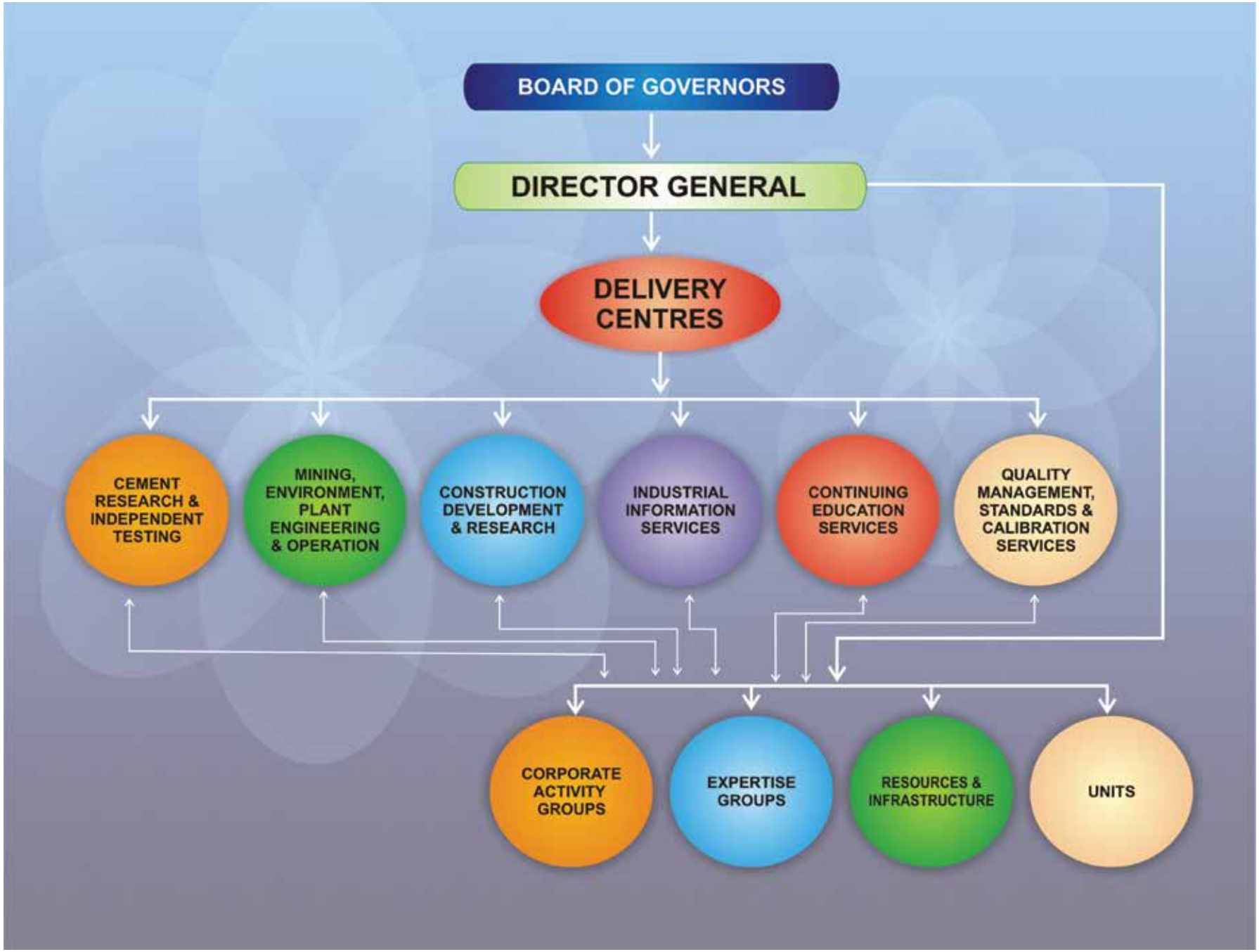
* Till 21 July 2016
** Since 22 July 2016
@ Till 31 March 2016
@@ Since 1 April 2016

Annual Report 2015 - 16

1 APRIL 2015 TO 31 MARCH 2016

National Council for Cement and Building Materials
(Under the Administrative Control of Ministry of Commerce & Industry, Govt of India)
34 Km Stone, Delhi-Mathura Road (NH-2), Ballabgarh-121 004, Haryana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FOREWORD

National Council for Cement and Building Materials (NCB), previously known as Cement Research Institute of India (CRI), was established in 1962 with the objective to promote research and scientific work connected with cement and building materials trade and industry. Today, this premier body under the administrative control of Ministry of Commerce and Industry, Govt. of India, with its corporate centre and main laboratories located at Ballabgarh (near New Delhi), also has well established regional centres at Hyderabad and Ahmedabad (Gujarat).

With the vision of establishing itself as a preferred technology partner to cement and construction sectors; its' Research and development activities in the domains of innovative technologies, their transfer and implementation in partnership with cement and construction industries can be summarized as under

- To enhance quality, productivity and cost-effectiveness
- To improve the management of materials, energy and environmental resources.
- To develop competency and productivity in human resources.
- To develop technologies for durable infrastructure and affordable housing

My long association with NCB gives confidence that NCB not only maintains pace with latest developments, but rather always tries to improve upon in the interest of the cement and construction industries and nation as a whole. NCB in past has taken up number of programmed projects on development of composite cements, technical suitability of performance improver in PPC and PSC, evaluation of high volume fly ash cements, technical suitability of steel slag in manufacture of PSC, Nano-particles blended cements, application of petrographic analysis in engineering, utilization of by-products of other industries in cement manufacture, evolving guide norms in different areas of interest, technologies for reducing dust emissions for cement and other industries, alternate fuels etc., to name just a few of these.

It also has been rendering its high quality technical services to the cement and building material industries by executing projects on sponsored basis, testing materials in its NABL accredited and BIS recognized laboratories, providing calibration, reference material and proficiency testing services, training and solving problems wherever required. With its strength, NCB has completed 328 sponsored projects during the year 2015-16. Petrographic analysis and its correlation with compressive strength of rock, limestone consumption factor studies, utilization of zinc, titanium and copper industry by-products in cement manufacture etc. are the areas where NCB has made significant contribution to the benefit of industry. Projects on the computer-aided deposit evaluation of a captive limestone mine, number of projects on environment management and monitoring of environmental parameters, process optimization, energy audit, preparation of TEFR for cement plants in India and abroad, utilization of waste as derived fuel etc. have been completed during the year.

In the concrete and construction sector, NCB has been carrying out significant work for the said industries. It has its own well developed advanced concrete research laboratory with state-of-the-art equipment. Development of design parameters for high strength concrete, evaluation of concrete making

materials and mix design, alkali aggregate reaction (AAR) studies of aggregates, development of accelerated mix design method for concrete using PPC or OPC with flyash etc. are the important areas where NCB has contributed to the industries. NCB has also developed number of special concretes for different uses. It has completed number of projects on structural assessment of buildings, bridges, dams, flyovers etc. Third Party Quality Assurance/Audit (TPQA) programme has assisted various organizations to ensure delivering quality constructed facilities.

Once in every two years NCB also organizes international Seminar on Cement and Building Material where participants from a wide spectrum of fields of expertise from India and abroad join in the seminar. The last of such seminars ie. the 14th NCB International Seminar on Cement and Building Materials was held from December 1st to 4th, 2015 in New Delhi. Technical presentations, deliberations and discussions were held during the seminar. The Technical Exhibition arranged during the seminar was a fruitful event for both manufacturers and users. Overall it was one more successful event organized by NCB which benefited the whole cement and building material Industries.

In the area of human resources development, NCB conducted 63 training programmes during the year 2015-16 benefiting 933 participants from various organizations in India and abroad. In the area of quality management NCB conducted 9 interlaboratory proficiency testing schemes. NCB developed 7 new reference materials during the year and continued the supply of reference materials to the industries. NABL accredited calibration services were also provided.

It is my pleasure to mention that under the leadership of Shri Ashwani Pahuja, Director General of NCB, the staff of NCB with their continuous efforts has achieved these significant goals as mentioned in this report, which are worth praising. The work carried out by the scientists and engineers are highly appreciable.

Over the years NCB has been partly funded through Cement Cess charged by the Government of India from the cement industry, which has recently been abolished. In addition, NCB has also generated its own resources through sponsored research projects and testing facilities. While The achievements and progress made by an autonomous institution like NCB to a great extent are due to the active support and cooperation from the government, the support it has received from the industry and other organizations also cannot be ignored. Today with wide range of construction materials and emergence of alternative construction technologies, there is a greater need of increased industry participation and support to NCB. I trust that the recent changes will not in any way dilute the autonomous character of NCB and its linkages with related industries.

With these words, I wish to extend my sincere thanks to my colleagues on the Board of Governors and its Committees for their valuable advice, and guidance in decision making on various issues from time to time. I also extend my sincere thanks to the Department of Industrial Policy and Promotion, Govt. of India, for providing their, support and direction.

Dr S Chouksey
Chairman

26 November 2016

INTRODUCTION

I am pleased to present the Annual Report for the Year 2015-16. The Report contains the achievements of NCB through its programmed projects and the activities that have been carried out during the year. With its innovative and sincere efforts NCB has executed number of research and development projects maintaining standards, quality and timeliness, imparted training programmes in the fields of cement, construction and building materials, rendered services on quality management, developed newer reference materials etc. The programmed projects covered a wide spectrum from cement research to utilization of waste derived fuels and development of special concretes.

The developments through research projects in the areas of composite cement, preparation and evaluation of high volume fly ash cements (HVFAC), evaluation of technologies for co- generation of power utilizing waste heat in cement manufacture, development of system design for storage, handling and firing of different types of alternate fuels/waste in cement plants, utilization of metal industrial waste in cement manufacture, incorporation of nano-materials in cement for development of better binders, development of alternatives to natural sand for use in concrete/ masonry/ plaster, development of accelerated mix design method for concrete using PPC or fly ash with OPC, development of special concretes etc. are being carried out through its research programmed projects, with an aim to facilitate the industry. Besides these, NCB has studied the application of petrographical analysis in construction, effect of mining on salinity intrusion etc. which benefited the industry.

In the area of cement research and testing, investigations on technical suitability of steel slag (LD Slag) in the manufacture of Portland Slag Cement (PSC), technical suitability of performance improvers in PPC and PSC, utilization of Pet Coke Gasification Slag in the manufacture of cement, use of Mechanical Mixer in physical testing and fixed w/c ratio for compressive strength testing of cements, feasibility studies for the use of jarosite in cement manufacture, utilization of by product sand in the manufacture of cement , utilization of copper granulated slag from copper industry, lump formation in cement bags etc. were carried out for different organizations. Ten cement plants availed the services of establishing limestone consumption factor. A large number of different samples including cement, coal, flyash, slag, industrial waste from different organizations were analysed in NCB laboratories.

Sponsored projects have been carried out in the areas of computer-aided deposit evaluation, environment management, monitoring of environmental parameters, techno-economic viability study of cement mill venting system, estimation of WHR potential, minimization of coating formation in kiln, plastic waste handling and feeding system, performance assessment of existing air pollution control equipment, energy audits of cement plants, TFR for modernization of packing plant etc.

In concrete technology, development of alternatives to natural sand for use in concrete /masonry/plaster, evaluation of concrete making materials, evaluation of corrosion inhibitors through modified accelerated corrosion test, petrographic and mineralogical analysis and alkali aggregate reaction (AAR) studies, development of special concretes like antiwashout underwater concrete, shotcrete and self compacting concrete have been developed for different hydel projects, building structures and irrigation projects. In structural optimization and design, methods for service life design of concrete structures and design parameters for high strength concrete are executed.

NCB has conducted diagnostic and prognosis evaluation of distress and condition assessment on variety of structures such as Turbo Generator Foundation, Dam Structure, Cooling Towers, Bridges and Residential, Commercial and Industrial Buildings in different states in India. Third Party Quality Assurance/ Audit (TPQA) programme of the centre has assisted various organizations to ensure quality workmanship to meet their specified quality standards in delivering quality constructed facilities. TPQA was carried out for roads and bridges construction; residential, commercial and institutional buildings; canal lining work; concrete drain projects; boundary wall construction etc. for construction industry.

In quality management area, NCB assisted one thermal power plant in documentation and implementation of quality management system in line with ISO 17025:2005 and NABL accreditation. Under Inter laboratory services, nine PT schemes have been completed on materials like: steel bar, fly ash, coal, limestone, PPC, building brick, ceramic tile, aggregate and water used in construction. Of the new nine schemes, steel bar, pet coke, building brick, and ceramic tile PT scheme have been conducted for the first time in India.

NCB has so far developed 75 certified reference materials and during the year 2015-16, 4 new types have been developed and made available to the industries. 1717 equipment/apparatus including proving rings, compression testing machines, vibrating machines, dial gauges, Blaine cells, pressure gauges, sieves, thermometers, environmental chambers, ovens, furnaces, balances and weighing scales of a RMC plant were calibrated for 559 clients.

Under its Continuing Education Services, NCB has been organizing and conducting training programmes in the areas of cement, mining, environment, process, concrete, construction etc. through long term, short term, special group, contact and simulator based courses. During the year, 63 training programmes were conducted benefiting 933 participants from various organizations in India and abroad.

It gives me immense pleasure to mention that NCB has successfully organized 14th NCB International Seminar on Cement and Building Materials during 01-04 December 2015 in New Delhi. The seminar witnessed overwhelming response from cement, construction, building materials and allied industries with participation of 1050 delegates around the world. About 180 technical papers were presented in 25 technical sessions, apart from two special invited lectures by internationally renowned experts. The concurrent Technical Exhibition also received overwhelming response, with 118 stalls from 86 companies. The Seminar as well as the Technical Exhibition were inaugurated by Shri Amitabh Kant, Secretary, DIPP, Ministry of Commerce and Industry, Govt. of India. A special NCB-CMA publication on *'Cement & Construction Industry – Perspective for Sustainable Growth'* was released on the occasion. Industries and DIPP supported the organization of the seminar.

I extend my sincere thanks to my colleagues for their support, cooperation and commitments in completing the projects. I am grateful to the Board of Governors and its Committees, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Govt. of India for their support, guidance and encouragement. I also thank industry in general for reposing faith in NCB's services and their continued patronage without which no achievements would have been possible.

Ashwani Pahuja
Director General

10 November 2016

NCB'S PROGRAMMES AND THEIR FULFILMENT

The Corporate Programmes

While reminiscing and rejoicing 52 years of presence and service to the nation, NCB continued providing technological support and industrial services to the cement, construction and other building materials industries, apart from pursuing fundamental research in relevant areas under its pro-active leadership. NCB could sustain providing innovative technological solutions and services and could make its presence felt in the industry in the areas of optimal exploitation of limestone reserves including mine planning and computer-aided deposit evaluation, utilization of industrial wastes, application of nanotechnology, reduction of emissions from cement plants, process optimization and productivity, energy management, plant maintenance, structural assessment and rehabilitation, concrete technology, quality assurance in construction, reference materials and proficiency testing.

Investigations have been taken up for evaluating technical suitability of performance improvers in PPC and PSC to enable provision for using performance improvers in Indian Standard specification of PPC and PSC. Studies have been taken up on preparation and evaluation of high volume fly ash cements (HVFAC) up to 55% pozzolana content including fly ash in pozzolanic cements. NCB has carried out Limestone Consumption Factor (LCF) studies for cement plants from all over the country. An investigation has been carried out on the partial utilization of LD slag in the manufacture of PSC. Investigations were carried out on the use of Pet Coke Gasification slag as raw mix component in manufacture of Portland clinker. Basic research was continued on application of nano-technology and fly ash based geopolymeric cements. Usage of mechanical mixer to improve the consistency level and reduce variability in test results of compressive strength of cement, and working out normal consistency in particular were completed. Studies have been completed for use of improved refractory engineering practices in Indian cement plants. Geological services like topographical survey, supervision of exploration, computer-aided deposit evaluation of limestone deposits were provided to cement industry. Study on effect of mining on Salinity Intrusion, Ground Water Level / and soil quality monitored and completed for two plants. A Feasibility Study was carried out for plastic waste utilization in cement kiln including plastic waste storage and handling system. A Diagnostic study was carried out for minimizing coating formation in kiln and recommendations were given by NCB team to reduce coating formation. A Techno-economic Viability Study was done for 100 tpd paper grade lime plant. Mandatory Energy Audit for Bureau of Energy Efficiency under Energy Conservation Act were completed for various cement plants. TEF Report was submitted for setting up 1 mtpa grinding and blending plant. Performance Assessment of existing Air Pollution Control Equipment (APCE) was done for 2 plants. Project Monitoring and Control (PMC) study for setting up a 600 tpd cement plant was done for an overseas customer. Feasibility study and preparation of DPR for Fly ash unloading for rail bowser, storage, feeding system and bulk cement truck loading system was completed. Technical Feasibility study for installation of cement

bag counting machine was done for one plant. Studies to develop alternatives to Natural Sand for use in Concrete / Masonry / Plaster have been carried out. NCB's services to the construction industry were reflected in studies on condition assessment of various concrete structures to determine the cause and extent of distress for repair and rehabilitation. Quality audit services were provided for various construction projects in the country. Evaluation of materials and concrete mix design studies were carried out for the construction industry. More than 300 concrete mix designs were carried out by NCB during this year.

Towards quality management, nine proficiency testing (PT) schemes as per ISO 17043 were organized and certified reference materials, developed by NCB, were provided to the industry. NCB continued providing training, testing, calibration and information services to the industry with its upgraded equipment facilities and ISO 17025 accredited laboratories.

The 14th NCB International Seminar, including the Technical Exhibition, organized in December 2015 in the series of biennial seminars, once again provided a good platform for exchange of information on the latest national and international trends and developments in the manufacture and use of cement and building materials. The seminar attracted much larger participation in terms of delegates, papers presented and exhibitors.

NCB's current Rolling Plan of Missions is given in Appendix I. During the year under review, specific projects with targets of time, cost and assured end-product were pursued under six Corporate Centres which are responsible for delivering the needed technological support services to the user industries. Close liaison was maintained as in the past with Cement Manufacturers' Association (CMA), Ministry of Environment and Forests (MoEF), Central Pollution Control Board (CPCB), Bureau of Indian Standards (BIS), Bureau of Energy Efficiency (BEE), Indian Bureau of Mines (IBM) and concerned departments of the state governments on aspects related to the development of cement and construction industries including availability of raw materials, quality assurance, modernization, energy management, environment, consumer protection, human resource development etc.

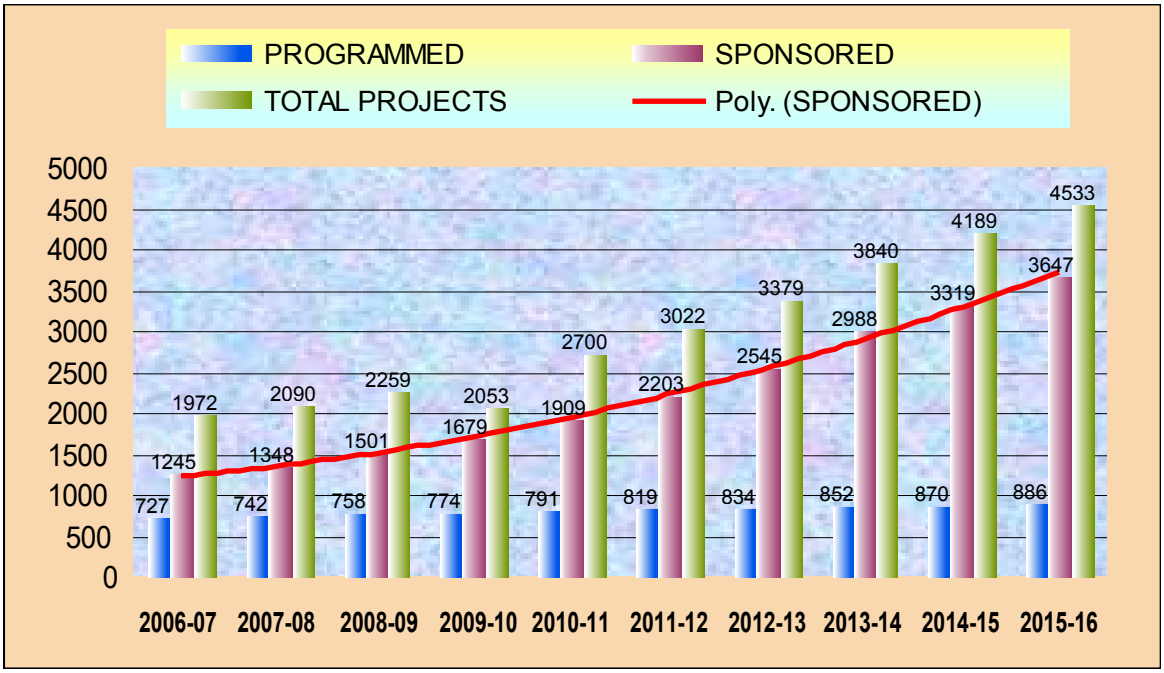
108th Board of Governors Meeting in Progress

Framework of Institutional Efforts

The activities of the Council were carried out under the six Corporate Centres at NCB's Units, situated in Ahmedabad, Ballabgarh and Hyderabad. While the infrastructure is physically distributed over these Units, all the Units are involved in the execution of projects or services as necessary, following the matrix approach.

During the year, 16 programmed and 328 sponsored projects were completed as listed in Appendices II and III respectively. The programmed projects, carried forward along with the new ones taken-up, comprised the R&D Programme for 2016-17, as given in Appendix IV.

The broad activities carried out by the six Corporate Centres during 2015-16 are highlighted in the following sections.



Projects Completed by NCB (Cumulative)

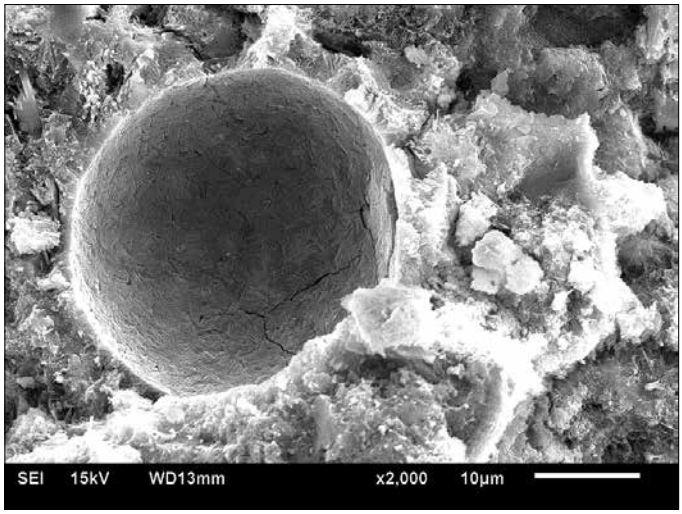
CENTRE FOR CEMENT RESEARCH AND INDEPENDENT TESTING - CRT

The Centre executes its activities through five programmes viz. Cements and Other Binders; Wastes Utilization; Refractories and Ceramics; Fundamental and Basic Research; and Independent Testing. 23 Sponsored Projects were completed and 6 Programmed Projects were pursued during the year.

Cements and Other Binders

Development of Composite Cements

Composite cement blends using 40-60% clinker, 35-55% combined mixes of fly ash and granulated blast furnace slag (GBFS) have been prepared and evaluated for physical properties. Composite cement blends containing 15-40% fly ash and 5-15% low grade limestone were also prepared and evaluation for physical performance characteristics has been completed up to 90 days. At above clinker replacement level, the values of compressive strength of composite cements were lower up to 28 days and improved at later ages as compared to control OPC. The hydration studies of these composite cements using XRD, DTA/TGA, SEM etc. have been taken up. Preparation and evaluation of ternary blends containing clinker, fly ash, GBFS and low grade limestone is in progress. The studies on concrete samples prepared using above composite cement blends are in progress.

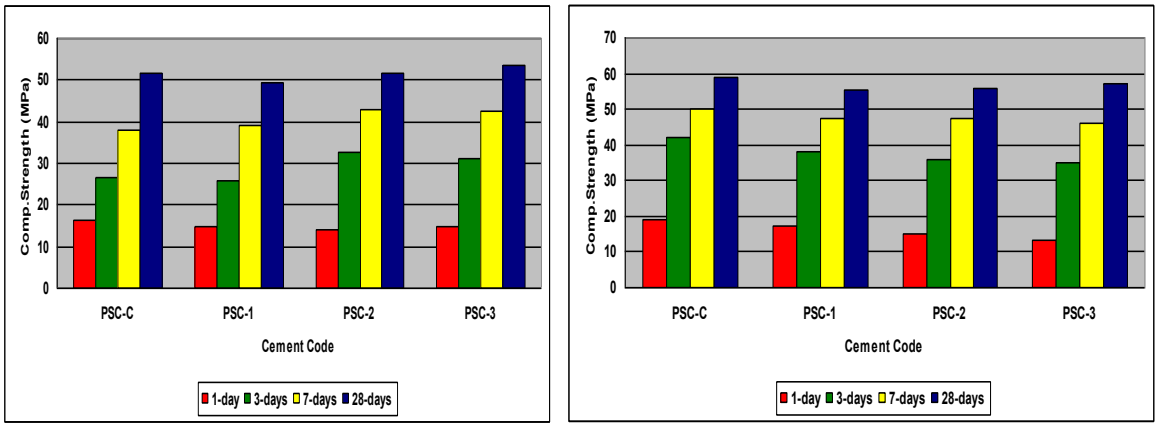


SEM Image of Composite Cement containing GBFS and Fly Ash Hydrated for 28 Days

Investigations on Technical Suitability of Performance Improver in PPC and PSC

Indian Standard IS: 269-2015 permits the use of up to 5% of different mineral additives such as limestone, fly ash, granulated BF slag, rice husk ash, metakaolin and silica fume as performance improver in the manufacture of Ordinary Portland Cement (OPC). However, use of performance improvers is not yet permitted in PPC and PSC. Investigations have been taken up for evaluating technical suitability of performance improvers in PPC and PSC

to enable provision for using performance improvers in Indian Standard specification of PPC and PSC. Different PSC samples were prepared using OPC clinker, mineral gypsum and 50% granulated BF slag (control cement, PSC-C) with addition of 5%, (max.) fly ash, high grade limestone and dolomite as mineral additives maintaining 3.0% SO_3 content by inter-grinding and separate grinding and blending of all components. These samples were designated as PSC-1, PSC-2 and PSC-3 corresponding to addition of fly ash, high grade limestone and dolomite respectively. The trend of compressive strength development of cement samples prepared by inter-grinding of all components showed comparable/marginal improved strength developments at all ages as depicted in figures shown below. Studies of the durability characteristics of PSC samples including rapid chloride permeability, accelerated carbonation, sulphate expansion etc. are under progress. Studies on PPC blends incorporating performance improvers have also been taken up.



(a) **(b)**

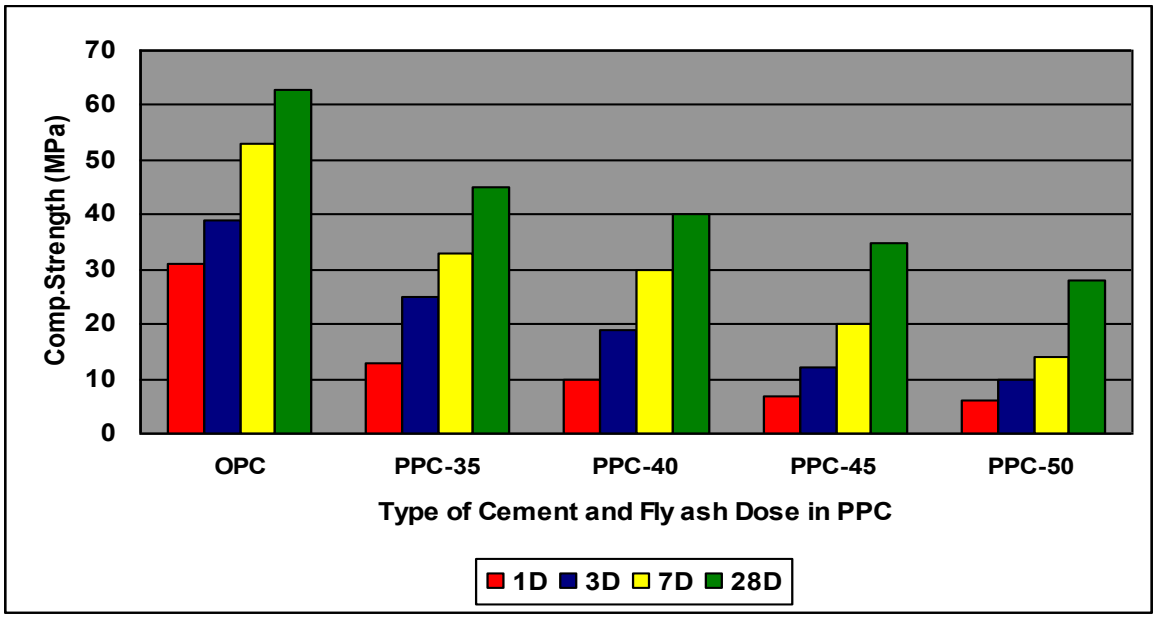
Compressive Strength Development of PSC prepared by
(a) Inter-grinding (Blaine's fineness: 380±10 m²/kg)
(b) Separate Grinding and Blending (Blaine's fineness: 340±10 m²/kg)

Investigations on Preparation and Evaluation of High Volume Fly ash Cements

The Indian Standard specification IS: 1489 (Part-1) for Portland Pozzolana Cement (PPC) permits 35%, max fly ash addition in PPC. Studies have been taken up on preparation and evaluation of high volume fly ash cements (HVFAC) in line with European Standard EN-197-1 that permits use of up to 55% pozzolana content including fly ash in pozzolanic cements. Different approaches are being tried for achieving desired strength development and other physical characteristics in HVFAC. The glass content, reactive silica and particles finer than 45-µm in fly ash sample affect its reactivity. Activation of fly ash through grinding/classification can be helpful in enhancing its reactivity and getting desired rate of strength development at higher fly ash content. Other avenues of interest for investigation include grinding of HVFAC to higher fineness, separate grinding and blending of constituents and use of mineral as well as chemical activators.

The studies presently under progress cover evaluation of PPC prepared using up to 50% fly ash. To adopt a national approach, the studies are being carried out using clinker from cement plants located in different regions/clusters in the country. Blends of PPC containing higher contents of fly ash up to 50% have been prepared and taken up for investigation of their chemical and physical properties. Initial studies indicate that at higher

fineness levels and with use of good quality clinker and fly ash, the PPC prepared with 40-45% fly ash conformed to the requirements of compressive strength as per IS:1489 (Part-1). Studies of the durability characteristics of high volume fly ash cement including rapid chloride permeability, accelerated carbonation and sulphate expansion have also been taken up.



Trend of Compressive Strength Development in HVFAC

Establishing Limestone Consumption Factor (LCF)

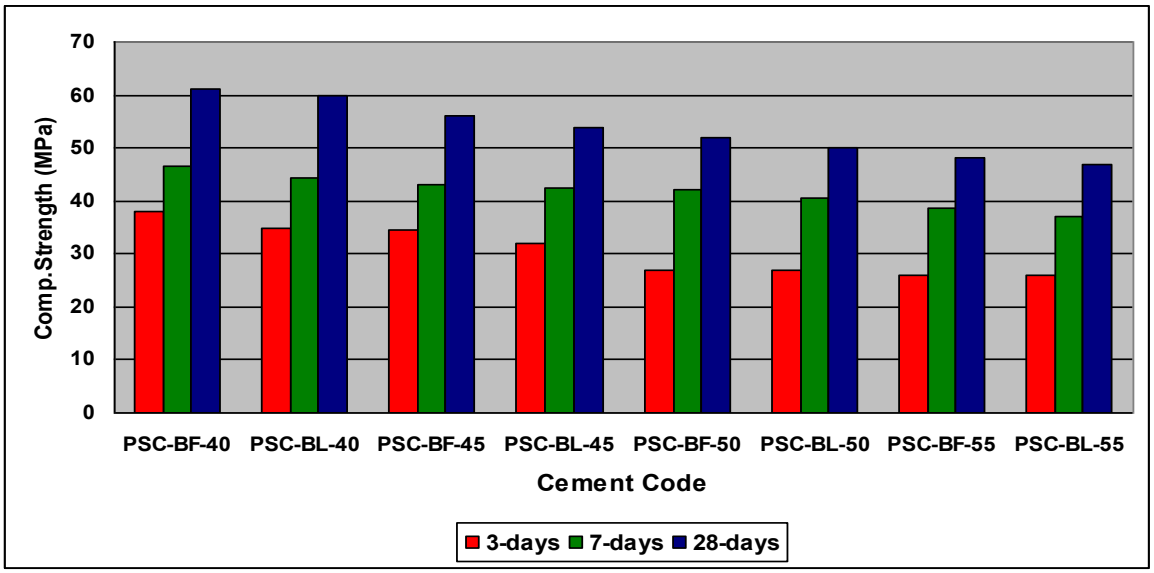
LCF studies are very important from the point of view of rationalization of limestone consumption in production of cement, estimating royalty payable to state for the limestone mined from their respective captive mines, besides internal material audit of the concerned cement plants. NCB has carried out Limestone Consumption Factor (LCF) studies for cement plants from all over the country and so far established the same for about 185 cement plants. During the year, LCF studies were completed for 11 cement plants from Himachal Pradesh, Rajasthan, Chhattisgarh, Maharashtra and Tamil Nadu.

Waste Utilization

Investigations on Technical Suitability of Steel Slag (LD Slag) in the Manufacture of Portland Slag Cement (PSC)

Steel slag (LD slag) from M/s Tata Steel Limited, Jamshedpur is a by-product generated during the processing of pig iron into crude steel through Linz-Donawitz process. The glass content in the LD slag sample was determined to be about 39% and therefore, did not meet the requirement of glass content (≥85%) as specified in Indian standard IS: 12089-1987 for slag to be used in the manufacture of PSC. The chemical analysis of LD slag sample showed its conformance to above standard. In view of above, an investigation has been

carried out on the partial utilization of LD slag by taking blends of 90% BF slag and 10% LD slag (designated as BL) with resultant glass content of 87% in the manufacture of PSC. Different cement samples were prepared by inter-grinding of 40, 45, 50 and 55% BF and BL slag samples with plant OPC clinker and gypsum. The results of compressive strength developments of above cement samples showed comparable strength development at all ages as shown below.

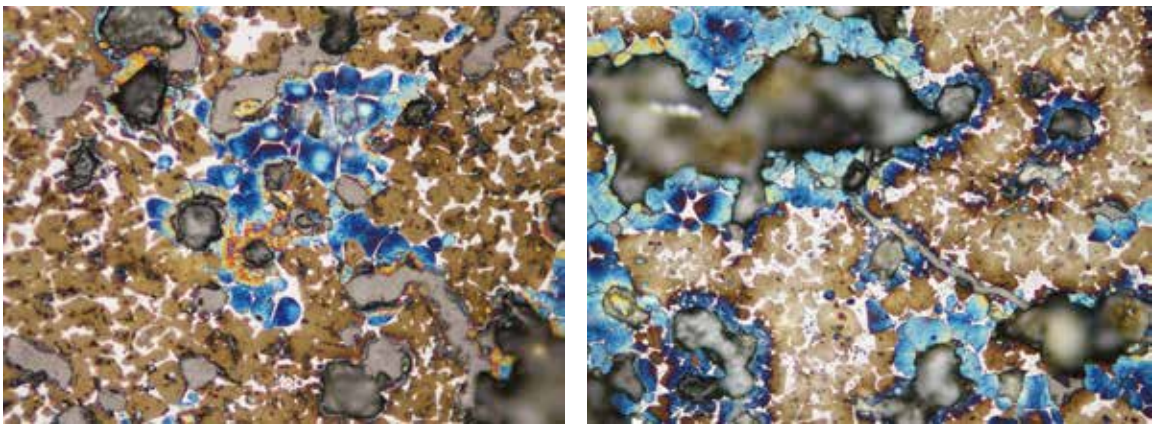


Compressive Strength Development of PSC Samples

Utilization of Pet Coke Gasification Slag in the Manufacture of Cement

A by-product slag, provided by M/s Reliance Industries Ltd, generated during the process of gasification of pet coke was investigated for its utilization in the manufacture of OPC. In addition to CaO, SiO_2, Al_2O_3, Fe_2O_3 and MgO, the slag also contains about 4% vanadium. Investigations were carried out on the use of this slag as raw mix component in manufacture of Portland clinker.

The burnability of cement raw mixes designed using 1-5% pet coke gasification slag showed its mineralizing effect, which was manifested through better lime assimilation and development of clinker mineral phases along with microstructure.



(a) **(b)**

Optical Micrographs of (a) Mineralized Clinker and (b) Control Clinker

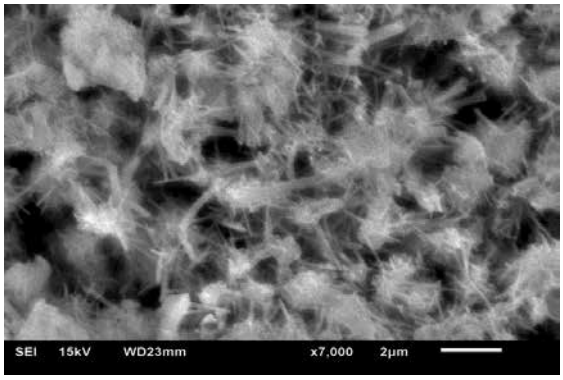
The slag sample was also investigated for its suitability as performance improver in manufacture of OPC. The glass content in the sample was found to be 54% and thus did not meet the requirement of Indian standard IS: 12089-1987. The physical characteristics of resultant cement were found to be comparable to its counterpart prepared using 5% BF slag at all the ages.

Fundamental and Basic Research

Investigations on Cement Containing Nanoparticles

Investigations on nanoparticle blended cements and cement based nano-composites have been continued. Effect of nanoparticles of various materials on the properties of cement & concrete and cement based nano-composites are being investigated. Use of carbon nanotubes as a reinforcing material for cement has also been investigated. Cementitious materials, though quite strong in compression, are relatively weak in flexure and have low bending strengths and fracture toughness. Fibre reinforcement of cementitious matrices improves their flexural strength as well as toughness by impeding crack formation and growth. Different types of fibres including polymer, glass and steel fibres have been used as reinforcement for cementitious materials. Reinforcement of cementitious material with high strength nanodiameter fibres such as CNT can be helpful in achieving high performance cement based composites. CNT is a tubular form of carbon. These are just a few nanometers in diameter and several microns long. CNT exhibits extraordinary mechanical properties including high Young's modulus (higher than some of the metals), as stiff as diamond, high tensile strength and high strength to weight ratio.

CNTs exist in agglomerated form and their dispersion in the cementitious matrix is a challenge. Aqueous dispersions of CNT were prepared using sonication and suitable dispersing agents. Sonication is a process in which ultrasound energy is used to agitate particles in a mixture or suspension. The aqueous dispersions of CNT were used to prepare cement paste and mortar, varying CNT concentration in the range of 0.01-1.0 percent. The Microstructural features and physical properties of OPC-CNT composites are under investigation. Scanning electron micrograph of OPC-CNT paste showed dispersed nanotubes in the hydrated cement matrix. Effect of CNT on cement hydration reactions is also being investigated using advanced instrumental techniques such as DTA/TG, XRD and SEM-EDAX.

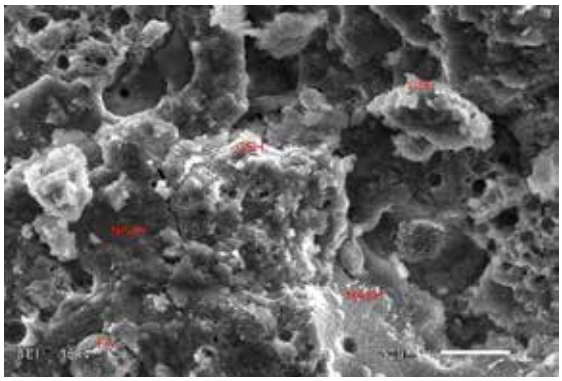


Scanning Electron Micrographs of OPC-CNT paste showing Dispersed Carbon Nanotubes in the Hydrated Cement Matrix

Development of Geopolymeric Cements

Studies on fly ash based geopolymeric cements have been continued. Alkali activation of low lime, coarser fly ash was carried out by employing initial thermal curing at two different temperatures up to 90°C for varying retention periods. It was observed that strength development was rapid at 90°C temperature curing but the specimens showed dimensional

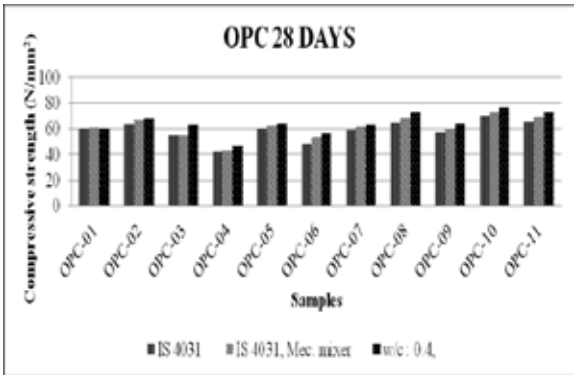
instability. The performance of geopolymeric cement was found to be influenced by initial thermal curing conditions and therefore need optimization. Investigations have also been carried out for preparation of cementitious binders at 27°C temperature using rationalized curing conditions by alkali activation of blends of fly ash with granulated blast furnace slag (GBFS) having 94 percent glass content. Studies indicated that ratio of fly ash and GGBFS in the blend affects the compressive strength property. The blend ratio as well as water content at fixed range of Na_2O required to be optimized to obtain better compressive strength property. SEM image of alkali activated fly ash – GGBFS system cured for 28 days indicated formation of CSH gel along with NASH in this system resulting in development of compressive strength at 27°C.



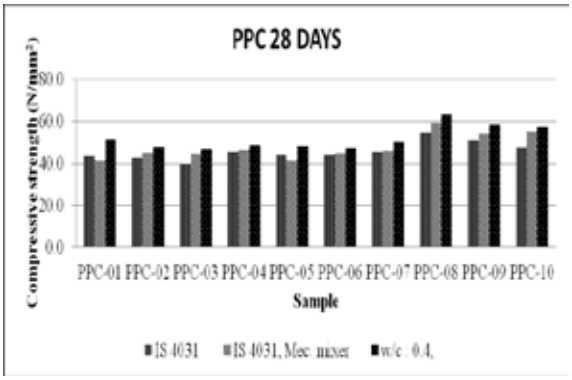
Scanning Electron Micrograph of Alkali activated Fly Ash - GGBFS System cured for 28 Days

Use of Mechanical Mixer in Physical Testing and Fixed w/c Ratio for Compressive Strength Testing of Cements

Studies were carried out on use of mechanical mixer and fixed w/c ratio in physical testing of cements. OPC, PPC and PSC samples were tested as per Indian standard test methods using manual gauging as well as mechanical mixer for preparation of paste and mortar. These cement samples were also tested for compressive strength using mechanical mixer and fixed water/cement (w/c) ratio of 0.4. Use of mechanical mixer is already specified in IS 4031 (Part 7) for preparation of mortar for testing of compressive strength of masonry cement. A similar mechanical mixer is also specified in IS 1727 for preparation of mortar for the determination of lime reactivity of pozzolanic materials as well as for determination of compressive strength of pozzolana cement. Use of mechanical mixer resulted in lower values of normal consistency from current practice of manual gauging for OPC, PPC and PSC. Use of mechanical mixer showed relatively lower setting times of OPC but relatively higher setting time of PPC and PSC. Le-Chatelier and autoclave expansion were not affected by use of mechanical mixer. Use of mechanical mixer resulted in higher values of compressive strength of OPC, PPC and PSC. Use of fixed w/c ratio of 0.4 resulted in higher values of compressive strength of OPC, PPC and PSC samples at all ages. The



Compressive Strength of OPC Samples at 28 Days



Compressive Strength of PPC Samples at 28 Days

28 Days compressive strengths of OPC and PPC as per IS 4031, as per IS 4031 using mechanical mixer and at fixed w/c ratio of 0.4 are given in the figure.

Usage of mechanical mixer would improve the consistency level and reduce variability in test results of compressive strength of cement, and working out normal consistency in particular. Usage of mechanical mixer is evident for increasing the speed and accuracy of testing to match with the progressively increasing volume of cement testing in plants of larger capacities and varieties of cement. Fixed w/c ratio coupled with usage of mechanical mixer would significantly improve the speed, accuracy and consistency of results of compressive strength of cement, from existing procedure as detailed in IS:4031.

Refractories and Ceramics

Evolving Guidelines for Improved Refractory Engineering Practices for Modern High Capacity Plants

Studies have been carried out to evolve guidelines for improved refractory engineering practices for cement plants. To collect the information on prevailing refractory engineering practices in Indian cement plants, a specific questionnaire for data collection was prepared and circulated to various cement plants in the country. Data have been received from 15 cement plants covering 20 cement rotary kiln systems. The analysis of the data indicated that the Indian cement plants are employing indigenous high alumina refractories as well as imported basic bricks with ISO and VDZ shapes. The installation practices range from manual to mechanized installation depending upon the capacity of kilns. The major problems encountered during the campaign are undesirable coating and buildups, kiln shell corrosion, ring formation, premature failures of refractories particularly burner lining failures. Accordingly, guidelines for improved refractory engineering practices are drawn covering various aspects of engineering practices applied in the country vis-à-vis global practices, particularly use of improved kiln access for increased safety, ease of operation and reduced downtime, safety inspection cage during inspection in kilns during shutdowns, remote controlled machine for reducing the demolition time, use of specially designed pay loader for quick removal of debris, laser light for drawing accurate centre line before starting brick installation, transportation of bricks in pallets, improved version of installation machine for increased lining speed and use of sacrificing layer to protect kiln shell from corrosion. The use of improved refractory engineering practices in Indian cement plants shall result in reduced kiln downtime and refractory related problems, with improved overall productivity of cement plant.

Demolition of Old Lining using De-bricking Machine

Independent Testing

Independent Testing Laboratories of NCB undertake complete physical, chemical, mineralogical and micro-structural analyses of various types of raw materials, cement, clinker, pozzolana, aggregate, concrete, admixtures, water, refractory, bricks, coal, lignite etc as per National and International standards.

The INT laboratories, established in 1977 on a Test House pattern, undertake testing jobs for cement, construction and allied industries. NCB testing laboratories achieved a landmark when NABL accredited them in the year 1997 as per ISO 17025 quality system. The quality of testing services is maintained through complying with system criteria and accreditation. The laboratories are equipped with state-of-the-art instruments to carry out the tests as per National and International standards. During the year, assignments were carried out for samples from neighboring countries also. The number of samples tested during the period was more than 7600.


Optical Microscope


Adiabatic Bomb Calorimeter C-2000


C H N S Analyser


Scanning Electron Microscope

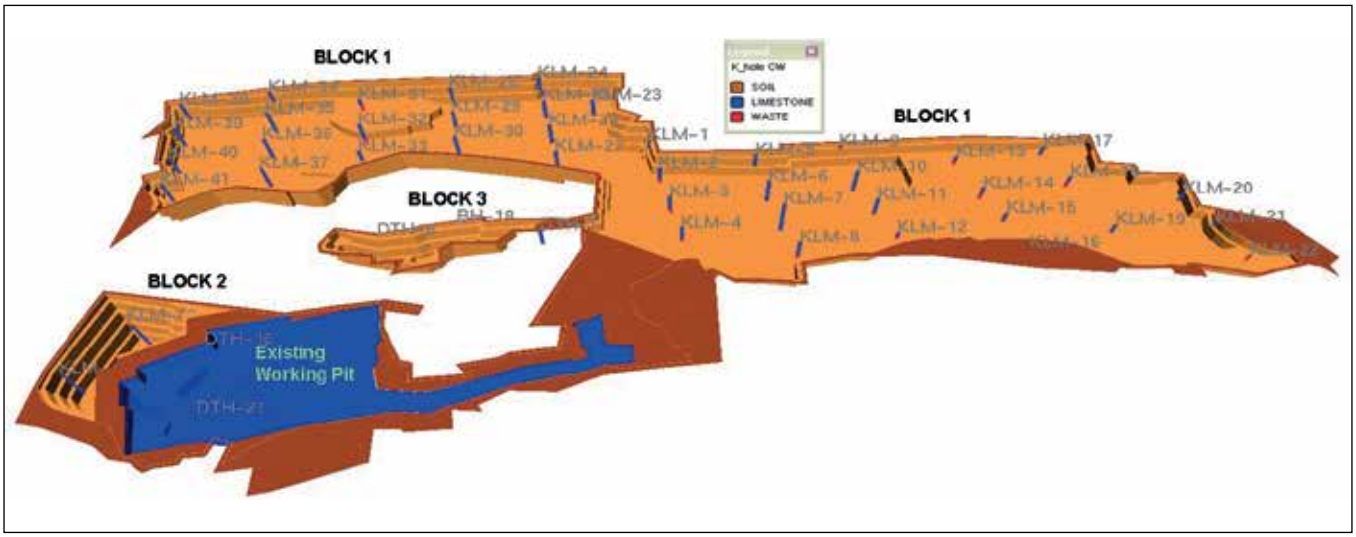
NCB's State-of-the-Art Laboratory at Ballabgarh Unit

CENTRE FOR MINING, ENVIRONMENT, PLANT ENGINEERING & OPERATION – CME

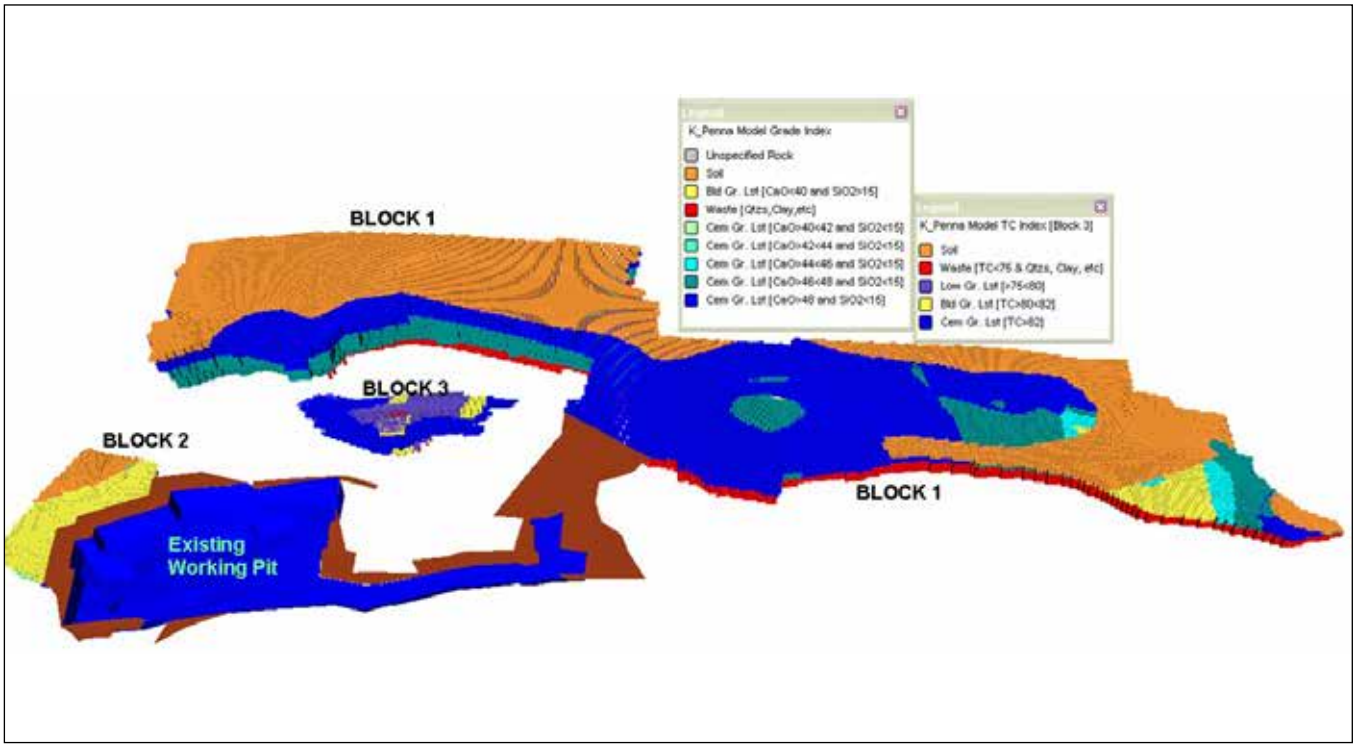
Centre for Mining, Environment, Plant Engineering and Operation carried out its activities through six Programmes viz Geology, Mining & Raw Materials; Environmental Management; Process Optimization and Productivity; Energy Management; Plant Maintenance and Project Engineering & System Design and completed 14 sponsored projects during the year.

Geology, Mining and Raw Materials

- NCB under its continuous activity *Updation of National Inventory of Cement Grade Limestone Deposits in India* has been kept updated through regular interaction with various state DGM's for collection of exploration data. The total limestone reserves of all categories is estimated at 124574.01 million tonnes as on 31st March 2016, out of which the *proved, probable* and *possible* categories are of 31605.73 million tonnes, 38580.24 million tonnes and 54388.04 million tonnes, respectively.
- Computer-aided Deposit Evaluation of Limestone Deposit located near Korumanipalle & Thollamadugu villages of Kolimigundla Mandal, Kurnool Dist. (AP) for M/s Penna Cement Industries Limited (PCIL) has been carried out. The 3-D Pit shell is being prepared through wire-framing based on distribution of Litho-units in boreholes having Black Cotton Soil, Limestone and Mixed waste (comprising of yellow clay, sandy soil with clay and quartzite) for Block 1, Block 2 and Block 3 and is shown below :



Boreholes inside the 3-D Pit Shell of the Study Area showing occurrences of Soil, Limestone and Waste



3-D Geological Model of Korumanipalle Limestone Mine 1 showing Black Cotton Soil, Limestone and Mixed Waste

- The total reserves of Cement Grade Limestone of *Proved* category (UNFC Code (111)) for Block 1, Block 2 and Block 3 of Korumanipalle Limestone Mine-1 have been estimated at 26.42 million tonnes, 1.18 million tonnes and 0.54 million tonnes, respectively. The total reserves of Blendable Grade Limestone of *Proved* category (UNFC Code (111)) for Block 1, Block 2 and Block 3 have been estimated at 0.52 million tonnes, 0.31 million tonnes and 0.08 million tonnes, respectively. Low grade limestone is present only in Block 3 and estimated at 0.10 million tonnes.

Environmental Management

- *Study on effect of mining on Salinity Intrusion, Ground Water Level /Quality, AAQ and Land Use Pattern of Adityana limestone and Clay Mines of M/s Saurashtra Cement Ltd, Ranavav* has been taken up. Ground water level & quality and soil quality monitored during Winter (January), pre-monsoon (Apr/May), monsoon (August), and post-monsoon (Nov.) for a period of one year. Ambient Air Quality (AAQ) and Land use pattern by using satellite imagery monitored for two seasons during pre-monsoon (Apr/May) and post-monsoon (Nov). Study completed during March 2016 and submitted the report.
- *Study on effect of mining on Salinity Intrusion, Ground Water Level / Quality, AAQ and Land Use Pattern of Ran Bauxite Mine of M/s Saurashtra Cement Ltd, Ranavav* has been taken up. Ground water level & quality and soil quality monitored during Winter (January), pre-monsoon (Apr/May), monsoon (August), and post-monsoon (Nov.) for a period of one year. Ambient Air Quality (AAQ) and Land use pattern by using satellite imagery

monitored for two seasons during pre-monsoon (Apr/May) and post-monsoon (Nov.). Study completed during March 2016 and submitted the report.

Process Optimization and Productivity

- A Feasibility Study (Phase-2) was carried out for plastic waste utilization in cement kiln at M/s Malabar Cements Ltd, Kerala. A plastic waste storage and handling system was proposed along with cost estimates and implementation schedule.
- A Diagnostic Study (Phase I) was carried out for minimizing coating formation in kiln at M/s Shree Digvijay Cements Limited. Recommendations were given by NCB team to reduce coating formation.
- A Techno-economic Viability Study was done for 100 tpd paper grade lime plant for Nagaland State Mineral Development Corporation Ltd Equipment specification has been given for lime manufacturing which is being used for construction sector.

Energy Management

- Projects on *Mandatory Energy Audit* for Bureau of Energy Efficiency under Energy Conservation Act were completed in JK White Cement Ltd – Gotan, JK Lakshmi Cement Ltd – Sirohi, Mangalam Cement Ltd – Morak and Reliance Cement Ltd-Maihar.

Project Engineering and System Design

- Preparation of TEFR for setting up 1 mtpa grinding & blending plant at Cuttack, Odisha, M/s Navrattan Blue Crete Industries (P) Ltd.
- Performance Assessment of existing Air Pollution Control Equipments (APCE) at Walayar - Preparation of suitable up-gradation schemes.
- Performance Assessment of existing Air Pollution Control Equipments (APCE) at Cherthala grinding unit - Preparation of suitable up-gradation schemes.

"In order to achieve new emission standards of PM emissions ≤ 30 mg/ Nm^3 and dust pollution load level of 0.125 kg/tonne of clinker production, M/s Malabar Cements Ltd (MCL) sponsored projects to assess their existing APCEs at Walayar plant and Cherthala grinding unit and prepare a Techno-economic Feasibility Report giving suitable suggestions for upgradation of existing APCEs, identification of areas for improvements, review of system design etc."

- Plant Performance Assessment for M/s Meghalaya Cements Ltd

  Realizing the need for continuous improvement, M/s Meghalaya Cements Ltd asked NCB to carryout Plant Performance Assessment (PPA), covering various aspects of plant operations like System Design Audit, Plant Process Audit, Environment Performance Assessment, Maintenance Management

Audit, Plant Utility Audit, E&I System Audit and Inventory Evaluation to reduce the input costs and minimize the production cost through optimized operations with environmental sustainability.

- Project Monitoring and Control (PMC) for setting up a 600 tpd cement plant in Republic of Congo for Government of Republic of Congo.

  "NCB shall act as a Project Management Consultant to RoC and prepare EPC tender, evaluate offers received, participate in bid opening, monitor and control the project implementation and provide support for project supervision."

- Feasibility study and preparation of DPR for Fly ash unloading for rail bowser, storage, feeding system and bulk cement truck loading system.

  "In view of utilizing BCFC type wagons for Flyash transport, M/s Malabar Cements Ltd sponsored a project to NCB to carry out a TEF study and prepare a DPR for fly ash unloading, storage, feeding and loading system for their plant at Walayar."

- Technical Feasibility study for installation of cement bag counting machine at Walayar for MCL, Kerala.

  "M/s Malabar Cements Ltd has sponsored a project to NCB to study and prepare a TEFR for installation of a cement bag counting machine for their plant at Walayar."

CENTRE FOR CONSTRUCTION DEVELOPMENT AND RESEARCH - CDR

The Centre provide services to the cement, concrete and construction industries through four programmes namely Concrete Technology; Structural Optimization and Design; Structural Assessment and Rehabilitation; and Construction Technology and Management. Strategic goal of centre is to contribute in developing durable and sustainable civil infrastructure for the nation. The Centre Completed 289 Sponsored Projects during the year.

Concrete Technology

Development of Alternatives to Natural Sand for use in Concrete / Masonry/Plaster

Concrete is the most widely used construction material all over the world. In India, the conventional concrete is produced by using river sand/crushed sand obtained from different sources. However, due to the increased use of concrete in almost all types of construction works, the demand of river sand or crushed sand has increased. To meet this demand of construction industry, excessive quarrying of sand from river beds is taking place causing the depletion of sand resources. The scarcity of river sand/ crushed sand due to such heavy demands in growing construction activities have forced to find the suitable substitute.

As per IS:383-2016 various industrial wastes like steel slag, iron slag, copper slag, C&D waste and bottom ash can be used as replacement of natural aggregate in concrete in limited percentage. The main objective of this study is to increase the use of these industrial wastes in construction. The study includes preparation of concrete mixes at different w/c ratios using the different alternatives such as Construction & Demolition Waste, Bottom Ash, Copper Slag, Steel Slag and Blast furnace Slag. Tests on concrete specimens include strength based tests and durability tests such as Rapid Chloride Penetrability Test (RCPT), Accelerated Carbonation Test, Water Permeability Test, Chloride Migration test, Abrasion Resistance Test, Sulphate Resistance Test and Acid Resistance test. Study on mortar includes Flow, Compressive strength and Loss of plaster on rebound from brick wall. Data base is also being generated indicating cost and availability of these materials across India.

Evaluation of Concrete Making Materials

Evaluation of concrete making materials is an important and crucial step before carrying out concrete mix designs. The evaluation of materials includes the testing of these materials, analysis of test results and establishing its correspondence into fresh, hardened and durability properties of concrete. Centre has evaluated various concrete making materials

such as cement, fly ash, silica fume, GGBS, water, fine and coarse aggregates, and chemical admixtures for Thermal power project structures (TG Deck, Cooling Tower, Chimneys etc.) of NTPC and its subsidiaries. Materials evaluation were also carried out for different hydroelectric projects like THDC India Limited, Koteshwar Hydroelectric Projects, Tehri Garhwal, Uttarakhand, NHPC Limited, Faridabad, and NHPC Limited, Dibang, Arunachal Pradesh and Loktak Downstream HE Corporation Ltd, Manipur (JV of Govt. of Manipur and NHPC). Concrete making materials have also been evaluated for Simplex Infrastructure Limited for DDA and other construction projects from across India. More than 15 brands of Chemical admixtures were tested and evaluated as per IS: 9103-1999.

Evaluation of Corrosion Inhibitor

Centre has developed the facility for evaluation of corrosion inhibitors through Modified Accelerated Corrosion Test as per JIS Z 1535, Rebar Weight loss by Immersion method as per ASTM G-1 and Polarization Test as per ASTM G-3. The Centre has evaluated 10 samples of different brands of corrosion inhibitors being used in construction.

Petrographic and Mineralogical Analysis and Alkali Aggregate Reaction (AAR) Studies of Aggregates

Over the years, NCB has developed expertise and hands-on competency for evaluation of concrete and concrete-making materials using various tests including petrographic techniques. Similarly, NCB has expertise and competencies to evaluate aggregates for potential alkali aggregate reaction which includes both alkali silica reaction and alkali carbonate reaction. Petrographic and Mineralogical Analysis and Alkali Aggregate Reaction (AAR) studies were carried out on different fine and coarse aggregates by conducting accelerated mortar bar testing as per ASTM C-1260 and long term testing like mortar bar testing as per IS: 2386 (Part-7) and concrete prism test as per ASTM C-1293 & 1105 for various projects of NTPC and its subsidiaries and NHPC and its JVs. In this financial year, more than 40 sources of aggregates have been evaluated through petrography and more than 45 aggregates have been tested and analyzed for Alkali Aggregate Reaction (AAR).

Concrete Mix Designs

Concrete mix designs have been carried out for Thermal Power Project structures (TG Deck, Cooling Tower, Chimneys etc.) of NTPC and its subsidiaries and for hydroelectric projects like THDC India Limited, Koteshwar Hydroelectric Projects, Tehri Garhwal, Uttarakhand. Concrete Mix designs were also carried out for various important structures of CPWD, PWD, DDA, Delhi Jal Board, DSIDC and various commercial RMC suppliers in National Capital Region. In this financial year, more than 325 concrete mix designs were carried out for various grades up to M80.

Development of Special Concrete Mixes

- *Self-compacting concrete*

  More than 15 mix designs of Self-compacting concrete (SCC) were carried out for Public Works Department, Delhi Development Authority with grades varying from M25 to M50.

- *Anti-washout under water concrete*

  Centre developed three underwater concrete mixes for Koteshwar Hydroelectric Project of THDC (India) Ltd Koteshwarpuram. Dosage of high range water reducer, anti-washout admixture and accelerator was optimized in order to ensure fresh concrete property conforming to the specification in terms of slump requirement, setting time and 15% maximum washout under water.

  Anti-washout underwater concrete is considered for use in a diverse range of work underwater. Anti-washout underwater concrete is different from other concrete in terms of its property in fresh state. It helps to prevent the concrete from segregation while placing under water. The viscosity of concrete is increased and its resistance to segregation under the washing action of water is enhanced by mixing an anti-washout admixture with the concrete. The tremie and concrete pump placing methods are adopted for construction.

- *Shotcrete*

  Shotcrete is the concrete which is pneumatically sprayed onto a surface at high velocity. This is used for in tunnel lining and concrete restoration work. Centre has developed one wet shotcrete and one dry shotcrete of M25 grade for Koteshwar Hydroelectric Project, THDC (India) Ltd Koteshwarpuram.

Concrete Mix Design of Various Grades in year 2015-16

Grade	M10 and 15	M20	M25	M30	M35	M40	M50	M60	M80
Nos.	15	20	135	60	35	25	15	8	2

Evaluation of Low Density Aggregate (LDA) and Performance Study of Light Weight Aggregate Concrete using LDA

Centre has evaluated the sintered fly ash light weight coarse aggregate, which is lower in density than conventional coarse aggregate, on various parameters for the use of this aggregate for production of Light Weight Aggregate Concrete. The center has also evaluated

Sintered Fly Ash based Light Weight Coarse Aggregate

A View of Concrete made with Light Weight Coarse Aggregate

the various fresh, hardened and durability properties of Light Weight Aggregate Concrete using sintered fly ash light weight coarse aggregate.

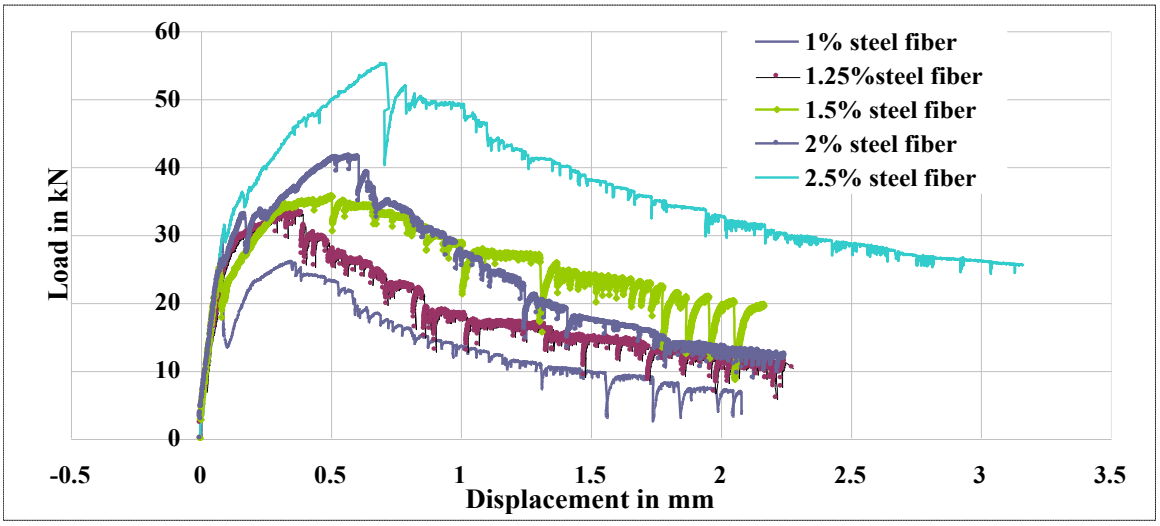
Evaluation of M40, M60 & M80 Grade Fibre Reinforced Concrete (FRC) for Performance Improvement of Concrete Structures

The R&D study consists of determining various engineering properties in its fresh and hardened state of standard & high strength concrete and its corresponding Fiber Reinforced Concrete (FRC) using indigenously available steel fibers (conforming to the specification of ASTM A 820), Polycarboxylic Ether based high range water reducing agent and Silica fumes.

The first objective of the study is to provide guidelines for construction & repairs of hydraulic structure overlays to sustain impact load, abrasion-erosion & cavitation caused by high velocity flow of waterborne solids containing silt and rolling boulders over the hydraulic structure, by developing a high performance concrete that has high abrasion-erosion & cavitation resistance, more impact strength, more toughness and more energy absorption capacity. Some test methods adopted to qualitatively simulate the field conditions are ASTM C 1138, ASTM C 1609, Impact Strength Test etc.

The second objective is to develop FRC technology to provide guidelines and develop design parameters of SFRC in structural members of reinforced concrete structures for Tall/Multistoried building that has more tensile strength, shear strength, ductility, energy absorption & bridge cracks.

Addition of steel fibres into the concrete result in ductile response in load deflection curve. Steel fibres in concrete allows the bridging of cracks, which aids in increasing the ductility of the concrete after the post-cracking stage. For all practical purposes, the load-deflection response of steel fibre reinforced concrete can be classified as either *strain-softening* or *strain-hardening*. Strain-hardening behavior in tension is one where multiple cracks occur prior to crack localization as similar to mild steel failure behavior in tension. As per ASTM C 1609 the measured area from zero to specified deflection in the load- deflection curve is the flexural toughness, which is the apparent amount of energy absorbed by the specimen. Energy absorption/toughness shows increasing trend with increase in steel fibre content by volume of concrete.



Load vs Displacement Curve of High Strength Steel fibre Reinforced Concrete (M80 Grade) with different percentages of Steel Fibers by Volume of Concrete Test carried out as per ASTM C 1608

Structural Optimization and Design

Development of Methods for Service Life Design of Concrete Structures

As per ISO 16204, the *design service life* is the "assumed period for which a structure is to be used for its intended purpose with anticipated maintenance, but without major repair being necessary". Traditionally, designers use to estimate service life design of the concrete structure based on the experience, and non-availability of standard guidelines causes obstacle for designing some important structures for stipulated service life.

The objective of the project is to develop method to assess the service life of new structures and also to assess the residual life of existing structures. Service life assessment or prediction is very complex as it depends upon materials proportioning, including selection of concrete constituents, structural detailing (such as concrete cover), environment condition etc. So the service life assessment does not guarantee the calculated service life but is a tool for systematic comparative engineering judgment. The project includes analyzing the deterioration mechanism of RCC structures such as Carbonation and Chloride induced corrosion, alkali silica reaction and sulfate attack for different environmental conditions. The effect of these deterioration mechanisms mainly chloride and carbonation on concrete will be studied by using different durability testing techniques/ test methods. While studying the effect of carbonation and chlorides, OPC, PSC and PPC cement of different grades/ types with different w/c ratios will be used. Correlations will be developed on the basis of laboratory studies of chloride diffusion and accelerated carbonation with the actual chloride ingress and actual carbonation, respectively, under different environmental conditions. The project also includes Corrosion study on Carbonation induced Corrosion at different chloride contents. Accelerated carbonation test and chloride diffusion (unidirectional) tests are in progress.

In order to simulate field condition of concrete deterioration through laboratory testing, various accelerated durability tests would be conducted in NCCBM laboratory and later these would be correlated with the natural phenomenon of concrete deterioration. For example, RCPT test which is an accelerated chloride migration technique should be synergized with the chloride immersion test / chloride ponding test for studying the effect of chloride penetration into the concrete.

To quantify the magnitude of chloride damage into the concrete structures, various tests methods are adopted. These methods are based upon the duration of testing period and are classified as under:

Sr. No	Test Method		Standard	Duration of Test
a.	Long term test	• Chloride immersion test	ISO 1920 Part 11	119 days
b.	Short term test	• RCPT • Non steady state chloride migration test	ASTM C 1202 NT Build 492	6 hour 6 hour to 96 hour
c.	Quick test	• Four point Wenner probe method • Air Permeability test		1-2 minute 12 minute

Presently the role of two binders i.e. OPC and PPC (fly ash based) in concrete against the chloride ingression have been studied. It had been found that the relationship between long term chloride immersion test with short term/ accelerated test methods could be achieved and these accelerated durability test methods could be used for predicting the service life of concrete structures.

Few field studies have also been carried out in order to study the effect of Carbon dioxide as a corrosive agent on the concrete structures and correspondingly Carbonation coefficient for the field structures have been worked out on the basis of depth of carbonation so obtained. The Carbonation model on the basis of field data and the laboratory data in case of OPC made concrete and PPC concrete have been worked out. For PSC, the work is in progress.

As per ISO 16204, rate of carbonation is the function of t^x (where x=0.5, though alternate value is also permitted). During the undergoing research project at NCB, it was seen that the reliability of carbonation depth as the function of $t^{0.5}$ does not hold valid /true but it actually started varying depending upon binder type even when concrete specimens were exposed to longer duration of Carbon dioxide environment. It was seen that the rate of increase of carbonation in case of PPC made concrete is somewhat lesser in comparison to OPC made concrete. However, predicted depth of carbonation is still higher in PPC made concrete even at the age of 30-40 years.

Based on the studies carried out so far and available literature, NCB can take up Service life Design studies for different structures while doing mix design, using standard accelerated tests or short term tests as discussed above. Based on such mix design, concrete mix and concrete cover to rebar can be selected for required service life with greater confidence. This is possible for different exposure conditions in coastal/ non-coastal areas.

Development of Design Parameters for High Strength Concrete

NCB has taken up the research on Development of Design Parameters for High Strength Concrete. In the absence of design parameters in the codes, designers are not able to use high strength concrete, even though the laboratories and RMC plants in the country have the expertise to design and produce high strength concrete. Therefore, this research is intended to develop design parameters for high strength concrete and help designers in using high strength concrete in design of structures with confidence. The objective of the project is to develop the design parameters for high strength concrete (HSC), for its effective utilization.

The mixes from M35 to M100 with slump of 100-125 mm will be studied. In addition to this, at least three grades of self-compacting concrete (SCC) will also be covered. SCC is becoming popular and difference in properties of SCC and conventional concrete needs to be studied while preparing recommendation for the design parameters. Medium quality flyash meeting the criteria of IS: 3812 and silica fume will be used in concrete grades above M75.

The HSC and SCC specimens will be tested for stress-strain relationship with ductility testing (strain after failure), static modulus of elasticity as per IS:516, flexural strength, split tensile strength and bond strength as per IS:2770 Part-1.

Based on the experimental testing, design values will be developed for Modulus of Elasticity, flexural strength and bond strength. Stress block parameters for flexure design

and values for permissible shear stress will also be worked out. In addition to above, some large size beams will also be tested based on the design parameters worked out after trials for verification and validation of recommended values.

Structural Assessment and Rehabilitation

World is rapidly changing with lot of innovative RC structures, so the health assessment & condition assessment of existing structures is becoming necessary due to safety & serviceability requirements. Various structures especially Commercial, Industrial & Residential buildings, Bridges, tunnels, dams and high rise structures require necessary structural stability checks for enhancing their service life. The distress in any form ie cracks, flaws, imperfection, spalling of concrete & Corrosion of reinforcement not only disturb the aesthetic appearance but also reduce safety and integrity of the structures under use.

In the area of SAR, condition assessment & structural stability on variety of structures like Turbo Generator roof structures, Cooling Towers, Tall structures, Machine Foundation, Turbine Foundation, Dam structures, Bridges, Water Reservoir Basins, Commercial, Industrial & Residential RCC Buildings in different states in India is carried out. These works were taken up as sponsored R&D assignments. The various R&D sponsored projects were completed for reputed customers like NTPC (Dadri, Badarpur, Talcher, Korba, Farakka, Tanda, Vishakhapatnam), NFL (Bathinda), RBI, BHEL (Delhi), GAIL (Noida), CPWD (Delhi), DDA (New Delhi), RGPPL etc. The Investigation / Assessment is carried out for effective repair, rehabilitation & re-strengthening of existing structures. The Centre has facilities of various Non-destructive Evaluation techniques like Rebound Hammer test, Ultrasonic Pulse Velocity testing, Core extraction, Half-cell potential measurement, Ferro Scanner,

UPV Testing being done by Surface Probing on RCC Slab in the Sample Survey Block (Back Wing) at IASRI, Pusa, New Delhi

Extraction of Concrete Core from RCC Column of OFOCGHS, Dwarka, Delhi

View of Ferro Scanning Examination at NTPC, Vindhyachal

Resistivity Test. Besides, the chemical analysis (*p*H, Chlorides, and Sulphates etc) of the powder sample collected from specialized projects studied in field & laboratory are done for different structures. The investigations are generally followed by recommendation for repair and rehabilitation with state-of-the-art repair materials and implementation techniques for distressed RCC structures covering specifications, cost estimates and bill of quantities. The assessment was carried out to evaluate the residual service life of structures. Team of scientists / experts at CDR centre have versatile abilities to provide adequate solution to distressed RCC structures for wide spread customers all over India. The main emphasis is to provide sustainable and durable RCC structures.

Construction Technology and Management

Checking of Torque of HSFG Bolts at PWD Flyover Project at Vikaspuri, Delhi

Third Party Quality Assurance/Audit (TPQA) programme of the centre has assisted various organisations to ensure quality workmanship to meet their specified quality standards in delivering quality constructed facilities. TPQA was carried out for roads and bridges construction, residential, commercial and institutional buildings, canal lining work, concrete drain projects, boundary wall construction etc. for Central Public Works Department, Delhi & Chennai, Public Works Department, Delhi, Municipal Corporation of Delhi (MCD), Delhi Development Authority (DDA), Delhi Urban Shelter Improvement Board (DUSIB), Delhi, Agricultural Produce Market Committee (APMC), Rajkot (Gujarat), Delhi State Industrial and Infrastructure Development Corporation Limited (DSIIDC), Odisha Industrial Infrastructure Development Corporation (IDCO), Bhubaneswar, Delhi Metro Rail Corporation (DMRC), Delhi, Public Works Department, Diu, Omnibus Industrial Development Corporation of

Inspection of HSFG Bolts after Slab Concreting at PWD Flyover Project at Vikaspuri, Delhi

Underground Multilevel Car Parking of SDMC at Subhash Nagar, New Delhi

Slab Casting of SDMC Underpass at Bijwasan, Delhi

RCC Box Base Slab of PWD under construction at Ganesh Nagar, New Dehli

Concrete of Road Construction of SDMC at Okhla, Delhi

Daman & Diu and Dadar & Nagar Haveli Limited, Daman, Sports Authority of Gujarat, Gandhi Nagar, National Institute of Technology, Warangal, etc.

The methodology of Third Party Quality Assurance / Audit (TPQA) are as per Quality Assurance Plan. Quality Assurance Plan included physical inspection of work at various stages, random testing of materials for verifications as per contract specifications and various relevant codes and standards such as IS codes, IRC, MORTH and CPWD specification, limited non-destructive testing as and when needed, review of quality system and quality assurance measures. Performance testing of RCC structures with NDT included ultrasonic pulse velocity, testing rebound hammer test, rebar locator, cover meter and core sampling.

CENTRE FOR INDUSTRIAL INFORMATION SERVICES – CIS

The Centre pursued its activities through six programmes viz. Industrial Information and Data Bank; Integrated IT Solutions; Publications; Seminars and Conferences; International and National Linkages; and Image Building. CIS collects and disseminates information to cement, building materials and construction industries. Besides other facilities, the Centre includes a modern library and a computer centre.

Industrial Information and Data Bank

NCB Ballabgarh Library

NCB Library at Ballabgarh Unit serves as the national information centre for cement, building materials and construction industries. The holdings of the Library have grown to 46,485 documents. The library has a bibliographic database consisting of about 41,191 entries derived from the journals received. NCB scientists as well as cement plants and other user industries utilize it for interactive searches. A library automation system called 'LIBSYS' has been installed. The system is user-friendly and compatible to network communication. Memberships of Indian and Overseas professional institutions, as listed below, were served.

MEMBERSHIPS

Indian	Overseas
• Construction Industry Development Council (CIDC), New Delhi • Indian Roads Congress (IRC), New Delhi • Indian Mining & Engineering Jl, Bhubaneswar • Materials Research Society of India, Bengaluru	• The American Concrete Institute (ACI), USA • Precast / Prestressed Concrete Institute (PCI), USA

Integrated IT Solutions

NCB continued modernizing its IT infrastructure with MS windows 8.1/10 based PCs and laptops. Now, NCB-Ballabgarh premises which is in Fiber-Star Topology is supported with copper & Fiber redundancy. Web Technology based Laboratory Information Management System (LIMS) covering ~5 Laboratories & 50 users (Max.), common database, Hardware & Software / Data redundancy is procured. Blade Servers with RAID 5 and Hardware redundancy is installed to take care of backup & restore, archiving, maintenance, web development and intranet application development.

Proof of Concept (PoC) for Sectoral Antenna based solution was done to make NCB Ballabgarh Unit complete campus Wi-Fi enabled. The NCB website, *www.ncbindia.com* is completely revamped with new look and feel giving vivid details of the various Centres and their activities. The Website was uploaded with various promotional information of 14th NCB International Seminar. Windows Deployment Services for maintenance & installation continued with BackUP Exec. Rain Mail Intranet Server is updated – it provides central email solution, *e-Abstracts* (monthly) and *e-NCB News* (quarterly) have been sent regularly. Following services were continued :

- Indexing Services from Library, through Intranet site and *www.ncbindia.com* site.
- Uploading website with announcements on 14th NCB International Seminar
- Various Training Course announcements, quality related schemes' announcements, recommendations of various workshops
- Employment opportunities & RTI related documents.

Publications

Efforts to widely popularize and promote NCB activities, technologies and consultancy services amongst the cement, construction and related building materials industries continued. During the year a *Proceedings / Extended Abstracts, NCB-CMA Special Publication, Programme Booklet,* were brought out for 14th NCB International Seminar. The other documents published were : *NCB Annual Report 2014-15* (English and Hindi), *Seminar Bulletin 2* of 14th NCB International Seminar, *NCB Training Programme 2016-17* including one centre's *brochure* on Construction Development and Research.

A few NCB Publications

Seminars and Conferences

14th NCB International Seminar on Cement and Building Materials

Shri Amitabh Kant, Secretary, DIPP, Ministry of Commerce and Industry Government of India is lighting Lamp in Inaugural Session of 14th NCB International Seminar on Cement and Building Materials at Manekshaw Centre, New Delhi

Shri Amitabh Kant, Secretary, DIPP, Ministry of Commerce and Industry Government of India is releasing NCB-CMA Special Publication in Inaugural Session of 14th NCB International Seminar on Cement and Building Materials at Manekshaw Centre, New Delhi

Shri Amitabh Kant, Secretary, DIPP, Ministry of Commerce and Industry Government of India is inaugurating Technical Exhibition on the occasion of 14th NCB International Seminar

- The Seminar was held during 1-4 December 2015 at Manekshaw Centre, New Delhi. It drew participation of more than 1050 delegates, including 100 from overseas countries, like Austria, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, Oman, Sweden, Switzerland, Turkey and USA. About 180 technical papers were presented in 25 technical sessions, apart from two special invited lectures by internationally renowned experts. The authors gave emphasis to issues related to all areas of cement manufacture, blended and special cements, performance and durability of concrete as well as emerging trends in building materials and construction practices.
- The concurrent Technical Exhibition also received overwhelming response, with 118 stalls from 86 companies showcasing the latest advances in Technology, Instrumentation & Control Systems, developments in machinery, related auxiliaries and services available to the cement industry and provided an opportunity for a very useful interaction among machinery suppliers and users.
- The Seminar as well as the Technical Exhibition were inaugurated by Shri Amitabh Kant, Secretary, DIPP, Ministry of Commerce and Industry, Govt of India. Presidential address was delivered by Dr S Chouksey, Vice President CMA & Vice Chairman NCB & Whole time Director JK Lakshmi Cement Ltd Presenting the industry perspective, Shri Ajay Kapur, Managing Director & CEO, Ambuja Cements Ltd highlighted the sustainability initiatives made by Indian

Cement Industry. Technological perspective of the cement industry was presented by Shri Ashwani Pahuja DG-NCB. Shri Amitabh Kant also released the special publication, *Cement & Construction Industry – Perspective for Sustainable Growth*, brought out jointly by National Council for Cement and Building Materials (NCB) and Cement Manufacturers' Association (CMA), on the occasion of the Seminar.

- The Seminar was sponsored by Ambuja Cements Ltd (Chief Patron), Cement Manufacturers' Association, Dalmia Cement (Bharat) Ltd, JK Lakshmi Cement Ltd, UltraTech Cement Ltd (Patrons), Shree Cement Ltd (Platinum Sponsor), Cement Manufacturing Co Ltd, (Gold Sponsor), Ghorahi Cement Industry Pvt Ltd, Nepal (Silver Sponsor), Calderys India Refractories Ltd, My Home Industries Ltd (Bronze Sponsors), Saurashtra Cement Ltd & Gujarat Sidhee Cement Ltd, Electra (Jaipur) Ltd (other Sponsors).
- Department of Industrial Policy & Promotion (DIPP) supported the event.
- The deliberations were enriched by Special lectures by Dr Tetsuya Ishida on *Multi-scale modeling of structural concrete for performance based design* and Dr Anjan K Chatterjee on *New cements and binding materials*.
- The Chief Guest of the Concluding Session, Shri Shailendra Singh, Joint Secretary, DIPP, Ministry of Commerce and Industry, Government of India gave away the National Awards for Energy Efficiency, Environmental Excellence and Quality Excellence in the Indian Cement Industry for the years 2013-14 and 2014-15 and also the Awards for Best Technical Papers.

Other Institutional Events

Some important institutional events, as mentioned below, were organized during the period of the report :

National Technology Day : NCB celebrated the 'National Technology Day' by organizing technology related programmes on 11 May 2015 at its Ballabgarh and Hyderabad Units. At Ballabgarh Unit, Er. Sanjeev Sood, General Manager & Head, NJHPS delivered Lecture on *Innovative Methods for Performance Improvement in Power Station*.

Dr (Ms) M Raina, Director, Ministry of Environment & Forests, Govt of India planting a sapling on World Environment Day at Ballabgarh Unit

World Environment Day : Special functions were organized on 5 June 2015 to celebrate 'World Environment Day' at Ballabgarh and Hyderabad Units. The theme of the year was *Seven Billion Dreams. One Planet. Consume With Care.* At Ballabgarh unit, chief guest of the occasion Dr (Ms) M Raina, Director, Ministry of Environment & Forests, Govt of India addressed NCB officials.

Quami Ekta Week : 'Quami Ekta Week' was observed during 19-25 November 2015 and National Integration Pledge was administered to the staff as a part of it.

NCB Day 2015: NCB Day 2015 was celebrated on 24 December 2015. Shri Ashwani Pahuja, Director General NCB addressed the staff on the occasion. Dr S Harsh, Joint Director NCB gave a presentation on core competences of NCB. Director General gave away Awards to NCB officials who made outstanding contributions during the year in their respective fields of activities. The 'Best Scientist Award' was given to Shri Suresh Vanguri, the 'Best Supporting Staff' Award was given to Ms Poonam Rani in the Technical Stream and Shri K Chellappa Gangadhar in Administrative Stream, respectively.

Dr Shri Harsh, Joint Director giving a presentation on the occasion NCB Day at Ballabgarh unit. In the Picture on right , the awardees of various activities and best speakers in Hindi Pakhwada 2015 competition with Shri Ashwani Pahuja Director General (centre) and Shri R K Goswami, Head of Centre-CIS on his right

Hindi Pakhwada : Hindi Pakhwada was organized during 14-28 September 2015 at Ballabgarh. Shri R K Goswami, Head of Centre (CIS) expressed his satisfaction on growth and development of Hindi in the organisation. He exhorted NCB officials to further promote use of Hindi in their day-to-day interaction. Adhyaksha, NCB Rajbhasha Karyanvayan Samiti, Dr Devendra Yadav reviewed various programmes organized during the year. Shri Vinod Kumar, Hindi Officer summarized the activities organized for promoting the use of Hindi in NCB during the year in the concluding celebration. On this occasion, NCB staff members also presented their views on the importance of Hindi language. The best two speakers Shri Kapil Kukreja and Shri Mohd Iqbal were declared as first and second winners, respectively, on the occasion.

Hindi Pakhwada celebration in progress at NCB Ballabgarh. Shri R K Goswami, Head of Centre-CIS and Dr Devendra Yadav, Adhyaksha NCB Rajbhasha Karyanvayan Samiti are on dais

Shri Vinod Kumar, Hindi Officer presenting Activity Report of the Year

Participation in Workshops, Seminars and Conferences

The following NCB officials participated in Seminar & Conferences shown against their names during the period.

SI. No.	Participants	Event
1.	Sh Ankur Mittal Sh Rayees Ahmed Sh R C Rao Sh Vinay Kant Sh V Naga Kumar Sh Parteek Sharma	Advanced Training Progrmme on Energy Efficiency, 23-24 April 2015, Delhi, Organized by CII Sohrabji Godrej Green Business Centre (CII-Godrej GBC)
2.	Sh B S Rao Sh Adarsh Kumar NS	Recent Advances in Structural Engineering (RASE 2015), 07-08 May 2015, Chennai, Organized By CISR-SERC
3.	Sh V V Arora Sh Satish Sharma	International Conference on the Regeneration and Conservation of Concrete Structures (RCCS), 1-3 June 2015, Nagasaki, Japan, Organized by Japan Concrete Institute
4.	Sh P N Ojha	Consultative Meet on Fly Ash, 04 June 2015, New Delhi, Organized by Centre for Fly Ash Research & Management (C-FARM)
5.	Sh Ashwani Pahuja Sh S K Chaturvedi	1st International Conference on Calcined Clays for Sustainable Concrete, 23-25 June 2015, Lausanne, Switzerland, Organized by EPFL-STI-IMX-LMC Laboratoire de Materiaux de Construction
6.	Sh Y N Daniel	One Day Workshop on FRC and Shotcrete Testing, 03 July 2015, Chennai, Organized by Department of Civil Engineering, IIT Madras
7.	Sh Amit Sagar Sh Arup Ghatak	Challenges in Earthquake Resistant Design of Building & Structures, 4-5 September 2015, New Delhi, Organized by Indian Association of Structural Engineers (IAStructE)
8.	Dr S K Breja	4th CII NABL National Conclave for Laboratories, 14-15 September 2015, organized by CII and NABL
9.	Sh V V Arora Sh Satish Sharma	Engineering Smart Cities, 25-26 September 2015, New Delhi, Organized by Consulting Engineers Association of India (CEAI)
10.	Sh S Agarwal	5th Annual Conference on Operation, Maintenance and Tolling in Road Sector, 26-27 September 2015, New Delhi, Organized by Indian Infrastructure Magazine

SI. No.	Participants	Event
11.	Sh Ashwani Pahuja Dr Shri Harsh	13th TCMB International Technical Seminar and Exhibition , 7-10 October 2015, Antalya, Turkey, Organized by The Turkish Cement Manufacturers' Association
12.	Dr S K Breja	Importance of Sieves and Sizing of particles in process industry, 08 October 2015, organized by BIS, New Delhi
13.	Sh Satander Kumar Sh Lalit Kumar Yadav	4th Asian Conference on Advancements in Structures, 8-10 October 2015 & 1st International Symposium on Ultra High Performance Concrete, 7th October 2015, Kolkata, Organized by Indian Concrete Institute-Asian Conference on Ecstasy in Concrete (ICI-ACECON) & Asian Concrete Forum (ACF 2015)
14.	Md Mustaque Jamali Sh Puneet Sharma Sh Poonam Rani Sh Abhishek Kumar Tripathi Sh Nihar Ranjan Dhanee	Importance of Sieves and Sizing of Particles in Process Industry, 08 October 2015, New Delhi, Organized by Bureau of Indian Standards
15.	Sh Ashwani Pahuja Sh S K Chaturvedi Sh Brijesh Singh	14th International Congress on the Chemistry of Cement (14th ICCC), 13-16 October 2015, Beijing, China, Organized by The Chinese Ceramic Society in association with China Building Materials Academy and State key Laboratories of Green Building Materials
16.	Dr S K Breja	World Standard Day Celebration, 16 October 2015, organized by BIS, Faridabad
17.	Sh Mantu Gupta Sh Shaurabh Garg	Conference and Exhibition on Structural Connections, 28 November 2015, New Delhi, Organized by Indian Concrete Institute (ICI)
18.	Sh Amit Prakash Sh Rizwan Anwar	International Conference & Exhibition Trenchless Technology for Building Smart Cities, 16-17 December 2015, New Delhi, Organized by Indian Society for Trenchless Technology (IndSTT)
19.	Sh Ashwani Pahuja	3rd Smart Cities Summit 2016, 10-11 February 2016, Mumbai, Organized by ASAPP Info Global Group
20.	Sh V K Mathur	3rd Annual Conference on Urban Rail-Based Transit Systems, 18-19 February 2016, Mumbai, Organized by India Infrastructure
21.	Sh Amit Trivedi Sh Amit Prakash	Symposium on Energy Conservation Using uPVC Windows / Doors, 20 February 2016, New Delhi, Organized by UWDMA-IGCC

SI. No.	Participants	Event
22.	Sh P Srikanth Sh Bharat Ram Sh R P Vijayvergia	Best Practices in Measurements and Evaluation of Uncertainty, 22-23 February 2016, New Delhi, Organized by National Physical Laboratory (NPL)
23.	Dr S K Breja Dr (Ms) Pinky Pandey	9th International Conference on Advances in Metrology-2016, 24 -26 February 2016, New Delhi, Organized by National Physical Laboratory (NPL)
24.	Sh Sanjay Mundra	Conference on Need of Environmentally Sustainable Urban Transport System in India (Focus: Eco Mobility, Alternative Fuels, Electric Mobility), 02 March 2016, New Delhi, Organized by PHD Chamber Supported by UNHABITAT
25.	Sh P Srikanth Sh Vishnu Dutt	One day Seminar on Applications of ULM and Evaluation of Measurement Uncertainty, 09 March 2016, organized by Octagon Precision (India) Pvt Ltd
26.	Sh Pritam Singh Rawat Sh Jagjit Singh	Conference on Sustainable Asphalt Pavement for Developing Countries (CONSAP-2016), 11-12 March 2016, New Delhi, Organized by CSIR-Central Road Research Institute
27.	Sh Manish Kumar Mandre Sh Jyothi Swaroop	Rheology of Concrete & Waterproofing Engineering, 18 March 2016, Gurgaon, Organized by BASF India Limited
28.	Sh P N Ojha Sh Nikhil Kaushik	Emerging Building Materials and Construction Technologies, 21-22 March 2016, New Delhi, Organized by Building Materials & Technology Promotion Council (BMTPC)

Papers Presented in Workshops, Seminars and Conferences

The following papers were contributed / presented by NCB experts to / in different National and International Seminars, Workshops etc. :

International Conference on the Regeneration and Conservation of Concrete Structures (RCCS)

01-03 June 2015, Nagasaki, Japan

1. *Distress Assessment, Repair and Strengthening of RCC Members of Turbo Generator Foundation of Anpara Thermal Power Station at Uttar Pradesh (India) – A Case Study* by Satish Sharma, V V Arora & Adarsh Kumar NS

4TH CII NABL National Conclave For Laboratories

14-15 September 2015, New Delhi

2. *Business Model for Profit Making in PT Provider Activity – A Case Study of Building Materials* by S K Breja

1ST International Symposium on Ultra High Performance Concrete

07 October 2015, Kolkata

3. *Cable Stayed and Suspension Bridges – Problems and their Solution* by Satander Kumar & V V Arora

Importance of Sieves and Sizing of Particles in Process Industry

08 October 2015, Bureau of Indian Standards, New Delhi

4. *Role of CRMs and Calibration in Sieving and Sizing in Cement Industry* by S K Breja

4TH Asian Conference on Advancements in Structures

08-10 October 2015, Kolkata

5. *Study on Ultimate to Yield Strength of HYSD Reinforcing Bars (An Overview & Issues)* by Brijesh Singh, V V Arora & Lalit Yadav

14TH International Congress on the Chemistry of Cement

13-16 October 2015, Beijing, China

6. *Potentials of Using Steel Slag in Manufacture of Cement in India* by S K Chaturvedi, D Yadav, M M Ali, Ashwani Pahuja, D Satish Kumar, S M R Prasad

7. *Investigations on the Role of Zinc Industry By-product "Jarosite" as Set Controller in OPC and PPC* by S K Agarwal, M M Ali, Ashwani Pahuja, B K Singh, Vikas Sharma

World Standard Day Celebration

16 October 2015, Bureau of Indian Standards, Faridabad

8. *Can India become a standards setter in the coming times?* by S K Breja

14TH NCB International Seminar on Cement and Building Materials

01-04 December 2015, Manekshaw Centre, New Delhi, India

9. *Utilization of Slab Quarry Reject Limestone in Cement Manufacture – A Case Study* by D K Panda, N K Sharma, A K Dubey, Richa Mazumdar and A K Mishra

10. *Challenges and Opportunities in Disposal of Spent FCC/RFCC Catalyst* by P K Kasliwal, K M Prabhu, B Kumar, S S V Ramakumar, B P Das, S K Chaturvedi, M M Ali and A Pahuja

11. *Impact of Utilization of Copper Slag on Development of Clinker Mineral Phases* by P S Sharma, S Vanguri, M N K P Bolisetty, S K Agarwal and S Harsh

12. *Co-Processing of AFR in Indian Cement Industry – NCB Experiences* by Rabindra Singh, A K Mishra, S K Chaturvedi, Rayees Ahmed and O P Grover

13. *GHG Reduction Potentials in the Indian Cement Industry – Upscaling Implementation* by P Fonta, E Sar, P V Kiran Ananth, S K Chaturvedi, A Pahuja, R Bhargava, K N Rao, L Rajasekar, S V Herwadkar, S Shrivastava and S Krishnamoorthy

14. *Studies on Development of Geopolymer Based Cements* by Alkali Activation of Fly Ash and Granulated Blast Furnace Slag Cured under Ambient Temperature by R S Gupta, S Vanguri, V Liju, S K Chaturvedi and A Pahuja

15. *Investigations on Composite Cement containing Indian Fly Ash and Granulated Blast Furnace Slag* by S K Chaturvedi, D Yadav, S Vanguri, V P Chatterjee and A Pahuja

16. *Productivity Enhancement with Improved Refractory Engineering Practices in Cement Plants* by S K Chaturvedi, V Liju and A Pahuja

17. *Improvement in the Appearance and Quality of Clinker through Optimization of Process and Raw Mix Design at M/s Gorahi Cement, Nepal* by S V P Gupta, S K Tiwari, P S V Prasad, Rabinder Singh, S Harsh, G J Naidu and Ankur Mittal

18. *Microstructural Features of Indian Portland Cement Clinker Samples* by V P Chatterjee and S K Chaturvedi

19. *Durability Test Methods for Service Life Design of Concrete Structures – Exposed to Coastal Environment* by V V Arora and Puneet Kaura

20. *Investigations on Engineering Properties of Aged Concrete Arch Dam – A Case Study* by V V Arora, Brijesh Singh and Shubham Jain

21. *Study on Flexural and Fatigue behaviour of Prestressed Concrete made with PPC* by V V Arora, Brijesh Singh and Lalit Yadav

22. *Air Entrainment in Cement and Cement Mortar Paste by Colloidal Gas Aphrons (CGAs)* by N K Tiwary

23. *Condition Assessment of Existing Distress Concrete Structures for Effective Repair and Restoration / Strengthening Measures to Enhance their Residual Life* by Satish Sharma, B S Rao, Adarsh Kumar N S, Rizwan Anwar and Ankit Sharma

24. *Development of Accelerated Mix Design Method for Concrete using PPC or OPC with Fly Ash* by V V Arora, Suresh Kumar and Manish Kumar Mandre

25. *Durability Test Methods for Service Life Design of Concrete Structures – Exposed to Semi Arid Indian Environment* by V V Arora and Puneet Kaura

26. *Distress Assessment & Rehabilitation of a Fire Damaged Building in Delhi-NCR – A Case Study* by V P Chatterjee, Satish Sharma, Adarsh Kumar N S, Rizwan Anwar and Y N Daniel

27. *High Performance Steel Fiber Reinforced Concrete – For Use in Spillways and Glacis* by Satish Sharma, V V Arora, Y N Daniel, Suresh Kumar and Adarsh Kumar N S

28. *Evaluation of Sintered Fly Ash Aggregate Produced in India* by P N Ojha, V P Chatterjee and Mantu Gupta

29. *Investigations on Expansion Issues in Aged Concrete Arch Dam – A Case Study* by V V Arora, V P Chatterjee, Brijesh Singh and Arun Sood

30. *Suitability of Sintered Fly Ash Lightweight Aggregate in Structural Concrete* by V V Arora, P N Ojha and Mantu Gupta

31. *Process Audit as a Tool for Improving Productivity in Cement Plant – NCB Experiences* by Rabindra Singh, M V Ramchandra Rao, Ankur Mittal and K P K Reddy

32. *Improvement in the Appearance and Quality of Clinker through Optimization of Process and Raw Mix Design at Ghorahi Cement, Nepal* by S V P Gupta, S K Tiwari and P S V Prasad, S Harsh, G J Naidu and Ankur Mittal

33. *Quality Assessment of Cement and Construction Materials Testing Laboratories through PT Route – Insights and Learnings* by S K Breja, S C Sharma, V K Kandhari, A Agnihotri and S N Sahay

34. *Big Q to Little Q – Back to Basics in TQM and Product Quality Assurance in Cement Industry* by S K Breja

35. Role of System Design Audit in Energy Audit of Cement Plant by Kapil Kukreja, A K Mishra and Ankur Mittal

36. *Microstructural Features of Indian Portland Cement Clinker Samples* by V P Chatterjee and S K Chaturvedi

37. *Innovations in Concrete Pavements* by Satander Kumar

38. *Usage of C&D Waste in Concrete as a Replacement of Natural Aggregate* by Nikhil Kaushik and V V Arora

39. *Assessment of Air Quality of Stone Crusher Units in India* by M Selvarajan, Anand Bohra, K R P Nath, N K Tiwary and A K Mishra

40. *Upgradation / Retrofit of Existing APCEs – A Challenge for Indian Cement Industry to Meet Stringent Emission Standards* by V Naga Kumar, Prateek Sharma, Rabindra Singh, A K Mishra and K R P Nath

41. *Low-density Aerated Concrete and Solid Waste Utilization of Aerated Concrete Industries* by Arunima Shukla and A N Bhaskarwar and N K Tiwary

42. *Special Applications Concrete – Pervious Concrete, Plastic Concrete and Controlled Low Strength Material* by V V Arora, P N Ojha, Suresh Kumar and Komalpreet Kaur

43. *Productivity Enhancement with Improved Refractory Engineering Practices in Cement Plants* by S K Chaturvedi, V Liju and A Pahuja

9TH INTERNATIONAL CONFERENCE ON ADVANCES IN METROLOGY-2016

24 -26 February 2016, New Delhi

44. *Evaluation of Technical Equivalence of Indian and International Coal Testing Methods through ILC based PT Study* by S K Breja and Pinky Pandey

NTPC-NETRA Conference on R&D for Energy Sustainability

03 March 2016 to 01 April 2016

45. *Flyash based Lightweight Aggregate – An Alternate to Natural Aggregate* by V V Arora and P N Ojha

National Conference on Advances in Science and Technology 2016 (NCAST)

03-04 March 2016, Mandi, Govindgarh

46. *Advances in Concrete Technology and Quality Issue for Durable and Sustainable Infrastructure Construction in India* by Satish Sharma and V V Arora

47. *Evaluation of Performance Characteristics of High Strength Steel Fibre Reinforced Concrete to Resist Erosion - Abrasion and Cavitation Attack in Dam Structures* by Satish Sharma, V V Arora, Y N Denial and Adarsh Kumar N S

International Seminar on Emerging Building Materials and Construction Technologies

21-22 March 2016, New Delhi

48. *Effect on Properties of Concrete using Construction and Demolition Waste as a Replacement of Natural Aggregate* by Nikhil Kaushik, V V Arora and P N Ojha

Papers Published

The following papers were contributed by NCB scientists to outside technical journals :

1. S K Agarwal, M M Ali, Ashwani Pahuja (NCB), B K Singh, Sunil Duggal (HZL) : *Mineralizing Effect of Jarosite : A Zinc Industry By-product in the Manufacturing of Cement.* **Advances in Cement Research,** 27(5), pp.248-258, 2015

2. N K Sharma, R Mazumder, D K Panda and A K Dubey : *Evaluation of Bench Height Selection for Limestone Resource Optimization – A Case Study.* **Industrial Angles,** Vol. 4, Issue-II, May 2015, pp 72-78.

3. D K Panda, N K Sharma, A K Dubey, Richa Mazumder and A K Mishra, *Utilization of Slab Quarry Reject Limestone in Cement Manufacture – A Case Study.* **Industrial Angles,** Vol.5, Issue-I, February 2016, PP-82-88.

Important Visitors

Sl.No.	Name of Visitors	Organisation
1.	Shri Sanjeev Sood	General Manager & Head, Nathpa Jhakri Hydro Power Station (NJHPS), SJVN Ltd
2.	Dr (Ms) Manju Raina	Director, Ministry of Environment and Forests, Government of India
3.	Mr Iqramul Haque (Leader of the Delegation)	Director General, Bangladesh Standards and Testing Institution (BSTI), Bangladesh
4.	Ms Ayumi Fujino	UNIDO Representative for India and Regional Director for South Asia

Dr (Ms) Manju Raina, Director, Ministry of Environment & Forests, Govt of India visited NCB Ballabgarh laboratory. NCB expert showing about advanced test facilities in NCB. Shri Ashwani Pahuja DG-NCB is standing on her left

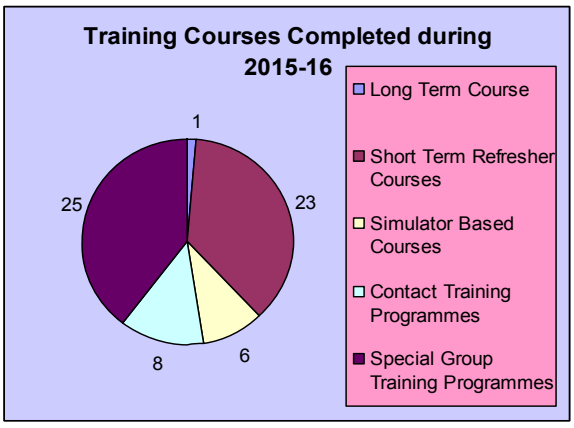
International Linkages / Collaboration Programmes

NCB has been actively interacting and liaising with a number of international bodies and exchanging knowledge and experience particularly in the area of cement and building materials industries.

CENTRE FOR CONTINUING EDUCATION SERVICES - CCE

Centre for Continuing Education Services (CCE), has been organizing variety of need-based, industry-oriented training programmes at entry and post-entry levels, for the participants from cement, concrete and construction industries since its inception in 1972. So far, 2,404 training programmes have been organized. A total number of 39,917 participants comprising of industry professionals and fresh graduates/post-graduates in science and different disciplines of engineering have been trained. A number of Govt./Semi-govt./Private organisations, both from India and abroad have availed the training services of NCB for their engineers and professionals.

During the year under report, 63 training courses were successfully organized with a total of 933 participants attending the programmes.



Long Term Course	1
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Simulator Based Courses	6
Contact Training Programmes	8
Special Group Training Programmes	25

Long Term Course

In its efforts to develop technological talent for the cement industry, NCB has been regularly conducting Post-Graduate Diploma in Cement Technology since 1983. The course is duly approved by All India Council for Technical Education (AICTE), Ministry of Human Resource Development, Govt of India.

Twelve self-sponsored participants admitted for 2014-15 session, comprising

A group photograph of senior officials of Indian Air Force along with faculty members during Special Training Programme organised at NCB Ballabgarh

of six chemical engineers and six post graduates in chemistry, have successfully completed the course in July 2015. As in the past, all these students were placed in the cement industry. In the session 2015-16, eight students were admitted in the course.

NCB's Expert interacting with Trainees at Ballabgarh Laboratories

Short Term Refresher Courses

During the year, 23 Short Term Training Courses were organized wherein 423 professionals from cement and construction industries participated. In Cement Technology related areas, special emphasis was given to areas such as Advances in Pyroprocessing in Cement Industry; Calibration of Laboratory Equipment and Quality Assurance in Cement, Construction and Process Industries, Instrumental Methods of Analysis and Quality Control; Advancements in Grinding Technology in Cement Industry; Improving Performance of Coolers; Sampling and Testing of Cement as per BIS Standards; Use of Blended Cements and Manufactured Sand in Concrete Construction; Modern Grinding Practices in Cement Industry; Condition Monitoring and Predictive Maintenance; Testing Quality of Cement as per BIS Standards.

Participants of DMRC (Delhi Metro) in a Group Photograph after successful completion of a Special Group Training Programme at Ballabgarh Unit

In Concrete and Construction related areas, the training programmes on specific topics were organized such as Sampling, Testing and Evaluation of Concrete making Materials and Concrete; Use of Fly Ash and Blended Cements for Durable Concrete; Prevention and Repair of Cracks and Leakages in Building; Concrete Mix Design and Acceptance Criteria of Concrete for Different Types of Mixes; Corrosion in RCC Structures: Prevention and Repair; Quality Control and Quality Assurance in Concrete Construction including Extreme Weather Concreting; Green Building: Design & Construction; High Performance Concrete and its Applications; Non-destructive Testing and Evaluation of Concrete Structures; Concrete Mix Proportioning and Quality Control; Modern Construction Practices; Repair and Rehabilitation of Concrete Structures including Water Proofing Materials and Techniques.

Hands-on Training of Trainees at Ballabgarh Laboratories

Simulator Based Courses

With the aim of providing comprehensive training on various aspects of kiln and mill operation, six training courses on Advanced Simulator trainer were organized at NCB's Ballabgarh and Hyderabad Units for 23 professionals from a number of cement plants in India and neighbouring countries. The participants were trained on Operation, Control and Optimization of Modern Grinding System based on Roller Press; Vertical Roller Mills; Ball Mills; Operation, Control and Optimization of Modern Precalciner kilns.

Contact Training Programmes

On the request of industry, eight tailor-made practice oriented contact training programmes for the professionals from cement and construction industries were organized to suit the specific requirement covering following areas :

- EDTA Method of Analysis of Cement and Raw Materials
- Proximate and Ultimate Analysis of Coal
- Calibration of CTM/UTM
- Estimation of Sulphide / Sulphur content in granulated blast furnace slag and PSC
- Physical Testing of Cement
- Chemical Testing of Cement
- Mechanical Testing of Pozzolana Materials

Special Group Training Courses

Twenty five special group training courses on specific topics for the group of engineers/ professionals were organised for the following organisations either at NCB's units or sponsors' sites:

a) Indian Organisations

- Dalmia Cement (Bharat) Ltd
- Zuari Cement Ltd
- Kalburgi Cements
- Delhi Metro Rail Corporation Ltd (DMRC)
- National Thermal Power Corporation Ltd (NTPC)
- Military Engineering Services (MES)
- Indian Air Force (IAF)
- National Hydroelectric Power Corporation Ltd (NHPC)
- Hindustan Petroleum Corporation Ltd (HPCL)
- Minor Irrigation, Water Resources Deptt., Govt of Tamil Nadu
- Quality Control Circle, Water Resources Deptt., Govt. of Maharashtra
- National Buildings Construction Corporation Ltd (NBCC)

b) **Overseas Organisations**
Oman Cement Company, Sultanate of Oman

Training / Retraining of NCB Personnel

Sl No	Name of the Official	Title of course	Name & Address of Training Organisation	Duration and Period
1	Dr M M Ali	Soft Skills	Prof (Dr) V H Radhakrishnan, NITTTR, Bhopal Organized by Centre for Continuing Education Services (CCE) at NCB Ballabgarh unit	01 day 25 April 2015
2	Dr V P Chatterjee			
3	Dr S Harsh			
4	Sh S K Chaturvedi			
5	Dr D Yadav			
6	Dr A K Dikshit			
7	Dr R S Gupta			
8	Sh G J Naidu			
9	Sh S C Sharma			
10	Sh S K Agarwal			
11	Dr (Ms) Pinky Pandey			
12	Dr (Ms) Varsha Liju			
13	Sh S Vanguri			
14	Dr T M Rajan			
15	Ms Rashmi Gupta			
16	Sh K P Hooda			
17	Sh S R Prasad			
18	Sh M S Prasad			
19	Sh Munish Kumar			
20	Sh C K P Sharma			
21	Dr S K Breja			
22	Sh P Srikanth			
23	Sh A Agnihotri			
24	Sh Bharat Ram			
25	Sh S N Sahay			
26	Sh R P Vijayvergia			
27	Sh K K Ganger			
28	Sh B S Rao			
29	Sh Nitin Chowdhary			
30	Sh Hari Kishore Gupta			
31	Sh Amit Prakash			
32	Sh Brijesh Singh			
33	Sh Manish Kumar Mandre			
34	Sh Amit Sagar			
35	Sh Adarsh Kumar N S			
36	Sh Sunil Kumar Soren			
37	Sh Nikhil Kaushik			
38	Sh P S Rawat			

39	Sh Punet Kaura			
40	Sh Y N Daniel			
41	Sh Rizwan Anwar			
42	Sh Ajay Kumar			
43	Sh Puneet Meena			
44	Ms Komalpreet Kaur			
45	Sh Jyoti Swaroop			
46	Sh Shubam Jain			
47	Sh Jagjit Singh			
48	Sh Lalit Kumar			
49	Sh Ankit Sharma			
50	Sh Sahil			
51	Sh N R Dhanee			
52	Sh A K Tripathi			
53	Ms Poonam			
54	Sh A K Mishra			
55	Sh Rajendra Singh			
56	Sh Ashutosh Saxena			
57	Sh Rabindra Singh			
58	Sh N K Sharma			
59	Sh K A Shah			
60	Sh Alok Kr Dubey			
61	Dr D K Panda			
62	Sh M Selvarajan			
63	Sh O P Grover			
64	Sh Ankur Mittal			
65	Sh Kapil Kukreja			
66	Sh S Rayees Ahmed			
67	Sh K R P Nath			
68	ShV Naga Kumar			
69	Sh M V Ramachandra Rao			
70	Sh Vinay Kant			
71	Sh Saurabh Bhatnagar			
72	Sh S Agarwal			
73	Sh N K Tiwary			
74	Sh K P K Reddy			
75	Sh Yogesh Bansal			
76	Sh A K Singhal			
77	Ms Meena Taneja			
78	Sh Manjit Singh			
79	Sh H K Kukreja			
80	Sh Ravindar Singh			
81	Sh R K Goswami			
82	Sh A Venkarasubramanian			
83	Sh Vinod Kumar			

84 85 86 87 88 89 90	Sh Bala Raju Ms Mamta Pawar Ms Madhumita Biswas Md Firoz Ahmad Sh Madhusudan Prasad Ms Jyotsna Panchal Sh K K Gangar	Calibration of Laboratory Equipment and Quality Assurance in Cement, Construction and Process Industries	Centre for Continuing Education Services (CCE), NCB Ballabgarh	03 days 12-14 May 2015
91 92 93 94	Sh B S Rao Sh Brijesh Singh Sh Adarsh Kumar NS, Sh Lalit Kumar Yadav	Seismic Design of Multi-Storey Buildings: IS 1893 vs. Eurocode 8	Building Materials & Technology Promotion Council, New Delhi	03 days 27-29 May 2015
95	Sh Manvendra Singh	Use of Flyash and Blended Cements for Durable Concrete	Centre for Continuing Education Services (CCE), NCB Ballabgarh	03 days 23-25 June 2015
96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115	Dr A K Dikshit Dr (Ms) Pinky Pandey Dr (Ms) Varsha Liju Sh Gaurav Bhatnagar Sh Munish Kumar Ms Rashmi Gupta Ms Kalpana Sharma Sh Ravinder Singh Sh Mantu Gupta Sh B S Rao Sh Brijesh Singh Sh Puneet Kaura Sh Nikhil Kaushik Sh Suresh Sharma Sh A Agnihotri Sh Vishnu Dutt Sh N K Tiwary Sh M Selvarajan Sh Anand Bohra Sh KRP Nath	Laboratory QMS and Internal Audit as per ISO/IEC-17025:2005	Centre for Electronics Test Engineering (CETE), NOIDA, oganised by Centre for Continuing Education Services (CCE), NCB Ballabrarh	04 days 30 June – 03 July 2015

116 117 118 119 120 121 122 123 124	Sh Jagat Singh Sh Sahil Ms Bharti Meena Sh Vishal Sh Jyothi Swaroop Sh Lalit Yadav Sh Shubham Jain Sh P S Rawat Sh Puneet Kaura	Project Management and Quality Assurance and Quality Control in Concrete Construction	Centre for Continuing Education Services (CCE), NCB Ballabgarh	10 days 20-31 July 2015
125 126	Sh B S Rao Sh Adarsh Kumar N S	Advances in Foundation Design for Building & Critical Structures	IIIT, Hyderabad	03 days 08-10 Oct 2015
127 128 129	Sh K A Shah Sh H K Kukerja Sh Ravinder Singh	Management Development Programme on Public Procurement	National Institute of Financial Management, Faridabad	06 days 12-17 Oct 2015
130 131 132 133 134 135 136 137 138 139 140 141 142 143	Sh Bhagwan Singh Sh K K Somaverma Sh Vinod Kumar Sh Kapil Kukreja Sh Ankur Mittal Sh Suresh Kumar Shaw Sh P K Chakraborty Sh G J Naidu Sh S K Agarwal Sh SureshVanguri Sh P Srikanth Sh Abhishek Agnihotri Sh Bharat Ram Sh Lajpat Hans	In Pursuit of Excellence	Jurom Management Consulting, Gurgaon oganised by Centre for Continuing Education Services (CCE), NCB Ballabrarh	01 day 15 Jan 2016
144 145	Sh S Agarwal Sh P N Ojha	Managerial Effectiveness Enhancement Programme	Institute of Management And Research (IMTR), Goa	05 days 18-22 Jan 2016
146 147 148 149	Sh B Pandu Ranga Sh T V G Reddy Sh Sanjay Mundra Sh Amit Trivedi	Non-Destructive Testing and Evaluation of Concrete Structures	Centre for Continuing Education Services (CCE), NCB Ballabgarh	03 days 27-29 Jan 2016
150	Sh V Venkatesh	Cement Manufacturing Technology	Centre for Continuing Education Services (CCE), NCB Ballabgarh	07 Weeks 01 Feb-16 March 2016

151	Dr S K Breja	IRCA UK Approved ISO 9001: 2015 Quality Management Systems (QMS) Transition Training	Federation of Indian Chambers of Commerce & Industry (FICCI) New Delhi	02 day 12-13 Feb 2016
152	Sh Ravi Yadav	Repair & Rehabilitation of Concrete Structures including Waterproofing Material and Technique	Centre for Continuing Education Services (CCE) NCB	03 day 1-3 March 2016
153 154 155	Dr Devendra Yadav Sh Amit Trivedi Sh P N Ojha	Laboratory Quality Management & Internal Audit as per IS/ISO 17025: 2005	National Institute of Training for Standardisation, BIS, NOIDA	04 days 08-11 March 2016
156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184	Sh S K Aggarwal Dr B M N K Prashad Sh Madhusudan Prashad Mrs Mithilesh Sharma Sh Aurn Kumar Sharma Sh C K Prasad Sharma Mrs Rashmi Gupta Dr (Ms) Pinky Pandey Sh R P Vijayvergia Sh K K Gangar Sh S N Sahay Sh Suresh Kumar Sh Nitin Chowdhary Sh Amit Prakash Sh Mantu Gupta Sh Adarsh Kumar N S Sh T V G Reddy Sh Yogesh Bansal Sh D Aggarwal Ms Meena Taneja Sh S Rayees Ahmed Mrs Anita Chopra Mrs H P Mehta Sh V Naga Kumar Sh Anand Bohra Sh Vinay Kant Sh R S Sharma Sh H K Kukreja Sh Manjit Singh	In Pursuit of Excellence	Jurom Management Consulting, Gurgaon oganised by Centre for Continuing Education Services (CCE), NCB Ballabrarh	01 day 16 March 2016

CENTRE FOR QUALITY MANAGEMENT, STANDARDS AND CALIBRATION SERVICES – CQC

The activities of the Centre for Quality Management, Standards and Calibration Services were organised under four programmes: Total Quality Management; Inter-laboratory Services; Standard Reference Materials; and Calibration Services. These activities address all aspects of quality management and provide the entire range of Standardization and Calibration services to cement industry, R&D institutions, Concrete and allied building materials laboratories in India and abroad. The activities of Inter-laboratory Services were given a boost and nine new proficiency testing (PT) schemes were completed in accordance with ISO17043:2010. Two sponsored projects were completed by the centre.

Total Quality Management

Under this programme, Centre for Quality Management, Standards and Calibration Services (CQC) assisted one thermal power plant in documentation and implementation of quality management system in line with ISO 17025:2005 and accreditation by NABL. Quality Manager and Technical Manager responsible for the above system have to be trained in ISO 17025. The centre fulfilled training requirement also of the plant and organized on-site four-day training workshop on ISO 17025:2005, internal audit and management review at the plant for laboratory staff, including Quality and Technical Manager.

Dr S K Breja (HOC-CQC) presenting paper on the occasion of World Standards Day 2015, organized by BIS, Faridabad

Ballabgarh and Hyderabad units of NCB have completed third cycle of ISO 9001:2008 certification. During the year, NCB successfully underwent recertification audit of NCB to ISO 9001:20008 Quality Management System (QMS). The scope of certification now covers all the three units of NCB. In addition to Ballabgarh and Hyderabad unit, Ahmedabad unit also is certified to ISO 9001:2008, now. Recertification of NCB units reflects NCB's commitment to ensuring excellence of processes, products and customer

satisfaction. The centre has initiated the process of upgrading the system to ISO 9001:2015. A transition training programme for 39 NCB officials was organized on 31st March 2016 at Ballabgarh.

Interlaboratory Services

In 2013, Interlaboratory Services (ILS) programme of Centre for Quality Management, Standards and Calibration Services (CQC) of NCB received first accreditation for PT provider as per ISO/IEC 17043: 2010 in the country, and successfully completed several PT schemes thereafter.

ILS implemented QMS in line with ISO 17043:2010 as per accreditation norms. It underwent assessment for reaccreditation by NABL and got accreditation certificate with enhanced scope. The present scope of accreditation covers: cement, fly ash, limestone, coal/ pet coke, clinker, granulated slag and water for concrete in chemical field, and cement, fly ash & aggregate in mechanical field. In 2015-16, ILS completed nine PT schemes. These schemes were implemented in accordance with ISO 17043:2010.

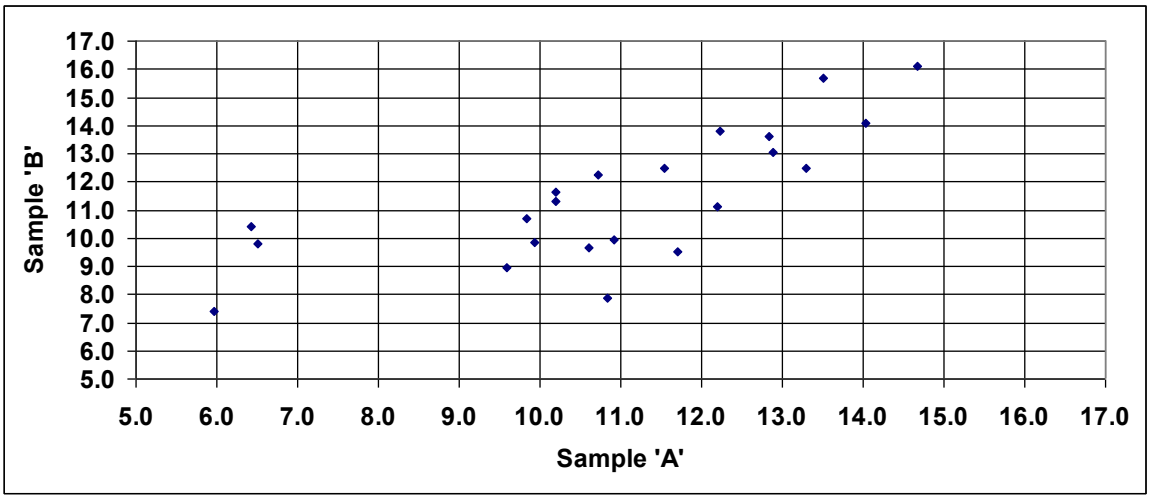
PT Schemes completed during 2015-16

Sl. No.	PT Item	Field	Parameters	Method of Test	No. of Participants
1.	Steel bar	Mechanical	Nominal mass; Yield stress; Elongation; Tensile strength	IS 1786:2008	25
2.	Fly ash	Chemical	Loss on ignition (LOI) ; Silicon dioxide (SiO_2); Iron oxide (Fe_2O_3); Aluminium trioxide (Al_2O_3); Calcium oxide (CaO); Magnesium oxide (MgO); Total Sulphur as Sulphur trioxide (SO_3)	IS 1727:1967	14
3.	Fly ash	Mechanical	Blaine fineness; Fineness by dry sieving (150µm); Fineness by wet sieving (75 µm); Fineness by wet sieving (45 µm)	IS 1727:1967	14
4.	Coal	Chemical	Moisture; Volatile Matter; Ash; Calorific Value; Sulphur	IS 1350-Part 1:1984; IS 1350-Part 2:1970; IS 1350-Part 3:1969	34
5.	PPC	Mechanical	Residue on 90µm sieve; Specific surface (Blaine fineness); Setting time (Initial and Final); 3 day (72 hrs.) Comp. strength; 7 day (168 hrs.) Comp. strength; 28 day (672 hrs.) Comp. strength	IS 4031 (Part 1):1996; IS 4031 (Part 2):1999; IS 4031 (Part 5):1988; IS 4031 (Part 6):1988	29

Sl. No.	PT Item	Field	Parameters	Method of Test	No. of Participants
6.	Building Brick	Mechanical	Water absorption; Compressive strength	IS 3495 (Part 2): 1992; IS 3495 (Part 1): 1992	22
7.	PPC	Chemical	Loss on ignition (LOI); Magnesium oxide (MgO); Sulphur trioxide (SO_3); Insoluble residue	IS 4032:1985	26
8.	Pet Coke	Chemical	Moisture; Volatile matter; Ash; Gross calorific value; Sulphur	IS 1350 (Part I):1984/ ASTM/EN/ISO; IS 1350 (Part I):1984/ ASTM/EN/ISO; IS 1350 (Part I):1984/ ASTM/EN/ISO; IS 1350 (Part II):1970/ ASTM/EN/ISO; IS 1350 (Part III):1969/ ASTM/EN/ISO	17
9.	Ceramic Tile	Mechanical	Thickness; Water absorption; Modulus of rupture; Breaking strength	IS 13630 (Part 1):2006; IS 13630 (Part 2):2006; IS 13630 (Part 6):2006	10

Of the new nine schemes, steel bar, pet coke, building brick, and ceramic tile PT scheme have been conducted for the first time in India. The participating laboratories were provided homogenized samples of PT items for testing in their laboratories. The test data reported by the laboratories were statistically evaluated for central tendency (median), spread and Z-score. The robust average and standard uncertainty for each parameter were calculated after normalizing the data as per ISO 13528:2005.

As per the above standard, performance of the laboratories with |Z| 2.0 is considered satisfactory. The laboratories getting |Z| 3.0 are considered outliers and those getting 2.0< |Z| <3.0 score are considered questionable performers. Outliers are encountered due to lack of statistical control and increase in variation in data.



Scatter Plot of Test Results – Compressive Strength (N/mm²) – Building Brick

Data received from the laboratories were studied for distribution and scatter. The scatter of results of building brick in water absorption and compressive strength shows data relationship and presence of bias. Laboratories were given the feedback of their performance.

Laboratories were evaluated for two types of variation – between laboratories and within laboratory, for both parameters. Between laboratories variation represents reproducibility and within laboratory repeatability of a test. N represents number of results considered in evaluation. 22 laboratories participated in building brick PT scheme.

In water absorption test, there is no questionable performer in reproducibility checking; however, there is 1 questionable performer in repeatability checking. In compressive strength test, there is 1 questionable performer each in both checks. As regards outliers, in water absorption test, there are 3 outliers in reproducibility checking and one in repeatability checking. There is no outlier in compressive strength test. The status is given below:

Performance Status in Building Brick PT Scheme

Parameter	N	No. of Questionable performers (2< |Z|<3)		No. of Outlying performers (|Z|≥3)	
		Between Labs	Within Lab	Between Labs	Within Lab
Water absorption (%)	22	Nil	1	3	1
Compressive strength (%)	22	1	1	Nil	Nil

13 laboratories participated in the pet coke scheme. The performance status in the pet coke scheme is as under.

Performance Status in Pet Coke PT Scheme

Parameter	N	No. of Questionable Performers (2.0 < |Z| < 3.0)		No. of Outlying Performers (Z ≥ 3.0)	
		Between Labs	Within Lab	Between Labs	Within Lab
Volatile Matter (%)	13	1	1	1	1
Ash (%)	13	1	Nil	1	2
Gross Calorific Value (cal/g)	13	2	Nil	1	1
Sulphur (%)	10	1	2	1	1

Ordered Bar charts presenting '*between*' and '*within*' laboratory Z-scores were prepared for all the parameters in all schemes and included in the study report. The charts showed code-wise location of the laboratories in terms of performance.

Standard Reference Materials

CQC / SRM developed and commercialized 7 new types of certified reference materials during the year. These CRMs can be used for checking proficiency of analysts and gaugers, monitoring the quality of testing in the laboratories, maintaining product quality to manufacturing standards and maintaining ISO 17025 accreditation. Now, NCB has a wide range of CRMs for chemical and mechanical parameters of cement, fly ash and other materials. So far, 75 types of CRMs have been developed. The new CRMs are laterite, silica fume, red-ochre / bauxite, pet coke, coal and standard sand were developed. These have now been commercialized. In addition, six types of CRMs were developed for replenishing exhausted stock.

CRMs Developed for Replenishing Exhausted Stock

Sl. No.	Materials	CRM Code	Parameters
1.	PSC	1017C	LOI, SiO_2, Fe_2O_3, Al_2O_3, CaO, MgO, Mn_2O_3, TiO_2, P_2O_5, SO_3, Na_2O, K_2O, Cl & Sulphide Sulphur
2.	White Portland Cement	1001W2	Blaine fineness
3.	Fly ash	1001FC7	Blaine fineness
4.	PSC	1002C3	Blaine fineness
5.	Flow Table Calibration	1028	Flow
6.	Fly ash	1037	Residue on sieve (300, 150, 75 & 45µ)
7.	Standard Sand	1038	3 Grades of Sand for Calibration Check of Sieves

New CRMs Developed and Commercialized During the Year

Sl. No.	Materials / Usage	CRM Code	Parameters
1.	Laterite / Iron ore	1039	SiO_2, Fe_2O_3, Al_2O_3, CaO, MgO, SO_3, Na_2O, K_2O, Cl & Moisture content (indicative value)
2.	Silica fume/ Micro silica	1040	LOI, SiO_2, Fe_2O_3, Al_2O_3, CaO, MgO, Na_2O, K_2O & Cl
3.	Red ochre/ Bauxite	1041	SiO_2, Fe_2O_3, Al_2O_3, CaO, MgO, SO_3, Na_2O, K_2O & Cl & Moisture (indicative value)
4.	Pet Coke	1042	Moisture content (indicative value), Ash content, Volatile matter, Sulphur and Calorific value
5.	Coal	1031A	Moisture content (indicative value), Ash content, Volatile matter, Sulphur and Calorific value (values based on dry basis)
6.	Coal	1031B	Moisture content (indicative value), Ash content, Volatile matter, Sulphur and Calorific value (values based on as- received and air-dried basis)

Supply of developed Certified Reference Materials (CRMs) was continued to the cement and construction industry laboratories. A total of 9343 vials of different CRMs and 1458 sets of standard lime were supplied to 645 customers from cement plants, testing laboratories and R&D institutions. Satisfaction of customers showed improvement in all quality dimensions.

Calibration Services

The calibration laboratories continued to implement Quality Management System as per ISO 17025:2005 requirements. The laboratories satisfactorily underwent reaccreditation audit by NABL. 1717 equipment/apparatus including proving rings, compression testing machines, vibrating machines, dial gauges, Blaine cells, pressure gauges, sieves, thermometers, environmental chambers, ovens, furnaces, balances and weighing scales of a RMC plant were calibrated for 559 clients. Satisfaction of customers from the calibration services showed significant improvement on timeliness, work quality and interaction dimensions.

Calibration of Relative Humidity Gauge

PATENTS

NCB has been filing applications for patents on processes, products, systems, machinery, equipment and accessories developed by it from time to time. Details of NCB patents presently in force and the applications filed, which are in different stages of processing, are given in Appendix V.

ORGANISATIONAL FORUMS

Society

General Meeting

The Annual General Meeting of the Society for the year 2015 was held on 18 November 2015 in New Delhi when it adopted the Annual Report, the Audited Accounts and Balance Sheet for the year 2014-15.

Board of Governors

The composition of the Board for the year 2016 is given in the beginning of the report.

52nd Annual General Meeting in Progress. Dr S Chouksey, Chairman NCB is addressing the Members of the Board and Shri Ashwani Pahuja DG NCB is seen on his left (Top)

Corporate Advisory Committees

Research Advisory Committee (RAC)

To advise on all aspects pertaining to Programmed R&D and industrial support services in NCB, with particular reference to technology forecasting, technology planning, programmes, strategies and methodologies and the overall project programme of NCB. The composition of the committee for the year 2016 is:

Chairman

Shri V S Narang
Director (Technical)
My Home Industries Ltd
Hyderabad

Members

Dr Ashok Kumar
Energy Economist
Bureau of Energy Efficiency (BEE)
New Delhi

Prof A K Tiwari
Vice President- Concrete Research
UltraTech Cement Ltd
Andheri (East), Mumbai

Shri J S Kalra
Senior Joint President
Birla Corporation Ltd,
(Satna Cement Works)
P.O. Birla Vikas, Satna (MP)

Dr G V K Prasad
Senior President (CPU-I, II & CCP)
The KCP Ltd
KCP Cement Unit–II,
Krishna Distt, (AP)

Dr Nahar Singh
Head, Metrology in Chemistry
National Physical Laboratory
Dr K S Krishnan Marg, New Delhi

The Director
Central Soil & Materials Research
Station (CSRMS)
New Delhi

Dr K Mohan
House No. 762
Sector - 8
Faridabad

Shri Sanjay Jain
Asstt. Executive Director
Dalmia Bharat Enterprises Limited
New Delhi

Shri C K Jain
Head Manufacturing Operations
(Cement Division)
Vasavdadatta Cement
Kesoram Industries Limited
Distt. Gulbarga
Karnataka

Dr S A I Mujtaba
Suptdg. Geologist
Geological Survey of India
P Block, NIT, NH-5
Faridabad (Haryana)

Dr D Venkateswaran
Sr. Vice President (R&D)
The India Cements Ltd
Chennai

Dr Manoranjan Hota
Director (IA)
Ministry of Environment,
Forests & Climate Change
Indira Paryavaran Bhawan,
New Delhi

The Industrial Advisor
Ministry of Commerce & Industry
Government of India
Udyog Bhavan
New Delhi

Shri Kamal Kumar
Chief General Manager
Holtec Consulting Pvt Ltd
Gurgaon (Haryana)

The Chief Mineral Economist
Indian Bureau of Mines, Nagpur

Shri J K Prasad
Chief – Building Materials
Building Materials and Technology
Promotion Council (BMTPC), New Delhi

Dr K Ramanjaneyulu
Chief Scientist
Structural Engineering Research Centre (SERC)
Taramani P.O., Chennai

The Chairman and Managing Director
National Research Development Corpn.
New Delhi

Shri Rakesh Bhargav
Chief Climate and Sustainability Officer
Shree Cement Ltd, Beawar
Dist. Ajmer (Rajasthan)

The Deputy Director General
National Productivity Council
New Delhi

Dr S K Handoo
Advisor (Technical)
Cement Manufacturers' Association
Noida (UP)

Shri Sanjay Pant
Director (Civil Engg)
Bureau of Indian Standards
Manak Bhavan,
New Delhi

Dr Bibekanand Mohapatra
VP (New product development and
product quality management)
Ambuja Cements Ltd, Andheri (E)
Mumbai

The Member Secretary
Central Pollution Control Board
Delhi

Dr Lakshmy Parameswaran
Chief Scientist
(Bridges and Structures Division)
Central Road Research Institute
P.O. CRRI
New Delhi

Shri Ashwani Gupta
Scientist 'G'
Department of Scientific and
Industrial Research (DSIR)
New Delhi

Shri S A Khadilkar
Director – Quality & Product Development
ACC Ltd
Thane (Maharashtra)

Prof B Bhattacharjee
Prof of Civil Engineering
Indian Institute of Technology
Delhi

Shri Sushil Kumar Rathore
Unit Head
J K Cement Works
Distt. Chittorgarh (Rajasthan)

Shri S K Saxena
Vice President
(Jhajjar Unit and QA)
J K Lakshmi Cement Ltd
Dist. Jhajjar (Haryana)

Shri Gopi Ranganathan
Sr. GM (TPE)
Zuari Cement Ltd
Bangalore

Shri V K Pandey
GM (Project & Technical)
Cement Corporation of India Ltd
New Delhi

Research Advisory Committee Meeting in Progress at Ballabgarh Unit

Shri Narendra Singh
Head - Plant
Saurashtra Cement Ltd
Ranavav (Gujarat)

Shri S K Tiwari
Technical Director
Heidelberg Cement India Limited
Gurgaon (Haryana)

Shri R K Khandekar
Addl General Manager
Ash Utilization Group
NTPC Ltd,
Noida (UP)

Shri Sivakumar Subramaniyam
County Head Supply Chain Management
& SVP- Industrial
Lafarge India Pvt Ltd, Kolkata

Director General NCB,
Directors, HOC's and Joint Directors of NCB

Member-Secretary

Dr S Harsh
Joint Director NCB

Infrastructural Development Committee (IDC)

To advise the Board of Governors on various aspects of land, building services, equipment and facilities at the various NCB Units and to cause these infrastructural developments to be carried out at the various NCB Units and to assist in conducting the affairs of the unit in such a manner as to fulfill the set objectives with the programmes, policies and guidelines laid down by the Board. The composition of the Committee for the year 2016 is:

Chairman

Shri Mahendra Singhi
Group CEO
Dalmia Cement (Bharat) Ltd
New Delhi

Members

The Director (Cement)
Dept of Indl Policy & Promotion
Ministry of Commerce & Industry
Udyog Bhawan, New Delhi

Shri S K Deshpande
Scientist 'G & Advisor
Dept. of Scientific & Indl. Research
Ministry of Science & Technology
New Delhi

Ms Saraswati Devi
Addl. General Manager (Operations)
Cement Corporation of India Ltd
New Delhi

Shri V K Hamirwasia
President
Birla Corporation Ltd
Birla Cement Works
Madhavnagar, Chanderia
Chittorgarh (Rajasthan)

Dr Rakesh Kumar
Head of Deptt (Rigid Pavements)
Central Road Research Institute
New Delhi

The Industrial Adviser
Dept of Indl Policy & Promotion
Ministry of Commerce & Industry
Udyog Bhawan, New Delhi

Shri Anil Shukla
Vice President
UltraTech Cement Ltd
Panipat Grinding Unit
Panipat (Haryana)

Shri Shashi Ranjan
General Manager – PE-Civil
NTPC Ltd, Noida (UP)

Shri Naveen Kumar Sharma
Vice President(Grinding Plant)
JK Lakshmi Cement Ltd
District Gandhi Nagar (Gujarat)

Director General NCB,
Directors, Joint Directors and Heads of
Concerned Services Groups in NCB

Member-Secretary

Shri A K Mishra
Joint Director NCB

Administration and Finance Committee (AFC)

To advise the Board of Governors on issues relating to financial planning, budgets, accounts, manpower growth plan and service matters including various rules of NCB. To take decisions on behalf of the Board of Governors on individual personnel cases and on issues of administrative nature as may be referred to it by the Board or by the Director General-NCB. All such decisions shall be reported to the Board at its immediate next meeting through the relevant status report. The composition of the Committee for the year 2016 is:

Chairman

Shri M S Gilotra
Managing Director
Gujarat Sidhee Cement Ltd &
Saurashtra Cement Ltd, Mumbai

Members

The Director (Cement)
Department of Indl Policy & Promotion
Ministry of Commerce & Industry
Udyog Bhavan, New Delhi

The Director
Integrated Finance Wing
Department of Indl Policy & Promotion
Ministry of Commerce & Industry
Udyog Bhavan, New Delhi

Shri C K Bagga
Vice President (Fin. & A/Cs)
JK Lakshmi Cement Ltd
New Delhi

Shri K V Mohan
Dy Executive Director (A/Cs & Tax)
Dalmia Cement (Bharat) Ltd
New Delhi

Director General NCB,
Directors, Joint Directors and Heads of concerned Service Groups

Member-Secretary

Shri S K Chaturvedi
Joint Director NCB

Regional Advisory Committee

Advisory Committee for NCB-Hyderabad

To advise the Board of Governors and RAC, AFC and IDC on various aspects of development of NCB Hyderabad and its activities, and in particular on matters concerning the development and utilization of infrastructural facilities of the Unit and the industrial services rendered by it, and to assist in conducting the affairs of the Unit in such a manner as to fulfill the set objectives within the programmes, policies and guidelines laid down by the Board. The composition of the Committee for the year 2016 is:

Chairman

Shri D Muruganandam
President (Manufacturing)
The India Cements Ltd
Chennai (Tamilnadu)

Members

Shri J S Rao
Vice President
Vasavadatta Cement
Dist. Gulbarga, Karnataka.

Shri D Lakshmikantham
Director (Technical)
Penna Cement Ind. Ltd
Banjara Hills
Hyderabad

Shri Anubhav Varma
Vice President (Mfg.)
Kalburgi Cement Pvt. Ltd
Kalburgi, Dist. Karnataka

Shri Anil Bajaj
Plant Head
Dalmia Cement Bharat Ltd
Kadapa (Andhra Pradesh)

Shri P Anantham
President (Operations)
My Home Cements Ltd
Hyderabad

Shri B R V Susheel Kumar
Director
Dept. of Mines & Geology
Govt. of Telangana
Tank Bund Road, Hyderabad

Shri D Shantan Kumar
Head CMD
National Remote Sensing Centre
Indian Spare Research Organization
Dept of Space, Govt. of India
Balangar, Hyderabad

Shri M Siva Rama Krishna
General Manager (O & M)
NTPC Ltd
Simhadri Super Thermal Power Station
P.O. NTPC – Simhadri
Visakhapatnam Dist. (Andhra Pradesh)

Shri K Suresh Kumar
Chief Engineer
Greater Hyderabad Municipal Corporation (GHMC)
5th Floor, GHMC Main Building
Lower Tank Bund Road, Hyderabad.

Shri P Ravinder Rao
I/C Engineer-in-Chief
(State Roads & CRN Govt. of Telangana)
Hyderabad

Shri N Sudhakar
Regional Manager
L & T Ltd, ECC Division, Hyderabad

Shri Macha N Rao
Sr Vice President – RMC (South)
UltraTech Cement Ltd (Unit: UltraTech Concrete)
Hyderabad

Shri Bikshapathi Kondai
Director General
National Academy of Construction (NAC)
Hyderabad

Shri M V S D Prasada Rao
The Scientist 'F' & Head
Bureau of Indian Standards, Hyderabad

Shri Shailendra Sharma
The Chief Engineer
Southern Zone – II
Central Public Works Department (CPWD)
Nirman Bhavan, Hyderabad

Shri V Anil Kumar
The Member Secretary
Telangana State Pollution Control Board
Sanathnagar, Hyderabad

Shri M P Naidu
Project Director
L & T Metro Rail (Hyderabad) Ltd
Hyderabad

Dr P Rathish Kumar
Associate Dean (P & D)
Civil Engineering Dept
National Institute of Technology (NIT)
Warangal (Telangana)

Dr N V Ramana Rao
Rector & Professor in Civil Engg.
Jawaharlal Nehru Technological University
Hyderabad (Telangana)

Member - Secretary

Ms K V Kalyani
Joint Director NCB and
Unit-in-Charge of NCB Hyderabad

Executive Committee

With a view to achieve the objectives of collegiate management and to assist the Director General to deal with various functions, the Executive Committee, comprising Heads of various Centres of Activities with the Director General as its Chairman, held 09 meetings and deliberated upon important issues including approving proposals for 277 sponsored projects.

Forum for Science and Technology

During the period, 05 meetings of FST were held. The meeting provided interactive discussions among the scientific staff of NCB. The meeting has served very well for keeping the scientists and engineers informed on the latest developments in the area.

1.	9 June 2015	NCB team experience on Chinese cement industry	Sh K P K Reddy, Dy Manager-CCE/CME
		Effect of additives on preparation and performance of cement	Sh G Jayachandra Naidu, GPM-CRT
		Proficiency testing as per ISO 17043 :2010	Sh Abheshek Agnihotri, Asstt Manager-CQC
		Special application concrete (i) Pervious concrete (ii) Plastic concrete	Ms Komalpreet Kaur, Project Engg-CDR
2.	21 August 2015	Carbon capture & storage/sequestration	Sh M V Rama Chandra Rao, Dy Manager-CME
		Application of thermo-analytical methods in cement industry	Dr B M N K Prasad, Asstt Manager-CRT
		Comparison of different standard methods for coal/pet coke analysis	Dr (Ms) Pinky Pandey, Manager-CQC/CRT
		Use of C & D waste in concrete	Sh Nikhil Kaushik, Dy Manager-CDR
3.	15 October 2015	XRD application in evaluation of raw materials, clinker, cement and concrete	Sh Suresh Vanguri, Dy Manager-CRT
		Meeting cement quality requirements through raw mix and process control	Dr A K Dikshit, General Manager-CRT/CQC Sh V Naga Kumar, Dy Manager-CQC/CRT
4.	21 January 2016	Developments in VRM drives	Sh Saurabh Bhatnagar, Dy Manager-CME
		Advancements in structural concrete	Sh Lalit Yadav, Dy Manager-CDR
5.	15 March 2016	Waste heat recovery system in cement industry	Sh Prateek Sharma, Dy Manager-CME
		Trenchless technology for building smart cities	Sh Amit Prakash, Manager-CDR
		Alkali aggregate reaction in concrete – Its causes and preventive measures	Sh Jyothi Swaroop, Project Engg-CDR

ORGANISATIONAL MATTERS

Staff Particulars

NCB had strength of 212 Cadre Officials comprising of engineers, scientists and technical and administrative support staff as on 31st March 2016 engaged in the activities of the organisation.

Staff Welfare

NCB continued to look after the welfare of its staff through several activities. During 2015-16, 72 NCB officials availed facility of staff quarters in NCB Housing Colony. The Group Personal Accident Insurance Policy to cover risks arising out of accidents was continued for the year 2015-16.

Activities of NCB Staff Club, working for fostering social and fraternal relations amongst the officials, included maintenance of library, indoor games and other cultural activities. The Club also involved the family members of staff, especially children, in celebration of Independence Day and Republic Day.

Shri Ashwani Pahuja, DG-NCB, addressing NCB Staff and their families on the occasion of Independence Day at Ballabgarh

INFRASTRUCTURE

NCB - Ahmedabad

Ahmedabad unit of NCB has essential facilities for testing of cement, concrete, steel and soil in order to provide Quality Assurance and Quality Control (QA-QC) and Third Party Quality Assurance (TPQA) services to the construction industry. Facilities include Universal Testing Machine (UTM), Automatic Compression Testing Machine (ACTM), Digital Thermo Hygrometer, Physical Testing Laboratory, CBR Testing Machine, Bomb Calorimeter, Marshal Stability Apparatus, Ductility Testing Apparatus and Non-Destructive Testing equipment such as Rebound Hammer, Ultrasonic Pulse Velocity, Corrosion Analyzer (Half Cell Potential), Core Cutting Machine, Cover Meter (Profometer) etc. The unit is using these facilities to provide QA-QC and TPQA services to various government agencies of Gujarat, Daman & Diu and Dadra & Nagar Haveli.

NCB - Ballabgarh

The technical infrastructure at NCB's Ballabgarh Unit, developed in a planned manner and upgraded over the years, makes it one of the most modern R&D laboratories for cement and building materials.

Major equipment facilities available here are:

Scanning Electron Microscopy & Energy Dispersive Analysis of X-rays (SEM & EDX) Laboratory, Advanced X-ray Diffractometer, Multi-dispersive X-ray Fluorescence Spectrometer with large auto sample changer, Fused Bead Making Machine and sample preparation unit, Inductive Coupled Plasma Spectrometer for minor heavy elements, Fourier Transform Infrared Spectroscope, fully automatic CHNS Analyser, Computerized Bomb Calorimeter, Optical Microscope with image analysing system, Pyrometric Cone-Equivalent Furnace, equipment for non-destructive evaluation of concrete structures, Flexural and Transverse Strength Testing Machine for concrete samples, Abrasion Testing Machine, Automatic Compression Testing Machines (various capacities), Universal Testing Machines, Permeability Tester, Heavy Test Floor for testing of large size structural elements and light weight concrete elements, Computerized Laser Beam Particle Size Analyser, Ultrasonic Pulse Velocity Apparatus, Concrete Pile Integrity Tester, Endoscopic Test Apparatus for Hardened Concrete, Bridge Testing Equipment, Impact Echo Test, and Underground Radar Equipment, Computer-Aided Image Analyser System for satellite imageries, Global Positioning System, high temperature testing for clinkerisation and refractories, Differential Thermal Analyser, pollution monitoring equipment facility including High Volume Air Samplers, Respirable Dust Samplers, Multi-gas Analyser, Portable Flue Gas Analyser, Opacity Monitor, Noise Measurement System, CO_2 Gas Analyser, Ultrasonic Gas Leak Detector and Low Level BTX Hydrocarbon Analyser for ambient air etc., Servo Controlled Compression Testing Machine, Ultrasonic Pulse Velocity Testing equipment and Flexural Testing Machine for RCC beam (as per ASTM C 1609) with displacement rate control upto 0.025mm/min. Simulator based training system for kiln and mill operation of cement plants with two PC-based trainer stations and five trainee stations each.

NCB has an Independent Test House equipped with an extensive range of sophisticated analytical instruments and a computer based Laboratory Information Management System (LIMS).

Calibration laboratories of NCB have equipment for calibration in mass, dimension, volume force, temperature and RPM field. The important equipment include profile projector, dry

and liquid temperature calibration. Baths, load cells and dynamometers of various capacities, SPRT/ RTD, Tachnometer, caliper checker, dial gauge tester, dead weight tester etc.

Construction of a new laboratory block for test house and new hostel building with cafeteria for trainees is under progress.

During the year, important equipment facilities added were : Constant Temperature Water Bath, Digital Concrete Hammer, Hot Air Oven, Ion Analyzer, Mercury Porosity Meter, Rebar Detector, Ductility Apparatus, Pressure Meter, Mandrel for bend and re-bend test and Elemental Analyzer.

NCB - Hyderabad

The range of equipment facilities at NCB's Hyderabad unit cover testing and evaluation facilities for cement, cement raw materials, coal, concrete making materials besides calibration facilities for related physical and mechanical testing equipment.

The advanced instruments laboratory of the unit is equipped with XRF Spectrometer, X-ray Diffractometer, DTA-TG-DSC equipment, CHNS elemental analyser, laser beam (based) particle size analyser and optical microscope with image analyser. The unit also has a concrete laboratory with a wide range of equipment facilities for testing of cement and concrete making materials and conducting concrete mix proportioning.

The unit has modern instruments and equipment for in-plant studies including gas analysers, pyrometers and velocity/pressure measuring instruments for energy audit and process diagnostic studies. A modern PC based simulator trainer covering different grinding and pyro-processing systems is available in the unit for providing hands – on training to mill and kiln operators of cement plants.

The unit is equipped with a training complex including training block, hostel and canteen to facilitate residential programmes.

LIAISON AND CO-ORDINATION

NCB maintained liaison with a large number of overseas and Indian organisations, through membership or otherwise.

The Director General and other officials continued to serve on a number of committees constituted by the Government of India, the Bureau of Indian Standards and other organizations as follows :

Shri Ashwani Pahuja
Director General

(a) Chairman, CPCB Standing Committee & National Task Force for Cement Industries

(b) Member, Governing Body, Bureau of Indian Standards (BIS)

(c) Member of Standards Advisory Committee, Laboratory Advisory Committee, Certification Advisory Committee of Bureau of Indian Standards (BIS)

(d) Member, Programme Advisory Committee (PAC) for Fly Ash, Department of Science & Technology, New Delhi

(e) Member, Standing Committee for Innovative Building Material and Technology (BMTPC), New Delhi

(f) Member, PAT Sectoral Expert Committee (Cement Sector), Bureau of Energy Efficiency, New Delhi

(g) Member, American Concrete Institute

(h) Member, Indian Roads Congress

(i) Member, Editorial Board, J Cement Energy and Environment, Cement Manufacturers' Association

(j) Member, Technical Committee, Cement Manufacturers' Association

(k) Member, Research Council of CSIR-CRRI

(l) Member, Expert Committee on Technological Intervention for Addressing Societal Needs (TIASN)

(m) Member, Technical Committee on Cement, Concrete & Mortars for the establishment of Products Environmental Protocols for the Indian Market of Indo-Italian Chamber of Commerce & Industry, Mumbai

Shri V V Arora
Joint Director

(a) Chairman, Cement Matrix Products Sectional Committee (CED 53), Bureau of Indian Standards, New Delhi

(b) Convener, Panel for Masonry (CED 46:P7), Bureau of Indian Standards, New Delhi

(c) Convener, Working Group for Revision of IS 9103:1999, CED 2:2/WG1 Specification for Admixture for Concrete, Bureau of Indian Standards, New Delhi

(d) Convener, Panel for Revision of IS:457, CED 2:2/P6, Code of Practice for General Construction of Plain and Reinforced Concrete for Dams and other Massive Structures, Bureau of Indian Standards, New Delhi

(e) Member, CIVIL Engg. Divisional Council (CEDC), Bureau of Indian Standards, New Delhi

(f) Member, Cement and Concrete Sectional Committee (CED 2), Bureau of Indian Standards, New Delhi

(g) Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi

(h) Member, Panel for Revision of Handbooks (CED 2/P2), Bureau of Indian Standards, New Delhi

(i) Member, Panel for Aggregates from other than Natural Sources (CED 2/P3), Bureau of Indian Standards, New Delhi

(j) Member, Concrete Sub Committee (CED 2:2), Bureau of Indian Standards, New Delhi

(k) Member, Panel for Revision of IS 3370 (Part I & Part II) (CED 2:2/P1), Bureau of Indian Standards, New Delhi

(l) Member, Panel for Revision of IS: 456 and IS: 1343 (CED 2:2/P5), Bureau of Indian Standards, New Delhi

(m) Member, Panel for Revision of Indian Standards on Test Methods for Concrete (CED 2:2/P7), Bureau of Indian Standards, New Delhi

(n) Member, Structural Safety Sectional Committee (CED 37), Bureau of Indian Standards, New Delhi

(o) Member, Earthquake Engineering Sectional Committee (CED 39), Bureau of Indian Standards, New Delhi

(p) Member, National Building Code Sectional Committee (CED 46), Bureau of Indian Standards, New Delhi

(q) Member, Panel for Fire protection (CED 46:P2), Bureau of Indian Standards, New Delhi

(r) Member, Panel for Load, Forces and Effects (CED 46:P4), Bureau of Indian Standards, New Delhi

(s) Member, Panel for Soil and Foundation/Panel for Plain Reinforced & Prestressed Concrete (CED 46:P5), Bureau of Indian Standards, New Delhi

(t) Member, Panel for Plain Reinforced & Prestressed Concrete (CED 46:P8), Bureau of Indian Standards, New Delhi

(u) Member, Panel for Prefabrication and Systems Building (CED 46:P10), Bureau of Indian Standards, New Delhi

(v) Member, Fibre Reinforced Cement Product Sub Committee (CED 53:1), Bureau of Indian Standards, New Delhi

(w) Member, Precast Concrete Products Sub Committee (CED 53:3), Bureau of Indian Standards, New Delhi

(x) Member, Concrete Reinforcement Sectional Committee (CED 54), Bureau of Indian Standards, New Delhi

(y) Co-Convener, H-3 Rigid Pavement Committee, Indian Road Congress, New Delhi

Dr S K Breja
Joint Director

(a) Member, Sieves, Sieving and other Sizing Methods Sectional Committee (CED 55), Bureau of Indian Standards, New Delhi

(b) Member, Flooring, Wall Finishing and Roofing Sectional Committee (CED 5), Bureau of Indian Standards, New Delhi

Dr V P Chatterjee
Joint Director

(a) Member, Stones Sectional Committee (CED 6), Bureau of Indian Standards, New Delhi

Shri S K Chaturvedi
Joint Director

(a) Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi

(b) Member, Cement, Pozzolana and Cement Additives Subcommittee (CED2.1), Bureau of Indian Standards, New Delhi

(c) Member, Refractories Sectional Committee (MTD 15), Bureau of Indian Standards, New Delhi

(d) Member, Sub Committee on Test Methods of Refractory Materials (MTD-15 / P-1), Bureau of Indian Standards, New Delhi

(e) Member, Working group WG 10 for testing of unshaped refractories, WG 17 for chemical analysis and WG 19 for Dimensions of refractory bricks (ISO TC-33), Bureau of Indian Standards, New Delhi

Dr Shri Harsh
Joint Director

(a) Member, Cement and Concrete Sectional Committee (CED 2), Bureau of Indian Standards, New Delhi

(b) Member, Cement, Pozzolana and Cement Additives Subcommittee (CED 2:1), Bureau of Indian Standards, New Delhi

(c) Member, Cement Matrix Products Sectional Committee (CED 53), Bureau of Indian Standards, New Delhi

(d) Member, Fibre Reinforced Cement Product Subcommittee (CED 53:1), Bureau of Indian Standards, New Delhi

(e) Member, Panel (Under BIS Sectional Committee CED 2) for Revision of Cement Standards, (CED2:1/P1), Bureau of Indian Standards, New Delhi

(f) Member, Panel (Under BIS Sectional Committee CED 2) for work relating to ISO/TC 71 & ISO/TC 74, (CED 2/P1), Bureau of Indian Standards, New Delhi

(g) Member, Method of Analysis Subcommittee (PCD 7.4), Bureau of Indian Standards, New Delhi

Shri A K Mishra
Joint Director

(a) Member, Bulk Handling Systems and Equipment Sectional Committee (MED 7), Bureau of Indian Standards, New Delhi

(b) Member, Coal Benefication & Lignite Sub Committee (PCD 7:6 & PCD 7:9), Bureau of Indian Standards, New Delhi

(c) Member, Working Group on Technical Sector of Standard Promotion and Consumer Affairs Deptt. (SP & CAD), Bureau of Indian Standards, New Delhi

Shri Satish Sharma
Joint Director

(a) Member, Panel for Revision of IS 457 (CED 2:2/P6), Bureau of Indian Standards, New Delhi

(b) Member, Construction Plant and Machinery Sectional Committee (MED 18), Bureau of Indian Standards, New Delhi

(c) Member, Planning, Housing and Prefabricated Construction Sectional Committee (CED 51), Bureau of Indian Standards, New Delhi

(d) Member, Panel for Administration, Development Control Rules and General Buildings (CED 46:P1), Bureau of Indian Standards, New Delhi

(e) Member, Concrete Pipes Sub Committee (CED 53:2), Bureau of Indian Standards, New Delhi

Shri Rabindra Singh
Joint Director

(a) Member, Solid Mineral Fuels Sectional Committee (PCD 7), Bureau of Indian Standards, New Delhi

(b) Member, National Task Force on Co-processing of AFR (Alternate Fuel and Raw Materials), Bureau of Indian Standards, New Delhi

Dr R S Gupta
General Manager

(a) Member, Building Limes Sectional Committee (CED 4), Bureau of Indian Standards, New Delhi

Dr D Yadav
General Manager

(a) Member, Building Limes Sectional Committee (CED 4), Bureau of Indian Standards, New Delhi

(b) Member, Refractories Sectional Committee (MTD 15), Bureau of Indian Standards, New Delhi

Shri N K Tiwary
General Manager

(a) Member, Environmental Protection and Waste Management Sectional Committee (CHD 32), Bureau of Indian Standards, New Delhi

(b) Member, Environmental Management Sectional Committee (CHD 34), Bureau of Indian Standards, New Delhi

(c) Member, Solid Waste Management Sectional Committee (CHD:33), Bureau of Indian Standards, New Delhi

(d) Member, Life Cycle Assessment Sub Committee (CHD 34:P7), Bureau of Indian Standards, New Delhi

Sh Brijesh Singh
Manager

(a) Member, B-4 Concrete (Plain, Reinforced and Pre-stressed) Structure Committee, Indian Road Congress, New Delhi

(b) Member, Panel for Asset and Facility Management (CED:46:P22), Bureau of Indian Standards, New Delhi

Appendix - I

Rolling Plan of Missions within the Framework of Centres

A. CENTRE – CEMENT RESEARCH AND INDEPENDENT TESTING (CRT)

Mission 1	:	Utilization of Marginal Grade Raw Materials in the Manufacture of Cement and Building Materials
Mission 2	:	Development of Newer Cements, Composites and Alternate Binding and Building Materials
Mission 3	:	Development of Newer Processes of Manufacturing Cement and other Binding and Buildings Materials
Mission 4	:	Raw Mix Design Optimization
Mission 5	:	Utilization of Industrial and other Wastes for Cement and Building Materials
Mission 6	:	Development of Newer Refractories
Mission 7	:	Improved Refractory Engineering Practices
Mission 8	:	Study of Fundamental Concepts in Material Science and Fundamental Studies Relating to Areas of Fuel Combustion, Pyro-processing, Size Reduction, etc
Mission 9	:	Independent Testing

B. CENTRE – MINING, ENVIRONMENT, PLANT ENGINEERING AND OPERATION (CME)

Mission 1	:	Compilation and Updating of National Inventory of Cement Grade Limestone Deposits
Mission 2	:	Identification, Exploration, Evaluation and Assessment of Limestone Deposits and other Cement Raw Materials
Mission 3	:	Upgradation and Quality Establishment of Limestone (at Quarries) and Mineral Conservation
Mission 4	:	Application of Remote Sensing Techniques
Mission 5	:	Advanced Survey Techniques including Geographical Information System (GIS) and Global Positioning System (GPS)
Mission 6	:	Application of Geophysical Techniques for Mineral Exploration, Ground Water Investigation, etc.

Mission 7	:	Mine Planning and Scheduling
Mission 8	:	Improved Machinery Application and Improved Technological Upgradation for Mining Practices
Mission 9	:	Sustainable Development through Environmental Improvement including Survey of Land and Water Resources.
Mission 10	:	Pollution Control Technologies for Particulate Gaseous Emissions and Liquid Effluents
Mission 11	:	Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for Industrial Projects and Mines
Mission 12	:	Environmental Management System (EMS) and ISO - 14001 Certification for Process Industries
Mission 13	:	Utilization of Hazardous Wastes as Supplementary Fuel
Mission 14	:	Monitoring of Environmental Parameters for Water, Ambient Air Quality, Noise and Vibration Studies
Mission 15	:	Rehabilitation and Reclamation of Mined out Areas
Mission 16	:	Improving Capacity Utilization and Increasing the Rate of Production in Kilns and Mills towards Improving Total Factor Productivity in Cement Industry through Process Optimization, Diagnostic Studies and Trouble Shooting and Improvement in Operation
Mission 17	:	Benchmarks, Best Practices, Operational Norms and Technical Audit including Plant Monitoring
Mission 18	:	Productivity Enhancement Programme (PEP)
Mission 19	:	Technological Upgradation
Mission 20	:	Improving Utilization of Coals
Mission 21	:	Utilization of Alternate Fuels such as Lignite, Natural Gas, Combustible Wastes etc.
Mission 22	:	Improvements in Fuel Combustion Efficiency
Mission 23	:	Optimization of Energy (Both Thermal and Electrical) Consumption
Mission 24	:	Energy Auditing, Management and Monitoring
Mission 25	:	Waste Heat Utilization including Cogeneration
Mission 26	:	Creating Awareness and Motivation for Energy Conservation
Mission 27	:	Total Productive Maintenance (TPM)
Mission 28	:	Preventive/Predictive Maintenance Programme, Condition Monitoring Techniques and Tribology including Computerised Maintenance
Mission 29	:	Inventory Control and Spare Parts Management
Mission 30	:	Risk Analysis and Improving Safety in Cement Plants
Mission 31	:	Turnkey Consultancy for Setting up Modern, Medium and Large Cement Plants from Concept to Commissioning including Fund Sourcing

Mission 32 : Establishing Modern Energy Efficient CRI-MVSK and Rotary Kiln based Mini Cement Plants from Concept to Commissioning

Mission 33 : Improvements in System Design and Engineering of Plant and Machinery (including CRI-designed indigenous Precalcinator System, Burners for High Ash Coals, Refractory Lining System and Coal Quality Modulation System)

Mission 34 : Modernization and Technological Upgradation in Cement Plants

Mission 35 : Upgradation and Modification of VSK based Cement and Lime Plants

Mission 36 : Developing Systems Designs for Bulk Movement of Cement by Rail, Road and Waterways

Mission 37 : Marketing Strategies and Logistics

Mission 38 : Improvements in Packaging of Cement

C. CENTRE – CONSTRUCTION DEVELOPMENT AND RESEARCH (CDR)

Mission 1 : Analysis and Design of Structures for Safety and Economy and Development of Related Software Packages

Mission 2 : Rationalizing Designs of Structures and Foundations in Cement Plants and Other Constructions

Mission 3 : Performance Evaluation of Structures including Machine Foundations through Site Inspection and Testing

Mission 4 : Formulation and Evaluation of Protective System for Enhancing the Service Life of Concrete Structures

Mission 5 : Evaluation of Concrete Construction through Non-Destructive Investigations

Mission 6 : Improving Durability of Concrete Construction through Distress Investigations and Rehabilitation Procedures

Mission 7 : Improved Quality Control Procedures for Enhancing Durability

Mission 8 : Rational Utilization of Cement and other Ingredients in Concrete, including Admixtures

Mission 9 : Promotion of Ready Mix Concrete Technology in India

Mission 10 : Development of Concrete for Special and Newer usages such as Underwater Concreting, Special Concrete Exposed to Extreme Temperature etc.

Mission 11 : Development and Evaluation of Prefab Systems Appropriate for Housing Programmes

Mission 12 : Application of Alternative Building Materials and Development of Construction Techniques for Low Cost Housing

Mission 13 : Improvements in Construction Technology of Cement Concrete Pavements and Canal Linings

Mission 14 : Development of Precast Architectural Concrete Elements and Concrete Finishes

Mission 15 : Preventive Maintenance Programme for Enhancing Service Life of Buildings

Mission 16 : Extended Application of Concrete for Non-Structural Usage

Mission 17 : Improvement in Construction Management Techniques

D. CENTRE – INDUSTRIAL INFORMATION SERVICES (CIS)

Mission 1 : Collection, Documentation and Retrieval of Information for Development of Cement and Building Materials Industries

Mission 2 : Establishing National Data Bank for the Cement and Building Materials Industries

Mission 3 : Providing Library Services

Mission 4 : Establishing Display Centre and Sample Museum and Participation in Exhibition and Trade Fairs

Mission 5 : Publication of R & D Projects, Technology Digests, R & D Journals, Trend Reports, Promotional Literature etc.

Mission 6 : Organising Workshops and Seminars at National and International Levels on Topical Subjects in the Areas of Cement and Building Materials

Mission 7 : Promoting International Linkages for Development of Technologies in the Field of Cement and Building Materials

E. CENTRE – CONTINUING EDUCATION SERVICES (CCE)

Mission 1 : Improving the Talent of Personnel at Entry Level to Cement Industry

Mission 2 : Improving Technical and Managerial Skills/Knowledge of NCB Officials through In-house/External Programmes

Mission 3 : Manpower Planning and Human Resource Development Strategies for Cement and Building Material Industries

Mission 4 : Upgrading Technological Talent of Personnel in the Cement and Building Materials Industries

Mission 5 : Improving Operational Skills of Personnel in the Cement Industry through Simulator Based Courses

Mission 6 : Training of Personnel in Computer Programming, Application and Information Technology at Different Levels of Participation

Mission 7 : Training of Personnel in Software Development, System Analysis and Information Technology Applicable to Cement Manufacturing Process Industry, Structural Design and Investigations

F. CENTRE – QUALITY MANAGEMENT, STANDARDS AND CALIBRATION SERVICES (CQC)

Mission 1 : Providing Traceable Calibration Services to the Industry for Ensuring Manufacture of Quality Product

Mission 2 : National and International Standardization

Mission 3 : Quality Management, Quality Assessment and Quality Improvement in Cement and Building Materials Industries

Mission 4 : Development of Improved Methodologies for Testing and Quality Control including Rapid Methods of Testing and Quality of Cement and Other Building Materials in the Field

Mission 5 : Interlaboratory Proficiency Testing

Mission 6 : Quality Related Services

Mission 7 : Development of New Standard Reference Materials

Mission 8 : Providing Standard Reference Materials (SRMs), Developed by NCB, to the Industry for Ensuring Accuracy of Testing for Quality Control

These Programmes and Missions are proposed to be achieved through the pursuit of specific projects with specified targets of time, cost and assured end products

Appendix - II

Programmed Projects Completed During the Year 2015-16

Sl. No.	Project No.	Project Title	Date of Commencement	Target Date of Completion
1	REC-10	Evolving Guidelines for Improved Refractory Engineering Practices for Modern High Capacity Cement Plants	April 2014	March 2016
2	INT-02	Testing Services as per Standard Specifications and Established Procedures	April 2015	March 2016
3	GMR-08	Updating of National Inventory Cement Grade Limestone Deposits	April 2015	March 2016
4	EMG-01	Study of Energy, Environment and Quality Performance Achievements and Creating Conditions for their Consistent Improvement	April 2015	March 2016
5	INF-01	Collection, Storage, Retrieval and Dissemination of Bibliographical and Other Technical Information	April 2015	March 2016
6	PBL-01	Dissemination of Research Results and Information on NCB	April 2015	March 2016
7	SMC-01	Organization of National and International Seminars/Conferences	April 2015	March 2016
8	HRD-01	Long Term Courses	April 2015	March 2016
9	HRD-02	Updating Knowledge and Skills of NCB Officials	April 2015	March 2016
10	CCE-02	Short Term Courses	April 2015	March 2016
11	CCE-03	Contact Training Programmes for Industrial Personnel	April 2015	March 2016
12	CCE-06	Special Programmes for Industry Personnel from India and Abroad	April 2015	March 2016
13	SBC-01	Simulator Based Courses	April 2015	March 2016
14	CLS-01	Calibration Services	April 2015	March 2016
15	SRM-01	Development of Standard Reference Materials	April 2015	March 2016
16	SRM-02	Supply of Standard Reference Materials	April 2015	March 2016

Appendix - III

Sponsored Projects Completed During the Year 2015-16

Sl. No	SP No.	Project Title	Sponsor
		CENTRE FOR CEMENT RESEARCH AND INDEPENDENT TESTING (CRT)	
1.	3964	Optimization of raw mix design for improving the clinker quality for the manufacture of OPC	Birla Cement Corporation, Chittorgarh, Rajasthan
2.	3432	Assessment of technology identified in Indian cement technology roadmap.	Shree Cement, Beawar, Rajasthan
3.	4011	Establishing limestone consumption factor.	ACC, Gagal, Bilaspur, H.P.
4.	4181	Testing of samples of imported coal, pet coke, carbon slurry, coal dust and burnability of kiln feed samples	ACC, Gagal, Bilaspur, H.P.
5.	4107	Establishing limestone consumption factor	Rawan Cement Works (M/s UCL) Chattisgarh
6.	4191	Evaluation of granulated BF slag and Portland slag cement	Tata Steel Ltd, Jamshedpur
7.	3889	Evaluation of FF and MTs slag for their suitability as performance improver and for preparation of Portland slag cement	Hindustan Zinc Limited, Udaipur
8.	4150	Investigations on utilization of by-product fine sand (-75µm fraction) generated at Veli plant along with coarse sand generated as by-product during clay beneficiation as replacement of natural sand in construction	ECIL, Trivendrum
9.	4113	Evaluation of limestone quality variations from the mines	Penna Cement Industries Ltd, Hyderabad
10.	4133	Cement quality monitoring services (CQMS)	Sree Jayajothi Cements Ltd, Banaganapalli Works-1, Kurnool, AP
11.	4134	Cement quality monitoring services (CQMS)	My Home Industries Ltd, Mellacheruvu (Unit-1, 2 & 3), AP
12.	4169	Establishing limestone consumption factor	Penna Cement Industries Limited, AP
13.	4237	Study on raw mix burnability	My Home Industries, Nalgonda, AP
14.	4238	Establishing limestone consumption factor	Shree Jayajothi Cements Ltd, Kurnool, AP
15.	4268	Establishing limestone consumption factor	Sagar Cements Ltd, Nalgonda, Telangana
16.	3993	Optimization of raw mix design	Thyssenkrupp Industries India Ltd, Pune

Sl. No	SP No.	Project Title	Sponsor
17.	4222	Detailed investigations of limestone, red ochre, laterite, kiln feed and clinker by optical microscope	Wonder Cement, Rajasthan
18.	3929	Burnability studies	Anjani Cements Ltd, Nalgonda
19.	4308	Establishing limestone consumption factor	Penna Cement Industries Ltd Boyareddypalli, AP
20.	4268	Establishing limestone consumption factor	Sagar Cements Ltd, Nalgonda, Telangana
21.	4300	Establishing limestone consumption factor	Andhra Pradesh Cement Works (M/s UCL) AP
22.	4308	Establishing limestone consumption factor	Penna Cement Industries Ltd Boyareddypalli, AP
23.	4209	Establishing limestone consumption factor	Trinetra Cement Ltd, Banswara, Rajasthan
CENTRE FOR MINING, ENVIRONMENT, PLANT ENGINEERING & OPERATION (CME)			
24.	4110	Computer-aided Deposit Evaluation of Limestone Deposit for 162 Ha at Korumanipalle Limestone Mine at Korumanipalle & Thollamadugu villages of Kolimigundla Mandal, Kurnool Dist. AP	Penna Cement Industries Limited (PCIL)
25.	4027	Study on effect of mining on Salinity Intrusion, Ground Water Level /Quality, AAQ and Land Use Pattern of Adityana limestone and Clay Mines	Saurashtra Cement Ltd, Ranavav
26.	4028	Study on effect of mining on Salinity Intrusion, Ground Water Level /Quality, AAQ and Land Use Pattern of Ran Bauxite Mine	Saurashtra Cement Ltd, Ranavav
27.	3880	Plastic waste handling and feeding system for M/s Malabar Cements Ltd, Kerala, (phase-1 and 2 completed, Phase-3 will Start after sponsor consent)	Malabar Cements Ltd, Kerala
28.	3886	Diagnostic study for Minimizing coating formation in kiln	Shreedigvijay Cements Ltd, Jamnagar, Gujarat
29.	3963	Preparation of TEFR/DPR for 100 tpd paper grade lime plant	Nagaland State Mineral Development Corporation Ltd, Kohima, Nagaland
30.	4266	Mandatory Energy Audit	JK White Cement Ltd, Gotan
31.	4309	Mandatory Energy Audit	JK Lakshmi Cement Ltd, Sirohi
32.	4316	Mandatory Energy Audit	Mangalam Cement Ltd, Morak
33.	4346	Mandatory Energy Audit	Reliance Cement Ltd, Maihar
34.	3953	Preparation of TEFR for setting up 1 mtpa grinding & blending plant at Cuttack, Odisha	Navrattan Blue Crete Industries (P) Ltd
35.	4162	Performance Assessment of existing Air Pollution Control Equipments (APCE) at Walayar plant	Malabar Cements Ltd

Sl. No	SP No.	Project Title	Sponsor
36.	4163	Performance Assessment of existing Air Pollution Control Equipments (APCE) at Cherthala grinding unit	Malabar Cements Ltd
37.	4202	Plant Performance Assessment for M/s Meghalaya Cements Ltd	Meghalaya Cements Ltd
		CENTRE FOR CONSTRUCTION DEVELOPMENT AND RESEARCH (CDR)	
38.	1772	Third Party Quality Assurance/Quality Audit for the Work of Construction of 100 Bedded Hospital Block and Service Block at Kalkaji	Executive Engineer Div-Pr-Cr-I, South Delhi Municipal Corporation, Lajpat Nagar, New Delhi
39.	2006	Third Party Quality Assurance/Quality Audit for Construction of Drain in Gandhi Nagar (H No.1403/2 Main Road Kailash Nagar Jhil Chowk one side)	Executive Engineer (Pr) SS, East Delhi Municipal Corporation, Krishna Nagar, Delhi
40.	2120	Third Party Quality Assurance/Quality Audit for Construction of 2 Nos Footover Bridges at Rani Jhansi Road and D.B Gupta Road near Jhandewalan Mata Mandir	Executive Engineer Pr. (SPZ), North Delhi Municipal Corporation, Kashmiri Gate, Delhi
41.	2455	Third Party Quality Assurance/Quality Audit for Improvement of Gokalpur Drain S.H : Construction of RCC Drain from RD-0 to 790 and 1120 to 1560 along with CC Pavement on both side of the Drain from RD-0 to 1560 and Construction of Culvert	Executive Engineer, Project (Shah-N)-II, East Delhi Municipal Corporation, New Usmanpur, Delhi
42.	2588	Third Party Quality Assurance/Quality Audit for the Work of Improvement & Strengthening of Roads in C R Park S.H : Improvement of Drainage System Road Side Berms in different blocks of C R Park	Executive Engineer (Pr) Central-I, Soth Delhi Municipal Corporation, Lajpat Nagar, New Delhi
43.	2805	Third Party Quality Assurance/Quality Audit for the Work of Street Improvement of Hazrat Nizamuddin Basti & Surrounding Area S.H : Street Scapping from Police Station to Ghalib Mazar up to Park Near Qureshi Masjid from Barakhamba to Baoli Gate and Baoli Gate to Barat Ghar in Hazrat Nizamuddin Basti W No.154, City Zone	Executive Engineer (M)-I CZ, South Delhi Municipal Corporation, Town Hall, New Delhi
44.	2877	Third Party Quality Assurance/Quality Audit for Improvement of Road and Providing Drainage System on Approach road from Car Workshop Plot No.2 at Shamshan Ghat Road i.e. Mukti Dwar to Aruna Saf Ali Marg in Kishangarh Village in Ward No.175 south Zone	Executive Engineer (Pr) South-II, South Delhi Municipal Corporation, Sewa Nagar, New Delhi
45.	2996	Third Party Quality Assurance/Quality Audit for work of Construction of M C Pry. School at Kotla Village in ward no.209	Executive Engineer (Pr.)-II/ Shahdara South Zone, East Delhi Municipal Corporation, Asaf Ali Road, Delhi

Sl. No	SP No.	Project Title	Sponsor
46.	3071	Third Party Quality Assurance/Quality Audit for work of Improvement of SC/ST basties in Mangolpuri SH: Construction of Community Hall at Block-UT, Mangolpuri	Executive Engineer DD-II Delhi Urban Shelter Improvement Board Govt. of NCT of Delhi Raja Garden, New Delhi
47.	3083	Third Party Quality Assurance/Quality Audit for work of construction of in M C Pry. School Meethapur Extension	Executive Engineer (Pr.), Central-II, South Delhi Municipal Corporation, Sewa Nagar Flyover, Delhi
48.	3134	Third Party Quality Assurance/Quality Audit for work of Construction in M C Pry. School Pushp vihar sector III in ward no. 184 South Zone	Executive Engineer (Pr.) South-I, South Delkhi Municipal Corporation, Sewa Nagar, New Delhi
49.	3234	Third Party Quality Assurance/Quality Audit for work of construction of Community Hall at Pkt-6, MIG Flats, Mayur Vihar Ph-III in AC-56 Shah South Zone	Executive Engineer (Project-II), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
50.	3260	Third Party Quality Assurance/Quality Audit for work of road restoration for improvement of Sewerage system by replacement of sewer line at D-Block Defence Colony in Ward No. 159, Central Zone SH: Rest. of cut by pdg. RMC Blocks, Defence Colony	Executive Engineer (M)-I, Central Zone, South Delhi Municipal Corporation, Defence Colony, New Delhi
51.	3300	Third Party Quality Assurance/Quality for Work of Construction of polyclinic at Bara Hindu Rao Dispensary site in Deputy Ganj	Executive Engineer (Pr.) SP Zone, South Delhi Municipal Corporation, Delhi
52.	3305	Third Party Quality Assurance/Quality Audit for Work of "Construction of RCC Box Drain on RHS of Kalyanvas Road from Kotla to JJ Cluster, Kalyanpuri, Ward No. 213, Sh (S) Zone"	Executive Engineer (M)-IV, East Delhi Municipal Corporation Shakkarpur Delhi, New Delhi
53.	3320	Third Party Quality Assurance/Quality Audit for Work of "Construction of Mother and Child Welfare Centre A-Block in Jahangirpuri in Sant Ravi Das Nagar"	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
54.	3349	Third Party Quality Assurance/Audit for Work of Restoration of cut made by ECIL department in Daryaganj C-153, City Zone. Restoration of cut made by ECIL by pdg. RMC from H.No. 4875/24 to H.82 Shyam Lal Road in D/G SH: Restoration of Road cut made by ECIL by pdg. RMC from H.N. 108 to 89, Subhash Baghva Marg in D/G. SH: from Ansari Road to Dayanand Road Shyam Lal Road (3) From Police Station to H.NO. 4809/24 Bharat Ram Road (4) From Footover bridge to Jain Bal Ashram(5) From Corner to Ansari Road to Corner of NS Marg (6) by RMC from digging trench less SH: R/R of Footpath cut from Bldg No. 7 to Sarvodaya Kanya Vidhalaya Dayanand Road in Daryaganj	Executive Engineer (M-I), Central Zone, South Delhi Municipal Corporation, Defence Colony, Delhi

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55.	3359	Third Party Quality Assurance/Quality Audit for Work of Re-construction of Community Hall at Amar Colony, Ward No. 160, Central Zone	Executive Engineer(Pr.-I), Central Zone, South Delhi Municipal Corporation, Lajpat Nagar, Delhi
56.	3363	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at M C Pry. School in Prashant Vihar, Rohini Zone	Executive Engineer (Project-I), Rohini, North Delhi Municipal Corporation, Sub Zonal Office Building, Rohini, Delhi
57.	3373	Third Party Quality Assurance/Quality Audit for Work of Construction of Staff quarters of health personal at Mehrauli in ward no. 170 South Zone	Executive Engineer (Pr)-II, South, East Delhi Municipal Corporation, Sewa Nagar, Delhi
58.	3409	Third Party Quality Assurance/Quality Audit for Work of "Construction of M&CW Centre with Delivery Facility at Sonai Vihar (Ward No. 272) in Shahdara (North) Zone"	Executive Engineer (Pr-II), South-N, East Delhi Municipal Corporation, New Usmanpur, Delhi
59.	3411	Third Party Quality Assurance/Quality Audit for Work of "Improvement development of Danveer Bhamashah Maternity home by pdg. 0 from ward No. 213, Sh (S) Zone in Khichripur"	Executive Engineer (M-III), Shah-S, East Delhi Municipal Corporation, Shakarpur, New Delhi
60.	3546	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at Block-3, Trilokpur	Executive Engineer (C-9), Delhi Urban Shelter Improvement Board 1 Kilokari, Opp Maharani Bagh New Delhi
61.	3569	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall Over Piece of Land in Front of A-4/26 Nand Nagari Old Tanga Stand Between CTC Complex Ward No. 234 in Shahadara North Zone	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Geeta Colony, Delhi
62.	3583	Third Party Quality Assurance/Quality Audit for Work of Renovation/Re-Modeling of Double Storied Existing Community Hall/Centre in Sangam Park	Executive Engineer,C-7, Delhi Urban Shelter Improvement Board, Rana Pratap Bagh, Delhi
63.	3606	Third Party Inspection and Monitoring (TPIM) for the work of Construction of 60 Bedded Hospital at Gandhipara, Diu	Omnibus Industrial Development Corporation, of Daman & Diu and Dadra & Nagar Haveli Limited, Somnath, Nani Daman
64.	3608	Third Party Quality Assurance/Quality Audit for Work of Construction of Polyclinic (Bigger Unit) Building Burari SH: Providing Aluminum Window Kota Stone Flooring and Glazed Tiles	Executive Engineer (Project-II), West Zone, South Delhi Municipal Corporation, Shakti Nagar, Delhi
65.	3609	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at M-Block, Raghubir Nagar in West Zone	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi

Sl. No	SP No.	Project Title	Sponsor
66.	3611	Third Party Quality Assurance/Quality Audit for Work of Construction of Recreation Centre and Gym Near Shastri Park red light in ward no. 233 in AC-61, Shahdara South	Executive Engineer (Project-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
67.	3612	Third Party Quality Assurance/Quality Audit for Work of Construction of M C Pry. School Building at Chand Mohalla in Ward No. 236 in AC-61 Shahdara South	Executive Engineer (Project-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
68.	3613	Third Party Quality Assurance/Quality Audit for Work of Construction of M C Pry. School Gandhi Nagar No.1 and 2 Ward No.229 AC-60	Executive Engineer (Project-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
69.	3617	Third Party Quality Assurance/Quality Audit for Work of Development of U/A Colony at S.No.1070/1639 at Z-Block, Prem Nagar, Colony Old Khaira Road, SH: Const. of Outfall drain from Z-Block, Prem Nagar colony to Outfall in C-140, NGZ	Executive Engineer (M-I), South Delhi Municipal Corporation, Near Delhi Gate, Delhi
70.	3618	Third Party Quality Assurance/Quality Audit for Work of Construction of Boundary Wall, attendant room & approach road, of Burial Ground (Qabristan) at Village Badarpur, W. No. 203, Central Zone	Executive Engineer (Project-II), Central, South Delhi Municipal Corporation, Under Sewa Nagar Flyover, Delhi
71.	3619	Third Party Quality Assurance/Quality Audit for Work of Construction of Senior Citizen Hall and Mohila Sillai Centre Near Shastri Park DDA flat in Shastri Park in Ward No. 233, AC-61, Shahdara South Zone	Executive Engineer (Project-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
72.	3641	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall, Recreation centre and GYM at Sahipur Village in Ward No. 55, Rohini Zone	Executive Engineer (Pr-III), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
73.	3643	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at Lajpat Nagar-IV, Daya Colony (Boys), Ward No. 160, Central Zone	Executive Engineer (Pr-I), Central Zone, South Delhi Municipal Corporation, Lajpat Nagar, Delhi
74.	3664	Third Party Quality Assurance/Quality Audit for work of Re-construction of Community Hall at Nehru Nagar Ward No.155, Central Zone	Executive Engineer (Pr-I), Central Zone, South Delhi Municipal Corporation, Lajpat Nagar, Delhi
75.	3665	Third Party Quality Assurance/Audit for Work of Development of U/A Colony at S.No. 1276D/1639 in C-139, NGZ. SH: Const. of Road and drain by pdg. RMC from Mehta Photo State to Sandeep Rao, Rajaram to Mukhtyar, R K Sharma to Khusal Singh Virender HS. to CH. Raj Singh Tmar, Raj Kanwar to Shyam Sunder, Ganga Ram to K P Singh in C1276 D Gopal Nagar Extn., A-Block in C-139, NGZ	Executive Engineer (M-I), South Delhi Municipal Corporation, Near Delhi Gate, Delhi

Sl. No	SP No.	Project Title	Sponsor
76.	3677	Third Party Quality Assurance/Quality Audit for Work of Improvement & Construction of RCC box type drain from main Najafgarh Bijwasan Road on Masjid road to Goela Kakrola Road drain in Village Deenpur in C-134/NGZ	Executive Engineer(Pr.), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
77.	3689	Third Party Quality Assurance/Audit for Work of Construction of M C Pry. School Building at Block 16 Trilokpuri in AC-55 in Shahadara South Zone	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Near Metro Station Laxmi Nagar, Delhi
78.	3690	Third Party Quality Assurance/Quality Audit for Work of Construction of M C Pry. School Building at Mandawali Extension in Ward No. 21 in Ward NO. 217 AC-57 in Shahadara South Zone	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Near Metro Station Laxmi Nagar, Delhi
79.	3698	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building in M C Pry. School at B-Block, Vikas Puri in West Zone	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
80.	3703	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall (Chaupal) at Vacant Land/Plot at Kasturba Nagar (Double Storied)	Executive Engineer (C-9), Delhi Urban Shelter Improvement Board, Maharani Bagh, New Delhi
81.	3712	Third Party Quality Assurance/Quality Audit for Work of Improvement & Strengthening of 13.5 m ROW roads in Suvida Kunj and West Enclave by dense carpeting and P/L RMC on 9.0 m &13.5 m road in Pushpanjali Enclave in Ward No. 60 in Rohini Zone. SH: Improvement & Development of roads by P/L RMC & Improvement of drain of 9.0 & 13.5 m Road in Pushpanjali Enclave	Executive Engineer (Pr-I), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
82.	3734	Third Party Quality Assurance/Quality Audit for Work of Pdg & laying underground drainage, Construction of Gully grating, CC pavement & Road in Ward No. 205 Central Zone–4 Sites	Executive Engineer (Pr), Central –II, South Delhi Municipal Corporation, Under Sewa Nagar Flyover Delhi
83.	3735	Third Party Quality Assurance/Quality Audit for Work of Construction of Senior Citizen Recreation Centre at CTC Site Z-III Block Welcome Seelampur, Shahdara (North) Zone	Executive Engineer (Pr), Shah-N, East Delhi Municipal Corporation, Geeta Colony, Delhi
84.	3736	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at 8 & 9 Block, Moti Nagar in Karol Bagh Zone.	Executive Engineer (Pr), KBZ, North Delhi Municipal Corporation, Old Rajinder Nagar, Delhi
85.	3746	Third Party Quality Assurance/Quality Audit for Work of Improvement & Strengthening of road by providing CC Pavement & drainage system of Jagdamba Road from H. No. TA-1 (Aggarwal Properties) near transformer to Gali No. 30 in Tughlakabad Extn. In Ward No. 185, Central Zone.	Executive Engineer (Pr-II), Central Zone, South Delhi Municipal Corporation, Under Sewa Nagar Flyover, Delhi

Sl. No	SP No.	Project Title	Sponsor
86.	3747	Evaluation of Materials and Concrete Mix Design for the Work of R&M Works of Existing ESPs at NTPC-Korba	BHEL Limited, C/o NTPC Limited, Korba Super Thermal Power Station, Korba, Chhattisgarh
87.	3748	Third Party Quality Assurance/Quality Audit for Work of Construction of 6 Classrooms, 1 Store Room and Toilet Block (Boys and Girls) in M C Pry. School at Vijay Nagar (Single Storey) in C-12/CLZ	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
88.	3755	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at L-Block, Hari Nagar in WZ	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
89.	3759	Evaluation of Concreting Materials & Concrete Mix Proportions (4 Nos) for Civil Works Construction of Chimney & Cooling Tower at 2X600 MW NTPC-Singareni Thermal Power Project - Jaipur, Adilabad Distt	National Building Construction Corporation Ltd, C/o Singareni Thermal Power Project Vill: Pegadapalli, Mandal: Jaipur, Distt: Adilabad
90.	3761	Third Party Quality Assurance/Quality Audit for Work of Construction of Addl Classrooms at M C Pry. School Dallupura in Ward No. 214 in Shahdara South Zone	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Laxmi Nagar, Delhi
91.	3774	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at Block-5 Nand Nagari	Executive Engineer C-8, Delhi Urban Shelter Improvement Board, Kilokari, New Delhi
92.	3777	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at Tihar Village (Ashok Nagar Block-I) in West Zone	Executive Engineer (Pr-II), West, South Delhi Municipal Corporation, Zakhira, Delhi
93.	3780	Third Party Quality Assurance/Quality Audit for Work of Construction of Integrated ward Office Complex at B-27 Trilokpuri in Ward No. 211 Shah-S Zone	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Lalita Park, Delhi
94.	3783	Third Party Quality Assurance/Quality Audit for Work of Construction of M C Pry. School (Urdu Section) Block-31 Trilokpuri Ward No. 211 in AC-55 Shah-S Zone	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Lalita Park, Delhi
95.	3784	Third Party Quality Assurance/Quality Audit for Work of Construction of Gym in Khel Parisar at Trilokpuri Opposite Block-8 in AC-55, Shahdara South Zone	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Lalita Park, Delhi
96.	3785	Third Party Quality Assurance/Quality Audit for Work of (i) Reconstruction of Community Hall at A Block, Sultanpuri in Rohini Zone (ii) Reconstruction of Community Hall at C-4 Block, Sultanpuri in Rohini Zone (Two sites)	Executive Engineer (Pr-II), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
97.	3790	Third Party Quality Assurance/Quality Audit for Work of Construction of M C Pry School at New Multan Nagar in Ward No. 58 in Rohini Zone	Executive Engineer (Pr-III), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi

Sl. No	SP No.	Project Title	Sponsor
98.	3791	Third Party Quality Assurance/Quality Audit for Work of Improvement of Internal lanes by P/L RMC and drainage system and back lanes by RMC in PU block Pitampura in C-54, Rohini Zone	Executive Engineer (Pr-III), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
99.	3800	Third Party Quality Assurance/Quality Audit for Work of Construction in M C Pry School, Singhu (Girls) in Narela Zone	Executive Engineer (Pr), Narela Zone, North Delhi Municipal Corporation, Narela, Delhi
100.	3810	Third Party Quality Assurance/Quality Audit for Work of Construction of Additional Classrooms at M C Pry. School at A-1, Jwalapuri in Ward No. 42, Rohini Zone	Executive Engineer (Pr-III), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
101.	3817	Third Party Quality Assurance/Quality Audit for Work of Construction of Integrated Health Unit at Khureji Khas in Ward No. 231 AC-60 Shahdara South	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, New Delhi
102.	3818	Third Party Quality Assurance/Quality Audit for Work of Construction of pucca School Building at M C Pry. School Seemapuri (Hindi) in ward no. 240, Shahdara (North) Zone. Dismantling of old existing structure at reserve price amounting to Rs. 3,40,000/-	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Geeta Colony, New Delhi
103.	3823	Third Party Quality Assurance/Quality Audit for Work of Construction of New building after demolition of existing M and CW Centre Gautam Nagar in ward no. 164 South Zone.	Executive Engineer (Pr-I), South Zone, South Delhi Municipal Corporation, Sewa Nagar, New Delhi
104.	3824	Third Party Quality Assurance/Quality Audit for Work of R/L RMC in Dilshad Garden Ward No. 239 AC-62 Shahdara South	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, New Delhi
105.	3836	Third Party Quality Assurance/Quality Audit for Work of Construction in M C Pry. School at Dhakka in C-12/CLZ	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
106.	3839	Third Party Quality Assurance/Quality Audit for Work of Construction of Sump well & Pump house at village Tikri Kalan in C-13, Narela Zone.	Executive Engineer (Pr), Narela, North Delhi Municipal Corporation, Narela, Delhi
107.	3843	Third Party Quality Assurance/Audit for Work of "Construction of Community Hall at Block-6 and 7 Khichripur in Ward No. 219, Shahdara South Zone".	Executive Engineer (Pr-II) Shah-S, East Delhi Municipal Corporation, Lalita Park, Delhi
108.	3845	Third Party Quality Assurance/Audit for Work of "Construction of M C Pry. School at Prahladpur Banger in C-26, Rohini Zone".	Executive Engineer (Pr-I), Rohini, East Delhi Municipal Corporation, Sector-17, Rohini
109.	3848	Third Party Quality Assurance/Audit for Work of "Construction of M C Pry. School at Wazirabad Water Works in C-10/CLZ".	Executive Engineer (Pr-I), CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi

Sl. No	SP No.	Project Title	Sponsor
110.	3853	Testing and Evaluation of Coarse and Fine Aggregate for the Work of Civil including HM Works at NTPC-Lata Tapovan HE Project	NTPC Limited, Tapovan Vishnugad Hydro Electric Project Chamoli, Uttrakhand
111.	3854	Third Party Quality Assurance/Audit for Work of "Construction of 21 Nos class rooms and 20 Nos Toilet sheets on each floor in M C Pry. School Matiala No-I in Ward No.136/NGZ"	Executive Engineer (Project), NGZ, South Delhi Municipal Corporation, Dhansa Stand, New Delhi
112.	3857	Third Party Inspection and Monitoring (TPIM) for the Work of Construction of Parallel Bridge to the Existing Diu-Ghoghla Bridge at Diu	Omnibus Industrial Development Corporation of Daman & Diu and Dadra & Nagar Haveli Limited Somnath, Nani Daman
113.	3858	Ultrasonic Pulse Velocity (UVP) Testing of TG Deck Slab of Unit-I and Unit-II (660x2 MW) as per IS:13311 (Part-I)-1992 to Ascertain Homogeneity and Integrity of Concrete	NTPC Limited, Solapur Super Thermal Power Plant Solapur, Maharashtra
114.	3859	Third Party Quality Assurance/Audit for Work of "Construction of Dispensary at West Vinod Nagar in Ward No. 217 Shahdara South Zone".	Executive Engineer (Pr-II), South, East Delhi Municipal Corporation, Laxmi Nagar, Delhi
115.	3860	Third Party Quality Assurance/Audit for Work of "Providing and laying of supply, installation, Testing and Commissioning of electric pump sets and DG Sets along with allied equipments by pdg. From at 2142, MIG flats, Nand Nagari, Storm Water Pump House. SH: P/L rising main for sump well and construction of park and walkway in Dilshad Garden".	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Geeta Colony, Delhi
116.	3863	Third Party Quality Assurance/Audit for Work of "Construction of M C Pry. School at Kalyanvas No-1 in Ward No. 219 Shahdara South Zone".	Executive Engineer (Pr-II), South, East Delhi Municipal Corporation, Laxmi Nagar, Delhi
117.	3872	Detailed Study on the use of Copper Slag as a Replacement to River Sand in Different Grades of Concrete for Sterlite Industries Ltd, Tuticorin, Tamilnadu	SSL Sterlite Limited – Sterlite Copper Tuticorin, Tamilnadu
118.	3873	Third Party Quality Assurance/Audit for Work of "Improvement and Strengthening of roads having ROW 25 (7.62M), 30 (9.14M), 40 (12.20M) and Chowks in EA, EB and EC-Pkt. of Maya Enclave, F-Pkt. Green view Apartment and DA-Block in Hari Nagar in Ward No. C-110/ SDMC." Construction of Re–modeling of storm water drain, Improvement and Strengthening of roads, berm by pdg. Interlocking tiles Maya Enclave in Hari Nagar in C-110/WZ. 3 Sites	Executive Engineer (M-I) West, South Delhi Municipal Corporation, Rajouri Garden, Delhi

Sl. No	SP No.	Project Title	Sponsor
119.	3874	Third Party Quality Assurance/Audit for Work of "Construction of 5 Nos. Class Rooms at M C Pry. School Naharpur Village in Ward No. 52 in Rohini".	Executive Engineer (Pr-I), Rohini, East Delhi Municipal Corporation, Sector-17, Rohini
120.	3885	Third Party Quality Assurance/Audit for Work of "Construction of Senior Citizen Recreation Centre at Karkardooma Village Ward No. 225 AC-59 Shahdara South".	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Shah-S.
121.	3890	Third Party Quality Assurance/Audit for Work of "Construction in M C Pry. School at Hakikat Nagar in C-12/CLZ".	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi.
122.	3893	Third Party Quality Assurance/Audit for Work of "Construction of M C Pry. School at Village Hasanpur (Addl Rooms) Ward No. 227 AC-59".	Executive Engineer (Pr.), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Shah-S.
123.	3897	Third Party Quality Assurance/Audit for Work of "Construction of Recreation Centre and Gym at B pkt. Infront of Arvachin Public School Dilshad Garden, Ward No. 239 AC-62".	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Shah-S.
124.	3900	Third Party Quality Assurance/Audit for Work of "Construction of Polyclinic & M & CW Centre at Ghumanhera Village in W.No. 133/NGZ".	Executive Engineer (Pr) NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
125.	3914	Evaluation of Materials and Concrete Mix Design for the Work of Wagon Tippler and Conveying Plant of NTPC-Sipat STPP	NTPC Limited, Sipat Super Thermal Power Project, Bilaspur, Chhattisgarh
126.	3917	Third Party Quality Assurance/Audit for Work of "Construction of 7 nos Class room and 1 Toilet Block in M. C Pry. School, Bawana (Old) in Narela Zone".	Executive Engineer (Pr.), Narela, North Delhi Municipal Corporation, Narela, Rohini
127.	3921	Condition Assessment Study of Old Quarters (100 Nos) Type B, C & D at NTPC-Vindhyachal and suggestion for Remedial Measures for Repair	NTPC Limited, Vindhyachal Super Thermal Power Project, Singrauli, Madhya Pradesh
128.	3924	Third Party Quality Assurance/Audit for Work of "Construction of 16 nos. Class Rooms, 1 Store Room, 1 Computer Room, 1 Library Room,, 1 Sports Room, 1 Science Lab, 2 Office Room, 1 Staff Room and 8 Toilet Block in M C Pry. School, E-Block, Site-5 J.J Colony Bawana C-28 in Narela Zone".	Executive Engineer (Pr) Narela, North Delhi Municipal Corporation, Narela, Delhi
129.	3926	Third Party Quality Assurance/Audit for Work of "Construction of main Building for Technical Laboratory South Delhi Municipal Corporation in Sec-9 R K Puram New Delhi in Ward No. 167 South Zone".	Executive Engineer (Pr.-I) South, South Delhi Municipal Corporation, Sewa Nagar, Delhi
130.	3927	Third Party Quality Assurance/Audit for Work of "Construction of Community Hall at Vasundhra Enclave in Ward No. 214 Shahdara South Zone".	Executive Engineer (Pr.-II) Shah-S, East Delhi Municipal Corporation, Lalita Park, Delhi

Sl. No	SP No.	Project Title	Sponsor
131.	3932	Field and Laboratory Investigations of Concrete Structure of Dam	Deputy Chief Engineer (DRIP, R&DS) Kerala State Electriciy Board, Research & Dam Safety Organisation, Kottayam, Kerala
132.	3938	Third Party Quality Assurance/Audit for Work of "Construction of RCC Drain in Main Market, Rani Bagh from round about to Road No. C-43 at C-59/RZ".	Executive Engineer (M-I), Rohini, North Delhi Municipal Corporation, Keshav Puram, Delhi
133.	3942	Distress Assessment Study and Preparation of BOQ/ Specifications/Cost Estimate to Carry out Repair and Restoration Work of 2 Nos Chimneys at NTPC-Badarpur TPS	NTPC Limited, Badarpur Thermal Power Station, Badarpur, New Delhi
134.	3943	Evaluation of Low Density Aggregate (LDA) and Concrete Mix Design	Indian Metals & Ferro Alloys Limited, Cuttack, Odisha
135.	3950	Third Party Quality Assurance/Audit for Work of "Remodeling of drainage system storm Water drain in appt. Colony Preet Vihar". SH: Remodeling of drainage system (Storm water drain) in A-Block Preet Vihar Ward no. 228".	Executive Engineer (M-II), Shah-S, East Delhi Municipal Corporation, Geeta Colony, Delhi
136.	3951	Third Party Quality Assurance/Audit for Work of "Construction of Ayurvedic Dispensary Old Seelampur in Ward No. 236 AC-61, Shahdara South".	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
137.	3954	Third Party Quality Assurance/Audit for Work of "Construction of M C Pry. School at Kapashera (G)-I, Ward No. 143/NGZ".	Executive Engineer (Project), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
138.	3956	Third Party Quality Assurance/Audit for Work of "Construction of M C Pry. School at A-5, Paschim Vihar in Rohini in C-58".	Executive Engineer (Pr-III), Rohini, North Delhi Municipal Corporation, Rohini, Delhi
139.	3969	Evaluation of Materials and Concrete Mix Design for the Work of Cooling Tower Package at NPGCL-Aurangabad	Nabinagar Power Generating Co Limited, Aurangabad, Bihar
140.	3970	Third Party Quality Assurance /Audit for Work of "Construction of M C Pry. School Building at Trilokpuri Block-22 in Ward No. 209 AC-55, Shahdara South Zone".	Executive Engineer (Pr.-II) Shah-S, East Delhi Municipal Corporation, Lalita Park, Delhi
141.	3972	Third Party Quality Assurance/Audit for Work of "Improvement of Phirni Road by RMC in village Paprawat in NGZ".	Executive Engineer (Project), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
142.	3973	Third Party Quality Assurance/Audit for Work of "Improvement of Phirni Road by RMC and box drain in village Kangaheri in NGZ".	Executive Engineer (Project), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi

Sl. No	SP No.	Project Title	Sponsor
143.	3975	Testing of Concrete for Creep, Moisture Movement and Coefficient Linear Expansion for Altair Colombo Tower Project at Colombo, Srilanka	Shapoorji Pallonji Srilanka Pvt Ltd, Altair Colombo Tower Project, Colombo, Srilanka
144.	3978	Third Party Quality Assurance/Audit for Work of "Construction of Up graduation of Nizampur Stadium by making seating arrangement, different playing courts and other utilities services in C-30 in Narela Zone"	Executive Engineer (Project), Narela, North Delhi Municipal Corporation, Narela, Delhi
145.	3979	Third Party Quality Assurance/Audit for Work of "Construction of wall along Barapulla Nallah towards Nizamuddin West (Opposite H.No A-30 – to G-8 (upto Dustbin) by pdg 0 from in ward no. 154, Central Zone in Nizamuddin"	Executive Engineer (M-I) Central, South Delhi Municipal Corporation, Defence Colony, Delhi
146.	3980	Third Party Quality Assurance/Audit for Work of "Improvement of roads by providing ready mix concrete in pocket I and II Sector-9 Dwarka, NGZ"	Executive Engineer (Project), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
147.	3985	Third Party Quality Assurance/Audit for Work of "Upd./Stg. of Hospital Services in Hindu Rao Hospital". SH: Renovation of Nurses Hostel rooms and corridor by providing flooring, doors, windows etc. in Hindu Rao Hospital, C-280/CLZ	Executive Engineer (Pr-I) CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi
148.	3987	Third Party Quality Assurance/Audit for Work of "Construction of toilet block in M C Pry. School Circular road Jhilmil Ward No. 238 AC-62 Shahdara South Zone"	Executive Engineer (Pr-I) Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
149.	3990	Third Party Quality Assurance/Audit for Work of "Construction of Ayurvedic Dispensary at Pooth Kalan in Ward No. 25 Rohini Zone"	Executive Engineer (Pr-II) Rohini, North Delhi Municipal Corporation, Sector-17, Delhi
150.	3991	Third Party Quality Assurance/Audit for Work of "Construction of Ayurvedic Diabetic Centre at Village Begampur, C-27 in Narela Zone". SH C/o underground water storage tank, septic Tank, Pump Room, development of ground, Aluminum partitions, Water Harvesting, drainage system and misc works	Executive Engineer (Project), Narela, North Delhi Municipal Corporation, Narela, Delhi
151.	3992	Third Party Quality Assurance/Audit for Work of "Construction of 10 nos. class's room and toilet block in North Delhi Municipal Primary School at Begampur Ward"	Executive Engineer (Project), Narela, North Delhi Municipal Corporation, Narela, Delhi
152.	3994	Third Party Quality Assurance/Audit for Work of "Remodeling of drainage system along with improvement of side berm Gidwani Road adjacent to Sarvodaya Kanya Vidhalaya in Adarsh Nagar in C-14/CLZ"	Executive Engineer (Pr-I) CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi

Sl. No	SP No.	Project Title	Sponsor
153.	4000	Evaluation of Materials and Concrete Mix Design for the Work of TG Deck & Chimney Shell of Main Plant & Offsite Civil Works Package at NTPC-Gadarwara STPP	NTPC Limited, Gadarwara Super Thermal Power Project, Narsinghpur, Madhya Pradesh
154.	4001	Study of Availability (Quantity) and Quality of Construction Materials and labour for NTPC Project at Pudimadaka	NTPC Limited, Southern Region Head Quarters, Secunderabad
155.	4004	Third Party Quality Assurance/Audit for Work of "Remodeling/Const. of drain in Village Khichripur in Ward No. 219 Shahdara South Zone"	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Laxmi Nagar, Delhi
156.	4007	Third Party Quality Assurance/Audit for Work of "Imp./Dev. of lanes of Kishan Kunj extn. Part-II by pdg. O from by remodeling of main drain from main road Kishan Kunj upto Bank Enclave in W. No. 221 in Kishan Kunj"	Executive Engineer (M-IV), East Delhi Municipal Corporation, Shakarpur, Delhi
157.	4008	Third Party Quality Assurance/Audit for Work of "Remodeling of drain from Anand lok to Sahyog Apartment from Anand lok to Una Apartment from Una Apartment to Mavilla Apartment and along Patparganj Village up to Ahlcon Public School, Mayur Vihar Ph-I in W. No. 220 Patparganj"	Executive Engineer (M-IV), East Delhi Municipal Corporation, Shakarpur, Delhi
158.	4009	Third Party Quality Assurance/Audit for Work of "Construction of RCC drain from Shiv Vihar Tiraha to Brijpuri Culvert (RHS) in AC-68 Shahdara North Zone"	Executive Engineer (Pr-I), East Delhi Municipal Corporation, Opp. Shyam Lal College, Shahdara, Delhi
159.	4010	Third Party Quality Assurance/Audit for Work of "Construction of drainage system on left hand side of Pandav Road and from Jwala Nagar Chowk to Ambedkar Park in Ward No. 238 Shahdara South Zone"	Executive Engineer (Pr-I) Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
160.	4012	Third Party Quality Assurance/Audit for Work of "Taking of services (Roads/Path/SW Drains Tot Lots) 2693/2714 EWS and 358/276 LIG House in Bindapur Pkt III Dwarka Phase I". SH Const. of SW drains in D-Block and Imp of existing drain by covering with precast RCC Slab in Bindapur Pkt III in Ward No. C-128/WZ.	Executive Engineer(M-II), WZ South Delhi Municipal Corporation, Near Honda Showroom, New Delhi
161.	4014	Third Party Quality Assurance / Audit for the Work of "Improvement and development of drainage system on both side and road by pdg. CC from H No. R-117 to R-129, from H. No. RZ-96 to RZ-93 back lane, from RZ-135 to RZ-142, from R-234 to R-239, from H. No. RZ-110 to RZ-121, from H. No. RZ-61 to RZ-46 in Vani vihar / Manas Kunj in Ward No. C-128 WZ"	Executive Engineer (M-II), WZ, South Delhi Municipal Corporation, Peera Garhi, Delhi

Sl. No	SP No.	Project Title	Sponsor
162.	4015	Third Party Quality Assurance / Audit for the Work of "SH: Improvement & Development of lane and drain by pdg. RMC at 5 Sites in Mohan Garden in ward C-126/WZ"	Executive Engineer (M-IV), WZ, South Delhi Municipal Corporation, Moti Nagar, New Delhi
163.	4016	Third Party Quality Assurance / Audit for the Work of "SH: Improvement & Development of lane and drain by pdg. CC at 6 Sites in Mohan Garden, Ward C-126/WZ"	Executive Engineer (M-IV), WZ, South Delhi Municipal Corporation, Moti Nagar, New Delhi
164.	4017	Third Party Quality Assurance / Audit for the Work of "Improvement & Development of drainage system and road by pdg. CC at Bhagwati Garden in Ward No. C-125/WZ"	Executive Engineer (M-II), WZ, South Delhi Municipal Corporation, Peera Garhi, Delhi
165.	4018	Third Party Quality Assurance / Audit for the Work of "Improvement of Drainage system on both side from A-96 to A-106 (Shiv Mandir) in Gulab Bagh in Ward No. C-127/WZ".SH: Imp. and Dev. of road by Pdg. CC in Gulab Bagh in Ward No. C-127/WZ"	Executive Engineer (M-II), WZ, South Delhi Municipal Corporation, Peera Garhi, Delhi
166.	4019	Third Party Quality Assurance / Audit for Work of "Construction of M.C. Pry. School at B-Block Jahangirpuri in C-20/CLZ". SH: Providing Water harvesting development of ground, concertina wire on boundary wall and hard drawn steel wire on window	Executive Engineer (Pr-II) CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
167.	4020	Third Party Quality Assurance / Audit for Work of "Providing Fire Safety System with all Civil Works".SH: Providing Safety Doors in Staircase portion segregating wards from lift area in Male ward 5-9 and 10-14 in RBIPMT Hospital in Civil Line Zone. 2. Strengthening of existing Boundary wall along MVID Hospital in RBIPMT Hospital	Executive Engineer (Pr-I) CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi
168.	4021	Third Party Quality Assurance / Audit for Work of "Improvement of S. W. Drainage System in Satyawati Nagar in C-66/CLZ". SH: C/o RCC Box Drain, Missing links and side berm in Satyawati Nagar in C-66/CLZ	Executive Engineer (Pr-I) CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi
169.	4023	Third Party Quality Assurance / Audit for Work of "1. Dev. and lowering down of drainage system on both sides of Arya Samaj road and A-Block main road from G.T.K Road to Moti Lal Road in Indira Nagar in C-14/CLZ. 2. Development of Function ground near dispensary in Indira Nagar in C-14/CLZ. 3. Construction of designer entry gates (2 Nos.) at the main entrance of Panchwati Colony in Adarsh Nagar in C-14/CLZ. 4. Improvement of berms of S.S. Rana Marg by providing RMC from Arya Samaj Road crossing to Goushala Road crossing in Adarsh Nagar in C-14/CLZ"	Executive Engineer (Pr-I) CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi

Sl. No	SP No.	Project Title	Sponsor
170.	4024	Third Party Quality Assurance / Audit for Work of "Imp. of drainage system & road by pdg. RMC in Ashok Vihar, Phase-II in C-66/CLZ"- 3 Sites	Executive Engineer (Pr-I) CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi
171.	4025	Third Party Quality Assurance / Audit for Work of "1. Imp. and Dev. of Entry/Exist gates and open area between Auditorium and Lab in RBIPMT Hospital, C-281/CLZ. 2. Construction of Trolly Track from Male Ward 5-9 to Female Ward 7-16, Kitchen Block to Main Road in RBIPMT Hospital, C-281/CLZ. 3. Reconstruction of damaged Boundary Wall relaying of damaged sewer line, Construction of U/G Water storage tank and development of open area in Laundry Block, RBIPMT Hospital, C-281/CLZ"	Executive Engineer (Pr-I) CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi
172.	4031	Third Party Quality Assurance/Audit for Work of "Improvement and Resurfacing of 13.5m ROW roads in Sector-7, Rohini in Rohini Zone"	Executive Engineer (Pr.-I) Rohini, North Delhi Municipal Corporation, Rohini, Delhi
173.	4034	Third Party Quality Assurance/Audit for Work of "Remodeling of drain from Mukund Kumar House to Kiran House on Solanki road in Vishwash Park in C-148/NGZ"	Executive Engineer (Pr.) NGZ, South Delhi Municipal Corporation, Dhansa Stand, Delhi
174.	4036	Third Party Quality Assurance/Audit for Work of "Construction of Pucca School Building in M C Pry. School at EA Block, Tagore Garden in West Zone(Part B: Demolishing of existing old structure)"	Executive Engineer (Pr.II) West, South Delhi Municipal Corporation, Zakhira, Delhi
175.	4038	Third Party Quality Assurance/Audit for Work of "Construction of Pucca School Building in M C Pry. School at B-2, Raghubir Nagar in West Zone.(Part B: Demolishing of existing old structure)"	Executive Engineer (Pr.II) West, South Delhi Municipal Corporation, Zakhira, Delhi
176.	4041	Third Party Quality Assurance/Audit for Work of "Improvement of approach road Ratia Marg to M C Pry. School I-Block Sangam Vihar W.NO. 187/Central Zone"	Executive Engineer (M-III) Central, South Delhi Municipal Corporation, Lajpat Nagar-I, Delhi
177.	4042	Third Party Quality Assurance/Audit for Work of "I/S of roads having ROW 25'(7.62M), 30'(9.14M) 40'(12.20M) & Chowk in EA-Pkt. Of Maya Enclave, F-pkt. Green View Apartment and DA-Block of Hari Nagar in C-110/SDMC". SH: Imp. to the boundary wall of Park Near DA-67 in DA-Block, Hari Nagar at C-110/SDMC	Executive Engineer (M-I) West, South Delhi Municipal Corporation, Rajouri Garden, Delhi
178.	4045	Third Party Quality Assurance/Audit for Work of "Construction of additional toilet in the sheep & Goat and Buffalo live stock Market at Slaughter House Ghazipur"	Executive Engineer (Pr-II) Shah-S, East Delhi Municipal Corporation, Laxmi Nagar, Delhi
179.	4048	Evaluation of Materials and Concrete Mix Design for the Work of CW System and Make Up Water System Civil Work Package for MUNPL	Meja Urja Nigam Private Limited, Meja Thermal Power Plant, Allahabad

Sl. No	SP No.	Project Title	Sponsor
180.	4051	Third Party Quality Assurance/Audit for Work of "Construction of Mundka Ranhola Road by pdg. RMC and berms by pdg. Interlocking tile from Mundka Phirni to Flood drain Ranhola in C-30 Narela Zone"	Executive Engineer (Pr.) Narela, North Delhi Municipal Corporation, Narela, Delhi
181.	4053	Third Party Quality Assurance/Audit for Work of "Construction/Improvement of various Roads of Panchwati Colony in Adarsh Nagar in C-14/CLZ". SH: Const. of S.W. Drainage system and RMC Pavement	Executive Engineer (Pr-I) CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi
182.	4055	Third Party Quality Assurance/Audit for Work of "Construction of Road by Providing RMC Phirni road of village Mundka C-30 Narela Zone"	Executive Engineer (Pr.) Narela, North Delhi Municipal Corporation, Narela, Delhi
183.	4056	Third Party Quality Assurance/Audit for Work of "Laying of Natural Gas Pipe Line in Double Storey New Rajinder Nagar in Ward C-149/KBZ". SH: Rest./ Imp. by pdg. RMC at Double Storey in New Rajinder Nagar C-149/KBZ	Executive Engineer M-1, North Delhi Municipal Corporation, Old Rajender Nager, New Delhi
184.	4057	Third Party Quality Assurance/Audit for Work of "Const./Imp. of Netaji Marg, Shankracharya Marg, Nehru Marg and Sushila Marg from Rajan Babu Road X-ing to Arya Samaj Road X-ing, Aggarsain Marg from Sushila Marg to Nehru Marg, Patel Road from Shiv Mandir to Sr. Secondary School, Moolchand Road from Nanda Road to Lord Krishna Road and Bonglow Marg in Adarsh Nagar in C-14/CLZ". SH: Const. of S.W. drainage system and RMC pavement	Executive Engineer (Pr-I) CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi
185.	4058	Third Party Quality Assurance/Audit for Work of "Construction of out Fall drain both side from Hastsal Nawada Road to Metro Piller No. 706 on Najafgarh Road in Ward No. C-126/WZ"	Executive Engineer (M-IV), West, South Delhi Municipal Corporation, Moti Nagar, New Delhi
186.	4059	Third Party Quality Assurance/Audit for Work of "Construction of 100 Bedded Hospital at Kalkaji Ward No. 196, Central Zone". SH: Providing and fixing false ceiling and SS railing and Fire resistance doors	Executive Engineer (Pr-I), Central, South Delhi Municipal Corporation, Lajpat Nagar-I, New Delhi
187.	4062	Third Party Quality Assurance/Audit for Work of "Providing and laying RMC from LG Showroom to Ambuja Cement Store on Som Bazar Road in C-148/ NGZ"	Executive Engineer (Pr.) NGZ, South Delhi Municipal Corporation, Dhansa Stand, Delhi
188.	4064	Third Party Quality Assurance/Audit for Work of "Construction of Road to M C Pry. School Building at Rajiv Nagar, Begumpur in C-27 Narela Zone"	Executive Engineer (Pr.) Narela, North Delhi Municipal Corporation, Narela, Delhi
189.	4065	Third Party Quality Assurance/Audit for Work of "Imp. of Internal Lanes by pdg. RMC and drainage system in JU-Block, Pitampura (N) in C-54/RZ". SH:1 Const. of SW Drain SH:2 Const. of RMC pavement	Executive Engineer (M-I) RZ, North Delhi Municipal Corporation, Near Keshav Puram, Delhi

Sl. No	SP No.	Project Title	Sponsor
190.	4066	Third Party Quality Assurance / Audit for the work of Development of Unauthorized Colony at Dhansa Road in C-139/NGZ" 6 Sites	Executive Engineer (M-I), NGZ, South Delhi Municipal Corporation, Najafgarh, New Delhi
191.	4068	Third Party Quality Assurance/Audit for Work of "Imp./Dev. of drainage system and side berm from H.NO. 87 to H.NO. 254 by pdg. B/W from in G Block Preet Vihar". SH: Imp Dev. Of drainage system and side berm from H.NO. 25 to DDA Park by pdg. B/W from in E Block Ward No. 228 Preet Vihar Shah-S Zone	Executive Engineer (M-II), Shah-S, East Delhi Municipal Corporation, Geeta Colony, Delhi
192.	4070	Third Party Quality Assurance/Audit for Work of "Imp. of Phirni Road from Narela Bazar to Ramdev Chowk and Mandir to Singhu Border Road in Mamurpur in Ward C-1 Narela Zone"	Executive Engineer (Pr.) Narela, North Delhi Municipal Corporation, Narela, Delhi
193.	4071	Third Party Quality Assurance/Audit for Work of "Improvement of Phirni Road from Bus Terminal to Chakshu Coaching Centre in Pana Paposiyan in Ward C-1 Narela Zone"	Executive Engineer (Pr.) Narela, North Delhi Municipal Corporation, Narela, Delhi
194.	4072	Third Party Quality Assurance/Audit for Work of "Imp/Stg of Phirni Road of Singhola Village from Tech Chand House to Balmiki Choupal and from Rajkumar House to Jai Singh House in Ward C-1 Narela Zone"	Executive Engineer (Pr.) Narela, North Delhi Municipal Corporation, Narela, Delhi
195.	4073	Third Party Quality Assurance/Audit for Work of "Remodeling and covering of existing drain from R-Block Maternity Centre to Flood drain in Jwalapuri in Ward No. C-41/RZ"	Executive Engineer (M-I) RZ, North Delhi Municipal Corporation, Near Keshav Puram, Delhi
196.	4074	Third Party Quality Assurance/Audit for Work of "Construction of Allopathic and Ayurvedic Dispensary at Harsh Vihar Ward No. 264 Shahdara (North) Zone"	Executive Engineer (Pr-I) Shah-N, East Delhi Municipal Corporation, Shahdara, Delhi
197.	4075	Third Party Quality Assurance/Audit for Work of "Imp./Dev. of road and Drain from Flat No. A-1/217 to A-1/192 and adjoing lanes of A-1 Block Keshav Puram in C-67/CLZ"	Executive Engineer (Pr-I) CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi
198.	4076	Third Party Quality Assurance/Audit for Work of "Imp. and Dev. of drain by pdg. B/W from Najafgarh Road to A-1/54 and A-1/54 to A-30 in Uttam Nagar Ward No. C-121/WZ Kunwar Singh Nagar"	Executive Engineer (M-I) West, South Delhi Municipal Corporation, Moti Nagar, Delhi
199.	4077	Third Party Quality Assurance/Audit for Work of "Pdg. RMC and drain in village Dhansa in C-140/NGZ"	Executive Engineer (M-I) NGZ, South Delhi Municipal Corporation, Najafgarh, Delhi

Sl. No	SP No.	Project Title	Sponsor
200.	4078	Third Party Quality Assurance / Audit for the Work of "Improvement Development of drain and side berm by pdg. CC and brick work in Vikas Puri, Vikas Nagar & Hastal Village in ward No. C-124/WZ"	Executive Engineer (M-IV), West, South Delhi Municipal Corporation, Moti Nagar, Delhi
201.	4079	Third Party Quality Assurance / Audit for the Work of "Re-development plan of Jama Masjid in City Zone". SH: Improvement of Gali Kucha Seth upto Dariba Kalan alongwith link galies of Gali Guliyan and Kucha Seth including improvement of gates	Executive Engineer (Pr) City, North Delhi Municipal Corporation, Asaf Ali Road, New Delhi
202.	4080	Third Party Quality Assurance/Audit for Work of "Improvement of road from Sarvodya Boys School Narela to Parashar Electronics via Gramin Siksha Kendra Pana Paposiyan in Ward no. C-1 Narela Zone"	Executive Engineer (Pr.) Narela, North Delhi Municipal Corporation, Narela, Delhi
203.	4081	Third Party Quality Assurance / Audit for the Work of "Improvement of road surface by providing RMC from Bikaner Sweets to Mother Dairy in Manglapuri"	Executive Engineer (Pr.) NGZ, South Delhi Municipal Corporation, Dhansa Stand, Delhi
204.	4083	Third Party Quality Assurance / Audit for the Work of "C/o lane by pdg. RMC and drainage system from H.NO. W-221 to 249 in PVC market Jwalapuri [--] by pdg. O from in Guru Harkishan Nagar". SH: C/o lane by pdg. RMC and drainage system Jwalapuri & interlocking tiles on road side berm in ward no. C-41/ RZ in Guru Harkishan Nagar – 2 Sites	Executive Engineer (M-I) RZ, North Delhi Municipal Corporation, Near Keshav Puram, Delhi
205.	4084	Third Party Quality Assurance / Audit for the Work of "Imp./Dev. of road H.No. 150 to 139 in Bhera Enclave [--]" by pdg from and road side berm in Guru Harkishan Nagar". SH: Imp. Dev. Of road at Bhera Enclave & Guru Harkishan Nagar ward no. C-41/RZ – 2 Sites	Executive Engineer (M-I) RZ, North Delhi Municipal Corporation, Near Keshav Puram, Delhi
206.	4085	Third Party Quality Assurance / Audit for the Work of "C/o road from H. No.342 to 327 in Bhera Enclave by pdg. Drain and side berm in Guru Harkishan Nagar" at 5 Sites	Executive Engineer (M-I) RZ, North Delhi Municipal Corporation, Near Keshav Puram, Delhi
207.	4086	Designing of 12 Concrete Mixes and 1 Shotcrete Mix for THDCIL, KHEP	THDC India Limited, Koteshwar Hydro Electric Project Tehri Garhwal, Uttarakhand
208.	4087	Assessment of Fire Damage and Repair & Restoration/ Strengthening Measures for Fire Effected Area of SRE Building at Air Force Station, Hindan, Ghaziabad	Executive Engineer, Ghaziabad Central Division, Central Public Works Department, Air Force Station, Hindan, Ghaziabad
209.	4088	Third Party Quality Assurance / Audit for the Work of "Imp./Dev. of road and drain work on Firni road from near Om Auto Service Center to near Babloo electrical and hardware by pdg. RMC and Brick work in ward no. 266 in Karawal Nagar East"	Executive Engineer [M Shah(N)]-II, East Delhi Municipal Corporation, Yamuna Vihar, Delhi

Sl. No	SP No.	Project Title	Sponsor
210.	4089	Third Party Quality Assurance / Audit for the Work of "Updg/Stg of Staff Quarters situated in the Campus of Dr SPM Chest Hospital, Patparganj by pdg. 0 from in W. No. 220/AC-57 Sh(S) in Patparganj"	Executive Engineer (M-IV) Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
211.	4090	Third Party Quality Assurance / Audit for the Work of "Imp. Dev. Of Boundary wall by pdg. B/W and concertina Coil fencing in AGCR Enclave in ward no. 228 Preet Vihar Shah-S Zone"	Executive Engineer (M-II), Shah-S, East Delhi Municipal Corporation, Geeta Colony, Delhi
212.	4091	Third Party Quality Assurance/Audit for Work of "Const. and up-gradation of M & CW Centre, Subzi Mandi, Ghanta Ghar in C-9/CLZ"	Executive Engineer (Pr-I) CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi
213.	4093	Third Party Quality Assurance / Audit for the Work of "Imp. Dev. Of drainage system and imp. Dev. Of lanes in village Madawali in W.No. 218/AC-57 Shah(S) Zone"	Executive Engineer (M-IV) Shah-S, East Delhi Municipal Corporation, Shakarpur, Delhi
214.	4094	Evaluation of Materials and Concrete Mix Design for the Work of BOP Civil Works for NTPC-FGUTPP Stage-IV	NTPC Limited Feroz Gandhi Unchahar Thermal Power Project, Unchahar, Raebareli, U.P
215.	4095	Evaluation of Materials and Concrete Mix Design for the Work of Main Plant Civil Works for NTPC-FGUTPP Stage-IV	NTPC Limited, Feroz Gandhi Unchahar Thermal Power Project Unchahar, Raebareli, U.P
216.	4097	Third Party Quality Assurance / Audit for the Work of "Const. in M C Pry. School at Gujranwala Town in C-72/CLZ" SH: Providing water harvesting arrangement and drinking water arrangement and development of ground	Executive Engineer (Pr.II) CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
217.	4101	Condition assessment using Non Destructive Evaluation Technique including preparation of Material Specifications for repair & rehabilitation of Staff Quarters (12 Blocks) at RBI Staff Quarters, Char Imli, Bhopal	Reserve Bank of India, Department of Estate, Bhopal, Madhya Pradesh
218.	4102	Evaluation of Materials and Concrete Mix Design for the Work of GSB, DLC & PQC for Infrastructure Facilities for Ash Utilisation at IGSTPP, APCPL-Jhajjar	Aravali Power Company Pvt Ltd, Jhajjar, Haryana
219.	4105	Third Party Quality Assurance / Audit for the Work of "Raising and covering of Nallah (Both side) from H.NO. B-3/199 to Dividing road [--] by pdg. RCC item from in ward no. 256 Shah (N) Zone"	Executive Engineer [M Shah(N)]-II, East Delhi Municipal Corporation, Yamuna Vihar, Delhi
220.	4106	Third Party Quality Assurance / Audit for the Work of "Imp./Dev. of Nallah from [Dispensary Chowk to Bhajanpura pump House] by pdg. 0 from in ward no. 256 in Yamuna Vihar"	Executive Engineer [M Shah(N)]-II, East Delhi Municipal Corporation, Yamuna Vihar, Delhi
221.	4108	Third Party Quality Assurance / Audit for the Work of "Providing & laying of RMC from RZ16A/15D to RZ-40 in Sagarpur main, Ward No. 131/NGZ"	Executive Engineer (Pr.) NGZ, South Delhi Municipal Corporation, Dhansa Stand, Delhi

Sl. No	SP No.	Project Title	Sponsor
222.	4109	Third Party Quality Assurance / Audit for the Work of "Providing and laying of RMC from RZ-21/291 to RZ-655/313 and RZ-42D to RZ-11/391 in Geetanjali Park, Sagarpur, Ward No. 131, NGZ"	Executive Engineer (Pr.) NGZ, South Delhi Municipal Corporation, Dhansa Stand, Delhi
223.	4112	Third Party Quality Assurance/Audit for Work of "Imp. Dev. Of Lane No. 1 from H.NO. 24 to H.No. 80 Shastri Park [--] by pdg. RMC in Ghondli" SH Improvement & Development of Lane in Shastri Park [--] in Ward no. 231-3 Sites	Executive Engineer M(I), Shah-S, East Delhi Municipal Corporation, Geeta Colony, Delhi
224.	4114	Third Party Quality Assurance/Audit for Work of "Imp. Dev. Of lane by pdg. CC from near Holi Chowk SLF Gate at Hastsal Uttam Nagar SLF gate at SLF Hastsal C-121/WZ."	Executive Engineer M(IV), West, South Delhi Municipal Corporation, Moti Nagar, Delhi
225.	4115	Third Party Quality Assurance/Audit for Work of "Imp. and Dev. of lane by pdg CC from Nangloi road to DDA Park in Kunwar Singh Nagar in ward C-12/ WZ"	Executive Engineer M(IV), West, South Delhi Municipal Corporation, Moti Nagar, Delhi
226.	4118	Third Party Quality Assurance/Audit for Work of "Construction of M C Pry. School at Dilshad Colony (--) by pdg. from ward no. 240 Shahdara(North)". SH: Raising of ground and providing sports facilities in Dilshad Colony	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Opp. Shyam Lal College, Delhi
227.	4120	Evaluation of Materials and concrete mix design for the work of Cooling Tower Civil works at NTPC -Unchahar Stage-IV (1X500MW)	NTPC Limited, Feroz Gandhi Unchahar Thermal Power Project, Disst. Raebareli, UP
228.	4121	Condition Assessment using Non Destructive Evaluation Technique including preparation of Bill of Quantities (BOQ), Cost Estimate & Third Party Quality Assurance during repair of the Service Building(G+3 floors) in Power Plant-II at NSPCL, Bhilai, Chhattisgarh	NTPC SAIL Power Company Pvt Ltd(NSPCL), Bhilai, Chhattisgarh
229.	4123	Third Party Quality Assurance/Audit for Work of "Pdg and laying of RMC from RZ-1108 to RZ-1310 and RZ-68G to Shiv Mandir in Sagarpur main, ward no. 131/ NGZ"	Executive Engineer (Pr.), NGZ, South Delhi Municipal Corporation, Dhansa Stand, Delhi
230.	4124	Non Destructive Tests of Concrete Structures for RBI's Property at Subhash Bridge, Ahmedabad	Reserve Bank of India, Estate Department, Gandhi Bridge Ahmedabad
231.	4126	Third Party Quality Assurance/Audit for Work of "Environmental Improvement in Urban Slums". SH: Providing CC pavement & drains in deteriorated lanes at Phase-II in JJ Cluster at Rakhi Market under Jakhira Flyover	Executive Engineer C-04, Delhi Urban Shelter Improvement Board, Ranjeet Nagar, New Delhi

Sl. No	SP No.	Project Title	Sponsor
232.	4131	Distress Assessment and Provide Remedial Measures to Arrest the Leakages for Water from the Terrace Slab of TG Unit # 4 & 5 including Preparation of BOQ and Third Party Quality Checking/Audi/Inspection During and after repair work of the Terrace Slab of TG Unit # 4&5	Executive Engineer, Electricity Civil Maintenance Division – (2X500MW) UP Rajya Vidyut Utpadan Nigam Ltd Anpara Thermal Power Project, Sonebhadra - UP
233.	4132	Preparation of BOQ/Specification/Cost Estimate services for repair & Restoration of Staff Quarters (12 Blocks covering 216 nos. Quarters) at RBI Staff Quarters, Char lmli, Bhopal	Reserve Bank of India, Hoshangabad Road, Bhopal, Madhya Pradesh
234.	4136	Third Party Quality Assurance/Audit for Work of "Construction of underground tank and pump room, raising of boundary wall and development of open space in M C Pry. School Building at Chand Mohallla in ward no. 236 in AC-61 Shahdara South Zone"	Executive Engineer (Pr-I) Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
235.	4139	Third Party Quality Assurance/Audit for Work of "GIA to DUSIB". SH: Extensive special and extra ordinary repairs to 39 nos Staff Quarters at Madipur	Executive Engineer C-4, Delhi Urban Shelter Improvement Board, Ranjeet Nagar, Delhi
236.	4140	Third Party Quality Assurance/Audit for Work of Construction of 40 seater double storied toilet block in JJC at F-Block Khyala(AC-27 Rajouri Garden)"	Executive Engineer C-4, Delhi Urban Shelter Improvement Board, Ranjeet Nagar, Delhi
237.	4141	Third Party Quality Assurance/Audit for Work of "Construction of 40 Seater double storied toilet block at land between JJC Shyam Nagar and Sikri Bhatta (AC-27 Rajouri Garden)"	Executive Engineer C-4, Delhi Urban Shelter Improvement Board, Ranjeet Nagar, Delhi
238.	4144	Third Party Quality Assurance/Audit for Work of "Construction in M C Pry. School at Nehru Vihar (Girls) in C-11/CLZ". SH: C/o of Water trough, fire ting, U.G water tank, Amphi-theater, walkway and driveway etc. and development of remaining courtyard, gates stage and ramp etc. in the M C Pry. School Nehru Vihar (Girls) in C-11/CLZ	Executive Engineer (Pr-I) CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi
239.	4145	Third Party Quality Assurance/Audit for Work of "Imp./Dev. of Karawal Nagar road from Mukhiya Market Chowk to Shiv Vihar Tiraha by pdg. RMC from in Shiv Vihar". SH: Imp. Dev. of both side berms on Karawal Nagar road from Mukhiya market chowk to near Hanuman Mandir by pdg. RMC from in ward no. 265 in Shiv Vihar	Executive Engineer (M-II) Shah-N, East Delhi Municipal Corporation, Yamuna Vihar, Delhi
240.	4146	Third Party Quality Assurance/Audit for Work of "Construction in M C Pry. School Bhalaswa Dairy in CLZ". SH: pdg water harvesting development of ground, hard drawn steel wire on window and misc. works in building	Executive Engineer (Pr.-II) CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi

Sl. No	SP No.	Project Title	Sponsor
241.	4148	Ultrasonic Pulse Velocity (UPV) Testing of TG Deck of Unit #2 of Meja Thermal Power Project (2X660MW) as per IS: 13311(Par-I)-1992 to ascertain Homogeneity and Integrity of Concrete	Meja Urja Nigam Pvt Ltd, Meja Thermal Power Plant, Distt. Allahabad, U.P
242.	4151	Third Party Quality Assurance/Audit for Work of "Imp. Dev. of Drainage System from B-93/1 Subhash Mohalla to Shivaji Road and H. No. B-531 North Ghonda to Shri Krishna Property North Ghonda – by pdg. B/W from in Subhash Mohalla in Ward No.257 Shah(N) Zone"	Executive Engineer (Pr-II), Shah-N, East Delhi Municipal Corporation, New Usmanpur, Delhi
243.	4152	Third Party Quality Assurance/Audit for Work of "Imp. Dev. Of lanes by providing RMC and Drainage System in Ravi Nagar Extension from RZ-58 to RZ-74, RZ-27 to RZ-127, Gurudwara to RZ-19 and from RZ-11in C-115/WZ"	Executive Engineer EE III/ WZ, South Delhi Municipal Corporation, Vishal Enclave, New Delhi
244.	4154	Third Party Quality Assurance/Audit for Work of "Construction of Mini Stadium at MC Pry. School Nand Vihar in Ward No. 241 Shahdara (North)	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Opp. Shyam Lal College, Delhi
245.	4155	Third Party Quality Assurance/Audit for Work of "Improvement Development of Lanes of Priyandarshini Vihar by Pdg. O from Reconstruction of Outfall Drain from Kishan Kunj Road upto Disuse Canal in W. No. 222/AC-58 in Laxmi Nagar	Executive Engineer M(IV), East Delhi Municipal Corporation, Shakarpur, Delhi
246.	4156	Third Party Quality Assurance/Audit for Work of "Improvement Development of Main road Lalita Park Below HT Line by Pdg. O from by Remodeling and Covering of Main Drain from Gurudwara upto M B Road in W. No. 221/AC-58 Sh(S) Zone in Kishan Kunj	Executive Engineer M(IV), East Delhi Municipal Corporation, Shakarpur, Delhi
247.	4158	Evaluation of Materials and Conducting 13 Nos Concrete Mix Designs at Site for the Work of Main Plant & Offsite Civil Works Package and IDCT Works Package for NTPC - Darlipali STPP, Odisha	L&T Power, (C/o NTPC Limited), Darlipali Super Thermal Power Project, Sundargarh, Odisha
248.	4159	Third Party Quality Assurance/Audit for Work of "Construction of Senior Citizen Recreation Centre at CTC Site Z-III Block Welcome Seelampur Shahdara (North) SH: Improvement of Boundary Wall and Ground with Concertina Coil Fencing and Water Harvesting	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Opp. Shyam Lal College, Delhi
249.	4160	Preparation of Bill of Quantities (BOQ) & Guidelines for Repair Covering Material Specification & Cost Estimate of Repair Items ('Part-1) Third Party Quality Assurance for Repair & Restoration Works (Part-2) of RCC Member Members of Grade III and Grade IV Staff Quarters of Meghalaya House, New Delhi	Public Works Department (B), Meghalaya House Sub-Division, New Delhi

Sl. No	SP No.	Project Title	Sponsor
250.	4161	Conditional Assessment of RCC Members, Part-2: Preparation of Guidelines for Repair, Covering Material Specification and Cost Estimate of Repair Items, Part-3: Third Party Quality Assurance for Repair & Restoration Work for Sample Survey Block (back Wing) at IASRI, Pusa, New Delhi Scope of work	Indian Agricultural Statistical Research Institute, (ICAR) Library Avenue, New Delhi
251.	4164	Evaluation of Materials and Concrete Mix-Design for the work of Renovation & Retrofitting of ESP Package for Stage-I (5X200 MW) & Stage-II (2X500MW) at NTPC-Singrauli	NTPC Limited, Singrauli Super Thermal Power Station, Sonebhadra, UP
252.	4165	Evaluation of Materials and Concrete Mix Design for the Work of Construction of HIG (Multi-Storeyed) Houses including Internal Development & Electrification in Sector 19B, Dwarka, Phase-II for DDA	Simplex Infrastructure limited, Dwarka, New Delhi
253.	4166	Evaluation of Materials and Concrete Mix-Design for the work of Seepage Water Recirculation Package for APCPL Jharli, Haryana	Aravali Power Company Pvt. Ltd, Jhajjar, Haryana
254.	4167	Evaluation of Materials and Concrete Mix-Design for the work of Renovation & Retrofitting of ESP Package for Stage-I (2X210 MW) at NTPC-Unchahar	NTPC Limited, Feroz Gandhi Unchahar Thermal Power Project, Unchahar, Distt. Raebareli
255.	4168	Third Party Quality Assurance/Audit for Work of (i) "Pay and Use JSC SH: Construction of 40 Seater Conventional JSC at JJC Dora Tambu Camp Mohan Cooperative Badarpur (ii) Pay and Use JSC SH: Construction of 40 Seater Conventional JSC at JJC Dayal Singh Colony, Friends Colony (iii) Pay and Use JSC SH: Construction of 40 Seater Conventional JSC at JJC Gola Kuan Okhla Phase-I (iv) Pay and Use JSC SH: Construction of 40 Seater Conventional JSC at JJC Shanti Camp Mandi	Executive Engineer C-6, Delhi Urban Shelter Improvement Board, Maharani Bagh, New Delhi
256.	4174	Third Party Quality Assurance / Audit for Work of Construction of additional floor for office by pdg. (--) from at Electric substation in SDN Hospital Shahdara (North) in Dilshad Garden	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Opp. Shyam Lal College, Delhi
257.	4176	Third Party Quality Assurance / Audit for Work of Construction of Corridor between Old Ward Block and Personalized Care block in SDN Hospital Shahdara (North)	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Opp. Shyam Lal College, Delhi

Sl. No	SP No.	Project Title	Sponsor
258.	4178	Third Party Quality Assurance/ Audit for work of Construction RCC Culvert at Gokalpur Drain near Pal Dharamshala H. No. A-116, South Gamri, Between Gali No.12 Som Bazar, South Gamri and Gali No. 16, C Block Gamri, Between Gali No. 11-A Block Gamri and Gali No. 20, C Block Kartar Nagar and Near Gali No. 21, Bhajanpura in Ward No. 253, Shah (N) Zone	Executive Engineer (Pr-II), East Delhi Municipal Corporation, New Usmanpur, Delhi
259.	4179	Third Party Quality Assurance/ Audit for work of Remodeling of Drain and Construction of Footpath in Resettlement Colony Nand Nagri in W No. 242 Shah North Zone SH: 1 Construction of Footpath from A-3 Block to Gurudwara to DSIDC Office in nand Nagri by Pdg. 0 from in Ward No. Shah North Zone 2. Improvement Development of drain D-1 Sulabh CTC Indira Par D-1 Block Nand Nagri (--) by Pdg. 0 from in nand Nagri Ward No. 243 Shah North Zone 3. Construction Footpath from Wazirabad Road to Kachipura Village Chow Pulia in nand Nagri by Pdg. 0 from in W. No. 243 Shah North Zone	Executive Engineer (M Shah North)-I, East Delhi Municipal Corporation, Shahdara, Delhi
260.	4180	Third Party Quality Assurance/ Audit for work of Improvement Development of Sani Bazar Road by Pdg. RMC from Hanuman Mandir to N-331 and Jhalkari Marg in Sundar Nagri W. No. 244 Shah North Zone	Executive Engineer (M Shah North)-I, East Delhi Municipal Corporation, Shahdara, Delhi
261.	4183	Third Party Quality Assurance/Audit for Work of (GIA to DUSIB) for existing Infrastructure SH Marble Grit Wash Plaster on the External Facades in Tenements at Basti Narnaul, Ajmeri Gate in AC-21	Executive Engineer, C-7, Delhi Urban Shelter Improvement Board, Rana Pratap Bagh, Delhi
262.	4185	Third Party Quality Assurance/ Audit for work of Road Restoration Charges for Improvement of Sewerage System by Replacement of Old Existing Sewer Line at Kailash Colony in Ward No. 192, Central Zone SH: Restoration of cut by Providing RMC in Kailash Colony in Ward No. 192, Central Zone	Executive Engineer (M-1) Central Zone, South Delhi Municipal Corporation, Defence Colony, New Delhi
263.	4186	Third Party Quality Assurance/ Audit for work of Construction of Boundary Wall of Hospital Complex at karawal by Providing RCC Items in Shiv Vihar, Ward No. 265, Sh N Zone	Executive Engineer (Project), Shahdara-N)-II, East Delhi Municipal Corporation, New Usmanpur, Delhi
264.	4187	Conditional Assessment of RCC Members, Part-2: Preparation of Guidelines for Repair, Covering Material Specification and Cost Estimate of Repair Items, Part-3: Third Party Quality Assurance for Repair & Restoration Work for Sample Survey Block (Back Wing) at IASRI, Pusa, New Delhi	Indian Agricultural Statistical Research Institute (ICAR) Library Avenue, New Delhi

Sl. No	SP No.	Project Title	Sponsor
265.	4188	Third Party Quality Assurance/ Audit for work of (i) Construction of BVK/C, Hall SH: Construction of Community Facility Centre at Prop. No. 2919-21/VII Near GB Road (ii) Environmental Improvement in Urban Slums SH: P/L Storm Water Drainage System & CC Pavement in JJC 64 Khamba Dhobi Ghat No. 26, Takia Kale Khan	Executive Engineer, C-7, Delhi Urban Shelter Improvement Board, Rana Pratap Bagh, Delhi
266.	4192	Evaluation of Materials and Concrete Mix Design for the Work of Balance Work of C4, C5 & C6 of Permanent Township Package for IGSTPP-Jharli, APCPL, Haryana	NTPC Limited, Aravali Power Company Pvt. Ltd, Jhajjar
267.	4193	Concrete Mix Design for the Work of Supply, Installation, Testing & Commissioning of EPC Package for NTPC North Karanpura STPP (3X660MW) (Sub Agency: J K Construction)	NTPC Limited, North Karanpura, Hazaribagh, Jharkhand
268.	4198	Third Party Quality Assurance/Audit for Work of "Construction of wall along Barapulla Nallah towards Nizamuddin West (Opposite H.No A-30 – to G-8 (upto Dustbin) by pdg 0 from in Ward No. 154, Central Zone in Nizamuddin"	Executive Engineer (M-I) Central, South Delhi Municipal Corporation, Defence Colony, Delhi
269.	4200	Third Party Quality Assurance/Audit for Work of "Construction of Gym/Fitness Centre at Community Hall at Ghazipur Village Ward No. 225 AC-59, Shahdara South	Executive Engineer (Pr-I), East Delhi Municipal Corporation, Krishna Nagar, Delhi
270.	4204	Evaluation of Fine Aggregate for Main Plant Package of NTPC Gadarwara STPP, Stage-I	NTPC Limited, Gadarwara Super Thermal Power Station, Gadarwara
271.	4205	Third Party Quality Assurance/Audit for Work of (GIA to DUSIB) for Existing Infrastructure SH: Marble Grit Wash Plaster on the External Facades in Tenements at Sheesh Mahal in AC-21	Executive Engineer, C-7, Delhi Urban Shelter Improvement Board, Pratap, Bagh Delhi
272.	4212	Ultrasonic Pulse Velocity (UPV) Testing of TG Deck Slab of Unit # 2 (660 MW) and its 10 supporting RCC Columns and Tie Beams of Meja Thermal Power Project as per IS: 13311 (Part-1)-1992 to ascertain Homogeneity and Integrity of Concrete	Meja Urja Nigam Pvt. Ltd, Allahabad (UP)
273.	4214	Development of High Performance Concrete (HPC) using Polymers and Fibres	NHPC Limited, Faridabad
274.	4215	Ultrasonic Pulse Velocity (UVP) Testing of TG Deck of Unit-4 of Stage-II as per IS:13311 (Part-I)-1992 to Ascertain Homogeneity and Integrity of Concrete	NTPC Limited, Mouda Super Thermal Power Plant, Nagpur, Maharashtra
275.	4216	Ultrasonic Pulse Velocity (UVP) Testing of TG Deck of Unit-1 for Lara STPP as per IS:13311 (Part-I)-1992 to Ascertain Homogeneity and Integrity of Concrete	NTPC Limited, Lara Super Thermal Power Plant, Raigarh (Chhattisgarh)

Sl. No	SP No.	Project Title	Sponsor
276.	4217	Third Party Quality Assurance/Audit for Work of Improvement Development of Lanes in RZC-Block, Vishnu Garden by Pdg. RMC and Drainage System from RZC-118 to RZC-130, RZC-12 to RZC-123, RZC-123 to RZC-106, RZC-18 to RZC-7 in C-115/WZ	Executive Engineer (Maint.-WZ)-III, South Delhi Municipal Corporation, New Delhi
277.	4219	Third Party Quality Assurance/Audit for Work of Providing and Laying RMC and Drain from Bijwasan Road to Phool Singh House, Phool Singh House to MC Pry. School Deendapur and Rohtash House to Masjid in Village Deenpur in C-134/NGZ	Executive Engineer (M-I) NGZ, South Delhi Municipal Corporation, Najafgarh, Delhi
278.	4220	Third Party Quality Assurance/Audit for Work of Re-Construction and Improvement of Dhobi Ghat in Nehru Nagar in Ward No. 155, Central Zone	Executive Engineer (Pr-I)/ Central Zone, South Delhi Municipal Corporation, Jal Vihar, Delhi
279.	4221	Third Party Quality Assurance/Audit for Work of Improvement and Strengthening of Carriageway, Berms, Footpath and Drainage System of JD Musafir Marg from CV Raman Marg to Ashoka Park Road in New Friends Colony in Ward No. 206, Central Zone	Executive Engineer (Pr-III)/ Central Zone, South Delhi Municipal Corporation, Ambedkar Stadium, Delhi
280.	4224	Third Party Quality Assurance / Audit for Work of (GIA to DUSIB) for Existing Infrastructure SH: Marble Grit Wash Plaster on the External Facades in Tenements at M. S Road in AC_21 (480 Flats) Phase-I & II (Project ID: 000005125)	Executive Engineer/C-7, Delhi Urban Shelter Improvement Board, Delhi
281.	4225	Third Party Quality Assurance / Audit for Work of Construction of Dhalo at 5th Pushta Marginal Bund Road adjoining PWD Office [--] by Pdg. 0 from in Bhajanpura, Ward No. 253, Shahdara (North) Zone	Executive Engineer, (Shahdara-N)-II, East Delhi Municipal Corporation, Delhi
282.	4228	Third Party Quality Assurance / Audit for work of Construction of Pay & Use (JSC) SH: Construction of 20 Seater Conventional JSC at JJC in JJ Cluster Indira Camp. T Market Sriniwaspuri	Executive Engineer, C-6, Delhi Urban Shelter Improvement Board, Delhi
283.	4230	Health monitoring and Assessment using Non Destructive testing technique and preparation of material specifications for repair & rehabilitation of 2 Nos. RCC Structures of Prilling Tower (PT#1) & Prilling Tower (PT#2) at Chambal Fertilizers and Chemicals Ltd, Gadepan, Kota	Chambal Fertilizers and Chemicals Limited, Kota, Rajasthan
284.	4231	Testing and Evaluation of Concrete Making Materials for the work of 2X660MW NTPC-Khargone STPP (L&T Power)	NTPC Limited, Khargone Super Thermal Power Project (2X660 MW), Khandwa (MP
285.	4232	Evaluation of Materials and Concrete Mix Design for the Work of Construction of Elevated Road over Barapullah Nallah Starting from Sarai Kale Khan to Mayur Vihar, New Delhi (L&T Ltd)	Executive Engineer, Flyover Project Division F-121, Public Works Department, Govt. of Delhi., Ramesh Park, Delhi

Sl. No	SP No.	Project Title	Sponsor
286.	4233	Third Party Quality Assurance / Audit for work of C/o RCC Culvert on Gokalpur Drain Near Lal Mandir 4th Pusta Kartar Nagar by Pdg. RCC New Usmanpur Village, in Ward No. 254, AC 66 Shah (N) Zone – 5 Sites	Executive Engineer (Pr-II), East Delhi Municipal Corporation, Delhi
287.	4234	Verification of Quality of Hardened Concrete of the Concrete from Indira Statue to Telgawan at NTPC Vindhyachal	NTPC Limited, Vindhyachal Super Thermal Power Station, Vindhyanagar, Singrauli, MP
288.	4236	Evaluation of Materials and Concrete Mix Design for Work of TG & Chimney Civil works Package for Nabinagar Power Generating Co. Pvt. Ltd, Aurangabad, Bihar	Nabinagar Power Generating Co. Pvt. Ltd, Aurangabad, Bihar
289.	4248	Third Party Quality Assurance / Audit for the work of "C/o Road by pdg. RMC along MCD Pry. School adjoining H. No.. 6B to 26D in Khizrabad Village in W. No. 205, Zakir Nagar, Central Zone"	Executive Engineer M-II, Central Zone, Shiv Mandir, Lajpat Nagar, New Delhi
290.	4252	Condition Assessment of Transient Engine Dynamometer Foundation at Indian Oil Corporation Limited, Faridabad	Indian Oil Corporation Limited, Faridabad
291.	4253	Third Party Quality Assurance / Audit for Work of Construction of Main road to Shiv Nagar from H. No. WZ 296 to H. No. WZ-175 Shiv Nagar by Constructing Both Side RCC Drain and RMC Road in Ward No. C-117/WZ in Janak Puri West	Executive Engineer (M-III)/ WZ, South Delhi Municipal Corporation, New Delhi
292.	4255	Ultrasonic Pulse Velocity Testing (UPV) for TG Deck Unit # 3 NTPC, Kudgi STPP	NTPC Limited, Kudgi Super Thermal Power Project, Kudgi, Bijapur (Karnataka)
293.	4258	Third Party Quality Assurance / Audit for Work of Construction of Construction of Senior Citizen Re-creation Centre Gautampuri (Service Road of Gokalpur Drain DDA land Gautampuri) by Pdg. O from in New Usmanpur, Ward No. 251 Shah (N) Zone SH: Construction of Boundary W all and Development of Ground [---] by Pdg. O from in New Usmanpur	Executive Engineer (Pr-II), East Delhi Municipal Corporation, Delhi
294.	4259	Third Party Quality Assurance / Audit for Work of Upgradation Strengthening of Kitchen, Ward No. OPD Block in Dr SPM Chest Hospital, Patparganj by Pdg. O from in Ward No 220 AC/57 Sh (S) in Patparganj	Executive Engineer (M-IV), SSZ East Delhi Municipal Corporation, New Delhi
295.	4260	Evaluation of Materials and Concrete Mix-Design for the work of Supply, Installation, Testing & Commissioning of EPC Package for NTPC North Karanpura STPP (3X660MW) (Agency: M/s Sunil Hi-Tech Engineers Limited)	NTPC Limited, North Karanpura Super Thermal Power Project, Hazaribagh, Jharkhand
296.	4262	Evaluation of Materials and Concrete Mix-Design using four brands of cement for work of TG & Chimney Civil Works Package for Nabinagar Power Generating Co Pvt Ltd, Aurangabad, Bihar	Nabinagar Power Generating Co. Pvt Ltd, Patna, Bihar

Sl. No	SP No.	Project Title	Sponsor
297.	4265	Ultrasonic Pulse Velocity Testing (UPV) for TG Deck Unit # 3 NTPC, Kudgi STPP	NTPC Limited, Kudgi Super Thermal Power Project, Kudgi, Bijapur (Karnataka)
298.	4269	Carrying Out the Assessment of Integrity of Concrete in the RCC Foundations of Crusher Decks at Marwa Thermal Power Plant, Janjgir, Champa (CG)	Chhattisgarh State Power Generation Company Limited, Janjgir, Champa (C.G.)
299.	4272	Testing and Evaluation of Two Chemical Admixture Samples for the Work of Main Plant & Offsite Civil Works Package of 2X800 MW Darlipali Super Thermal Power Project, NTPC Ltd Odisha	NTPC Limited, Darlipali Thermal Power Project Sundargarh, Orissa
300.	4273	Third Party Quality Assurance / Audit for Work of Construction of Poly Clinic at Karawal Nagar Ward No. 265, Shah (N) Zone SH: Improvement/Development of Surrounding Area and Pdg. Aluminum Grill in Windows	Executive Engineer (Pr-II), East Delhi Municipal Corporation, New Usmanpur, Delhi
301.	4275	Evaluation of Materials and Concrete Mix Designs for work of Construction of Concrete Road from Ash Mound Area to Solar Plant for National Capital Power Station Dadri, NTPC Ltd	NTPC Limited, National Capital Power Station, Dadri Gautam Budh Nagar, Noida
302.	4278	Third Party Quality Assurance / Audit for Work of P/L of RMC from in RZ block by Providing RMC in Sagarpur Ward No. 131/NGZ (Total Lanes 910.00m, Avg. Width of Lanes 5.21m and Thickness of RMC 0.15M)	Executive Engineer (Project) NGZ, South Delhi Municipal Corporation, Najafgarh, New Delhi
303.	4279	Third Party Quality Assurance / Audit for Work of P/L of RMC in RZ block and Lanes in Between Main Road to Service Lane in East Sagarpur in Ward No. 131/ NGZ (Total Lanes 965.00m, Avg. Width of lanes 5.66 and Thickness of RMC 0.15M)	Executive Engineer (Project) NGZ, South Delhi Municipal Corporation, Najafgarh, New Delhi
304.	4280	Third Party Quality Assurance / Audit for Work of Imp/Stg. Of Road by Providing RMC and Const. of Drain from Road No. 3 Ram Chander House in Village Begumpur in C-27 in Narela Zone (ii Pdg./Lanes from Village Begumpur Barwala Road to 20 Programme Colony in Village Begumpur in C-27 Narela Zone	Executive Engineer (Project) Narela, North Delhi Municipal Corporation, Narela New Delhi
305.	4282	Third Party Quality Assurance / Audit for Work of Improvement and Strengthening of Roads in Chirag Enclave, Hemkunt Colony, Pamposh Enclave & Greater Kailash Enclave in Ward No. 192 Central Zone SH: Improvement of Road Berms by RMC Pavement & Improvement of Drainage System	Executive Engineer (Pr-1)/ Central Zone, South Delhi Municipal Corporation, Lajpat Nagar, New Delhi
306.	4293	Verification of Quality of Hardened Concrete of 2nd and 3rd Panels of Span P1-P2 of Rail cum Road Bridge over Ganga River in Munger, Bihar using Non Destructive Evaluation Technique	Gammon India Limited, Munger

Sl. No	SP No.	Project Title	Sponsor
307.	4296	'Civil Design Audit of Existing Cement Mill Building for Additional Loading of New Bag Filter	Malabar Cements Limited, Walayar-Plant Distt. Palakkad, Kerala
308.	4298	Concrete Mix Design for the Work of Kundalia Major Multi Purpose Project, Rajgarh	Water Resource Division, Narsinghgarh, Distt, Rajgarh, MP
309.	4301	Concrete Mix Design (10 no's) for the work of C/o Elevated road over Barapullah Nallah starting from Sarai Kale Khan to Mayur Vihar, New Delhi	Public Works Department, Flyover Project Division F-121, Ramesh Park, Delhi
310.	4311	UPV Testing of TG Deck Slab and Supporting columns of TG Foundation Unit # 1 (800MW) of Gadarwara Super Thermal Power Project at Narsinghpur (MP)	NTPC Limited, Gadarwara Super Thermal Power Project Gadarwara, MP
311.	4314	UPV Testing of TG Deck Slab and Supporting columns of TG Foundation Unit # 2 (250MW) of Bongaigaon Thermal Power Project at Bongaigaon, Assam	NTPC Limited, Bongaigaon Thermal Power Project, Assam
312.	4317	Verification of Quality of Hardened Concrete of the 6m wide Concrete Road from Dhoti to Shahpur (approx. 3.5 km in Length) Executed by M/s Kamal Builders at NTPC Vindhyachal	NTPC Limited, Vindhyachal Super Thermal Power Project, Vindhyanagar, Singrauli (MP)
313.	4319	Innovative Measures for Stabilizing the Overburden Causing Rock fall near Nathpra Dam and Bhaba Tail Race Diversion Tunnel Pump House – (PCD-2167)	SJVN Limited, Nathpa Jhakri Hydro Power Station, Nathpa, Kinnaur (HP)
314.	4323	Condition Assessment Study using Non Destructive Evaluation Technique including Preparation of BOQ/ Specification/Cost Estimate for Repair & Restoration Work of RCC Cantilever Slab/Main Terrace Slab at Gujarat Bhavan, New Delhi	Executive Engineer, Ahmedabad City (R&B) Division, Ahmedabad, Gujarat
315.	4327	Third Party Quality Assurance/Audit for work of "Imp. Dev. of Road/drain by pdg. RMC from WZ-507 to RZ-20 E/1 (Syndicate Market Road) in Raj Nagar-I, Palam in C-145/NGZ"	Executive Engineer (M-III), NGZ, South Delhi Municipal Corporation, Dwarka, New Delhi
316.	4332	Evaluation of Materials and Concrete Mix Design for the Balance Work of Township Package for NTPC-Gadarwara STPP (Stage-I)	NTPC Limited, Gadarwara Super Thermal Power Project, Narsinghpur, (MP)
317.	4342	Third Party Quality Assurance / Audit for Work of Imp. Dev of Road by pdg. RMC from WZ-113A (DDA Flyover) to WZ-238B (Gali No. 6) in Sadh Nagar, Palam In C-145/NGZ	Executive Engineer (M-III)/ NGZ, South Delhi Municipal Corporation, Opp. Kargil Appt Sec-12, Dwarka, New Delhi
318.	4348	Third Party Quality Assurance / Audit for Work of Improvement and Strengthening of 13.5 ROW roads in Sector 3 & 4, Rohini in Ward No. 45 in RZ	Executive Engineer (Proj)-II, Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
319.	4354	Evaluation of Concreting Materials & Concrete Mix Proportions (03 nos) for various civil works of NTPC Limited, Simhadri Super Thermal Power Project, AP	NTPC Limited, Simhadri Super Thermal Power Project, Simhadri, AP

Sl. No	SP No.	Project Title	Sponsor
320.	4361	Distress Assessment and Recommendations on Repair and Rehabilitation of MLPU Building at OICL, Ambala	Indian Oil Corporation Limited, Pipelines Division, NRPL, Ambala Cantt., Haryana
321.	4362	Ultrasonic Pulse Velocity of TG Deck Slab and supporting RCC Columns/Beams of Unit # 1, Stage – IV of NTPC-FGUTPP as per IS: 13311 (Part-I) - 1992	Power Mech Projects Limited, C/o NTPC Ltd, Feroze Gandhi Unchahar Thermal Power Project, Raebareli, UP
322.	4363	Ultrasonic Pulse Velocity of TG Deck Slab and supporting RCC Columns of Unit # 1 (3x660 MW) at NPGCL-Shivanpur as per IS: 13311 (Part-I) - 1992	Gannon Dunkerlay & Co Ltd, C/o Nabinagar Power Generation Co Ltd, Aurangabad, Bihar
323.	4366	Part-I : Distress Assessment and Providing Remedial Measures to Arrest the Leakage of Water from TG Roof Slab including Bill of Quantity and Specification of the Materials/Products for repair; Part-II : Third Party Quality Inspection during and after Repair Work of the TG Roof Slab at NTPC-Talcher TPS	NTPC Limited, Talcher Thermal Power Station, Angul, Orissa
324.	4379	Testing and Evaluation of Coarse Aggregate for 2x660 MW Khargone STPP	NTPC Limited, Khargone Super Thermal Power Project, Khargone, MP
325.	4382	Evaluation of Coarse and Fine Aggregate Samples for NHPC-Dibang Multipurpose Project	NHPC Limited, Dibang Multipurpose Project, Arunachal Pradesh
326.	4384	Assessment of Quality and Integrity of Segment 3 of Raft Foundation for 275 m RCC Chimney at NTPC-North Karanpura using Ultrasonic Pulse Velocity Testing	Bygging India Limited, New Delhi
CENTRE FOR QUALITY MANAGEMENT, STANDARD AND CALIBRATION SERVICES (CQC)			
327.	4210	Assistance in NABL accreditation	TSPL, Mansa, Punjab
328.	4351	Four-Day training workshop on laboratory management system and internal audit as per ISO/IEC 17025: 2005	TSPL, Mansa, Punjab

Appendix - IV

Research and Development Programme 2016-17

Sl. No.	Project No.	Project Title	Date of Commencement	Target Date of Completion
		I PLAN FUNDED PROJECTS		
1.	CCE-09	Modernization & upgradation of training facilities for cement, concrete and construction industries at NCB units	April 2012	March 2017
2.	ITS-04	Information technology for improving communication	April 2012	March 2017
3.	CQC-03	Modernization and upgradation of laboratories and infrastructural facilities at NCB units	April 2013	March 2017
4.	FBR-12	Investigations on fly ash based geopolymeric cements	April 2013	March 2017
5.	FBR-13	Investigations on nanoparticle blended cements and cement based nano-composites	April 2013	March 2017
6.	COB-04	Development of composite cements based on OPC	April 2013	March 2017
7.	SOD-07	Development of methods for service life design for concrete structure	April 2013	March 2017
8.	SOD-08	Development of design parameters for high strength concrete	April 2013	March 2017
		II CESS FUNDED PROJECTS		
9.	COB-05	Investigations on technical suitability of performance improvers in PPC and PSC	April 2015	March 2017
10.	COB-06	Investigations on high volume fly ash blended cements	April 2015	March 2018
11.	CON-09	Performance evaluation of M40, M60 & M80 grade fibre reinforced concrete for performance improvement of concrete structures	April 2014	March 2017

Sl. No.	Project No.	Project Title	Date of Commencement	Target Date of Completion
12.	CON-11	Development of alternatives to natural sand for use in concrete masonry / plaster	April 2014	March 2017
		III OTHER PROJECTS		
13.	COB-07	Investigations on Portland Limestone Cements and their performance characteristics	April 2016	March 2018
14.	COB-08	Performance evaluation of cement samples by mechanical mixing and keeping fixed w/c ratio for compressive strength determination vis a vis as per Indian standard test procedures	April 2016	March 2018
15.	FBR-14	Development of chemical formulations for enhancing and achieving desired properties of cements	April 2016	March 2018
16.	ENV-17	Best practices for reduction of NO_X and SO_2 emissions for Indian cement industry	April 2016	March 2019
17.	ENV-18	Water footprint assessment study for cement plants	April 2016	March 2018
18.	CON-12	Development of guidelines for design of high performance concrete mixes for specified long service lives using latest available ultrafines and admixtures	April 2016	March 2018
19.	SOD-09	Studies on the effectiveness of different repair systems for repair, restoration and strengthening of corrosion damaged structures	April 2016	March 2019
20.	CTM-01	Development of cost-effective concrete road technology for rural roads	April 2016	March 2019

Appendix - V

NCB Patents in Force as on 31st March 2016

Sl. No.	Patent No.	Title	Name of Inventors
1.	269/Del/ 2004	A ceramic body mix utilizing Spent Catalyst Waste and a Process for preparing the same	Shri S Raina Dr K Mohan Dr K M Sharma Dr M M Ali Shri S K Chaturvedi Dr D Yadav Shri S K Agarwal

PATENTS FILED :

Sl.No.	Application No.	Title	Name of Inventors
2.	2204/Del/2004	Decorative tiles utilizing marble dust and a process for preparation thereof	Shri S Raina Dr K Mohan Dr K M Sharma Dr M M Ali Shri S K Chaturvedi Shri S K Agarwal
3.	2203/Del/2004	Cement and flyash based aesthetic building bricks tiles utilizing marble dust and a process for preparation thereof	Shri S Raina Dr K Mohan Dr K M Sharma Dr M M Ali Shri S K Chaturvedi Shri S K Agarwal
4.	2675/DEL/2008	A sintered aggregate and a process for manufacture thereof	Shri M Vasudeva Dr M M Ali Shri S K Chaturvedi Shri P S Sharma Dr D Yadav
5.	2235/Del/2012	A process for preparation of synthetic slag from low grade limestone and dolomite	Shri A Pahuja Dr M M Ali Shri P S Sharma Shri S K Chaturvedi Shri S K Aggrawal Dr V P Chatterjee Dr D Yadav Shri TashiTshering Shri Udai Kaflay

S.No.	Application No.	Title	Name of Inventors
6.	2598/DEL/2014	Marble dust as mineral additive in the manufacture of Ordinary Portland Cement	Shri A Pahuja Dr M M Ali Shri P S Harma Shri S K Aggrawal Shri Ashish Goyal
7.	2599/DEL/2014	Mineralizing effect of "barium sludge- an industrial byproduct" in the manufacture of Ordinary Portland Cement	Shri A Pahuja Dr M M Ali Dr V P Chatterjee Shri S K Chaturvedi Shri S K Aggrawal
8.	634/DEL/2015	Rationalizing formulations and curing conditions for improving properties of hardened Geopolymeric Cement	Shri Ashwani Pahuja Dr M M Ali Dr R S Gupta Dr S Vanguri Dr V Liju
9.	1195/DEL/2015	Investigations on the use of limestone mine reject on the properties of OPC clinker and resultant cement	Shri Ashwani Pahuja Dr M M Ali Dr V P Chatterjee Shri S K Chaturvedi Shri S K Agarwal
10.	1194/DEL/2015	Process for the preparation of sulphoaluminate - belite cement utilizing high magnesia / dolomitic limestone	Shri Ashwani Pahuja Dr M M Ali Shri P S Sharma Dr V P Chatterjee
11.	1196/DEL/2015	Nanosilica blended ordinary Portland cement compositions with improved performance characteristics and a process thereof	Shri Ashwani Pahuja Dr M M Ali Dr S Harsh Shri Suresh Vanguri Dr Varsha Liju
12.	1964/DEL/2015	Method for rapid estimation of Na_2O and K_2O in different types of cement and raw materials	Shri Ashwani Pahuja Dr M M Ali Shri S K Chaturvedi Shri S C Sharma

Finance and Accounts

Finance

CONTRIBUTIONS

Ministry of Commerce & Industry Grant

During the year 2015-16, Plan Grant of ₹ 800 lakhs, Non-Plan Grant from Cement Cess of ₹ 1455 lakhs were received.

FOREIGN EXCHANGE

During the year 2015-16, the Council earned Foreign Exchange amounting to US$ 134,491 & Euro 2540 towards Training Fee, Testing Charges, Sponsored R & D Contribution, Seminar Delegate Fee, Technical Exhibition etc.

AUDITORS

M/s K S Aiyar & Co., Chartered Accountants, Mumbai were the Auditors of the Council for the year 2015-16.

Accounts

The Accounts for the year 2015-16 duly audited by the Auditors of the Council are given at Annexure (Balance Sheet as at 31st March 2016 and Income & Expenditure Account for the year ended 31st March 2016).

K. S. AIYAR & CO.
CHARTERED ACCOUNTANTS

F-7, Laxmi Mills,
Shakti Mill Lane (Off Dr E Moses Rd)
Mahalaxmi Mumbai 400 011 India
Tel. : 91 22 2493 2502/66551770
Fax : 91 22 66551774
Grams : VERIFY
www.KSAiyar.com
Mail@KSAiyar.com

INDEPENDENT AUDITIOR'S REPORT

To the members of National Council for Cement and Building Materials

Report on the Financial Statements

We have audited the accompanying financial statements of National Council for Cement and Building Materials, which comprise the Balance Sheet as at March 31, 2016 and the Income and Expenditure account for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements

The Council's Management is responsible for the preparation of these financial statements that give a true and fair view of the financial position and financial performance in accordance with the Accounting Principles generally accepted in India. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those Standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from materials misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal controls relevant to the Council's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of the accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our qualified audit opinion.

Basis for Qualified Opinion

a) No provision is made the accounts of Rs 70.65 Lakhs for R & D Contribution Outstanding.

b) Reference is invited to Note No.2 and 3 of Schedule N with regard to fixed asset reconciliation and obsolete/discarded fixed assets.

c) Reference is invited to Note No. 8 of Schedule N with regard to recognition under section 35 (1)(ii), application rejected by the authorities.

Qualified Opinion

In our opinion and to the best of our information and according to the explanations given to us, except for the effects of the matters described in the Basis for Qualified Opinion paragraph, the financial statements give a true and fair view in conformity with the accounting principles generally accepted in India:

a) In the case of the Balance Sheet, of the state of affairs of the Society as at March 31, 2016; and

b) In the case of the Income and Expenditure, the excess of Income over Expenditure of the Society for the year ended on that date.

For K.S. Aiyar & Co.
Chartered Accountants

RAGHUVIR M. AIYAR
Partner
M.No. 038128

Place: Mumbai

Date: 21th Sept, 2016

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
BALANCE SHEET AS AT MARCH 31, 2016

	Schedules		As at March 31, 2016 (Amount in Rs.)		As at March 31, 2015 (Amount in Rs.)
SOURCES OF FUNDS					
Capital Fund	**A**	68,076,146		68,076,146	
Reserves and Surplus	**B**	381,553,901		267,669,405	
Building Fund		4,500,000		4,500,000	
Gratuity Fund		172,050,839		157,125,420	
Provision For Leave Encashment		139,013,037		107,041,599	
Capital Grant from Govt of India	**C**	477,147,079		434,671,355	
Current Liabilities & Provisions	**D**	141,738,794	**1,384,079,796**	139,548,634	**1,178,632,559**
Total			**1,384,079,796**		**1,178,632,559**
APPLICATION OF FUNDS					
Fixed Assets					
Gross Block	**E**	876,564,392		842,748,238	
Less : Depreciation		498,081,018	**378,483,374**	471,120,593	371,627,645
Net Block					
Gratuity Fund Investment					
(Fixed Deposit / Savings Bank / Interest Accrued)		153,539,495			**133,853,257**
Leave Fund account		135,668,901			**123,855,849**
Current Assets Loans & Advances					
R&D Contribution Outstanding		6,959,805		7,564,781	
Sundry Debtors	**F**	3,690,573		11,049,367	
Loans and Advances (unsecured and considered good)		95,740,005		101,098,941	
Cash and Bank Balances	**G**	559,349,811	**954,948,590**	389,242,588	**508,955,677**
FDR In lien			**29,973,768**		**13,416,921**
Interest Accrued on Bank Deposits			**20,674,064**		**26,923,211**
Total			**1,384,079,796**		**1,178,632,559**
Significant Accounting Policies	**M**				
Notes on Accounts	**N**				

The Schedules referred to above form an integral part of the Balance Sheet.

This is the Balance Sheet referred to in our report of even date.

For and on behalf of
K.S. Aiyar & Co.
Chartered Accountants

Raghuvir M. Aiyar
Partner
M.No. 38128
Mumbai
Date: 21st Sept, 2016

Sd/-
S K Chaturvedi
Joint Director (Finance & Accounts)

Sd/-
Ashwani Pahuja
Director General-NCB

Sd/-
Dr S Chouksey
Chairman
Board of Governors NCB

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED MARCH 31, 2016

	Schedules		For the Year Ended March 31, 2016 (Amount in Rs.)		For the Year Ended March 31, 2015 (Amount in Rs.)
INCOME					
Research & Development Contribution	**H**		**158,617,590**		157,116,453
Other Income	**I**		**186,857,405**		122,179,000
Grant-in-Aid (Revenue) from Ministry of Commerce & Industry	**J**		**165,500,000**		148,700,000
			510,974,995		**427,995,453**
EXPENDITURE					
Employee's Cost	**K**		**317,288,040**		275,921,805
Travelling & Conveyance (Including Overseas Travelling)			**8,651,204**		5,988,449
Laboratory Stores, Raw Materials			**10,425,740**		6,972,880
Symposia & Seminars			**12,106,288**		269,205
Training Programmes			**3,138,356**		2,454,769
Repairs and Maintenance			**5,483,177**		5,273,270
Other Expenses	**L**		**30,561,546**		27,718,571
Depreciation		26,960,425		32,379,663	
Add. Provision of Depreciation of previous Year					
Less : Transfer from Capital Grant from Govt of India		17,524,276	**9,436,149**	22,018,140	10,361,523
			397,090,500		**334,960,471**
Surplus for the year transferred to Reserve Fund			**113,884,495**		**93,034,981**
Significant Accounting Policies					
Notes on Accounts					

The Schedules referred to above form an integral part of the Income and Expenditure Account.

This is the Income and Expenditure Account referred to in our report of even date.

For and on behalf of
K.S.Aiyar & Co.
Chartered Accountants

Raghuvir M. Aiyar
Partner
M.No. 38128
Mumbai
Date: 21st Sept, 2016

Sd/-
S K Chaturvedi
Joint Director (Finance & Accounts)

Sd/-
Ashwani Pahuja
Director General-NCB

Sd/-
Dr S Chouksey
Chairman
Board of Governors NCB

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2016

Particulars	As at March 31, 2016 (Amount in Rs.)	As at March 31, 2015 (Amount in Rs.)
SCHEDULE - A		
Capital Fund		
As per the last Balance Sheet	**68,076,146**	68,076,146
Includes UNIDO Equipment valued at Rs 20,187,535 (Previous Year Rs 20,187,535) (Refer Note 3 (b) of Schedule M)		
	68,076,146	**68,076,146**
SCHEDULE - B		
Reserves and Surplus		
As per the last Balance Sheet	**267,669,406**	174,634,424
Add: Surplus for the year	**113,884,495**	93,034,981
	381,553,901	**267,669,405**

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2016

Particulars	As at March 31, 2016 (Amount in Rs.)	As at March 31, 2015 (Amount in Rs.)
SCHEDULE - C		
Capital Grant from Govt of India		
As per the last Balance Sheet	**434,671,355**	389,789,495
Add : Plan Grant received during the year	**60,000,000**	66,900,000
	494,671,355	456,689,495
Less : Grant transferred to Income & Expenditure Account to the extent depreciation charged during the year on assets purchased out of capital grant	**17,524,276**	22,018,140
	477,147,079	**434,671,355**
SCHEDULE - D		
Current Liabilities and Provisions		
Retention & Security Money	**17,801,347**	13,726,761
Other Liabilities	**123,937,447**	125,821,873
	141,738,794	**139,548,634**

SCHEDULE - E

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
DEPRECIATION AS AT 31 MARCH 2016

(Amount in Rs)

Particulars	GROSSBLOCK							DEPRECIATION										NET BLOCK	
	Cost upto March 31, 2001	Cost from April 1, 2001 to March 31, 2015	Total cost as at March 31, 2015	Addition During the Year 2015-2016	Disposal/ Adjustment out of cost before 2001 2015-2016	Disposal/ Adjustment out of cost after 2001 2015-2016	Total cost as at March 31, 2016	On Old Assets Upto March 31, 2001	On Assets from April 1, 2001 to March 31, 2015	Op.Bal Depreciation as at April 1, 2015	Rate %	On Assets Prior to 1 Apr l 01 during the year 2014 - 2015	Rate %	On Additions after 1 Apr l 01 2014 - 2015 (Amt.)	Depreciation/ Adjustment on cost before 2001 2014 - 2015	Dep. / Adj. on cost after 2001 2014 - 2015	Total Depreciation as at March 31, 2016	WDV As at March 31, 2016	WDV As at March 31, 2015
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
LAND (FREE HOLD)	3,924,748	-	3,924,748				3,924,748	-	-	-		-		-			-	3,924,748	3,924,748
LAND (LEASE HOLD)	239,104	(239,104)	0				0	-	-	-		-		-			-	0	0
VEHICLES	833,717	5,365,103	6,198,820				6,198,820	729,707	3,526,365	4,256,073	20.0	20,802	20.0	367,748			4,644,622	1,554,198	1,942,746
COMPUTER INCLUDING ACCESSORIES		44,441,863	44,441,863	153,154			44,595,017	-	42,042,326	42,042,326		-	60.0	1,531,615			43,573,941	1,021,076	2,399,537
FURNITURE AND OFFICE EQUIPMENTS	10,263,037	22,520,099	32,783,136	2,234,498			35,017,634	9,278,627	10,788,117	20,066,744	10.0	98,441	10.0	1,396,648			21,561,833	13,455,801	12,716,392
LABORATORY EQUIPMENT	79,479,641	344,693,815	424,173,456	8,237,091		701,438	431,709,109	71,689,296	279,787,646	351,476,942	10.0	779,035	25.0	18,110,455			370,366,432	61,342,677	72,696,514
MOBILE QUALITY CONTROL LABORATORY	-	5,268,489	5,268,489				5,268,489	-	5,064,834	5,064,834		-	20.0	40,731			5,105,565	162,924	203,655
CENTRE FOR CONTINUING EDUCATION																			
BUILDINGS	1,922,707	50,110,818	52,033,525			7,990,991	44,042,534	1,085,328	4,831,644	5,916,971	2.5	20,934	2.5	932,205			6,870,110	37,172,424	46,116,554
OTHER SERVICES	535,144	66,120	601,264	24,760,191			25,361,455	518,560	6,368	524,928	10.0	1,658	2.5	620,499			1,147,085	24,214,370	76,336
LABORATORY PROJECTS																			
BUILDINGS	27,973,919	77,838,284	105,812,203	7,123,650	-		112,935,853	15,903,723	7,499,315	23,403,038	2.5	301,755	2.5	1,936,565			25,641,359	87,294,494	82,409,165
CAPITAL WORK IN PROGRESS		142,148,598	142,148,598				142,148,598										-	142,148,598	142,148,598
BULDG (PG) UNDER CONST.																			
OTHER SERVICES	10,046,554	5,849,746	15,896,300				15,896,300	9,720,114	3,177,466	12,897,580	10.0	32,644	25.0	668,070			13,598,294	2,298,006	2,998,720
STAFF HOUSING	8,386,427	-	8,386,427				8,386,427	4,748,758	-	4,748,758	2.5	90,942	2.5	-			4,839,700	3,546,727	3,637,669
PILOT PLANT FACILITIES																			
BUILDINGS	778,010	-	778,010				778,010	431,048	-	431,048	2.5	8,674		-			439,722	338,288	346,962
EQUIPMENT	301,399	-	301,399				301,399	291,352	-	291,352	10.0	1,005		-			292,357	9,042	10,047
Total	144,684,407	698,063,831	842,748,238	42,508,584	-	8,692,429	876,564,393	114,396,513	356,724,081	471,120,593		1,355,890		25,604,535	-	-		378,483,375	371,627,644

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2016

Particulars	As at March 31, 2016 (Amount in Rs.)	As at March 31, 2015 (Amount in Rs.)
SCHEDULE - F		
Sundry Debtors (Unsecured and Considered Good)		
More than three years		-
Others	**3,690,573**	11,049,367
	3,690,573	**11,049,367**
SCHEDULE - G		
Cash and Bank Balances		
In Fixed Deposits	**492,773,469**	303,241,539
In Saving Accounts	**66,424,264**	85,791,751
Cash in hand including postage imprest	**150,941**	208,161
UNESCO Coupons (US Dollar 132.10)	**1,137**	1,137
	559,349,811	**389,242,588**

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS FOR THE YEAR ENDED MARCH 31, 2016

Particulars	As at March 31, 2016 (Amount in Rs.)	As at March 31, 2015 (Amount in Rs.)
SCHEDULE - H		
Research and Development		
Sponsored Research and Development Contribution	**158,617,590**	157,116,453
	158,617,590	**157,116,453**
SCHEDULE - I		
Other Income		
Interest	**65,180,423**	47,337,622
Sale of Publications	**13,270**	2,812
Standardisation, Calibration, Testing and Technical Services	**61,574,671**	54,887,975
Symposia & Seminars	**36,750,175**	-
Training Programmes	**17,910,043**	15,480,569
Miscellaneous Receipts	**243,007**	92,865
Licence Fee (Housing Colony)	**757,585**	654,941
National Awards for Energy Efficiency	**454,000**	-
Foreign Exchange Fluctuation	**51,731**	39,216
Advertisements	**58,500**	
TIS Fees	**-**	10,000
Proficiency Improvement Programme in Coal Test	**-**	269,000
Proficiency Improvement Prog In Limestone Test	**3,864,000**	3,404,000
	186,857,405	**122,179,000**
SCHEDULE - J		
Grant from Ministry of Commerce & Industry		
Towards Plan Grant	**80,000,000**	85,600,000
Less : Towards Capital Expenditure	**60,000,000**	66,900,000
	20,000,000	18,700,000
Towards Non-Plan Grant from Cement Cess	**145,500,000**	130,000,000
Grants from Ministry of Enviroment		
	165,500,000	**148,700,000**

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS FOR THE YEAR ENDED MARCH 31, 2016

Particulars	As at March 31, 2016 (Amount in Rs.)	As at March 31, 2015 (Amount in Rs.)
SCHEDULE - K		
Employee's Cost		
Establishment Charges	**264,754,543**	219,884,344
Contribution to Provident Fund & other Fund	**17,970,303**	16,018,218
Gratuity (Refer Note 4 of Schedule - M)	**32,299,518**	38,317,358
Social Security & Welfare	**2,263,676**	1,701,885
	317,288,040	**275,921,805**
SCHEDULE - L		
Other Expenses		
Rent, Rates and Taxes	**2,709,254**	2,886,667
Electricity and Water Charges	**11,000,136**	9,921,225
Postage, Telegrams & Telephones	**1,924,228**	1,759,149
Publications	**228,896**	221,881
Stationery & Miscellaneous Stores	**2,038,472**	2,131,197
Books, Periodicals and Membership Fee	**720,920**	758,709
Exhibition, Publicity and Advertisements	**1,092,209**	712,371
Legal Expenses	**239,640**	369,215
Patents	**207,580**	106,710
Audit Fees - Statutory Auditors	**75,000**	95,752
Bank Charges	**67,939**	29,579
Insurance of Assets	**687,047**	671,344
Sundry Expenses	**7,270,576**	6,072,367
Collaborative Assistance in R&D and Exchange Programmes & Consultants Fee	**2,299,649**	1,982,404
	30,561,546	**27,718,571**

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2016

SCHEDULE – M

SIGNIFICANT ACCOUNTING POLICIES

1. The accounts are prepared on a going concern basis as per the historical cost convention.

2. Recognition of Income:

a) Income from Sponsored Research & Development Contribution is accounted for on the basis of the percentage of work completed during the year.

b) Other Incomes, other than Technical Services Fees, are accounted for on accrual basis.

3. Fixed Assets :

a) Fixed Assets are recorded at cost and for the better presentation of financia1 statements, the Council has decided to change the depreciation rates prospectively i.e., new rate will be applied only to the additions made from the financial year 2001-02 onwards and are depreciated on written down value basis at the following rates:

	Old Rates	New Rates
	% p.a.	% p.a.
* Vehicles	20	20
* Office Furniture and Equipment	10	10
* Laboratory Equipment	10	25
* Laboratory Projects Services	10	25
* Building including Staff Housing	2.5	2.5
* Computers	-	60

Depreciation has been provided on assets for whole year irrespective of the date of addition.

b) Fixed Assets include Laboratory Equipment and Energy Bus received free of cost & custom duty from the United Nations Industrial Development Organisation (UNIDO). The value adopted in the accounts is as per customs CIF assessment upon import or at value advised by UNIDO and the corresponding credit for this amount is included under Capital Fund (Refer schedule A) Rs. 1,95,64,057 for Laboratory Equipment and Rs. 6,23,478 for Energy Bus. The title to these assets has been transferred to Government of India and the further transfer of these fixed assets from the Ministry of Commerce & Industry, Government of India to the Council is pending. However, the Council provides depreciation on these fixed assets in accordance with the rates noted in para 3 (a) above.

4. Liability for Gratuity and Leave Encashment is provided for on the basis of actuarial valuation.

5. Accounting for Government Grants:

a) Government Grants for purchase of specific assets have been accounted for under head 'Capital Grant from the Government of India' and shown in the Balance Sheet.

b) Other Grant of Revenue nature received from the Government have been accounted for as Income for the year under the Income and Expenditure Account.

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2016

SCHEDULE – N

NOTES ON ACCOUNTS

1. Purchases made during the year in respect of laboratory stores, raw materials, miscellaneous consumable stores, publications, tools and accessories are charged to the Income and Expenditure Account and closing stock of these items has not been ascertained or accounted for, as per the decision of the Board of Governors.
2. Fixed Asset Register is being updated with the complete details along with value which is to be reconciled with the Accounts. Physical verification of the Fixed Assets has been carried out in each Centre/Group but reconciliation with the records is pending. In absence of details of obsolete / discarded fixed Assets, provision for the same could not be made in the books of account.

   In pursuance to a decision taken, the council has started charging depreciation on fixed assets "lying under Inspection / installation /commissioning" with effect from 01st April, 2008. Effect on depreciation has not been taken retrospectively from the date of purchases of such assets and depreciation has been charged for the current financial year only, based on the cost of these assets as on 31st March, 2010.
3. The value of Fixed Assets under inspection is Rs 2,63,92,962 which is not installed in the premises till date. These assets are shown under installation in earlier years also.
4. Contingent liabilities not provided for in respect of:

a) Claims not acknowledged as debts by the Council, the liability of which is not ascertainable as pending in various Courts.

b) Claim for interest by the Andhra Pradesh State Government, in 1998, for delay in payment for purchase of Land (amount not intimated).

5. Gratuity Fund Investment has a balance of Rs.15,35,39,495. There is a shortfall of Rs. 1,85,11,344 in the "Gratuity Fund Investment Account" as compared to the "Gratuity Fund Account" as at 31st March 2016.
6. The Council has got an actuarial valuation of the leave encashment for and upto the year ended 31st March 2016 and the liability computed is Rs. 13,90,13,037.
7. An amount of Rs. 6, 31,976 has been deposited with Hon'ble Delhi High Court in connection with a case filed by a former employee. Necessary adjustment will be made after the decision of the Hon'ble Court.
8. Recognition under section 35(1) (ii) of the Income Tax Act, was granted upto the year ended March 31, 2001. The Council had applied for the renewal but the same has been rejected by the Authorities.
9. The encashment of valuation of UNESCO Coupons of US $ 132.10 are subject to ascertainment and confirmation.
10. R&D Contribution Outstanding of Rs. 69,59,805 has been arrived after adjusting R&D Contribution received in advance of Rs 11,82,23,070.
11. Previous year's figures have been regrouped and rearranged wherever necessary so as to conform to this year's classification.

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

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