

ANNUAL REPORT 2014-15



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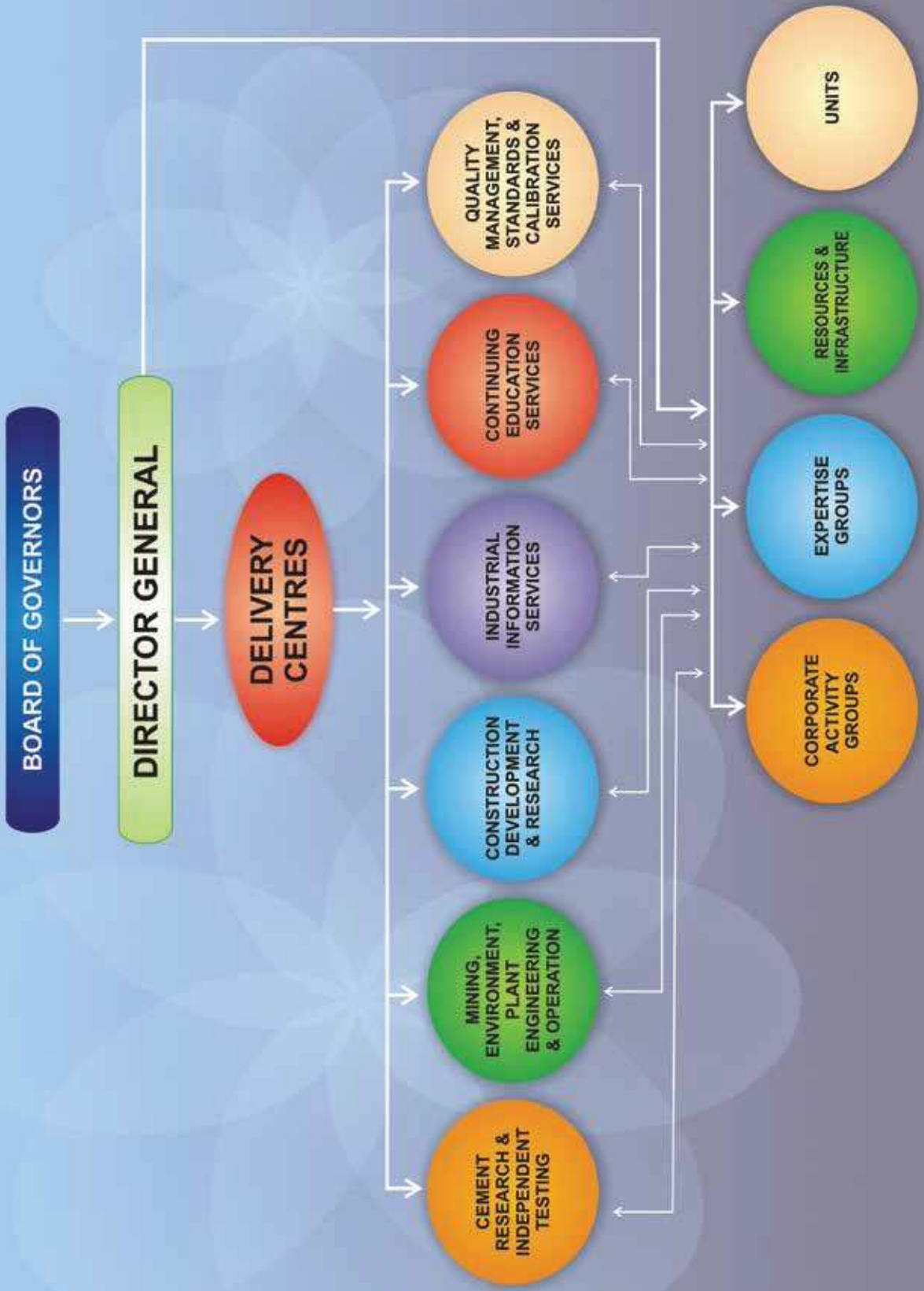
** Since 01 April 2015

Annual Report 2014 - 15

1 APRIL 2014 TO 31 MARCH 2015



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



NCB under its mission based approach has always strived for developing technical know-how through its programmed projects and rendering technical services with efficiency to the cement and construction industries. It is a matter of contentment to be associated with NCB since long. As I have observed, NCB always keeps pace with latest developments in the interest of the industry and nation such as conservation of mineral wealth, conservation of energy, environmental aspects, productivity, quality control and quality assurance, and growth as a whole.

Keeping in view the interest of the industry, NCB has taken up programmed projects on development of composite cements, geopolymeric cements, 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.. NCB has completed 18 programmed projects in the year 2014-15.

NCB renders its services to the cement and building material industries by executing projects on sponsor basis, testing materials in its NABL accredited and BIS recognized laboratories, providing calibration services, training and solving problems wherever required. With its strength, NCB has completed 331 sponsored projects during the year 2014-15.

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 prime areas where NCB has made significant contribution to the benefit of industry.

Projects on utilization of slab quarry reject limestone in cement manufacture, 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 derived fuel etc. have been completed during the year.

NCB has been carrying out pioneering work for the concrete and construction industries. It has its own advanced concrete research laboratory with state-of-the-art equipments. 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. NCB 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.

NCB has been organizing International Seminars on Cement and Building Materials since 1987, and the 14th NCB International Seminar will be held during 01-04 December 2015 in New Delhi for which NCB is putting all its efforts to bring all in cement and construction sectors to a single platform for mutual benefit and benefit to the nation as a whole.

In the area of human resources development, NCB conducted 73 training programmes during the year 2014-15 benefiting 1060 participants from various organizations in India and abroad. In the area of quality management NCB conducted 6 inter laboratory proficiency testing services and continued the supply of reference materials. NABL accredited calibration services were also provided.

Under the leadership of the Director General of NCB Shri Ashwani Pahuja, the scientists and engineers including other technical and non technical staff with their continuous efforts have achieved these significant goals as mentioned in this report, which are worth praising. The achievements and progress made by NCB to a great extent are due to the active support and cooperation from the Government, industry and other organizations. 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, Government of India for providing their support and direction.

O P Puranmalka
Chairman

29 October 2015

INTRODUCTION



I am pleased to present the Annual Report for the Year 2014-15 which contains the activities that have been carried out and the achievements of NCB during the year. With its concerted efforts NCB has maintained its status as the leading research organization and also the preferred technology development partner in the cement and construction sector. NCB's programmed projects covered a wide spectrum from mineral exploration and optimization of mine planning, widening the base of raw materials, improving select engineering practices, addressing environmental concerns, service life design of concrete structures to utilization of construction and demolition wastes.

The research projects in the specific areas such as development of composite cements, geo-polymeric cements, utilization of metal industrial waste in cement manufacture, incorporation of nano-materials in cement for development of better binders, process optimization, utilization of waste as secondary fuel etc. have yielded encouraging results and are worth mentioning. Besides these, NCB has studied the application of petrographical analysis in construction, utilization of slab quarry reject limestone in cement manufacture, effect of mining on salinity intrusion, estimation of WHR potential, modernization of cement packing plant, development of special concretes, creep and shrinkage studies etc which benefited the industry.

In the area of cement research, available interim results show that clinker factor can be substantially brought down in composite cements, slow process of geo polymerization at lower temperatures results in better product formation and certain wastes from metallic industries have good mineralizing effect resulting in lowering of the temperature of clinkerisation and better product formation. Other studies related to utilization of jarosite as part replacement of mineral gypsum in cement manufacture, utilization of clay processing industry by product sand in the manufacture of cement, utilization of granulated slag from copper industry, solving the problem of lump formation in cement bags etc were carried out for different organizations. Ten cement plants availed the services of establishing limestone consumption factor. Number of samples including that of cement, raw materials, coal, fly ash, slag, other industrial waste from different organizations were analyzed in NABL accredited NCB laboratories.

Studies sponsored by industry 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, use of plastic waste in kiln, energy audits of cement plants, TFR for modernization of packing plant and TEFr for setting up of cement plant and grinding units in Kenya.

In the areas of construction development and research, special concretes like plastic concrete, pervious concrete, anti washout underwater

concrete and self compacting concrete have been developed for different customers including hydroelectric projects, irrigation projects and others. Creep and shrinkage studies have been carried out successfully for an organization in Sri Lanka. 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. Assessment was carried out to evaluate the residual service life of the dam structure of Nathpa Jhakri Hydro Power station. Third Party Quality Assurance/Audit (TPQA) programme of the center has assisted various organizations to ensure quality of materials and workmanship to meet their quality commitments in constructed facilities. TPQA was carried out for roads and bridges construction, residential blocks, community facilities and institutional buildings, canal lining work, concrete drain projects, boundary wall construction etc for construction industry.

In quality management area, NCB assessed the quality assurance system of a cement plant and a clinker grinding unit. Under Inter laboratory services, six PT schemes have been completed on materials like: coal, limestone, OPC, aggregate and water used in construction. These schemes were implemented in accordance with ISO 17043:2010. NCB developed 11 new types of certified reference materials for use by the laboratories engaged in testing of cement and building materials. 1521 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 606 clients.

NCB is organizing the 14th NCB International Seminar on Cement and Building Materials during 01-04 December 2015 in New Delhi for which preparations are now in final phase for successful organization of the seminar.

In the area of human resources development, NCB conducted short and long term training programmes on subjects related to cement manufacture, testing and calibration, quality management, concrete technology and construction practices during the year 2014-15 benefiting 1060 participants from various organizations in India and abroad.

I wish to thank my colleagues for their dedicated support, whole hearted cooperation and commitment to uphold the high standards of professionalism. I am grateful the Board of Governors and its Committees, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India and Planning Commission 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.

29 October 2015

Ashwani Pahuja
Director General

NCB'S PROGRAMMES AND THEIR FULFILMENT

The Corporate Programmes

Over the years, NCB has emerged as preferred research & consultancy partner for the cement and construction industry. With its modern laboratories, experienced team of research scientists and engineers and pro-active leadership, NCB has been providing innovative technological solution to overcome the hurdles faced by industry. Services were provided in the area of development of newer products, optimal utilization of resources be it limestone or industrial waste, process optimization, energy studies, plant maintenance, structural assessment and rehabilitation, quality assurance in construction, concrete technology, materials evaluation, application of nanotechnology and total quality management.

Further investigation on development of composite cements containing clinker, flyash and granulated blast furnace slag provided encouraging results. Limestone consumption factor was established for ten cement plants. Studies were conducted on rock petrography and compressive strength. Effect of aggressive environment on cement prepared by partial substitution of gypsum by jarosite was studied for periods upto 24 months. Another industrial waste generated during beneficiation of clay was found suitable to be used in place of natural sand and also as a raw mix component. Titanium industry by-product were found to be good source of iron oxide as cement raw mix component. Studies showed that copper slag could be a good mineralizer in cement manufacture. Comparative studies on refractory engineering practices resulted in developing the guidelines for improving plant productivity. In the fundamental research area studies continued on developing geopolymetric cements with improved properties. National inventory of cement grade limestone deposit has been updated as on March 2015. Studies were undertaken to utilize the huge quantity of dumped limestone in cement manufacture. Computer aided deposit evaluation service was provided to one cement plant. In the environmental management area, services were provided to two cement plants for monitoring of environmental parameters and generation of background environmental data. Study on methodologies for mitigation of dust emission at stone crushers was completed. Studies on effect of mining on salinity intrusion and certain related effects are going on at two mines. In the process optimization and productivity area, studies on estimation of waste heat recovery potential, viability of cement mill venting system, performance evaluation of RABH and utilizing plastic wastes in cement kiln were conducted for a cement plant. The

problem of excessive coating formation was also investigated and suitable remedial measures suggested.

In the area of energy management, studies on evaluation of technologies for cogeneration of power utilizing waste heat in cement manufacture was completed. Mandatory energy audits under the Bureau of Energy Efficiency were conducted in two cement plants. Technical (health) audit of a major cement plant was also conducted. Studies on development of system design for storage, handling and firing of alternate fuels in cement plants have been completed. TEFR for modernization of a packing plant, setting up of grinding and blending unit, setting up of a cement handling unit at a port were prepared for various customers. An overseas project on TEFR for setting up a large cement plant in Kenya and two grinding units at Kisumu, Kenya and Arusha, Tanzania was also completed. In the area of structural optimization and design, work continued on establishing design parameters for high strength concrete. Services on concrete mix design were provided to a large number of customers with varying requirements. Developmental work continued on accelerated mix design method using PPC. Engineering properties of various grades of fibre reinforced concrete were studied for performance improvement. Assessment of alkali aggregate reaction potential by various methods was done for a number of projects. Concretes with special properties were developed for different customers. On the structural assessment and rehabilitation side, field studies



105th BOG Meeting in progress



107th BOG Meeting in progress

using ultra sonic pulse velocity measurement and rebound hammer were under taken for a number of structures and rehabilitation measures suggested. Investigations were conducted for establishing the causes of distress in concrete dam in Kerala and assessment of residual services life of a dam structure in Himachal Pradesh. Third party quality assurance / audit services were provided for a number of on going projects. In the area of quality management, technical guidance was provided to one cement plant for documentation and implementation of laboratory QMS in accordance with ISO 17025:2005 and NABL accreditation. Assessment of quality assurance system of a cement plant and a clinker grinding unit was completed. Proficiency testing schemes on various materials were also organized. Certified reference materials were developed and supplied to a number of laboratories. Calibration services and testing services were provided through NABL accredited laboratories at Ballabgarh and Hyderabad. The 14th NCB International Seminar has been announced with newly added themes in the area of concrete technology.

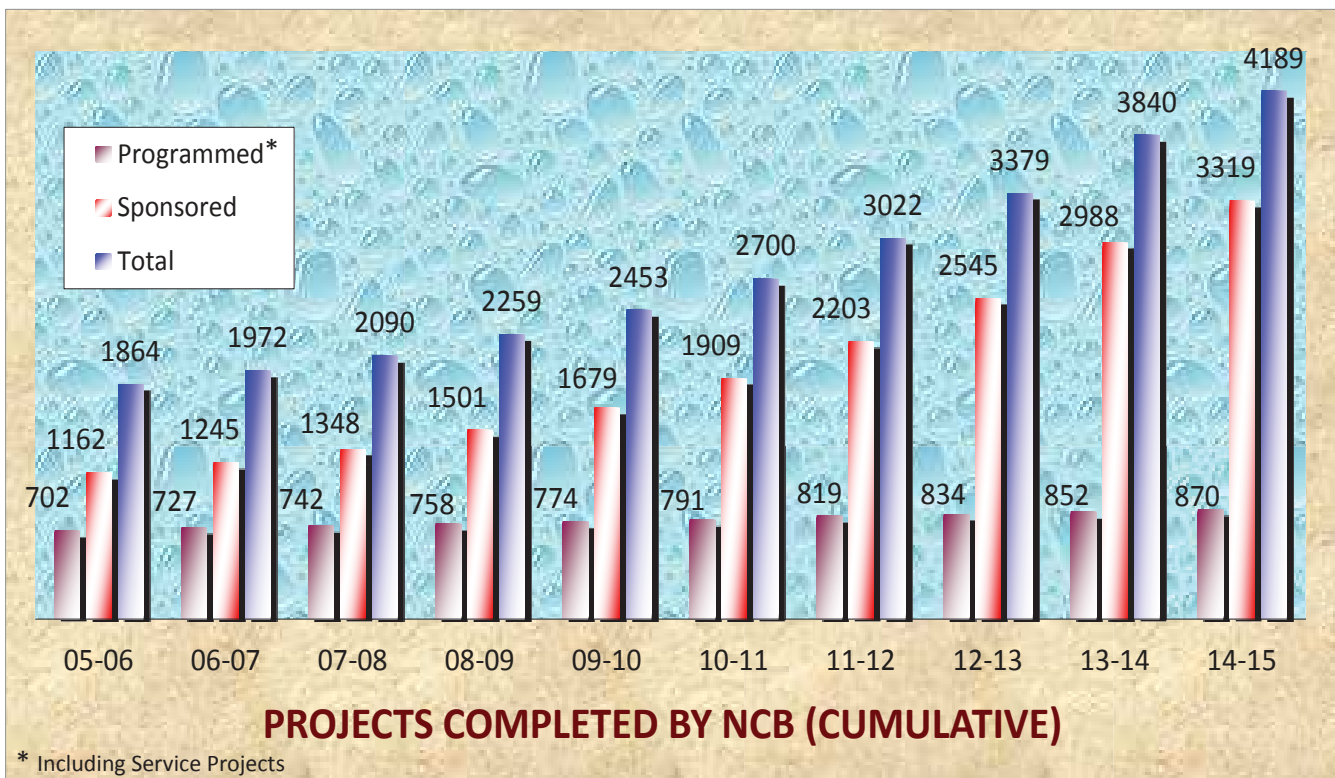
NCB's current Rolling Plan of Missions is given in Appendix I. During the year under review specific projects with targets of time, cost and assured end-product were pursued under six Corporate Centres which are responsible for delivering the needed technological support services to the user industries. 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.

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, 18 Programmed and 331 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 2015-16, as given in Appendix IV.

The broad activities carried out by the six Corporate Centres during 2014-15 are highlighted in the following sections.



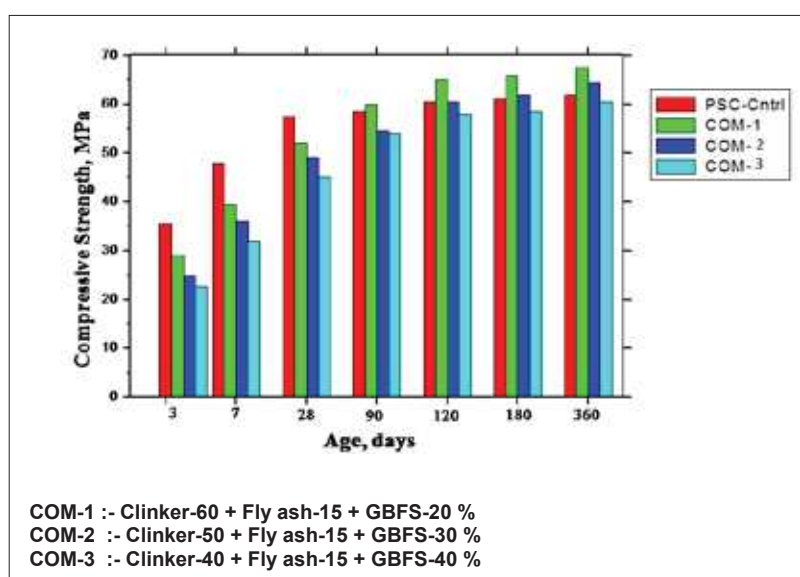
CENTRE FOR CEMENT RESEARCH AND INDEPENDENT TESTING - CRT

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. Twenty seven Sponsored Projects were completed and 04 Programmed Projects were pursued during the year.

Cements and Other Binders

Development of Composite Cements

A state-of-art report has been prepared covering developments on composite cements. Composite cements containing 40 to 60% OPC clinker, 35 to 55% mixes of fly ash and granulated blast furnace slag (GBFS) along with mineral gypsum were prepared from a set of materials and evaluated for their physical characteristics such as blaine's fineness, setting time, compressive strength, soundness, sulphate expansion and heat of hydration following Indian standard methods specified for portland and blended cements. As compared to OPC, the compressive strength values of these cement blends were found to be marginally lower whereas improved at 90 and 120 days as shown in *figure*. The strength development was generally higher with higher clinker content as well as with increase in slag content. Further, composite cement preparation is under way from another set of raw materials such as clinker, coarser fly ash, low grade limestone and mineral gypsum which have been procured and got evaluated for their characteristics.



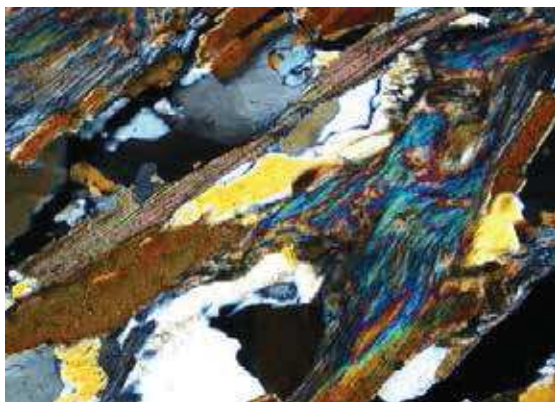
Compressive strength developments of cement blends at fixed fly ash content with varying GBFS and clinker

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 172 cement plants. During the year, LCF studies were completed for 10 cement plants from Andhra Pradesh, Tamilnadu, Madhya Pradesh, Rajasthan and Himachal Pradesh.

Petrographic Analysis and Compressive Strength of Rock Sample

Petrographic Analysis and Compressive Strength Tests of four core samples of different diameter and sizes were carried out. The petrographic studies indicated that the core samples were full of megacrysts and phenocrysts developed along the foliation planes of the rocks. These grains were highly fractured, shattered and partially altered with numerous weak planes. The strained quartz percentage and their undulatory extinction angle were on higher side in all the four core samples. Hence, it was suggested that other test of physical properties of these rocks should be done before using them as coarse aggregate component of the concrete. Compressive strength test of all the core samples were also carried out, and the values were found in the range of 283 kg/cm² to 443 kg/cm². Variation in the compressive strength of the samples was mainly because of composition, texture, structure, morphology of grains and effect of weathering of the rocks. The microstructures are shown in the micrographs.



CORE-II-1: Distribution of quartz, biotite, orthoclase-feldspar, muscovite and iron oxide grains in the rock (5x, x-nicols)



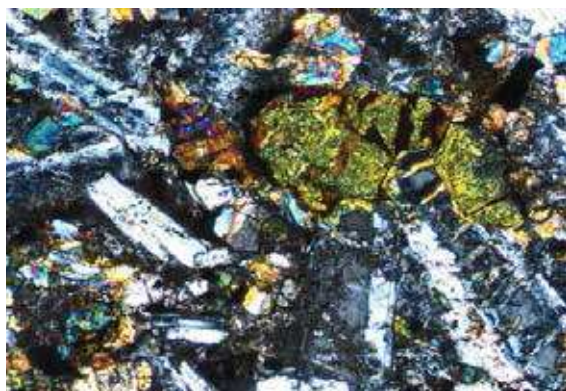
Core-II-2: Distribution of quartz, biotite, orthoclase-feldspar, muscovite and iron oxide grains in the rock (5x, x-nicols)

Optical micrographs of rock samples

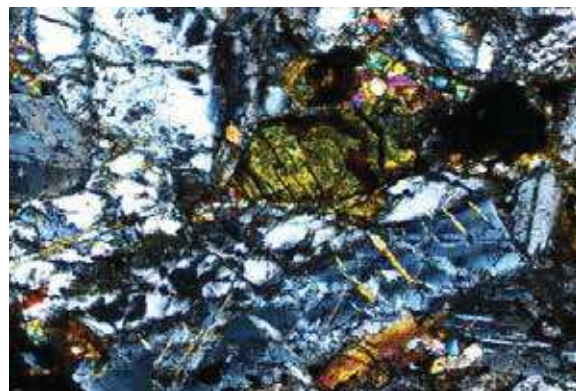
Petrographic Investigations of Underground Rock Strata at Palitana, Gujarat

A study was carried out on petrography and compressive strength of volcanic rock strata at Palitana, Gujarat. These rocks represented Basalt family. In all the locations mixed volcanic

rocks were encountered. No major structural deformations were observed in the rock strata. Poorly developed joint and fracture planes were present in some locations, which were restricted on the surface only and discontinuous in nature. Petrographic analysis of the rock samples indicated that these rocks were rich in glass and intended to rhyolite. Most of them were of mixed combination of rhyolite and tholeiite basalt. Compressive strength test results indicated that the samples of various locations were different because of variation in composition, texture, micro structure and alteration developed in them. Hardness tests were conducted on massive compact fresh samples of the rocks. Hardness of the rocks varies between 5.5 and 8.5. This was observed that variation in hardness of the rock samples of different locations vary because of the complex geological features. Variation in test results of hardness and compressive strength supported the petrographic analysis results. Based on the studies conducted it could be concluded that the rock samples of the Palitana area were complex in nature. The rate of weathering was different with varying depth. Hence hardness of the rocks varied from location to location. The microstructure of the rock samples are shown in the micrographs.



Location-2&3 (Plate1): Distribution of plagioclase-feldspar, clinopyroxene, orthopyroxene, quartz and iron oxide (10x, x-nicols)



Location-2&3 (Plate-2): Distribution of plagioclase-feldspar, clinopyroxene, orthopyroxene, quartz, iron oxide and glass grains in the rock (10x, x-nicols)

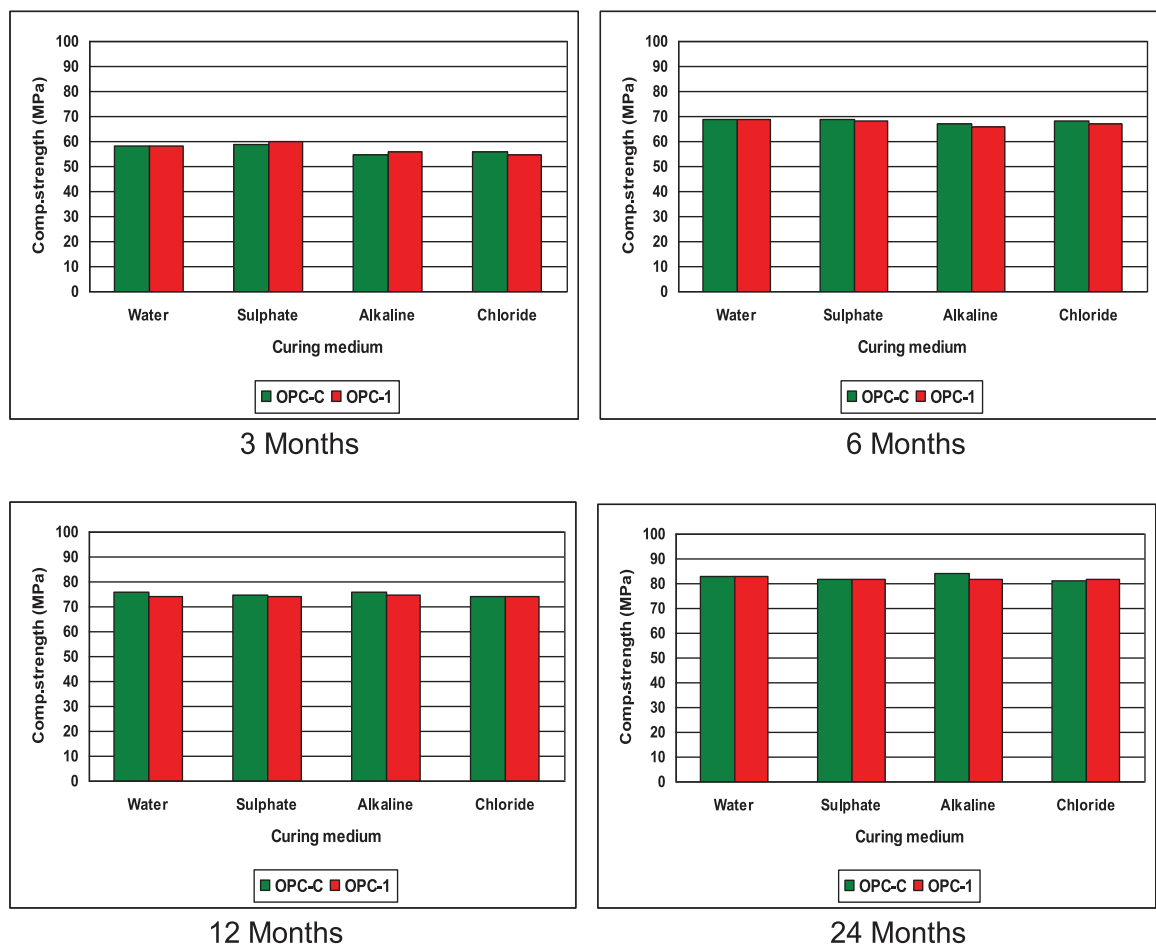
Microstructure of rock samples

Wastes Utilization

Use of Zinc Industry By-product “Jarosite” as Set Controller in Cement Partially Replacing Conventional Mineral Gypsum

The presence of sulphate bearing mineral phases such as natrojarosite, anhydrite and bassenite in jarosite, a zinc industry by-product showed its suitability to regulate the setting of cement by partially/ fully replacing conventional mineral gypsum without adversely affecting the cement properties. The long term compressive strength developments of hardened cement mortar samples OPC-1 prepared with 20% replacement level of mineral gypsum by jarosite and OPC-C prepared with 100% mineral gypsum and cured under the influence of different aggressive environments i.e. sulphate (0.33 N Na_2SO_4 , pH-5.99), chloride (0.5 N NaCl, pH-6.43) and alkaline (0.3 N NaOH, pH-12.88) salts along with lean

water for the period of up to 24 months showed no deleterious effect of jarosite addition in OPC partially replacing mineral gypsum as shown below in *figure*.

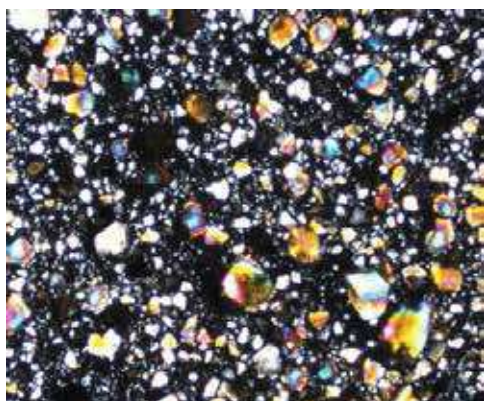


Long term compressive strength development of OPC samples cured under different aggressive mediums for 3, 6, 12 and 24 months

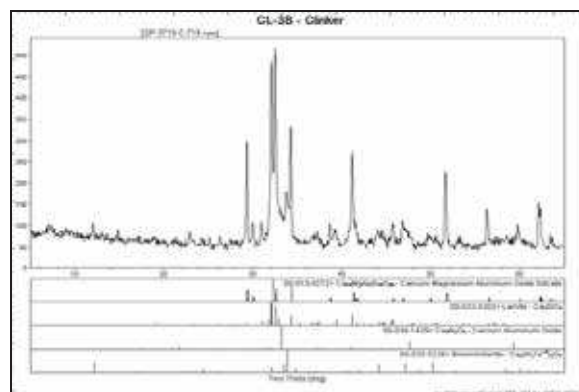
Evaluation of a Industrial By-product for Use as Aggregate in Construction Sector and as a Raw Mix Component in Cement Manufacture

Investigations have been carried out on evaluation of by-product waste generated during the process of beneficiation of clay from a manufacturer site for its utilization in construction industry by replacing natural sand. The characterization of the sample collected before and after washing was found to show properties similar to the natural sand conforming to Indian Standard IS: 383-1970. Up to 50 % of above waste could be used in place of natural sand in meeting the construction requirement.

The study carried out on its suitability as raw mix component in the manufacture of OPC indicated utilization level of up to 6% in raw mix for the preparation of laboratory sample of 53 grade OPC. The optical micrograph of sand sample and X-ray diffraction pattern of the clinker sample are shown.



Optical micrograph of sand



XRD Pattern of clinker

Investigations on Technical Suitability of By-products from a Mineral Industry in Cement Manufacture

Investigations were carried out on utilization of titanium industry by-products such as ETP sludge, iron oxide sludge and dry iron oxide powder in the manufacture of Ordinary Portland Cement (OPC). Chemical analysis of above by-products indicated their suitability due to the predominance of fluxing component such as Fe_2O_3 and small amount of TiO_2 . Different cement raw mixes were designed incorporating up to 3.0% doses of ETP sludge, iron oxide sludge and dry iron oxide powder individually along with conventional raw materials. Burnability studies of raw mixes showed reduction in clinkerization temperature by 40-50°C as compared to control raw mix prepared without incorporating above by-products. OPC samples prepared with laboratory clinker samples containing optimized doses of 2.50% ETP sludge, 2.40% iron oxide sludge and 2.50% dry iron oxide powder individually showed physical characteristics comparable to control OPC and were found to conform to all the requirements of Indian standard IS: 12269-2013 specified for 53 grade OPC cement.

Technical Suitability of Copper Slag as Mineralizer in Cement Manufacture

Copper slag, a by-product of non-ferrous metallurgical industries was investigated for use as an additive in the manufacture of ordinary portland cement on account of presence of fluxing component Fe_2O_3 along with copper oxide which is known to contribute in formation of clinker mineral phases. Accordingly, the burnability study of cement raw mix prepared utilizing up to 3.0% copper slag showed rapid clinkerization reaction resulted in reduction in clinkerization temperature by 40-50°C, better formation of clinker mineral phases along with improved micro-structural development. The cement sample thus prepared with optimum dose of 3.0% was found to conform all the requirements of the Indian standard specified for OPC.

Quality Evaluation of Fly Ash Samples from NTPC

Quality assessment studies of fly ash samples generated from different fields and different thermal power plants of NTPC in India were carried out and studied for their quality parameters as per Indian Standard IS:3812 (1)-2013.

Refractories and Ceramics

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

Investigations have been taken up to evolve guidelines for Improved Refractory Engineering Practices for Cement Plants. Literature survey and preparation of state-of-the-art report has been continued. The state-of-the-art refractory engineering practices as reported in the literature are : improved kiln access provides increased safety, ease of operation and reduce downtime, ready for use in 30 minutes, can take ~ 7 MT load, use of safety inspection cage, demolition time reduced from 120 to 30 hrs by remote controlled machine, specially designed pay loader quickly remove debris saving about 20 Hrs, use of Laser light to ensure drawing of accurate centre line, transporting bricks on a pallet, improved version of installation machine provides increased lining speed. The double arch system adjusts in 10 minutes to meet any kiln distortion, use of sacrificing layer protects kiln shell from corrosion (*figure*), etc. In order to analyze the prevailing refractory engineering practices in Indian cement plant, a specific questionnaire for data collection was prepared and circulated to various cement plants in the country. So far, data has been received from 4 cement plants covering 7 CRK systems and the same is being analysed and validated. The analysis of collected data indicated that the installation speed in rotary kiln has gone up from 6 meters per day from manual installation to 10-12 meters per day using machine installation. Extra care has been taken for protecting kiln shell by application of suitable anti corrosion paints. Further data/information shall be evaluated and benchmarks shall be created on the basis of which guidelines for improved refractory engineering practices shall be evolved. Implementation of the developed guidelines shall lead to improvement of plant productivity and profitability.

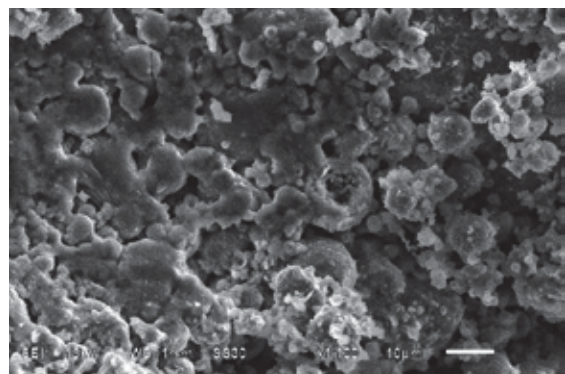


Use of sacrificing layer protects kiln shell from corrosion

Fundamental and Basic Research

Investigation on Development of Geopolymeric Cements

Investigations on formation and properties of geopolymeric cements based on alkali activation of low lime coarser fly ash have been taken up. The alkali treated fly ash samples were subjected to initial thermal curing at two different temperatures up to 90°C for varying retention periods. Scanning Electron Microscopy (SEM) studies indicated the formation of geopolymers as shown in *figure*. The initial temperature conditions were observed to be significant in development of properties of geopolymeric cement.

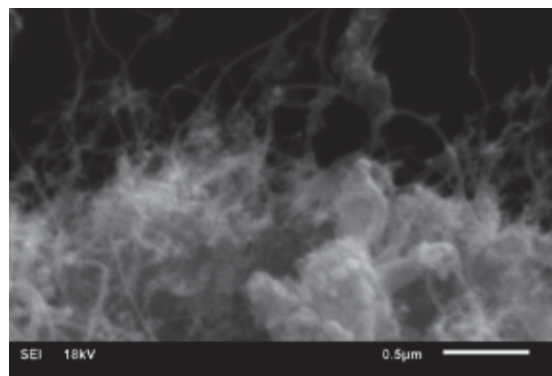


SEM image of alkali treated fly ash specimen cured at 60°C for 7 days

Accelerated initial thermal curing showed development of cracks in later age hardening of geopolymeric cement resulting in strength retrogression. In fact, the slow process of geopolymerization by initial curing at optimum temperature showed better product formation without any retrogression in strength up to a period of 75 days. The hardened samples showed dimensional stability.

Investigations on Cement Containing Nanoparticles

Investigations on Nanoparticles blended cements and cement based nano-composites have been continued. Effect of nano-particles of various materials on the properties of cement and concrete and cement based nano-composites are being investigated. Blends of OPC with 3-5 percent of different nanoparticles such as nanosilica, nano- Fe_2O_3 and nano- TiO_2 were prepared by blending as well as by intergrinding of constituents. Blends of OPC were also prepared with Carbon Nano Tubes (CNT) using 0.5-1.0% of CNT by weight of cement. CNT is a tubular form of carbon, configurationally equivalent to a two dimensional sheet rolled into a tube as shown in SEM micrograph (*figure*). CNTs can be excellent reinforcing materials because of their extremely high strength, toughness and aspect ratios. Cementitious materials can be reinforced using CNTs to make high performance composite materials.



Scanning Electron Micrograph of Carbon Nanotubes (CNT)

The blends of OPC with different nanoparticles have been investigated for their physical properties as well as hydration characteristics. Instrumental techniques including SEM, DTA, XRD and IR spectroscopy were used for investigations on the hydration characteristics of OPC blends incorporating nanoparticles. Improvements obtained in compressive strength were highest with 5% nanosilica on account of its pozzolanic reaction and better dispersion as compared to dispersion of other nanoparticles in the cement blends. Investigations on improving the dispersion of nanoparticles in the cement blends and on the use of nanoparticles in concrete mixes have been taken up.

Independent Testing

Independent testing laboratories of NCB undertake complete physical, chemical, mineralogical and micro structural analysis 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 Independent testing laboratories were established in 1977 on a Test House pattern and undertake testing jobs for cement, construction and allied industries. NCB testing laboratories achieved a hallmark when NABL accredited them in the year 1997. The quality of testing services is maintained through NABL accreditation. The laboratories are equipped with state-of-the-art instruments to carry out the tests as per national and international standards. Assignments were carried out for samples from neighboring countries also. The number of samples tested during the period was more than 7500.

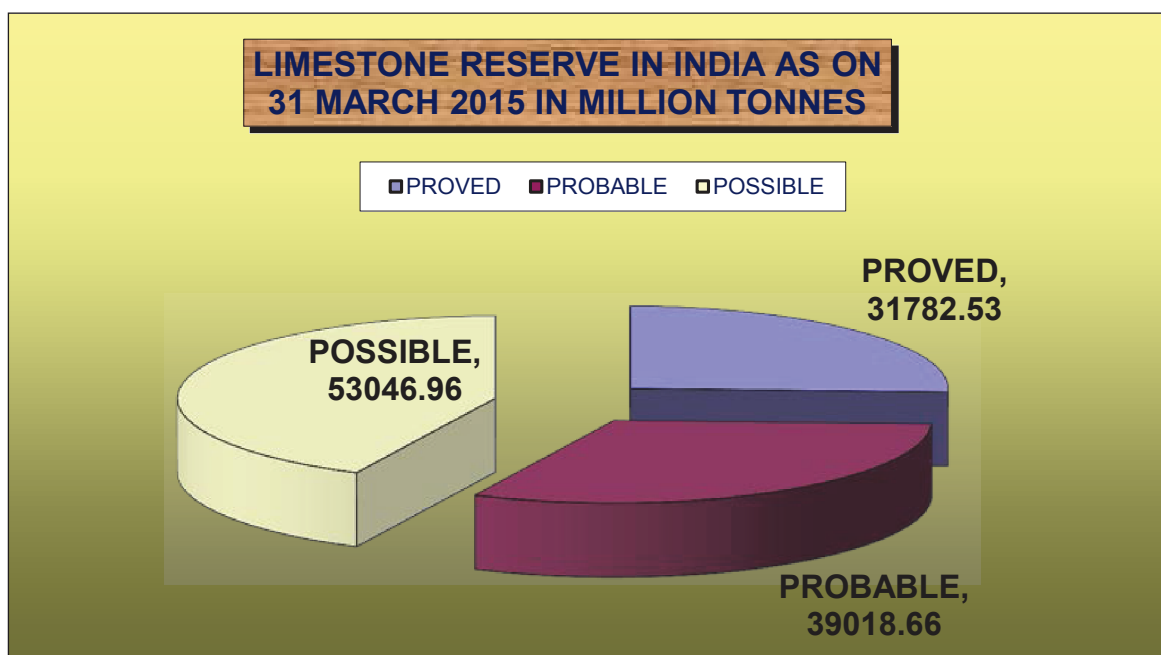
CENTRE FOR MINING, ENVIRONMENT, PLANT ENGINEERING AND OPERATION - CME

The Centre for Mining, Environment, Plant Engineering and Operation carried out its activities through six programmes viz. Geology, Mining and Raw Materials; Environmental Management; Process Optimization and Productivity; Energy Management; Plant Maintenance; and Project Engineering and System Design. The Centre completed 13 Sponsored Projects and two Programmed Projects during the year.

Geology, Mining and Raw Materials

Updation of National Inventory of Cement Grade Limestone Deposits in India

NCB under its continuous activity *Updation of National Inventory of Cement Grade Limestone Deposits in India* has kept updated through regular interaction with various state DGMs for collection of exploration data as per “UNFC” guidelines. The total limestone reserves of all categories is estimated at 123848.16 million tonnes as on 31st March 2015 out of which the proved, probable and possible categories are of 31782.53 million tonnes, 39018.66 million tonnes and 53046.96 million tonnes respectively.



Bulk density, Recovery Factor Studies & Quantitative and Qualitative Assessment of Limestone from Dumps

Bulk density, Recovery Factor Studies & Quantitative and Qualitative Assessment of Limestone from dumps lying at Pathapadu Block within ML Area at Banaganapalle Cement Works for M/s Jayajothi Cements Ltd (SJCL) is carried out to utilize the limestone lying in the waste dumps for cement manufacture.



Site investigation by NCB geologist at Pathapadu Block



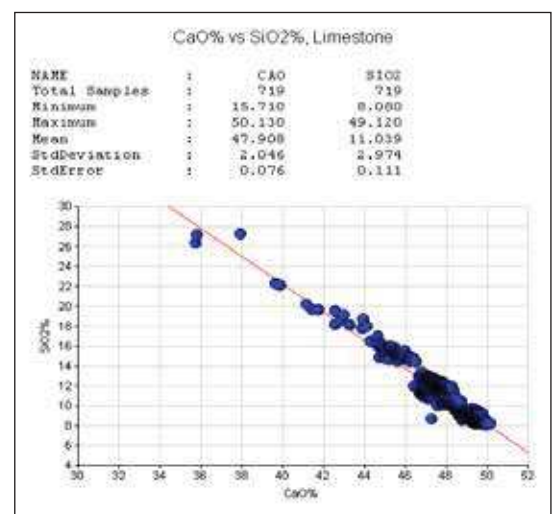
Collection of surface samples from dumps and Kunkur/clay samples of Pathapadu Block during the site investigations

NCB team comprising of geologists and laboratory personnel visited the site at Pathapadu Block along with mining officials of M/s SJCL. Traverse has been taken all along the block where the dumps are lying within the ML area. Prior to traverse taken, the survey map, geological map, exploration details including the borehole litho-chemical logs, geological and mining reports of the area have been reviewed. Representative surface and bulk samples have been collected from the dumps and analysed chemically.

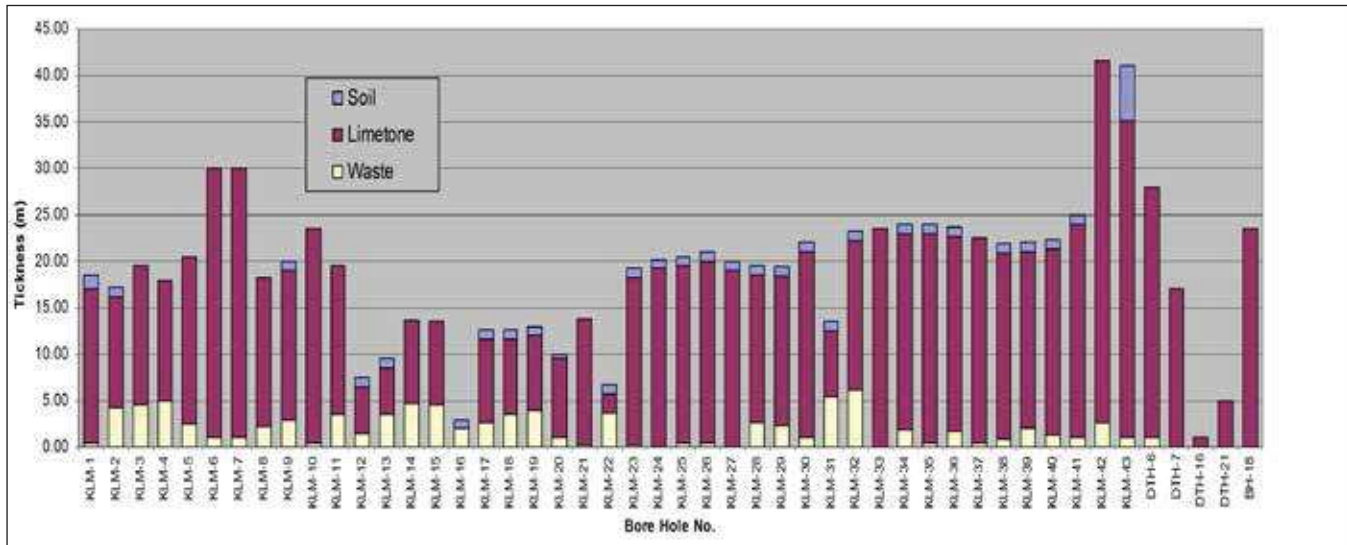
The cut-off grade, quality of limestone as assessed by SJCL, surface sample analysis, bulk sample analysis, size analysis of the bulk samples followed by chemical analysis of each size fraction etc have been studied experimentally by NCB for the qualitative assessment of these dumps. Based on the field investigations, qualitative analysis of surface samples and bulk samples, size analysis, bulk density and recovery factor analysis, the quantity of the recovered material was estimated.

Computer-Aided Deposit Evaluation of Limestone Deposit

Computer-Aided Deposit Evaluation of Limestone Deposit for M/s Penna Cement Industries Limited (PCIL) located near Korumanipalle & Thollamadugu villages of Kolimigundla Mandal, Kurnool Dist AP has been carried out.



Scatter diagram for the different chemical constituents of the limestone



Distribution of different litho-units of bore holes in the study area

Digitization of the geological and topographical maps for preparation of drawings in Auto CAD and DATAMINE, and computerized database of bore hole data is prepared in MS-Office Excel. Statistical analysis of bore hole data and determination of distribution pattern etc of major chemical constituents is done. The project is in progress. The correlation between CaO% and SiO₂ % of limestone and the distribution of different litho units in boreholes are presented graphically.

Environmental Management

Study on Dust Emission Levels and Available Technologies for Reducing the Dust Emission at Stone Crushers

The Project Study on dust emission levels and available technologies for reducing the dust emission at stone crushers was completed. Twelve Stone Crusher units in 4 different zones viz., Dindigul dist. of Tamilnadu in South, Goa in West, Faridabad clusters of Haryana in North and Pakur cluster of Jharkhand in East were monitored for Ambient/Fugitive Dust. Report submitted covering the present dust emission levels of the stone crusher industry and the present available technologies / methodologies followed for dust control and mitigation at various stone crusher units in India.

Generation of Background Environmental Data

- The generation of background environmental data at M/s JK White Cement Works, Gotan, Rajasthan has been taken up. Ambient Air Quality with in 10 km radius of the plant is to be monitored during three different seasons. First season monitoring completed during April 2014 when plant was shutdown for maintenance.
- The generation of background environmental data at M/s JK Cement Works, Gotan, Rajasthan has been taken up. Ambient Air Quality with in 10 km radius of the plant is to be monitored during three different seasons. First season monitoring

completed during April 2014 when plant was shutdown for maintenance. Second season monitoring will be taken during the next plant shutdown.

Monitoring of Environmental Parameters

- The monitoring of environmental parameters at M/s JK White Cement Works, Gotan, Rajasthan has been taken up. Various environmental parameters like ambient air quality, source/stack emission, ground water quality in and around the plant, ambient noise level and noise level at plant machineries are to be monitored during two phases for three consecutive years. Second phase monitoring for 1st year completed during October 2014 and first phase monitoring for 2nd year completed during March 2015. Submitted the report for each phase of monitoring separately.
- The monitoring of environmental parameters at M/s JK Cement Works, Gotan, Rajasthan has been taken up. Various environmental parameters like ambient air quality, source/stack emissions, ground water quality in and around the plant, ambient noise level and noise level at plant machineries, to be monitored during two phases for three consecutive years. Second phase monitoring for 1st year completed during October 2014 and first phase monitoring for 2nd year completed during March 2015. Submitted the report for each phase of monitoring separately.

Study on Effect of Mining on Salinity Intrusion, Ground Water Level / Quality, AAQ and Land Use Pattern

- The 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 to be monitored during pre monsoon (April/May), monsoon (August), post monsoon (November) and winter (January) for a period of one year. Ambient Air Quality (AAQ) and Landuse Pattern by using satellite imagery to be monitored for two seasons. First season monitoring completed during January 2015 and submitted the report.
- The 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. First phase monitoring completed during January 2015 and submitted the report. Ground water level & quality and soil



Environmental monitoring at M/s J K White Cement Works

quality to be monitored during pre monsoon (April/May), monsoon (August), post monsoon (November) and Winter (January) for a period of one year. AAQ and land use pattern by using satellite imagery to be monitored for two seasons. First season monitoring completed during January 2015 and submitted the report.

Process Optimization and Productivity

Techno-Economic Viability Study of Cement Mill Venting System

The Techno-Economic Viability Study of cement mill venting system for M/s Malabar Cements Limited, Kerala was carried out and the bottlenecks in the present system such as high outlet emissions, low collection efficiency, high maintenance cost of present ESP and sensitivity of ESP for frequent switching of products were identified. Four feasible options have been evaluated for the new proposed cement mill venting system.

Estimation of WHR Potential

The estimation of WHR potential for M/s Malabar Cements Limited, Kerala was carried out. Based on data analysis, process measurements, it is technically feasible but economically it is not attractive due to long payback period of 10 years.

Assessment of Losses During Installation & Commissioning of RABH

Assessment of losses during installation & commissioning of RABH for M/s Malabar cements limited, kerala was carried out. Production loss was estimated and reasons for poor performance of the RABH were identified.

Diagnostic Study for Minimizing Coating Formation in Kiln

The diagnostic study for minimizing coating formation in kiln of M/s Shree Digvijay Cements Limited was carried out. NCB recommendations for reducing coating formation are in implementation stage.

Feasibility Report for Using Plastic Waste in Cement Kiln

The feasibility report for using plastic waste in cement kiln for M/s Malabar Cements Ltd, Kerala was carried out. Preliminary report of *System for plastic waste storage and handling* was submitted.

Energy Management

The programmed project on *Evaluation of Technologies for Cogeneration of Power Utilizing Waste Heat in Cement Manufacture* is completed. Detailed TEFRRs were carried out for 2 plants during the project. Study and assessment of technologies used, major barriers and methodology of computing were carried out.

“Mandatory Energy Audit” under Bureau of Energy Efficiency

Projects on *Mandatory Energy Audit* under Bureau of Energy Efficiency were completed in Ambuja - Maratha cement works, Ambuja - Rabriyawas cement works, and Prism Cement Ltd - Satna.

Cement Status and Possible Future Trends in Cement Industry Sector

Another project on *Cement Status and Possible Future Trends in Cement Industry Sector* for The Energy and Resources Institute (TERI) was completed.

Plant Maintenance

Technical (Health) Audit

The project on *Technical (Health) Audit covering mechanical, electrical & instrumentation and process & quality aspects* was carried out for a major cement plant of 3750 TPD in Gujarat. Based on the assessments NCB has given recommendations for improvement.



View of mill worn-out rotor and stator of the classifier of VRM

Project Engineering and System Design

Development of System Design for Storage, Handling and Firing of Different Types of Alternate Fuels/ Wastes in Cement Plants.

The programmed project on *Development of System Design for Storage, Handling and Firing of Different Types of Alternate Fuels/ Wastes in Cement Plants* is completed. The best practices on handling and storage of waste alternative fuels like shredded tyres, ETP sludge, organic waste and spent wash from sugar industry, waste oils and waste paints were studied, and the guidelines for identification of proven technologies was prepared. Accordingly, system design flow-sheets for handling, storage and firing of different types of alternate fuels were prepared.

Preparation of TEFR for Modernization of Packing Plant

M/s Malabar Cements Ltd (MCL) sponsored a project to prepare a TEFR for up-gradation and modernization of their existing packing plant at Walayar unit. NCB officials visited the

plant for requisite data collection and discussions. A report was prepared and submitted to MCL in which the feasibility of up-gradation of existing packing plant was established.

Preparation of DPR for Capacity Enhancement of Cement Grinding Section

M/s Malabar Cements Ltd (MCL) sponsored a project to prepare a DPR for capacity enhancement of cement grinding section at Walayar unit. NCB officials visited the plant for requisite data collection and discussions. Accordingly, a DPR was prepared and submitted to MCL.

TEFR for Setting up 1 mtpa Clinkerisation Unit at Bissel, Kenya and 2 x 0.6 mtpa Grinding Units at Kisumu, Kenya and Arusha, Tanzania

M/s East African Portland Cement Company Ltd, (EAPCC), Kenya sponsored a project to prepare TEFRs for setting up a 1 mtpa clinkerisation unit at Bissel, Kenya and two 0.6 mtpa grinding units at Kisumu, Kenya and Arusha, Tanzania. NCB officials visited the sites at Bissel and Kisumu for preliminary investigation, data collection and discussions with plant officials and local authorities. Report suggests that all the three projects are technically feasible and economically viable.

Preparation of TEFR for Setting Up 1 mtpa Grinding & Blending Plant at Cuttack, Odisha

M/s Navrattan Blue Crete Industries (P) Ltd sponsored a project to prepare a TEFR for setting up 1-mtpa slag based cement like material grinding and blending plant at Cuttack. M/s NBCIPL shall be using a binder- 'Crete' and add slag and fly ash in suitable proportions with it to make a product that exhibits cementitious properties. Preliminary investigations and tests have been carried out at NCB. NCB officials along with officials for M/s NBCIPL have visited the proposed site. The TEFR for the project is under preparation.

Preparation of Feasibility Report for Setting Up a Cement & Allied Materials Handling Unit at Ernakulam Wharf, Cochin Port

M/s Malabar Cements Ltd sponsored a project to prepare a TEFR for setting up a Cement and Allied Materials handling unit at Ernakulam wharf, Cochin Port. NCB officials visited the proposed plant site along with MCL officials. The report has been submitted.

CENTRE FOR CONSTRUCTION DEVELOPMENT AND RESEARCH – CDR

The Centre provides services to the cement, concrete and construction industries through four programmes namely Structural Optimization and Design; Concrete Technology; Structural Assessment and Rehabilitation; and Construction Technology and Management. Strategic goal of center is to contribute in developing durable and sustainable civil infrastructure for the nation. The Centre completed 287 sponsored projects during the year.

Structural Optimization and Design

Development of Design Parameters for High Strength Concrete

Development of High Strength Concrete (generally defined as concrete above M55 to M100) at national and international level has taken a leap with availability of material like silica fume and polycarboxylate ether-based high range superplasticizers (PCEs). However, structural design parameters such as modulus of elasticity, flexural strength, bond strength, stress block parameters for flexure design and values for permissible shear stress etc have either not been part of Design Codes or they are different in different international codes. IS: 456 -2000 recommends to consult specialized literature and experimental results for these design parameters in case of design of structural members using concrete of grades higher than M55.

The main objective of this study is to develop the design parameters for high strength concrete which will enable structural engineers to design the structural members using high strength concrete. The study includes the concrete mixes from M35 to M100 with slump of 100-125 mm. In addition to this, three grades of Self-Compacting Concrete (SCC) is being covered, as the 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 are being used in concrete grade above M75. In the first phase of the project, the different tests are being conducted to determine the static modulus of elasticity and poisson ratio, tensile strength, bond strength, shear strength and flexural strength apart from compressive strength. In addition to this the drying shrinkage and creep, fatigue and rapid chloride permeability test on selected samples are also being conducted. In the second phase of the study, the experimentally obtained design parameters are being used to design few large size beams (RCC and prestressed) and columns and the same are being tested for verification and validation of experimentally obtained design parameters before recommendation of these parameters for the structural designer's use.

Concrete Technology

Evaluation of Concrete Making Materials and Mix Design

Evaluation of concrete making materials, analysis of test results and establishing its correspondence into fresh, hardened and durability properties of concrete is an important and crucial step before carrying out concrete mix designs. Centre has evaluated various concrete making materials such as cement, fly ash, silica fume, GGBS, water, fine and coarse aggregates, and chemical admixtures and carried out concrete mix designs for various grades for Thermal Power Project structures (TG Deck, Cooling Tower, Chimneys etc.) of NTPC and its subsidiaries. Material evaluation and mix designs were also carried out for different hydroelectric projects like Loktak Downstream HE Corporation Ltd, Manipur (JV of Govt. of Manipur and NHPC), Goriganga-III HE Project of NHPC, Teesta –IV HE Project Sikkim. More than 255 concrete mix designs for various grades up to M80 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. More than 20 brands of Chemical Admixtures were tested and evaluated as per IS: 9103-1999.

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

Over the years, NCB has developed expertise and hands-on competency for evaluations of concrete and concrete-making materials employing 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 JV's. Similar studies were also carried out for Promac Engineering Industries Limited, Bangalore, Karnataka for their power plant at Sendou, Dakar, Senegal (West Africa).

Development of Accelerated Mix Design Method for Concrete Using PPC or OPC with Flyash

Early prediction of 28 days compressive strength results through existing codal provision is not possible for concrete mixes having Pozzolana like flyash due to the effect of their physical and chemical properties on the rate of strength gain. Hence, NCB has taken up this research study focused on development of accelerated curing regime and simple deterministic equation for accurate prediction of compressive strength using PPC or OPC with flyash. Studies on concrete specimens prepared by using different brands of PPC and different sources of flyash mixed with different brands of OPC were carried out. Accelerated curing of concrete specimens was carried out using different temperature regime for different duration. Flyash ranging from 20 to 45% was added by weight of cementitious materials in the mixes. Mathematical model for early prediction of 28 days compressive strength of concrete are developed separately for the mixes having flyash up to 35% and the mixes having flyash content >35% to 45%.

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

Comparative study of various Engineering Properties of Standard & High Strength Plain and Fiber Reinforced Concrete (FRC) using indigenously available fibers (Polymer and Steel) is being carried out. FRC Technology will be developed and guidelines will be prepared for Design & Construction of Reinforced Concrete Structures & Abrasion-Erosion/cavitation resistant concrete for hydraulic structures like spillways, glacis etc are under progress.

Development of Special Concrete

Plastic Concrete

Plastic concrete is used for creating an impermeable barrier (cut-off wall) for containment of contaminated sites or seepage control in highly permeable dam foundations. It consists of aggregates, cement, water and bentonite, mixed at a high water cement ratio, to produce a ductile material. Centre developed the plastic concrete for NTPC Limited Tapovan Vishnugad Hydro Power Project, Joshimath, Chamoli, Uttarakhand with unconfined compressive strength of 2.3 MPa and confined compressive strength of 3.5 MPa at confining pressure of 4 Kg/cm²

Pervious Concrete

Pervious concrete is a special type of concrete with a high porosity. It consists of cement, coarse aggregate and water with little to no fine aggregates. Pervious concrete is also called porous concrete, permeable concrete, no-fines concrete and gap-graded concrete. Centre developed the pervious concrete for Rajasthan Feeder Division, Ferozpur with compressive strength of 10 MPa and water permeability of 0.25 cm/sec measured under falling head method.

Anti Washout Under Water Concrete

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 requires 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. Center developed three underwater concrete mixes for Koteswar Hydroelectric Project of THDC (India) Ltd Koteswar having slump = 150 mm at 30 minute & initial setting time = 2-3 hrs having 15% washout. Dosage of high range water reducer, anti washout admixture and accelerator was optimized in order to ensure fresh concrete property conforming to the specification.

Self-Compacting Concrete

Several mix designs of Self compacting concrete (SCC) were carried out for Public Works Department, Delhi Development Authority and Water Resource Department, Govt of Maharashtra, Nagpur with grades varying from M25 to M50.

Concrete Mix Design of Various Grade in the Year 2014-15

Grade	M10 and 15	M20	M25	M30	M35	M40	M50	M60	M80
Nos.	12	14	115	42	35	22	9	4	2

Creep and Shrinkage Studies

Creep and shrinkage behavior of concrete is very important property and is to be taken into consideration while designing the prestressed concrete structural members and columns of tall buildings. The creep of concrete originates from the calcium silicate hydrates (C-S-H) in the hardened Portland cement concrete. The creep and shrinkage studies have been carried out for M40 and M50 grade of concrete for Shapoorji Pallonji Lanka (Pvt) Ltd, Colombo, Sri Lanka.

Structural Assessment and Rehabilitation

The distress evaluation, condition assessment, repair and rehabilitation of existing structures such as buildings, bridges, tunnels, dams and industrial structures are becoming increasingly important to make them functional and conforming to the safety and serviceability requirements as these structures are aging.

The center 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. These assignments were taken up as sponsored R&D assignments for NTPC (Bijapur, Singrauli, Adilabad, Aurangabad, Korba, Raigarh, Kokarjhar, Nagpur, Barh, Solapur), DDA (New Delhi), National Informatics Centre (Hyderabad), HUDA (Gurgaon, Faridabad), RBI (Ahmedabad, Bhopal), Sardarsarovar Narmada Nigam Limited (Gujrat), BHEL (Sonbhadra), Continental Engineering Corporation (Gurgaon), NBCC (Ankaleshwar), ITC (Gurgaon), Simplex Infra (Suratgarh), SJVNL.



View of ultra sonic pulse velocity test on column of community centre building at Faridabad



Apparently un-distressed outer face of chimney stack of BRBCL Aurangabad



View of overhead tank at
RBI Bhopal



UPV testing of column of water tank at RBI Bhopal

The structures were investigated by using visual observation, non-destructive evaluation technique (NDE) and other field tests followed by laboratory tests on extracted core samples and chemical analysis of hardened concrete. Various NDE techniques employed are ultrasonic pulse velocity testing, rebound hammer test, half-cell potential measurement, carbonation depth, rebar locator, cover meter and core sampling. The investigation are generally followed by recommendation for repair and rehabilitation with state-of-the-art repair materials and implementation techniques for distressed RC structures covering specifications, cost estimates and bill of quantities.

The matter of distress in Concrete dam of Kerala State Electricity Board (KSEB) was taken up under Dam Rehabilitation and Improvement Project (DRIP) by the Central Project Management Unit (CPMU) under Dam Safety Rehabilitation Directorate, Central Water Commission (CWC), Delhi. For finding out the reasons of unusual behaviour in dam, there was need to test the concrete used in dam for determining various properties which can be eventually used in Mathematical modelling of dam. Subsequently, NCB was approached by KSEB to undertake the field and laboratory investigations of concrete structure of dam. The study was carried out to determine engineering and chemical properties of aged concrete including Petrographic Studies, Scanning Electron Microscopy (SEM) studies, X-Ray Diffraction (XRD) studies, Alkali Aggregate Reaction (AAR) studies etc. The reasons for unusual behaviour of concrete dam were identified by NCB from the study and critical parameters for modelling were suggested.

Assessment was carried out to evaluate the residual service life of the dam structure of Nathpa



Measurement of UPV on longitudinal beam of TG deck
Slab at NTPC-Lara



View of up-stream side of the Nathpa Dam



Erosion of concrete due to high velocity flow of water in the spillway of Nathpa Dam, HP



Pull off testing being carried out on the dam body of Nathpa Dam of SJVNL, Nathpa (HP)

Jhakri Hydro Power station. The assessment involved visual inspection for any signs of distress, various on field non-destructive test like air permeability, rebound hammer, UPV testing, resistivity testing etc as well as partially destructive testing like core testing & pull-off testing. Evaluation of different physical and chemical properties of the concrete was carried out on the concrete cores. The testing for ASR was also carried out. Based on the assessment carried out recommendations were provided on repair measures required and further monitoring needed.

Construction Technology and Management

Third Party Quality Assurance/Audit (TPQA) programme of the centre has assisted the various organization to ensure quality workmanship to meet their specified quality standards in delivering quality constructed facilities. TPQA was carried out for roads and



NCB Engineers at TPQA Project Site of PWD, Vikaspuri Flyover, Delhi

bridges construction; residential, commercial and institutional buildings; canal lining work, concrete drain projects, boundary wall construction etc for Public Works Department, Municipal Corporation of Delhi (MCD), Delhi Development Authority (DDA), Delhi Urban Shelter Improvement Board (DUSIB), Sardar Sarovar Narmada Nigam Limited Gujarat and Agricultural Produce Market Committee (APMC) Rajkot (Gujrat).



NCB engineers at TPQA project site of PWD, Vikaspuri flyover, Delhi

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.



Third party quality assurance for construction of 2 nos RCC box underpass for PWD, Delhi

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 consists of a modern library and a computer centre.

Industrial Information and Data Bank

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 46,439 documents. The library has a bibliographic database consisting of about 40,750 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 serviced.

MEMBERSHIPS	
Indian	Overseas
<ul style="list-style-type: none"> ● Construction Industry Development Council (CIDC), New Delhi ● Indian Roads Congress (IRC), New Delhi ● Indian Mining & Engineering JI, Bhubaneswar ● Materials Research Society of India, Bengaluru 	<ul style="list-style-type: none"> ● United Nations Economic Commission for Europe(UNECE)-CIDC ● The American Concrete Institute (ACI), USA ● The Concrete Society, UK ● Precast/ Prestressed Concrete Institute (PCI), USA

Integrated IT Solutions

NCB continued modernizing its IT infrastructure with MS windows 8.1 based PCs and laptops. Now NCB-Ballabgarh premises is in Star Topology 1Gbps Fiber Optic network with Fiber redundancy. Overall it is 10 Gbps ready Fiber network. The Fiber optic network consists of Layer 3 and Layer 2 switches with some on Power On Ethernet facility. In select

Blocks, it is provided with wireless enablement. It is strengthened with centralized D-View network flow monitoring software.

RainMail Intranet Server (RIS) is moved into virtual Environment along with NCCBM intranet Server, Libsys Server & Symantec Protection Suite 4.0 Enterprise Security Server in Core i7 hardware. Virtualisation Software: VMware ESXi 5.1 at Server end ; VMware Workstation 10.0 and oracle Virtual Box 4.0 at client end are used. The Websites, uploaded with various promotional information including 14th NCB International Seminar.

Following services were continued to be provided:

- 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, recommendations of various workshops,
- Employment opportunities & RTI related documents.

Publications

Information on technologies and services of NCB is disseminated through NCB Publications regularly. Efforts to widely popularize and promote NCB activities, technology and consultancy services amongst the cement and related building materials industries were continued.

During the year NCB Annual Report 2013-14 (English and Hindi), Seminar Bulletin 1 of 14th NCB International Seminar, NCB Training Programme 2015-16 were brought out and widely circulated.

Seminars and Conferences

The 14th NCB International Seminar on Cement and Building Materials has been scheduled to be held from 01 to 04 December 2015 in New Delhi. The Call for Papers (*Bulletin-1*) for the Seminar was circulated widely in India and abroad. Preliminary response for participation in the Seminar and Technical Exhibition has been very encouraging. An Organizing Committee has been constituted and preparations for the Seminar are in full swing.



A few NCB Publications

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 10 May 2014 at its Ballabgarh and Hyderabad Units. At Ballabgarh Unit, Dr MM Ali, Joint Director NCB delivered a talk on *New and Special Cements*. Mrs Jhansi Lakshmi, CEO & Director, GREENARK was the chief guest at NCB-Hyderabad on the occasion and delivered a talk on *Green Building Concepts*.

World Environment Day : Special functions were organized on 5 June 2014 to celebrate ‘World Environment Day’ at Ballabgarh and Hyderabad Units. The theme of the year was “Raise your Voice, not the Sea Level”. At Ballabgarh unit, Shri R N Jindal, Additional Director, Ministry of Environment & Forests, Govt of India was the Chief Guest and addressed the NCB officials on the occasion. At NCB-Hyderabad, Shri K Murali Krishna, Senior Counselor, CII-GBC was the chief guest on the occasion. He delivered a talk on *Low Carbon Technology Road Map*.

Quami Ekta Week : Quami Ekta Week was observed during 19-25 November 2014 and National Integration Pledge was administered to the staff as a part of it.

NCB Day 2014 : NCB Day 2014 was celebrated on 24 December 2014. Shri Ashwani Pahuja, DG-NCB addressed the staff on the occasion. Dr B R K Pillai, Director, Dam Safety and Rehabilitation Directorate, Central Water Commission, New Delhi was the chief guest at the celebrations. The Chief Guest also gave away Awards to NCB officials who made outstanding contributions during the year



National Technology Day 2014 celebration at NCB-Ballabgarh



Shri R N Jindal, Additional Director, Ministry of Environment & Forests, Govt of India, addressing on the occasion of World Environment Day (Top). The Chief Guest planting a sapling in the Ballabgarh Unit (Bottom)



Dr A K Dhawan, Former Director, Central Soil & Materials Research Station, Dr B R K Pillai, Director, Dam Safety and Rehabilitation Directorate, Central Water Commission, New Delhi and Shri Ashwani Pahuja, DG-NCB are on the occasion of NCB day (left). Chief Guest with long service awardees (right)

in their respective fields of activities and presented mementoes to NCB officials, who had completed 25 years of service in NCB.

Best Scientist Award was given to Shri Adarsh Kumar NS. The Best Supporting Staff Awards in the Technical Stream were given to Shri Vishnu Dutt, Ms Kalpana Sharma and Shri Bhagwan Singh. The Best Supporting Staff Award in Administrative Stream was given to Shri DVVR Prasad.

Hindi Pakhwada : Hindi Pakhwada was organized during 14-28 September 2014 in compliance with the Rajbhasha policy of Govt of India. Shri Ashwani Pahuja, Director General, speaking in the concluding function of the Pakhwada celebrated on 29 September 2014, had shown his satisfaction on growth and development of Hindi in the organization. He exhorted the 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 Vinod kumar and Ms Charu Sharma were awarded as first and second winners respectively on the occasion.



DG NCB Shri Ashwani Pahuja is speaking on the concluding function of Hindi Pakhwada at Ballabhgarh Unit

Swachch Bharat Abhiyan : The Swachch Bharat Abhiyan (Clean India Mission) was organized on 02 October 2014 being a National Campaign notified by the Government. The mission was launched through out the country for next five years to keep India wholly clean. In the opening of the programme Director General Shri Ashwani Pahuja and staff members took pledge to keep our environment always clean and garbage free. On the day the staff members cleaned their working places, laboratories and roads by themselves to make mission most successful.



Shri Ashwani Pahuja is taking pledge along with staff member on the occasion of Swachch Bharat Abhiyan (Left). Staff members and DG-NCB are cleaning road in NCB premises (Right)

Participation in Workshops, Seminars and Conferences

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

Participant(s)	Event
Sh H K Gupta Sh Mantu Gupta Sh Brijesh Singh	5th conference on Bridges, Flyovers & Elevated Roads, 21 April 2014, New Delhi, organized by India Infrastructure Publishing Pvt Ltd
Sh Shubham Jain Sh Saurabh Garg	Technical Lecture on Launching of Precast Elements in construction Metro Rail elevated corridors, flyover & river bridges – A brief overview, 24 April 2014, New Delhi organized by Consulting Development Centre, New Delhi
Sh Manish Kumar Mandre Sh Nikhil Kaushik Ms Komalpreet Kaur	Seminar on 'Promoting Awareness & Usage of Slag : Ushering a New Era', 25 April 2014, New Delhi, Organised by FICCI and Ministry of Steel
Sh Rabindra Singh Sh Naga Kumar	Workshop on 10th Green Cementech 2014, 15-16 May 2014, Hyderabad organized by CII-Godrej GBC & CMA
Sh P S Rawat Sh Jagjit Singh	5th Annual conference on Tunnel Construction in India, 21-22 May 2014, New Delhi organized by India Infrastructure Publishing Pvt Ltd
Dr S K Breja	Reference Material Producer (RMP) Accreditation based on ISO guide 34:2009, 26 May 2014, India Habitat Centre, Lodhi Road, Delhi
Sh V V Arora Sh Satish Shrama	National Roads & Highways summit 2014, 15 July 2014, New Delhi, organized by PHD Chamber of Commerce and Industry
Sh Ravi Yadav Sh Jagmohan Garg	Workshop on Waterproofing Technologies in Construction Industry, 18-19 July 2014, New Delhi organized by PWD Govt. of India & Indian Concrete Institute
Sh N K Tiwary	Regional workshop for Asian Countries in Support for the ratification and early implementation of the Minamata Convention on Mercury organized by MoEF&CC, 18-20 September 2014, New Delhi
Sh S K Jain Sh Vishnu Dutt	Seminar on Mass Metrology, organized by Sartorius Weighing India Pvt. Ltd., 23 September 2014, Delhi
Sh Pritam Singh Rawat	International Seminar and Exhibition on Recent Development In Design and Construction of Precast Concrete Technology, 09-13 November 2014, Bengaluru organized by Association of Consulting Civil Engineers (India)

Sh Ashwani Pahuja	Conference & Exhibition on Cement Business & Industry in India 2014, 12-13 November 2014, New Delhi organized by GMI Global LLC, USA
Sh Nikhil Kaushik Sh Arun Sood	Seminar on Advanced Characterization of Cement and Concrete using Calorimetry, 03 December 2014, Delhi Organised by IIT Delhi
Sh Ashwani Pahuja Sh V V Arora Sh Satish Sharma Sh Brijesh Singh Sh Adarsh Kumar NS Sh Puneet Kaura	2 nd International Congress on Durability of Concrete 2014, 04-06 December 2014, New Delhi organized by Norwegian Concrete Association, Tekna, Indian Concrete Institute
Sh Ashwani Pahuja	3 rd Indian Cement Review Conference 2015, 17-18 January 2015, Mumbai organized by ASAPP Media Group
Sh Ashwani Pahuja	Workshop on Strategic Management & Managerial Effectiveness, 29- 31 January 2015, Goa organized by Management Development and Research
Sh Nitin Chowdhary	National Conference on Road Construction in India, 12 February 2015, New Delhi organized by PHDCCI, New Delhi.
Sh K R P Nath	2 nd International Conference on Enhanced Usage of Alternate Fuels and Raw Materials in the Cement Industry organized by CMA & IIP, 19-20 February 2015, New Delhi
Sh Rabindra Singh Sh Ankur Mittal Sh K P K Reddy Sh Prateek Sharma Sh Ramchandra Rao Sh V Nagakumar	2 nd CMA Workshop on AFR Utilization in Cement Industry, 19-21 February 2015, New Delhi

Papers Published

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

1. *Mineralizing effect of jarosite-a zinc industry by-product in the manufacture of OPC*, SK Agarwal, M M Ali, Ashwani Pahuja (National Council for Cement and Building Materials) and B K Singh, Sunil Duggal (Hindustan Zinc Limited), **Advances in Cement Research**, 2014, (<http://dx.doi/10.1680/adcr.13.00102>) (published online)
2. *Properties and performance of cement prepared using jarosite as mineralizer*, S K Agarwal, M M Ali, Ashwani Pahuja (National Council for Cement and Building Materials) and T N Suresh Kumar (Binani Zinc Limited), **ALITinform**, International Analytical Review, Cement. Concrete. Dry Mixtures, 3 (35), p.1-11, 2014.

3. *Zinc Industry by-product for gypsum substitute*, M M Ali, S K Agarwal, Ashwani Pahuja (National Council for Cement and Building Materials) and T N Suresh Kumar (Binani Zinc Limited), **World Cement**, November 2014, p.141-146.
4. *Studies on cement hydration in the presence of nanosilica* S Harsh, A K Arora, V Liju, M M Ali, **Cement International**, Vol 12(3), 74-78, 2014
5. *Investigation on geopolymetric cements based on alkali activation of low lime fly ash* R S Gupta, S Vanguri, A K Arora, V Liju, M M Ali, **Cement International**, Vol 12(5), 62-69, 2014
6. *Reaction mechanism of multi-blend cementitious systems-A review*, S K Chaturvedi and A K Sahu (Delhi Technological University), **The Indian Concrete Journal**, 88(7), p.75-83 (2014)
7. *Role of refractories in minimizing the shell corrosion phenomena in cement kilns in India*, **Cement and its Applications**, Saint Petersburg, Russia (2014)

Papers Presented in Seminars & Workshops etc.

2nd International Congress on Durability of Concrete, 04-06 December 2014, New Delhi, India

1. DURABILITY TESTING OF BLENDED CEMENT- RELATIONSHIP BETWEEN ACCELERATED TESTS & LONG TERM TESTS by Vir Vikram Arora and Puneet Kaura.
2. PERFORMANCE IMPROVEMENT OF CONCRETE STRUCTURES IN COASTAL ENVIRONMENT BY USE OF PORTLAND POZZOLANA CEMENT (FOR PRE-STRESSED CONCRETE) by Vir Vikram Arora, Brijesh Singh-NCB and K. Saravanan.
3. NON DESTRUCTIVE EVALUATION AND REPAIR AND STRENGTHENING OF CORROSION DISTRESSED RCC STRUCTURE – A CASE STUDY by Satish Sharma, Adarsh Kumar N S and Vir Vikram Arora.

Indian Power Stations-2015 the Operation and Maintenance Conference with Exhibition Theme - Fuel Adequacy, Organized by NTPC Limited, Noida 13-15 February 2015, New Delhi.

1. USE OF FLYASH MADE CONCRETE FOR ENHANCING DURABILITY OF CONCRETE STRUCTURES by Brijesh Singh & Vir Vikram Arora.

2nd CMA Intl. Conference on AFR, New Delhi, 19-21 February 2015

1. CONCEPT TO COMMISSIONING OF ALTERNATE FUELS IN CEMENT INDUSTRY by Ravinder Singh, A K Mishra, Ramachandra Rao.

Important Visitors

Mr. R N Jindal	Additional Director, Ministry of Environment and Forest, New Delhi
Dr B R K Pillai	Project Director- Central Water Commission, New Delhi
Mr. Hubert Bemba Milandou	Director, International Corporation, Ministry of Industry, Republic of Congo

International Linkages / Collaboration Programmes

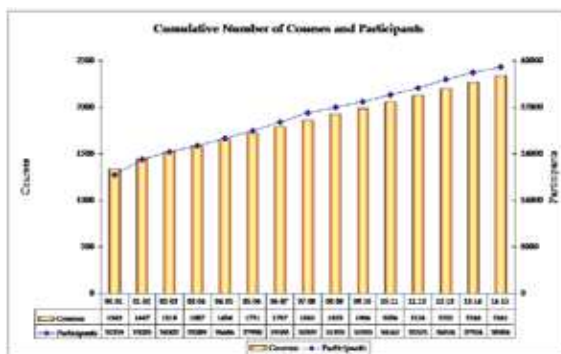
NCB has been actively interacting and liaising with a number of international bodies and exchanging knowledge and experience particularly in the area of cement and building materials industries.

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, 2344 training programmes have been organized. A total number of 38988 participants comprising of industry professionals and fresh graduates/post-graduates in science and different disciplines of engineering have been benefited. A number of Govt./Semi-govt./Private organizations both from India and abroad have availed the training services of NCB for their engineers and professionals.

During the year under report, 73 training courses were successfully organized and a total of 1060 participants have been benefited.

The highlights of the training programmes conducted are as under :



Long Term Course	1
Short Term Refresher Courses	25
Simulator Based Courses	8
Contact Training Programmes	15
Special Group Training Programmes	24

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 (wef 1998) by All India Council for Technical Education (AICTE), Ministry of Human Resource Development, Govt of India.

Eighteen self sponsored participants admitted for 2013-14 session, comprising of five chemical engineers and thirteen post graduates in chemistry, have successfully completed the course in July 2014. As in the past, all these students were placed in the cement industry. In the session 2014-15, twelve students were admitted in the course.

Short Term Refresher Courses

During the year, 25 Short Term Training Courses were organized wherein 484 professionals from cement and construction industries participated. In Cement Technology related area, special emphasis were given to such courses as Advances in Pyro-processing in Cement Industry; Calibration of Laboratory Equipment and Quality Assurance in Cement, Construction and Process Industries, Instrumental Methods of Analysis and Quality Control; Advanced Mining Techniques and Practices 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 etc..

In Concrete and Construction related areas, the training 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; Non – Destructive Testing and Evaluation of Concrete Structures; Concrete Mix Proportioning Quality Control and Specification; Repair and Retrofitting of Concrete Structures including Water Proofing Materials and Techniques; Modern Construction Practices.

Simulator Based Courses

With the aim of providing comprehensive training on various aspects of kiln and mill operation, eight training courses on Advanced Simulator Trainer were organized at NCB's Ballabgarh and Hyderabad Units for 41 professionals from various cement industries



Senior Officers of Indian Air Force at a training programme on sampling, testing and evaluation of concrete making materials



Trainees are given demonstration at a clinker yard



Trainees are interacting with NCB experts at Ballabgarh Unit

of India and neighboring 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, fifteen 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:

- Physical Testing of Cement
- Calorific Value and Proximate Analysis of Coal
- Characterization of Cement, Raw Materials and Raw Mix by Different Thermal Analysis
- EDTA Method of Analysis of Cement and Raw Materials
- Proximate and Ultimate Analysis of Coal
- Chemical Testing of Cement

Special Group Training Courses

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

a) Indian Organisations

Delhi Metro Rail Corporation Ltd (DMRC Ltd) ; J K Lakshmi Cement Ltd ; Hindustan Petroleum Corpn Ltd ; A K S University ; Minor Irrigation, Deptt of Water Resources, Govt of Tamil Nadu; National Hydroelectric Power Corporation (NHPC Ltd); Nanjing C-HOPE Cement Engg. Group; Military Engineering Services; NTPC Ltd and NHDC Ltd

b) Overseas Organisations

M/s Oman Cement Company, Sultanate of Oman and M/s Dungsum Cement Co Ltd, Bhutan.



Hands on Practice Session of Simulator for Cement Plant Operation

Training / Retraining of NCB Personnel

Sl No	Name of the Official	Title of Course	Name and address of Training Organisation	Duration and Period
1 2	Sh S K Chaturvedi Sh R K Goswami	Laboratory Management System and Internal Audit	Centre for Electronics Test Engineering, Bangalore	4 days 02-05 April 2014
3 4 5	Sh Vijay Kumar Ms Beauty Chopra Sh Praveen Kumar	Sampling, Testing and Evaluation of Concrete Making Materials and Concrete	Centre for Continuing Education Services (CCE), NCB	4 days 20-23 May 2014
6 7 8 9 10	Sh Brijesh Singh Sh Manish Mandre Sh Nikhil Kaushik Sh Arun Sood Ms Poonam Rani	Calibration of Laboratory Equipment and Quality Assurance in Cement, Construction and Process Industries	Centre for Continuing Education Services (CCE), NCB	3 days 28-30 May 2014
11	Sh Lalit Kumar	Quality Control & Quality Assurance in Concrete Construction	Centre for Continuing Education Services (CCE), NCB	5 days 04-08 Aug 2014
12	Sh Sahil	Concrete Mix Design and Acceptance Criteria	Centre for Continuing Education Services (CCE), NCB	3 days 20-22 Aug 2014
13 14 15	Sh Nihar Ranjan Dhaneer Sh Ajay Rana Sh Mahesh Mishra	Sampling and Testing of Cement as per BIS Standards	Centre for Continuing Education Services (CCE), NCB	3 days 10-12 Nov 2014
16	Sh Ankit Sharma	Non-Destructive Testing and Evaluation of Concrete Structures	Centre for Continuing Education Services (CCE), NCB	3 days 12-14 Nov 2014
17 18	Sh Manish Mandre Sh Nikhil Kaushik	Shotcrete Technology	Centre for Continuing Education Services (CCE), NCB	1 day 28 Nov 2014
19	Dr S K Breja	Reference Material Producers Accreditation	NABL Gurgaon	3 days 24-26 Nov 2014
20 21 22	Dr Ashok Kumar Dikshit Sh M N K Prasad Bolisetty Sh Pradeep Kumar	Cement Chemistry & Manufacturing Process	Centre for Continuing Education Services (CCE), NCB	2 days 01-02 Dec 2014
23 24 25 26	Sh Ravinder Singh Sh Ankur Mittal Sh Prateek Sharma Sh Ramchandra Rao	Energy Conservation and Management in Cement Industry	CII, Training Programme, New Delhi	1 day 21 Jan 2015

CENTRE FOR QUALITY MANAGEMENT, STANDARDS AND CALIBRATION SERVICES – CQC

The activities of the Centre for Quality Management, Standards and Calibration Services are organized 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 six new Proficiency Testing (PT) schemes were completed in accordance with ISO17043:2010. The centre has completed four sponsored projects during the year.

Total Quality Management

Under this programme, Centre for Quality Management, Standards and Calibration Services (CQC) assessed the quality assurance system of a cement plant and a clinker grinding unit. This study dealt with the capability of the quality management and assurance system of the units in attaining the quality objectives. Further, the centre also assisted one cement plant in documentation and implementation of quality management system in line with ISO 17025:2005 and NABL accreditation. The centre organized a four-day training workshop on ISO 17025:2005, internal audit and management review at a cement plant and a similar two-day workshop at a NTPC plant.



Inaugural session of the Workshop on ISO 17025 and Internal Audit at NTPC, Korba. Sitting (from left) on the dais are Dr SK Breja, Joint Director NCB, Shri Anoop Mishra, AGM (FQA), Shri A Karunakaran AGM (HR-EDC), NTPC, Korba

Presently, Ballabgarh and Hyderabad units of NCB are in the third cycle of ISO 9001:2008 certification. To ensure continued effectiveness of the quality management system, TQM organized a training workshop on ISO 9001:2008 requirements and internal audit for

24 NCB officials at Ballabgarh. During the year, NCB successfully underwent surveillance audit of NCB to ISO 9001:2008 Quality Management System (QMS). The continuation of certification by M/s BMS Certification reflected NCB's commitment to ensuring excellence of processes and products and customer satisfaction.

Inter Laboratory Services

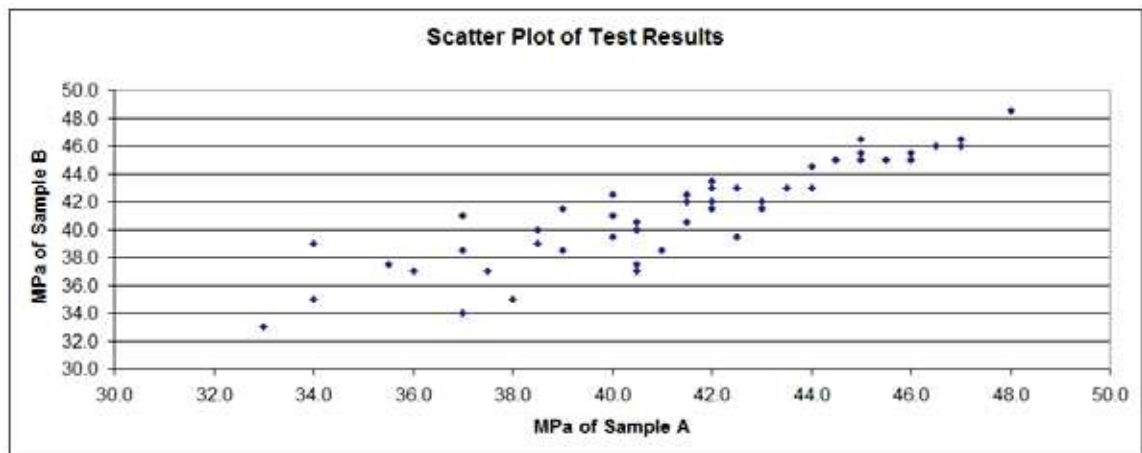
In 2013, Inter Laboratory Services (ILS) programme of the Centre received first NABL accreditation for PT provider as per ISO/IEC 17043: 2010 in the country, and successfully completed PT schemes on Portland Pozzolana Cement (PPC) in chemical testing (ILS/PT/01) and mechanical testing (ILS/PT/02) after the accreditation. Thereafter, schemes on fly ash in chemical testing (ILS/PT/03) and mechanical testing (ILS/PT/04) were completed.

Inter Laboratory Services (ILS) implemented QMS in line with ISO 17043:2010 as per accreditation norms. It underwent NABL assessment for enhancement in scope of accreditation. In 2014-15, the scope was enhanced to include limestone and coal, apart from cement and fly ash. In 2014-15, ILS completed six PT schemes on materials like: coal, limestone, OPC, aggregate and water used in construction (as per IS 456). These schemes were implemented in accordance with ISO 17043:2010. The details are given in the *Table*.

PT Schemes Completed During the Year 2014-15

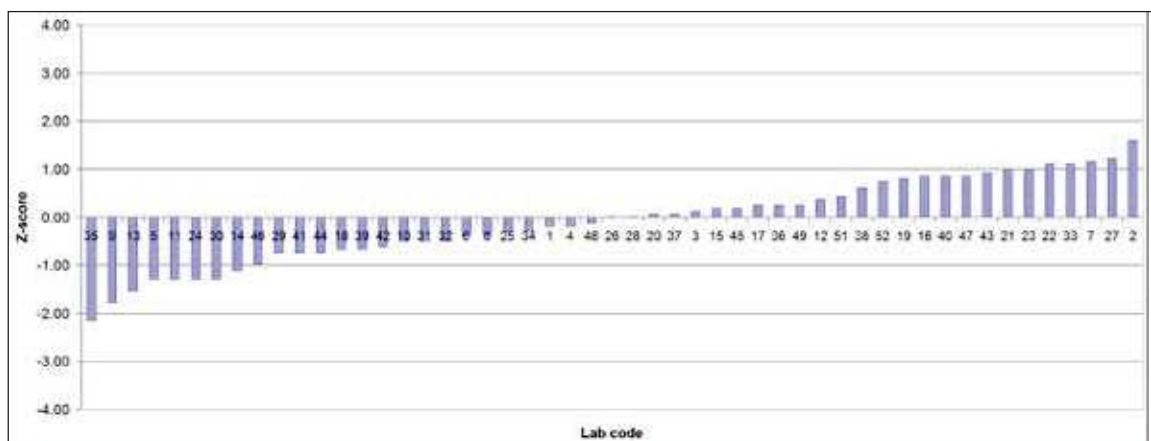
Sl. No.	PT Item	Field	Parameters	No. of Participants
1.	Coal	Chemical	Moisture; Volatile Matter; Ash; Calorific Value; Sulphur	36
2.	Limestone	Chemical	Loss on Ignition (LOI); Silica (SiO ₂); Iron Oxide (Fe ₂ O ₃); Alumina (Al ₂ O ₃); Calcium oxide (CaO); Magnesia (MgO)	22
3.	OPC	Chemical	Loss on Ignition (LOI); Silicon dioxide (SiO ₂); Iron oxide (Fe ₂ O ₃);	32
4.	OPC	Mechanical	Specific surface (Blaine fineness); Setting time; 3 day (72 hrs) comp strength; 7 day (168 hrs.) comp strength	52
5.	Aggregate (coarse and fine)	Mechanical	Apparent specific gravity	29
			Water absorption	
6.	Water	Chemical	Organic (volatile) filterable residue; Inorganic (fixed) filterable residue; Sulphates (as SO ₃); Chlorides (as Cl); Suspended (non-filterable) matter	19

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. The scatter of results shows data relationship and presence of bias in most of the parameters. The results of 7-day compressive strength, presented in the *figure*, show a strong positive relationship between two sets of data. Laboratories were given the feedback of their performance.



Scatter Plot of 7-day (168 hrs) compressive strength results in OPC

Overall status of performance of the laboratories, indicating number of outliers and questionable performers (presented in bar-chart) for reproducibility error (between laboratories variation) and repeatability error (within laboratory variation), was presented in the study report.



Bar Chart of Reproducibility-7-day (168 hrs) compressive strength in OPC

A comparison of performance with the scheme completed in 2012-13 shows that number of questionable performers, presented in the following table, has significantly increased for final setting time and 3-day and 7-day compressive strength in repeatability test. Number of outliers has significantly increased for Blaine fineness test in both reproducibility and repeatability test. This situation might have arisen due to excellent growth witnessed in cement and construction sector and setting up of new testing laboratories.

Comparison of Performance of Laboratories in Two OPC Schemes

Parameter	N	Number of questionable performers ($2 < Z < 3$)		Number of outlying performers ($Z \geq 3$)	
		Between Labs (Reproducibility)	Within Lab (Repeatability)	Between Labs (Reproducibility)	Within Lab (Repeatability)
Blaine fineness (m ² /kg)	45 (22)	2 (Nil)	2 (Nil)	4 (Nil)	8 (1)
Initial setting time (minutes)	51 (22)	1 (1)	3 (4)	1 (2)	2 (2)
Final setting time (minutes)	51 (22)	2 (3)	7 (2)	2 (Nil)	4 (3)
3-day compressive strength (MPa)	51 (22)	2 (Nil)	6 (Nil)	Nil (Nil)	3 (Nil)
7-day compressive strength (MPa)	51 (22)	1 (1)	7 (1)	Nil (2)	3 (2)

Note: Figures in parentheses indicate data of previous scheme (2012-13) and outside of 2014-15 scheme.

Standard Reference Materials

Standard Reference Materials Programme of the Centre has developed 11 new types of certified reference materials and made available to the industries during the year. With this, NCB has become the first organization in the world providing new CRMs for a range of mechanical parameters. 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 NABL accreditation. Now, NCB has a wide range of CRMs for chemical and mechanical parameters of cement and fly ash. So far, 68 types of CRMs have been developed.

New CRMs Developed During the Year

Sl. No.	Material	CRM No.	Parameter	Quantity/Packing
1.	OPC	1032A	Normal consistency	1 kg (2 x 500 g)
2.	PPC	1032B	Normal consistency	1 kg (2 x 500 g)
3.	OPC	1033A	Setting time	1 kg (2 x 500 g)
4.	PPC	1033B	Setting time	1 kg (2 x 500 g)
5.	OPC	1034A3	3-day (72 hrs.) Compressive strength	600 g (3 x 200 g)
6.	OPC	1034A7	7-day (168 hrs.) Compressive strength	600 g (3 x 200 g)

Sl. No.	Material	CRM No.	Parameter	Quantity/Packing
7.	OPC	1034A28	28-day (672 hrs.) Compressive strength	600 g (3 x 200 g)
8.	PPC	1034B3	3-day (72 hrs.) Compressive strength	600 g (3 x 200 g)
9.	PPC	1034B7	7-day (168 hrs.) Compressive strength	600 g (3 x 200 g)
10.	PPC	1034B28	28-day (672 hrs.) Compressive strength	600 g (3 x 200 g)
11.	Fly ash	1035	Lime reactivity	300 g (2 x 150 g)

During the year 2014-15, 8 CRMs of physical and chemical parameters were also developed for replenishing exhausted stock. These CRMs will meet the quality standardization and assurance needs of cement and allied materials testing laboratories.

CRMs of Physical Properties Developed During the Year for Replenishing Exhausted Stock

Sl. No.	Materials/Parameter	CRM Code	Certified Value
1.	OPC (Blaine fineness)	1001A15	271 m ² /kg
2.	OPC (Blaine fineness – higher)	1001C5	400 m ² /kg
3.	PPC (Blaine fineness)	1002A8	343 m ² /kg
4.	Fly ash (Blaine fineness)	1001FC4	485 m ² /kg

CRMs of Chemical Parameters Developed During the Year for Replenishing Exhausted Stock

Sl. No.	Materials/Usage	CRM Code	Parameter
1.	OPC for chemical analysis	1012L	LOI, SiO ₂ , Fe ₂ O ₃ , Al ₂ O ₃ , CaO, MgO, Mn ₂ O ₃ , TiO ₂ , P ₂ O ₅ , SO ₃ , IR, Na ₂ O, K ₂ O & Cl
2.	PPC for chemical analysis	1016D	LOI, MgO, SO ₃ , IR, Na ₂ O, K ₂ O & Cl
3.	Gypsum for chemical analysis	1007B	Combined water, SiO ₂ (+Acid insoluble), R ₂ O ₃ , CaO, MgO, SO ₃ , Cl, & Purity
4.	Hydrated lime powder for LR test	1010	CaO, MgO, SiO ₂ , IR, specific gravity & Residue on 212 µm sieve

Supply of developed Certified Reference Materials (CRMs) was continued to the cement and construction industry laboratories. A total of 10319 vials of different CRMs and 1617 sets of standard lime were supplied to 586 customers from cement plants, testing laboratories and R&D institutions. The supplies of CRM sets increased by 37% and lime sets by 6% during 2014-15, compared to 2013-14.

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. 1521 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 606 clients. Satisfaction of customers from the calibration services showed significant improvement on timeliness, work quality and interaction dimensions.

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 2014 was held on 16 December 2014 in New Delhi when it adopted the Annual Report, the Audited Accounts and Balance Sheet for the year 2013-14.

Board of Governors

The composition of the Board for the year 2015 is given in the beginning of the report.

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 2015 is:

Chairman

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



50th Adjourned Annual General Meeting held on 06 May 2014

Members

Dr Subrato Chowdhury
Chief, Research and Development
UltraTech Cement Ltd
Ahura Centre, 1st Floor,
Mahakali Caves Road,
Andheri (East), Mumbai

Shri S S Jain
President
Mangalam Cement Ltd
Dist. Kota (Rajasthan)

The Secretary
Bureau of Energy Efficiency
New Delhi

Shri A Jha
Sr. Vice President (Prod.)
Birla Corporation Ltd
Birla Cement Works &
Chandaria Cement Works,
Chittorgarh- (Rajasthan)

The Director
National Physical Laboratory
New Delhi

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

Dr S A I Mujtaba
Suptdg. Geologist
Geological Survey of India
Faridabad (Haryana)

Dr K C Narang
Adviser (Technical)
Dalmia Bharat Enterprises Limited
New Delhi

The Chairman and Managing Director
National Research Development Corpn
New Delhi

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

Dr Achal Kumar Mittal
Scientist 'F'
Head, Structural Engg. Division
Central Building Research Institute
Roorkee (UK)

Dr M Salahuddin
Director - Clean Technology Division
Ministry of Environment
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)

Shri Satish Gurtoo
Joint President
(Elect., Instrument & Powerhouse)
Century Cement
P.O. Baikunth
Distt Raipur, (Chattisgarh)

The Director
Central Pulp & Paper Research Institute
Saharanpur (UP)

The Chief Mineral Economist
Indian Bureau of Mines
Indira Bhavan, Civil Lines
Nagpur

Shri Jose Kurien
Chief Engineer
Delhi Tourism and Transportation
Corporation Ltd
New Delhi

The Director
Structural Engineering Research
Centre (SERC)
Chennai

Shri Rakesh Bhargava
Chief Climate and Sustainability Officer
Shree Cement Ltd
Beawar, 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
New Delhi

Shri Manoj Kumar Jha
President – Technical
Prism Cement Ltd
P.O. Bathia, Distt. Satna (MP)

Dr Bibekanand Mohapatra
VP (New Product Development and
Product Quality Management)
Ambuja Cements Ltd
Andheri-Kurla Road, Andheri (E),
Mumbai

The Member Secretary
Central Pollution Control Board
Delhi

The Director
Central Road Research Institute
Delhi-Mathura Road,
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 Jitander Kumar
Plant Head
Heidelberg Cement India Ltd
District Tumkur (Karnataka)

Dr S B Hegde
Vice President-Quality and Material Development
Reliance Cement Company Pvt Ltd,
Navi Mumbai

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

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

Shri Sanjay Joshi
Vice President – CCP
Lafarge India Pvt Ltd
Chittor Cement Plant
Distt.-Chittorgarh (Rajasthan)

Shri Ashwani Pahuja
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 2015 is:

Chairman

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

Members

Shri V S Bajaj
Senior President (Corporate Affairs)
Jaiprakash Associates Ltd (Cement Division)
Noida (UP)

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

Shri S K Chakraborty
Scientist 'F'
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
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

Dr Subrato Chowdhury
Head R&D, Cement Division
Ultra-Tech Cement Ltd
Andheri (East), Mumbai

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)

Shri Ashwani Pahuja
Director General NCB

Directors,
HOC's and Joint Directors and Heads of
Concerned Services
Groups of 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 2015 is:

Chairman

Dr S Chouksey
Wholetime Director
JK Lakshmi Cement Ltd
New Delhi

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 R Muralidhar
Vice President
The India Cements Ltd
New Delhi

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

Shri Ashwani Pahuja
Director General NCB

Directors,
HOC's and Joint Directors and
Heads of Concerned Services
Groups of NCB

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 2015 is:

Chairman

Shri V S Narang
Director – Technical
My Home Cements Ltd
Hyderabad

Members

Shri Animesh Banerjee
President (Cement Division)
Vasavadatta Cement
Dist. Gulbarga, Karnataka

Shri N B Singh
Senior Joint President (Technical)
Jaypee Balaji Cement Project
Jaggayyapet, Distt-Krishna

Shri S K Gupta
Exe. President & Unit Head
Rajashree Cements Ltd
Gulbarga (Karnataka)

Shri A K Pillai
Director & CEO
JSW Cement Ltd
Hyderabad

Shri D Lakshmikantham
Director
Penna Cement Ind. Ltd
Hyderabad

Shri K N Rao
Director (Energy & Environment)
ACC Limited
Environment & Energy Conservation Cell
Thane (Maharashtra)

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

The Scientist 'F' & Head
Bureau of Indian Standards
Manoranjan Building
Hyderabad

Shri N V S Reddy, IRAS
Managing Director
Hyderabad Metro Rail Ltd
Hyderabad

Shri P N Sharma
The Regional Controller of Mines
Indian Bureau of Mines (IBM)
Ministry of Mines, Govt. of India
Kawadiguda, Secunderabad

The Chief Engineer
Southern Zone – II
Central Public Works Department (CPWD)
Hyderabad

The Director
Dept. of Mines & Geology
Govt. of Telangana
Hyderabad

The Director
Dept. of Mines & Geology
Govt. of Andhra Pradesh
Hyderabad

The Member Secretary
A.P. State Pollution Control Board
Paryavaran Bhawan, Hyderabad

The Member Secretary
Telangana State Pollution Control Board
Hyderabad

The Engineer-in-Chief
(State Roads Division)
Roads & Buildings Department
Govt. of Andhra Pradesh
Hyderabad

The Chief Engineer
Greater Hyderabad Municipal Corporation
(GHMC), Hyderabad

The Regional Manager
L & T Ltd ; ECC Division
Hyderabad

Dr Rateesh Kumar
Associate Dean (P&D)
Civil Engineering Department
National Institute of Technology (NIT)
Warangal

Member-Secretary

Shri M S Rao
Joint Director & Unit-in-Charge of
NCB–Hyderabad

Executive Committee (EC)

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 6 meetings and deliberated upon important issues including approving proposals for 291 sponsored projects.

Forum for Science and Technology (FST)

During the period one meeting of FST was 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.	09 January 2015	“Development of Nano Silica particles by Green approach for Cement and Concrete” by Dr A K Dikshit, General Manager, NCB.
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ORGANISATIONAL MATTERS

Staff Particulars

NCB had strength of 201 Cadre Officials comprising of engineers, scientists and technical and administrative support staff as on 31st March 2015 engaged in the activities of the organization.

Staff Welfare

NCB continued to look after the welfare of its staff through several activities. During 2014-15, 82 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 2014-15.

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 A Pahuja DG-NCB addressing NCB staff and their families on the occasion of Republic Day at Ballabgarh unit

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 includes Universal Testing Machine (UTM), Automatic Compression Testing Machine (ACTM), Physical Testing Laboratory, Spectrophotometer, Flame photometer, RCPT, Triaxial Testing Machine, CBR Testing Machine, Consolidation Testing Machine, Cone penetrometer and Non-Destructive Testing (NDT) equipment such as Rebound hammer and Feroscan. 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



Carbonation Chamber

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, CO₂ Gas Analyser, Ultrasonic Gas Leak Detector and Low Level BTX Hydrocarbon Analyser for ambient air etc. 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



X-Ray Diffractometer



ICP-Atomic Emission Spectrometer



Thermal Analyzer



X-ray Fluorescence Spectrometer

Laboratory Information Management System (LIMS).

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 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.

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 organizations, 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, Editorial Board, J Cement Energy and Environment, Cement Manufacturers' Association
- (i) Member, Technical Committee, Cement Manufacturers' Association

- (j) Member, Research Council of CSIR-CRRI

Dr M M Ali **Joint Director**

- (a) Member, Cement and Concrete Sectional Committee (CED 2), Bureau of Indian Standards, New Delhi.
- (b) Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi.
- (c) Member, Cement, Pozzolana and Cement additives Subcommittee (CED: 2:1), Bureau of Indian Standards, New Delhi.
- (d) Member, Building Limes Sectional Committee (CED4), Bureau of Indian Standards, New Delhi.

Dr Shri Harsh **Joint Director**

- (a) Member, Panel for Revision of Cement Standards (CED 2:1/P1), Bureau of Indian Standards, New Delhi.
- (b) Member, Methods of Analysis Sub Committee (PCD 7:4), Bureau of Indian Standards, New Delhi.

Shri S K Chaturvedi **Joint Director**

- (a) Member, Refractories Sectional Committee (MTD 15), 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 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 Beneficiation & 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 Rabindra Singh
Joint Director

- (a) Member, Solid Mineral Fuels Sectional Committee (PCD 7), Bureau of Indian Standards, New Delhi.
- (b) Member, Coke Sub Committee (PCD 7:2), Bureau of Indian Standards, New Delhi.
- (c) Member, Coal Sub Committee (PCD 7:3), Bureau of Indian Standards, New Delhi.

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) Member, H-3 Rigid Pavement Committee, Indian Road Congress, 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.

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.

Shri N K Tiwari

General Manager

- (a) 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, Air Quality Sectional Committee (CHD 35), Bureau of Indian Standards, New Delhi.

Shri Brijesh Singh

Manager

- a) Member, B-4 Concrete (Plain, Reinforced and Pre-stressed) Structure Committee, Indian Road Congress, 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 Precalculator 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 : Inter-Laboratory 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 2014-15

Sl. No.	Project No.	Project Title	Date of Commencement	Target Date of Completion
1	EMG-03	Studies on Evaluation of Technologies for Co-Generation of Power Utilizing Waste Heat in Cement Manufacture	April 2013	March 2015
2	PSD-01	Development of System Design for Storage, Handling and Firing of Different Types of Alternate Fuels/Waste in Cement Plants	April 2012	March 2015
3	CON-10	Development of accelerated mix design method for concrete using PPC or fly ash with OPC	April 2012	Sep. 2014
4	INT-02	Testing Services as per Standard Specifications and Established Procedures	April 2014	March 2015
5	GMR-08	Updating of National Inventory Cement Grade Limestone Deposits	April 2014	March 2015
6	EMG-01	Study of Energy, Environment and Quality Performance Achievements and Creating Conditions for their Consistent Improvement	April 2014	March 2015
7	INF-01	Collection, Storage, Retrieval and Dissemination of Bibliographical and Other Technical Information	April 2014	March 2015
8	PBL-01	Dissemination of Research Results and Information on NCB	April 2014	March 2015
9	SMC-01	Organization of National and International Seminars/Conferences	April 2014	March 2015
10	HRD-01	Long Term Courses	April 2014	March 2015
11	HRD-02	Updating Knowledge and Skills of NCB Officials	April 2014	March 2015
12	CCE-02	Short Term Courses	April 2014	March 2015
13	CCE-03	Contact Training Programmes for Industrial Personnel	April 2014	March 2015
14	CCE-06	Special Programmes for Industry Personnel from India and Abroad	April 2014	March 2015
15	SBC-01	Simulator Based Courses	April 2014	March 2015
16	CLS-01	Calibration Services	April 2014	March 2015
17	SRM-01	Development of Standard Reference Materials	April 2014	March 2015
18	SRM-02	Supply of Standard Reference Materials	April 2014	March 2015

Appendix - III

Sponsored Projects Completed During the Year 2014-15

Sl. No	SP. No.	Project Title	Sponsor
CENTRE FOR CEMENT RESEARCH AND INDEPENDENT TESTING (CRT)			
1.	2811	Feasibility study for the use of jarosite in cement manufacture.	Hindustan Zinc Ltd, Udaipur, Rajasthan.
2.	3242	Cement quality monitoring services.	JSW Cement Ltd, Kurnool, Andhra Pradesh
3.	3257	Investigations on technical suitability of gypsum prepared with jarosite and marble slurry as set controller for cement manufacturing.	Hindustan Zinc Ltd, Udaipur, Rajasthan.
4.	3288	Cement quality monitoring services.	Penna Cements Industries Ltd, Andhra Pradesh
5.	3431	Investigations on technical suitability of jarofix/ jarosite as set controller in performance of cement.	Binani Zinc Ltd, Ernakulam, Kerala.
6.	3485	Testing of physical and chemical properties of fly ash as per IS:3812(1)-2013.	NTPC, Vindhyanchal, Madhya Pradesh
7.	3512	Establishing limestone consumption factor.	KCP Ltd,
8.	3577	Assessment of technology papers identified in India cement technology roadmap.	Confederation of Indian Industries for ACC Ltd, Bargarh, Cement works, Bargarh, Odisha
9.	3637	Establishing limestone consumption factor.	ACC, Kymore, Madhya Pradesh
10.	3673	Investigations on coarse and fine sand generation as by product during clay beneficiation as replacement of natural sand in construction.	English Indian Clay Ltd, (EICL) Trivandrum, Kerala.
11.	3719	Investigations on utilization of by-product sand in the manufacture of cement .	English Indian Clay Ltd, (EICL) Trivandrum, Kerala.
12.	3720	Characterization and evaluation of raw materials, fuel and clinker samples.	Trinetra Cement Works, Mahi Cement, Banswara, Rajasthan.
13.	3721	Establishing limestone consumption factor.	Penna Cement Industries Ltd, Tandur, Telengana.
14.	3737	Establishing limestone consumption factor.	Sree Jayajothi Cements Ltd (A unit of My Home Industries Ltd,) Kurnool, Andhra Pradesh
15.	3741	Establishing limestone consumption factor.	Orient Cement Ltd, Adilabad, Telengana.

Sl. No	SP. No.	Project Title	Sponsor
16.	3751	Establishing limestone consumption factor.	Ultra Tech Cement Ltd (Unit : Awarpur Cement Works), Awarpur
17.	3764	Utilization of copper granulated slag from Indian Copper Complex, Ghatshila, Jharkhand, in the cement industry.	Hindustan Copper Ltd, Kolkata, West Bengal.
18.	3775	Investigations on technical suitability of unutilized materials such as ETP sludge, iron oxide sludge and dry Iron oxide in the manufacture of cement.	Kerla Minerals and Metals Ltd, Kerala.
19.	3804	Establishing limestone consumption factor.	Vikram Cement Ltd, Khor, Madhya Pradesh
20.	3828	Establishing limestone consumption factor.	ICL, Malkapur.
21.	3832	Establishing limestone consumption factor.	India Cement Ltd, (Sankari Cement Works), A.P.
22.	3850	Expert services for verification of the rock strata encountered during the execution of the under ground drainage scheme at Palitana.	Gujarat Urban Development Co. Ltd, Ghandhi Nagar, Gujarat.
23.	3852	Establishing limestone consumption factor.	ICL, Chilamkur
24.	3875	Investigations on lump formation in cement bags.	Lafarge India Pvt Ltd, Bhiwani Cement Plant.
25.	3929	Burnability study of raw mix.	Anjani Portland Cement Ltd, Nalgonda, Telangana
26.	3960	Characterization and physical testing of slag based cement like material.	Navrattan Blue Crete Industries Pvt Ltd, New Delhi
27.	3993	Optimization of raw mix design for production of quality clinker	Thyssen Krupp Industries India Pvt Ltd, Pune
CENTRE FOR MINING, ENVIRONMENT, PLANT ENGINEERING & OPERATION (CME)			
28.	2164	Development of “Comprehensive Industry Document (COINDS) and Environmental Standards for Plywood Industry.	CPCB, Delhi
29.	3507	Preparation of TEFr for modernization of packing plant at Walayar.	Malabar Cements Ltd
30.	3508	Preparation of DPR for capacity enhancement of cement grinding section at Walayar.	Malabar Cements Ltd
31.	3730	TEFr for setting up 1 mtpa clinkerisation unit at Bissel, Kenya and 2 x 0.6 mtpa grinding units at Kisumu, Kenya and Arusha, Tanzania.	East African Portland Cement Company Ltd
32.	3805	Assessment of losses during installation & commissioning of RABH.	Malabar Cements Ltd, Kerala.

Sl. No	SP. No.	Project Title	Sponsor
33.	3822	Assessment of Technology.	Toshali Cements Pvt Ltd, Andhra Pradesh
34.	3838	Techno-Economic Viability Study of cement mill venting system.	Malabar Cements Ltd, Kerala.
35.	3856	Estimation of WHR potential.	Malabar Cements Ltd, Kerala.
36.	3952	Mandatory Energy Audit.	Ambuja (Maratha Cement Works)
37.	4040	Bulk density, Recovery Factor Studies & Quantitative and Qualitative Assessment of Limestone from Dumps lying at Pathapadu Block within ML Area at Banaganapalle Cement Works.	Sree Jayajothi Cements Limited, Andhra Pradesh
38.	4122	Mandatory Energy Audit.	Prism cement Ltd- Satna
39.	4125	Cement status and possible future trends in cement industry sector.	The Energy and Resources Institute (TERI)
40.	4147	Mandatory Energy Audit.	Ambuja Rabriyawas Cement Works
CENTRE FOR CONSTRUCTION DEVELOPMENT AND RESEARCH (CDR)			
41.	2229	Third Party Quality Assurance/Quality Audit for Construction of Pucca M.C Pry School Building at North Gonda, Shahdara	Executive Engineer (Project) (Shah-N)-II, East Delhi Municipal Corporation, New Usmanpur, Delhi
42.	2269	Third Party Quality Assurance/Quality Audit for Construction of RUB on Auchandi Road connection G.T Road to Badli Industrial Area (on Delhi-Ambala Road)	Executive Engineer (Pr) CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
43.	2512	Third Party Quality Assurance/Quality Audit for Construction of M.C. Pry. School Building at New Ranjit Nagar in KBZ	Executive Engineer-I/KBZ, North Delhi Municipal Corporation, Karol Bagh Zone
44.	2514	Third Party Quality Assurance/Quality Audit for (i) Construction of Double Storey Community Centre at Ber Sarai Village (ii) Construction of open surface drain from Lado Sarai Tube Well to MB road in Lado Sarai Village	Executive Engineer (Pr) South-II, South Delhi Municipal Corporation, Sewa Nagar, New Delhi
45.	2599	Third Party Quality Assurance/Quality Audit for Installation of Pumps at Underground Sump Well Near Zeenat Mahal Sr. Sec. School on Road No.66, Jafrabad, Maujpur	Executive Engineer (Shah-N)-II, East Delhi Municipal Corporation, New Usmanpur, Delhi

Sl. No	SP. No.	Project Title	Sponsor
46.	2606	Third Party Quality Assurance/Quality Audit for Improvement & Strengthening of Road along G.T.B Enclave from Road No.69 to Road No.68 in AC-45, Shahdara North	Executive Engineer (Shah-N)-I, East Delhi Municipal Corporation, Geeta Colony, Delhi
47.	2658	Third Party Quality Assurance/Quality Audit for Construction of Poly Clinic at Karwal Nagar, Shiv Vihar	Executive Engineer-Proj (Shah-N-II), East Delhi Municipal Corporation, New Usmanpur, Delhi
48.	2688	Third Party Quality Assurance and Quality Audit for Canal Lining Works and Dam Structures in Gujarat Region	Sardar Sarovar Narmada Nigam Ltd, Gandhinagar, Gujarat
49.	2759	Third Party Quality Assurance/Quality Audit for Construction of Community Hall at Sant Ravidas Nagar (Jahangirpuri) adjoining Babu Jagiwan Ram Hospital C-5/CLZ	Executive Engineer (Pr)-CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
50.	2884	Third Party Quality Assurance/Quality Audit for Repair & Strengthening of RCC Columns and Roof Slabs in Block G-2 for the Work of Construction of 457 MS HIG Dwelling Units in Sector 18B, Dwarka Phase-II, Pkt-II, Delhi	Executive Engineer, WD-8, Delhi Development Authority, Dwarka, Delhi
51.	2915	Third Party Quality Assurance/Quality Audit for Improvement Development of left out lanes of Pkt. -A-1,A-2,A-3 Mayur Vihar Phase-III [---] by providing RMC from in Gharoli in Ward No. 216	Executive Engineer(Pr)-II, East Delhi Municipal Corporation, Asaf Ali road, Delhi-02
52.	2919	Third Party Quality Assurance/Quality Audit for Construction of Parking and face lifting the surrounding of Hanuman Mandir Yamuna Bazar near ISBT in C-77/CLZ	Executive Engineer (Project)-I/CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
53.	2922	Third Party Quality Assurance/Quality Audit for Development of road from Ratia Marg to M C Pry. School in G-Block Sangam Vihar East in Ward No.188/Central Zone(Gali No.12)	Executive Engineer (M-III) Central Zone, South Delhi Municipal Corporation, Lajpat Nagar New Delhi
54.	2954	Third Party Quality Assurance/Quality Audit for work of Construction of Community hall at A block Dilshad Colony, Shahdara(North) in New Seemapuri	Executive Engineer (Pr)-I, Shahdara North Zone, East Delhi Municipal Corporation, Geeta Colony, Delhi
55.	2956	Third Party Quality Assurance/Quality Audit for work of Construction of M C Pry. School by Providing from at Janta Mazdoor Colony, Shahdara (North) Zone in Janta Colony	Executive Engineer (Pr)-I, Shahdara North Zone, East Delhi Municipal Corporation, Geeta Colony, Delhi
56.	2972	Third Party Quality Assurance/Quality Audit for work of Construction of Gym. Library recreation centre at FU block Pitampura Ward No. C-54 in Rohini Zone	Executive Engineer(Project)-I/ Rohini Zone, North Delhi Municipal Corporation, Sector-17 Rohini, Delhi

Sl. No	SP. No.	Project Title	Sponsor
57	2980	Third Party Quality Assurance/Quality Audit for work of Construction of M C Pry. School Building at Dilshad Colony ward no. 240 in Shahdara (North)Zone	Executive Engineer (Project) Shah N-I, East Delhi Municipal Corporation, Geeta Colony, Delhi
58	2995	Third Party Quality Assurance/Quality Audit for work of Construction of M C Pry. School Building Block-27 Trilokpuri Ward No.211	Executive Engineer (Pr.)-II/Shahdara South Zone, East Delhi Municipal Corporation, Asaf Ali Road, Delhi
59	2997	Third Party Quality Assurance/Quality Audit for work of Remodeling and Construction of cunnit of Nallah No.4 from Culvert behind NSG Camp to Culvert outer ring road in R K Puram in Ward No.168 South Zone.	Executive Engineer (Pr) South-I, South Delhi Municipal Corporation, Sewa Nagar, Delhi
60	3051	Third Party Quality Assurance/Quality Audit Work for Construction work of various buildings, allied services & infrastructure works at new market yard, Vill : BEDI, APMC-RAJKOT	Agriculture Produce Market Committee (APMC), Sardar Vallabhbhai Patel Market Yard, Pedak, Rajkot – 360 003
61	3060	Third Party Quality Assurance/Quality Audit for work of construction of M C Pry School Building at Model Town -II in C-72/CLZ	Executive Engineer (Project)-I, CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
62	3061	Third Party Quality Assurance/Quality Audit for work of construction of Pucca School Building at M C Pry. School at Khera Village, Shahdara(North) Ward No. 241	Executive Engineer (Project)-I, Shah-N, East Delhi Municipal Corporation, Geeta Colony, Delhi
63	3109	Third Party Quality Assurance/Quality Audit for work of construction of M C Pry. School at Shiv Vihar in ward no. 265, Shah North Zone	Executive Engineer (Pr.)-II, Shah-North, East Delhi Municipal Corporation, New Usmanpur, Delhi
64	3122	Third Party Quality Assurance/Quality Audit for work of Reconstruction of community Hall and Gym at Azadpur Colony in C-72/CLZ	Executive Engineer (Project-I), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
65	3132	Third Party Quality Assurance/Quality Audit for work of construction of 120 bedded ward Block at Swami Dayanand Hospital, Shadra(North) SH: Improvement development of land around 120 bedded Ward Block SDN Hospital Shahdara (North) Dilshad Garden	Executive Engineer (Project-I), Shah-N, East Delhi Municipal Corporation , Geeta Colony, Delhi
66	3136	Third Party Quality Assurance/Quality Audit for work of M C Pry. School in Sonia Vihar, Ward no. 272, AC-70 Shah.(North) part B Dismantling of old structure	Executive Engineer (Pr.)-II, Shah-North, East Delhi Municipal Corporation, New Usmanpur, Delhi
67	3158	Third Party Quality Assurance/Quality Audit for work of Construction of Pucca School Building in M C Pry. School at D-1-A Janakpuri No. 1 D-1-A janakpuri No.2 and D-1-A Janakpuri Nursery in WZ(Part B Demolishing of existing old structure)	Executive Engineer (Project-II), West Zone, Municipal Corporation of Delhi, Zakhira, Delhi

Sl. No	SP. No.	Project Title	Sponsor
68	3172	Third Party Quality Assurance/Quality Audit for work of construction of School of Nursing at Primary Health Centre at Narela Zone	Executive Engineer (Project), Narela, North Delhi Municipal Corporation, Narela, Delhi
69	3176	Third Party Quality Assurance/Quality Audit for work of construction in M C pry. School Ambedkar Nagar Sec-6 school No5 in ward 180 south Zone	Executive Engineer (Pr.) South-I South Delhi Municipal Corporation, Sewa Nagar, New Delhi
70	3177	Third Party Quality Assurance/Quality Audit for work of construction of community centre at K block at K Blcok Dakshinpuri in ward no. 183 South Zone	Executive Engineer (Pr.) South-I South Delhi Municipal Corporation, Sewa Nagar, New Delhi
71	3179	Third Party Quality Assurance/Quality Audit for work of reconstruction of community hall after dismantling the old structure at Tigri in ward no. 178 South Zone	Executive Engineer (Pr.) South-I South Delhi Municipal Corporation, Sewa Nagar, New Delhi
72	3180	Third Party Quality Assurance/Quality Audit for work of construction in M C Pry. School Pushp Vihar sec-IV in w.no.184 South	Executive Engineer (Pr.) South-I South Delhi Municipal Corporation, Sewa Nagar, New Delhi
73	3194	Third Party Quality Assurance/Quality Audit for work of MLA-LAD-FUND SH: construction of community hall at F-block Madangir JJ Colony Dakshin Puri	Executive Engineer (DD-V), Delhi Urban Shelter Improvement Board, Government of NCT of Delhi, Kirloki Opp. Maharani Bagh, New Delhi
74	3195	Third Party Quality Assurance/Quality Audit for work of MLA-LAD-FUND SH: construction of community hall at F-block Madangir JJ Colony Dakshin Puri	Executive Engineer (DD-V), Delhi Urban Shelter Improvement Board, Government of NCT of Delhi, Kirloki Opp. Maharani Bagh, New Delhi
75	3207	Third Party Quality Assurance/Quality Audit for work of construction of Pucca School Building at M C Pry. School at Hastsaal Village No.1 in West Zone	Executive Engineer (Project-II), West Zone, Municipal Corporation of Delhi, Zakhira, Delhi
76	3208	Third Party Quality Assurance/Quality Audit for work of reconstruction of primary health centre, M and CW centre and construction of polyclinic at Mehrauli in SZ	Executive Engineer (Pr.) South-II, South Delhi Municipal Corporation, Sewa Nagar, New Delhi
77	3209	Third Party Quality Assurance/Quality Audit for work of construction of 8 class rooms and 1 toilet block in M C Pry. School Hauz Rani Hindi(Boys) in ward no. 162 South Zone	Executive Engineer (Pr.) South-I, South Delhi Municipal Corporation, Sewa Nagar, New Delhi
78	3215	Third Party Quality Assurance/Quality Audit for work of construction of Pucca School building at M C Pry. School at Nangal Raya in West Zone	Executive Engineer (Project-II), West Zone, Municipal Corporation of Delhi, Zakhira, Delhi
79	3220	Third Party Quality Assurance/Quality Audit for work of construction of M C Pry. School at Pkt.-C, Mayur Vihar- Ph-II in ward No. 219 in Shah South Zone	Executive Engineer (Project-II), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi

Sl. No	SP. No.	Project Title	Sponsor
80	3231	Evaluation of Aggregate for the work of Stage-III Coal Handling Plant at NTPC-Rihand (M/s FLSnidth Pvt Ltd)	Manager, Civil NTPC - Rihand Rihand Nagar Distt Sonebhedra(UP)
81	3252	Third Party Quality Assurance/Quality Audit for work of construction of additional classrooms at M C Pry. School New Seemapuri Shahdara(North) Zone	Executive Engineer (Project-I), Shah-N, East Delhi Municipal Corporation, Geeta Colony, Delhi
82	3254	Third Party Quality Assurance/Quality Audit for work of Construction of boundary wall along Kushak Nallah from Pillangi culvert to upstream side upto NDMC drain in Kotla Mubarakpur ward no. 158, Central Zone	Executive Engineer (Pr.) Central Zone, South Delhi Municipal Corporation, Lajpat Nagar, New Delhi
83	3262	Third Party Quality Assurance/Quality Audit for work of improvement/ strengthening of Kalka Dass Marg in Mehrauli and pdg drainage system from SDM office to Teekha More via Delhi Jal Board office upto T-Junction at Aurbindo Marg in ward 170 SZ	Executive Engineer (Pr-II), South Zone, South Delhi Municipal Corporation, Sewa Nagar, Delhi
84	3274	Third Party Quality Assurance/Quality Audit for work of construction of Multipurpose Ayurvedic Hospital as Pandit Deen Dayal Upadhyay Chikitsya Kendra at Geeta Colony W.No. 229 Shah South Zone	Executive Engineer (Pr-), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
85	3287	Third Party Quality Assurance of Re-construction of Community Hall at D-Block Sultanpuri, W No. – 39 in Rohini Zone	Executive Engineer (Pr) Rohini-II, North Delhi Municipal Corporation, Sector-17, Delhi
86	3303	Third Party Quality Assurance/Quality Audit for “Construction of M.C. Pry. School Building at Sagarpur, Old in W. No. 131/NGZ	Executive Engineer (Pr.) NGZ, South Delhi Municipal Corporation, Old Hindu College, Delhi
87	3310	Third Party Quality Assurance/Quality Audit for Work of “P/L RMC over Deteriorated CC pavement and construction of SW drain in the lanes of block A, F, H,I,J,K & L in JJ Cluster Janta Mazdoor Camp, Zafrabad Part-I ”	Executive Engineer C-8(DD-VI), Delhi Urban Shelter Improvement Board, Kilokari, Delhi
88	3313	Third Party Quality Assurance/Quality Audit for Work of “Construction of waiting area between 120 bedded Ward Block at Gayne Block Shahdara North Zone ”	Executive Engineer (Pr)-I Shah(N), East Delhi Municipal Corporation, Geeta Colony, Delhi
89	3325	Evaluation of Materials and Concrete Mix Design for the work of CHP, Stage-IV at NTPC-Vindhyachal STPP	NTPC Limited, Vindhyachal Super Thermal Power Plant, Singrauli, Madhya Pradesh
90	3334	Third Party Quality Assurance/Quality Audit for Work of Improvement Development of Lanes of DDA Flats C-Block and D-Block lanes(--) by providing Drain from and RMC in Ghazipur Dairy Farm in Khichripur	Executive Engineer (Pr-II), Shah –S, East Delhi Municipal Corporation, Near Laxmi Nagar Metro Station, New Delhi

Sl. No	SP. No.	Project Title	Sponsor
91	3336	Third Party Quality Assurance/Quality Audit for Work of Improvement Strengthening of Block B and E Ghazipur Dairy Farm by providing CC Pavement and drain in AC-56 Shahdara South	Executive Engineer (Pr-II), Shah –S, East Delhi Municipal Corporation, Near Laxmi Nagar Metro Station, New Delhi
92	3346	Third Party Quality Assurance/Quality Audit for work of Construction of Biochemistry Department for Medical College in Hindu Rao Hospital, C-280/CLZ	Executive Engineer (Pr-I), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
93	3362	Third Party Quality Assurance/Quality Audit for Work of Improvement of Internal lanes by P/L RMC and drainage system in CU block, QU block(between PU block and Chitrakoot Apartment) and QU block(between St. Stephen School) and outer ring road Pitampura, C-54	Executive Engineer (Project-I), Rohini, North Delhi Municipal Corporation, Rohini, Delhi
94	3366	Third Party Quality Assurance/Quality Audit for Work of Construction of M C Pry. School Building at Chandu Park in Ward No. 232 AC-60 Shah South Zone	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
95	3369	Third Party Quality Assurance/Quality Audit for Work of Construction of SW drain along Shani Road, H Block Pushpanjali road and Indian Oil Road in Bijwasan Constituency	Executive Engineer (Project), NGZ, South Delhi Municipal Corporation, Kashmeri Gate, Delhi
96	3371	Third Party Quality Assurance/Quality Audit for Work of Construction of Khelparisar opp. Block-8 Trilokpuri in AC-55 Shah South SH: C/o Badminton court, basketball court, lawn tennis court, Football ground	Executive Engineer (Pr)-II, Shah-S, East Delhi Municipal Corporation, Laxmi Nagar, Delhi
97	3377	Third Party Quality Assurance/Quality Audit for Work of Re-construction of Community Hall at Tagore Garden in WZ	Executive Engineer (Pr)-II, West Zone, South Delhi Municipal Corporation, Zakhira Nagar, Delhi
98	3378	Third Party Quality Assurance/Quality Audit for Work of Construction of M C Pry. School Building at Block-6, Geeta Colony ward no. 230 in AC-60, Shah-S Zone by pdg 0 from in Geeta Colony	Executive Engineer (Pr)-II, Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
99	3380	Third Party Quality Assurance/Quality Audit for Work of “Construction of Pucca School Building at M. C. Pry. School in Sahipur Village in C-55 in Rohini Zone”	Executive Engineer (Pr.I), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
100	3381	Third Party Quality Assurance/Quality Audit for work of construction of Pucca School building at M C Pry Mandoli (Extn) Shahdara North Zone	Executive Engineer (Pr)-I, Shah-N, East Delhi Municipal Corporation, Geeta Colony, Delhi
101	3387	Third Party Quality Assurance/Quality Audit for Work of “Construction of M. C. Pry. School at Guru Angad Nagar in Shahadara South, Laxmi Nagar”	Executive Engineer (Pr)-II, Shah-S, East Delhi Municipal Corporation, Laxmi Nagar, Delhi

Sl. No	SP. No.	Project Title	Sponsor
102	3388	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at Sec-24, Rohini in W.NO. 25 in Rohini Zone	Executive Engineer (Pr.II), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
103	3389	Third Party Quality Assurance/Quality Audit for Work of Re-construction of M C Pry School Building in B-1 & B-II block at Sulatanpuri in W.No. 37 in Rohini Zone	Executive Engineer (Pr.II), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
104	3391	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
105	3408	Third Party Quality Assurance/Quality Audit for Work of Improvement and strengthening og 13.5m ROW roads in sector 16 Rohini SH: Improvement of drain	Executive Engineer (Pr-II), South-N, East Delhi Municipal Corporation, New Usmanpur, Delhi
106	3410	Third Party Quality Assurance/Quality Audit for Work of “Construction of M. C. Pry. School Sector-26 Rohini in W. No. 26 in Rohini Zone	Executive Engineer (Pr.II), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
107	3413	Third Party Quality Assurance/Quality Audit for Work of “Construction at M. C. Pry. School, Indra Vihar in C-11/Civil Line Zone”	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
108	3414	Third Party Quality Assurance/Quality Audit for Work of “Construction of M C Pry. School Building at O Block Nand Nagari Shahadara North Zone”	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Geeta Colony, Delhi
109	3427	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at Gokulpuri AC-68 Ward no. 262 Shahdara (North) Zone	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Geeta Colony, Delhi
110	3428	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at M C Pry. School in Ashok Vihar, Phase-III, Rohini Zone	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
111	3434	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at M C Pry. School Gokulpuri in Ward No.262 in Shahdara (North) Zone	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Geeta Colony, Delhi
112	3435	Third Party Quality Assurance/Quality Audit for Work of Construction of Old Age Home and Recreation Centre in M C Pry. School in AB block, Shalimar Bagh in Rohini SH: C/o pump room, underground reservoir, boundary wall, gate and other misc. work e.g POP and aluminum window/grill etc	Executive Engineer (Pr.I), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi

Sl. No	SP. No.	Project Title	Sponsor
113	3438	Third Party Quality Assurance/Quality Audit for Work of Construction fo M C Pry. School at South Bhola Nath Nagar in Ward no. 237 Shadara South Zone	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
114	3445	Third Party Quality Assurance/Quality Audit for Work of Construction of 6 Classroom, 1 Computer Room, 1 Library room, 1 Science room, Toilet Block (Girls), Toilet Block (Staff) in M C Pry. School at DTU Colony in C-70/CLZ	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
115	3447	Third Party Quality Assurance/Quality Audit for Work of Construction in M C Pry. School at Gujranwala Town in C-72/CLZ	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
116	3465	Third Party Quality Assurance/Quality Audit for Work of “Construction of Ayurvedic, Unani, Homeopathic Dispensary at Neelwal Village in C-30 in Narela Zone”	Executive Engineer (Project), Narela, North Delhi Municipal Corporation, Narela, Delhi
117	3466	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at M C Pry. School at JJ Haiderpur in C-55 in Rohini Zone	Executive Engineer (Pr-I), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
118	3467	Third Party Quality Assurance/Quality Audit for Work of Construction of 15 Nos Class Rooms in M C Pry. School at Jhilmil in Ward NO. 239 Shahadra South Zone”	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
119	3472	Third Party Quality Assurance/Quality Audit for Work of “Construction of Ayurvedic, Unani, Homeopathic Dispensary at Mundka Village in C-30 in Narela Zone”	Executive Engineer (Project), Narela, North Delhi Municipal Corporation, Narela, Delhi
120	3473	Third Party Quality Assurance/Quality Audit for Work of “Construction of Recreation Centre in Vardhaman Vatika Tri Nagar in Civil Line Zone”	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
121	3474	Third Party Quality Assurance/Quality Audit for Work of “Improvement and Strengthening of 13.5 m & 9 m ROW roads of Sector-11, Rohini SH: Improvement of Drain and Side Berms”	Executive Engineer (Pr-I), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
122	3476	Third Party Quality Assurance/Quality Audit for Work of “Improvement and Strengthening of 13.5 m & 9 m ROW roads of Sector-5, Rohini SH: Improvement of Drain and Side Berms”	Executive Engineer (Pr-I), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
123	3481	Third Party Quality Assurance/Quality Audit for Work of Remodeling of Nalla at Ivth Pusta Kartar Nagar[H. NO. A-512A-H.No.21/46B] in Brahmपुरi in ward no 254 Shah(N) Zone	Executive Engineer (M-Shah(N-II), East Delhi Municipal Corporation, Yamuna Vihar, Delhi

Sl. No	SP. No.	Project Title	Sponsor
124	3490	Third Party Quality Assurance/Quality Audit for Work of “Land Protection from Encroachment” SH: Construction of Boundary Wall at Sector-23, Rohini Near Pooth Kalan	Executive Engineer(C-12) Delhi Urban Shelter Improvement Board Government of NCT of Delhi Malka Ganj, New Delhi -07
125	3492	Distressed Condition assessment and Third Party Quality Assurance repairs & restoration works of DDA's Buildings at Rajendra Bhawan & Hog Market in Delhi Part-I: Distress condition assessment & preparation of BOQ/specification to carry out repair & restoration of the buildings Part-II: Third Party Quality Inspection services during execution of repair & restoration works of the buildings.	Executive Engineer, Delhi Development Authority, Western Division No.5, Vikas Minar, New Delhi
126	3494	Third Party Quality Assurance/Quality Audit for Work of Improvement and strengthening of 13.50 mtr. And 9.00 mtr ROW road in Tarun Enclave, C-60 Rohini Zone	Executive Engineer (M-I), Rohini Zone, North Delhi Municipal Corporation, Keshav Puram, Delhi
127	3495	Third Party Quality Assurance/Quality Audit for Work of Improvement of Strengthening of Captain Satish Marg (13.50 mtr. ROW Road) at Risi Nagar, Rani Bagh C-59, Rohini Zone	Executive Engineer (M-I), Rohini Zone, North Delhi Municipal Corporation, Keshav Puram, Delhi
128	3497	Third Party Quality Assurance/Quality Audit for Work Construction of J.E. Store Building at X-block Brahmpuri in ward No. 254 Shah(N) Zone.	Executive Engineer (M-II), Shah-N, East Delhi Municipal Corporation, Yamuna Vihar, Delhi
129	3498	Third Party Quality Assurance/Quality Audit for Work Remodeling of Nalla at Main Road IIIrd Pusta Jagjeet Nagar (H No. K87- H NO. D-1) in Brahampuri in Ward No. 254 Shah (N) Zone	Executive Engineer (M-II), Shah-N, East Delhi Municipal Corporation, Yamuna Vihar, Delhi
130	3500	Third Party Quality Assurance/Quality Audit for Work of “Construction of Stadium at Madipur Village in West Zone”	Executive Engineer (Pr.-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
131	3501	Third Party Quality Assurance/Quality Audit for Work of 4 Classrooms, 1 Official, 1 Computer room, 1 Library room and 3 Toilet Block in M C Pry. School at Bharola Udyan Panchwati C-14/CLZ	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
132	3505	Third Party Quality Assurance/Quality Audit for Work Construction of Cunit of Nalla by pdg between from CNG pump towards DJB Pump House in RK Puram Sector-3 in Munirka in Ward no. 166/SZ	Executive Engineer (M-I), South Zone, South Delhi Municipal Corporation, Gulmohar Park, Delhi
133	3510	Third Part Quality Assurance/Quality Audit for work of Providing RMC and Construction of Outfall drain on Phirni Road of Hiran Kudna Village C-30 in Narela Zone	Executive Engineer (Project), Narela, North Delhi Municipal Corporation, Narela, Delhi

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134	3511	Third Party Quality Assurance/Quality Audit for Work of Construction of M C Pry. School at Shahabad Daulatpur (Boys) in W.No. 26 in Rohini Zone	Executive Engineer(Pr-II), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
135	3516	Third Party Quality Assurance/Quality Audit for Work of Remodeling of Drain by providing RCC box Drain from Rescue Hospital to Sec-3 Pkt-16 Madhu Vihar, Dwarka in Ward No. 148/NGZ	Executive Engineer (Project), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
136	3518	Third Party Quality Assurance/Quality Audit for Work of Providing Additional work/accommodation required for the newly constructed building Ayurvedic Panchkarma Hospital at SDN Hospital Shah-N	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Geeta Colony, Delhi
137	3521	Third Party Quality Assurance/Quality Audit for Work of Construction in M C Pry. School(B) in Qutub Vihar in C-134/NGZ	Executive Engineer (Project), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
138	3526	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at Pkt. A-7, Sector-17, Rohini in ward no. 21 in Rohini Zone	Executive Engineer(Pr-I), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
139	3528	Third Party Quality Assurance/Quality Audit for Work of Construction of M C Pry School Kailash Colony in Central Zone	Executive Engineer (Pr-I), CNZ, South Delhi Municipal Corporation, Shiv Mandir Marg, Delhi
140	3529	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at Jungpura Extension, Ward No. 157, Central Zone	Executive Engineer (Pr-I), CNZ, South Delhi Municipal Corporation, Shiv Mandir Marg, Delhi
141	3530	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at Nangal Raya Village in West Zone	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
142	3535	Development of Alternate Technology for Manufacture of Prestressed Concrete Poles using Latest Brand of Superplasticizer and Accelerators to Achieve Compressive Strength (a) 210 kg/cm ² within 72 hr (b) 420 kg/cm ² at 28 days using PPC instead of OPC for Different Temperature and RH Condition	Punjab State Power Corporation Ltd, Patiala
143	3538	Third Party Quality Assurance/Quality Audit for Work of Improvement of SC/ST Basties, SH: Construction of Community Hall at D-block Mangolpuri (Single Storeyed)	Executive Engineer, C-3 Govt. of NCT of Delhi Delhi Urban Shelter , Raja Garden, New Delhi
144	3539	Third Party Quality Assurance/Quality Audit for Work of Improvement of SC/ST Basties, SH: Construction of Community Hall at F-Block Mangolpuri (Single Storeyed)	Executive Engineer, C-3 Govt. of NCT of Delhi Delhi Urban Shelter , Raja Garden, New Delhi

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145	3542	Third Party Quality Assurance/Quality Audit for Work of Construction in M C Pry. School No. 1 at Indira Park in W. No. 146/NGZ	Executive Engineer (Project), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
146	3544	Evaluation of Materials for Loktak Downstream Hydroelectric Project, Manipur	Loktak Downstream H E Corporation Ltd, (A Joint Venture of Govt. of Manipur & NHPC Ltd), Kom Keirap, Manipur
147	3545	Third Party Quality Assurance/Quality Audit for Work of providing drainage to Batla House & Jogabai area in Ward No. 205, Central Zone SH: Const. of outfall covered built up section Nallah on Nafees Road from Muradi road to main proposed outfall in Batla House in W.No.205 Central Zone	Executive Engineer (Pr-I), Central Zone, South Delhi Municipal Corporation, Lajpat Nagar, Delhi
148	3547	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at M C Pry. School at A-1-A, Janak Puri in West Zone	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
149	3548	Third Party Quality Assurance/Quality Audit for Work of Construction of RCC drain from P & T Staff Residential Complex Back Side to Govt Sarvodya Co. Ed. Sr. Sec. School Possangipur, B-1, Janakpuri in West Zone	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
150	3549	Third Party Quality Assurance/Quality Audit for Work of Construction of Cunit of Ambedkar Basti Nalla (Culvert in Tamil Sangam Marg Ring Road) by Pdg. B/W from near CTC Ambedkar Basti NO.1 to DPS Nalla in Ward No. 167 in R K Puram	Executive Engineer(M-I), South, South Delhi Municipal Corporation, Gulmohar Park, Delhi
151	3550	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building in M C Pry. School at Asalat Pur Janakpuri in West Zone	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
152	3552	Third Party Quality Assurance/Quality Audit for Work of Construction of RCC box SW drain on Kalyan Marg from Shri Ram Chowk to Outfall drain along NH-24 near Shani Mandir, East Vinod Nagar in W.No.217/AC-57 Sh-(S) Zone	Executive Engineer (M-IV), South-S, East Delhi Municipal Corporation, Shakarpur, Delhi
153	3553	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at M C Pry. School at Hari Nagar Ghanta Ghar in West Zone	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
154	3554	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at M C Pry. School at Rajapur Khurd No.4 in WZ	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi

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155	3555	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at M C Pry. School(Nigam Pratibha Co. Ed School) at Tilak Vihar in West Zone	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
156	3556	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at M C Pry. School Shivaji Enclave, West Zone	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
157	3557	Third Party Quality Assurance/Quality Audit for Work of Providing and laying RMC and Construction of drain in village Mundka C-30 Narela Zone	Executive Engineer (Pr.), Narela, North Delhi Municipal Corporation, Narela, Delhi
158	3558	Third Party Quality Assurance/Quality Audit for Work of Providing RMC & raising of outfall drain on Phirni road of Sawda Village C-30 in Narela Zone	Executive Engineer (Pr.), Narela, North Delhi Municipal Corporation, Narela, Delhi
159	3559	Third Party Quality Assurance/Quality Audit for Work of Strengthening of road by providing RMC from RUB Mundka to road no-3 via Madanpur Dabas in C-30/Narela	Executive Engineer (Pr.), Narela, North Delhi Municipal Corporation, Narela, Delhi
160	3560	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at M C Pry. School CP Block Pritampura in Rohini Zone	Executive Engineer (Pr-I), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
161	3567	Evaluation of Concreting Materials & Concrete Mix Proportions for Civil Works Construction of Balance Plant Package at 2X600 MW of NTPC-Singareni TPP	NTPC Ltd, Singareni Thermal Power Project, Jaipur Distt: Adilabad, A.P
162	3572	Third Party Quality Assurance/Quality Audit for Work of Construction Physical Education Centre adjacent to M C Pry. School, Satyawati Nagar in C-66/CLZ	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, CLZ, Delhi
163	3573	Third Party Quality Assurance/Quality Audit for Work of Construction in M C Pry. School at B-block Jahangirpuri in C-20/CLZ	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, CLZ, Delhi
164	3574	Third Party Quality Assurance/Quality Audit for Work of Improvement & Strengthening of roads in Institutional Area of Janakpuri in West Zone SH: Improvement of Drainage System and Widening of Roads	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
165	3578	Third Party Quality Assurance/Quality Audit for Work of Construction of M.C. Pry. School Building at Dichaon Kalan (B) C-139/NGZ	Executive Engineer (Project), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
166	3581	Third Party Quality Assurance/Quality Audit for Work of Improvement Development of Nallah at Main Road IIIrd Pusta Jagjeet Nagar by PdG. B/W in Brahmpuri in Ward No. 254, Shah (N) Zone	Executive Engineer(M-II), Shah-N, East Delhi Municipal Corporation, Yamuna Vihar Delhi

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167	3585	Third Party Quality Assurance/Quality Audit for Work of Improvement and development of 45ft ROW Roads in Sainik Vihar at C-59, Rani Bagh in Rohini Zone	Executive Engineer (M-I), Rohini Zone, North Delhi Municipal Corporation, near Keshavpuram, Delhi
168	3591	Third Party Quality Assurance/Quality Audit for Work of remodeling of drain block A-1, A-3 and E-2 and E-4 Nand Nagari in Ward No. 243 AC-63-63 Shahdara (North) Zone	Executive Engineer (Pr-I), Shah-N, East Delhi Municipal Corporation, Geeta Colony, Delhi
169	3592	Third Party Quality Assurance/Quality Audit for Work of Reconstruction of M. C. Pny. School at Sultanpuri Mazra in W. No. 40 in Rohini Zone”	Executive Engineer (Pr-II), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
170	3593	Third Party Quality Assurance/Quality Audit for Work of Improvement Development of lanes and drains in A-1, A-2, B-2 block in New Kondli resettlement colony and road from DDA Community Centre to Panchayat Ghar in Kondli Village and Re-modelling of drain along STP wall by pdg. RCC box section in ward no. 215, SH-S Zone	Executive Engineer (M-III), South-S, East Delhi Municipal Corporation, Shakarpur, Delhi
171	3598	Third Party Quality Assurance/Quality Audit for Work of Construction of building for disaster management centre/auto workshop in sector-9, Dwarka in Najafgarh Zone SH: Construction of building block “C” Phase-I	Executive Engineer (Project), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
172	3601	Third Party Quality Assurance/Quality Audit for Work of Construction of Boundary Wall of Disaster management Centre at Sector-9, Dwarka, NGZ	Executive Engineer (Project), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
173	3604	Third Party Quality Assurance/Quality Audit for Work of Improvement of Drain and Road surface by Providing RMC in Gali No. 11 and adjoining Lanes in Durga Park Ward No. 129/NGZ. (Drain from RZ C/14A to RZ-9 to RZ A-1/99 to RZ A1/96 & RMC from RZ C/14A to RZ-9, RZ C-1 to RZ 224/3 to RZ A-1/99 to Pole No. 339) (iii) Improvement of Drainage and Road surface by providing RMC in Gali No. 9 from RZ 58 to Shiv Mandir & in Gali No. 10 Durga Park Ward No. 129 NGZ	Executive Engineer (Project), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
174	3620	Third Party Quality Assurance/Quality Audit for Work of Construction of road by pdg. RMC & drain from Mundka Phirni Raj Clinic (Mundka Kamudding Nagar Road) in C-30 Narela Zone	Executive Engineer (Pr.), Narela, North Delhi Municipal Corporation, Narela, Delhi
175	3621	Third Party Quality Assurance/Quality Audit for Work of Construction of Sump Well & Pump House at Village Mundka in C-30 Narela Zone	Executive Engineer (Pr.), Narela, North Delhi Municipal Corporation, Narela, Delhi

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176	3622	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building in M C Pry. School at J J Hasthaal NO.1 (Shiv Vihar) in West Zone	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
177	3629	Third Party Quality Assurance/Quality Audit for Work of Pdg. RMC and Drain in Village Khera and Issapur in C-140/NGZ	Executive Engineer (M-I), South Delhi Municipal Corporation, Near Delhi Gate, Delhi
178	3633	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building in M C Pry. School at Rajender Khurd NO.3, West Zone	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
179	3639	Third Party Quality Assurance/Quality Audit for Work of Improvement of lane by RMC and drainage system from Lovely Sweet to Dhobhi Ghat between D&E block Jhilmil 2Improvement of lane by RMC and drainage system from H.No. 4/27/27 to H.No. 294/1 in Bihary Colony 3. Condition of LHS drain o Pandav road from road No. 57 to Chaar Kahmba	Executive Engineer(Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
180	3642	Third Party Quality Assurance/Quality Audit for Work of Improvement Development of approach road to Tughlakabad Village from Tughlakabad Extn. To Balmiki Mohalla in Ward No. 197/ CNZ	Executive Engineer (M-III), Central Zone, South Delhi Municipal Corporation, Lajpat Nagar, Delhi
181	3647	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at Pant Nagar, Ward No. 157, Central Zone	Executive Engineer (Pr-I), Central Zone, South Delhi Municipal Corporation, Lajpat Nagar, Delhi
182	3657	Third Party Quality Assurance/Quality Audit for Work of Development of U/A Colony at S. No. 72/1639 in C-138/NGZ SH: Imp. of Road by pdg. RMC and Drain in Wali Gali, Ekta Vihar Bahadurgarh Road in C-138//NGZ	Executive Engineer (M-I), South Delhi Municipal Corporation, Near Delhi Gate, Delhi
183	3658	Third Party Quality Assurance/Quality Audit for Work of Development of U/A Colony at S.No.648/1639 in C-138, NGZ.SH: Const. of Road by RMC and drain in Maksudabad, C-138, NGZ.	Executive Engineer (M-I),NGZ, South Delhi Municipal Corporation, Near Delhi Gate, Delhi
184	3662	Third Party Quality Assurance/Quality Audit for work of 'Imp. of drain by covering at locations (i) A Block Chowk to BSES office along A Block, Dilshad Garden. (ii) Near Aggarwal Bikaneri Sweet to Corner of Park along B Block, Dilshad Garden (iii)Near Safal Shop No. 747 to Gol Chakkar Tel. Exchange along Market in Dilshad Garden (iv) Along Dear Park opp. H Pkt. Park Dilshad Garden, (v) Near H.No. A-1/G-A to H.No 8/G-3 in A Block in Dilshad Garden Ward No. 239, Shahdara South Zone.'	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi

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185	3668	Third Party Quality Assurance/Quality Audit for Work of Re-Development of Rani Jhansi Stadium at Keshav Puram in C-67/CLZ	Executive Engineer(Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
186	3669	Third Party Quality Assurance/Quality Audit for work of Re-modeling of Kasturba Nagar drain (Ph-III) from Nehru Gali to Gali No. 10 Vishwas Nagar SH: Construction of Dhalao near Karan Gali	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
187	3670	Third Party Quality Assurance/Quality Audit for Work of Re-construction of Community Hall Y-block, Mangolpuri in ward no. 38 in Rohini Zone	Executive Engineer (Pr-III) Rohini, North Delhi Municipal Corporation, Sector-17 Rohini, Delhi
188	3674	Evaluation of Concrete Materials and Concrete Mix Proportions for Civil Works Construction of IDCT Package for NTPC-Kudgi STPP	NTPC Ltd, Kudgi Super Power Project, Bujapur, Karnataka
189	3676	Third Party Quality Assurance/Quality Audit for Work of Improvement/Remodeling of drain from Palam Chowk via Lodhi Chowk to Ambedkar Bhawan (Outfall) in Palam Village in C-145/NGZ	Executive Engineer(M-III),NGZ, South Delhi Municipal Corporation, Dwarka, New Delhi
190	3678	Third Party Quality Assurance/Quality Audit for Work of Development of U/A Colony at S.No. 849,1263,1291,1477,998,980 and 985 in C-137, NGZ. S.H: (i) Const. of Drain and pdg. RMC in Prem Nagar G-Block, New Roshanpura Extn. part-II in C-137, NGZ. (ii) Const. of Drain and road by pdg. RMC in J-Block in New Roshanpura Extn. (iii) Const. of drain and road by pdg. RMC in Gupta Park in C-137, NGZ (iv) Const. of drain and road by pdg. RMC in Prem Nagar G-block New Roshan Pura Extn. Part-II in C-137, NGZ. (v) Const. of outfall drain in Prem Nagar Z-Block in C-137, NGZ (vi) Const. of drain and road by pdg. RMC in Prem Nagar PH-1,2,4 in C-137, NGZ. (vii) Pdg. RMC and drain in Village Malikpur in C-140, NGZ. (viii) Imp. of lane by pdg. raising road and drain in Nanda Enclave in C-137, NGZ. (ix) Const. of drain and pdg. RMC in East Krishna Vihar in C-137, NGZ. (9 sites)	Executive Engineer (M-I), South Delhi Municipal Corporation, Near Delhi Gate, Delhi
191	3686	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building in M C Prry. School at Rajouri Garden (South) in West Zone (Part B : Demolishing of existing old structure)	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
192	3691	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at C-Block Shakurpur JJ Colony in CLZ	Executive Engineer(Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi

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193	3696	Third Party Quality Assurance/Quality Audit for Work of Construction of 9 Nos Additional Class Rooms in M. C. Pry. School at Uttam Nagar New-II in WZ	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
194	3699	Third Party Quality Assurance/Quality Audit for Work of Improvement of road from cremation ground kondli (Ghazipur) to Slaughter House Ghazipur via live stock market in Shah.. South	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Near Metro Station Laxmi Nagar, Delhi
195	3701	Third Party Quality Assurance/Quality Audit for Work of Construction of M C Pry. School at O block Dilshad Garden Shahdara (North)	Executive Engineer (M-I), Shah-S, East Delhi Municipal Corporation, Geeta Colony, Delhi
196	3702	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at Tri Nagar (near Vardhman Vatika) in C-61/CLZ	Executive Engineer(Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
197	3704	Third Party Quality Assurance/Quality Audit for Work of Improvement of Phirni Road by RMC from M C Pry. School to Balmiki Mohalla in Village Nangli sakrawati in C-134/NGZ	Executive Engineer(Pr.), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
198	3705	Evaluation of Concreting Materials for Civil works Construction of make up water system package for NTPC-Solapur STPP	NTPC Limited, Solapur Supter Thermal Power Project, Maharashtra
199	3710	Third Party Quality Assurance/Quality Audit for Work of Remolding of drainage of drainage system (Storm Water Drain) in Approved Colonies of Anand Vihar Ward No. 225 AC-59 Shahdara South. SH Remolding of drainage system (Storm Water Drain) in A & B block Yojna Vihar AC-59 Shahdara South	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
200	3714	Third Party Quality Assurance/Quality Audit for Work of Construction of drain and road by pdg Cement concrete from Bindapur village to T-212 on Bindapur Matiyala road in ward no. C-128/WZ	Executive Engineer(M-II), West Zone, South Delhi Municipal Corporation, Peera Garhi, New Delhi
201	3716	Third Party Quality Assurance/Quality Audit for Work of Construction of Gym at A-Block Jawala Puri in W No. C-42 in Rohini Zone in Peera Garhi	Executive Engineer (M RZ-I), North Delhi Municipal Corporation, Keshavpuram, New Delhi
202	3717	Third Party Quality Assurance/Quality Audit for Work of Construction of Library at C-Block Jawala Puri in W No. C-42 in Rohini Zone in Peera Garhi	Executive Engineer (M RZ-I), North Delhi Municipal Corporation, Keshavpuram, New Delhi
203	3718	Evaluation of Materials and Concrete Mix Design for the Work of Main Plant and Offsite Civil Work for NTPC-Gadarwara STPP	NTPC Limited, Gadawara Super Thermal Power Project, Narsinghpur, Madhya Pradesh
204	3724	Evaluation of Materials and Concrete Mix Design for the Work of Ash Handling Package at MUNPL, Allahabad	Meja Urja Nigam Pvt Ltd, (Joint Venture of NTPC Ltd & UPRVUN Ltd), Allahabad

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205	3725	Third Party Quality Assurance/Quality Audit for Work of Providing and laying Cement concrete paving and improvement of drainage system in SC/ST Basti at Regarpura, karol Bagh (lane No. 29 to 38-59 to 66), Jagiwan Niwas 1 to 3, 67 to 81 and Krishna Nagar 1 to 7, AC-23, Karol Bagh	Executive Engineer (C-10), Delhi Urban Shelter Improvement Board, Inder Lok, Delhi
206	3726	Third Party Quality Assurance/Quality Audit for Work of Providing and laying Cement concrete paving and improvement of drainage system in SC/ST Basti at Regarpura, Karol Bagh (lane 1 to 16, 40 to 46) (17 to 28, 48 to 58) and Sant Nagar, AC-23, Karol Bagh	Executive Engineer (C-10), Delhi Urban Shelter Improvement Board, Inder Lok, Delhi
207	3727	Third Party Quality Assurance/Quality Audit for Work of Providing and Laying Cement Concrete Paving and Improvement of Drains in Block A, B,C,D,E & F at JJ Colony Inder Puri AC-39, Rajinder Nagar	Executive Engineer (C-10), Delhi Urban Shelter Improvement Board, Inder Lok, Delhi
208	3729	Evaluation of Materials and Concrete Mix Design for the Construction of Cooling Tower at BRBCL-Nabinagar TPP	Bharatiya Rail Bijlee Co Ltd, (Subsidiary of NTPC Ltd), Patna, Bihar
209	3728	Evaluation of Materials and Concrete Mix Design for the Work of Cooling Tower Package at NTPC-Vindhyachal STPP	NTPC Limited, Vindhyachal Super Thermal Power Project, Vindhyachal, Singrauli, Madhya Pradesh
210	3732	Third Party Quality Assurance/Quality Audit for Work of Construction of road and drainage system work in temporary transit accommodation at J J Colony Madanpur Khadar, Ph-I & II in W.NO.207/CNZ	Executive Engineer (M-IV), Central, South Delhi Municipal Corporation, Andrews Ganj, Delhi
211	3733	Third Party Quality Assurance/Quality Audit for Work of Construction of public Utility (Recreation Centre) at Sidharth Extn in Ward NO. C-154, Central Zone	Executive Engineer (M-I), Central Zone, South Delhi Municipal Corporation, Defense Colony, New Delhi
212	3738	Third Party Quality Assurance/Quality Audit for Work of Construction of Community Hall at J-Block, Mangolpuri (Single Storied)	Executive Engineer, DD-II/C-3 Delhi Urban Shelter Improvement Board, Raja Garden, New Delhi
213	3739	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building in M C Pry. School at Tatar Pur in West Zone	Executive Engineer (Pr-II), West Zone, South Delhi Municipal Corporation, Zakhira, Delhi
214	3740	Evaluation of Materials and Concrete Mix Design for the Work of 400 KV Switchyard Package for MUNPL-Allahabad	Meja Urja Nigam Pvt Ltd, (Joint Venture of NTPC Ltd & UPRVUN Ltd), Allahabad
215	3743	Third Party Quality Assurance/Quality Audit for Work of Construction in M C Pry. School at G-Block Jahangirpuri in C-16/CLZ	Executive Engineer (Project-I), CLZ, North Delhi Municipal Corporation, Sawan park, Delhi
216	3752	Evaluation of Materials for Goriganga-III HE Project of NHPC	NHPC Limited, Dahauliganga Intermediate HE Project, Pithoragarh, Uttranchal

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217	3754	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at M C Pry School at Bhagirathi Vihar, Shahdara (North). SH: Construction of Boundary Wall and Development of Ground	Executive Engineer (Pr)-I, Shah-N, East Delhi Municipal Corporation, Geeta Colony, Delhi
218	3756	Third Party Quality Assurance/Quality Audit for Work of Construction of road by Providing RMC from Rohtak Road to Neelwal Village in C-30 Narela Zone.	Executive Engineer, Narela Zone, North Delhi Municipal Corporation, Narela, Delhi
219	3758	Evaluation of Concreting Materials & Concrete Mix Proportions for Civil Works Construction of water Treatment Plant Package for NTPC-Kudgi	NTPC Ltd, Kudgi Super Power Project, Bujapur, Karnataka
220	3760	Evaluation of Concreting materials for Civil works of Plant CW, Offsite and Chimney & Chimney Elevator Package for NTPC-Solapur STPP	NTPC Limited, Solapur Super Thermal Power Project, Maharashtra
221	3763	Third Party Quality Assurance/Quality Audit for Work of Providing Build up facilities. SH: Demolition and re-construction of community Hall at Old Block-A Shahabad Daulatpur (Old Scheme)	Executive Engineer C-12, Delhi Urban Shelter Improvement Board, 1st Floor Community Hall, Malka Ganj, Delhi
222	3765	Evaluation of Materials and Concrete Mix Design for the Work of Cooling Tower Package at MUNPL, Allahabad	Meja Urja Nigam Pvt Ltd, (Joint Venture of NTPC Ltd & UPRVUN Ltd), Allahabad
223	3766	Evaluation of Materials and Concrete Mix Design for the Work of Stage-I, NTPC-Lara STPP	NTPC Limited, Lara Super Thermal Power Project, Raigarh, Chhattisgarh
224	3767	Third Party Quality Assurance/Quality Audit for Work of Construction of boundary wall of land acquired for setting up a Hot Mix Plant at Village Ferozpur Kalan in Faridabad, Haryana	Executive Engineer (Pr-I), Central Zone, South Delhi Municipal Corporation, Lajpat Nagar, Delhi
225	3768	Third Party Quality Assurance/Quality Audit for Work of Construction of Pucca School Building at Sant Nagar Ward No.157 Central Zone	Executive Engineer (Pr-I), Central Zone, South Delhi Municipal Corporation, Lajpat Nagar, Delhi
226	3769	Third Party Quality Assurance/Quality Audit for Work of Improvement & Strengthening of roads and drainage system of B-III block and road between BG-1 Block Paschim Vihar in ward no. C-57/RZ, Paschim Vihar(South)	Executive Engineer (M-I), RZ, North Delhi Municipal Corporation, Keshav Puram, Delhi
227	3770	Third Party Quality Assurance/Quality Audit for Work of Construction of stone masonry wall from Dhalao to Delhi Police Staff Quarters in AU Block, Pitampura (North) in C-54 in Rohini Zone.	Executive Engineer (Pr-I), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
228	3771	Third Party Quality Assurance/Quality Audit for Work of Construction in M C Pry. School Holambi Khurd in Narela Zone	Executive Engineer (Pr), Narela Zone, North Delhi Municipal Corporation, Narela, Delhi

Sl. No	SP. No.	Project Title	Sponsor
229	3776	Evaluation of Coarse and Fine Aggregates for NHPC-Teesta-IV H.E Project, Sikkim	NHPC Limited, Teesta (Stage-IV) Hydroelectric Project, Singtam, E.Sikim
230	3779	Evaluation of Materials and Concrete Mix Design for the Work of Renovation and Retrofitting of ESP for NTPC-VSTPS Stage-I & II (6x210 MW + 2x500 MW)	NTPC Limited, Vindhyachal Super Thermal Power Project, Vindhyanagar, Singrauli, Madhya Pradesh
231	3781	Ultrasonic Pulse Velocity Testing of TG Deck Slab (1x800 MW) of Unit # 1 at NTPC-Kudgi as per IS:13311 (Part-I)-1992	NTPC Limited, Kudgi Super Thermal Power Project, Kudgi, Bijapur, Karnataka
232	3782	Third Party Quality Assurance/Quality Audit for Work of Remodeling of SW drainage system and side berm in B-2 Block, Keshav Puram in C-67/CLZ	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
233	3786	Evaluation of Materials and Concrete Mix Design for the Work of Switchyard Package at NTPC-Lara	NTPC Limited, Lara Super Thermal Power Project, Raigarh, Chatisgarh
234	3788	Third Party Quality Assurance/Quality Audit for Work of Construction of Library at MC Pry School, Rajgarh Colony in ward no. 236 Shahdara South Zone	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, Delhi
235	3792	Third Party Quality Assurance/Quality Audit for Work of (i) Improvement of lane from N-23 to Road No. 65 in Uldhanpur, Naveen Shahdara by pdg. RMC Pvt in C-248 (ii) Imp. of Gali No. 4,5,6 Subhash Park Extn. By pdg RMC pavement in C-248 (iii) Imp. of link from Behl Gali to main Road Mohan park and Adj links in Pratap Pura by pdg RMC pavement in C-248, (iv) Imp. of Daak Khale Wali Gali from Shivaji Park main road to 52 Cusec drain in Shivaji Park by RMC Pavement in C-248, in Welcome Colony.	Executive Engineer (M-III), Rohini Zone, East Delhi Municipal Corporation, East of Loni Road, Delhi
236	3793	Third Party Quality Assurance/Quality Audit for Work of Construction of Senior Citizen Recreation Centre in Block-8 Khichripur, ward No. 219 Shahdara South Zone	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Lalita Park, Delhi
237	3794	Third Party Quality Assurance/Quality Audit for Work of Improvement and Stg. Of road in block A, C,F,J,H,J-4,J-12,A-1 and A-2 Rajouri Garden in ward no. C-105/SDMC SH: Const. storm water drain and Imp. to side berms from C-13 to F-51(Part Portion on one side) J-159 to J-179 in Rajouri Garden in C-105/SDMC	Executive Engineer (M-I), West, South Delhi Municipal Corporation, Rajouri garden, Delhi

Sl. No	SP. No.	Project Title	Sponsor
238	3795	Third Party Quality Assurance/Quality Audit for Work of Imp. of Stg. Of roads in block D,E,N,W,V,QR,T,J-9J-11 and Service land of Red MIG Rajouri Garden in Ward No. C-105. Shri C/o storm water drain and Imp. to side berms from 26A to 93A Red MIG Rajouri Garden.	Executive Engineer (M-I), West, South Delhi Municipal Corporation, Rajouri garden, Delhi
239	3796	Third Party Quality Assurance/Quality Audit for Work of Imp. of Stg of roads having ROW 30(9.00m), 40(12.2m), 50 (15.20m) in blocks D,E,N,W,V,Q,R,T, J-11 and service land of Red MIG Rajouri Garden in Ward No. C-105/SDMC SH: Remodeling of storm water drain and Imp. to side.	Executive Engineer (M-I), West, South Delhi Municipal Corporation, Rajouri garden, Delhi
240	3797	Third Party Quality Assurance/Quality Audit for Work of Improvement and Strengthening of roads in Tagore Garden C-105/SDMC SH: C/o storm water and Imp. to side berms.	Executive Engineer (M-I), West, South Delhi Municipal Corporation, Rajouri garden, Delhi
241	3798	Third Party Quality Assurance/Quality Audit for Work of Improvement and Strengthening of roads having in blocks A,C,F,J,J-12,A-1&A-2 and Service land of red MIG Rajouri Garden in C-105/SDMC SH: Remodeling of storm water drain and Imp. to side berms. (ii) Imp. and Stg. Of Roads in Tagore Garden in C-105/SDMC SH: Remodeling of storm water drain and Imp. to side berms.	Executive Engineer (M-I), West, South Delhi Municipal Corporation, Rajouri garden, Delhi
242	3801	Third Party Quality Assurance/Quality Audit for Work of Improvement Development of Internal Roads in MCD Flats Usmanpur A, B & C Block in ward No-251 Shah(N) Zone	Executive Engineer (M-IV), Shah-N, East Delhi Municipal Corporation, Delhi
243	3802	Third Party Quality Assurance/Quality Audit for Work of Construction of road from G T Road to Jindpur Village by pdg. RMC in ward no. C-4 Narela Zone.	Executive Engineer (M-1), Narela Zone, North Delhi Municipal Corporation, Narela, Delhi
244	3806	Condition Assessment using Non-Destructive Evaluation of the Super Structure (limited to 1st and 3rd Floor) of the 10 Storied NIC Building at A-Block, BRKR Bhawan, Hyderabad	National Informatics Centre, Hyderabad
245	3807	Third Party Quality Assurance/Quality Audit for Work of Improvement of drainage system and providing RMC in different lanes (from Gali No. 1 to Gali No. 12) in Indra Park in Ward No. 146/NGZ	Executive Engineer (Pr), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
246	3808	Third Party Quality Assurance/Quality Audit for Work of Providing RMC in different lanes (from Gali No. 1 to Mangal Bazar Wali and their adjoining lanes) in Kailash Puri in Ward No. 146/NGZ	Executive Engineer (Pr), NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi

Sl. No	SP. No.	Project Title	Sponsor
247	3809	Material Test & Concrete Mix Design using different parameters for Construction of 24660 LIG & 4855 EWS Houses by using Prefab Technology (Having Structural RCC Members i.e. Columns, Beams & Slabs all precast) in Narela & Rohini, Delhi	Delhi Development Authority, Northern Division-12, Narela, Delhi
248	3811	Third Party Quality Assurance/Quality Audit for Work of Improvement of road by pdg. RMC and Drainage System from Old Rohtak Road to Kali Dass Marg in West Moti Bagh in Ward C-74/KBZ	Executive Engineer (M-II), KBZ, North Delhi Municipal Corporation, Old Rajinder Nagar, New Delhi
249	3812	Ultrasonic Pulse Velocity (UVP) Testing of TG Deck Slab of Unit # 13 (Stage-V) as per IS:13311 (Part-I)-1992 to Ascertain Homogeneity and Integrity of Concrete	NTPC Limited, Vindhyachal Super Thermal Power Plant, Singrauli, Madhya Pradesh
250	3813	Third Party Quality Assurance/Quality Audit for Work of Improvement to Drainage System and Road adjacent to NG drain starting from 201 Indira Vihar up to SFS Corner back side and Imp. to Drainage system and road (Service Road) Starting from Midha Properties upto Gopal Jhuggi in Mukherjee Nagar in C-11/CLZ.	Executive Engineer (Pr-I), CLZ, North Delhi Municipal Corporation, Sawan Park, New Delhi
251	3814	Third Party Quality Assurance/Quality Audit for Work of Construction of various roads in G-Block and adjoining roads in Malkaganj and Const. of main road adjoining roads in front of Laxmi Narayan Mandir in Malkaganj in C-9/CLZ	Executive Engineer (Pr-II), CLZ, North Delhi Municipal Corporation, Shakti Nagar, New Delhi
252	3815	Third Party Quality Assurance/Quality Audit for Work of Construction of M&CW Centre cum Poly Clinic at Pooth Kalan in Ward No. 25 in Rohini Zone.	Executive Engineer (Pr-I), Rohini Zone, North Delhi Municipal Corporation, Rohini, Delhi
253	3816	Testing and Evaluation of Materials for Construction of Reservoir at NTPC-Anta Gas Power Project	NTPC Limited, Anta Gas Power Project, Baran, Rajasthan
254	3819	Evaluation of Materials and Concrete Mix Design for the Work of 220 KV Line Bays at Patraru Sub-Station	NTPC Electric Supply Co Limited, Hazaribagh, Jharkhand
255	3820	Evaluation of Materials and Concrete Mix Design for the Work of 220/33 KV Sub-Station at Pakri Barwadih, Hazaribagh	NTPC Electric Supply Co Limited, Hazaribagh, Jharkhand
256	3825	Third Party Quality Assurance/Quality Audit for Work of Construction of Senior Citizen Recreation Centre and Gym at Circular Road in Ward No. 238 AC-62, Shahdara South Zone.	Executive Engineer (Pr-I), Shah-S, East Delhi Municipal Corporation, Krishna Nagar, New Delhi

Sl. No	SP. No.	Project Title	Sponsor
257	3827	Third Party Quality Assurance/Quality Audit for Work of Improvement Development of drain/ Nallah footpath/ walkway/side berm in Dilshad Garden and Dilshad Colony W.No.242 Sh(N) Zone	Executive Engineer (M-I), Shah-N, East Delhi Municipal Corporation, Shahdara, New Delhi
258	3829	Evaluation of Materials and Concrete Mix Design for the Work of CW System & Making up Water System Civil Works Package for NTPC- Lara STPP, Stage-I (2x800)	NTPC Limited, Lara Super Thermal Power Project, Raigarh, Chatisgarh
259	3831	Evaluation of Materials and for the Civil Including HM Works at NTPC-Lata Tapovan HE Project	NTPC Limited, Tapovan Vishnugad Hydro Electric Project, Chamoli, Uttrakhand
260	3833	Third Party Quality Assurance/Quality Audit for Work of Improvement/Development of roads of 30 feet ROW and above in Jain Nagar Colony in C-70/CLZ	Executive Engineer (M-III), CLZ, North Delhi Municipal Corporation, 16 Rajpur Road, New Delhi
261	3834	Quality Assessment of Concrete used in RMC (M40 grade) Road Sector Dividing Road of Sec-6 & 13,12A & 13,U/E Gurgaon, using Rebound Hammer Testing as per IS:13311-1992(Part II) and Sampling & Testing of Concrete Cores as per IS:516/IS:456	Executive Engineer, Division No. II, Haryana Urban Development Authority, Gurgaon
262	3835	Quality Assessment of Concrete in TG Deck Slab and Supporting RCC Columns of the Super Structure of Unit # 1 of NTPC-Singareni Thermal Power Plant, Adilabad using Ultrasonic Pulse Velocity (UPV) Testing Technique as per IS:13311 (Part-I) 1992 to Ascertain Homogeneity and Integrity of Concrete	Prasad & Company (Project Works) Limited, NTPC-Singareni Thermal Power Plant, Mancherial, Adilabad
263	3840	Evaluation of Materials and Concrete Mix Design for the Work of Site Leveling and Infrastructure at MUNPL, Allahabad	Meja Urja Nigam Pvt Ltd, (Joint Venture of NTPC Ltd & UPRVUN Ltd), Allahabad
264	3841	Quality Assessment of hardened Concrete in Distressed & Un-distressed Concrete Portions Laid & Compacted in proposed 28m dia & 214m Height RCC Chimney Stack Constructed up to 14m Height at BRBCL, Aurangabad (Bihar) and Suggestions for Repair/Remedial Measures	Bhartiya Rail Bijli Co. Ltd, (A Subsidiary of NTPC Ltd), Aurangabad, Bihar
265	3844	Third Party Quality Assurance/Audit for Work of “Development of 45 ft. ROW road by pdg. RMC along BL-Block, Jaspal Kaur Public School from Gurudwara road turning to club road turning and from H.No 10 to 109 in BG-Block and 30ft. ROW lane from H.NO. 5 to 97 in BH (West) Block in Shalimar Bagh (North) in C-55/MRZ-I”	Executive Engineer (M-I), Rohini, North Delhi Municipal Corporation, Keshav Puram, New Delhi

Sl. No	SP. No.	Project Title	Sponsor
266	3846	Carry out (i) Plastic Concrete Mix Design; (ii) Mix Design of M25 Grade Plain and Steel Fibre Reinforced Shotcrete for Construction of Barrage and De-Silting Chamber (Balance Works) Package for Tapovan Vishnugad Hydro Power Project (4x130 MW)	NTPC Limited, Tapovan Vishnugad Hydro Power Project, Joshimath, Chamoli, Uttrakhand
267	3847	Non-Destructive Evaluation of Concrete Structures for RBI-Ahmedabad Bank's Offices & Residential Properties: 1) Bank's Main Building 2) La Gajjar Chambers 3) Bank's Senior Officers' Quarters and 4) Bank's Officers' Quarters to Ascertain Structural Integrity & Economic Service Life of each Structure Separately	Reserve Bank of India, Estate Department, Ahmedabad
268	3849	Third Party Quality Assurance/Audit for Work of "Construction of additional 6 nos. class rooms in M C Pry. School, Bawana (Old) girls in Narela Zone".	Executive Engineer (Project), Narela, North Delhi Municipal Corporation, Narela, Delhi
269	3855	Third Party Quality Assurance/Audit for Work of "Construction of 6 nos class rooms at M C Pry. School Razapur Village in Ward no. 52 in Rohini"	Executive Engineer (Pr-I), Rohini, East Delhi Municipal Corporation, Sector-17, Rohini
270	3861	Third Party Quality Assurance/Audit for Work of "Improvement of road by providing Ready Mix Concrete from Shiv Mandir Wali Gali to Rice Mill in Rithala Village in C-22, MRZ-IV, Rithala".	Executive Engineer (M-IV), Rohini, North Delhi Municipal Corporation, Pitam Pura, Rohini
271	3864	Extraction and Testing of Concrete Core from each of the Slope and Bottom of Canal Work at Radhanpur Branch Canal Reach 0.00 to 11.515 Km (Slice-I)	Executive Engineer, K B C Division No/1/1, Sardar Sarovar Narmada Nigam Limited, Radhanpur, Gujarat
272	3865	Testing and Evaluation of Coarse Aggregate for Construction of 3x250 MW Thermal Power Plant at NTPC-Bongaigaon	NTPC Limited, Bongaigaon Thermal Power Project, Salakati, Kokrajhar, Assam
273	3866	Petrographic, Mineralogical and Repeated Temperature Cycle Tests on Coarse Aggregate Sample for 1 x 125 MW Thermal Power Plant at Sendou, Dakar, Senegal (West Africa)	Promac Engineering Industries Limited, Bangalore, Karnataka
274	3867	Evaluation of Materials and Concrete Mix Design for the Work of Main Plant and Offsite Works Package for NTPC-Gadarwara STPP of 2x800 MW (Stage-I)	NTPC Limited, Gadarwara Super Thermal Power Project, Narsinghpur, Madhya Pradesh
275	3868	Quality Assessment of Secondary Cement Grout used in 8 No. Pedestals of TG Deck of Unit # 6 & 7 using Non-Destructive Evaluation Technique of Anpara – D Thermal Power Plant at Anpara-D Distt Sonebhadra (U.P).	M/s Power Mech Projects Limited, BHEL-D'TPS, 2x500 MW, Anpara-D, Sonebhadra, U.P

Sl. No	SP. No.	Project Title	Sponsor
276	3869	Quality Assessment of Concrete in TG Deck Slab and Supporting RCC Columns of the Super Structure of Unit # 2 of NTPC-Singareni Thermal Power Plant, Adilabad using Ultrasonic Pulse Velocity (UPV) Testing Technique as per IS:13311 (Part-I) 1992 to Ascertain Homogeneity and Integrity of Concrete	Sunil Hi-Tech Engineers Limited, NTPC-Singareni Thermal Power Plant, Mancherial, Adilabad, A.P
277	3876	Evaluation of Materials and Concrete Mix Design for the Work of Cooling Tower Package for NTPC-Gadarwara STPP 2 x 800 MW (Stage-I)	NTPC Limited, Gadawara Super Thermal Power Plant, Narsingpur, M.P
278	3877	Third Party Quality Assurance/Audit for Work of “Imp/Dev. Of road and drain from WZ-508B/1 to WZ-1015B/1 Basai Darapur at C-101/WZ by pdg. RMC from Raja Garden”. SH: (1) Imp/Dev of road and drain from WZ – 523/12 to Ramesh Nagar Metro Station in Basai Darapur at C-101/WZ by pdg. RMC from Raja Garden. (2) Imp/Dev of road and drain from WZ-193 to ESI Hospital in Basai Darapur at C-101/WZ by pdg. RMC from in Raja Garden”.	Executive Engineer (M-I) West, South Delhi Municipal Corporation, Rajouri Garden, Delhi
279	3878	Third Party Quality Assurance/Audit for Work of Improvement of drain and road surface by providing RMC from BSES Pole no. 738 to RZ B-14 and adjoining lanes in ward no. 129, NGZ	Executive Engineer (Pr) NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi
280	3879	Third Party Quality Assurance/Audit for Work of Imp. and stg. of roads having ROW varying from 13 meter to 18 meter in Commercial Complex (Ch. Lokbir Singh Tanwar Complex) Nangal Raya in Ward C-110/SDMC. “SH: Construction of Storm water drain, Imp. and stg of roads , Imp. to internal Compound by pdg. Interlocking tiles in Commercial Complex	Executive Engineer (M-I) West, South Delhi Municipal Corporation, Rajouri Garden, Delhi
281	3881	Evaluation of Evocrete URCC – Additive for Concrete	CCL International Limited, Raj Nagar, Ghaziabad, U.P
282	3888	Third Party Quality Assurance/Audit for Work of “Construction of Pucca School Building at South Extension Part-II, ward no. 159, Central Zone”.	Executive Engineer (Pr-I), Central Zone, South Delhi Municipal Corporation, Lajpat Nagar, Delhi.
283	3896	Evaluation of Materials and Concrete Mix Design for the Work of Construction of Township Main Package for NTPC-Lara STPP	NTPC Limited, Lara Super Thermal Power Project, Raigarh, Chatisgarh
284	3898	Third Party Quality Assurance/Audit for Work of “C/o Building for Disaster management Centre/Auto Workshop in Sector-9, Dwarka in Najafgarh Zone. SH: Improvement of ground by providing RMC”.	Executive Engineer (Pr) NGZ, South Delhi Municipal Corporation, Near Dhansa Stand, Delhi

Sl. No	SP. No.	Project Title	Sponsor
285	3899	Evaluation of Materials and Concrete Mix Design for Wagon Tippler & Conveying Plant Package for NTPC-Korba STPS	NTPC Limited, Korba Super Thermal Power Station, Korba, Chattisgarh
286	3901	Distress Evaluation and Damage Assessment of Community Centre in Sector-7, Faridabad	Executive Engineer, Haryana Urban Development Authority, Division No.1, Faridabad
287	3902	Third Party Quality Assurance/Audit for Work of "Imp. and Development of M C Pry. Schol at Kotla Village Ward No. 299 [-] by pdg O from in Mayur Vihar Phase-I Shahdara South Zone".	Executive Engineer (Pr-II), Shah-S, East Delhi Municipal Corporation, Laxmi Nagar, Delhi
288	3903	Third Party Quality Assurance/Audit for Work of "Imp./Dev of road from WZ-257 in Village Nangal Raya at C-110/WZ] by Pdg. RMC from in Nangal Raya" SH: Imp/Dev. of side road from by pdg. RMC and Pdg drainage system	Executive Engineer (M-I) West, South Delhi Municipal Corporation, Rajouri Garden, Delhi
289	3905	Third Party Quality Assurance/Audit for Work of "Improvement of road and drainage system in B-Block, Rajori Garden in ward no. C-98, Mansarover Garden in KBZ".	Executive Engineer (Pr.) KBZ, North Delhi Municipal Corporation, Old Rajinder Nagar, New Delhi
290	3906	Ultrasonic Pulse Velocity (UVP) Testing of TG Deck Slab of Unit-I (660 MW) as per IS:13311 (Part-I)-1992 to Ascertain Homogeneity and Integrity of Concrete at NTPC-Lara STPP	NTPC Limited, Lara Super Thermal Power Project, Raigarh, Chatisgarh
291	3907	Third Party Quality Assurance/Audit for Work of "Improvement Development of Community Centre, Sector-9, Rohini by providing Ready Mix Concrete, Colored Cement Concrete Pavers, drainage system, RCC benches etc. in ward no. C-50, Rohini Central, MRZ-IV".	Executive Engineer (M-RZ)-IV North Delhi Municipal Corporation, Pitampura - Delhi
292	3908	Evaluation of Materials and Concrete Mix Design for the Work of CW System and Makeup Water System Civil Works for NTPC-Gadarwar STPP 2x800 MW (Stage-I)	NTPC Limited, Gadarwara Super Thermal Power Plant, Narsingpur, M.P
293	3911	Verification of the Qulity of Concrete in RCC Members of Induced Draft Cooling Tower Unit # 1 (CT # 1) and Unit # 2 (CT # 2) Structures at NPC-Bongaigon using Non-Destructive Testing Techniques	NTPC Limited, Bongaigaon Thermal Power Plant, Kokrajhar, Assam
294	3912	Third Party Quality Assurance/Audit for Work of "Imp. and Stg. Of roads in Tagore Garden SH: Imp. to roads/lanes roads by pdg. RMC from CA-59 to CA-70, CA-1 to CA-42, CA-108 to CA-100, BA-341 to BA-355, BA-225 to B-23 and AE-8 to AE-14.	Executive Engineer (M-I) West, South Delhi Municipal Corporation, Rajouri Garden, Delhi

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295	3913	Third Party Quality Assurance/Audit for Work of “Construction of Dhalao at Shastri Park near Y point GT Road in Ward No. 233 in Dharampura Shah-S Zone”	Executive Engineer (M-I) Shah-S, East Delhi Municipal Corporation, Geeta Colony, Delhi
296	3918	Third Party Quality Assurance/Audit for Work of “Imp. to Drainage System and Stg. Of Road starting from Dusshera Ground to MCD Pump House corner in Mukherjee Nagar in C-11/CLZ”.	Executive Engineer (Pr.), CLZ, North Delhi Municipal Corporation, Sawan Park, Rohini
297	3919	Third Party Quality Assurance/Audit for Work of “Remodeling of drainage system and pdg. RMC in the lanes JD Block, Pitampura (S) in C-53/RZ”.	Executive Engineer (M-I) Rohini, North Delhi Municipal Corporation, Keshav Puram, Delhi
298	3920	Third Party Quality Assurance/Audit for Work of “Remodeling of drainage system and pdg. RMC in the lanes from H No. 8 to 61 along DAV School, 61 to 69 along main park, 45 to 58, 31 to 44, 20 to 28, 11 to 19 and 1 to 69 in MD Block, Pitampura (S) in C-53/RZ	Executive Engineer (M-I) Rohini, North Delhi Municipal Corporation, Keshav Puram, Delhi
299	3923	Ultrasonic Pulse Velocity (UVP) Testing of TG Deck of Unit-I 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
300	3925	Third Party Quality Assurance/Audit for Work of (i) Construction of Open Space (Square) by PdG. Glass Moulded Interlocking Tiles in E Block Sector 3, A Block Sector 4 Ward No 45 Rohini. (ii) Construction of Open Space (Square) by PdG. Glass Moulded Interlocking Tiles in B Block Sector 3 Ward No. 45. Rohini.	Executive Engineer (M-III)/ RZ, North Delhi Municipal Corporation, Outer Ring Road, Delhi
301	3928	Evaluation of Chemical Admixture & Concrete Mix Design for the Work of Main Plant and Offsite Civil Works Package of NTPC-Gadarwara STPP 2 x 800 MW (Stage-I)	NTPC Limited, Gadarwara Super Thermal Power Plant, Narsingpur, M.P
302	3931	Third Party Quality Assurance/Audit for Work of “Restoration of Main Ashok Gali in Gandhi Nagar by PdG. RMC from ward no. 234 Gandhi Nagar in Gandhi Nagar” SH: Resto. of road by PdG. RMC in Ward 234, Gandhi Nagar.	Executive Engineer (M-I), Shah-S, East Delhi Municipal Corporation, Geeta Colony, Delhi
303	3935	Third Party Quality Assurance/Audit for Work of “Restoration of cut made by DJB Department. Replacement of old/Damaged CI water lines by pdg. 0 from in C-Block, Saraswati Vihar at ward C-60”. SH: Improvement of road and lanes by CC in Saraswati Vihar.	Executive Engineer (M-I), Rohini, North Delhi Municipal Corporation, Keshav Puram, Delhi

Sl. No	SP. No.	Project Title	Sponsor
304	3936	Third Party Quality Assurance/Audit for Work of “Imp./Dev of Lane of Drainage by Pdg. RMC from C-4 Block DDA Market to Metro Line in C-4 and C-5 Block Keshav Puram in C-67, Civil Line Zone”.	Executive Engineer (Pr-I), CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi
305	3939	Concrete Mix Design for Multistoreyed RCC Structure of Celler Plus Stilt Plus Ten Stored, Phase-XV & Phase-IV of AP Housing Board	Dy. Executive Engineer, Western Division, A.P Housing Board, Hyderabad
306	3940	Evaluation of Materials and Concrete Mix Design for the Work of Water Treatment Plant Package for NTPC-Gadarwara STPP 2 x 800 MW (Stage-I)	NTPC Limited, Gadarwara Super Thermal Power Plant, Narsingpur, M.P
307	3944	Assessment of Residual Service Life of Existing Structures and Suggestions for increasing the Life of Nathpa Dam of Nathpa Jakhri Hydro Power Station (NJHPS).	SJVN Limited, Shimla, Himachal Pradesh
308	3946	Evaluation of Materials and Concrete Mix Design for the Work of Coal Handling Plant Package for NTPC-Gadarwara STPP 2 x 800 MW (Stage-I)	NTPC Limited, Gadarwara Super Thermal Power Project, Narsinghpur, Madhya Pradesh
309	3947	Evaluation of Materials and Concrete Mix Design for the Work of Site Leveling & Infrastructure for NTPC-Darlipali STPP	NTPC Limited, Darlipali Super Thermal Power Project, Sundergarh, Orissa
310	3948	Quality Assessment of Hardened Concrete in RCC Pier at PR3 location in Bhalswa Flyover under Project of Comprehensive Development of Corridor (Outer Ring Road) between Mukarba Chowk to Wazirabad Chowk, New Delhi	Continental Engineering Corporation, Gurgaon, Haryana
311	3955	Evaluation of Materials and Concrete Mix Design for the Work of CHP & AHP of 2x660 MW Suratgarh Super Critical Thermal Power Station Unit # 7 & 8	Gannon Dunkerley & Co Limited, New Delhi
312	3966	Condition Assessment using Non-Destructive Evaluation Technique and Testing of Materials and Quality of Work at selected locations of Construction of 100 Bedded Hospital of ESIC, Ankleswar	NBCC Limited, Ankleswar, Bharuch, Gujarat
313	3967	Evaluation of Coarse Aggregate for the Work of Construction of 3x250 MW NTPC-Bongaigaon TPP	NTPC Limited, Bongaigaon Thermal Power Project, Salakati, Kokrajhar, Assam
314	3968	Evaluation of Coarse and Fine Aggregate for the Work of TG & Chimney at NPGCL-Aurangabad	Nabinagar Power Generating Co Limited, Aurangabad, Bihar
315	3971	Evaluation of Materials and Concrete Mix Design for the Work of Construction of Water Treatment Plant Package at NTPC-Lara	NTPC Limited, Lara Super Thermal Power Project, Raigarh, Chatisgarh

Sl. No	SP. No.	Project Title	Sponsor
316	3974	Quality Assessment of RCC of Collapsed Common Through of Ash Slurry Pump House at NTPC-Barh STPP	NTPC Limited, Barh Super Thermal Power Station, Barh, Patna, Bihar
317	3976	Evaluation of Coarse Aggregate for the Work of Construction of 3x250 MW NTPC-Bongaigaon TPP	NTPC Limited, Bongaigaon Thermal Power Project, Salakati, Kokrajhar, Assam
318	3984	Quality Assessment of Concrete Poured and Compacted in RCC Beams and Slabs of Terrace Slab (2nd Floor Level) of ITC Building of M/s AVL India Pvt Ltd at Gurgaon	Newcon Engineers Pvt Ltd, New Delhi
319	3989	Quality Assessment of Hardened Concrete in Distressed and Undistressed Concrete Laid and Compacted in Proposed 275m Height RCC Chimney Constructed up to 6.2m at Suratgarh SCTPS and Suggestion for Repair and Remedial Measures	M/s Simplex Infrastructures Limited, C/o Bharat Heavy Electricals Ltd, 2x660 MW RRVUNL Suratgarh Super Critical TPS, Suratgarh, Rajasthan
320	3995	Third Party Quality Assurance/Audit for Work of "Construction of Community Hall at Tri-Nagar Vardhman Vatika in C-61/CLZ."	Executive Engineer (Pr-II) CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
321	3996	Third Party Quality Assurance/Audit for Work of "Strengthening/Improvement of Rajan Babu Road from G.T. Road to 80 feet wide road in Adarsh Nagar in C-14/CLZ." SH: Raising and improvement of side berms.	Executive Engineer (Pr-I) CLZ, North Delhi Municipal Corporation, Sawan Park, Delhi
322	3997	Evaluation of Concreting Materials and Concrete Mix Proportions for Construction of CHP Package Civil Works for NTPC-LaraSTPP	NTPC Limited, Lara Super Thermal Power Project, Raigarh, Chatisgarh
323	3999	Study of Slump Retention Problem - CGU Suary Cement Ltd at Cement Plant.	Zuari Cement Ltd, Thiruvalur, Chennai
324	4006	Ultrasonic Pulse Velocity Testing of TG Deck Slab (1x800 MW) of Unit # 2 at NTPC-Kudgi as per IS:13311 (Part-I)-1992	NTPC Limited, Kudgi Super Thermal Power Project, Kudgi, Bijapur, Karnataka
325	4029	Third Party Quality Assurance/Audit for Work of "Construction in M C Pry. School Model Town-II in C-72/CLZ". SH: Construction of Boundary Wall and Development of ground.	Executive Engineer (Pr-II) CLZ, North Delhi Municipal Corporation, Shakti Nagar, Delhi
326	4033	Condition Assessment using Non Destructive Evaluation Technique Including Preparation of Material Specifications for Repair & Rehabilitation of Over Head Tank (OHT) and 2 Nos Underground Sumps at RBI Staff Quarters, Char Imli, Bhopal	Reserve Bank of India, Department of Estate, Bhopal, Madhya Pradesh

Sl. No	SP. No.	Project Title	Sponsor
327	4096	Testing and Evaluation of Coarse Aggregate including Potential Alkali Aggregate Reactivity for the Work of Main Plant & Offsite Civil Works Package of NTPC-Darlipali STPP	NTPC Limited, Dalripali Super Thermal Power Project, Sundargarh, Odisha
CENTRE FOR QUALITY MANAGEMENT, STANDARD AND CALIBRATION SERVICES (CQC)			
328	3543	Assistance in NABL accreditation at M/s Binani Cement Ltd	Binani Cement Ltd
329	3803	Training workshop (4-day) on ISO 17025 at M/s Binani Cement Ltd	Binani Cement Ltd
330	3821	Assessment of quality assurance system and quality control laboratory at M/s Toshali Cements Pvt Ltd	Toshali Cements Pvt Ltd
331	3871	Training workshop (4-day) on laboratory management system and internal audit as per ISO/IEC 17025 at M/s NTPC, Korba	NTPC, Korba

Appendix - IV

Research and Development Programme 2015-16

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 2016
II CESS FUNDED PROJECTS				
9	REC-10	Evolving Guidelines for Improved Refractory Engineering Practices for Modern High Capacity Cement Plants	April 2014	March 2016
10	CON-09	Performance Evaluation of M40, M60 & M80 Grade Fibre Reinforced Concrete for Performance Improvement of Concrete Structures	April 2014	March 2017
11	CON-11	Development of Alternatives to Natural Sand for Use in Concrete Masonry / Plaster	April 2014	March 2017

Sl. No.	Project No.	Project Title	Date of Commencement	Target Date of Completion
12	COB-05	Investigations on technical suitability of performance improvers in PPC and PSC	April 2015	March 2017
13	COB-06	Investigations on high volume fly ash blended cements	July 2015	March 2018
III OTHER PROJECTS				
14	INT-01	Testing Services as per Standard Specifications and Established Procedures	April 2015	March 2016
15	GMR-08	Updating of National Inventory of Cement Grade Limestone Deposits	April 2015	March 2016
16	EMG-01	Study of Energy, Environment and Quality Performance Achievements and Creating Conditions for their Consistent Improvement	April 2015	March 2016
17	INF-01	Collection, Storage, Retrieval and Dissemination of Bibliographical and Other Technical Information	April 2015	March 2016
18	PBL-01	Dissemination of Research Results and Information on NCB	April 2015	March 2016
19	SMC-01	Organisation of National and International Seminars/Conferences	April 2015	March 2016
20	HRD-01	Long Term Courses	April 2015	March 2016
21	HRD-02	Updating Knowledge and Skills of NCB Officials	April 2015	March 2016
22	CCE-02	Short Term Courses	April 2015	March 2016
23	CCE-03	Contact Training Programmes for Industrial Personnel	April 2015	March 2016
24	CCE-06	Special Programmes for Industry Personnel from India and Abroad	April 2015	March 2016
25	SBC-01	Simulator Based Courses	April 2015	March 2016
26	CLS-01	Calibration Services		
27	SRM-01	Development of Standard Reference Materials	April 2015	March 2016
28	SRM-02	Supply of Standard Reference Materials	April 2015	March 2016

Appendix - V

NCB Patents in Force as on 31st March 2015

Sl. No.	Patent No.	Title	Name of Inventors
1	251637	A decorative plaster coating	Shri S Raina Dr K Mohan Dr K M Sharma Dr M M Ali Shri S K Chaturvedi Shri S K Agarwal

PATENTS FILED :

S.No.	Application 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
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

S.No.	Application No.	Title	Name of Inventors
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 Tashi Tshering Shri Udai Kafay
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 Shri S Vanguri Ms V Liju

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NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

34 Km Stone, Delhi-Mathura Road (NH-2), Ballabgarh-121 004, Haryana, INDIA