ANNUAL REPORT 2019-20

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

Annual Report 2019 - 20

1 April 2019 to 31 March 2020

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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Message from the Chairman

My association with NCB spans over a number of years. I am happy to note that NCB's research programme remains aligned to national plans and R&D needs of cement and construction industries. Thus, NCB is able to effectively address various issues faced by industry and extend technical support for expansion of raw material base, improving energy efficiency, enhancing productivity, adaptation of technologies to reduce emission from cement plants, total quality management and human resource development.

NCB has taken up programmed projects focused on reduction in carbon footprint, waste utilization, resource conservation and improved sustainability of cement and construction industry.

Selected important projects taken up are Investigation for Standardization of High Magnesia (MgO) Clinker for the Manufacture of PPC and PSC, Investigations on Development of Portland Composite Cements Based on Fly Ash and Limestone, Development of New Clinker System Using Low Limestone Content and Industrial Byproducts, Performance Evaluation of Concrete made with Portland Limestone Cement, and Investigations on Multi-Component Blended Cements, Development of Geopolymer Concrete for Application in Pavements and Precast Concrete Construction, Development of Ultra High Performance Concrete (UHPC) including use of Nano Technology, Construction and Demolition Waste, Service Life of Concrete Structures including Studies to Improve Green Cements, , design of high strength concrete including effect of fiber etc. NCB has completed 11 programmed projects during 2019-20.

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 and training to industry personnel. With its strength/ competency and infrastructural support, NCB has completed 146 sponsored projects during this period.

Some of the significant studies carried out by NCB relate to Improving the Reactivity of Fly ash and their Effect on Cement and Concrete and development of composite cements. Limestone consumption factor determination and raw mix design & optimization studies were also conducted for several plants.

NCB conducted studies on Consultancy services for installation of Alternate Fuel (AF) storage, feeding and dosing system, Third party inspection and certification of equipment, energy audit studies at various plants, Impact of mining on salinity intrusion, Impact of Ammonia usage for secondary NOx control on Environment, Productivity improvement of kiln, monitoring of environmental parameters, technical audit (process), and projects engineering are other areas in which NCB's services were sought after by various clients.

A large number of projects in the area of materials evaluation and concrete mix design, self- compacting concrete mix design, Roller Compacted Concrete, Durability Studies on PSC made using composite slag, and alkali aggregate reactivity potential of aggregates were carried out by NCB. Quality audit services were provided for a large number of construction projects covering roads, flyovers and buildings. Third Party Quality

Assurance/Audit (TPQA) programme has assisted various organizations to ensure delivering quality constructed facilities.

NCB organizes International Seminar on Cement and Building Materials since 1987, where participants from a wide spectrum of fields of expertise from India and abroad join in the seminar. The 16th NCB International Seminar on Cement, Concrete and Building Materials was held from 03rd-06th December 2019 at Manekshaw Centre, New Delhi. Technical presentations, deliberations and discussions were held during the seminar. The Technical Exhibition arranged during the seminar was a fruitful event for both manufacturers and users. Overall it was one more successful event organized by NCB which benefited the whole cement and building materials fraternity.

In the area of human resources development, NCB conducted 64 training programmes during the year 2019-20 benefiting 1065 participants from various organizations in India and abroad. In the area of quality management, NCB conducted 10 interlaboratory proficiency testing schemes. NCB continued the supply of reference materials to the industries. NABL accredited calibration services were also provided.

It is my pleasure to mention that under the leadership of Dr. B N Mohapatra, Director General of NCB, the staff of NCB with their continuous efforts has achieved these significant goals as mentioned in this report, which is commendable. The works carried out by the scientists and engineers are highly appreciable. 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 DPIIT, Ministry of Commerce & Industry, Government of India for providing their support and direction.

7th December 2020

Mahendra Singhi
Chairman

From the desk of Director General

I am delighted to present the Annual Report of National Council for Cement and Building Materials (NCB) for the year 2019-20 to all our stakeholders. 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, which is reflected in the report.

This year's Annual Report captures the of activities and achievements of NCB during the last one year, covering the wide spectrum of applied research projects undertaken and enhanced interaction with industry and academia. NCB has executed 146 sponsored projects apart from completing 11 programmed projects during the year maintaining international standards of quality and timeliness. The projects covered all important research fields like resource conservation, utilization of industrial wastes, development of low carbon clinker and cements, raw mix design, process optimization, energy conservation, environmental improvement, ultra-high performance concrete, diagnostic studies on distressed structures, quality audits, total quality management, human resource development and so on.

In the area of cement research and testing, NCB studies show that use of high magnesia (MgO) clinker for the manufacturing of the PPC and PSC will pave the way for utilization of low-grade limestone containing high MgO, which will result in increased mine life and improved sustainability of cement industry. For reduction in carbon footprint of cement industry, studies on investigations on development of portland composite cements based on fly ash & limestone, development of belite calcium sulpho-aluminate cement using low grade limestone & industrial waste, development of multi-component blended cement etc. were undertaken. NCB completed Limestone Consumption Factor (LCF) studies for various cement plants located in different states. The ISO 17025:2017 accredited Independent Testing Laboratories tested more than 15,150 samples during the period.

In the area of Alternate Fuels and Raw Materials (AFR), NCB has identified around 100 potential materials which can be used as a source of energy / material recovery in Indian Cement Industry. Feasibility study for Co-processing of Alternative Fuel, Consultancy services for installation of tyre chips storage, feeding and dosing system for a plant, Third party inspection and certification of equipment, Comprehensive audits of cement plants, Study on Impact of mining on salinity intrusion & ambient air quality, Techno-Economic Feasibility of Secondary SO_2 Control Systems, Energy Audits for various cement plants, Environment Monitoring, TEFR for setting up a blending/grinding unit , PMC for setting up a 600 tpd Greenfield cement plant in Republic of Congo were some of the industry sponsored studies undertaken for our clients in India and abroad.

In the area of construction development and research, NCB has prepared UHPC mixes with Compressive strength so far in the range of 185 to 190 MPa. Prestigious projects of national importance were awarded to NCB by central and state govt. agencies for conducting Third Party Quality Assurance /audit of their landmark infrastructure facilities. Distress evaluation and condition assessment studies were conducted on a variety of structures covering industrial and residential buildings, heavy engineering structures like turbo-generator foundations, dam structures, bridges, tunnels, cooling towers, high-rise buildings etc. Concrete mix designs for special applications such as Self-Compacting Concrete (SCC), High performance concrete with and without steel fiber, dry shotcrete and control low strength material (CLSM) have been carried out successfully for various clients. Various testing & evaluation projects of corrosion inhibitors were taken up to help the construction industry.

In the area of total quality management, 12 nos. of Bhartiya Nirdeshak Dravyas (BNDs), the Indian Certified Reference Materials (CRMs) were developed in collaboration with CSIR-NPL, New Delhi and supply of developed Certified Reference Materials (CRMs) was continued to the laboratories of cement and construction industry. A total of 7265 vials of different CRMs and 1552 sets of standard lime were supplied to 711 customers from cement plant, testing laboratories and R&D institutions in India and abroad. The ISO 17025:2005 accredited calibration laboratory provided calibration services for various equipment used in testing of cement, concrete and cementitious materials to the users from cement & construction industries, research institutes and equipment manufacturers. The activities of interlaboratory services were given a boost and eleven Proficiency Testing (PT) schemes were completed in accordance with ISO 17043:2010.

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, benefiting 1065 participants from various organizations in India and abroad. Additionally, 4 contact training programmes and 23 Special Group Training Programmes were organized on request of industry with tailor made content.

The 16th NCB International Seminar on Cement, Concrete and Building Materials drew overwhelming participation of about 1125 delegates including 78 from overseas countries. About 193 technical papers were deliberated in 24 technical sessions. The concurrently organized Technical Exhibition, consisting of 120 stalls from 79 exhibitors. The Seminar as well as the Technical Exhibition were inaugurated by Dr Guruprasad Mohapatra, Secretary-DPIIT, along with Shri Anil Agrawal, Joint Secretary-DPIIT, Ministry of Commerce and Industry, Govt. of India. Shri Piyush Goyal Hon'ble Minister of Railways and Commerce & Industry, Govt. of India released the 2nd Edition of Compendium, distributed National Awards and addressed the delegates. Shri Shashank Priya, ASFA-DPIIT released the NCCBM newsletter in the valedictory session of the seminar. Shri Som Parkash, Hon'ble MoS for Commerce & Industry visited NCB on the 57th NCB Day and released the NCB's New Hindi Magazine "Darpan".

It is a matter of great satisfaction that Expertise groups were formed in different domains like Mineralogy & Microstructure, Advanced Pyro-processing, Carbon Capture & Utilization, Low carbon cements, Renewable Energy, etc. to meet the targets of carbon neutrality and to contribute significantly in the Advanced Cement and Concrete research. NCB effectively utilized the lockdown period started from the last week of March for internal capacity building by organizing online presentations and technical discussions.

I extend my sincere thanks to the members of Board of Governors and its Advisory Committees for their valuable advice and encouragement. My sincere most thanks are due to Secretary, Additional Secretary, Joint Secretary and other officials of Department for Promotion of Industry and Internal Trade, Ministry of Commerce and Industry, Govt. of India for their continued support and guidance. I also express my gratitude to industry in general for reposing faith in NCB's services and their continued patronage without which no achievements would have been possible.

Dr. B N Mohapatra
Director General

7th December 2020

National Council for Cement and Building Materials (A Premier R&D Organisation under the Administrative Control of Ministry of Commerce & Industry, Govt. of India)

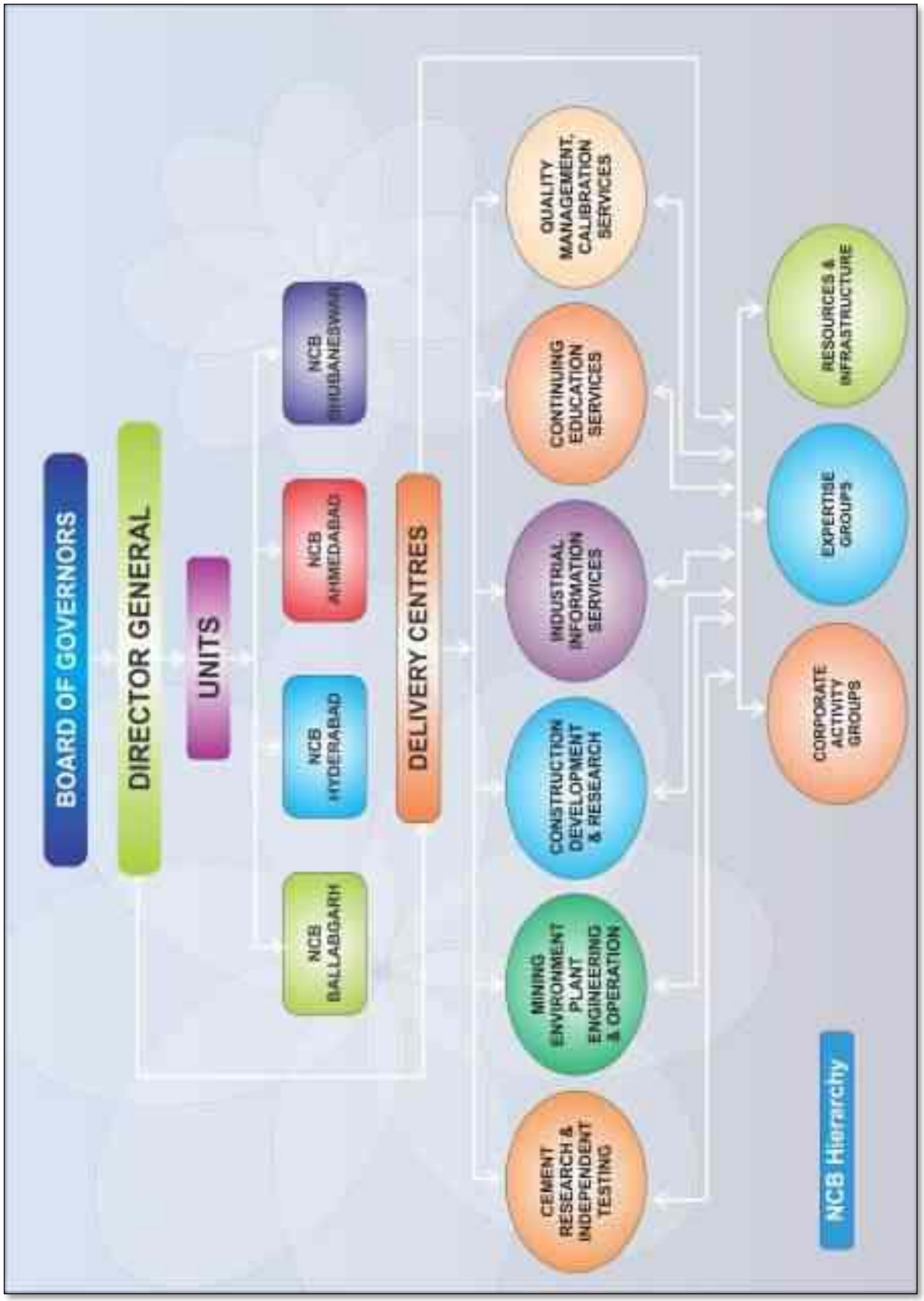
OUR VISION

Be a preferred technology partner to cement and construction sectors in the sustainable development of a better infrastructure and housing.

OUR MISSION

Research and Development of innovative technologies, their transfer and implementation in partnership with cement and construction industries.

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


BOARD OF GOVERNORS
DIRECTOR GENERAL
UNITS
NCB BHUBANESWAR
NCB AHMEDABAD
NCB HYDERABAD
NCB BALLABGARH
DELIVERY CENTRES
QUALITY MANAGEMENT, CALIBRATION SERVICES
CONTINUING EDUCATION SERVICES
INDUSTRIAL INFORMATION SERVICES
CONSTRUCTION DEVELOPMENT & RESEARCH
MINING ENVIRONMENT PLANT ENGINEERING & OPERATION
CEMENT RESEARCH & INDEPENDENT TESTING
RESOURCES & INFRASTRUCTURE
EXPERTISE GROUPS
CORPORATE ACTIVITY GROUPS
NCB Hierarchy

INTRODUCING NCB

National Council for Cement and Building Materials (NCB), then Cement Research Institute of India (CRI) was founded on 24th December 1962 with the objective to promote research and scientific work connected with cement and building materials trade and industry.

Today, NCB is the premier R&D Organisation under the administrative control of Ministry of Commerce and Industry, Govt. of India, for technology development, transfer, continuing education and industrial services for cement and construction industries. NCB serves as the nodal agency for providing the Government the necessary support for formulation of its policy and planning activities related to growth and development of cement industry. It is devoted to protect the interests of consumers of cement and concrete in the country. NCB's stakeholders are Government, Industry and Society, who perceive NCB's role as discharging national responsibility, providing adequate technology support and improving the quality of life respectively.

Geographically, NCB has its corporate center and main laboratories located at Ballabgarh (near New Delhi); another well-established regional center at Hyderabad, unit at Ahmedabad (Gujarat) and at Bhubaneshwar (Odisha). The units of NCB-Ballabgarh, Hyderabad and Ahmedabad are ISO 9001:2015 certified.

NCB's areas of work span over the entire spectrum of cement manufacturing and usage starting with geological exploration of raw materials through the processes, the machinery, the manufacturing aspects, energy and environmental considerations to the final utilization of materials in actual construction, condition monitoring & rehabilitation of buildings and structures. NCB provides ISO 17025 accredited testing and calibration services, ISO 17043 accredited proficiency testing (PT) services and ISO 17020 accredited inspection services. It also develops and supplies certified reference materials (CRMs) to cement and construction sector. For human resource development, NCB provides training services in cement, concrete and building materials field through short term and long term courses. PG diploma course in cement technology is accredited by AICTE. In the area of industrial information services, NCB organizes international seminars on cement, concrete and building materials. It has organized 15 editions of this seminar, so far. All these activities are channelized through six corporate centres:

- **Centre for Cement Research & Independent Testing (CRT):** Centre is responsible for research activity in the area of cement and other binder, waste utilization, refractory and ceramics, fundamental and basic research. Centre also look after testing activities of cement and cementitious materials and other building materials.

- **Centre for Mining, Environment, Plant Engineering & Operation (CME):** Centre carries out its activity in the area of geology, mining and raw materials, environmental management, process utilization and productivity, energy management, plant maintenance and project engineering and system designing.

- **Centre for Construction Development & Research (CDR):** Centre is responsible for research activities in the area of structural assessment and rehabilitation, concrete technology, construction technology and management and structural optimization and design.

- **Centre for Quality Management, Standards & Calibration Services (CQC):** Centre provides services to the industry in the area of proficiency testing, standards reference materials, calibration services and total quality management.

- **Centre for Industrial Information Services (CIS):** CIS provides the IT infrastructure. Centre also looks after the publications, seminar and conferences, international and national linkage and image building of NCB.

- **Centre for Continuing Education Services (CCE):** Centre organizes variety of need base, industry oriented training programmes in the area of cement, concrete and constructions.

NCB has following four service groups to support the technical activities of above six corporate centres.

- **Finance and Account Services (FAS):** FAS is responsible for managing all day-to-day financial activities

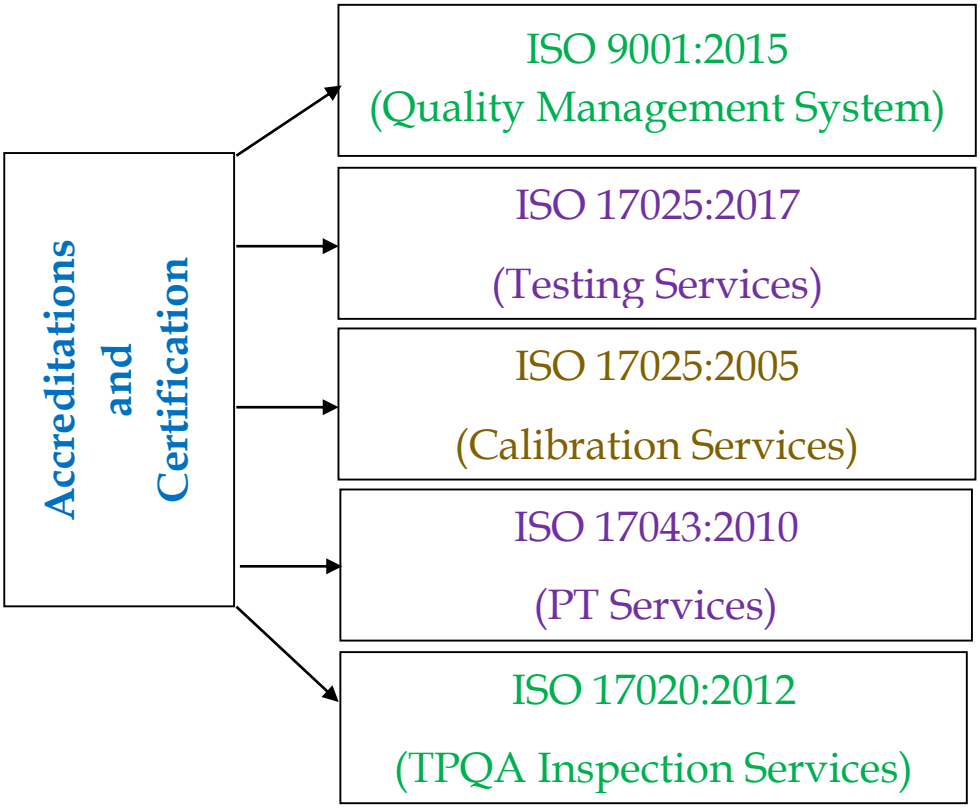
- **Human Resource and Administrative Services (HRS):** HRS-GEN provides the transportation infrastructure and HRS-PER human resources activity such as recruitment, promotion, appraisal etc.

- **Estate Management and Technical Services (ETS):** The infrastructure including resources such as workspace, utilities, equipment and communication technology infrastructure are maintained by ETS.

- **Materials Management Services (MMS):** MMS is responsible for purchase of materials including raw material as well as equipment as per the requirements of different departments of organization.

NCB's Commitment to International Quality Standards

NCB in its commitment to achieve excellence has adopted world class practices and implemented international standards for Quality Management System. NCB's quality management system is certified as per ISO 9001:2015. NCB provides world class Testing, Calibration, Proficiency Testing and Third Party Inspection Activities which are accredited as per International Standards.



Quality Management System Certification as per ISO 9001:2015

ISO 9001 is international standard published by International Organization for Standardization which specifies requirements for quality management system with the aim to enhance customer satisfaction, ability to provide reliable products and services meeting customer's requirements and expectations. NCB implemented ISO 9001 since 2002. NCB-Ballabgarh, NCB-Hyderabad and NCB-Ahmedabad units are ISO 9001:2015 certified.

QUALITY POLICY

We commit ourselves to:

- **Pursue global standards of excellence in all our endeavors, covering: Research, Design and Development, Technology Transfer, Continuing Education, Calibration and Testing Services in the areas of Cement, Construction and Building Materials.**
- **Satisfy all our stakeholders- Government, Industry and Society.**
- **Continually improve the Quality Management System.**
- **Comply with the requirements of ISO 9001:2015[E] Quality Management System and other applicable requirements.**

ISO 17025:2017- Testing Services

ISO/IEC 17025:2017 is international standard published by International Organization for Standardization and International Electro Technical Commission. ISO/IEC 17025:2017 specifies the general requirements for the competence, impartiality and consistent operation of laboratories involved in testing, calibration and sampling. NCB implemented ISO/IEC 17025 for its testing services since 1998. NCB provides 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, Environment parameters etc. & Non Destructive Testing as per National and International standards.

QUALITY POLICY

Testing laboratories of National Council for Cement and Building Materials, Ballabgarh are committed to provide reliable and accurate test results to the total satisfaction of customers in accordance with the stated methods and customer's requirement.

National Accreditation Board for Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS (TESTING LABORATORIES)

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

TESTING

Signed for and on behalf of NABL

ISO 17025:2005- Calibration Services

ISO/IEC 17025:2005 is international standard published by International Organization for Standardization and International Electro Technical Commission. This standard specifies the general requirements for the competence to carry out tests and/or calibrations, including sampling. NCB implemented ISO/IEC 17025 for its calibration services since 1998. NCB provides quality calibration services in the field of force, mass, pressure, volume, rpm and dimension fields.

QUALITY POLICY

Independent Calibration Laboratories of National Council for Cement and Building Materials, Ballabgarh are committed to provide reliable and accurate calibration results to the total satisfaction of customers in accordance with the stated methods and customer's requirements, and set quality objectives.

QUALITY OBJECTIVES

1. **Providing reliable calibration services, accurately and timely, to the satisfaction and requirements of customers;**
2. **Continual improvement and upgradation of services and facilities in accordance with changing customer requirements;**
3. **Improving customer satisfaction feedback;**
4. **Increasing resource generation.**

National Accreditation Board for Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

INDEPENDENT CALIBRATION LABORATORIES,
NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2005

'General Requirements for the Competence of Testing & Calibration Laboratories'

for its facilities at

34, KM Stone, NH-2, Delhi-Mathura Road, Ballabgarh, Haryana

in the field of

CALIBRATION

ISO 17043:2010 - Proficiency Testing Services

ISO/IEC 17043:2010 is international standard published by International Organization for Standardization and International Electro Technical Commission. This standard specifies general requirements for the competence of providers of proficiency testing schemes and for the development and operation of proficiency testing schemes. NCB implemented ISO/IEC 17043:2010 since 2013. NCB provided proficiency testing services in testing of various building materials like cement, clinker, fly ash, limestone, coal/coke, granulated slag, water, steel, aggregate etc.

QUALITY POLICY

Interlaboratory Services of National Council for Cement and Building Materials, Ballabgarh, are committed to provide highest quality of proficiency testing services to participants and other customers.

QUALITY OBJECTIVES

1. **To provide efficient and reliable proficiency testing services, to the satisfaction and requirements of proficiency testing participants and other customers;**
2. **To continually improve and upgrade proficiency testing services;**
3. **To improve feedback of participants and customers**
4. **To analyze and improve the management system, proficiency testing schemes and customer service.**

National Accreditation Board for Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

INTERLABORATORY SERVICES, NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

has been assessed and accredited in accordance with the standard

ISO/IEC 17043:2010

"Conformity Assessment - General Requirements for Proficiency Testing"

for its facilities at

34, KM Stone, NH-2, Delhi-Mathura Road, Ballabgarh, Haryana

in the field of

Proficiency Testing Provider

ISO 17020:2012-Third Party Quality Assessment

ISO/IEC 17020:2012 is international standard published by International Organization for Standardization and International Electro Technical Commission. This standard specifies requirements for the competence of bodies performing inspection and for the impartiality and consistency of their inspection activities. NCB implemented ISO 17020:2012 for Third Party Quality Assurance Inspection Services since 2017. NCB provides Technical Audit (TA), Quality Assurance & Quality Control (QA/QC) and Third Party Quality Audit (TPQA) of new constructions-residential, commercial & institutional Buildings; Flyovers, Concrete roads, Bridges etc.

QUALITY POLICY

National Council for Cement and Building Materials is committed to provide reliable and impartial inspection services in a confidential manner and without any discrimination to the total satisfaction of customers in accordance with the stated methods and customer requirements.

National Accreditation Board for Certification Bodies

NABCB

INSPECTION BODY

Accreditation Certificate

NABCB hereby conferns that

National Council for Cement and Building Materials

Complies with NABCB Accreditation Criteria for Inspection Bodies and is accredited in accordance with

International Standard ISO/IEC 17020:2012 as Type 'A' Inspection Body

to provide Inspection Services as per Approved Scope of Accreditation described in Schedule I and from its Office(s) described in Schedule II

Accreditation Certificate Number	IB 063
Date of Initial Accreditation	12 January 2018
Validity of Accreditation	11 January 2021

CEO

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12 January 2018
Issue Date

BOARD OF GOVERNORS (BOG) 2018 & 2019

Management of NCB is entrusted to a Board of Governors, which consists of representatives of cement manufacturers, government of India and consumers of cement.

Composition of BOG

Chairman

Shri Mahendra Singhi
President-CMA,
Managing Director & Chief Executive Officer
Dalmia Cement (Bharat) Limited

Members

Shri Shashank Priya #
Additional Secretary & Financial Adviser
Dept. for Promotion of Industry and Internal Trade,
Ministry of Commerce & Industry, Govt. of India

Shri Saraswati Prasad$
ASFA (Steel) Additional Charge
Govt. of India

Dr Subhash Chandra Pandey ##
Special Secretory & Financial Advisor
Dept. for Promotion of Industry and Internal Trade,
Ministry of Commerce & Industry, Govt. of India

Shri Anil Agrawal
Joint Secretary (Cement)
Dept. for Promotion of Industry and Internal Trade,
Ministry of Commerce & Industry, Govt. of India

Shri K K Maheshwari*
Managing Director
UltraTech Cement Ltd.

Shri B V N Prasad
Chairman & Managing Director
Cement Corp. of India (CCI)

Shri Rajendra Chamaria
Vice Chairman & MD
Star Cement Ltd.

Shri Sumeer Malgoora
Managing Partner
Shivalik Cement Industries

Shri Abhay Bakre
Director General
Bureau of Energy Efficiency

Shri Ajay Kapur**
Managing Director & CEO
Ambuja Cements Ltd.

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

Shri Prashant Bangur
Director
Shree Cement Ltd.

Shri S P Singh Parihar
Chairman
Central Pollution Control Board

Shri Shiv Das Meena
Chairman
Central Pollution Control Board

Shri Getamber Anand
Chairman, Confederation of Real Estate Developers' Associations of India (CREDAI),
ATS Infrastructure Ltd.

Dr B N Mohapatra
Director General NCB

** Retired from M/s UltraTech Cement Ltd. On 31st December 2019*
*** Resigned as per communication received from M/s Ambuja Cements Ltd. dated 09 March 2019*
 # Since 01st August 2019 *## Upto 30th June 2019*
$ from 01st July 2019 to 31st July 2019

Glimpses of 118th BOG Meeting in Progress

CORPORATE ADVISORY COMMITTEES

Research Advisory Committee (RAC)

RAC advises 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. RAC comprises of eminent and learned technocrats representing Indian cement and concrete industry, technology suppliers, officials from Ministry of Commerce and Industry, Government of India, Elite academia and Bureau of Indian Standards *(BIS)*, Director General-NCB etc. The RAC members meet twice in a year.

In the financial year 2019-20, the 72nd RAC meeting was held on 11th February, 2020. During the meeting, 16 ongoing R&D projects and 12 new project proposals were discussed. In his concluding remarks, Chairman RAC suggested to take up projects on Low carbon technologies like Low carbon cements, Low lime cements, Magnesia based cement, carbon capture and utilization etc. Cement research should be taken up on utilization of dolomitic limestone, utilization of high Sulphur limestone, to improve quality of clinker using low grade limestone and on problems faced by industry with the use of alternate fuels. The composition of RAC includes officials from Govt. of India: 01, Other Govt organizations: 09, CSIR Labs: 05, Academic institutions: 02, Cement & Construction Industry: 19, Consultants / Others: 01, NCB: 07. The detail composition is given below:

Composition of RAC

Chairman

Shri Ashwani Pahuja
Executive Director & Chief Sustainability Officer
Dalmia Cement (Bharat) Limited

Members

Shri V H Choudary
Plant Head
My Home Industries Ltd.

Dr Awadhesh Singh
VP and Head (Product Assurance and Services)
UltraTech Cement Ltd.

Dr V Ramachandra
Head (Technical Services)
UltraTech Cement Ltd.

Shri Raju Goyal
Chief Technology Officer
Ultratech Cement Ltd.

Shri Pankaj Kejriwal
Executive Director
Cement Manufacturing Co Ltd.

Dr Manish V Karandikar
Vice President- Raw Mix & Product Optimisation
ACC Ltd.

Dr G V K Prasad
Executive President (CPU-I, II & CCP)
The KCP Ltd.

Shri A Subose Chandra Bose
Joint President (Manufacturing)
The India Cements Ltd.

Shri Dinesh G Randad
Director (Works)
Gujarat Sidhee Cement Ltd.

Shri Sushil Kumar Rathore
Unit Head
J K Cement Works

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

Shri B C Pandey
Manufacturing Cluster Head (N)
Ambuja Cements Ltd.

Shri S K Tiwari
Technical Director
Heidelberg Cement India Ltd.

Director (IA)
Ministry of Environment, Forests & Climate Change

The Controller General
Indian Bureau of Mines

The Executive Director
Building Materials and Technology Promotion Council

The Director General
National Productivity Council

Shri Sanjay Pant
Director (Civil Engg.) & Head
Bureau of Indian Standards

The Member Secretary
Central Pollution Control Board

Shri Narendrasinh N Gohil
Dy General Manager (Q&A)
Shree Digvijay Cement Co Ltd.

Shri M Srinivasan
President-Manufacturing
The Ramco Cements Ltd.

Shri S D Arya
Vice President (Production & QA)
Mangalam Cement Ltd.

Director (Cement)
Dept. for Promotion of Industry and Internal Trade,
Ministry of Commerce & Industry

Shri Sunil Khandare
Director
Bureau of Energy Efficiency

Dr Nahar Singh
Principal Scientist
National Physical Laboratory

The Director
Central Soil & Materials Research Station

The Deputy Director General
Geological Survey of India

The Director
Central Building Research Institute
Roorkee

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

Prof. G C Mishra
Director (Cement Technology)
AKS University

Ms Aparna Dutt Sharma
Secretary General
Cement Manufacturers' Association

Shri R K Khandekar
Addl. General Manager
Ash Utilization Group
NTPC Ltd.

Dr K Ramanjaneyulu
Chief Scientist
Structural Engineering Research Centre

Dr K Mohan
Ex Director General NCB

The Chairman and Managing Director
National Research Development Corporation

Dr S K Handoo
Advisor (Tech)
My Home Industries Pvt. Ltd

Dr Lakshmy Parameswaran
Chief Scientist
Bridges and Structures Division
Central Road Research Institute

Glimpses of 72nd RAC Meeting in Progress

ADVISORY COMMITTEE FOR NCB–HYDERABAD (ACH) (2019 – 2020)

In an endeavor to reach out to the cement and construction sectors in South India and share NCB's Research and Innovative initiatives, Advisory Committee for NCB-Hyderabad (ACH) has been constituted for the year 2020.

The committee deliberates on various aspects of development of NCB–Hyderabad and its activities. It focusses in particular on the development & utilization of infrastructural facilities of the Unit and industrial & training services rendered by it. The composition of ACH includes officials from Central/State Government Departments: 08, Cement & Construction Industry: 23, Research Institutes (IIT/NIT/BITS): 05. The detail composition is given below:

Composition of ACH

Chairman

Shri V S Narang
Director (Technical)
My Home Industries Limited

Members

Shri V S Narang – Chairman
Director (Technical)
My Home Industries Pvt. Ltd.

Shri Sushil Kumar
Unit Head
Ambuja Cements Ltd.
(Unit: Maratha Cements Works)

Shri V Ganesan
Chief Operating officer
Chettinad Cement Corp. Pvt. Ltd.

Shri K Karunakara Rao
Plant Head
Dalmia Cement (Bharat) Ltd.
(Unit: Kadapa)

Shri RBM Tripathi
Plant Head
M/s J K Cement Ltd.
Muddapur Works, Mudhol

Shri Amit Mehta
Vice President – Mgf.
Kalburgi Cement Pvt. Ltd.
Gulbarga

Shri K R Reddy
Director
ACC Ltd.

Shri B M Mahana
HOD - Prod
Cement Corporation of India Ltd.
Tandur Cement Factory

Shri AVNVS Murthy
Plant Head
Dalmia Cement (Bharat) Ltd., Unit: Ariyalur)

Shri D Muruganandam
President (Manufacturing)
The India Cements Ltd.

Shri Arpan Parekh
Plant Head
M/s JSW Cement Ltd.
(Unit: Nandyal)

Shri Madhusudhan Rao
Vice President
M/s The K C P Ltd.
Jaggayapet Mandal

Shri G Srinivasa Reddy
Plant Head
Kesoram Industries Ltd.

Shri RVR Murthy
Plant Head
M/s. Orient Cement Ltd.
(Unit: Devapur Cement Works)

Shri SVRK Murthy Rao
Vice President - Process
The Ramco Cements Ltd.

Shri S Sreekanth Reddy
Joint Managing Director
Sagar Cements Ltd.

Shri Surya Valluri
Plant Head
Ultra Tech Cement Ltd.
(Unit: Rajashree Cement Works)

Dr V Ramachandra
Head (Technical Services)
UltraTech Cement Ltd.

Shri S V Murali Prasad Reddy
Plant Head
Zuari Cement Ltd.
(Unit: Yerraguntla)

Dr P Rathish Kumar
Professor – Civil Engg.
National Institute of Technology- Warangal

Prof. KVL Subramanian
Indian Institute of Technology
IIT Hyderabad

Shri N N Samba Siva Rao
Chief Engineer
Central Public Works Department
Nirman Bhavan, Hyderabad

Shri J Mohan Naik
Chief Engineer (R & B)
State Roads & Core Roads Network wing,
Hyderabad

Shri K Ravi
Managing Director
NCL Industries Ltd.

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

Shri V M Moorthy
Vice President - Technical
Rain Cements Ltd.

Shri Arvind kumar Patil
Unit Head
M/s Shree Cement Ltd.
(Unit: Karnataka Cement Project)

Shri Raju Goyal
Chief Technical Officer
Ultra Tech Cement Ltd.

Shri Jayasankar K
Vice President – Technical Services
Ultra Tech Cement Ltd.

Dr N V Ramana Rao
Director
National Institute of Technology- Warangal

Shri Ameer Uz Zaman
Scientist 'F' & Head
Bureau of Indian Standards

Shri N Srinivasa Rao
Superintendent Engineer – CMDA Member
Chennai Metro Politan Development authority

Shri P K Laad
General Manager- Tech Services
NTPC Ltd., Ramagundam

Shri Rafi Ahmad
Joint Director,
Mines & Geology, Govt. of Telangana,
Hyderabad

Member Secretary
Telangana State Pollution Control Board

Shri Cheeti Muralidhar
Engineer-In-Chief (Irrigation)
O/o The Engineer-In-Chief (Irrigation)
Irrigation & CAD Department
Govt. of Telangana

Dr K Ramanjaneyulu
Chief Scientist
Structural Engineering Research Centre,
CSIR Complex

Prof. G Sundar
Senior Professor & Director
BITS-Pilani, Hyderabad Campus

Dr B N Mohapatra
Director General
National Council for Cement and Building Materials

Ms K Kalyani
Unit-in-Charge of NCB–Hyderabad,
Member Secretary

Glimpses of ACH Meeting in Progress

Infrastructural Development Committee (*IDC*) (2019-2020)

In the financial year 2019-20, the 49th IDC meeting was held on 09th May 2019. During the meeting Infrastructural Development Committee (IDC) advises 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.

Composition of IDC

Chairman

Shri V S Narang
Director (Technical)
My Home Industries Limited

Members

The Director (Cement)
Dept. for Promotion of Industry and Internal Trade
Ministry of Commerce & Industry, Govt. of India

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

Dr Sujit Ghosh
Executive Director (New Building Solutions)
Dalmia Cement (Bharat) Ltd.

An NCB Official nominated by
DG NCB : Member-Secretary

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

Shri Chander Shekhar
Addl. General Manager-PE-Civil
NTPC Ltd.

DG NCB, Joint Directors and Heads of concerned Service Groups in NCB

Administration and Finance Committee (AFC) (2018 & 2019)

Administration and Finance Committee (AFC) advises 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 are reported to the Board at its immediate next meeting through the relevant status report.

Composition of AFC

Chairman

Shri Rajendra Chamaria
Vice Chairman & Managing Director
Star Cement Limited

Members

The Senior Development Officer (Cement)
Dept. for Promotion of Industry and Internal Trade
Ministry of Commerce & Industry, Govt. of India

The Director Integrated Finance Wing
Dept. for Promotion of Industry and Internal Trade
Ministry of Commerce & Industry, Govt. of India

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

Shri Dharmender Tuteja
Executive Director
F&A & Commercial
Dalmia Cement (Bharat) Ltd.

DG NCB, Joint Directors and Heads of concerned Service Groups

An NCB Official nominated by DG NCB: Member-Secretary

Executive Committee (EC)

With a view to achieve the objectives of collegiate management and to assist the Director General to deal with the various functions, the Executive Committee, comprising heads of various Divisions of activities with the Director General as its Chairman, held 05 meetings and deliberated upon important issues including approving proposals for 381 sponsored projects.

Composition of EC

Chairman

Dr B N Mohapatra
DG NCB

Secretary

Dr S K Chaturvedi
HOC-CRT & HOS-FAS

Members

Shri V V Arora	:	HOC-CDR
Shri Ashutosh Saxena	:	HOC-CME & HOS-HRS
Mrs. K V Kalyani	:	Unit Head, NCB-Hyderabad
Shri P N Ojha	:	HOC-CQC
Shri A K Dubey*	:	HOS-ETS
Shri A V S Manian	:	HOC-CIS
Dr D K Panda	:	HOC-CCE
Shri Amit Trivedi	:	HOS-MMS
Dr Devendra Yadav	:	Incharge-TPM

**Retired on 31st Jan. 2020*

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 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 areas 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, dissemination of information through seminars & training programmes and total quality management.

NCB has taken up studies for Improving the Reactivity of Fly ash and their Effect on Cement and Concrete Performance. Limestone consumption factor was established for cement plants from all over the country and so far established the same for 218 cement plants. NCB studies show Use of high magnesia (MgO) clinker for the manufacturing of the PPC and PSC will pave the way for utilization of low grade limestone containing high MgO resulting in increased mine life besides improved sustainability in cement manufacture. In another study, the synthesized jarrosite-based belite-rich cement shows significant potential to commercialize. Assignments were carried out by Independent Testing Laboratories of NCB, for samples from neighboring countries also and a large number of samples tested during the period.

Environment Monitoring Studies were carried out for various thermal power plants. Performance Evaluation of Air Pollution Control Equipment, Impact of Ammonia on Environment, Impact of mining on salinity intrusion, ambient air quality, ground water quality and land use pattern, Techno-Economic Feasibility of Secondary SO2 Control Systems are various studies carried out in the areas of Environmental Management by NCB. In the areas of Process Optimization and Productivity, Process audits, Comprehensive audits, Third party inspection and Certification of equipment. Consultancy services for installation of tyre chips storage, feeding and dosing system for a Cement Company at Sultanate of Oman is currently underway in which NCB will provide PMC services to the plant. The Energy Management division carried out plant energy audit studies at various cement plants. In the areas of Project Engineering and System Design, Technical Economic Feasibility for setting up a blending/grinding unit, Feasibility study for Co-processing of Alternative Fuel in Rotary Kiln, Project Monitoring and Control (PMC) Consultancy Services for setting up a Cement Plant abroad are the various assignments under progress.

Condition/health assessment services for old & new structures like Turbo Generator, Cooling Towers, Chimneys, Coal Handling Structures, Machine Foundations, Dam Structures,

Bridges, Water Reservoir Basins, Commercial, Industrial & Residential RCC buildings in different states of India as sponsored R&D assignments were provided by Programme namely Structural Optimization and Design.

In the area of Concrete Technology, NCB has conducted evaluation of wide range of concrete making materials such as natural coarse and fine aggregates, cement, flyash, GGBS, alternative aggregates like geo-polymer flyash sand etc. and has successfully carried out important projects for prestigious clients. Distress investigation, durability assessment & service life prediction for the existing RC structures are being carried out under Structural Assessment and Rehabilitation Programme. More than 50 number of coarse and fine aggregates were evaluated for accelerated mortar bar test, mortar bar test, potential alkali reactivity of carbonate rocks (rock cylinder method) & length change of concrete due to alkali carbonate reaction for various prestigious clients. More than 22 sponsored projects of material characterization and about 150 mix designs were completed during the period of 2019-20. Concrete mix designs for special applications such as Self-Compacting Concrete (SCC), High performance concrete with and without steel fiber, dry shotcrete and control low strength material (CLSM) have been carried out successfully for various clients. Large number of projects for Testing & evaluation of corrosion inhibitors were taken up to help the construction industry. Studies were taken up to investigate possibilities of using high concentration (1-10%) Carbon Nanotubes (CNT) solutions for improving the performance and properties of cement concrete and concrete based precast building products. In yet another study, a milestone is achieved in preparing UHPC mix using NCB Planetary Mixer and Compressive strength achieved so far in the range of 185 to 190 MPa. Application of SCMs (single and multi) mainly, fly ash and GGBS as a part replacement to Ordinary Portland Cement and impact of corrosion inhibitor on corrosion rate has been studied comprehensively. The expertise on Development of Geopolymer concrete for application in pavements and precast concrete construction is extended to study the properties of geopolymer concrete in reinforced concrete as well. Concrete mix designs for special applications such as Self-Compacting Concrete (SCC), High performance concrete with and without steel fiber, dry shotcrete and control low strength material (CLSM) have been carried out successfully for various clients. Prestigious projects of national importance were awarded to NCB by Indian Trade Promotion Organization (ITPO), India International Convention Centre (IICC), Central Public Works Dept. (CPWD), State PWDs, All India Institute of Medical Sciences (AIIMS), Delhi Development Authority (DDA), Odisha Industrial Infrastructure Development Corporation (IDCO), State Trade Promotion Organizations in Karnataka & Tamil Nadu, Sports Authority of Gujrat (SAG), etc. The Centre continues to provide specialized services in the area of quality assurance/control and thereby contributing to the durable infrastructure in India. The Third Party Quality Assurance/Audit of construction projects was taken up this year for a large number of satisfied customers.

In the area of Total Quality Management services, during the year, Interlaboratory Services completed 11 PT schemes. Twelve Bhartiya Nirdeshak Dravyas (BNDs), the Indian Certified

Reference Materials (CRMs) were developed NCB. The availability of SI traceable BNDs will give a boost to "Make in India" programme and harmonize the quality infrastructure of the country. Reference materials have been developed and provided to the end users. NCB has a wide range of CRMs for chemical and mechanical parameters of cement, fly ash and other materials. So far, 79 types of CRMs have been developed. Calibration services are continued. Different CRMs and standard lime were supplied customers from cement plants, testing laboratories, public sector undertakings, R&D institutions including Bangladesh, Bhutan, Nepal etc. More than 1800 equipment/instrument including proving rings, compression testing machines, vibrating machines, dial gauges, Blaine cells, pressure gauges, sieves, thermometers, environmental chambers, ovens, furnaces, balances, rebound hammers etc. were calibrated at NCB laboratories and at customer's site.

NCB organized the 16th NCB International Seminar on Cement, Concrete and Building Materials. In order to emphasize the importance of concept of circular economy, climate change and sustainability, the theme of this year's seminar was chosen as "Clean and Green is Sustainable". The seminar saw participation of 1125 delegates from cement industry, building materials industry, exhibitors, NCB officials, foreign delegates, government organizations, academia, media partners etc. The seminar witnessed 78 foreign delegates from 18 countries across the globe. The seminar was attended by inaugurated by Dr Guruprasad Mohapatra, Secretary, Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Govt. of India.

Shri Piyush Goyal, Hon'ble Minister of Railways and Commerce & Industry, released the 2nd edition of Compendium "The Cement Industry – India 2019" during the special session of the Seminar. The compendium published by NCB in association with DPIIT, Ministry of Commerce & Industry was blessed by the messages from Hon'ble Prime Minister of India Shri Narendra Modi Compendium included information on status of Indian Cement Industry and its profile, key issues/challenges related to raw materials, energy efficiency, environment concerns and an exhaustive directory of cement plants in India.

प्रधान मंत्री

Prime Minister

MESSAGE

It is heartening to learn that National Council for Cement and Building Materials (NCCBM) in collaboration with Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce & Industry is bringing out the 2nd edition of Compendium on cement industry titled 'The Cement Industry – India 2019'.

The Compendium will highlight the important issues facing the cement industry and raise technological and technical advances for the benefit of the various stakeholders of the cement industry in our country.

The publication will surely provide valued inputs to the cement sector and contribute to the growth and development of the sector, as well as to the overall progress of our nation.

I wish the publication of the 2nd edition of the Compendium on cement industry all success.

(Narendra Modi)

New Delhi
अग्रहायण 13, शक संवत् 1941
4th December, 2019

Dr. B. N. Mohapatra
Director General
16th NCB International Seminar
On Cement, Concrete & Building Materials
34 KM Stone, Delhi-Mathura Road (NH-2)
Ballabhgarh
Haryana – 121004

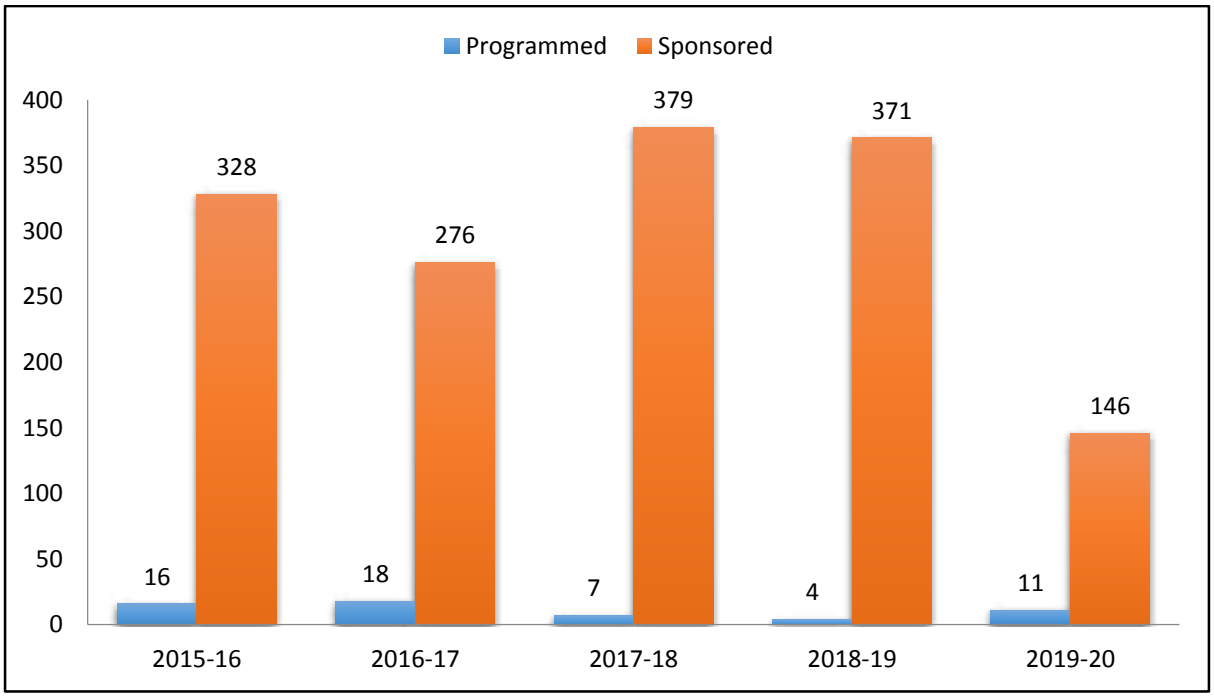
Shri Piyush Goyal gave the National Awards for Energy Efficiency, Environmental Excellence and Total Quality Excellence in Indian Cement Industry which plays a catalytic role in achieving excellence through competitive improvement in performance. In his address, Shri Piyush Goyal congratulated NCB for organizing 16th NCB International seminar with a relevant theme of "Clean and Green is Sustainable" and all the winners of National Awards on Energy, Environment and Total Quality Excellence. He complimented cement industry for working on the concept of a circular economy and for utilizing plastic waste. He thanked cement industry for their huge contribution to nation building, working towards sustainability and towards using alternate fuels. He also complimented cement industry for setting various targets to become a sustainable industry. He was of the opinion that Modern India cannot be built without cement and the very foundation of the country's future lies in this industry.

NCB's Rolling Plan of Missions is given in Appendix-I. During the year, projects with time target, 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 with Cement Manufacturers Association (CMA), Ministry of Environment and Forests (MoEF), Central Pollution Control Board (CPCB), Indian Bureau of Mines (IBM), Bureau of Energy Efficiency (BEE), Bureau of Indian Standards (BIS) 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 resources development etc.

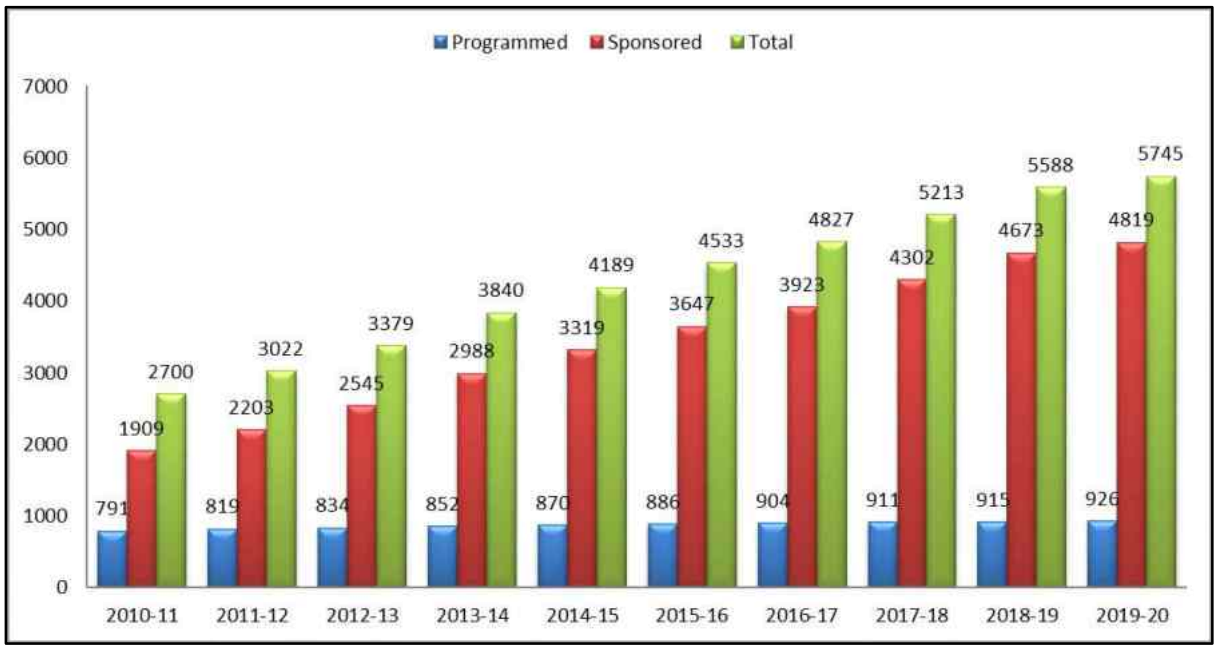
Framework of Institutional Efforts

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, 11 Programmed and 146 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 2019-20, as given in Appendix IV. The broad activities carried out by the six Corporate Centres are highlighted in the following sections.



Projects Completed by NCB



Projects Completed by NCB (Cumulative)

NCB BALLABGARH

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. 22 Sponsored Projects were completed and 6 Programmed Projects were pursued during the year.

Cements and Other Binders

Establishing Limestone Consumption Factor (LCF)

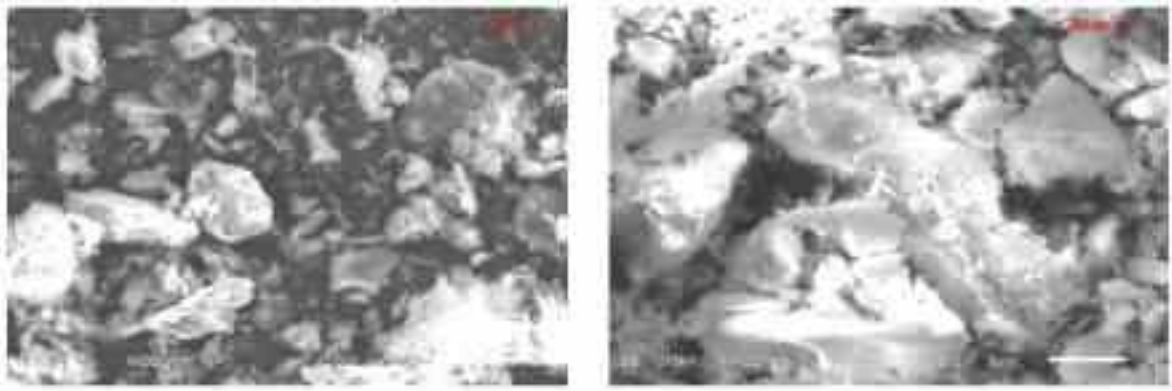
LCF studies are very important from the point of view of rationalization of limestone consumption in production of cement, estimating royalty payable to state for the limestone mined from their respective captive mines besides internal material audit of the concerned cement plants. NCB has carried out Limestone Consumption Factor (LCF) studies for cement plants from all over the country and so far established the same for 218 cement plants. During the year, LCF studies were completed for 11 cement plants from Andhra Pradesh, Chhattisgarh, Gujarat, Karnataka, Maharashtra, Madhya Pradesh, Rajasthan, Telangana, and Tamil Nadu.

Improving the Reactivity of Fly ash and their Effect on Cement and Concrete Performance

Fly ash is a typical industrial waste and around 217 MT per year produced from thermal power plants in India. Around 65% of generated fly ash is utilized in different sectors including cement. The utilization of fly ash largely depends on its characteristics such as amorphous /glass content, lime reactivity and carbon content percentage. Fly ash is generated by combustion of coal and contains various inorganic minerals such as silicate, alumino silicate, iron silicate, and minerals, which influence the reactivity of fly ash. Quality of Indian fly ashes were relatively poor and vary in terms of glass content (15-45%), lime reactivity (2-7 Mpa), and reactive silica.

Amorphous content is an important characteristic property for utilization of fly ash in cement sector. The present study investigates the effect of mineral matter doping in the coal before combustion on its chemico-mineralogical constituents of the resultant ash. Different types of sintering aids were mixed with coal of different percentages. The ash prepared of the designed coal and dopants mixes in laboratory furnace at around 950°C. The resultant ash with and without dopants were evaluated for their chemico-mineralogy and microstructure characterization using state of art instruments such as XRD, SEM and Optical Microscopy The mineralogical or crystalline compositions and glass content of doped ash samples shows better characteristics than the un doped sample. The addition of sintering aids may convert the crystalline content of silicate minerals into amorphous content and enhances the total amorphous content in the doped ash samples. Lime reactivity,

and cement reactivity of doped ash samples shows better performance than the control sample. Tie up with the thermal power plant for industrial plant scale trials are advance stage.



SEM Micrograph Showed Deformed Grains and Higher Amorphous Content in the 1% CSA ash Doped

Waste Utilization

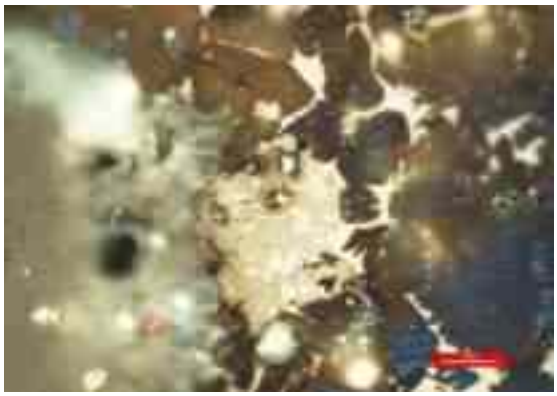
Investigation for Standardization of High MgO Clinker for Blended Cement

The objective of this study is to investigate clinker characterization with MgO content up-to 8% for the manufacturing of blended cements, such as PPC and PSC to utilize high MgO content low grade limestone for clinker manufacturing. Four types of high MgO clinker samples from different industries named as Clinker-1 (MgO~6.16%), Clinker-2 (MgO~6.80%), Clinker-3 (MgO~7.50%) and Clinker-4 (MgO~8.40 %) on the basis of MgO content were procured along with other cementitious and additive samples such as Fly ash, GBF slag and Gypsum. Chemical and mineralogical characterization of the above procured samples was studied. OPC, PPC and PSC cement samples were prepared by inter-grinding the constituents in a laboratory ball mill utilizing Clinker-1 (CL-1), Clinker-2 (CL-2), Clinker-3 (CL-3) and Clinker-4 (CL-4) respectively keeping the fineness level 350±10 m^2/kg. PPC samples were prepared varying the fly ash from 15% - 35% whereas PSC samples were prepared varying the Slag percentage from 25% to 70%. Total 64 nos. of cement batch were prepared and evaluated for the physical and chemical properties as per IS 4031 and IS 4032.

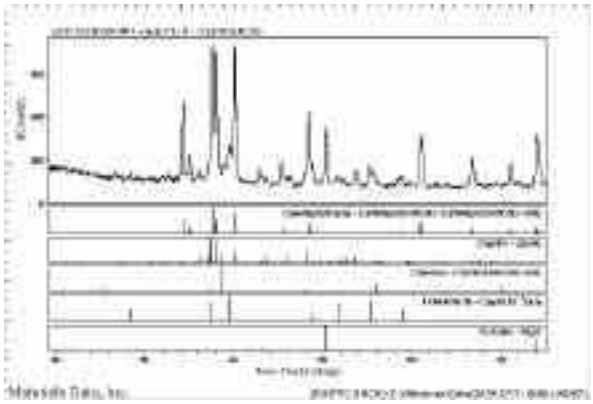
The results of physical performance evaluation carried out as per IS:4031 indicated that all the four control OPC samples were meeting the requirement of IS:269 except autoclave expansion. In case of PPC, the samples prepared using different type of high MgO clinker samples containing upto 8.4% MgO and minimum 25% fly ash addition were conforming to all the requirement as per IS:1489 (part 1). Therefore, in case of PPC samples prepared using high MgO clinker containing MgO as high as ~8.4% minimum addition of fly ash was optimized to be 25% by weight. Similarly, in case of PSC, the samples prepared using different type of high MgO clinker samples containing upto 8.4% MgO and minimum 35% slag addition were conforming to all

the requirement as per IS: 455. Therefore, in case of PSC samples prepared using high MgO clinker containing MgO as high as ~8.4% the minimum addition of GBFS was optimized to be 35% by weight.

The results of investigation revealed that addition of fly ash and granulated blast furnace slag (GBFS) in the blended cements prepared from high MgO clinker samples were found to have potential effect on arresting the expansion caused by periclase (MgO). The performance results obtained so far are quite encouraging. Use of high magnesia (MgO) clinker for the manufacturing of the PPC and PSC will pave the way for utilization of high MgO content low grade limestone containing high MgO resulting in increased mine life besides improved sustainability in cement manufacture.



Clinker-3 (MgO-7.50%) Periclase cluster Surrounded by both alite and belite crystals

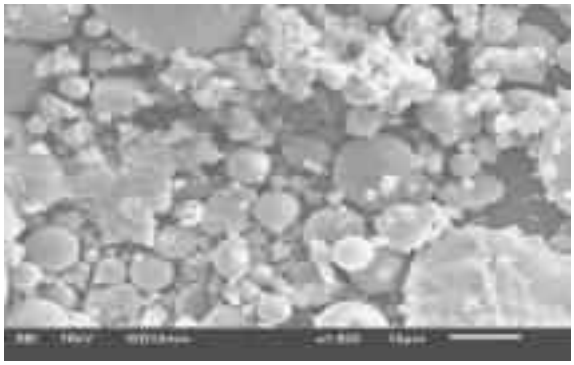


XRD of high MgO Clinker-3 (MgO-7.50%)

Improving the Properties of Fly ash at higher Fineness through Mechanical activation

Fly ash has been established as the most sought after material in cement, construction and related building materials Industry. Enhancing the fly ash utilization in the manufacture of cement is identified as one of the key areas to mitigate the Green House Gas emissions from cement industry. Owing to the poor reactivity of Indian fly ash, cement industry is generally using activation methods to improve the properties of fly ash for enhanced use as a blending component in cement manufacturing. Among different methods of activation, mechanical activation is the most economic and effective way for improving the fly ash properties. Grinding of fly ash alone or along with clinker to the required fineness is a common practice in cement industry. Though increasing the fly ash content in cement has economic and environmental benefits, it results in decrease in the compressive strength values particularly at early ages. Investigations were carried out on the mechanical activation of fly ash to the very high fineness values to see the effect of use of high fine fly ash on the properties of resultant cement. Though the physical properties and glass content values of the fly ash were found to be improving with the fineness, after a certain fineness some properties of fly ash such as lime reactivity (L.R.) and comparative compressive strength (C.C.S.) were found

to be decreasing. Change in the microstructure of fly ash with increasing the fineness of fly ash was identified as the primary reason that is affecting the L.R. and C.R. values. Besides, increasing the fineness of clinker was found to be more beneficial than increasing the fineness of fly ash to absorb more fly ash in the cement manufacturing.



Improved fineness of Fly ash by mechanical activation

Investigations on Development of Portland Composite Cements based on Fly Ash and Limestone

Portland composite cement blends were prepared (80 nos.) with four types of clinker from different regions of India along with the regional available Fly ash and limestone. The materials were ground in a laboratory ball mill with a capacity of about 8 kg by inter-grinding method. The clinker inter-ground with 3.7% of gypsum by mass is referred to as OPC. A series of tests was carried out on various mixes of limestone-fly ash cement mortars in order to investigate the effects of using different percentages of lime and fly ash as a replacement of cement on the compressive strength of such mortars at various ages. Different mix proportions were adopted for the experimental work.

The experimental matrix can be divided into three main groups, 100% OPC (mix 1) in the first group. In the second group, OPC is gradually replaced by fly ash in steps of 20% up to 35%. In the third group, different limestone powder and fly ash combinations were tested, all at a total OPC replacement level of 40% by mass. Clinker quality plays an important role on performance of limestone and fly ash based composite cements. PCC samples containing Fly ash and Limestone up to the level off 30% and 7 % respectively comply with IS 16415-2015 at all ages. 5% and 7 % of limestone replacement cement blends compressive strength shows higher than the 43 grade strength values. When increasing the fly ash content in lower percentage of Limestone such as 5% and 7%, reduction in initial strength observed but at later age strength is almost similar. Reduction of compressive strength was observed at initial and later ages with 10% replacement of limestone cement blends. Strength values of the different mortar mixes in comparison to the percentages of lime stone, fly ash and cement in a particular mix. Lower levels of limestone additions show higher percentage of difference between IS requirements and obtained results. Whereas 10% replacement shows marginal difference between IS requirements and obtained results. PCC samples of 5% replacement of Flyash with Limestone comply

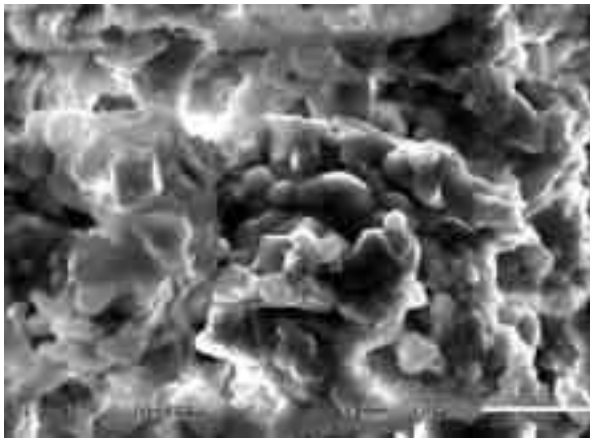
performance with respective PPC samples at all ages. PCC samples show strength reduction with 10% Limestone replacement at all the ages. Durability evaluation of selected cement compositions against SO_4 attack, chloride ingress and CO_2 attack is under progress. Impact of limestone quality (low grade limestone and Dolomitic limestone) on the performance of Portland composite cements is under progress.

Fundamental and Basic Research

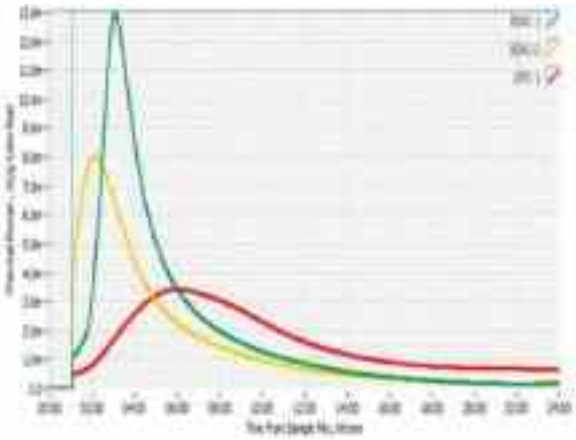
Development of Belite Calcium Sulpho-Aluminate Cement using Low Grade Limestone and Industrial Waste

Belite Sulfo-Aluminate Cements (BSAC) are an alternative to the Ordinary Portland Cements (OPC) and gaining the importance due to its potential in conserving limestone reserves and mitigating CO_2 emissions. In addition, these materials require lower operating temperature of the kilns, ~1250°C and they are easily ground due to their higher porosity. The production process of BSAC requires sulphate source such as gypsum or anhydrite as major raw material. But, the availability of gypsum is not uniform throughout the India. In order to address these concerns, the present study highlights the effect of the addition of typical Jarosite as a substitute for sulphate source generally gypsum in BSAC raw mixes prepared with other conventional raw materials.

Burnability studies conducted at temperatures of 1150, 1200 and 1250^{0}C with a retention time of 20 min showed rapid formation of BSAC clinker mineral phases with low LSF (~70) of raw mix. The mineral phase developments such as dicalcium silicate (C_2S) and ye'elimite ($C_4A_3\$$) of laboratory clinkers fired at 1250°C. XRD, Scanning Electron Microscope and Optical Microscope confirmed the formation of ye'elimite ($C_4A_3\$$) and C_2S through microstructural and morphological characterization. Isothermal conduction calorimetry study showed that the heat liberation of BSAC were higher at early age compare to conventional OPC. With these results, the synthesized jarrosite-based belite-rich cement shows significant potential for commercialization.



SEM micrographs for BSAC



Isothermal conduction calorimetry performance of BSAC cement mixtures and Commercial OPC

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.

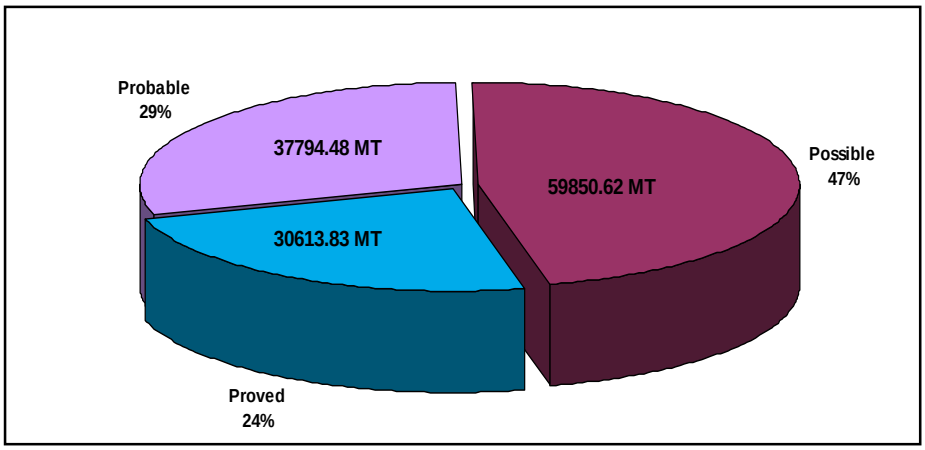
The Independent Testing laboratories established in 1977 on a Test House pattern, undertake testing jobs for cement, construction and allied industries. NCB testing laboratories achieved a landmark when NABL accredited them in the year 1997 as per ISO 17025 quality system. The laboratories are equipped with state-of-art instruments to carry out the tests as per National and International standards. During the year, assignments were carried out for samples from neighbouring countries also. The number of samples tested during the period was more than 15,156.

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

Centre for Mining, Environment, Plant Engineering and Operation carries out its activities through six Programmes viz Geology, Mining & Raw Materials; Environmental Management; Process Optimisation and Productivity; Energy Management; Plant Maintenance and Project Engineering & System Design and completed 17 sponsored projects during the year.

Geology, Mining and Raw Materials

NCB under its continuous activity "Updating of National Inventory of Cement Grade Limestone Deposits in India" is updating it through regular interaction with various central and state DGM's for collection of exploration data on latest status of limestone resources. The total limestone resources of all categories is estimated at 128258.93 million tonnes as on 31st March 2020 out of which the proved, probable and possible categories are of 30613.83 million tonnes, 37794.48 million tonnes and 59850.62 million tonnes respectively.



National Inventory of Cement Grade Limestone Resources

Environmental Management

Impact of Ammonia on Environment due to use of Ammonia for secondary abatement of NOx control in Cement Industries in India

In India, Ministry of Environment, Forests and Climate Change (MOEF&CC) notified NOx emission limits of 600/800/1000 mg/Nm3 depending upon the type of technology installed in the cement plant. Indian cement plants are in the process of installing secondary NOx control equipment like SNCR (Selective Non-Catalytic Reduction), which utilizes ammonia/urea for reduction of NOx level to meet the prescribed emission limits. There was a serious concern in the Indian cement industry that usage of ammonia for NOx reduction using SNCR will result in net increase in environment impacts, as the ammonia consumption will be having its own environmental issues like Ammonia slip/emission, additional carbon foot print

in ammonia manufacture and transport of ammonia over long distances to cement plants. NCB has carried out a holistic assessment of environment impacts by comparing the uncontrolled NOx emissions from baseline scenario and impacts from secondary NOx control (involving ammonia production, transportation, ammonia slip, controlled NOx emissions). The environment impacts assessed in this study were Global Warming Potential, Acidification Potential, Eutrophication Potential and Particulate Formation Potential. These impact categories were selected to capture the effect of ammonia and NOx emissions. The impacts were assessed for base NOx levels between 1200 mg/Nm3 to 2000 mg/Nm3.

Environment Monitoring Studies

Environment Monitoring Studies were carried out at two units of a thermal power plant in Uttar Pradesh under which Point source emissions (Particulate Matter) were monitored at inlet of ESP and at stack.

Performance Evaluation of Existing Air Pollution Control Equipment (APCE)

Performance Evaluation of Existing Air Pollution Control Equipment was carried out for a cement plant in Meghalaya under which 8 major APCEs were monitored. This included 6 Bag Houses / Bag filters and two ESPs. Various process parameters and dust concentration at inlet and outlet of APCE were measured to evaluate the performance.

Study on Impact of Mining on Salinity Intrusion, Ambient Air Quality, Ground Water Quality and Land Use Pattern

Study on Impact of Mining on salinity intrusion, ambient air quality, ground water quality and land use pattern was taken up for two mine leases of a cement plant. Ground water level & quality and soil quality monitored during Pre-monsoon (June), Monsoon (August), Post-Monsoon (Nov.) and Winter (February) for a period of one year. Ambient Air Quality (AAQ) and Land use pattern by using satellite imagery monitored for two seasons.

Study on Techno-Economic Feasibility of Secondary SO_2 Control Systems

In India, Ministry of Environment, Forests and Climate Change (MOEF&CC) notified emission limits for SO2 of 100/700/1000 mg/Nm3 depending upon the pyrite content in the limestone of <0.25%, >0.25% to <0.5% and >0.5% respectively for kiln stacks of cement plants. In this study, NCB team collected & tested limestone samples and carry out process measurements at stage wise preheater cyclones to study the release of SO2 from pyritic sulphur in the preheater cyclones. Due to the limited SO2 reduction from primary control measures in comparison to required reduction, use of secondary SO2 control measures becomes imperative. Under the study, the secondary SO2 control options namely Dry Flue Gas Desulphurization (FGD) based on hydrated lime / quick lime / sodium bicarbonate; Semi Dry

Scrubber with hydrated lime injection in CFB; Dual Alkali Lime Scrubber; FGD based on limestone / NaOH / Sea water / Ammonia and De-SOx Cyclone were evaluated and compared on the basis of water requirement, effect on plant operation, maintenance requirement, efficiency of SO2 control, cost etc. A trial of hydrated lime injunction was conducted at one cement plant in Meghalaya using lime feeding system prepared and arranged by the plant. The calibration of feeding mechanism was carried out before trial. The trial run was conducted with lime injection at different molar ratios and up to 40% reduction in SO2 emission level at stack was observed.

Process Optimisation and Productivity

Process Audit of Preheater & Junction Duct for a Cement Plant in West India

A cement plant in West India is operating a cement plant with single kiln of 9000 TPD Clinker. The pyro-processing section has a Pre-heater with 1 ILC string and 2 SLC strings. The plant was experiencing the problem of pressurization in Junction duct before Reverse air bag house (RABH) which adversely impacts the normal kiln operation and at times leads to reduction in clinker production. The plant operation team also observed high return dust from top stages of Preheater.

NCB took up the process audit study of Preheater & Junction point. The study included detailed process measurement to establish the distribution of Preheater Gases to Raw Mill, Coal Mill and RABH

The recommendations for reduction in pressurization in Junction duct included:

- CFD simulation for identifying the reasons for the poor collection efficiency of Top stage cyclones in all the three strings. The assignment may however be taken up one by one.
- Reduction in false air infiltrations in various ducts of the preheater exhausts gas handling section
- CFD simulation for the Junction Duct to establish the gas flow pattern from each of the Preheater ID fans. A simulation for modification inside the JD or the three outlet branches can be done to guide / control the gas flows using a baffle plates or flow control dampers.

Third Party Inspection and Certification of Equipment Supplied by M/s FLSmidth M/s Gulf Nations for a Cement Plant in Kuwait

A cement grinding plant at Shuaiba Industrial area, Kuwait, is installed for manufacturing OPC & SRC cements. The plant is having Two (02) nos of cement mill circuits each having capacity of 150 tph and Two (02) nos of packers each having capacity of 150 tph. The Cement Mill-1 circuit and Packer-1 was commissioned in January 2019 and Cement Mill-2 as well as Packer-2 is under commissioning. The plant entrusted NCB to inspect the plant machinery supplied by M/s FLSmidth.

NCB Team Inspecting Plant Machinery

NCB Team with the Plant Team

Comprehensive Audit for Identifying Bottleneck in Producing 650 tpd for M/s Barak Valley Cements Ltd.

M/s Barak Valley Cements Limited (**BVCL**), Silchar, Assam has a cement kiln designed for 550 tpd and currently operating at 600 – 630 tpd clinker. In absence of in-line Calciner, Secondary firing (of upto 25%-30%) is being done in the Kiln riser duct. **BVCL** entrusted National Council for Cement and Building Materials, Ballabgarh (**NCB)** with a "Comprehensive Audit for Identifying Bottlenecks in producing 650 tpd clinker. NCB team visited the plant to discuss with the plant officials and carried out process measurement besides collecting relevant samples and data / information.

Recommendations were given for reducing coating on Fan impeller and improving the plant availability, which included:

- reduce preheater return dust quantity so that gypsum concentration in the return dust and the overall dust concentration in the gas stream reduces.
- reduce the preheater exhaust gas temperature about 350-360°C for avoiding gypsum & anhydrite formation and imparting charge to the particles in the gas stream.
- The cooler breakdown issue due to the hydraulic failure may be taken up with an external agency who are experts in the field of such mechanical breakdown / troubleshooting
- A new cooler can be installed in place of the existing, for which the technical feasibility shall be studied and submitted in the final report.

Consultancy Services for Installation of Tyre Chips Storage, Feeding and Dosing System for M/s Oman Cement Company, Sultanate of Oman

M/s Oman Cement Company (OCC) is having integrated cement manufacturing plant having 3 no of kilns. To protect the natural resources and serve the country in handling waste, OCC wants to utilize used tyres in their cement rotary kilns as fuel. NCB did the Technical Feasibility study on utilization of tyre chips in cement kiln. Based upon the recommendations of the feasibility study OCC decided to install the Tyre chips storage, handling and dosing system in one of the cement kilns.

NCB has now been awarded the contract for Project Monitoring and Control (PMC) services for executing the project on turnkey basis. The scope of services includes preparing the tender document, tender bid evaluation, contact preparation and site supervision during construction to till successful commissioning of the project. The total project schedule is spread over 12 months and is currently under progress.

Study for Installation of Vibratory Screen in Crusher at a Cement Plant in North East India

The plant is having integrated cement manufacturing unit in Meghalaya. The plant desired to increase the clinkerization capacity for which Raw mill grinding capacity was identified as one the limitation in its throughput capacity. The plant decided to install a Vibratory screen in the crushing section order to improve the capacity of the Raw mill, so as to segregate the coarse particle and recirculate to the primary crusher. This will help in better control of size of the feed particle going to the Raw mill.

NCB has studied the feasibility of installing the vibratory screen before secondary crusher and recommendation have been submitted to the plant. Along with the recommendation, other details like Civil and Mechanical design of the Vibratory screen and General Arrangement drawings for modification of the structure has also been submitted.

Energy Management

NCB has been very closely associated with energy efficiency improvement of the Indian Cement Industry. NCB has an experienced team of Energy Engineers, Certified Energy auditors and Accredited Energy auditors certified by Bureau of Energy Efficiency (BEE) to conduct detailed energy audits.

NCB has carried out more than 200 detailed energy audits till date in various cement plants. Energy audit studies in cement plants include assessment of energy management, monitoring and target setting, detailed heat balance and gas balance studies, identification of potential for thermal and electrical energy savings and recommendations for remedial measures, techno economic feasibility studies for waste heat recovery system (WHRS) etc.

Sponsored projects completed during the year F.Y. 2019-20:

- Mandatory Energy Audit (CPP): M/s Mangalam Cement Ltd., Morak (Rajasthan)
- Energy Audit: M/s J K Cement, Jhajjar (Haryana)
- Detailed plant energy audit (Line-1 &2): M/s Oman Cement Company, Sultanate of Oman
- Energy audit saving projects implementation (Line -1 &2): M/s Oman Cement Company, Sultanate of Oman

- Detailed plant energy audit (Line-3): M/s Oman Cement Company, Sultanate of Oman
- Mandatory Energy Audit: M/s Malabar Cement Ltd., Kerala

Sponsored projects continued during the year F.Y. 2019-20:

- Compressed air energy assessment: M/s Saurashtra Cement Limited, Ranavav (Gujarat)

Project Engineering and System Design

Technical Economic Feasibility Report for Setting up a Blending/grinding Unit at Sipat for National Thermal Power Corporation

To enhance utilization of fly ash at NTPC SIPAT, NCCBM team along with NTPC executive, visited SIPAT site. Based on the data collected during the visit, market survey, team's observations, interaction with NTPC & local cement industry of Chhattisgarh, first hand data verification & assessment and secondary research, carried out a study for setting up a blending/ grinding unit. Two cases have been described to take the decision regarding Blending Unit (BU) or Grinding Unit (GU).

Feasibility Study for Co-processing of Alternative Fuel in Rotary Kiln System for M/s Malabar Cements Ltd. (MCL) Kerala

To introduce the waste having calorific value as a fuel in rotary kiln alongwith Coal & Petcoke, MCL asked to carry out a study in their existing plant at Walayar. NCCBM team visited the plant as well as the waste processing unit to understand the requirement and submitted the report.

Project Monitoring and Control (PMC) Consultancy Services for Setting up a 600 tpd Cement Plant for Government of Republic of Congo

NCB is working as a Project Management Consultant to the Government of the Republic of Congo for preparation of EPC tender, offers evaluation, participation in bid opening, monitoring and controlling the project implementation activities and providing the support for project supervision. Package-I (Mine development & Mining Equipment Supply) is under progress. The signing of contract documents for Package II for setting up a 600 tpd Greenfield cement plant at Louvakou district, Department of NIARI, Republic of Congo is underway.

CENTRE FOR CONSTRUCTION DEVELOPMENT AND RESEARCH – CDR

Centre for Construction Development and Research (CDR) is contributing in developing durable and sustainable civil infrastructure for the nation. The Centre provides services to the cement, concrete and construction industries through four programs namely Concrete Technology, Structural Optimization and Design, Structural Assessment and Rehabilitation, Construction Technology and Management. The Centre conducted 107 sponsored projects during the year.

Concrete Technology (CON)

Material Evaluation and Concrete Mix Designs

Selection of materials for making concrete for a specific application is very important exercise to avoid problems related to durability. The ultimate goal should be the production of economical and durable concrete. To achieve this goal proper evaluation and characterization of various concrete making materials i.e. cement, coarse aggregates, fine aggregates, mineral & chemical admixtures is very crucial. Various government / semi government / private organizations like NTPC and its subsidiaries, NHPC and its subsidiaries, NUPPL, THDCIL, U.P.R. Vidyut Utpadan Nigam Limited, HPVUNL, NBCC, PWD, CPWD, municipal corporations, Delhi Jal Board, IRCON ISL, RITES, L&T Limited, Shapoorji Pallonji Group, APCPL, SJVN Limited approached NCB to study the performance of different concrete making materials and to provide recommendations for the required grade of concrete ranging from M10 to as high as M90. Also, the characterization of materials like ballast aggregate and micro fine Ordinary Portland Cement was done as per their respective IS codes on the basis of their physical and mechanical properties. More than 22 sponsored projects of material characterization and about 150 mix designs were completed during the period of 2019-20.

Concrete Mix Design for Special Applications

Concrete mix designs for special applications such as Self-Compacting Concrete (SCC), High performance concrete with and without steel fiber, dry shotcrete and control low strength material (CLSM) have been carried out successfully for various clients.

Roller Compacted Concrete

NCB has taken up the sponsored project of designing high volume fly ash (using fly ash up to 65%) concrete mix to be used as Roller Compacted Concrete including performance study on hardened concrete like tensile strength, modulus of elasticity, Poisson's ratio, permeability and shear strength properties for Dibang Multipurpose project in Arunachal Pradesh to be constructed by M/s NHPC Ltd.

Alkali Aggregate Reaction (AAR) Studies on Aggregates

Alkali-aggregate reactions can be either alkali-carbonate reactions (ACRs) or alkali-silica reactions (ASRs). In ACR, the reaction is between the alkalis (sodium and potassium) and certain carbonate rocks, particularly calcitic and dolomitic lime stones, present in some aggregates. In ASR, the reaction is between alkalis and certain siliceous rocks or minerals, present in some aggregates. NCB has been conducting AAR studies on coarse and fine aggregates as per relevant Indian and international standards. More than 50 number of coarse and fine aggregates were evaluated for accelerated mortar bar test, mortar bar test, potential alkali reactivity of carbonate rocks (rock cylinder method) & length change of concrete due to alkali carbonate reaction for various prestigious clients like NTPC, L&T, HPPCL, NHPC Ltd.

Evaluation of Corrosion Inhibitors and Water Proofing Compound

Centre has developed the facility for evaluation of corrosion inhibitors through modified accelerated corrosion test as per JIS Z 1535, rebar weight loss by immersion method as per ASTM G-1, polarization test as per ASTM G-3 and corrosion rate measurement as per ASTM G109 & AASTHO T259. Testing & evaluation project of corrosion inhibitors were taken up to help the construction industry.

Various crystalline/integral water proofing compounds as per IS: 516 (Part-II, section 1)/ IS: 2645 were tested to check their performance in comparison to reference mixes.

Some of the Important Projects:

Investigation on Application of Carbon Nanotubes for Improving Performance of Cement Concrete and Concrete based Precast Building Products for M/s Indian Oil Corporation, Faridabad.

M/s. Indian Oil Corporation Ltd. (IOCL), Faridabad is developing carbon nanotubes for various applications. NCB took up an R&D project on investigation on application of Carbon Nanotubes for improving the performance and properties of cement concrete and concrete based precast building products.

In this project, studies were conducted on preparation and evaluation of well dispersed aqueous solutions of CNT using PCE based super plasticizer as a dispersant. Concrete mixes of different grades containing CNT dosage in the range of 0.05 to 0.50 % by weight of cement were prepared and evaluated for different fresh, hardened and durability properties of concrete. Studies were conducted to investigate the possibilities of preparation of high concentration (1-10%) CNT solutions.

Durability Studies on PSC made using Composite Slag (Mix of BF slag and LD slag) for M/s Tata Steel

Slags are generated as main by-product at two different stages of steel production: Iron making and Steel making known as BF slag and Steel Slag respectively. At present, yearly generation of LD steel slag is approximately 20 million tonnes in India out of which 5 million tonnes is being utilized and 15 million tonnes remain unutilized. Generally, BF slag is granulated and used in cement making due to its high cementitious properties, however steel slag is not being used in cement making in principle because it has poorer hydraulic properties in comparison to blast furnace slag.

In this project, NCB conducted studies to investigate the possibility of incorporation of LD slag as a partial replacement of BF slag for preparation of PSC. LD slag samples received from 8 different sources were characterized for different chemical and physical properties along with BF slag and clinker. BF slag was replaced with LD slag from two different sources by 8 % and 15 % to make composite slag. Various PSCs' were prepared using different proportions (50% and 60%) of composite slag. Those PSCs' were examined for all the physical and chemical properties of PSC. Along with that, concrete mixes prepared from selected PSC samples were studied for several fresh, hardened and durability properties of concrete samples and were compared with properties of concrete mixes prepared using control PSC samples.

Development of Ultra High Performance Concrete (UHPC) – Including use of Nano Technology for UHPC

Ultra High Performance Concrete (UHPC) can be defined as cementitious based composite material with compressive strength above 150 MPa and enhanced durability via their discontinuous pore structure. UHPC is the "future" material with the potential to be a viable solution for improving the sustainability of buildings and other infrastructure components. UHPC has several advantages over conventional concrete but the use of it is limited due to the high cost and limited design codes. Therefore, it is imperative to study and further develop the UHPC using the indigenous technology for production and usage in India.

NCB is working on an R&D project for development of UHPC. The objective of this project is to prepare guideline for developing UHPC in India based on various international codal procedures, accepted research theories and experimental research. The project focuses deeply on the materials comprising UHPC and the mechanical behaviour of the end product based on the production methodology adopted and the constituents involved. The project has been carried out in two steps. Firstly, the project study includes the design of concrete mixes for strength. Secondly, the mixes will be studied for their mechanical and durability performance. To improve the packing density of the mixture, materials of different particle size ranges were combined in such fractions that their combined grading lies close to a certain optimum curve given by Modified Andreasen and Andersen equation as mentioned below:

$$P(d) = \frac{d^q - d_{min}^q}{d_{max}^q - d_{min}^q}$$

More than 40 mixes with cementitious materials comprising OPC-53, GGBS, UFGGBS, Silica fume and Nano Silica were theoretically optimized for optimum particle packing with the help of above mentioned Modified Andreasen and Andersen equation.

To overcome the challenges of lump formation and non-uniform mixing during preparation of UHPC mixes using conventional pan mixer, NCB developed a planetary mixer with variable speed for producing a homogeneous UHPC mix. Planetary mixer has high mixing efficiency and helps in producing homogeneous mix with high powder content and low water to binder ratio. It can be operated at three different speed ranges i.e. low speed (0-125 rpm), medium speed (125-250 rpm) and high speed (250-325 rpm).

Planetary Mixer Developed at NCB for Preparation of UHPC

Mixes prepared using planetary mixer were studied for different mechanical parameters such as compressive strength, stress strain curve, split tensile strength etc. at three different curing regimes namely, auto clave curing, steam curing and standard water curing. Compressive strength achieved so far is in the range of 185 to 190 MPa**.** Along with mechanical parameters, microstructure of UHPC has also been investigated.

Structural Optimization & Design (SOD)

Effect of supplementary cementitious material (SCM's) (single and multi blends) on service life of concrete structures-including studies on durability/service life

Concrete is a fairly modern building material and thus extensively used in construction activities. Concrete primarily consists of cement, aggregates, water,

chemical admixture and SCM's. Since, cement is the third most energy-intensive material to produce, behind steel and aluminium and it almost contributes about 1-0.8 tonnes of carbon dioxide (CO_2) into the atmosphere for every 1 tonne production of Ordinary Portland cement, which leads to global warming. Use of supplementary cementitious materials (SCM's) such as fly ash and ground granulated blast furnace slag (GGBS) as a partial replacement to Portland cement in concrete results in reduced levels of GHG emissions. Additional benefit of using SCM's includes minimization of waste disposal and lessens the pressure on exploitation of natural resources (such as limestone).

Worldwide research shows promising aspect of SCM's with respect to durability and sustainability but still research gaps exist. Even though some of the existing international standards and guidelines for durability design for example, ISO 16204, EN 206 &EN 1990 and ACI 365 & ACI 201.2R are not able to address issues like corrosion of reinforcement, impact of type of SCM's on durability /service life and many other associated problems holistically.

In this project, application of SCM's (single and multi) mainly, fly ash and GGBS as a part replacement to Ordinary Portland Cement and impact of corrosion inhibitor on corrosion rate has been studied comprehensively. The assured end product will be the industry oriented design guideline that assures greater acceptability of these cementing materials among engineering fraternity.

Some of the noteworthy findings of the study are as follows:

Chloride Environment (Coastal Environment)

Binary Cementitious System

- It was observed that concrete made with fly ash (up to 40 % replacement) gives desirable performance in both mechanical and durability parameters.
- Concrete made with 50 % GGBS has shown better resistance against Cl ingress. However, concrete made with 70 % GGBS shows significant reduction in strength irrespective of better durability properties.

Ternary Cementitious Blends or Composite Systems

- Concrete made with ternary cementitious blends or composite systems has shown better resistance against chloride penetration as compared to binary cementitious system (PPC/PSC).

CO_2 Environment (Exposed to Air and Moisture)

Binary Cementitious System

- Concrete made with fly ash (up to 30 % replacement) gives desirable performance in terms of carbonation induced corrosion.

- In case of concrete made with 70 % GGBS, initial rate of carbonation was found to be very high i.e. almost 3 times in comparison to conventional concrete (made with OPC).
- The rate of corrosion and carbonation depth of concrete made with 50% GGBS was found to be comparable to concrete made with 30 % fly ash.

Ternary Cementitious System

- Ternary cementitious blends with 50% OPC content and 25% fly ash content gives adequate performance with respect to carbonation resistance and corrosion rate when compared to binary cementitious blend i.e. PPC (with 35 % fly ash). This conclusion for ternary cementitious systems was found to be in line with the results achieved in laboratory trials as well as composite cement samples obtained from the cement plant.

- It should be noted that more research is required to study the effect of cement and SCM's properties on durability, as the present work corresponds to only two given set of materials. Further research to study this aspect is under progress at NCB.

Corrosion Inhibitor

- In an attempt to improve the resistance of SCM's /Green cements against carbonation induced corrosion, bi-polar corrosion inhibitor (admix type, dosage @3kg/m^3) were used. However, no significant reduction in corrosion rate has been observed for said dosage.

Experimental Study on Shear & Compression Design of High Strength Concrete including effect of Fibre on enhanced ductility & fire resistance

Worldwide research on High Strength Concrete is going on since about one and half decade or more. Still, the structural design parameters in various international codes are different. Therefore, this research was intended to develop design parameters for high strength concrete so that designers can use high strength concrete in design of structures with confidence.

For development of shear design parameters, RCC beams of high grade concrete were tested under two-point loading and electrical resistivity type strain gauges on concrete and reinforced bars were used. LVDT was placed in centre of beam to measure mid-point deflection. The test was conducted using 50T capacity displacement controlled machine.

Testing of High Strength Concrete Reinforced Beams under progress in presence the of Dr B N Mohapatra, DG NCB, Sh V V Arora, Joint Director & Head-CDR & NCB Scientists

For design parameters for compression members, RCC columns are being tested under 3000 KN CTM machine with clear span of 3 m. The mid-point deflection using LVDT and the compressive strain on the extreme fiber is being measured using electrical resistivity type strain gauges.

Testing of High Strength Concrete Reinforced Columns Under Progress

Further study of the effect of steel fibers on the ductility and fracture behavior of high strength concrete, effect of polypropylene fibers on fire resistance of high strength concrete were studied.

Test Setup for Three-point Bending of Beam Specimen for Fracture Study

Test Setup for Modulus of Elasticity of Concrete Cylinder Exposed at 600° C

The project also covered the study on behaviour of normal and high strength concrete including comparison of empirical formulae proposed for calculation of ultimate strain and strain at peak stress for High Strength unconfined concrete in European standard EC: 02-2004 with the experimental results. Based on the study, proposal for revision in flexural design parameters taking into account the up gradation of IS:456-2000 up to M100 grade concrete has been forwarded to Bureau of Indian Standard (BIS). The outcomes of the studies covering empirical equations for modulus of elasticity, split tensile strength and flexural strength of high strength concrete, cube to cylinder ratio for high strength concrete, stress block parameters for normal and high strength concrete, tensile strength to yield strength ratio of steel bars, effect of polypropylene fiber on fire resistance of high strength concrete etc. were submitted to BIS for the revision of Indian Standard IS:456-2000 and amendment in Indian Standard IS: 516 and IS: 1786. The findings of this study were also disseminated through research papers in seminars, conferences and journals.

Structural Assessment & Rehabilitation (SAR)

The health assessment and condition assessment of existing RCC structures are being carried out by Structural Assessment & Rehabilitation program. Various structures especially commercial, industrial and residential buildings, bridges, tunnels, dams and high-rise buildings require periodical structural stability checks for enhancing their service life. The distress in any form i.e. cracks, spalling of concrete and corrosion of reinforcement not only disturbs the aesthetic appearance but also reduces the safety and integrity of the structures under use.

In SAR program, condition assessment & structural stability of RCC structures located in different states of India is carried out. These works were taken up as sponsored R&D assignments. The various R&D sponsored projects were completed for reputed clients like NTPC, PGCIL, NHPC, RBI, BHEL, GAIL, AIIMS, CPWD (Delhi), DDA (New Delhi), IPGCL etc.

Investigation is carried out for effective repair, rehabilitation & re-strengthening of existing RCC structures. The centre has various facilities of various non-destruction evaluation techniques like Rebound Hammer test, Ultrasonic Pulse Velocity testing, core extraction, half-cell potential measurement, Ferro Scanner, electrical resistivity Test, air permeability besides the chemical analysis (Ph., Chlorides, Sulphates etc) of the powdered sample collected from specialized projects studied in field & laboratory are done for different structures. The Investigations are generally followed by recommendation for repair and rehabilitation with state of the art repair materials and implementation techniques for distressed RCC structures covering specifications, cost estimates and bill of quantities. The assessment was carried out to evaluate the residual service life of structures.

Team of scientists / experts at CDR centre have versatile abilities to provide adequate solution to distressed RCC structures for its wide spread clients all over

India. The main emphasis is to provide durable repair strategy for distressed RCC structures to enhance their service life.

Ultrasonic Pulse Velocity test on 200m High RCC Chimney

Strain measurement test on RCC girders for 400m PSC Bridge

Ferro scanning test on RCC pedestal of Conveyer belt in Coal Handling Plant

Core extraction from a Fire Damaged RCC Building

Site Investigation on Fire damaged TG Deck

Quality assessment on TG Unit Column

Construction Technology and Management (CTM)

NCB aims to be the most competent and productive technical service organization in construction sector in the country. Our core competencies in third party quality inspection, verification and testing are being continuously improved to be best in class. NCB - Inspection Body is accredited in accordance with ISO/IEC 17020:2012 Type 'A' status and provides technical services for wide range of construction projects such as buildings, roads, bridges and tunnels, construction utility projects, special construction activities etc. built by various central/ state/ autonomous organizations across India through the NCB geographical units located at Ballabgarh, Hyderabad, Ahmedabad and Bhubaneswar.

NCB uses state-of-the-art examination methodologies with unsurpassed accuracy to perform inspections that reduce risk and assure quality. Our experts provide training, specifically designed for the precise needs of our clients, providing the right skills and knowledge to maximize and improve the construction quality. We provide our customers with independent and impartial services that enable them to identify, manage and reduce risk. Our reputation for independence and integrity enables us to build trust wherever needed. We provide transparent and unbiased inspection, testing, verification and certification solutions so our customers can give assurance in their products, processes, systems and services. We ensure that quality of construction processes follow the latest national and international standards – wherever our clients are within the country.

As part of digital India initiative, a mobile application has been developed for getting real time information on inspection status of the assignment. Inspecting engineers can also upload their information through this application.

Prestigious projects of national importance were awarded to NCB by Indian Trade Promotion Organization (ITPO), India International Convention Centre (IICC), Central Public Works Dept. (CPWD), State PWDs, All India Institute of Medical Sciences (AIIMS), Delhi Development Authority (DDA), Odisha Industrial Infrastructure Development Corporation (IDCO), State Trade Promotion Organization's in Karnataka & Tamil Nadu, Sports Authority of Gujrat (SAG), etc. The Centre continues to provide specialized services in the area of quality assurance/control and thereby contributing to the durable infrastructure in India.

Indian Trade Promotion Organization
(Hall A3)

Indian Trade Promotion Organization
(Hall 4a & b)

India International Convention Centre
(Halls)

India International Convention Centre
(Testing)

Central Public Works Dept.
(Thyagraj Nagar)

Central Public Works Dept.
(Mohammadpur)

Tunnel Near Pragati Maidan (PWD/ITPO)

North Delhi Municipal Corp. (Sultanpuri flyover)

Delhi Development Authority Project, Dwarka

LUVAS Project at Hisar

Development of Geopolymer concrete for application in pavements and precast concrete construction

In view of the serious impact of carbon dioxide on the environment and the continued anticipated growth of industrialization and urbanization, there is a need to redirect the construction industry away from its overwhelming reliance on Portland cement by developing alternative binder systems like geopolymer (or alkali activated) binders. In such systems an alkaline liquid is used to react with Silicon (Si) and Aluminium (Al) in a source material of geological origin or in by-product materials such as fly ash or granulated blast furnace slag to produce cementitious binders. NCB took up a project to develop the geopolymer concrete and study its properties for precast products. Based on expertise gathered, an additional project has also been taken in current financial year (2020-21) which aims to study the properties of geopolymer concrete in reinforced concrete as well. The key achievements of completed project are shown below:

Milestone

Timeline

2017 **2018** **2019**

CENTRE FOR QUALITY MANAGEMENT, STANDARDS AND CALIBRATION SERVICES – CQC

The activities of the Centre for Quality Management, Standards and Calibration Services were organised under four programmes: Standard Reference Materials, Calibration Services, Interlaboratory Services and Total Quality Management. 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.

STANDARD REFERENCE MATERIALS

12 Bhartiya Nirdeshak Dravyas (BNDs), the Indian Certified Reference Materials (CRMs) were developed by Centre for Quality Management, Standards and Calibration Services (CQC). These BNDs derive their traceability to SI units from CSIR-National Physical Laboratory (NPL), India, the custodian of national standards in India. Bhartiya Nirdeshak Dravya (BND) is an Indian Reference Material. BNDs would play key role in maintaining the quality infrastructure of the economy through testing and calibration with precise measurements traceable to SI units and also for evaluating proficiency of analysts, evaluating/comparing various test methods and calibration of equipment for analyzing minor constituents of the cementitious materials. The availability SI traceable BNDs will give a boost to "Make in India" programme and harmonize the quality infrastructure of the country fulfilling the mission of "***Atmanirbhar Bharat***". The following BNDs are commercially available:

Sl. No.	BND No.	CRM No.	Material Description
1	5001	1001A18	OPC–Blaine fineness
2	5002	1002A12	PPC-Blaine fineness
3	5003	1002C3	PSC–Blaine fineness
4	5004	1001FC9	Fly ash–Blaine fineness
5	5006	1002E2	Composite Cement-Blaine fineness
6	5007	1001W3	WPC-Blaine fineness
7	5011	1001A2-400	OPC-Higher Blaine fineness
8	5021	-	OPC-Middle fineness
9	5051	1012M	OPC–Chemical
10	5052	1016D	PPC–Chemical
11	5054	1001FC9	Fly Ash-Chemical
12	5091	CRM 1031	Coal-Chemical

NCB has so far developed 79 types of CRMs. These CRMs are traceable to SI units of measurement. Now, the traceability of NCB CRMs has been certified by CSIR-NPL India, the National Metrology Institute (NMI) of India, by releasing some of these CRMs as BNDs. On 4th January 2020, 12th NCB BND 5091 (Coal) was released in the presence of Dr D K Aswal (Director-NPL), other dignitaries and NCB team at CSIR-NPL, New Delhi.

Supply of developed Certified Reference Materials (CRMs) was continued to the cement and construction industry laboratories. A total of 7265 vials of different CRMs and 1552 sets of standard lime were supplied to 711 customers from cement plants, testing laboratories, public sector undertakings, R&D institutions including Bangladesh, Bhutan, Nepal etc.

Dr D K Aswal, Director-NPL, other dignitaries and NCB Team during the Release of BND Certificates on 4th January 2020

CALIBRATION SERVICES

The calibration laboratories continued to implement Quality Management System as per ISO 17025:2005 requirements. More than 1800 equipment/instrument including proving rings, compression testing machines, vibrating machines, dial gauges, Blaine cells, pressure gauges, sieves, thermometers, environmental chambers, ovens, furnaces, balances, rebound hammers etc. were calibrated at NCB laboratories and at customer's site. The calibration services are being provided to various Central Govt., State Govt., PSUs, Cement & Construction Industries and have shown remarkable growth. It is pertinent to mention that more than 80% customers rated our services as excellent.

Calibration of Test Sieve in Progress

Calibration services have ensured traceability of the laboratory equipment to SI units and reliability of the results of various tests carried out using these equipment.

INTERLABORATORY SERVICES

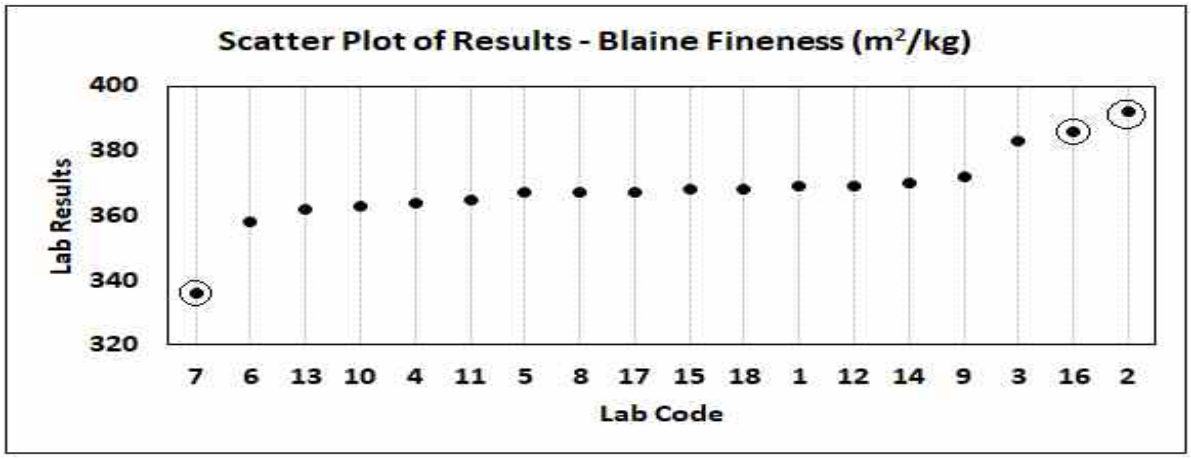
NCB's Interlaboratory Services (ILS) are ISO/IEC 17043:2010 accredited, thus NCB is first accredited PT provider in India.

The present scope of accreditation covers: limestone, clinker, cement, fly ash, concrete admixture, water for concrete & coal/coke/pet coke in chemical field and cement, fly ash, aggregate, mortar/concrete, tile (ceramic), burnt clay building brick & steel bar in mechanical field. In 2019-20, NCB completed 11 PT schemes. The participating laboratories were mainly from reputed private laboratories, cement plants, govt. laboratories, public sector laboratories etc.

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, spread and Z-score. The robust average and standard uncertainty for each parameter were calculated after normalizing the data as per ISO 13528:2015(E). Laboratories were evaluated on the basis of Z-Scores based on robust average and robust standard deviation.

Z-scores/Z'-scores for all the parameters in all schemes were calculated on the basis of results provided by the participant laboratories. As per the above standard, performance of the laboratories with $|Z| \leq 2.0$ is considered satisfactory. The laboratories getting $|Z| \geq 3.0$ are considered outliers and those getting $2.0 < |Z| < 3.0$ score are considered questionable performers. Outliers are encountered due to lack of statistical control and increase in variation in data.

Data received from the laboratories were studied for distribution and scatter. Out of 11 PT schemes, example for PPC-Mechanical is illustrated here as under. The scatter of results in PPC-Mechanical scheme show presence of bias. In the scatter plot of results, code number of the outlier laboratory (Lab code 7, 16 and 2) is mentioned along with the data point. Outliers performers are put in circle. The scatter of results for Blaine's fineness test of OPC-Mechanical is shown in the following figure.



Scatter Plot of Test Results – Blaine's fineness (m^2/kg) of OPC-Mechanical (ILS/PT/57)

TOTAL QUALITY MANAGEMENT

Under this programme, Centre for Quality Management, Standards and Calibration Services (CQC) took up projects related to quality improvement and accreditation etc. Consultancy was provided in ISO 17025 accreditation of two quality control laboratories of public sector unit. One project was taken up for training laboratory personnel of public sector unit in ISO 17025 accreditation requirements. These projects resulted in improvement of quality control system, proficiency and infrastructure of the laboratories.

During the year, re-certification audit of Quality Management System based on ISO 9001:2015 of NCB was successfully carried out. The scope of certification covers all the three units of NCB.

List of Sponsored Projects taken up this year included:

- Assistance in ISO/IEC 17025 Accreditation for M/s Regional Quality Control Laboratory EG & G Division of NHPC Limited, Faridabad

- Assistance in ISO/IEC 17025 Accreditation for M/s Regional Quality Control Laboratory of NHPC Limited, Siliguri

- Four-Day Training Workshop on Laboratory Management System and Internal Audit as per ISO/IEC 17025:2005 for NABL Accreditation for M/s Regional Quality Control Laboratory of NHPC Limited, Siliguri

CENTRE FOR INDUSTRIAL INFORMATION SERVICES – CIS

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

Industrial Information and Data Bank

NCB 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 46,834 documents. The library has a bibliographic data base consisting of about 43,564 entries derived from the journals received. NCB scientists as well as cement plants and other user industries utilize it for interactive searches. A library automation system called 'LIBSYS' has been installed. The system is user-friendly and compatible to network communication. Memberships of Indian and Overseas professional institutions, as listed below, were served.

NCB Ballabgarh Library

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

Integrated IT Solutions

The Website, www.ncbindia.com was uploaded with promotional information

about NCB's activities was done from time-to-time. The following services were continued:

- Indexing Services from Library, through Intranet site and www.ncbindia.com site.
- Announcements on 16th NCB International Seminar, Training Courses and quality related schemes.
- Employment opportunities & RTI related documents.
- Maintenance of hardware and software for whole of the institute including LIMS and LIBSYS.
- Bulk e-mailing services was continued for promotional information.
- website, www.ncbseminar.com was hosted covering details like details of programme booklet, panellists & moderators' details, daily minute-to-minute programme etc. It also gave the latest details of the papers to be presented and the speakers reflecting the latest changes

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. The following publications were brought out during the year are as follows:

- NCB Annual Report 2018-19 in English and Hindi versions separately
- Compendium – "The Cement Industry - India 2019" Second Edition
- NCB News Letters
- Darpan
- 16th NCB International Seminar on Cement, Concrete and Building Materials, 03-06 December 2019, New Delhi

Participation in Workshops, Seminars and Conferences

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

Sl No.	Workshop/Seminar/Events/Conferences	Participant(s)
1.	Seminar for Workshop on "Latest Trends in Inspection & Investigations of Dams", 30-31 May 2019, New Delhi Organised by Aqua Foundation Academy	Sh Suresh Kumar Sh Y N Daniel Sh Digvijay Kumar
2.	Technical Lecture on "Life of Structure: Service Life and Durability Design of Concrete", 23rd May 2019, New Delhi Organised by Indian Association of Structural Engineers	Sh Puneet Kaura Sh Piyush Mittal
3.	Seminar for International Conference on "Rehabilitation and Retrofitting of Structures", 24-25 June 2019, Mumbai Organised by Association of Structural Rehabilitation (ASTR)	Sh Rizwan Anwar Sh Ankit Sharma
4.	Seminar for Reference Course on "Application of New Seismic Code for Highway Bridges IRC:SP:114-2018", 24 - 28 August 2019, New Delhi Organised by Indian Association of Structural Engineers	Sh T V G Reddy
5.	2 Days Conclave on "Proficiency Testing Provider (PTP) / Reference Material Producers (RMP)" on 30th to 31st August 2019, Hyderabad organized by National Accreditation Board for Testing and Calibration Laboratories (NABL)	Sh P N Ojha Sh Suresh Kumar Shaw Sh V Naga Kumar Sh Abhishek Agnihotri
6.	15th International Congress on the Chemistry of Cement (ICCC), 16th – 20th September 2019, Czech Republic Prague	Dr B N Mohapatra Sh Brijesh Singh Sh Puneet Kaura
7.	Conference and Exhibition on "Precast Concrete for Sustainable Construction", 19th – 20th Sept. 2019, New Delhi Organised by Indian Concrete Institute	Sh V V Arora Sh B P R Rao Sh Sanjay Mundra
8.	"CORCON 2019 - 26th International Conference & Expo on Corrosion", 23rd – 26th Sept. 2019, Mumbai Organised by NACE International Gateway India Section (NIGIS)	Sh P N Ojha Sh Piyush Mittal Sh Abhishek Singh
9.	7th Roundtable Conference on "Coal", 24th September 2019, New Delhi Jointly Organized by India Energy Forum	Dr B N Mohapatra Sh G J Naidu Sh Ramachnadra Rao Sh Munish Kumar Sh Aashish Goyal
10.	3rd International Conference on "Calcined Clays for Sustainable Concrete", 15 - 17 Oct. 2019, New Delhi Organised by Indian Institute of Technology Delhi	Sh P N Ojha Sh Piyush Mittal Sh Abhishek Singh
11.	2 Days National Conference on "Use of Fly Ash in Agriculture, Forestry and Other Applications", 17th – 18th December 2019, Hyderabad Organized by Centre for Fly Ash Research and Management & Professor Jayashankar Telangana State Agriculture University	Sh Lalit Yadav

Sl No.	Workshop/Seminar/Events/Conferences	Participant(s)
12.	Workshop on "Quality Control, New Materials and Techniques in Road Sector", 7th & 8th February 2020, Roorkee Organised by Indian Roads Congress in Association with Indian Institute of Technology, Roorkee	Sh Jai Sharma Sh Pankaj Gupta

Important Visitors

Date	Name of Visitors	Organisation
10-05-2019	Shri Vishnu Gupta Shri Anuj Bhatnagar	DDG (Labs) BIS- LPPA & NRDL Bureau of Indian Standards (BIS)
05-06-2019	Shri Sandeep Shrivastava	Sr. VP (Sustainability & Environment) Ambuja Cements Limited
04 & 05-07-2019	Mr Abdulaziz Al-Maqbali	Oman Cement Company (SAOG)
21-07-2019	Shri Prashantha Nanda Shri Manmath Mallick Dr Himanshu Raul	Member of Parliament (Rajya Sabha) Social Worker
06-08-2019	Shri Anand Shukla Mr Bernard Mathieu Shri Atul Khosla	Senior Thematic Advisor Energy HOP3 Consulting (Belgium)
20-12-2019	Mr Edelio Mr Christophe Mr Yatin Joshi	LafargeHolcim
15-01-2020	Shri Som Parkash	Minister of State for Commerce and Industry, Govt of India
29-01-2020	Shri Sanjay Mathur Shri Shashi Gaggar	Executive President & Head SIG Vice President UltraTech Cement Limited

International Linkages / Collaboration Programmes

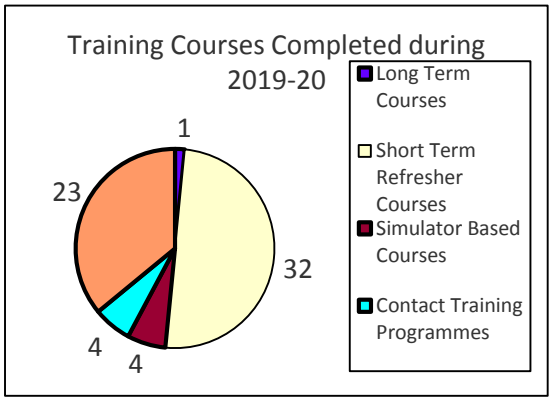
NCB has been actively interacting and liaising with a number of international bodies and exchanging knowledge and experience particularly in the area of cement and building materials industries.

CENTRE FOR CONTINUING EDUCATION SERVICES - CCE

Centre for Continuing Education Services (CCE), has been organizing various need-based and industry-oriented training programmes at all levels, for the participants from cement, concrete and construction industries since its inception in 1972. So far, 2665 training programmes have been organized. A total number of 44,609 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 2019-20, 64 training programmes were successfully organized with a total of 1065 participants attending the programmes.

The highlights of the training programmes conducted are as under:



Type of Course	Number
Long Term Courses: *PG Diploma in Cement Technology*	**1**
Short Term Refresher Courses	**32**
Simulator Based Courses	**4**
Contact Training Programmes	**4**
Special Group Training Programmes	**23**

LONG TERM COURSES

Post-Graduate Diploma in Cement Technology

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

Eleven self-sponsored participants admitted for 2018-19 session have successfully completed the course in July 2019. As in the past, all the students were placed in the cement industry. In the session 2019-20, four students were admitted in the course.

SHORT TERM REFRESHER COURSES

During the year, 32 Short Term Training Courses were organized wherein 585 professionals from cement and construction industries participated. In Cement Technology related area, special emphasis was given to courses such as Instrumental Methods of Analysis and Quality Control; Optimisation of Grinding Systems; Kiln Feed Optimisation to Improve Cement Quality; Consumer Complaint and Handling Technique in Cement Marketing, Technologies for Reducing PM, NOx, SOx and CO_2 in Cement Industry; Sampling and Testing of Cement as per BIS Standards; Optimisation of Clinker Cooler to Improve Clinker Quality and Kiln Operation; Safety Practices in Cement Industry; Alternate Cementitious Materials; Optimisation of Pyroprocessing Systems in Clinker Manufacture; Calibration and Measurement of Uncertainty of Lab Equipment; Optimisation of Raw Mix to Improve Clinker and Cement Quality; Alternate Fuels and Raw Materials in Portland Cement Manufacture; Energy Efficiency in Cement Industry.

In Concrete and Construction related areas, the training programmes on specific topics such as; Production of Durable Concrete; Seismic Evaluation and Retrofitting of Reinforced Concrete Buildings; Use of Fly Ash and Blended Cements for Durable Concrete; Cracks and Leakages in Concrete Structures - Causes, Prevention and Repair; Quality Control and Quality Assurance in Concrete Construction; Concrete Mix Design and Acceptance Criteria of Concrete; Corrosion in Reinforced Concrete Structures and its Remedial Measures; Non–Destructive Testing and Evaluation of Concrete Structures; Design, Construction and Quality Control Practices for Concrete Roads for Highway & Low Volume Roads; Concrete Mix Proportions and Acceptance Criteria; Repair and Rehabilitation of Concrete Structures were organized.

Lectures Sessions during Short Term Training Courses

Special Group Training Programme on "Concrete Technology & High Performance Concrete" for the Engineers M/s NHPC Ltd.

SIMULATOR BASED COURSES

With the aim of providing comprehensive training on various aspects of kiln and mill operation, four training courses on Advanced Simulator trainer were organized at NCB's Ballabgarh unit for 16 professionals from cement plants in India and neighbouring countries. The participants were trained on Operation, Control and Optimization of Modern Grinding System based on Vertical Roller Mills, Roller Press and Ball Mills; Operation, Control and Optimization of Pre-calciner kilns.

CONTACT TRAINING PROGRAMMES

On the request of industry, four tailor-made practice oriented contact training programmes at NCB's Hyderabad unit were organized for the professionals from cement and construction industries to suit the specific requirement covering following areas:

- Estimation of Free Silica in Limestone & Kiln feed
- Physical and Chemical testing of Cement
- Chemical testing of Cement by Gravimetric method
- Chemical testing of Cement by EDTA method & Flame Photometer

SPECIAL GROUP TRAINING COURSES

Twenty one 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:

Sl. No.	Organization	Topics of the Courses Organized
1.	The KCP Ltd., Macherla	➢ Optimisation of Raw mix to improve Cement Quality
2.	Dalmia Cement (Bharat) Ltd.	➢ Cement Manufacturing Technology
3.	Oman Cement Company, Muscat	➢ Methods of Sampling, Testing and Quality Control of Cement ➢ Optimisation of Pyro-processing Technologies in Cement Manufacture ➢ Raw Mix Design, Burnability and Cement Quality
4.	Irrigation Management Training Institute (IMTI), Water Resources Department, PWD, Govt. of Tamil Nadu	➢ Quality Control & Quality Assurance in Concrete Construction for Irrigation Projects
5.	Hindustan Petroleum Corporation Ltd (HPCL)	➢ Quality Control & Quality Assurance in Concrete Structure
6.	Indian Air Force (IAF)	➢ Concrete Construction, Project Management and Quality Assurance and Quality Control
7.	Bharat Petroleum Corporation Ltd. (BPCL)	➢ Quality Control and Quality Assurance in Concrete Structure
8.	Power Grid Corporation of India Ltd. (PGCIL)	➢ Quality Control in Construction & Durability Assessment in Concrete Structures
9.	NHPC Ltd.	➢ Concrete Technology and High Performance Concrete

DG's Interaction with the GET's of Dalmia Cement (Bharat) Ltd. alongwith the Faculty during Inaugural

Participants of Irrigation Management Training Institute (IMTI), Water Resources Department, PWD, Govt. of Tamil Nadu. During Special group training programme at NCB-Ballabgarh Unit

Participants of Bharat Petroleum Corporation Ltd. during a Special Group Training Programme at NCB-Ballabgarh Unit

Two special courses were designed and conducted for cement industry professionals on following topics:

- Advanced Pyro-processing Techniques for Improved productivity and Clinker Quality
- Application of XRD in cement industry.

DG NCB Interactive Session during Special Training Programme on Application of XRD in Cement Industry at NCB-H

LIST OF NCB OFFICIALS WHO HAVE UNDERGONE TRAINING

Sl. No.	Name of the Official	Title of Course	Name and Address of Training Organisation	Duration and Period
1 2 3 4 5 6	Ms Mithlesh Sharma Ms Mamta Pawar Shri Ashish Goyal Ms Kalpna Sharma Ms Meenu Verma Ms Anita Rani	Instrumental Methods of Analysis of Quality Control	Centre for Continuing Education Services (CCE)	3 Days 23 - 25 April 2019
1 2 3	Shri Rahul Bansal Shri Sachin Kumar Shri Nitesh Kumar	Seismic Evaluation and Retrofitting of Reinforced Concrete Buildings	Centre for Continuing Education Services (CCE)	2 Days 23 - 24 May 2019
1 2 3 4 5 6	Shri O P Sharma Shri Amit Kumar Shri Deepa Kumari Ms Pallavi Shri Ratnesh Sharma Shri Bharat Ram	Sampling and Testing of Cement as per BIS Standards	Centre for Continuing Education Services (CCE)	3 Days 24-26 July 2019
1 2 3	Shri A K Tripathi Shri Ajay Rana Ms Suruchi	Concrete Mix Design and Acceptance Criteria of Concrete"	Centre for Continuing Education Services (CCE)	3 Days 31 July - 02 August 2019
1 2	Shri Rahul Das Shri Shivang Bansal	NDT & Evaluation of Concrete Structures	Centre for Continuing Education Services	3 Days 18-20 Sept. 2019

Sl. No.	Name of the Official	Title of Course	Name and Address of Training Organisation	Duration and Period
			(CCE)	
1 2 3 4	Shri Dinesh Kumar Shri Vipin Rana Shri Jitender Kumar Ms Pallavi Tripathi	Alternate Cementitious Materials"	Centre for Continuing Education Services (CCE)	2 Days 26 - 27 September 2019
1	Shri D Pavan Kumar	Laboratory Quality Management and Internal Audit as per IS/ISO/IEC 17025:2017	National Institute of Training for Standardisation (NITS), Bureau of Indian Standards, Noida	4 Days 14-17 October 2019
1 2 3 4 5 6 7 8	Shri Shivang Bansal Shri Mahesh Mishra Ms Meenu Verma Ms Jyotsna Panchal Shri Ashish Kr. Maurya Ms Sinu Mathew Shri Babulal Attri Ms Beauty	Calibration and Measurement of Uncertainty of Lab Equipment"	Centre for Continuing Education Services (CCE)	3 Days 18-20 December 2019
1 2	Shri R P Vijayvergia Shri Rishi Raj	IS/ISO/IEC 17025:2017	National Institute of Training for Standardisation (NITS), Bureau of Indian Standards, Noida	4 Days 07-10 January 2020
1 2 3	Shri. P N Ojha Shri Amit Trivedi Shri Abhishek Agnihotri	NABL Assessor's Training Course on ISO/IEC 17025:2017	National Accreditation Board for Testing and Calibration Laboratories (NABL), Gurgaon	5 Days 21-25 January 2020
1 2	Shri Bhupinder Singh Shri Munish Moudgal	Management Development Programme on GeM and GFRs 2017	National Institute of Financial Management	2 Days 10-11 February 2020

NCB HYDERABAD

NCB HYDERABAD UNIT

NCB Hyderabad is the regional centre established in 1982 in a sprawling campus having world class testing, R&D and training facilities. The activities of NCB Hyderabad are illustrated through the respective centers which provide various testing, R&D facilities, training, Third Party inspection and consultancy services to the industries. The unit has adopted quality management systems and certified with ISO 9001:2015.

CENTRE FOR CEMENT RESEARCH AND INDEPENDENT TESTING (CRT)

CRT centre executes its activities in the areas of Research and development studies, Industry sponsored projects and testing. Laboratories are NABL accredited, BIS recognized & ISO certified, and equipped with state-of-art facilities. The Independent testing laboratories conduct complete chemical, mechanical, mineralogical and microstructure analysis of various raw materials, in-process materials in cement production, fuels, clinker, pozzolanic materials, different industrial slag materials, industrial waste and by-products, different cements, aggregates, water used in construction, admixtures etc.

R & D activities: Studies were carried out on enhanced use of fly ash in PPC, development of composite cements based on clinker, limestone & fly ash, mineralogical & hydration studies of special and new cements.

Establishing Limestone Consumption Factor (LCF): LCF studies were conducted in kilns to denote the amount of limestone consumed by the cement plant for production of 1T of clinker; to monitor the limestone reserves and plan the mining activities.

Assessment of Quality Control Laboratories of Cement Plant: CRT has conducted laboratory assessment studies including XRF calibration in a cement plant in Nepal covering visit to the laboratories, assessment of infrastructure and equipment, calibration of equipment, skill level assessment of the manpower and providing the recommendations and required training to the plant officials for the improved accuracy of the results as per various National Standards.

XRF Calibration Standards: Development of standards for calibration of XRF was taken up at a plant laboratory in Karnataka. Results from the XRF, predominantly depends on the quality of the standards used for the calibration of the equipment. Various samples of raw materials, raw meal, kiln feed, clinker, cement etc. were collected from the plant and analysed in the NCB laboratories for chemical composition. This high quality data was used to calibrate the XRF of plant laboratory.

CENTRE FOR QUALITY MANAGEMENT, STANDARDS & CALIBRATION SERVICES (CQC)

CQC calibrated around 230 Proving Rings (50kN, 100kN, 250kN, 500kN, 1000kN, 2000kN) received from cement and allied industries, testing laboratories & Educational institutions to help them maintain accuracy in compressive strength measurements. The laboratory is in the process of obtaining NABL accreditation in the areas of Thermal, Dimension, Mass & Force (Proving rings) calibration.

CENTRE FOR CONSTRUCTION, DEVELOPMENT AND RESEARCH (CDR)

Centre for Construction Development and Research (CDR) is contributing in developing durable and sustainable civil infrastructure in the southern region of India. The Centre provides services to the cement, concrete and construction industries through the structured programmes namely Concrete Technology, Structural Assessment and Rehabilitation, and Construction Technology and Management.

Structural Assessment and Rehabilitation (SAR):

The distress evaluation, condition assessment, repair and rehabilitation of existing structures such as buildings 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 structures were investigated by using visual observation, non-destructive evaluation technique (NDE) and other field test followed by laboratory test on extracted core samples and chemical analysis of hardened concrete. The investigation is generally followed by recommendation for repair and rehabilitation with state of art repair materials and implementation techniques for distressed RC structures covering specifications, cost estimates and bill of quantities. Quality inspection during the repair of RCC structures are also done and Centre has investigated about 30 project for various clients viz., NTPC, NHPCL, etc.

Construction Technology and Management (CTM):

Inspection Body at NCB-Hyderabad provided Third Party Quality Assurance/Audit (TPQA) services for vide range of construction projects such as institutional buildings,residential buildings, skill development centers, hostel blocks, etc in southern states viz., Tamilnadu, Karnataka, Puduchery and Goa and associated with various Central/ State/ Autonomous Organizations in delivering durable buildings & structures and to meet specified quality standards by ensuring quality workmanship, good construction practices, use of quality materials etc. and inspections done in accordance with ISO/IEC 17020:2012 Type 'A' Accreditation standards. NCB-Hyderabad has secured/ entrusted with the projects of national importance which include works for Karnataka Trade Promotion Organization, Tamil Nadu Trade Promotion Organization, etc.

Concrete Technology:

Evaluation of materials and conducting of concrete mix proportions of M25A20 for civil works at NTPC site and M50A20 grade of concrete for civil works of precast lining segment for tunnel project was taken up.

CENTRE FOR MINING, ENVIRONMENT, PLANT ENGINEERING AND OPERATIONS (CME)

Performance Assessment of Air Pollution Control Equipment (APCE):

Studies were carried out in Coal mill, Cooler, Cement Mills and Packing Plant sections of cement plants in Karnataka& Kerala, where in various parameters monitored for evaluating the existing performance of APCEs in order to comply with emission norms prescribed by the CPCB and suggested necessary actions for improvement of their performance. Preheater return dust measurement studies for cement plant in Andhra Pradesh was carried out at two lines to assess the performance of Preheater efficiency.

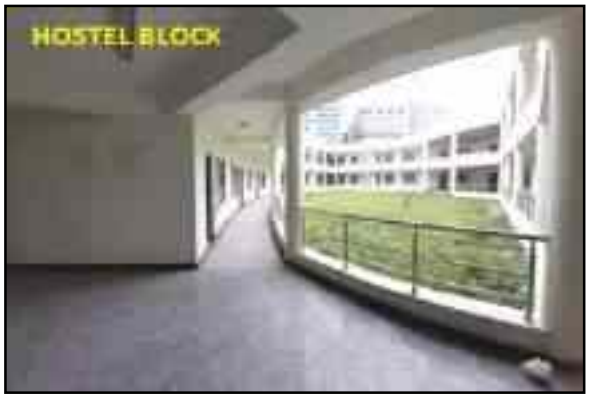
Third Party Quality Assurance:

TPQA activities of electrical & mechanical works of South India & Odisha projects in various multi storied buildings such as Construction of Skill Development Centre at IISc Challakere, Karnataka and in Construction of Guest House Building at IIT Madras, Tamil Nadu has been carried out.

CENTRE FOR CONTINUING EDUCATION (CCE)

Centre for Continuing Education (CCE) centre is organizing various training courses to meet the needs of professionals from cement, concrete & construction industry. The centre has well established training complex with excellent infrastructure of class rooms of capacities up to 100 seating capacity with video conferencing facilities. A hostel block attached to the training complex is also available for providing residential facility to participants.

CCE organized 9 short term refresher courses for Cement industry and 6 short term refresher courses for Construction industry. Hands on training was imparted through 4 Contact Training Programmes on Mechanical & Chemical testing of Cement; Estimation of Free Silica in Limestone & Kiln feed. Special training program was conducted on Application of XRD in cement industry. Special Group Training Programmes were conducted Onsite / Offsite for India and abroad participants. (M/s. The KCP Ltd and Oman Cement Co., Muscat).



Competence Building:

As part of Competence Building Programme, NCBH Officials conducted morning meetings to discuss and deliberate on technical matters for exchange of ideas and planning of regular activities. Weekly meetings were conducted and officials delivered lectures on topics pertaining to their activities.

National Safety Day was celebrated on 4 March 2020 and Safety pledge was administered. Safety Committee identified unsafe practices in the premises from time to time and streamlined the same. Fire extinguishers in laboratory and PPE of laboratory staff were periodically monitored. Awareness meetings were conducted regularly to apprise about workplace safety.

"National Energy Conservation Week" was celebrated during 14-20 December 2019. An awareness meeting on "Energy Conservation Practices at NCB" was conducted and various practices which can be adopted in NCB and in daily life to conserve energy were discussed.

NCB AHMEDABAD

NCB AHMEDABAD UNIT

NCB Ahmedabad Unit 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, CBR Testing Machine and Non-Destructive Testing (NDT) equipment such as Rebound hammer, Ferroscan & Ultrasonic Pulse Velocity Test (UPV).

Unit is using these facilities to provide testing and TPQA services to various Government agencies of Gujarat, Union Territory (UI) of Daman & Diu and Dadra and Nagar Haveli. The unit is ISO 9001: 2015 certified and has ISO 17025: 2017 accredited testing laboratories.

Following facilities are available in NCB-Ahmedabad unit.

Testing Facilities:

- Cement and Cementitious Materials such as OPC, PPC, PSC, Fly ash, Slag, Silica-fume etc.
- Aggregates – complete physical and chemical analysis, Soundness
- Special Concrete, Advance Concrete Composite, Standard Concrete Mix Designs & Self Compaction Concrete Mix Design
- Ordinary concrete, standard concrete and High Strength Concrete using OPC, PPC, PSC, OPC + Fly ash, OPC+ Fly ash + Silica fume etc.

Structural Assessment & Rehabilitation Services Offered:

- In-situ quality assessment and durability investigation
- NDT, Pile integrity testing
- Distress investigations of buildings, bridges, dams, power plants, chimney etc. deteriorated due to aggressive environment or fire damaged structure
- Consultancy for repairs/rehabilitation & retrofitting

Construction Technology & Management Services Offered

- Quality control services to construction project through mobile laboratories
- Technical Audit (TA), Quality Assurance & Quality Control (QA/QC) and Third Party Quality Audit (TPQA) of new constructions- residential, commercial & institutional buildings; flyovers, concrete roads, bridges etc.

Projects Undertaken:

- Third Party Inspection of Providing and Fixing Acoustic wall paneling work Indoor hall at Sama Complex, Vadodara for Sports Authority of Gujarat - Gandhinagar (Government of Gujarat).

- Third Party Inspection of Providing and Fixing HVAC work in Indoor Hall at Sama Complex, Vadodara for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Construction of Multipurpose hall, Swimming Pool and Synthetic Track at Desar, Dist: Vadodara for Swarnim Gujarat Sports University, Gujarat (Government of Gujarat).

- Third Party Inspection for SITC of High mast pole work with LED light for Nadiad, Himmatnagar and Bhavnagar sports complex for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Providing and fixing LED light in place of metal light in thirteen indoor hall at ground sports complex for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of LED street light work in sport complex at Godhra, Rajpipla & Saputara for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Light fitting work in sama sports complex for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Development of Sports Complex at Nadiad for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Construction of Synthetic athletic track at Naroda for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Construction of Sports Hostel at Vaghodia for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Construction of Indoor Multipurpose Hall and Cricket Ground at Bibipur for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

- Third Party Inspection of Construction of Administrative Building, Boys & Girls Hostel for SGSU at Desar for Swarnim Gujarat Sports University, Gujarat (Government of Gujarat).

- Third Party Inspection of Construction of Sports Complex at Nadiad for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).
- Third Party Inspection of Construction of Sports Hostel at Patan for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).
- Third Party Inspection of Construction of Sports Hostel at Naroda for Sports Authority of Gujarat -Gandhinagar (Government of Gujarat).

Sports Complex at Nadiad

Cricket Ground Stadium at Bibipur

Sports Hostel at Desar

Synthetic Athletic track at Naroda

A glimpse of Third Party Inspection & Quality Assurance Project at NCB-Ahmedabad

NCB BHUBANESWAR

NCB BHUBANESWAR UNIT

NCB Bhubaneswar unit is providing Third Party Quality Assurance of various construction projects of Industrial Development Corporation of Odisha (IDCO) all over the state of Odisha since 2016 as mandated in MoU between NCB and IDCO.

In order to provide Quality Assurance and Quality Control (QA/QC) and Third Party Quality Assurance (TPQA) services to IDCO, NCB has setup office cum laboratory, with essential facilities for testing of Cement, Aggregate, Concrete, Bricks, Blocks and Soil, in Bhubaneswar at IDCO Central Store, Mancheswar Industrial Estate, Bhubaneswar. Besides, site office in Sambalpur, Odisha.

Testing facilities such as Automatic Compression Testing Machine (ACTM), Physical Testing Laboratory of Cement, Building Materials like bricks, blocks and Non-Destructive Testing (NDT) equipment were installed/available at Bhubaneswar Laboratory.

NCB Bhubaneswar is using these facilities to provide QA/QC and TPQA services to various projects of IDCO undertaken by its 11 Divisions. The projects are spread across the state of Odisha.

Particular of Important Visitors to NCB Bhubaneswar:

Dr B K Das along with his team visited on 22 January 2020 to identify the buildings and land pocket for allotment to NCB on long lease basis.

Shri Dwaipan Bhadra, Scientist 'D', BIS, Kolkata had a formal interactive meeting with the officials of NCB Bhubaneswar in connection with NABL Accreditation and BIS Lab recognition for Cement Testing Labs.

Interactive Meetings and Trainings conducted

Interaction meet with the representatives of IDCO on Quality Assurance and Quality Control of Concrete Constructions on 19.07.2019. Role of NCB as TPQA explained and various Quality Assurance and Quality Control measures for quality construction of Concrete works were discussed with the participants.

Interaction meet with the representatives of Cement Industry:

An interactive meet with representatives of cement industries of Odisha under the stewardship of Dr B N Mohapatra, Director General at IDCO Conference Hall, Bhubaneswar on 17th January 2020.

NCB officials visited M/s Toshali Cements, Choudwar
8th November 2019

Swachhata Hi Seva-Organised at NCB Bhubaneswar
during October '2019

Photographs of various NCB Sr. Level officials
Visiting NCB Bhubaneswar

Papers Published

The following papers were contributed by NCB scientists to Technical Journals:

Centre for Construction Development and Research - CDR

1. "Field and Laboratory Investigations on Ageing effect in concrete Arch Dam"- V V Arora & Brijesh Singh (2019) International Journal of Dam Engineering, Volume XXIX Issue-3, March 2019.

2. "Challenges in quality Assurance in Construction Industry-A Case for Delhi"- Vikas Patel, Brijesh Singh, B P R Rao & V V Arora, CE&CR Magazine, May, 2019.

3. "Non-Destructive Testing of Bored Piles using the Low Strain Pile Integrity Method"- Brijesh Singh, V V Arora, Vikas Patel & Nitin Chowdhary (2019) Indian Concrete Journal, May Issue.

4. "Durability and corrosion studies in prestressed concrete made with blended cement"- V V Arora, Brijesh Singh & Vikas Patel, Asian Concrete Federation Journal, Vol. 5, No. 1, July 2019.

5. "Stress-Strain behaviour and performance evaluation of high strength steel fibre reinforced concrete (SFRSHC)" – V V Arora, Brijesh Singh, Vikas Patel, Y N Daniel & Dr B N Mohapatra, Indian Concrete Journal, Vol. 93, No. 12, December 2019.

6. "Diagnosis of alkali aggregate reaction in concrete dams (An Indian case study)"- V V Arora, Brijesh Singh, Vikas Patel & Dr B N Mohapatra, Asian Concrete Federation Journal, Vol. 5, No. 2 (December 31, 2019).

Centre for Mining, Environment, Plant Engineering & Operation - CME

1. "Energy audit in Indian cement plant for analysis and recovery of waste energy from kiln hot shell surface"- Technical paper (under publication), Ankur Mittal for International Journal for Thermal and Process Engineering on (Jointly prepared with IIT Delhi).

2. "Case study on the role of energy audit and related benefits to cement plant"- Ankur Mittal as Co-author for Technical paper published in CMA journal (Cement, Energy and Environment, Issue Jan - Jun 2019) on.

3. "Indian Cement Industry: A Key Player in the Circular Economy of India"- A paper entitled by Prateek Sharma as co-author presented by Kapil Kukreja in the 3rd Indo-German Conference on Sustainability in Engineering: Enhancing

Future Skills and Entrepreneurship during September 16-17, 2019 organized at BITS-Pilani. To be published in springer series.

4. "Use of alternative fuels and raw materials in cement industry in India-Prospects and challenges"- Sh Prateek Sharma as co-author published in CMA special publication.

5. "Transfer chute design for solid alternative fuels"- Kapil Kukreja, Dr B N Mohapatra & Ashutosh Saxena, Indian Cement review, June 2019, https://indiancementreview.com/viewpoint/Transfer-chute-design-for-solid-alternative-fuels/115555.

Centre for Cement Research & Independent Testing - CRT

1. "Investigations into the Mechanical Properties of Portland Slag Cement based on GBFS and Steel Slag", S K Agarwal, Suresh Vanguri, Dr S K Chaturvedi, Dr B N Mohapatra (NCB), Anil Kumar, S Sen, A S Reddy, Ashok Kumar (Tata Steel Ltd., Jamshedpur), ZKG International, 12, 2019, p.28-41.

2. "Investigations on the Preparation of Geopolymer-Based Cementitious Materials at Normal Temperature, Curing by Alkali Activation of Blends of Fly ash and Granulated Blast Furnace Slag,"- R S Gupta, S. Vanguri, Dr V Liju, Dr S K Chaturvedi, Cement International, Vol.17, 2/2019.

3. "Investigations on Limestone Calcined Clay Cement System"- S K Agarwal, Dr S Palla, Dr S K Chaturvedi, Dr B N Mohapatra (NCB), S Bishnoi (IIT-D), S Maity (TARA), , RILEM Book Series, Calcined Clay for Sustainable Concrete", S Bishnoi (Ed), Volume-25, 2020, Springer, Singapore, page:443-454, online assess: https://doi.org/10.1007/978-981-15-2806-4_52.

4. "Investigations on the Effect of Minor Mineral Additions on the Mechanical Properties of Portland Pozzolana Cement (PPC)"- S K Agarwal, Dr S K Chaturvedi, Dr B N Mohapatra, International Cement Review (Accepted for publication in April 2020, p.91-102).

Papers Presented in Institutional Seminars & Conferences

87th ICOLD International Commission on Large Dams / Commission, Ottawa. Canada June 9-14, 2019

1. Detailed Investigations and Finite Element Analysis of IDUKKI Dam in India by V V Arora, Pramod Narayan, Brijesh Singh & Bikram K Patra.

15th International Congress on the Chemistry of Cement, Prague, Czech Republic, September 2019.

2. Effect of Chemical and Mineralogical Parameters of Cement On Concrete Workability – Dr B N Mohapatra, Pravesh Sharma, Shrikant Varpe.

3. Improving The Reactivity and Quality of Clinker Through Enhanced Combustion Kinetics in Kiln Main Burner – Dr B N Mohapatra, K Subbulakshmanan, Atul Kumar Chaturvedi, Ramsinh Chauhan, Reshu Chauhan, Rishi Kumar Joshi, Sukuru Ramarao.

4. Superiority of Composite Cement Over Binary Blended Cement – Dr B N Mohapatra, P K Sharma, Prem Shrivastava, Rajesh Kothari, Subbaraidu Ayyagari.

5. Study on Alkali Aggregate Reaction and Sulphide Attack on Aged Concrete Large Dams by V V Arora & Brijesh Singh.

6. Service Life Design of RC Structures Prone to Carbonation using Accelerated Test Methods by Puneet Kaura, V V Arora & Dr B N Mohapatra.

3rd Indo-German Conference on Sustainability in Engineering: Enhancing Future Skills and Entrepreneurship during September, 2019, BITS-Pilani.

7. "Indian Cement Industry: A key player in the Circular Economy of India" – Kapil Kukreja, Dr B N Mohapatra.

8. "Oxygen Enrichment Technology- an Innovation for Improved Solid Fuel Combustion and Sustainable Environment" - Ankur Mittal & Dr B N Mohapatra.

9. "Indian Cement Industry: A Key Player in the Circular Economy of India"- A paper entitled by Sh Prateek Sharma as co-author presented by Kapil Kukreja in the 3rd Indo-German Conference on Sustainability in Engineering: Enhancing Future Skills and Entrepreneurship during September 16-17, 2019 organized at BITS-Pilani. To be published in springer series.

2nd International Conference and Exhibition on Energy & Environment: Challenges & Opportunities (ENCO 2019) during February, 2019

10. "Oxyfuel Combustion Technology in Cement Plant" - Ankur Mittal, Dr B N Mohapatra, 2nd International Conference and Exhibition on Energy & Environment: Challenges & Opportunities (ENCO 2019) during February, 2019 organized by CSIR-Central Institute of Mining and Fuel Research (CSIR-CIMFR), Dhanbad at New Delhi.

CMA Conserve Conference, New Delhi

11. "Use of Alternative Fuels and Raw Materials in Cement Industry in India-Prospects and Challenges", Dr B N Mohapatra, S K Chaturvedi, A Saxena, Prateek Sharma, Anand Bohra.

CORCON 2019 on Corrosion Science and Engineering, Sept 2019, Mumbai

12. "Laboratory and Field Investigation of Long Term Performance of Bi-polar Corrosion Inhibitor" by P N Ojha, Puneet Kaura, Piyush Mittal and V V Arora.

3rd International Conference on Calcined Clays for Sustainable Development, October 2019, New Delhi

13. "Investigations on Limestone Calcined Clay Cement System" by S K Agarwal, Dr S Palla, Dr S K Chaturvedi & Dr B N Mohapatra.

7th International Conference on Advances in Energy Research (ICAER 2019), December, 2019, IIT, Bombay

14. "Energy Farming – A green solution for Indian cement industry" – Kapil Kukreja & Dr B N Mohapatra.

15. "Waste to energy: issues, opportunities and challenges for RDF utilization in Indian cement industry" – Prateek Sharma & Dr B N Mohapatra.

16. "Recovery & Utilization of Heat Energy Wasted through Hot Kiln Surface in Cement Plant" – Ankur Mittal & Dr B N Mohapatra.

16th NCB International Seminar on Cement, Concrete and Building Materials, Clean & Green Is Sustainable, Manekshaw Centre, New Delhi, India, December, 02-06, 2019

17. Experimental shear study on reinforced high strength concrete beams by V V Arora, Brijesh Singh, Vikas Patel, Amit Trivedi & Lalit Kumar.

18. Stress strain characteristics of high strength concrete with steel fibres using blended cements by Brijesh Singh, V V Arora, Vikas Patel, Amit Trivedi & Megha Kalra.

19. Study on behaviour of polypropylene fiber reinforced high strength concrete exposed to higher temperatures by Vikas Patel, V V Arora, Brijesh Singh, Megha Kalra & Sahara Adhikari.

20. Importance of ISO: 17020 implementation for quality assurance system in construction industry by Vikas Patel, B. Pandu Ranga Rao, Brijesh Singh & V V Arora.

21. Mechanical and durability properties of concrete made with ternary blends by Puneet Kaura, V V Arora, Piyush Mittal.

22. Condition assessment & remedial measures for rehabilitation of induced draught cooling towers (IDCTs) located in different climatic regions of India-a case study by Rizwan Anwar, TVG Reddy, Sanjay Mundra.

23. Experimental investigations on fiber reinforced self-leveling pavement quality concrete (PQC) for use in partial depth repairs of cement concrete pavements in urban areas by D Pavan Kumar, J Narsinga Rao, P N Ojha, B Sreenivasa Rao, Adarsh Kumar NS.

24. Studies on fly ash and slag based geopolymer concrete by Lalit Kumar, Amit Trivedi, V V Arora and Lopamudra Sengupta.

25. Performance evaluations of polymer modified mortar and bonding agent for structural repair by Puneet Kaura, Y N Daniel, Nitesh Kumar & T V G Reddy

26. Characteristics of Indian bottom ash and its feasibility for use as fine aggregate in reinforced concrete by P N Ojha, Amit Trivedi, Suresh Kumar, Nikhil Kaushik, Digvijay Kumar & V V Arora.

27. Case studies on repair of concrete dam in Himalayan region using high performance concrete by P N Ojha, Suresh Kumar, Digvijay Kumar & V V Arora.

28. Role of packing density, mixing efficiency and curing regime on development of UHPC by P N Ojha, Abhishek Singh, Piyush Mittal, Brijesh Singh, V V Arora.

29. Laboratory test method for evaluating corrosion inhibiting efficiency of admix type bipolar corrosion inhibitor by Puneet Kaura, P N Ojha, Piyush Mittal & V V Arora.

30. Experimental investigation of ferrochrome slag as aggregate in concrete by P N Ojha, Amit Trivedi, Nikhil Kaushik, Vaibhav Chawla.

31. Comparative study of characteristics of opc-53 grade cement and its influence on water demand and rheological properties of concrete by P N Ojha, G J Naidu, Suresh Palla & Piyush Mittal.

32. Design and construction of low traffic volume concrete roads using C&D aggregates and supplementary cementitious materials by Vaibhav Chawla, Amit Trivedi, V V Arora.

33. Assessment of mechanical and mineralogical properties of concrete dams in India by Brijesh Singh, V V Arora, Shubham Jain, Vikas Patel and Pramod Narayan.

34. Performance analysis of in-service RC members of turbo generator in India - a comparative study of service life assessment by Sanjay Mundra, T V G Reddy, Naman Agarwal.

2 Days National Conference on Use of Flyash in Agriculture, Forestry and Other Applications, Hyderabad, December, 17-18, 2019

35. Field Utilization of Flyash and Slag based Geopolymer Concrete in Precast Products by Lalit Yadav, Amit Trivedi & V V Arora.

Sh S K Agarwal of NCB reviewed following papers for British Journal: Advances in Cement Research

1. "Incorporation of Zinc in Calcium Sulfoaluminate Cement Clinker" Kleib J, Aouad G, Zakhour M.

2. "Early formation of belite in cement clinker raw materials with slag", Viggh E, Eriksson M, Wilhelmasson B, Backman R.

3. "Effect of Ti on Crystal Transition and Solid Solution Characteristics of White PC clinker" Li J, Cheng G, Huang S, Huang L.

Reviewership by NCB Scientists

1. Reviewer of ACI Structural and Materials Journals – Brijesh Singh

2. Reviewer of British Journal "Advances in Cement Research" – S K Agarwal

3. Reviewer of ACF Journal Korea – Brijesh Singh

4. Reviewer of RESM Journal – Brijesh Singh

REPRESENTATION OF NCB OFFICIALS IN VARIOUS TECHNICAL COMMITTEES

NCB is actively involved with a large number of overseas and Indian organizations in formulating and revising standards and policies 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:

Dr B N Mohapatra, Director General

a. Member, Panel for Building Materials (CED 46:P3), Bureau of Indian Standards, New Delhi.
b. Member of BIS Cement & Concrete sectional committee CED 2, Cement pozzolana and Cement Additives sub-committee CED 2:1 and Concrete Sub-committee CED 2:2.
c. Member of BIS Technical Committee (P4).
d. Member of technical Committee for development of Low Calcined Clay Cement (LC3) with of IIT- Mumbai, Delhi & Chennai & TARA.
e. Member of Research Advisory Committee at DISIR (Dalmia Institute of Scientific and Industrial Research, Rajgangpur, Orissa.
f. Member of scientific committee of 15th International Congress on the Chemistry of Cement (ICCC) held at Prague at 2019.
g. Member in their Technical Committee for the development of Standards for RMC. (Formed by CII – Confederation of Indian Industry).

Sh Ashutosh Saxena, Joint Director

a. Member, Working Group on Technical Sector of Standard Promotion and Consumer Affairs Deptt. (SP & CAD), Bureau of Indian Standards, New Delhi.
b. Member, Environmental Services Sectional Committee: SSD 07, Bureau of Indian Standards, New Delhi.

Dr S K Chaturvedi, 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, Panel for Revision of Cement Standards (CED 2:1/P1), Bureau of Indian Standards, New Delhi.
e. Member, Refractories Sectional Committee (MTD 15), Bureau of Indian Standards, New Delhi.

Sh V V Arora, Joint Director

a. Chairman, Cement Matrix Products Sectional Committee (CED 53), Bureau of Indian Standards, New Delhi.
b. Member, Civil Engg. Divisional Council (CEDC), Bureau of Indian Standards, New Delhi.
c. Member, Cement and Concrete Sectional Committee (CED 2), Bureau of Indian Standards, New Delhi.
d. Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi.
e. Member, Panel for Revision of Handbooks (CED 2/P2), Bureau of Indian Standards, New Delhi.
f. Member, Panel for Aggregates from other than Natural Sources (CED 2/P3), Bureau of Indian Standards, New Delhi.
g. Member, Panel for Revision of Cement Standards (CED 2:1/P1), Bureau of Indian Standards, New Delhi.
h. Member, Concrete Sub Committee (CED 2:2), Bureau of Indian Standards, New Delhi.
i. Member, Panel for Revision of IS 3370 (Part I & Part II) (CED 2:2/P1), Bureau of Indian Standards, New Delhi.
j. Member, Panel for Revision of IS: 456 and IS: 1343 (CED 2:2/P5), Bureau of Indian Standards, New Delhi.
k. Convenor, Panel for Revision of IS 457 (CED 2:2/P6), Bureau of Indian Standards, New Delhi.
l. Member, Panel for Revision of Indian Standards on Test Methods for Concrete (CED 2:2/P7), Bureau of Indian Standards, New Delhi.
m. Member, Structural Safety Sectional Committee (CED 37), Bureau of Indian Standards, New Delhi.
n. Member, Earthquake Engineering Sectional Committee (CED 39), Bureau of Indian Standards, New Delhi.
o. Member, National Building Code Sectional Committee (CED 46), Bureau of Indian Standards, New Delhi.
p. Member, Panel for Fire protection (CED 46:P2), Bureau of Indian Standards, New Delhi.
q. Member, Panel for Building Materials (CED 46:P3), 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 Masonry (CED 46:P7), Bureau of Indian Standards, New Delhi.
u. Member, Panel for Plain Reinforced & Prestressed Concrete (CED 46:P8), Bureau of Indian Standards, New Delhi.
v. Member, Panel for Prefabrication and Systems Building (CED 46:P10), Bureau of Indian Standards, New Delhi.

Sh P N Ojha, General Manager

a) Member, Laboratory and RAMCO subcommittee, Bureau of Indian Standards, New Delhi.
b) Member, CIVIL Engg. Divisional Council (CEDC), Bureau of Indian Standards, New Delhi.
c) Member, Panel for Revision of Handbooks (CED 2/P2), Bureau of Indian Standards, New Delhi.
d) Member, Concrete Sub Committee (CED 2:2), Bureau of Indian Standards, New Delhi.
e) Member, Panel for Revision of IS: 456 and IS: 1343 (CED 2:2/P5), Bureau of Indian Standards, New Delhi.
f) Member, Cement Matrix Products Sectional Committee (CED 53), Bureau of Indian Standards, New Delhi.
g) Member, Fibre Reinforced Cement Product Sub Committee (CED 53:1), Bureau of Indian Standards, New Delhi.

Dr D Yadav, General Manager

a) Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi.
b) Member, Cement, Pozzolana and Cement additives Subcommittee (CED 2:1), Bureau of Indian Standards, New Delhi.
c) Member, Panel for Revision of Cement Standards (CED 2:1/P1), Bureau of Indian Standards, New Delhi.
d) Member, Methods of Analysis Sub Committee (PCD 7:4), Bureau of Indian Standards, New Delhi.

Sh Amit Trivedi, General Manager

a) Member, Panel for work relating to ISO/TC71 and ISO/TC74 (CED2/P1), Bureau of Indian Standards, New Delhi.
b) Member, Panel for Aggregates from other than Natural Sources (CED 2/P3), Bureau of Indian Standards, New Delhi.
c) Member, Flooring, Wall Finishing and Roofing Sectional Committee (CED 5), Bureau of Indian Standards, New Delhi.
d) Member, Planning, Housing and Prefabricated Construction Sectional Committee (CED 51), Bureau of Indian Standards, New Delhi.
e) Member, Concrete Pipes Sub Committee (CED 53:2), Bureau of Indian Standards, New Delhi.
f) Member, Concrete Reinforcement Sectional Committee (CED 54), Bureau of Indian Standards, New Delhi.

Dr D K Panda, General Manager

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

Sh Anupam, General Manager

a) Member, Environmental Protection and Waste Management Sectional Committee (CHD 32), Bureau of Indian Standards, New Delhi.
b) Member, Environmental Management Sectional Committee (CHD 34), Bureau of Indian Standards, New Delhi.
c) Member, Coal Beneficiation & Lignite Sub Committee (PCD 7:6 & PCD 7:9), Bureau of Indian Standards, New Delhi.

Sh B P Ranga Rao, General Manager

a) Member, National Building Code Sectional Committee (CED 46), Bureau of Indian Standards, New Delhi.
b) Member, Planning, Housing and Prefabricated Construction Sectional Committee (CED 51), Bureau of Indian Standards, New Delhi.
c) Member, Water Proofing and Damp Proofing Sectional Committee (CED 41), Bureau of Indian Standards, New Delhi.
d) Member, Construction and Related Engineering Services Sectional Committee (SSD 06), Bureau of Indian Standards, New Delhi.

Sh M Selvarajan, General Manager

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

Sh T V G Reddy, General Manager

a) Member, Panel for Revision of IS 3370 (Part I & Part II) (CED 2:2/P1), Bureau of Indian Standards, New Delhi.
b) Member, Structural Safety Sectional Committee (CED 37), Bureau of Indian Standards, New Delhi.
c) Member, Panel for Administration, Development Control Rules and General Buildings (CED 46:P1), Bureau of Indian Standards, New Delhi.
d) Member, Panel for Load, Forces and Effects (CED 46:P4), Bureau of Indian Standards, New Delhi.

Sh P Anil Kumar, Group Manager

a) Member, Coal Sub Committee (PCD 7:3), Bureau of Indian Standards, New Delhi.

Sh Sanjay Mundra, Group Manager

a) Member, Fibre Reinforced Cement Product Sub Committee (CED 53:1), Bureau of Indian Standards, New Delhi.
b) Member, Panel for Soil and Foundation/Panel for Plain Reinforced & Prestressed Concrete (CED 46:P5), Bureau of Indian Standards, New Delhi.
c) Member, Water Proofing and Damp Proofing Sectional Committee (CED 41), Bureau of Indian Standards, New Delhi.

Sh G J Naidu, Group Manager

a) Member, Panel for Fire protection (CED 46:P2), Bureau of Indian Standards, New Delhi.
b) Member, Sieves, Sieving and other Sizing Methods Sectional Committee (CED 55), Bureau of Indian Standards, New Delhi.

Sh Ankur Mittal, Manager

a) Member, Solid Mineral Fuels Sectional Committee (PCD 07), Bureau of Indian Standards, New Delhi.

Sh Amit Prakash, Manager

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

Sh Brijesh Singh, Manager

a) Member, Cement and Concrete Sectional Committee (CED 2), Bureau of Indian Standards, New Delhi.
b) Member, Cement, Pozzolana and Cement additives Subcommittee (CED 2:1), Bureau of Indian Standards, New Delhi.
c) Member, Earthquake Engineering Sectional Committee (CED 39), Bureau of Indian Standards, New Delhi.
d) Member, Panel for Plain Reinforced & Prestressed Concrete (CED 46:P8), Bureau of Indian Standards, New Delhi.
e) Member, Concrete Reinforcement Sectional Committee (CED 54), Bureau of Indian Standards, New Delhi.
f) Member, Panel for revision of IS:456 and IS:1343
g) Member, Panel for Fire protection, CED 46:82

Sh Kapil Kukreja, Manager

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

b) Member, Construction Plant and Machinery Sectional Committee (MED 18), Bureau of Indian Standards, New Delhi.
c) Member, Bulk Handling Systems and Equipment Sectional Committee (MED 7), Bureau of Indian Standards, New Delhi.

Sh S K Agarwal, Manager

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

Sh Suresh Kumar Shaw, Manager

a) Member, Coke Sub Committee (PCD 7:2), Bureau of Indian Standards, New Delhi.

Sh Suresh Kumar, Manager

a) Member, Panel for Revision of IS 457 (CED 2:2/P6), Bureau of Indian Standards, New Delhi.
b) Member, Panel for Revision of IS 2386 (CED 2:2/P10), Bureau of Indian Standards, New Delhi.
c) Member, Precast Concrete Products Sub Committee (CED 53:3), Bureau of Indian Standards, New Delhi.
d) Member, Sieves, Sieving and other Sizing Methods Sectional Committee (CED 55), Bureau of Indian Standards, New Delhi.

Sh M K Mandre, Manager

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

Sh Nitin Chowdhary, Manager

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

Dr (Mrs) Pinky Pandey, Manager

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

Dr (Mrs) Varsha T Liju, Deputy Manager

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

Sh Anand Bohra, Deputy Manager

a) Member, Environmental Protection and Waste Management Sectional Committee (CHD 32), Bureau of Indian Standards, New Delhi.
b) Member, Air Quality Sectional Committee (CHD 35), Bureau of Indian Standards, New Delhi.
c) Member, Environmental Services Sectional Committee: SSD 07, Bureau of Indian Standards, New Delhi

Sh Saurabh Bhatnagar, Deputy Manager

a) Member, Construction Plant and Machinery Sectional Committee (MED 18), Bureau of Indian Standards, New Delhi.
b) Member, Bulk Handling Systems and Equipment Sectional Committee (MED 7), Bureau of Indian Standards, New Delhi.

Sh M V Ramachandra Rao, Deputy Manager

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

Sh Prateek Sharma, Deputy Manager

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

Sh P Srikanth, Deputy Manager

a) Alternate Member, Laboratory and RAMCO subcommittee, Bureau of Indian Standards, New Delhi.

Sh Puneet Kaura, Deputy Manager

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

Sh K P K Reddy, Deputy Manager

a) Member, Coal Sub Committee (PCD 7:3), Bureau of Indian Standards, New Delhi.

Sh Nikhil Kaushik, Deputy Manager

a) Member, Panel for Revision of IS 2386 (CED 2:2/P10), Bureau of Indian Standards, New Delhi.

Sh Amit Sagar, Deputy Manager

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

Sh Arup Ghatak, Deputy Manager

a) Member, Structural Safety Sectional Committee (CED 37), Bureau of Indian Standards, New Delhi.
b) Member, Construction and Related Engineering Services Sectional Committee (SSD 06), Bureau of Indian Standards, New Delhi.

Sh Ajay Kumar, Deputy Manager

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

Sh Giasuddin Ahamed, Deputy Manager

a) Refractories Sectional Committee (MTD 15), Bureau of Indian Standards, New Delhi.

Sh Y N Daniel, Deputy Manager

a) Member, Fibre Reinforced Cement Product Sub Committee (CED 53:1), Bureau of Indian Standards, New Delhi.
b) Member, Precast Concrete Products Sub Committee (CED 53:3), Bureau of Indian Standards, New Delhi.

Sh Munish Kumar, Assistant Manager

a) Member, Coke Sub Committee (PCD 7:2), Bureau of Indian Standards, New Delhi.

Mrs Mithlesh Sharma, Assistant Manager

a) Member, Methods of Analysis Sub Committee (PCD 7:4), Bureau of Indian Standards, New Delhi.

Sh Gaurav Bhatnagar, Assistant

a) Member, Solid Mineral Fuels Sectional Committee (PCD 07), Bureau of Indian Standards, New Delhi.
b) Member, Coal Sub Committee (PCD 7:3), Bureau of Indian Standards, New Delhi.

FINANCE AND ACCOUNTS

FINANCE

CONTRIBUTIONS

Ministry of Commerce & Industry Grant

During the year 2019-20, Grant of Rs. 15.25 Crores received.

FOREIGN EXCHANGE

During the year 2019-20, the Council earned Foreign Exchange amounting to US $ 121424 CHF 7823.80 & EUR 7507.52 towards Training Fee, Testing Charges, Sponsored R & D, Seminar, Delegate Fee, Technical Exhibition Etc.

AUDITORS

M/s K S Aiyar & Co, Chartered Accounts, Mumbai were the Auditors of the Council for the year 2019-20.

ACCOUNTS

The Accounts for the 2019-20 duly audited by the Auditors of the Council are given at Annexure (Balance Sheet as at 31st March 2020 and Income & Expenditure Accounts for the year ended 31st March 2020).

INDEPENDENT AUDITORS' REPORT

To,
The Members of National Council for Cement and Building Materials

Opinion
We have audited the accompanying financial statements of **National Council for Cement and Building Materials** ("the entity"), which comprise the Balance Sheet as at March 31,2020 and Income and Expenditure Account for the year then ended, and notes to accounts including a summary of significant accounting policies.

In our opinion and to the best of our information and according to the explanations given to us, the aforesaid financial statements give a true and fair view of the financial position of the entity as at March 31, 2020, and of its financial performance for the year then ended in accordance with the accounting standards issued by the Institute of Chartered Accountants of India (ICAI).

Basis of Opinion
We conducted our audit in accordance with the Standards on Auditing (SAs) issued by the Institute of Chartered Accountants of India (ICAI). Our responsibility under those Standards are further described in the, "Auditor's Responsibilities for the Audit of the Financial Statements" section of our report. We are independent of the entity in accordance with the code of Ethics issued by the ICAI and we have fulfilled our other ethical responsibilities in accordance with the code of ethics. We believe that the audit evidence we have obtained is sufficient and appropriate to provide the basis for our opinion.

Responsibilities of Management and Those Charged with Governance for the Financial Statements
Management is responsible for the preparation of these financial statements that give a true and fair view of the state of affairs, results of operations and cash flows of the entity in accordance with the Generally Accepted Accounting Principles in India. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and
are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is responsible for assessing the entity's ability to continue as going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless management either intends to liquidate the entity or to cease operations, or has no realistic alternative but to do so.

Those Charged with Governance are responsible for overseeing the entity's financial reporting process

Auditors' Responsibilities for the Audit of Financial Statements
Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

We further report that:

a. We have obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purpose of our audit.
b. In our opinion proper books of account as required by law have been maintained by the entity as far as appears from our examination of these books.
c. The Balance Sheet and Income and Expenditure Account dealt with by this report are in agreement with the books of account.

For K. S. Aiyar & Co.
Chartered Accountants
Firm Registration No. 100186W

Raghuvir M. Aiyar
Partner
Membership No. 038128

Place: Mumbai
Date: 5th December, 2020

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
BALANCE SHEET AS AT MARCH 31, 2020

	Schedules		As at March 31, 2020		As at March 31, 2019
SOURCES OF FUNDS					
Capital Fund	A	68,076,146		68,076,146	
Reserves and Surplus	B	1,446,202,217		1,148,879,670	
Building Fund		4,500,000		4,500,000	
Gratuity Fund		92,670,193		127,147,745	
Provision For Leave Encashment		165,944,983		174,327,157	
Capital Grant from Govt of India	C	376,556,565		442,383,777	
Current Liabilities & Provisions	D	144,347,511	2,298,297,615	173,584,749	2,138,899,243
					-
Total			**2,298,297,615**		**2,138,899,243**
APPLICATION OF FUNDS					
Fixed Assets					
Gross Block	E	884,824,426		853,352,637	
Less : Accumulated Depreciation		502,236,421	382,588,005	447,041,237	406,311,400
Lab Equipment Under Inspection			1,094,783		
Gratuity Fund Investment					
(Fixed Deposit / Savings Bank / Interest Accrued)		201,975,580		212,342,516	
Leave Fund account		109,728,978		105,640,711	
Current Assets Loans & Advances					
R&D Contribution Outstanding		99,141,830		101,839,976	
Sundry Debtors	F	33,138,965		23,024,075	
Loans and Advances (unsecured and considered good)		168,988,686		154,014,734	
Cash and Bank Balances	G	1,252,369,071	1,865,343,110	1,103,218,046	1,700,080,058
FDR In lien			6,805,663		11,082,408
Investments					-
Interest Accrued on Bank Deposits			42,466,054		21,425,377
Total			**2,298,297,615**		**2,138,899,243**
Significant Accounting Policies	M				
Notes on Accounts	N				

The Schedules referred to above form an integral part of the Balance Sheet.
This is the Balance Sheet referred to in our report of even date.

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

Dr S K Chaturvedi
Joint Director(Finance & Accounts)

Dr B N Mohapatra
Director General

Raghuvir M. Aiyar
Partner
M.No. 38128
Mumbai
Date:

Shri Mahendra Singhi
Chairman -NCB

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED MARCH 31, 2020

			For the Year ended March 31,2020	For the Year ended March 31,2019
INCOME				
Research & Development Contribution	H		347,508,874	420,226,090
Other Income	I		125,374,813	99,621,825
Grant-in-Aid (Revenue) from Ministry of Commerce & Industry	J		152,500,000	300,000,000
			625,383,687	**819,847,915**
EXPENDITURE				
Employee's Cost	K		253,825,493	215,735,514
Travelling & Conveyance (Including Overseas Travelling)			12,995,078	12,933,641
Lab. Stores Serv.& Comp.(S.W.)			9,436,197	21,657,629
Symposia & Seminars			13,892,775	1,125,704
Training Programmes			4,730,322	3,488,039
Repairs and Maintenance			8,627,718	8,565,996
Other Expenses	L		35,185,582	35,129,295
Depreciation		55,195,186		36,695,283
Add. Provision of Depreciation of previous Year		-		
Less : Transfer from Capital Grant from Govt of India		35,876,871	**19,318,315**	
			358,011,481	**335,331,099**
Surplus for the year transferred to Reserve Fund			**267,372,206**	**484,516,816**
Significant Accounting Policies	M			
Notes on Accounts	N			

The Schedules referred to above form an integral part of the Income and Expenditure Account.
This is the Income and Expenditure Account referred to in our report of eve

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

Dr S K Chaturvedi
Joint Director(Finance & Accounts)

Dr B N Mohapatra
Director General

Raghuvir M. Aiyar
Partner
M.No. 38128
Mumbai
Date:

Shri Mahendra Singhi
Chairman -NCB

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2020

Particulars	As at March 31, 2020 (Amount in Rs.)	As at March 31, 2019 (Amount in Rs.)
SCHEDULE - A		
Capital Fund		
As per the last Balance Sheet	68,076,146	68,076,146
Includes UNIDO Equipment valued at Rs 20,187,535 (Previous Year Rs 20,187,535) (Refer Note 3 (b) of Schedule M)		
TOTAL	**68,076,146**	**68,076,146**
SCHEDULE - B		
Reserves and Surplus		
As per the last Balance Sheet	1,148,879,670	664,362,854
Add: Surplus for the year	267,372,206	484,516,816
Less :Depreciation Transferred from Capital Grant from Govt of India for Financial year 2017-18 and 2018-19	29,950,341	-
TOTAL	**1,446,202,217**	**1,148,879,670**
SCHEDULE - C		
Capital Grant from Govt of India		
As per the last Balance Sheet	442,383,777	442,383,777
Add : Plan Grant received during the year	-	-
	442,383,777	442,383,777
Less : Grant transferred to Income & Expenditure Account to the extent depreciation charged during the year on assets purchased out of capital grant	35,876,871	-
Less : Grant transferred to Reserve and Surplus to the extent depreciation charged during the Fnancial year 2017-18 and 2018-19 on assets purchased out of capital grant	29,950,341	-
TOTAL	**376,556,565**	**442,383,777**
SCHEDULE - D		
Current Liabilities and Provisions		
Retention & Security Money	18,492,770	19,274,643
Other Liabilities	125,854,741	154,310,106
TOTAL	**144,347,511**	**173,584,749**

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

DEPRECIATION AS AT 31 MARCH 2020

SCHEDULE E

(Amount in Rs.)

PARTICULARS	GROSS BLOCK							DEPRECIATION										NET BLOCK	
	Cost upto March 31, 2001	Cost from April 1, 2001 to March 31, 2019	Total cost as at March 31, 2019	Addition During the Year 2019-2020	Disposal/ Adjustment out of cost before 2001 2019-2020	Disposal/ Adjustment out of cost after 2001 2019-2020	Total cost as at March 31, 2020	On Old Assets Upto March 31, 2001	On Assets from April 1, 2001 to March 31, 2019	Op.Bal Depreciation as at April 1, 2019	Rate %	On Assets Prior to 1 Aprl 01 during the year 2019-20	Rate %	On Additions after 1 Aprl 01 2019-20	Depreciation/ Adjustment on cost before 2001 2019-20	Dep. / Adj. on cost after 2001 2019-20	Total Depreciation as at March 31, 2020	WDV As at March 31, 2020	WDV As at March 31, 2019
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
LAND (FREE HOLD)	3,924,748	-	3,924,748	-	-	-	3,924,748	-	-	-	-	-		-			-	3,924,748	3,924,748
VEHICLES	833,717	5,365,103	6,198,820	-	-	-	6,198,820	791,115	4,611,957	5,403,072	20.0	8,520	20.0	150,629			5,562,222	636,598	795,748
COMPUTER INCLUDING ACCESSORIES		51,312,968	51,312,968	1,608,188	-	5,577	52,915,579		49,467,891	49,467,891		-	60.0	2,068,611			51,536,502	1,379,077	1,845,075
FURNITURE AND OFFICE EQUIPMENTS	10,263,037	21,737,886	32,000,923	6,044,911	-	151,272	37,894,562	9,617,166	146,244	9,763,410	10.0	64,587	10.0	2,748,528			12,576,525	25,318,037	22,237,513
LABORATORY EQUIPMENT	79,479,641	312,625,787	392,105,428	25,657,585	-	574,000	417,189,013	74,368,395	236,167,666	310,536,061	10.0	511,125	25.0	25,385,427			336,432,612	80,756,401	81,569,367
MOBILE Quality Control Laboratory	-	5,268,489	5,268,489	-	-	-	5,268,489		5,185,072	5,185,072		-	20.0	16,683			5,201,755	66,734	83,417
CENTRE FOR CONTINUING EDUCATION																	-		
BUILDINGS	1,922,707	42,119,827	44,042,534	-	-	-	44,042,534	1,165,977	8,422,948	9,588,924	2.5	18,918	2.5	842,422			10,450,264	33,592,270	34,453,609
OTHER SERVICES	535,144	24,826,311	25,361,455	-	-	-	25,361,455	524,263	2,396,829	2,921,092	10.0	1,088	25.0	20,182,857			23,105,037	2,256,418	22,440,363
SOLAR PAWER PLANT	-	2,501,000	2,501,000	-	-	-	2,501,000		1,000,400	1,000,400		-	40.0	600,240			1,600,640	900,360	1,500,600
LABORATORY PROJECTS									-								-		
BUILDINGS	27,973,919	95,151,619	123,125,538	237,650	-	-	123,363,188	17,066,229	15,414,106	32,480,335	2.5	272,692	2.5	1,999,379			34,752,406	88,610,782	90,645,203
CAPITAL WORK IN PROGRESS BULDG. (PG) UNDER CONSTRUCTION	-	142,148,598	142,148,598	-	-	1,345,696	140,802,902											140,802,902	142,148,598
OTHER SERVICES	10,046,554	5,849,746	15,896,300	-	-	-	15,896,300	9,832,377	5,004,220	14,836,598	10.0	21,418	25.0	211,382			15,069,397	826,903	1,059,702
STAFF HOUSING	8,386,427	-	8,386,427	-	-	-	8,386,427	5,099,109	-	5,099,108	2.5	82,183		-			5,181,291	3,205,136	3,287,319
PILOT PLANT FACILITIES																	-		
BUILDINGS	778,010	-	778,010	-	-	-	778,010	464,465	-	464,465	2.5	7,839		-			472,304	305,706	313,545
EQUIPMENT	301,399	-	301,399	-	-	-	301,399	294,807	-	294,807	10.0	659		-			295,466	5,933	6,592
Total	144,445,303	708,907,334	853,352,637	33,548,334	-	2,076,545	884,824,426	119,223,903	327,817,333	447,041,235		989,029		54,206,157	-		502,236,421	382,588,005	406,311,400

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2020

Particulars	As at March 31, 2020 (Amount in Rs.)	As at March 31, 2019 (Amount in Rs.)
SCHEDULE - F		
Sundry Debtors (Unsecured and Considered Good)		
More than three years		
Others	33,138,965	23,024,075
TOTAL	**33,138,965**	**23,024,075**
SCHEDULE - G		
Cash and Bank Balances		
In Fixed Deposits	1,175,737,731	756,667,605
In Saving Accounts	76,228,713	346,047,607
Cash in hand including postage imprest	401,490	501,697
UNESCO Coupons (US Dollar 132.10)	1,137	1,137
TOTAL	**1,252,369,071**	**1,103,218,046**
SCHEDULE - H		
Research and Development		
Sponsored Research and Development Contribution	217,461,244	342,042,362
Standardisation and calibration	57,547,752	58,528,118
Symposia & Seminars	38,358,919	1,848,809
NCB Proficiency Testing Programme	34,140,959	17,806,801
TOTAL	**347,508,874**	**420,226,090**
SCHEDULE - I		
Other Income		
Interest	96,062,354	69,843,199
Sale of Publications	250	-
Training Programmes	21,163,906	15,215,389
Miscellaneous Receipts	2,607,978	1,503,215
Licence Fee (Housing Colony)	1,390,491	1,277,559
National Awards for Energy Efficiency	-	-
Foreign Exchange Fluctuation	(183,226)	1,460,762
Investement Inccome(STCG)	-	10,321,700
Interest on Income Tax Refund	4,333,060	-
TOTAL	**125,374,813**	**99,621,825**

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

SCHEDULES FORMING PART OF THE ACCOUNTS AS AT MARCH 31, 2020

Particulars	As at March 31, 2020 (Amount in Rs.)	As at March 31, 2019 (Amount in Rs.)
SCHEDULE - J		
Grant from Ministry of Commerce & Industry		
Towards Plan Grant	-	-
Less : Towards Capital Expenditure	-	-
	-	-
Towards Non-Plan Grant from Cement Cess	152,500,000	300,000,000
Grants from Ministry of Enviroment		
TOTAL	**152,500,000**	**300,000,000**
SCHEDULE - K		
Employee's Cost		
Establishment Charges	248,924,027	236,441,725
Contribution to Provident Fund & other Fund	22,147,275	24,297,101
Gratuity (Refer Note 4 of Schedule - M)	(19,064,311)	(48,193,769)
Social Security & Welfare	1,818,502	3,190,457
TOTAL	**253,825,493**	**215,735,514**
SCHEDULE - L		
Other Expenses		
Rent, Rates and Taxes	2,837,051	2,907,661
Electricity and Water Charges	10,858,961	10,858,774
Postage, Telegrams & Telephones	2,791,313	2,586,608
Publications	281,142	388,247
Stationery & Miscellaneous Stores	2,621,563	3,091,735
Books, Periodicals and Membership Fee	3,127,676	921,163
Exhibition, Publicity and Advertisements	2,264,823	341,289
Legal Expenses	757,830	474,600
Patents	122,448	171,200
Audit Fees - Statutory Auditors	75,000	75,000
Bank Charges	192,485	75,751
Insurance of Assets	1,552,857	779,280
Sundry Expenses	3,705,029	5,476,252
Collaborative Assistance in R&D and	3,997,405	6,981,735
TOTAL	**35,185,582**	**35,129,295**

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
Schedules forming part of the Accounts as at March 31, 2020

SCHEDULE – M

SIGNIFICANT ACCOUNTING POLICIES

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

2. **Recognition of Income:**

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

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

3. **Fixed Assets:**

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

		Old Rates % p.a.	New Rates % p.a.
*	Vehicles	20	20
*	Office Furniture and Equipment	10	10
*	Laboratory Equipment	10	25
*	Laboratory Projects Services	10	25
*	Building including Staff Housing	2.5	2.5
*	Computers	-	60
*	Solar Power Plant	-	40

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

   (b) Fixed Assets include Laboratory Equipment and Energy Bus received free of cost & custom duty from the United Nations Industrial Development Organisation (UNIDO). The value adopted in the accounts is as per customs CIF assessment upon import or at value advised by UNIDO and the corresponding credit for this amount is included under Capital Fund (Refer Schedule A) Rs. 19,564,057 for Laboratory Equipment and Rs. 623,478 for Energy Bus. The title to these assets has been transferred to Government of India and the further transfer of these fixed assets from the Ministry of Commerce & Industry, Government of India to the Council is pending. However, the Council provides depreciation on these fixed assets in accordance with the rates noted in para 3 (a) above.

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

5. **Accounting for Government Grants**:

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

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS
Schedules forming part of the Accounts as at March 31, 2020

SCHEDULE – N

NOTES ON ACCOUNTS

1. Purchases made during the year in respect of laboratory stores, raw materials, miscellaneous consumable stores, publications, tools and accessories are charged to the Income and Expenditure Account and closing stock of these items has not been ascertained or accounted for, as per the decision of the Board of Governors.

2. Fixed Asset Register is being updated with the complete details along with value which is to be reconciled with the Accounts. Physical verification of the Fixed Assets has been carried out in each Centre/Group.

3. **Contingent liabilities not provided for in respect of:**

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

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

4. Gratuity Fund Investment has a balance of Rs. 20,19,75,580/- (Rs. 21,23,42,516). There is a shortfall of Rs. Nil (Rs. Nil) in the "Gratuity Fund Investment Account" as compared to the "Gratuity Fund account" as at 31st March 2020.

5. The Council has got an actuarial valuation of the leave encashment for and upto the year ended 31st March 2020 and the liability computed is Rs. 16,59,44,983/- (Rs. 17,43,27,157).

6. An amount of Rs. 6,31,976 has been deposited with Hon'ble Delhi High Court in connection with a case filed by a former employee. Necessary adjustment will be made after the decision of the Hon'ble Court.

7. The encashment of valuation of UNESCO Coupons of US $ 132.10 are subject to ascertainment and confirmation.

8. R&D Contribution has been arrived after adjusting R&D Contribution received in advance of Rs. 2,07,82,948/- (Rs. 2,75,00,489).

9. During the year 2019-20 DPIIT allocated to NCB an amount of Rs. 30.75 crores (Rs. 18 crores for Non plan Grant –in-Aid –Base level funding, Rs. 4.50 crores for DCCI, R &D projects and Rs. 8.25 crores for project-based support) to be released in four quarters during the financial year 2019-20. NCB vide letter ref. FIN/VI.5 dated 05.11.2019 to The Under Secretary, DPIIT has requested that NCB may be permitted to surrender the remaining grant Rs. 15.50 Crore allocated by DPIIT for the 3rd and 4th quarter of FY 2019-2020 for the following reason: "Due to increased internal generation of revenue owing to particularly some specific high value TQPA projects in construction and other mega projects, NCB shall be able to meet its recurring expenditure for the 3rd and 4th quarter of the FY 2019-2020 from the internal revenue generation".

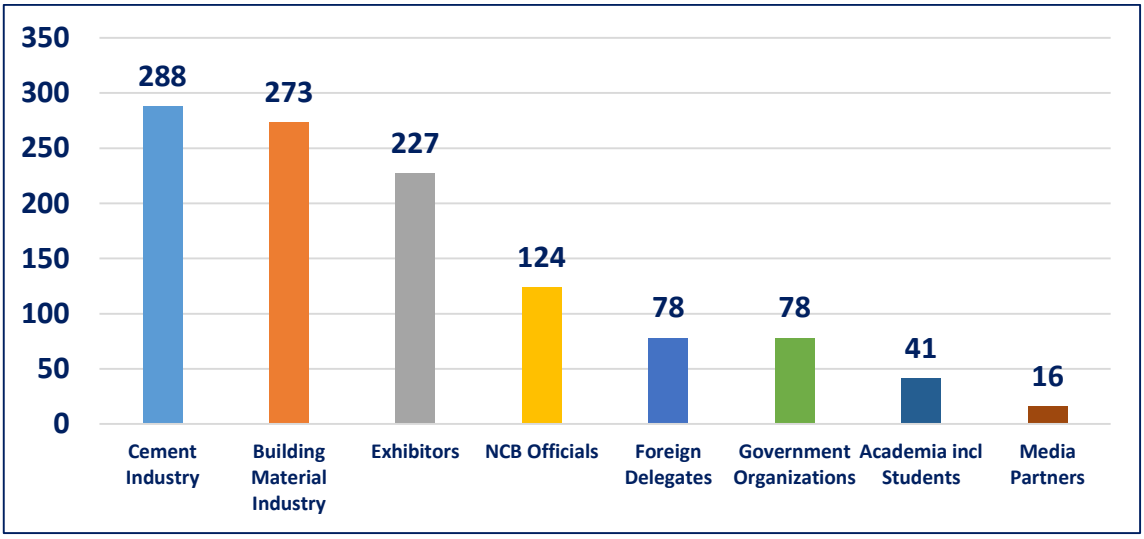
10. Previous year's figures have been regrouped and rearranged wherever necessary so as to conform to this year's classification.

IMPORTANT EVENTS

16th NCB International Seminar on Cement, Concrete and Building Materials

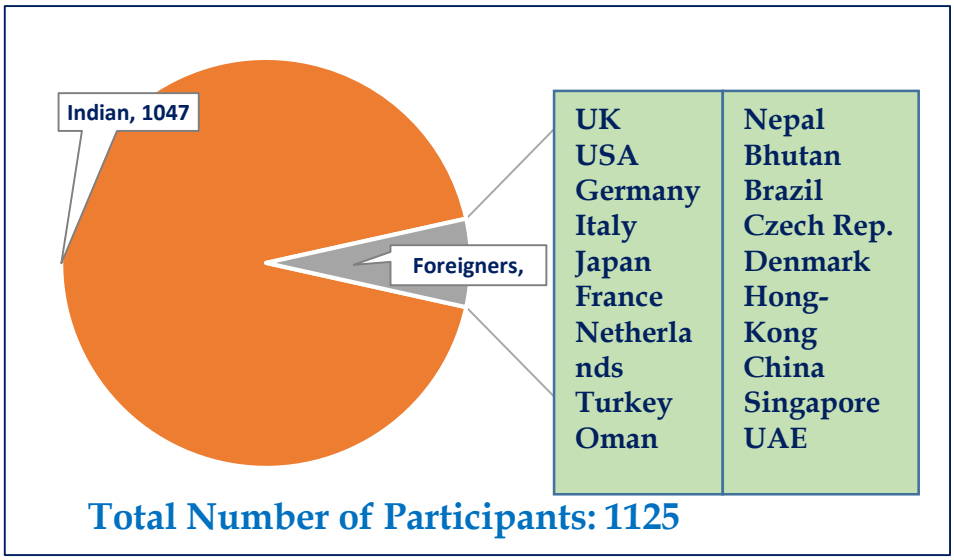
"Clean and Green is Sustainable"

The 16th NCB International Seminar on Cement, Concrete and Building Materials was held from 03 - 06 December 2019 at Manekshaw Centre, Parade Road, New Delhi. In order to emphasize the importance of concept of circular economy, climate change and sustainability, the theme of this year's seminar was chosen as ***"Clean and Green is Sustainable"***.

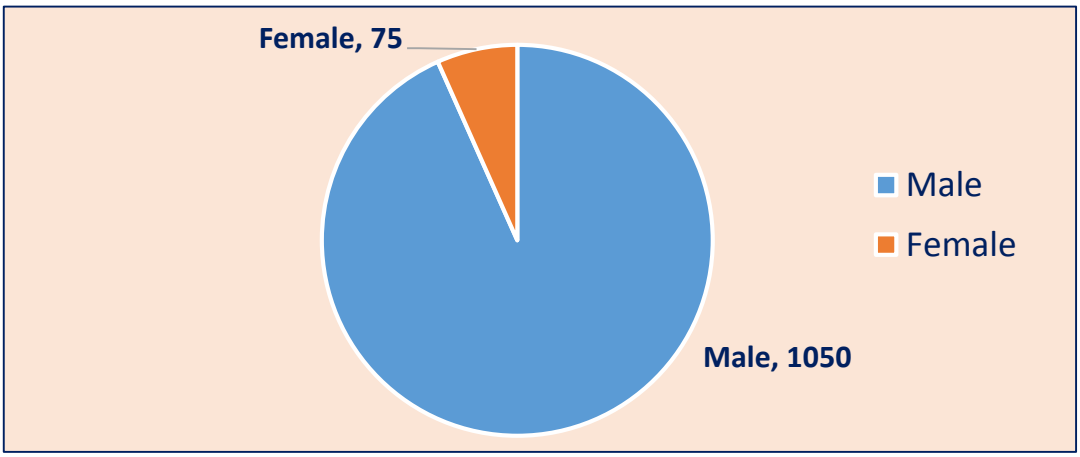


Participation in the 16th NCB International Seminar

16th NCB International seminar saw participation of 1125 delegates from cement industry, building materials industry, exhibitors, NCB officials, foreign delegates, government organizations, academia, media partners etc. The seminar witnessed 78 foreign delegates from 18 countries across the globe.



Registration Statistics of the 16th NCB International Seminar



During the four days of the seminar, the technical deliberations comprised of about 193 presentations in 24 technical sessions covering wide spectrum of themes relating to cement, concrete and construction sectors.

Scientific Programme Statistics

Descriptions of Sessions	No. of Sessions	No. of Presentations
Panel Discussions	2	6 Panelist in each session
Special Technical Sessions	2	3
Parallel Sessions	23	185
Special Students Sessions	1	8
ABSTRACTS	# Abstracts	
Received Abstracts	200	
Accepted Abstracts	193	

Special Technical Sessions on emerging topics and Panel discussions on *"Cement and Construction Industry – A Convergence Point of Circular Economy"* and *"Changing Climate - A Threat or Opportunity for Cement Industry"* with eminent Keynote Speakers and Panellists were the main highlights of the seminar. The 2nd edition of Compendium "The Cement Industry – India 2019" was released by Shri Piyush Goyal, Hon'ble Minister of Railways and Commerce & Industry.

Inauguration of 16th NCB International Seminar

The 16th NCB International seminar was inaugurated by Dr Guruprasad Mohapatra, Secretary, Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Govt. of India along with Shri Anil Agrawal, Joint Secretary, DPIIT, Ministry of Commerce and Industry, Govt. of India; Shri Mahendra Singhi, Chairman-NCB, President – Cement Manufacturers' Association and MD & CEO, Dalmia Cement (B) Ltd.; Shri K K Maheshwari, MD, UltraTech Cement Ltd.; Dr B N Mohapatra, Director General-NCB and Dr S K Chaturvedi, Organising Secretary, 16th NCB International Seminar.

Inauguration of Seminar by Lamp Lighting

Inaugural Session

Release of Seminar Proceedings

Inauguration of Technical Exhibition

Welcome Address and Technology Perspective

During his welcome address, Dr B N Mohapatra spoke about the technology perspective of cement industry. He shared the progress on NCB's research activities in high MgO clinker, new clinker with modified chemistry & mineralogy using low grade limestone, development of limestone-fly ash based composite cement system, feasibility of using low grade limestone, dolomitic limestone along with cement grade limestone in development of Portland Limestone Cement, investigations on improving reactivity of non-conforming fly ash, enhancing use of fly ash in PPC beyond BIS limit, various studies on utilization of industrial waste & by-products such as copper slag, lead-zinc slag, jarosite, red mud, barium sludge, SPL waste, E-catalytic waste, leather sludge & marble dust as raw material or as a mineralizer in production of clinker.

Director General NCB Dr B N Mohapatra delivering Welcome Address at the Inaugural Session

Cement Industry - Challenges, Opportunities and Future Outlook

Shri Mahendra Singhi in his inaugural speech stated that NCB Seminars have been helping in imparting knowledge, demonstrating innovations and delivering the best in the cement industry. He emphasized that collective knowledge gathered in NCB seminar has made the Indian Cement Industry, future ready. He made important points on achievements of cement industry, efforts of the industry in turning challenges to opportunities, emerging challenges and policy interventions required from government.

Shri Mahendra Singhi, Chairman-NCB, President – Cement Manufacturers' Association and MD & CEO, Dalmia Cement (B) Ltd delivering talk on "Cement Industry - Challenges, Opportunities and Future Outlook" at the Inaugural Session

Cement Industry Perspective

After complimenting NCB for its services to the cement sector, Sh K K Maheshwari informed that Indian cement industry has been at forefront of sustainability. It has been working on four principles of sustainability viz. continuous improvement of environmental profile by reducing emissions and becoming more energy efficient; principle of what is good for environment is also good for business; earning the right to operate from society; and the belief to take the society along with the industry. He stated that alternate fuels account for 4 to 5 % of total energy consumption and offer huge opportunity for industry in close partnership with government. He told that cement industry has been practising circular economy and has also been at forefront of renewable energy.

Shri K K Maheshwari, MD, UltraTech Cement Ltd. delivering talk on "Cement Industry Perspective" at the inaugural Session

Government Initiatives for Cement and Construction Sector

In his speech, Shri Anil Agrawal, Joint Secretary, DPIIT, shared information about the government initiatives like Bharatmala & Sagarmala project, building of railway lines & smart cities, investments made in industrial corridors and "*Housing for All*" scheme. He complimented the industry for participation in "*Swachhata Hi Sewa*" campaign in which cement plants lifted 7000 tonnes of plastic waste from Urban Local Bodies in 30 days and expressed happiness on partnership of cement industry with DPIIT in waste consumption.

Shri Anil Agrawal, Joint Secretary, DPIIT, Ministry of Commerce and Industry, Govt. of India delivering talk on "Government Initiatives for Cement and Construction Sector" at the Inaugural Session

Inaugural Address by Chief Guest Dr Guruprasad Mohapatra

After congratulating NCB for its services provided to the industry, Chief Guest of the session, Dr Guruprasad Mohapatra, Secretary, DPIIT, viewed that Indian cement industry is a vital part of economy employing a million people directly or indirectly. The gap in cement consumption of 240 kg per capita as against global average of 530 kg shows a huge potential for cement demand. He hoped that the government's recent initiatives like reduction in corporate tax would provide boost for adding capacity and increasing existing capacity utilization. He viewed that to make India a 5 trillion-dollar economy by 2025, cement industry's role is crucial for developing infrastructure and increasing exports. He complimented the industry for "*Swachhata Hi Sewa*" campaign, asked the industry to adopt the international best practices for increasing alternate fuel utilization and assured that the government is willing to make effective policies for solving logistic issues.

Inaugural Address by Chief Guest of the session Dr Guruprasad Mohapatra, Secretary, Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Govt. of India

Release of 2nd Edition of Compendium "The Cement Industry – India 2019"

Hon'ble Minister released the 2nd edition of Compendium "The Cement Industry – India 2019" during the special session of 16th NCB International Seminar on 3rd December 2019 at Manekshaw Centre, Delhi. The compendium was published by NCB in association with DPIIT, Ministry of Commerce & Industry. It contains information on status of Indian Cement Industry and its profile, key issues/challenges related to raw materials, energy efficiency, environment concerns and an exhaustive directory of cement plants in India.

A release of **2nd edition of Compendium "The Cement Industry – India 2019"** *on the occasion of 16th NCB International Seminar on Cement, Concrete and Building Materials at New Delhi.*

The dignitaries seen on dais are (left to right): **Dr B N Mohapatra, Director General-NCB, Shri Anil Agrawal, Joint Secretary, DPIIT, Ministry of Commerce and Industry, Shri Piyush Goyal, Hon'ble Minister of Railways and Commerce & Industry, Shri Mahendra Singhi, Chairman-NCB, President – Cement Manufacturers' Association and MD & CEO, Dalmia Cement (B) Ltd., and Dr S K Chaturvedi, Organising Secretary, 16th NCB International Seminar.**

Prime Minister

MESSAGE

(Narendra Modi)

Distribution of National Awards by Shri Piyush Goyal, Hon'ble Minister of Railways and Commerce & Industry

The scheme of National Awards for Energy Efficiency started from 1986-87 and since then, these awards are being given regularly to the best performing cement plants. The objective of energy efficiency awards is to motivate competitive improvement in energy performance and improve energy consciousness by giving recognition to the efforts for realization of lower energy consumption levels. In view of the growing importance of environmental protection and quality standards, two more categories of awards were instituted from 2000-2001. National Awards for Energy Efficiency, Environmental Excellence and Total Quality Excellence in Indian Cement Industry have played a catalytic role in achieving excellence through competitive improvement in performance. Cement plants have achieved best levels of 671 kcal/kg of clinker in thermal energy and 63.9 kWh/tonne of cement in electrical energy comparable to the best reported figures of 660 kcal/kg of clinker and 65 kWh/t of cement in other developed countries such as Japan.

Distribution of National Awards by Hon'ble Minister

NATIONAL AWARDS

Sl. No.	CATEGORY	2017-18	2018-19
NATIONAL AWARDS FOR ENERGY EFFICIENCY			
1	Best Thermal Energy Performance	Ultratech Cement Ltd.(Unit – Vikram Cement Works, Line 2), Neemuch, MP	RCCPL Private Limited Maihar, MP
2	Best Electrical Energy Performance	Dalmia Cement (Bharat) Ltd. Ariyalur, TN	Dalmia Cement (Bharat) Ltd. Ariyalur, TN
3	Best Improvement in Thermal Energy Performance	J K Cement Works, Muddapur, Karnataka	RCCPL Private Limited, Maihar, MP
4	Second Best Improvement in Thermal Energy Performance	The Ramco Cements Ltd., Virudhunagar, TN	Dalmia Cement (Bharat) Ltd. Kadapa, Andhra Pradesh

Sl. No.	CATEGORY	2017-18	2018-19
5	Best Improvement in Electrical Energy Performance	J K Cement Works, Muddapur, Karnataka	Chanderia Cement Works, Chittorgarh, Rajasthan
6	Second Best Improvement in Electrical Energy Performance	Ultratech Cement Ltd.(Unit – Vikram Cement Works, Line 2), Neemuch, MP	J K Cement Works, Muddapur, Karnataka
7	Best Improvement in Energy Performance in Manufacture of Blended Cements	Ultratech Cement Ltd.(Unit – Vikram Cement Works, Line 2), Neemuch, MP	J K Cement Works, Muddapur,Karnataka
NATIONAL AWARDS FOR ENVIRONMENTAL EXCELLENCE			
1	Best Environmental Excellence in Cement Plants	J K Cement Works, Muddapur,Karnataka	J K Cement Works, Muddapur,Karnataka
2	Second Best Environmental Excellence in Cement Plants	J K Lakshmi Cement, Sirohi, Rajasthan	J K Lakshmi Cement, Sirohi, Rajasthan
3	Best Environmental Excellence in Limestone Mines	The Ramco Cements Ltd., Alathiyur Works, Ariyalur, TN	Dalmia Cement (Bharat) Ltd. Dalmiapuram, Trichy, TN
4	Second Best Environmental Excellence in Limestone Mines	Dalmia Cement (Bharat) Ltd., Dalmiapuram, Trichy, TN	The Ramco Cements Ltd., Alathiyur Works, Ariyalur, TN
NATIONAL AWARDS FOR TOTAL QUALITY EXCELLENCE			
1	Best Total Quality Excellence	Shree Cement Ltd., Beawar, Ajmer, Rajasthan	Shree Cement Ltd., Beawar, Ajmer, Rajasthan
2	Second Best Total Quality Excellence	Ultratech Cement Ltd. (Unit – Vikram Cement Works), Neemuch, MP	Ultratech Cement Ltd. (Unit – Awarpur Cement Works), Chandrapur, Maharashtra

Address by Hon'ble Minister of Railways and Commerce & Industry Shri Piyush Goyal

At the onset, he congratulated NCB for organizing 16th NCB International seminar with a relevant theme of "***Clean and Green is Sustainable***" and all the winners of National Awards on Energy, Environment and Total Quality Excellence. He noted that there exists a huge gap between China and India, both in demand and production. He highlighted that Indian economy cannot reach 10 trillion-dollar economy status until cement production capacity reaches 900 million tonnes and 1200 kgs of per capita consumption. He complimented cement industry for working on the concept of a circular economy and for utilizing plastic waste. He called upon the industry to provide employment opportunities to Divyang's and extend all social security benefits ESIC, pension etc. to its employees who are engaged on contractual basis. He thanked cement industry for their huge contribution to nation building, working towards sustainability and towards using alternate fuels. He also complimented cement industry for setting various targets to become a sustainable industry. He was of the opinion that Modern India cannot be built without cement and the very foundation of the country's future lies in this industry.

Address by Hon'ble Minister of Railways and Commerce & Industry

Panel Discussions

Two panel discussions on relevant topics such as "Changing Climate – A threat or opportunity for cement industry" and "Cement and construction Industry- A Convergence point of circular economy" were organized on the first day of the seminar. The panel discussions saw participation of top leaders of Indian Cement Industry and various sectoral experts.

Panel Discussion on Changing Climate – A threat or opportunity for cement industry: The first panel discussion was moderated by Shri Sumit Bannerjee, Chairman, Editorial Advisory Board, Indian Cement Review and the distinguished panelists were: Shri Mahendra Singhi, Chairman NCB, President – Cement Manufacturers' Association, MD & CEO– Dalmia Cement (B) Ltd., Shri Vivek Agrawal, Group Executive President & Chief Marketing Officer, UltraTech Cement Ltd., Shri Bimlendra Jha, MD & CEO, Ambuja Cement Ltd., Shri Rajnish Kapur, Business Head, J K Cement Ltd. and Shri V S Narang, Director (Technical), My Home Industries

Panel Discussion on Cement and construction Industry- A Convergence point of circular economy: The second panel discussion on circular economy was moderated by Shri Sujeet Samaddar, Former Senior Consultant, Niti Aayog and the distinguished panelists were: Dr D K Aswal, Director, CSIR-NPL ,Shri Sanjay Pant, Head – Civil Engineering Department, BIS, Shri Sunil Gupta, CEO, KJS Cement Ltd, Shri Arpan Gupta, Dy. Director & Head-Mines, Metals & Cement Division, FICCI , Shri K S Venkatagiri, Executive Director-GBC, CII, Dr Mukesh Kumar, Director, Steel Research and Technology Mission of India

Special Technical Sessions: Keynote Presentations

The first keynote presentation was given by Dr Anjan Kumar Chatterjee, Chairman, Conmat Technologies Private Limited on "**Emerging Technological Options for Improving the Application Potential of Blended Cements".**

The second keynote presentation was given by Dr Ravindra Gettu, Professor, Civil Engineering & Head, Building Technology and Construction Management Division at Indian Institute of Technology Madras on "**Sustainability Assessment of Concrete Systems with Alternate Binders"**

The third keynote presentation was given by Dr Dhanada Kanta Mishra, Research Scholar, Hong Kong University of Science and Technology on "**Smart Cement-Based Composites".**

Dr Anjan Kumar Chatterjee, Chairman, Conmat Technologies Private Limited delivering First Keynote Presentation

Dr Ravindra Gettu, Professor, Civil Engineering & Head, Building Technology and Construction Management Division at Indian Institute of Technology Madras delivering Second Keynote Presentation

Dr Dhanada Kanta Mishra, Research Scholar, Hong Kong University of Science and Technology delivering Third Keynote Presentation

Technical Sessions

More than 193 papers were presented in 24 technical sessions including one special session for students. The Technical Sessions were based on specific themes like: Raw Material Resource Management, Portland, Blended & Special Cements, Alternate / Waste Fuels & Raw Materials, Plant Machinery & Project Engineering, Productivity Enhancement & Process Optimization, Energy Conservation, Performance & Durability of Concrete, Concrete Deterioration Mechanisms & Advanced Concrete System, Advances in Grinding Systems, Emerging Trends, Total Quality Management, Refractory Management & Process Optimization, Analytical Methods & Lab Automation, Smart & High Performance Concrete, Environmental Management & Sustainable Development, Distress Investigation, Repair/ Strengthening/ Retrofitting of Concrete Structures, Sustainable Construction Practices & Other Building Material & Binders.

Technical Exhibition

The 16th NCB International Seminar also had a Technical Exhibition, which was held concurrently at the seminar venue. The exhibition gave additional exposure to the latest in available technologies and services for efficient operation of cement plants, making of concrete and construction activities.

Concluding Session

The concluding session of 16th NCB International seminar was held on 6th December 2019 and attended by Chief Guest Shri Shashank Priya, Additional Secretary and Financial Advisor, Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Govt. of India along with Shri Mahendra Singhi, Chairman-NCB, President – Cement Manufacturers' Association and MD & CEO, Dalmia Cement (B) Ltd.; Dr B N Mohapatra, Director General-NCB and Dr S K Chaturvedi, Organising Secretary, 16th NCB International Seminar.

Release of NCCBM Newsletter

The first edition of NCCBM newsletter was released by Shri Shashank Priya, Additional Secretary and Financial Advisor, DPIIT, Ministry of Commerce & Industry, Govt of India on 6th December 2019. The newsletter included a glimpse of NCB team and its R&D activities.

Release of NCCBM Newsletter on the occasion of 16th NCB International Seminar on Cement, Concrete and Building Materials at New Delhi.

The dignitaries seen on dais are (left to right):
Dr B N Mohapatra, Director General-NCB, Chief Guest Shri Shashank Priya, Additional Secretary and Financial Advisor, Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Govt. of India, Shri Mahendra Singhi, Chairman-NCB, President – Cement Manufacturers' Association and MD & CEO, Dalmia Cement (B) Ltd., and Dr S K Chaturvedi, Organising Secretary, 16th NCB International Seminar.

Awards for Papers of High Merit

Out of the 193 papers presented in the 16th NCB International seminar in 24 technical sessions, 10 technical papers from the papers presented by delegates and 1 paper presented by student were selected as papers of high merit and were awarded.

Valedictory Address

In the concluding session, the Valedictory address was delivered by Shri Shashank Priya. He stated that NCB is doing seminal work and providing platform for bringing together the manufacturers of cement, academicians, scientists and manufacturers of plant machinery. He also said that NCB is bringing needs of research and its practical applications together and expressed confidence that it will take the industry forward. He said that it is heartening to know that the industry has taken initiatives to become a leader in low carbon technology. He added that use of industrial waste will make industry not only competitive but will also reduce its carbon footprint. He told that the next level of growth for Indian cement industry has to come by becoming global leader in export of high quality and cost effective cement. He noted that the feedback from the industry regarding the seminar has been phenomenal and delegates had a rich learning experience. He congratulated the recipients of papers of high merit of seminar. He also congratulated NCB for organizing the seminar successfully.

Valedictory Address by Chief Guest Shri Shashank Priya, Additional Secretary and Financial Advisor, Department for Promotion of Industry and Internal Trade (DPIIT), Ministry of Commerce and Industry, Govt. of India

57th NCB Day Celebration

The 57th NCB day was celebrated at NCB Ballabgarh (Head Office) on 15th January 2020 with Shri Som Parkash- Hon'ble Minister of State for Commerce and Industry, Govt. of India as the Chief Guest for the occasion. At the program, release of "*NCB Darpan*"-Hindi Magazine by NCB, inauguration of 3000 kN Compression Testing Machine and release of NCB Newsletter- "*16th NCB International Seminar Special Issue*" by the Chief Guest, took place. The occasion was graced by notable dignitaries from Ministry of Commerce and Industry, BIS, CPPRI and Cement Industry.

Arrival of Hon'ble Minister at NCB Ballabgarh

Inauguration of NCB Day by Lamp Lighting

After invocation and lamp lighting ceremony by the Chief Guest and dignitaries on the dais, DG- NCB highlighted the current Research and Innovation activities being carried out at NCB, which are in line to the current requirements of the cement and building materials sector. Shri Mahendra Singhi - Chairman NCB, President-CMA, MD & CEO- Dalmia Cement (B) Ltd. made important points on achievements of cement industry, efforts of the industry in turning challenges to opportunities and emerging challenges. He also spoke about the contributions made by the cement industry and NCBs scientists and engineers towards improving the productivity of the sector and making the sector, future ready.

Inauguration of 3000 kN Compression Testing Machine by Hon'ble Minister

Release of NCB Newsletter- *"16th NCB International Seminar Special Issue"* by Hon'ble Minister

During his speech, Hon'ble Minister of State for Commerce and Industry, Shri Som Parkash, highlighted the importance of R&D for the industry, congratulated NCB for its achievements and also asked everyone to contribute gainfully through hard work and determination for India to realize the aim of becoming 5 trillion dollar economy.

Afterwards, awards for Best Scientist, Best Employee- Technical & Administrative staff, Long Service Award and Hindi Samiti awards were given to the employees. The program ended with a vote of thanks to the Chief Guest and notable dignitaries by the Organizing Secretary of the occasion.

Distribution of Awards by Hon'ble Minister

Release of NCB BND 5091 (Coal)

Memorandum of Understanding (MOU) between CSIR-National Physical Laboratory and National Council for Cement and Building Materials (NCB) for BND Certifications was signed on the occasion of World Metrology Day on 21st May 2018.

On 4th January 2020, NCB BND 5091 (Coal) was released in the presence of Dr D K Aswal (Director-NPL), other dignitaries and NCB team at CSIR-NPL, New Delhi.

Corporate Advisory Committee Meetings

72nd Research Advisory Committee Meeting

The Committee comprised of 1 member of GoI, 09 from other Govt. organizations, 05 from CSIR labs, 02 from Academic institutions, 19 from cement & construction sector, 01 Consultant and 07 from NCB. Chairman of RAC, Shri Ashwani Pahuja, expressed his happiness that NCB's R&D Programme, comprising of on-going projects as well as new proposals, covering development of reactive belite cement using low grade lime stone, improving the performance of composite cement by separate grinding, development of Portland Composite Cement based on fly ash and limestone, formulation of new clinker standard for blended cements, development of Geopolymer concrete, effect of supplementary cementitious materials on service life of concrete structures, development of UHPC, Fresh, hardened and durability performance evaluation of concrete made with Portland Limestone cement, use of 3D printing in construction and use of drones for structural assessment are well aligned to the needs of the industry, nation & society at large. Through its R&D activities, NCB has been contributing to both revision of existing cement standards and providing technical input to formulation of new standards in the areas of cement construction and building materials.

72nd Research Advisory Committee Meeting at NCB Ballabgarh

Sl. No.	List of Ongoing projects
01	COB-11: Investigation for Standardization of High Magnesia (*MgO*) Clinker for the Manufacture of Blended Cement such as PPC and PSC.
02	COB-09: Development of Reactive Belite Cement Using Low Grade Lime Stone and Different Dopants.
03	COB-10: Improving the Performance of Composite Cement by Separate Grinding of Constituents.
04	WAU-16: Investigations on Development of Portland Composite Cements Based on Fly Ash and Limestone.
05	WAU-15: Investigations on multi component blended cements using limestone, calcined clay and other mineral additives.
06	WAU-14: Improvement of Fly ash quality, through chemical / mineral doping in coal during its generation in thermal power plant, and study its effects in cement and concrete.
07	CTM-02: Development of Geo-polymer concrete for application in pavements and precast concrete construction.
08	SOD-09: Studies on the Effectiveness of Different Repair Systems for repair, restoration and strengthening of Corrosion Damaged Structures.
09	SOD-10: Effect of supplementary cementitious material (*SCM's*) (*Single and Multi Blends*) on service life of concrete structures including studies to improve green cements to meet durability/ ser- vice life requirements.
10	SOD-11: Experimental Study on Shear & Compression Design of High Strength Concrete including effect of Fibre on enhanced ductility & fire resistance.
11	CTM-03: Use of advanced electronics in construction and condition assessment of concrete structures.
12	CTM-04: Model Low Cost Housing Sustainable Technology for Mass EWS & LIG/MIG Housing Scheme using precast/prefab systems with emphasis on maximization of waste-based materials.
13	CON-14: Development of Ultra-High-Performance Concrete (*UHPC*)– Including use of Nano Technology for UHPC.
14	CON-15: Enhancing the Utilization of Construction and Demolition Waste and Other Waste Based Aggregates in Concrete Structures and Pavements.
15	CON-16: Fresh, Hardened and Durability Performance Evaluation of Concrete made with Portland Limestone Cement (*PLC*).
16	CLS-02/2017: Development of Calibration methodologies with improved Accuracy.

Sl. No.	List of New Projects
01	CDR-CTM: Studies on Mechanical and Durability properties of High Strength Geopolymer Concrete.
02	CDR-CON: Study of Carbonation and Carbonation induced reinforcement corrosion in new cementitious system.
03	CDR-CON: Cathodic Protection (*CP*) of RCC structures to enhance service life of new and existing structures using three systems (Sacrificial anode, ICCP and hybrid system).
04	CDR-SOD: Studies on mechanical and time dependent properties of Very High Strength Concrete (*100 to 130 MPa*) and Ultra High Strength Concrete (*130 To 180 MPa*).
05	CDR-CON: Utilization of Coarser Flyash (*having fineness between 250 m^2/kg to 320 m^2/kg*) in Concrete as a cementitious material
06	CRT-01/20: Investigations on Fly Ash based Geopolymer Coarse Aggregate.
07	CRT-02/20: Investigations on Utilization of Coarse Flyash (*200-250 m^2/kg*) in Cement.
08	CRT-03/20: Development of new clinker system using industrial by products and low limestone content.
09	CRT-04/20: Investigations on role of Particle Size Distribution (*PSD*) on performance of blended cements and concrete (*Additional Proposal Tabled during the meeting*).
10	CME-01/20: Process design and integration of RDF Gasification in cement manufacturing process.
11	CME-02/20: Solar thermal calcination of phosphor gypsum for cement manufacture.
12	CME-03/20: Design and Development of Transfer Chute to Handle Alternate Fuels and Their Mix in Indian Cement Plants.

21st ACH Meeting Hyderabad

Meeting of "Advisory Committee for NCB-Hyderabad" was held on 20 February 2020 at their Hyderabad unit. Shri V S Narang, Director (Tech), My Home Industries Pvt Ltd, chaired the committee meeting. Apex level officials of various Government bodies, cement plants, construction sectors viz., BIS, TSPCB, NTPC, CPWD, Telangana state R&B, Irrigation departments UltraTech Cement Ltd., Dalmia Cement Ltd., Orient cement Ltd., Shree Cement, JK Cement, Zuari Cement Ltd (Heidelberg), Sagar Cement, NCL Industries were part of the committee meeting. Discussions were held on research activities that are being carriedout at NCB and inputs were given by the industry on the new areas where the detailed studies are required.

Infrastructural Development Committee (*IDC*) (2019-2020)

In the financial year 2019-20, the 49th IDC meeting was held on 09th May 2019. During the meeting Infrastructural Development Committee (IDC) advises 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.

Administration and Finance Committee (AFC) (2018 & 2019)

Administration and Finance Committee (AFC) advises 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 are reported to the Board at its immediate next meeting through the relevant status report.

Annual General Meeting (AGM)

The Annual General Meeting of the society for the year 2019 was held on 04th December 2019 in New Delhi in which it adopted the Annual Report, the Audited Accounts and the Balance sheet for the year 2018-19.

Glimpse of AGM Meeting

Institutional Events

National Technology Day: National Technology Day 2019 was celebrated at NCB on 10th May. Chief Guest, Shri Vishnu Gupta, DDG (*Labs*) – BIS and Chief Speaker, Shri Anuj Bhatnagar, Scientist F, Head (*BIS*), Labs Policy & Planning, graced the occasion and discussed the latest on ISO 9001:2015 clauses and implementation.

Director General NCB with Chief Guest, Shri Vishnu Gupta, DDG (*Labs*) – BIS and Chief Speaker, Shri Anuj Bhatnagar, Scientist F, Head (*BIS*)

World Environment Day: World Environment Day 2019 was celebrated at NCB on 06th June. Chief Guest, Shri Sandeep Shrivastava, Sr. VP, Corp. Sustainability & Environment, Ambuja Cements Ltd. graced this occasion and shared his views on the theme "Beating Air Pollution" with NCB officials.

Director General NCB with Chief Guest, Shri Sandeep Shrivastava, Sr. VP, Corp. Sustainability & Environment, Ambuja Cements Ltd.

Independence Day: DG NCB, Dr B N Mohapatra hoisted the national flag on 73rd Independence Day of India and encouraged the employees for giving their best to the nation by working hard and continual improvement. In his speech, DG NCB put thrust on aligning NCB Research and Innovation projects with Sustainable Development Goals, societal requirement and Cement Sustainability.

Director General NCB delivering Independence Day Speech

NCB-H celebrated Independence Day and Republic day with due reverence and hoisted the National Flag.

Other Institutional Events

Hindi Pakhwada: *Hindi Pakhwada* was organized during 13-27 September 2019 at Ballabgarh. In the opening ceremony of *Pakhwada*, Shri Ashutosh Saxena, Joint Director expressed his satisfaction on growth and development of Hindi in the organization. He exhorted NCB officials to further promote use of Hindi in their day-to-day interactions. During the *Pakhwada*, four competitions, i.e., *Shurt lekhan & Tippani Lekhan, Nibandh Lekhan, Hindi Shabd Kosh Gyan,* and *Anuwad Pratiyogita* were organized and a large number of officials participated.

हिन्दी पखवाड़ा का आयोजन

संस्थान में हिन्दी पखवाड़े का आयोजन 13 सितंबर से 27 सितंबर 2019 के बीच बड़े हर्षोल्लास के मनाया गया। हिन्दी पखवाड़े का शुभारंभ 13 सितंबर 2019 को श्री आशुतोष सक्सेना, संयुक्त निदेशक (प्रशासन) एवं इकाई प्रभारी द्वारा किया गया। पखवाड़े का शुभारंभ करते हुये संयुक्त निदेशक (प्रशासन) एवं इकाई प्रभारी ने सभी सदस्यों से अनुरोध किया की संस्थान में सभी सदस्यों को राष्ट्र भाषा के प्रचार प्रसार की लिये निरंतर प्रयास करते रहना चाहिये तथा अधिक से अधिक कार्य हिन्दी भाषा में करना चाहिये, तथा राष्ट्र भाषा में कार्य करते समय हमें गौरान्वित महसूस करना चाहिये।

संस्थान में हिन्दी पखवाड़ा 2019 के दौरान संस्थान में निम्नलिखित प्रतियोगितायें आयोजित की गई:

- श्रुतलेख व टिप्पणी लेखन प्रतियोगिता,
- निबंध लेखन प्रतियोगिता,
- कार्यालय में प्रयोग होने वाले हिन्दी शब्दकोश प्रतियोगिता,
- अनुवाद प्रतियोगिता

संस्थान में हिन्दी पखवाड़ा 2019 का शुभारंभ एंव प्रतियोगिताओं का आयोजन

हिन्दी पखवाड़े का समापन समारोह दिनांक 27 सितंबर 2019 को माननीय महानिदेशक की अध्यक्षता में सम्पन्न हुआ। इस अवसर पर` कार्यान्वयन समिति के अध्यक्ष श्री विनोद कुमार जी ने माननीय श्री अमित शाह जी, केन्द्रीय मंत्री, गृह मंत्रालय, भारत सरकार का सन्देश सबको पढकर सुनाया। समापन समारोह में प्रतिभागियों ने राष्ट्रीय विकास में हिन्दी का महत्व एवं विश्व परिपेक्ष्य में हिन्दी की प्रगति और जागरूकता पर अपने व्यक्तिगत विचार, कविता पाठ भाषण इत्यादि प्रस्तुत किये। समापन समारोह में महानिदेशक डॉ बी.एन. महापात्र ने सभी को बताया की संस्थान हिन्दी भाषा के प्रचार-प्रसार के लिये निरंतर प्रयत्नशील है। महानिदेशक ने राजभाषा समिति के सदस्यों को संस्थान में हिन्दी भाषा में अधिक कार्यशालायें आयोजन करने के लिये कहा, जिससे अधिक से अधिक कर्मचारी / अधिकारी लाभान्वित हो सकें तथा अधिक से अधिक कार्य हिन्दी भाषा में कर सकें। इसके साथ साथ महानिदेशक ने हिन्दी भाषा के प्रचार-प्रसार के लिये वर्ष भर प्रतियोगिताएं आयोजित करने के लिये कहा जिससे नराकास जे अन्य कर्मचारी / अधिकारी भी भाग ले सकें।

हिन्दी पखवाड़े में आयोजित प्रतियोगिताओं में प्रथम व द्वितीय विजेताओं का एन.सी.बी. स्थापना दिवस के अवसर पर माननीय माननीय श्री सोम प्रकाश, राज्यमंत्री, वाणिज्य एंव उद्योग मंत्रालय, भारत सरकार के करकमलों द्वारा सम्मानित किया गया तथा अन्य प्रतिभागियों को संस्थान में महानिदेशक द्वारा सम्मानित किया गया।

एनसीबी दर्पण के प्रथम अंक का विमोचन

एन.सी.बी. वार्षिक दिवस के कार्यक्रम में संस्थान की प्रथम हिन्दी पत्रिका "एनसीबी दर्पण" का विमोचन माननीय श्री सोम प्रकाश जी, राज्यमंत्री, वाणिज्य एंव उद्योग मंत्रालय, भारत सरकार के करकमलों द्वारा संस्थान के चेयरमैन श्री महेन्द्र सिंघी तथा वाणिज्य एवं उद्योग मंत्रालय के उच्चाधिकारियों की उपस्थिति में किया गया।

हिन्दी कार्यशाला का आयोजन

संस्थान में 2019-20 हिन्दी भाषा के प्रचार-प्रसार एवं अनुपालन हेतु निम्नलिखित कायर्शालाओं का आयोजन किया गया:

1. राजभाषा नीति अनुपालन से सम्बंधित कार्यशाला

   एन.सी.बी. में 15 फरवरी 2019 राजभाषा नीति अनुपालन से सम्बंधित कार्यशाला आयोजित की गई जिसका उद्घाटन महानिदेशक, डॉ बी.एन. महापात्र द्वारा किया गया। संस्थान के अधिकांश अधिकारियों तथ कार्मिकों ने इसमें भाग लिया। इस अवसर पर एन. एच.पी.सी., फरीदाबाद के डॉ राजबीर सिंह, महाप्रबंधक, राजभाषा द्वारा नीति अनुपालन से संबंधित वार्ता प्रस्तुत की गई।

2. कंप्यूटर साधित सॉफ्टवेयर पर कार्यशाला

एन.सी.बी. में हिन्दी में उपलब्ध कंप्यूटर साधित सॉफ्टवेयर व नवीनतम जानकारी विषय पर कार्यशाला दिनांक 03 जुलाई 2019 को आयोजित की गई। इसमें मुख्य अतिथि श्री केवल कृष्ण, सेवानिवृत, राजभाषा गृह मंत्रालय से संबंधित थे। इस कार्यशाला का मुख्य उद्देश्य एन.सी.बी. अधिकारीयों एवं कार्मिकों को हिन्दी में उपलब्ध कंप्यूटर व नवीनतम जानकारी से अवगत करा सकें।

3. राजभाषा नीति का अनुपालन टिप्पणी लेखन पर , कार्यशाला

संस्थान (एन.सी.बी.) में दैनिक कार्यो में हिन्दी के उपयोग में आने वाली कठिनाइयों का समाधान राजभाषा नीति का अनुपालन, टिप्पणी लेखन तथा इससे जुड़ी अन्य जानकारी पर दिनांक 04 जुलाई 2019 को एक कार्यशाला का आयोजन किया गया जिसमे महानिदेशक, डॉ बी एन महापात्र, राजभाषा अध्यक्ष. श्री विनोद कुमार, तथा राजभाषा समिति के सदस्यों तथा अधिकारियों एवं कार्मिकों ने उत्साह के साथ भाग लिया, इसमें मुख्य अतिथि श्री नरेश कुमार, पूर्व उपमहाप्रबंधक, रिज़र्व बैंक ऑफ़ इंडिया से संबंधित थे।

Quami Ekta Week: '*Quami Ekta Week*' was observed during 19-25 November 2019 and National Integration Pledge was administered to the staff as a part of it.

National Unity Day: On the occasion of National Unity Day, NCB remembered the role of Sardar Vallabhbhai Patel in independence and integrity of nation. All NCB officials took pledge towards integrity in work environment and development of nation with DG NCB.

DG NCB alongwith NCB officials taking pledge on National Unity Day

Constitution Day: The 70th Constitution day was observed at NCB where officials read the Preamble to our Constitution and pledged to cherish and preserve the noble principles of Justice, Liberty, Equality and Fraternity, enshrined in our Preamble which have constituted our beloved country in to a Sovereign, Socialist, Secular, Democratic Republic.

NCB officials reading the Preamble and taking Pledge on Constitution Day

Republic Day: During celebration of 71st Republic Day on January 26, 2020 at NCB Ballabgarh unit DG NCB spoke about importance of the day and NCB's diversified role in cement research and construction activities which will lead to nation building.

DG NCB delivering Republic Day Speech

World day for Safety & Health at Work 2019: NCB observed "*The World Day for Safety and Health at Work*", an annual international campaign to promote safe, healthy and decent work, by taking a Safety Pledge. The day is held on 28th April every year and has been observed by the International Labor Organization (*ILO*) since 2003. It raises awareness on how to make work, safe and healthy and of the need to raise the profile of occupational safety and health. It also promotes prevention of occupational accidents and diseases globally. The pledge was administered by Director General-NCB to Head of Centres/Head of Services as well as members of Safety Committee. Furthermore, the pledge was administered by Head of Centres/Head of Services and Team leaders in office and at various sites today in their respective Centers/Services/Units/Laboratories/ Sites.

Director General NCB taking pledge with Head of Centres/Head of Services as well as members of Safety Committee

Yoga day: An interactive yoga session was organized at NCB-Ballabgarh for 5th International Yoga day on 21st June 2019. Renowned socialist Shri Ramkaran Sharma graced the occasion and demonstrated very useful Yoga tips.

DG NCB delivered a motivated speech on the day and emphasized to adopt Yoga as an integral part of daily routine for healthy development of mind, body and soul.

Shri Ramkaran Sharma demonstrating useful Yoga tips on Yoga Day

Swachhata Hi Seva (SHS) 2019 Awareness Campaign at NCB Ballabgarh:

Dr B N Mohapatra, Director General, NCB addressed the employees and workers to highlight the harmful effects of plastics and polythene. He motivated the workers to use cloth bags instead of polythene in their daily life. He encouraged them to spread this message to their family and villages. DG NCB strictly instructed all to stop the purchase and usage of Single-use plastics in NCB campus.

Sh Ashutosh Saxena, Joint Director, NCB briefed all employees and workers about the Hon'ble Prime Minister's call to action for plastic waste management during Hon'ble Prime Minister's Independence Day Speech on 15th August 2019 and the focus of this year's Swachhata Hi Seva 2019 campaign.

SWACHHATA HI SEVA ABHIYAN was observed during 11 September-2 October 2019 and Plastic waste awareness and management campaign was conducted. Cleaning the premises and Green belt development was also taken up.

International Institutional Events

15th ICCC Participation (16-20 September 2019), Prague, Czech Republic

NCB team led by DG NCB, attended 15th International Congress on the Chemistry of Cement (15th ICCC-2019) in September 2019 at Prague, Czech Republic along with Shri Brijesh Singh, Manager- NCB and Shri Puneet Kaura, Deputy Manager-NCB. During the five day conference, Director General-NCB and a Member of the Scientific Committee, 15th ICCC-2019 chaired the Technical Session on Supplementary Cementitious Materials (SCMs). He also presented a technical paper on **"Improving the Reactivity and Quality of Clinker through Enhanced Combustion Kinetics in Kiln Main Burner"**. NCB team also presented four technical posters on:

1. Superiority of Composite Cement over Binary Blended Cement
2. Effect of Chemical and Mineralogical Parameters of Cement on Concrete Workability
3. Study on Alkali Aggregate Reaction and Sulphide Attack on Aged Concrete Large Dams
4. Service Life Design of RC Structures Prone to Carbonation using Accelerated Test Methods

Dr B N Mohapatra, Mr Brijesh Singh and Mr Puneet Kaura with Dr Angel Palomo, Eduardo Torroja Institute for Construction Science, Spain

Dr B N Mohapatra with Martin Schnieder, VDZ, Germany and Dr Sada Sahoo, Solidia Technologies, USA

Dr B N Mohapatra and Mr Brijesh Singh with Dr Lukas Perka, Chairman Organizing Committee, 15th ICCC-2019, Prague

Dr B N Mohapatra and Mr Brijesh Singh with Dr A K Chatterjee, India and Dr Sada Sahoo, Solidia Technologies, USA

Dr B N Mohapatra with Mr Jan Gemrich, Chairman Scientific Committee, 15th ICCC-2019, Prague and Dr Subrato Chowdhury, India

Technical experts and eminent professors from academic institutes, cement and construction industries shared their experiences and current areas of research in the field of cement and construction sector. To meet the requirements of sustainable future, low carbon binders, hybrid binders, digital concrete, improvement in climate performance of cement based binders, geopolymer concrete etc. in the field of cement and construction industry, DG NCB shared with all international experts that NCB has already taken up various activities in line with the issues of cement and construction industries.

National Institutional Events

15th Green Cementech 2019 Conference (30th - 31st May 2019)

DG NCB, attended 15th Green Cementech 2019 conference organized jointly by Confederation of Indian Industry (*CII*) and Cement Manufacturers Association (*CMA*) held at Hyderabad on during 30-31 May 2019. DG NCB was invited to give Special Address in the Inaugural Session. Sh Phillip Mathew-Chairman Green Cementech 2019, Sh M K Singhi, President – CMA, Sh K N Rao, Co-Chairman- Green Cementech 2019, Ms. Aparna Dutt Sharma, Secretary General-CMA, Sh Venkatagiri, Executive Director-CII were present during Inaugural Session. DG highlighted status of cement industry's efforts and NCB R&D activities to "***Make the Indian Cement Plants World Class in Green***".

Director General NCB delivering Special Address at the Inaugural Session

DG NCB was invited for a panel discussion on Sustainability in Cement sector: Challenges and Perspective – Present and Future. The Session was chaired by Mr Sumit Banerjee, Chairman, Editorial Advisory Board, Indian Cement Review and the other panelists were Sh K N Rao, Co-Chairman-Green Cementech 2019 & Director-Energy and Environment, ACC Ltd, Sh Sandeep Srivastava, Sr Vice President-Corp. Sustainability & Environment, Ambuja Cement Ltd. Sh Ashwani Pahuja, Chief Sustainability Officer, DCBL & Sh Sivaram Krishnamoorthy, Operations Officer, International Finance Corporation. As part of panel discussions, various initiatives taken by the cement plants to reduce emissions and develop cement plants sustainable manner were highlighted. DG NCB discussed R&D activities that are in-line with commitment towards sustainable development of cement industry

CMA Conference on "Conserve Green & Sustainable Resources" Conference 30th September 2019 – 01st October 2019

DG NCB participated in the CMA conference "**CONSERVE GREEN & SUSTAINABLE RESOURCES**" held in New Delhi in September 2019 and was panelist in the session on "**Technology and Innovations for Sustainability**".

During the session, DG NCB presented the current status of thermal substitution in Indian cement industry and future potential of waste availability. He also highlighted the challenges faced by cement plants and modifications required for increasing Alternate Fuel utilization. He showcased NCB's contribution towards utilizing alternate raw materials, reducing clinker factor by increasing usage of supplementary cementitious materials and development of new clinker. He also shown the efforts made by cement plants in increasing AF utilization in India.

For the problems faced by cement plants while using AF, DG NCB highlighted the futuristic technologies like gasification of RDF, torrefaction of MSW / biomass, new technology by CEMEX to tackle the problem of chlorine evaporation etc.

Conference on Promoting Awareness & Usage of Iron and Steel Slag: Ushering a New Era 27 August 2019

One- day conference on **"Promoting Awareness & Usage of Iron and Steel Slag: Ushering a New Era"** was organized at FICCI Federation House, New Delhi in August 2019. Dr B N Mohapatra, Director General delivered a talk on ***'Iron & Steel Slag Utilization in Cement and Concrete'*** which was well received by the audience attending the conference.

1st Cement and Concrete Conclave, Satna Cluster 2020 in February 2020

DG – NCB participated in the inauguration of 1st Cement and Concrete Conclave, Satna Cluster 2020 in February 2020 and released the souvenir of the conclave. The conclave was organized by Indian Concrete Institute, UltraTech Cement Ltd. and AKS University. Dr Mohapatra gave a special lecture on the topic **"Superiority of Composite Cement over Binary Blended Cement"** and also participated in the Special Technical Session on **"Satna Smart City and Cement Park".**

Director General NCB delivering special lecture at 1st Cement and Concrete Conclave, Satna Cluster 2020

Highlights of NCB Activities

Interaction with Government Institutes/Organizations

A presentation on the various R&D projects of National Importance undertaken by NCB was held in DPIIT, Delhi on 09th May, 2019. Shri Anil Agrawal, Joint Secretary-DPIIT reviewed the progress and findings of various R & D projects along with DG NCB, Head of Centres, Scientists and Engineers of NCB. The Head of Centres of NCB also presented the various activities of their respective centres.

Joint Secretary, DPIIT reviewing R&D Projects at Udyog Bhawan, New Delhi

DG NCB visited NCB- Bhubaneswar office and testing laboratory during June 2019 and reviewed the infrastructure facilities including establishment of mechanical and physical testing laboratory & progress of third party quality assurance/audit projects in the state of Odisha. Target was set for getting the NABL Accreditation for Cement (Physical Testing), Testing of Aggregates, Bricks, Blocks and Concrete Compressive Strength before March 2020 and getting the approval of BIS for Cement Testing Laboratory after NABL Accreditation.

DG NCB along with NCB-CDR officials interacted with Senior Officials of Odisha State Govt. organisations & apprised them about NCB, its Centres and Services offered to industries. During the interactions with officials, it is found that there is enormous scope for development of NCB- Bhubaneswar to cater to the needs of the industry in the field of cement, concrete and building materials.

Dr B N Mohapatra, DG NCB met with Shri Lalit Das, IPS, MD, OPHWC (Odisha Police Housing Corporation). CMD inquired about various facilities of building materials especially pertaining to green buildings, AAC blocks, paver blocks, arresting the leakages of plumbing installations post construction, water harvesting and solid waste disposal.

NCB team met with Shri Anil Kumar Tripaty, CE (World Bank Projects) Dept. of Roads. CE suggested NCB to submit an offer for providing services of (i) inspection of bridges covering all elements of bridges including small, minor and major bridges under SAR and (ii) inspection of road works like profile correction courses, testing construction of road materials (post construction).

NCB Team Interacting with CMD of Odisha Police Housing Corporation

NCB Team Interacting with CE (World Bank Projects) Dept. of Roads

DG NCB met with Shri Suresh Chandra Mohapatra, IAS, Addl. Chief Secretary, Dept. of Forest & Environment, Odisha. Shri Suresh Chandra Mohapatra suggested NCB to interact with various State Govt. Organizations like Works Deptt., Water Resources Deptt., R&B, Rural Development, Police Housing Corp, Major Infrastructure Development clients like Shipping, National Highways etc. within the state and provide services to such clients in the state.

DG NCB met with Shri Kalyan Charan Mohanty, CGM (SLNA). CGM formally invited NCB senior officials to participate in the upcoming industrial meeting to be held in Bhubaneswar, so that they can use the platform and to interact with various industries.

DG NCB Meeting with Addl. Chief Secretary, Dept. of Forest & Environment, Odisha

DG NCB Meeting with Shri Kalyan Charan Mohanty, CGM (SLNA)

DG NCB briefed Sh Sanjay Singh, IAS, CMD, IDCO about the TPQA services of various IDCO project during the last $3^{1/2}$ years provided to IDCO as per the MoU. Sh Singh expressed his satisfaction to the services offered by NCB.

NCB briefed about the TPQA Services of IDCO Project to the CMD, IDCO

DG NCB met with Shri Mainak Sarkar, Capacity Building Expert (WR). Shri Mainak Sarkar showed interest in the NCB's CCE Training Programmes for the Skill Development Training needs of his department.

DG NCB Meeting with Shri Mainak Sarkar, Capacity Building Expert (WR)

International Assignment Awarded to NCB

A prestigious International assignment was awarded to National Council for Cement and Building Materials by M/s Gulf Nations for Construction Material Company, Kuwait (*Trade name: Baitak Cement*). The assignment included the Inspection and Certification of Equipment supplied by a European OEM and Evaluation of plant operational performance. A team of 3 experts from NCB visited Kuwait from 23rd April 2019 to 05th May 2019 and successfully completed the assignment, meeting the customer's satisfaction.

NCB Team with the Executives of
M/s Gulf Nations for Construction Material Company, Kuwait

MoU with KTPO, Karnataka

NCB signed an agreement with Karnataka Trade Promotion Organization, Benguluru, Karnataka (*KTPO*) in July 2019 for Third Party Quality Assurance Works to be carried out for Construction of Exhibition and Convention hall at KTPO Benguluru. Dr Veeranna S.H, MD-KTPO, Sh Sambasiva Rao K, Manager-KTPO, Sh Venu P R, DGM- NBCC, Sh B S Rao, Group Manager -NCB & Sh Adarsh Kumar NS, Deputy Manager-NCB, were present in the meeting of signing agreement.

NCB-team signing an agreement with Karnataka Trade Promotion Organization, Benguluru, Karnataka (*KTPO*)

Interaction with Officials of Embassy of Switzerland

A team of experts from Swiss Cooperation Office, Embassy of Switzerland in India comprising of Sh Anand Shukla, Senior Thematic Advisor Energy, Mr Bernard Mathieu, HOP3 Consulting (*Belgium*) and Sh Atul Khosla called on DG NCB in August 2019. The team held wide ranging discussions on prospects of Limestone Calcined Clay Cement (*LC3*) in India.

Director General NCB Interacting with a Team of Experts from Swiss Cooperation Office, Embassy of Switzerland

Interaction with Odisha Govt. Officials

DG NCB and team met Shri Suresh Chandra Mohapatra, IAS, DC-cum-ACS & Secretary-Planning & Convergence, Odisha and discussed on expansion of NCB-Bhubaneswar unit and sought his support.

Odisha Integrated Irrigation Project for Climate Resilient Agriculture [*OIIPCRA*] representatives Shri VSS Patro and Shri Mainak Sarkar met senior officials from NCB's CDR highlighting training requirements of their technical group.

The team met Dr B K Das, Chief General Manager (*P&C*), IDCO- Odisha. They discussed on allocation of IDCO buildings for expansion of NCB -Bhubaneswar unit.

The team also met Ms Rashmita Panda, IAS, Director Employment & CEO OSDA, Odisha where they discussed on feasibility of undertaking skill development activities by NCB in Odisha.

DG NCB and Team during Interaction with Senior officials of Odisha State Govt.

INTERACTIONS WITH ACADEMIA

Worldwide, industry and academia share a mutually beneficial relationship. The academia and industry interaction help cope with the high pace of changes these days with the help of new competencies and skills. Academia has a rich blend of creativity and competency whereas the industry is having the potential to execute and commercialize these. This combination substantially leads to meaningful innovation, research and a change which will ultimately benefit the society.

NCB, has also taken steps and ventured in this industry and academia interaction by collaborating with BITS Pilani. Under this collaboration, students are being involved in live R&D and Sponsored projects who in turn add value to the ongoing projects in the organization.

Dr B N Mohapatra, DG NCB along with Shri Kapil Kukreja and Shri Prateek Sharma visited BITS-Pilani, Pilani Campus on 6th February 2020. NCCBM is a well-established Practice School Station (Internship for BITS Students), the purpose of this visit was to explore new avenues for further collaborations in R&D, Implementation of Ph.D Aspirant Scheme for the scientists and Engineers of NCB, Joint conferences, joint courses for working cement industry professionals etc. This collaboration shall help the cement industry and nation to face the upcoming challenges and contribute to the Skill India mission of GoI.

During the visit, NCB team interacted with experienced faculties of Mechanical, Civil and Chemical Engineering department to explore the possibilities of joint research work in the area of CCU, Solar thermal application in cement industry, waste utilization, sustainable manufacturing etc. A short visit of BITS state of the art laboratories facilities and Library was also done.

Visit was concluded with the long and fruitful discussion of NCB team with Dr Souvik Bhattacharyya, Vice Chancellor-BITS-Pilani and Dr Sudhirkumar Barai, Director-Pilani Campus.

NCB Team extended their gratitude towards the support provided by the faculty members of BITS Pilani i.e. Dr S Gurunarayanan, Dr A P Singh, Dr Manish Dave, Dr Manoj Soni, Dr Pratik N Seth, Shri Mahesh Hamirwasia and Dr G Muthukumar.

Director General NCB along with his Team at BITS Pilani

Dr B N Mohapatra, DG NCB, visited BITS Pilani, Hyderabad Campus with NCB team. Discussions were held with Prof. G Sundar, Director, BITS Hyderabad Campus and Civil Engineering department faculty for research collaboration in the areas of cement and concrete. DG NCB also interacted with students on various research activities being carried out by NCB.

Director General NCB along with his Team at BITS Pilani, Hyderabad Campus

Further, NCB has signed a MoU with Manav Rachna University on 2nd September 2019. Manav Rachna University (MRU) is a State Private University (established by Haryana State Legislature Act No. 26 of 2014 & under section 2(f) of UGC Act 1956), MoU covers submission of collaborative research projects, students' trainings, FDPs, availability of instrumentation facilities, laboratory & library facilities and other aspects of capacity building in order to bridge the industry- academia gap.

The MoU was Signed by Dr B N Mohapatra, Director General, NCB and Prof (Dr) I K Bhat, Vice Chancellor, MR

MRU First Year MSc Students Visited NCB Laboratory

Highlights of NCB-Academia Interaction

- More than 40 students have completed their Short term/long term Internship at NCB where they were involved in Live Sponsored & R&D Projects.
- 4 NCB officials are pursuing their PhD studies under the guidance of DG NCB
- BITS Pilani & NCB have undergone a new collaboration where BITS

Pilani extended PhD under Aspirant scheme for NCB scientists and engineers. Under this PhD programme, NCB scientists and engineers may have their supervisor from NCB and Co-supervisor from BITS-Pilani and Research & Development work related to PhD will be carried out at NCB. After completion of research work (Approval of thesis) PhD degree would be awarded by BITS-Pilani.

NCB team led by Director General visited Berhampur University in January 2020 and held discussions with Prof. (Dr) G J Chakrapani, VC and faculty members of Chemistry department of Berhampur University. The interaction focused on activities and services of NCB for Cement, Construction and Building Materials Industries, current research projects carried out, laboratory facilities and training / skill development capabilities of NCB particularly PG Diploma in Cement Technology for MSc (Chemistry) students.

NCB team led by Director General visit Berhampur University & Interacted with Prof. (Dr) G J Chakrapani, VC and faculty members of Chemistry Department

NCB team led by Director General-NCB visited Khallikote Autonomous College in January 2020 where they held discussions with HoD Dr Panchanana Gouda & Professors of Chemistry Department Dr (Ms) Ellarani Pattnaik and Dr Sunasira

Mishra of Khallikote Autonomous College. DG NCB gave a detailed presentation on Waste Utilization in Cement Industry to around 50 MSc (Chemistry) students.

Dr D K Panda-GM, NCB then gave a presentation on Introduction to NCB activities and about PG Diploma course in Cement Technology of NCB. The students interacted with Dr Panda on modalities of admission and other queries on PG Diploma course.

NCB team led by Director General visit Khallikote Autonomous College

Director General NCB giving a detailed presentation on Waste Utilization in Cement Industry to the students of Khallikote Autonomous College

NCB team led by Director General visited Utkal University Vani Vihar in January 2020 where they held discussions with Prof. (Dr) Praful Kumar Sahu and Dr Jaidev Dinda of Chemistry department of Utkal University. DG NCB addressed students on the scope of research on waste utilization in cement industry to around 50 MSc (Chemistry) students. Dr D K Panda then gave a presentation on Introduction to NCB activities and about PG Diploma course in cement technology of NCB.

Director General NCB addressing students of Utkal University Vani Vihar

Dr D K Panda giving presentation to students of Utkal University Vani Vihar

NCB team led by Director General visited IIT Bhubaneswar in January 2020 and held discussions with Dr Ravi Pattnaik, Career Development Cell and Dr P Dinakar of Civil Engineering Department of IIT-Bhubaneswar. DG NCB and Dr D K Panda interacted with M.Sc students on their future plans and prospects of PG Diploma in Cement Technology course at NCB.

NCB team led by Director General visit IIT Bhubaneswar

Director General NCB and Dr D K Panda interacting with M.Sc students of IIT Bhubaneswar

In the ongoing tour of colleges and universities, Director General-NCB and team of NCB officials visited Ravenshaw University, Cuttack in January 2020. The team held discussions with Vice Chancellor Prof. Ishan Kumar Patro, Registrar Sh Ashok Kumar Dash, HoD-Chemistry Department-Dr J P Das and Dr (Ms) S P Das, Professor of Chemistry Department of Ravenshaw University. DG NCB gave an inspiring talk to the young MSc (Chemistry) students on their vision for future. He presented the areas of research for MSc Chemistry students in Cement Industry and the need of competent manpower in cement industry.

Dr D K Panda-GM, NCB gave a detailed presentation on PG Diploma Course in Cement Technology of NCB. The students interacted with Dr Mohapatra and Dr Panda on modalities of admission and other queries on PG Diploma course.

Director General-NCB and team's visit to Ravenshaw University, Cuttack and interacted with Vice Chancellor Prof. Ishan Kumar Patro, Registrar Sh Ashok Kumar Dash, HoD-Chemistry Department-Dr J P Das and Dr (Ms) S P Das, Professor of Chemistry Department of Ravenshaw University

Director General and team of NCB officials visited Sambalpur University in January 2020. At Sambalpur University, NCB team held discussions with Dr Amitabh Mohapatra, HoD-Chemistry Department, Dr Ajay Kumar Behera, Professor-Chemistry Department and Dr Chinmay Purohit, Head-Training & Placement Cell. DG NCB presented on various avenues for research to MSc (Chemistry) students in cement industry and highlighted the research carried out by NCB on waste utilization and sustainability. DG NCB and Dr D K Panda interacted with M.Sc students regarding various aspects of PG Diploma in Cement Technology course of NCB.

Director General and team of NCB officials visit to Sambalpur University

Dr D K Panda interacting with M.Sc students of Sambalpur University

INTERACTIONS WITH INDUSTRY

NCB team led by DG NCB visited cement plants like Vikram Cement works, Udaipur Cement works limited, Aditya Cement works, Birla Cement Ltd., Nuvoco Cement works, Wonder Cement Limited during 3 days visit to cement plants in Chittorgarh (*Rajasthan*) cluster in July 2019. Industry shared their experiences and concerns to DG and asked NCB to come forward for speedy solutions in area of low-grade limestone utilization, increasing thermal substitution rate, development of new clinker & cement standards, increase share of clean and green energy etc. Industry showed their confidence in ongoing research activities at NCB.

With a purpose of sustainable coalition with industry and raw material suppliers, NCB team led by DG NCB, organized an interaction session at Regional Training Centre (*RTC*), Nimbahera in July 2019 with cement plants located in Chittorgarh cluster. Industry showed an overwhelming response with more than 30 nos. participation of dignitaries like Shri S K Rathore, President, J K Cement; Shri S M Joshi, President, Wonder Cement; Shri Ashok Khuntwal, President Vikram Cement, Shri Dinesh Kumar- Vice President, Birla Cement. Industry appreciated the deliberations and discussions that took place during the meeting and expressed confidence in NCB's capability to work in the field of new product development, exploring alternative raw materials/additives with a clean, green and sustainable cement industry growth. NCB thanks Shri N K Vaishnav, In-charge RTC (*N*) for co-organizing the meeting.

DG NCB Interacting with Cement Industry of Chittorgarh Cluster

NCB team led by DG NCB, Dr B N Mohapatra visited cement plants in Satna region, Madhya Pradesh during 25th -26th August 2019. During these two days Prism Johnson cement, Satna Cement Works (M P Birla, Birla Corporation) and KJS Cement, Maihar, Satna were visited. Technical experts from cement industries shared their experiences and concerns and asked NCB to carry out

R&D work on utilization of dolomitic limestone in clinker manufacturing and another issues cement industries are facing.

DG NCB with Cement Industry of Satna Cluster

To meet the requirements of Sustainable Development in the field of cement manufacturing, DG NCB shared with all experts that NCB has already taken up various activities regarding the issues of cement industries.

DG NCB welcomed team of Senior Officials of Oman Cement Company (*SAOG*), Mr Hilal Al-Dhamri, General Manager Manufacturing & Mr Abdulaziz Al-Maqbali, Head of Quality Control Deptt. The team visited NCB Ballabgarh in July 2019 and discussed various on-going projects.

DG NCB with Team of Senior Officials of Oman Cement Company (*SAOG*)

Dr B N Mohapatra, Director General, NCB visited Corporate Office of Ultratech Cement Limited at Ahura Centre, Mumbai discussing with Senior Technical Executives of Cement Research and Development Team and Ready-mix Concrete Team of during his visit between 18th to 20th December 2019. The discussion covered various subjects and was focused on identifying the areas to expand the knowledge sharing platform between the two organizations.

Dr B N Mohapatra, Director General, NCB discussing with Senior Technical Executives of Cement Research and Development Team and Ready-mix Concrete Team of Ultratech Cement Limited at Corporate Office, Ahura Centre, Mumbai

Dr B N Mohapatra, Director General, NCB visited the Ambuja Knowledge Centre and NABL accredited Laboratory during his visit to Mumbai between 18th to 20th December 2019. Dr Mohapatra shared with the Ambuja team various Research & Development activities and Technical projects currently being undertaken in the field of cement and concrete.

Dr B N Mohapatra, Director General, NCB interacting with Ambuja Team

A two member NCB team from Hyderabad visited 6 cement plants in the Nalgonda & Jaggayyapeta cluster of Telangana & Andhra Pradesh respectively to discuss about the various activities carried out at NCB. During the two days programme, NCB team visited cement plants of M/s India Cements Ltd, M/s Bhavya Cements Ltd, M/s Durga Cement Works of Jaypee Cements, M/s NCL Industries, M/s Ultratech Cements Ltd (*Balaji Cement Works*) and M/s Ramco Cements Ltd.

NCB-H Team with Cement Industry of Nalgonda Cluster

NCB team led by Mrs K V Kalyani, JD & Unit In- charge, Hyderabad visited cement plants in Tandur cluster of Telangana & Karnataka to discuss activities being carried out and services offered to the industry. During the programme, NCB team visited M/s Cement Corporation of India, M/s Penna Cement Industries, and M/s Chettinad Cement.

NCB-H Team with Cement Industry of Tandur Cluster

Mr Tenzin, CEO, Penden Cement Authority Ltd, Bhutan, visited NCB Hyderabad unit and held discussions for conducting special group training programs for their executives in 2-3 batches on various topics viz., testing of cement, pyroprocesiresing, environment and concrete related topics. He also visited NCB XRD, XRF, OM, Chemical & Physical testing laboratories.

Mr Tenzin, CEO, Penden Cement Authority Ltd, Bhutan interacting with NCB officials

DG NCB visited Global Cement and Concrete Association (*GCCA*) India's office at Mumbai to discuss on various collaborative projects and studies on cement sector focussing on the long term sustainability with Mr Kaustubh Phadke, General Manager, GCCA and Shri Shashi Gaggar, VP of UltraTech Cement Ltd.

DG NCB with Mr Kaustubh Phadke, General Manager, GCCA and Shri Shashi Gaggar, VP of UltraTech Cement Ltd.

LafageHolcim Innovation Center Team, France comprising of Mr Edelio, Head-R&D; Mr Christophe, Scientific Director and Mr Yatin Joshi, R&D Project Manager alongwith officials of Ambuja Cement Ltd. & The ACC Ltd. visited NCB in December 2019 for interaction with DG NCB and NCB officials about the R&D activities. The team also visited NCB laboratories.

DG NCB interacting with LafageHolcim Innovation Center Team

LafageHolcim Innovation Center Team with DG NCB and NCB officials

NCB organized an interactive meet with representatives of cement industries of Odisha under the stewardship of DG NCB at IDCO Conference Hall, Bhubaneswar in January 2020. The meet was attended by senior officials like Dr B K Das, CGM (*P&C*), Shri Sushant Mohanty, CGM (*Land*) and divisional heads of IDCO; Shri Kalyan Mohanty, CGM-IPICOL; Shri S C Naik, Scientist from Bureau of Indian Standards and scientists from NCB. The interactive meet was also attended by representatives of cement companies like UltraTech Cement, Dalmia Cement (*B*) Ltd., J K Lakshmi Cement, JSW Cement, My Home Industries, Emami Cements, Toshali Cements.

The program started with the opening remarks by Shri Kalyan Mohanty after which DG NCB gave a detailed presentation on the challenges faced by cement industry in terms of availability of raw material, utilization of various industrial wastes like fly ash, steel slag, red mud, phospo-gypsum etc. and NCB's initiatives towards sustainability namely development of Portland Limestone Cement, Portland Composite Cement, High MgO clinker for blended cements, New Clinker Systems & synthetic slag. He also highlighted the technical services, testing and calibration offered by NCB through its units at Ballabgarh, Hyderabad, Ahmedabad and Bhubaneswar to cement and construction sectors. The activities of BIS were highlighted Shri S C Naik in his brief presentation.

Representatives of cement industry exchanged their views and raised issues of raw materials, process, grinding of clinker & quality control they are facing in their cement plants. The above interactive meeting provided a platform to the stakeholders of cement production in Odisha. The meeting was successful and all participants commended the role of NCB in providing technical services for sustainable growth of cement and construction industry and the steps taken for bringing together all cement manufacturing units in the cluster. All participants felt the need for such interactions at regular intervals.

Shri Sushant Mohanty in his closing remarks briefed about the initiatives of the Odisha government in helping the cement companies for setting up of their units in Odisha.

DG NCB interacting with representatives of cement industries of Odisha at IDCO Conference Hall, Bhubaneswar

Shri Sanjay Mathur, Executive President & Head SIG and Shri Shashi Gaggar, Vice President from M/s UltraTech Cement Limited visited NCB-B Laboratories in January 2020 and interacted with senior officials of NCB Centres regarding various collaborative projects and studies.

DG NCB and team of NCB officials with Shri Sanjay Mathur, Executive President & Head SIG and Shri Shashi Gaggar, Vice President,M/s UltraTech Cement Limited

Mr Ali Ali Saeed Al-Najri, Director of Training and Rehabilitation, Amran Cement Plant, Yemen with his team visited NCB Hyderabad unit and held discussions for conducting special group training programs for their executives from Amran, Bajil& Al-Barh Cement Plants on various topics on cement manufacturing.

Mr Ali Ali Saeed Al-Najri, Director of Training and Rehabilitation, Amran Cement Plant, Yemen with his team visited NCB Hyderabad unit

DG-NCB Visited My Home Industries Ltd., Hyderabad along with Mrs K V Kalyani, UIC-NCB Hyderabad, and had interactions with Mr V S Narang, Director – Technical & Mr Chandra Sekhar Pandey, Director – Operations.

NCB team also visited Govt. offices in Chennai (CMDA, Metro, CPWD) to appraise the services being offered by NCB.

EMPLOYEE WELFARE AT NCB

EMPLOYEE WELFARE AT NCB

Internal Complaints Committee

An Internal Complaints Committee was formed under the Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act 2013 where Smt. Vidhu Grover (external member) interacted with the women staff of NCB-Ballabgarh in April 2019.

Training Program on e-Safety for Women

A training program on safety while socializing on the internet was organized by Safety Committee. During training, presentation related to precautions to be taken whilst interacting on internet was given using interactive videos. The presentation educated women about how to be cautious and what precautions one must take whilst chatting, browsing on Facebook, Twitter, Whatsapp, playing online games or posting content on YouTube / Instagram etc.

Workshop on Behavioral Training for Management

Two-day Workshop on Behavioral training conducted in May 2019 at NCB-Ballabgarh for Frontline & Middle Management on Day 1 and Senior & Middle Management on Day 2.

Training Program on Safety from Electrical Hazards

A training program on safety from electrical hazards was organized in July 2019 by Safety Committee of NCB. Before start of the training, DG NCB shared his vision of electrical hazard free workplace with NCB staff and requested all officials to support ETS/Safety Committee by identifying electrical hazards and informing to concerned officials for quick rectification of such hazards. He asked all participants to imbibe the principles of safety not only at workplace but also in their day to day life.

Some important decisions (in principle) like procurement of Energy Management System (EMS), load master, additional manpower for electrical hazards rectification at NCB housing colony as well as premises were taken by NCB Management.

Other Important Activities at NCB

NABL Re-Assessment Audit for ISO: 17043:2010

The re-assessment audit for ISO 17043:2010 conducted by NABL during April 2019. The opening meeting was chaired by Director General-NCB in the presence NABL auditors Shri S Subramanian (Lead Assessor), Dr Laxmi Rawat (Technical Assessor) and Shri D V S Prasad (Technical Assessor) along with Shri P N Ojha, HoC-CQC and ILS team.

Recently, the accreditation renewal assessment of NCB (Testing Laboratories) for transition from ISO/IEC 17025: 2005 to the latest technically revised version ISO/IEC 17025: 2017 was held in April 2019 in the disciplines of Chemical, Mechanical and Non-Destructive testing. Initially, in opening meeting, Dr S K Chaturvedi, Quality Manager, welcomed the audit team & others. In his opening address DG NCB, highlighted the role of NCB towards Industry, Society and Nation, welcomed the auditors and stated that NCB is the first accredited PT provider as per ISO 17043:2010 in India in the areas of cement, concrete and building materials since 2013. He also expressed the importance of the Proficiency Testing (PT) services in system quality improvement and asked the auditors for their suggestions to improve the efficiency of the system. Dr S Bandopadhyay, Lead Assessor introduced his team and briefed the audit plan.

After two days' assessment a closing meeting was held where assessors discussed their audit findings and expressed their overall satisfaction on the entire assessment process of NCB (Testing Laboratories). The assessment team highly appreciated the coordination and team work among highly qualified and technically competent NCB staff.

NCB – CMA Technical Meeting

A meeting was held on 12th April 2019 between officials of cement plants, CMA and NCB officials at NCB-Ballabgarh regarding the carbonation studies in composite cements. NCB highlighted the carbonation studies performed during the study on the composite cement sample of R&D Project (*COB-04*). CMA and plant officials discussed about the need for extensive carbonation studies on clinker samples from different zones of the country and simultaneous experimentation in other cement plants along with NCB.

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

Mission 2: Development of Newer Cements, Composites and Alternate Binding and Building Materials

Mission 3: Development of Newer Processes of Manufacturing Cement and other Binding and Buildings Materials

Mission 4: Raw Mix Design Optimization

Mission 5: Utilization of Industrial and other Wastes for Cement and Building Materials

Mission 6: Development of Newer Refractories

Mission 7: Improved Refractory Engineering Practices

Mission 8: Study of Fundamental Concepts in Material Science and Fundamental Studies Relating to Areas of Fuel Combustion, Pyro-processing, Size Reduction, etc

Mission 9: Independent Testing

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

Mission 1: Compilation and Updating of National Inventory of Cement Grade Limestone Deposits

Mission 2: Identification, Exploration, Evaluation and Assessment of Limestone Deposits and other Cement Raw Materials

Mission 3: Upgradation and Quality Establishment of Limestone (at Quarries) and Mineral Conservation

Mission 4: Application of Remote Sensing Techniques

Mission 5: Advanced Survey Techniques including Geographical Information System (GIS) and Global Positioning System (GPS)

Mission 6: Application of Geophysical Techniques for Mineral Exploration, Ground Water Investigation, etc.

Mission 7: Mine Planning and Scheduling

Mission 8: Improved Machinery Application and Improved Technological Upgradation for Mining Practices

Mission 9: Sustainable Development through Environmental Improvement including Survey of Land and Water Resources.

Mission 10: Pollution Control Technologies for Particulate Gaseous Emissions and Liquid Effluents

Mission 11: Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for Industrial Projects and Mines

Mission 12: Environmental Management System (EMS) and ISO - 14001 Certification for Process Industries

Mission 13: Utilization of Hazardous Wastes as Supplementary Fuel

Mission 14: Monitoring of Environmental Parameters for Water, Ambient Air Quality, Noise and Vibration Studies

Mission 15: Rehabilitation and Reclamation of Mined out Areas

Mission 16: Improving Capacity Utilization and Increasing the Rate of Production in Kilns and Mills towards Improving Total Factor Productivity in Cement Industry through Process Optimization, Diagnostic Studies and Trouble Shooting and Improvement in Operation

Mission 17: Benchmarks, Best Practices, Operational Norms and Technical Audit including Plant Monitoring

Mission 18: Productivity Enhancement Programme (PEP)

Mission 19: Technological Upgradation

Mission 20: Improving Utilization of Coals

Mission 21: Utilization of Alternate Fuels such as Lignite, Natural Gas, Combustible Wastes etc.

Mission 22: Improvements in Fuel Combustion Efficiency

Mission 23: Optimization of Energy (Both Thermal and Electrical) Consumption

Mission 24: Energy Auditing, Management and Monitoring

Mission 25: Waste Heat Utilization including Cogeneration

Mission 26: Creating Awareness and Motivation for Energy Conservation

Mission 27: Total Productive Maintenance (TPM)

Mission 28: Preventive/Predictive Maintenance Programme, Condition Monitoring Techniques and Tribology including Computerised Maintenance

Mission 29: Inventory Control and Spare Parts Management

Mission 30: Risk Analysis and Improving Safety in Cement Plants

Mission 31: Turnkey Consultancy for Setting up Modern Medium and Large Cement Plants from Concept to Commissioning including Fund Sourcing

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

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

Mission 34: Modernization and Technological Upgradation in Cement Plants

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

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

Mission 37: Marketing Strategies and Logistics

Mission 38: Improvements in Packaging of Cement

C. CENTRE – CONSTRUCTION DEVELOPMENT AND RESEARCH (CDR)

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

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

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

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

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

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

Mission 7: Improved Quality Control Procedures for Enhancing Durability

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

Mission 9: Promotion of Ready Mix Concrete Technology in India

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

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

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

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

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

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

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

Mission 17: Improvement in Construction Management Techniques

D. CENTRE – INDUSTRIAL INFORMATION SERVICES (CIS)

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

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

Mission 3: Providing Library Services

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

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

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

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

E. CENTRE – CONTINUING EDUCATION SERVICES (CCE)

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

Mission 2: Improving Technical and Managerial Skills/Knowledge of NCB Officials through Inhouse/ 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 AN 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

R&D Project Programme 2019 – 2020

S.No.	Code	Project Title	Start Date	End Date
PROJECTS UNDER DCCI				
1	COB-09	Development of Reactive Belite Cement Using Low Grade Lime Stone and different dopants	1/4/2017	31/03/2020
2	COB-10	Improving The Performance of Composite Cement By Separate Grinding of Constituents	1/4/2017	31/03/2020
3	WAU-14	Improvement of Fly Ash Quality, Through Chemical / Mineral Doping In Coal During Its Generation In Thermal Power Plant, and Study Its Effects In Cement And Concrete.	1/4/2017	31/03/2022
4	WAU-15	Investigations of Multi Component Blended Cements Using Limestone, Calcined Clay and Other Mineral Additives	1/4/2017	31/03/2020
5	COB-11	Investigation for Standardization of High Magnesia (MgO) Clinker for the Manufacture of Blended Cement such as PPC and PSC	1/4/2019	31/03/2021
6	WAU-16	Development of Portland composite cement based on flyash and limestone	1/4/2019	31/03/2022
PROJECTS UNDER PROJECTS BASED SUPPORT TO AUTONOMOUS INSTITUTION				
1	CON-16	Fresh, hardened and durability performance evaluation of concrete made with Portland Limestone Cement (PLC)	1/4/2019	31/03/2021
2	SOD-09	Effectiveness of Different Repair Systems for Repair of Corrosion Damaged Structures	1/4/2016	31/03/2020
3	CTM-02	Development of Geopolymer Concrete For Application In Pavements and Precast Concrete Construction	1/4/2017	31/03/2020

S.No.	Code	Project Title	Start Date	End Date
4	CON-14	Development of Ultra High Performance Concrete (UHPC)-including use of Nano Technology for UHPC	1/4/2017	31/03/2020
5	CON-15	Enhancing The Utilization of Construction and Demolition Waste and Other Waste Based Aggregates In Concrete Structures and Pavements	1/4/2017	31/03/2020
6	SOD-10	Effect of Supplementary Cementitious Materials (SCM's-Single And Multi Blends) on Service Life of Concrete Structures Including Studies To Improve Green Cements To Meet Durability/Service Life Requirements	1/4/2017	31/03/2020
7	CTM-03	Use of Advanced Electronics in Construction And Condition Assessment of Concrete Structures	1/4/2017	31/12/2020
8	CTM-04	Model low cost housing sustainable technology for Mass EWS & LIG/MIG housing schemes-using precast / prefab systems with emphasis On maximization of waste based materials	1/4/2017	31/03/2020
9	SOD-11	Experimental study on shear and compression design of high strength concrete including effect of fibre on enhanced durability and fire resistance	1/4/2017	30/09/2019
10	CLS-02	Development of calibration methodologies with improved accuracy	1/4/2017	31/03/2020

Appendix – III

Sponsored Projects Completed During the Year 2019-20

National Council for Cement and Building Materials has completed 371 sponsored projects in the year 2018-19. Centre for Cement Research and Independent Testing (CRT) completed 40 nos. of projects, Centre for Centre for Mining, Environment, Plant Engineering & Operation (CME) have completed 43 nos. of sponsored projects, Centre for Construction Development and Research (CDR) have completed 284 nos. of sponsored projects and Centre for Quality Management, Standards and Calibration Services (CQC) have completed 3 nos. of sponsored projects.

Centre for Cement Research and Independent Testing (CRT)

Centre for Cement Research and Independent Testing (CRT) has completed 22 nos. sponsor projects during the year 2019-20, the distribution of 22 number sponsor projects as under: -

Projects Titles	Sponsor
Establishing limestone consumption factor	M/s Maihar Cement, Maihar, (M.P.)
Establishing limestone consumption factor	M/s Maihar Cement, Maihar, (M.P.)
Establishing limestone consumption factor	M/s Prism Johnson Ltd. (Formerly Prism Cement Ltd.)
Investigations on preparation of composite cement	M/s Shriram Cement Works, Kota, Rajasthan
Establishing limestone consumption factor	M/s UltraTech Cement Ltd.
Optimization of Raw Mix Design for manufacture of OPC	Sulthan Qaboos University (SQU), Muscat
Investigation of Raw Mix Burnability and preparation of bulk clinker	M/s Dalmia Cement (Bharat) Ltd, New Delhi
Establishing limestone consumption factor	M/s KJS Cement (I) Ltd., NH-7, Village Amilia, Distt-Satna (M.P.)
Establishing limestone consumption factor	M/s Heidelberg Cement India Ltd, Narsingarh, Damoh, (M.P.)
Sample analysis (limestone, additives, fuel) and raw mix design	M/s Adani Cement Ltd.
Assessment of Quality Control Laboratory and XRF Calibration	M/s Palpa Cement Industries Pvt. Ltd., Lumbini, Nepal
Establishing limestone consumption factor	M/s The India Cements Ltd., Banswara Works, Post- Vajwana, Banswara District, Rajasthan
Establishing limestone consumption factor	M/s ACC Kymore, (M.P.)

Projects Titles	Sponsor
Technical Suitability of Utilization of Gasification Slag in Manufacturing of Cement	M/s Reliance Industries Ltd., Jamnagar, Gujarat.
Petrographic Examination including Complete Chemical Analysis and PSD of Silt samples (from Water and deposited silt) from canal intake and reservoir intake points at IGSTPP-Jharli	IGSTPP-Jharli, Jhajjar, Haryana
Establishing limestone consumption factor	M/s Vikram Cement Works, Neemuch, (M.P.)
Evaluation of burnability of raw mix and testing of limestone samples	M/s RCCPL Pvt. Ltd., Maihar, Satna, (M.P.)
Evaluation of burnability of raw mix and testing of limestone samples	M/s Manikgarh Cement Ltd., Chandrapur, Maharastra
Establishing limestone consumption factor	M/s Birla Corporation Ltd., PO-Birla Vikas, Satna-485005, (M.P.)
Establishing limestone consumption factor	M/s RCCPL Pvt. Ltd. (Formerly Reliance Cement Company Pvt. Ltd), Village-Itahra, P.O-Bharauli, Maihar-485775, Satna, (M.P.)
Evaluation of burnability of raw mix and testing of limestone samples	M/s Prism Johnson Ltd. (Formerly Prism Cement Ltd.) (Cement Division)
Evaluation of burnability of raw mix and testing of limestone samples	M/s Prism Johnson Ltd. (Formerly Prism Cement Ltd.) (Cement Division)

Centre for Mining, Environment, Plant Engineering & Operation (CME)

Centre for Mining, Environment, Plant Engineering & Operation (CME) has completed 17 nos. of sponsor projects in the year 2019-20. Details of projects are given below:

Sponsored Projects Completed during the F.Y. 2019-20:

Project Title	Sponsor
Technical Study of feasibility of used tyres as alternate fuels in preheater and clinkerisation	M/s Oman Cement Company
Feasibility study for pre-processing & co-processing of AF	M/s RCCPL
Process audit of Preheater & Junction point	M/s Sanghi Cements Ltd.
Third party inspection and certification of cement plant	M/s Baitak Cement, Kuwait

Project Title	Sponsor
Comprehensive audit for identifying bottleneck in producing 650 tpd.	M/s Barak Valley Cement Ltd.
Study and suggestions for installation of vibratory screen in crusher	M/s Goldstone Cement Ltd.
CFD study for junction duct	M/s Sanghi Industries Ltd.
Technical Economic Feasibility Report for setting up a blending/grinding unit at Sipat.	National Thermal Power Corporation.
Feasibility study for Co-processing of Alternative Fuel in Rotary Kiln System for	M/s Malabar Cements Ltd. (MCL) Kerala
Mandatory Energy Audit (CPP)	M/s Mangalam Cement Ltd., Morak (Raj)
Plant Energy Audit	M/s J K Cement, Jhajjar (Haryana)
Detailed Plant Energy Audit (Line 1 &2)	M/s Oman Cement Ltd., Sultanate of Oman
Energy audit saving projects implementation (Line -1 &2)	M/s Oman Cement Ltd., Sultanate of Oman
Detailed plant energy audit (Line-3)	M/s Oman Cement Ltd., Sultanate of Oman
Mandatory Energy Audit	M/s Malabar Cement Ltd., Kerala
Monitoring of Point Source Emissions at Parichha Thermal Power Station, Parichha, Jhansi	M/s Parichha Thermal Power Plant, Parichha, Jhansi, (U.P.)
Performance Evaluation of Existing Air Pollution Control Equipment of M/s Calcom Cement, a unit of Dalmia Cement (Bharat) Ltd.	M/s Calcom Cement, a Unit of Dalmia Cement (Bharat) Ltd., Umrangshu

Centre for Construction Development and Research (CDR)

Centre for Construction Development and Research (CDR) has completed 107 nos. sponsored projects during the year 2019-20. Total 29 projects complete under Programme Structural Assessment and Rehabilitation (SAR), 25 projects completed under programme Concrete Technology (CON) & 53 projects completed under programme Construction Technology Management (CTM). The details are given below:

Concrete Technology (CON)

Title	Name of Sponsor	No. of Projects
Evaluation of Materials and Concrete Mix Designs for various structural elements of thermal power plants of NTPC	NTPC Ltd.	10
Studies for Preparation of Specifications and Guidelines for use of Coal based Bottom Ash as Replacement of Fine Aggregate in Concrete	NPTC Ltd. (NETRA)	1
Concrete Mix Proportions M30A20 (2 No's) & M30A10 (2 No's) Grades using mineral admixture (i.e. GGBFS), polypropylene fiber & M. Sand for the repair of pot holes in cement concrete Pavement roads in the area of Manikonda/Puppalaguda/Nekhnampur Villages, of Dept. of Panchayat Raj Engg Dept. Govt. of Telangana, Hyderabad	Panchayat Raj Engineering Dept., Rajendra Nagar, Government of Telangana	1
Evaluation of Rock Samples from Bami and Hurla Quarry for Suitability for use in Concrete	HPPCL	1
Evaluation of ACC Cement Samples for Concrete Testing at NCB-Ballabgarh	ACC Ltd.	1
Evaluation of Materials and Concrete Mix Designs for the Work of EPC Package for Obra 'C' 2x660MW Power Extension Project	Uttar Pradesh Rajya Vidyut Utpadan Nigam Ltd.	1
Evaluation of Materials and Concrete Mix Design to Execute Repair Work in Stilling Basin of Dam with M65/A20 Grade High Performance Concrete	NHPC Ltd.	1
Testing of Microfine Ordinary Portland cement i.e. Alccofine 1106, Alccofine 1108, Alccifine 1108KR and Alccofine 1109SS	COUNTO Microfine Products Pvt. Ltd. Goa	1
Evaluation of Rock Samples from Ashapuri Quarry for Suitability for use in Concrete	NHPC Ltd.	1
Evaluation of Rock Sample for Track Ballast Construction Works Purpose for Source Approval for M/s Larsen & Toubro Ltd.	Larsen and Toubro Ltd.	1
Conducting Concrete Mix Proportions M50A20 Grades (2 No's) of Concrete using with OPC-53 Grade, chemical admixture for civil works of Precast Lining segment for Srisailam Tunnel Project (inlet & outlet)	M/s Jaiprakash Associates Ltd.	1
AAR Test using "Accelerated Mortar bar as per ASTM C1260" on Tunnel Excavated Rock	SJVN Ltd.	1

Title	Name of Sponsor	No. of Projects
for Appurtenant Work (other than Main Structure)		
Performance Evaluation study on Microfibre in PPC as per IS: 1489(1)-2015	M/s Nuvoco Vistas Corp. Ltd.	1
Performance Evaluation of SS Core BP (Bipolar Corrosion Inhibitor Admixture) to be used in concrete	M/s SS Technology, Gurgaon	1
Water Requirement for PPC Chetak, PPC Perfect Plus & OPC 43 Grade Cement to Make M20 Grade Concrete	Birla Corporation Ltd.	1
Carbonation Study of PPC, PSC & CC Cement Samples	My Home Industries Pvt. Ltd.	1
Structural Assessment and Rehabilitation (SAR)		
Condition assessment of various RCC structural elements of various NTPC plants using Non-Destructive Testing (NDT) Techniques	NTPC Ltd., Chhattisgarh	8
Rebound hammer testing, Concrete Core Testing & UPV on RCC structures of PGCIL	Power Grid Corporation of India Ltd.,	6
Condition Assessment of RCC members using Non Destructive Evaluation Technique and Providing repair/restoration measures for Old Emergency Building at Dr. Ram Manohar Lohia Hospital, New Delhi.	Central Public Works Department, New Delhi	1
Core Testing of 10 Nos. of 9 Mtr. PSC Poles & 10 Nos. of 11 Mtr. PSC Poles for BSES	BSES Rajdhani Power Ltd., Delhi	1
Condition Assessment and Recommendation on repair and Restoration/Strengthening measures of RCC structures of Stage-I at Kanti Bijlee Utpadan Nigam Ltd, Bihar	Kanti Bijlee Utpadan Nigam Ltd., Bihar	1
Study for evaluation of Abrasion resistance and bonding strength of cementitious repair product & systems complying with specifications as per EN-1504-3(R4)	NHPC Ltd., Faridabad, Haryana	1
Third Party Quality Assurance for the Work of "Design & Construct SC/ST hostel beneficiaries and associated building for NIEPMD with PRECAST TECHNOLOGY at Muttukadu, Chennai (Tamil Nadu).	Central Public Works Department, Chennai	1
Condition Assessment of 22 Storied (B+G+22) Vikas Minar Building at New Delhi	Delhi Development Authority, New Delhi	1
Ultrasonic Pulse Velocity Testing of RCC Members (Columns, Beams, Slab Panels and	Central Public Works Department, Telangana	1

Title	Name of Sponsor	No. of Projects
Water Tanks) of Boys Hostel (G+2) Building at Kakatiya University, Warangal		
Condition Assessment & Recommendation for the remedial measures to make the basement parking water proof located at Mega Housing behind D-6, Vasant Kunj, New Delhi	DDA, New Delhi	1
Condition Assessment for One Billet (Two Storey load bearing semi-permanent structure) at Air force station, Race-course road, New Delhi.	Central Public Works Department, New Delhi	1
Condition Assessment of RCC Members of (B+G+2) storied and Recommendations for the remedial measures at V.K. Global publication building at Plot Nos. 15/1 Mathura Road Faridabad	V. K. Global Publication Pvt. Ltd., Haryana	1
Preliminary site inspection of RCC Structures of Stage-II at Talcher Super Thermal Power Station	NTPC Ltd.	1
Condition Assessment of RCC buildings (6 Nos.) at GAIL Chhainsa	GAIL (India) Ltd., Faridabad	1
Condition Assessment of fire damaged concrete in Fire Effected floors of Teaching block of AIIMS Building in Delhi	All India Institute of Medical Sciences, New Delhi	1
Condition assessment and recommendations on Remedial Measures of RCC Structure of Over Head Tank (OHT) at Tihar Jail, New Delhi	Public Works Department, New Delhi	1
Investigation of Unit 1 & 2 using NDE testing on RCC Foundation of Generator/Turbine of Dulhasti Power Station, Kishtwar, J & K	NHPC Ltd. J & K	1
Construction Technology and Management (CTM)		
Third Party Quality Assurance/Quality Audit in Construction projects such as Buildings (Residential, commercial, Hospital), roads, bridges, retaining walls, drains, ETP's, multilevel car parkings etc.	Municipal Corporation of Delhi, Delhi	38
Third Party Quality Assurance / Quality Audit for Construction of staff quarters, office buildings, hostels, drainage work, roads and swimming pools.	Odisha Industrial Infrastructure Development Corporation, Odisha	10
Third Party Quality Assurance/Quality Audit in construction of residential buildings, hospitals and hostel blocks	Central Public Works Department	4

Title	Name of Sponsor	No. of Projects
Third Party Field Quality Inspection at random for 800KV Raigarh-Pugalur Transmission lines (SR-I Portion) against Specification No SR-I/C&M/WC-1856-5A/2017-TW 05 Jangoan, Telangana State	Power grid Corporation of India Ltd.	1

Appendix – IV

Research and Development Programme 2019 - 2020: In Progress and New

Sl. No	Project No.	Project title	Date of Commencement	Date of Completion
1.	WAU-17	Investigations on Utilization of Coarse Flyash (200-250 m2/kg) in Cement	April 2020	September 2021
2.	COB-12	Development of new clinker system using industrial by products and low limestone content	April 2020	March 2023
3.	COB-13	Investigations on role of Particle size distribution (PSD) on performance of blended cements and concrete	April 2020	March 2022
4.	WAU-14	Improvement of Fly Ash Quality, Through Chemical / Mineral Doping In Coal During Its Generation In Thermal Power Plant, and Study Its Effects In Cement And Concrete	April 2017	March 2022
5.	COB-11	Investigation for Standardization of High Magnesia (MgO) Clinker for the Manufacture of Blended Cement such as PPC and PSC	April 2019	March 2021
6.	WAU-16	Development of Portland composite cement based on flyash and limestone	April 2019	March 2022
7.	EMG-01	Process design and integration of RDF Gasification in cement manufacturing process	April 2020	March 2022
8.	EMG-02	Solar thermal calcination of phosphogypsum for cement manufacture	April 2020	March 2021
9.	PSD-02	Design and Development of Transfer Chute to Handle Alternate Fuels and Their Mix in Indian Cement Plants	April 2020	March 2022
10.	CON-16	Fresh, Hardened and Durability Performance Evaluation of Concrete made with Portland Limestone Cement (PLC)	April 2019	March 2021

Sl. No	Project No.	Project title	Date of Commencement	Date of Completion
11.	CTM-05	Studies on Mechanical and Durability properties of High Strength Geopolymer Concrete	April 2020	March 2022
12.	CON-17	Study of Carbonation and Carbonation induced reinforcement corrosion in new cementitious system	April 2020	March 2023
13.	SOD-12	Studies on mechanical and time dependent properties of Very High Strength Concrete (100 to 130 MPa) and Ultra High Strength Concrete (130 To 180 MPa)	April 2020	March 2023
14.	CON-18	Utilization of Coarser Flyash (having fineness between 250 m2/kg to 320 m2/kg) in Concrete as a cementitious material	April 2020	March 2021
15.	SAR-01	Cathodic Protection (CP) of RCC structures to enhance service life of new and existing structures using three system (Sacrificial anode, ICCP and hybrid system)	October 2020	March 2023
16.	CTM- 03	Use of Advanced Electronics in Construction and Condition Assessment of Concrete Structures	April 2017	March 2020* * Extended up to Dec.2020

Appendix –V

NCB Patents Granted/ Filed During 2010-2019

Patent Granted:

Sl. No.	Application No.	Title	Name of Inventors
1	248230	A Ceramic Composition for Preparing Scientific Pottery ware and Process of Preparation thereof (Date of Grant: 28-06-2011)	Shri S Raina Dr K Mohan Dr K M Sharma Dr M M Ali Sh S K Chaturvedi Dr D Yadav Sh S K Agarwal
2	251637	A decorative plaster coating (Date of Grant: 27-03-2012)	Shri S Raina Dr K Mohan Dr K M Sharma Dr M M Ali Sh S K Chaturvedi Sh S K Agarwal
3	288839	Decorative tiles utilizing marble dust and a process for preparation there of (Date of Grant: 27-10-2017)	Sh S Raina Dr K Mohan Dr K M Sharma Dr M M Ali Sh S K Chaturvedi Sh S K Agarwal
4	289766	Cement and flyash based aesthetic building bricks tiles utilizing marble dust and a process for preparation thereof (Date of Grant: 21-11-2017)	Sh S Raina Dr K Mohan Dr K M Sharma Dr M M Ali Sh S K Chaturvedi Sh S K Agarwal
5	294833	A process of preparation of ordinary Portland cement (Date of Grant: 23-03-2018)	Sh M Vasudeva Dr M M Ali Dr D Yadav Dr J M Shatma NALCO Officials

Sl. No.	Application No.	Title	Name of Inventors
6	295058	A process for preparation of synthetic slag from low grade limestone and dolomite (Date of Grant: 27-03-2018)	Sh A Pahuja Dr M M Ali Sh P S Sharma Sh S K Chaturvedi Sh S K Agarwal Dr V P Chatterjee Dr D Yadav Sh Tashi Tshering Sh Udai Kaflay
7	314591	Rationalizing formulations and curing conditions for improving properties of hardened Geopolymeric Cement (Date of Grant: 25-06-2019)	Sh Ashwani Pahuja Dr M M Ali Dr R S Gupta Dr S Vanguri Dr V Liju

NCB Patents Filed

Sl.No	Application No.	Title	Name of Inventors
1	2598/DEL/2014	Marble dust as mineral additive in the manufacture of ordinary Portland cement	Shri A Pahuja Dr M M Ali Sh P S Sharma Sh S K Agarwal Sh Ashish Goyal
2	2599/DEL/2014	Mineralizing effect of "barium sludge- an industrial by product" in the manufacture of ordinary Portland cement	Shri A Pahuja Dr M M Ali Dr V P Chatterjee Sh S K Chaturvedi Sh S K Agarwal
3	1195/DEL/2015	Investigations on the use of limestone mine reject on the properties of OPC clinker and resultant cement	Sh Ashwani Pahuja Dr M M Ali Dr V P Chatterjee Sh S K Chaturvedi Sh S K Agarwal
4	1194/DEL/2015	Process for the Preparation of sulphoaluminate - belite cement utilizing high magnesia / dolomitic limestone	Sh Ashwani Pahuja Dr M M Ali Sh P S Sharma Dr V P Chatterjee

Sl.No	Application No.	Title	Name of Inventors
5	1196/DEL/2015	Nanosilica blended ordinary Portland cement compositions with improved performance characteristics and a process thereof	Sh Ashwani Pahuja Dr M M Ali Dr S Harsh Sh Suresh Vanguri Dr Varsha Liju
6	1964/DEL/2015	Method for rapid estimation of Na_2O and K_2O in different types of cement and raw materials	Sh Ashwani Pahuja Dr M M Ali Sh S K Chaturvedi Sh S C Sharma
7	201611029136	Fast process for determining expected 28-day compressive strength of concrete made with Portland Pozzolana Cement (PPC)	Sh V V Arora Sh Suresh Kumar Sh Manish Kumar Mandre
8	201711000524	A process for preparing tiles	Sh Ashwani Pahuja Dr S K Chaturvedi Dr S Harsh Dr R S Gupta Sh S Vanguri Dr V Liju Dr MNK Prasad Bolisetty
9	201811047884	Geopolymer concrete paving block and a preparation thereof	Sh V V Arora Sh Amit Trivedi Sh Lalit Yadav
10	201911049295	Composition of PPC and PSC using High Magnesia (MgO) clinker	Dr B N Mohapatra Dr S K Chaturvedi Sh G J Naidu Sh Giasuddin Ahemad

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

34 Km Stone, Delhi-Matura Raod (NH-2), Ballabgarh-121 004, Haryana India