PRE FEASIBILITY PROJECT REPORT

for

EXPANSION OF CEMENT PLANT FROM 100 TPD TO 250 TPD

at

211, 212 and 213-B, INDUSTRIAL ESTATE, SICOP, KATHUA
JAMMU AND KASHMIR

By

GANPATI CEMENTS
211, 212 and 213-B, INDUSTRIAL ESTATE, SICOP, KATHUA
JAMMU AND KASHMIR
SUMMARY

1.0 M/s Ganpati Cements is a partnership firm having two partners namely (1) Sh. Rajesh Bajaj S/o Sh. Sat Pal Bajaj and (2) Sh. Raghu Bajaj S/o Madan Gopal Bajaj. The firm is involved in the production of cement and is currently operating a cement plant of around 100 TPD capacity located at SICOP Industrial Estate, Kathua, District Kathua, Jammu & Kashmir.

2.0 Ganpati Cements, is planning to expand its existing cement plant capacity from 100 TPD capacity to 250 TPD at the existing location at 212, 213-B, SICOP, Industrial Estate, Kathua (Jammu and Kashmir). The industry would install a new Vertical Shaft Kiln (VSK) for the proposed expansion.

3.0 The estimated cost of expansion of the said project of cement plant from 100 TPD to 250 TPD would be around 2.14 Crores. The industry would be operative for 330 days a year and function two 8 hour shifts per day.

4.0 The industry would manufacture various grades of cement including OPC (Ordinary Portland Cement), PPC (Portland Pozzolona cement) and masonary cement conforming to BIS standards. The quantity of the desired product would depend on the market demand.

5.0 The promoters of the project are having their existing unit in 7.5 Kanals of land at SICOP, Industrial Area, Kathua (Jammu and Kashmir). The land is enough for the proposed expansion. However the promoters are in process of acquiring additional 4 Kanals of adjoining land for raw material and final product storage purposes.

6.0 Kathua district is one of 22 administrative districts that comprise the state of Jammu and Kashmir under Indian rule. It is situated at 32° 17' to 32° 55' North Latitude and 75° 70' to 76° 16’ East longitude. It is surrounded by Jammu to the northwest, the Doda and Udhampur districts to the north, the state of Himachal Pradesh to the east, Punjab to the south, and Pakistan's working boundary to the west. Its terrain is diverse, consisting of rich agricultural areas along the Punjab/Kashmir border, plains sweeping eastward to the foothills of the Himalaya, and a mountainous Pahari region in the east.

7.0 The industry would be using "wet" method for the production of clinker in their process. In the wet method, water is added to the raw materials after milling to promote thorough mixing, and the mixture is added to the kiln as slurry, containing 30-40% water. The different process steps involved in the production of cement are;

a) Crushing of limestone
b) Pre-homogenization  
c) Grinding of raw materials  
d) Homogenization  
e) Pyroprocessing  
f) Coal grinding system  
g) Clinker formation  
h) Cement grinding  
i) Cements storage, packing & dispatch

8.0 The raw material required by the industry is limestone, are pet coke, clay, iron dust and gypsum and fly ash. All the raw material required are available within state and if the need be can be imported from other states in abundance.

9.0 To control the fugitive emissions from various process steps in the industry, bag house filters would be installed.
CHAPTER – 1
INTRODUCTION

M/s Ganpati Cements is a partnership firm having two partners namely (1) Sh. Rajesh Bajaj S/o Sh. Sat Pal Bajaj and (2) Sh. Raghu Bajaj S/o Madan Gopal Bajaj. The firm is involved in the production of cement and is currently operating a cement plant of around 100 TPD capacity located at SICOP Industrial Estate, Kathua, District Kathua, Jammu & Kashmir.

The industry is registered with the office of General Manager, District Industries Centre, Kathua vide reg. no. 07/05/04282/PMTSSI dated 27/03/2004 for the manufacturing of Cement and Clinker. The existing unit is operating on Vertical Shaft Kiln technology for the production of Clinker. The industry has been set up on leased land measuring 7.5 Kanals. The promoters of the project have made good access in the market. The products of the company are in high demand and conforms to BIS standards. Due to the promotional ability of the promoters the unit has been doing great especially in the last three years.

Based on the past experience of the partners of the company, the company is now planning to expand its existing cement plant capacity from 100 TPD to 250 TPD by setting up another Vertical Shaft Kiln and other required machinery within the existing premises located at SICOP Industrial Estate, Kathua, District Kathua, Jammu & Kashmir. The industry has acquired another 4 kanals of land adjoining the existing site. After expansion, the industry would be producing OPC/PPC/Masonary cement as per market demand of each category.

In the State of J & K, the consumption of cement is much more than the production and the cement has to be transported from faraway places outside the state to meet the gap in the demand and supply of the cement. Apart from the demand of cement for industries, housing and other construction activities, Central/State Govt. has undertaken major and minor irrigation and hydel projects which require large quantity of cement for their completion. The project thus enjoys an almost assured market.
CHAPTER – 2

PROJECT LOCATION

Ganpati Cements, an existing cement plant at 212, 213-B, SICOP, Industrial Estate, Kathua (Jammu and Kashmir), are planning to expand its existing cement plant capacity from 100 TPD to 250 TPD capacity. The industry is already having a VSK (Vertical Shaft Kiln) for the production of clinker in the existing plant. The industry plans to add another VSK (Vertical Shaft Kiln) in the existing premises for the proposed expansion. The Industry will be operational for 330 days in a year. The total land area available to the industry after expansion would be 11.5 Kanals, including the existing 7.5 Kanals.

2.1 About the State: Jammu and Kashmir is a state in northern India. It is located mostly in the Himalayan mountains, and shares a border with the states of Himachal Pradesh and Punjab to the south. Jammu and Kashmir has an international border with China in the north and east, and the Line of Control separates it from the Pakistani-controlled territories of Azad Kashmir and Gilgit–Baltistan in the west and northwest respectively.

Jammu and Kashmir consists of three regions: Jammu, the Kashmir Valley and Ladakh. Srinagar is the summer capital, and Jammu is the winter capital. The Kashmir valley is famous for its beautiful mountainous landscape, and Jammu’s numerous shrines attract tens of thousands of Hindu pilgrims every year. Ladakh, also known as "Little Tibet", is renowned for its remote mountain beauty and Buddhist culture.

Jammu and Kashmir’s economy is predominantly dependent on agriculture and allied activities. The Kashmir valley is known for its sericulture and cold-water fisheries. Wood from Kashmir is used to make high-quality cricket bats, popularly known as Kashmir Willow. Kashmiri saffron is very famous and brings the state a handsome amount of foreign exchange. Agricultural exports from Jammu and Kashmir include apples, barley, cherries, corn, millet, oranges, rice, peaches, pears, saffron, sorghum, vegetables, and wheat, while manufactured exports include handicrafts, rugs, and shawls. Horticulture plays a vital role in the economic development of the state. With an annual turnover of over ₹3 billion (US$45 million), apart from foreign exchange of over ₹800 million (US$12 million), this sector is the next biggest source of income in the state’s economy. The region of Kashmir is known for its horticulture industry and is the wealthiest region in the state. Horticultural produce from the state includes apples, apricots, cherries, pears, plums, almonds and walnuts.
2.2 ABOUT THE DISTRICT

2.2.1 Topography

Kathua district is one of 22 administrative districts that comprise the state of Jammu and Kashmir under Indian rule. It is situated at 32° 17' to 32° 55' North Latitude and 75° 70' to 76° 16' East longitude. It is surrounded by Jammu to the northwest, the Doda and Udhampur districts to the north, the state of Himachal Pradesh to the east, Punjab to the south, and Pakistan's working boundary to the west. Its terrain is diverse, consisting of rich agricultural areas along the Punjab/Kashmir border, plains sweeping eastward to the foothills of the Himalaya, and a mountainous Pahari region in the east.

Kathua district is divided into 8 blocks: Bani, Barnoti, Basholi, Billawar, Duggan, Ghagwal, Hiranagar, Kathua and Lohai Malhar. It has approximately 512 villages. The traditional language of Kathua is Dogri. The Pahari languages are prevalent in the mountainous area of the east. The principal media of education are English, Hindi, and Urdu. In a Muslim majority state, Kathua, like the Jammu district, is overwhelmingly Hindu. Total Population is 6.15 Lacs (Census of India 2001), Hinduism practiced by 91%, Muslims 7% and Sikhs 2%.
Kathua District is located about 88 Kms. from Jammu, 390 Kms from Srinagar and about 500 Kms. from Delhi and 25 Kms from Pathankot. Kathua District is connected to Jammu, Srinagar, Pathankot, Delhi through National Highway NH-1A. Regular Bus Service is available for Jammu, Srinagar, Udhampur, Katra, Delhi, Pathankote, Chandigarh, Shimla and all other major cities of Punjab, Himachal Paradesh, Haryana, Delhi, UP, Rajasthan.
2.2.2 Demography: Kathua District is spread over an area of 2651 Sq. Kms constituting 1.9 percent of the total area of the State. The District has a population of over 6,16,435 comprising 3,26,109 males and 2,90,326 females as per 2011 census. The density of population of the district has gone upto 246 persons per square km. Sex ratio is 890 females per 1000 male. Literacy rate in Kathua district is 73.09 %. The literacy percentage in case of males is 81.53 % and in case of females is 63.72 % (Census 2011). As regards to the main ethnic groups, Hindus constitutes 91% of the district while Muslims form 7% and Sikhs 2 %. SC Population is 22.83%.Out of total population of the district, 28.82% are main workers, 14.58% marginal workers while 56.60% are non-workers. Among the main workers, cultivators and agricultural laborers accounted for 60.74% and 5.67 % respectively which indicates that dependence on agricultural is of much more significance than any other sector/ occupation.

2.2.3 Rainfall and Climate: The areas falling in Kathua district experiences wide range of climate from sub-tropical to temperate area and even alpine in higher regions of Bani and Lohai-Malhar blocks. Because of altitudinal varities, there is vast difference between the temperature of two plain thesils of Kathua and Hiranagar with those of Hilly Tehsils of Basohli and Billawar. The Summer temperature rises as high as 48 °Celsius in the plains and Winter temperature in the upper hilly areas touches sub-zero. Most of the higher areas in the basohli and billawartehsils experiences snowfalls for most part of the year. The district experiences rainfall during winter and early summer primarily from western disturbances and monsoon rains from second week of July onwards. The hilly areas receive more rains than the plains. The annual rainfall in the district is approx. 1672 mm.

2.2.5 Agriculture and Land Classification: The district has a total land area of 2.65 lacs Ha as per revenue records. Out of this 0.45 lacs Ha is for agricultural use, 0.36 lacs Ha constitutes barren land and uncultivable land excluding fallow land, 0.12 lacs Ha accounts for cultivable waste, 0.13 lacs Ha is under misc. trees, 0.10 lacs Ha forms permanent pastures, 0.01 lacs Ha is fallow land other than current fallows, 0.14 lacs is the area under current fallows and 0.61 Ha is net area sown. The total cropped area of the district during 1999-2000 was 1.24 lacs Ha of which 0.63 lacs Ha represents the area sown more than once.

Land Holding
According to the agricultural census of 1991-92, the district had 69508 number of land holding of different sizes. Out of these 60.15% were of below one Ha and only 39.85% were of the sizes of one ha and above which indicates that large number of land holding are very small.
Cropping pattern

Major crops of the district are Paddy, Maize and Wheat. Wheat and Paddy constitutes the staple food in plain tehsils like Kathua and Hiranagar whereas maize for hilly tehsils such as Basohli and Billawar. Wheat being the main crop in whole of the district had covered 50 thousands Ha of area followed by paddy grown over an area of 36 thousand ha and rest 38 thousand ha were covered under maize, millets, oil seeds, pulses and vegetable crop during 1999-2000.

2.2.6 Industries: Kathua is coming as an advent infrastructure provider for the existing as well as prospective industries. In the last few years, there has been a significant increase in the industrial establishments in the district.

SICOP (State Industrial Co-operation), on the outskirts of Kathua, is a well-developed industrial estate, includes the Nirmal Industries, Chenab Textile Mill (CTM). This venture of Birla Group, established in the 1970s, contributed greatly to the development of today's Kathua. In addition to CTM, there are several other factories, manufacturing cement, iron, and other products. There is a unit Celine Health Care Pvt. Ltd. that is involved in the manufacturing of cosmetic products. In 2011, a new milestone, JAKSON entered in Jammu & Kashmir with the two units for manufacturing Generating Sets at SICOP, IID Centre, Kathua. In 2012 M/s. J and K Integrated Textile Park Limited (JKITPL) entered in Kathua with the manufacturing HUB of Textiles and its products/auxiliaries in approx. 10,00,000 sq. ft. area with an investment of Rs. 50 crores in infrastructure and Rs.150 Crores in Plant & Machinery. JKITPL is a project approved by Ministry of Textiles, Govt. of India and is a private project categorized as Prestigious project.
### KATHUA DISTRICT AT A GLANCE

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Total Geographical Area of the district</td>
<td>2502 sq. km.</td>
</tr>
<tr>
<td>4.</td>
<td>Total population of the district</td>
<td>6,16,435</td>
</tr>
<tr>
<td>5.</td>
<td>Sex ratio (female : male)</td>
<td>890 : 1000</td>
</tr>
<tr>
<td>6.</td>
<td>Literacy Ratio</td>
<td>73.09 %</td>
</tr>
<tr>
<td>8.</td>
<td>Administrative setup</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of Sub-Division</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Number of Tehsils</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Number of CD &amp; NES Blocks</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Number of Police Station</td>
<td>8</td>
</tr>
<tr>
<td>10.</td>
<td>Total Number of villages</td>
<td>512</td>
</tr>
<tr>
<td></td>
<td>Total cultivable area</td>
<td>45000 hectares</td>
</tr>
<tr>
<td></td>
<td>Barren and uncultivable land</td>
<td>36000 hectares</td>
</tr>
<tr>
<td></td>
<td>Net area sown</td>
<td>61000 hectares</td>
</tr>
</tbody>
</table>

#### 2.3 SELECTION OF SITE

The basic criteria for the selection of site for a cement plant project are as below:

- Raw material availability
- Raw material cost
- Transportation cost
- Accessibility to markets within and nearby states
- Market for final Product

Advantages of the location at SICOP Industrial area for the expansion of existing cement plant project from 100 TPD to 250 TPD production.

1. **Fiscal Incentives by the State Govt.**
   
   Industries are considered as essential tool for the development of economy as they successfully process the existing resource base, utilize local skill and also provide ample job opportunities to the local unemployed youth. Thus, in view of the major
significance of industrial development, J & K Govt. is making all efforts by providing adequate infrastructure and incentives which is evident from the rail project that is likely to connect Kashmir valley with Jammu region. Further, the state Govt. is also providing necessary industrial infrastructure viz. industrial estates and growth center, and providing incentive to industries.

The incentives provided to industries in the state of J & K are;

1. Income tax holidays
2. Excise duty refund
3. Freight subsidy
4. Toll Tax Exemption
5. 100% subsidy on DG Sets and testing equipment
6. Capital investment Subsidy
7. 3% Interest Subsidy on working capital

The unit will be eligible for Capital Investment Subsidy on the fixed assets and other incentives i.e. 100% subsidy on D.G. Set, Laboratory and Testing equipment and 3 % Interest Subsidy on working capital limit etc. as per the Industrial Policy of the State Government. The unit shall also be eligible for refund of excise duty.

Apart from above, industrial plots are provided on subsidized basis in the industrial estates and power tariffs are cheap in comparison to other states. CST and VAT do not exist in the State. Now, Govt. is planning to provide additional facilities to those industrialists who intend to establish their industrial units in rural and far off areas where raw material is available. All the above factors have been the key factors to attract all type of entrepreneurs to invest in industries pertaining to different sectors including in cement industries of mineral sectors as they substantially decrease the cost of production of items. Constantly, industries have been set up over the last 5 to 6 years in different sectors including in cement industries.

2. Raw material availability

The unit would be requiring Limestone, Coal/Petcoke, Clay, flyash and Gypsum etc. for the manufacture of Portland cement confirming to BIS Specifications. The limestone of quality required in the manufacture of cement is easily available from Banihal, district
Ramban and Khrew, district Pulwama. Coal of requisite quality is available from Kalakote in Jammu and Kashmir and Coal Mines at Bihar and West Bengal. The calcined clay is available from local and adjoining areas. The other raw material viz. gypsum, is easily available from within the state. The Pet Coke is available from Reliance Industries, Jamnagar as well as from IOC refinery at Panipat. Necessary provision for Pollution control equipment has been made in the Project Report. Flyash is available to the industry from various thermal power plants of Punjab.

3. **Demand for the Product**

In the State of J & K, the consumption of cement is much more than the production and the cement has to be transported from faraway places outside the state to meet the gap in the demand and supply of the cement. Apart from the demand of cement for industries, housing and other construction activities, Central/State Govt. has undertaken major and minor irrigation and hydel projects which require large quantity of cement for their completion. The project thus enjoys an almost assured market.
CHAPTER – 3

PROCESS DESCRIPTION

3.0 M/s Ganpati Cements, an existing cement plant located at 212, 213-B, SICOP, Industrial Estate, Kathua (Jammu and Kashmir), are planning to expand its existing cement production capacity from 100 TPD to 250 TPD. The industry is already having a VSK (Vertical Shaft Kiln) for the production of clinker in the existing plant. The industry plans to add another VSK (Vertical Shaft Kiln) in the existing premises for the proposed expansion.

3.1 Manufacturing Process

There are two different types of process methods, referred to as "wet" and "dry" for the production of clinker. The essential difference between the two types is the medium used to mix the powdered raw materials prior to heating, and the consequent degree of moisture in the materials entering the kiln. In the wet method, water is added to the raw materials after milling to promote thorough mixing, and the mixture is added to the kiln as slurry, containing 30-40% water. In the dry method, the powders are generally blended in a silo using compressed air. Ganpati Cements would use the 'wet method' for the production of clinker. The different process steps involved in the production of cement are:

a) Crushing of limestone
b) Pre-homogenization
c) Grinding of raw materials
d) Homogenization
e) Pyroprocessing
f) Coal grinding system
g) Clinker formation
h) Cement grinding
i) Cements storage, packing & dispatch

Figure 1 shows the schematic flow diagram of the process operations.

3.1.1 Crushing of Limestone

The big boulders obtained from the mines would be crushed into crushers. The crushing would be carried out in double stage by using primary crusher and secondary crusher. Jaw crushers would be employed for the reduction of size of limestone boulders to a suitable feed size.
acceptable to the different types of grinding machines installed in the plant. The crushed limestone would be transported to plant stockpile with the help of belt conveyor/ropeway.

3.1.2 Prehomogenisation

The crushed limestone would be transported to stacker reclaimer site with the help of belt conveyor/ropeways installed at plant site. The crushed limestone would be pre-blended with the help of stacker and reclaimer systems. The crushed limestone travelling on the belt conveyors would be stacked in layers with the help of stacker machine, which moves to and fro along the side of stacking yard. The stacked materials would be then cut in slices with the help of a reclaiming machine which mixes the layers of stacked limestone thereby reducing the variation in quality of limestone as compared to the large variations obtained in the limestone obtained from mines.

3.1.3 Grinding of raw materials

The pre-blended limestone from stack pile would be transported to raw mill hoppers. Raw mill hoppers would be provided with continuous weighing machines known as weigh feeders in order to produce a suitable raw meal proportioned appropriately for production of desired good quality of cement clinker. Vertical Roller Mill and Tube Mill Grinding machines would be used for production of pulverized raw meal.

3.1.4 Homogenization

The raw meal ground in the raw mill would be thoroughly blended and water would be sprayed for homogenization. The moisture content of raw meal powder would be less than 40%. The properly blended raw meal would now be ready for burning the same to produce cement clinker in the cement kiln.

3.1.5 Pyro processing

The modern pyro processing system comprises of three important sections namely preheating, clinkerisation and cooling. The preheating section is a tall column and comprises of battery of cyclones arranged one over the other in series. The clinkerisation reaction is carried out in a vertical shaft kiln. The industry would install an additional vertical shaft kiln for increasing the production of clinker to cater the requirements of 250 MT/day of cement production.

The kilns are a long cylindrical shell provided with refractory bricks from inside which prevents
the heat loss from the kiln and protects the steel shell from any damage due to persistent high temperature maintained inside the kiln. The vertical shaft kiln is a cylindrical vessel mounted vertically and the raw meal is fed from the top of the kiln. The properly blended raw meal would be lifted mechanically by bucket elevator from the bottom of raw meal blending to the top of the preheater, and fed at the top stage of cyclone inlet duct with the help of screw conveyor and rotary air lock. Raw meal weigh-feeders are installed for continuous weighment of raw meal for feeding the same to preheater at a constant rate.

3.1.6 Clinker formation

Conversion of raw meal into cement clinker is accomplished in steps within the various zones of kiln circuit. The pulverized fuel (about 35-40% of total fuel to be fed to kiln system) is pushed into the burning zone of VSK through a specially designed burner pipe along with the carrier air known as primary air. The high temperature persisting in burning zone makes the fine coal to burn near the tip of burner pipe and helps in flame propagation.

The combustion gases generated from burning of pulverized coal in clinkerisation zone of the kiln flow towards the inlet of PH fan under the influence of the induced draft created in the kiln circuit. While flowing from burning zone towards the inlet of fan after passing through Kiln, the high temperature combustion gas transfer its heat to the finally derived raw meal which is fed to the inlet duct of 1st stage twin cyclone and falls towards the bottom end of preheater after passing through all stages of cyclones under the influence of hot gases flowing in the circuit. The final clinkerisation of raw meal would be achieved between the temperature range of 1250-1450°C depending upon the raw meal characteristics. The high temperature clinker nodules varying in size would then fall out of the kiln and enter the cooler.

The modern grate coolers would be provided with fixed and moving grate plates. Below the grate would be provided number of air chambers which receive atmospheric cold air with the help of number of high pressure discharge fans in different compartments. The pressurized air flows through the holes provided in the grate plates and cools the clinker which would be travelling in the form of granules on the grate plates. The clinker would be cooled down to a temperature of 100-150°C while leaving the outlet end of the cooler. The cold clinker would be crushed continuously in a suitable clinker crusher provided at the outlet end of the cooler before the same is discharged on the clinker transportation system for transporting the same to clinker storage Silo stock/Pile.
3.1.7 Coal grinding system
The coal obtained in the form of lump containing up to 10% moisture. The coal would be grounded to suitable fineness in closed circuit tube mills. The cooler exhaust/ part of preheater gases would be used for driving away the moisture from coal while grinding the same in the air swept tube mills.

3.1.8 Cement grinding
In order to achieve the objectives of energy conservation, the clinker produced in kiln would be usually stored for few days before it is ground in cement grinding mills along with appropriate quantity of gypsum and other additive materials for production of finely pulverized cement with desired fineness. The ball mills along with roller press would be used for clinker grinding in cement plant.

3.1.9 Cements storage, packing & dispatch
The pulverized different types of cements would be stored in different silos installed with different capacities. Depending upon the market requirements the cement would be loaded in bulk or packed in 50 KG bags with the help of conventional rotary packages or electronic packages, loaded onto trucks and finally dispatched to the required destinations.
MANUFACTURING PROCESS OF CEMENT
3.2 Technical Know-How

The manufacture of clinker based on vertical shaft kiln technology is already established in the country and a number of units are already manufacturing cement based on vertical shaft kiln based technology in the country and also in the J & K state. In addition, the supplier of main items of plant and machinery would also provide services for erection and commission of plant at reasonable charges. The supplier of main items of plant and machinery is reported to have supplied the said technology to number of units in the country and they are reported to be doing well. The cement plant based on vertical shaft kiln technology can be operated by person without high level of formal technical qualification. The general skills of operating the kiln could be imparted with in the period of few months to operators. The services of machinery supplier are available for installation of the unit. Moreover the company is planning to appoint a consultant who will be expert in the line. In view of the above the unit shall not face any major constraints in implementing and successfully commissioning of the plant for manufacture of Portland cement.

3.3 Utilities

The various utility and auxiliary requirements for the cement manufacturing process will include;

a) Storage of raw materials
b) Lubricant Oils
c) Electrical sub-station
d) D.G. Sets
e) Manpower

3.3.1 Storage of raw materials

The industry is having their existing plant in an area of 7.5 Kanals. The industry has acquired another 4 Kanals of extra land adjoining to the existing land for the storage of raw materials. The industry would construct covered sheds for the proper storage of raw materials.
3.3.2 Lubricants and oils

The requirements will include hydraulic oil (for hydraulic operations), lubricant oils (for machinery, in-house vehicles and DG sets), transformer oils (for transformers in electrical sub-station), and coolant oil.

The hydraulic oil will be used in closed loop and needs to be rejected (to account for loss of its desirable properties) periodically. The rejection, and hence, make-up, requirement will be about 500litre/year.

The overall waste lube oil generation will be about 1000 litre/year.

3.3.3 Electrical sub-station

The total electrical power requirement will be about 1500 KW after the proposed expansion. The industry is already in possession of sanctioned power load of 600 KW. The promoters of the industry would approach the concerned authorities of the Power Department (after acquiring necessary permissions) for the proposed expansion. It is proposed that a 2000 KW distribution transformer shall be installed as a replacement of existing which is of smaller capacity.

3.3.4 DG sets

The industry has existing DG sets as a back-up to state electricity supply. The DG sets are operated on FO/LDO. To supplement the additional requirements for the capacity expansion, the industry would increase its DG sets capacity to 1000 KVA. The D G sets would be housed in acoustic enclosures and would comply with the CPCB norms.

3.3.5 Manpower

The existing industry engages a total strength of 30 to 40 persons in the plant. After the substantial expansion the manpower requirement would increase to 50 to 60 persons. Local manpower would be engaged from around the area.
CHAPTER – 4

RAW MATERIALS

4.0 M/s Ganpati Cements, an existing cement plant located at SICOP, Industrial Estate, Kathua (Jammu and Kashmir), are planning to expand their existing cement production capacity from 100 TPD to 250 TPD. The industry is already having a VSK (Vertical Shaft Kiln) for the production of clinker in the existing plant. The industry plans to add another VSK (Vertical Shaft Kiln) in the existing premises for the proposed expansion. The Industry will be operational for around 330 days in a year.

4.1 Raw Materials for cement plant

Lime Stone – Limestone is the main raw material for the production of cement. It should have the following chemical composition/specifications (as per NCBM) for its use in the cement industry.

<table>
<thead>
<tr>
<th>Oxide components</th>
<th>Acceptable range</th>
<th>Limiting value for blending</th>
</tr>
</thead>
<tbody>
<tr>
<td>CaO</td>
<td>44 - 52</td>
<td>40</td>
</tr>
<tr>
<td>MgO</td>
<td>3.5</td>
<td>5</td>
</tr>
<tr>
<td>SiO₂</td>
<td>To satisfy LSF &amp; S. Min. raw mix.</td>
<td></td>
</tr>
<tr>
<td>Al₂O₃</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fe₂O₃</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The industry would be buying its limestone and gypsum from within the state only. Limestone deposits are available in the districts of Anantnag, Baramulla, Kathua, Udhampur, Doda and Pulwama. Similarly, gypsum is available in both the regions of the State. Cement industries are set up in the regions where high deposits of limestone exists. In case of Jammu and Kashmir state, higher qualitative grade deposits of limestone and gypsum are also the incentives available for setting up of cement industries which substantially decrease the cost of production. Cost of cement manufacturing at factory gate is one of the lowest in the region. Apart from lime stone and gypsum, flyash is also required by the cement plant which would be made available by the thermal power station located outside the state. Setting up of large number of cement plants is necessary in the state to manufacture cost effective cement for the creation of necessary infrastructure such as roads, railway tracks, bridges, over bridges, hydel projects, housing and hotels constructions to accommodate large number of tourists, airports etc. Quality and cost effective cement on the one hand will encourage per capita consumption of cement and on the other hand would discourage large quantity of import of cement from the
other parts of the country.

**Other raw materials** - The other raw materials required by the unit are pet coke, clay, iron dust and gypsum. The requirement of various components of raw material per ton of clinker is computed after selecting modules for lime, silica and aluminum. The general composition factor would be more or less as follows:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Raw Material</th>
<th>Consumption ration per ton of cement</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Limestone</td>
<td>1.224</td>
<td>72%</td>
</tr>
<tr>
<td>2.</td>
<td>Clay</td>
<td>0.255</td>
<td>15%</td>
</tr>
<tr>
<td>3.</td>
<td>Coal/pet coke</td>
<td>0.204</td>
<td>12%</td>
</tr>
<tr>
<td>4.</td>
<td>Iron ore/dust</td>
<td>0.017</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1.700</td>
<td>100%</td>
</tr>
</tbody>
</table>

Coal of requisite quality is available for Kalakote in Jammu and Kashmir and Coal Mines at Bihar and West Bengal. The calcinated clay is available for local and adjoining areas. Iron ore/dust is available from Uri and Rambari mines and steel Re-Rolling Mills at Jammu and outside the state. The other raw material viz gypsum, is easily available locally from J & K Minerals Ltd, a State Corporation. The pet coke is available from Reliance Industries, Jamnagar as well as IOC, Panipat. The consumable stores and packing material i.e. HDPE bags, are easily available from Jammu and Delhi Markets. As such, the unit is not likely to face any difficulty regarding availability of raw materials and packing materials of required quantity at maximum capacity utilization.
Based on the above information the daily raw material consumption by the industry in the existing plant as well as for future expansion would be as follows:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Item</th>
<th>Unit</th>
<th>Existing (100 TPD)</th>
<th>Proposed (150 TPD)</th>
<th>Total (250 TPD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Limestone</td>
<td>MT</td>
<td>123</td>
<td>187</td>
<td>310</td>
</tr>
<tr>
<td>2.</td>
<td>Clay</td>
<td>MT</td>
<td>26</td>
<td>38</td>
<td>64</td>
</tr>
<tr>
<td>3.</td>
<td>Coal/pet coke</td>
<td>MT</td>
<td>20</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>4.</td>
<td>Iron ore/dust</td>
<td>MT</td>
<td>1.7</td>
<td>2.5</td>
<td>4.2</td>
</tr>
<tr>
<td>5.</td>
<td>Gypsum @ 3%</td>
<td>MT</td>
<td>3</td>
<td>4.5</td>
<td>7.5</td>
</tr>
</tbody>
</table>
CHAPTER – 5

PRODUCTION

5.0 M/s Ganpati Cements, an existing cement plant located at SICOP, Industrial Estate, Kathua (Jammu and Kashmir), are planning to expand their existing cement production capacity from 100 TPD to 250 TPD. The industry is already having a VSK (Vertical Shaft Kiln) for the production of clinker in the existing plant. The industry plans to add another VSK (Vertical Shaft Kiln) in the existing premises for the proposed expansion. The Industry will be operational for around 330 days in a year.

5.1 Production from Cement Plant

The industry would be manufacturing different grades of cement conforming to various BIS standards. It would include OPC (Ordinary Portland Cement), PCC (Portland Pozzolana Cement), and masonary cement as per the demand of the market. The basic steps of manufacturing are same with some constituent changes in the final product. The basic raw material for manufacturing cement is clinker which would also be manufactured indigenously by the unit only.

Phase wise daily production cement in the existing and proposed expansion will be;

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Item (OPC/PPC/Masonry)</th>
<th>Unit</th>
<th>Existing Capacity</th>
<th>Proposed Additional Capacity</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Cement</td>
<td>TPD</td>
<td>100</td>
<td>150</td>
<td>250</td>
</tr>
</tbody>
</table>
CHAPTER – 6
ENvironmental management and pollution control

6.0 Ganpati Cements, an existing cement plant at SICOP, Industrial Estate, Kathua (Jammu and Kashmir), are planning to expand its existing cement plant capacity from 100 TPD capacity to 250 TPD. The industry has already installed a VSK (Vertical Shaft Kiln) for the existing plant and plans to add another hence replicating the same technology for the expansion. The Industry will be operational for around 330 days in a year.

During the operation of the Cement plant, environmental pollution would be generated from different sources. The industry would adopt the latest technologies for the abatement of pollution generated by the production process.

6.1 Sources and nature of pollution

6.1.1 Water pollution

The industrial unit will use wet technology for the production of cement. Due to this, the water consumption in the plant would be for clinker production and for dust suppression. No waste water would be generated from the process and dust suppression systems. Total fresh water requirement for process and dust suppression would be a maximum of 100 m³/day.

To support drinking, cooking, sanitary, etc. requirements of the workers, industry will need a maximum of 10 m³/day of fresh water, which will contribute to about 8 m³/day of domestic sewage.

The average wastewater characteristics will be: BOD – 200-250 mg/l, COD – 450-500 mg/l, TSS – 300-400 mg/l, TKN (as N) – 30-35 mg/l, and total phosphorus (as P) – 10-12 mg/l.

6.3 Air Pollution Generation

The potential air pollution sources in the cement manufacturing process are:

a) Crusher section

b) Raw mill section

c) Kiln section

d) Cement mill section

e) Packing section
6.3.1 **Crusher Section**

Fugitive dust emissions in the crushing section would occur at 3 stages - firstly during feeding, secondly during crushing and thirdly during free fall on belt conveyor. The magnitude of dust generation would depend on the hardness, moisture content and feed size of limestone. During feeding, the dust would be emitted due to movement of material and friction of the material resulting in breaking or loosening of particles, thereby the fines getting air borne. During crushing, breaking of lumps would result in generation of newer fines. During discharge of the material over belt conveyor, dust would get air borne due to free fall of material through a height.

During transfer operation involving free fall of material from a higher to a lower level, emissions would be generated. In addition, some fresh fine dust would also be generated as a result of breaking of lumps due to impact during the free fall and by breaking due to movement/conveying of material.

As per the statutory norms (as applicable to the industry), the flue gas emission shall not have SPM levels (in the stack) exceeding 50 mg/Nm³. Additionally, the stack height requirements for discharge of emissions will need to be complied with.

6.3.2 **Raw mill section**

In the raw mill section, the emissions generates from handling and crushing of coal and handling of other raw materials.

The coal unloading operation would be intermittent and would generate substantial quantity of fugitive emissions. The emissions would last for a short duration of a minute or two during each unloading, but in terms of quantity of the emissions, it would be substantial. Similarly, substantial fugitive emissions would be generated during the coal crushing operation. The degrees of emissions would depend on hardness, moisture content and size of feed. The shape and arrangement of breaker plates & the circumferential velocity of rotor would also play a major role. Low velocity would result in coarse product. With higher velocity, the size reduction energy would be greater and the material would be broken into correspondingly smaller fragments resulting in substantial fugitive emissions. The emissions would also occur during feeding of coal into crusher and at the crusher discharge location. Besides that, substantial fugitive emissions would be generated from the coal stockpile during wind currents. The degrees of emissions would depend upon moisture content, fines present in the coal.

In case of gypsum, due to high percentage of fines, substantial fugitive dust emission would
occur, especially during loading and unloading operation. The movement of the pay loader and truck over the gypsum floor would lead to fugitive emissions. Fines would also get air borne due to wind. During summer season, the wind carryover from open stockpiles would lead to substantial fugitive emissions.

Handling and storage of additives would give rise to substantial fugitive emissions if the material is dry. The emission would occur primarily due to operations like loading and unloading, movement of pay loaders and due to wind currents, carrying away fines from the stockpiles.

6.3.3 Kiln Section

The following descriptions of emissions refer to modern kiln plants based on dry process technology.

Carbon dioxide - During the clinker burning process CO\textsubscript{2} would be emitted. CO\textsubscript{2} would account for the main share of these gases. CO\textsubscript{2} emissions would be both raw material related and energy related. Raw material related emissions would be produced during limestone decarbonation (CaCO\textsubscript{3}) and would account for about 60 % of total CO\textsubscript{2} emissions.

Nitrogen oxides (NO\textsubscript{x}) - The clinker burning process would be a high-temperature process resulting in the formation of nitrogen oxides (NO\textsubscript{x}). The amount formed would directly relate to the main flame temperature (typically 1850 - 2000 °C). Nitrogen monoxide (NO) would account for about 95 % and nitrogen dioxide (NO\textsubscript{2}) for about 5 % in the exhaust gas of rotary kiln. Most of the NO would be converted to NO\textsubscript{2} in the atmosphere.

Sulfur dioxide (SO\textsubscript{2}) - Sulfur would be an input into the clinker burning process via raw materials and fuels. Depending on their origin, the raw materials may contain sulfur bound as sulfide or sulfate. Higher SO\textsubscript{2} emissions by rotary kiln systems in the cement industry are often attributable to the sulfides contained in the raw material, which become oxidized to form SO\textsubscript{2} at the temperatures between 370 °C and 420 °C prevailing in the kiln pre-heater. The sulfur input with the fuels would be completely converted to SO\textsubscript{2} during combustion in the rotary kiln. In the pre-heater and the kiln, this SO\textsubscript{2} would react to form alkali sulfates, which are bound in the clinker.

6.3.4 Cement mill section

Clinker Transfer Point - The fine dust associated/adhered with clinker gets loose and would get air borne due to free fall from certain height during transfer operation. As the clinker is dry in nature and the quantity of fines is substantial so significant fugitive emissions would occur at
Silo Vents - As only dry and finely ground material would be stored in silos it has the great potential to generate fugitive emissions. The emission would escape through silo vents or any other leakages. At times if some of the filter bags are torn, substantial emission occurs from the bag house chimney also. Emission also occurs from the bottom end of the silo during retrieval operation, through leakages if any.

6.3.5 Packing Section

As cement contains substantial quantity of fines below 10 micron and it is in dry condition, any leakage or spillage leads to fugitive emission. During conveying of the cement bags emissions would be generated. As the cement bags are manually loaded in trucks during which bags are dropped from a height which causes emissions.

6.4 Solid Wastes Generation

The industry would not generate any solid wastes as whole of the process rejects solid wastes would be reused for the production of cement.

6.5 Hazardous Waste Generation

Hazardous waste will include used/spent oils and lubricants [classifiable under Category 5.1 of Schedule – I of Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008] – ~1000 litre/year.

The used oils will be in metallic drums inside a lined and covered room and will be, ultimately, sold to the authorized recyclers.

Appropriate record of the hazardous waste shall be maintained as per Form 3 specified in of Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008. The industry shall submit annual return of the hazardous waste, before June 30 of every year, in Form 4 specified in of Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008.

6.6 Air Pollution Control

6.6.1 The Pollution Control System

The manufacturing process consists of a number of operations (refer art. 2.2). Following factors may play big role in preventing or minimising losses, problems and hazards, and improving
all the dust emission sources should be properly enclosed and all work areas should be
properly ventilated (exhaust ventilation of at least 50-100 ACH for work areas – depending
on conditions)
b) The emissions from the clinker formation unit should be recuperated with combustion air
supply to effect energy efficiency in combustion systems
c) The solid wastes generated should be reused in the process as raw material
d) The potential areas oil leaks (onto ground) should be epoxy painted
e) Material handling and movement paths to be properly identified and marked
f) All efforts should be made to avoid direct human contact with any material
g) Appropriate provision of personal protective equipment for skin, eye and respiratory
protection
h) The emission sources should be interlocked with the flue gas cleaning system.

6.6.2 Fugitive Emission Control

Lime Stone Crushing Operation - Dust generated during crushing operation would be
captured with dust extraction cum pulse jet bag filter type control system. The dust collected in
bag filter would be returned at immediate down stream location. At this point, an extraction
would be provided to suck the air borne fines back to bag filter.

For the purpose of dust suppression, water would be sprayed through nozzles during
unloading. Remote sensor based on/off switch arrangement for water sprays would be
installed. The sprays would get operational only during unloading operation and would stop as
the dumper moves away. The spray nozzles would be placed above the unloading hopper at a
height so that the spray covers the hopper cross section. A regular maintenance schedule
would be employed for cleaning and replacement of the nozzles.

Coal Crushing Operation - Bag filter type control system would be adopted for capturing the
dust emissions. The collected dust would be recycled on conveyor belt.

Coal Transfer Points (Primary Crusher to Stacker/stockpiles) - Bag filter type control
system would be adopted for capturing the dust emissions. The collected dust would be
recycled on conveyor belt.

Coal Stacker &Reclaimer - To control emissions, generally a set of water spray nozzles are
provided over the conveyor belt in the stacker feed point.
**Gypsum Handling and Storage** – Gypsum storage would be provided in enclosed storage area. Gypsum being highly hygroscopic in nature, water would not be spread for dust suppression purposes else it would form lumps which further needs to be broken and therefore dust suppression measure would not be practiced. The dry extraction cum bag filter type system would be adopted for controlling the emissions.

**Clinker Transfer Point (Clinker Cooler to Clinker Stock Piles)** - The industrial unit will have dry type dust extraction cum bag filter systems installed for transfer points. Due to longer distances between transfer points, separate bag filters would be installed for each transfer point. Pulsejet type bag filter would be employed. From all these bag filters the collected fine dust would be recycled into the system at an immediate downstream location.

**Packing Section** - Natural ventilation would be provided for dust dispersion in shop-floor. Conveyor belts would be fitted with rubber flaps and brushes for continuous surface cleaning of cement bags. The packer machines would be provided with dust extraction cum bag filter arrangement.

**Silo Vents** - All the silo vents would be provided with bag filters.

### Details of air pollution control system to be provided for the control of emissions

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Section</th>
<th>Type of APCD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Limestone crushing section</td>
<td>Pulse jet type bag house filter</td>
</tr>
<tr>
<td>2.</td>
<td>Coal crushing section</td>
<td>Pulse jet type bag house filter</td>
</tr>
<tr>
<td>3.</td>
<td>Coal transfer section</td>
<td>Pulse jet type bag house filter</td>
</tr>
<tr>
<td>4.</td>
<td>Kiln section (vertical shaft kiln)</td>
<td>Pulse jet type bag house filter</td>
</tr>
<tr>
<td>5.</td>
<td>Clinker transport section</td>
<td>Pulse jet type bag house filter</td>
</tr>
<tr>
<td>6.</td>
<td>Cement Mill Section</td>
<td>Pulse jet type bag house filter</td>
</tr>
<tr>
<td>7.</td>
<td>Cement Blending Section</td>
<td>Pulse jet type bag house filter</td>
</tr>
<tr>
<td>8.</td>
<td>Packing Section</td>
<td>Pulse jet type bag house filter</td>
</tr>
</tbody>
</table>

**6.6.3 Flue gas cleaning from vertical shaft kiln**

The air pollution control system, for the combustion emissions from Vertical kiln furnace, will comprise of the following:

a) ducting arrangement to transport emissions to the APCD,
b) an APCD – Bag House Filter for each of the VSK

c) an ID fan, and

d) a stack to discharge the cleaned flue gas at adequate height.

The vertical shaft kiln furnace emissions will be conveyed into the APCD, the bag house filter, where it will get cleaned (removal of SPM) before being discharged into the atmosphere, through a stack of adequate height.

6.7 Water Pollution

6.7.1 Wastewater treatment and disposal

The industry would generate only domestic effluent from its industrial premises. The quantity of domestic effluent generation would be around 8 m³/day. The average wastewater characteristics will be : BOD – 200-250 mg/l, COD – 450-500 mg/l, TSS – 300-400 mg/l, TKN (as N) – 30-35 mg/l, and total phosphorus (as P) – 10-12 mg/l. The wastewater would be treated in a septic tank before its utilisation on land for irrigation purposes.

Septic tank

The septic tank will provide and effective HRT of at least 48 hours, for maximum daily flow, to biologically stabilize, partially, the organic pollution load. A two compartment septic tank will be used for the purpose. The stabilisation compartment (first compartment) will have volumetric capacity of 20 m³/day, with aspect ratio (length:width) of at least 3. Floor slope at 1:5 will be provided for sludge accumulation. The effective submerged depth of tank will not exceed 2.5 m. Provision will be made for periodic withdrawal (pumping out) of accumulated sludge. The actual tank dimensions will be worked out to suit the process and site requirements.

Disposal of treated wastewater

The industrial unit will generate a maximum of 8 m³/day of wastewater from the proposed project. The treated wastewater will be used for watering/irrigation of the green area (horticulture and plantation) within the project site. Besides this, SICOP sewer is also present in the Industrial Estate for the disposal of the wastewater.
CHAPTER – 7

PROJECT ESTIMATES

ESTIMATED OVERALL PROJECT INVESTMENT

The estimated cost of project for the expansion of the cement plant from 100 TPD to 250 TPD would be as below:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description</th>
<th>Amount (Rs. in Lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Land and Site Development</td>
<td>14.00</td>
</tr>
<tr>
<td>2</td>
<td>Building and Civil Works</td>
<td>20.00</td>
</tr>
<tr>
<td>3</td>
<td>Plant and Machinery</td>
<td>104.49</td>
</tr>
<tr>
<td>4</td>
<td>Misc. Fixed Assets</td>
<td>69.38</td>
</tr>
<tr>
<td>5</td>
<td>Contingencies</td>
<td>6.22</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL PROJECT COST</strong></td>
<td><strong>214.09</strong></td>
</tr>
</tbody>
</table>