ENVIRONMENTAL IMPACT ASSESSMENT
FOR
EXPANSION OF INTEGRATED CEMENT PLANT FROM 3.6 TO 7.2
MTPA CLINKER AND 5.0 TO 10.0 MTPA CEMENT BY
INSTALLATION OF LINE-II
AT
VILLAGES BHARAULI AND ITAHARA, TEHSIL MAIHAR,
DISTRICT SATNA, MADHYA PRADESH

EXECUTIVE SUMMARY

Project Proponent:

M/s. RELIANCE CEMENT COMPANY PRIVATE LIMITED

EIA Consultant:

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1.0 Project Description

1.1 Introduction

Reliance Cement Company Private Limited (RCC) is a constituent of the Reliance – Anil Dhirubhai Ambani Group (ADAG), which has planned to set up Cement Plants in the various parts of the country preferably near Group’s own Power Plants for the sourcing of fly ash.

RCC has cement plant with production capacity of 3.6 MTPA clinker and 5.0 MTPA cement and 75 MW CPP under phase-I (Maihar Line-I) at Bharauli and Itahara villages, Maihar tehsil, Satna district, Madhya Pradesh. On the basis of market demand, RCC is planning to enhance the existing cement plant capacity of 3.6 MTPA to 7.2 MTPA clinker and 5.0 MTPA to 10.0 MTPA cement plant by installing one additional Line-II 3.6 MTPA clinker and 5.0 MTPA cement within the existing plant premises. Total project cost is estimated to be Rs. 1663 crores.

The proposed project can be classified as 3 (b) type activity under the category ‘A’ as per EIA notification dated 14th September 2006.

1.2 Environmental Setting

The study area map of 10 km radius around the proposed site is given in Figure-1. The environmental setting of the proposed expansion is as follows:

- The proposed expansion of cement plant falls at the intersection of Latitude 24°09’27.5"N - 24°10’48.6"N and Longitude 80°41’21.2"E - 80°42’7.0"E and at an elevation of about 340 - 350 m above Mean Sea Level (MSL).

- The proposed expansion of cement plant is located at about 15 km (aerial) from Maihar in NE direction. Tamas river is flowing at a distance of 0.6 km in SSE from the project site.

- There are no ecological sensitive locations, archaeological monuments, places of tourist interests and defence installations within 10 km radius.

- One reserved forest and one protected forest blocks exists within 15 km radius. Nearest hill is situated at a distance of 1.0 km in S from the project site.

- Nearest major town from the plant is Maihar and city is Satna which is located at about 35.0 km in N.

- Nearest village from the plant is Bharauli is located at about 0.1 km in SW direction.

- Nearest railways station from the plant is Bhadanpur at about 1.5 km in W direction.

- Proposed plant site does not fall in any critically polluted areas as per the CPCB/MoEF circular dated January 2010.
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FIGURE-1
STUDY AREA MAP (10 KM RADIUS)
2.0 PROCESS DESCRIPTION AND SOURCES OF POLLUTION

2.1 Process Description

The plant is operated on dry basis, which offers more advantages, particularly in fuel consumption. The proposed plant comprises of rotary kiln, preheater and precalciner.

Cement manufacturing principally involves grinding and blending of raw materials in a definite proportion - a material containing calcium oxide (such as limestone, chalk, marl) with a siliceous material (such as clay, shale, sand) along with certain additive or corrective materials (such as laterite) and then calcining the mixture at high temperatures in a kiln. The resulting ‘clinker’ is cooled and then ground with gypsum to produce the finished product, Ordinary Portland Cement (OPC). Gypsum is added to control the setting time of cement. Portland Pozzolona Cement (PPC) is manufactured by adding approximately 30% fly ash to clinker and gypsum during the grinding operation.

2.2 Infrastructural Facilities and Raw Material Requirement

* Land Requirement

The total area acquired for the cement plant is about 166 Ha out of which the proposed expansion will be set up in an area of 16 Ha. No additional area is required for the proposed expansion.

* Raw Material Requirement

The major raw material requirement for proposed expansion will be limestone, laterite, coal, gypsum and flyash. The details of raw materials requirement, the source and mode of transportation are provided in Table-1.

**TABLE-1**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Raw Material</th>
<th>Quantity (TPD)</th>
<th>Source</th>
<th>Distance (km) &amp; Mode of Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Line I</td>
<td>Proposed Line II</td>
<td>Total</td>
</tr>
<tr>
<td>1.</td>
<td>Limestone</td>
<td>5.4</td>
<td>5.4</td>
<td>10.8</td>
</tr>
<tr>
<td>2.</td>
<td>Fly ash</td>
<td>1.75</td>
<td>1.75</td>
<td>3.5</td>
</tr>
<tr>
<td>3.</td>
<td>Coal</td>
<td>0.6</td>
<td>0.6</td>
<td>1.2</td>
</tr>
<tr>
<td>4.</td>
<td>Gypsum</td>
<td>0.25</td>
<td>0.25</td>
<td>0.5</td>
</tr>
<tr>
<td>5.</td>
<td>Laterite</td>
<td>0.07</td>
<td>0.07</td>
<td>0.14</td>
</tr>
</tbody>
</table>
• **Water Requirement**

The total fresh water requirement for the proposed plant expansion is about 1350 m³/day which will be met from underground.

• **Manpower**

The manpower required for the proposed project will be about 100 including skilled and unskilled workers.

• **Township**

A full-fledged township developed for existing plant will be utilized for accommodating the staff of proposed expansion of cement plant. Other amenities such as school, community center, hospital, shopping complex, post office, bank etc are well established in the surrounding areas.

2.3 **Sources of Pollution and Control**

2.3.1 **Source Emissions and Fugitive Emissions**

The major sources of pollution are particulate matter from cement plant. For kiln, cement mill, coal mill, bag house will be installed to control particulate matter emission to less than 50 mg/Nm³ and in case of clinker cooler, ESP of >99.9% efficiency will be installed to limit the particulate matter emission to 50 mg/Nm³.

2.3.2 **Wastewater Generation and Treatment**

As the proposed cement plant will be operated on the dry process and air is used as cooling media, no wastewater will be generated. Additional domestic waste water generated due to expansion of the project will also be treated in the existing Sewage Treatment Plant (STP) and used in greenbelt development.

2.3.3 **Solid Waste Generation and Utilization**

No solid waste is generated in the cement manufacturing process. Dust collected from air pollution control equipment will be 100% recycled in process. Solid waste in the form of sludge will be generated from the sewage treatment plant and same will be used as manure for greenbelt development.

2.3.4 **Noise Levels**

The noise generation from various equipments of the proposed plant (Cement Plant) will not exceed 90 dB(A). All the equipment will be designed to comply with the Factories Rules and Stipulations.

3.0 **BASELINE ENVIRONMENTAL STATUS**

Primary baseline environmental monitoring studies were conducted during winter season of 2012-2013 and details are as follows:
• **Soil Environment**

A total of 8 samples within the study area were collected and analyzed. It has been observed that the texture of soil is mostly clay in the study area. It has been observed that the pH of the soil quality ranged from 7.6 to 8.1 indicating that the soil is moderately alkaline in nature. The electrical conductivity was observed to be in the range of 195 to 329 µS/cm. Available potassium was observed to be in the range of 98.3 to 161.6 kg/ha. The nitrogen values range between as 26.1 to 39.2 kg/ha and the phosphorus values observed in sampling locations varies between 39.7 to 69.6 kg/ha.

• **Meteorological Data Generated at Site**

The meteorological parameters were recorded on hourly basis during the study period near proposed plant site and comprises of parameters like wind speed, wind direction (from 0 to 360 degrees), temperature, relative humidity, atmospheric pressure and rainfall. The summary of meteorological data generated at site is presented in following Table-2. The predominant wind directions during study period are northwest.

<table>
<thead>
<tr>
<th>TABLE-2</th>
<th>METEOROLOGICAL DATA GENERATED AT SITE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Month</td>
<td>Temperature (°C)</td>
</tr>
<tr>
<td>Winter season</td>
<td></td>
</tr>
<tr>
<td>December 2012</td>
<td>27.3</td>
</tr>
<tr>
<td>January 2013</td>
<td>28.1</td>
</tr>
<tr>
<td>February 2013</td>
<td>30.2</td>
</tr>
<tr>
<td>Range</td>
<td>9.9 - 30.2</td>
</tr>
</tbody>
</table>

• **Air Quality**

The study area represents mostly rural/residential environment. Eight ambient air quality monitoring stations were selected in and around project site and studies were carried out as per CPCB standards. The summary of ambient air quality data generated during monitoring period is given in Table-3. Ambient air quality analysis reveals that these results are well within limits in all locations as per National Ambient Air Quality standards 2009.

<table>
<thead>
<tr>
<th>TABLE-3</th>
<th>SUMMARY OF AMBIENT AIR QUALITY RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sr. No</td>
<td>Parameters</td>
</tr>
<tr>
<td>1</td>
<td>Particulate Matter (PM₁₀)</td>
</tr>
<tr>
<td>2</td>
<td>Particulate Matter (PM₂.₅)</td>
</tr>
<tr>
<td>3</td>
<td>Sulphur Dioxide (SO₂)</td>
</tr>
<tr>
<td>4</td>
<td>Nitrogen Dioxide (NOx)</td>
</tr>
<tr>
<td>5</td>
<td>Carbon Monoxide (CO)</td>
</tr>
</tbody>
</table>
• **Water Quality**

Water samples were collected from eleven sampling locations. These samples were taken as grab samples and were analyzed for various parameters to compare with the standards.

➤ *Ground Water Quality*

The pH of the water samples collected ranges between 7.2 to 7.7. The conductivity recorded in between 395 – 672 µS/cm in the sample. Calcium and Magnesium concentrations ranged from 30.2 – 45.5 mg/l and 13.4 – 25.3 mg/l respectively. Range of Chlorides and Sulphates concentrations at all the locations 28.4 - 156.4 mg/l and 12.2 – 29.8 mg/l respectively. Similarly, Nitrates are also found to be ranging between 2.3 – 13.4 mg/l.

➤ *Surface Water Quality*

The pH of the water samples collected was observed to be in the range of 7.4 to 7.9. The conductivity was found to be 367 to 458 µS/cm. Based on the above results it is evident that all of the parameters in surface water fairly meet the desirable standard limits of IS: 10500.

• **Noise Level Survey**

The noise monitoring has been conducted for determination of noise levels at eight locations in the study area. Noise monitoring results reveal ambient noise levels in all locations are well within the limits as per Ambient Noise standards.

• **Flora and Fauna Studies**

A preliminary survey was made for determination of baseline details of flora. During field survey, maximum 234 plant species were recorded from the study area which includes floral vegetation, exotic plants, medicinal plants climbers and grasses. The vegetation present in the study area is of dry deciduous type. The study area did not record the presence of any critically threatened species. The records of Botanical Survey of India and Forest department also did not indicate presence of any endangered and or vulnerable species in this area. 48 animal species were observed or recorded during study period. There is no Schedule-I species in and around the project. Some Schedule II and the rest are Schedule-III and IV observed during study period.

4.0 **IMPACT ASSESSMENT**

4.1 **Impacts during Construction Phase**

Impact on Land Use

The land use of proposed expansion is under industrial category. The total land required for the proposed expansion will be about 16 ha which will be installed within the existing cement plant complex in an area of about 166 ha. Hence no
additional land is required for the present expansion. The green belt development will be in an area of 55 ha which is under development phase. The existing roads are well established and will be strengthened.

**Impact on Soil**

The construction activities will result in minimum loss of vegetation and topsoil in the plant area. Maximum possible extent tree cutting would be avoided. No significant adverse impact on the soil in the surrounding area is anticipated.

**Impact on Air Quality**

During construction phase, dust will be the main pollutant, which would be generated from the site development activities and vehicular movement on the road. The impact of such activities would be confined within the project boundary and restricted to the construction phase.

**Impact on Noise Levels**

The major sources of noise during the construction phase are vehicular traffic, construction equipment like dozers, scrapers, concrete mixers, cranes, generators, pumps, compressors, rock drills, pneumatic tools, saws, vibrators etc. The operation of these equipment will generate noise ranging between 70-85 dB(A). The noise produced during the construction will have significant impact on the existing ambient noise levels.

**Impact on Terrestrial Ecology**

Most of the land identified for the proposed project contains land, with limited number of trees. Trees will be cut only if required and as per functional requirement. Therefore, no major loss of biomass is envisaged during construction phase.

**Demography and Socio-Economics**

The non-workers constitute about 58.1 % of the total population in 10 km radius study area. Some of them will be available for employment in the proposed plant during construction activities. As the labourers are generally un-skilled, the locals would get opportunities for employment during construction activities.

### 4.2 Impacts During Operational Phase

**Impact on Soil vis-à-vis Solid Waste**

All the solid wastes generated will be fully re-used either in the process, or in ancillary activities, hence, no impact of solid waste is envisaged on soil quality of the area.
Impact on Air Quality

Adequate stack heights have been provided to disperse gaseous emissions over a wider area. In order to control emissions of particulates adequate control equipment are proposed.

Prediction of impacts on air environment has been carried out by using Industrial Source Complex (ISCST3) and the incremental concentration for PM$_{10}$, SO$_2$ and NO$_x$ are observed as 2.6 µg/m$^3$, 1.6 µg/m$^3$ and 2.1 µg/m$^3$ occurring at a distance of 1.0 km, 2.2 km and 2.2 km respectively in SE direction. After the implementation of the proposed project, these concentrations are found to be well below the permissible NAAQS norms for rural/residential zone and Industrial/Mixed zone. Therefore, the proposed activity is not likely to have any significant adverse impact on the air environment.

Fugitive Emissions

Fugitive dust emissions from the proposed plant would be significant as there will be air pollution due to activities like transport of limestone, coal handling, clinker handling, crushing unit and generally due to the movement of vehicles on the roads.

Impact on Water Resources

RCC has estimated the water requirement for its cement plant as 1350 m$^3$/day. The required water will be sourced from ground water resources. As all of the domestic wastewater generated will be suitably treated either in the proposed Sewage Treatment Plant (STP) for Line-I and re-used for greenbelt development and no discharge is proposed outside the premises, no impact is envisaged on water quality from the project. The plant will be operated on zero discharge basis. Hence, no impact is envisaged on the surface water resources of the area.

Impact on Noise Levels

The proposed expansion of cement plant contains number of items of heavy equipment – such as fans, engines, generators and cement grinding plant. There will be associated road or rail traffic, including truck movement and loading equipment. Consequently cement manufacturing is likely to generate noise and vibration. Noise and vibration is greater from heavy truck traffic associated with quarry operations and transport of raw materials and finished product.

Impact on Ecology

The impact of air pollutants on vegetation due to the proposed expansion of cement plant, is identified and quantified by using air dispersion modeling. The simulations have been done to evaluate PM$_{10}$, SO$_2$ and NO$_x$ likely to be contributed by the proposed project activities, the resultant concentrations for study period are within the limits as per National Ambient Air Quality Standards.
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No wildlife sanctuaries are found within 10 km radius of the project site. Hence, no impact is envisaged on the wildlife due to proposed expansion of cement plant. Similarly, as per the forest department, no endangered or rare species of flora and fauna are reported or observed in the study area.

5.0 ENVIRONMENT MANAGEMENT PLAN

During construction, some of the vegetation in the plant premises is required to be cleared. The measures required to be undertaken to minimise the impact on the ecology are:

- Water sprinkling;
- The felling of trees will be kept at minimum;
- The greenbelt shall be developed; and
- To maintain condition of construction equipment and prevention maintenance so that minimum disturbance to the surrounding environment.

5.1 Environment Management during Operation Phase

Air Pollution Management

**Air Pollution Control Equipment – Proposed Expansion of Cement Plant**

Kiln and Raw mill exhaust gases shall be commonly de-dusted while clinker cooler exhaust air is separately dedusted. For deducting of kiln/raw mill, a glass fiber bag house dust collector shall be provided; while for clinker cooler exhaust, an electrostatic precipitator (ESP) has been considered. The particulate matter in all stacks will be limited to less than 50 mg/Nm³.

- **Fugitive Emissions**

To control the fugitive emissions, the following measures are proposed:

- The covered OLBC system for transportation of limestone from mine to plant;
- All the conveyors will be provided with conveyer covers and hoods to offset any trapping of material in wind stream;
- High efficiency reverse air jet type bag filters are considered to arrest the air borne dust at all the locations where transfer of material from one conveyor to other takes place;
- The automatic bagging machine with bag filters will be installed for packing plant;
- Unloading of coal trucks will be carried out sprinkling of water while unloading;
- The sprinkling of water will be done along the internal roads in the plant in order to control the dust arising due to the movement of vehicular traffic;
- All the workers inside the plant will be provided with disposable dust masks; and
- Thick greenbelt will be developed around the plant to arrest the fugitive emissions.
Air Pollution Control Schemes

Adequate and efficient control equipment will be installed in the proposed plant to keep the dust emission at a minimum.

- Online particulate monitor will be installed for Kiln/Raw mill stack;
- Process interlocking system will be provided to trip off the complete system in case of raise in temperature of the gases and dust particulate across the glass fibre bag house and bag filters, which will trip the entire systems;
- As far as gaseous pollution is concerned, the impact of carbon monoxide (CO) emission is negligible in view of the firing technique of keeping a positive oxygen balance. However, regular monitoring and continuous auto regulation of fuel and air by automatic combustion control system is an indispensable part of all large cement plants; and
- Installation of proper pollution control equipment like bag house, bag filters and ESP to maintain pollutants emission limits as per CPCB / SPCB norms.

Noise Pollution Management

The greenbelt proposed around the boundary of the plant will attenuate the noise emitted by the various sources in the plant.

Earplugs will be provided for the personnel working close to the noise generating units as a part of the safety policy. Apart from this, some of the design features provided to ensure low noise levels are as follows:

- All rotating machinery will be well lubricated and provided with enclosures as far as possible to reduce noise transmission;
- The insulation provided for prevention of loss of heat and personnel safety will also act as noise reducers;
- Layouts, equipment foundations and structures will be designed keeping the requirement of noise abatement in view;
- Necessary enclosures will also be provided on the working platforms/areas to provide local protection in high noise level areas;
- All equipment will be kept in a well maintained condition with proper lubrication and housekeeping to avoid excessive noise generation;
- The workers will be provided with ear plugs; and
- Plantation in the zone between plant and township would attenuate noise in the residential area.

Water Pollution Management

Effluents will not be generated in the process. Sanitary wastewater are planning to treat in Sewage Treatment Plant (STP) and treated effluents will be used in greenbelt or in plant operations/dust suppression. There will be no wastewater discharge from the proposed plant. Hence, there will not be any contamination of surface water bodies.
Solid Waste Management

No solid waste will be generated in the process. Dust collected from air pollution control equipment will be 100% recycled in process and there will be no solid wastes in cement plant.

Solid waste in the form of sludge is generated from the sewage treatment plant. Major portion of waste will be used for maintaining biomass in the activated sludge process of STP. The balance waste will be used as manure for greenbelt development.

Greenbelt Development

Due care will be taken to ensure that a greenbelt is developed around the plant and colony. All areas devoid of vegetation and having low density will be systematically and scientifically afforested. RCC has proposed to develop greenbelt in 33 % of area.

The anticipated capital expenditure for the environment management is about Rs. 135 crores.

6.0 Risk Assessment and Disaster Management Plan

The identification of various hazards, probable risks in the cement plant, maximum credible accident analysis and consequence analysis are addressed which gives a broad identification of risks involved in the proposed cement plant. Based on the risk estimation disaster management plan has also been prepared.

7.0 Project Benefits

Proposed plant will result in considerable growth of stimulating the industrial and commercial activities in the state. Small and medium scale industries may be further developed as a consequence.

The basic requirement of the community needs will be strengthened by extending healthcare, educational facilities to the community, building/strengthening of existing roads in the area. RCC will initiate the above amenities either by providing or by improving the facilities in the area, which will help in uplifting the living standards of local communities.

The CSR activities were digging and de-silting of ponds, skill training program, bio-gas plant, solar lantern, infrastructure development, health camps, mobile medical van and other welfare activities. The company has spent Rs 111 Lakhs for these activities till March 2013.

8.0 Environment Monitoring Programme

The environment monitoring for the proposed expansion of cement plant complex operations shall be conducted as follows:
A centralized environment monitoring cell will be established for cement plant. Monitoring of important and crucial environment parameters is of immense importance to assess the status of environment during operation of cement plant. With the knowledge of baseline conditions, the monitoring program can serve as an indicator for any deterioration in environment conditions due to operation of the cement plant and suitable mitigatory steps could be taken in time to safeguard the environment.