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# Environmental and Health Impacts of Cement Industry

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## Abstract

An integrated development of the nation is very much desirable to ensure food, health and economic security for all the people of the country. Development projects should go on but it should not create ecological imbalance, because destruction of environment poses serious threat to the survival of human race. However, the factors such as population explosion, rapid industrialization, over exploitation of natural resources, increased transportation etc. have resulted in change of climatic conditions, depletion of ozone layer, increase in air, water and noise pollution. Under proper Environmental Management Plan, the adverse environmental effects of development projects can be mitigated to a great extent. Industrialization is recognized as the backbone for development. Availability of resources coupled with infrastructural facilities, accelerate industrial growth.

The cement sector notably plays a critical role in the economic growth of the country and its journey towards conclusive growth. Cement is vital to the construction sector and all infrastructural projects. The construction sector alone constitutes about 5-7 per cent of the country's gross domestic product. The industry occupies an important place in the Indian economy because of its strong linkages to other sectors such as construction, transportation, coal and power.

The Environmental impact assessment has been carried out to assess the existing base line environmental scenario of the area and based on the activities of proposed grinding unit, environmental management plan has been suggested. The plan will identify and address the impacts and design imitative measures to manage such impacts in a manner as to conserve environment and ecology of the area. The EMP has been prepared with a view to ultimately ensure that the adverse impacts can be minimized if these cannot be prevented altogether.

## 1. INTRODUCTION

Dust includes tiny particles of debris and dead skin. Its small size means it can be inhaled and potentially evoke an immune reaction. Such allergic reactions may be minor or major depending on the individual. Dust can also serve as a “fomite”, potentially carrying viruses and possibly passing on infection.

Dust is seen as something irritating rather than harmful. It’s practically everywhere, so we don’t really pay it enough attention – or consider how overexposure to dust in the workplace can lead to poor health. That’s right – dust is actually a very dangerous substance that impacts the lives of millions of people.

### 1.2. Objectives of EMS are given below:

EMS make sure that project decision makers think about the likely effects on the environment at the earliest possible time and aim to avoid, reduce or offset those effects. This ensures that proposals are understood properly before decisions are made.

- To evaluate the impacts of proposed operations on the environment and public health.
- To study primary environmental data of the project site before establishing the factory.
- To study the long-term impact of the operation of the cement grinding unit.
- To prepare an action plan for the implementation of mitigating measures.
- To suggest monitoring programs of imitative measures to ensure the quality of the environment.
- To prepare a capital cost estimate and annual recurring cost for Environmental Management System.

The Project outlines existing and potential problems that may adversely impact the environment and recommends corrective measures where required. Also, the system outlines roles and responsibilities of the key personnel and contractors who are charged with the responsibility to manage the Industry.

Analysis and comparative study of environmental data before and after the establishment of cement grinding unit, study the previous health data & study of the long-term impact of the operation of cement grinding unit. Also study the available monitoring data of factory, environmental as well health.

**1.3. Raw Material Requirement for Cement Grinding Unit**

| S.N | Material | Type of Storage |
|---|---|---|
| 1. | Clinker | RCC silo. |
| 2. | Gypsum | Covered stockpile |
| 3. | Cement | RCC silo |
| 4. | Flyash | RCC silo. |

**1.4 Environmental & Health Impact of the cement grinding unit:**

Despite of all precautions and protective measures, emergencies/accidents like release of fire and explosion from the plant premises can occur. Even though such occurrence may be rare and a remote possibility, such accidents will have an adverse effect on the plant, property and people working inside the plant. To cope with and contain such "Emergency", a Risk Analyses exercise has been conducted, based on which Disaster Management Plan has been developed. Such assessment includes policy issues, programmes, technology, economics and education. As per the Environment Protection Act, Section 8 and Rules under Manufacturing and Storage of Hazardous Chemical Rules 1994 4(2), an occupier of an existing industrial plant shall have identified the major accident hazards and taken adequate steps to prevent such major accidents; occupier shall provide to the persons working on the site with the information, training and equipment including antidotes necessary to ensure their safety. Also Rule 10 (4&6) stipulates that the Occupier shall have to update Safety Audit report once in a year by conducting a fresh Safety Audit. The Factories Act 1948, Rule 7A specifies the general duties of occupier such as to ensure the E, safety and welfare of all workers while they are at work in the factory and to maintain all places of work in the factory in condition that is safe and without risk to health. In light of above, risk assessment is one such tool to identify hazards at industrial site and take engineering and managerial steps to mitigate the same.

Cement plant emissions can cause damage to human health, aquatic and terrestrial ecology as well as material due to mainly the air exposure routes. For example, adverse effects of the plants on human health can derive from the direct impact of suspended particulate matter and combustion gases emission on the organism and/ or their direct impact via the food chain and changes in the environment. High levels of fine particulates, noxious gases like sulphur dioxide and nitrogen oxides can lead to respiratory diseases. The duration of exposure is decisive. Injurious heavy metals (e.g. lead, mercury, cadmium, etc) can enter the food chain and thereafter, the human organism by way of drinking water and consuming vegetables and animal products. Thus, a solid waste management plan has been developed.

The cement industry which are established on overexploited area has big challenge to save ground water and maintaining its quality. The cement industry has consumed water for the manufacturing process but does not generate effluent from its process.

**1.5 Recommendation for saving and quality improvement of groundwater:**

After the study of the Dhar (MP) region, as per the notification from CGWA **(DYNAMIC GROUND WATER RESOURCES OF INDIA, 2017)** The area dhar fallen under over-exploited area & After the study of groundwater, it is recommended to cement industry situated around to utilize surface water resources as far as possible to safeguard ground water resources.

It is proposed that rain water stored in the pond located inside the cement plant is utilized for industrial use to reduce withdrawal of ground water which will have positive impact of ground water in the surrounding areas. If surface water pond is considered as source of industrial water instead of withdrawal from ground water (Tube well) positive impact on ground water resources of the area to be assessed.

To access the rainwater harvesting potential of the plant premise and to access the impact of recharge structures constructed by the company on groundwater system.

After carrying out the water availability study, the following finals observations

The average annual rainfall in the region is 826.1 mm.

The active storage capacity of the pond is 110632.5 cum.

About 4.964 sqkm of the catchment area is contributing flow into the nallah, which further contributes flow to the pond. The 75% dependable yield from this catchment is 808639.64 cum (0.81 MCM) and the average yield is 1228949 cum (1.23 MCM).

The pond gets direct rainfall from 14000 sqm of its storage area. The 75% dependable inflow due to direct rainfall is 9447.13 cum (0.009 MCM) and the average is 11565.1 cum (0.012 MCM).

In working table simulation, it is observed that the pond built its storage during monsoon months (Jun-Sep) and eventually the storage gets depleted gradually from October onwards.

The total annual industrial water demand for 2MTPA cement grinding unit is @245 cum/day. Out of which, 10cum/day is for domestic utilization and the rest 235 cum/day is for industrial working purpose. From the water availability study, it is observed that the total quantum of 235cum/day can be met from the pond

(surface water) without any failure. However, the rest 10cum/day has to be met from the groundwater source.
If water from the pond is utilized for industrial use, it will reduce 235cum/day for 300 working days (70500 cum/year) withdrawal from groundwater resources. An additional volume of groundwater 84834 cum /year will be available to the surrounding community & ground water recharge purpose.

Artificial recharge by means of 12 no of recharge wells by harvesting rainwater of plant premise, ground water can be recharged to the tune of 0.103249 MCM which is almost equal to total rain water harvesting potential of plant premise i.e. 0.101419 MCM i.e100%.
Groundwater level in and around plant premise is showing rising trend in water level in both seasons from 2.38 to 17%.
The IMD meteorological observatory is located at the district headquarter Dhar and the nearest rain gauge station is located at Tehsil headquarter Badnawar. The climatological data of Dhar observatory have been taken for analysis. Rainfall data available from various agencies to carry out the current study is shown in the below table

**Table: Rainfall Data Availability from Various Sources**

| Sl.No | Source | Region | Time Step | Period |
|---|---|---|---|---|
| 1 | Water Resource Department, Madhya Pradesh (WRD, MP) Site:- http://www.mpwrd.gov.in/rainfall | Badnawar RG Station, Dhar District | Monthly | 1970 to 2014 (45 years) |
| 2 | Indian Meteorological Department Site:- http://indiawris.gov.in/wris/#/waterData | IMD Grid Rainfall for Dhar District | Daily | 1999 to 2019 (20 years) |

## CONCLUSIONS

After the comparison of data before and after the establishment of cement plant it is find out that most of air & water data are under limit as per the stander. the data founded under the stander of Desired environmental and health safety can be managed by regular checkup of health of workers as well by monitoring of environmental parameters. By the adopt recommendations industry can save water and reduce the consumption of ground water.
Suggested Specific personnel protective equipment's to workers those are working in the hazardous waste area also will more protect from the adverse impact of hazardous waste.

During this study, there is no any adverse effect noted on surrounding environment as well on the health effect on workers those are working in critical area such as in operation, maintenance and involved in handling of chemical or hazardous waste.
The ground water quality is important aspect as the ground water is to be used for industrial purpose and also for domestic purpose. For drinking purpose, the quality of ground water should be within the permissible limits prescribed by Bureau of Indian Standards for drinking water, as it affects the health of persons. The ground water samples were collected from bore well of near the project area at a distance of 50m. The chemical analysis of the ground water samples was done in laboratory. The results of the chemical analysis are given in Table below. On the basis of chemical analysis and its comparison with the recommended concentrations by IS stander it is observed that the concentrations are within the desirable/permissible limits recommended by IS and it can be concluded that the quality of ground water in the project area is potable.

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