Centralisation of Cement Industry Causing Degradation of Environment in Beawar (AJMER)

Dr. Rajesh Sharma
Assistant Professor, Geography, SD Govt. College, Beawar, Rajasthan, India

ABSTRACT

In Beawar Cement manufacturing is a high volume process and correspondingly requires adequate quantities of resources, that is, raw materials, thermal fuels and electrical power. The main environmental (air quality) impacts of the manufacture of cement, in general, are related to the categories as: 1) Gases & VOCs:- Gaseous atmospheric emissions of CO2, NOx, SO2, Volatile Organic Compounds (VOCs) and others Carbon dioxide is released during the production of clinker, a component of cement, in which calcium carbonate (CaCO3) is heated in a rotary kiln to induce a series of complex chemical reactions. Specifically, CO2 is released as a by-product during calcination, which occurs in the upper, cooler end of the kiln, or a pre calciner, at temperatures of 600-900°C, and results in the conversion of carbonates to oxides.2) Dust:- Dust emissions originate mainly from the raw mills, the kiln system, the clinker cooler, and the cement mills. A general feature of these process steps is that hot exhaust gas or exhaust air is passing through pulverised material resulting in an intimately dispersed mixture of gas and particulates. The nature of the particulates generated is linked to the source material itself, that is, raw materials, clinker or cement.3) Noise:- Noise emissions occur throughout the whole cement manufacturing process from preparing and processing raw materials, from the clinker burning and cement production process, from material storage as well as from the dispatch and shipping of the final products. The heavy machinery and large fans used in various parts of the cement manufacturing process can give rise to noise and/or vibration emissions, particularly from: chutes and hoppers, any operations involving fracture, crushing, milling and screening of raw material, fuels, clinker and cement, exhaust fans, blowers, duct vibration.4) Bad Odour:- Foul smell is sometimes a direct result of the gases emitted during cement manufacturing. Since cement manufacturer has life-threatening impacts on plants and animals, the manufacturing process then, directly and indirectly, gives rise to offensive smells like the dead plants and animals decay.

KEYWORDS: *Beawar, cement industry, environment degradation, bad odour, offensive smells, health.*

Introduction

In Beawar, Cement industries are centralized and cement manufacturing requires a huge amount of non-renewable resources like raw material and fossil fuels. It is estimated that 5-6% of all carbon dioxide greenhouse gases generated by human activities originate from cement production. [1]

The exhaust gases from a cement kiln contain are nitrogen oxides, carbon dioxide, water, oxygen and small quantities of dust, chlorides, fluorides, sulfur dioxide, carbon monoxide, and still smaller quantities of organic compounds and heavy metals.[2] Toxic metals and organic compounds are released when industrial waste is burnt in the cement kiln. Other sources of dust emissions include the clinker cooler, crushers, grinders, and materials-handling equipment. The results of several studies showed that these emissions are adversely affecting human health in a variety of ways, like itchy eyes, respiratory diseases like tuberculosis, chest discomfort, chronic bronchitis, asthma attacks, cardiovascular diseases and even premature death. It is a well-known act that air pollution is hazardous[3] to the environment and human health. Due to infrastructure, the developmental activities Cement industry is flourishing & resulting in environmental degradation and in the degradation of human health worldwide.[4] The gaseous & particulate emissions from Beawar Cement plants are degrading air quality & thus creating considerable environmental pollution especially air pollution.[5]

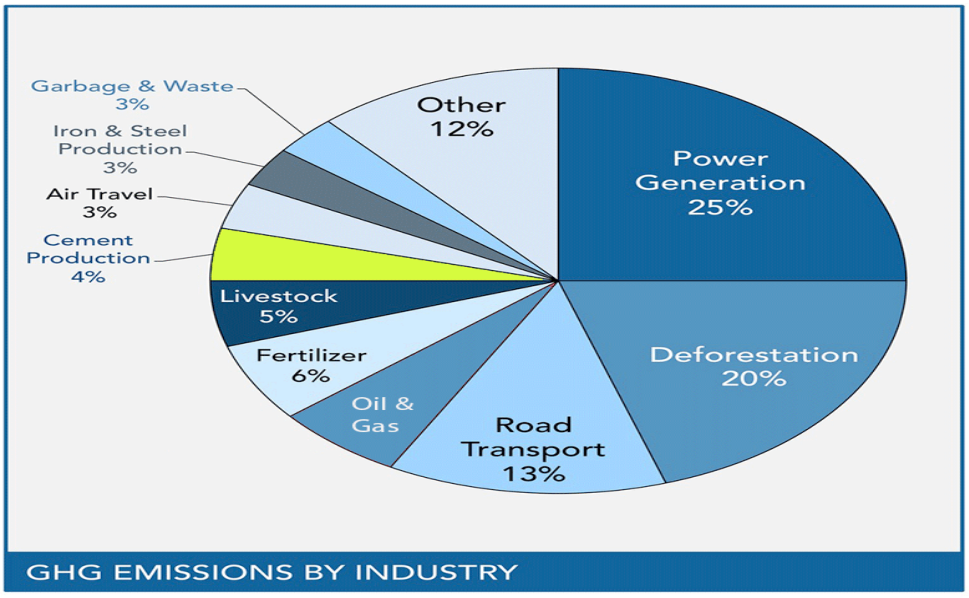
The cement industry in Beawar, is one of the main producers of carbon dioxide, a potent greenhouse gas. Concrete causes damage to the most fertile layer of the earth, the topsoil. [6]Concrete is used to create hard surfaces which contribute to surface runoff that may cause soil erosion, water pollution and flooding. Conversely, concrete is one of the most powerful tools for proper flood control, by means of damming, diversion, and deflection of flood waters, mud flows, and the like. Light-colored concrete can reduce the urban heat island effect, due to its higher albedo.[7] However, original vegetation results in even greater benefit. Concrete dust released by building demolition and natural disasters can be a major source of dangerous air pollution. The presence of some substances in concrete, including useful and unwanted additives, can cause health concerns due to toxicity and (usually naturally occurring) radioactivity. Wet concrete is highly alkaline and should always be

handled with proper protective equipment.[8] Concrete recycling is increasing in response to improved environmental awareness, legislation, and economic considerations. Conversely, the use of concrete mitigates the use of alternative building materials such as wood, which is a natural form of carbon sequestering.[9]

Discussion

Global warming caused by cement industry in Beawar

Making cement results in high levels of CO_2 output. Cement production is the cause of transport and energy generation. 4 - 5% of the total of CO_2 emissions is caused by cement production in Beawar. CO_2 is produced at two points during cement production[10] :- the first is as a byproduct of burning of fossil fuels, primarily coal, to generate the heat necessary to drive the cement-making process- the second from the thermal decomposition of calcium carbonate in the process of producing cement clinker.$CaCO_3$ (limestone) + heat -> CaO (lime) + CO_2• Production of one tonne of cement results in 780 kg of CO2 Of the total CO_2 output, 30% derives from the use of energy and 70% results from decarbonation Important to realise is that although 5% of the Beawar generation of CO_2 is due to cement production[11], that level of output also reflects the unique and universal importance of concrete throughout the construction industry in Beawar.[12]



GHG (Green House Gas) emissions by cement production industry in Beawar

Cement manufacturing Industries is one of the key sectors of the Indian Economy has been rapidly growing at a rate over 8% and it is estimated to grow more. Cement is a crucial product for the society delivering easy secure reliable modern housing and infrastructure[13]. The contribution of pollution towards the environmental degradation is increasing at an alarming rate. A good number of cement plants have made significant efforts in controlling and regulating the emissions by well-organized control measure like Electro Static Precipitator (ESP) and Bag Filter APCD devices and these plants are maintaining their pollution level[14]. Fugitive emissions (emission not from stack) in cement plant is still is a major problem and are waiting for new effective technologies[15]. This paper focuses on overview of the pollution of air and water and solid waste in cement industries in Beawar and the main sources of environmental pollution by cement industries here. The review carried out here shows techniques which are in practice in present to treat the waste (air, water and solid)[16] generated from cement industry including co-processing and pollution control at each stage of cement production. Now Beawar, has introduced strict ecological and environmental standard for cement industries. With more strict controls expected in the future, it is essential that control measures be implemented to minimize effluent problems from industries of cement in Beawar.[17]

Results

Soil quality is also degrading because of pollution from air and water discharge, even farmers starts complaining about the reduction in crops yield because of poor quality of soil. In this paper an attempt has been made to identify the impact of Cement Industries in Beawar on the surrounding environment mainly on the soil quality. [18]This study is a part of a comparative EIA report, so importance of using the high efficiency ESP's and other control equipment to avoid or reduce the pollution is also studied. Degradation of soil quality nearby a cement industry in Beawar (Shree Cement Industry) was analysed[19] as follows:-

Table 1. Soil quality in the study area (Season-monsoon)

S.N.	Parameters	A	B	C
1.	pH Value	8.22	7.9	7.8
2.	Conductivity at 250 C (milli mhos/cm)	0.59	0.51	0.542
3.	Color	Yellowish Grey	Yellowish Grey	Yellowish Grey
4.	Porasity (%)	57.0	47.51	59.0
5.	Water Holding Capacity(%)	31.0	39.91	41.25
6.	Sodium as Na (meq/100gm)	0.6	0.25	37.0
7.	Potassium as K (meq/100 gm)	0.24	2.0	0.7
8.	Calcium as Ca (meq/100)	2.65	10.8	6.0
9.	Maganisum as Mg (meq/100 gm)	0.7	4.0	0.9
10.	Available Iron (ppm)	32.5	12.5	18.5
11.	Manganese (as Mn)	N.D	N.D	N.D
12.	Chloride as Cl (meq/100 gm)	0.12	0.32	0.36
13.	Sulfates as SO_4 (meq/100 gm)	0.05	0.07	0.068
14.	Bicarbonates (meq/100 gm)	6.0	7.1	7.0
15.	Carbonates	N.D	N.D	N.D
16.	Phosphates as P (ppm)	40.0	130.0	26.0
17.	TKN (%)	0.083	0.088	0.138
18.	CEC (meq/100 gm)	6.0	17.2	6.9

N.D=Not detectable

Table 2. Soil quality in the study area (Season-Post-monsoon)

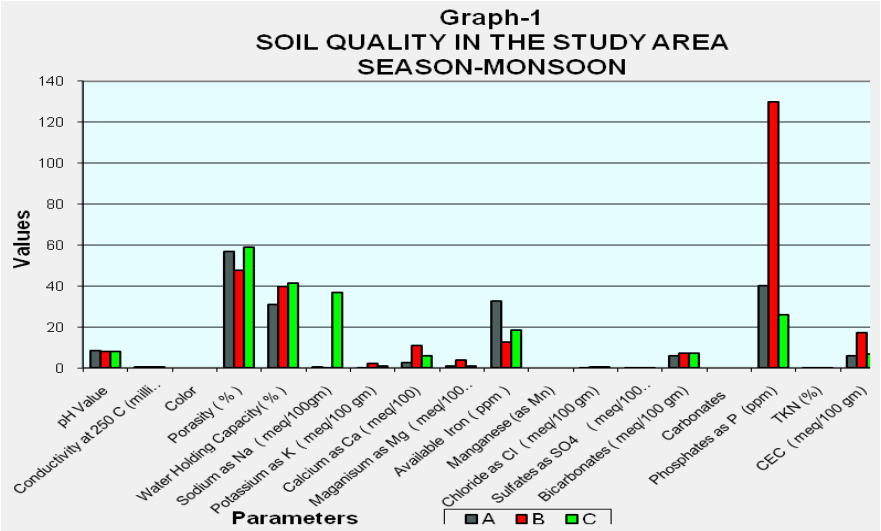
S.N.	Parameters	A	B	C
1.	pH Value	8.15	7.9	8.1
2.	Conductivity at 25 °C (milli mhos/cm)	0.182	0.65	0.74
3.	Color	Yellowish Grey	Yellowish Grey	Grey
4.	Porasity (%)	55.0	48.9	58.0
5.	Water Holding Capacity(%)	32.0	39.00	41.0
6.	Sodium as Na (meq/100gm)	0.6	0.8	0.4
7.	Potassium as K (meq/100 gm)	1.2	0.78	0.5
8.	Calcium as Ca (meq/100)	1.85	2.9	0.8
9.	Maganisum as Mg (meq/100 gm)	1.0	0.5	0.7
10.	Available Iron (ppm)	9.8	5.15	62.5
11.	Manganese (as Mn)	N.D	N.D	N.D
12.	Chloride as Cl (meq/100 gm)	0.11	0.29	0.25
13.	Sulfates as SO_4 (meq/100 gm)	0.05	0.08	0.01
14.	Bicarbonates (meq/100 gm)	7.0	16.8	5.9
15.	Carbonates	N.D	N.D	N.D
16.	Phosphates as P (ppm)	15.0	270.0	140.0
17.	TKN (%)	0.08	0.24	0.09
18.	CEC (meq/100 gm)	39.9	54.6	76.2

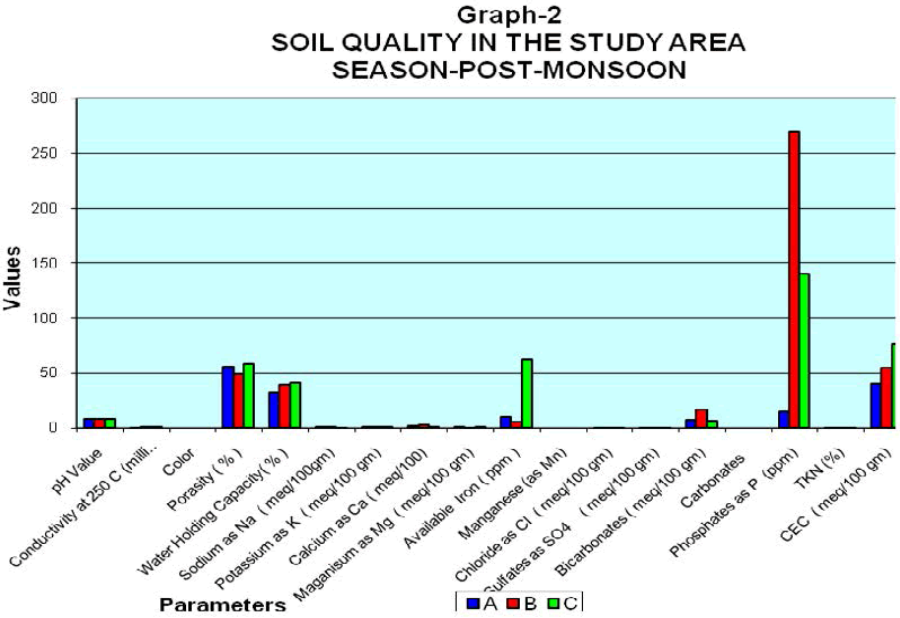
N.D=Not detectable

Table 3. Soil quality in the study area (Season - Winter)

S.N.	Parameters	A	B	C
1.	pH Value	8.25	8.1	8.2
2.	Conductivity at 250 C (milli mhos/cm)	0.23	0.35	0.75
3.	Color	Yellowish Grey	Yellowish Grey	Grey
4.	Porasity (%)	58.0	56.0	58.0
5.	Water Holding Capacity(%)	39.0	38.0	41.0
6.	Sodium as Na (meq/100gm)	0.82	1.1	0.51
7.	Potassium as K (meq/100 gm)	1.2	0.9	1.88
8.	Calcium as Ca (meq/100)	2.4	3.2	3.96
9.	Maganisum as Mg (meq/100 gm)	1.1	0.9	0.88
10.	Available Iron (ppm)	9.2	6.0	54.0
11.	Manganese (as Mn)	N.D	N.D	N.D
12.	Chloride as Cl (meq/100 gm)	0.4	0.5	0.3
13.	Sulfates as SO_4 (meq/100 gm)	0.017	0.03	0.07
14.	Bicarbonates (meq/100 gm)	5.1	5.4	7.1
15.	Carbonates	N.D	N.D	N.D
16.	Phosphates as P (ppm)	17	280.0	150.0
17.	TKN (%)	0.09	0.28	0.09
18.	CEC (meq/100 gm)	37.2	42.4	42.4

N.D=Not detectable


Graph-1
SOIL QUALITY IN THE STUDY AREA
SEASON-MONSOON
Values
Parameters
A B C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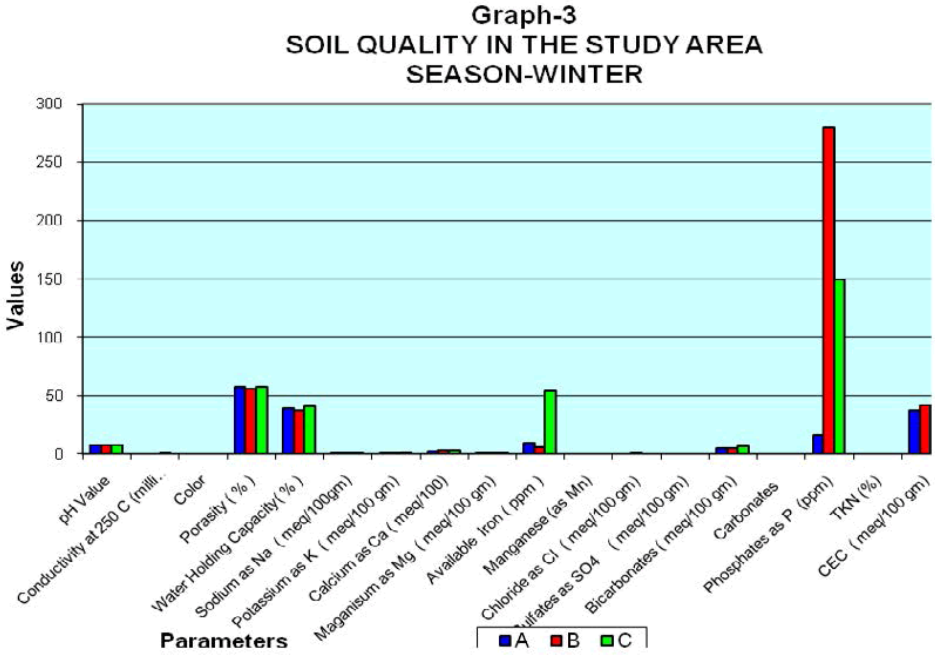
SOIL QUALITY IN THE STUDY AREA
SEASON-POST-MONSOON
Values
Parameters
A B C


Graph-3
SOIL QUALITY IN THE STUDY AREA
SEASON-WINTER
Values
Parameters
A B C

Conclusions

Soil may be defined as a thin top layer of earth's crust, which serves as a natural medium for the growth of plants.[20]

Unconsolidated mineral matter has been subjected to and influenced by environmental factors such as parent materials, climate, organism and physio-chemical action of wind, water and sunlight, all acting over a period of time. Soil differs from parent materials in the morphological, physical and chemical properties.[21] Study for impact assessment due to atmospheric pollution on the ecosystem has been demonstrated number of times. This type of pollution is caused industrial activities and cement industry is one of them in Beawar, Rajasthan. The main impact of cement industry is because of particulate matter and gaseous pollutants. The particulate matter are having different diameter and they are at the mercy of atmosphere. The atmospheric particles can have as consequence the reduction of biodiversity[22] and quality of products. The main visible pollutants generated by cement industry is particulate matter which is generated throughout the manufacturing process right from extraction of raw material to packing of finished product.[23] It is important to understand that presence of sulfur dioxide in the soil may be entropic origin , that may be because of combustion of the fossil fuels (coke or oil) consumed by the industry and resulting the generation of sulfur dioxide. The particles that are generated from the cement industry can enter into the soil as dry, humid or occult deposits and may have impact on its physiochemical properties.[24]

In this study there are clear indications of a good environmental management systems adopted by the Shree cement industry in Beawar. Results are more or less similar to the previous study results and concludes that industry are the requirement for the development and progress of Beawar, use of best available control technologies gives options to control the harmful pollutants at their minimal level.[25]

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