Dust Management Plan

| 10 March 2022

Company info

Company Name:	Lafarge Industries South Africa (Pty) Ltd
Trading as:	Lafarge Industries South Africa (Pty) Ltd
Type of Entity:	Company
Company Registration Number:	2005/033309/07
Registered Address:	35 Westfield Road, Longmeadow Business Estate Ext. 11, 1609
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Telephone Number:	(011) 657 0000
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Company Website:	www.lafarge.com
Industry Type/Nature of Trade:	Cement Production
Name of the Landowner/s or Landlord/s:	Dr Gernot Kirchner
Name of Mortgage Bondholder/s (if any):	Lafarge
Deeds Office Registration Number of Mortgage Bond:	TOIP0000000000270061, TOIP0000000000270071 TOIP0026000010240000
Land Use Zoning as per Town Planning Scheme:	Industrial

Report details

Project Name	**Dust Management Plan Lafarge Lichtenburg 2021**
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Introduction

Lafarge industries South Africa (Pty) Ltd cement production operations (Lafarge Lichtenburg operations) located in the outskirt of Lichtenburg town in the North West Province. As promulgated within the National Environmental Management: Air Quality Act, 2004 (Act No 39 of 2004) Chapter 4 Part 5 section 29 (subsection 1 (b)) to implement Pollution Prevention Plan of substance declared as priority air pollutant and submit the proposed pollution prevention plan.

The scope of this report is to outline the measures that will be employed by Lafarge industries South Africa (Pty) Ltd cement production to ensure that impacts related to dust associated with cement production process will be avoided or, where avoidance is not possible, then mitigated. Potential sources of dust, and the required prevention and mitigation measures are described in this document.

The dust management plan addresses the dust related impacts associated with the cement production process.

Objectives

The objectives of this Dust Management Plan are as follows:

1. Summarise the National Dust Control Regulations.
2. Summarise the regulatory framework governing the management of dust associated with the cement production activities.
3. Define roles and responsibilities for the implementation of this plan and management of dust.
4. Describe measures and controls related to the management of dust during the cement production activities.
5. Provide framework for monitoring and reporting on the management of dust during the operation.
6. Describe requirements relates to responding to dust related complaints.

Process description

1. **Material handling and storage**

- Various materials require handling and storage on site. These include raw materials (limestone and additives for the kiln and cement milling), fuels (coal and industrial paraffin) and interim process materials (ground raw mix, clinker and ground cement).

- Additives used in the kiln include: magnetite (Fe_2O_4 - contains iron), pozzsand (SiO_2 –contains silica) and bauxite (Al_2O_3 – contains alumina). Additives used in the cement milling circuit include: limestone ($CaCO_3$), gypsum and fly ash. These materials are stored in a dry form in covered and surfaced storage facilities. From the stockpiles, the materials are conveyed to the raw milling circuit.

- Fuel sources are stored as follows: coal is stored in an open stockpile adjacent to the railway line and industrial paraffin (in liquid form) in sealed tanks and in a dedicated storage area.

- Interim process materials are stored in covered storage areas/stockpiles and within bunkers at the additive feeding plant.

2. **Raw milling circuit**

- The crushed limestone from the Lafarge quarry together with the kiln additives are ground in a ball mill to produce a raw mix (fine powder).This is a dry milling process.

- From the mill, the raw mix is conveyed to blending silos prior to the heating circuit.

3. **Coal grinding plant**

- Coal used as fuel in the kiln is fed from the stockpile to a grinding plant before being fed into the kiln.

4. **Heating circuit**

- Prior to the kiln, the raw mix is fed to a pre-heater where the material is heated to approximately 900°C.

- From the pre-heater, the material is fed into the rotary kiln which operates like an industrial oven. There are two (2) kilns in operation at the plant.

- In the kilns, the ground coal is used as an energy resource. The raw mix is heated to a temperature of up to 1450°C. As the material heats, water is evaporated, minerals decompose and react and partial melting takes place.

- ❖ The partial melting causes the material to aggregate into lumps or nodules, typically of 1–10 mm diameter. This is called clinker.

5. **Cooling**

- ❖ From the kiln, the hot clinker falls onto a cooling grate which comprises a perforated grate within an enclosed chamber through which ambient air is blown.
- ❖ The cooling process recovers most of the heat and cools the clinker to around 100°C, at which temperature it can be conveniently conveyed to storage silos prior to being fed into the cement mills.
- ❖ These coolers have two main advantages: they cool the clinker rapidly, which is desirable from a quality point of view, and, because they don't rotate, hot air can be ducted out of them for use as preheated combustion air.

6. **Milling circuit – cement**

- ❖ The clinker is fed together with extender (limestone or fly ash) and gypsum, at a certain ratio, into the cement mills to produce different types of cement. The extender is used as bulking and grinding materials. The gypsum is added as a setting additive for cement and to facilitate the grinding of clinker.
- ❖ The clinker is then ground into the final cement product.

7. **Fans**

- ❖ A large volume of gases has to be moved through the kiln system. Fans are used to suck air through the pre-heaters, force air through the cooler bed, and to propel the fuel in to the kiln. Beneath the mills, fans account for most of the electric power consumed in the system.

8. **Product handling and packing**

- ❖ The cement is transported to silos where it is dispatched to the packing plant.

- ❖ In the packing plant the cement is placed into cement bags or bulk form ready for distribution to clients.

9. **Air cleaning equipment**

- ❖ Air cleaning equipment at the plant comprises baghouses, electrostatic precipitators and gravel bed filters.
- ❖ The mills are equipped with dedicated baghouses. These baghouses collect fugitive dust emissions which are recycled back into the process.
- ❖ The kilns are equipped with dedicated bag-houses, precipitators and gravel bed filters. Cleaned gas is emitted to atmosphere via stacks.

An illustration of Lafarge cement plant production processes is show in figure 1 - 3 below

Roles and responsibilities

Environment Team	✔ Primary responsibility for implementing the mitigation measures to minimise dust generation and ensure that dust emissions levels comply with the regulatory limits set in the AEL. ✔ Review and interpretation of monitoring data. ✔ Keeping records of all activities or incidents onsite. ✔ Report on environmental issues including dust at regular plant meetings. ✔ Ensure accurate records of monitoring data are kept (Continuous Emission Monitoring). ✔ Recommend and/or developing corrective actions in the event of significant non-compliance and excessive dust generation ✔ Implement appropriate actions in the case of non-compliance
Service provider	✔ Provide and install dust monitoring equipment as per the regulation

	✔ Sample, analyse and report the dust fallout results

Regulatory requirements

Generally, the AEL is issued for point sources and maximum permissible emission rates of the cement production operation using alternative fuels and resources (AFRs) are stipulated in the licence.

The National Environmental Management: Air Quality Act

The objective of the Air Quality Act is to protect the environment by providing the necessary legislation for the prevention of air pollution "*To reform the law regulating air quality in order to protect the environment by providing reasonable*

measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto."

National Dust Control Regulation

As per Government Gazette No 36974, Notice Number 827 of November 2013. The purpose of the regulation is to prescribe general measures for the control of the dust in all areas.

The acceptable dust fall rates in terms of the regulations are described in the table below.

Table 1

Restriction area	Dustfall rate (D) (mg/m2/day, 30day average)	Permitted frequency of exceeding dust fall rate
Residential	D<600	Two within a year, not sequential months
Non- residential	600<D>1200	Two within a year, not sequential months

The regulation specifies the method to be used for measuring dust fallout and the guideline for locating sampling points shall be ASTM D1739 or equivalent method approved by any internationally recognized body.

Air Quality Impact

Cement manufacturing processes generate a tremendous amount of dust particulates (coarse and fine), which largely impact on the surrounding air quality. Their emission are known to have some amounts of toxic gases and particulate matters into the atmosphere is causing significant air pollution.

Cement dust deposits on plants interfere with the biosynthesis of chlorophyll and damage leaf cells, resulting in a reduction in photosynthesis. In some cases, the dust deposition stiffens/weakens flower buds, resulting in bud drop

Heavy metals, such as chromium, nickel, cobalt, lead, and mercury, are readily found in cement dust. The release of cement dust particles, along with heavy metals, has created severe environmental and health issues. Their harmful effects extend to human health, causing skin irritation and damaging the mucous membrane of the eyes as well as the respiratory system.

Lafarge's Mitigation measures.

In alignment with the purpose of National Environmental Management: Air Quality Act 39 0f 2004 and National Dust Control Regulations (Notice R827 Gazette 36974 1 November 2013).

Process

Lafarge cement plant operation has in total number, 9 stationary dust points where on each of the stacks an air pollution control technology is installed and in operation to abate the stack dust.

Kiln 3

Technology type: Bag filters on kiln3 Bag House Main stack

Technology type: Gravel bed filter. Gravel bed stack North and South

Kiln 4

Technology type: Pulse air Bag filters on kiln 4 Bag House Main stack

Technology type: Pulse air filter Bag. Cooler stack 4

Cement mills

Cement mill 1 (mill and separator stacks)

Technology type: Bag filter

Cement mill 2 (mill and separator stacks)

Technology type: Bag filter

Environmental impacts and associated activities during the cement production processes.

Impact	Source	Activity
Particulate Matter (PM)	Kiln 3 BH (Main stack) Gravel bed North stack Gravel bed South stack	Clinkerization process
	Kiln 4 BH (Main stack) Cooler 4 stack	Clinkerization process

	Cement mill 1 SK 50 stack SK 80 stack	Cement process
	Cement mill 2 SK 50 stack SK 80 stack	Cement process

The quantity of dust emission from all the 9 stacks across the cement production processes is monitored continuously with installed dust monitors on all the stack.

Dust arising from the vehicle

Lafarge plant surfaces are paved throughout to avoid dust arising from moving machinery and equipment and for continual improvement, Lafarge have invested in dust sweepers for removing of dust on pavements. Dust suppression measure is taken as and when needed or recommended.

Monitoring and reporting

Lafarge South Africa will implement and maintain a fallout dust monitoring programme for its production processes. Dust emission depositions must be monitored in terms *National Dust Control Regulation No 36974, Notice Number 827 of November 2013* to ensure acceptable dust fall rates measured at and beyond the boundary of plants premises where dust originates.

The monitoring will entail the visual assessment of both atmospheric levels of fugitive dust and dust dispersion on the surrounding vegetation. This will provide evidence to create trends and ensure dust management techniques remain effective by identifying needs for remedial action. Colleagues at site level will be made aware of issues related to dust and will be required to report any exceedances and excessive atmospheric PM releases.

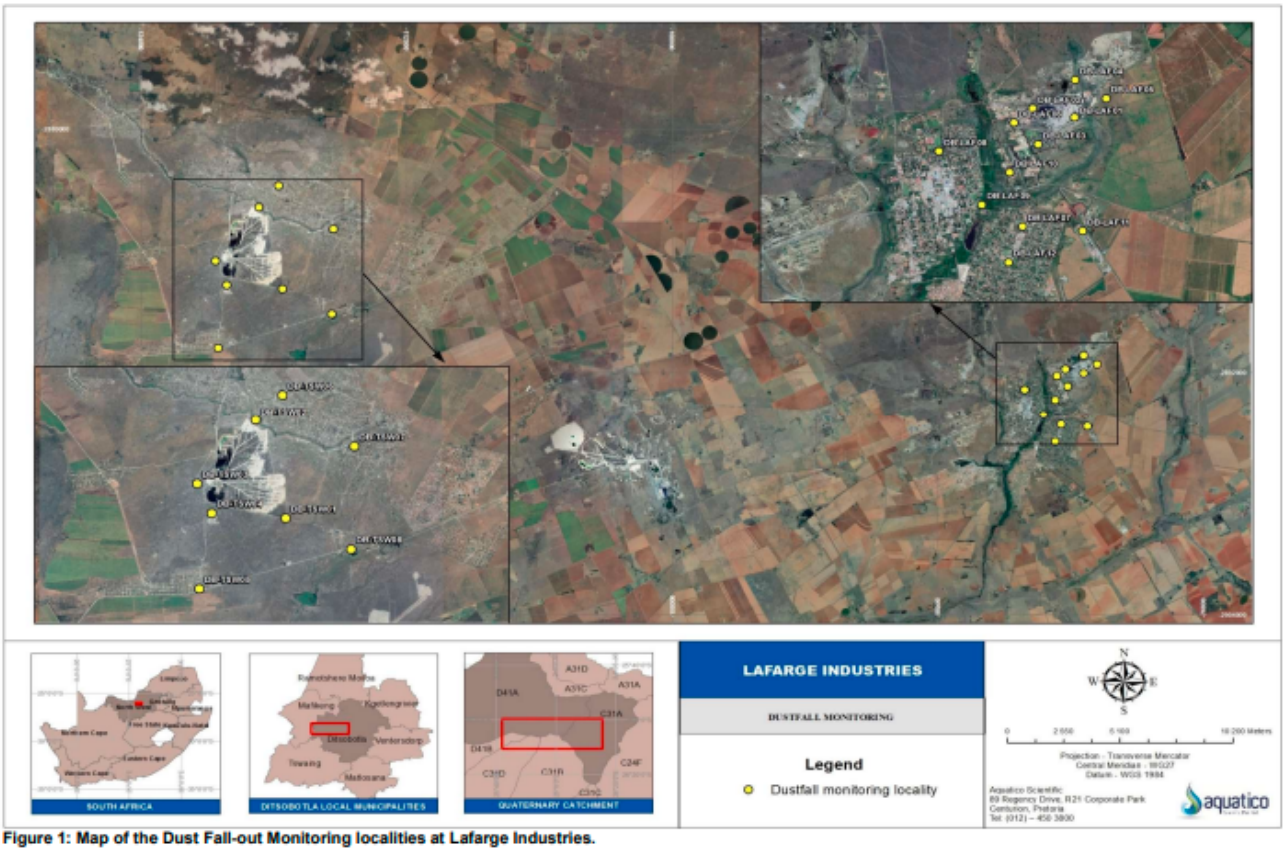

Figure 1: Map of the Dust Fall-out Monitoring localities at Lafarge Industries.

Table 1: Dust fall-out Monitoring Localities.

Locality	Description	Latitude	Longitude	Sampling Frequency
Dust fall-out				
DB-TSW01	East side of Tswana Lime Quarry	S26.094914°	E25.824131°	Monthly
DB-TSW02	North side of Tswana Lime Quarry	S26.058510°	E25.813962°	Monthly
DB-TSW03	Quarry Dam	S26.082161°	E25.794124°	Monthly
DB-TSW04	South side of Tswana Lime Quarry	S26.093044°	E25.799125°	Monthly
DB-TSW05	Water Treatment Plant South of Quarry	S26.120927°	E25.794875°	Monthly
DB-TSW06	Bodibe Township Primary School	S26.048896°	E25.823047°	Monthly
DB-TSW07	Mokakana School - Bodibe Township	S26.068299°	E25.847419°	Monthly
DB-TSW08	Sewage Treatment Works	S26.106327°	E25.846417°	Monthly
DB-LAF01	Waste Water Treatment Plant	S26.134839°	E26.185887°	Monthly
DB-LAF02	Railway - North west side of Plant	S26.132974°	E26.177707°	Monthly
DB-LAF03	Village	S26.140694°	E26.178689°	Monthly
DB-LAF04	Plant Quarry - North side of Plant	S26.126874°	E26.185935°	Monthly
DB-LAF05	Railway - East side of Plant	S26.130860°	E26.192059°	Monthly
DB-LAF06	Cement Stockyard - South Side of Plant	S26.136920°	E26.177220°	Monthly
DB-LAF07	Hoërskool Lichtenburg	S26.158274°	E26.175685°	Monthly
DB-LAF08	Laerskool Lichtenburg	S26.142153°	E26.159277°	Monthly
DB-LAF09	Lichtenburg Test Station	S26.153582°	E26.167676°	Monthly
DB-LAF10	Lichtenburg Cemetery	S26.146687°	E26.173151°	Monthly
DB-LAF11	Laerskool Burgersdorp	S26.159196°	E26.187453°	Monthly
Parameters				
Insoluble Dust Deposition				Monthly

Stakeholders and Interested Parties.

Lafarge South Africa practices an open door policy to its Stake holders and Interested parties to freely lodge any complaints they might have with the operations, this include fugitive dust complaints

Record keeping

All records related to dust must be kept on file

1. Dust fall-out reports
2. Any exceedances recorded
3. Remedial action taken to address exceedances
4. Complaint register

Training and awareness

Lafarge South Africa will ensure that its employees and contractors are aware of the importance minimising the impacts on air quality as a result of the cement production processes and specific mitigation measures.

This will be achieved by

1. Including Environmental related issues (Including fugitive dust) in the induction training package.
2. Offering extra training to personnel tasked with process monitoring functions
3. Communicate Environmental awareness topics (including air quality)

Monitoring and Evaluation

Lafarge South Africa will ensure that this DMP is reviewed annually and necessary changes thereto will be included in the revised version of this document