



LEADERS IN ENVIRONMENTAL MONITORING



ANGLO PLATINUM
RUSTENBURG PROCESS DIVISION

Monthly Dustfall Monitoring Report

July to August 2020

Prepared by Aquatico Scientific (Pty.) Ltd
Office: (012) 450 3846

REPORT DETAILS

REFERENCE	APPD-DF-08-2020
REPORT TITLE	Anglo Platinum – Rustenburg Process Division Monthly Dustfall Report
CLIENT	Dustin van Helsdingen Environmental Manager Western Limb Distribution Centre Rustenburg 0299 South Africa Email: dustin.vanhelsdingen@angloamerican.com
PREPARED BY	Werner Rossouw Aquatiko Scientific Route 21 Corporate Park 89 Regency Drive Irene Ext. 72 Centurion 0178 Tel: +27 12 450 3800 Email: werner@aquatiko.co.za
STATUS	Final
REPORTING SCOPE	This report will be considered to be a short information report and will include a brief evaluation of the monthly dustfall results over the monthly period. The report will include the dust fallout results for all the monitoring localities, time-series graphs, performance analyses and compliance assessments, dust fallout thematic maps as well as a discussion and recommendation section. The report will also highlight dust fallout results that may require urgent management actions from the mine.

Table of Content

1. INTRODUCTION	i
2. DATA INTERPRETATION AND EVALUATION	2
2.1 Data interpretation.....	2
2.2 Data evaluation	3
3. DUST MONITORING METHODOLOGY.....	5
4. MONITORING PROGRAMME.....	6
5. DUST FALLOUT RESULTS	8
6. DUST FALLOUT DISCUSSION.....	11
6.1. Important field notes	11
6.2. Assessment.....	11
7. RECOMMENDATIONS.....	11
8. REFERENCES	11

List of Tables

Table 1: South African National Dust Control Regulations.....	4
Table 2: Current dustfall monitoring localities at Anglo Process Division	6
Table 3: Anglo Process Division Monthly Dustfall Sampling Register	7
Table 4: Residential Dust Fallout results for monitoring period	8

List of Figures

Figure 1: Wind shield for dust container.....	5
Figure 2: Plan view of wind shield.....	5
Figure 3: Recorded dustfall results for the past monitoring month	9
Figure 4: Recorded dustfall results at residential sites for the past 12-month monitoring period.	10

LIST OF ACCRONYMS IN THIS REPORT

ACCRONYM	DEFINITION
ASTM D1739	American Standard for Testing and Materials method D1739, which is the standard test method for the collection and measurement of dust fall
Dust (or settleable particulate matter)	Any material composed of particles small enough to pass through a 1 mm screen and large enough to settle by virtue of their weight into the sampling container from the ambient air.
Dustfall	the deposition of dust
Dustfall monitoring programme	Monitoring of the dustfall on a continuous basis
Non-residential area	Any area not classified for residential use as per local town planning scheme
Residential area	Any area classified for residential use in terms of the local town planning scheme
AQA	National Environmental Management: Air Quality Act, 2004 (Act No.39 of 2004)
NDCR 2013	National Environmental Management: Air Quality Act (Act No. 39 of 2004): National dust control regulations, 2013. Government Gazette of 1 November 2013 (No 36974). Notice 827.
Draft NDCR 2018	National Environmental Management: Air Quality Act (Act No. 39 of 2004): National dust control regulations, 2018. Government Gazette of 25 May 2018 (No 41650). Notice 517.
DEA	Department of Environmental Affairs

**ANGLO AMERICAN
RUSTENBURG PROCESS DIVISION**

Monthly dustfall monitoring report

July to August 2020 data

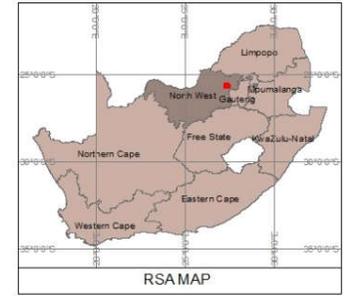
1. INTRODUCTION

Aquatico was commissioned by Anglo American to monitor ambient dustfall around its Rustenburg Process Division operations, specifically at local communities situated around these operations. This includes the sampling and analysis of dustfall at several representative localities on a monthly basis.

The Anglo Rustenburg Process Division is situated immediately to the north and east of the town Rustenburg in the Critical Zone of the western lobe of the Bushveld Complex. These operations include various plants including Precious Metal Refiners (PMR), Rustenburg Base Metal Refiners (RBMR), Waterval Smelter and the Anglo Converting Process (ACP) plant. Figure 1 below contains an aerial view map of these operations.

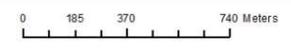
Various informal communities are situated around the Process Division operations, including Bokamoso, Mfidikwe, Nkaneng, Photsaneng, Thekwane and Zakhele. Dust stands to monitor the ambient dustfall were placed in each of these communities.





**ANGLO AMERICAN PLATINUM
DUST FALL-OUT
MONITORING PROGRAM**

- Legend**
- Dust Fallout Monitoring Locality



Projection - Transverse Mercator
Central Meridian - Lo27
Datum - WGS 1984

Aquatico Scientific
89 Regency Drive, R21 Corporate Park
Centurion, Pretoria
Tel: (012) – 450 3800



2. DATA INTERPRETATION AND EVALUATION

2.1 Data interpretation

Dust emissions is often defined in two broad based categories:

- Process sources:
 - Emissions typically released to the atmosphere through stacks. The emissions are generally created as a result of the physical and chemical alteration of raw material through industrial processes.
- Fugitive sources:
 - Emissions of solid particles from exposed material as a result of external forces such as wind or machinery.

Meteorological fluctuations and changes in operating procedures (i.e. material handling, mining procedures and activities) often plays an important role in the fluctuation of dustfall rates. Three meteorological parameters are often assessed when conduct dustfall assessments of a site and include:

- Local Wind Fields (Wind Speed and Wind Direction):
 - Local wind fields are generally illustrated through wind rose plots. Wind roses are useful for illustrating the prevailing wind speeds and directional frequency distributions of an area.
- Temperature
 - Ambient air temperature is important, both for determining the effect of plume buoyancy (the larger the temperature difference between the plume and the ambient air, the higher the plume is able to rise), and determining the development of the mixing and inversion layers.
- Rainfall
 - Rainfall requires consideration as it represents an effective removal mechanism of atmospheric pollutants, thereby improving the air quality situation in high rainfall areas.

Meteorological data may be included in this report in future to support monitoring results.

Dust monitoring generally aims to:

- Quantify an operation's contribution to dust deposition in the area;
- Identify potential problem or high-risk areas; and
- Assess compliance of the operation to relevant governing air quality standards.

Dust monitors that are subject to the dustfall limits set out by the National Dust Control Regulations, can be either of the following:

1. **Residential monitors**- means any dust monitor situated within an area classified for residential use as per the local town planning scheme.
2. **Non-Residential monitors** - means any dust monitor situated within an area not classified for residential use as per the local town planning scheme.

The dustfall monitoring programme should be implemented as to meet the following specifications:

1. The method to be used for measuring dust fallout rates and the guideline for locating sampling points shall be ASTM D1739: 2010, or equivalent method approved by any internationally recognized body.
2. The number and location of samplers shall be sufficient to monitor dust fallout at representative locations around the source, and will include monitors located at all human residences and sensitive businesses, industrial or agricultural locations within a maximum distance of 2 km from the source boundary (SANS, 1929: 2011).
3. Micro-surroundings of the samplers shall, where possible, comply with ASTM D1739. The ASTM D1739 (2010) makes the following recommendations for selecting a dust fallout monitoring site:
 - a. The sampling site should be in an open area, free of structures higher than 1 m within a 20 m radius of the container stand. It should be away from local sources of pollution and objects that could affect the settling of particulate matter, such as trees, and air exhausts and intakes. Accessibility and security from vandalism are major considerations in the selection of a site.
 - b. Elevations to higher objects within 20 m should not exceed 30° from the horizontal.
 - c. Open areas around police and fire stations and libraries are often suitable because of their accessibility and security.
 - d. Avoid siting the containers near chimneys. Whenever possible, the sampling site shall be more than ten stack-lengths from an operating stack and upwind from it in accordance with the most frequent wind direction.

2.2 Data evaluation

The DEA issued National Dust Control Regulations on 1 November 2013 (National dust control regulations, 2013. Government Gazette of 1 November 2013 (No 36974). Notice 827.). The purpose of the regulations is to prescribe general measures for the control of dust in all areas. The regulations prohibit activities which give rise to dust in such quantities and concentrations that the dust fall at the boundary or beyond the boundary of the premises where it originates exceeds:

- a) 600 mg/m²/day averaged over 30 days in residential areas measured using reference method ASTM D1739.
- b) 1 200 mg/m²/day averaged over 30 days in non-residential areas measured using reference method ASTM D1739.

Updated draft National Dust Control Regulations were published on 25 May 2018. The draft regulations prescribe the method that should be used for undertaking dust fallout monitoring, which includes the use of dust bucket stations with a wind shield.

Table 1: South African National Dust Control Regulations.

RESTRICTION AREAS	DUST FALLOUT RATE (D) ⁽¹⁾	FREQUENCY OF EXCEEDANCE
Residential Areas	D < 600	Two within a year, no two sequential months ⁽²⁾
Non-residential areas	600 < D < 1200	Two within a year, no two sequential months ⁽²⁾
<u>Notes:</u> (1) Averaged over 1 month (30±2-day average) (mg/m ² /day) (2) Per dust fallout monitoring site.		

Any person who has exceeded the dust control standard must, within three months after submission of a dust fallout monitoring report, develop and submit a dust management plan to the air quality officer for approval. The dust management plan must:

- a) Identify all possible sources of dust within the affected site;
- b) Detail the best practicable measures to be undertaken to mitigate dust emissions;
- c) Develop an implementation schedule;
- d) Identify the line management responsible for implementation;
- e) Incorporate the dust fallout monitoring plan;
- f) Establish a register for recording all complaints received by the person regarding dust fall, and for recording follow up actions and responses to the complainants.

The dust management plan must be implemented within a month of the date of approval. An implementation progress report must be submitted to the air quality officer at agreed time intervals.

The variable maps may be viewed under **Appendix A**. Please note that the size reference is in line with the selected guideline limit. The closer a recorded concentration comes to the set limit the larger the circle displayed.

A test report of the analysis done by Aquatico Laboratories is attached to this report under **Appendix B**.

3. DUST MONITORING METHODOLOGY

Dustfall is to be measured using the standard dust bucket method. The dust bucket method comprises the use of a bucket and a bucket-stand, which is set up in priority dust fallout areas. The device consists of a cylindrical open-topped container not less than 150 mm in diameter with height not less than twice its diameter, which is placed on a bucket stand 2 m high and is firmly secured to the ground. The device will also include a wind shield, constructed in accordance with Figure 2 and Figure 3 (ASTM D1739: 2010).

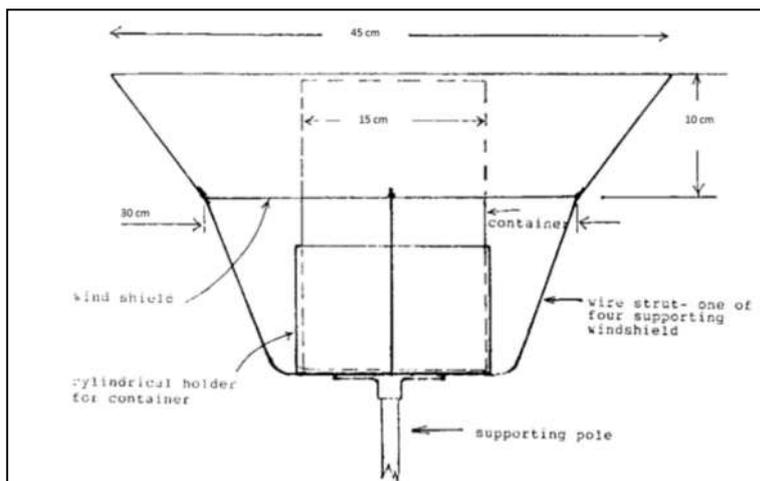


Figure 1: Wind shield for dust container

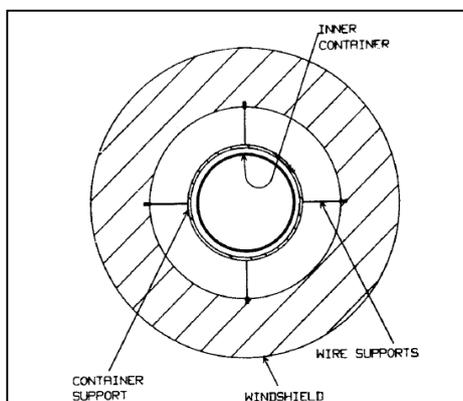


Figure 2: Plan view of wind shield

The bucket is left exposed in the field for one calendar month to environmental conditions (30 ± 2 days).

Buckets that have been exposed to field conditions for the monitoring period are returned to the laboratory and the buckets are rinsed with deionised water to remove residue from the sides of the bucket. The bucket contents, including the rinsed water, are filtered through a coarse (>1 mm) screen to remove insects and other coarse organic detritus. The sample is then filtered through a

pre-weighed paper membrane to remove the insoluble fraction, or dust fallout. The residue and filter are dried, and gravimetrically analysed to determine the insoluble fraction (dustfall).

The dustfall results for the monitoring period (usually 30 days) are divided by the amount of sampling days for that period and in this way, the average dust fallout per day is expressed in mg/m²/day.

4. MONITORING PROGRAMME

A total of six (6) dustfall monitoring stations form part of the current dustfall monitoring programme at Anglo Rustenburg. The dustfall monitoring programme map and locality table is presented as Figure 1 and Table 2.

Table 2: Current dustfall monitoring localities at Anglo Process Division

Rustenburg platinum mines dustfall localities				
Locality name	Description	Latitude	Longitude	Classification
DB Bokamoso	Dust bucket at Bokamoso	S25.67451	E27.34781	Residential
DB Mfidikwe	Dust bucket at Mfidikwe	S25.66338	E27.34635	Residential
DB Photsaneng	Dust bucket at Photsaneng	S25.68646	E27.38188	Residential
DB Thekwane 1	Dust bucket 1 at Thekwane next to school	S25.65835	E27.36644	Residential
DB Thekwane 2	Dust bucket 2 at Thekwane	S25.65504	E27.37485	Residential
DB Zakhele	Dust bucket at Zakhele	S25.65315	E27.33259	Residential

A dust stand was originally included in the Nkaneng community; the owner of the property then demanded compensation for having the dust stand in their yard and would not allow access to the property. This stand was therefore removed from the programme.

Table 3: Anglo Process Division Monthly Dustfall Sampling Register

Anglo Rustenburg Dustfall monitoring									
Locality	Description	Coordinates		Placement date	Retrieval date	Status	Flow/Level/Dust Days	Remarks	Lab no
		Latitude	Longitude						
Dust fallout									
DB Bokamoso	Dust bucket at Bokamoso	S25.67451	E27.34782	2020/07/21 11:04	2020/08/20 09:14	Yes	30 Days	DUST	36646
DB Mfidikwe	Dust bucket at Mfidikwe	S25.66338	E27.34632	2020/07/21 12:04	2020/08/20 12:45	Yes	30 Days	DUST	36647
DB Photsaneng	Dust bucket at Photsaneng	S25.68644	E27.38199	2020/07/21 14:03	2020/08/20 11:25	Yes	30 Days	DUST	36648
DB Thekwane 1	Dust bucket 1 at Thekwane next to school	S25.65836	E27.36640	2020/07/21 12:15	2020/08/17 13:15	Yes	27 Days	DUST	35365
DB Thekwane 2	Dust bucket 2 at Thekwane	S25.65506	E27.37486	2020/07/21 12:56	2020/08/17 12:37	Yes	27 Days	DUST	35366
DB Zakhele	Dust bucket at Zakhele	S25.65294	E27.33258	2020/07/21 11:30	2020/08/19 13:54	Yes	29 Days	DUST	36322

5. DUST FALLOUT RESULTS

Table 4 presents the recorded dustfall data for the current monitoring period for each of the Residential classified dustfall monitoring localities respectively. Figures 4 and 5 present graphs of the data recorded for each locality for the last 12 months (calendar Months).

Table 4: Residential Dust Fallout results for monitoring period

DATA TABLE:					
PROJECT NAME		Anglo Rustenburg Dust fall-out monitoring			
ASSESSMENT SET		GN 827 Ambient Air Quality evaluation criteria for dust fall out monitoring: Residential			
Red Value exceeds the assessment set					
VARIABLE	Dust - Insoluble	Dust - Soluble	Dust - Rate	Dust - Rate	Complies with / exceeds dustfall guideline
UNITS	g/m ² /day	g/m ² /day	g/m ² /day	mg/m ² /day	
ASSESSMENT SET	0.6	-	0.6	600	
DB Bokamoso	0.241	0.03	0.271	271	Complies
DB Mfidikwe	0.396	0.036	0.432	432	Complies
DB Photsaneng	0.178	0.027	0.205	205	Complies
DB Thekwane 1	0.046	0.027	0.073	73	Complies
DB Thekwane 2	0.03	0.028	0.058	58	Complies
DB Zakhele	0.163	0.025	0.188	188	Complies



Dust deposition results for Anglo Platinum residential sites July to August 2020

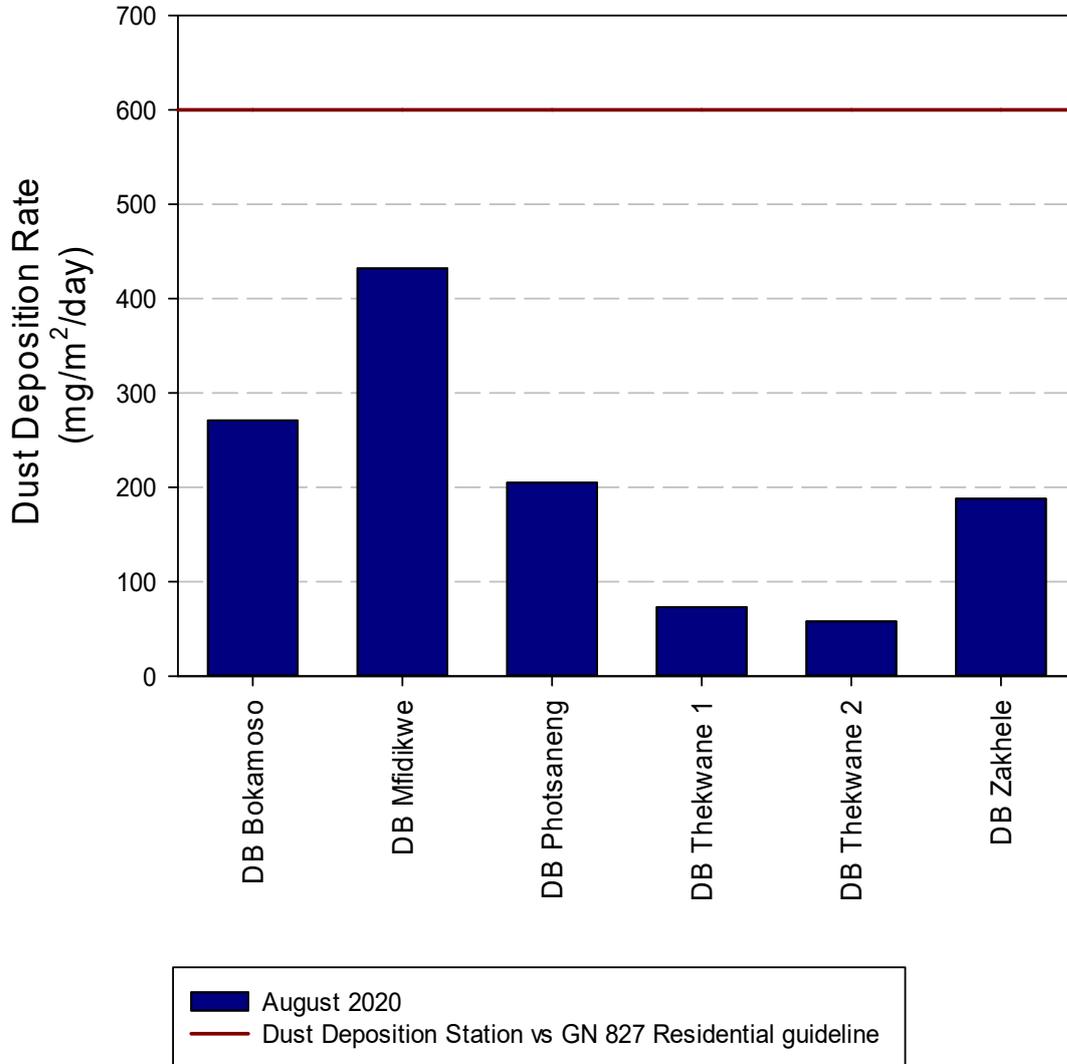


Figure 3: Recorded dustfall results for the past monitoring month

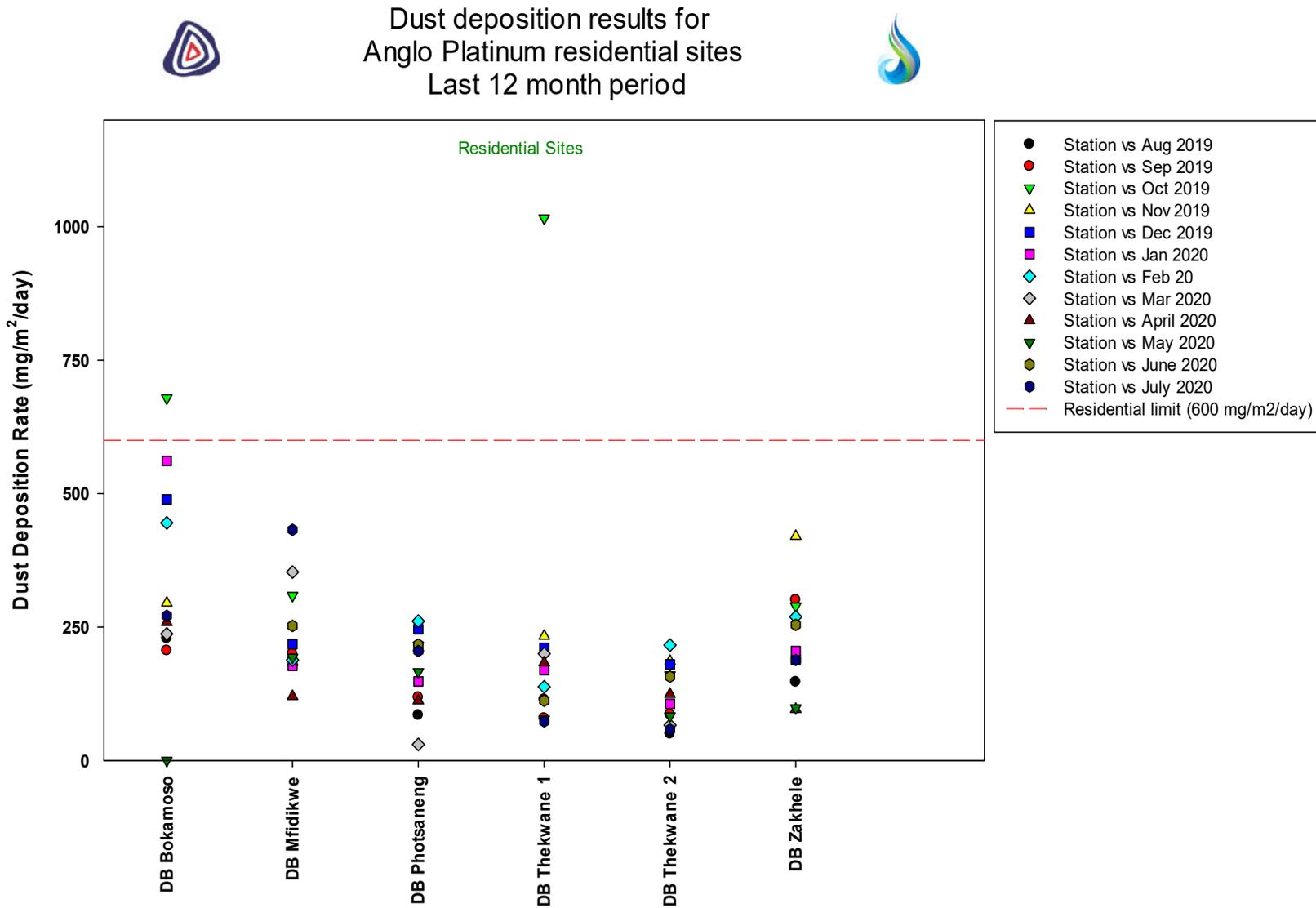


Figure 4: Recorded dustfall results at residential sites for the past 12-month monitoring period.

6. DUST FALLOUT DISCUSSION

6.1. Important field notes

- No relevant field observations were made.

6.2. Assessment

Dustfall Rate exceedances for the past 30-day monitoring period
Residential guideline limit (600 mg/m ² /day)
No exceedances

Figure 5 shows results for the dustfall localities during the past 12-month monitoring period. Localities that exceeded the guideline limits more than twice (or two consecutive months) and fall outside the permitted exceedance frequency (as per the NDCR) are listed below.

Residential

- None exceed the NDCR guidelines

Low overall dustfall was seen during the past 30-day monitoring period.

7. RECOMMENDATIONS

- Weather data may be included to support monthly dustfall results.
- The community should be liaised with as to not remove and take the dustfall buckets for monitoring.

8. REFERENCES

South African National Standard (SANS) 1137:2012. The Standard test method for collection and measurement of dust fall (Settleable Particulate Matter).

Department of Environmental Affairs (DEA) 2013. National Dust Control Regulations (Act no.39 of 2004).

ASTM International D1739 – 98. (2017). *Standard Test Method for Collection and Measurement of Dustfall (Settleable Particulate Matter)*. Philadelphia, PA: ASTM Data Serie

Appendix A

Variable maps





www.aqu



aquatico
Scientific (Pty.) Ltd.

Anglo Rustenburg Dustfall monitoring

ANGLO DUST MAP

FIGURE 1

Legend

● Complies with guideline	● No Assessment
● Does not comply with guideline	

VARIABLE ASSESSMENT
Dust - Rate
ASSESSMENT SET
GN 827: Residential
DATA DATE
11-Aug-20
COMPOSED BY
Werner Rossouw

Appendix B

Test Report



Test Report

Page 1 of 2

Client: Anglo Platinum - Rustenburg environmental
Address: Group Environmental Offices, Central SHE Complex, Rustenburg, South Africa
Report no: 90858
Project: Anglo Rustenburg Dustfall monitoring

Date of report: 20 August 2020
Date accepted: 17 August 2020
Date completed: 20 August 2020
Date received: 17 August 2020

Lab no:				35365	35366
Date sampled:				17-Aug-20	17-Aug-20
Aquatico sampled:				Yes	Yes
Sample type:				Dust	Dust
Locality description:				DB	DB
Analyses				Thekwane 1	Thekwane 2
		Unit	Method		
N	Diameter	cm	EXT	17.2	17.2
N	Days	Days	EXT	27	27
N	Placement	Date	EXT	21-Jul-20	21-Jul-20
N	Retrieval	Date	EXT	17-Aug-20	17-Aug-20
A	Pre Weight	g	ALM 27	51.4143	53.8017
A	Post Weight - Insoluble	g	ALM 27	51.4433	53.8205
A	Dust Deposition - Insoluble	g/m ² /day	ALM 27	0.046	0.030
A	Dust Deposition - Soluble	g/m ² /day	ALM 27	0.027	0.028
A	Dust Deposition - Rate	g/m ² /day	ALM 27	0.073	0.058
A	Post Weight - Soluble	g	ALM 27	44.9606	45.4990
A	Pre Weight - Soluble	g	ALM 27	44.9439	45.4817

A = Accredited N = Non accredited Out = Outsourced Sub = Sub-contracted NR = Not requested RTF = Results to follow NATD = Not able to determine ATR = Alternative test report ; Results only apply to the samples as received and tested; Results reported against the limit of detection; Results marked 'Non SANAS Accredited' in this report are not included in the SANAS Schedule of Accreditation for this laboratory; Uncertainty of measurement available on request for all methods included in the SANAS Schedule of Accreditation; The report shall not be reproduced except in full without approval of the laboratory
 Results may be affected by deviation; EXT = external information provided can affect the validity of the results.

Test Report

Page 2 of 2

Client:	Anglo Platinum - Rustenburg environmental	Date of report:	20 August 2020
Address:	Group Environmental Offices, Central SHE Complex, Rustenburg, South Africa	Date accepted:	17 August 2020
Report no:	90858	Date completed:	20 August 2020
Project:	Anglo Rustenburg Dustfall monitoring	Date received:	17 August 2020

Lab no:	Locality:	Variable:	Deviation:
35365	DB Thekwane 1	Days	Sampling period should be between 28-32 days
35366	DB Thekwane 2	Days	Sampling period should be between 28-32 days

A = Accredited N = Non accredited Out = Outsourced Sub = Sub-contracted NR = Not requested RTF = Results to follow NATD = Not able to determine ATR = Alternative test report ; Results only apply to the samples as received and tested; Results reported against the limit of detection; Results marked 'Non SANAS Accredited' in this report are not included in the SANAS Schedule of Accreditation for this laboratory; Uncertainty of measurement available on request for all methods included in the SANAS Schedule of Accreditation; The report shall not be reproduced except in full without approval of the laboratory
 Results may be affected by deviation; EXT = external information provided can affect the validity of the results.

Authenticated signature on first page

Test Report

Page 1 of 1

Client: Anglo Platinum - Rustenburg environmental
Address: Group Environmental Offices, Central SHE Complex, Rustenburg, South Africa,
Report no: 91026
Project: Anglo Rustenburg Dustfall monitoring

Date of report: 22 August 2020
Date accepted: 19 August 2020
Date completed: 21 August 2020
Date received: 19 August 2020

Lab no:	36322		
Date sampled:	19-Aug-20		
Aquatico sampled:	Yes		
Sample type:	Dust		
Locality description:	DB Zakhele		
Analyses	Unit	Method	
N Diameter	cm	EXT	17.2
N Days	Days	EXT	29
N Placement	Date	EXT	21-Jul-20
N Retrieval	Date	EXT	19-Aug-20
A Pre Weight	g	ALM 27	54.3816
A Post Weight - Insoluble	g	ALM 27	54.4916
A Dust Deposition - Insoluble	g/m ² /day	ALM 27	0.163
A Dust Deposition - Soluble	g/m ² /day	ALM 27	0.025
A Dust Deposition - Rate	g/m ² /day	ALM 27	0.188
A Post Weight - Soluble	g	ALM 27	44.0750
A Pre Weight - Soluble	g	ALM 27	44.0584

A = Accredited N = Non accredited Out = Outsourced Sub = Sub-contracted NR = Not requested RTF = Results to follow NATD = Not able to determine ATR = Alternative test report ; Results only apply to the samples as received and tested; Results reported against the limit of detection; Results marked 'Non SANAS Accredited' in this report are not included in the SANAS Schedule of Accreditation for this laboratory; Uncertainty of measurement available on request for all methods included in the SANAS Schedule of Accreditation; The report shall not be reproduced except in full without approval of the laboratory
 EXT = external information provided can affect the validity of the results.

Test Report

Page 1 of 1

Client: Anglo Platinum - Rustenburg environmental
Address: Group Environmental Offices, Central SHE Complex, Rustenburg, South Africa,
Report no: 91105
Project: Anglo Rustenburg Dustfall monitoring

Date of report: 23 August 2020
Date accepted: 21 August 2020
Date completed: 23 August 2020
Date received: 20 August 2020

Lab no:			36646	36647	36648
Date sampled:			20-Aug-20	20-Aug-20	20-Aug-20
Aquatico sampled:			Yes	Yes	Yes
Sample type:			Dust	Dust	Dust
Locality description:			DB Bokamoso	DB Mfidikwe	DB Photsaneng
Analyses	Unit	Method			
N Diameter	cm	EXT	17.2	17.2	17.2
N Days	Days	EXT	30	30	30
N Placement	Date	EXT	21-Jul-20	21-Jul-20	21-Jul-20
N Retrieval	Date	EXT	20-Aug-20	20-Aug-20	20-Aug-20
A Pre Weight	g	ALM 27	52.3628	53.7279	52.4266
A Post Weight - Insoluble	g	ALM 27	52.5309	54.0039	52.5509
A Dust Deposition - Insoluble	g/m ² /day	ALM 27	0.241	0.396	0.178
A Dust Deposition - Soluble	g/m ² /day	ALM 27	0.030	0.036	0.027
A Dust Deposition - Rate	g/m ² /day	ALM 27	0.271	0.432	0.205
A Post Weight - Soluble	g	ALM 27	42.1373	45.6965	44.1487
A Pre Weight - Soluble	g	ALM 27	42.1167	45.6711	44.1296

A = Accredited N = Non accredited Out = Outsourced Sub = Sub-contracted NR = Not requested RTF = Results to follow NATD = Not able to determine ATR = Alternative test report ; Results only apply to the samples as received and tested; Results reported against the limit of detection; Results marked 'Non SANAS Accredited' in this report are not included in the SANAS Schedule of Accreditation for this laboratory; Uncertainty of measurement available on request for all methods included in the SANAS Schedule of Accreditation; The report shall not be reproduced except in full without approval of the laboratory
 EXT = external information provided can affect the validity of the results.