

CAPE BENTONITE MINE: IMERY'S REFRACTORY MINERALS

QUARTER 1:
CATEGORY A MINE



ENVIRONMENTAL & OCCUPATIONAL HEALTH

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REPORT ON AN OCCUPATIONAL HYGIENE SURVEY 2024

DMR FILE NO 11/ 8/ 7/ 10/ 6
SIMRAC - 12243



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STATEMENT

I, C.D. le Roux (SAIOH registration no. 0327), declare on behalf of EXCO Services, as a SANAS Accredited Inspection Body (certification no. OH0077) and a Department of Employment and Labour Approved Inspection Authority (certification no. OH0077 - CI 011) that the results and findings of this report are a true reflection of the conditions that were encountered at the time of the survey.

All recommendations and suggestions are made in good faith and EXCO Services would make reasonable effort to ensure that such recommendations are viable and practicable.

However, EXCO Services and its employees assume no liability or responsibility for any loss, damage, injury, cost or expense, whether of a financial or other nature, directly or consequentially incurred by the Client based on this report.

This report only pertains to the conditions found at Cape Bentonite Mine (Heidelberg) at the time of the survey. The content of this document, or any part thereof, may not be reproduced or transmitted in any form or by any means, electronic, physical or otherwise, without prior written approval of the author.

APPROVAL

REPORT COMPILED & APPROVED BY
Le Roux Bothma OCCUPATIONAL HYGIENE CONSULTANT (MEC & SAIOH, ROH)

_____ SIGNATURE
_____ 31/03/2024 DATE OF ISSUE

ACKNOWLEDGEMENT OF RECEIPT

ON BEHALF OF CAPE BENTONITE MINE
Mr. Helmut Gemurr MANAGER
_____ SIGNATURE
_____ DATE

DISTRIBUTION LIST

Copy No.	Attention	Name and Contact Details of Concern
1.	Mr. H. Gemurr	Cape Bentonite Mine P.O. Box 242 Heidelberg 6665 Tel 028 722 2011 Fax 028 722 2927 Cell 060 983 0102 E-mail: helmut.gemurr@imerys.com
2.	Library	EXCO Services P.O. Box 6577 Welgemoed Bellville 7538 Tel 021 913 8422 Fax 086 670 5282 Cell 083 554 1419 E-mail: info@excocoservices.co.za
3.	DMR Western Cape	Acting Principal Inspector (Att. Mr. Lindsay Polley) Western Cape Region Private Bag X9 Roggebaai 8012 Tel 021 427 1023 Fax 021 427 1047/086 710 0984 Cell 082 461 4247 E-mail: Lindsay.polley@dmre.gov.za

CAPE BENTONITE MINE WORKERS**1st QUARTER 2024 (As Supplied)****HEG 1: MINING (15)**

NO. OF EMPLOYEES	OCCUPATION	DMR CODE
2	Quarry Supervisor/ Excavator Op.	30204/21105
2	Excavator Operators	21105
10	Truck Drivers	21109
1	Dozer Operator	21103

HEG 2: PLANT (34)

NO. OF EMPLOYEES	OCCUPATION	DMR CODE
2	Front End Loader Operators	21104
12	Dryermen/ Process Attendants	30406/30299
2	Crusher Attendants	30207
10	Plant Workers	30299
4	Forklift Operators	80905
4	General Workers	30299

HEG 3: ROAMING & OTHER (26)

NO. OF EMPLOYEES	OCCUPATION	DMR CODE
1	Mine Manager	00101
1	Production Manager	00101
1	Site Administrator	30204
1	Geologist	50101
1	Geologist Assistant	50108
1	Mechanic	40473
2	Mechanic Assistants	40480
2	Electricians	40314
1	Electrician Assistant	40317
2	Fitters	40428
1	Fitter Assistant	40434
5	Admin staff	29995
4	Laboratory Staff	50406
3	Process Controllers	30203
1	Stores Controller	10310

TOTAL = 75

OPERATION DETAILS

ANNEXURE 1: The substitution of the form 21.9 (2) (f) with the following form:

Operational – Report Form 21.9(2)(f)

			Pages/Report		
Report Exposure Level	Airborne Pollutants	✓	8	Sampling Period	1 st QTR 2024 Jan – Mar
	Thermal Stress	✓	23(Heat)		
	Noise				
DMRE Mine Code	11/8/7/10/6	DMRE Sub Mine Code	12243		

Mine	CAPE BENTONITE MINE				
Address	P.O. BOX 242	Control Group	IMERY'S REFRACTORY MINERALS (PTY) LTD		
	HEIDELBERG	Commodities	BENTONITE		
Area Code	6665				

Section 4.1 Details

Employer Name	MR. HELMUT GEMURR	Production	BENTONITE
Telephone	028 722 2011		
Cell phone	060 983 0102	Process	DRYING, CRUSHING, SCREENING & BAGGING
Email	HELMUT.GEMURR@IMERY'S.COM		

Section 12.1 Details

Full Time	Part Time	MEC Certificate No.	Intermediate MEC Certificate No.	SAIOH Registration
	✓	1303		1303


Name	LE ROUX BOTHMA	Cell Phone	079 438 9494
Telephone	021 913 8422	Email	LBOOTHMA@EXCOSERVICES.CO.ZA

Regulation 2.13.1 appointee details (appointed engineer)

Name		Cell Phone	
Telephone		Email	

Airborne Pollutants		No. of employees at Risk per pollutant	No. of Persons per category				Gases & Vapours	Total no. of employees at Risk per pollutant	No. of employees per category				Noise	No. of employees per category				Thermal Stress	No. of employees per category			
Substance	Code		A	B	C	D			Substance	Code	A	B		C	D	A	B		C	D	A	B
Alpha Quartz	522	48	-	12	53	10	-	-	-	-	-	-	-	-	-	Heat	-	-	49	26		
PNOC	459	48	-	-	53	22	-	-	-	-	-	-	-	-	-	Cold	-	-	-	-		

Labour	Permanent	Contractors	Total Labour
	75	-	75

Section 4.1 appointee			Section 12.1 appointee			Regulation 2.13.1 appointee (Appointed engineer)		
Name and Surname	Signature	Date	Name and Surname	Signature	Date	Name and Surname	Signature	Date
			Le Roux Bothma		31/03/2024			

1 AIRBORNE CONTAMINANTS

1.1 Purpose of Survey

This survey was performed to:

- Comply with legal requirements;
- Determine airborne contaminant concentrations and personal exposure of employees;
- Determine whether exposure levels are within the set legal limits;
- Link workers exposure levels to their health; and
- Make recommendations with regard to engineering, administrative, personal protective equipment (ppe) and other control measures in order to counter exposure risks effectively.

The following consultant from EXCO Services, who has a Certificate in Mine Environmental Control, visited the Cape Bentonite Mine near Heidelberg on **02 February and 08 March 2024** to perform the necessary measurements:

- Le Roux Bothma (MEC & SAIOH ROH, reg. no. 1303).

1.2 Survey Methodology

Monitoring and analysis were performed according to methodology of the NIOSH Manual of Analytical Methods and included the following:

- NIOSH 7602 - Alpha Quartz (Silica crystalline).

The following instruments and equipment were used:

- Gilian Gilair constant-flow sampling pumps, calibrated at 2.2l/min respectively;
- Gilian Gilibrator primary calibration unit (Serial No. 009106-S);
- 0.8µm pore-size cellulose nitrate membrane filters (37mm diameter, placed in sampling cassettes);
- Respirable Fraction Cyclones;
- Shimadzu AUW102D Electronic Microbalance (Serial No. D449928344); and
- Infrared Absorption Spectrophotometer.

1.3 Sampling Strategy

The workers were divided into Homogeneous Exposure Groups (HEG's). A HEG is defined as a group of employees who experience similar pollutant exposure. Therefore, monitoring dust exposures of any representative subgroup of employees in the HEG will provide data useful for predicting exposures of the remaining employees.

For crushing plants there are normally three (3) HEG's namely:

- **HEG 1:** Workers at the Mine;
- **HEG 2:** All the workers at the Plant; and
- **HEG 3:** Roving workers.

Pre-weighed filter papers, placed in sampling cassettes, are obtained from an approved laboratory. A sampling cassette, loaded with the filter, is mounted onto a respirable fraction cyclone, which is then connected to the sampling pump by means of plastic tubing. To obtain the personal exposure of an employee, the unit containing the filter is placed within the breathing zone of the worker.

The sampling pump is calibrated to a flow rate of 2.2 litres per minute. At this flow rate the coarse dust is separated from the respirable dust by means of the cyclone, allowing only the respirable particles to deposit onto the filter paper. The filter paper, laden with dust, is then re-weighed and the mass of the dust deposited on the filter is calculated. Thereafter, the filter is sent to an SANAS approved analytical laboratory where it is analysed to determine the alpha quartz and PNOC (Particles Not Otherwise Classified) contents. The analysis results are incorporated into the formulas below, which is used to calculate an Air Quality Index (AQI).

Dust monitoring conducted was representative of normal working activities prevailing on that day.

1.4 Calculation Formula

MEAN POLLUTANT CONCENTRATION DOSE ALLOCATED TO MEDICAL RECORD IN mg/m³	MEAN POLLUTANT CONCENTRATION DOSE ALLOCATED TO MEDICAL RECORD IN mg/m³	AIR QUALITY INDEX (AQI)
Time Weighted Average (TWA) dust concentration x Alpha quartz percentage ÷ 100	Time Weighted Average (TWA) dust concentration x PNOC percentage ÷ 100	AQI = (MX/10) + M(0.33 - 0.0033X)
Where: TWA = Time Weighted Average Alpha Quartz: OEL=0.1mg/m ³ Action level = 0.05 mg/m ³ Where: OEL: Occupational Exposure Limit mg/m ³ : milligram per cubic meter	Where: TWA = Time Weighted Average PNOC: OEL=3 mg/m ³ Action level = 1.5 mg/m ³ Where: OEL: Occupational Exposure Limit mg/m ³ : milligram per cubic meter	Where: AQI = Air Quality Index M = Time Weighted Average (TWA) dust concentration; and X = Respirable alpha quartz content (%) <ul style="list-style-type: none"> • An AQI of < 0.50 is acceptable. • An AQI of 0.5 to 0.99 is the action level. • An AQI of ≥ 1 is unacceptable. Limit = 1

1.5 Conditions during Surveys

02 February & 08 March 2024 (1st & 2nd Surveys 2024)

The weather conditions during the 1st survey was sunny and warm, with a light moderate south-easterly wind blowing.

The weather conditions during the 2nd survey was partly cloudy and warm, with a light to moderate south-easterly wind blowing.

1.6 Alpha Quartz

The respirable dust samples were subjected to in-house gravimetric analysis, whereafter it was sent to *Chemtech Laboratory Services* (SANAS accredited testing laboratory, TO 316) for the determination of crystalline silica (alpha quartz) levels according to a method based on NIOSH 7602 (IR).

The percentage alpha quartz by analysis per sample ranged from **1.14%** up to **23.33%**. Each individual sampling analysis result was used for the calculation of the Alpha Quartz - TWA's and the AQI's.

1.7 Results and Recommendations

The summaries reflected in Table 1 and Figure 1 are for your convenience (see below). It is a DMR requirement that the results be submitted on prescribed forms (see pages 18 - 20).

TABLE 1: ALPHA QUARTZ-TWA AND AIR QUALITY INDICES. CAPE BENTONITE MINE, HEIDELBERG. 02 FEBRUARY AND 08 MARCH 2024.

Sample Details	Airborne Pollutant Conc. TWA		Reason	Action Required (if any)
02 FEBRUARY 2024				
HEG 1: Mine				
GM 1488 - A. Fredericks - Truck Driver HINO 2841 (CB08) (21109)	Alpha Quartz (522):	0.009 mg/m ³ (2.06%)	<ul style="list-style-type: none"> Air-conditioning system of vehicle is operational. Cabin windows and door were kept closed throughout the day. Minimal visible dust was noted inside the vehicle cabin. Dry, dusty conditions. The Water Truck was active at the Mine. 	<ul style="list-style-type: none"> Current maintenance programme should be continued to ensure the air-conditioning system of vehicle is functioning properly throughout shifts. Keep all current practices in place.
	PNOC (459):	0.429 mg/m ³		
	AQI:	0.23		
GM 1489 - W. Miola - Quarry Supervisor/ Excavator Operator (CAT 320DL) (30204/ 21105)	Alpha Quartz (522):	0.030 mg/m ³ (7.45%)	<ul style="list-style-type: none"> Air-conditioning system of vehicle was not fully operational. Cabin windows and door were kept closed throughout the day. Minimal visible dust was noted inside the vehicle cabin. Dry, dusty conditions. The Water Truck was active at the Mine. 	<ul style="list-style-type: none"> Employees should be trained on safe working practices so that they notice higher risk areas and enter safely with the use of a FFP2 dust mask. Repair air-conditioning system of vehicle. Keep all current practices in place.
	PNOC (459):	0.379 mg/m ³		
	AQI:	0.43		
GM 1490 - M. Bester	Alpha Quartz (522):	0.057 mg/m³ (6.02%)	<ul style="list-style-type: none"> Air-conditioning system of vehicle was not fully operational. 	<ul style="list-style-type: none"> Employees should be trained on safe working practices so that they notice higher risk areas

Sample Details	Airborne Pollutant Conc. TWA		Reason	Action Required (if any)
- Truck Driver (UD Quester CGE 420) (21109)	PNOC (459):	0.895 mg/m ³	<ul style="list-style-type: none"> Cabin windows were kept closed throughout the day. Some visible dust was noted inside the vehicle cabin. Dry, dusty conditions. The Water Truck was active at the Mine. 	<p>and enter safely with the use of a FFP2 dust mask.</p> <ul style="list-style-type: none"> Repair air-conditioning system of vehicle. Draw up maintenance programme to ensure the air-conditioning system of vehicle is functioning properly throughout the entire shift and that the vehicle cabin seals correctly to reduce airborne dust from migrating into vehicle cabin.
	AQI:	0.87		
GM 1491 - L. Plaatjies - Excavator Operator (Hitachi Zaxis 280) (21105)	Alpha Quartz (522):	0.006 mg/m ³ (2.80%)	<ul style="list-style-type: none"> Air-conditioning system of vehicle is operational. Cabin windows and door were kept closed throughout the day. Minimal visible dust was noted inside the vehicle cabin. Dry, dusty conditions. The Water Truck was active at the Mine. 	<ul style="list-style-type: none"> Current maintenance programme should be continued to ensure the air-conditioning system of vehicle is functioning properly throughout shifts. Keep all current practices in place.
	PNOC (459):	0.202 mg/m ³		
	AQI:	0.13		
GM 1492 - D. Hill - Truck Driver (UD Quester CWE 330, CB011) (21109)	Alpha Quartz (522):	0.011 mg/m ³ (4.66%)	<ul style="list-style-type: none"> Air-conditioning system of vehicle is operational. Cabin windows and door were kept closed throughout the day. Minimal visible dust was noted inside the vehicle cabin. Dry, dusty conditions. The Water Truck was active at the Mine. 	<ul style="list-style-type: none"> Current maintenance programme should be continued to ensure the air-conditioning system of vehicle is functioning properly throughout shifts. Keep all current practices in place.
	PNOC (459):	0.215 mg/m ³		
	AQI:	0.18		
HEG 2: Plant				
GM 1493 - T. Meyer - Forklift Operator (80905)	Alpha Quartz (522):	0.047 mg/m ³ (12.42%)	<ul style="list-style-type: none"> Employee works between the Mills and Dispatch areas with the use of Respiratory Protective Equipment (FFP2). In certain instances, employees may work in close proximity to 	<ul style="list-style-type: none"> Maintain the current practice where employees are trained on safe working practices so that they make use of a FFP2 dust mask.
	PNOC (459):	0.332 mg/m ³		

Sample Details	Airborne Pollutant Conc. TWA		Reason	Action Required (if any)
	AQI:	0.58	<p>moving conveyors and other bagging machinery, which could result in increased dust exposure.</p> <ul style="list-style-type: none"> • Employees also perform bulk loading activities outdoors. • Depending on the wind direction, employees may be exposed to dust plumes originating from the bulk truck loading process. 	<ul style="list-style-type: none"> • Investigate the feasibility of automating the Bulk Loading process. • Keep all current practices in place.
GM 1494 - A. Lotz - Forklift Operator (80905)	Alpha Quartz (522):	0.005 mg/m ³ (1.32%)	<ul style="list-style-type: none"> • Employee works between the Mills and Dispatch areas with the use of Respiratory Protective Equipment (FFP2). • In certain instances, the employee may be in close proximity to moving conveyors and other bagging machinery that may contribute to higher dust exposure. 	<ul style="list-style-type: none"> • Maintain the current practice where employees are trained on safe working practices so that they make use of a FFP2 dust mask. • Keep all current practices in place.
	PNOC (459):	0.374 mg/m ³		
	AQI:	0.17		
HEG 3: Roaming				
GM 1495 - M. February - Store Controller (10310)	Alpha Quartz (522):	0.088 mg/m³ (10.68%)	<ul style="list-style-type: none"> • Employee roams between the Stores, Ambient environment, and the Plant. • Employee works with the use of Respiratory Protective Equipment (FFP2). • Store is naturally ventilated by means of an (pedestrian door) with an issue counter that is open towards the ambient environment and is left open for periods throughout the day. 	<ul style="list-style-type: none"> • Maintain the current practice where employees are trained on safe working practices so that they make use of a FFP2 dust mask. • Employee will be resampled during the next site visit for verification, to ensure no accidental sample tampering occurred. • Keep all current practices in place.
	PNOC (459):	0.736 mg/m ³		
	AQI:	1.13		

Sample Details	Airborne Pollutant Conc. TWA	Reason	Action Required (if any)	
Discussion of Results:				
<p>The weather conditions during the 1st survey were sunny and warm, with a light to moderate south-easterly wind blowing. A water truck was present at the mining area. Consequently, the volume of dust made airborne was kept to a minimum, contributing to the dust suppression efforts on-site. A symbolic safety sign indicating the compulsory use of dust masks was displayed at the entrance to the plant. Approved FFP2 dust masks were available should they be required.</p> <p>A total of eight (8) respirable dust samples were taken across two of the three HEGs. The vast majority of the samples reflected Alpha Quartz TWA concentrations and AQI results that complied with the designated action levels set for Alpha Quartz as well as for the AQI.</p> <p>However, the dust samples retrieved from the truck driver (GM 1490) and store controller (GM 1495) reflected Alpha Quartz TWA concentrations that exceeded the designated action level set at 0.05 mg/m³. Additionally, the calculated AQI results for samples GM 1490, GM 1493, and GM 1495 were found to be in excess of the AQI action level set at 0.5 and/or the AQI Limit of 1.</p> <p>Please note that during the current survey, the plant was non-operational for a duration of two (2) hours of the shift due to load shedding (10:00 - 12:00). Production was halted during this period.</p> <p>Please refer to the above table for the suitable required action (Table 1).</p>				
08 MARCH 2024				
HEG 2: Plant				
GM 1569 - S. du Toit - Front-End Loader Operator Volvo (21104)	Alpha Quartz (522):	0.007 mg/m ³ (23.33%)	<ul style="list-style-type: none"> Air-conditioning system of vehicle is operational. Cabin windows and door were kept closed throughout the day. Minimal visible dust was noted inside the vehicle cabin. Employee works between the Mills and Dispatch areas with the use of Respiratory Protective Equipment (FFP2). 	<ul style="list-style-type: none"> Keep all current practices in place. Maintain the current practice where employees are trained on safe working practices so that they make use of a FFP2 dust mask.
	PNOC (459):	0.022 mg/m ³		
	AQI:	0.08		
GM 1570 - D. Tenyana - Dryer Attendant (30406)	Alpha Quartz (522):	0.006 mg/m ³ (2.01%)	<ul style="list-style-type: none"> Employee works at Dryer area with the use of Respiratory Protective Equipment (FFP2). Dryer Area open towards the Ambient Environment. In certain instances, the employee may be in close proximity to moving conveyors and other bagging 	<ul style="list-style-type: none"> Keep all current practices in place. Maintain the current practice where employees are trained on safe working practices so that they make use of a FFP2 dust mask.
	PNOC (459):	0.268 mg/m ³		

Sample Details	Airborne Pollutant Conc. TWA		Reason	Action Required (if any)
	AQI:	0.15	<p>machinery that may contribute to higher dust exposure.</p> <ul style="list-style-type: none"> Conducting maintenance and cleaning activities at the Dryer. 	
GM 1573 - P. Davids - Plant Worker (A-Mill Operator) (30299)	Alpha Quartz (522):	0.026 mg/m ³ (3.18%)	<ul style="list-style-type: none"> Employee works at A-Mill area filling large bulk bags and making use of the Respiratory Protective Equipment (FFP2). The employee is a new operator. Area is equipped with mechanical ventilation system to remove excess airborne dust from workroom. In certain instances, the employee may be in close proximity to bag filling machinery that may contribute to higher dust exposure. Dusty conditions noted when bag filling nozzle is inserted and removed from the bulk bags. Conducting cleaning activities at the plant when required. 	<ul style="list-style-type: none"> Maintain the current practice where employees are trained on safe working practices so that they make use of a FFP2 dust mask. Ensure that the correct bag filling procedures are followed to ensure dust exposure is minimized. Operator must ensure that her body positioning is out of the extraction systems draft. Ensure that the nozzle of the bag filling machine is held firmly, to ensure that excess dust is limited. Keep all current practices in place.
	PNOC (459):	0.789mg/m ³		
	AQI:	0.52		
HEG 3: Roaming				
GM 1569 - K. Mrali - Laboratory Assistant (50406)	Alpha Quartz (522):	0.019 mg/m ³ (10.60%)	<ul style="list-style-type: none"> Employee roams between the Laboratory, Ambient environment, and the Plant. Employee works with the use of Respiratory Protective Equipment (FFP2). Laboratory fitted with split unit Air-conditioning system. Employee collects and prepares samples for sediment analyses several times per shift 	<ul style="list-style-type: none"> Keep all current practices in place. Maintain the current practice where employees are trained on safe working practices so that they make use of a FFP2 dust mask.
	PNOC (459):	0.162 mg/m ³		
	AQI:	0.24		

Sample Details	Airborne Pollutant Conc. TWA		Reason	Action Required (if any)
GM 1572 - J. Hine - Administrative Staff (29995)	Alpha Quartz (522):	0.004 mg/m ³ (1.14%)	<ul style="list-style-type: none"> Employee roams between the Admin Offices, Ambient environment, and the Plant. Employee works with the use of Respiratory Protective Equipment (FFP2). Office fitted with split unit Air-conditioning system. 	<ul style="list-style-type: none"> Keep all current practices in place. Maintain the current practice where employees are trained on safe working practices so that they make use of a FFP2 dust mask.
	PNOC (459):	0.678 mg/m ³		
	AQI:	0.31		
GM 1571 - R. Potgieter - Electrician (40314)	Alpha Quartz (522):	0.012 mg/m ³ (1.37%)	<ul style="list-style-type: none"> Working at Workshop Area. The employee roams the various areas of the mine throughout the day conducting maintenance activities where required. 	<ul style="list-style-type: none"> Employees should be trained on safe working practices so that when they need to do work in the ambient environment, it is done safely with the use of a FFP2 dust mask. Keep all current practices in place.
	PNOC (459):	0.837 mg/m ³		
	AQI:	0.40		
GM 1574 - T. van der Walt - Geologist Assistant (50108)	Alpha Quartz (522):	0.004 mg/m ³ (L.O.D.)	<ul style="list-style-type: none"> Employee roams between the Admin Offices, Ambient environment and the Plant. The employee roams the various mining areas throughout the day conducting sample drilling activities where required. In certain instances, the employee may be in close proximity to dusty drilling processes that may contribute to higher dust exposure. 	<ul style="list-style-type: none"> Employees should be trained on safe working practices so that when they need to do work in the ambient environment, it is done safely with the use of a FFP2 dust mask. Keep all current practices in place.
	PNOC (459):	0.005 mg/m ³		
	AQI:	0.04		

Discussion of Results:

The weather conditions during the 2nd survey was partly cloudy and warm, with a light to moderate south-easterly wind blowing. The symbolic safety sign, indicating the compulsory use of dust masks, was displayed at the entrance to the Plant. Approved FFP2 dust masks were available, should they be required.

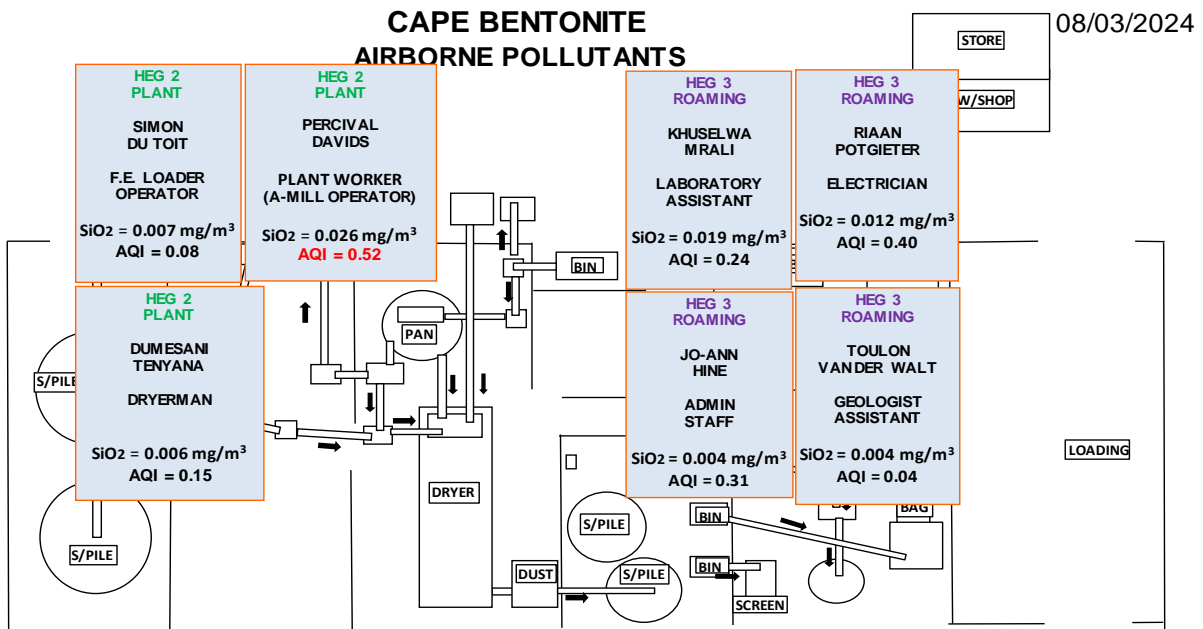
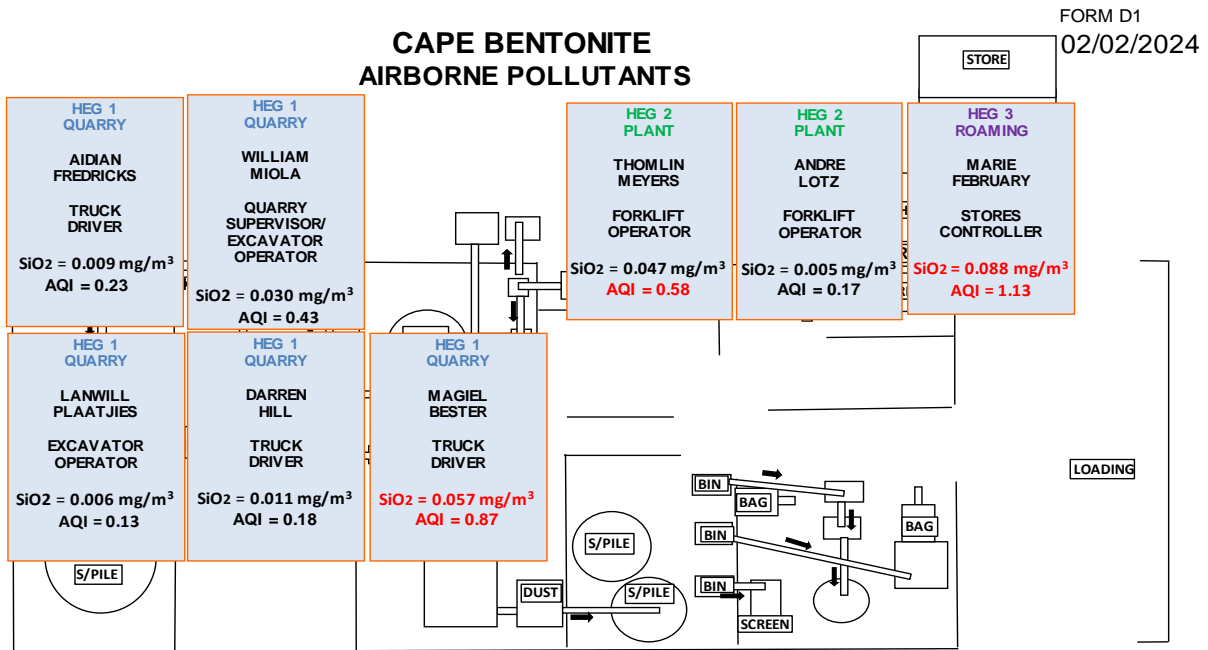
A total of seven (7) respirable dust samples were taken across the various HEG's. All of the samples taken reflected Alpha Quartz TWA concentration results that complied with the designated action level. However, the calculated AQI result for sample GM 1573 was found to be in excess of the AQI action level set at 0.5.

Please note that during the current survey, the plant was non-operational for a duration of two (2) hours of the shift due to loadshedding (08:00 - 10:00). Production was halted during this period.

Please refer to the above table for the suitable required action (Table 1).

Sample Details	Airborne Pollutant Conc. TWA	Reason	Action Required (if any)
PNOC: Particles Not Otherwise Classified AQI: Air Quality Index OEL: Occupational Exposure Limit TWA: Time Weighted Average mg/m ³ : milligram per cubic meter Please note: Values indicated in red reflects an excess of action level		L.O.D.: Limit of Detection Alpha Quartz: OEL = 0.1 mg/m ³ PNOC OEL = 3 mg/m ³ AQI: Limit = 1 Please note that categorisation of the mine is based on all of the abovementioned results:	action level = 0.05 mg/m ³ action level = 1.50 mg/m ³ action level = 0.5 CAT A: ≥ OEL's and/or ≥ AQI Limit of 1 CAT B: ≥ 50 % of all OEL's and/or ≥ 50 % AQI Limit of 1 CAT C: ≥ 10 % of all OEL's and/or ≥ 10 % AQI Limit of 1 CAT D: ≤ 10 % of all OEL's and/or ≤ 10 % AQI Limit of 1

Figure 1: Measuring Positions for Airborne Contaminants.



Mine Name: Cape Bentonite																									
Quarterly Airborne Pollutants Exposure Report form 21.9(2)(a)in terms of Regulation 9.2.7																									
Main Commodity Code:		BT		DMR Mine Code:		11 / 8 / 7 / 10 / 6																			
Sample Area:		1		Sub Mine Code:		12243																			
Activity Area Code:		7		Reporting Period:		JAN - MAR 2024																			
HEG reclassification Band (Based on previous annual 90 th Percentile results):		B		Name and SANAS accreditation number of analytical laboratory used		Chemtech				T0361															
Number of samples planned for the current sampling cycle		Q1		Q2		Q3		Q4		Annual Results															
Number of samples taken		5		5		5		5		20															
Quarterly HEG classification (Based on 90 th percentile measurement results)		B																							
HEG 1		Occupations Codes in HEG		Number of Persons per Occupation		Pollutant Code		Sample Concentration per Occupation (TWA - 8hr) mg/m ³		Pollutant analytical result (mg)		Pollutant Concentration per Occupation (TWA - 8hr) mg/m ³		Mean Pollutant Concentration Allocated to Medical Record (Tick appropriate box) mg/m ³ f/ml ppm		90 th Percentile HEG Classification		OEL (Tick appropriate box) mg/m ³ f/ml ppm		Pollutant Index		AQI			
30204/ 21105		Quarry Supervisor/ Excavator		2		522		0.409		0.032		0.030		522		0.023		0.046		0.10		0.30		0.43	
21105		Excavator Operator		2		522		0.208		0.398		0.379		459		0.424		0.709		3.00		0.13		0.13	
21109		Truck Drivers		10		522		0.438		0.006		0.006								0.10		0.06		0.13	
21103		Dozer Operator		1		459		0.226		0.214		0.202								3.00		0.07		0.18	
TOTAL/AVE				15		522		0.447		0.024		0.023		0.023		0.046		0.046		0.10		0.23		0.37	
				459						0.448		0.424		0.424		0.709		0.709		3.00		0.14			
COMMENTS ON: REASON/S FOR OVEREXPOSURES												See comments in Report Section 1.7													
CORRECTIVE MEASURES THAT WILL BE IMPLEMENTED TO PREVENT/MITIGATE OVEREXPOSURES.												See recommendations in Report Section 1.7													
Calculations used in above columns :		[Sample Concentration = Sample mass (mg) / Sample Volume (m ³)		1. If Sampling time = exposure duration or < exposure duration TWA 8h= Sampling Concentration * (actual exposure duration / 480 (min))		2. If Sampling time > exposure duration TWA 8h= Sampling Concentration *(actual sampling time/480 (min))		Pollutant Concentration = Pollutant mass (mg) / Sample Volume (m ³)		1. If Sampling time = exposure duration or < exposure duration Pollutant TWA 8h= Pollutant Concentration * (actual exposure duration / 480 (min))		2. If Sampling time > exposure duration Pollutant TWA 8h= Pollutant Concentration *(actual sampling time/480 (min))		Mean Pollutant Concentration Dose Average TWA Pollutant Concentration (average of all results calculated in C)		90th Percentile HEG Classification = PERCENTILE [(C),0.9]		Pollutant Index = Pollutant TWA Concentration / Respective OEL		AQI = Sum of Pollutant Index					

Mine Name: Cape Bentonite																	
Quarterly Airborne Pollutants Exposure Report form 21.9(2)(a)in terms of Regulation 9.2.7																	
Main Commodity Code:		BT		DVR Mine Code:		11 / 8 / 7 / 10 / 6											
Sample Area:		1		Sub Mine Code:		12243											
Activity Area Code:		30		Reporting Period:		JAN - MAR 2024											
HEG reclassification Band (Based on previous annual 90 th Percentile results):		A		Name and SANAS accreditation number of analytical laboratory used		Chemtech				T0361							
Number of samples planned for the current sampling cycle		Q1		Q2		Q3		Q4		Annual Results							
Number of samples taken		5		5		5		5		20							
Quarterly HEG classification (Based on 90 th percentile measurement results):		B															
HEG 2																	
Occupations Codes in HEG	Occupations in a HEG	Number of Persons per Occupation	Pollutant Code	Sample Concentration per Occupation (TWA - 8hr) mg/m ³	Pollutant analytical result (mg)	Pollutant Concentration on per Occupation (TWA - 8hr) mg/m ³	Mean Pollutant Concentration Allocated to Medical Record (Tick appropriate box) mg/m ³ f/ml ppm	90 th Percentile HEG Classification	OEL (Tick appropriate box) mg/m ³ f/ml ppm	Pollutant Index	AQI						
				(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)						
30406/30299	Dryermen/Process Attendants	12	522	0.274	0.006	0.006	522	0.018	0.10	0.06	0.15						
80905	Forklift Operators	4	459	0.379	0.284	0.268	459	0.357	3.00	0.09	0.58						
30207	Crusher Attendants	2	522		0.050	0.047			0.10	0.47							
			459		0.350	0.332			3.00	0.11							
			522		0.005	0.005			0.10	0.05							
			459		0.395	0.374			3.00	0.12							
30299	Plant Workers	10	522		0.027	0.026			0.10	0.26	0.52						
			459		0.833	0.789			3.00	0.26							
21104	Front End Loader Operator	2	522		0.007	0.007			0.10	0.07	0.08						
			459		0.023	0.022			3.00	0.01							
30299	General Workers	4	522														
			459		0.019	0.018			0.10	0.18	0.30						
			522		0.377	0.357			3.00	0.12							
			459														
COMMENTS ON: REASON/S FOR OVEREXPOSURES																	
See comments in Report Section 1.7																	
CORRECTIVE MEASURES THAT WILL BE IMPLEMENTED TO PREVENT/MITIGATE OVEREXPOSURES.																	
See recommendations in Report Section 1.7																	
Calculations used in above columns:			[Sample Concentration = Sample mass (mg)/Sample Volume (m ³) 1. If Sampling time = exposure duration or < exposure duration TWA 8h= Sampling Concentration * (actual exposure duration / 480 (min)) 2. If Sampling time > exposure duration TWA 8h= Sampling Concentration * (actual sampling time / 480 (min))			Mean Pollutant Concentration Dose Average TWA Pollutant Concentration (average of all results calculated in C)			90th Percentile HEG Classification = PERCENTILE [(C),0.9]			Pollutant Index = Pollutant TWA Concentration/ Respective OEL			AQI = Sum of Pollutant Index		

1.8 Comments

The results obtained during the survey indicated that this is a medium risk mine and falls in "**Category B**" of the Personal Exposure Level Classification Band (see Table 1 Legend for detailed explanation). Category B requires that dust sampling on employees and reporting be performed on bi-annual basis (or as otherwise directed by the DMR).

However, taking into consideration all of the previous results obtained from Cape Bentonite Mine, the mine retains its "**Category A**" status. Therefore, for the duration of the preceding (2024) surveys, it will be treated as such until final sampling results for the entire year (2024) are obtained and aggregates of said results indicates otherwise and justify reclassification, or if directed by the DMR.

For information (from DMR)

Guideline for the compilation of a mandatory code of practice for an occupational health program (occupational hygiene and medical surveillance) on personal exposure to airborne pollutants.

Determining sample size

The total number of dust samples should be evenly spread out over a twelve (12) month period for all categories that is A, B and C as below.

A minimum of 5% or 5 samples per HEG (whichever is the greater) should be taken as per classification as follows:

Category A - 5% or 5 samples per HEG per quarter;

Category B - 5% or 5 samples per HEG six-monthly: To be evenly spread bi-annually;

Category C - 5% or 5 samples per HEG per annum: To be evenly spread annually; and

Category D - No sampling plan for this category. Measurement results that are below 10% of the OEL will be reported under this category.

Chemical analysis methodology

The COP should address the following points:

(a) For each pollutant identified, an appropriate chemical analysis methodology, which complies with internationally accepted good practice, should be selected and implemented. All the selected chemical analytical methods should be listed in the COP. e.g. NIOSH methods for Silica crystalline respirable: NIOSH 7500 (XRD); NIOSH 7602 (IR).

(b) The sample analysis should be done either by a laboratory that is accredited (accredited to chemically analyse the specific pollutant/s) in terms of SABS ISO/IEC 17025 of the South African National Accreditation System (SANAS), or a laboratory that is participating in a proficiency testing program and is in a process of obtaining SANAS accreditation, which latter laboratory must produce a proficiency test certificate to the client before doing any sample analysis.

(c) The minimum number of samples taken must each be individually analysed.

NOTE: Each respirable dust sample is analysed individually to determine the Alpha Quartz (Silica) content. The results from the analysis obtained in then used to calculate the Alpha Quartz TWA concentration for each sample. Thereafter,

the 90th Percentile is calculated for each HEG applying the obtained results. Then, during the final 4th Quarter report, the 90th Percentile averages are calculated per HEG and the appropriate HEG Category is allocated to each specific HEG in which the samples were taken.

Mandatory reports

Reporting to the DMR must be done on a quarterly basis for all categories, that is A, B, C and D.

See also: Airborne Pollutants - Particulates Personal Exposure Reports Form 21.9(2)(a) In terms of regulation 9.2.(7).

2 HEAT STRESS SURVEY

2.1 Statutory Requirements

The temperatures (set as legal limits) to which workers can be exposed over an 8-hour shift, before they are at risk of developing heat stress, are equal to:

Classification systems for Heat Stress (Guideline for Thermal Stress)

Classification	Temperature Range	Interpretation	General Action
A	WB ≥ 32.5°C; OR DB ≥ 37.0°C; OR GT ≥ 37.0°C; OR WBGT Index ≥ 34	Abnormally hot environment	- No normal work should be undertaken except work to rectify to condition(s) -Work to rectify the condition(s) must be undertaken only on a basis of the risk assessment, supervision, and protocols
B	WB ≥ 27.5°C - < 32.5°C; AND/OR DB ≥ 32.0°C - < 37.0°C; AND/OR GT ≥ 32.0°C - < 37.0°C; AND/OR WBGT Index ≥ 30 - < 34	Hot environment	HSM mandatory
C	WB ≥ 25.0°C - < 27.5°C; AND/OR DB ≥ 32.0°C - < 37.0°C; AND/OR GT ≥ 32.0°C - < 37.0°C; AND/OR WBGT Index ≥ 25 - < 30	Significant Risk	HSM Mandatory
D	WB < 25.0°C DB < 32.0°C GT < 32.0°C WBGT Index < 25	Non-significant Risk	- No special precautions - Environmental monitoring must be sufficiently sensitive to detect critical upward drifts in the environmental heat load. - Monitoring programme to satisfy this requirement should be specified.

HSM - Heat Stress Management

DB - Dry Bulb Temperature

GT - Globe Temperature

WB - Wet Bulb Temperature

Heat Stress Classification and Monitoring Frequency
(Guideline for Thermal Stress)

Classification	Temperature Range	Monitoring Frequency
A	WB $\geq 32.5^{\circ}\text{C}$; OR DB $\geq 37.0^{\circ}\text{C}$; OR GT $\geq 37.0^{\circ}\text{C}$; OR WBGT Index ≥ 34	Continuously monitor until the environmental conditions have improved to acceptable limit(s)
B	WB $\geq 27.5^{\circ}\text{C} - < 32.5^{\circ}\text{C}$; AND/OR DB $\geq 32.0^{\circ}\text{C} - < 37.0^{\circ}\text{C}$; AND/OR GT $\geq 32.0^{\circ}\text{C} - < 37.0^{\circ}\text{C}$; AND/OR WBGT Index $\geq 30 - < 34$	Monitoring must be conducted within every 30 days
C	WB $\geq 25.0^{\circ}\text{C} - < 27.5^{\circ}\text{C}$; AND/OR DB $\geq 32.0^{\circ}\text{C} - < 37.0^{\circ}\text{C}$; AND/OR GT $\geq 32.0^{\circ}\text{C} - < 37.0^{\circ}\text{C}$; AND/OR WBGT Index $\geq 25 - < 30$	Monitoring must be conducted within every 45 days
D	WB $< 25.0^{\circ}\text{C}$ DB $< 32.0^{\circ}\text{C}$ GT $< 32.0^{\circ}\text{C}$ WBGT Index < 25	As determined by the risk assessment

HSM - Heat Stress Management

DB - Dry Bulb Temperature

GT - Globe Temperature

WB - Wet Bulb Temperature

2.2 Survey Methodology

Heat Stress measurements were performed using a Kestral Thermal Stress Monitor (Instrument Serial No. 2449368) according to the International Standard ISO 7423: 2017 "Ergonomics of the thermal environment - Assessment of heat stress using the WBGT (wet bulb globe temperature) index".

2.3 Results

Air temperatures were measured, and results are listed below:

In the Ambient Mining Area (02 February 2024 at 14h00):

- Wet-bulb temperature = 24.0°C
- Dry-bulb temperature = 36.8°C

- Globe temperature = 41.9°C (Radiant heat)
- WBGT index = 28.9

Inside Excavator without AC (02 February 2024 at 14h20):

- Wet-bulb temperature = 23.5°C
- Dry-bulb temperature = 35.8°C
- Globe temperature = 39.5°C (Radiant heat)
- WBGT index = 27.9

In the Plant at Dryer Area (02 February 2024 at 14h15):

- Wet-bulb temperature = 23.6°C
- Dry-bulb temperature = 35.6°C
- Globe temperature = 38.2°C (Radiant heat)
- WBGT index = 27.7

In the Office Area(02 February 2024 at 14h30):

- Wet-bulb temperature = 20.3°C
- Dry-bulb temperature = 30.8°C
- Globe temperature = 30.8°C (Radiant heat)
- WBGT index = 23.5

2.4 Discussion

The survey was conducted on a sunny and warm summer day, with the ambient temperature reaching a high of 36.8°C. Measurements were taken at 14:00.

Tests were conducted in various areas, including the ambient mining area, inside a vehicle (Excavator Cabin), dryer, and office areas where employees spend extended periods and may experience concerns regarding hot and uncomfortable work environments.

In the mining area, measurement results showed compliance with the designated statutory limits for the Wet-bulb temperature (24.0°C) and the Dry-Bulb temperature (36.8°C). However, the Globe temperature (41.9°C) exceeded its statutory limit of 37°C. Additionally, a WBGT Index of 28.9 was calculated, exceeding the designated lower limit of 25 but remaining well below the upper limit set at 30.

In the vehicle cabin, measurement results also reflected compliance with the designated statutory limits for the Wet-bulb temperature (23.5°C) and the Dry-Bulb temperature (35.8°C). However, the Globe temperature (39.5°C) exceeded its statutory limit of 37°C. Additionally, a WBGT Index of 27.9 was calculated, exceeding the designated lower limit of 25 but remaining well below the upper limit set at 30.

Similarly, in the Dryer Area, measurement results indicated compliance with the designated statutory limits for the Wet-bulb temperature (23.6°C) and the Dry-Bulb temperature (35.6°C). However, the Globe temperature (38.2°C) exceeded its statutory limit of 37°C. Additionally, a WBGT Index of 27.7 was calculated,

exceeding the designated lower limit of 25 but remaining well below the upper limit set at 30.

Measurement results from the office area indicated compliance with all designated statutory limits. Additionally, a compliant WBGT Index of 23.5 was calculated.

The results obtained during the current survey indicated that this is a low-risk mine and falls in "**Category C**" of the Thermal Environment Categorisation Classification Band. The risk of employees developing Heat Stress related ailments due to exposure in their working environments, therefore, cannot be ruled out and this issue may be seen as a source of concern. Furthermore, the **Category C rating requires that a Heat Stress Management** should be implemented with the aim of reducing the possibility of such occurrences.

2.5 Recommendations

The following recommendations are made to the management of the Cape Bentonite Mine to reduce employee exposure to heat:

- Employees should regularly be informed of the need to partake of at least 600 milliliters of water every hour. Cool drinking water should be made accessible to all employees who perform manual tasks under extreme thermal conditions. Where applicable, it is advisable to install drinking fountains close to their workstations, which should facilitate water intake on a regular basis.
- Permit self-limitation of exposures and encourage co-worker observation to detect signs and symptoms of heat strain in others.
- Counsel and monitor those who take medications that may compromise normal cardiovascular, blood pressure, body temperature regulation, renal, or sweat gland functions; and those who abuse or are recovering from the abuse of alcohol or other intoxicants.
- Encourage healthy life-styles, ideal body weight and electrolyte balance amongst those working in extreme heat conditions.
- Repair all vehicles' air-conditioners to ensure it can operate continuously throughout the shift; and
- Clean air-conditioner filters regularly to ensure its efficiency.

2.6 Conclusion

Based on the results and findings of this survey, it can be concluded that the Wet-bulb and Dry-bulb temperatures encountered at the monitoring positions at Cape Bentonite remained below the statutory limits throughout the test period. However, the Globe temperatures at some of the measurement positions exceeded the said limit. Additionally, some of the calculated WBGT Indices also exceeded the designated lower limit.

It is a DMR requirement that the results be submitted on prescribed forms. See the Heat Stress Exposure - Report Form 21.9(2)(c) In terms of Regulation 9.2(7).

