



Test Report: Dust Fallout Monitoring – December 2022

Prepared for

Saldanha Bay Municipality

AQ0344

Test dates: 8th November – 8th December 2022

EXECUTIVE SUMMARY

Dust fallout sampling was conducted at seven (7) sites in the Saldanha Bay Municipal area, commencing Feb 2015 and samplers are exchanged and collected on a monthly basis.

There was valid data for five (5) of the seven (7) samples collected, resulting in 71% data capture for the period under review. The SBM-04 and SBM-05 samplers are damaged by corrosion and replacement samplers are being procured. This report covers the period 8th November – 8th December 2022.

There was one (1) exceedances of the South African National Dust Control Regulations residential limit of 600mg/m²/day during the month at site SBM-03 (Curro School) possibly due to wind-blown sand from an adjacent building project, around 100m west of the site.

There were no exceedances of the South African National Dust Control Regulations non-residential limit of 1200mg/m²/day during the month for sites classed as non-residential.

Results for lead were evaluated against US EPA Federal Register (40 CFR Part 745: Lead; identification of dangerous levels of lead; Final Rule). This regulation establishes:

“hazard standards for residential dust and soil lead. As stated in Unit II.F.3. Today’s rule establishes two hazard standards for bare residential soil; 400ppm for playgrounds and an average of 1200ppm for the rest of the yard.”

This represents a cautionary approach in estimating worst-case scenarios for exposure to the general public. Lead levels for the “rest of the yard” (1200ppm) and the “playground areas” (400ppm) were not exceeded during the review period. Care must be taken in evaluating “concentrations” figures when dust fallout mass is low. A table of “net lead (Pb) mass in mg”, Table 4.2, has been added for information purposes.

Net lead masses were low and ranged between 2µg and 13µg over the month. These are possibly a better measure than concentration when assessing “heavy metal” levels in dust fallout.

Meteorological conditions at the Saldanha site were characterised by moderate to strong winds from the south westerly quadrant (SW), with a westerly (W), north-westerly (NW) bias. There was a 2% occurrence of calm conditions during December 2022.

REPORT DETAILS


REFERENCE	AQ0344/202212
REPORT TITLE	Dust Fallout Monitoring, December 2022
DATE SUBMITTED	17 January 2023
CLIENT	René Toesie Saldanha Bay Municipality Pick and Pay Centre VREDENBURG E-mail: rene.toesie@sbm.gov.za
PREPARED BY:	Dean Ravenscroft Argos Scientific Pty Ltd Paarden Eiland Cape Town dravenscroft@argos-sci.c.za
SIGNED	DR
APPROVER	G Ravenscroft Signed: 
STATUS	Final
NOTICE	

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ABBREVIATIONS

BDL	Below Detection Limit
DEAT	Department of Environment Affairs and Tourism
EPA	See US EPA
ℓ/min	Litres per minute
m.s ⁻¹	Metres per second
m ³	Cubic metres
Max	Maximum
mg/m ³	milligrams per cubic metre
Min	Minimum
PM ₁₀	Particulate matter of aerodynamic diameter less than 10µm
ppm	Parts per million
SABS	South African Bureau of Standards
SW	South West
US EPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
WHO	World Health Organisation

1 INTRODUCTION

ARGOS SCIENTIFIC was contracted by Saldanha Bay Municipality to perform dust fallout monitoring and heavy metals (Iron, lead, zinc, manganese and copper) measurements at various sites in the Saldanha Bay Municipal Area

A dust fallout and metals contamination impact assessment will be performed using this data.

1.1 *Scope of Work*

ARGOS SCIENTIFIC's understanding of the scope of work is as follows:

- To measure dust fallout rates at seven (7) sampling points for 12 months.
- Monthly collection of samples for duration of 12 months.
- Monthly sample analysis as follows: Seven (7) gravimetric samples per month.
- Elemental sample analysis as follows: Iron, lead, zinc, manganese and copper.
- Monthly results to client in electronic format.
- Data interpretation and reporting will be submitted electronically.

2 METHODOLOGY

2.1 Sample Location

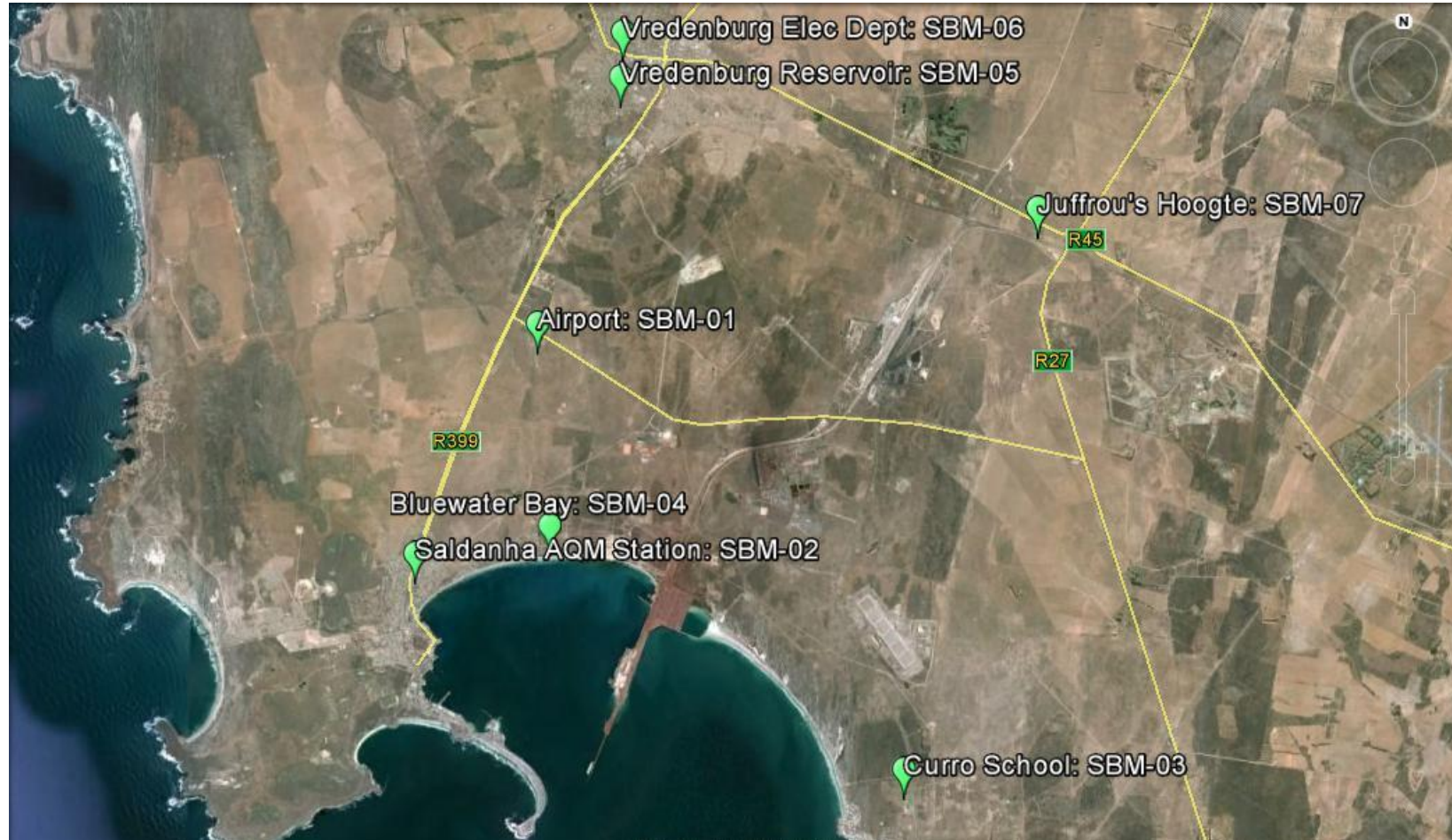
Dust fallout sampling was conducted the following seven sites sites:

Vredenburg Electricity Dept.: SBM-06	32° 54' 27.2" S	17° 59' 13.7" E
Vredenburg Reservoir: SBM-05	32° 54' 56.1" S	17° 59' 12.9" E
Juffroushoogte: SBM-07	32° 56' 13.8" S	18° 04' 33.6" E
Airport: SBM-01	32° 57' 34.5" S	17° 58' 12.5" E
Saldanha AQM Station: SBM-02	33° 00' 41.0" S	17° 56' 18.5" E
Blue Water Bay: SBM-04	32° 59' 43.8" S	17° 58' 24.7" E
Curro School: SBM-03	33° 02' 16.2" S	18° 02' 59.9" E

Sites selected had to be:

- Along the prevailing wind vector for the area.
- Distributed evenly within the Saldanha Bay Municipality Area and near areas of possible contamination.

Figure 2.1.1: Location of dust fallout samplers for Saldanha Bay Municipality



2.2 Dust fallout

Dust fallout samplers were deployed in Sept 2015 and samples are collected on a monthly basis. Distilled water was added to minimise sample loss, particularly during high wind speed episodes. Each series of samples were analysed at a SANS 17025 accredited facility.

Total insoluble dust fallout was determined in accordance with ASTM D 1739: 1970 or demonstrable equivalent, a requirement in terms of the SA National Standards (SANS 1929:2005 - Edition 1.1).

3 GUIDELINES AND AIR QUALITY STANDARDS

3.1 Dust fallout

In terms of the *Government Gazette* Volume 476, No. 27318, the South African Air Quality Act 39 of 2004 was promulgated in 2005. The South African National Dust Control Regulations describes the proposed guidelines for dust fallout, an extract of which is discussed briefly below.

A standard for the acceptable dustfall rate is set out in Table 3.1. The target, action and alert thresholds are shown in Table 3.2.

Table 3.1: Evaluation criteria for Dust Fallout

Restriction Areas	Dust fall rate (D) mg/m ² /day (30 day average)	Comment
Residential	D < 600	Permissible for residential and light commercial
Non-Residential	600 < D < 1200	Permissible for heavy commercial and industrial

For heavy commercial and industrial regions, the new guidelines state that monthly average dust fallout concentrations below 1200mg/m²/day “are permissible”. For residential regions, monthly average dust fallout concentrations not exceeding 600mg/m²/day “are permissible”.

Table 3.2: Acceptable Dust Fall Rates

Restriction Areas	Dust fallout rate (D) mg/m ² /day (30 day average)	Averaging period	Permitted frequency of exceeding dust fall rate
residential	D<600	30 days	2 within a year, not sequential months
Non-residential	600<D<1200	30 days	2 within a year, not sequential months

The target annual average dust fallout concentration is 300mg/m²/day. This is an ultimate goal set to achieve “ongoing improvement”, even in areas where compliance with all other guidelines can be demonstrated. The monthly average “action level” for residential regions is 600mg/m²/day and for industrial regions 1200mg/m²/day.

Exceptions are granted where elevated concentrations arise on a regional scale from adverse meteorological conditions. Background dust monitoring sites can be used to identify and monitor impacts of such exceptions. Access to historical and current meteorological information, particularly wind conditions, can be used to distinguish between “adverse” and “normal” meteorological conditions.

4 RESULTS

4.1 Dust fallout and heavy metal results

Table 4.1 Dust fallout and heavy metal results from Nov - Dec 2022. Exceedance of Dust Fallout Industrial Standards in Red

Sampling Site	Sampling Start Date	Sampling End Date	Net Mass (g)	No. of Days	Dust Fall rate (mg/m ² /day)	Lead (ppm)	Copper (ppm)	Zinc (ppm)	Iron (ppm)	Manganese (ppm)
SBM-01	8-Nov-22	8-Dec-22	0.136	30	200	15	37	315	6747	147
SBM-02	8-Nov-22	8-Dec-22	0.040	30	58	76	202	531	21988	480
SBM-03	8-Nov-22	8-Dec-22	1.539	30	2261	3	6	14	2470	53
SBM-04	8-Nov-22	8-Dec-22	0.000	-*	-*	-*	-*	-*	-*	-*
SBM-05	8-Nov-22	8-Dec-22	0.000	-*	-*	-*	-*	-*	-*	-*
SBM-06	8-Nov-22	8-Dec-22	0.054	30	80	240	203	2217	31404	1275
SBM-07	8-Nov-22	8-Dec-22	0.088	30	130	68	79	363	17007	4762

-* / SBM04/05 – Broken due to corrosion

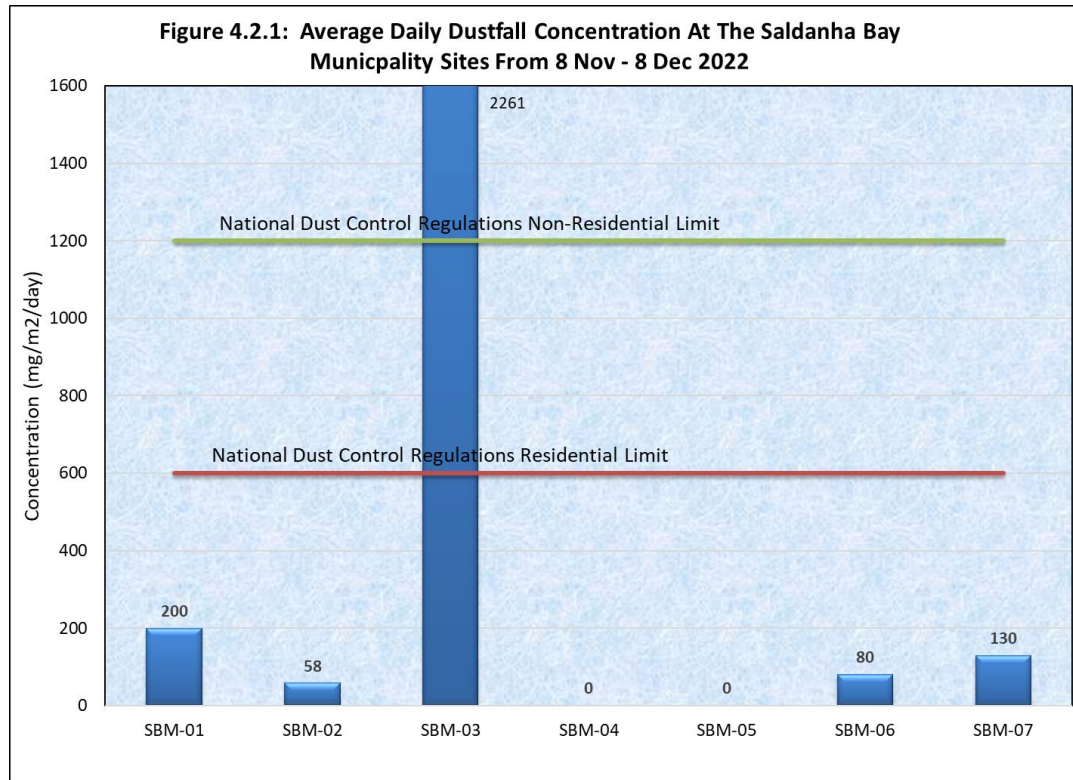
Table 4.2 Lead content (net mass, mg) in dust fallout, Oct 2019 – December 2022

Site/Period	Oct – Nov 19	Nov – Dec 19	Dec – Jan 20	Jan – Feb 20	Feb – Mar 20	Mar - Apr 20	Apr – May 20	Oct – Nov 20	Nov - May 21
SBM-01	0.005	0.002	0.002	0.002	0.003	0.004	0.004	0.007	0.004
SBM-02	0.003	0.003	0.002	0.005	0.003	0.002	0.002	0.002	0.010
SBM-03	0.004	0.001	0.001	0.002	N/A	N/A	0.001	0.001	0.002
SBM-04	0.005	0.004	0.002	0.010	0.004	0.002	0.003	0.002	N/A
SBM-05	0.015	0.012	0.006	0.019	0.020	0.009	0.003	0.004	0.032
SBM-06	0.013	0.008	0.006	0.044	0.014	0.023	0.002	0.017	0.021
SBM-07	0.002	0.003	0.002	0.004	0.002	0.003	0.003	0.006	0.012

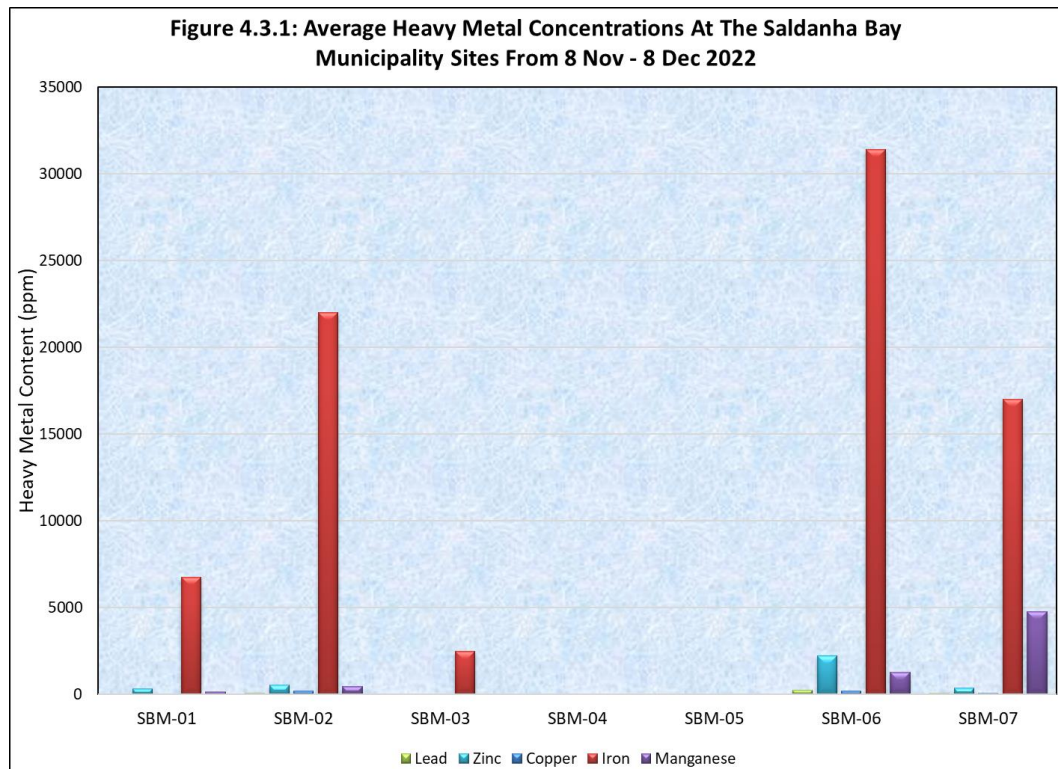
Site/Period	Mar - Apr 21	Apr - May 21	May - Jun 21	Jun - Mar 22	Mar - Apr 22	Apr - May 22	May - Jun 22	Jun - Jul 22	Jul - Aug 22	Aug - Sep 22	Sep - Oct 22	Oct - Nov 22	Nov - Dec 22
SBM-01	N/A	0.002	N/A	0.018	0.004	0.001	0.005	0.002	0.005	0.006	0.004	0.002	0.002
SBM-02	<0.001	0.010	0.002	0.011	0.005	0.001	0.004	0.003	0.001	0.004	0.003	0.003	0.003
SBM-03	0.004	0.004	0.002	0.011	0.004	0.001	0.003	0.003	0.002	0.004	0.005	0.002	0.004
SBM-04	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SBM-05	0.012	0.009	0.007	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SBM-06	0.018	0.006	0.006	0.032	0.021	0.007	0.006	0.004	0.003	0.006	0.009	0.009	0.013
SBM-07	0.006	0.060	0.013	0.008	0.004	0.002	0.005	0.002	0.005	0.002	0.006	0.004	0.006

N/A = Corroded / Broken or contaminated

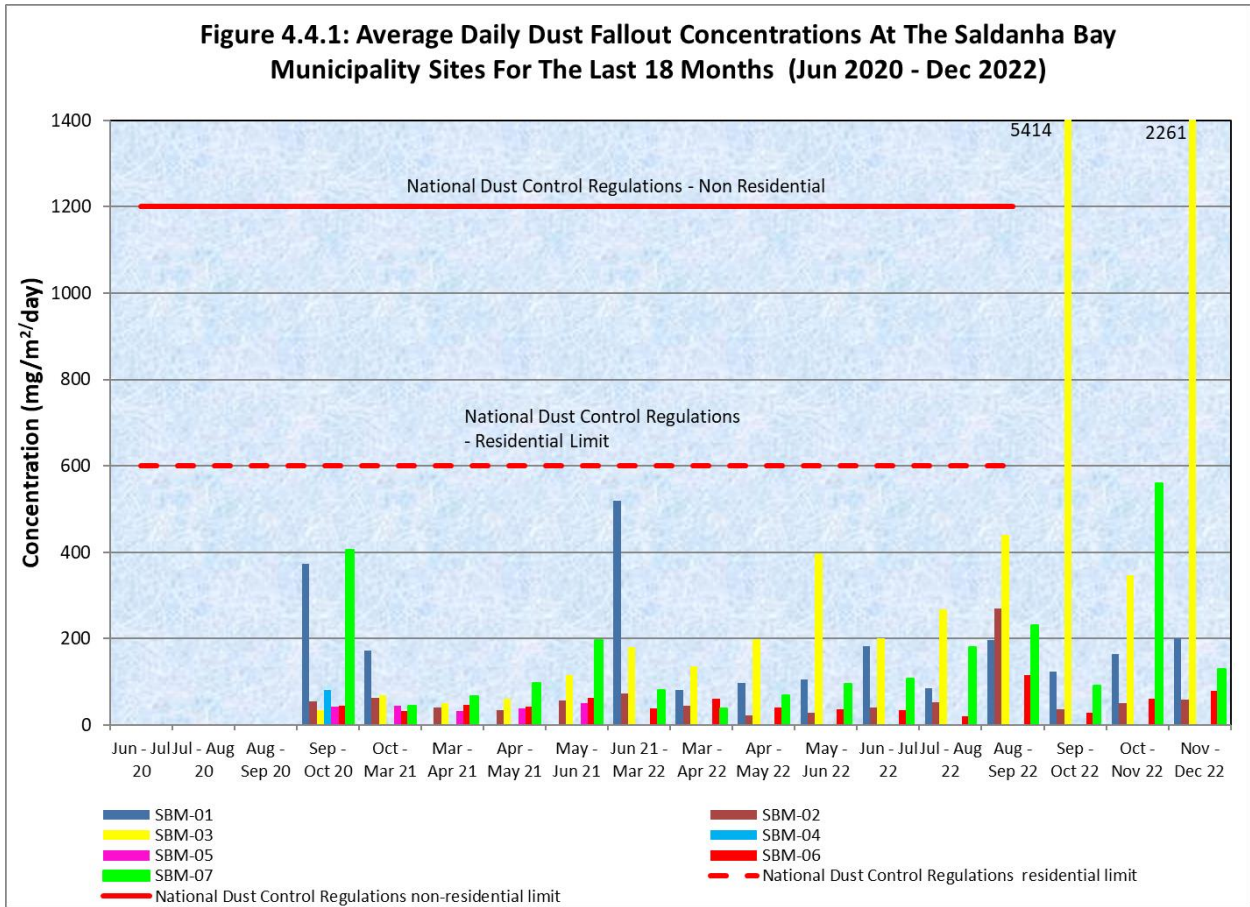
4.2 Dust fallout concentration



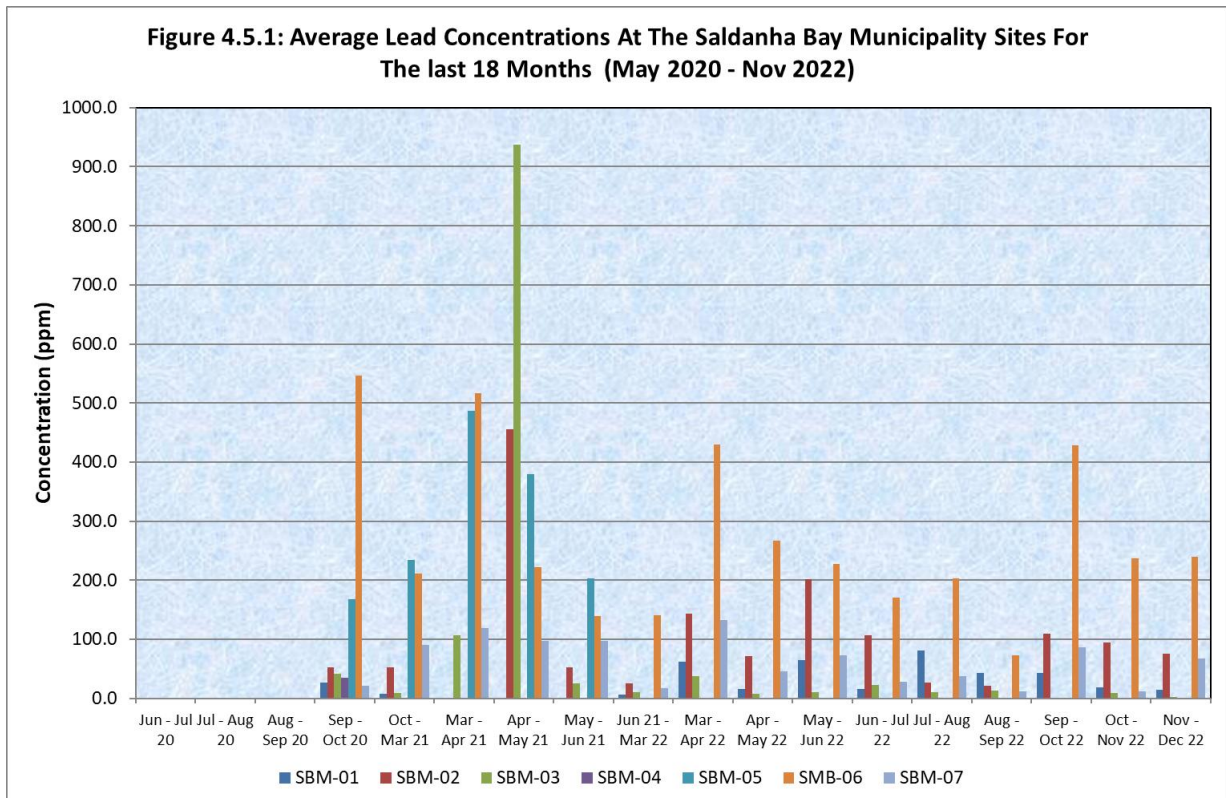
4.3 Heavy metal concentration



4.4: Average Historical Daily Dust fallout concentrations

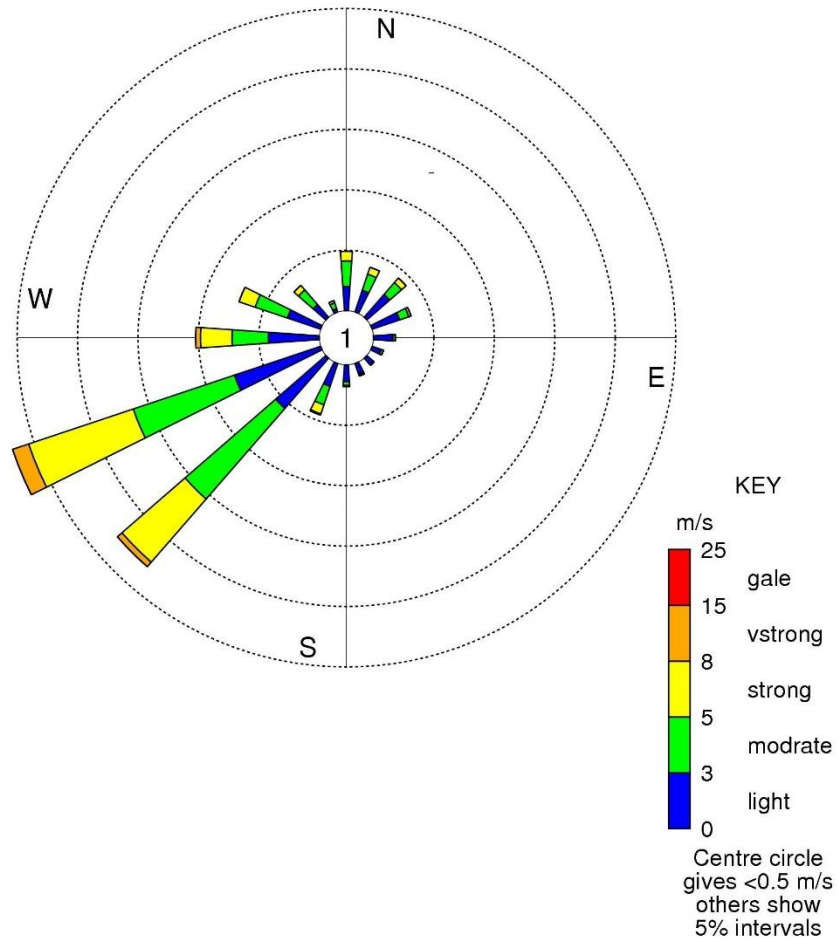


4.5: Average Historical Lead fallout concentrations



4.6 Wind Roses for Saldanha Bay Municipality

WIND ROSE SALDANHA – DECEMBER 2022



5 CONSULTANT'S OBSERVATIONS AND CONCLUSIONS

There was valid data for five (5) of the seven (7) samples collected, resulting in 71% data capture for the period under review. The SBM-04 and SBM-05 samplers are damaged by corrosion and replacement samplers are being procured.

The sampler SBM-03 located at the Curro School Site, is adjacent and close to recently commenced housing construction and reported elevated dust fallout levels. This report covers the period 8th November – 8th December 2022.

There was one (1) exceedances of the South African National Dust Control Regulations residential limit of 600mg/m²/day during the month at site SBM-03 (Curro School), possibly due to wind-blown sand of an adjacent building project around 100m west of the site.

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Net lead masses were low and ranged between 2µg and 13µg over the month. These are possibly a better measure than concentration when assessing “heavy metal” levels in dust fallout.

Meteorological conditions at the Saldanha site were characterised by moderate to strong winds from the south westerly quadrant (SW), with a westerly (W), north-westerly (NW) bias. There was a 1% occurrence of calm conditions during December 2022.

5.1 SANAS Accredited Certificates of Analysis for Dust Fallout



In association with SKYSIDE South Africa

Monthly Dust Fallout Results


Prepared for
Argos Scientific

AQ344

Report date - 15 December 2022



The accredited scope for this report includes the gravimetric analysis only, based on samples received from the client. The deployment of sample buckets is the responsibility of the client. The exposure period of samples is therefore under the control of the client and the client needs to ensure that the sample acceptance criteria are met and reported together with the sample submission to the laboratory.

REFERENCE:	AQ344 SBM
CLIENT REFERENCE:	
REPORT TITLE:	Monthly Dust Fallout Results
DATE SUBMITTED:	Thursday, 15 December 2022
CUSTOMER:	Lukas Tshela Argos Scientific 8 Section St, Paarden Eiland Cape Town, 7405 Tel: + 27 (0) 21 0015392 E-mail: ltshehla@argos-sci.co.za Tel: + 27 (0) 21 0015392 E-mail: ltshehla@argos-sci.co.za
REPORT COMPILED BY: DESIGNATION:	Zoe Rao Associate Skyside South Africa (Pty) Ltd Ninian Westmead Estate, Unit 2, Building 4, 33 Henry Pennington (Richmond) Road Westmead, 3610 Tel: +27 (0) 31 100 1310 E-mail: zoe@skyside.co.za
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REPORT AUTHORISED BY: DESIGNATION: SIGNATURE:	Mathew Weedman Technical Signatory
NOTICE:	<p><i>The Technical Signatory hereby declares that, to the best of his/her knowledge, the analytical data was checked for completeness, the results presented in this report are accurate and legible, and analysis was conducted in accordance with the methods in the approved protocol.</i></p> <p>Disclaimer:</p> <ol style="list-style-type: none"> 1. <i>The preparation of sample buckets and the deployment thereof is the responsibility of the client.</i> 2. <i>The results contained in this report relate only to the streams tested and to the conditions prevalent during such tests.</i> 3. <i>In certain instances, generally identified, SKYSIDE relied on information provided by third parties. It was not possible to verify all such information independently.</i> 4. <i>The report includes the most pertinent calibration evidence and field data, but further traceability and similar data not considered immediately relevant is available at SKYSIDE offices if required. Signed calibration certificates are available on request.</i> 5. <i>This test report may not be reproduced except in full.</i> 6. <i>SKYSIDE is accredited for compliance with ISO/IEC 17025:2017.</i> 7. <i>Results marked "Not SANAS Accredited" or otherwise marked with # in this report are not included in the SANAS Scope of Accreditation for SKYSIDE.</i> 8. <i>Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.</i>



Test Results: ARGOS SCIENTIFIC DUST FALLOUT

Client Argos Scientific
Project code AQ344
Sampling date Start Day Tuesday, 08 November 2022
 End day Thursday, 08 December 2022
Report date Thursday, 15 December 2022

Site Description	Net Mass (mg)	No of Days Exposed	Dust fallout (mg/m ² /day)	Comments
SBM1- 11	136	30	200	
SBM2- 11	40	30	58	
SBM3- 11	1539	30	2259	
SBM6- 11	54	30	79	
SBM7- 11	88	30	130	

Specific Test Conditions	Samples stored at room temperature prior to analysis. Filters weighed at constant mass
Deviations from Method	None.
Measurement Uncertainty	± 5%

Note: Laboratory results are reported for gravimetric analysis based on samples received from the client. The preparation of sample buckets and the deployment thereof is the responsibility of the client. Sample handling and transportation is done by the client (or field personnel that act on behalf of the client). The exposure period of samples is therefore under the control of the client and the client needs to ensure that the sample acceptance criteria are met and reported together with the sample submission to the laboratory.

It is recommended that the client conforms to the sample exposure period of 30 ± 3 days.

CLIENT DETAILS

Contact Mathew Weedman
Client SKYSIDE (PTY) LTD
Address 2 Samantha Street
Strydompark
Randburg
Telephone 011 590-3000
Facsimile
Email mathew@skyside.co.za
Order Number AQ344 November 2022
Samples 5
Sample matrix AIR

LABORATORY DETAILS

Laboratory X-Lab Earth Science
Address 2 Samantha Street, Strydompark, Randburg,
2169
Telephone +27 (0)11 590 3000
Laboratory Manager Mrs Tasneem Tagari
Lab Reference JBX22-13716
Report Number 0000052661
Date Received 15/12/2022 12:51
Date Started 20/12/2022 15:35
Date Reported 20/12/2022 16:51

The document is issued in accordance with SANAS's accreditation requirements.
Accredited for compliance with ISO/IEC 17025. SANAS accredited laboratory T0775.



Samples received at ambient temp good condition.

SIGNATORIES

Tasneem Tagari

General Manager/Technical Signatory

TEST REPORT

Sample Number	JBX22-13716.001	JBX22-13716.002	JBX22-13716.003	JBX22-13716.004
Sample Name	SBM1-11	SBM2-11	SBM3-11	SBM6-11

Parameter Units LOR

Metals on Filters Method: ME-AN-027

Copper	mg/filter	0.002	0.005	0.008	0.010	0.011
Iron	mg/filter	0.005	0.92	0.87	3.8	1.7
Manganese	mg/filter	0.001	0.020	0.019	0.082	0.069
Lead	mg/filter	0.001	0.002	0.003	0.004	0.013
Titanium	mg/filter	0.0005	0.0075	0.018	0.14	0.025
Zinc	mg/filter	0.001	0.043	0.021	0.022	0.12

Sample Number	JBX22-13716.005
Sample Name	SBM7-11

Parameter Units LOR

Metals on Filters Method: ME-AN-027

Copper	mg/filter	0.002	0.007
Iron	mg/filter	0.005	1.5
Manganese	mg/filter	0.001	0.42
Lead	mg/filter	0.001	0.006
Titanium	mg/filter	0.0005	0.024
Zinc	mg/filter	0.001	0.032

METHOD SUMMARY

METHOD

ME-AN-027

METHOD SUMMARY

Filters are digested with a mixture of nitric and hydrochloric acids. The digest is then analysed for metals, excluding Hg, by inductively coupled plasma optical emission spectrometry (ICP-OES). Based on NIOSH methods 7300 and 7301.

FOOTNOTES

IS	Insufficient sample for analysis.	-	The sample was not analysed for this analyte
LNR	Sample listed, but not received.	*	Results marked "Not SANAS Accredited" in this report are not included in the SANAS Schedule of Accreditation for this laboratory / certification body / inspection body".
^	Performed by outside laboratory.		
LOR	Limit of Reporting		

Samples analysed as received.
Solid samples expressed on a dry weight basis.

Unless otherwise indicated, samples were received in containers fit for purpose.

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Signed with Impression - Chain of Custody



Signature Request

Signature Request ID:	0dee47a6-7688-4be9-9947-49437df63261	Timestamp:	2022-12-21 06:36:08 GMT
Signee Name:	Tasneem Tagari	Sender Name:	Tasneem Tagari
Request Type:	WebSigning	Request Status:	WEBVIEWER SIGNED

Original Document

Document Name:	JBX2213716_0000034549PDF.pdf	Document Size:	137.5 KB
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Email Evidence

Signee Email:	tt@xlab.earth	Email Subject:	Not available in Silent Mode
Email Sent Timestamp:	Not available in Silent Mode	Email Opened Timestamp:	Not available in Silent Mode

Web Evidence

Signee IP Address:	41.79.81.146	Request Timestamp:	2022-12-21 06:35:45 GMT
Signee GPS (if shared):	ZA: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/108.0.0.0 Safari/537.36	Terms Accepted Timestamp:	2022-12-21 06:35:59 GMT

Annotations and Modifications

Signature Count:	1	Form Fields Filled Count:	0
Text Annotation Count:	0	Initial All Pages Count:	0
Single Initial Count:	0		

Signing Evidence

Signee Mobile:	+27834449137	Sign Type:	WebSigning
Security Challenge:	NONE	Part of Workflow:	NONE

Chain Of Custody Generation

Attached Document Name:	20221221T063607.967285Z JBX2213716_0000034549PDF.pdf	Attached Timestamp:	2022-12-21 06:36:08 GMT
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