Tetra4 Virginia Compression Plant Air Pollutant Passive Sampling Campaign 1: February 2022

Project done on behalf of **Tetra 4 (Pty) Ltd**

Project Compiled by:
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Reviewed by:
T Bird

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Report Details

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Client	Tetra4 (Pty) Ltd
Report Number	21TET01-01
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Notice	Airshed Planning Professionals (Pty) Ltd is a consulting company located in Midrand, South Africa, specialising in all aspects of air quality, ranging from nearby neighbourhood concerns to regional air pollution impacts as well as noise impact assessments. The company originated in 1990 as Environmental Management Services, which amalgamated with its sister company, Matrix Environmental Consultants, in 2003.
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Revision Record

Revision Number	Date	Reason for Revision
Draft	03 April 2022	Draft for client review
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1 INTRODUCTION

Airshed Planning Professionals (Pty) Ltd (Airshed) was appointed by Tetra 4 (Pty) Ltd to sample identified potential pollutants of concern, as stipulated in the Environmental Management Programme (EMPr), around the Tetra4 Virginia Compression Plant. The passive sampling campaign used Radiello® passive diffusive samplers at two (2) sites around the property and at an upwind background site located near a residential receptor.

The terms of reference for the sampling campaign included:

- Sampling and assessment of ambient concentrations of:
  - sulfur dioxide (SO_2);
  - nitrogen dioxide (NO_2);
  - hydrogen fluoride (HF) and,
  - total volatile organic compounds (TVOCs).
- Reporting of results and recommendations.

This report summarises the evaluation criteria used, the sampling methodology, the sampling locations, potential receptor locations and results from the second sampling campaign.

2 EVALUATION CRITERIA

2.1 National Ambient Air Quality Standards

The South African National Ambient Air Quality Standards (NAAQS) were determined based on international best practice for particulate matter ($PM_{2.5}$ and PM_{10}), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO), lead (Pb) and benzene. The NAAQS for pollutants of concern in this assessment is given in Table 1. Campaign length (~14 days) pollutant concentrations were extrapolated using the method described in Section 4 to allow for comparison to the applicable hourly; daily; and annual average NAAQS.

Table 1: National Ambient Air Quality Standards for pollutants of concern to the project

Pollutant	Averaging Period	Concentration (µg/m³)	Frequency of Exceedance
Sulfur dioxide (SO_2)	1 hour	350	88
	24 hours	125	4
	1 year	50	-
Nitrogen dioxide (NO_2)	1 hour	200	88
	1 year	40	-
Benzene (C_6H_6)	1 year	5	-

2.2 International Health Effect Screening Levels

The Risk Assessment Information System (https://rais.ornl.gov/tools/profile.php) (sponsored by the US Department of Energy, Office of Environmental Management), as a database of toxicity values derived for various exposure pathways, was referred to for health-effect screening levels above which negative health effects may occur. The health-effect screening levels used, for the inhalation pathway only, are listed in Table 2. The concentrations of individual VOCs detected in the passive diffusive cartridges were screened against specific chronic inhalation reference concentrations and inhalation unit risk factors (for increased life-time cancer risk) published by international agencies.

Table 2: Most stringent health-effect screening level identified for all non-criteria pollutants assessed

Compound	Acute exposure[(a)] [units: µg/m^3]	Chronic exposure[(b)] [units: µg/m^3]
Hydrogen fluoride (HF)	16.4 [(c)]	14 [(d)]
Volatile organic compounds (VOCs)	[(e)]	100 [(f)]

(a) Hourly concentrations compared with short-term / acute exposure health effect screening level

(b) Annual concentrations compared with long-term / chronic exposure health effect screening level

(c) California Environmental Protection Agency Office of Environmental Health Hazard Assessment's (OEHHA) Chronic Reference Exposure Levels (RELS)

(d) Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels (MRLs)

(e) No health-effect screening level defined for averaging period

(f) Texas Commission on Environmental Quality (TCEQ) inhalation reference concentrations (diesel fuel used as indicator)

2.3 Chronic Hazard Risk Index

Reference Concentrations (RfCs) related to inhalation exposures are used to estimate non-carcinogenic effects representing a level of environmental exposure at or below which no adverse effect is expected to occur. Non-carcinogenic effects are evaluated by calculating the ratio, or chronic hazard risk index, between a dose (the extrapolated annual pollutant concentration) and the pollutant-specific inhalation RfC. A hazard risk index less than 1 is not expected to result in adverse effect. In the current study the most conservative chronic inhalation toxicity values published in the Risk Assessment Information System (RAIS) were used.

It should be noted that RfCs are based on assumption of lifetime exposure and, thus, provide a very conservative estimate when applied to shorter exposure periods.

2.4 Increased Life-time Cancer Risk

The identification of an acceptable cancer risk level has been debated for many years and will continue to be debated as societal norms and values change. Some people would easily accept higher risks than others, even if it were not within their own control; others prefer to take very low risks. An acceptable risk is a question of societal acceptance and will therefore vary from society to society. Despite the difficulty to provide a definitive "acceptable risk level", the estimation of a risk associated with an activity provides the means for a comparison of the activity to other everyday hazards, and therefore allowing risk-management policy decisions. Technical risk assessments seldom set the regulatory agenda because of the different ways in which the non-technical public perceives risks. Consequently, science does not directly provide an answer to the question.

Whilst it is perhaps inappropriate to make a judgment about how much risk should be acceptable, through reviewing acceptable risk levels selected by other well-known organizations, the US EPA's application is the most suitable, i.e. "If the risk to the maximally exposed individual (MEI) is no more than $1x10^{-6}$, then no further action is required. If not, the MEI risk must be reduced to no more than $1x10^{-4}$, regardless of feasibility and cost, while protecting as many individuals as possible in the general population against risks exceeding $1x10^{-6}$". Some authorities tend to avoid the specification of a single acceptable risk level. Instead, a "risk-ranking system" is preferred. For example, the New York State Department of Health (NYSDOH) produced a qualitative ranking of cancer risk estimates, from very low to very high (Table 3). Therefore, if the qualitative descriptor was "low", then the excess lifetime cancer risk from that exposure is in the range of greater than one per million to less than one per ten thousand. The impact of emissions from the landfill on increased life-time cancer risk (i.e. 70-year exposure to maximum concentrations of expected carcinogenic compounds via the inhalation pathway) was assessed according to the New York Department of Health qualitative estimate ranking system.

Table 3: Increased life-time cancer risk (as applied by NYSDOH)

Risk ratio	Qualitative descriptor
Equal to or less than one in a million	Very low
Greater than one in a million to less than one in ten thousand	Low
One in ten thousand to less than one in a thousand	Moderate
One in a thousand to less than one in ten	High
Equal to or greater than one in ten	Very high

3 SAMPLING SITES

Passive sampling was conducted at two locations near the boundary of the facility and at a background location close to a nearby residential receptor. Sampling site locations are shown in Figure 1, with the coordinates, elevation and site classification detailed in Table 4.

Table 4: Sampling site coordinates, elevation, and classification

Site ID	Site location	Latitude	Longitude	Elevation (m)	Classification
TET1	HDR1 Wellhead	-28.12576	26.718934	1 299	Boundary
TET2	HDR1 Compressor	-28.12701	26.719149	1 299	Boundary
TET3	Background site	-28.12011	26.720198	1 296	Residential

Figure 1: Tetra4 Passive Sampling locations

4 Sampling Methodology

The aim of the passive sampling campaign was to quantify ambient air pollutant concentrations which could present odour and health issues for Tetra4 personnel and the neighbouring communities. Two sampling periods (each 14 days in duration) were conducted at the Tetra4 Virginia Compression Plant. Pollutants assessed included SO_2, NO_2, and, VOCs. The results from the sampling will be used to inform long-term monitoring requirements and potential mitigation and management strategies to minimise impact on nearby receptors (if any).

Radiello® passive diffusive tubes were used to sample pollutant concentrations at the three sampling locations. Passive diffusive sampling relies on the movement of pollutants through a diffusive surface onto an adsorbent. After sampling, the analytes are chemically desorbed by solvent extraction or thermally desorbed and analysed. Passive sampling does not involve the use of pumping systems and does not require electricity and is therefore an ideal sampling method at rural sampling locations. The concentration of pollutants adsorbed during the exposure period can be calculated to time-frames comparable with the NAAQS for criteria pollutants, international chronic inhalation reference concentrations, and, inhalation unit risk factors.

Passive diffusive samplers were placed in a manufacturer approved rain shelter and attached to a post at eye level, ensuring protection against adverse weather conditions while allowing adequate ventilation. Supporting plates were assembled and operated according to manufacturer instructions. The analysis of the adsorbed compounds was conducted by the accredited Biograde Laboratory Services (SANAS Facility T0574) in Pretoria.

Table 5: Details of sampling periods in Campaign 1: February 2022

Period number	Start date	End date	Exposure period	Season
Period 1	2022/02/02	2022/02/16	14	Summer
Period 2	2022/02/16	2022/03/02	14	

To compare the average sampled concentrations to long term (annual average) evaluation criteria (Section 1), equivalent annual average concentrations were extrapolated. For extrapolating time averaging periods from 24 hours to 1 year, Beychock (2005)[1], recommends the following equation:

$$\frac{C_x}{C_p} = \left(\frac{t_p}{t_x}\right)^{0.53}$$

where:

C_x *and* C_p are concentrations over any two averaging periods between 24 hours and 1 year;

t_x *and* t_p are corresponding averaging times in days.

All pollutant concentrations, including the suite of VOC compounds detected, were screened against NAAQS, chronic inhalation reference concentrations, and inhalation unit risk factors (for increased life-time cancer risk) published by international agencies.

[1] Beychock, M. R. (2005). *Fundamentals of Stack Gas Dispersion* (4th Edition ed.).

Where pollutant concentrations were below detection level, concentrations were adjusted prior to comparison with the identified criteria using the methodology of Croghan and Egeghy (2003)[2] as per equation below:

$$\text{Replacement value} = \frac{\text{Limit of Detection}}{\sqrt{2}}$$

5 MANAGEMENT OF UNCERTAINTY

1. Theoretical hourly peak concentrations were extrapolated from each of the 14-day sampling period. It is not possible to confirm the date or time of peak concentrations, or if any peaks occurred.
2. Equivalent annual average concentrations of pollutants were calculated based on campaign length averages for each of the sampling campaigns.
3. Where campaign length concentrations were reported as below detection level, the detection level was divided by the square root of two.
4. The SO_2, NO_2 and HF sample at TET1 was found on the ground due to broken triangle at the end of the second sampling period. It is assumed that the results are valid.

6 RESULTS

6.1 Sulfur Dioxide, Nitrogen Dioxide, and Hydrogen Fluoride

All period-length concentrations of SO_2, NO_2, and HF were extrapolated to equivalent hourly, daily, and annual average concentrations (Table 6) to allow for comparison against the assessment criteria, including the NAAQS (Table 1). Period-length HF concentrations at all sites for both sampling periods were below detection level and therefore extrapolated concentrations are not presented. Equivalent SO_2 concentrations were compliant with all applicable NAAQS for hourly, daily, and annual averaging periods (Table 6). The highest concentrations were sampled at TET2 (near the compressor) during the first and second sampling period. (Figure 2).

NO_2 concentrations were higher during the second sampling period (16 February to 02 March 2022) at all sampling locations. Equivalent NO_2 concentrations were compliant with the applicable NAAQS for hourly and annual averaging periods (Table 6). The average equivalent hourly concentrations were 95% or less of the hourly NAAQS. Vehicle exhaust emissions and the compressor may be the main source of NO_2 concentrations sampled at the Tetra4 Virginia Compression Plant.

SO_2 and NO_2 concentrations were low and compliant with the applicable NAAQS at all sampling locations over all averaging periods, during this campaign. HF concentrations were below detection level and are therefore compliant with health-effect screening levels for acute and chronic exposure.

[2] Croghan, C.W. & Egeghy, P.P. (2003) Methods of Dealing with Values Below the Limit of Detection using SAS, paper presented at the Southeastern SAS User Group, City, 22–24 September, 2003.

Table 6: Exposure period and extrapolated concentrations of SO_2, NO_2 and HF for Campaign 1: February 2022 (all units: µg/m³)

Summer				
Statistic	**Exposure period**	**Annual[(a)]**	**Daily[(a)]**	**Hourly[(a)]**
SO_2				
NAAQS	(b)	50	125	350
Average	1.4	0.3	5.8	34.2
Max	3.9	0.7	15.7	92.9
NO_2				
NAAQS	(b)	40	(b)	200
Average	3.6	0.6	(b)	86.1
Max	4.8	0.9	(b)	116.0
HF				
HESL(c)	(d)	14	(d)	16.4
Average	(d)	0.02	(d)	2.68
Max	(d)	0.02	(d)	2.68

Notes:
(a) Calculated concentrations based on period concentration
(b) No applicable NAAQS
(c) Health effect screening level (HESL)
(d) No applicable HESL

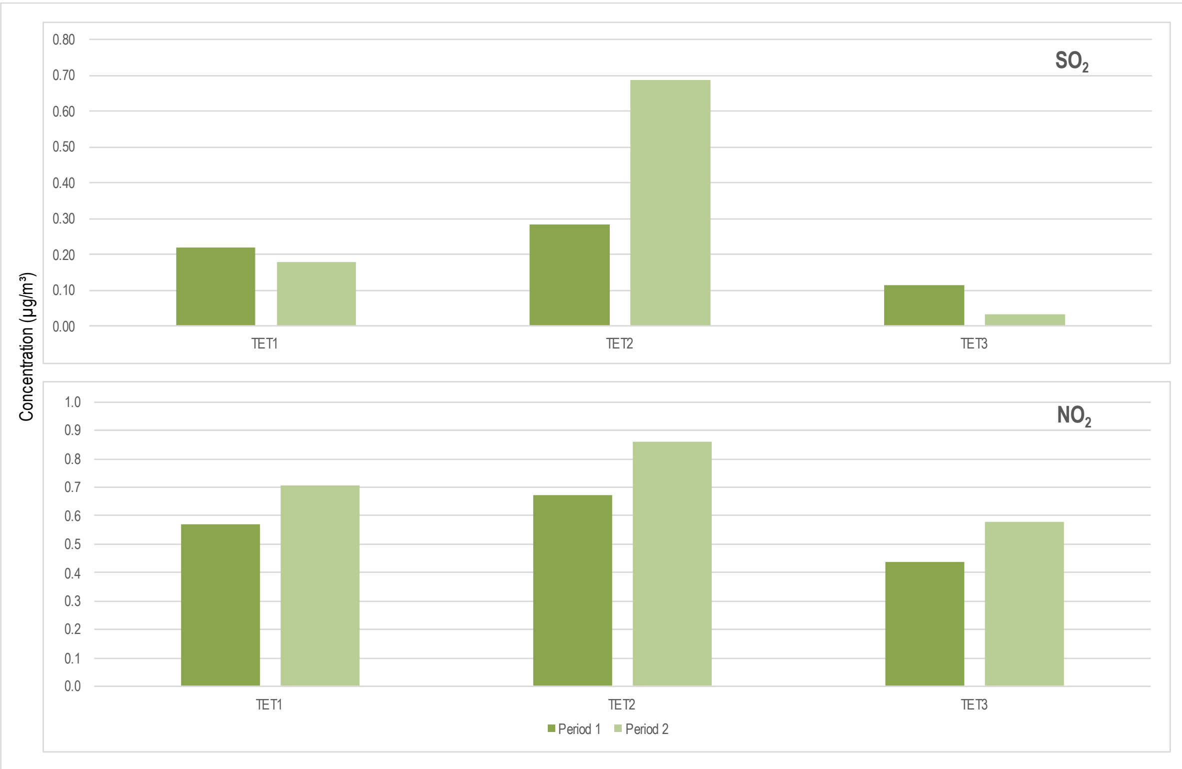

Figure 2: Spatial variation in SO_2 and NO_2 concentrations (14 days campaign lengths)

6.2 Volatile Organic Compounds (VOCs) Results

A suite of 38 compounds were quantified from the VOC passive samplers during the two sampling periods. All compound concentrations were below detection limit during both sampling periods. The calculated equivalent annual average concentrations for benzene were compliant with the NAAQS (Figure 3). Chronic exposure to total VOCs (TVOCs) concentration were less than 10 µg/m³ at all sites (Figure 3), and therefore lower than the 100 µg/m³ health-effect screening level (Table 2).

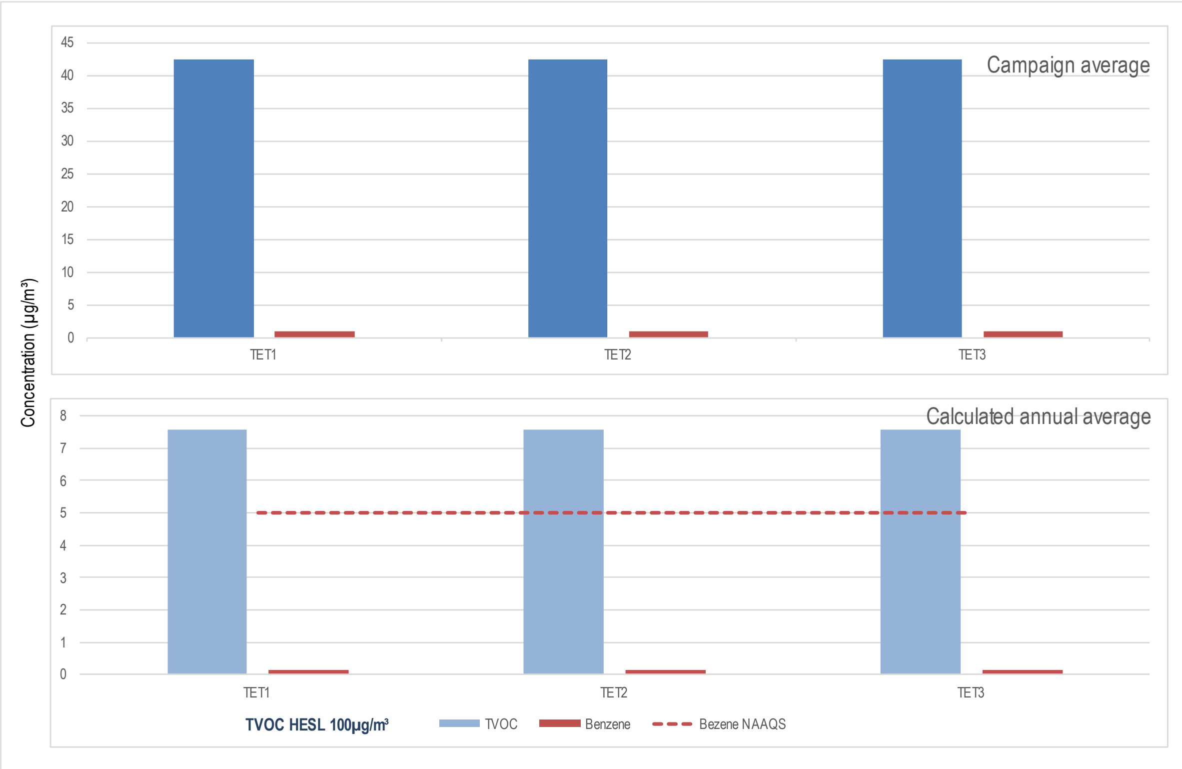

Figure 3: Campaign average (campaign length 14 days) (top) and calculated annual average (bottom) TVOC and benzene concentrations

6.2.1 Chronic Hazard Risk Index

The calculated annual concentrations of VOCs measured at all sampling locations were well below the most stringent inhalation reference concentrations for all compounds during all campaigns, where the maximum risk was 1.10x10³ (from all cartridges, locations, and sampling periods – data not shown). Chronic hazard risk index values less than 1 are not expected to pose a significant health risk.

6.2.2 Increased Life-time Cancer Risk

Based on the maximum potential exposure to VOCs measured near the Tetra4 Virginia Compression Plant over the period of a life-time, the increased life-time cancer risk (ILCR) at all sampling locations was calculated between "moderate" and "low" (Table 7). It is important to note that the calculation of cancer risk the assumes that the concentrations remain the same for 70 years; and that if 1 000 000 people were exposed to these concentrations for 70 years, only 1 person would develop cancer as a result of exposure.

Table 7: Increased life-time cancer risk for exposure to VOCs - Campaign 1: February 2022

Statistic	Increased life-time cancer risk		
	TET1	TET2	TET3
Maximum Risk (all pollutants)	4.68×10^{-4}	4.68×10^{-4}	4.68×10^{-4}
Risk category	Moderate	Moderate	Moderate
Maximum Risk (Benzene)	1.21×10^{-6}	1.21×10^{-6}	1.21×10^{-6}
Risk category	Low	Low	Low

7 MAIN FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Two passive sampling period were conducted at 3 locations around the Tetra4 Virginia Compression Plant from 2 to 16 February 2022 and 16 February to 2 March 2022. The pollutants sampled were: SO_2, NO_2, HF, and VOCs. The main findings of the sampling campaigns can be summarised as follows:

- SO_2 concentrations were low and compliant with the applicable NAAQS at all sampling locations;
- NO_2 concentrations were compliant with the applicable NAAQS at all sampling locations;
- HF concentrations were below detection level at all sampling locations during all sampling periods;
- No volatile organic compounds were analysed to have concentrations above the detection limit in all samples. Thus, TVOC concentrations, chronic hazard risk, and increased life-time cancer risk screening were below the screening criteria and exposure risk is rated between "moderate" and "low";
- The calculated equivalent annual average concentrations for benzene were compliant with the NAAQS;
- The highest sampled concentrations of SO_2 and NO_2 were observed at TET2 (near compressor); and VOCs maintained below detection limit concentrations at all sites. Activities near the compressor, including vehicle and generator exhausts are probably the most likely sources of on-site emissions, while road traffic could be a main off-site source near the background site.

It is noted that, when compared with earlier sampling campaigns – specifically the Winter 2021 campaign, the pollutant concentrations sampled during the February 2022 were on average:

- higher for maximum SO_2, but similar for average SO_2
- lower for NO_2, and
- VOCs all below detection level while toluene had an detectable concentration in the previous period.

Based on the findings of the sampling campaign, the current sampling activities are appropriate. This includes passive sampling of SO_2, NO_2, HF, and TVOCs at a minimum of three locations for 1-month sampling campaigns at least twice per year. Should potential exceedances be calculated, the following additional recommendations are made:

- increase the number of sampling locations and the frequency of sampling;
- ensure safer packaging of fragile sample holders to avoid breakage;
- installation of an on-site meteorological station; and,
- establishment a Complaints Register – if not already in place – where complaints can be lodged by telephone, email, or in person.

8 Annex A – Laboratory Reports; Accreditation Certificates; and Field Log Sheets

CERTIFICATE OF ANALYSIS

R22-22753

BIOGRADE
CC 2006/212609/23

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Company	:	Airshed Planning Professionals (Pty) Ltd
Address	:	PO Box 5260, Halfway House, 1685
Contact	:	Terri Bird
Reference Number	:	20TET01 TB
Date Accepted	:	15 March 2022
Date Completed	:	24 March 2022
Condition of sample(s)	:	All samples received at room temperature
Lab Number(s)	:	B182827 - B182840

<u>Analysis of 7 radiello sample(s) as received:</u>

Test	:	Hydrogen Fluoride (HF), Nitrogen Dioxide (NO_2) and Sulfur Dioxide (SO_2)
Method	:	Radiello Method F and K

Sample ID 兀	FO115	FO117	FO119	FO121	FO125	FO123
Determinant 尢	Result ⇑g/m^3	Result ⇑g/m^3	Result ⇑g/m^3	Result ⇑g/m^3	Result ⇑g/m^3	Result ⇑g/m^3
HF	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11
NO_2	3.20	3.79	2.47	3.99	3.25	4.84
SO_2	1.24	1.60	0.64	1.01	0.19	3.87

Results in units specified

Approximate quantitation limit signified by _ < : followed by the limit value

Supplied media used for blank correction: BLANK

Willem Wepener
Head of Laboratory

CERTIFICATE OF ANALYSIS

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Date Accepted	:	15 March 2022
Date Completed	:	24 March 2022
Condition of sample(s)	:	All samples received at room temperature
Lab Number(s)	:	B182827 - B182840

Analysis of 7 radiello badge sample(s) as received:

Test	:	Volatile organic compounds (VOC) / Organic Vapors
Method	:	Based on Radiello Method D and MDHS Method 88

Sample ID 兀	FO116	FO118	FO120	FO122	FO124	FO126
Determinant 尢	Result IJg/m^3	Result IJg/m^3	Result IJg/m^3	Result IJg/m^3	Result IJg/m^3	Result IJg/m^3
Acetone	< 1.29	< 1.29	< 1.29	< 1.29	< 1.29	< 1.29
Pentane	< 1.34	< 1.34	< 1.34	< 1.34	< 1.34	< 1.34
n-Hexane	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Methylethylketone	< 0.38	< 0.38	< 0.38	< 0.38	< 0.38	< 0.38
Ethyl Acetate	< 0.64	< 0.64	< 0.64	< 0.64	< 0.64	< 0.64
Chloroform	< 0.66	< 0.66	< 0.66	< 0.66	< 0.66	< 0.66
1,1,1-Trichloroethane	< 0.48	< 0.48	< 0.48	< 0.48	< 0.48	< 0.48
1,2-Dichloroethane	< 0.64	< 0.64	< 0.64	< 0.64	< 0.64	< 0.64
Isopropyl Acetate	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75	< 0.75
Benzene	< 0.62	< 0.62	< 0.62	< 0.62	< 0.62	< 0.62
Cyclohexane	< 0.55	< 0.55	< 0.55	< 0.55	< 0.55	< 0.55
Carbon Tetrachloride	< 1.48	< 1.48	< 1.48	< 1.48	< 1.48	< 1.48
Fluorobenzene (IS)						
Isooctane	< 0.54	< 0.54	< 0.54	< 0.54	< 0.54	< 0.54
Heptane	< 0.86	< 0.86	< 0.86	< 0.86	< 0.86	< 0.86
Trichloroethylene	< 0.72	< 0.72	< 0.72	< 0.72	< 0.72	< 0.72
1,4-Dioxane	< 1.46	< 1.46	< 1.46	< 1.46	< 1.46	< 1.46
Propyl acetate	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76	< 0.76
Methyl Isobutyl Ketone	< 0.74	< 0.74	< 0.74	< 0.74	< 0.74	< 0.74
Toluene	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
Isobutyl Acetate	< 0.79	< 0.79	< 0.79	< 0.79	< 0.79	< 0.79
Tetrachloroethylene	< 0.84	< 0.84	< 0.84	< 0.84	< 0.84	< 0.84
1,2-Dibromoethane	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40	< 1.40
Butyl Acetate	< 0.83	< 0.83	< 0.83	< 0.83	< 0.83	< 0.83
Chlorobenzene	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44
Ethylbenzene	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44	< 0.44
m+p-Xylene	< 0.71	< 0.71	< 0.71	< 0.71	< 0.71	< 0.71
Styrene	< 0.81	< 0.81	< 0.81	< 0.81	< 0.81	< 0.81
o-Xylene	< 0.46	< 0.46	< 0.46	< 0.46	< 0.46	< 0.46
Nonane	< 1.03	< 1.03	< 1.03	< 1.03	< 1.03	< 1.03
Cumene	< 0.51	< 0.51	< 0.51	< 0.51	< 0.51	< 0.51
Propylbenzene	< 0.87	< 0.87	< 0.87	< 0.87	< 0.87	< 0.87
1,3,5-Trimethylbenzene	< 0.99	< 0.99	< 0.99	< 0.99	< 0.99	< 0.99
1,2,4-Trimethylbenzene	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60	< 0.60
Decane	< 1.15	< 1.15	< 1.15	< 1.15	< 1.15	< 1.15
p-Cymene (IS)						
1,2-Dichlorobenzene	< 1.95	< 1.95	< 1.95	< 1.95	< 1.95	< 1.95
Naphthalene	< 1.19	< 1.19	< 1.19	< 1.19	< 1.19	< 1.19
Other Hydrocarbons (HC) found to be present: Positive (Pos) or Negative (Neg)						
Aliphatic HC [SQ57]	Neg	Neg	Neg	Neg	Neg	Neg
Aromatic HC [SQ91]	Neg	Neg	Neg	Neg	Neg	Neg

Results in units specified

Approximate quantitation limit signified by _< : followed by the limit value

Supplied media used for blank correction: BLANK

* : Identified by library search and semi-quantified

IS : Internal standards

Disclaimer:

Tests marked with # in this report are not included in the SANAS schedule of accreditation for this laboratory. T&C's apply.

Willem Wepener
Head of Laboratory

South African National Accreditation System

CERTIFICATE OF ACCREDITATION

In terms of section 22(2) (b) of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act, 2006 (Act 19 of 2006), read with sections 23(1), (2) and (3) of the said Act, I hereby certify that:-

BIOGRADE CC

Co. Reg. No.: 2006/212609/23

Facility Accreditation Number: **T0574**

is a South African National Accreditation System accredited facility provided that all conditions and requirements are complied with

This certificate is valid as per the scope as stated in the accompanying schedule of accreditation, Annexure "A", bearing the above accreditation number for

CHEMICAL ANALYSIS

The facility is accredited in accordance with the recognised International Standard

ISO/IEC 17025:2005

The accreditation demonstrates technical competency for a defined scope and the operation of a quality management system

While this certificate remains valid, the Accredited Facility named above is authorised to use the relevant accreditation symbol to issue facility reports and/or certificates

Mr R Josias
Chief Executive Officer

Effective Date: 23 January 2019
Certificate Expires: 22 January 2024

ANNEXURE A

SCHEDULE OF ACCREDITATION

Facility Number: **T0574**

Permanent Address of Laboratory:
Biograde CC
667 Viscount Street
Elarduspark X6
Pretoria
0181

Signatory:
Ms L Lightfoot (All Methods)
Mr WD Wepener (All Methods)

Postal Address:
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Nominated Representative:
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E-mail: willem@biograde.co.za

Issue No.: 04
Date of Issue: 24 January 2019
Expiry Date: 22 January 2024

Material or Products Tested	Type of Tests/ Properties Measured, Range of Measurement	Standard Specifications, Techniques / Equipment Used
CHEMICAL		
Air	Gravimetric Analysis of Respirable, Thoracic and Inhalable Particles/Aerosols	Based on MDHS 14, NIOSH 0500, NIOSH 0600 and GME 16/1/3/2/3
	Carbon Black (Gravimetric)	NIOSH 5000
	Oil Mist, Mineral (Gravimetric)	MDHS 84
	Coal Tar Pitch Volatiles (CTPV) (Gravimetric)	OSHA 58, NIOSH 5023 & 5042
	Soluble and Insoluble Nickel by FAAS & ICP	MDHS 42
	Cobalt and compounds by FAAS & ICP	MDHS 30
Environmental Samples (Air, Liquid and Solids)	Metals, Metalloids and Fumes by FAAS & ICP	OSHA ID-121 & ID-125
	Elements by ICP	NIOSH Method 7303
	Hydrofluoric Acid, Nitrogen Dioxide and Sulfur Dioxide	Radiello F1 & K1
	Hydrochloric Acid	Radiello J1
	Acids, Inorganic	NIOSH Method 7903
	Sulfur Dioxide	NIOSH Method 6004

Environmental Samples (Air, Liquid and Solids)	Hydrogen Sulfide	NIOSH Method 6013
	Bromine and Chlorine	NIOSH Method 6011
	Fluorides, aerosol and gas	NIOSH Method 7906
	Volatile Acids	NIOSH Method 7907
	Non-Volatile Acids	NIOSH Method 7908
	Sulphuric Acid	OSHA Method ID-113
	Ozone	OSHA Method ID-214
	Inorganic Anions	EPA Method 9056
	Metal Elements	EPA Method 6010C
	Volatile Organic Compounds (VOC)/Organic Vapours	Based on OSHA Method 7, NIOSH 1003, 1005, 1022, 1300, 1451, 1457, 1500, 1501, 1600, 1612, 2500, MDHS 88, Radiello D1 & 3M Method
	Polynuclear Aromatic Hydrocarbons (PAH) by GCMS	NIOSH 5515 & OSHA 58
Stationary Sources (Environmental)	Particulate Matter (PM)	EPA CFR Promulgated Test Method 5 & 17
	Sulfur Dioxide (SO_2)	EPA CFR Promulgated Test Method 6
	Nitrogen Oxides (NOx)	EPA CFR Promulgated Test Method 7
	Volatile Organic Compound (VOC)	EPA CFR Promulgated Test Method 18
	Hydrogen Halides and Halogens by IC	EPA CFR Promulgated Test Method 26
	Metal Emissions	EPA CFR Promulgated Test Method 29

Original Date of Accreditation: 23 January 2014

ISSUED BY THE SOUTH AFRICAN NATIONAL ACCREDITATION SYSTEM

Acting Accreditation Manager

AIRSHED PLANNING PROFESSIONALS								480 Smuts Drive, Halfway Gardens P O Box 5260, Halfway House, 1685 Tel: +27 (0)11 805 1940 Fax: +27 (0)11 805 7010 Web: www.airshed.co.za	
LABORATORY FORM		**HANDOVER FORM FOR PASSIVE SAMPLES AND LOGSHEET**							
Document Number	**QF 032**	**Revision**	**A**	**Issue date**	**06 Dec 2019**	**Effective date**	**06 Dec 2019**		

Airshed Ref. No.: ____________________

PASSIVE SAMPLES FOR Tetra 4

This letter is to confirm that ____________________ samples comprising of _____ sample bags with sampling numbers ____________________ were received.

Provided/delivered by:

Full name ____________________

Signed ____________________ Date ____________________

Received by:

Full name Glendah Mamba.

Signed [signature] Date 10/03/22

QF 032 (Handover form for passive samples and logsheet) (Rev A) Page **1** of **2**

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Filter No.	Pollutant name:	Location of Sample	Date	Elapsed Time Time in (Start)	Elapsed Time Time out (End)	Comments
Tet 1 P1 FO115		CNG Plant	02/02/2022	09:18	15:57	16/02
Tet 1 FO116		CNG Plant	02/02/2022	09:18	15:59	16/02
Tet 2 P2 FO117		CNG Plant	02/02/2022	09:16	15:53	16/02
Tet 2 FO118		CNG Plant	02/02/2022	09:16	15:55.	16/02/2022 changed
Tet 3 FO119		Background	02/02/2022	09:04	15:34	16/02/2022 changed
Tet 3B FO120		Background.	02/02/2022	09:01	15:30	16/02/2022 changed
FO121		CNG Plant	16/02/2022	15:55	16:48	Broken triangle
FO122		CNG Plant	16/02/2022	15:56	16:50	→ Sample exposed on
FO123		CNG Plant	16/02/2022	15:58	16:51	grand.
FO124		CNG Plant	16/02/2022	16:00	16:52	
FO125		Background	16/02/2022	15:35	14:33	
FO126		Background	16/02/2022	15:36	14:32	

Was the person who conducted the sampling trained by an Airshed consultant? Yes ☐ No ☐

Full name Chandré Kok Signed [signature] Date 9 March 2022

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