



Department of Employment & Labour Approved Inspection Authority (OH0036-CI04)

CONFIDENTIAL REPORT

PERSONAL AIR SAMPLING REPORT

Project Number: GEO 06962_7

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Prepared for:

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Shongweni Landfill site

Durban

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STATEMENT

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- *Lead Regulations (2001)*
- *Noise Induced Hearing Loss Regulations (2003)*
- *Asbestos Abatement Regulations (2020)*
- *Hazardous Chemical Agents Regulations (2021)*

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DOCUMENT CONTROL SHEET

**DOCUMENT: GEO Project No. 06962_7 – EnviroServ Waste Management (Pty) Ltd,
Shongweni Landfill site: Personal air sampling survey:
Worker exposure to priority airborne particulate contaminants**

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EXECUTIVE SUMMARY

Geozone Environmental conducted personal air sampling surveys at the EnviroServ Shongweni Landfill site to evaluate worker exposure to priority airborne contaminants. The findings from the latest survey period are summarized as follows:

Findings:

The diesel particulate matter (DPM) concentration recorded from the chemical controller was below the occupational exposure limit (OEL) but equalled the action level, necessitating the implementation of remedial measures. The employee made use of a half-face FFP dust mask.

Conversely, inhalable particulate levels were found to be below both the OEL and the action level, and no excessive exposure to airborne asbestos fibres was observed in the area. Similarly, neither of the traffic controllers were found to be exposed to elevated concentrations of VOCs.

Recommendations:

It is advised that general workers continue to be issued with suitable RPE for optional use, whilst the chemical controller is to be issued with such equipment for mandatory application. FFP2 half mask respirators, which provide protection against inhalable particulates exceeding ten times the occupational exposure limit (OEL), are recommended for general respiratory protection.

Workers exposed to vapours, fumes, or gases, especially during treatment and disposal of priority waste streams, must be equipped with Type ABEK1P3 half mask respirators. The compulsory use of these respirators is particularly imperative for those operating within the liquids blending bunker.

In relation to asbestos management, FFP3 half mask respirators are recommended for optional use by workers directly involved in the handling or disposal of asbestos or asbestos-containing materials (ACMs). In addition, all workers must be thoroughly briefed on the health risks associated with airborne contaminants, especially asbestos fibres, to reinforce compliance with protective measures.

Vehicle and plant operators must maintain closed cabin environments, with fully functioning air conditioning systems, which should be routinely inspected and maintained to ensure operational efficacy.

Ongoing asbestos personal air sampling is to continue, with an emphasis on coinciding these with actual asbestos disposal activities. All personnel on site are to remain under medical surveillance as deemed necessary by the Occupational Medical Practitioner.

Lastly, comprehensive instruction must be provided to all workers required to utilise RPE. This includes training on proper usage, limitations, fit testing, maintenance, and recognising potential medical contraindications.

These recommendations are made in the interest of safeguarding worker health and ensuring ongoing compliance with occupational exposure standards.

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LIST OF DEFINITIONS AND ABBREVIATIONS

Term	Definition
Action Level	½ of the OEL, i.e. safe level at which action need to be taken to reduce worker exposure

Abbreviation	Full Form
BEI	Biological exposure index
GHS	Globally Harmonized System
HCA	Hazardous Chemical Agent
OEL	Occupational Exposure Limit
OMP	Occupational Medical Practitioner
PPE	Personal Protective Equipment
RPE	Respiratory Protective Equipment
SDS	Safety Data Sheet
STEL	Short Term Exposure Limit (15 minutes)
TLV	Threshold Limit Value
TWA OEL-ML	Time Weighted Average Occupational Exposure Limit - Maximum Limit
TWA OEL-RL	Time Weighted Average Occupational Exposure Limit - Restricted Limit
VOC	Volatile Organic Compound

1. PURPOSE

The purpose of the survey was to assess the risks of worker exposure to priority airborne particulate contaminants when engaged in activities on the EnviroServ Shongweni Landfill site in Durban. This was done in order to:

- *Fulfill the air sampling requirements of the Occupational Hygiene Programme for the site*
- *Compare the findings to current statutory requirements (Occupational Exposure Limits)*
- *Evaluate the worker health risks posed by such exposures*
- *Recommend (if necessary) any remedial actions*

2. PREMISES

The surveys were conducted at the EnviroServ Waste Management (Pty) Ltd, Shongweni landfill site, Shongweni, KwaZulu Natal, on 13 February 2025.

3. INTRODUCTION

In accordance with the requirements of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), Geozone Environmental (Pty) Ltd, a Department of Employment and Labour Approved Inspection Authority (AIA) has compiled a comprehensive Occupational Hygiene Programme (OHP) for the various EnviroServ sites. The core documents generated as part of this OHP are the site Health Risk Assessments (HRAs) which are reviewed every 24 months or in the event of any changes being affected on site which could impact on the health risks to which workers are exposed. As part of the risk assessment process, the risks of worker exposure to airborne contaminants are qualitatively assessed and recommendations are made regarding the need for quantitative air sampling in order to verify the identified risks.

Formal Personal Air Sampling Strategies (PASS) have been drafted for each site. Each of these strategies are tailored to ensure that the worker risks of exposure to priority airborne contaminant compounds when engaged in activities on the various sites are suitably quantified and adequately assessed in accordance with the requirements of the Regulations for Hazardous Chemical Agents (HCA) as promulgated in terms of the OHSA.

3. INTRODUCTION...continued

Currently, the PASS for the Shongweni Landfill site includes the quantitative sampling of priority worker exposure to the following airborne contaminants every 6-12 months:

- *Inhalable particulates*
- *Respirable particulates*
- *Metal compounds (particulate form)*
- *Volatile Organic Compounds (VOC)*
- *Asbestos Fibres*

Note: The risk of worker exposure to other airborne contaminants is also assessed as and when required – i.e. during special treatment and disposal activities which require dedicated HRAs to be performed followed by specific quantitative air sampling surveys.

The focus of this current investigation was to assess the risk of worker exposure to airborne particulate contaminants when engaged in typical treatment and disposal activities at the Shongweni Landfill site during the summer season. Appropriate personal air sampling was conducted in order to assess worker exposure to the following priority airborne contaminants:

- *Inhalable Particulates*
- *Diesel Particulate Matter*
- *Volatile Organic compounds (VOCs)*
- *Asbestos*

The results of this personal air sampling survey are detailed and discussed in the ensuing report.

4. STATUTORY REQUIREMENTS

Regulation 5 of the Environmental Regulations for Workplaces, Occupational Health and Safety Act, 1993 (Act 85 of 1993), states, inter alia, that an employer must ensure that the air breathed by employees does not endanger their safety and, that prescribed *exposure limits* for airborne agents therein are not exceeded.

Regulation 5(4) of the Regulations for Hazardous Chemical Agents states inter alia that: If an assessment of a workplace indicates that any employee may be exposed, the employer shall ensure that monitoring is carried out in accordance with the provisions of regulations 6 and 7. Regulation 6 requires, inter alia, that such monitoring of employee exposure be conducted by an approved inspection authority - **Regulation 6(c)**.

The **Asbestos Abatement Regulations, 2020** as promulgated under the Occupational Health and Safety Act (Act 85 of 1993) are of relevance to this investigation.

Regulation 16 of the Asbestos Abatement Regulations deals specifically with air monitoring and states inter alia that:

- (1) In the case of type 2 and type 3 asbestos work, an asbestos client must ensure that air monitoring of the concentration of airborne regulated fibres to which an employee may be exposed, is-
 - (a) Performed by an approved inspection authority;
 - (b) Carried out in terms of HSG 248;
 - (c) Representative of employee exposure; and
 - (d) Carried out at a frequency determined by the approved inspection authority based on the site -specific asbestos risk assessment.
- (2) The results of air monitoring obtained must be compared with the OEL or the OEL short -term exposure limit to ensure that no employee is exposed to asbestos in excess of the prescribed OELs.
- (3) Environmental air monitoring must be performed by an approved inspection authority during type 2 and type 3 asbestos work.

4. STATUTORY REQUIREMENTS...continued

Particulate contaminants

In South Africa, the OEL for Diesel Particulate Matter (DPM) = 0.16mg/m³ for total carbon (TC).

Table 1: Occupational Exposure Limits for Particulate contaminants

Contaminant(s)	OEL	TWA OEL-ML / TWA OEL-RL
Inhalable Particulates	10.0 (mg/m ³)	RL
Diesel Particulate Matter	0.16 (mg/m ³)	RL
Regulated Asbestos Fiber	0.1 (f/ml)	4 hours sampling time (CARC) (ML)

mg/m³ = milligrams per cubic metre of air

f/ml = fibres per milliliter

Also of particular relevance are:

- Regulation 5: Information and training.
- Regulation 6: Duties of persons who may be exposed.
- Regulation 9: Medical surveillance.
- Regulation 11: Control of exposure to asbestos.
- Regulation 17: Personal protective equipment and facilities.

A *regulated asbestos fibre* is defined as:

- a particle of asbestos with a length:diameter ratio greater than 3:1
- a length greater than 5 µm (micrometers)
- a diameter of less than 3 µm (micrometres)

4. STATUTORY REQUIREMENTS...continued

VOC (Volatile Organic Compounds)

Table 2: Occupational Exposure Limits for Volatile Organic Compounds (VOC)

Compounds	TWA OEL (ppm)	RL, ML, STEL or TLV
Pentane	2000	RL
Ethanol	2000 (STEL)	RL
Acetone	500	RL
n-Hexane	100	RL
Ethyl acetate	800	RL
Benzene	1	ML
n-Heptane	800	RL
Toluene	40	RL
Ethyl benzene	40	RL
Xylene	200	RL
2-Butoxyethanol	40	ML
Dichloromethane	100	ML
1,2,4-TMB	50	RL
2-Propanol	400	RL
White spirits	100	TLV
2-Butanol	200	RL
Cyclohexane	200	RL
Iso propyl acetate	200	RL
MIBK	40	RL
Naphthalene	20	RL

4. STATUTORY REQUIREMENTS...continued

TWA OEL-RL = Time Weighted Average Occupational Exposure Limit - Restricted Limit: the concentration of an airborne agent, averaged over a reference period, at which, according to current knowledge, there is no evidence that it is likely to be injurious to workers if they are exposed by inhalation, day after day, to that concentration

TWA OEL-ML = Time Weighted Average Occupational Exposure Limit - Maximum Limit: defined as the maximum concentration of an airborne agent, average over a reference period, to which workers may be exposed by inhalation, under any circumstances.

Action Level = $\frac{1}{2}$ of the OEL – safe level at which action need to be taken to reduce worker exposure.

* **TLV** = in the absence of South African Occupation Exposure Limits (OELs), reference is made to the Threshold Limit Values (TLVs) published by the American Conference of Governmental Industrial Hygienists (ACGIH).

SKIN (Skin notation) = can be readily absorbed into the bloodstream via intact skin.

CARC = a chemical agent or mixture which induces cancer or increases its incidence.

BEI = Biological Exposure Index. Reference values as guideline for the evaluation of potential health hazards. They do not represent a sharp distinction between hazardous and non-hazardous exposures and cannot be used as a diagnostic tool for occupational diseases.

5. INSTRUMENTATION

Inhalable Particulate sampling:

- Gilian GilAir Basic P/N 800485 personal air sampling pumps.
- SKC IOM multi-dust samplers.
- SKC 25 mm 0.8 µm filters loaded into IOM sampler cassettes.

The pumps were calibrated before and after the survey period using a Gilian Gilibrator primary flow calibrator serial no. 2390-B. The Gilibrator is subject to annual calibration by a SANAS accredited calibration facility – refer attached calibration certificate.

Diesel Particulate Matter (DPM) sampling

- Gilian GilAir Basic P/N 800485 air sampling pumps
- One filter in series separated with a chemically inert spacer. Pre-filter: 37-mm quartz fibre
- Gilian Gilibrator primary flow calibrator serial No2390-B
- Higgins-Dewell cyclones

The pumps were calibrated both before and after the survey using a Gilian Gilibrator primary flow calibrator, Serial No2390-B. The Gilibrator instrument is subject to annual calibration by a SANAS accredited facility – refer attached calibration certificate.

Asbestos:

- Gilian GilAir Basic P/N 800485 personal air sampling pump.
- Millipore type AA 25 mm 0.8 µm MCE filter membrane.
- Asbestos monitor cassette (Poretics corp).

The pump was calibrated both before and after the survey with a Gilian Gilibrator primary flow calibrator serial no. 2390-B. The Gilibrator instrument is subject to annual calibration by a SANAS accredited facility – refer attached calibration certificate.

Volatile Organic Compound (VOC) sampling:

- SKC Model 3500 passive VOC monitor.
- Coolbox and ice-bricks

6. METHODOLOGY

Logistically it is impractical to simultaneously include all of the workers engaged on site in a formal air sampling programme. Priority is instead given to sampling the personal exposures to airborne contaminants of those site workers *most at risk* – i.e. *worst-case scenarios*.

Inhalable Particulate sampling:

With the assistance of the site supervisor, the following two (2) *most-at-risk workers* were identified and selected to partake in the personal air sampling surveys:

- *Sample PVC-M-1921: Mr. L. Nene – Excavator Operator*
- *Sample MCE-GN4-8204: Mr. S. Mbele – Traffic Controller*

The participants were each given a sampling train to wear on his person for the duration of the survey periods. The sampling train comprised of a personal sampling pump and an aerosol monitor cassette containing a pre-weighed membrane filter. The participant was supplied with a sampling train to wear during the survey period. The sampling train comprised of a personal sampling pump and an IOM sampler containing a pre-weighed cassette with a pre-weighed MCE filter for inhalable and dust sampling.

The IOM samplers were attached to each worker's collar in order to capture airborne contaminants from within his breathing zone - i.e. *to obtain a personal breathing zone sample*.

Reference was made to MDHS 14/4 and the Geozone in-house method (GEO/IH/001).

The sample was returned to the Geozone laboratory where they were left to stabilize overnight before being submitted to Chemtech Laboratory Services, Monument Park, for gravimetric weighing and analysis as per the selected methodology.

Diesel particulate matter (DPM) sampling:

With the assistance of the site supervisor, the following *most-at-risk worker* was identified and selected to partake in the sampling survey:

- * *Sample DPM-1462: Mr. S. Mbembu – Chemical Controller*

The worker was given a sampling train to wear on his person for the duration of the survey period. The sampling train comprised of a personal air sampling pump, an aerosol monitor cassette containing a support pad and a quartz fibre filter and a cyclone. The cassette was attached to worker's collars in order to capture diesel particulate matter from within his breathing zone - i.e. *to obtain a personal breathing zone sample*.

6. METHODOLOGY...continued

Diesel particulate matter (DPM) sampling...continued:

Reference was made to NIOSH method 5040.

Following termination of the sampling, the samples were submitted to Chemtech Laboratory Services, Monument Park, Centurion for analysis as per the selected methodologies.

Asbestos sampling:

In compliance with statutory requirements (Asbestos Abatement Regulations, 2020 - OHS Act 85 of 1993), reference was made to the following:

- **HSG248** – Asbestos: The analysts guide for sampling, analysis and clearance procedures (Health and Safety Executive of the United Kingdom).
- **MDHS 39/4** - Methods for the Determination of Hazardous Substances: Asbestos fibres in air: sampling and evaluation by phase contrast microscopy (Health and Safety Executive of the United Kingdom)
- **HSG173** - Monitoring Strategies for Toxic Substances, HSG173, published by the Health and Safety Executive of the United Kingdom.

Analysis of the collected sample was performed by Assurecloud (NOSA) Testing Laboratories in Midrand – accredited by the South African National Accreditation System (SANAS).

The following (most at risk) worker was selected to partake in the personal air sampling survey:

** Sample No. ASB/SHO/001: Mr. M. Jeke – Traffic Controller*

This worker was provided with a sampling train comprising a personal air sampling pump calibrated at a flow rate of 1000 ml/minute and a 25 mm asbestos monitor cassette containing a 25 mm diameter MCE filter membrane. The sampling train remained attached to the worker for the duration of the sampling period, with the monitor cassette positioned within the worker's breathing zone.

Following completion of the sampling period, the pump was deactivated, and the monitor cassette removed, capped and transferred to a GME sample transport container.

6. METHODOLOGY...continued

VOC sampling:

With the assistance of the site supervisor, the following *most-at-risk worker* was identified and selected to partake in the sampling survey:

** Sample SKC001: Mr. M. Jeke – Traffic Controller*

The worker was given a passive sampling monitor to wear on his person for the duration of the survey periods. The monitors were attached to the employee's collar in order to capture airborne contaminants from within their breathing zone - i.e. to obtain personal breathing zone samples.

Reference was made to MDHS 88 for volatile organic compounds.

Upon termination of the survey period, the passive sampling monitor was removed, sealed and placed in a cooled container with icepacks and transported to Chemtech Laboratory Services in Monument Park, Centurion, for gas chromatography and mass spectrophotometry analysis.

For the purposes of additional evaluation of the worker health risk associated with exposure to airborne VOC, the C/L Fraction Method was referenced. This method allows for more definitive assessment of the additive (cumulative) effects of substances with the same or similar health effects.

The C/L Fraction has been used within the occupational setting successfully and is defined within the Occupational Health and Safety Act 85, 1993, Hazardous Chemical Agents Regulations, Annexure 1, Mixed Exposures Section 48 (b), Additive Substances, which states inter alia that where there is reason to believe that the effects of the constituents are additive, and where the exposure limits are based on the same health effects, the mixed exposure of the employee should be assessed by means of the formula:

$$C1/OEL1 + C2/OEL2 + Cn/OELn \dots\dots\dots < 1$$

Where C1, C2, etc. are the time-weighted average concentrations of the constituents in air and OEL1, OEL2, etc. are the corresponding occupational exposure limits. Where the sum of the C/L does not exceed one (1), the exposure is not considered to exceed the additive Occupational Exposure Limit (OEL).

7. RESULTS

NOTE: Sampling was performed for as long as possible during the course of typical shifts without exceeding the maximum volume as per the respective sampling methodologies. The tabled results are 8-hour time weighted averages (TWA) calculated in accordance with the procedure specified under Annexure 2 of the HCA Regulations.

Staff engaged within on the Shongweni Landfill site work the following shift:

- 07:00 – 16:00 with 60 minutes allowed for breaks – i.e. effectively engaged in production activities for ~8-hours *per day*.

7.1 Inhalable Particulate sampling:

7.1.1 Sample PVC-M-1921: Mr. L. Nene – Excavator Operator

Sample details	Contaminant	Results (mg/m ³)	OEL-RL (mg/m ³)
Sample No: PVC-M-1921 Location: Landfill site (Mixing Ash) Sampling time: 362 min Flow rate: 1.94 liters/ min Sample volume: 0.702 m ³	Inhalable particulates	0.83	10.0

Note: Sample obtained with closed windows

7.1.2 Sample MCE-GN4-8204: Mr. S. Mbele – Traffic Controller

Sample details	Contaminant	Results (mg/m ³)	OEL-RL (mg/m ³)
Sample No: MCE-GN4-8204 Location: Landfill site Sampling time: 353 min Flow rate: 1.946 liters/ min Sample volume: 0.686 m ³	Inhalable particulates	1.28	10.0

Note: Partial shift sampling was done due the limited availability of landfill site workers, as they were engaged with ongoing site operations, which occasionally delayed coordination for sampling activities

7. RESULTS...continued

7.2 Diesel particulate matter sampling:

7.2.1 Sample DPM-1462: Mr. S. Mbembu – Chemical Controller

Sample details	Organic Carbon (mg/m ³)	Elemental Carbon (mg/m ³)	Total Carbon (mg/m ³)	OEL (mg/m ³)
Sample No: DPM-1462 Sampling time: 359 min Flow rate: 2.210 litres / min Sample volume: 0.793 m ³	0.07	0.01	0.08	0.16

Bold font = equal / in excess of the Action Level (1/2 the OEL)

Note: Partial shift sampling was done due the limited availability of landfill site workers, as they were engaged with ongoing site operations, which occasionally delayed coordination for sampling activities.

7.3 Asbestos sampling:

7.3.1 Sample No. ASB/SHO/001: Mr. M. Jeke – Traffic Controller

Sample details	Contaminant	Results (f/ml)	OEL (f/l)
Sample No: ASB/SHO/001 Location: Landfill site Sampling time: 226 min Flow rate: 0.955 litres / min. Sample volume: 0.215 m ³	Regulated asbestos fibres	<i>BDL</i>	0.2

BDL= Below the detection limit (<0.010 fibres per sample)

7. RESULTS...continued

7.4 VOC Sampling:

7.4.1 Sample SKC001: Mr. M. Jeke – Traffic Controller

Sample No: SKC001

Worker ID:	Mr. M. Jeke - Traffic Controller			
Exposure time:	Contaminant	Result (ppm)	OEL/TLV (ppm)	Hazard Quotient
353 min	Isohexane	0.23	1000	0.0002300000
Date:	n-Hexane	0.03	100	0.0003000000
13/02/2025	Toluene	0.05	40	0.0012500000
	Ethyl benzene	0.03	40	0.0007500000
	Xylene	0.11	200	0.0005500000
	d-Limonene	0.04	30	0.0013333333
	White Spirits	0.14	100	0.0014000000
			Hazard Index (HI)	0.0058133333

Note: Partial shift sampling was done due the limited availability of landfill site workers, as they were engaged with ongoing site operations, which occasionally delayed coordination for sampling activities

8. DISCUSSION

8.1 Inhalable Particulate sampling:

8.1.1 Sample PVC-M-1921: Mr. L. Nene – Excavator Operator

- The operator was involved in operating the excavator on the Landfill site on the day of the survey and engaged in the mixing of ash.
- This sample yielded a result for inhalable dust = 0.83 mg/m^3 – i.e. below both the occupational exposure limit (OEL = 10.0 mg/m^3) and the Action Level (50% of the OEL = 5.0 mg/m^3).
- The excavator was operated with closed windows.
- The operator made use of respiratory protective equipment (RPE) on the day of the survey.

8.1.2 Sample MCE-GN4-8204: Mr. S. Mbele – Traffic Controller

- The traffic controller was involved in directing trucks on the Landfill site on the day of the survey. The majority of the work was conducted outdoors.
- This sample yielded a result for inhalable dust = 1.28 mg/m^3 – i.e. below the OEL (10.0 mg/m^3) and the Action Level (5.0 mg/m^3).
- The traffic controller made use of a FFP2 dust mask on the day of the survey.

8. DISCUSSION ...continued

8.2 Diesel Particulate Matter (DPM) sampling...continued

8.2.2 **Sample DPM-1462: Mr. S. Mbembu – Chemical Controller**

* The sample yielded a result for organic carbon (OC) of 0.07 mg/m³ i.e., - below the OEL (0.16 mg/m³) *and marginally below the Action Level (0.08 mg/m³). The action level is the point where remedial measures must be implemented.*

* The sample yielded a result for elemental carbon (EC) of 0.01 mg/m³ i.e., - below the OEL (0.16 mg/m³) and the Action Level (0.08 mg/m³).

* The sample yielded a result for total carbon (TC) of 0.08 mg/m³ i.e., - below the OEL (0.16 mg/m³) *but equal to the Action Level (0.08 mg/m³). The action level is the point where remedial measures must be implemented.*

* *The chemical controller was therefore potentially exposed to excessive airborne concentrations of diesel particulate matter during the survey period.*

*The employee made use of a half-face dust mask (FFP2) on the day of the survey.

8.3 Asbestos sampling:

8.3.1 **Sample No. ASB/SHO/001: Mr. M. Jeke – Traffic Controller**

*The traffic controller was responsible for guiding trucks on the Landfill site.

*Analysis of the sample further yielded no detectable fibers – i.e., below the detection limit of the analytical method and well below the relevant OELs and Action Levels.

*This employee was therefore not exposed to excessive airborne concentrations of asbestos during the survey period.

*No demarcation or respiratory protective equipment (RPE) is necessary at this point.

8. DISCUSSION...continued

8.4 VOC Sampling

8.4.1 **Sample SKC001: Mr. M. Jeke – Traffic Controller**

*The traffic controller was responsible for guiding trucks on the Landfill site.

*Various VOCs were detected on the sample as listed in 7.4.1 – all below the relevant OEL's and Action Levels.

* Simultaneous exposure to the detected VOC may cause similar neurological (narcotic) health effects and it is therefore prudent to consider the additive effects of combined exposure to these compounds – refer Annexure 3 (82b) of the Regulations for Hazardous Chemical Agents (OHS 85 of 1993).

* The calculated Hazard Index (HI) resulting from the sum of the Hazard Quotients (HQ) for each compound = 0.005 - i.e., the additive exposure was well below the exposure index of 1. The results are similar than the results obtained in the previous survey (GEO06655_9).

* The traffic controller was therefore not exposed to excessive airborne concentrations of VOCs during the survey period.

*No demarcation or respiratory protective equipment (RPE) is necessary at this point, although the employees has been provided with a full-face respirator (ABEK1) which will be sufficient in protecting the employee against organic fumes and vapours.

9. RECOMMENDATIONS*

** opinions and interpretations expressed herein are outside the scope of SANAS accreditation*

- 9.1 The general workers on the Landfill site must continue to be issued with appropriate respiratory protective equipment (RPE) for optional use. However, the chemical controller must be issued with RPE for compulsory use. It is recommended that staff be issued with Type FFP2 half masks for respiratory protection which are able to afford protection against inhalable particulates of >10x the OEL.
- 9.2 Type ABEK1P3 half mask respirators must be issued to all workers who are at risk of exposure to airborne concentrations of vapours, fumes or gases – i.e. during treatment and disposal of priority waste streams. There should be compulsory use of this RPE by all workers engaged at the liquids blending bunker.
- 9.4 All workers who actively engage in the disposal of asbestos or asbestos containing material (ACM) on site should be issued with Type FFP3 half mask respirators, despite the low results obtained during the survey period.
- 9.5 All workers on site must be fully informed about the health hazards associated with excessive inhalation exposure to airborne particulate contaminants (particularly exposure to airborne asbestos fibres). Such instruction would help to improve worker compliance with the wearing of personal protective equipment.
- 9.6 Respiratory protection should not be left exposed in the contaminated work area when not in use. All respiratory protection should be stored in a dust-and chemical free environment e.g. lockers or cupboards during lunch or tea breaks.
- 9.7 Workers who are actively engaged in the disposal of asbestos/asbestos containing material must be instructed to remain upwind of these activities as far as reasonably practicable – i.e. remain out of the dust emissions generated during disposal activities.
- 9.8 Procedures for the safe handling and disposal of asbestos or asbestos containing materials must continue to be fully adhered to including the diligent implementation of post-exposure/de-contamination protocols. There must not be any mixing of clean/dirty PPE (separate storage of clean clothing) and no dirty PPE must be removed from site by the workers.
- 9.9 All vehicles and plant equipment on site must be operated with closed cabin doors and windows and with fully functional air conditioning systems. This is essential to adequately reduce/control operator exposure to airborne contaminants whilst ensuring that their working environments remain comfortable. The functioning efficiency of all air conditioning units must be regularly checked according to a set maintenance schedule. Any malfunctions must be promptly rectified.

9. RECOMMENDATIONS*

** opinions and interpretations expressed herein are outside the scope of SANAS accreditation*

- 9.10 Asbestos personal air sampling must continue to be performed on an ongoing basis to verify the results obtained during previous studies. As far as reasonably practicable, every attempt must be made to ensure that asbestos air sampling coincides with periods of actual disposal of asbestos or asbestos containing materials.
- 9.11 All workers engaged on site must continue to be subject to appropriate medical surveillance at the discretion of the appointed Occupational Medical Practitioner.
- 9.12 All workers required to make use of RPE should be instructed in at least the following:
- why RPE is needed
 - what protection RPE can (or cannot) offer
 - how to properly inspect, put on, take off and use RPE
 - how to perform a “user seal check
 - what to do if the RPE does not work properly
 - how to recognise medical signs and symptoms that may limit or prevent use of RPE
 - how improper fit, use or maintenance can reduce effectiveness of RPE
 - correct maintenance and storage procedures
- 9.13 Follow-up personal air sampling is required within 24 months – as per HCA Regulation 6(b) for monitoring of worker exposure to Restricted Limit (RL) substances.

Geozone Environmental would like to thank the management and staff of Shongweni Landfill site for their help and co-operation during the course of these surveys.

10. CONCLUSIONS

Geozone Environmental conducted personal air sampling surveys on the Shongweni Landfill site in order to assess the risks of worker exposure to priority airborne contaminants.

Based on the results obtained during the latest survey period, the following may be concluded:

- 10.1 *The result for DPMs obtained from the chemical controller was marginally below the OEL and equalled the Action Level. The action level is the point where remedial measures must be implemented. The employee made use of a FFP2 half-face dust mask.*
- 10.2 *The result for inhalable particulates was below both the OEL and the Action Level.*
- 10.3 *The traffic controller was not exposed to excessive airborne concentrations of asbestos fibres during the survey period – i.e. sample yielded results well below the OEL (0.1 f/ml).*
- 10.4 *The traffic controller was not exposed to excessive airborne concentrations of VOCs during the survey period.*
- 10.5 *The results obtained were not representative of worst-case conditions due the limited availability of landfill site workers, as they were engaged with ongoing site operations, which occasionally delayed coordination for sampling activities.*

11. REFERENCES

- 11.1 Ashton, I. and G.U.F.S. 1992. Monitoring for Health Hazards at Work. (2nd ed.) London. Blackwell Scientific Publications.
- 11.2 Plog, Barbara A. (ed). 1988). Fundamentals of Industrial Hygiene. (3rd ed.) Chicago. National Safety Council.
- 11.3 South Africa (Republic). 1993. Occupational Health and Safety Act, 1993 (Act 85 of 1993). Pretoria. Government Printer.
- 11.4 South Africa (Republic). 2021. Occupational Health and Safety Act, 1993 (Act 85 of 1993) - Regulations for Hazardous Chemical Agents. Pretoria. Government Printer.
- 11.5 ACGIH Handbook for Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices – 2021 ed.
- 11.6 Geozone Environmental: Project No GEO 04576_0. Personal air sampling survey: particulates May 2020.
- 11.7 Geozone Environmental: Project No GEO 05366_6. Personal air sampling survey: particulates July 2021.
- 11.8 Geozone Environmental: Project No GEO 05565_2. Personal air sampling survey: particulates August 2021.
- 11.9 Geozone Environmental: Project No GEO 05815_7. Personal air sampling survey. March 2022.
- 11.10 Geozone Environmental: Project No GEO 05815_11. Personal air sampling survey. October 2022.
- 11.11 Geozone Environmental: Project No GEO 06209_4. Personal air sampling survey. April 2023.
- 11.12 Geozone Environmental: Project No GEO 06697_6. Personal air sampling survey. May 2024.



Department of Employment and Labour Approved Inspection Authority (OH0036-CI04)

Annexure A

LABORATORY RESULTS

Confidential

CHEMTECH
LABORATORY SERVICES

TEST REPORT

DATE OF REPORT : 6 March 2025

CONTACT PERSON : Adri Cowley

REFERENCE NO : CLS250483

CLIENT : Geozone Environmental
CLIENT ADDRESS : P O Box 287
ALLENS NEK
1737

CLIENT CONTACT PERSON : Marine Steyn
CLIENT TELEPHONE NO : (011) 475 3161
CLIENT e-MAIL ADDRESS : maritnes@geoenv.co.za

TEST RESULTS

See attached spreadsheet.

WORK APPROVED BY:



Adri Cowley
(Laboratory Manager)
(Technical Signatory)



Eugene Cowley
(Technical Manager)
(Technical Signatory)

06/03/2025
Date

This report relates to the specific sample(s) tested as identified herein, it does not imply Chemtech Laboratory Services approval of the quality and/or performance of the item(s) in question and the test results do not apply to any similar item that has not been tested.

This report may only be reproduced in full, with the written approval of Chemtech Laboratory Services.

The acceptance of an item for test and the issue of a test report are subject to Chemtech Laboratory Services condition of test. This document is available on request.

Chemtech Laboratory Services does not accept responsibility for errors that might have arisen during sampling and transport of samples by external parties.

Results express in ppm, ppb, mg/m³ or µg/m³ were calculated using data supplied by the client.

CLS250483	
Status	Confidential
Tab	3 of 3
Test Item Description	Filters
Test Item Condition	Sealed in IOM cassettes
	Received at ambient temperature
Date Received	18/02/2025
Date of Analysis	20/02/2025
Analysis Required	Inhalable Particulates
Method Used	MDHS 14/4
Results:	
Sample Number	Inhalable Particulates
Unit	mg
PVC-M-1921	0.58
MCE-GN4-8204	0.88
Specific Test Conditions	Samples stored at ambient temperature prior to analysis
Comments	Results are blank corrected
Limit of Detection	0.04 mg per sample

CLS250483			
Status	Confidential		
Tab	1 of 3		
Test Item Description	Quartz Tissue Filters		
Test Item Condition	Sealed in cassettes		
	Received at ambient temperature		
Date Received	18/02/2025		
Date of Analysis	27/02/2025		
Analysis Required	Diesel Particulate Matter		
Method Used	NIOSH 5040		
Results: Table 1 - GEO06962			
Sample Number	Organic Carbon	Elemental Carbon	Total Carbon
Unit	mg	mg	mg
DPM-1462	0.057	0.008	0.065
Specific Test Conditions	Samples stored at ambient temperature prior to analysis		
Comments	Results are not blank corrected		
Limit of Detection	0.002 mg per sample		

CLS250483	
Status	Confidential
Tab	2 of 3
Test Item Description	SKC Passive Monitors
Test Item Condition	Sealed in plastic vials Received at ambient temperature
Date Received	18/02/2025
Date of Analysis	21/02/2025
Analysis Required	Volatile Organic Compounds
Method Used	MDHS 88
Results: Table 2 - GEO06962	
Compound	SKC001
Unit	ppm
Hexane, all isomers	0.23
n-Hexane	0.03
Toluene	0.05
Ethyl benzene	0.03
Xylene, mixed isomers	0.11
d-Limonene	0.04
White Spirits	0.14
Specific Test Conditions	Stored at < 5 °C prior to analysis
Comments	Results are not blank corrected
Limit of Detection	0.50 µg per compound



Portion 5, Corporate Park South, Midrand
 Postnet Suite 125, Private bag x 3, The Reeds, Midrand
 Tel: 087 330 3792
 E-mail: shimona.munsamy@assurecloud.co.za
 Web address: www.assurecloud.co.za

TEST REPORT

Report NO:	866391	No. of Samples	1
Customer:	Geozone Environmental (Pty) Ltd	Sample Condition:	Acceptable
Address:	Block 13 1st Floor Fancourt Office Park 2162 Northriding 2162	Sampling Date:	17-Feb-2025
		Test Date:	18-Feb-2025
		Date Received:	17-Feb-2025
		Date Completed:	11-Mar-2025
Contact:	Marine Steyn		
Phone:	071 513 8107	Email Address:	marines@geoenv.co.za
Order No/Ref:	17/02/47		

ASBESTOS FIBRE COUNTING

Lab No	SAMP DESCR	METHOD	LOD	FIELDS	FIBRE COUNTS	# CONCENTRATION (f/ml)
866391-0001	Asbestos Cowl (ASB/SHO/001)	AIA-202(HSG 248)	<<0.010	200	<0.0	<0.01000

NOTES:

This report relates only to the samples tested as received. Assurecloud does not accept responsibility for any matters arising from the further use of these results. This certificate shall not be reproduced, except in full, without the written approval of the Laboratory Manager. No reference may be made to Assurecloud or any of its units or employees in advertisements, for sale or publicity purposes without obtaining Assurecloud's prior written approval.

Samples may be discarded four weeks from the issue date of this certificate, so please notify us within this time if you have any comments or queries about the results or the certificate.

** Opinions and interpretations expressed here in are outside of the scope of SANAS Accreditation.

*** Uncertainty of Measurement for the different tests will be made available upon request.

Results calculated using flow rate and time as provided by client

* Tests that are not accredited

J. Mogotlane

Date Printed

11-Mar-2025

Johannes Mogotlane - Technical Signatory -

Page 1 of 1

Date Issued: 11-Mar-2025

This COA has been electronically signed with an Advanced Electronic Signature (AES) as per the Electronic Communications and Transactions Act (No 25 of 2002). This certificate is issued without any alteration or erasure.



Department of Employment and Labour Approved Inspection Authority (OH0036-CI04)

Annexure B

CERTIFICATES



employment & labour

Department:
Employment and Labour
REPUBLIC OF SOUTH AFRICA

National Department of Employment and Labour
Republic of South Africa

APPROVED INSPECTION AUTHORITY

Registered in accordance with the provisions of the Occupational Health and Safety Act, Act 85 of 1993, as amended.

This is to certify that:

GEOZONE ENVIRONMENTAL (PTY) LTD

has been approved by the Department of Employment & Labour as a Type A, Approved Inspection Authority: Occupational Health and Hygiene under the following regulations:

- o Asbestos Abatement Regulations 4(2), 5(7), 13, 15(2)(c), 16 & 22
- o Hazardous Chemical Agents Regulations 6 & 12.
- o Lead Regulations 7 & 14.
- o Noise Induced Hearing Loss Regulation 7


CHIEF INSPECTOR

Valid from: **15 July 2022**
Expires: **14 July 2026**
Certificate Number: **OH0036 – CI 04**





The Southern African Institute for Occupational Hygiene

This is to certify that

Mariné Steyn

ID Number: 9506080176081

Has satisfied the requirements of
the Constitution of the Institute
and on recommendation of the Professional Certification Committee
is registered as an

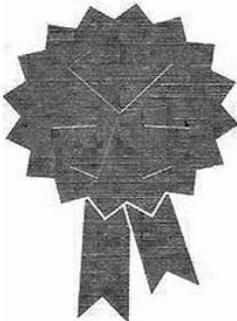
Occupational Hygiene Technologist (OHT)

Member Number: 1813

Valid until: 31 January 2025

Elsie Cornelia Peens

Chairperson: Professional Certification Committee



Member ID: 60359257

Certificate ID: 60359257-27713

Issued by the Southern African Institute for Occupational

Hygiene

SAQA Professional Body ID: 844

**IOHA Recognised
Certification Scheme**





The Southern African Institute for Occupational Hygiene

This is to certify that

Maritza Visser (Visser) Ms

ID Number: 7812310020087

Has satisfied the requirements of
the Constitution of the Institute
and on recommendation of the Professional Certification Committee
is registered as an

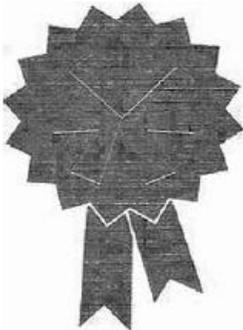
Occupational Hygienist (OH)

Member Number: 0434

Valid until: 31 January 2025

Elsie Cornelia Peens

Chairperson: Professional Certification Committee



Member ID: 33914641

Certificate ID: 33914641-27714

Issued by the Southern African Institute for Occupational

Hygiene

SAQA Professional Body ID: 844

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Certificate of Calibration

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Certificate No	L92052	As Found/As Left	Rev 0
Manufacturer	Sensidyne		
Description	Primary Flow Calibrator; Bubble Generator; Std Flow Cell Assy; Sensor Block Std		
Model No	Gilian Gilibrator 2; 850190; D800286; D800266; D800289		
Serial No	2390-B; 21196-S		
Plant No	None		
Calibrated for	Geozone Environmental (Pty) Ltd		
Address	Cnr Felstead & Northumberland, Fancourt Office Park, Building 13, Northriding, Randburg, 2162		
Temperature	(24.3 ± 2) °C		
Relative humidity	(32 ± 5) %rh		
Date of calibration	13 March 2024		
Expiry date	13 March 2025	Issue Date	13 March 2024
Calibrated by			

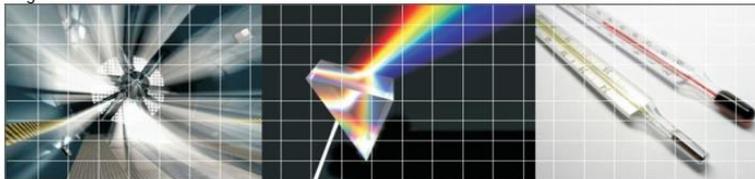
American Standard Calibration Laboratory
Measurement Science Laboratory



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Technical Signatory

Page 1 of 3



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