# Ventilation Survey Report

6th July 2020

APEX ENVIRONMENTAL

| **QUICK REFERENCE GUIDE** | |
|---|---|
| Date/s of Assessment: | 6th July 2020 |
| Next Survey Due: | July 2022 |
| Date Report Issued: | 15th July 2020 |
| Project Number: | A17560 |
| Order Number: | GORDON |
| Assessment Physical Address: | 1 Goshawk Road, New Germany |
| Client Contact/s: | Gordon Rechner |
| Revision: | 00 |
| **APEX REFERENCES** | |
| Department of Employment and Labour AIA Number: | OH 0084-CI 034 |
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| Your Consultant: | Miss. M. Chamberlain: michell@apexenviro.co.za<br>Registered Occupational Hygiene Technologist (SAIOH)<br>Legal Knowledge: Occupational Hygiene (Cert 6364) (DUT)<br>International Certificate of Operational Competence in Occupational Hygiene (ICertOH – BOHS-UK) |
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ATTACHED ITEM:

- AIA APPROVAL CERTIFICATE
- SAIOH CERTIFICATE (OCCUPATIONAL HYGIENIST REGISTRATION)
- CALIBRATION CERTIFICATE

## 1. EXECUTIVE SUMMARY

General ventilation standards existing within various areas of the Gordon's Productions, New Germany premises were assessed to determine whether or not a sufficient supply of fresh replacement air was being provided for work areas, and if there was a potential for the build-up of heat and/or airborne contaminants.

In addition to the above, it should be noted that due to this assessment being conducted during the Covid-19 pandemic, general consideration of the potential exposure risk in regard to the Covid-19 transmission probability was also conducted. It is however recommended that management consider conducting a comprehensive Covid-19 Risk Assessment to identify potential workplace hazards that could increase risks for COVID-19 transmission. *Apex can assist in this regard*.

The upstairs Open-plan Office measured carbon dioxide gas levels that exceeded the Guideline Standard and was observed to have relatively poor ventilation controls (i.e. closed door and windows). Due to the lack of fresh air infiltration and contaminant exfiltration, the Covid-19 virus transmission and infection risk significantly increases which resulted in this office being identified as a high risk. In addition to this, the non-operational extractor fan also reduces the removal of airborne contaminants such as carbon dioxide gas and viral (Covid-19) particles. It is therefore recommended that the extractor fan be repaired and the supply of fresh air be introduced by daily opening windows and entrance doors to increase the circulation of outside air and prevent pockets of stagnant air in the office.

In addition to the above, the area of the Finalizing Table relates to limited fresh air supply (airflow) and the circulation thereof. Pockets of stagnant air (where a group of individuals work) thus increases the risk for both thermal discomfort as well as the transmission of airborne viral particles. Where natural air infiltration is not possible, the general ventilation should be improved through mechanical means such as the existing oscillating fan. This should improve fresh (outside) air circulation and reduce heat and the potential build-up of airborne contaminants (such as Covid-19 virus) in poorly ventilated spaces.

*It should be noted that the increased risk for $CO_2$ build-up and the transmission of airborne viral particles (Covid-19) in the areas of concern was communicated to management during the close meeting and was immediately rectified (as per Apex Consultant's verbal recommendations) as part of their corrective action plan.*

## 2. PURPOSE

To evaluate ventilation systems within the Gordon's Productions, New Germany premises to determine compliance with the Regulations for Hazardous Chemical Substances, 1995, Regulation

12 as well as the Environmental Regulations for Workplaces, Regulation 5, framed under the Occupational Health and Safety Act 1993.

## 3. EVALUATION AND RECOMMENDATIONS

### 3.1 Production Factory

| Parameters Assessed | Findings | Ventilation Status |
|---|---|---|
| **Infiltration:** | Provided naturally via: -<br>• large open roller shutter door<br>• windows (closed at the time of the survey)<br>• passive wall vents<br>• steel grid openings along one side of the building<br>• 2 x open emergency exit doors<br>• open windows and doors in the male / female toilets | Sufficient |
| **Exfiltration:** | As above, as well as through three (3) roof-mounted whirly extractor fans and window-mounted extractor fans in the toilets | |
| **General Airflow:** | The general airflow was noted to be good at the Eastern Side of the Factory (near the open roller shutter door).<br><br>General airflow assisted by: -<br><br>• wall-mounted oscillating fan (behind the Paper Plate Section)<br>• large pedestal oscillating fan next to the Crepe Machine<br>• wall-mounted oscillating fan in front of the Finalizing Table - towards the Western side of the Factory (switched off during the assessment period), Due to this General airflow was noted to be relatively poor at the Finalising Table. | Some Attention Required |
| **Extraction systems:** | An overhead LEV Canopy Hood has been installed above the Crepe Machine. In addition to this, a steel structure has been connected directly to the Canopy Hood (as an extension) in order to contain steam generated from the paper crepe processes. Smoke pattern analysis of the LEV hood revealed good extraction capabilities. | Sufficient |
| **Are any OELs likely to be exceeded?** | | No |
| **Are any Lower Explosive Limits likely to be exceeded?** | | No |
| **Will 8hr TWA for $CO_2$ exceed 0.5 % or at any time exceed 3% by volume of air?** | | No |
| **Can heat accumulate to a level of concern?** | | Low Probability (Heat Index) |
| **Could the air employees breathe endanger their safety?** | | No |
| **Estimated overall health risk posed** | General Factory | **Low Risk** |
| | Area of the Finalizing Table | **Medium Risk (Heat & Covid-19 Transmission)** |

| Environmental Factors Measured | Temperature °C: | Relative Humidity %: | *Carbon Dioxide ($CO_2$) Gas ppm*: |
|---|---|---|---|
| **Results** | 23.3 – 24.5 | 40.0 – 48.7 | 415 - 566 |

| | | | |
|---|---|---|---|
| **Guideline Standards** | 20 – 26°C<br>ANSI/ASHRAE Standard 55 1999/EPA | 30-60% | 800 ppm<br>(Hong Kong IAQ Standard) |

## Production Factory (Continued…)

| Evaluation | Recommendations |
|---|---|
| 1. The higher humidity levels measured towards the Finalizing Station could be attributed to the lack of general airflow (potentially as a result of the oscillating fan switched off reportedly from employees feeling cold). However, the increased risk for the transmission of airborne viral particles (Covid-19) transmission was communicated to management and was immediately rectified during the assessment period.<br><br>2. Various production machinery and motor pumps in the Factory generate heat and emit steam (the Crepe Machine). Ventilation controls such as the extended Overhead Canopy Hood above the Crepe machine and additional oscillating fans facilitate general airflow throughout the Factory and greatly assist in the build-up of heat and airborne contaminants.<br><br>3. Two employees operate the two relatively small printers and use paraffin (sprayers or cloths) to clean the printer rollers approximately four times a day. In addition to this, solvent-based inks are used to conduct the printing processes. Although these printers are not enclosed, they do not emit large volumes of solvent vapours. Due to this and the good ventilation controls, excessive employee exposure to organic compounds is at this stage anticipated to be relatively low. | 1. Continue to ensure that the oscillating fans are switched on at all times. This will facilitate general airflow as well as create a wind chill effect leading to sweat evaporation i.e. cooling of employees. This would also increase airflow and consequently assist in the removal of airborne pathogens such as Covid-19 virus transmission.<br><br>2. In addition to the above, it should be emphasized that direct air flow should be diverted away from groups of individuals to avoid pathogen dispersion from infected subjects and transmission.<br><br>3. Continue to ensure that the Overhead LEV Canopy Hood is routinely serviced and maintained to ensure sufficient capture of steam / heat emitted from the Crepe Machine. |
| *It should be noted that the increased risk for $CO_2$ build-up and the transmission of airborne viral particles (Covid-19) was communicated to management during the close meeting and was immediately rectified (as per Apex Consultant's verbal recommendations) as part of their corrective action plan.* | |

## 3.2 Administration Offices

| Parameters Assessed | Findings | Ventilation Status |
|---|---|---|
| **Infiltration:** | Achieved naturally via open entrance doors and windows. | Insufficient (Requires improvement) |
| **Exfiltration:** | As above, as well as through a window-mounted extractor fan within the Open Plan Office (switched off during the assessment period)/ | |
| **General Airflow:** | • The Ground Floor and Director's offices revealed a relatively fair general airflow assisted by split unit air-conditioning units (these were not operational *due to Covid-19 virus infection risk).*<br>• *The Open Plan Office (three employees) revealed a relatively poor general airflow with no open windows or entrance door and the air-conditioning unit was operational (on a fan setting).* These practises significantly increases the *Covid-19 virus infection risk).* | |
| **Are any OELs likely to be exceeded?** | | Yes ($CO_2$ in the Open Plan Office) |
| **Are any Lower Explosive Limits likely to be exceeded?** | | No |
| **Will 8hr TWA for $CO_2$ exceed 0.5 % or at any time exceed 3% by volume of air?** | | No |
| **Can heat accumulate to a level of concern?** | | No |
| **Could the air employees breathe endanger their safety?** | | No |
| **Estimated overall health risk posed** | Ground Floor & Director's Offices | **Low Risk** |
| | Open Plan Office | **High Risk** |

| Environmental Factors Measured | Temperature °C: | Relative Humidity %: | *Carbon Dioxide ($CO_2$) Gas ppm*: |
|---|---|---|---|
| **Ground Floor Office** | 22.3 | 51.6 | 475 |
| **Open-plan Office** | 23.0 | 52.7 | **871** |
| **Gordon's Office** | 22.6 | 52.1 | 517 |
| **Guideline Standards** | 20 – 26°C ANSI/ASHRAE Standard 55 1999/EPA | 30-60% | 800 ppm (Hong Kong IAQ Standard) |

**Administration Offices (Continued…)**

| Evaluation | Recommendations |
|---|---|
| **Ground Floor Office**:<br><br>The Ground Floor Office consists of two open doors and is directly linked to the Production Factory. This office is also used as an entry point for visitors where they are attended to and where their temperatures are checked and hands are sanitized prior to entering the factory. This also increases the risk of viral particles (Covid-19) transmission within this office. | 1. Introduce supply of fresh air, by daily opening windows and entrance doors as this should increase the circulation of outside air and prevent pockets of stagnant air in the office. These practices should also apply for routine meetings held within the Director's Office.<br><br>2. In addition to the above, windows / entrance doors should be opened on different facades to create cross ventilation air flow. Cross ventilation will increase the outdoor airflow and consequently increase the removal of any airborne pathogens such as carbon dioxide gas and the risk of Covid-19 transmission.<br><br>3. It is recommended that management continue to restrict the air-conditioning use during the Covid-19 pandemic to prevent the risk of recirculated airborne viral particles transmission throughout the building.<br><br>4. Repair the window mounted extractor fan. |
| **Director's Office**:<br><br>1. The Director's office consists of an open entrance door and windows (closed during the assessment period). Although only one employee work in this office, routine meetings are held here and can hold up to six employees during the meeting.<br><br>2. Whenever meetings are held, with the entrance door and windows closed, the *Covid-19 virus transmission and infection risk significantly increases.* | |
| **Open Plan Office**:<br><br>1. There are three (3) employees situated within this office. During the assessment period, the entrance door and windows remained closed, the air-conditioning unit was operating on a fan setting, and the window-mounted extractor fan was not operational.<br><br>2. Due to the lack of fresh air infiltration and contaminant exfiltration (open door and windows), the Covid-19 virus transmission and infection risk significantly increases which resulted in this office being identified as a high risk. In addition to this, the non-operational extractor fan also reduces the removal of airborne contaminants such as carbon dioxide gas and viral (Covid-19) particles. | |
| *It should be noted that the increased risk for $CO_2$ build-up and the transmission of airborne viral particles (Covid-19) was communicated to management during the close meeting and was immediately rectified (as per Apex Consultant's verbal recommendations) as part of their corrective action plan.* | |

## 4. GENERAL RECOMMENDATIONS

4.1 It is important that any mechanical ventilation systems (i.e. extractor fans), follow an ongoing and consistent maintenance programme.

4.2 Where there is no artificial ventilation system, all doors and windows of work areas should continue to remain open during normal work processes so as to allow for the following:

- The optimum through flow of ambient air currents (i.e. natural ventilation)
- Sufficient changes of air (i.e. adequate supply of oxygen and removal of Carbon Dioxide and other airborne contaminants).

4.3 The installation/modification of ventilation systems requires the expertise of a qualified ventilation specialist who can be held responsible for the installed or modified systems meeting the required standard.

4.4 Workers should be taught to pay attention as to whether the control measures and/or ventilation systems are working properly and notify management if they are not. Some of the problems a worker may be taught to notice include:

- Less air flow noted by feel or reading gauges;
- Smelling or observing excess amounts of chemical and dust in the air;
- Health problems such as respiratory tract irritation;
- Damaged hoods or enclosure;
- Interfering currents from natural ventilation through open doors and windows;
- Lack of makeup/supply air

## 5. DESCRIPTION OF MEASURING PROCEDURE

The effectiveness of natural (i.e. ambient airflow) supply and dilution ventilation was evaluated during the test period. Smoke tubes were used to evaluate air movement characteristics in order to obtain an accurate directional profile and maximise anemometer application.

The areas were evaluated with regard to:

- **Infiltration** - supply or replacement air i.e. fresh make up air,
- **Exfiltration** – general mechanical or passive routes for the removal of contaminated air,
- **General Airflow** – characteristics of dilution airflow and through draughts,
- **Local Exhaust Ventilation (LEV)** – local mechanical extraction of airborne contaminants at source.

## 6. EQUIPMENT SPECIFICATIONS

(a) Description: Direct reading $CO_2$ gas instrument
(b) Manufacturer: Delta Ohm
(c) Model No: HD21AB17
(d) Serial No.: 13024871
(e) Drager smoke tubes

## 7. LIMITATIONS

Results obtained were indicative of the conditions that prevailed during the sampling period. Changes in production rates and process operations, as well as temperature, season, rate and direction of air movement (which amongst other factors affects natural ventilation), could cause variations in the results monitored.

## 8. DISCLAIMER

The Department of Employment and Labour document (OHS 3/1/1/8/1) 'Requirements for Approval as an Approved Inspection Authority: Occupational Health and Hygiene' lists under *Section 9. Format and Content of Reports* – Paragraph 9.8, that *'Specific recommendations to control and identified risks should be made. This will ensure that the employer is able to obtain assistance towards complying with the requirements of the Act'*. The results and recommendations contained in this report are therefore a reflection of the on-site conditions during the on-site survey period.

Apex Environmental makes no warranty or guarantee as to the absolute correctness and suitability of the contents of this report. The final responsibility lies with the client to ensure the correctness and suitability of these recommendations. Apex Environmental shall not in any way be liable for any loss suffered by the client as a result of such recommendations and observations. The information and recommendations provided in this report have been made in good faith with professional integrity.

All information obtained by Apex Environmental shall be treated as private and confidential as prescribed by the Protection of Personal Information Act (Act No. 4 of 2013). Information obtained through onsite observations and monitoring will not be disclosed by Apex Environmental unless required by law and authorized by contractual commitments.

## 9. QUALITY ASSURANCE

Details of recommended requirements, specifications and conditions that are to be contained in written reports are issued in terms of SANS ISO/IEC 17020, *Conformity assessment – Requirements for the operation of various types of bodies performing inspections*.

## 10. HOURS WORKED IN TEST ENVIRONMENT

Taken as an 8-hour day, 40-hour week.

## 11. CERTIFICATION STATEMENT

This is to certify that the attached report has been compiled and issued under the authority, direction and the responsibility of an Apex Occupational Hygienist.

## 12. REPRODUCTION OF REPORTS

This report may not be reproduced except in full, without the written approval of an Apex Occupational Hygienist.

## 13. DOCUMENT CONTROL

| | |
|---|---|
| **Document No.:** | APEX-RT-029 |
| **Compiled by:** | Robert Randolph |
| **Approved by:** | Sean Chester |
| **Revision No:** | 004 |
| **Document date:** | 6th January 2020 |
| **Document review date:** | 13th December 2019 |

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National Department of 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:

**APEX ENVIRONMENTAL CC**

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

- Asbestos Regulations 8, 18 & 21.
- Hazardous Chemical Substances Regulations 6 & 12.
- Lead Regulations 7 & 14.
- Noise Induced Hearing Loss Regulation 7

**CHIEF INSPECTOR**

Valid from: **06 March 2019**
Expires: **05 March 2023**
Certificate Number: **OH0084- CI 034**

# The Southern African Institute for Occupational Hygiene

This is to certify that

## Keegan Seeram

**ID Number: 8103245105089**

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: 0400**

*Valid until: 31 January 2021*

Mr Sean Chester

Chairman: Professional Certification Committee

Member ID: 33914622

Certificate ID: 33914622-18623

Issued by the Southern African Institute for Occupational Hygiene

SAQA Professional Body ID: 844

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# CALIBRATION CERTIFICATE

**Calibration REF No:** I20170570

| | |
|---|---|
| **Company:** | **Apex Environmental** |
| Instrument Model: | **HD21AB17** |
| Instrument Serial No: | **13024871** |

The Calibration of this instrument has been checked in accordance with the manufacturer's instructions using the below reference which itself has been certified under Certificate of

**Air Zero # 2555748 | 33%RH 19011438 | 75.4%RH 19012393**

and the instrument was found to be within the manufacturer's specification.

This certificate is issued without alteration and the calibration was correct at time of issue.

Recalibration should be performed after a period of 12 months, which has been chosen to ensure that under normal circumstances, the instruments accuracy remains within the desired limits.

NEXT CALIBRATION DUE: **13-March-2021**

Signed: Botha

Date: 12-March-2020

Customer Signature: _____