REPORT TO: **Yee Hop Environmental Protection Limited**

ADDRESS: Room 5, 11/F, Nan Fung Industrial City Block 3,
No.18 Tin Hau Road, Tuen Mun,
New Territories, Hong Kong

ATTN.: Ms. Cho

REPORT NO.: IPJ22-267-RP001

ISSUE DATE: 15 February 2023

Indoor Air Quality Measurement (RSP, Pb, Sn, Sb & Ni) for Room 5, 11/F, Nan Fung Industrial City Block 3, No.18 Tin Hau Road, Tuen Mun

(PROJECT NO.: IPJ22-267)

Prepared by:

Chan Ka Wai
Technical Officer
WN / MT / NS/ JL

Endorsed by:

Ng Yan Wa
Laboratory Manager
Approved IAQ Signatory

Room 422,Leader Industrial Centre,57-59 Au Pui Wan Street ,Fo Tan, Shatin,N.T.,Hong Kong
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1. Introduction

1.1 Acoustics and Air Testing Laboratory Company Limited, (A+A)*L, was appointed by Yee Hop Environmental Protection Limited to conduct an Indoor Air Quality measurement.

1.2 2 sampling locations were selected at Room 5, 11/F, Nan Fung Industrial City Block 3, No.18 Tin Hau Road, Tuen Mun. Five parameters were measured, including Respiratory Suspended Particulates (RSP), Lead (Pb), Tin (Sn), Antimony (Sb) & Nickel (Ni).

1.3 Respiratory Suspended Particulates (RSP), Lead (Pb), Tin (Sn), Antimony (Sb) & Nickel (Ni) were taken using continuous measurements for the 8-hour sampling period inside Room 5 and 1-hour sampling period at the window of Room 5.

2. Methodology

2.1 Respirable Suspended Particulates (RSP)

RSP concentrations were measured by a TSI Side Pak AM510 and AM520. They are operated based on the method of optical scattering. The operating ranges of the monitor are 1$\mu g/m^3$ to 20,000 $\mu g/m^3$ and 1 – 100,000 $\mu g/m^3$ respectively with a resolution of 1 $\mu g/m^3$.

2.2 Lead (Pb), Tin (Sn), Antimony (Sb) & Nickel (Ni)

The sample is collected on a cellulose ester membrane filter and then digested by concentrated hydrochloric acid (HCl) and concentrated nitric acid (HNO3). After digestion the sample is analysed using ICPMS. The ICPMS technique utilizes a highly efficient argon plasma to ionize all elements in the sample. Metallic Ions then passed into a high vacuum mass spectrometer which separates the analytes, based on their distinct mass to charge ratios prior to their measurement by a discrete-dynode ion detector.

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3. Details of Measurement

3.1 Location

Room 5, 11/F, Nan Fung Industrial City Block 3, No.18 Tin Hau Road, Tuen Mun

3.2 Test Date

30 January 2023 09:30 – 17:30

3.3 Instrumentation

Parameter	Model	Detection Limit
Respirable Suspended Particulates (RSP)	TSI Side Pak AM510	1 – 20,000μg/m^3
	TSI Side Pak AM520	1 – 100,000 μg/m^3
Lead (Pb)	Cellulose Ester Membrane	N/A
Tin (Sn)		
Antimony (Sb)		
Nickel (Ni)		

Table 3.1 Details of the IAQ Sampling Instrument

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4. IAQ Objective (for reference only)

4.1 According to HKSAR Government guidance "Guidance Notes for the Management of Indoor Air Quality in Offices and Public Places", a 2-level IAQ Objective is established to act as the benchmark for evaluating and assessing indoor air quality. The individual IAQ parameters and corresponding limits are listed as follows:

Table 4.1 Indoor Air Quality Objective for Office Buildings and Public Places in Hong Kong.

Parameter	Unit	8-hr average	
		Excellent Class	Good Class
Respirable Suspended Particulates (RSP)	$\mu g/m^3$	<20	<100

4.2 The 2-level IAQ Objective are classified as follows:

Excellent Class — represents an excellent indoor air quality that a high-class and comfortable building should have.

Good Class — represents the indoor air quality that provides protection to the public at large including the young and the aged.

4.3 According to NIOSH 7300, the exposure limit for Lead (Pb), Tin (Sn), Antimony (Sb) & Nickel (Ni) are listed as follows:

Table 4.2 Exposure Limits for Lead (Pb), Tin (Sn), Antimony (Sb) & Nickel (Ni) listed in NIOSH 7300

Parameter	Unit	Standard		
		OSHA	NIOSH	ACGIH
Lead (Pb)	$\mu g/m^3$	50	50	50
Tin (Sn)	$\mu g/m^3$	2000	2000	2000
Antimony (Sb)	$\mu g/m^3$	500	500	500
Nickel (Ni)	$\mu g/m^3$	1000	15, Ca	100 (soluble) 1000 (insoluble, metal)

(Ca = carcinogen)

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4.3 According to client's information, an emission monitoring quarterly was provided by EPD and it was given to client. They are listed as follows:

Table 4.3 The given EPD's Emission monitoring quarterly for Lead (Pb), Tin (Sn), Antimony (Sb), Respirable Suspended Particulates (RSP) & Nickel (Ni)

Parameter from Air Emission	**Unit**	**Air sample collected at the working area (8 hour time weighted avg.)**	**Air sample collected at the exhaust (1 hour time weighted avg.) ***
Antimony (Sb)	$\mu g/m^3$	≤ 500	≤ 500
Lead (Pb)	$\mu g/m^3$	≤ 50	≤ 50
Nickel (Ni)	$\mu g/m^3$	≤ 1500	≤ 1500
Tin (Sn)	$\mu g/m^3$	≤ 2000	≤ 2000
Respirable Suspended Particulates (RSP)	$\mu g/m^3$	≤ 3000	≤ 3000

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5. Measurement Results

5.1 The average measurement results for Room 5, 11/F, Nan Fung Industrial City Block 3, No.18 Tin Hau Road, Tuen Mun are summarized in the Table 5.1 and 5.2. The measurement points marked on the layout plan are given in Appendix 1 and the photographic records of the measurement setup are shown in Appendix 2.

Sample ID	Sampling Date (ddmmyy)	RSP - PM10 (8 hrs) $\mu g/m^3$	Antimony (8 hrs) $\mu g/m^3$	Lead (8 hrs) $\mu g/m^3$	Nickel (8 hrs) $\mu g/m^3$	Tin (8 hrs) $\mu g/m^3$
SP1	30-Jan-23	64	<0.1	<0.05	<0.1	<0.1

Table 5.1 Result summary for IAQ measurement (8-hr) at Room 5, 11/F, Nan Fung Industrial City Block 3, No.18 Tin Hau Road, Tuen Mun

Sample ID	Sampling Date (ddmmyy)	RSP - PM10 (1 hr) $\mu g/m^3$	Antimony (1 hr) $\mu g/m^3$	Lead (1 hr) $\mu g/m^3$	Nickel (1 hr) $\mu g/m^3$	Tin (1 hr) $\mu g/m^3$
SP2	30-Jan-23	63	<0.1	<0.05	<0.1	<0.1

Table 5.2 Result summary for IAQ measurement (1-hr) at the window of Room 5, 11/F, Nan Fung Industrial City Block 3, No.18 Tin Hau Road, Tuen Mun

6. Conclusion

6.1 An IAQ measurement had been conducted to measure Respiratory Suspended Particulates (RSP), Lead (Pb), Tin (Sn), Antimony (Sb) & Nickel (Ni) at Room 5, 11/F, Nan Fung Industrial City Block 3, No.18 Tin Hau Road, Tuen Mun.

6.2 For Lead (Pb), Tin (Sn), Antimony (Sb) & Nickel (Ni) measurement, the measurement results indicate that all the measurement sampling points can meet the exposure limits listed in NIOSH 7300.

6.3 For the Respirable Suspended Particulates (RSP), the measured values indicate that all the measurement sampling points can meet the limits listed in EPD's Emission monitoring quarterly.

-END-

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List of Appendices

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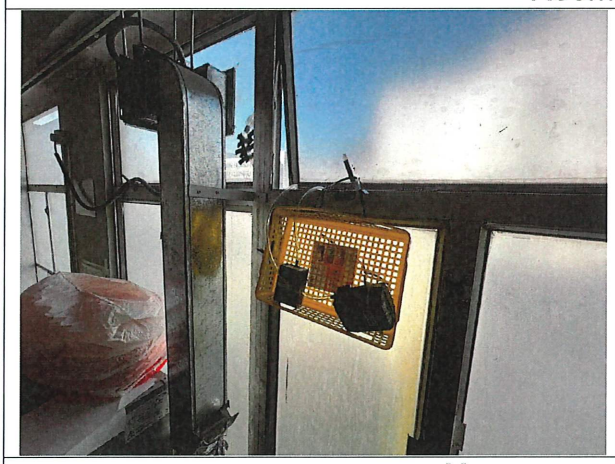
Appendix 1

Photographic Records

Measurement Setup at SP1
Room 5, 11/F



Measurement Setup at SP2
Room 5, 11/F (at the window)

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Appendix 2

Field Data sheet for SP1 (8-hour)

Field Data sheet for SP1

Indoor Air Quality Measurement

Data Log Sheet

Project No.:	IPJ22-267
Client:	Yee Hop Environmental Protection Limited
Date of Sampling:	30-Jan-23
Sampling Premise / Location:	Room 5, 11/F, Room 5, 11/F, Nan Fung Industrial City Block 3, No.18 Tin Hau Road, Tuen Mun
Sampling Staff:	Chan Ka Wai

Sample Point	Sampling Peroid	RSP μg/m³
SP1	9:35	35
	9:40	39
	9:45	43
	9:50	43
	9:55	45
	10:00	45
SP1	10:05	45
	10:10	41
	10:15	40
	10:20	45
	10:25	48
	10:30	47
SP1	10:35	46
	10:40	45
	10:45	44
	10:50	55
	10:55	48
	11:00	45
SP1	11:05	45
	11:10	45
	11:15	48
	11:20	45
	11:25	45
	11:30	45
SP1	11:35	49
	11:40	64
	11:45	75
	11:50	97
	11:55	78
	12:00	73
SP1	12:05	134
	12:10	107
	12:15	107
	12:20	130
	12:25	120
	12:30	125
SP1	12:35	108
	12:40	110
	12:45	102
	12:50	101
	12:55	105
	13:00	95
SP1	13:05	80
	13:10	76
	13:15	71
	13:20	62
	13:25	52
	13:30	48
SP1	13:35	47
	13:40	60
	13:45	71
	13:50	57
	13:55	51
	14:00	53
SP1	14:05	59
	14:10	59
	14:15	55
	14:20	63
	14:25	59
	14:30	76
SP1	14:35	77
	14:40	82
	14:45	77
	14:50	71
	14:55	69
	15:00	88
SP1	15:05	94
	15:10	76
	15:15	70
	15:20	74
	15:25	73
	15:30	68
SP1	15:35	75
	15:40	75
	15:45	73
	15:50	80
	15:55	60
	16:00	58
SP1	16:05	56
	16:10	52
	16:15	60
	16:20	58
	16:25	59
	16:30	52
SP1	16:35	48
	16:40	48
	16:45	43
	16:50	50
	16:55	40
	17:00	54
SP1	17:05	50
	17:10	45
	17:15	43
	17:20	46
	17:25	42
	17:30	45
8 hour Average		**64**

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Field Data sheet for SP2 (1-hour)

Field Data sheet for SP2

Indoor Air Quality Measurement

Data Log Sheet

Project No.:	IPJ22-267
Client:	Yee Hop Environmental Protection Limited
Date of Sampling:	30-Jan-23
Sampling Premise / Location:	Room 5, 11/F (at the window), Room 5, 11/F, Nan Fung Industrial City Block 3, No.18 Tin Hau Road, Tuen Mun
Sampling Staff:	Chan Ka Wai

Sample Point	Sampling Peroid	RSP $\mu g/m^3$
SP2	16:30	69
	16:35	55
	16:40	66
	16:45	68
	16:50	67
	16:55	55
SP2	17:00	69
	17:05	70
	17:10	54
	17:15	58
	17:20	58
	17:25	61
1 hour Average		**63**

Appendix 3

Details of Laboratory Employed For Analysis of Integrated Chemical/Biological Samples

Name of Laboratory Employed
ALS Technichem (HK) Pty Ltd.

Address of Laboratory Employed
11/F., Chung Shun Knitting Center,
1-3 Wing Yip Street,
Kwai Chung,
N.T., Hong Kong

Tel: 2610 1044
Fax: 2610 2021

Air Parameters and Methodology

Lead (Pb), Tin (Sn), Antimony (Sb) & Nickel (Ni) – Sampling and analysis by ICPMS.

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Appendix 4

Laboratory Results

ALS Technichem (HK) Pty Ltd

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

CERTIFICATE OF ANALYSIS

Client	: ACOUSTICS & AIR TESTING LABORATORY CO. LTD	Laboratory	: ALS Technichem (HK) Pty Ltd	Page	: 1 of 4
Contact	: WALLACE NG	Contact	: Richard Fung	Work Order	: HK2303734
Address	: RM 422, LEADER INDUSTRIAL CENTRE, 57-59 AU PUI WAN STREET, FOTAN, N.T. HONG KONG HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street, Kwai Chung, N.T., Hong Kong Kwai Tsing Hong Kong		
E-mail	: laqdata@aa-lab.com	E-mail	: richard.fung@alsglobal.com		
Telephone	: ---	Telephone	: +852 2610 1044		
Facsimile	: ---	Facsimile	: +852 2610 2021		
Project	: IPJ22-267			Date Samples Received	: 31-Jan-2023
Order number	: ---	Quote number	: HKE/1261/2022_V2	Issue Date	: 14-Feb-2023
C-O-C number	: ---			No. of samples received	: 2
Site	:			No. of samples analysed	: 2

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Hong Kong Accreditation Service (HKAS) has accredited this laboratory, ALS Technichem (HK) Pty Ltd (Reg. No. HOKLAS 066) under Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS Directory of Accredited Laboratories.

This document has been signed by those names that appear on this report and are the authorised signatories.

Signatories	Position	Authorised results for
Wong Wing , Kenneth	Assistant Manager - Environmental	Metals_ENV, Kwai Tsing

General Comments

This report supersedes any previous report(s) with the same work order number. All pages of this report have been checked and approved for release. When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.
Testing period is from 31-Jan-2023 to 14-Feb-2023.
Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific Comments for Work Order: HK2303734

Sample(s) was/ were submitted by client. Sample(s) arrived laboratory in ambient condition. The result(s) related only to the item(s) tested.
Sample information (Project name, Sample ID, Sampling date/time, etc.) is provided by client.
Result(s) of sample(s) is/are reported on as received basis, unless otherwise specified.

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Page Number : 3 of 4
Client : ACOUSTICS & AIR TESTING LABORATORY CO. LTD
Work Order : HK2303734

Analytical Results

Sub-Matrix: AIR

				Sample ID	SP1	SP2	---	---	---
				Sampling date / time	30-Jan-2023 10:00	30-Jan-2023 15:30	---	---	---
Compound	CAS Number	LOR	Unit		HK2303734-001	HK2303734-002	---	---	---
EG: Metals and Major Cations									
EG020: Antimony	7440-36-0	0.100	mg/m³		<0.100	<0.100	---	---	---
EG020: Lead	7439-92-1	0.050	mg/m³		<0.050	<0.050	---	---	---
EG020: Nickel	7440-02-0	0.100	mg/m³		<0.100	<0.100	---	---	---
EG020: Tin	7440-31-5	0.100	mg/m³		<0.100	<0.100	---	---	---

Page Number : 4 of 4
Client : ACOUSTICS & AIR TESTING LABORATORY CO. LTD
Work Order : HK2303734

Laboratory Duplicate (DUP) Report

- No Laboratory Duplicate (DUP) Results are required to be reported.

Method Blank (MB), Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report

Matrix: AIR

		Method Blank (MB) Report			Laboratory Control Spike (LCS) and Laboratory Control Spike Duplicate (DCS) Report						
					Spike Concentration	Spike Recovery (%)		Recovery Limits (%)		RPD (%)	
Method: Compound	CAS Number	LOR	Unit	Result		LCS	DCS	Low	High	Value	Control Limit
EG: Metals and Major Cations (QC Lot: 4871814)											
EG020: Antimony	7440-36-0	1	µg/m³	<1	---	---	---	---	---	---	---
EG020: Lead	7439-92-1	1	µg/m³	<1	---	---	---	---	---	---	---
EG020: Nickel	7440-02-0	1	µg/m³	<1	---	---	---	---	---	---	---
EG020: Tin	7440-31-5	1	µg/m³	<1	---	---	---	---	---	---	---

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

- No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.

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