

EMISSIONS MONITORING SURVEY

Prepared for:

**Sandvik Hard Materials
South Site
PO BOX 89
Torrington Avenue
Coventry
CV4 9XG**

Permit Numbers	: PPC 025
Job Number	: B0032
Report Number	: R003
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1.0 EXECUTIVE SUMMARY

The monitoring at this installation was carried out in accordance with our quotation reference AB/B032/Q003, for compliance check monitoring of emissions to air. The substances requested for monitoring at each emissions point are listed below:

Substances to be monitored	Emission Point Identification		
	LEV 2 (Vent 30)	LEV 12a (Vent 28)	LEV 15a (Vent 34)
Particulates	• u	• u	• u
Tungsten & Cobalt	• u	• u	• u
Substances to be monitored	Emission Point Identification		
	LEV 23 (Vent 27)	LEV 25 (Vent 21)	LEV 27 (Vent 23)
Particulates	• u	• u	• u
Tungsten & Cobalt	• u	• u	• u

- Denotes the substances to be monitored.
- u Denotes UKAS accreditation is held for monitoring that substance.

Special Requirements: *"Testing any time that processes are operating."*

Historically the stacks have been grouped together and one stack from each group tested in alternating years as follows:

*LEV 2 is paired with LEV11. LEV 11 was tested last year.
LEV 23 is paired with LEV 22. LEV 22 was tested last year.
LEV 27 is paired with LEV 28. LEV 28 was tested last year.
LEV 12a is paired with LEV 12. LEV 12 was tested last year.*

LEVs 15, 15a, 17, 18 & 16 were grouped together. Currently only 15, 15A and 16 are in place (17 & 18 are removed). LEV 16 is outside the roof protection and so can no longer be tested.

2004, LEV 15 was tested. 2005 was LEV 16. 2006 was LEV15.

LEVs 19, 20, 21, 25 & 26 were grouped together. LEV 19 is outside the roof edge protection and so can no longer be tested.

2004, LEV 20 was tested. 2005 was LEV 20. 2006 was LEV18.

1.1 Monitoring Results

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result (mg.m ⁻³)	Uncertainty	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation for use of Method	Operating Status
LEV 2	Total Particulate ^s	20 mg.m ⁻³	2.1	70%	& Wet Gas	11/09/07	11:56 – 13:06	BS EN 13284	NU	Normal
	Tungsten ^s	n/a	0.03	> 100 %				Based on BS EN 14385	NU	
	Cobalt ^s	n/a	<0.001	> 100 %				Based on BS EN 14385	NU	
LEV 12a	Total Particulate ^s	20 mg.m ⁻³	0.5	> 100 %	& Wet Gas	11/09/07	10:32 – 11:42	BS EN 13284	NU	Normal
	Tungsten ^s	n/a	0.01	> 100 %				Based on BS EN 14385	NU	
	Cobalt ^s	n/a	<0.001	> 100 %				Based on BS EN 14385	NU	
LEV 15a	Total Particulate ^s	20 mg.m ⁻³	2.6	60%	& Wet Gas	11/09/07	13:48 – 15:02	BS EN 13284	NU	Normal
	Tungsten ^s	n/a	0.01	> 100 %				Based on BS EN 14385	NU	
	Cobalt ^s	n/a	<0.001	> 100 %				Based on BS EN 14385	NU	
LEV 23	Total Particulate ^s	20 mg.m ⁻³	0.7	> 100 %	& Wet Gas	11/09/07	10:32 – 11:42	BS EN 13284	NU	Normal
	Tungsten ^s	n/a	<0.01	> 100 %				Based on BS EN 14385	NU	
	Cobalt ^s	n/a	<0.001	> 100 %				Based on BS EN 14385	NU	
LEV 25	Total Particulate ^s	20 mg.m ⁻³	0.7	> 100 %	& Wet Gas	11/09/07	13:50 – 14:55	BS EN 13284	NU	Normal
	Tungsten ^s	n/a	<0.01	> 100 %				Based on BS EN 14385	NU	
	Cobalt ^s	n/a	<0.001	> 100 %				Based on BS EN 14385	NU	
LEV 27	Total Particulate ^s	20 mg.m ⁻³	0.5	> 100 %	& Wet Gas	11/09/07	11:56 – 13:09	BS EN 13284	NU	Normal
	Tungsten ^s	n/a	<0.01	> 100 %				Based on BS EN 14385	NU	
	Cobalt ^s	n/a	0.002	> 100 %				Based on BS EN 14385	NU	

Notes

Emission Limit Value
Periodic Monitoring Result
Uncertainty
Reference Conditions
Monitoring Method Reference
Accreditation for use of Method
Operating Status

NU
NA

The emission limit value is that stated in the permit and will be expressed as a concentration or a mass emission.
The result given is expressed in the same terms and units as the emission limit value.
The uncertainty associated with the quoted result is at the 95% confidence interval.
All results are expressed at 273 K and 101.3kPa. The oxygen and moisture corrections are stated.
The method stated is in accordance with the Environment Agency Technical Guidance Note M2, or other method approved by the Environment Agency.
The details indicate the accreditation for the use of the complete monitoring method, e.g. MCERTs, UKAS. If use of the method is not accredited " NA" is stated.
The details indicate the feedstock and the loading rate of the plant during monitoring.
Chemical Analysis on sample reagents was performed by an External Laboratory as detailed in Section 3.0
UKAS Accreditation Held but UKAS Accreditation cannot be claimed for the test as sampling did not comply with the Standard Reference Method (SRM), see section 3.0 & 4.0
Method is NOT UKAS Accredited.

1.2 Operating Information

Emission Point Reference	Date	Process Type	Process Duration	Fuel	Feedstock	Abatement	Load	Comparison of Operator CEMS and Periodic Monitoring Results			
								Substance	CEMS Results	Periodic Monitoring Results	Units
LEV 2	11/09/07	Batch	Various	n/a	n/a	Wet Collector	Normal	-	-	-	-
LEV 12a	11/09/07	Batch	Various	n/a	n/a	Dry Filter	Normal	-	-	-	-
LEV 15a	11/09/07	Batch	Various	n/a	n/a	Dry Filter	Normal	-	-	-	-
LEV 23	11/09/07	Batch	Various	n/a	n/a	Dry Filter	Normal	-	-	-	-
LEV 25	11/09/07	Batch	Various	n/a	n/a	Dry Filter	Normal	-	-	-	-
LEV 27	11/09/07	Batch	Various	n/a	n/a	Dry Filter	Normal	-	-	-	-

Notes:

Process Type
Process Duration
Fuel
Feedstock
Abatement
Load

State whether the process is a continuous or batch process.
If a batch process, state the duration, frequency and details of the portion of the batch sampled. If continuous state "NA"
If applicable, state the fuel type. If not applicable state "NA"
State the feedstock type
State the type and whether operational during monitoring. If not applicable state "NA"
State the normal load, throughput or rating of the plant

2.0 INTRODUCTION

Environmental Compliance Ltd (ECL) was commissioned by **Sandvik Hard Materials** to undertake an emission monitoring survey at their **South Site**, in Coventry. This report presents the findings of the study.

The emissions monitoring survey was carried out by the site sampling team detailed in the table below at the request of **Mr Phil Moran** in accordance with quotation reference AB/B0032/Q003.

Site Sampling Team

Names of Site Team	Dates on Site	MCERTS No.	LEVEL	Technical Endorsements
Andy Barnes	11/09/07	MM 03 235	2	TE1, TE2, TE3, TE4
Paul Calland	11/09/07	MM 03 212	2	TE1, TE3 TE4

Report Reviewer

Name	MCERTS No.	LEVEL	Technical Endorsements
Andy Barnes	MM 03 235	2	TE1, TE2, TE3, TE4

Technical Endorsement Key:-

- TE1 – Isokinetic** Particulates, Temperature & Velocity Profiles
- TE2 – Isokinetic** Extractive Pollutants:- Metals, Dioxin & Furans, PAHs, PCBs, HCL, HF
- TE3 – Non-Isokinetic** Extractive Pollutants:- Speciated VOCs, HF, HCL, Cyanide.
- TE4 – Continuous Analysers** (Combustion Gases):- VOCs, CO, NOx, SO2, O2

2.1 Objectives

The objective of the survey was to measure the concentrations of pollutants from the processes / locations as detailed in the Executive Summary.

The objective of the survey was to measure the concentrations of pollutants from the processes / locations as detailed in the Executive Summary. This survey meets the requirements of the site's **PPC Permit Number: PPC 025** only where UKAS and MCERTS accreditation has and could be claimed for the testing in the monitoring results table.

2.2 Scope of Work

There were no deviations from the original and agreed emissions monitoring schedule, as detailed in the Executive Summary.

For all stacks, the access arrangements or duct configurations mean that heated sampling equipment cannot be deployed, and as such all testing for metals is using a modified BS EN 14385 train and MCERTS/ UKAS accreditation cannot be claimed.

3.0 SAMPLING PROTOCOLS / METHODOLOGIES

3.1 Total Particulate Matter

Testing was carried out using an unheated particulate sampling train with in-stack filtration, in accordance with **BS EN 13284-1 & MID 1**, and In-house technical procedure **ECL/TPD/027**.

Isokinetic particulate sampling is achieved when the velocity of gas entering the sampling nozzle is exactly equal to the velocity of the approaching gas stream within the stack. A measured volume of sample gas is withdrawn from the stack isokinetically through a sampling nozzle and preweighed filter positioned in a housing, where the particles are collected on the filter.

The filters are subsequently analysed to determine the amount of particulate matter captured. Analysis of filters & probe washes are performed by RPS and ECL who are UKAS accredited.

In addition to the survey samples, a field blank is submitted as part of the technical procedure.

3.2 Cobalt and Tungsten

Determination of the total emissions of **Cobalt and Tungsten** was carried out, as far as possible, in accordance with **BS EN 14385** and In-house technical procedure **ECL/TPD/028**. In this method the stack gases are filtered to remove particulate matter then the gases are passed through a series of impingers containing a solution of **3.3 % Nitric Acid / 1.5 % Hydrogen Peroxide**

RPS Laboratories (RPS) who are situated in Manchester carried out the analysis of the samples. **RPS** are UKAS accredited for Cobalt analysis but not for Tungsten. In addition to the survey samples, a field blank is submitted as part of the technical procedure.

4.0 SAMPLE POINT DESCRIPTION

The sample locations that were monitored are detailed below:-

4.1 LEV 2 – Vent 30

Sampling takes place in a section of ductwork with 60 cm diameter.

The sample plane is just before and bend and the exit point and 30 cm after the silencer. Only 1 sample line is available and there is swirl above 15 degrees.

The location of the sampling plane does meet the *recommendations* of BSEN 13284, furthermore, the sampling plane does meet the *flow requirements* of the standard.

The sampling ports are not fitted correctly and as a result, sampling could not take place at all required positions. This duct requires two sampling lines at 90 degrees.

In addition, the sampling platform is not large enough to allow the deployment of the Universal Stack Sampler and its associated impinger train. This means that a smaller impinger sampling train had to be used which does not fully comply with the requirements of BS EN 14385.

As sampling could not be carried out in accordance with the Standard Reference Method (SRMs) UKAS accreditation cannot be claimed for the test results for Particulates and Metals even though UKAS accreditation is held for monitoring.

4.2 LEV 12a – Vent 28

Sampling takes place in the outlet grille of the filter unit. There is no emissions stack.

The location of the sampling plane does meet the *recommendations* of BSEN 13284, and non isokinetic grab sampling was necessary.

As sampling could not be carried out in accordance with the Standard Reference Method (SRMs) UKAS accreditation cannot be claimed for the test results for Particulates and Metals even though UKAS accreditation is held for monitoring.

4.3 LEV 15a – Vent 34

Sampling takes place in a straight section of ductwork 42.5 cm diameter. The sample plane is vertical, and well away from flow disturbances.

The location of the sampling plane meets the *recommendations* of BSEN 13284 however there is only 1 sample port and this is not large enough to allow the deployment of the Universal Stack Sampler and its associated impinger train. This means that a smaller impinger sampling train had to be used which does not fully comply with the requirements of BS EN 14385.

As sampling could not be carried out in accordance with the Standard Reference Method (SRMs) UKAS accreditation cannot be claimed for the test results for Particulates and Metals even though UKAS accreditation is held for monitoring.

4.4 LEV 23 – Vent 26

Sampling takes place at the duct exit (15 cm diameter). There is no straight section of duct, as the duct leaves silencer upwards and turns through 180 (n shape)

The location of the sampling plane does not meet the *recommendations* of BSEN 13284, furthermore, the sampling plane does not meet the *flow requirements* of the standard, as there is significant swirl.

Also the sampling platform arrangements do not allow the deployment of the Universal Stack Sampler and its associated impinger train. This means that a smaller impinger sampling train had to be used which does not fully comply with the requirements of BS EN 14385. In any case the duct diameter means that the Universal stack sampler could not be used.

As sampling could not be carried out in accordance with the Standard Reference Method (SRMs) UKAS accreditation cannot be claimed for the test results for Particulates and Metals even though UKAS accreditation is held for monitoring.

4.5 LEV 25 – Vent 21

Sampling takes place in a straight section of ductwork 30 cm diameter. The sample plane is vertical, and well away from flow disturbances.

The location of the sampling plane meets the *recommendations* of BSEN 13284 however there is swirl in excess of 15 degrees and the port size does not allow the deployment of the Universal Stack Sampler and its associated impinger train. This means that a smaller impinger sampling train had to be used which does not fully comply with the requirements of BS EN 14385.

As sampling could not be carried out in accordance with the Standard Reference Method (SRMs) UKAS accreditation cannot be claimed for the test results for Particulates and Metals even though UKAS accreditation is held for monitoring.

4.6 LEV 27 – Vent 23

Sampling takes place in a vertical straight section of ductwork 15cm diameter. The nearest bend is 45cm in each direction from the plane. The location of the sampling plane does meet the *recommendations* of BSEN 13284.

However, the high velocity in the stack means that a 4mm nozzle is required to achieve isokinetic sampling, much smaller than the 6mm minimum required in BS EN 13284.

The sampling platform arrangements do not allow the deployment of the Universal Stack Sampler and its associated impinger train. This means that a smaller impinger sampling train had to be used which does not fully comply with the requirements of BS EN 14385. In any case the duct diameter means that the Universal stack sampler could not be used.

As sampling could not be carried out in accordance with the Standard Reference Method (SRMs) UKAS accreditation cannot be claimed for the test results for Particulates and Metals even though UKAS accreditation is held for monitoring.

5.0 RESULTS

The results of the survey are presented in the Tables Section, and are also presented graphically in the Figures Section.

5.1 Emissions Limit Exceedances

All pollutants measured were below their respective authorised emission limit values.

FIGURES & TABLES

Detailed Particulate & Metals Results

Plant Type	Vent 30/ LEV 2	Stack Area (m ²)	0.283
Job Number	B0032	Meter Temp (C)	29 31
Client Name	Sandvik	Stack Diameter (cm)	60
Date	11/09/2007	Pitot Factor (squared)	1.00
		Pitot Factor Cp	1.00
		Stack Pressure (Pa)	10
		Ambient Pressure (kPa)	101.2
MeterYd	0.944	Nozzle Size (mm)	7

PITOT SURVEY

Traverse Point	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Distance From Near Wall (D)	0.085	0.150	0.211	0.350	0.450	0.550	0.650	0.789	0.850	0.915
Pitot Reading (Pa)	45	40	36	34	35	38	40	45	38	36
Temperature (°C)	25	25	25	25	25	25	25	25	25	25
Duct Velocity (m/s)	8.7	8.2	7.8	7.6	7.7	8.0	8.2	8.7	8.0	7.8

Absolute Mean Duct Velocity (m/s) **8.1**
 Absolute Flow Rate (m³/hr) **8218**
 Normalised Flow Rate (Nm³/hr) **7522**

Sampling Run 1	Time:	11:56	to	12:28						
Sampling Point	A1	A3	A8	A10						
Sampling Rate (l/min)	22.0	19.7	22.0	19.7						
Sampling Duration (mins)	8.0	8.0	8.0	8.0						
Filter No	30767									
Volume Sampled (m ³)	Meter	0.569	Expected	0.591						
Initial Meter Reading (l)	95510									
Final Meter Reading (l)	96140									
Volume Sampled (l)	630		Corrected Volume =	0.54 Nm ³ (at NTP)						
Isokineticity Error (%)	-3.8									
<i>(Maximum Allowed Error = -5 to +15%)</i>										

Sampling Run 2	Time:	12:34	to	13:05						
Sampling Point	A1	A3	A8	A10						
Sampling Rate (l/min)	22.0	19.7	22.0	19.7						
Sampling Duration (mins)	8.0	8.0	8.0	8.0						
Filter No	30768									
Volume Sampled (m ³)	Meter	0.566	Expected	0.591						
Initial Meter Reading (l)	96145									
Final Meter Reading (l)	96775									
Volume Sampled (l)	630		Corrected Volume =	0.53 Nm ³ (at NTP)						
Isokineticity Error (%)	-4.3									
<i>(Maximum Allowed Error = -5 to +15%)</i>										

Test Number	Filter No	FILTER WEIGHTS		Rinsings		Gain (mg)					
		Pre-Weight (mg)	Post-Weight (mg)	Pre-Weight (mg)	Post-Weight (mg)						
1	30767	1000.00	1000.56	139707.50	139708.30	1.36					
2	30768	1000.00	1000.45	131278.40	131278.80	0.85					
Blank Filter	=	0.04	mg	Blank Rinse =	0.50	mg	Cont filt	0.00	Cont Bas	0.00	mg

TEST RESULTS

	Test 1	Test 2	Mean
Particulate Concentration(mg/Nm ³)	2.54	1.59	2.06
Mass Emission (g/hr)	19.07	11.98	15.53
Tungsten Concentration(mg/Nm ³)	0.0379	0.0232	0.0306
Mass Emission (g/hr)	0.2849	0.1748	0.2299
Cobalt Concentration(mg/Nm ³)	0.0010	0.0010	0.0010
Mass Emission (g/hr)	0.0074	0.0075	0.0074

Plant Type	LEV 12 a	Stack Area (m ²)	
Job Number	B0032	Meter Temp (C)	27 29
Client Name	Sandvik	Stack Diameter (cm)	
Date	11/09/2007	Pitot Factor (squared)	
		Pitot Factor Cp	
Grille Outlet - Grab Samples		Stack Pressure (Pa)	
		Ambient Pressure (kPa)	101.2
MeterYd	0.944	Nozzle Size (mm)	7

Sampling Run 1			
Time:	10:32	to	11:02
Sampling Point	CP		
Sampling Rate (l/min)	33.0		
Sampling Duration (mins)	30.0		
Filter No			30769
Volume Sampled (m ³)	Meter 0.880	Expectec	0.990
Initial Meter Reading (l)	93630		
Final Meter Reading (l)	94595		
Volume Sampled (l)	965	Corrected Volume =	0.83 Nm ³ (at NTP)

Sampling Run 2			
Time:	11:12	to	11:42
Sampling Point	CP		
Sampling Rate (l/min)	30.0		
Sampling Duration (mins)	30.0		
Filter No			30770
Volume Sampled (m ³)	Meter 0.814	Expectec	0.811
Initial Meter Reading (l)	94600		
Final Meter Reading (l)	95500		
Volume Sampled (l)	900	Corrected Volume =	0.77 Nm ³ (at NTP)

Test Number	Filter No	FILTER WEIGHTS		Rinsings		Gain (mg)	
		Pre-Weight (mg)	Post-Weight (mg)	Pre-Weight (mg)	Post-Weight (mg)		
1	30769	1000.00	1000.04	137387.00	137387.60	0.64	
2	30770	1000.00	1000.04	140721.80	140722.00	0.24	
Blank Filter	= 0.04	mg	Blank Rinse = 0.50	mg	Cont filt 0.00	Cont Bas 0.00	mg

	TEST RESULTS		
	Test 1	Test 2	Mean
Particulate Concentration(mg/Nm ³)	0.77	0.31	0.54
Mass Emission (g/hr)	n/a	n/a	n/a
Tungsten Concentration(mg/Nm ³)	0.0055	0.0109	0.0082
Mass Emission (g/hr)	n/a	n/a	n/a
Cobalt Concentration(mg/Nm ³)	0.0007	0.0007	0.0007
Mass Emission (g/hr)	n/a	n/a	n/a

Plant Type	Vent 34/ LEV 15a	Stack Area (m ²)	0.001
Job Number	B0032	Meter Temp (C)	29 33
Client Name	Sandvik	Stack Diameter (cm)	4
Date	11/09/2007	Pitot Factor (squared)	1.00
		Pitot Factor Cp	1.00
		Stack Pressure (Pa)	3
		Ambient Pressure (kPa)	101.2
MeterYd	0.944	Nozzle Size (mm)	10

PITOT SURVEY

Traverse Point	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Distance From Near Wall (D)	0.120	0.150	0.211	0.350	0.450	0.550	0.650	0.789	0.850	0.880
Pitot Reading (Pa)	6	6	6	6	5	5	6	6	6	6
Temperature (°C)	20	20	20	20	20	20	20	20	20	20
Duct Velocity (m/s)	3.2	3.2	3.2	3.2	2.9	2.9	3.2	3.2	3.2	3.2

Absolute Mean Duct Velocity (m/s) 3.1
 Absolute Flow Rate (m³/hr) 16
 Normalised Flow Rate (Nm³/hr) 15

Sampling Run 1	Time:	13:48	to	14:20						
Sampling Point	A1	A3	A8	A10						
Sampling Rate (l/min)	16.6	16.6	16.6	16.6						
Sampling Duration (mins)	8.0	8.0	8.0	8.0						
Filter No										30763
Volume Sampled (m ³)	Meter	0.451	Expected	0.471						
Initial Meter Reading (l)	96800									
Final Meter Reading (l)	97300									
Volume Sampled (l)	500		Corrected Volume =	0.43 Nm ³ (at NTP)						
Isokineticity Error (%)	-4.1									
	(Maximum Allowed Error = -5 to +15%)									

Sampling Run 2	Time:	14:22	to	15:02						
Sampling Point	A1	A3	A8	A10						
Sampling Rate (l/min)	16.6	16.6	16.6	16.6						
Sampling Duration (mins)	10.0	10.0	10.0	10.0						
Filter No										30764
Volume Sampled (m ³)	Meter	0.626	Expected	0.589						
Initial Meter Reading (l)	97305									
Final Meter Reading (l)	98005									
Volume Sampled (l)	700		Corrected Volume =	0.59 Nm ³ (at NTP)						
Isokineticity Error (%)	6.3									
	(Maximum Allowed Error = -5 to +15%)									

FILTER WEIGHTS

Test Number	Filter No	Pre-Weight (mg)		Post-Weight (mg)		Gain (mg)
		Pre-Weight (mg)	Post-Weight (mg)	Pre-Weight (mg)	Post-Weight (mg)	
1	30763	1000.00	1000.08	135063.00	135063.90	0.98
2	30764	1000.00	1000.04	108677.10	108678.80	1.74

Blank Filter = 0.04 mg Blank Rinse = 0.50 mg Cont filt 0.00 Cont Bas 0.00 mg

TEST RESULTS

	Test 1	Test 2	Mean
Particulate Concentration(mg/Nm ³)	2.30	2.95	2.63
Mass Emission (g/hr)	0.03	0.04	0.04
Tungsten Concentration(mg/Nm ³)	0.0099	0.0107	0.0103
Mass Emission (g/hr)	0.0001	0.0002	0.0002
Cobalt Concentration(mg/Nm ³)	0.0012	0.0009	0.0011
Mass Emission (g/hr)	0.0000	0.0000	0.0000

Plant Type	Vent 26/ LEV 23	Stack Area (m ²)	0.018
Job Number	B0032	Meter Temp (C)	32 34
Client Name	Sandvik	Stack Diameter (cm)	15
Date	11/09/2007	Pitot Factor (squared)	1.00
		Pitot Factor Cp	1.00
		Stack Pressure (Pa)	150
		Ambient Pressure (kPa)	101.2
MeterYd	0.942	Nozzle Size (mm)	6

PITOT SURVEY

Traverse Point	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Distance From Near Wall (D)	0.065	0.150	0.250	0.350	0.450	0.550	0.650	0.750	0.850	0.935
Pitot Reading (Pa)	250	220	200	190	170	170	190	200	220	250
Temperature (°C)	70	70	70	70	70	70	70	70	70	70
Duct Velocity (m/s)	22.1	20.7	19.7	19.2	18.2	18.2	19.2	19.7	20.7	22.1

Traverse Point	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
Distance From Near Wall (D)	0.065	0.150	0.250	0.350	0.450	0.550	0.650	0.750	0.850	0.935
Pitot Reading (Pa)	250	220	200	190	170	170	190	200	220	250
Temperature (°C)	70	70	70	70	70	70	70	70	70	70
Duct Velocity (m/s)	22.1	20.7	19.7	19.2	18.2	18.2	19.2	19.7	20.7	22.1

Absolute Mean Duct Velocity (m/s) 20.0
Absolute Flow Rate (m³/hr) 1270
Normalised Flow Rate (Nm³/hr) 1011

Sampling Run 1	Time:	10:32	to	11:02						
Sampling Point	CP									
Sampling Rate (l/min)	29.5									
Sampling Duration (mins)	30.0									
Filter No										30739
Volume Sampled (m ³)	Meter	0.787	Expectec	0.784						
Initial Meter Reading (l)	154835									
Final Meter Reading (l)	155715									
Volume Sampled (l)	880									Corrected Volume = 0.74 Nm³ (at NTP)
Isokineticity Error (%)	0.4									
<i>(Maximum Allowed Error = -5 to +15%)</i>										

Sampling Run 2	Time:	11:12	to	11:42						
Sampling Point	CP									
Sampling Rate (l/min)	29.5									
Sampling Duration (mins)	30.0									
Filter No										30740
Volume Sampled (m ³)	Meter	0.784	Expectec	0.784						
Initial Meter Reading (l)	155720									
Final Meter Reading (l)	156600									
Volume Sampled (l)	880									Corrected Volume = 0.74 Nm³ (at NTP)
Isokineticity Error (%)	-0.1									
<i>(Maximum Allowed Error = -5 to +15%)</i>										

FILTER WEIGHTS				Rinsings		
Test Number	Filter No	Pre-Weight (mg)	Post-Weight (mg)	Pre-Weight (mg)	Post-Weight (mg)	Gain (mg)
1	30739	1000.00	1000.04	137337.40	137338.00	0.54
2	30740	1000.00	1000.04	140125.40	140126.00	0.54

Blank Filter = 0.04 mg Blank Rinse = 0.50 mg Cont filt: 0.00 Cont Bas 0.10 mg

TEST RESULTS

	Test 1	Test 2	Mean
Particulate Concentration(mg/Nm ³)	0.73	0.73	0.73
Mass Emission (g/hr)	0.74	0.74	0.74
Tungsten Concentration(mg/Nm ³)	0.0059	0.0060	0.0060
Mass Emission (g/hr)	0.0060	0.0060	0.0060
Cobalt Concentration(mg/Nm ³)	0.0007	0.0007	0.0007
Mass Emission (g/hr)	0.0007	0.0007	0.0007

Plant Type	Vent 21/ LEV 25	Stack Area (m ²)	0.071
Job Number	B0032	Meter Temp (C)	29 30
Client Name	Sandvik	Stack Diameter (cm)	30
Date	11/09/2007	Pitot Factor (squared)	1.00
		Pitot Factor Cp	1.00
		Stack Pressure (Pa)	30
		Ambient Pressure (kPa)	101.2
MeterYd	0.942	Nozzle Size (mm)	6

PITOT SURVEY

Traverse Point	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Distance From Near Wall (D)	0.065	0.150	0.250	0.350	0.450	0.550	0.650	0.750	0.850	0.935
Pitot Reading (Pa)	90	95	97	100	110	110	100	96	94	92
Temperature (°C)	25	25	25	25	25	25	25	25	25	25
Duct Velocity (m/s)	12.3	12.7	12.8	13.0	13.6	13.6	13.0	12.7	12.6	12.5

Traverse Point	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
Distance From Near Wall (D)	0.065	0.150	0.250	0.350	0.450	0.550	0.650	0.750	0.850	0.935
Pitot Reading (Pa)	93	95	99	100	110	110	103	97	91	88
Temperature (°C)	25	25	25	25	25	25	25	25	25	25
Duct Velocity (m/s)	12.5	12.7	12.9	13.0	13.6	13.6	13.2	12.8	12.4	12.2

Absolute Mean Duct Velocity (m/s) 12.9
 Absolute Flow Rate (m³/hr) 3279
 Normalised Flow Rate (Nm³/hr) 3002

Sampling Run 1	Time:	13:50	to	14:20
Sampling Point	CP			
Sampling Rate (l/min)	25.4			
Sampling Duration (mins)	30.0			
Filter No		30765		
Volume Sampled (m ³)	Meter 0.687	Expectec 0.675		
Initial Meter Reading (l)	158475			
Final Meter Reading (l)	159235			
Volume Sampled (l)	760	Corrected Volume = 0.65 Nm ³ (at NTP)		
Isokineticity Error (%)	1.7	(Maximum Allowed Error = -5 to +15%)		

Sampling Run 2	Time:	14:25	to	14:55
Sampling Point	CP			
Sampling Rate (l/min)	25.4			
Sampling Duration (mins)	30.0			
Filter No		30766		
Volume Sampled (m ³)	Meter 0.680	Expectec 0.675		
Initial Meter Reading (l)	159245			
Final Meter Reading (l)	160000			
Volume Sampled (l)	755	Corrected Volume = 0.64 Nm ³ (at NTP)		
Isokineticity Error (%)	0.7	(Maximum Allowed Error = -5 to +15%)		

FILTER WEIGHTS						
Test Number	Filter No	Rinsings				
		Pre-Weight (mg)	Post-Weight (mg)	Pre-Weight (mg)	Post-Weight (mg)	Gain (mg)
1	30765	1000.00	1000.04	129965.60	129966.00	0.44
2	30766	1000.00	1000.04	135648.40	135648.80	0.44

Blank Filter = 0.04 mg Blank Rinse = 0.50 mg Cont filt 0.00 Cont Bas 0.00 mg

TEST RESULTS

	Test 1	Test 2	Mean
Particulate Concentration(mg/Nm ³)	0.68	0.69	0.68
Mass Emission (g/hr)	2.04	2.06	2.05
Tungsten Concentration(mg/Nm ³)	0.0068	0.0078	0.0073
Mass Emission (g/hr)	0.0204	0.0234	0.0219
Cobalt Concentration(mg/Nm ³)	0.0008	0.0008	0.0008
Mass Emission (g/hr)	0.0025	0.0025	0.0025

Plant Type	Vent 23/ LEV 27	Stack Area (m ²)	0.018
Job Number	B0032	Meter Temp (C)	32 35
Client Name	Sandvik	Stack Diameter (cm)	15
Date	11/09/2007	Pitot Factor (squared)	1.00
		Pitot Factor Cp	1.00
		Stack Pressure (Pa)	1000
		Ambient Pressure (kPa)	101.2
MeterYd	0.942	Nozzle Size (mm)	4

PITOT SURVEY

Traverse Point	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
Distance From Near Wall (D)	0.065	0.150	0.250	0.350	0.450	0.550	0.650	0.750	0.850	0.935
Pitot Reading (Pa)	1200	1100	1000	900	800	800	900	1000	1100	1200
Temperature (°C)	43	43	43	43	43	43	43	43	43	43
Duct Velocity (m/s)	46.4	44.4	42.3	40.2	37.9	37.9	40.2	42.3	44.4	46.4

Traverse Point	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
Distance From Near Wall (D)	0.065	0.150	0.250	0.350	0.450	0.550	0.650	0.750	0.850	0.935
Pitot Reading (Pa)	1200	1100	1000	900	800	800	900	1000	1100	1200
Temperature (°C)	43	43	43	43	43	43	43	43	43	43
Duct Velocity (m/s)	46.4	44.4	42.3	40.2	37.9	37.9	40.2	42.3	44.4	46.4

Absolute Mean Duct Velocity (m/s) 42.2
 Absolute Flow Rate (m³/hr) 2685
 Normalised Flow Rate (Nm³/hr) 2340

Sampling Run 1		Time: 11:56 to 12:26	
Sampling Point	CP		
Sampling Rate (l/min)	29.9		
Sampling Duration (mins)	30.0		
Filter No	30761		
Volume Sampled (m ³)	Meter 0.804	Expectec 0.795	
Initial Meter Reading (l)	156610		
Final Meter Reading (l)	157510		
Volume Sampled (l)	900	Corrected Volume =	0.76 Nm ³ (at NTP)
Isokineticity Error (%)	1.2		
<i>(Maximum Allowed Error = -5 to +15%)</i>			

Sampling Run 2		Time: 12:39 to 13:09	
Sampling Point	CP		
Sampling Rate (l/min)	29.9		
Sampling Duration (mins)	30.0		
Filter No	30762		
Volume Sampled (m ³)	Meter 0.798	Expectec 0.795	
Initial Meter Reading (l)	157515		
Final Meter Reading (l)	158415		
Volume Sampled (l)	900	Corrected Volume =	0.75 Nm ³ (at NTP)
Isokineticity Error (%)	0.3		
<i>(Maximum Allowed Error = -5 to +15%)</i>			

Test Number	Filter No	FILTER WEIGHTS		Rinsings		Gain (mg)
		Pre-Weight (mg)	Post-Weight (mg)	Pre-Weight (mg)	Post-Weight (mg)	
1	30761	1000.00	1000.04	136867.00	136867.20	0.24
2	30762	1000.00	1000.04	135908.10	135908.60	0.54

Blank Filter = 0.04 mg Blank Rinse = 0.50 mg Cont filt: 0.00 Cont Bas: 0.00 mg

TEST RESULTS

	Test 1	Test 2	Mean
Particulate Concentration(mg/Nm ³)	0.32	0.72	0.52
Mass Emission (g/hr)	0.74	1.68	1.21
Tungsten Concentration(mg/Nm ³)	0.0057	0.0058	0.0057
Mass Emission (g/hr)	0.0132	0.0135	0.0133
Cobalt Concentration(mg/Nm ³)	0.0007	0.0007	0.0007
Mass Emission (g/hr)	0.0017	0.0016	0.0017