

Report for Periodic Monitoring of Emissions to Atmosphere

Part 1: **Executive Summary**

Permit Number: **RP3133LD**

Operator: **RWE Generation UK plc.**

Installation: **Aberthaw Power Station**

Emission Points: **Unit 7, Unit 8, Unit 9**

Monitoring Date: **4th March 2016 & 2nd November 2016**



Contract Reference: FTBS 39556

Operator: RWE Generation UK plc.

Address: Aberthaw Power Plant
The Leys
Aberthaw, Nr Barry
South Glamorgan
CF62 4ZW

Monitoring Organisation: RPS Consultants

Address: Noble House, Capital Drive, Linford
Wood, Milton Keynes, MK14 6QP

Report Date: 1st February 2017

Report Approved By: Glyn Harrison

Position: Operations Manager

MCERTS Registration Number: MM 03 228

MCERTS Certification Level: 2

Technical Endorsements: TE1, TE2, TE3, TE4

Signature:

A rectangular box containing a handwritten signature in black ink, which appears to be 'Glyn Harrison'.

RPS Consultants has produced this report within the term of the contract with the client and taking account of the resources devoted to it by agreement with the client.

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Monitoring Objectives

At the request of Richard Kadim of RWE Generation UK plc, RPS Consultants conducted stack emission monitoring at the Aberthaw site in March and November 2016.

The monitoring programme at this installation was carried out to provide data on emissions to atmosphere for comparison with the limits specified in the air emission criteria for this site.

The following tables detail the parameters requested for monitoring at each emission point and the actual monitoring conducted.

Table 1.1

Parameters Requested to be Monitored	Emission Point
	Unit 7
Total Mercury	✓
Specific Requirements	None

Notes:

✓ Represents pollutants sampled

Table 1.2

Parameters Requested to be Monitored	Emission Point
	Unit 8
Total Mercury	✓
Specific Requirements	None

Notes:

✓ Represents pollutants sampled

Table 1.3

Parameters Requested to be Monitored	Emission Point
	Unit 9
Total Mercury	✓
Specific Requirements	None

Notes:

✓ Represents pollutants sampled

Monitoring Results

Table 2.1 Monitoring results for Unit 7, Carried out on the 4th March 2016.

Substance Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Uncertainty (Expressed expanded k=2)	Reference Conditions 273K, 101.3kPa	Sampling Date	Sampling Times	Monitoring Reference Method	Accreditation Status	Operating Status
Total Mercury	No Limit	0.00068	mg/m ³	+/- 0.000092	273K, 101.3kPa, Dry, 6% O2	04/03/2016	12:00 – 13:00	EN 13211:2001	MCERTS	Normal
	-	0.0011	Kg/hr	-						

Table 2.2 Monitoring results for Unit 8, Carried out on the 2nd November 2016

Substance Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Uncertainty (Expressed expanded k=2)	Reference Conditions 273K, 101.3kPa	Sampling Date	Sampling Times	Monitoring Reference Method	Accreditation Status	Operating Status
Total Mercury	No Limit	0.00066	mg/m ³	+/- 0.000095	273K, 101.3kPa, Dry, 6% O2	02/11/2016	11:41 – 12:41	EN 13211:2001	MCERTS	Normal
	-	0.00097	Kg/hr	-						

Table 2.3 Monitoring results for Unit 9, Carried out on the 4th March 2016.

Substance Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Uncertainty (Expressed expanded k=2)	Reference Conditions 273K, 101.3kPa	Sampling Date	Sampling Times	Monitoring Reference Method	Accreditation Status	Operating Status
Total Mercury	No Limit	0.0042	mg/m ³	+/- 0.00063	273K, 101.3kPa, Dry, 6% O2	04/03/2016	10:28 – 11:28	EN 13211:2001	MCERTS	Normal
	-	0.0057	Kg/hr	-						

Operating Information

Table 3.1 Operating conditions during the monitoring of Unit 7 carried out on the 4th March 2016.

Parameter	Result
Sample Date	04/03/2016
Process Type	Continuous
Process Duration	N/A
If 'Batch', was monitoring carried out over the whole batch?	N/A
Abatement/Operational?	Bag Filter / Operational

Comparison of Operator CEM and Periodic Monitoring Results		
Substance	CEMs Results (mg/m ³)	Periodic Monitoring Results (mg/m ³)
No CEMS Installed/Data Available		

Table 3.2 Operating conditions during the monitoring of Unit 8 carried out on the 2nd November 2016

Parameter	Result
Sample Date	02/11/2016
Process Type	Continuous
Process Duration	N/A
If 'Batch', was monitoring carried out over the whole batch?	N/A
Abatement/Operational?	Bag Filter / Operational

Comparison of Operator CEM and Periodic Monitoring Results		
Substance	CEMs Results (mg/m ³)	Periodic Monitoring Results (mg/m ³)
No CEMS Installed/Data Available		

Table 3.3 Operating conditions during the monitoring of Unit 9 carried out on the 4th March 2016.

Parameter	Result
Sample Date	04/03/2016
Process Type	Continuous
Process Duration	N/A
If 'Batch', was monitoring carried out over the whole batch?	N/A
Abatement/Operational?	Bag Filter / Operational

Comparison of Operator CEM and Periodic Monitoring Results		
Substance	CEMs Results (mg/m ³)	Periodic Monitoring Results (mg/m ³)
No CEMS Installed/Data Available		

Monitoring Deviations

Table 4.1 Monitoring Deviations for Emission Point Unit 7

Pollutant	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Total Mercury.	None	Due to the size of duct and limited space, we were unable to monitor at all the points along the duct.	None

Table 4.2 Monitoring Deviations for Emission Point Unit 8

Pollutant	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Total Mercury.	None	Due to the size of duct and limited space, we were unable to monitor at all the points along the duct.	None

Table 4.3 Monitoring Deviations for Emission Point Unit 9

Pollutant	Substance Deviations	Monitoring Deviations	Other Relevant Issues
Total Mercury.	None	Due to the size of duct and limited space, we were unable to monitor at all the points along the duct.	None

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Part 2: **Supporting Information**

Permit Number: **RP3133LD**

Operator: **RWE Generation UK plc.**

Installation: **Aberthaw Power Station**

Emission Points: **Unit 7, Unit 8, Unit 9**

Monitoring Date: **4th March 2016 & 2nd November 2016**



Contract Reference: FTBS 39556

Operator: RWE Generation UK plc.

Address: Aberthaw Power Plant
The Leys
Aberthaw, Nr Barry
South Glamorgan
CF62 4ZW

Monitoring Organisation: RPS Consultants

Address: Noble House, Capital Drive, Linford
Wood, Milton Keynes, MK14 6QP

Report Date: 1st February 2017

Report Approved By: Glyn Harrison

Position: Operations Manager

MCERTS Registration Number: MM 03 228

MCERTS Certification Level: 2

Technical Endorsements: TE1, TE2, TE3, TE4

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Appendix 5 – Certificates of analysis

APPENDIX 1: General Information

Monitoring Organisation Staff Details

Table 5.1 Sampling Personnel

Sampling Personnel	Role	MCERTS Level	Technical Endorsements	MCERTS Registration Number
Edwin Powell	Team Leader	Level 2	TE1, TE2, TE3, TE4	MM 05 621
Dan Lewis	Technician	Level 1	-	MM 14 1291

Table 5.2 Report Author

Report Author	Position	MCERTS Level	Technical Endorsements	MCERTS Registration Number
Dan Lewis	Technician	Level 1	-	MM 14 1291

Table 5.3 Report Reviewer

Report Reviewer	Position	MCERTS Level	Technical Endorsements	MCERTS Registration Number
Glyn Harrison	Operations Manager	Level 2	TE1, TE2, TE4	MM 03 228

Monitoring Organisation Method Details

Table 6.1 Monitoring Methods

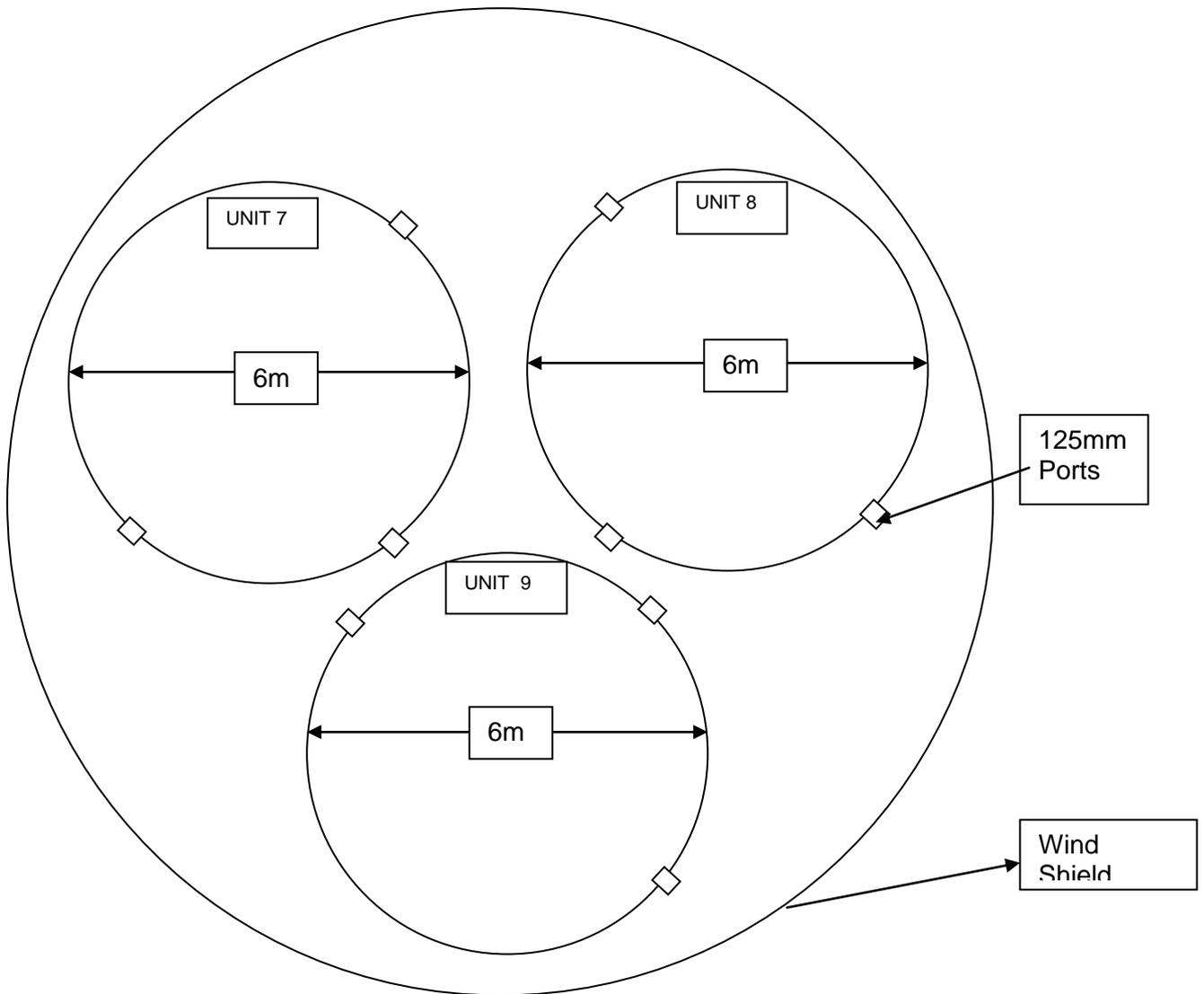
Emission Parameter	Standard Method	Monitoring Procedure No.	Monitoring Accreditation	Analysis	Analysis Procedure No.	Analytical Laboratory	Analysis Accreditation
Practical Considerations Prior to Monitoring	N/A	RPSCE/1/1	UKAS	N/A	N/A	N/A	N/A
Gas Flows	BS-EN 13284-1:2001	RPSCE/1/2	MCERTS	N/A	N/A	N/A	N/A
Gas Temperatures	BS-EN 13284-1:2001	RPSCE/1/2	MCERTS	N/A	N/A	N/A	N/A
Total mercury	EN 13211:2001	RPSCE/1/9b	MCERTS	ICP	M1	RPS Laboratories	UKAS

Table 7.1 – Checklist Used

Equipment Checklist Used	File Location Address
FTBS39556 Checklist	FTBS39556 Electronic & Work File

APPENDIX 2:
Unit 7 Sampling, Analysis & Uncertainty Data

Unit 7, 8 & 9 Stack Diagram



Company Name: Aberthaw Power Station
Site Name: Aberthaw
Sampling Point Ref: Unit 7
Project Reference: FTBS 29312

Date: 04/03/16
Run: Metals

Mean Stack Temperature, oC 56.000

Traverse Stack Velocity, m/s 16.588

Stack Gas Volume Flow Rate, m3/s (acms) 469,022

Stack Gas Volume Flow Rate, m3/s. Dry, STP and O2 Corrected 395,348

Δp Measurement units (Pa or mmH2O) mmH2O

Pitot Coefficient 0.827

Barometric	753	mmHg	Leak Test		
Static			Instrument range	250	mmH2O
Port A	-24	mmH2O	Δp for leak test	187.5	mmH2O
Port B	-24	mmH2O	Positive leakage rate	0	per 15secs
Mean	-24	mmH2O	Negative leakage rate	0	per 15secs
			Pass/Fail	Pass	

Stagnation Test		
Static measurement		
Positive side	-24	mmH2O
Negative side	-24	mmH2O
Difference (Pa)	0	
Pass/Fail	Pass	

Stack Dimensions		
Rectangular A		(Width) m
Rectangular B		(Length) m
Circular diam A	6	m
Circular diam B	6	m
Circular Mean	6	m
Area	28.27431	m ²

Traverse Point	Distance m	Port A						Port B					
		Δ p, mmH2O			Swirl Degrees	Temp °C	Δ p, mmH2O			Swirl Degrees	Temp °C		
		Reading 1	Reading 2	Reading 3			Average	Reading 1	Reading 2			Reading 3	
1	0.20	22	22	22	22	0	56	22	22	22	22	0	56
2	0.63	21	21	21	21	0	56	23	23	23	23	0	56
3	1.16	23	23	23	23	0	56	24	24	24	24	0	56
4	1.94												
5	4.06												
6	4.84	23	23	23	23	0	56	24	24	24	24	0	56
7	5.37	24	24	24	24	0	56	23	23	23	23	0	56
8	5.80	21	21	21	21	0	56	22	22	22	22	0	56
9													
10													

Gas Data	
Oxygen %	5.28
CO ₂ %	13.53
CO %	

Oxygen Correction	
Required Correction Value	6
Actual Oxygen Factor	0.95
Leave BLANK if no O2 correction is required	

BS EN 13284-1 & M1 Sample Point Requirements	Requirement Met?
Duct gas Flow: angle with regard to duct access <15°?	Y
Duct Gas Flow: No Negative Velocity: Not Permitted	Y
Duct Gas Flow: Ratio of max to min velocity <3:1?	Y
Working Area > 5m ² ?	
Handrails with removable chains / self closing gates across the top of the ladder?	
Handrails (approx 0,5 and 1,0 m high) and vertical baseboards (approx 0,25m high)?	
Scaffold Built to 'Heavy Duty' Scafftag Rating or at least 2.5kN/m2 loading	
Handrails not restricting access to ports?	
Room opposite sampling port equal or greater than the length of the sampling probe plus 1 metre?	
Sufficient Power (Waterproof 110V BS4343 Standard) close or on the platform?	

Company Name: Aberthaw Power Station In-stack Filter? **N** Bar. Press.mm Hg **753** K Factor **0.498247828** Ambient Temp. **15.33333333** Leak Rate (fin / %) **0.46**
 Site Name: Aberthaw Outstack Filter? **Y** Cp **0.827** Dn used **3.917** Start Time **12:00** Leak Rate (start / %) **0.96**
 Project Reference: FTBS 29312 Date: **04/03/16** Operators **EP DL** Bws% **1.26** Nozzle No. **0** Stop Time **13:00** Box/Probe setting **160 +/- 5 °C**
 Run: Metals Meter Correction Yd **0.988**

Sample Filter Analysis

	Analysis Result (ug)	Analysis Blank Results (ug)	Analysis Result (mg)
Mercury	0.1070	0.0945	0.0001

Sample Impinger & Wash Solution Analysis

	Analysis Result (ug)	Analysis Blank Results (ug)	Analysis Result (mg)
Mercury	0.3714	0.0002	0.0004

Sample ID Nos

	Sample	Blank
Filter		
Wash		
Imp 1 & 2		
Imp 3		
HG Imp 1	30009052	30009048
HG Imp 2	30009053	30009049

Sample Filter Blank Weighings

Weights	Initial	Final	Increase, mg
Impinger 1			
Impinger 2			
Impinger 3			
Impinger 4			
Impinger 5			
Silica Gel			
Total			10.5

Sample Point	Clock Time min	Pitot Δ p, mm H ₂ O	Stack Temp, °C	Orifice Δ H, mm H ₂ O		Gas Meter Reading m ³	Temp at Gas Meter Outlet °C	Condenser Temp, °C	Filter Box Temp °C	Probe Temp °C	Pump Vacuum Inches Hg	Impinger Stem Temp, °C	Root Δ p,
				Desired	Actual								
	0	30	52	14.94743483	16	3234566.8	16		180	180	0	8	5.477
	5	29	52	14.449187	15		16		180	180	0	8	5.385
	10	29	52	14.449187	15		17		180	180	0	8	5.385
	15	28	52	13.95093917	15		17		180	180	0	9	5.292
	20	31	52	15.44568265	17		17		180	180	0	9	5.568
	25	31	52	15.44568265	17		17		180	180	0	9	5.568
Endpoint	30												
	0	31	52	15.44568265	17		18		180	180	0	10	5.568
	5	31	52	15.44568265	17		18		180	180	0	10	5.568
	10	32	52	15.94393048	17		18		180	180	0	10	5.657
	15	32	52	15.94393048	17		18		180	180	0	10	5.657
	20	32	52	15.94393048	17		18		180	180	0	10	5.657
	25	28	52	13.95093917	15		18		180	180	0	11	5.292
Endpoint	30					3235295.5							
	60.00	30.333	52.0	15.1	16.2	0.7	17.3	#DIV/0!	180.0	180.0	0.0	9.3	5.506

Uncertainty Calculation for Metals to BS EN 14385

Measured Values		
Sampled Volume	0.7287	m ³
Sampled gas Temperature	290.3333333	k
Sampled gas Pressure	100.16	kPa
Sampled gas Humidity	0	% by volume
Oxygen content	5.28	% by volume
Volume Impinger 1 + 2	213	ml
Volume Impinger 3	189	ml
Total Impinger Volume	402	litre
Leak	0.71	%

Standard Uncertainties for Measured Values		
Sampled Volume	0.001	m ³
Sampled gas Temperature	2	k
Sampled gas Pressure	1	kPa
Sampled gas Humidity	1	% by volume
Oxygen content	0.1	% by volume
Volume in Impinger	0.001	litre

Uncertainty Calculation for Volume Correction				Uncertainty Calculation for Oxygen Correction			
Volume Correction Factor	0.930			Oxygen Correction Factor	0.9539		
	Sensitivity Coefficient		Uncertainty, Uv		Sensitivity Coefficient		Uncertainty, Uo
Sampled gas Temperature	0.0032		0.0064	Oxygen Measurement	0.0608		0.0061
Sampled gas Pressure	0.0093		0.0093				
Sampled gas Humidity	0.0093		0.0093				
	Sqrt (Uv)*2		0.0146				
	Total Uv		0.011			Total Uo	0.0061

Metal	Total Mass - Impingers	Total Mass - Part Fraction	Analytical uncertainty %		Standard Uncertainties - Mass		Concentration (mg/m ³)	Itemised Uncertainty Contributions				Uncertainty Contributions - Concentration (mg/m ³)				Calculated Uncertainties	
			Particulate	Impingers	Particulate	Impingers		Volume Correction	Mass Analyte	Oxygen Correction	Leaks	Volume Correction	Mass Analyte	Oxygen Correction	Leaks	Expanded - mg/m ³	% of Result
Mercury	0.0003714	0.000107	6	5	0.0	0.000	0.000679763	0.001012556	1.42091	0.00	1.00	1.0832E-05	2.7919E-05	0.00	2.79863E-06	0.000092	14

(Uncertainty has been expanded with a coverage factor of 2 (K=2))

Company Name: Aberthaw Power Station
Site Name: Aberthaw
Sampling Point Ref: Unit 7
Run: Metals

Date: 04/03/16
Run: Metals

Barometric Pressure, mm Hg	753.00
Stack Pressure, mm Hg	751.23
Volume of Water as gas at STP, scm	0.013
Meter Volume (Standardised m ³), Dry	0.671
Meter Volume (Standardised m ³) Wet	0.684
Stack Moisture Content, %	1.9
%O ₂	5.28
Average Stack Velocity, m/sec	19.07
Stack Area, m ²	28.27
Stack Flow Rate, (Actual m ³ /s)	539.253
Stack Flow Rate (Standardised m ³ /s) wet	469.109
Stack Flow Rate, (Standardised m ³ /s), dry	460.142
Nozzle Diameter, mm	3.92
% Isokinetic Variation	99.5

SAMPLE CONCENTRATIONS & MASS EMISSION RATES

Analyte	Concentration. Dry, STP, and O2 Corrected (Particulate Phase - mg/m ³)	Concentration. Dry, STP, and O2 Corrected (Vapour Phase, mg/m ³)	Mass Concentration, Dry, STP, and O2 Corrected (mg/m ³)	Mass Emissions Dry, STP, and O2 Corrected (Kg/hr)	ELV
Mercury	0.00015	0.00053	0.00068	0.00113	

BLANK CONCENTRATIONS & MASS EMISSIONS RATES

Analyte	Concentration. Dry, STP, and O2 Corrected (Particulate Phase - mg/m ³)	Concentration. Dry, STP, and O2 Corrected (Vapour Phase, mg/m ³)	Mass Concentration, Dry, STP, and O2 Corrected (mg/m ³)	Mass Emissions Dry, STP, and O2 Corrected (Kg/hr)
Mercury	0.00013	0.00000030	0.00013	0.00022

APPENDIX 3:
Unit 9 Sampling, Analysis & Uncertainty Data

Company Name: Aberthaw Power Station
Site Name: Aberthaw
Sampling Point Ref: Unit 9
Project Reference: FTBS 29312

Date: 04/03/16
Run: Metals

Mean Stack Temperature, oC 70.000

Traverse Stack Velocity, m/s 18.101

Stack Gas Volume Flow Rate, m3/s (acms) 511.789

Stack Gas Volume Flow Rate, m3/s. Dry, STP and O2 Corrected 399.030

Δp Measurement units (Pa or mmH2O) mmH2O

Pitot Coefficient 0.827

Barometric	753	mmHg	Leak Test		
Static			Instrument range	250	mmH2O
Port A	-26	mmH2O	Δp for leak test	187.5	mmH2O
Port B	-26	mmH2O	Positive leakage rate	0	per 15secs
Mean	-26	mmH2O	Negative leakage rate	0	per 15secs
			Pass/Fail	Pass	

Stagnation Test		
Static measurement		
Positive side	-26	mmH2O
Negative side	-26	mmH2O
Difference (Pa)	0	
Pass/Fail	Pass	

Stack Dimensions		
Rectangular A		(Width) m
Rectangular B		(Length) m
Circular diam A	6	m
Circular diam B	6	m
Circular Mean	6	m
Area	28.27431	m ²

Traverse Point	Distance m	Port A						Port B					
		Δ p, mmH2O			Swirl Degrees	Temp °C	Δ p, mmH2O			Swirl Degrees	Temp °C		
		Reading 1	Reading 2	Reading 3			Average	Reading 1	Reading 2			Reading 3	Average
1	0.20	22	22	22	22	0	70	23	23	24	23	0	70
2	0.63	23	23	23	23	0	70	25	25	25	25	0	70
3	1.16	23	23	23	23	0	70	28	28	28	28	0	70
4	1.94												
5	4.06												
6	4.84	26	26	26	26	0	70	28	28	28	28	0	70
7	5.37	28	28	28	28	0	70	26	26	26	26	0	70
8	5.80	32	32	32	32	0	70	27	27	27	27	0	70
9													
10													

Gas Data	
Oxygen %	5.81
CO ₂ %	13.55
CO %	

Oxygen Correction	
Required Correction Value	6
Actual Oxygen Factor	0.99
Leave BLANK if no O2 correction is required	

BS EN 13284-1 & M1 Sample Point Requirements	Requirement Met?
Duct gas Flow: angle with regard to duct access <15°?	Y
Duct Gas Flow: No Negative Velocity: Not Permitted	Y
Duct Gas Flow: Ratio of max to min velocity <3:1?	Y
Working Area > 5m ² ?	
Handrails with removable chains / self closing gates across the top of the ladder?	
Handrails (approx 0,5 and 1,0 m high) and vertical baseboards (approx 0,25m high)?	
Scaffold Built to 'Heavy Duty' Scafftag Rating or at least 2.5kN/m2 loading	
Handrails not restricting access to ports?	
Room opposite sampling port equal or greater than the length of the sampling probe plus 1 metre?	
Sufficient Power (Waterproof 110V BS4343 Standard) close or on the platform?	

Company Name: Aberthaw Power Station In-stack Filter? **N** Bar. Press.mm Hg **753** K Factor **0.473133932** Ambient Temp. **13** Leak Rate (fin / %) **0.43**
 Site Name: Aberthaw Outstack Filter? **Y** Cp **0.827** Dn used **3.917** Start Time **10:28** Leak Rate (start / %) **0.86**
 Project Reference: FTBS 29312 Date: **04/03/16** Operators **EP DL** Bws% **2.08** Nozzle No. **0** Stop Time **11:28** Box/Probe setting **160 +/- 5 °C**
 Run: Metals Meter Correction Yd **0.971**

Sample Filter Analysis

	Analysis Result (ug)	Analysis Blank Results (ug)	Analysis Result (mg)
Arsenic			
Antimony			
Cadmium			
Chromium			
Mercury	0.1005	0.0945	0.0001
Cobalt			
Copper			
Iron			
Lead			
Manganese			
Nickel			
Selenium			
Thallium			
Tin			
Vanadium			
Zinc			

Sample Impinger & Wash Solution Analysis

	Analysis Result (ug)	Analysis Blank Results (ug)	Analysis Result (mg)
Arsenic			
Antimony			
Cadmium			
Chromium			
Mercury	2.2899	0.2240	0.0023
Cobalt			
Copper			
Iron			
Lead			
Manganese			
Nickel			
Selenium			
Thallium			
Tin			
Vanadium			
Zinc			

Sample ID Nos

	Sample	Blank
Filter	30009042	30009038
Wash	30009043	30009039
Imp 1 & 2		
Imp 3		
HG Imp 1	30009044	30009040
HG Imp2	30009045	30009041

Sample Filter Blank Weighings

Weights	Initial	Final	Increase, mg
Impinger 1			
Impinger 2			
Impinger 3			
Impinger 4			
Impinger 5			
Silica Gel			9.5
Total			9.5

Sample Point	Clock Time min	Pitot Δ p, mm H ₂ O	Stack Temp, °C	Orifice Δ H, mm H ₂ O		Gas Meter Reading m ³	Temp at Gas Meter Outlet °C	Condenser Temp. °C	Filter Box Temp °C	Probe Temp °C	Pump Vacuum Inches Hg	Impinger Stem Temp. °C	Root Δ p.
				Desired	Actual								
	0	22	61	10.4089465		3233950.5	10		180	180	0	12	4.690
	5	22	61	10.4089465			15		180	180	0	12	4.690
	10	21	61	9.935812571			16		180	180	0	12	4.583
	15	21	61	9.935812571			16		180	180	0	12	4.583
	20	23	61	10.88208043			16		180	180	0	12	4.796
	25	23	61	10.88208043			16		180	180	0	12	4.796
Endpoint	30												
	0	23	61	10.88208043			16		180	180	0	12	4.796
	5	22	61	10.4089465			16		180	180	0	13	4.690
	10	22	61	10.4089465			16		180	180	0	13	4.690
	15	22	61	10.4089465			16		180	180	0	13	4.690
	20	23	61	10.88208043			16		180	180	0	13	4.796
	25	23	61	10.88208043			16		180	180	0	13	4.796
Endpoint	30					3234565.5							
	60.00	22.250	61.0	10.5	#DIV/0!	0.6	15.4	#DIV/0!	180.0	180.0	0.0	12.4	4.716

Company Name: Aberthaw Power Station
Site Name: Aberthaw
Sampling Point Ref: Unit 9
Run: Metals

Date: 04/03/16
Run: Metals

Barometric Pressure, mm Hg	753.00
Stack Pressure, mm Hg	751.09
Average Stack Temp, °C	61.0
Volume of Water as gas at STP, scm	0.012
Meter Volume (Standardised m ³), Dry	0.560
Meter Volume (Standardised m ³) Wet	0.572
Stack Moisture Content, %	2.1
%O ₂	5.81
Average Stack Velocity, m/sec	16.562
Stack Flow Rate, (Actual m ³ /s)	468.280
Stack Flow Rate (Standardised m ³ /s) wet	382.866
Stack Flow Rate, (Standardised m ³ /s), dry	374.944
% Isokinetic Variation	98.4

SAMPLE CONCENTRATIONS & MASS EMISSION RATES

Analyte	Concentration, Dry, STP, and O2 Corrected (Particulate Phase - mg/m ³)	Concentration, Dry, STP, and O2 Corrected (Vapour Phase, mg/m ³)	Mass Concentration, Dry, STP, and O2 Corrected (mg/m ³)	Mass Emissions Dry, STP, and O2 Corrected (Kg/hr)	ELV
Mercury	0.00018	0.0040	0.0042	0.0057	

BLANK CONCENTRATIONS & MASS EMISSIONS RATES

Analyte	Concentration, Dry, STP, and O2 Corrected (Particulate Phase - mg/m ³)	Concentration, Dry, STP, and O2 Corrected (Vapour Phase, mg/m ³)	Mass Concentration, Dry, STP, and O2 Corrected (mg/m ³)	Mass Emissions Dry, STP, and O2 Corrected (Kg/hr)
Mercury	0.00017	0.00039	0.00056	0.00076

Uncertainty Calculation for Metals to BS EN 14385

Measured Values		
Sampled Volume	0.615	m ³
Sampled gas Temperature	288.416667	k
Sampled gas Pressure	100.14	kPa
Sampled gas Humidity	0	% by volume
Oxygen content	5.81	% by volume
Volume Impinger 1 + 2	225	ml
Volume Impinger 3	213	ml
Total Impinger Volume	438	litre
Leak	0.64	%

Standard Uncertainties for Measured Values		
Sampled Volume	0.001	m ³
Sampled gas Temperature	2	k
Sampled gas Pressure	1	kPa
Sampled gas Humidity	1	% by volume
Oxygen content	0.1	% by volume
Volume in Impinger	0.001	litre

Uncertainty Calculation for Volume Correction				Uncertainty Calculation for Oxygen Correction			
Volume Correction Factor	0.936			Oxygen Correction Factor	0.9874		
	Sensitivity Coefficient		Uncertainty, Uv		Sensitivity Coefficient		Uncertainty, Uo
Sampled gas Temperature	0.0032		0.0065	Oxygen Measurement	0.0652		0.0065
Sampled gas Pressure	0.0093		0.0093				
Sampled gas Humidity	0.0094		0.0094				
	Sqrt (Uv)^2		0.0147				
	Total Uv		0.009			Total Uo	0.0065

Metal	Total Mass - Impingers	Total Mass - Part Fraction	Analytical uncertainty %		Standard Uncertainties - Mass		Concentration (mg/m ³)	Itemised Uncertainty Contributions							Expanded - mg/m ³	% of Result	
			Particulate	Impingers	Particulate	Impingers		Sensitivity Coefficients				Uncertainty Contributions - Concentration (mg/m ³)					
								Volume Correction	Mass Analyte	Oxygen Correction	Leaks	Volume Correction	Mass Analyte	Oxygen Correction			Leaks
Mercury	0.0022899	0.0001005	6	5	0.0	0.000	0.004212675	0.007518797	1.762331	0.00	1.00	6.8526E-05	0.00020206	0.00	1.5608E-05	0.00063	15

(Uncertainty has been expanded with a coverage factor of 2 (K=2))

APPENDIX 4:
Unit 8 Sampling, Analysis & Uncertainty Data

Company Name: Aberthaw power station
Site Name: Aberthaw
Sampling Point Ref: unit 8
Project Reference:

Date: 02/11/16
Run: Metals

Mean Stack Temperature, oC 65.000

Traverse Stack Velocity, m/s 19.867

Stack Gas Volume Flow Rate, m³/s (acms) 561.729

Stack Gas Volume Flow Rate, m³/s, Dry, STP and O2 Corrected 417.669

Δp Measurement units (Pa or mmH2O) mmH2O

Pitot Coeficiant 0.831

Barometric	758	mmHg	Leak Test		
Static			Instrument range	250	mmH2O
Port A	-25	mmH2O	Δp for leak test	187.5	mmH2O
Port B	-25	mmH2O	Positive leakage rate	0	per 15secs
Mean	-25	mmH2O	Negative leakage rate	0	per 15secs
			Pass/Fail	Pass	

Stagnation Test		
Static measurement		
Positive side	-25	mmH2O
Negative side	-25	mmH2O
Difference (Pa)	0	
Pass/Fail	Pass	

Stack Dimensions		
Rectangular A		(Width) m
Rectangular B		(Length) m
Circular diam A	6	m
Circular diam B	6	m
Circular Mean	6	m
Area	28.27431	m ²

Traverse Point	Distance m	Port A						Port B					
		Δ p, mmH2O			Swirl Degrees	Temp °C	Δ p, mmH2O			Swirl Degrees	Temp °C		
		Reading 1	Reading 2	Reading 3			Average	Reading 1	Reading 2			Reading 3	Average
1	0.20	28	28	28	28	0	63	27	27	27	27	0	63
2	0.63	33	33	33	33	0	66	33	33	33	33	0	66
3	1.16	34	34	34	34	0	66	34	34	34	34	0	66
4	1.94												
5	4.06												
6	4.84	33	33	33	33	0	66	34	34	34	34	0	66
7	5.37	32	32	32	32	0	66	34	34	34	34	0	66
8	5.80	29	29	29	29	0	63	30	30	30	30	0	63
9													
10													

Gas Data	
Oxygen %	6.90
CO ₂ %	13.80
CO %	

Oxygen Correction	
Required Correction Value	6
Actual Oxygen Factor	1.06
Leave BLANK if no O2 correction is required	

BS EN 13284-1 & M1 Sample Point Requirements	Requirement Met?
Duct gas Flow: angle with regard to duct access <15°?	Y
Duct Gas Flow: No Negative Velocity: Not Permitted	Y
Duct Gas Flow: Ratio of max to min velocity <3:1?	Y
Working Area > 5m ² ?	y
Handrails with removable chains / self closing gates across the top of the ladder?	y
Handrails (approx 0,5 and 1,0 m high) and vertical baseboards (approx 0,25m high)?	y
Scaffold Built to 'Heavy Duty' Scafftag Rating or at least 2.5kN/m2 loading	N/A
Handrails not restricting access to ports?	y
Room opposite sampling port equal or greater than the length of the sampling probe plus 1 metre?	y
Sufficient Power (Waterproof 110V BS4343 Standard) close or on the platform?	y

Company Name: Aberthaw power station
Site Name: Aberthaw
Sampling Point Ref: unit 8
Run: Metals

Date: 02/11/16
Run: Metals

Barometric Pressure, mm Hg	758.00
Stack Pressure, mm Hg	756.16
Average Stack Temp, °C	66.0
Volume of Water as gas at STP, scm	0.016
Meter Volume (Standardised m ³), Dry	1.044
Meter Volume (Standardised m ³) Wet	1.060
Stack Moisture Content, %	1.5
%O ₂	6.90
Average Stack Velocity, m/sec	19.273
Stack Flow Rate, (Actual m ³ /s)	544.939
Stack Flow Rate (Standardised m ³ /s) wet	410.014
Stack Flow Rate, (Standardised m ³ /s), dry	403.989
% Isokinetic Variation	95.7

SAMPLE CONCENTRATIONS & MASS EMISSION RATES

Analyte	Concentration. Dry, STP, and O2 Corrected (Particulate Phase - mg/m3)	Concentration. Dry, STP, and O2 Corrected (Vapour Phase, mg/m3)	Mass Concentration, Dry, STP, and O2 Corrected (mg/m3)	Mass Emissions Dry, STP, and O2 Corrected (Kg/hr)
Mercury	0.001	0.000	0.00066	0.00096

BLANK CONCENTRATIONS & MASS EMISSIONS RATES

Analyte	Concentration. Dry, STP, and O2 Corrected (Particulate Phase - mg/m3)	Concentration. Dry, STP, and O2 Corrected (Vapour Phase, mg/m3)	Mass Concentration, Dry, STP, and O2 Corrected (mg/m3)	Mass Emissions Dry, STP, and O2 Corrected (Kg/hr)
Mercury	0.001	0.001	0.001	0.002

Uncertainty Calculation for Metals to BS EN 14385

Measured Values		
Sampled Volume	1.131	m ³
Sampled gas Temperature	292.25	K
Sampled gas Pressure	100.82	kPa
Sampled gas Humidity	0	% by volume
Oxygen content	6.90	% by volume
Volume Impinger 1 + 2	0	ml
Volume Impinger 3	0	ml
Total Impinger Volume	0	litre
Leak	0.00	%

Standard Uncertainties for Measured Values			
Sampled Volume	0.001	m ³	
Sampled gas Temperature	2	K	
Sampled gas Pressure	1	kPa	
Sampled gas Humidity	1	% by volume	
Oxygen content	0.1	% by volume	
Volume in Impinger	0.001	litre	

Uncertainty Calculation for Volume Correction				Uncertainty Calculation for Oxygen Correction			
Volume Correction Factor	0.930			Oxygen Correction Factor	1.0643		
	Sensitivity Coefficient		Uncertainty, Uv		Sensitivity Coefficient		Uncertainty, Uo
Sampled gas Temperature	0.0032		0.0064	Oxygen Measurement	0.0757		0.0076
Sampled gas Pressure	0.0092		0.0092				
Sampled gas Humidity	0.0093		0.0093				
	Sqrt (Uv) ²		0.0146				
	Total Uv		0.016			Total Uo	0.0076

Metal	Total Mass - Impingers	Total Mass - Part Fraction	Analytical uncertainty %		Standard Uncertainties - Mass		Concentration (mg/m ³)	Sensitivity Coefficients				Uncertainty Contributions - Concentration (mg/m ³)				Calculated Uncertainties	
			Particulate	Impingers	Particulate	Impingers		Volume Correction	Mass Analyte	Oxygen Correction	Leaks	Volume Correction	Mass Analyte	Oxygen Correction	Leaks	Expanded - mg/m ³	% of Result
			Mercury	0.000115	0.00053	6		5	0.0	0.000	0.000657241	0.000629262	1.018978	0.00	1.00	1.038E-05	3.2404E-05

(Uncertainty has been expanded with a coverage factor of 2 (K=2))

**APPENDIX 5:
Certificates of Analysis**



Test Certificate

Date 22/03/2016

Client RPS Milton Keynes HSED Order No. FTBS 29312
Noble House Certificate No. WK16-1611
Capital Drive Issue No. 2
Linford Wood
Milton Keynes
MK14 6QP

Contact Edwin Powell Date Received 14/03/2016
Description 4 filters & 12 solutions for Mercury Technique ICP Stack

Parameter	Analysis Method	Accreditation	Method LOD	Uncertainty
Mercury	M112-BSEN13211	UKAS	F-0.03ug SN-0.5ug/l	12.00%

Sample No.	873288	30009038	Method	
Mercury	<0.03 µg		M112-BSEN13211(U)	
Sample No.	873289	30009039	Method	
Mercury	<0.5 µg/l	129 ml	M112-BSEN13211(U)	
Sample No.	873290	30009040	Method	
Mercury	<0.5 µg/l	215 ml	M112-BSEN13211(U)	
Sample No.	873291	30009041	Method	
Mercury	<0.5 µg/l	233 ml	M112-BSEN13211(U)	
Sample No.	873292	30009042	Method	
Mercury	<0.03 µg		M112-BSEN13211(U)	
Sample No.	873293	30009043	Method	
Mercury	<0.5 µg/l	141 ml	M112-BSEN13211(U)	
Sample No.	873294	30009044	Method	
Mercury	8.0 µg/l	225 ml	M112-BSEN13211(U)	

Page 1 of 3

RPS Laboratories Ltd. Unit 12, Waters Edge Business Park, Modwen Road, Salford, M6 3EZ
Tel: (0161) 872 2443 Fax: (0161) 877 3969



Test Certificate

Date 22/03/2016

Client	RPS Milton Keynes HSED		Certificate No.	WK16-1611
			Issue No.	2
Sample No.	873296	30009046	Method	
Mercury	2.3 µg/l	213 ml	M112-BSEN13211(U)	
Sample No.	873369	30009046	Method	
Mercury	<0.03 µg		M112-BSEN13211(U)	
Sample No.	873370	30009047	Method	
Mercury	<0.5 µg/l	128 ml	M112-BSEN13211(U)	
Sample No.	873371	30009048	Method	
Mercury	<0.5 µg/l	197 ml	M112-BSEN13211(U)	
Sample No.	873372	30009049	Method	
Mercury	<0.5 µg/l	229 ml	M112-BSEN13211(U)	
Sample No.	873373	30009060	Method	
Mercury	<0.03 µg		M112-BSEN13211(U)	
Sample No.	873374	30009061	Method	
Mercury	1.0 µg/l	77 ml	M112-BSEN13211(U)	
Sample No.	873376	30009062	Method	
Mercury	1.3 µg/l	213 ml	M112-BSEN13211(U)	
Sample No.	873376	30009063	Method	
Mercury	0.5 µg/l	189 ml	M112-BSEN13211(U)	



Test Certificate

Date 22/03/2016

Client	RPS Milton Keynes HSED	Certificate No.	WK16-1611
		Issue No.	2
Tested By	Andrew Grieve Thomas Wiggins	Date	22/03/2016
Approved By	 Joanne Dewhurst Operational Manager	Date	22/03/2016
For and on authority of RPS Laboratories Ltd.			
Method Symbols	(U) Analysis is UKAS Accredited (N) Analysis is not UKAS Accredited		

Concentration values (mg/m³ and ppm) are calculated on the basis of information provided by the customer.
Results stated as ml are referring to the sample volume.

Analysis carried out on samples 'as received'
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Test Certificate

Date 15/11/2016

Client	RPS Milton Keynes HSED Noble House Capital Drive Linford Wood Milton Keynes MK14 6QP	Order No.	FTBS 29312
		Certificate No.	WK16-6978
		Issue No.	1

Contact	Edwin Powell	Date Received	08/11/2016
Description	8 samples for Mercury	Technique	ICP Stack

Parameter	Analysis Method	Accreditation	Method LOD	Uncertainty
Mercury	M112-BSEN13211	UKAS	F-0.03ug SN-0.5ug/l	12.00%

Sample No.	908786	30011392	Method	
Mercury	<0.03 µg		M112-BSEN13211(U)	
Sample No.	908787	30011393	Method	
Mercury	<0.5 µg/l	130 ml	M112-BSEN13211(U)	
Sample No.	908788	30011394	Method	
Mercury	<0.5 µg/l	118 ml	M112-BSEN13211(U)	
Sample No.	908789	30011395	Method	
Mercury	<0.5 µg/l	112 ml	M112-BSEN13211(U)	
Sample No.	908790	30011388	Method	
Mercury	<0.03 µg		M112-BSEN13211(U)	
Sample No.	908791	30011389	Method	
Mercury	<0.5 µg/l	226 ml	M112-BSEN13211(U)	
Sample No.	908792	30011390	Method	
Mercury	4.8 µg/l	160 ml	M112-BSEN13211(U)	



Test Certificate

Date 15/11/2016

Client	RPS Milton Keynes HSED		Certificate No.	WK16-6978
			Issue No.	1
Sample No.	908793	30011391	Method	
Mercury	<0.5 µg/l	154 ml		M112-BSEN13211(U)

Tested By Calum Green Date 15/11/2016
Lora McKerracher

Approved By  Date 15/11/2016
Joanne Dewhurst
Operational Manager

For and on authority of RPS Laboratories Ltd.

Method Symbols (U) Analysis is UKAS Accredited
(N) Analysis is not UKAS Accredited

Concentration values (mg/m³ and ppm) are calculated on the basis of information provided by the customer.
Results stated as ml are referring to the sample volume.

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