

WOLVERHAMPTON ENERGY FROM WASTE PLANT

PERMIT No AP3835SM

WASTE INCINERATION DIRECTIVE

ANNUAL REPORT

2016

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Annual performance report for MES Environmental Wolverhampton EfW Plant – Permit No. AP3835SM– Year 2016

Introduction;

This report is produced under the Waste Incineration Directive's Article 12(2) which requires the operator of an incineration or co-incineration plant to produce an annual report to the Regulator on the functioning and monitoring of the plant and to make this available to the public. In accordance with the requirements of the Directive, the following information is therefore provided:

<i>Name of Company</i>	<i>M E S Environmental</i>
<i>Name of Plant</i>	<i>Wolverhampton EfW Facility</i>
<i>Permit Number</i>	<i>AP3835SM</i>
<i>Address</i>	<i>Crown Street, Wolverhampton W Midlands WV1 1QB</i>
<i>Phone</i>	<i>01902 458888</i>
<i>Contact name</i>	<i>Mr. S Price</i>
<i>Position</i>	<i>Plant Manager</i>
<i>Further information, description of waste types burned and origin.</i>	<i>Constructed in 1998 to burn in the region of 123,000 tonnes per annum of local domestic refuse and generate a nominal 8MW of electricity for the local community.</i>
(If you would like to make any comment on this report or if you would like any further information or to arrange a visit to the plant please telephone Mr S Price on the above number)	

General information

The plant provides a sustainable method of waste disposal and recovery, predominantly for the area within the administrative boundary of Wolverhampton Metropolitan Borough Council, with smaller quantities of wastes accepted, where capacity and demand exists, from other local authorities within the general vicinity of the plant.

In 2016, 61.7% of waste came from the local Wolverhampton area. 2.15% of the waste processed came from private sector deliveries.

Table 1

Year	Local council deliveries %	Separate %
2012	56.9	1.6
2013	56.9	1.49
2014	56.3	0.948
2015	59.98	1.35
2016	61.7	2.15

Priority will always be given to the delivery of local authority wastes, as required by the terms of contractual arrangements, to ensure that safe, reliable, consistent and sustainable disposal and recovery process are available as and when required. This also reduces reliance on and quantities of wastes delivered for disposal to landfill with little or no beneficial outcome. It also contributes significantly to the diversion of biodegradable municipal waste away from landfill consistent with the European Union and Governments objectives under the terms of the EU Landfill Directive.

Non-Technical Plant Description.

The installation comprises an energy from waste facility (EFW) processing a maximum of 118,000 tonnes per year of municipal and other specified wastes.

The plant contains two incineration lines with a combined design capacity to process up to 14 tonnes of waste per hour. Each line has separate waste feed systems, furnaces, boilers and flue gas treatment equipment but share a common electricity generation system.

Heat produced during the incineration process is converted to electrical energy by generating steam in high-pressure boilers and expanding the steam through a steam turbine. Air-cooled condensers re-circulate condensate back to the boilers.

By this means the plant, when operating at full load, will typically generate around 8 MW of electricity and, after satisfying its own power needs, exports approximately 7.1 MW of electricity to the local electricity network. This assists in contributing to the Government's target of providing 15% of electricity generation from renewable energy sources by the year 2020.

The combined effect of the plant's energy recovery process and the recycling activities of the local authorities in the area results in the recovery of value from around 80% of the municipal wastes produced in the area, either in the form of electricity production, recycling or composting.

This demonstrates that the two processes have a strong environmental synergy and work in common to treat waste as a resource to be put to beneficial use.

As recycling performance and capacity within the primary catchment area increases this provides further opportunity to divert additional materials away from landfill in conjunction neighbouring local authorities, who are more heavily reliant on landfill as their primary disposal route.

In 2016, 42394 tonnes of wastes delivered came from other council authorities or their agents, wastes that would otherwise have been disposed of by landfill.

In terms of plant operation the incineration processes have been designed against the background of a detailed assessment of the prevailing environmental conditions at the site location and are based upon the Best Available Technology as detailed both in the original Authorisation application and the application for the Permit issued under the Pollution Prevention and Control (England and Wales) Regulations 2000.

These include but are not limited to the following:

- Well proven process plant developed specifically for incineration of municipal solid wastes,
- Efficient, comprehensive process control and monitoring systems to ensure optimum conditions for complete combustion of the wastes and to minimise emissions from the processes.
- Operations confined within buildings under slight negative pressure in order to contain and minimise emissions such as dust and odour.
- Qualified and experienced operating and maintenance personnel to implement procedures to ensure that the required high standards are maintained. Operating and Maintenance Procedures are established according to an

internationally recognised system of quality assurance.

- Multi-stage high efficiency flue gas cleaning systems comprising deNO_x Selective Non-Catalytic Reduction (SNCR) for the removal of oxides of nitrogen, activated carbon and lime semi-dry acid gas scrubbing for controlling acid gas, dioxins/furans and mercury emissions.
- Final stage flue gas abatement for particulate materials using fabric filtration.
- 76 metre chimney stacks for effective dispersion of the low emission concentrations
- Residues from the combustion process and from the flue gas cleaning system disposed of by approved means, maximising recycling wherever possible.
- Residues transported in appropriate vehicles, suitably enclosed and covered to ensure that no spillage occurs.
- Operation of the installation under an Environmental Management System, certified to ISO 14001 and a Quality Management System, certified to ISO9001. MESE also employs a health and safety system certified to OHSAS 18001. The site also includes a UKAS accredited laboratory certified to ISO 17025. The organisation also maintains the globally recognised RoSPA Gold standard award
- Waste water from the process is neutralised and recycled as far as is practicable to minimise the quantities released to sewers.
- Provision of bunds or double skinned vessels for storage of fuel and chemicals to prevent accidental and inappropriate discharge to the public sewers and watercourse.

The Plant is regulated under the terms of a Permit issued by the Environment Agency (reference AP3835SM) and which contains conditions to ensure that the requirements of the Waste Incineration Directive are incorporated and will be met. A variation to the permit (Variation Number HP3536XC) was issued on the 30th April 2008 and which amended the periodic emission limit values for particulate matter, hydrogen chloride, carbon monoxide, sulphur dioxide and oxides of nitrogen. The values in each case are now the same as the corresponding ½ hourly or 10 minute ELV's for continuous emission monitoring.

A variation to the permit (Variation Number EPR/AP3835SM/V003) was issued on the 04/11/2013. The variation has increased the potential waste tonnage throughput from the original 110,000 tonnes to 118,000 tonnes. This was applied for due to the extremely high availability of the plant which in the previous year had forced the plant to slow down as to not breach the original permitted amount, subsequently reducing the efficiency of the plant.

An approved application for an extension to the EWC waste acceptance codes was received from the Environmental Agency early January 2017. The additional EWC codes reflect the changes in the waste industry and wastes available after increased recycling and pre-processing as taken place. The latest additions have been added to enable local NHS trust hospitals to deliver their waste to the site, massively reducing the carbon foot print, establishing best practise when dealing with waste and reduce the cost of disposal.

Summary of plant operation:

The plant is designed to process a heterogeneous mix of municipal type wastes in two identical streams each burning up to 7 tonnes per hour.

Although this creates a technical capacity for around 123,000 tonnes per annum, in reality, waste deliveries are typically less than the nominal capacity when taking into consideration periods of planned maintenance and are well within the permit limitations of 118,000 tonnes of mixed municipal waste, of this 5% or 5,900 tonnes is allowed to be of separately collected fractions.

Separately collected fractions are generally wastes delivered by private sector, for 2016 this was 2.15%

Total deliveries for 2016 are set out in Table 2 below

Annual waste throughputs

<i>Waste Types</i>	<i>EW C codes</i>	<i>Tonnes burnt</i>
<i>Mixed municipal wastes</i>	<i>20.03.01</i>	Stream 1 53756 Stream 2 54623 Total 108,379
<i>Separately collected fractions</i>	<i>15.01.06 Packaging 20.01.01 Paper & card 20.01.08 Kitchen waste 20.02.01 Biodegradable 20.03.02 Market waste 20.03.03 Street sweepings</i>	Total 2380
<i>Total burnt – all types</i>		110,759

Table 2 - Incinerated Wastes 2016

Plant operational hours in the year and reasons for any significant outages

Each boiler is designed to operate continuously throughout the year, although regular routine preventative maintenance programmes are in place to ensure performance efficiency is maintained and to prevent the development of major problems resulting in significant plant outages.

Routine maintenance activities and legal requirements represent the principal reasons for significant outages. Other stoppages tend to be short term shutdowns of individual streams, for one or two days, to deal with smaller scale issues such as tube leaks or minor repair works. Although these are generally relatively small jobs the time taken to complete is often extended whilst waiting for boilers to cool down before work can commence and then by the curing time required when bringing the system back up to operating temperatures.

There were a number of significant up-grades and major periodic work carried out in 2016. These included the overhaul of the under-fire heater bundle which helps when waste quality is poorer than usual creating more stable conditions.

Routine planned maintenance in 2016 commenced on the 12th June.

Boiler 1 was off for 22 days to carry out routine maintenance from the 12th June to the 03rd July.

Boiler 2 was off for 17 days to carry out routine maintenance from the 19th June and the 05th July.

The Turbine “common outage” period was for 16 days between the 19th June and the 04th July, no major issues were experienced.

Taking into account the considerable amount of work carried out, the overall level of plant availability, in terms of operating hours, was consistent with expectations with boiler 1 and boiler 2 available for 7893 and 8006 hours respectively.

This was equivalent individually to 89.85% and 91.15% of potential operating hours or 90.5% overall. This was comparable to previous years and is attributed to a higher awareness of preventative and not reactive maintenance and good planning by all concerned during the outage period.

Further details on plant performance are contained in Appendix 1

Residues produced.

There are two main sources of residues arising from the operation of the plant comprising:

- Bottom ash from the combustion process (including metals discharged within the ash: and
- Residues from the flue gas treatment system Air Pollution Control Residue (Fly ash)

Burned out bottom ash residues are discharged from the lower end of each grate into a water filled ash discharger, where it is quenched and then ejected onto a conveyor system. Larger items are screened out and ferrous metals removed by magnetic separation.

Residues from the flue gas treatment process are discharged in an enclosed system into double skinned heavy duty bags prior to removal from site for treatment and disposal.

The residual material represents approximately 10% of the original refuse volume and around 25% of its weight with bottom ash discharged into the residues storage bunker.

The storage capacity for bottom ash residues and separated ferrous metals is sufficient to ensure 4 days storage. Collections for delivery to further processing or treatment sites are made on Mondays to Fridays and are scheduled to ensure sufficient storage capacity is maintained at all times. Collections are available at weekends if operational conditions require this facility.

Bottom ash is now widely used in the UK and Europe as a substitute for valuable primary aggregate materials in the construction of roads and embankments.

Bottom ash is currently being reprocessed with additional ferrous and trace metals being further removed with the residue being further processed into usable aggregate

The upgrading of the magnetic separator towards the end of 2012 has improved the removal rate from 0.86% to 0.94% in 2015 with the current removal rate being at 1.45%

Table 3 shows the total quantities of the various residues produced in 2016.

Residue	Annual tonnage	Percentage of input waste	Disposal destination.
	t	%	
Bottom ash	20020	18.08	Reprocessing – reuse
Fly ash	3525	3.18	Reprocessing acidic liquid residue neutralisation prior to use on landfill site
Ferrous metals	1602	1.45	Recycling

Table 3 - Residues produced & final destination

Electricity Production

All deliveries to the plant are weighed and, in conjunction with the quantities of electricity produced, details used to determine the calorific values of wastes delivered. This can vary seasonally and is dependent upon the types of wastes delivered but, typically, are in the order of 8 - 8.5 MJ/kg.

In 2016 the average calorific value (CV) of wastes delivered over the year was 8.15 MJ/Kg. This is comparable with previous years (2015 8.3 MJ/Kg, 2014 8.2 MJ/Kg, 2013 8.2 MJ/Kg)

The combustion of municipal waste at the plant not only produced sufficient electrical power to supply the majority of the plant's own power but sufficient also to meet the power demands for over 10,000 households during the year.

This reduces the demand for electricity produced in a conventional fossil fuel power stations and the use of a renewable energy source not only saves the depletion of an irreplaceable natural resource but also reduces the associated CO₂ production and pollution from the mining operation and transportation of the fossil fuel.

The Sector Guidance note IPPC S5.06 contains a guide value of 5 to 8 MWe exported per 100,000 tonnes of waste. Typically, at design performance the plant exports 7 MWe from processing around 100,000 tonnes and falls well within the range of guide values.

Details of electrical power produced, used and exported from the plant is set out in Table 4 below together with details of quantities of power imported during the times when the plant or part of the plant is shut-down for servicing.

Electrical power production (in MW/hrs)			
1 MW/hr = 10,000 X 100 watt light bulbs powered for 1 hour			
Imported	Production	Site use	Exported
296	53117	8867	44251

Table 4 - Electrical power production 2016

Plant emissions monitoring:

Emissions to air and water are continuously monitored in accordance with legal and regulatory requirements. Emissions to air are either combustion emissions from the stack or fugitive emissions from the storage of materials and chemicals on site.

Stack emissions (Particulates, Hydrogen Chloride, Sulphur Dioxide, Volatile Organic Carbons, Ammonia, Carbon Monoxide and Oxides of Nitrogen) are monitored and recorded continuously on site. Periodic (Bi annual) checks of these are also made by accredited external testing laboratories together with further quarterly or bi-annual checks as may be required by the permit of Dioxins, Mercury, Hydrogen Fluoride, Cadmium / Thallium and other metals.

Fugitive emissions monitoring, for substances having no specific emissions limit value specified in the permit, is part of the general maintenance regime carried out on site.

Table 5 below sets out the frequencies of monitoring for the various substances specified within the permit and in order to comply with the requirements of the Waste Incineration Directive. Further details of associated plant performance shown are also shown in Table 6 and Appendices 1 and 2.

Pollutants measured	Continuously	Periodically
<i>Particulates</i>	✓	✓
<i>Oxides of Nitrogen</i>	✓	✓
<i>Sulphur Dioxide</i>	✓	✓
<i>Carbon Monoxide</i>	✓	✓
<i>Ammonia</i>	✓	✓
<i>Total Organic Carbon</i>	✓	✓
<i>Hydrogen Chloride</i>	✓	✓
<i>Mercury</i>		✓
<i>Cadmium and Thallium</i>		✓
<i>Group III metals</i>		✓
<i>PCDD and PCDF</i>		✓
<i>Hydrogen Fluoride</i>		✓

Table 5 - Emissions monitoring frequencies

Emissions to water are monitored by equipment built into the on-site effluent treatment plant which aims to recycle 100% of water from site for reuse on site excluding sewerage. In 2015 the cumulative volume of water discharged to sewer was 446 m³.

Any emissions which exceed the limits that are imposed upon the operation are reported to the Environment Agency without delay along with plans for the prevention of further occurrences.

Continuous Emissions Monitors (CEMs) Operation

The CEMs equipment operated satisfactorily throughout the year with minor breakdowns on individual sampling streams being responded to by a1-CBISS the company contracted to service the equipment. At no time was the plant shut down due to CEMs failure.

CEMs equipment continuously measures and records information on emission limits for the substances set out in Table 5 above with 10 minute, ½ hourly and daily average values recorded, as required, and compared with corresponding emission limit values as set out in the permit. Monthly reports are prepared for each substance although these only need to be submitted to the Environment Agency every 6 months. (Wolverhampton plant submits these reports monthly).

A summary CEM data for all continuously monitored substances is shown at Appendix 2 with a summary of results for substances which are only monitored and reported periodically shown below in Table 6. The requirement for Dioxin sampling is for two samples a year.

Note: All data supplied is subject to uncertainty of measurement which is not included here;

Pollutant	ELV	Stream	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Ave
Cd/Th (mg/m ³)	0.05 mg/m ³	1	0.0015	0.0015	0.001	0.0096	0.003925
		2	0.0026	0.0016	0.001	0.0126	
		Annual Ave	0.00205	0.00155	0.001	0.0111	
Hg (mg/m ³)	0.05 mg/m ³	1	0.0005	0.0065	0.005	0.0018	0.004875
		2	0.0007	0.0084	0.0111	0.005	
		Annual Ave	0.0006	0.00745	0.00805	0.0034	
Hf (mg/m ³)	2 mg/m ³	1	0.01	0.005	0.006	0.01	0.00835
		2	0.01	0.01	0.0058	0.01	
		Annual Ave	0.01	0.0075	0.0059	0.01	
Group III Metals (mg/m ³)	0.5 mg/m ³	1	0.0428	0.0402	0.0398	0.0594	0.05665
		2	0.12	0.0534	0.025	0.0726	
		Annual Ave	0.0814	0.0468	0.0324	0.066	
Dioxins (ng/m ³)	0.1 ng/m ³	1	0.0553		0.0339		0.039775
		2	0.0472		0.0227		
		Annual Ave	0.05125		0.0283		

Table 6 Emissions of periodically monitored pollutants 2016

Summary of plant compliance:***Description of non-compliances and abnormal operations notified to the Environment Agency.***

Set against the total operational hours on each stream plant performance is of an extremely high level. The numbers of occasions where emission limit values have been exceeded are comparatively small and when expressed as a percentage of operating time within limits, equates to 0.7% for the year of 2016.

These are based on the numbers of 10 minute or ½ hourly average readings taken by emissions monitoring instruments and, in reality, although each complete 10 minute or ½ hour period has been considered in this evaluation, the duration during which any limit was exceeded are usually for a much shorter time.

The permit also recognises that equipment can malfunction and allows, in certain circumstances, for the plant to remain in service under abnormal operating conditions with increased emission limit values. This allows for short term continuous emissions monitoring or purification equipment to be rectified.

Although the permit restricts the period of abnormal operating conditions above to a maximum of 4 hours on any one occasion, or no more than 60 hours of abnormal operation on each line per year, boilers are generally shutdown after the first ½ hour of abnormal operation.

Table 7; below sets out the percentage of time that the plant was operating within its permitted limits, for each continuously monitored parameter and both on individual and combined streams. No figures are included below for NH₃ as, whilst this is continuously measured and monitored, there is no limit specified for emissions within the permit.

It is also important to consider that in addition to the high levels of performance indicated in terms of operating times, actual emission levels were also considerably lower than prescribed daily averages. Across all parameters actual emissions were, on average 85% and 56% lower than 10 minute or ½ hourly and daily limits respectively.

Substance	Stream 1 (% operating time within limits)	Stream 2 (% operating time within limits)	Combined (% operating time within limits)
Hydrogen Chloride	99.33	99.7	99.52
Sulphur Dioxide	100	100	100.00
Oxides of Nitrogen	99.96	99.7	99.83
Volatile Organic Carbon	99.99	99.99	99.99
Particulates	100	100	100.00
Carbon Monoxide	99.97	100	99.99

Table 7 - Percentage of plant operating time within limits

Unauthorised releases / Schedule 1's

Unauthorised releases relate to circumstances in which permitted emission limit values have been exceeded in situations not considered to comply with the exceptions provided for in abnormal operation.

Levels of unauthorised releases are tightly controlled and prompt remedial action is taken to address the situation with boilers closed down as soon as is practicable where necessary.

Unauthorised releases are notified to the Environment Agency without delay and confirmed in writing by use of 'Schedule 1' Notices. Schedule 1 notices shall also be sent to the Environment Agency should any accident occur which has caused or has the potential to cause pollution.

In 2016, 5 schedule 1 incidents were reported on stream 1 and 6 on stream 2.

Abnormal Operations

As with any type of plant or machinery there will inevitably be occasions where problems or breakdowns are experienced.

Abnormal operations are technically unavoidable stoppages, disturbances, or failures of the abatement plant or measurement devices, during which the concentrations into air and the purified water of the regulated substances may exceed normal emission limit values

As referred to earlier this is recognised within the permit which provides for the plant to continue to operate within limited circumstances for up to 4 hours to enable restoration of normal operations or failed equipment or its replacement as quickly as possible.

In practice, MES Environmental have adopted a general policy to initiate the shut-down process after only ½ hour of any abnormal operation, unless it is clear that the problem can be resolved well within the 4 hour period. Whilst this does not necessarily affect the level of incidence of abnormal operation it significantly reduces the number of operating hours in this situation.

During 2016 stream1 had 7.5 hrs of abnormal periods of operation and for stream 2 this figure was 7 hrs

Non reportable incidents

In addition to unauthorised releases and abnormal operations there are also situations where incidents will occur that are not required to be reported to the Environment Agency if these either result in no emission being made to atmosphere or occur during start up or shut down mode.

As a responsible operator if such situations occur MESE, always submit a report to the EA describing what occurred and including supporting evidence.

All incidents are recorded on the daily shift log.

Additional reports are also supplied to the Environmental Agency when an incident occurs that causes a spike or reading that would, if it was correct, produce an operational emissions breach. These anomalies may be due to electrical physical disturbances. On these occasions alternative measurements from dual monitoring systems and/or additional expert analysis may be included to clarify the situation.

Enforcement Notices

No enforcement notices were issued by the Environment Agency in respect of any aspect of plant operations during 2016.

6. Summary of plant improvements:

There were a number of significant up-grades and major periodic work carried out in 2016. These included the overhaul of the under-fire heater bundle which helps when waste quality is poorer than usual creating and maintaining more stable running conditions.

The collation, review, trending, root cause and analysis of breakdowns and the highlighting of areas of improvement by the maintenance department has improved the effectiveness of breakdown periods, procurement of services and goods and as a result the overall performance of the plant.

Notwithstanding this the operational and environmental efficiency and effectiveness of the plant infrastructure and systems are constantly monitored to identify potential areas for improvement.

Key performance indicators are considered at regular management meetings to identify trends and variations in performance, not only at an individual plant level but in comparison with sister plants at Dudley and Stoke.

This provides a focus for Managers to consider possible areas for improvement and/or situations where action may be necessary in the future.

7. Summary of information made available:

MES Environmental operate an inclusive policy of involving the public in their Operations by encouraging escorted tours of their facilities by interested groups. Last year numerous schools, colleges and industry or environmental groups visited sites and the same will happen this year.

For information about the facility or to arrange a visit, please contact the Plant Manager Mr S Price on 01902 458888

All information sent to the Environment Agency including the operation permit details is available on the public register which is accessible on the Environment Agency website.

Extra copies of this report are available by request from either of the above or by writing to:

Stuart Thompson
Quality & Environmental Manager
MES Environmental
Crown Street
Wolverhampton
WV1 1QB

Appendices

Appendix 1 Performance Reports 2015

Permit Reference Number: AP3835SM

Operator: MES Environmental Limited

Installation; Wolverhampton Waste Services Limited

Form Number: Agency Form / AP3835SM / R1

Reporting of Waste Disposal and Recovery for the year2016

Wates description	Disposal route	Tonnes	Recovery tonnes
2016			
1) Hazardous Wastes			
Named haz. Waste (Specify each separately)	Reprocess Fly ash (APC)	3525	0
Other hazardous wastes			
Total hazardous waste		3525	0
2) Non-Hazardous Wastes			
Named non-haz. Waste (Specify each separately)	Reprocess IBA	20020	0
Other non-hazardous wastes	Recycling (Fe)	1602	1602
Total non-hazardous waste		21622	
TOTAL WASTE	-	25147	

Wates description	Disposal route	Tonnes	Recovery tonnes
2015			
1) Hazardous Wastes			
Named haz. Waste (Specify each separately)	Reprocess Fly ash (APC)	3392	0
Other hazardous wastes			
Total hazardous waste		3392	0
2) Non-Hazardous Wastes			
Named non-haz. Waste (Specify each separately)	Reprocess IBA	19651	0
Other non-hazardous wastes	Recycling (Fe)	983	983
Total non-hazardous waste		20634	
TOTAL WASTE	-	24026	

Signed Date.....
(Authorised to sign as representative of Operator)

Permit Reference Number: AP3835SM

Operator: MES Environmental Limited

Installation; Wolverhampton Waste Services Limited

Form Number: Agency Form AP3835SM / WU1

Reporting of Water Usage for the year2016

2016 - Water source	Usage (m ³)	Usage (m ³ /t)
Mains water	44789	0.4
Site borehole		
River abstraction		
Canal abstraction		
TOTAL WATER USAGE	44789	0.4

2015 - Water source	Usage (m ³)	Usage (m ³ /t)
Mains water	43216	0.415
Site borehole		
River abstraction		
Canal abstraction		
TOTAL WATER USAGE	43216	0.415

Signed Date.....
(Authorised to sign as representative of Operator)

Installation; Wolverhampton Waste Services Limited

Form Number: Agency Form / AP3835SM / E1

Reporting of Energy Usage for the year2016

2016 - Source		Calculated	CO ₂ Produced (tonnes)
Electricity	MWh	9163	3940.1
Natural Gas	tonnes	N/A	
Gas Oil	tonnes	159	584.2
Recovered Fuel Oil	tonnes	N/A	
TOTAL	-		4524.3

2015 - Source		Calculated	CO ₂ Produced (tonnes)
Electricity	MWh	8531	3668.3
Natural Gas	tonnes	N/A	
Gas Oil	tonnes	130.9	480.9
Recovered Fuel Oil	tonnes	N/A	
TOTAL	-		4149.2

Signed Date.....
 (Authorised to sign as representative of Operator)

Permit Reference Number: AP3835SM

Operator: MES Environmental Limited

Installation; Wolverhampton Waste Services Limited

Form Number: Agency Form / AP3835SM/ PI1

Reporting of Performance Indicators for the period ...01/01/2016..... to ...31/12/2016

Annual Production/Treatment	
Total municipal waste incinerated (excluding separately collected fractions)	108,379 tonnes
Total other wastes Incinerated	2380 tonnes
Electrical energy generated and exported	44251 MWhrs
Electrical energy generated and used on installation	8867 MWhrs

Environmental Performance Indicators

2016

Parameter	Average	Units
Electrical energy imported to site	2.67	kWhrs/ tonne of waste incinerated (dry basis)
Fuel oil consumption	1.73	kg/ tonne of waste incinerated (dry basis)
Mass of bottom ash produced	180.8	kg/ tonne of waste incinerated (dry basis)
Mass of APC residues produced	31.8	kg/ tonne of waste incinerated (dry basis)
Mass of other solid residues produced	14.46	kg/ tonne of waste incinerated (dry basis)
Urea consumption	2.52	kg/ tonne of waste incinerated (dry basis)
Activated carbon consumption	0.13	kg/ tonne of waste incinerated (dry basis)
Lime consumption	9.64	kg/ tonne of waste incinerated (dry basis)
Water consumption	0.4	m ³ / tonne of waste incinerated (dry basis)

2015

Parameter	Average	Units
Electrical energy imported to site	4.176	kWhrs/ tonne of waste incinerated (dry basis)
Fuel oil consumption	1.51	kg/ tonne of waste incinerated (dry basis)
Mass of bottom ash produced	188.7	kg/ tonne of waste incinerated (dry basis)
Mass of APC residues produced	32.6	kg/ tonne of waste incinerated (dry basis)
Mass of other solid residues produced	9.44	kg/ tonne of waste incinerated (dry basis)
Urea consumption	2.48	kg/ tonne of waste incinerated (dry basis)
Activated carbon consumption	0.22	kg/ tonne of waste incinerated (dry basis)
Lime consumption	10.7	kg/ tonne of waste incinerated (dry basis)
Water consumption	0.415	m ³ / tonne of waste incinerated (dry basis)

Signed
(authorised to sign as representative of Operator)

Date.....

APPENDIX 2

Continuously Monitored Emissions to Air (mg/m3*) from Emission Point A1 – 2016

HCL	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 60	Annual ½ Hrly Max	251	Monthly ½ Hrly Max	44	58	135	39	81	76	71	148	119	251	54	36
	Annual ½ Hrly Mean	8	Monthly ½ Hrly Mean	7	7	7	7	8	8	8	9	8	8	7	8
Daily Ave ELV 10	Annual Daily Max	13	Monthly Daily Max	9	8	9	9	9	10	10	13	11	13	9	10
	Annual Daily Mean	8	Monthly Daily Mean	7	7	7	7	8	8	8	9	8	8	7	8

SO2	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 200	Annual ½ Hrly Max	206	Monthly ½ Hrly Max	76	73	130	191	206	72	176	118	103	146	166	165
	Annual ½ Hrly Mean	23	Monthly ½ Hrly Mean	20	23	24	23	21	17	24	23	23	27	28	28
Daily Ave ELV 50	Annual Daily Max	39	Monthly Daily Max	28	32	31	33	27	24	33	31	27	39	35	39
	Annual Daily Mean	23	Monthly Daily Mean	20	23	24	23	21	17	24	23	23	27	28	28

NOx	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 400	Annual ½ Hrly Max	486	Monthly ½ Hrly Max	361	294	303	291	227	274	400	291	486	380	308	413
	Annual ½ Hrly Mean	187	Monthly ½ Hrly Mean	187	185	185	183	183	186	184	190	187	190	190	192
Daily Ave ELV 200	Annual Daily Max	210	Monthly Daily Max	192	189	187	187	191	194	195	197	210	199	195	200
	Annual Daily Mean	187	Monthly Daily Mean	187	185	185	183	183	186	184	190	187	190	190	192

VOC	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 20	Annual ½ Hrly Max	45	Monthly ½ Hrly Max	5	6	6	14	13	4	45	7	24	12	19	24
	Annual ½ Hrly Mean	1	Monthly ½ Hrly Mean	1	1	1	1	1	1	0	0	1	0	0	1
Daily Ave ELV 10	Annual Daily Max	3	Monthly Daily Max	1	2	2	2	1	1	1	1	1	1	1	3
	Annual Daily Mean	1	Monthly Daily Mean	1	1	1	1	1	1	0	0	1	0	0	1

NH3	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av No ELV	Annual ½ Hrly Max	192	Monthly ½ Hrly Max	22	8	6	15	8	39	192	54	62	61	56	84
	Annual ½ Hrly Mean	5	Monthly ½ Hrly Mean	2	1	0	1	1	2	9	6	8	9	8	10
Daily Ave No ELV	Annual Daily Max	27	Monthly Daily Max	3	2	2	1	1	6	21	12	19	27	17	19
	Annual Daily Mean	5	Monthly Daily Mean	2	1	0	1	1	2	9	6	8	9	8	10

Particulates	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 30	Annual ½ Hrly Max	171	Monthly ½ Hrly Max	20	1	2	0	2	2	171	1	84	12	1	1
	Annual ½ Hrly Mean	0.5	Monthly ½ Hrly Mean	1	0	0	0	0	1	4	0	1	0	0	0
Daily Ave ELV 10	Annual Daily Max	5	Monthly Daily Max	2	0	0	0	1	1	1	0	5	1	0	0
	Annual Daily Mean	0.5	Monthly Daily Mean	1	0	0	0	0	1	1	0	1	0	0	0

CO	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10 minute Av ELV 150	Annual 10 min Max	2071	Monthly 10 min Max	472	40	34	51	114	37	390	105	158	123	127	2071
	Annual 10 min Mean	16	Monthly 10 min Mean	18	11	8	9	9	12	18	14	19	20	17	38
Daily Ave ELV 50	Annual Daily Max	280	Monthly Daily Max	23	22	17	39	12	20	36	38	72	49	38	280
	Annual Daily Mean	16	Monthly Daily Mean	18	11	8	9	9	12	18	14	19	20	17	38

* Figures reported to the nearest whole number.

Continuously Monitored Emissions to Air (mg/m3*) from Emission Point A2 – 2016

HCL	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 60	Annual ½ Hrly Max	272	Monthly ½ Hrly Max	45	47	39	46	74	31	272	89	65	70	138	74
	Annual ½ Hrly Mean	8	Monthly ½ Hrly Mean	8	8	8	8	8	8	8	7	8	9	8	7
Daily Ave ELV 10	Annual Daily Max	13	Monthly Daily Max	9	9	9	9	10	9	13	9	9	9	10	9
	Annual Daily Mean	8	Monthly Daily Mean	8	8	8	8	8	8	8	7	8	9	8	7

SO2	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 200	Annual ½ Hrly Max	267	Monthly ½ Hrly Max	63	113	73	75	100	99	171	87	155	113	120	267
	Annual ½ Hrly Mean	20	Monthly ½ Hrly Mean	11	12	16	16	15	19	24	21	23	23	30	34
Daily Ave ELV 50	Annual Daily Max	41	Monthly Daily Max	18	21	23	24	22	33	30	36	35	31	39	41
	Annual Daily Mean	20	Monthly Daily Mean	11	12	16	16	15	19	24	21	23	23	30	34

NOx	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 400	Annual ½ Hrly Max	611	Monthly ½ Hrly Max	427	382	407	289	377	322	329	361	611	459	269	459
	Annual ½ Hrly Mean	187	Monthly ½ Hrly Mean	186	187	188	186	188	185	187	181	192	187	186	191
Daily Ave ELV 200	Annual Daily Max	203	Monthly Daily Max	199	196	201	193	199	187	191	196	203	196	193	198
	Annual Daily Mean	187	Monthly Daily Mean	186	187	188	186	188	185	187	181	192	187	186	191

VOC	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 20	Annual ½ Hrly Max	146	Monthly ½ Hrly Max	32	25	19	6	8	5	9	7	146	79	16	23
	Annual ½ Hrly Mean	1	Monthly ½ Hrly Mean	1	1	1	1	1	1	1	1	1	1	1	1
Daily Ave ELV 10	Annual Daily Max	5	Monthly Daily Max	1	1	3	1	1	1	1	1	5	3	2	2
	Annual Daily Mean	1	Monthly Daily Mean	1	1	1	1	1	1	1	1	1	1	1	1

NH3	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av No ELV	Annual ½ Hrly Max	121	Monthly ½ Hrly Max	69	37	82	22	42	44	112	76	88	121	20	78
	Annual ½ Hrly Mean	6	Monthly ½ Hrly Mean	8	8	7	2	5	5	9	6	9	4	2	5
Daily Ave No ELV	Annual Daily Max	28	Monthly Daily Max	14	15	16	5	9	9	18	19	28	8	4	12
	Annual Daily Mean	6	Monthly Daily Mean	8	8	7	2	5	5	9	6	9	4	2	5

Particulates	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
½ Hourly Av ELV 30	Annual ½ Hrly Max	18	Monthly ½ Hrly Max	8	7	0	18	8	8	3	1	1	1	1	0
	Annual ½ Hrly Mean	1	Monthly ½ Hrly Mean	2	1	0	2	2	2	0	0	0	0	0	0
Daily Ave ELV 10	Annual Daily Max	6	Monthly Daily Max	6	2	0	3	2	3	0	0	0	0	0	0
	Annual Daily Mean	1	Monthly Daily Mean	2	1	0	2	2	2	0	0	0	0	0	0

CO	Annual Summary		Monthly Summary	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10 Minute Av ELV 150	Annual 10 min Max	143	Monthly 10 min Max	143	89	89	45	39	75	70	59	52	86	48	26
	Annual 10 min Mean	13	Monthly 10 min Mean	19	18	15	9	12	12	13	9	13	15	8	10
Daily Ave ELV 50	Annual Daily Max	86	Monthly Daily Max	40	32	28	19	20	21	37	17	86	39	20	23
	Annual Daily Mean	13	Monthly Daily Mean	19	18	15	9	12	12	13	9	13	15	8	10

* Figures reported to the nearest whole number.