

**Annual Performance Report  
for  
Eastcroft Energy from Waste  
Facility**

**Permit No: EPR/EP3034SN**

**Year – 2014**



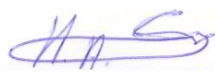
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FCC Environment  
On behalf of WasteNotts (Reclamation) Ltd

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## Glossary

	Definition
°C	Degrees Centigrade
APC	Air Pollution Control
As	Arsenic
BAT	Best Available Technique
BS EN	British Standard - European
CDM	Construction Design Management
Cd	Cadmium
CEMs	Continuous Emission Monitoring
CHP	Combined Heat & Power
CFD	Computational Flow Dynamics
Co	Cobalt
CO	Carbon Monoxide
Cr	Chromium
Cu	Copper
CV	Calorific Value
EA	Environment Agency
EfW	Energy from waste
EWG	European Waste Catalogue
FGT	Flue Gas Treatment
HAZOP	Hazardous operations
HCl	Hydrogen Chloride
HWRC	Household Waste Recycling Centre
ID	Induced draught
IED	Industrial Emissions Directive
LOI	Loss Of Ignition
LRHS	London Road Heat Station
Mn	Manganese
MWh	Mega Watt hours
NDHS	Nottingham District Heating Scheme
NHIC	Non Hazardous Industrial & Commercial
Ni	Nickel
NOx	Oxides of Nitrogen
OS	Ordnance Survey
Pb	Lead
PPC	Pollution Prevention Control
PPE	Personal Protective Equipment
Sb	Antimony
SNCR	Selective Non Catalytic Reduction
SOx	Oxides of Sulphur
SRCL	Ex White Rose Environmental
Th	Thalium
TOC	Total Organic Carbon
UKAS	United Kingdom Accreditation Service
V	Vanadium
WNR	WasteNotts (Reclamation) Ltd
FCCE	FCC Environment

## Introduction

This report is required to be produced under the requirements of the Industrial Emission Directive on access to information and public participation, which requires the operator to produce an annual report to the Regulator on the functioning and monitoring of the plant and to make this available to the public.

The Nottingham Waste Incinerator installation at Eastcroft comprises the Energy from Waste facility operated by WasteNotts (Reclamation) Limited (WNR) and the clinical waste incinerator operated by SRCL. WNR is owned by FCC Environment. This report relates only to the Energy from Waste facility.

The Energy from Waste facility is located at

Incinerator Road  
Off Cattle Market Road  
Nottingham  
NG2 3JH

OS Grid Reference: SK45823391

The Energy from Waste facility is part of the Nottingham District Heating Scheme which produces heat and power for local users by burning up to 200,000 tonnes of waste from Nottingham, Nottinghamshire and the surrounding area each year. Non hazardous municipal waste, or similar, is brought to the facility after people have separated out materials for recycling at home and at the Household Waste Recycling Centres.

The Eastcroft Energy from Waste facility generates nearly 20 megawatts of thermal energy in the form of steam and hot water which helps to reduce the need for non-renewable fossil fuels and produces electricity for the local grid and heat for homes and businesses in the city centre.

Steam from the facility is sent by pipes to an energy generation and distribution facility on London Road. From there it is used for district heating in around 4,600 local homes and converted to electricity for distribution to the grid.

Housing in St Ann's is served by power and heat from the facility, as are the Victoria Shopping Centre, the Nottingham Magistrates Court and the National Ice Centre, amongst others.

Using waste to generate heat and power helps to reduce the need for fossil fuels; while avoiding landfill disposal of the waste

Should a member of the public want a copy of this report or wish to make comments then please use the following contact information

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Web:         [www.fccenvironment.co.uk/eastcroft](http://www.fccenvironment.co.uk/eastcroft)  
Post         Eastcroft EfW Facility  
               Incinerator Road  
               off Cattle Market Road  
               Nottingham  
               NG2 3JH  
Call:         0845 601 5432

## **Plant Description**

The EfW facility currently comprises two incineration streams each capable of burning up to 11.7 tonnes/hour of municipal and light commercial and industrial waste. Approximately 170,000 tonnes of waste can be burned in the plant per year at the present time. FCC Environment the owner of WasteNotts (Reclamation) Ltd has planning permission to add a third line to the plant. Planning permission was granted in 2009 for a third line which will increase the capacity of the incineration process to 300,000 tonnes per year. The third line is already included in the scope of the Environmental Permit (EP3034SN).

The following sections describe the existing operations at Eastcroft EfW. A summary of the proposals for the third line is given at the end of this description.

### ***Raw materials handling***

Municipal waste and non-hazardous commercial/industrial/trade waste is delivered to site by lorry and tipped into one of two refuse bunkers inside the tipping hall. Deliveries are typically made from Monday to Saturday morning. Waste is transferred from the bunkers by grab crane into the feed chute of each incinerator stream. Waste is only fed to the incinerator if the temperature is above 850°C.

### ***Incineration***

Each incinerator stream has a moving grate on which the waste is burned, with preheated air being injected above and below the grate. Combustion air is drawn from the tipping hall and boiler hall to reduce odours and dust levels in these areas and fed to the furnace via an air preheater which can raise the temperature of the air up to 160 Deg C. Two auxiliary burners, fired on gas oil, are installed halfway up each combustion chamber to maintain temperatures above the 850°C threshold. The auxiliary burners are also used to pre-heat the incinerators before start up. Ammonium hydroxide is injected into the furnaces to reduce emissions of nitrogen oxides (this technique is known as selective non-catalytic reduction or SNCR).

Hot gases from the combustion chamber pass to a boiler in which steam is raised and sent to the London Road Heat Station for supply of heat to the district heating system and generation of electricity. Flue gases leaving the boiler are cooled to about 130°C in the economiser to achieve the correct temperature for gas treatment.

### ***Ash handling system***

Grate ash (known as bottom ash) is quenched in water and collected in a residuals bunker inside the building. Ferrous metal items are removed by magnetic separators (and are sent for recycling) and the bottom ash is stored in a silo on site. The silo is emptied regularly and the bottom ash is sent for further metal extraction and use as a substitute aggregate.

Fly ash entrained within the incinerator exhaust gases, together with any accumulations of dust removed from the walls of the economiser by the shot cleaning system, is treated in the air pollution control equipment.



### ***Air pollution control (APC) equipment***

Each incinerator stream has its own dedicated air pollution control equipment. Cooled flue gases leaving the economiser are dosed with a mixture of hydrated lime, activated carbon and recirculated reagent, in order to reduce acid gases (by reaction with the lime), and other substances such as heavy metals and hydrocarbons (by adsorption onto the activated carbon). The exhaust gases and reagent particles are then filtered in a four compartment fabric filter to remove the dust burden. The fabric filters are regularly cleaned by reverse jet pulses, and the collected end product is stored in the APC residue silo. The APC residue silo is regularly emptied and the residue used to treat industrial acidic wastes before final disposal in a suitably licensed landfill site.

### ***Stack emission***

The treated exhaust gases from both streams are discharged via the 91m high stack. The final emissions from the municipal waste incinerator are continuously monitored for particulate matter, sulphur dioxide, nitrogen oxides, carbon monoxide, hydrogen chloride, volatile organic compounds and ammonia prior to entry into the main stack.

### ***Outline Description of the Third Line***

Engineering details of the proposed third line are not yet available since FCC Environment has not yet awarded the contract for the design and build of the incinerator extension. However it is known that the third line will mainly comprise:

- Waste reception into the existing tipping hall and waste bunkers.
- A moving grate incinerator and integrated steam raising boiler designed to meet the temperature and residence time requirements of the Waste Incineration Directive.
- An ash collection and handling system for incinerator bottom ash with an automatic conveying system to the existing bottom ash silo.
- Abatement of nitrogen oxide emissions in the incinerator combustion chamber by selective non-catalytic reduction.
- An air pollution control system similar to that for the existing lines, i.e. comprising acid gas neutralisation, carbon injection and dust filtration.
- Emission of the treated flue gases via the currently unused semi-circular flue of the existing stack.
- Continuous and periodic monitoring of emitted pollutants in the stack.
- An effluent treatment plant for all effluents which cannot be reused within the process, including back-flush water from the boiler water treatment plant, overflow from the wet ash handling system and surface water drainage.
- A steam turbine at the Eastcroft site for generation of electricity for sale to the grid, and possible supply of residual heat to the district heating scheme.
- An air cooled condenser to condense the residual steam and return it to the boiler system.

## Summary of plant operation

### ***Plant size including number of lines***

The Eastcroft Energy from Waste facility is designed around two process streams each with a capacity of 11.7 tonnes per hour with the waste having an average calorific value (CV) of 8.3 MJ/kg. The facility however can easily deal with fluctuations in the composition of the waste and has a design CV range of 6 – 12 MJ/kg which it can accept without any adverse effects.

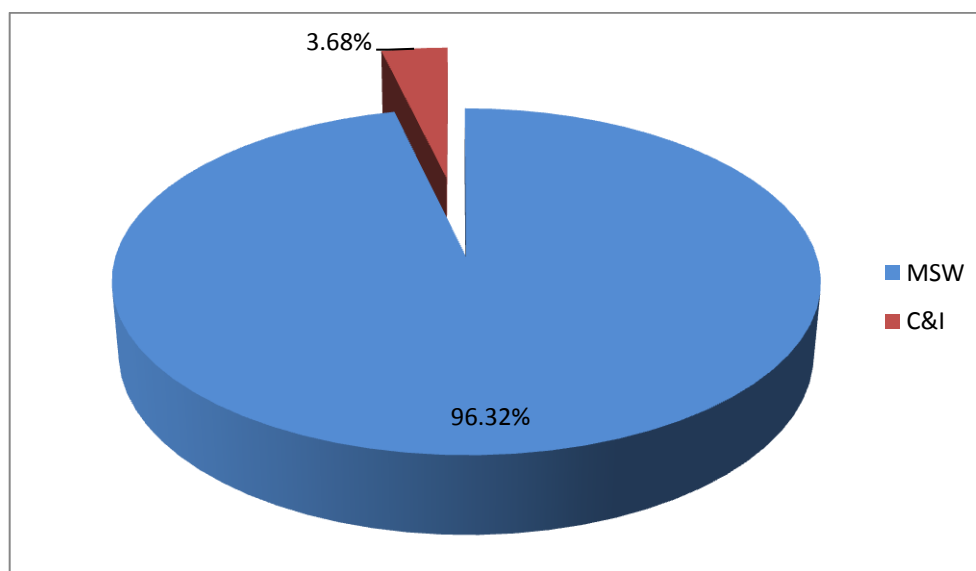
The theoretical maximum capacity of the plant assuming a 'low' CV waste input and the plant running every hour of the year would be approximately 200,000 tonnes. In reality the plant accepts waste with a higher CV resulting in a throughput of around 170,000 tonnes per year,

Under normal operation the facility does not need supplementary fuel to sustain the combustion process. Additional Fuel is only required for start-up and shut down, to ensure that no waste is burnt at temperatures less than 850°C.

### ***Annual Waste Throughputs***

The facility received approximately 170,395.83 tonnes of waste in the reporting period. The vast majority of this waste was municipal waste from Nottingham City, Nottinghamshire and the surrounding area. A breakdown of the waste inputs is shown in Figure 1.

**Figure 1: Breakdown by category for waste input**

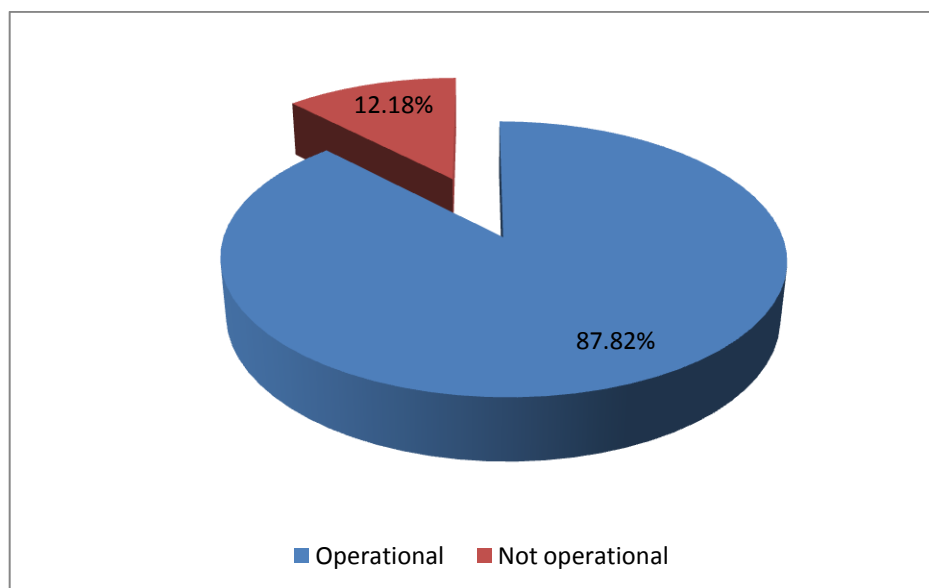


As can be seen from figure 1; the majority of waste inputs to the facility are municipal in nature; with smaller quantities of certain types of commercial and industrial wastes allowed by the permit accepted making up the remaining input.

### ***Total Plant Operational Hours***

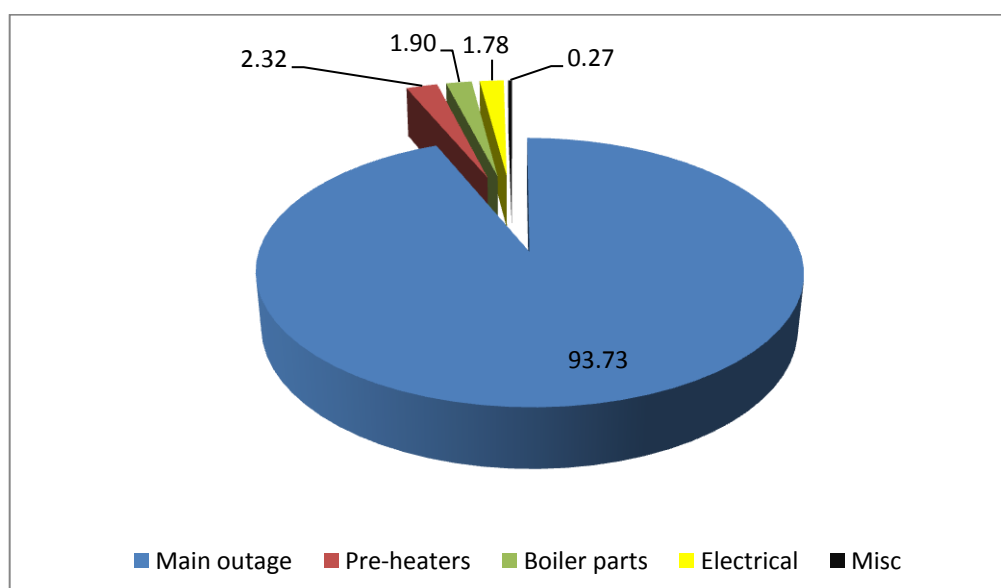
The Eastcroft facility is similar to all plants in the fact that it has a computerised maintenance management system. This allows the Operators to schedule in maintenance activities and predict when systems are likely to fail. This coupled with the experience of the Operator maximises the availability of the plant. However it must be recognised that no system is perfect and that the plant may have to come offline either because the repair necessitates it or unforeseen issues arise.

**Figure 2: Plant availability**



In total the two lines operated for 15386 hours giving an overall availability of 87.82% for the reporting period, as seen in Figure 2. The analysis of lost time for the plant is broken down into various categories in Figure 3.

**Figure 3: Analysis of lost time**



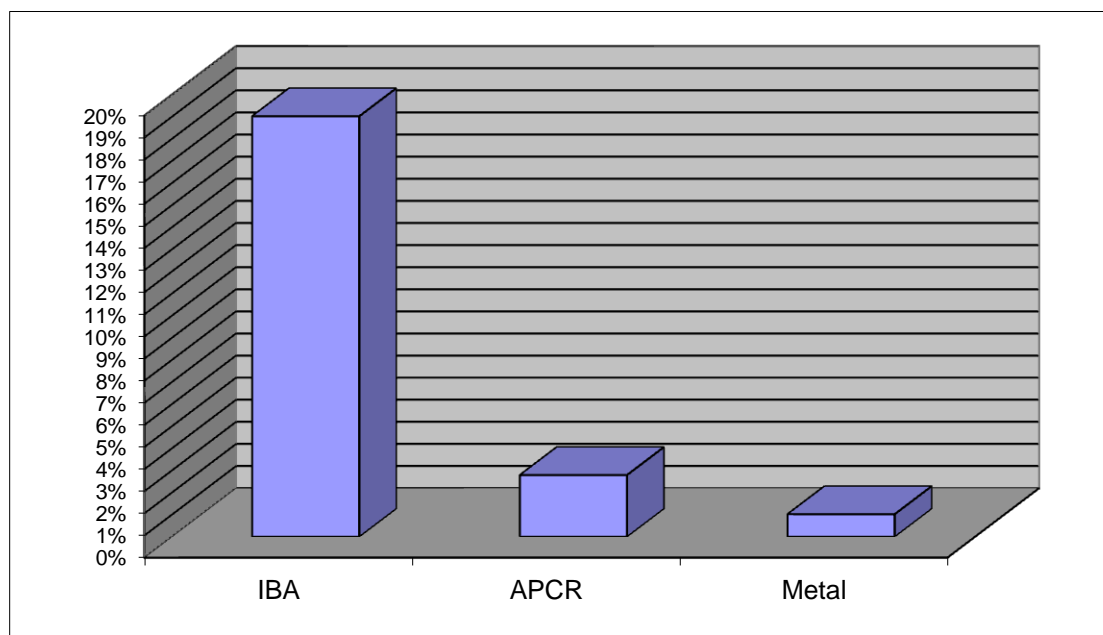
As can be seen from figure 3 the vast majority of lost time in 2014 was due to the planned main outage maintenance period where significant works throughout the boilers and flue gas treatment plant take place.

The largest losses of time for unplanned reasons in 2014 were due to leaks on the air pre-heater system on line 1; while minor leaks within parts of the boiler was the second most cause of unplanned down time in 2014.

Other causes of unplanned works in 2014 were caused by work being required to take place on the site's electrical infrastructure and a number of other short periods of shut down caused by a variety of issues such as crane and hydraulic issues (where waste could not be fed to the plant for a period of time) and blockages with the ash discharger or boiler hoppers. In all these instances the plant could and was brought off in a controlled manner allowing for the cause to be rectified and in a manner which ensured compliance with Permit emissions level values.

### ***Residue production***

**Figure 4: Quantity of residue produced as a % of the input**



The plant produces three types of residue;

- Bottom Ash – an inert material left over from the combustion process. This was sent for further reprocessing to remove any remaining metals and for the ash to be used as a substitute aggregate.
- Air Pollution Control Residue – A mixture of lime and other particles that have been captured by the Flue Gas Treatment Facility. This material gets sent to a treatment facility where it is mixed with other waste before final disposal in a suitable landfill site
- Ferrous – the ferrous metal in the bottom ash for most of the year was reclaimed using a magnet on site and the material was sent away for recycling. During the year a change in contractual arrangements for

management of IBA and scrap metal took place leading to the separation of metal now taking place at the facility receiving the IBA.

The quantities of residues produced as a percentage of the waste inputs are shown in Figure 4 and are consistent with recent years' performances.

### ***Energy Production***

The Eastcroft EfW Facility is part of the Nottingham District Heating Scheme providing energy in the form of steam and hot water to the heat station at London Road owned by Enviroenergy which in turn is wholly owned by Nottingham City Council.

The premises on London Road convert the energy into electricity and hot water. Electricity is supplied to major customers using dedicated cabling. Hot water is distributed to customers over the extensive pipe network that covers much of the city centre. Customers have heat exchangers rather than boilers to keep their building warm and to provide a constant supply of hot water.

Enviroenergy's customers include the National Ice Arena, the Broadmarsh and Victoria shopping centres, the Inland Revenue offices beside the canal, Capital One's UK headquarters and Nottingham Trent University as well as over 4,600 domestic consumers.

In 2014 Enviroenergy generated 59,945 MWh of electricity and distributed 110,385 MWh of heat and hot water. If energy were not recovered from Nottingham's waste, fossil fuels would be burnt and more waste would have been disposed of in landfill sites.

For the reporting period Eastcroft exported 348,508.33 MWh of energy in the form of steam and hot water.

## Summary of plant emissions

The monitoring requirements are set out in Schedule 3 of the permit.

The plant is required to carry out both continuous monitoring as well as periodic testing twice per year.

### ***Pollutants Measured***

Pollutants Measured	Continuously	Periodically
Particulates	✓	
Oxides of Nitrogen	✓	
Sulphur dioxide	✓	
Carbon Monoxide	✓	
Ammonia	✓	
Total Organic carbon	✓	
Hydrogen Chloride	✓	
Mercury		✓
Cadmium & Thallium		✓
Group III Metals		✓
PCDD & PCDF		✓
Hydrogen Fluoride		✓
Nitrous Oxide		✓
PAHs		✓
PCBs		✓

### ***Control of emissions***

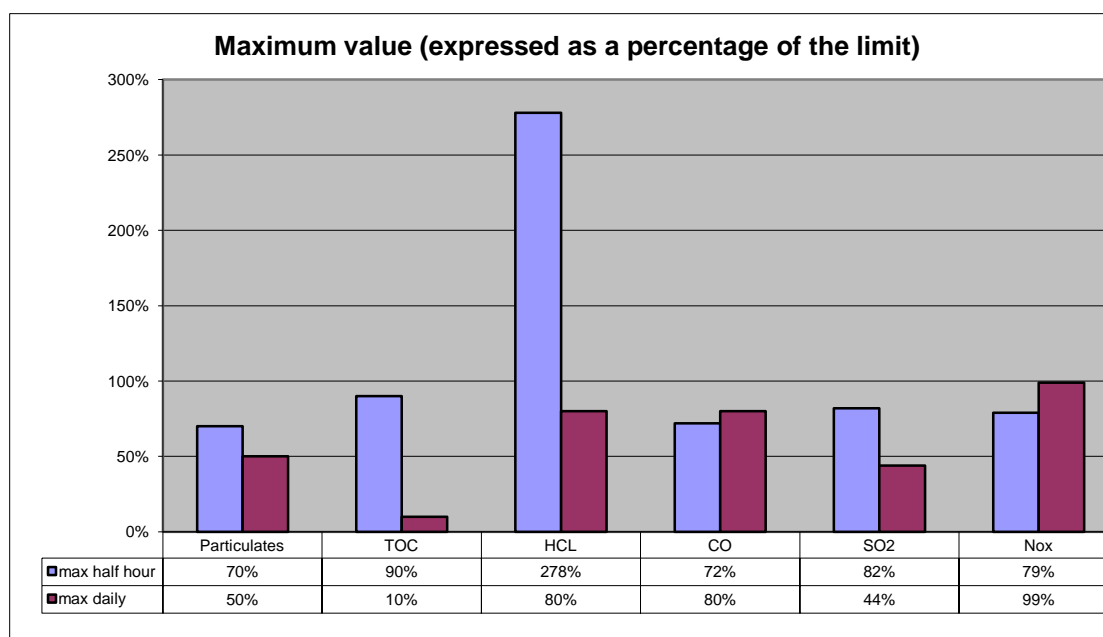
The control of the emissions is explained in the “Plant Description” section although for ease of reference the control measures have been summarised below:

- The acidic gases (Sulphur Dioxide & Hydrogen Chloride) are controlled by the addition of lime to the flue gases.
- Carbon Monoxide and the Total Organic Carbons are controlled through the combustion controls which affect the amount of air in the combustion chamber
- Oxides of Nitrogen are controlled by adding sufficient amounts of ammonium hydroxide solution. The use of computers allows the system to react to the changing parameters within the boiler exactly controlling the levels of NOx and minimising the formation of ammonia.
- The particulates or dust are captured by the bag filters which are highly effective capturing around 99.9% of the particles generated from the process.

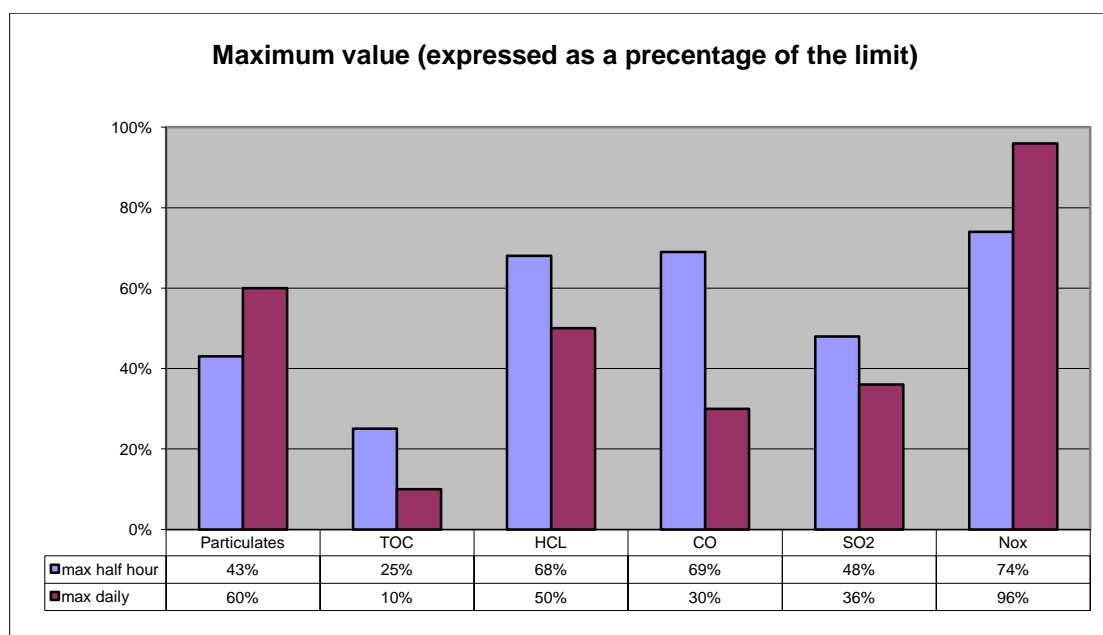
Figures 5 and 6 shows the single maximum daily and half hourly value recorded for each continuously monitored substance in the reporting period (not the average value). During 2014 there was 1 instance where a half hourly Emission Limit Value was exceeded for Hydrogen Chloride on stream 1.

More detailed graphs showing the plants performance on a month by month basis can be found in Appendix 1.

**Figure 5: Line 1 Continuous emissions monitoring**



**Figure 6: Line 2 Continuous emissions monitoring**



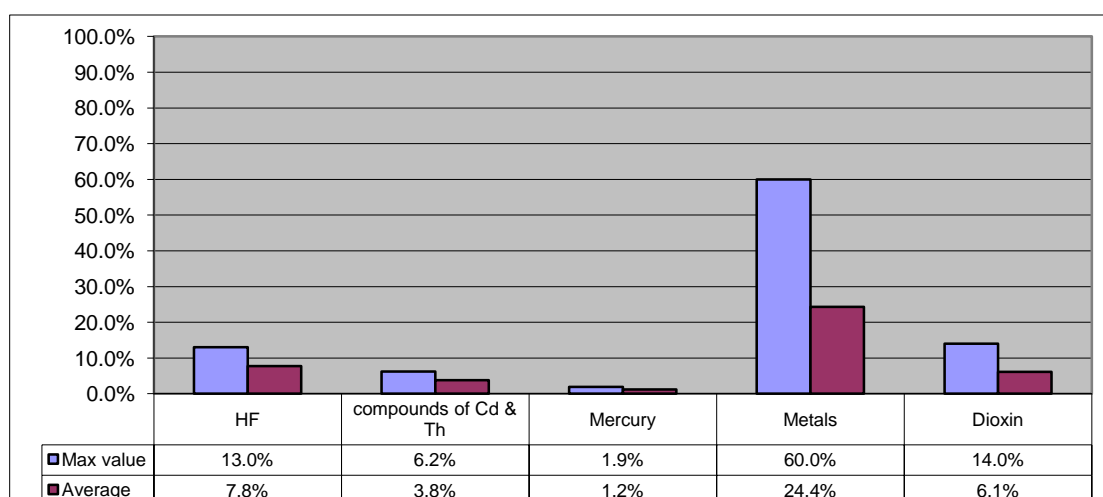
## ***Periodical Monitoring (Extractive testing)***

### **Emissions to Air**

Within the permit there is an obligation to carry out periodic tests on the substances emitted from the stack and quality assurance of the installed Continuous Emissions Monitoring System. A UKAS certified company carries out these tests and submits a report to FCC Environment. The results from the tests are included in the reports submitted to the Environment Agency and held on the public register.

Figure 7 shows the maximum result for substances tested by extractive methods expressed as a percentage of the ELV. As can be seen all periodic emissions limit values were complied with.

**Figure 7: Bi-annual results showing the maximum and average reading from lines 1 & 2 expressed as a % of the ELV**

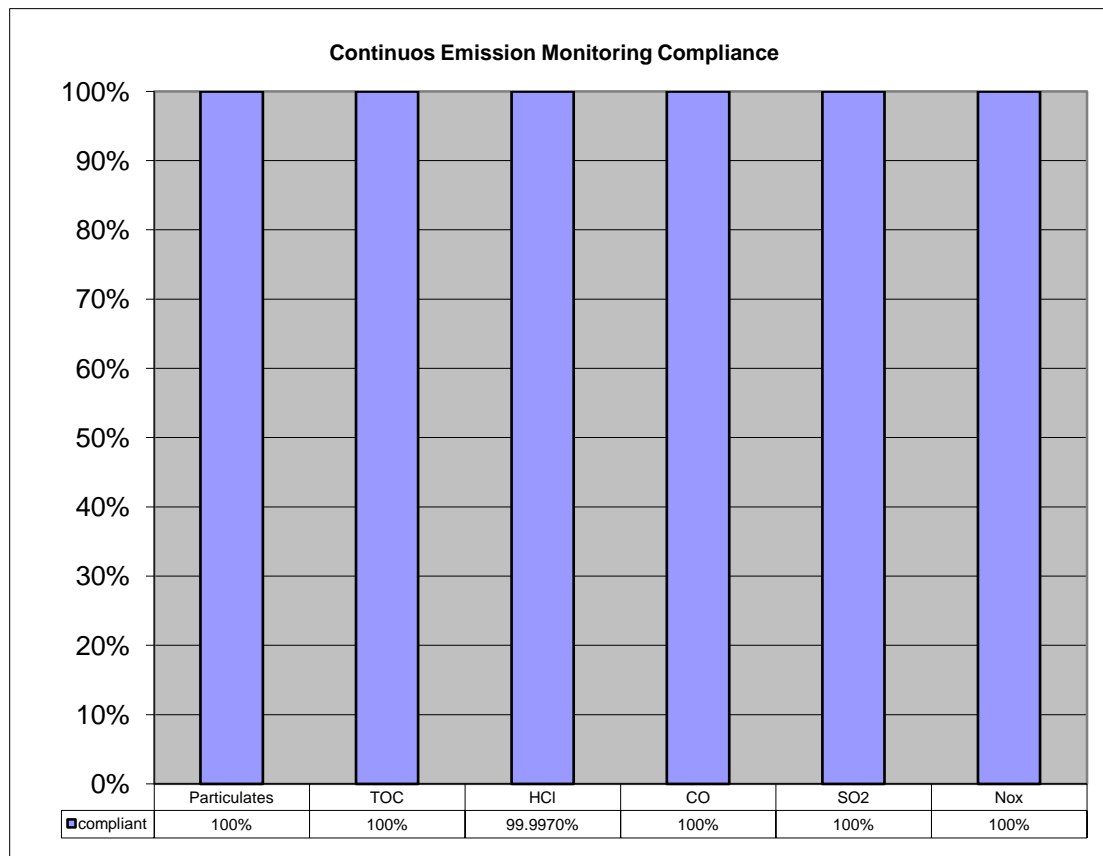




## Summary of plant compliance

### *Compliance with emissions to air*

**Figure 8: Compliance with Continuous Emissions Monitoring**



The plant was fully compliant for continuously monitored daily averages in 2014, while there was 1 period of non conformance against a half hourly average for Hydrogen Chloride (HCl) during 2014.

During 2014 there was also an occurrence where the by-pass to the bag filters was activated, resulting in a Schedule 5 report being made to the Environment Agency. This occurrence was short in duration with further remedial measures taken to prevent such a re-occurrence.

### ***Compliance with Ash Limits.***

Full compliance with the permit limits for ash was achieved during 2014

### ***Formal Enforcement Notices***

No enforcement notices were received during 2014.

## **Summary of plant improvements**

### ***Improvement Conditions***

Within the original PPC permit applicable for the EfW facility, the Environment Agency set out ten improvement conditions. FCC Environment has not been required to submit responses to any improvement conditions during this reporting period. The revised permit sets out the remaining improvement conditions; these all relate to the development of the third line and cannot be completed until the final designs/plant commissioning is approved. Alongside these improvement conditions are a number of pre-operational conditions which must be met before a third line could be operational.

## Summary of information made available

General information about FCC Environment and the Eastcroft Energy from Waste Facility can be found at [www.fccenvironment.co.uk](http://www.fccenvironment.co.uk) and [www.fccenvironment.co.uk/eastcroft](http://www.fccenvironment.co.uk/eastcroft) , alternatively written enquiries can be sent to the following address:

Eastcroft Energy from Waste Facility  
Incinerator Road  
Off Cattle Market Road  
Nottingham  
NG2 3JH

For telephone enquiries please phone 0845 601 5432 quoting Eastcroft as a reference.

Information held on the public register can be found at:

Environment Agency Trentside Scarrington Road West Bridgford Nottingham NG2 5FA Tel: 0115 846 3608	City of Nottingham City Development Lawrence House Talbot Street Nottingham NG1 5NT Tel: 0115 915 6410
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In both cases members of the public are advised to phone to arrange a viewing. This is to allow the sites time to make the information requested more accessible. This information can be viewed during normal working hours e.g. 09:00 to 17:00.

The site has a local liaison group which will meet bi-annually from 2015 onwards (previously a quarterly meeting) to discuss the performance of the installation and future activities. If you are interested in joining the group or require further information please contact:

Karl Starkey  
General Manager  
Eastcroft Energy from Waste Facility  
Incinerator Road  
Off Cattle Market Road  
Nottingham  
NG2 3JH  
  
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## Appendix 1

