

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

Permit No: EPR/EP3034SN

Year – 2016

Report produced by

FCC Environment
On behalf of WasteNotts (Reclamation) Ltd

Report Issued: 23rd January 2017

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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
EWC	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
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).

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 heat from the facility, as are the Victoria Shopping Centre, the Nottingham Magistrates Court and the National Ice Centre, amongst others.

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 180,000 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.

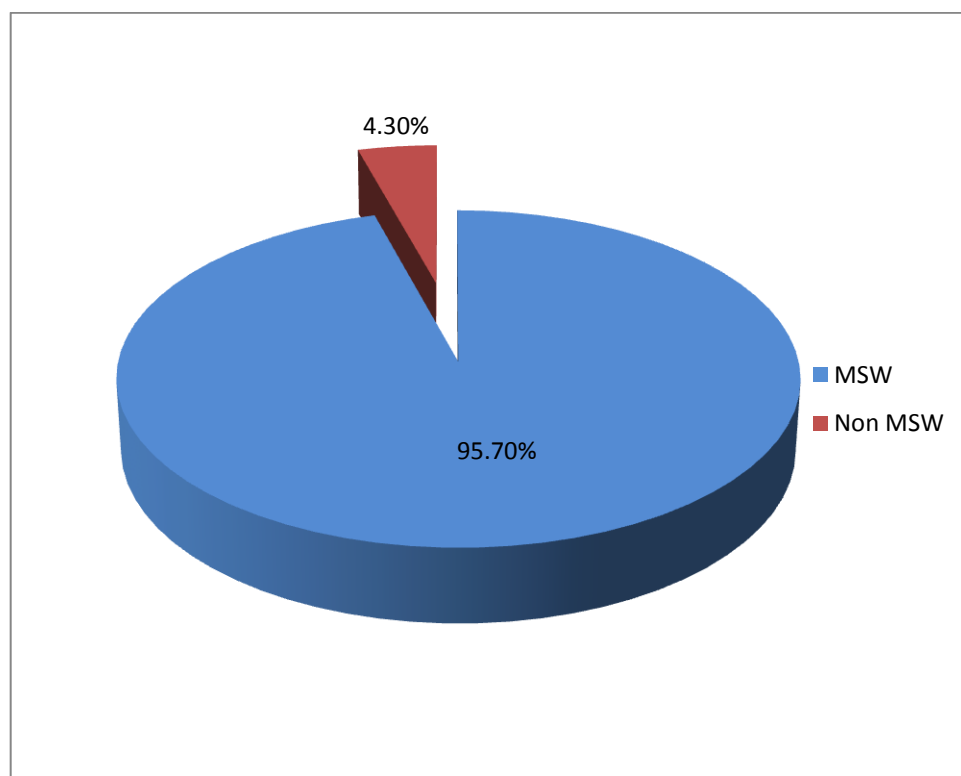
The theoretical maximum capacity of the plant assuming a 'low' CV waste input and the plant running every hour of the year would be approximately 200,000 tonnes. In reality the plant accepts waste with a higher CV resulting in a throughput of around 175,000 tonnes per year,

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 169,844 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.

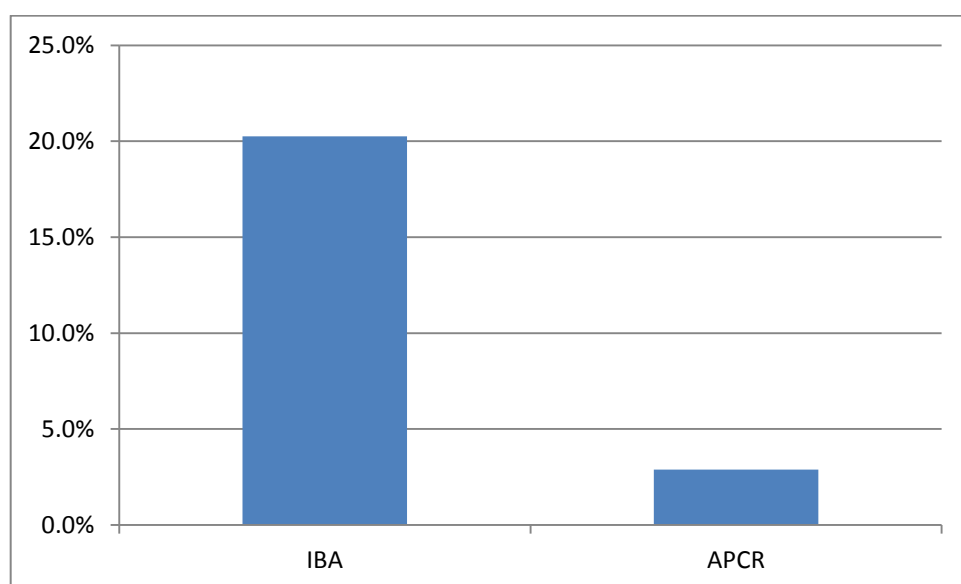
Total Plant Operational Hours

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.

During 2016 the facility ran for a combined period of 14,554.25 hours, equating to an availability of 82.8%. The main cause of the lost time related to major works undertaken during the planned shut down.

Residue production

Figure 2: 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 is now sent of within the bottom ash for recovery at an off-site facility.

The quantities of residues produced as a percentage of the waste inputs are shown in Figure 2 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.

For the reporting period Eastcroft exported 300,563 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 3 and 4 show the single maximum daily and half hourly value recorded for each continuously monitored substance in the reporting period (not the average value). During 2016 there were no instances where a half hourly Emission Limit Value or daily average was exceeded. Carbon Monoxide (CO) is monitored at a 10 minute average; requiring 95% of values recorded being below 150mg/m³. Full compliance with this requirement was also achieved in 2016.

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

Figure 3: Line 1 Continuous emissions monitoring

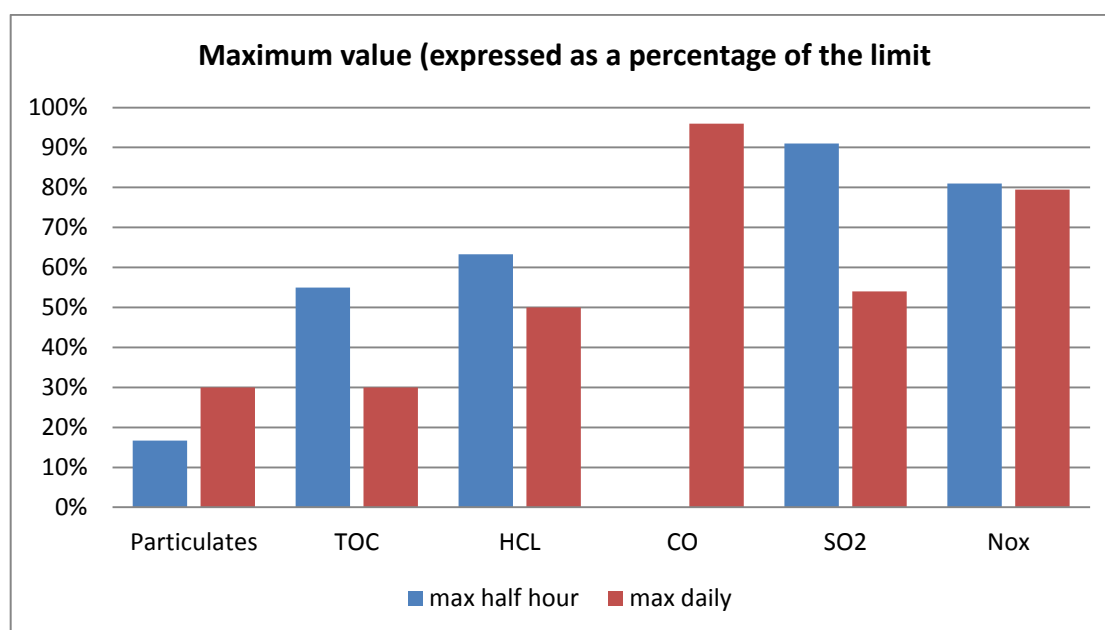
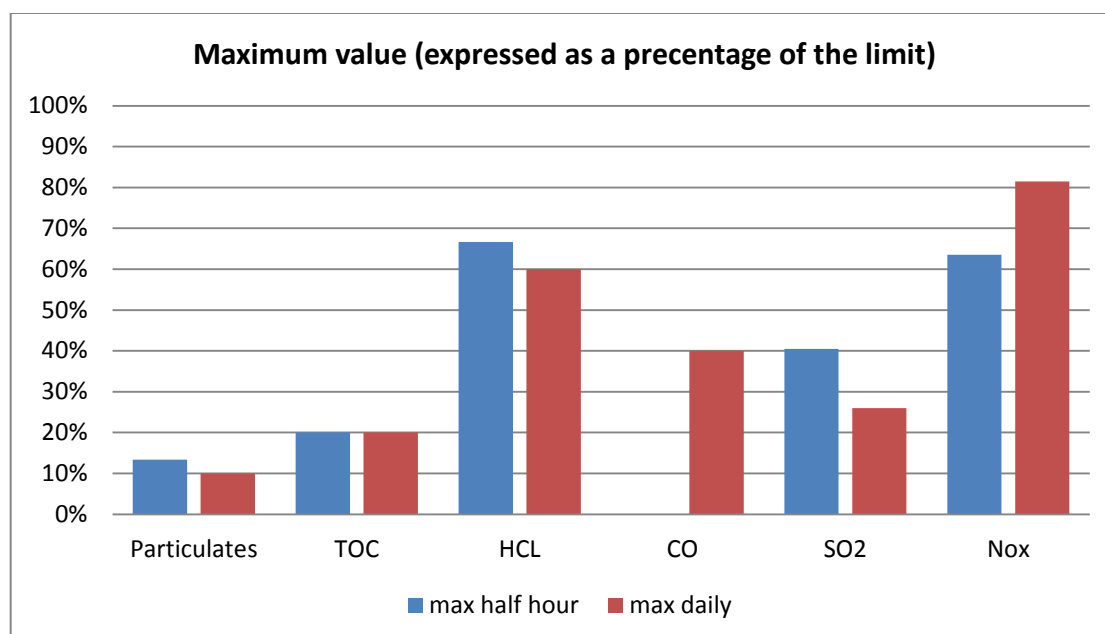


Figure 4: Line 2 Continuous emissions monitoring



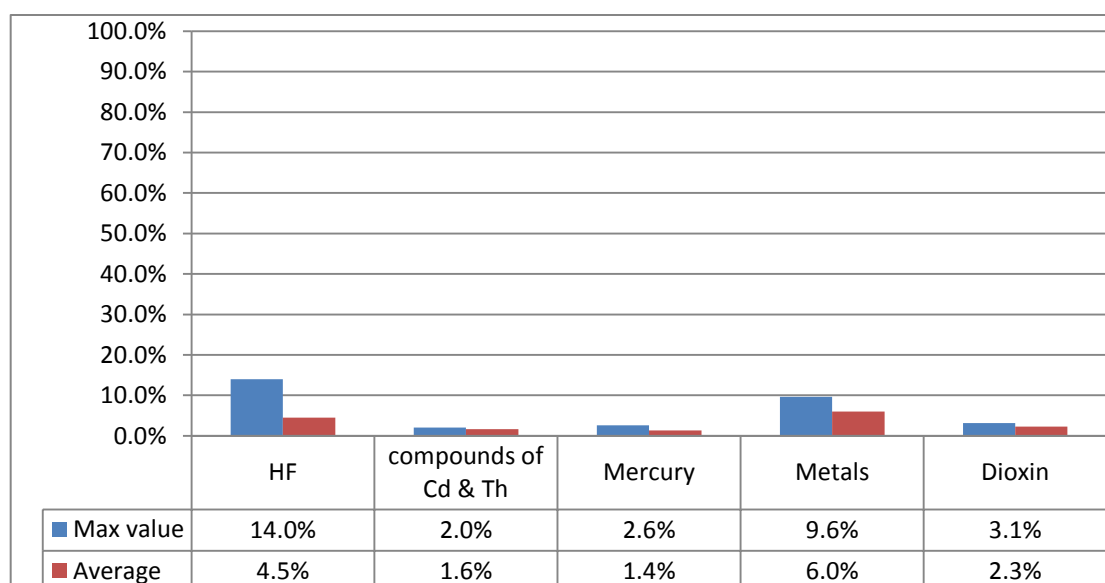
Periodical Monitoring (Extractive testing)

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 5 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 the permit limits.

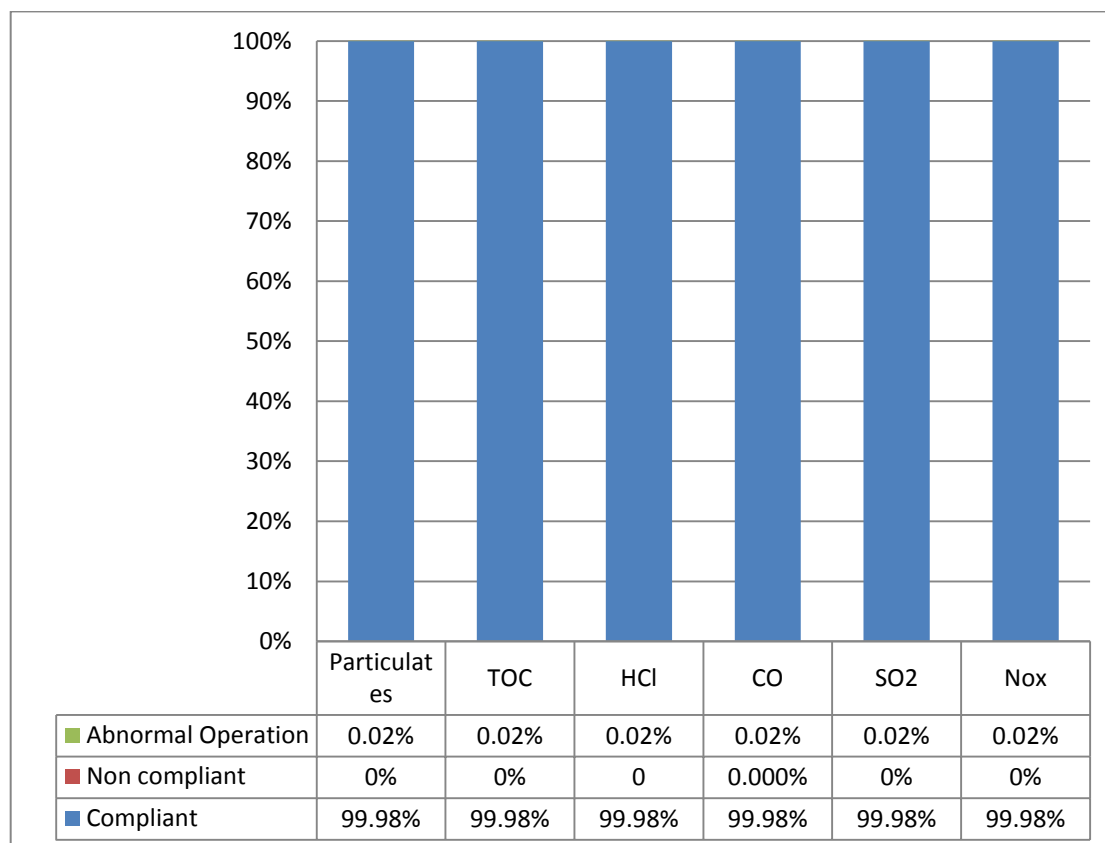
Figure 5: Bi-annual results showing the maximum and average reading from lines 1 & 2 expressed as a % of the ELV



Summary of plant compliance

Compliance with emissions to air

Figure 6: Compliance with Continuous Emissions Monitoring



During 2016 plant was fully compliant against permit limits for continuously monitored 10 minute, half hourly or daily averages emissions. There was one occasion whereby an abnormal operation occurred and reported where planned maintenance on the equipment caused a brief loss of data.

Schedule 5 notification

No Schedule 5 notifications were submitted in 2016.

Compliance with Ash Limits.

Full compliance with the permit limits for ash was achieved during 2016.

Formal Enforcement Notices

No enforcement notices were received during 2016.

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 and 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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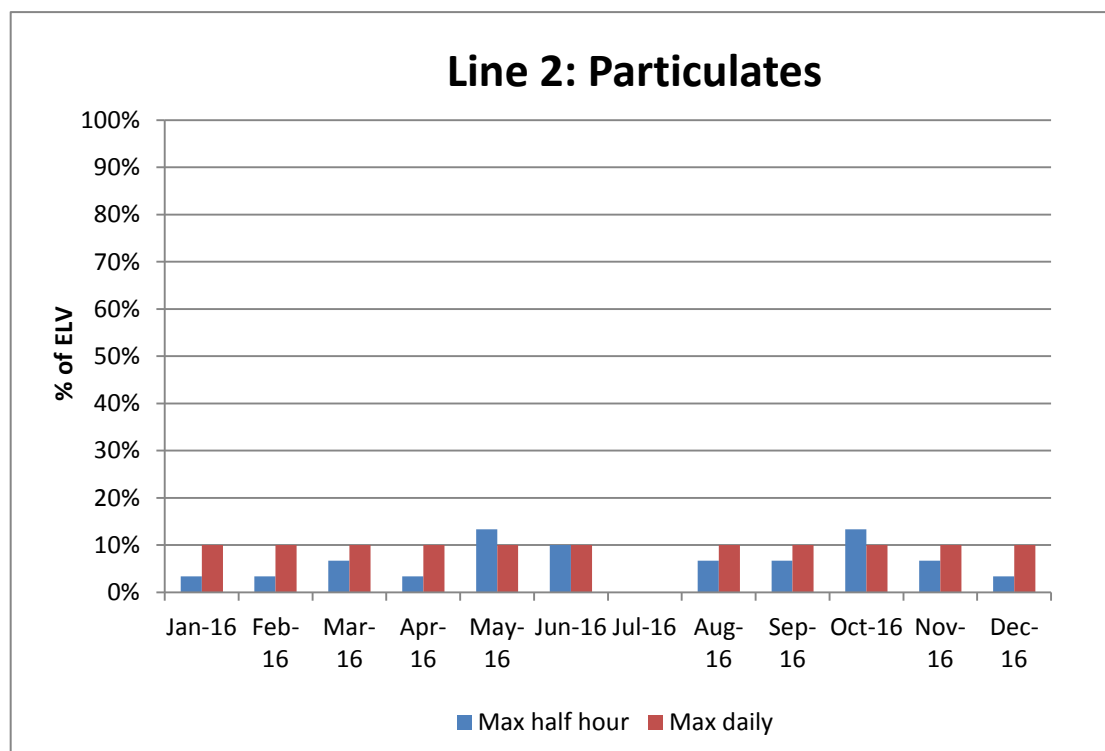
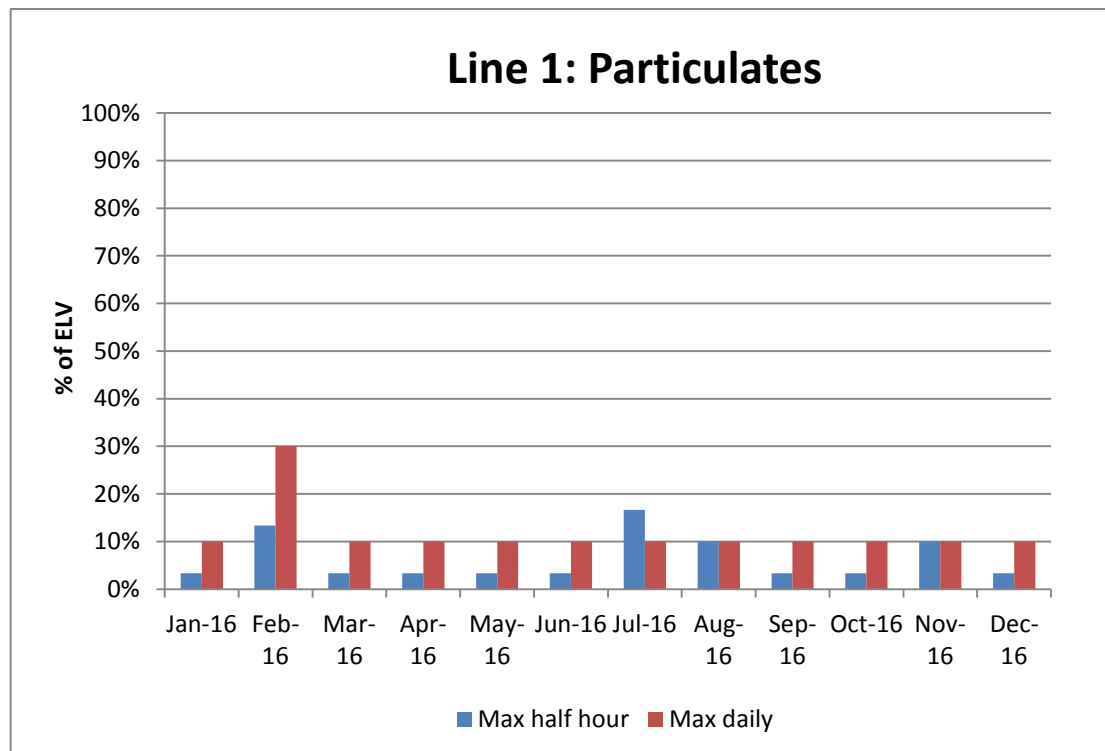
In both cases members of the public are advised to phone to arrange a viewing. This is to allow the sites time to make the information requested more accessible. This information can be viewed during normal working hours e.g. 09:00 to 17:00.

The site has a local liaison group which meets bi-annually to discuss the performance of the installation and future activities. If you are interested in joining the group or require any further information or a copy of this report please contact:

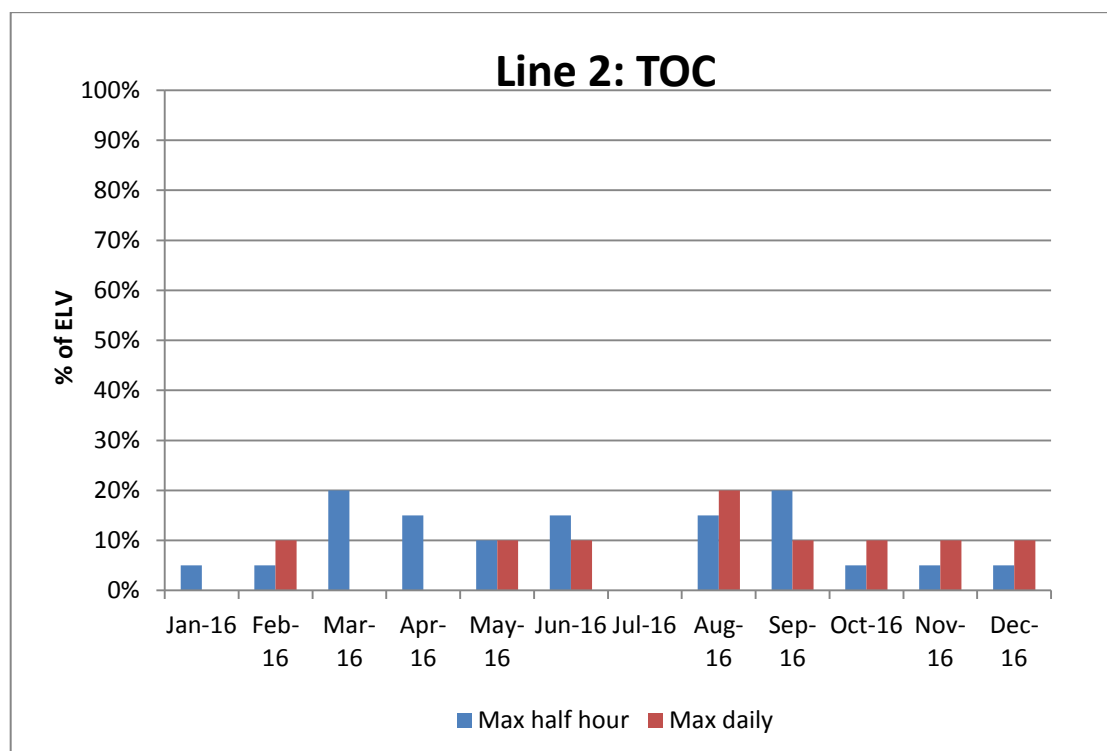
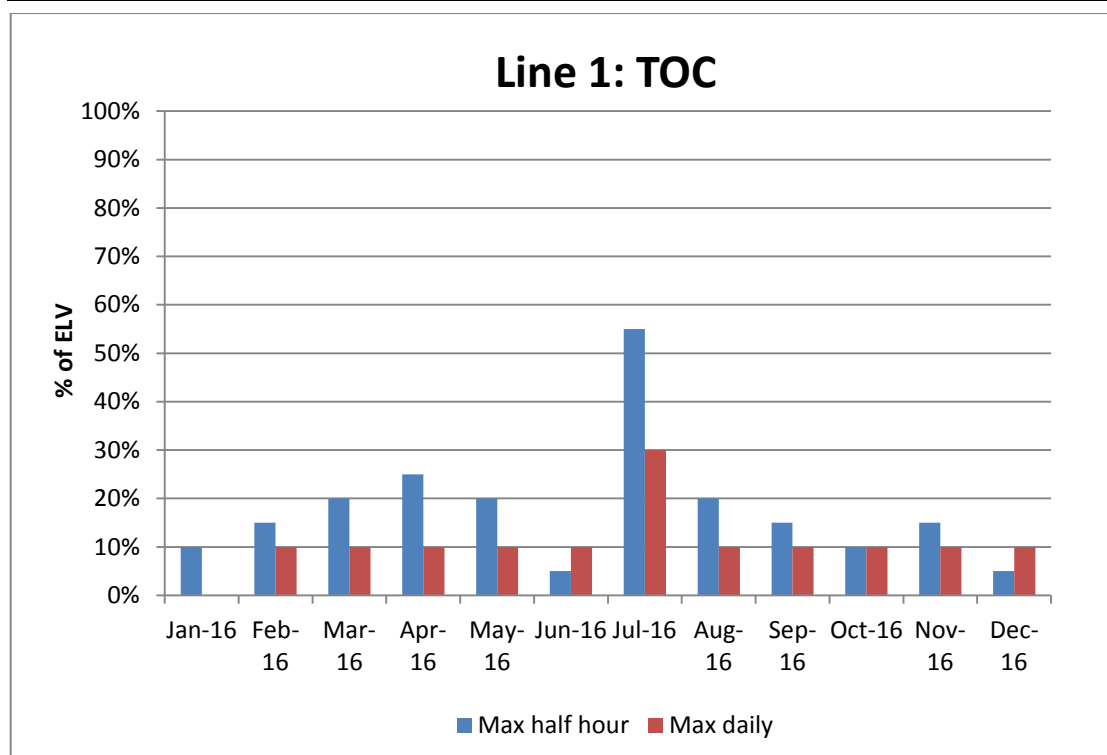
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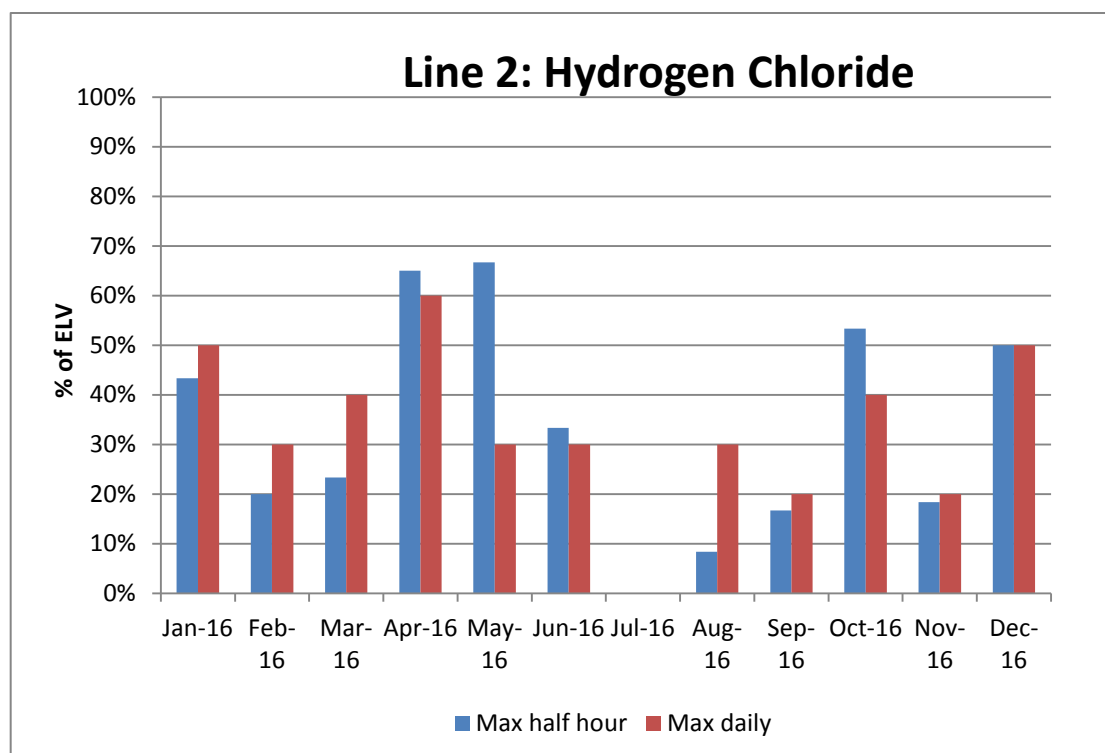
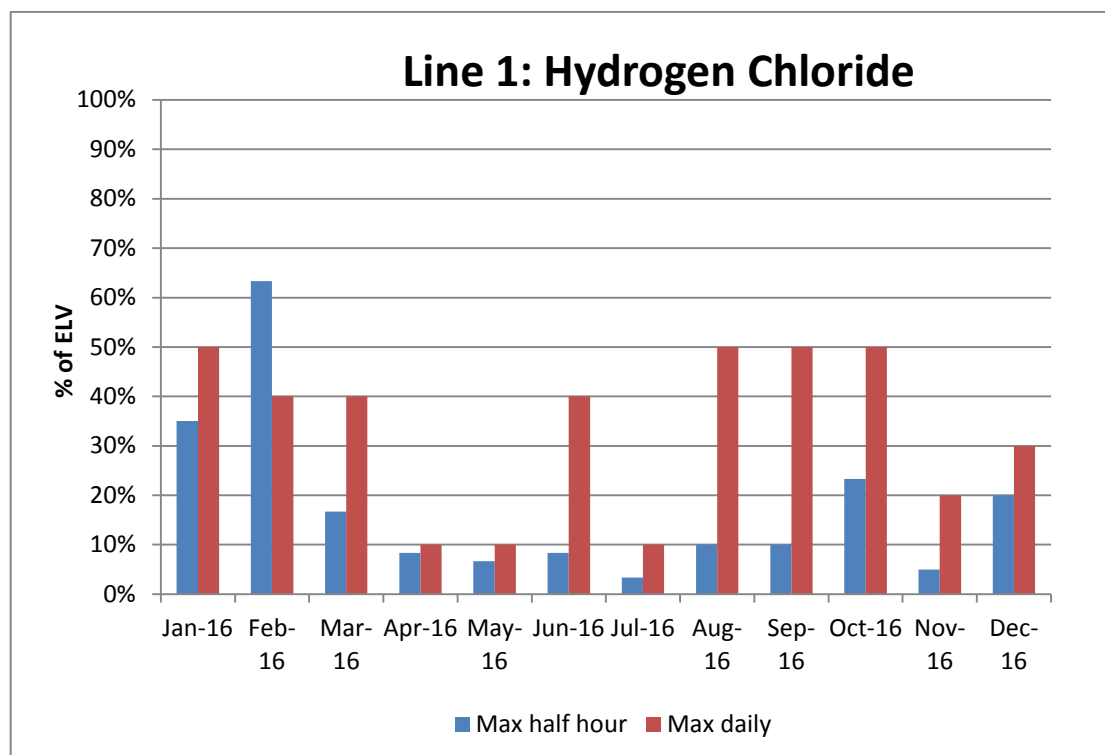
Appendix 1



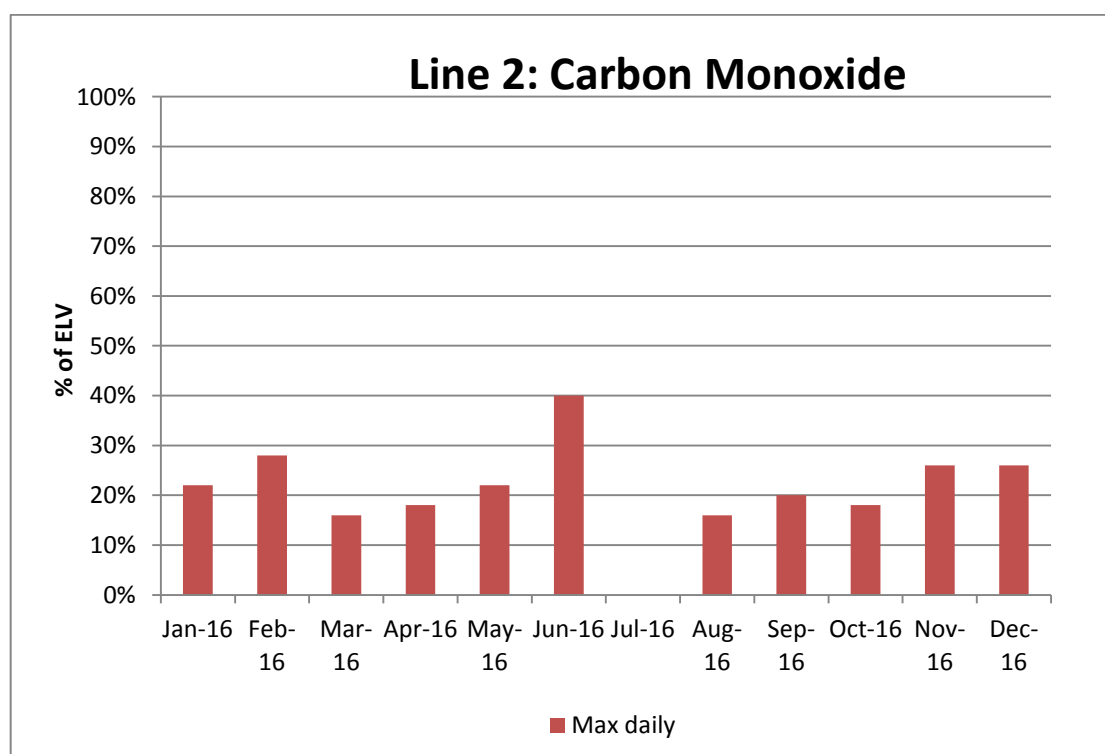
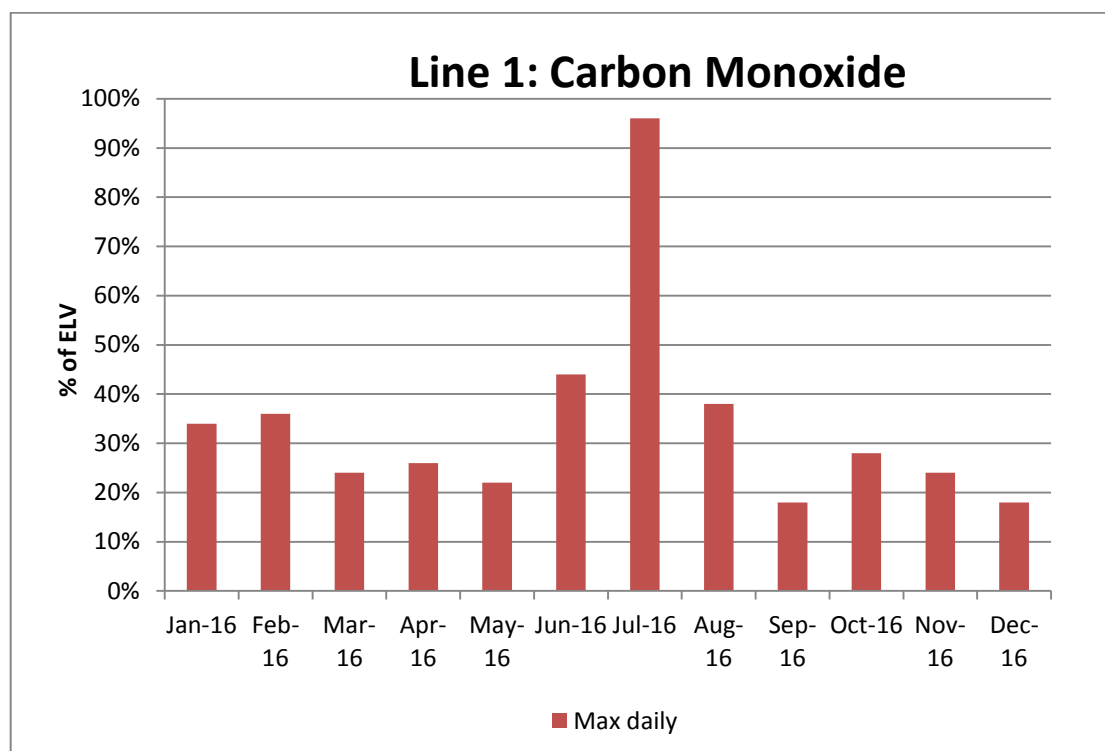
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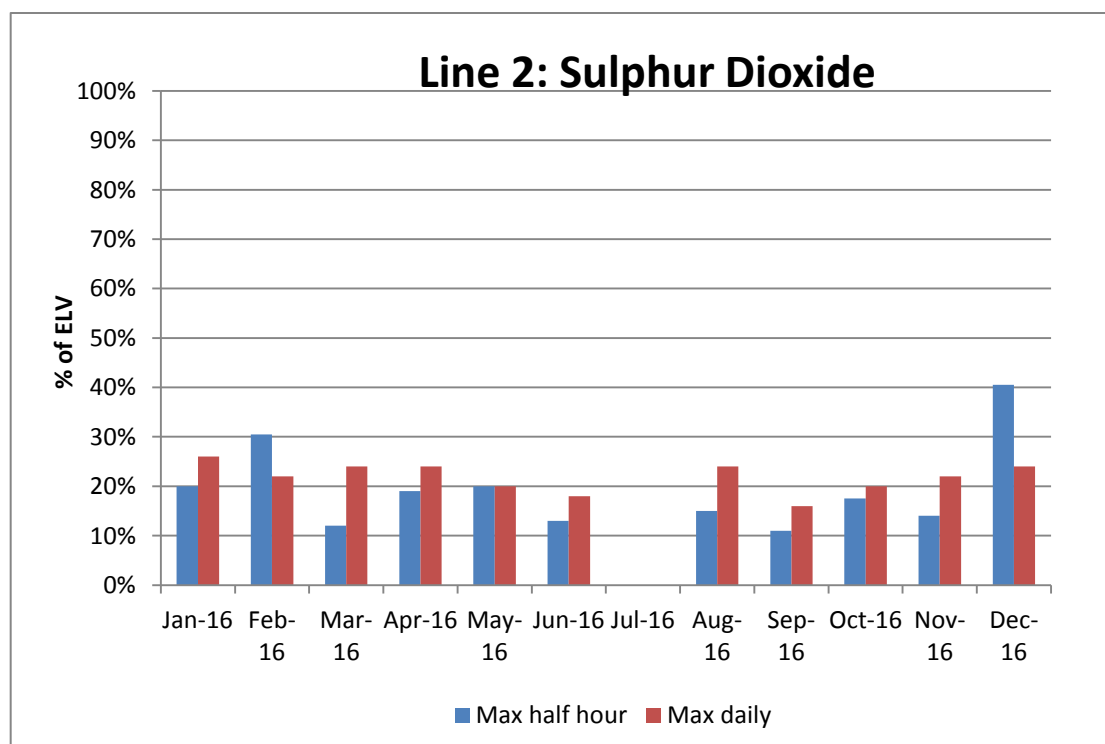
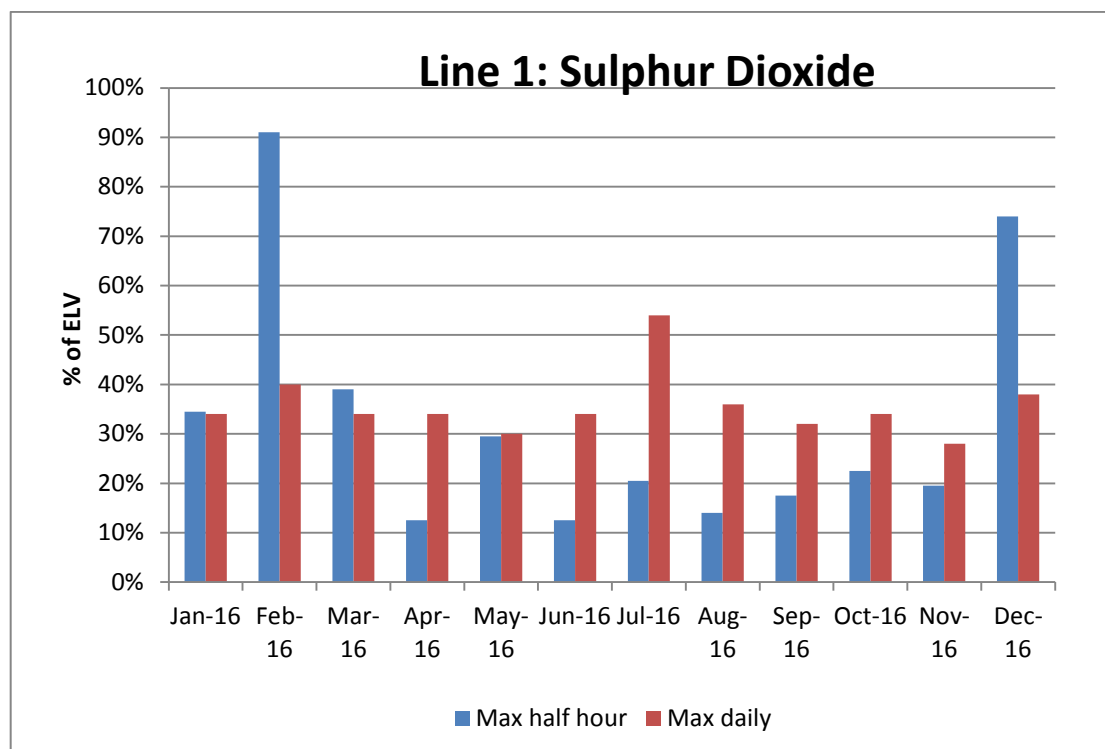
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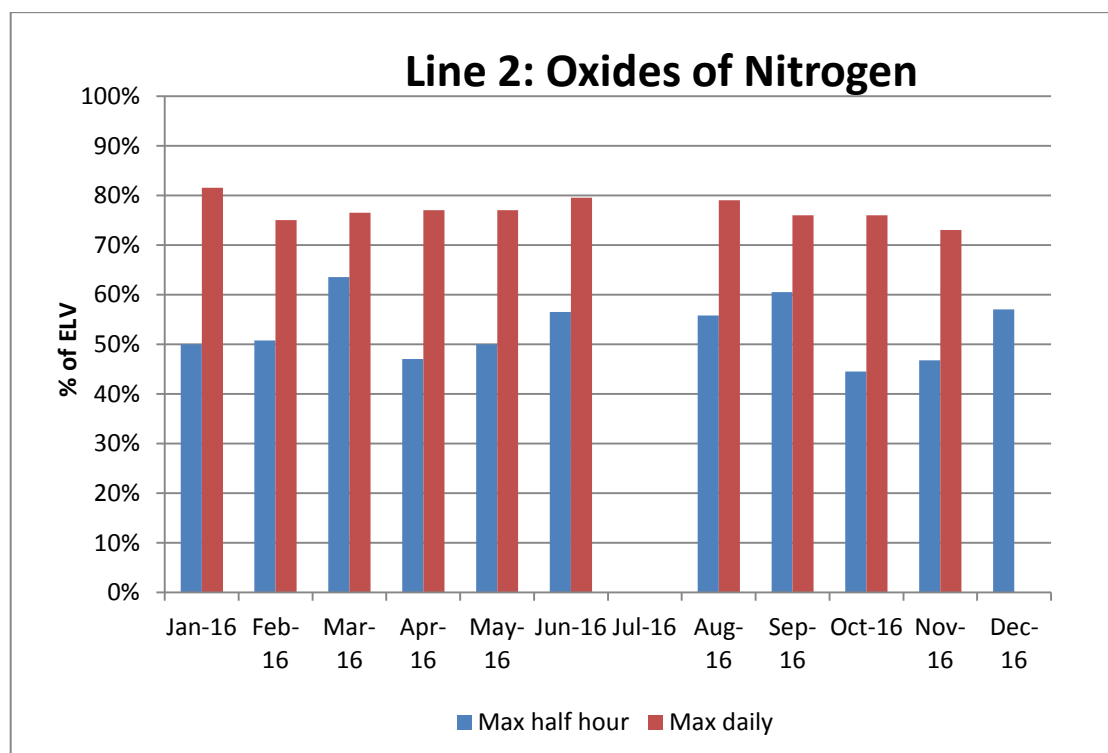
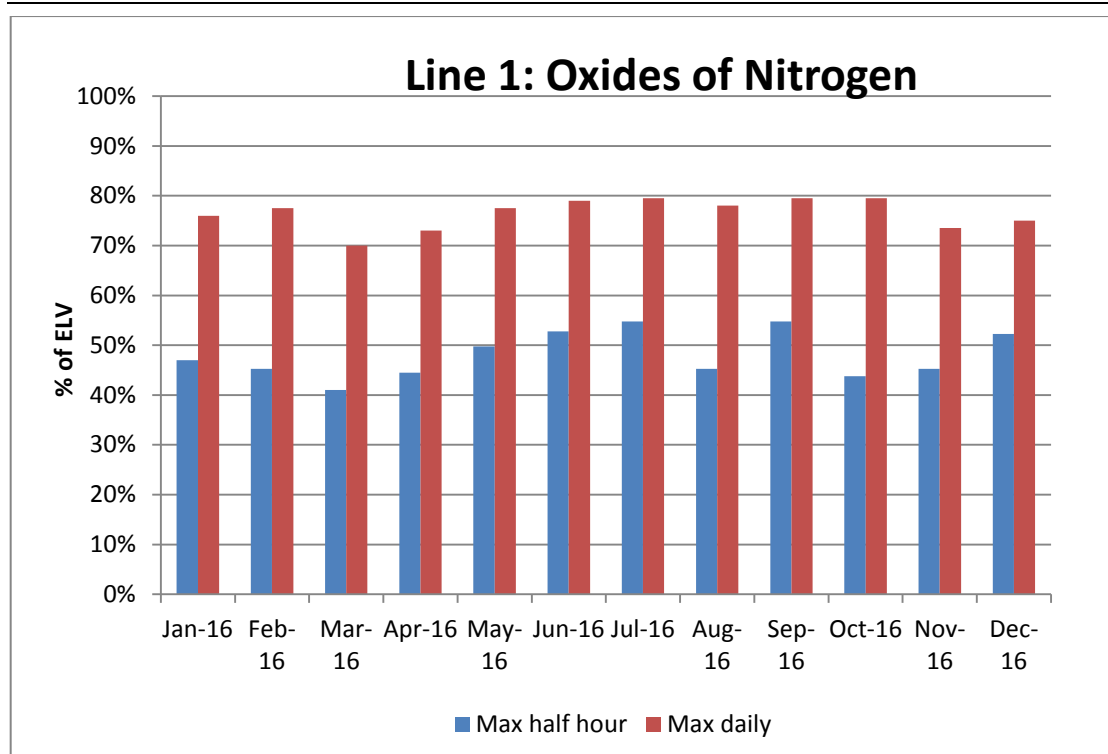
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