

Annual performance report for: E.ON Climate and Renewables UK Biomass Limited, Blackburn Meadows Renewable Energy Plant

Permit Number: EPR/LP3131TA

Year: 2018

This report is required under the Industrial Emissions Directive's Article 55(2) requirements on reporting and public information on waste incineration plants and co-incineration plants, which require the operator to produce an annual report on the functioning and monitoring of the plant and make it available to the public.

1. Introduction

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|--|--|
| Name and address of plant | Blackburn Meadows Renewable Energy Plant Alsing Road Sheffield S9 1HF |
| Description of waste input | 100% Waste Wood |
| Operator contact details if members of the public have any questions | BlackburnMeadowsEnquiries@eon-uk.com |

2. Plant description

Blackburn Meadows is a biomass fired renewable energy plant. The Installation is designed to process 250,000 tonnes of biomass per year and export up to 30 MWe of electricity and up to 25 MWth of heat. It is owned by E.ON Climate and Renewables and is located 5km North East of Sheffield to the East of the M1 Tinsley Viaduct in Blackburn Meadows on land off Alsing Road. It is about 400 meters North East of the Meadowhall shopping centre.

Biomass is delivered by road and unloaded into the fuel store by conveyor from the tipping area. The entire unloading process is conducted in an enclosed space. Any ferrous material is removed by magnetic separators during conveyance to the fuel store.

The biomass is removed from the fuel store by moving floor conveyors and loaded into the feed chute for delivery to the combustion unit. This is a bubbling fluidised bed design which ensures homogeneous mixing of the biomass with bed material and leads to good combustion. Residues from the combustion chamber are drawn down from the bottom of the bed and passed through a classifier. This separates out and cools the coarse particles and allows the fine particles to be returned as bed material. Surpluses are diverted via a blow pot to a boiler ash silo. Ash is transferred off site for recovery or disposal at a suitably licenced facility.

Emissions of nitrogen oxides are controlled by the injection of urea into the combustion chamber. Hot gases from the combustion are passed through a boiler to raise steam. The steam is then passed to a steam turbine to generate electricity for export to National Grid, before being condensed in an air-cooled condenser and returned to the boiler. The combustion gases are cleaned in a flue gas treatment plant. This includes the injection of

carbon, primarily to control dioxin emissions, the injection of lime, to control acid gas emissions, and the use of a fabric filter to remove dust. The cleaned exhaust gases are released to atmosphere via a 90 metre stack.

There are emissions to sewer for process water arising from boiler blow-down and cleaning. There are no process emissions to water.

3. Summary of Plant Operation

| | |
|--|--|
| Waste wood (biomass) received | 214,135 tonnes |
| Total waste received | 214,135 tonnes |
| Total plant operational hours | 8,098 hours |
| Total hours of "abnormal operation" (see permit for definition) | 6.9 hours |
| Total quantity of incinerator bottom ash (IBA) produced | 3,636 tonnes |
| Disposal or recovery route for IBA | R04 - Recycling/reclamation of metals and metal compounds |
| Did any batches of IBA test as hazardous? If yes, state quantity | Currently all IBA is consigned as hazardous whilst zinc speciation study is being completed |
| Total quantity of air pollution control (APC) residues produced | 5,324 tonnes |
| Disposal or recovery route for APC residues | D09 - Physico-chemical treatment which results in final compounds or mixtures which are discarded by means of any of the operations numbered D1 to D12 (e.g. evaporation, drying, calcination, etc.) |
| Total electricity generated for export to the National Grid | 227,776 MWh - total exported 255,251 MWh - total generated |
| Total heat produced for export (e.g. to hospital or district heating scheme) | 18,033 MWh |

4. Summary of Plant Emissions

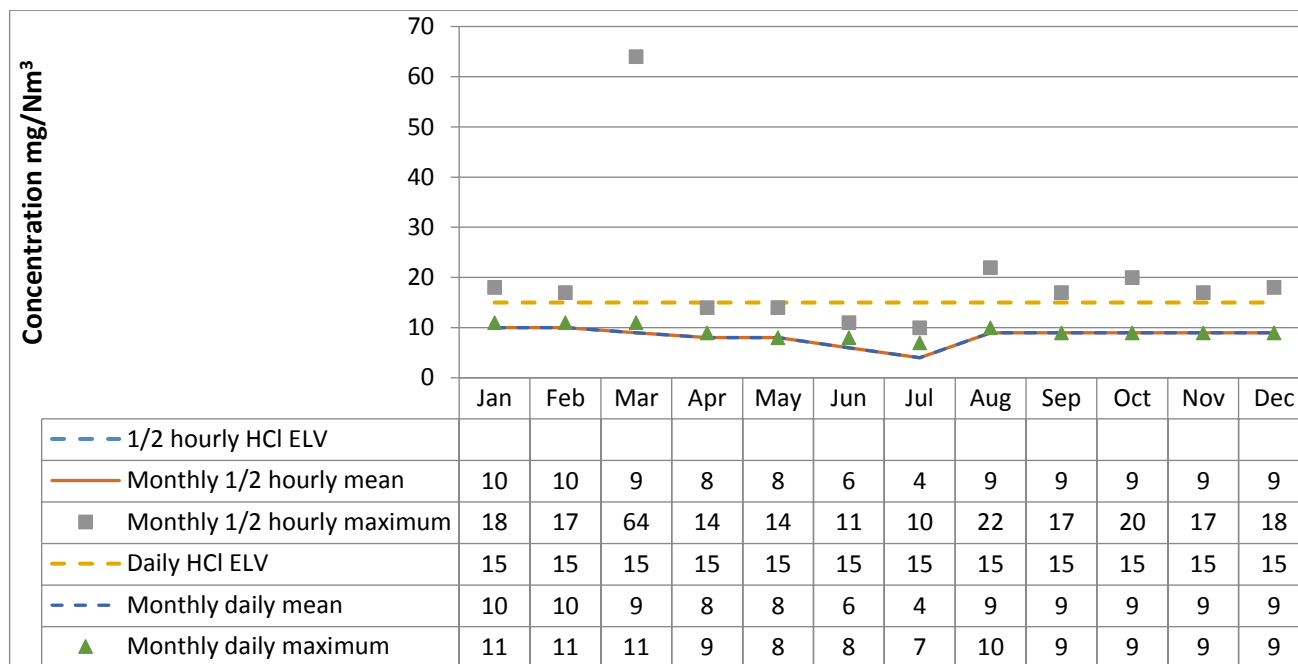
4.1 Summary of continuous emissions monitoring results for emissions to air

The following charts show the performance of the plant against its emission limit values (ELVs) for substances that are continuously monitored.

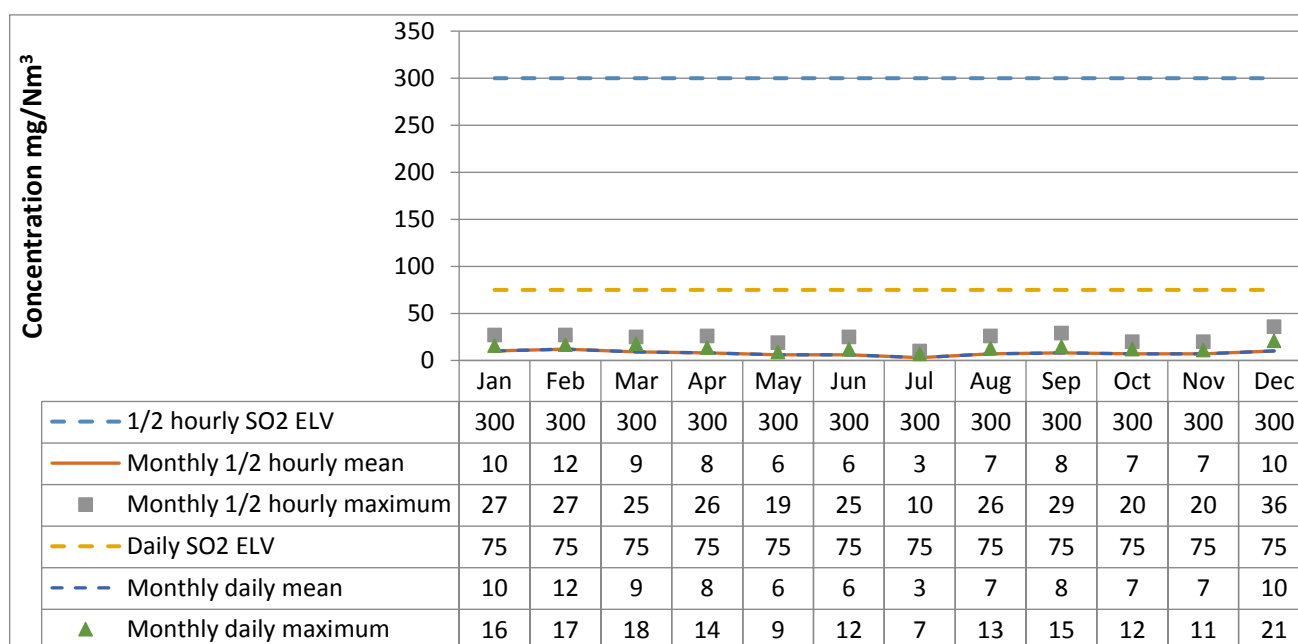


Monthly emissions
summary incl half-hou

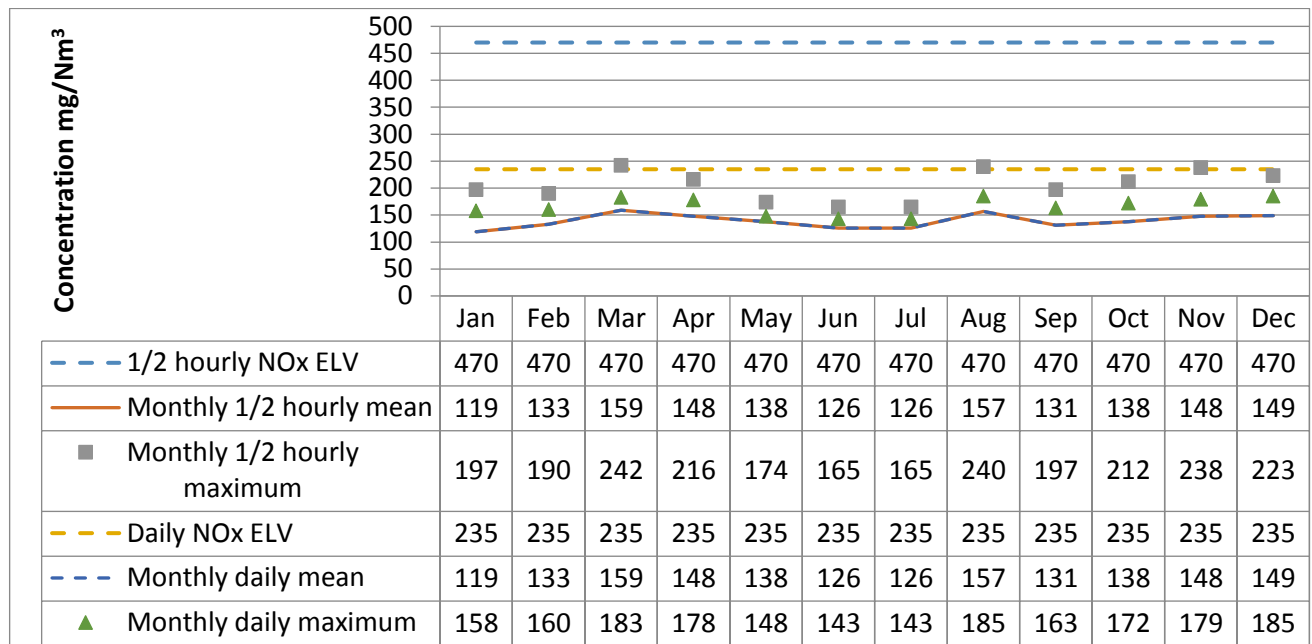
Line 1 - Hydrogen chloride



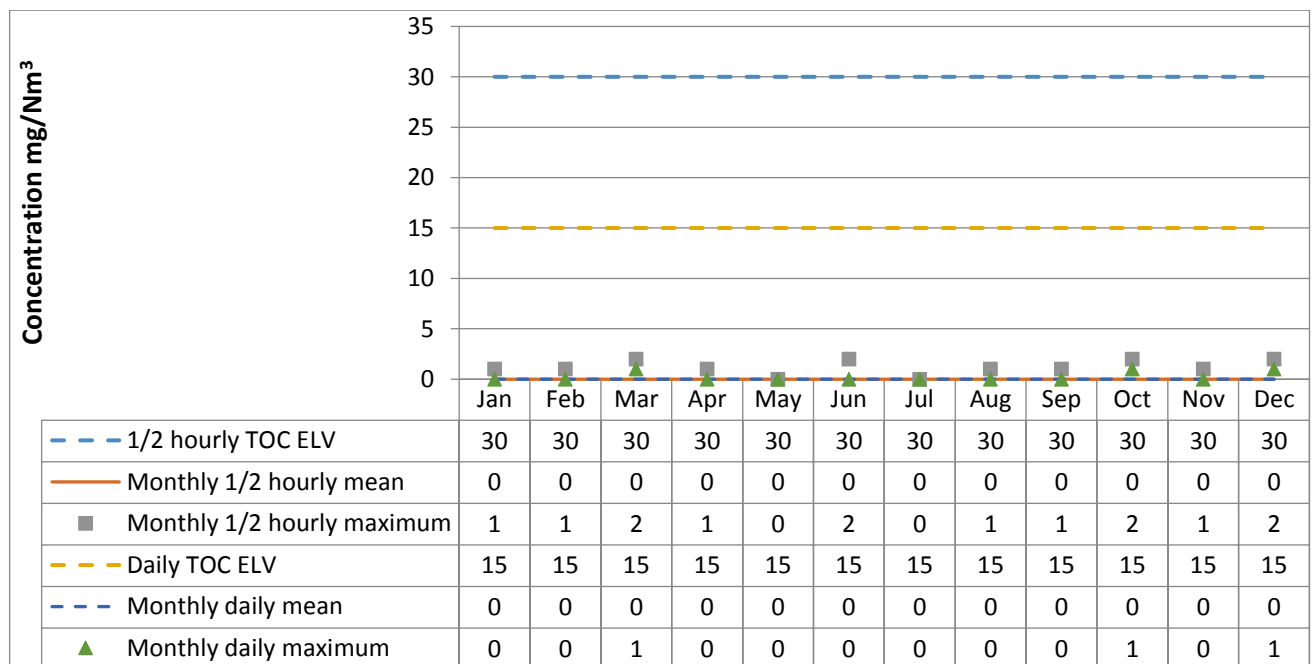
Line 1 – Sulphur dioxide



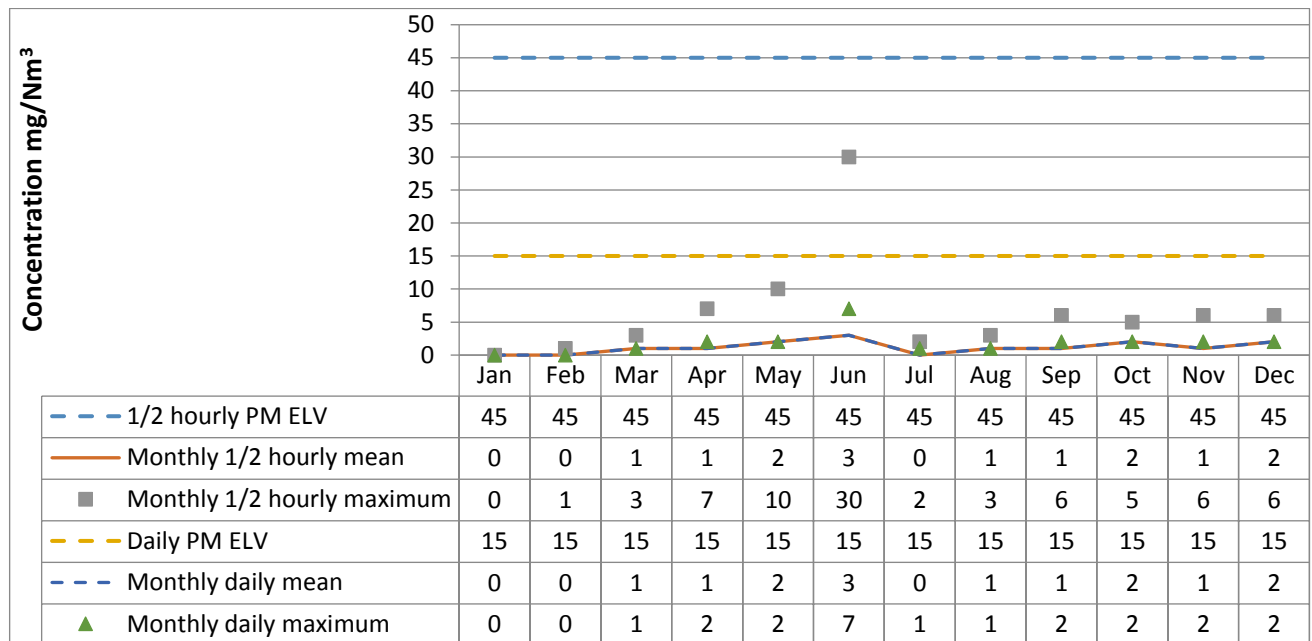
Line 1 – Oxides of nitrogen



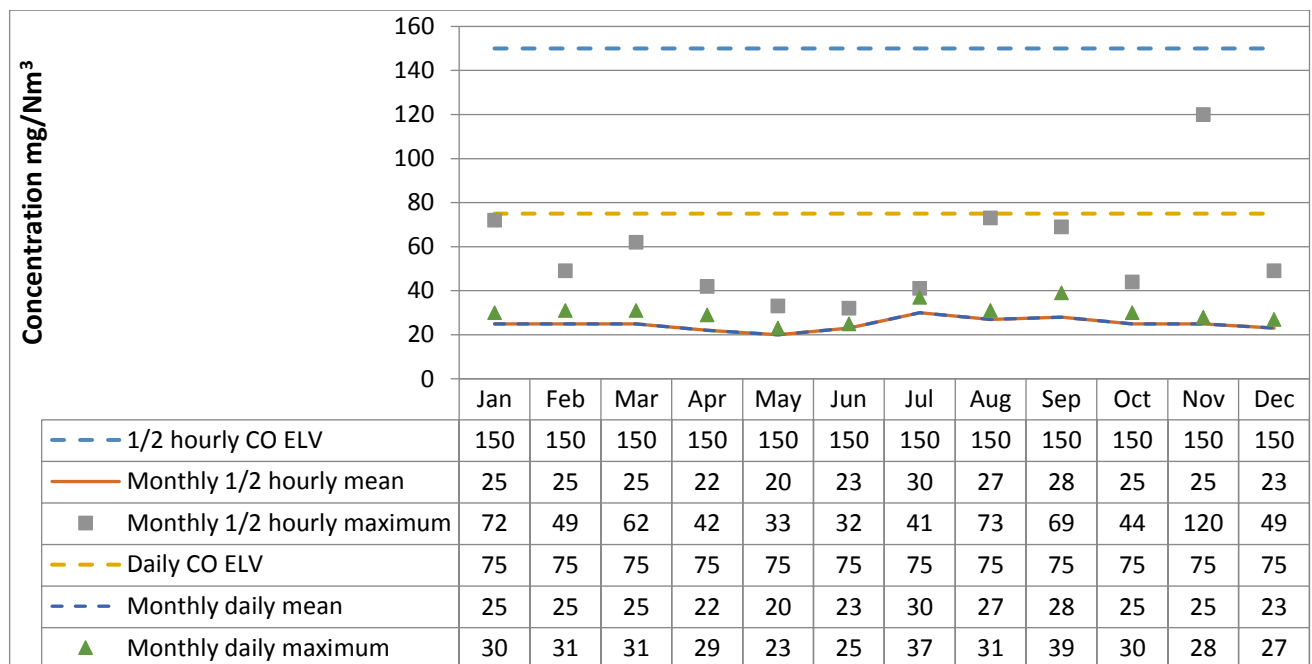
Line 1 – Total organic carbon



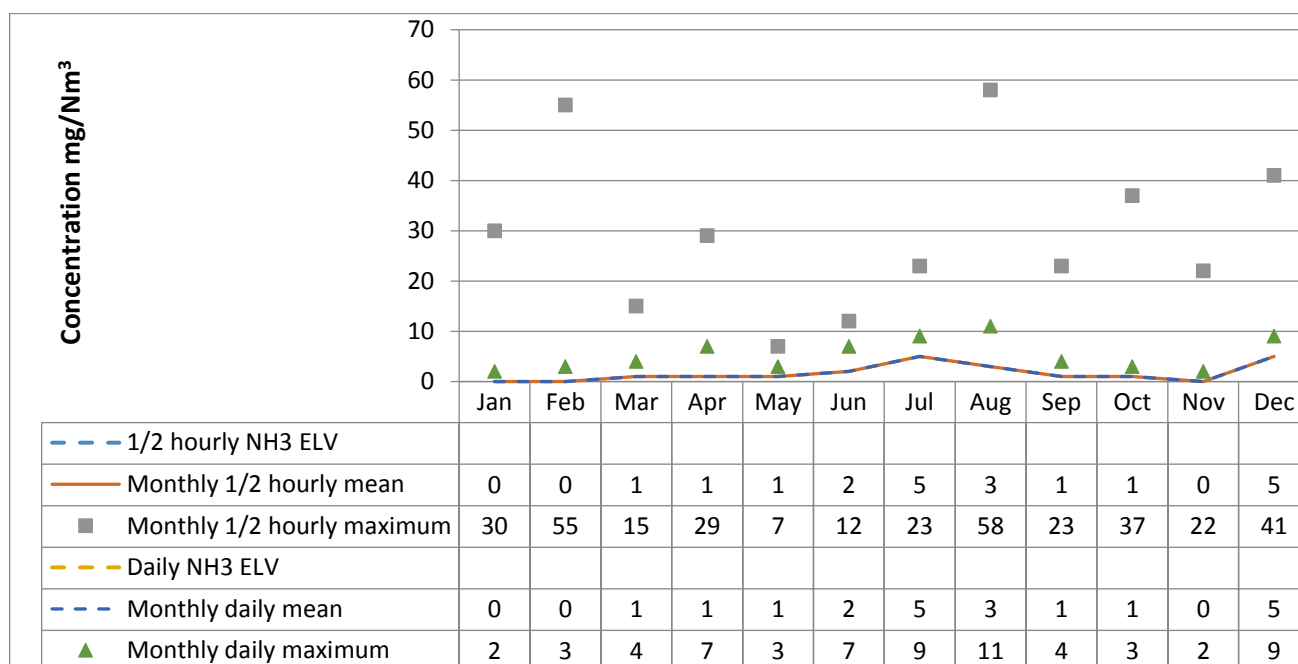
Line 1 – Particulates



Line 1 – Carbon monoxide



Line 1 – Ammonia



4.2 Summary of periodic monitoring results for emissions to air

The table below shows the results of periodically monitored substances.

| Substance | Emission limit value | Results | |
|--|------------------------|--------------------------|---------------------------|
| | | 13-14/02/18 | 16-19/07/18 |
| Mercury and its compounds | 0.05 mg/m ³ | 0.0004 mg/m ³ | 0.0003 mg/m ³ |
| Cadmium & thallium and their compounds (total) | 0.05 mg/m ³ | 0.002 mg/m ³ | 0.003 mg/m ³ |
| Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total) | 0.5 mg/m ³ | 0.204 mg/m ³ | 0.021 mg/m ³ |
| Dioxins and furans (I-TEQ) | 0.1 ng/m ³ | 0.0127 ng/m ³ | 0.03823 ng/m ³ |
| Hydrogen Fluoride | 3 mg/m ³ | 0.05 mg/m ³ | 0.08 mg/m ³ |

4.3 Summary of monitoring results for emissions to water

There are no emissions to water from the process [other than clean surface water and emissions to sewer].

5. Summary of Permit Compliance

5.1 Compliance with permit limits for continuously monitored pollutants

The plant met its emission limits as shown in the table below.

| Substance | Percentage time compliant during operation | |
|----------------------|--|-------------|
| | Half-hourly limit | Daily limit |
| Particulates | 100 % | 100 % |
| Oxides of nitrogen | 100 % | 100 % |
| Sulphur dioxide | 100 % | 100 % |
| Carbon monoxide | 100 % | 100 % |
| Total organic carbon | 100 % | 100 % |
| Hydrogen chloride | 100 % | 100 % |

5.2 Summary of any notifications or non-compliances under the permit

| Date | Summary of notification or non-compliance | Reason | Measures taken to prevent reoccurrence |
|----------|---|--|--|
| 05/08/18 | Release of smoke off site from a fire within the fuel store | Fire likely to have been caused by heat created at the driven wheels of the fuel tripper car due to a control system malfunction igniting residual wood dust | Modifications to tripper system and control system logic completed Full review of fire detection and suppression system Review and improve dust collection system performance Complete full fire risk assessment to replace existing document |

5.3 Summary of any complaints received and actions to taken to resolve them.

| Date of complaint | Summary of complaint | Reason for complaint including whether substantiated by the operator or the EA | If substantiated, measures to prevent reoccurrence |
|-------------------|--|---|--|
| 12/11/18 | Call received by EA incident line. Caller advised site was emitting thick black smoke with strong toxic odours | Investigation completed, no evidence of any abnormal operation during this time. Local EA Inspector confirmed complaint was unsubstantiated | N/A |

6. Summary of plant improvements

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|---|
| Summary of any permit improvement conditions that have been completed within the year and the resulting environmental benefits. |
| None |
| Summary of any changes to the plant or operating techniques which required a variation to the permit and a summary of the resulting environmental impact. |
| None |
| Summary of any other improvements made to the plant or planned to be made and a summary of the resulting environmental benefits. |
| <p>A speciation study has been completed on the IBA produced as a by-product of the combustion process. The IBA produced is currently classified as hazardous waste owing to the concentrations of zinc and potentially copper exceeding the thresholds prescribed within WM3. The study has concluded that a significant proportion of the zinc and copper species present in the ash are present as non-hazardous zinc and copper compounds and hence the ash does not trigger the hazardous thresholds prescribed in WM3. This study is awaiting EA approval, with the non-hazardous classification expected to provide additional re-use/recycling routes for the ash stream to be explored.</p> <p>Studies have been commenced to optimise the sand usage on site. Sand is added to the fluidised bed of the boiler as per the design specification and operating instructions provided on plant handover. A study is underway to look at any options to reduce the amount of sand consumed by the boiler. This will have two environmental benefits:</p> <ul style="list-style-type: none">• Reduced resource utilisation |

- Reduced amount of ash produced

An additional project is underway to review ways of optimising urea consumption within the SNCR system. Urea is injected into the flue gas to control NO_x emission levels, and a project is underway to look at whether the volumes of urea consumed can be optimised to ensure that emissions remain comfortably compliant with prescribed emission limit values whilst reducing the amount of natural resources the plant consumed. As well as reducing the resource consumption, this project will also minimise ammonia carry over into the flue gas, thus minimising emissions to air of ammonia.