



## Annual Performance Report 2023

Permit EPR/LP3030XA

Cardiff Energy Recovery Facility

Trident Park ERF

VIRIDOR TRIDENT PARK LTD

Year: 2023

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Version: 1

Issue Date: Jan-24

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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.

**Plant Description and Design**

"Cardiff Energy Recovery Facility is located immediately north of Cardiff Docks. The facility will process approximately 22.96 tonnes of residual municipal and C&I waste per line, per hour and has the capability of exporting approximately 34MW of electrical power.

In accordance with the requirements of Condition 4.2.2, Schedule 4 and Table S4.1 of Permit EPR/LP3030XA issued by Natural Resources Wales to Viridor Waste Management Limited (Viridor) on 21 Decemeber 2022, Viridor is required to produce an annual performance report which is to be submitted to Natural Resources Wales by the 31 January (or as agreed in writing with Natural Resources Wales) each year.

Viridor took over the operation of the Plant on 31st January 2015.

This report summarises the environmental and performance data collected at the site 1st January – 31st December 2023 and fulfils the reporting requirement of Chapter IV, Article 55 (2) of the Industrial Emissions Directive.

**Summary of Operational Processes and Procedures**

Incoming waste is mainly received from local authorities that have joined together to form two contract hubs - Prosiect Gwyrdd and Tomorrows Valley, some waste is recieved from Pembrokeshire County Council and the rest of the waste is received from third party businesses. Waste is received into an enclosed waste bunker. The waste is loaded into one of two furnaces, which combust the waste at >850°C. The hot gases are put through a variety of heat exchangers used to heat demineralised water to create superheated steam which drives a turbine generator. The turbine generator produces around 37MWh and exports around 33MWh. Combusted waste (incinerator bottom ash) is sent to a third party for further processing. The gases are treated with Lime, Activated carbon and Urea to remove potential pollution leaving the stacks. The powder containing reacted gas particulates (APCr) is removed and sent via a third party for reprocessing. Emissions are monitored via Continuous Emissions Monitoring equipment (CEMs) that are serviced by a contractor.

**Operational Data**

|                         |                   |                  |     |
|-------------------------|-------------------|------------------|-----|
| Plant Size              | 425,000 tonnes pa | MWth             | MWe |
| No. of combustion lines | 2                 | No. of Turbines: | 1   |

| Waste types received              | Unit   | Q1             | Q2            | Q3             | Q4             | Year Total     | %     |
|-----------------------------------|--------|----------------|---------------|----------------|----------------|----------------|-------|
| Household / Local Authority       | tonnes | 66,396         | 58,793        | 60,776         | 62,536         | 248,500        | 61.5% |
| Commercial & Industrial           |        | 40,212         | 28,165        | 44,413         | 42,994         | 155,785        | 38.5% |
| Hazardous                         |        | -              | -             | -              | -              | -              | -     |
| Clinical                          |        | -              | -             | -              | -              | -              | -     |
| Waste wood (biomass)              |        | -              | -             | -              | -              | -              | -     |
| Refuse Derived Fuel * - H'hold/LA |        | -              | -             | -              | -              | -              | -     |
| Refuse Derived Fuel * - C&I       |        | -              | -             | -              | -              | -              | -     |
| Other [Please specify]            |        | -              | -             | -              | -              | -              | -     |
| Other [Please specify]            |        | -              | -             | -              | -              | -              | -     |
| Other [Please specify]            |        | -              | -             | -              | -              | -              | -     |
| <b>Total waste received</b>       |        | <b>106,608</b> | <b>86,958</b> | <b>105,189</b> | <b>105,530</b> | <b>404,285</b> |       |
| Rejected Waste                    |        | -              | -             | -              | -              | -              | -     |
| Unprocessed waste transferred out |        | -              | -             | -              | -              | -              | -     |
| <b>Total waste combusted **</b>   |        | <b>109,584</b> | <b>88,315</b> | <b>103,503</b> | <b>109,511</b> | <b>410,913</b> |       |

| Energy Usage / Export       | Unit | Q1     | Q2     | Q3     | Q4     | Year Total | KWh/te |
|-----------------------------|------|--------|--------|--------|--------|------------|--------|
| Power Generated             | MWh  | 79,135 | 59,040 | 78,063 | 80,642 | 296,880    | 722    |
| Power Exported              |      | 70,842 | 52,601 | 69,251 | 71,762 | 264,456    | 644    |
| Power Used on site          |      | 8,213  | 5,219  | 8,719  | 8,834  | 30,985     | 75     |
| Power Imported              |      | 80     | 1,220  | 93     | 46     | 1,439      | 4      |
| Parasitic Load              | %    | 10.6%  | 12.7%  | 11.4%  | 11.1%  | 11.4%      |        |
| Thermal Energy Produced *** | MWh  | -      | -      | -      | -      | -          | -      |
| Thermal Energy Exported *** |      | -      | -      | -      | -      | -          | -      |
| R1 value (if applicable)    | R1   |        |        |        |        | 0.8        |        |

| Waste Disposal & Recovery | Unit   | Q1     | Q2     | Q3     | Q4     | Year Total | % inputs |
|---------------------------|--------|--------|--------|--------|--------|------------|----------|
| APC Residues - produced   | tonnes | 1,148  | 981    | 1,149  | 1,202  | 4,481      | 1.1%     |
| IBA - produced            |        | 18,795 | 15,505 | 17,973 | 19,193 | 71,466     | 17.4%    |
| Metals recycling          |        | 234    | 224    | 207    | 206    | 872        | 0.2%     |
| Other                     |        | -      | -      | -      | -      | -          | -        |
| Other                     |        | -      | -      | -      | -      | -          | -        |
| Other                     | -      | -      | -      | -      | -      | -          |          |

| Raw Material Usage   | Unit | Q1         | Q2      | Q3      | Q4        | Year Total | kg or Ltr /te |
|----------------------|------|------------|---------|---------|-----------|------------|---------------|
| Mains Water          | ltrs | 16,066,000 | #####   | #####   | #####     | 67,394,000 | 164.01        |
| Other Water          | ltrs | -          | -       | -       | -         | -          | -             |
| Ammonia              | kgs  | -          | -       | -       | -         | -          | -             |
| Urea                 | kgs  | 113,000    | 69,000  | 111,000 | 143,460   | 436,460    | 1.06          |
| Activated Carbon     | kgs  | 40,000     | 34,000  | 44,000  | 50,600    | 168,600    | 0.41          |
| Lime / hydrated lime | kgs  | 1,617,000  | #####   | #####   | 1,796,000 | 6,413,000  | 15.61         |
| Fuel oil             | ltrs | 98,775     | 161,280 | 90,963  | 92,727    | 443,745    | 1.08          |
| Gas                  | cuf  | -          | -       | -       | -         | -          | -             |
| Other                | -    | -          | -       | -       | -         | -          | -             |

| Summary  | Line/Unit | Q1           | Q2           | Q3           | Q4           | Year Total |              |
|--|-----------|--------------|--------------|--------------|--------------|------------|--------------|
| Availability of waste combustion by line, hrs **** | 1         | 2,129        | 1,701        | 2,058        | 2,141        | 8,028      | 91.6%        |
|  | 2         | 2,007        | 1,722        | 2,140        | 2,137        | 8,005      | 91.4%        |
|  | 3         | -            | -            | -            | -            | -          | 0.0%         |
|  | 4         | -            | -            | -            | -            | -          | 0.0%         |
|  | 5         | -            | -            | -            | -            | -          | 0.0%         |
| Overall Availability, mean avg. of all lines, hrs  |           | <b>2,068</b> | <b>1,711</b> | <b>2,099</b> | <b>2,139</b> | 3,207      | <b>36.6%</b> |
| Hours of turbine operations, hrs                   | 1         | 2,128        | 1,645        | 2,179        | 2,189        | 8,141      | 92.9%        |
| Hours of turbine operations, hrs                   | 2         | -            | -            | -            | -            | -          | 0.0%         |
| Hours of heat / steam export                       |           | -            | -            | -            | -            | -          | n/a          |
| Net Calorific Value of waste                       | MJ/kg     | 9            | 10           | 10           | 9            | 10         |              |
| Abnormal Events                                    | qty.      | 2            | -            | -            | -            | 2          | yes          |
| Abnormal operation                                 | hours     | 2            | -            | -            | -            | 2          | 0.0%         |
| Permit Breaches                                    | qty.      | 2            | -            | 1            | -            | 3          | yes          |

### Summary of Plant Operations and Maintenance during the reporting year

The main purpose of the facility is to burn non-hazardous municipal, commercial and industrial waste and to recover energy by producing steam. The steam will be used to produce electricity for export to the local grid and has the potential for further heat export to local consumers. The installation includes waste receipt and storage, two waste combustion units with associated waste heat boilers and exhaust gas abatement systems, on-site storage of residues and all systems for controlling and monitoring incinerator operation. The plant is designed to process approximately 26.48 tonnes per hour in two parallel and identical combustion units. Taking into account the expected long term availability of the facility, the annual permitted throughput of the facility is 425,000 tonnes of waste per annum.

The incoming municipal waste is loaded into the furnace via a feed hopper from the reception hall, where the waste vehicles deposit their loads into the storage bunker. After entering the combustion chamber via the refuse feed ram the waste is allowed to fall onto the grate in a controlled manner. The moving grate mechanisms are used to agitate the waste as it progresses down to the ash discharger. As the waste moves along, primary air is introduced from beneath the grate causing the waste to go through a series of drying and burning areas. Secondary air is introduced from above the grate for combustion control. An auxiliary oil fired burner is located in each combustion chamber to both establish minimum temperature on start up and to maintain the combustion gas temperature at a minimum of 850°C for 2 seconds in the combustion chamber before passing to the boiler, economiser and abatement plant. The furnace is equipped with a water tube boiler raising steam at 60 bar and 400°C. Economisers are fitted down stream of the boiler unit to pre-heat the incoming feed water. Each furnace unit is fitted with an independent dry urea injection system in order to reduce the facility's emissions of Oxides of Nitrogen (NOx) to air through selective non-catalytic reduction. A dry hydrated lime flue gas treatment system is used to neutralise acid flue gases with the injection of lime reagent into the reaction chamber. Activated carbon is injected into the flue gas stream in order to reduce the concentrations of heavy metals and dioxins in the combustion gases emitted to air. Bag filters are used to separate out the resulting particulate matter from the cooled and treated gases. The facility has a 90m stack containing the separate flue gas streams from each combustion unit, via which the combustion gases are released to air. Each flue gas stream is equipped with a Continuous Emission Monitoring System (CEMS) which continuously monitor for particulates, carbon monoxide (CO), ammonia (NH3), sulphur dioxide (SO2), hydrogen chloride (HCl), oxygen (O2), nitrogen oxides (NOx) and volatile organic compounds (VOC's).

There is a discharge of process effluent to sewer in accordance with a Trade Effluent Consent issued by Dwr Cymru Welsh Water. Uncontaminated surface and roof waters are discharged to the surface water drainage system via a series of interceptors, attenuation lagoons and isolation valves.

Trident Park's annual plant maintenance outage was held from 5 June to 6 July 2023. During this period planned maintenance and repair of equipment was undertaken.

### Summary of Residue Handling for the reporting year

Bottom ash from the incinerator grate is quenched with water and then conveyed via a metals extraction system to a concrete storage area prior to removal from site.

Air pollution control residues (APCr) from the bag filter systems are collected continuously and stored in two dedicated silos. APCr is collected by direct transfer from the on site silos into transport tanker and goes to either for reprocessing or disposal. When taken for reprocessing APCr is taken through accelerated carbonation technology. These carbonated wastes are blended with binders and fillers and pelletised to form an aggregate. If APCr is sent for disposal it is placed within a hazardous waste cell in the landfill.



## 2023 Annual Reporting Performance Form 1

Permit EPR/LP3030XA

Operator: VIRIDOR TRIDENT PARK LTD

Facility: Cardiff Energy Recovery Facility

Form: Performance 1

Reporting Period from:

01 January 2023

to:

31 December 2023

### 2023 Annual Reporting of Waste Disposal and Recovery

| Waste Description                | Disposal Route(s) | Disposal Tonnes | Recovery Tonnes | % / tonne of waste incinerated |
|----------------------------------|-------------------|-----------------|-----------------|--------------------------------|
| <b>1) Hazardous Wastes</b>       |                   |                 |                 |                                |
| APC Residues                     | D05.03            | 1,491.7         |                 | 0.4%                           |
| APC Residues                     | R05.04            |                 | 2,988.9         | 0.7%                           |
|                                  |                   |                 |                 | -                              |
|                                  |                   |                 |                 | -                              |
| <b>Total Hazardous Waste</b>     |                   | <b>1,491.7</b>  | <b>2,988.9</b>  | <b>1.1%</b>                    |
| <b>2) Non-Hazardous Wastes</b>   |                   |                 |                 |                                |
| IBA                              | R05               |                 | 71,465.8        | 17.4%                          |
| Ferrous Metal                    | R04               |                 | 872.0           | 0.2%                           |
| Process Water                    |                   |                 | 13,665.0        | 3.3%                           |
| Non-Processable                  | D05.02            | 24.7            |                 | 0.0%                           |
|                                  |                   |                 |                 | -                              |
| <b>Total Non-Hazardous Waste</b> |                   | <b>24.7</b>     | <b>86,002.7</b> | <b>20.9%</b>                   |
| <b>TOTAL WASTE</b>               |                   | <b>1,516.4</b>  | <b>88,991.6</b> | <b>22.0%</b>                   |

Operator's comments :

### 2023 Annual Reporting of Water and Other Raw Material Usage

| Raw Material                          | Usage   | Unit           | Specific Usage | Unit               |
|---------------------------------------|---------|----------------|----------------|--------------------|
| Mains Water                           | 67394   | m <sup>3</sup> | 0.16           | m <sup>3</sup> /te |
| Total Water                           | 67394   | m <sup>3</sup> | 0.16           | m <sup>3</sup> /te |
| Urea / Ammonia                        | 436460  | kg             | 1.06           | kg/te              |
| Activated Carbon                      | 168600  | kg             | 0.41           | kg/te              |
| Lime / hydrated lime / Sodium Bicarb. | 6413000 | kg             | 15.61          | kg/te              |

Operator's comments :

### 2023 Annual Reporting of other performance indicators

| Parameter   | Results by Line |      |    |    |    | Turbine 1 | Turbine 2 |
|---|-----------------|------|----|----|----|-----------|-----------|
|   | A1              | A2   | A3 | A4 | A5 |           |           |
| Operating hours for the year, hours                         | 8028            | 8005 |    |    |    | 8141      |           |
| Number of periods of abnormal operation, qty.               | 2               | 0    |    |    |    |           |           |
| Cumulative hours of abnormal operation for this year, hours | 1.5             | 0    |    |    |    |           |           |

Operator's comments :

Signed: \_\_\_\_\_

Date: 29/01/2024

## 2023 Annual Reporting of Energy Usage/Export

Permit EPR/LP3030XA

Operator: VIRIDOR TRIDENT PARK LTD

Facility: Cardiff Energy Recovery Facility

Form: Energy 1

Reporting Period from:

01 January 2023

to:

31 December 2023

| Energy Source            | Energy Usage | Unit   | Specific Usage (KWh/tonne incinerated) |
|--------------------------|--------------|--------|--|
| Electricity Produced     | 296,880      | MWh    | 722                                    |
| Electricity Imported     | 1439         | MWh    | 4                                      |
| Electricity Exported     | 264,456      | MWh    | 644                                    |
| Gas Oil                  | 443          | tonnes |  |
| Steam/hot water exported | 0            | GWh    | -                                      |
|                          |              |        |  |
|                          |              |        |  |

Operator's comments :

|  |
|--|
|  |
|--|

Signed: \_\_\_\_\_

Date: 29/01/2024

**Summary of Permit Compliance****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 <sup>Note 1</sup> |             |
|----------------------|--|-------------|
|                      | Half-hourly limit  | Daily limit |
| Particulates         | 100%   | 100.00%     |
| Oxides of nitrogen   | 100%   | 100.00%     |
| Sulphur dioxide      | 100%   | 100.00%     |
| Carbon monoxide      | xx.xx % or<br>100.00% 95% of 10-min averages                 | 100.00%     |
| Total organic carbon | 99.99%   | 100.00%     |
| Hydrogen chloride    | 99.99%   | 100.00%     |
| Hydrogen fluoride    | 100.00%  | 100.00%     |
|                      | xx.xx %  | xx.xx %     |

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

| Date       | Summary of notification or non-compliance<br>[including Line/Reference] <sup>Note 2</sup> | Reason                                   | Measures taken to<br>prevent<br>reoccurrence |
|------------|---|--|--|
| 11/01/2023 | Line 1 . Half hour VOC schedule 5   | Power supply lost to<br>common MCC board | Replacement power<br>supplies installed      |
| 19/02/2023 | Line 1 HCl 60 mins abnormal operation   |  |  |
| 21/02/2023 | Emission testing schedule 5   | Periodic emissions testing               | Isolated event                               |
| 06/03/2023 | Line 1 HCl 30 mins abnormal operation   |  |  |
| 18/09/2023 | Line 2 Half hour HCl schedule 5   | Waste composition                        | Targetted waste<br>inspections               |

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

| Date       | Summary of complaint [including<br>Line/Reference] | Reason *                    | Measures taken to<br>prevent<br>reoccurrence |
|------------|--|-----------------------------|--|
| 05/10/2023 | Photo of stack emission                            | Not substantiated by<br>NRW |  |
|            |  |                             |  |
|            |  |                             |  |
|            |  |                             |  |

\* including whether substantiated by the  
operator or the EA

**Summary of Plant Improvements**

**Summary of any efficiency improvements that have been completed within the year.**

Lighting within the Tipping Hall have changed from fluorescent bulbs to LED lighting.

**Summary of any permit improvement conditions that have been completed within the year and the resulting environmental benefits.**

Historical Improvement Conditions (ICs) associated with the ERFs Environmental Permit EPR/LP3030XA/v007 were completed prior to 21 December 2022. Additional ICs have been included within the variation v008 dated 21 December 2022. IC6 OTNOC Management Plan, IC7 Results of NOx trial, IC8 results of mercuric monitoring, IC9 and IC10 Report demonstrates viability of CHP have all been submitted during 2023.

**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 during 2023.

**Summary of any other improvements made to the plant or planned to be made and a summary of the resulting environmental benefits.**

No significant improvements have occurred. The operations and engineering elements have remained constant.

**Details of Public & Stakeholder Liasion**

| <b>Summary of events held during the reporting year.</b> |  |
|--|--|
| <b>Date</b>  | <b>Description</b>                     |
| 10_01_2023   | Community Liasion Meeting held on site |
| 18_04_2023   | Community Liasion Meeting held on site |
| 11_07_2023   | Community Liasion Meeting held on site |
| 10_10_2023   | Community Liasion Meeting held on site |

| <b>List of events planned for next year</b> |   |
|---|---|
| <b>Date</b>                                 | <b>Description</b>  |
| Jan-24                                      | Meeting to be held on-site conditions permitting                                |
| Apr-24                                      | Meeting to be held on-site conditions permitting                                |
| Jul-24                                      | Meeting to be held on-site conditions permitting                                |
| Oct-24                                      | Meeting to be held on-site conditions permitting                                |
|   | 2 open dates are scheduled to be held during 2024. Dates are "to be confirmed". |

**If you wish to be involved in the public liasion programme, please contact [REDACTED] or [REDACTED]**

**Carbon dioxide emissions and biogenic content of waste inputs**

**Carbon dioxide emissions (all types of plant)**

|   |   |        |
|---|---|--------|
| Annual mass of carbon dioxide released  | tonnes  | 357500 |
| Annual mass of carbon dioxide released per tonne of waste burned                          | t CO <sub>2</sub> / t waste                           | 1      |
| Annual mass of carbon dioxide released per MWh of energy exported                         | t CO <sub>2</sub> / MWh export                        | 1      |
| Description of how annual carbon dioxide mass emission has been calculated.<br>See Note 1 | Calibrated CEMS equipment and CDAS Reporting software |        |

**Nitrous oxide emissions (only plants which use ammonia or urea to abate NOx emissions)**

|   |   |         |
|---|---|---------|
| Annual mass emissions of nitrous oxide  | tonnes N <sub>2</sub> O                               | 14      |
| Description of how annual nitrous oxide mass emission has been calculated<br>See Note 2 | Calibrated CEMS equipment and CDAS Reporting software |         |
| <b>Total annual carbon dioxide and nitrous oxide emissions.</b><br>Note 3.              | tonnes CO <sub>2</sub> e                              | 361,522 |

**Biogenic CO2 emissions (See Note 4)**

|   |  |       |
|---|--|-------|
| Percentage of total carbon dioxide emissions arising from biogenic waste  | %  | 51.4% |
| No. of measurements undertaken  | Number   | 1     |
| Description of how percentage biogenic carbon dioxide emissions have been measured or calculated.<br>See Note 5 | Waste sample and laboratory analysis undertaken by Marchwood |       |

**Biogenic fraction of waste feedstock (See Note 4)**

|   |   |       |
|---|---|-------|
| Yearly average biogenic percentage of the waste by net calorific value (NCV)      | % | 51.4% |
| If sampling undertaken, no. of samples used to ascertain average biogenic % above |   | 1     |

|   |  |
|---|--|
| Description of how biogenic percentage (by NCV) has been calculated or estimated.<br>See Note 6 | Waste sample and laboratory analysis undertaken by Marchwood |
|---|--|

Comments:

|  |
|--|
|  |
|--|

**Residue Quality Monitoring Requirements**

|  |
|--|
| <b>Summary of monitoring undertaken and compliance</b>   |
| IBA sampling undertaken in accordance with ESA protocol. |
|  |
|  |

**Commentary on any specific events**

| Date & Event | Description |
|--------------|-------------|
|              |             |
|              |             |
|              |             |
|              |             |
|              |             |

| Residue Quality Monitoring Results |       |                  |              |
|------------------------------------|-------|------------------|--------------|
| Parameter (unit)                   | Limit | Normal Operation |              |
|                                    |       | Bottom ash       | APC Residues |
| Loss on Ignition (average %)       | <5%   | 2.03             | <del> </del> |
| Total Organic Carbon (average %)   | <3%   | 1.57             | <del> </del> |
| No. of Assessments Undertaken      | --    | 33               | 4            |
| No. of Hazardous Results           | --    | 0                | <del> </del> |

**Comments :**

Additional IBA samples were undertaken to achieve Improvement Condition (NOx trial) within Environment

**Emissions to Water**

|  |
|--|
| <b>Summary of monitoring undertaken and compliance</b>   |
| Sampling of Trade Effluent Discharge undertaken by DWR CYMRU WELSH WATER on a monthly frequency. |
|  |
|  |

|  |
|--|
| <b>Commentary on any specific events</b> |
|--|

| Date & Event | Description |
|--------------|-------------|
|              |             |
|              |             |
|              |             |

**Emissions to Water / Sewer**

| Parameter                        | Monitoring Frequency | Limit | Target | Max. | Average |
|----------------------------------|----------------------|-------|--------|------|---------|
| Trade Effluent Discharge Consent | Monthly              |       |        |      |         |
|                                  |                      |       |        |      |         |
|                                  |                      |       |        |      |         |
|                                  |                      |       |        |      |         |
|                                  |                      |       |        |      |         |
|                                  |                      |       |        |      |         |
|                                  |                      |       |        |      |         |

**Emissions to Air (periodically monitored)****Summary of monitoring undertaken, standards used and compliance****Results of emissions to air that are periodically monitored - oxygen reference 6%**

| Substance   | Ref. Period | Emission Limit Value*      | Average |         |    |    |    |
|---|-------------|----------------------------|---------|---------|----|----|----|
|   |             |                            | A1      | A2      | A3 | A4 | A5 |
| Hydrogen fluoride                                     | 1 hr        | 2 mg/m <sup>3</sup>        | 0.027   | 0.049   |    |    |    |
| Cd and Th and their compounds                         | 0.5-8hrs    | 0.05 mg/m <sup>3</sup>     | 0.0004  | 0.0004  |    |    |    |
| Hg and its compounds                                  | 0.5-8hrs    | 0.05 mg/m <sup>3</sup>     | 0.0131  | 0.0076  |    |    |    |
| Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V and their compounds | 0.5-8hrs    | 0.5 mg/m <sup>3</sup>      | 0.0391  | 0.035   |    |    |    |
| Dioxins & Furans (I-TEQ)                              | 6-8hrs      | 0.1 ng/m <sup>3</sup>      | 0.0412  | 0.0418  |    |    |    |
| PCBs (WHO-TEQ Humans / Mammals)                       | 6-8hrs      | None set ng/m <sup>3</sup> | 0.0041  | 0.0027  |    |    |    |
| PCBs (WHO-TEQ Fish)                                   | 6-8hrs      | None set ng/m <sup>3</sup> | 0.0002  | 0.0001  |    |    |    |
| PCBs (WHO-TEQ Birds)                                  | 6-8hrs      | None set ng/m <sup>3</sup> | 0.0069  | 0.0023  |    |    |    |
| Dioxins & Furans (WHO-TEQ Humans / Mammals)           | 6-8hrs      | None set ng/m <sup>3</sup> | 0.0382  | 0.0373  |    |    |    |
| Dioxins & Furans (WHO-TEQ Fish)                       | 6-8hrs      | None set ng/m <sup>3</sup> | 0.0433  | 0.0445  |    |    |    |
| Dioxins & Furans (WHO-TEQ Birds)                      | 6-8hrs      | None set ng/m <sup>3</sup> | 0.0886  | 0.079   |    |    |    |
| Anthanthrene  | 6-8hrs      | None set µg/m <sup>3</sup> | <0.001  | <0.0011 |    |    |    |
| Benzo(a)anthracene                                    | 6-8hrs      | None set µg/m <sup>3</sup> | < 0.001 | <0.0011 |    |    |    |
| Benzo(a)pyrene  | 6-8hrs      | None set µg/m <sup>3</sup> | <0.001  | <0.0011 |    |    |    |
| Benzo(b)fluoranthene                                  | 6-8hrs      | None set µg/m <sup>3</sup> | < 0.001 | <0.0011 |    |    |    |
| Benzo(b)naphtho(2,1-d)thiophene                       | 6-8hrs      | None set µg/m <sup>3</sup> | <0.001  | <0.0011 |    |    |    |
| Benzo(c)phenanthrene                                  | 6-8hrs      | None set µg/m <sup>3</sup> | <0.001  | <0.0011 |    |    |    |
| Benzo(ghi)perylene                                    | 6-8hrs      | None set µg/m <sup>3</sup> | < 0.001 | <0.0011 |    |    |    |
| Benzo(k)fluoranthene                                  | 6-8hrs      | None set µg/m <sup>3</sup> | <0.001  | <0.0011 |    |    |    |
| Cholanthrene  | 6-8hrs      | None set µg/m <sup>3</sup> | <0.001  | <0.0011 |    |    |    |
| Chrysene  | 6-8hrs      | None set µg/m <sup>3</sup> | < 0.001 | <0.0011 |    |    |    |
| Cyclopenta(cd)pyrene                                  | 6-8hrs      | None set µg/m <sup>3</sup> | <0.001  | <0.0011 |    |    |    |
| Dibenzo(ai)pyrene                                     | 6-8hrs      | None set µg/m <sup>3</sup> | <0.001  | <0.0011 |    |    |    |
| Dibenzo(ah)anthracene                                 | 6-8hrs      | None set µg/m <sup>3</sup> | <0.001  | <0.0011 |    |    |    |
| Fluoranthene  | 6-8hrs      | None set µg/m <sup>3</sup> | 0.02    | 0.01    |    |    |    |
| Indeno(123-cd) pyrene                                 | 6-8hrs      | None set µg/m <sup>3</sup> | <0.001  | <0.0011 |    |    |    |
| Naphthalene   | 6-8hrs      | None set µg/m <sup>3</sup> | 0.15    | 0.11    |    |    |    |

**Comments :**

**Emissions to Air (continuously monitored)**

|  |
|--|
| <b>Summary of monitoring undertaken, standards used and compliance</b> |
|  |
|  |

| <b>Results of emissions to air that are continuously monitored (maximum and average values for each line) - oxygen reference 11%</b> |                     |                             |         |          |         |         |      |      |      |      |      |      |
|--|---------------------|-----------------------------|---------|----------|---------|---------|------|------|------|------|------|------|
| Substance  | Reference Period    | Emission Limit Value**      | A1      |          | A2      |         | A3   |      | A4   |      | A5   |      |
|  |                     |                             | Max.    | Avg.     | Max.    | Avg.    | Max. | Avg. | Max. | Avg. | Max. | Avg. |
| Oxides of nitrogen   | Daily mean          | 200 mg/m <sup>3</sup>       | 191.08  | 177.639  | 199.04  | 173.912 |      |      |      |      |      |      |
|  | ½ hourly mean       | 400 mg/m <sup>3</sup>       | 328.83  | 177.718  | 271.26  | 174.107 |      |      |      |      |      |      |
| Particulates   | Daily mean          | 10 mg/m <sup>3</sup>        | 1.97    | 0.5625   | 2.3     | 0.4825  |      |      |      |      |      |      |
|  | ½ hourly mean       | 30 mg/m <sup>3</sup>        | 4.09    | 0.56167  | 8.82    | 0.48333 |      |      |      |      |      |      |
| Total Organic Carbon   | Daily mean          | 10 mg/m <sup>3</sup>        | 0.51    | 0.1025   | 1.48    | 0.3175  |      |      |      |      |      |      |
|  | ½ hourly mean       | 20 mg/m <sup>3</sup>        | 85.81   | 0.099167 | 11.09   | 0.3075  |      |      |      |      |      |      |
| Hydrogen chloride  | Daily mean          | 10 mg/m <sup>3</sup>        | 9.44    | 8.60167  | 9.41    | 8.3     |      |      |      |      |      |      |
|  | ½ hourly mean       | 60 mg/m <sup>3</sup>        | 143.59  | 8.5925   | 68.16   | 8.23667 |      |      |      |      |      |      |
| Sulphur dioxide  | Daily mean          | 50 mg/m <sup>3</sup>        | 31.89   | 19.5408  | 33.43   | 13.9183 |      |      |      |      |      |      |
|  | ½ hourly mean       | 200 mg/m <sup>3</sup>       | 166.26  | 19.5675  | 92.45   | 13.9933 |      |      |      |      |      |      |
| Carbon monoxide  | Daily mean          | 50 mg/m <sup>3</sup>        | 21.36   | 2.0375   | 39.18   | 6.15333 |      |      |      |      |      |      |
|  | ½ hourly mean *     | 100 mg/m <sup>3</sup> *     | NA      | NA       | NA      | NA      |      |      |      |      |      |      |
|  | 95%ile 10-min avg * | 150 mg/m <sup>3</sup> *     | 6252.21 | 13.7367  | 3874.27 | 48.07   |      |      |      |      |      |      |
| Ammonia  | Daily mean          | No limit set until 03/12/23 | 6.84    | 1.585    | 6.28    | 1.178   |      |      |      |      |      |      |

\*\* = delete as appropriate, depending on whether your plant has half-hourly or 10-min CO ELVs

Comments :

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|--|
|  |
|--|

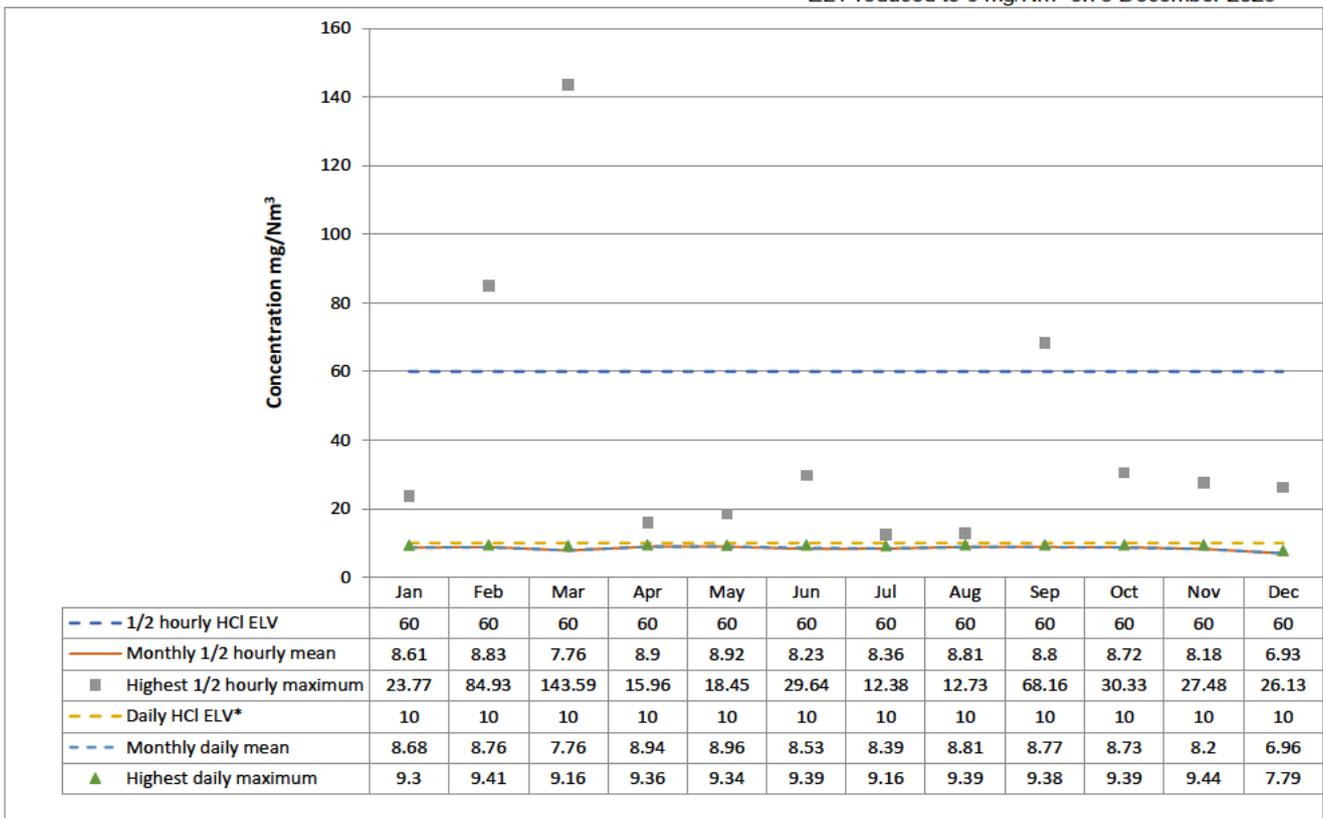
Monitoring of Hydrogen Chloride emissions

Whole Installation

See Notes in Cell Q3

| mg/Nm <sup>3</sup> | 1/2 Hourly Reference Periods |                         |                            | Daily Reference Periods |                    |                       |
|--------------------|------------------------------|-------------------------|----------------------------|-------------------------|--------------------|-----------------------|
|                    | 1/2 hourly HCl ELV           | Monthly 1/2 hourly mean | Highest 1/2 hourly maximum | Daily HCl ELV*          | Monthly daily mean | Highest daily maximum |
| 2023               |                              |                         |                            |                         |                    |                       |
| Jan                | 60                           | 8.61                    | 23.77                      | 10                      | 8.68               | 9.3                   |
| Feb                | 60                           | 8.83                    | 84.93                      | 10                      | 8.76               | 9.41                  |
| Mar                | 60                           | 7.76                    | 143.59                     | 10                      | 7.76               | 9.16                  |
| Apr                | 60                           | 8.9                     | 15.96                      | 10                      | 8.94               | 9.36                  |
| May                | 60                           | 8.92                    | 18.45                      | 10                      | 8.96               | 9.34                  |
| Jun                | 60                           | 8.23                    | 29.64                      | 10                      | 8.53               | 9.39                  |
| Jul                | 60                           | 8.36                    | 12.38                      | 10                      | 8.39               | 9.16                  |
| Aug                | 60                           | 8.81                    | 12.73                      | 10                      | 8.81               | 9.39                  |
| Sep                | 60                           | 8.8                     | 68.16                      | 10                      | 8.77               | 9.38                  |
| Oct                | 60                           | 8.72                    | 30.33                      | 10                      | 8.73               | 9.39                  |
| Nov                | 60                           | 8.18                    | 27.48                      | 10                      | 8.2                | 9.44                  |
| Dec                | 60                           | 6.93                    | 26.13                      | 10                      | 6.96               | 7.79                  |

\* ELV reduced to 8 mg/Nm<sup>3</sup> on 3 December 2023



Comments :

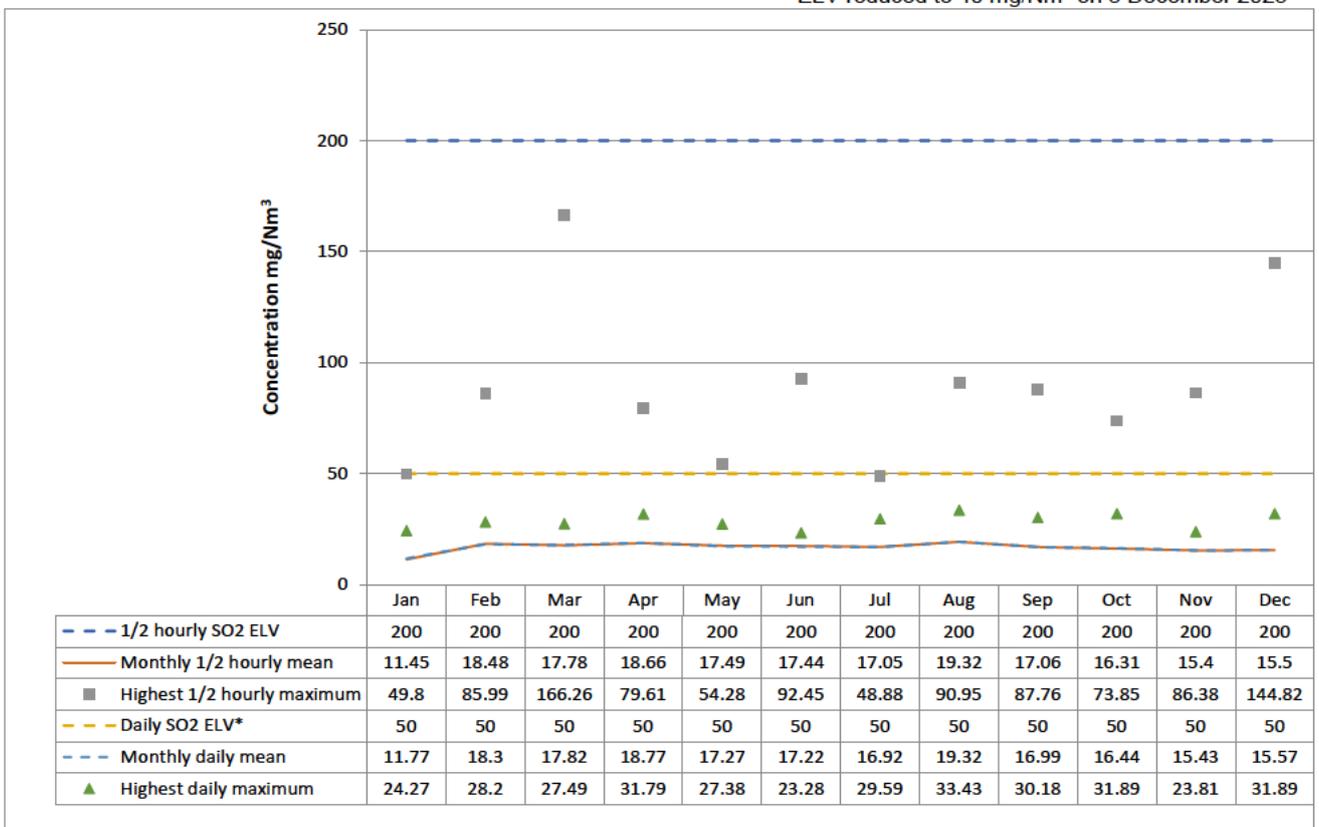
Monitoring of Sulphur dioxide emissions

Whole Installation

See Notes in Cell Q3

| 2023 | 1/2 Hourly Reference Periods |                         |                            | Daily Reference Periods |                    |                       |
|------|------------------------------|-------------------------|----------------------------|-------------------------|--------------------|-----------------------|
|      | 1/2 hourly SO2 ELV           | Monthly 1/2 hourly mean | Highest 1/2 hourly maximum | Daily SO2 ELV*          | Monthly daily mean | Highest daily maximum |
| Jan  | 200                          | 11.45                   | 49.8                       | 50                      | 11.77              | 24.27                 |
| Feb  | 200                          | 18.48                   | 85.99                      | 50                      | 18.3               | 28.2                  |
| Mar  | 200                          | 17.78                   | 166.26                     | 50                      | 17.82              | 27.49                 |
| Apr  | 200                          | 18.66                   | 79.61                      | 50                      | 18.77              | 31.79                 |
| May  | 200                          | 17.49                   | 54.28                      | 50                      | 17.27              | 27.38                 |
| Jun  | 200                          | 17.44                   | 92.45                      | 50                      | 17.22              | 23.28                 |
| Jul  | 200                          | 17.05                   | 48.88                      | 50                      | 16.92              | 29.59                 |
| Aug  | 200                          | 19.32                   | 90.95                      | 50                      | 19.32              | 33.43                 |
| Sep  | 200                          | 17.06                   | 87.76                      | 50                      | 16.99              | 30.18                 |
| Oct  | 200                          | 16.31                   | 73.85                      | 50                      | 16.44              | 31.89                 |
| Nov  | 200                          | 15.4                    | 86.38                      | 50                      | 15.43              | 23.81                 |
| Dec  | 200                          | 15.5                    | 144.82                     | 50                      | 15.57              | 31.89                 |

\* ELV reduced to 40 mg/Nm<sup>3</sup> on 3 December 2023



Comments :

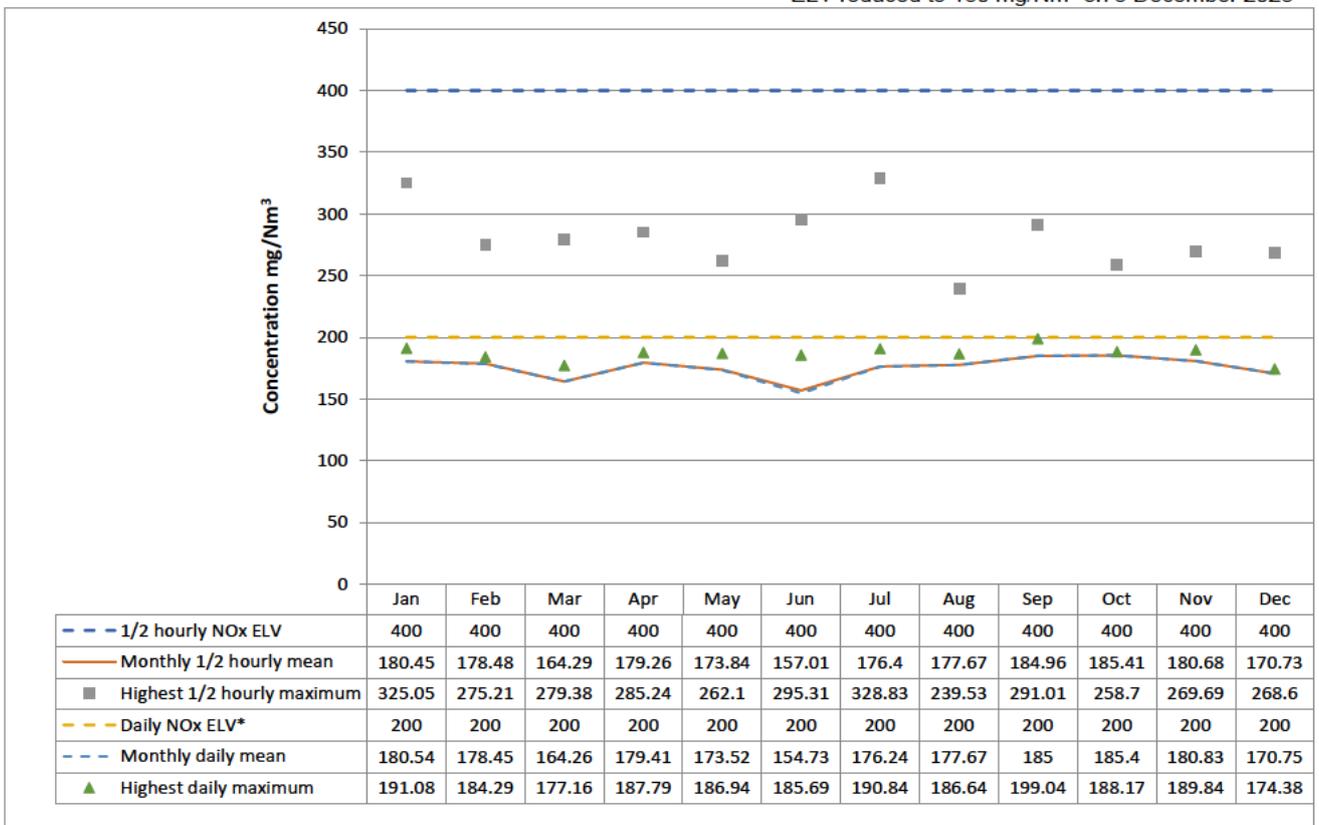
Monitoring of Oxides of Nitrogen emissions

Whole Installation

See Notes in Cell Q3

| mg/Nm <sup>3</sup> | 1/2 Hourly Reference Periods |                         |                            | Daily Reference Periods |                    |                       |
|--------------------|------------------------------|-------------------------|----------------------------|-------------------------|--------------------|-----------------------|
|                    | 1/2 hourly NOx ELV           | Monthly 1/2 hourly mean | Highest 1/2 hourly maximum | Daily NOx ELV*          | Monthly daily mean | Highest daily maximum |
| 2023               |                              |                         |                            |                         |                    |                       |
| Jan                | 400                          | 180.45                  | 325.05                     | 200                     | 180.54             | 191.08                |
| Feb                | 400                          | 178.48                  | 275.21                     | 200                     | 178.45             | 184.29                |
| Mar                | 400                          | 164.29                  | 279.38                     | 200                     | 164.26             | 177.16                |
| Apr                | 400                          | 179.26                  | 285.24                     | 200                     | 179.41             | 187.79                |
| May                | 400                          | 173.84                  | 262.1                      | 200                     | 173.52             | 186.94                |
| Jun                | 400                          | 157.01                  | 295.31                     | 200                     | 154.73             | 185.69                |
| Jul                | 400                          | 176.4                   | 328.83                     | 200                     | 176.24             | 190.84                |
| Aug                | 400                          | 177.67                  | 239.53                     | 200                     | 177.67             | 186.64                |
| Sep                | 400                          | 184.96                  | 291.01                     | 200                     | 185                | 199.04                |
| Oct                | 400                          | 185.41                  | 258.7                      | 200                     | 185.4              | 188.17                |
| Nov                | 400                          | 180.68                  | 269.69                     | 200                     | 180.83             | 189.84                |
| Dec                | 400                          | 170.73                  | 268.6                      | 200                     | 170.75             | 174.38                |

\* ELV reduced to 180 mg/Nm<sup>3</sup> on 3 December 2023

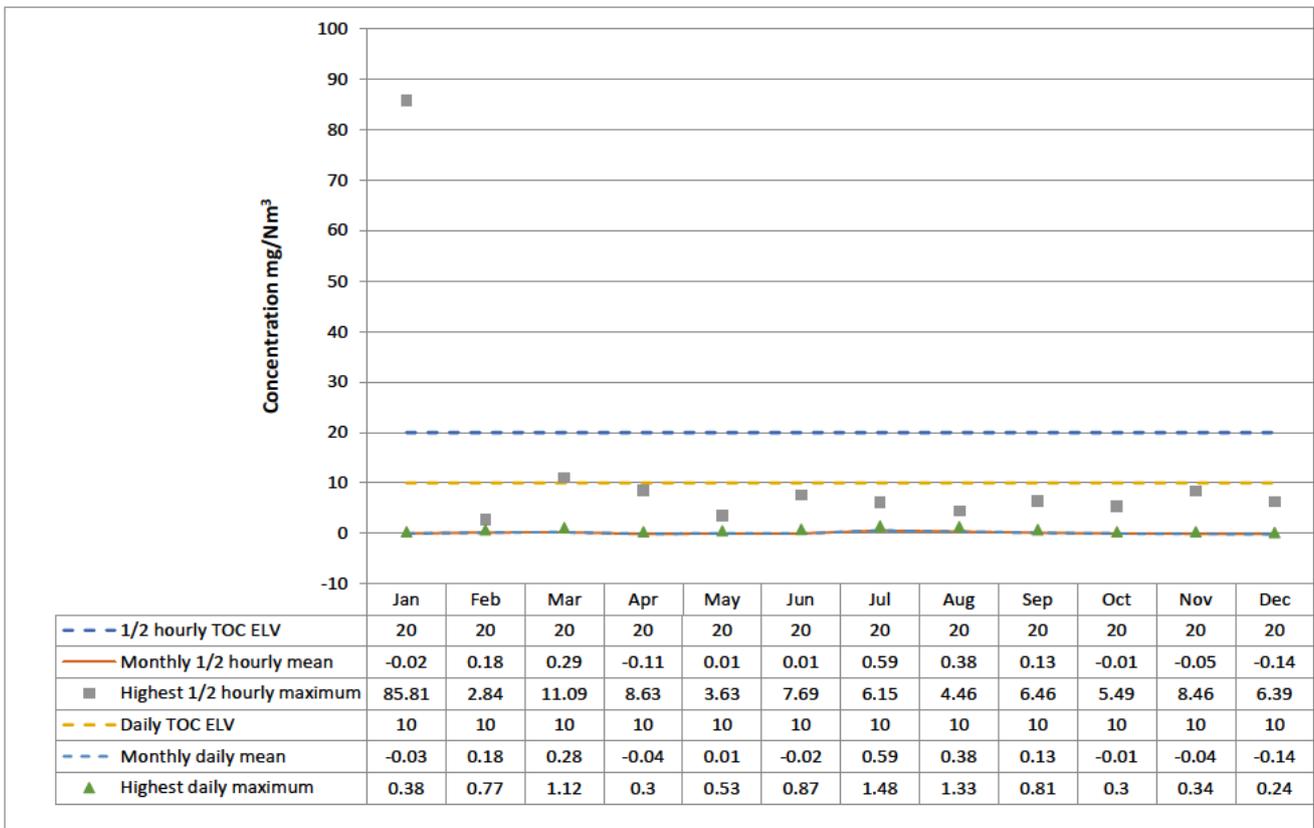


Comments :

Monitoring of Total organic carbon emissions Whole Installation

See Notes in Cell Q3

| mg/Nm <sup>3</sup> | 1/2 Hourly Reference Periods |                         |                            | Daily Reference Periods |                    |                       |
|--------------------|------------------------------|-------------------------|----------------------------|-------------------------|--------------------|-----------------------|
|                    | 1/2 hourly TOC ELV           | Monthly 1/2 hourly mean | Highest 1/2 hourly maximum | Daily TOC ELV           | Monthly daily mean | Highest daily maximum |
| 2023               |                              |                         |                            |                         |                    |                       |
| Jan                | 20                           | -0.02                   | 85.81                      | 10                      | -0.03              | 0.38                  |
| Feb                | 20                           | 0.18                    | 2.84                       | 10                      | 0.18               | 0.77                  |
| Mar                | 20                           | 0.29                    | 11.09                      | 10                      | 0.28               | 1.12                  |
| Apr                | 20                           | -0.11                   | 8.63                       | 10                      | -0.04              | 0.3                   |
| May                | 20                           | 0.01                    | 3.63                       | 10                      | 0.01               | 0.53                  |
| Jun                | 20                           | 0.01                    | 7.69                       | 10                      | -0.02              | 0.87                  |
| Jul                | 20                           | 0.59                    | 6.15                       | 10                      | 0.59               | 1.48                  |
| Aug                | 20                           | 0.38                    | 4.46                       | 10                      | 0.38               | 1.33                  |
| Sep                | 20                           | 0.13                    | 6.46                       | 10                      | 0.13               | 0.81                  |
| Oct                | 20                           | -0.01                   | 5.49                       | 10                      | -0.01              | 0.3                   |
| Nov                | 20                           | -0.05                   | 8.46                       | 10                      | -0.04              | 0.34                  |
| Dec                | 20                           | -0.14                   | 6.39                       | 10                      | -0.14              | 0.24                  |



**Comments :**

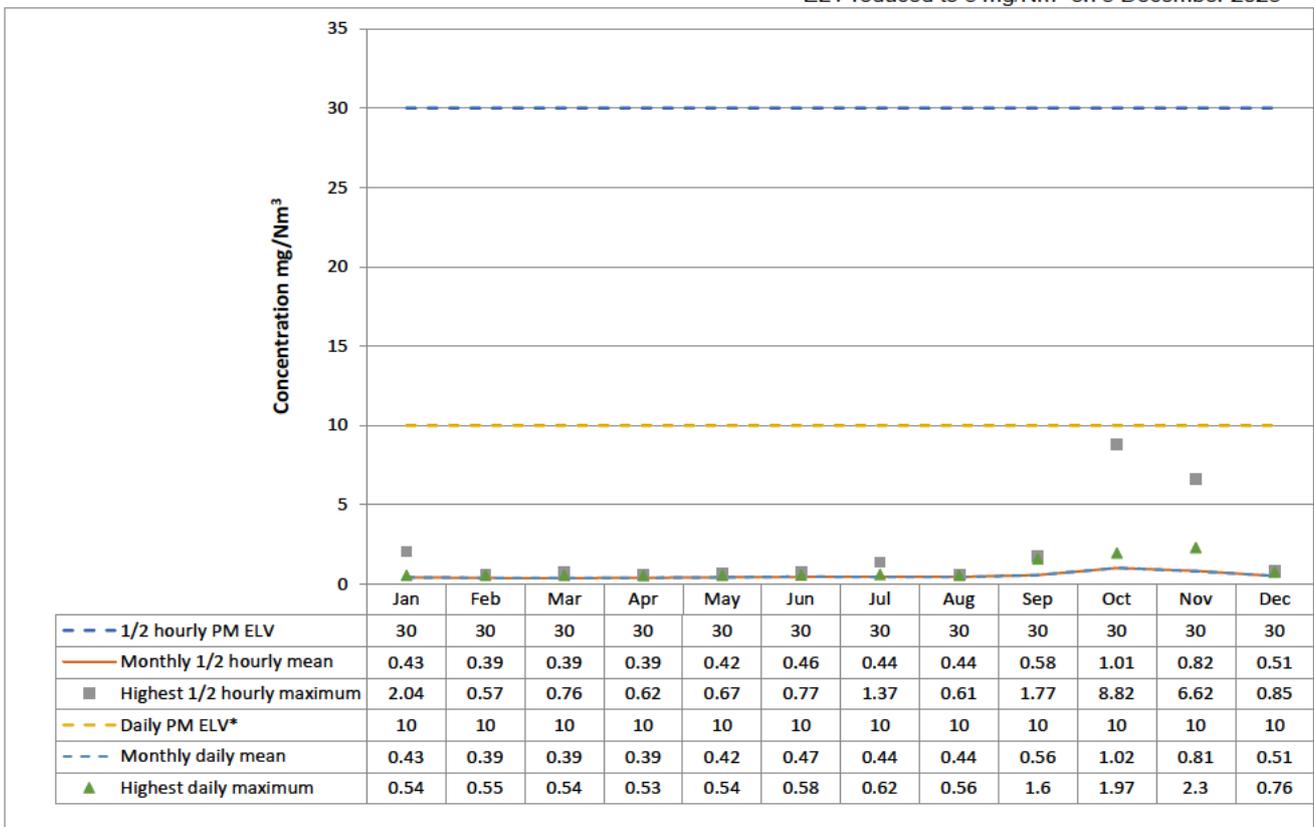
Monitoring of Particulate matter emissions

Whole Installation

See Notes in Cell Q3

| 2023 | 1/2 Hourly Reference Periods |                         |                            | Daily Reference Periods |                    |                       |
|------|------------------------------|-------------------------|----------------------------|-------------------------|--------------------|-----------------------|
|      | 1/2 hourly PM ELV            | Monthly 1/2 hourly mean | Highest 1/2 hourly maximum | Daily PM ELV*           | Monthly daily mean | Highest daily maximum |
| Jan  | 30                           | 0.43                    | 2.04                       | 10                      | 0.43               | 0.54                  |
| Feb  | 30                           | 0.39                    | 0.57                       | 10                      | 0.39               | 0.55                  |
| Mar  | 30                           | 0.39                    | 0.76                       | 10                      | 0.39               | 0.54                  |
| Apr  | 30                           | 0.39                    | 0.62                       | 10                      | 0.39               | 0.53                  |
| May  | 30                           | 0.42                    | 0.67                       | 10                      | 0.42               | 0.54                  |
| Jun  | 30                           | 0.46                    | 0.77                       | 10                      | 0.47               | 0.58                  |
| Jul  | 30                           | 0.44                    | 1.37                       | 10                      | 0.44               | 0.62                  |
| Aug  | 30                           | 0.44                    | 0.61                       | 10                      | 0.44               | 0.56                  |
| Sep  | 30                           | 0.58                    | 1.77                       | 10                      | 0.56               | 1.6                   |
| Oct  | 30                           | 1.01                    | 8.82                       | 10                      | 1.02               | 1.97                  |
| Nov  | 30                           | 0.82                    | 6.62                       | 10                      | 0.81               | 2.3                   |
| Dec  | 30                           | 0.51                    | 0.85                       | 10                      | 0.51               | 0.76                  |

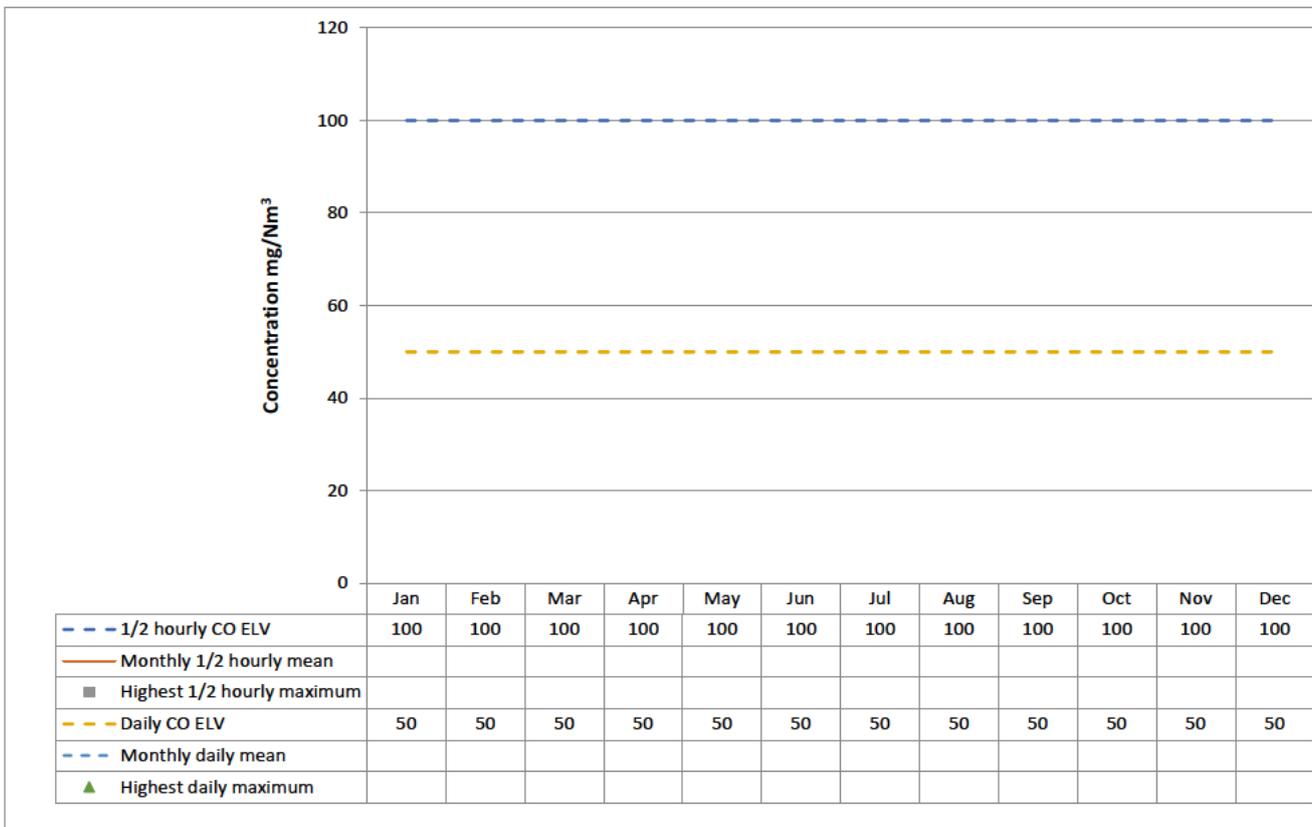
\* ELV reduced to 5 mg/Nm<sup>3</sup> on 3 December 2023



Comments :

Please complete this tab for your plant if you have 1/2 hourly CO ELVs; otherwise, leave it blank and complete the CO 95% 10 min tab

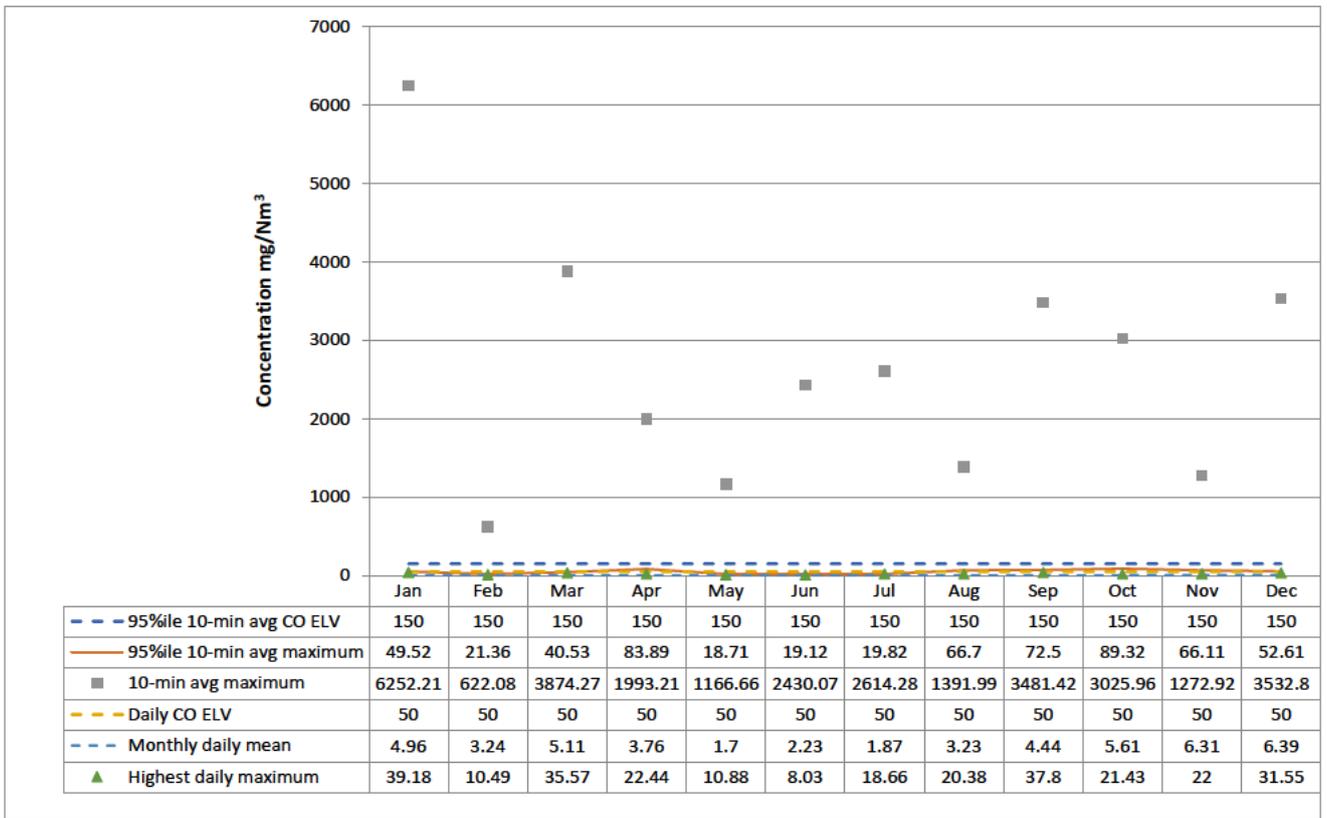
| mg/Nm <sup>3</sup> | 1/2 Hourly Reference Periods |                         |                            | Daily Reference Periods |                    |                       |
|--------------------|------------------------------|-------------------------|----------------------------|-------------------------|--------------------|-----------------------|
|                    | 1/2 hourly CO ELV            | Monthly 1/2 hourly mean | Highest 1/2 hourly maximum | Daily CO ELV            | Monthly daily mean | Highest daily maximum |
| 2023               |                              |                         |                            |                         |                    |                       |
| Jan                | 100                          |                         |                            | 50                      |                    |                       |
| Feb                | 100                          |                         |                            | 50                      |                    |                       |
| Mar                | 100                          |                         |                            | 50                      |                    |                       |
| Apr                | 100                          |                         |                            | 50                      |                    |                       |
| May                | 100                          |                         |                            | 50                      |                    |                       |
| Jun                | 100                          |                         |                            | 50                      |                    |                       |
| Jul                | 100                          |                         |                            | 50                      |                    |                       |
| Aug                | 100                          |                         |                            | 50                      |                    |                       |
| Sep                | 100                          |                         |                            | 50                      |                    |                       |
| Oct                | 100                          |                         |                            | 50                      |                    |                       |
| Nov                | 100                          |                         |                            | 50                      |                    |                       |
| Dec                | 100                          |                         |                            | 50                      |                    |                       |



Comments :

Please complete this tab for your plant if you have 10-minute average CO ELVs; otherwise, leave it blank and complete the CO 0.5 hourly tab

| mg/Nm <sup>3</sup> | 10-minute Reference Periods            |   |                            |                    | Daily Reference Periods |                    |                       |
|--------------------|--|---|----------------------------|--------------------|-------------------------|--------------------|-----------------------|
|                    | 95 <sup>th</sup> ile 10-min avg CO ELV | 95 <sup>th</sup> ile 10-min avg maximum | Monthly CO 10-min avg mean | 10-min avg maximum | Daily CO ELV            | Monthly daily mean | Highest daily maximum |
| 2023               |  |   |                            |                    |                         |                    |                       |
| Jan                | 150                                    | 49.52                                   | 6.42                       | 6252.21            | 50                      | 4.96               | 39.18                 |
| Feb                | 150                                    | 21.36                                   | 3.23                       | 622.08             | 50                      | 3.24               | 10.49                 |
| Mar                | 150                                    | 40.53                                   | 5.64                       | 3874.27            | 50                      | 5.11               | 35.57                 |
| Apr                | 150                                    | 83.89                                   | 3.74                       | 1993.21            | 50                      | 3.76               | 22.44                 |
| May                | 150                                    | 18.71                                   | 1.78                       | 1166.66            | 50                      | 1.7                | 10.88                 |
| Jun                | 150                                    | 19.12                                   | 4.3                        | 2430.07            | 50                      | 2.23               | 8.03                  |
| Jul                | 150                                    | 19.82                                   | 1.87                       | 2614.28            | 50                      | 1.87               | 18.66                 |
| Aug                | 150                                    | 66.7                                    | 3.23                       | 1391.99            | 50                      | 3.23               | 20.38                 |
| Sep                | 150                                    | 72.5                                    | 5.05                       | 3481.42            | 50                      | 4.44               | 37.8                  |
| Oct                | 150                                    | 89.32                                   | 5.9                        | 3025.96            | 50                      | 5.61               | 21.43                 |
| Nov                | 150                                    | 66.11                                   | 6.33                       | 1272.92            | 50                      | 6.31               | 22                    |
| Dec                | 150                                    | 52.61                                   | 6.88                       | 3532.8             | 50                      | 6.39               | 31.55                 |



**Comments :**  
 Environment Agency explanatory note: The 10-minute average ELV is based on the “95th percentile”. In this case this means that 95% of the 10 minute averages in the relevant 24-hour period (i.e. 137) must be below 150 mg/Nm3, and 5% (i.e. 7) are allowed to be any value above 150 mg/Nm3. Whilst we expect operators to minimise CO emissions at all times, it is perfectly acceptable for the value of the maximum 10-minute average to be above 150 mg/Nm3, provided the 95th percentile ELV has been met for that period.

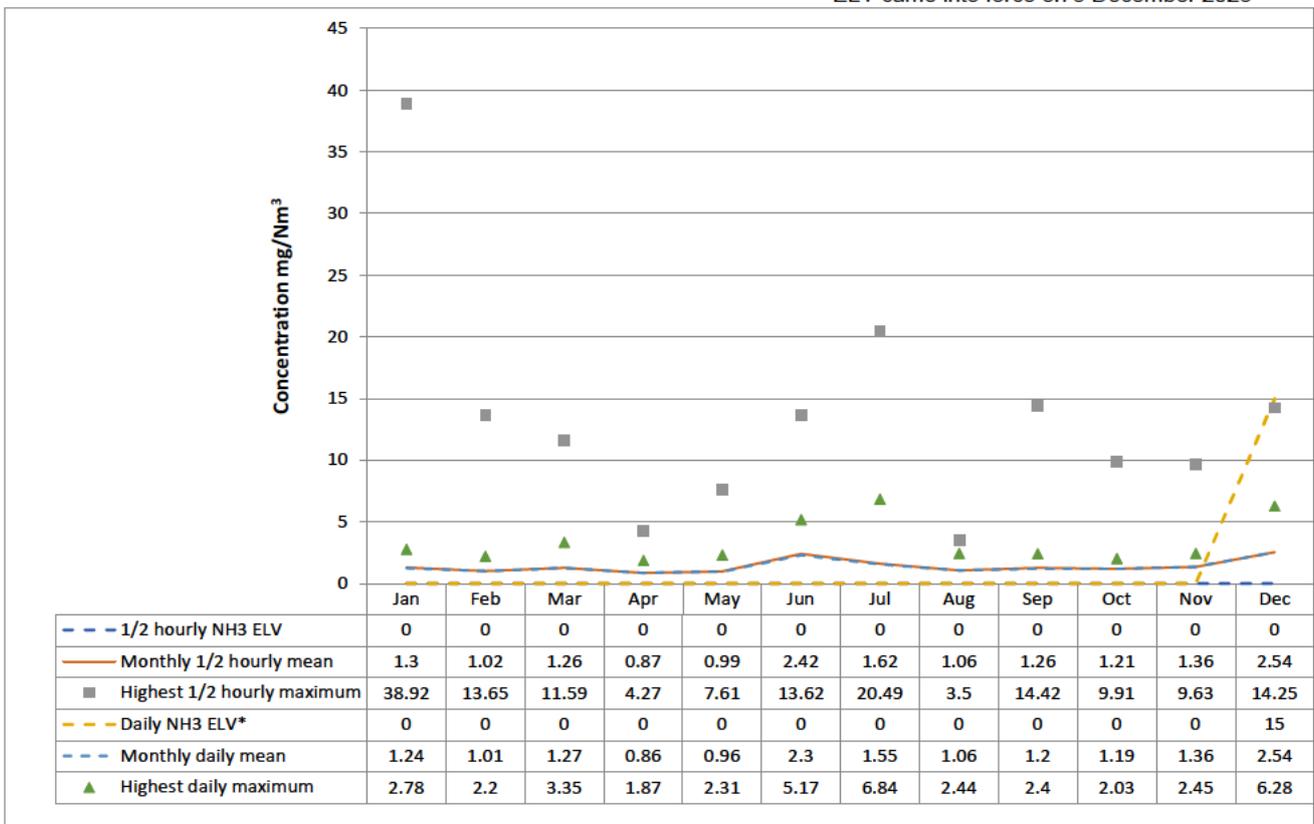
Monitoring of Ammonia emissions

Whole Installation

See Notes in Cell Q3

| mg/Nm <sup>3</sup> | 1/2 Hourly Reference Periods |                         |                            | Daily Reference Periods |                    |                       |
|--------------------|------------------------------|-------------------------|----------------------------|-------------------------|--------------------|-----------------------|
|                    | 1/2 hourly NH3 ELV           | Monthly 1/2 hourly mean | Highest 1/2 hourly maximum | Daily NH3 ELV*          | Monthly daily mean | Highest daily maximum |
| 2023               |                              |                         |                            |                         |                    |                       |
| Jan                | None                         | 1.3                     | 38.92                      | None                    | 1.24               | 2.78                  |
| Feb                | None                         | 1.02                    | 13.65                      | None                    | 1.01               | 2.2                   |
| Mar                | None                         | 1.26                    | 11.59                      | None                    | 1.27               | 3.35                  |
| Apr                | None                         | 0.87                    | 4.27                       | None                    | 0.86               | 1.87                  |
| May                | None                         | 0.99                    | 7.61                       | None                    | 0.96               | 2.31                  |
| Jun                | None                         | 2.42                    | 13.62                      | None                    | 2.3                | 5.17                  |
| Jul                | None                         | 1.62                    | 20.49                      | None                    | 1.55               | 6.84                  |
| Aug                | None                         | 1.06                    | 3.5                        | None                    | 1.06               | 2.44                  |
| Sep                | None                         | 1.26                    | 14.42                      | None                    | 1.2                | 2.4                   |
| Oct                | None                         | 1.21                    | 9.91                       | None                    | 1.19               | 2.03                  |
| Nov                | None                         | 1.36                    | 9.63                       | None                    | 1.36               | 2.45                  |
| Dec                | None                         | 2.54                    | 14.25                      | 15                      | 2.54               | 6.28                  |

\* ELV came into force on 3 December 2023



Comments :

An indicated ELV value of zero in the table above means that no ammonia limit is/was set in the permit.