

**Annual performance report for:** Cambridge University Hospitals NHS Foundation Trust, Addenbrooke’s Hospital Incinerator

**Permit Number:** EPR/WP3935SM/V003

**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**

<b>Name and address of plant</b>	Addenbrooke’s Hospital Incinerator Hills Road Cambridge Cambridgeshire CB2 2QQ
<b>Description of waste input</b>	Waste input is mainly clinical waste (including infectious waste) generated by Addenbrooke’s Hospital. Other wastes incinerated include clinical waste from third parties, items seized by law enforcement agencies, public service uniforms, confidential papers, radioactive waste, animal tissue and plant tissue.
<b>Operator contact details if members of the public have any questions</b>	

**2. Plant description**

The plant comprises two small moving grate incinerators each burning up to 0.5 tonnes/hour of hazardous and non-hazardous waste. Ancillary to these is incoming materials handling equipment, two waste heat recovery boilers (which generate steam to provide space heating for the hospital), gas cleaning equipment and automatic ash handling equipment. The maximum throughput is 1 tonne/hour, and up to approximately 4500 tonnes/year of waste.

The incinerators are served by emissions abatement plant comprising a dry reaction tower where a blend of powered bicarbonate and activated carbon is injected into the exhaust gases to neutralise acids and remove mercury and dioxins. Ceramic filters provide a reaction surface for the absorption and adsorption of acid gases, dioxins, heavy metals and particulate matter before exhaust gases discharge to a 71 m multi-flue stack.

Spent abatement media (fly ash) is released from the ceramic filters and collected in hoppers for transfer to the sealed fly ash vacuum transfer skip. Ash from the combustion chambers (bottom ash) is discharged via a hydraulic ram into an ash skip system which is transferred into a sealed ash skip for disposal. Up to approximately 400 tonnes of bottom ash and 250 tonnes of fly ash are disposed of per year.

Surface water is discharged to the main hospital surface water drainage system. Trade effluent which includes container washings, floor washings and blow-down from the waste heat boilers is discharged via the hospital’s foul drainage system into the public sewer.

### 3. Summary of Plant Operation

<b>Hazardous waste received (clinical)</b>	188.55 tonnes
<b>Non-Hazardous waste received (clinical)</b>	2,006.49 tonnes
<b>Other waste received (radioactive)</b>	2.85 tonnes
<b>Other waste received (non-hazardous from law enforcement agencies)</b>	0.06 tonnes
<b>Total waste received</b>	2,197.95 tonnes
<b>Total plant operational hours</b>	12,170 hours (plant A1 – 5,843 hours; plant A2 – 6,327 hours)
<b>Total hours of “abnormal operation” (see permit for definition)</b>	8.5 hours (January – 3.5 hrs; September – 5 hrs)
<b>Total quantity of incinerator bottom ash (IBA) produced</b>	156.02 tonnes
<b>Disposal or recovery route for IBA</b>	Disposal in landfill (D05)
<b>Did any batches of IBA test as hazardous? If yes, state quantity</b>	Tests carried out quarterly; Q1: Non-Haz Q2: Non-Haz Q3: Non-Haz Q4: Non-Haz
<b>Total quantity of air pollution control (APC) residues produced</b>	157.12 tonnes
<b>Disposal or recovery route for APC residues</b>	Disposal by treatment (D09)
<b>Total heat produced for export (e.g. to hospital or district heating scheme)</b>	250,132 GJ (69,481 MWh)

### 4. Summary of Plant Emissions

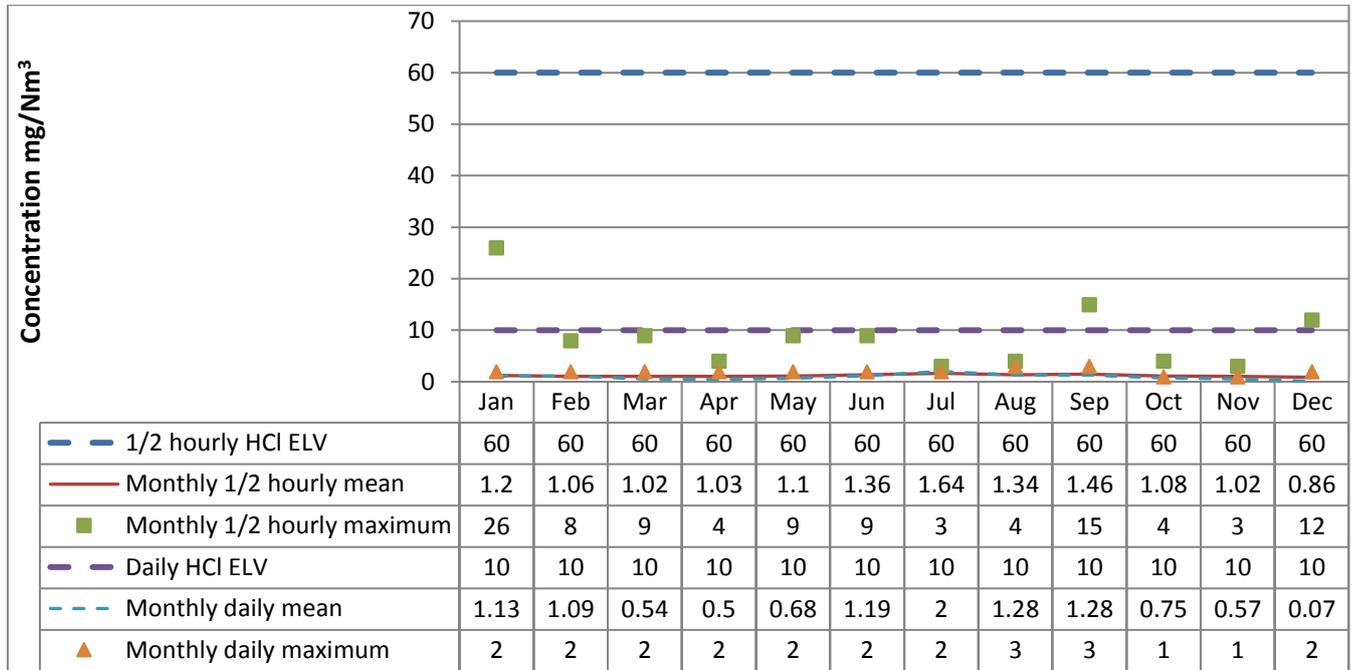
#### 4.1 Summary of continuous emissions monitoring results for emissions to air

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

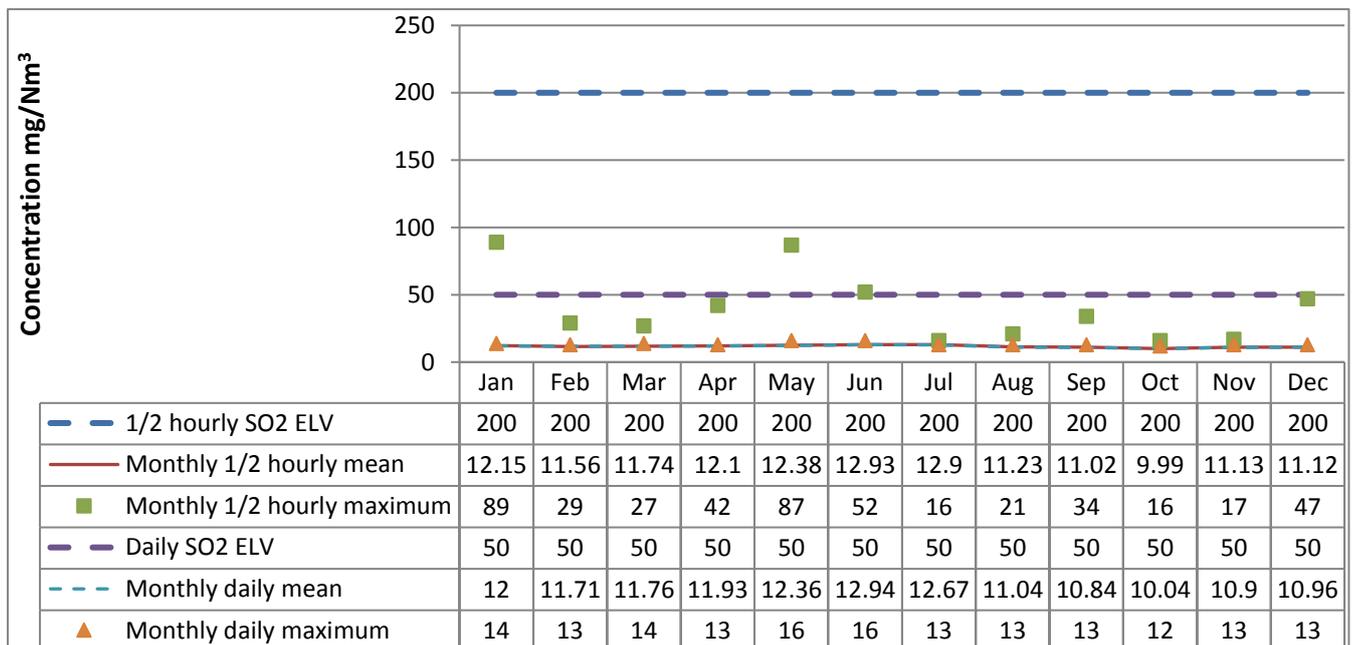


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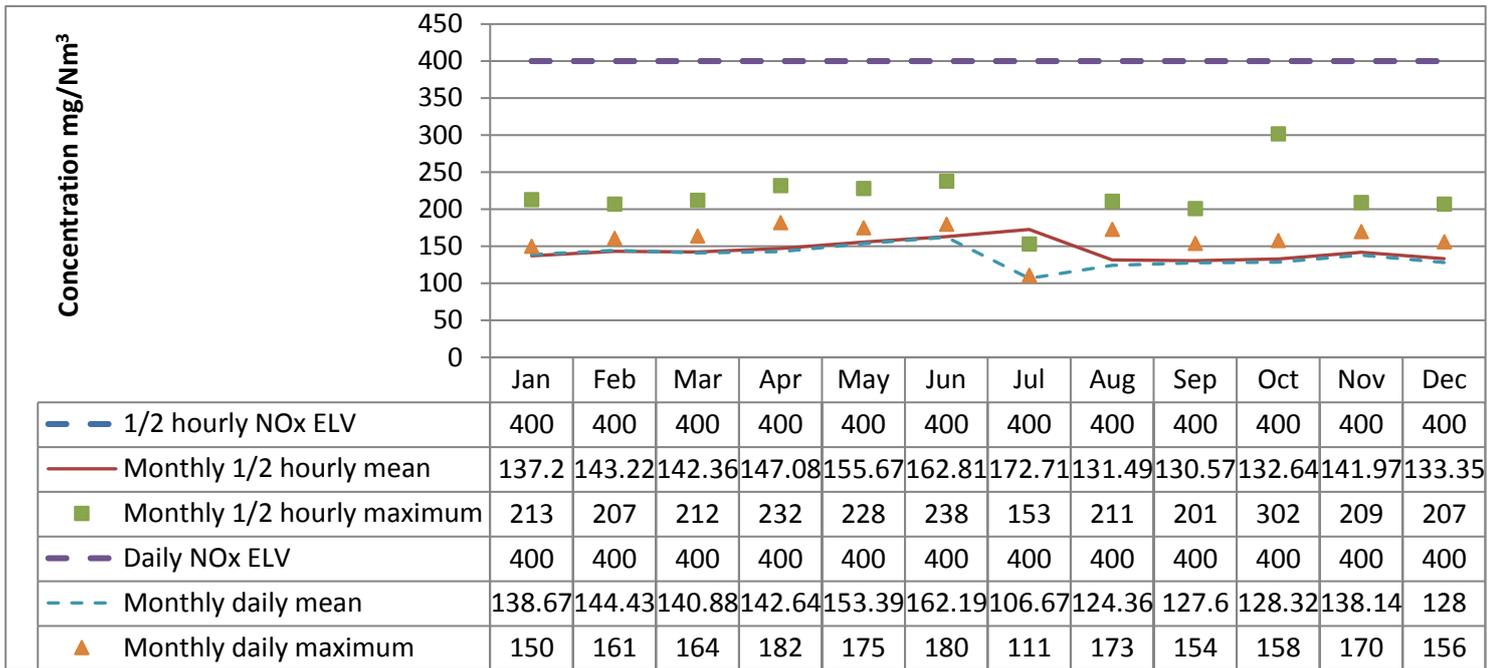
Plant A1 - Hydrogen chloride



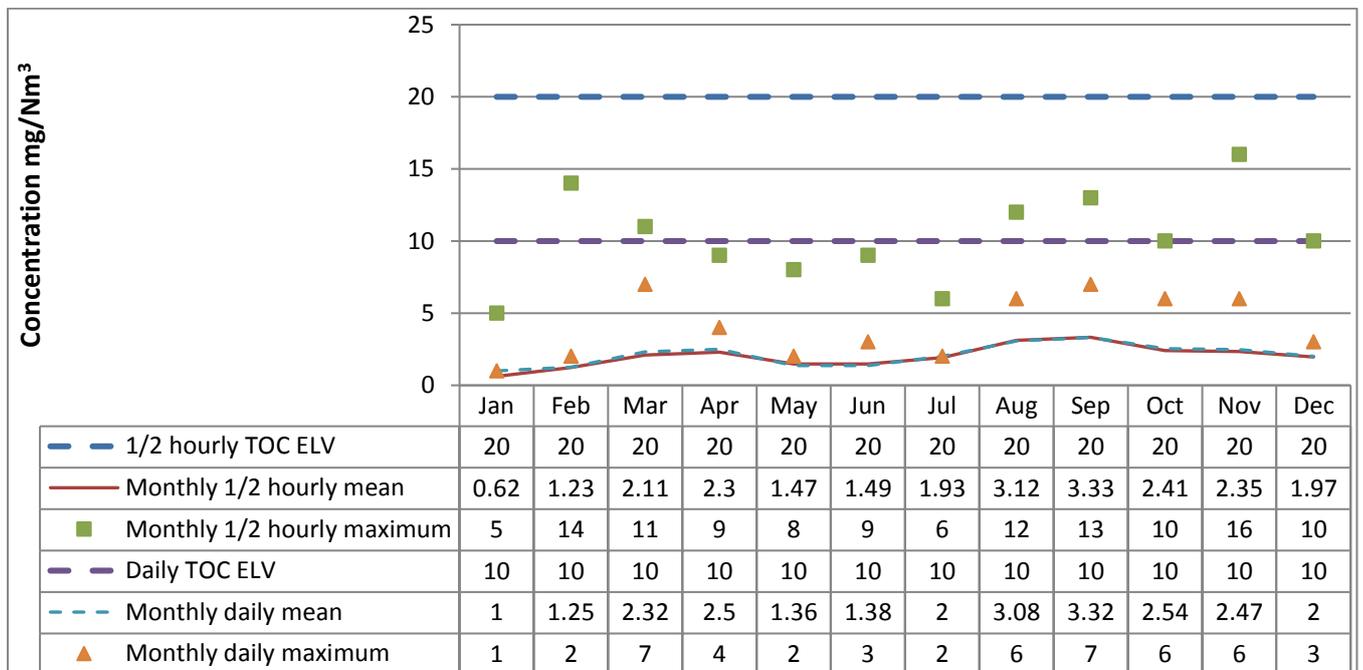
Plant A1 – Sulphur dioxide



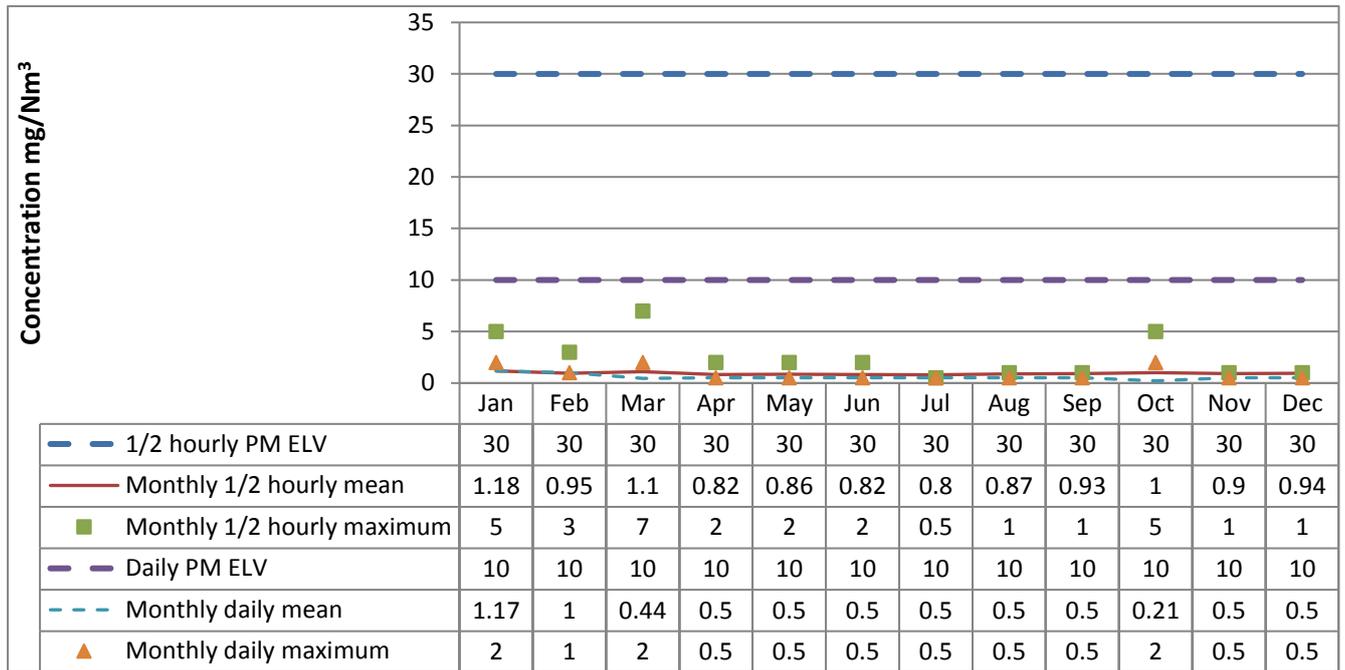
Plant A1 – Oxides of nitrogen



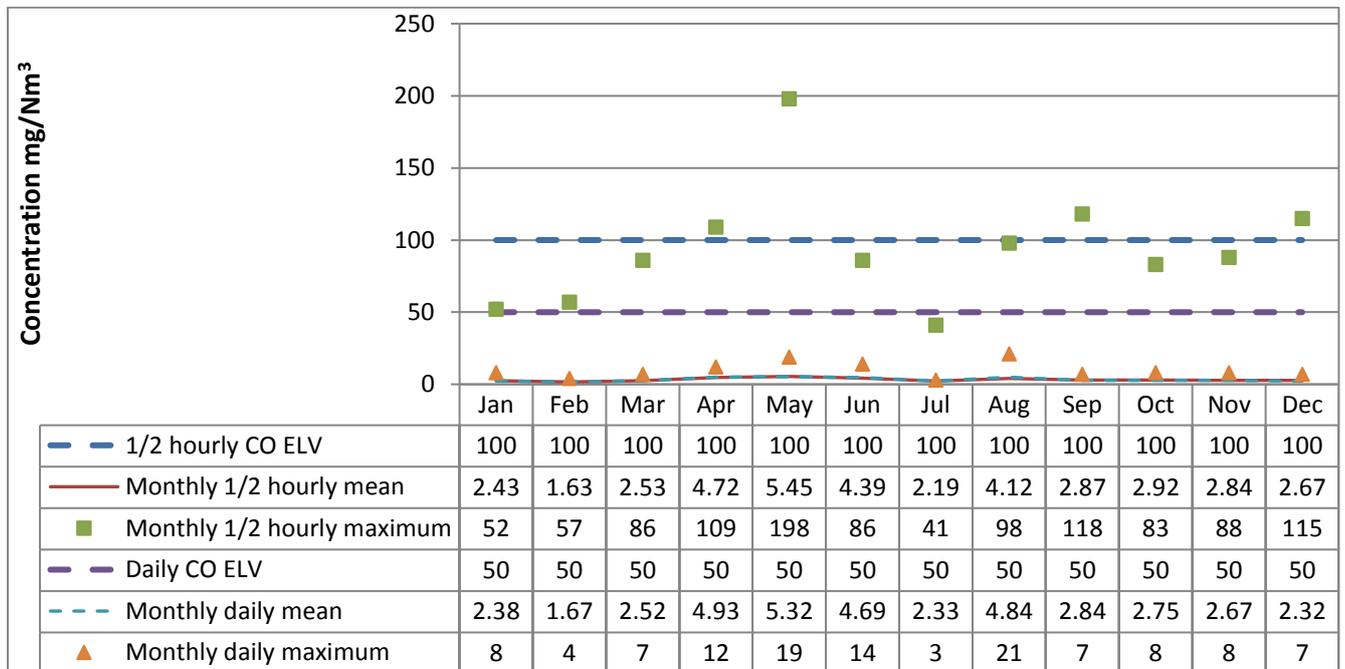
Plant A1 – Total organic carbon



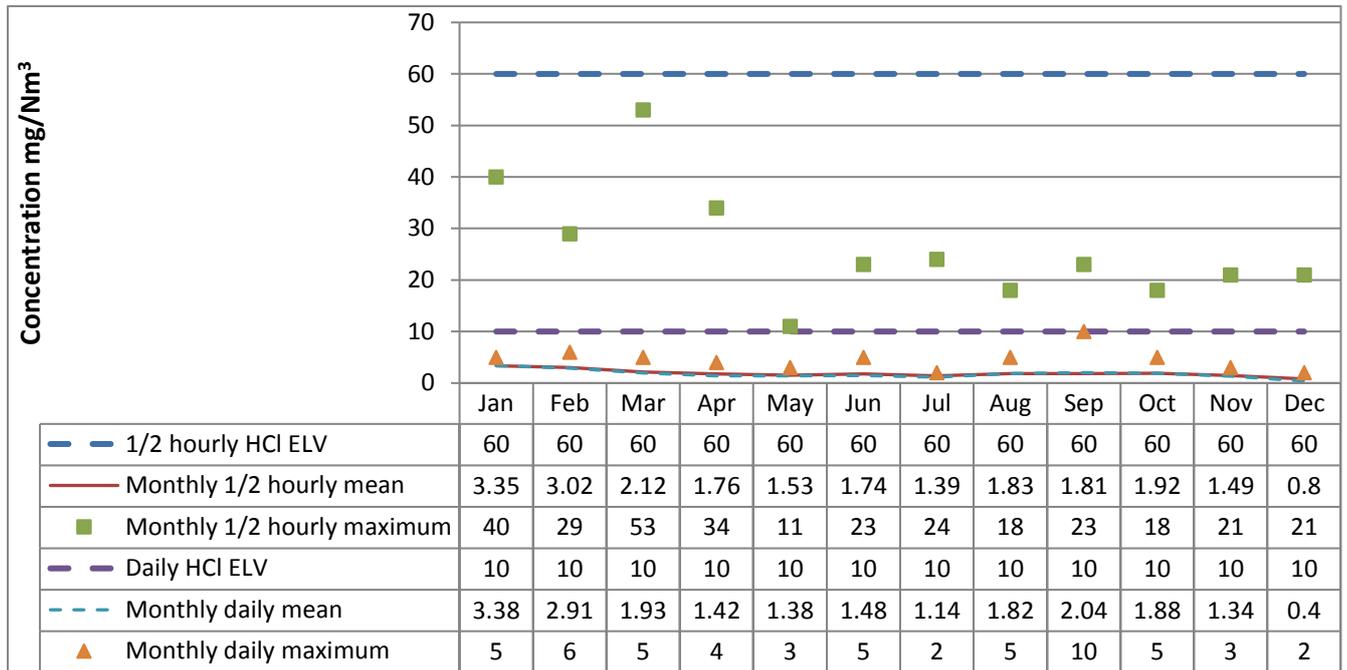
Plant A1 – Particulates



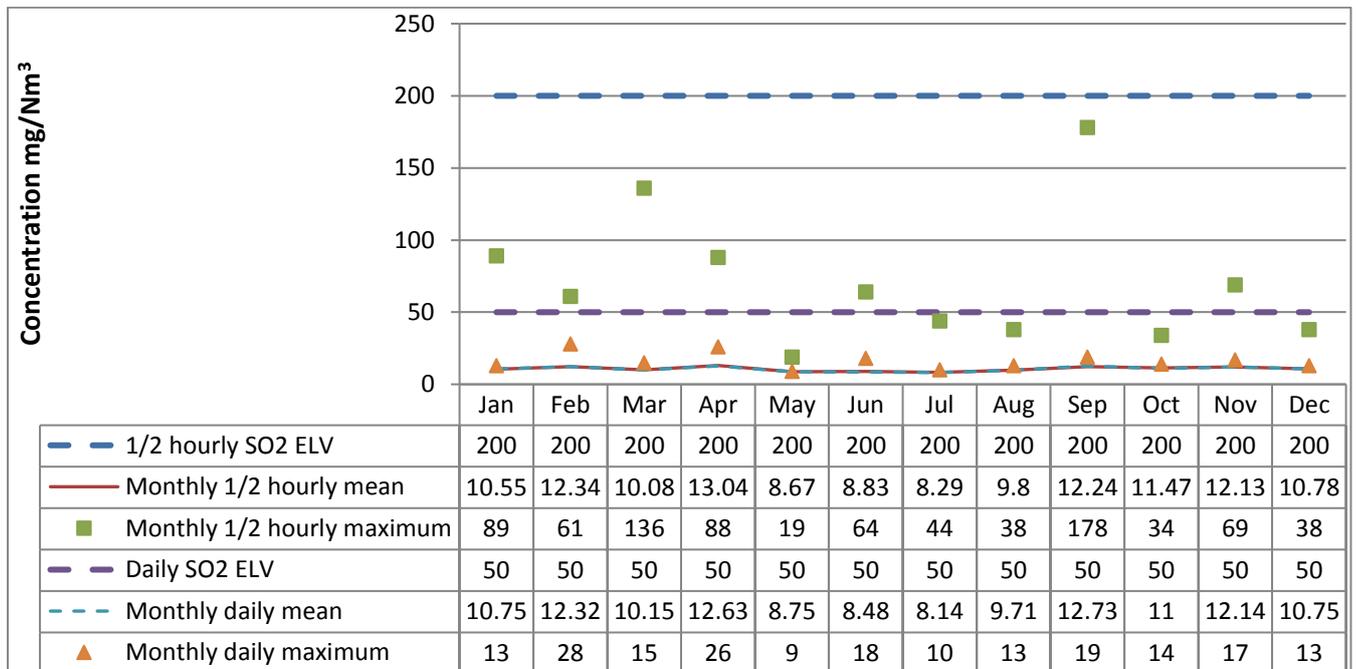
Plant A1 – Carbon monoxide



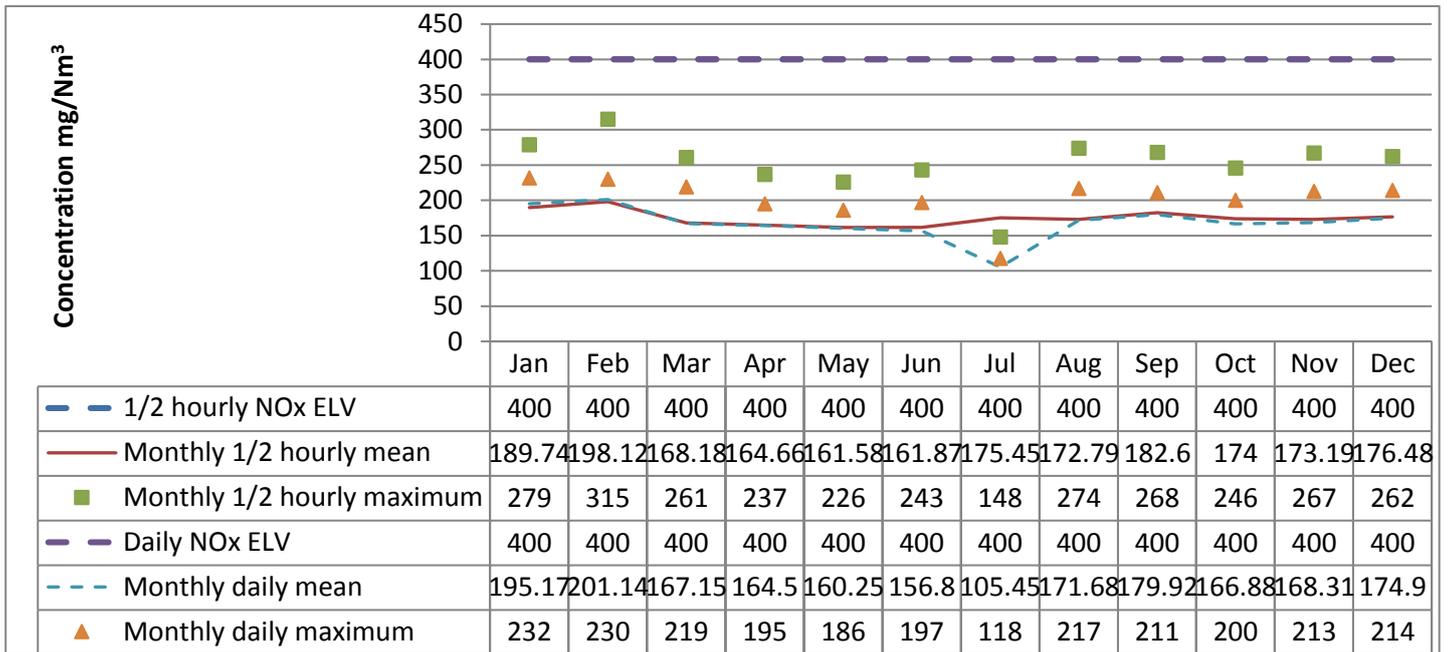
Plant A2 – Hydrogen chloride



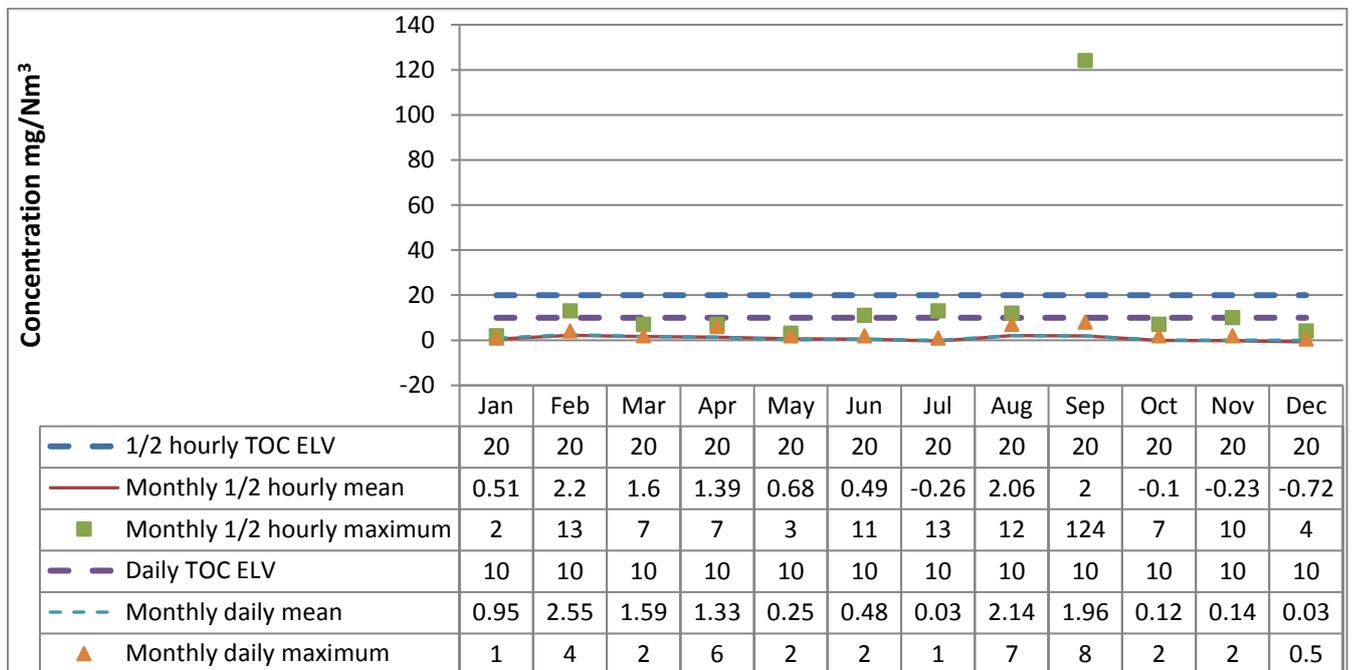
Plant A2 – Sulphur dioxide



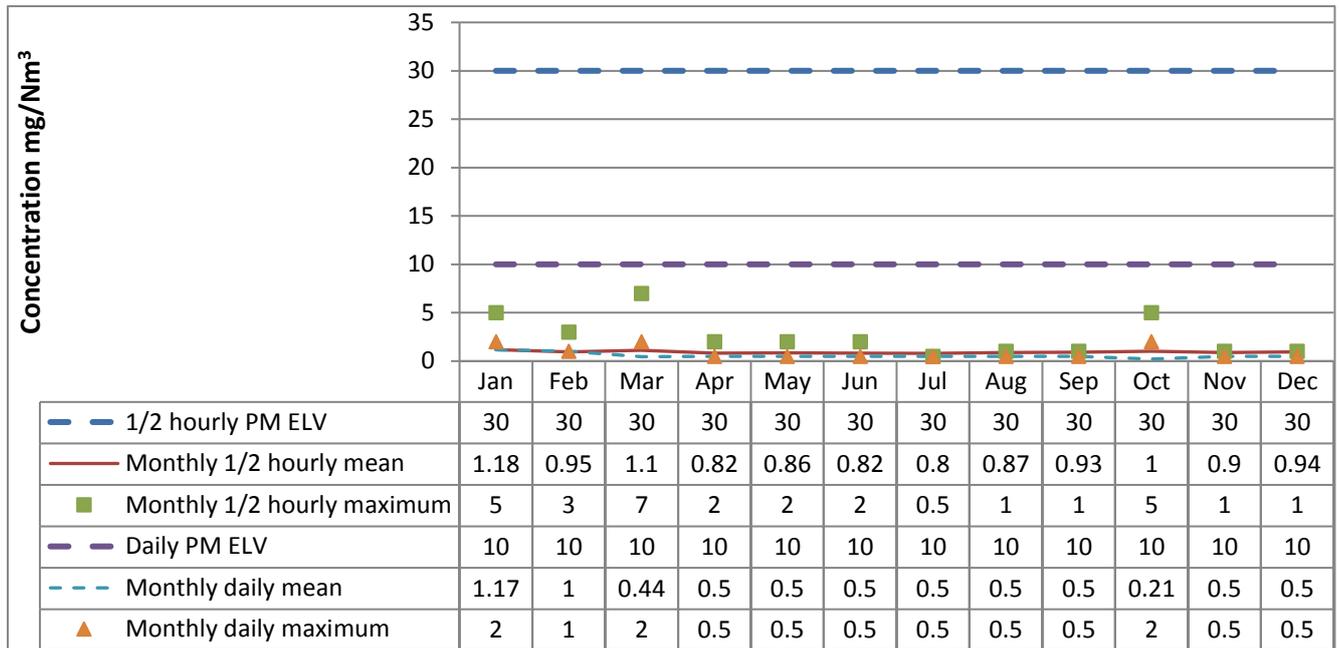
Plant A2 – Oxides of nitrogen



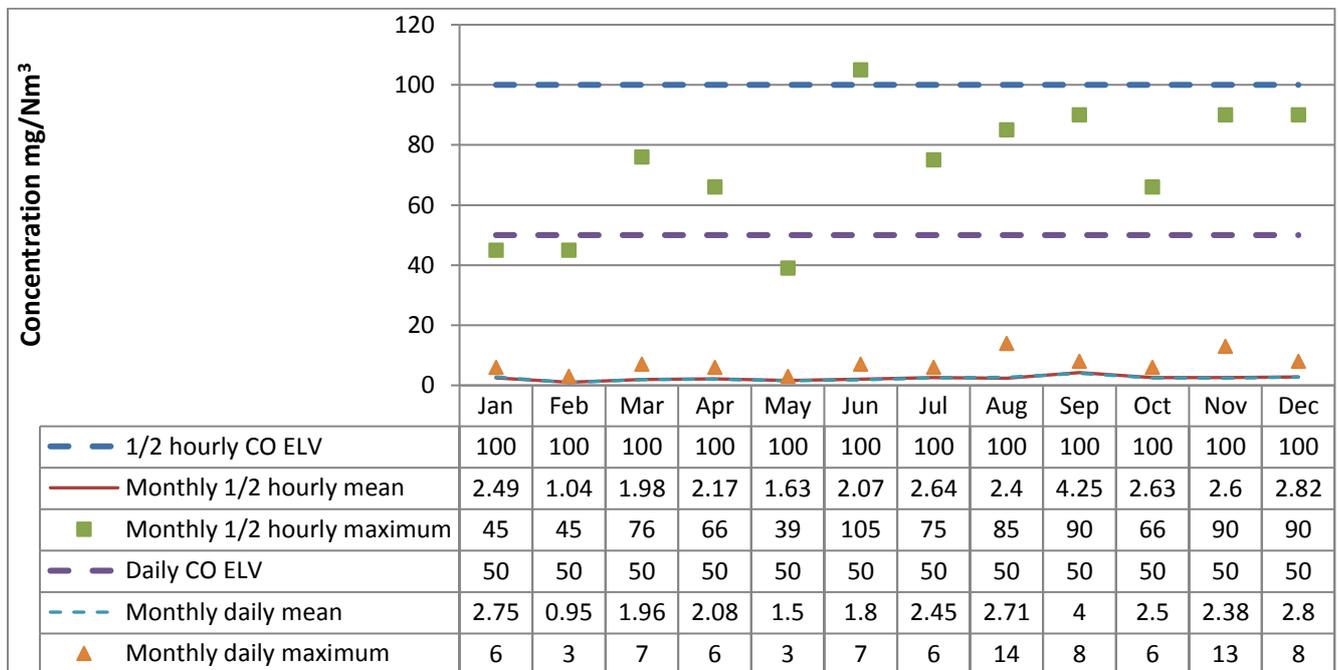
Plant A2 – Total organic carbon



Plant A2 – Particulates



Plant A2 – Carbon monoxide



## 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 Plant A1		Results Plant A2	
		06/06/18	20/11/18	06/06/18	20/11/18
Mercury and its compounds	0.05 mg/m <sup>3</sup>	0.0007 mg/m <sup>3</sup>	0.0034 mg/m <sup>3</sup>	0.0013 mg/m <sup>3</sup>	0.0028 mg/m <sup>3</sup>
Cadmium & thallium and their compounds (total)	0.05 mg/m <sup>3</sup>	0.0023 mg/m <sup>3</sup>	0.0023 mg/m <sup>3</sup>	0.0027 mg/m <sup>3</sup>	0.0018 mg/m <sup>3</sup>
Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m <sup>3</sup>	0.0578 mg/m <sup>3</sup>	0.1727 mg/m <sup>3</sup>	0.0649 mg/m <sup>3</sup>	0.0575 mg/m <sup>3</sup>
Dioxins and furans (I-TEQ)	0.1 ng/m <sup>3</sup>	0.0436 ng/m <sup>3</sup>	*	0.0466 ng/m <sup>3</sup>	*
Hydrogen Fluoride	2 mg/m <sup>3</sup>	0.01 mg/m <sup>3</sup>	0.01 mg/m <sup>3</sup>	0.01 mg/m <sup>3</sup>	0.012 mg/m <sup>3</sup>

\* At the time of production of this annual report, the finalised results have not yet been provided by the contractor

## 4.3 Summary of monitoring results for emissions to water

Emissions to water from emission point W1 comprise clean rain water from the site; this is discharged via the hospital's main surface water drain, into Hobson's Brook. There are no monitoring requirements or limits set in the permit for this.

Emissions to sewer are via point S1 and comprise rainwater drainage from potentially contaminated areas and effluent from bin washing and boiler blow-down. This is one of 8 consented discharge points across the wider hospital site and is regulated by Anglian Water under discharge consent ACU 182. There are no limits set in the permit for this emission but Anglian Water undertake regular monitoring across the hospital site against limits for COD, oils & fats, pH, silver, and suspended solids.

## 5. Summary of Permit Compliance

### 5.1 Summary of any notifications or non-compliances under the permit

Date	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
14/04/18	Notification for half-hourly CO ELV exceedence on Plant A1	Nature of the waste stream as Plant A2 was shut down for maintenance	Implement procedure to slow down the throughput and adjust parameters
24/05/18	Notification for half-hourly CO ELV	Nature of the waste stream	Implement procedure to slow down the throughput and adjust parameters

	exceedence on Plant A1		
25/05/18	Notification for half-hourly CO ELV exceedence on Plant A1	Nature of the waste stream	Implement procedure to slow down the throughput and adjust parameters
25/05/18	Notification for half-hourly CO ELV exceedence on Plant A1	Not immediately clear – cessation of waste charging in order to investigate and look at the combustion chamber	Overhaul of oxygen probes and implementation of weekly re-calibrations
18/09/18	Notification for half-hourly CO ELV exceedence on Plant A1	Loading ram forward sensor malfunction; when cleared it pushed extra waste into the plant	Wire rope replaced
20/12/18	Notification for half-hourly CO ELV exceedence on Plant A1	Nature of the waste stream	Implement procedure to slow down the throughput and adjust parameters
13/03/18	Notification for dioxin/furan ELV exceedence on Plant A2 (during bi-annual emission testing)	A bicarbonate feed blockage caused raised HCL readings	Blockage was cleared
08/06/18	Notification for half-hourly CO ELV exceedence on Plant A2	Nature of the waste stream	Implement procedure to slow down the throughput and adjust parameters

## 5.2 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
14/02/18	Odour complaint from Golding Road area – 'severe acrid smoke smell'	Compliant received via EA. Addenbrooke's investigated operational status and weather conditions at the time of the complaint. The location was not down wind and operations were normal. Agreed in writing by EA (15/02/18) that the complaint was unsubstantiated.	N/A

## 6. Summary of plant improvements

**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.**

Completed during 2018:

- Movement of reciprocating shelves in No.1 and No.2 incinerator plants. Leading to reduction in burner use and ID fan ramping
- Filter bank improvements – reduce use of compressed air
- Installation of desiccant drier – reduced energy use
- An upgrade to the fly ash system has been installed which has gone from a common to individual systems which gives us more flexibility.

Planned for 2019:

- Hot well upgrade to allow continual retention of operating temperature
- The installation of direct coupling motors for both No.1 and No.2 ID fans. This system will be more energy efficient and will reduce the noise generated by this part of the plant.
- Upgrade to existing Oxygen probes as unable to obtain parts.