recycling and recovery UK

CORNWALL

Energy Recovery Centre

2018 ANNUAL PERFORMANCE REPORT

DOCUMENT TITLE:	Cornwall Energy Recovery Centre [CERC] 2018 Annual Performance Report

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	Environment Agency Officer	1

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1. INTRODUCTION

Table 1: Plant Details	
Name of Company	SUEZ R&R UK
Name of Plant	Cornwall Energy Recovery Centre [CERC]
Permit Number	GP3433GH
Address	St Dennis St Austell Cornwall PL26 8DY
Phone	01726 821380
Contact Name/Position	Tony Burge – EfW Plant Manager
Further information, description of waste types burned and origin	Municipal household waste Commercial and Industrial waste

2. PLANT DESCRIPTION

This non-hazardous waste incinerator operates 24/7 and can receive up to 240,000 tonnes of municipal waste and commercial/Industrial waste. The plant has two furnace lines with a processing capacity of 240,000 tonnes per annum. The heat produced by waste incineration is used to raise superheated steam which generates up to 188,000 MWh/annual of electricity.

Activities associated with the incineration are receipt and storage of municipal waste and commercial/industrial waste, production of steam and electricity, abatement of flue gas and handling of Incinerator Bottom Ash (IBA) and Air Pollution Control Residue (APCR).

Cornwall ERC commissioning finished on 23rd March 2017, when the plant was handed over from the EPC contractor to SUEZ UK. Permit conditions have applied since 1st April 2017, as agreed with the Environment Agency. The data included in this report corresponds to the following period: 1st January 2018 to 31st December 2018.

3. SUMMARY OF PLANT OPERATION

Incoming waste is delivered to site by refuse collection trucks. It is weighed in and delivered into the tipping hall.

TIPPING HALL

A large tipping hall allows for refuse collection trucks to manoeuvre and tip waste safely. Air needed for combustion is drawn into the furnace from here so that negative pressure is maintained in order to avoid odour and dust escaping the building.

BUNKER

Waste vehicles reverse to a wheel stop and tip their loads into a large concrete bunker. Mixing of waste occurs as the cranes driver sorts the waste looking for unsuitable material to be removed, and to improve the homogeneity of the incinerator feedstock.

CONTROL ROOM

The plant's control room centralises the operation of all equipment, including the grab cranes used to mix and load waste into a hopper that feeds the furnace. All on-site functions are monitored automatically and manually. Its systems verify in real time that equipment is functioning properly, continuously monitor the combustion gas, and maximise the efficiency of the entire ERC process.

GRATE AND BOILER

Waste is lifted into the charging hoppers by the crane. From here it falls into the furnace-charging chute and then is introduced onto the grate system by hydraulic feeders for incineration. Auxiliary burners can be used to help keeping the temperature above 850°C if required. The thermal energy released from the burning is used to convert water to super-heated steam along a boiler composed of 4 vertical passes. At high pressure, this steam drives a turbine to generate electricity.

ELECTRICITY GENERATION

Electricity is generated at 11kv, with an electric production of 188,000 MWh/annum and exporting 150,000 MWh/annum to the national grid.

INCINERATOR BOTTOM ASH (IBA)

Ash left on the grate after incineration is carried by conveyor, after quenching, to the IBA processing facility. Up to 65,000 tonne of IBA is processed on site by the removal of ferrous and non-ferrous metal, stabilised and separated into fraction sizes of IBA prior to the export from site of the processed IBA and metals for re-use.

AIR-COOLED CONDENSERS

After exiting the turbine, the steam is cooled and condensed back into water through air condensers. This recovered water is treated and reused in the boilers to produce more steam.

EMISSION CONTROL

The gases from the furnace are subject to a rigorous cleaning process involving ammonia as selective non-catalytic reduction (SNCR), lime and active carbon injections. This removes oxides of nitrogen, acidic gases, dioxins, and heavy metals from the gas stream.

AIR POLLUTION CONTROL RESIDUE (APCR)

The cleaned gas passes through fine-fabric bag filters to remove solid particles before it is emitted through the stack. The resultant APCR residue, or fly-ash, contains particles from the incineration process, lime used in the flue gas treatment, salts and carbon dust. It is stored in a sealed silo until it is taken away for recycling in tankers.

EMISSIONS MONITORING

As they pass through the stack, the residual flue gases from the process are continuously monitored before release. This data is relayed automatically to the control room.

Table 2: Plant Key Parameters				
Plant size, including number of lines	240,000 t/yr Two lines			
Annual waste throughputs	Mixed Municipal Waste & Commercial and Trade Waste Not to exceed a combined total of 240,000t/yr			
Total plant operational hours in the year	Operating hours: Line 1 – 6,767 h Line 2 – 7,558 h			
Residues produced	Bottom ash	APCR	Metals	Other waste
Amount of each residue, including metals (where appropriate) recycled/land filled	41,677.54 t	5,705.32 t	7,022.18 t	N/A
Electricity	Produced: 80,035 MWh Exported: 71,855 MWh Parasitic load: 8,779 MWh			

Table 3: Annual Waste Throughput		
Waste types	**EWC code**	**Tonnes**
Mixed Municipal Waste	20 03 01	41,681.71
Other	19 12 12 18 01 04	179,672.34 223.36

4. PERMIT VARIATION

No permit variation was applied for during the 2018 calendar year.

5. SUMMARY OF PLANT MONITORING – A1 and A2

Table 4: Emission Limits to Air and Monitoring During Normal Operation		
Particulate matter	30 mg/m^3 (½-hr mean)	C
Particulate matter	10 mg/m^3 (Daily mean)	C
TOC	20 mg/m^3 (½-hr mean)	C
TOC	10 mg/m^3 (Daily mean)	C
Hydrogen chloride	60 mg/m^3 (½-hr mean)	C
Hydrogen chloride	10 mg/m^3 (Daily mean)	C
Hydrogen fluoride	1 mg/m^3 (Daily mean)	C
Hydrogen fluoride	4 mg/m^3 (½-hr mean)	C
Carbon monoxide	100 mg/ m^3 (½-hr mean)	C
Carbon monoxide	50 mg/m^3 (Daily mean)	C
Sulphur dioxide	200 mg/m^3 (½-hr mean)	C
Sulphur dioxide	50 mg/m^3 (Daily mean)	C
Sulphur dioxide	20 mg/m^3 (Rolling annual mean)	C
Oxides of nitrogen	400 mg/m^3 (½-hr mean)	C
Oxides of nitrogen	200 mg/m^3 (Daily mean)	C
Oxides of nitrogen	150 mg/m^3 (Monthly mean)	C
Ammonia	10 mg/m^3 (Daily mean)	C
Ammonia	6.5 mg/m^3 (Rolling annual mean)	C
Cadmium & thallium (& compounds)	0.05 mg/m^3 (Mean over - min 30 mins/ max 8hr)	Qu
Mercury & its compounds	0.05 mg/m^3 (Mean over - min 30 mins/ max 8hr)	Qu
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V & their compounds (total)	0.5 mg/m^3 (Mean over - min 30 mins/ max 8hr)	Qu
Dioxins / furans (I-TEQ)	0.1 ng/m^3 (Mean over period - min 6hr/ max 8hr	Qu

Note: 'C' denotes Continuous Monitoring. 'Qu' denotes Quarterly Monitoring

The Annual Mass Emissions of Monitored Pollutants

Table 5: Annual Mass Emissions of Monitored Pollutants			
Pollutant	**Reporting Threshold**	**Line 1**	**Line 2**
Carbon Dioxide CO_2	100,000,000 kg	175,260,972.3 kg	
Ammonia NH_3	10,000 kg	<Recorded Threshold	
Antimony Sb	1 kg	<Recorded Threshold	
Arsenic As	20 kg	<Recorded Threshold	
Cadmium Cd	10 kg	<Recorded Threshold	
Chromium Cr	100 kg	<Recorded Threshold	
Copper Cu	100 kg	<Recorded Threshold	
Lead Pb	200 kg	<Recorded Threshold	
Manganese Mn	10 kg	<Recorded Threshold	
Mercury Hg	10 kg	<Recorded Threshold	
Nickel Ni	50 kg	<Recorded Threshold	
Vanadium V	10 kg	<Recorded Threshold	
Total Heavy Metals (Sb, As, Pb, Cr, Co, Cu, Mn, Ni, V)	1 kg – 200 kg	42.32 kg	
Chlorine & inorganic chlorine compounds (HCL)	10,000 kg	<Recorded Threshold	
Dioxins & furans (PCDDs/PCDFs) nas WHO-TEQ	0.0001 kg	<Recorded Threshold	
Fluorine & inorganic fluorine compounds (HF)	5,000 kg	<Recorded Threshold	
Nitrogen oxides (NO and NO_2) as NO_2	100,000 kg	152,512 kg	
Nitrous oxide N_2O	10,000 kg	<Recorded Threshold	
Particulate matter	50,000 kg	<Recorded Threshold	
Polychlorinated biphenyls (PCBs)	0.00001 kg	<Recorded Threshold	
Sulphur oxides (SO_2 and SO_3) as SO_2	150,000 kg	<Recorded Threshold	
Carbon monoxide CO	500,000 Kg	<Recorded Threshold	

SUMMARY OF PLANT COMPLIANCE

Date of Part A	Line 1 or 2	Parameter(s)
08/01/2018	1	Data loss and CO
08/01/2018	2	Dust Data Loss
20/01/2018	2	CO
05/02/2018	1	Particulates
10/02/2018	1	Particulates
18/02/2018	2	CO
18/02/2018	2	All
17/03/2018	1	All
18/03/2018	1	CO
18/03/2018	1	CO
19/03/2018	1	CO
19/03/2018	2	Particulates
20/03/2018	2	TOC
27/03/2018	1	SO2
28/03/2018	2	SO2
07/04/2018	2	CO
08/04/2018	2	TOC
25/04/2018	IBA	TOC% IBA Permit Compliance
02/05/2018	2	CO
08/05/2018	1	CO
18/05/2018	1	CO
20/05/2018	2	CO
24/05/2018	1	CO
28/05/2018	1	CO
07/06/2018	2	CO

Date of Part A	Line 1 or 2	Parameter(s)
09/06/2018	1	CO
16/06/2018	1	CO
21/06/2018	1	CO
24/06/2018	1	CO
25/06/2018	2	CO
11/07/2018	1	CO
13/07/2018	1	CO
04/08/2018	1	CO
21/09/2018	1	CO
20/11/2018	1	CO
10/12/2018	1	SO2
11/12/2018	2	Particulates

SUMMARY OF PLANT IMPROVEMENTS

Table 7: Improvement Programme Requirements		
Ref.	**Requirement**	**Date**
IC2	The Operator shall submit a written summary report to the Agency to confirm by the results of calibration and verification testing whether the performance of Continuous Emission Monitors for parameters as specified in Table S4.1 and Table S4.1(a) complies with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3.	Submitted: 16.06.17 Part 1 Discharged (14/2/18) Part 2 - Submitted
IC4	The operator shall submit a written commissioning report to the Agency. The report shall include review of the performance of the facility against the conditions of this permit and details of procedures during commissioning for achieving and demonstrating compliance with permit conditions.	Submitted: 13.10.17 Discharged 16.1.18
IC5	The Operator shall carry out an assessment of the impact of emissions to air of Arsenic and Chromium (VI) having regard to the 2009 report of the Expert Panel on Air Quality Standards – Guidelines for Metal and Metalloids in Ambient Air for the Protection of Human Health. The assessment shall predict the impact of Arsenic and Chromium (VI) against the guidelines during the first year of operation and air dispersion modelling.	Within 12 to 15 months of completion of commissioning Discharged 2.8.18

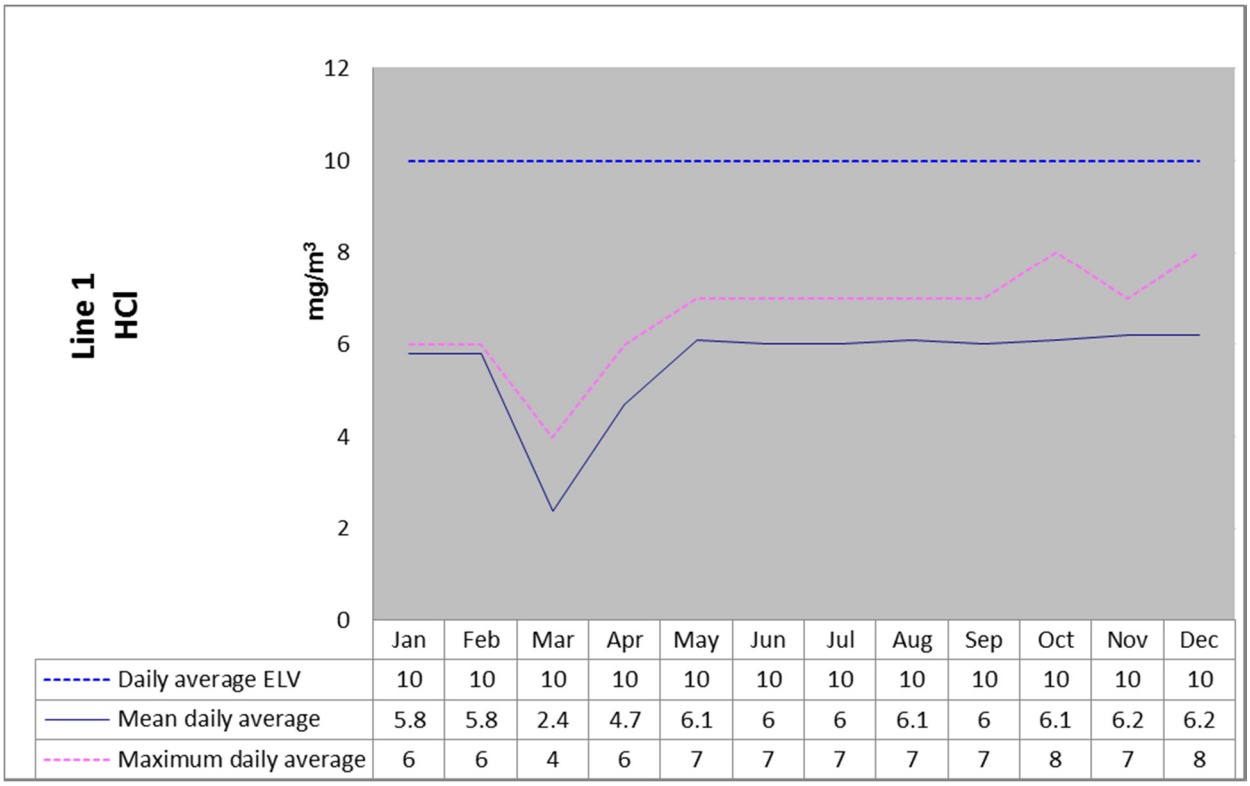
General plant improvements have focused on combustion control modifications, which have been carried out to give a steadier combustion profile. These modifications have been carried out by Vinci (EPC contractor) during 2018 and have helped to dramatically reduce the amount of CO non-compliances at the plant.

8. FURTHER INFORMATION

Further information available at: http://www.suezcornwall.co.uk/

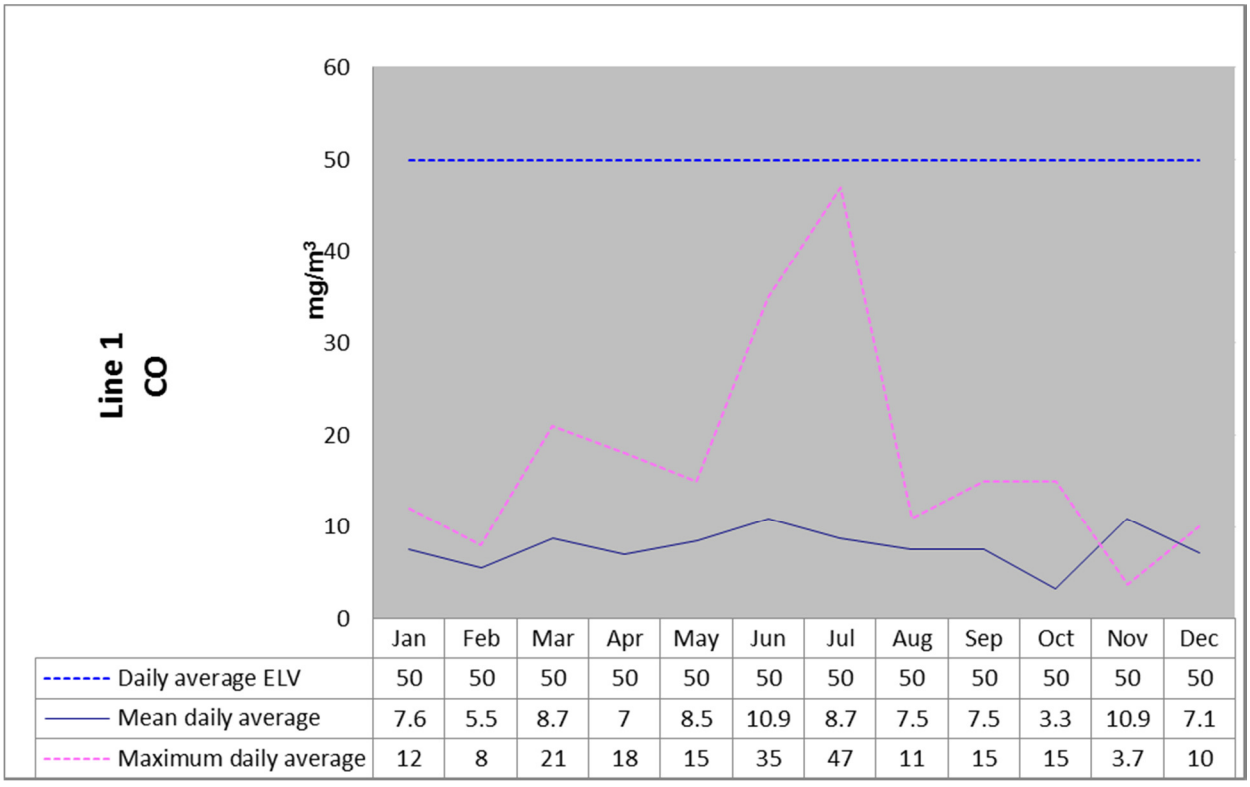
Appendix A – Air Emissions Graphs

Line 1 Hydrogen Chloride (HCl)



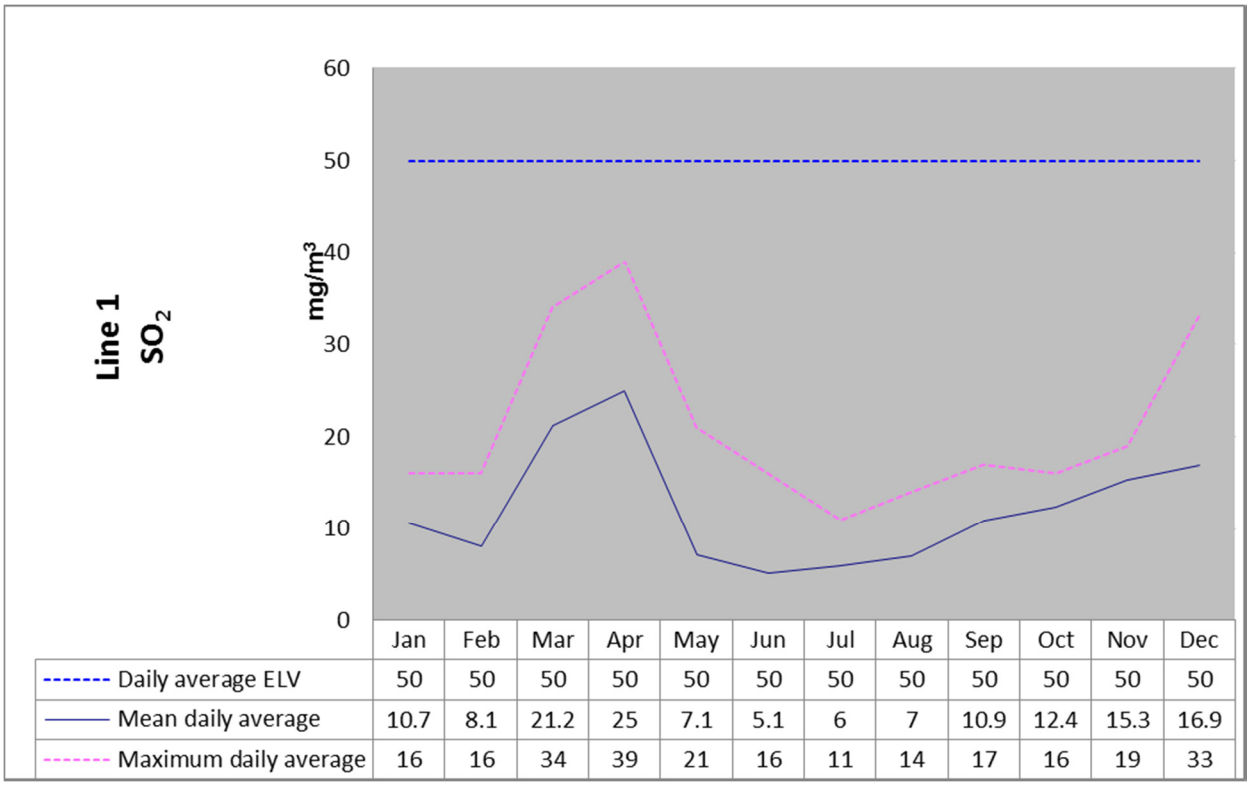
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	10	10	10	10	10	10	10	10	10	10	10	10
Mean daily average	5.8	5.8	2.4	4.7	6.1	6	6	6.1	6	6.1	6.2	6.2
Maximum daily average	6	6	4	6	7	7	7	7	7	8	7	8

Line 1 Carbon Monoxide (CO)



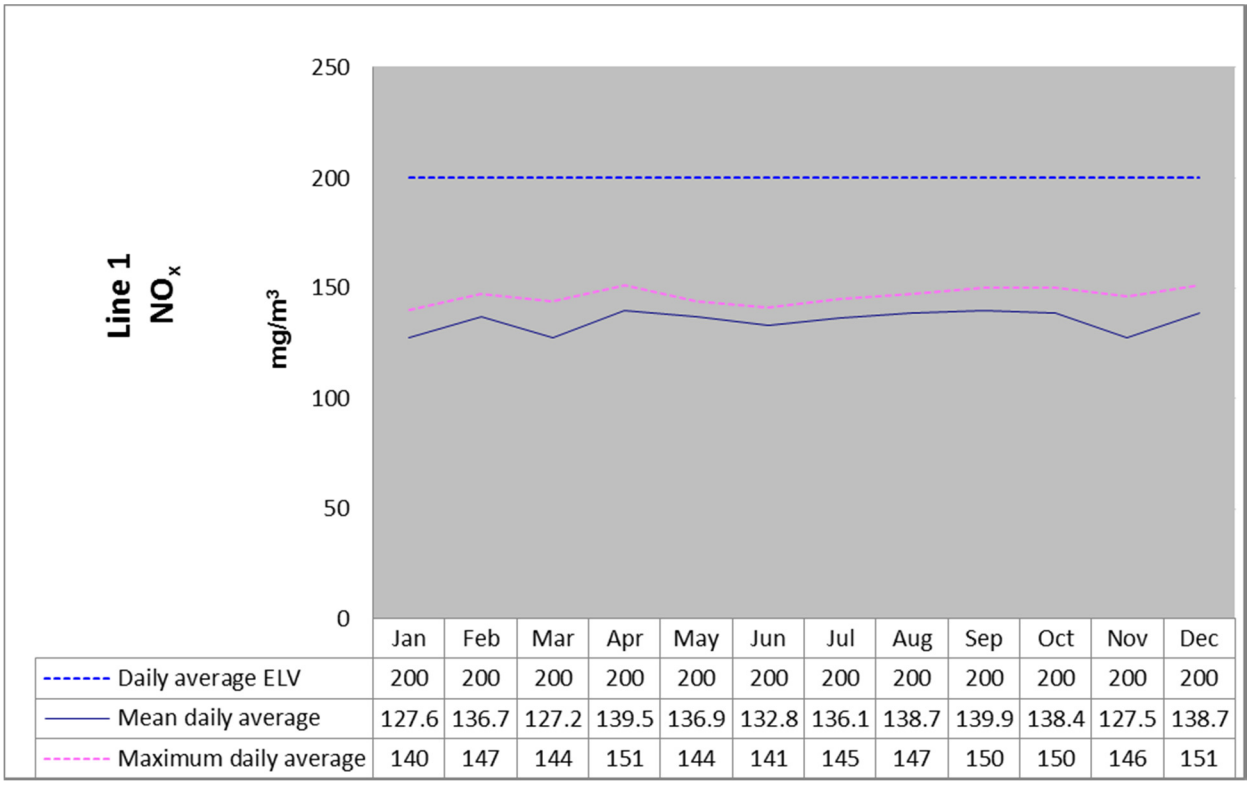
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	50	50	50	50	50	50	50	50	50	50	50	50
Mean daily average	7.6	5.5	8.7	7	8.5	10.9	8.7	7.5	7.5	3.3	10.9	7.1
Maximum daily average	12	8	21	18	15	35	47	11	15	15	3.7	10

Line 1 Sulphur Dioxide (SO_2)



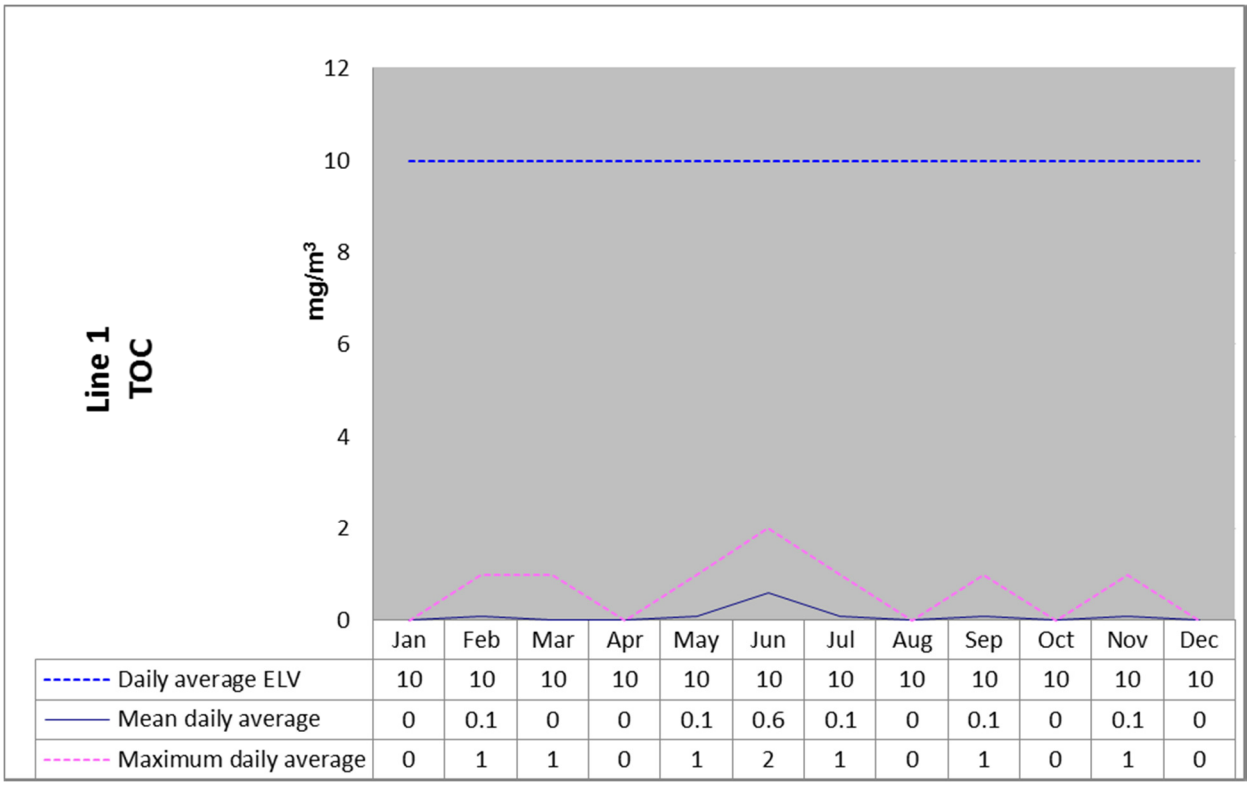
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	50	50	50	50	50	50	50	50	50	50	50	50
Mean daily average	10.7	8.1	21.2	25	7.1	5.1	6	7	10.9	12.4	15.3	16.9
Maximum daily average	16	16	34	39	21	16	11	14	17	16	19	33

Line 1 Nitrous Oxides (NO_x)



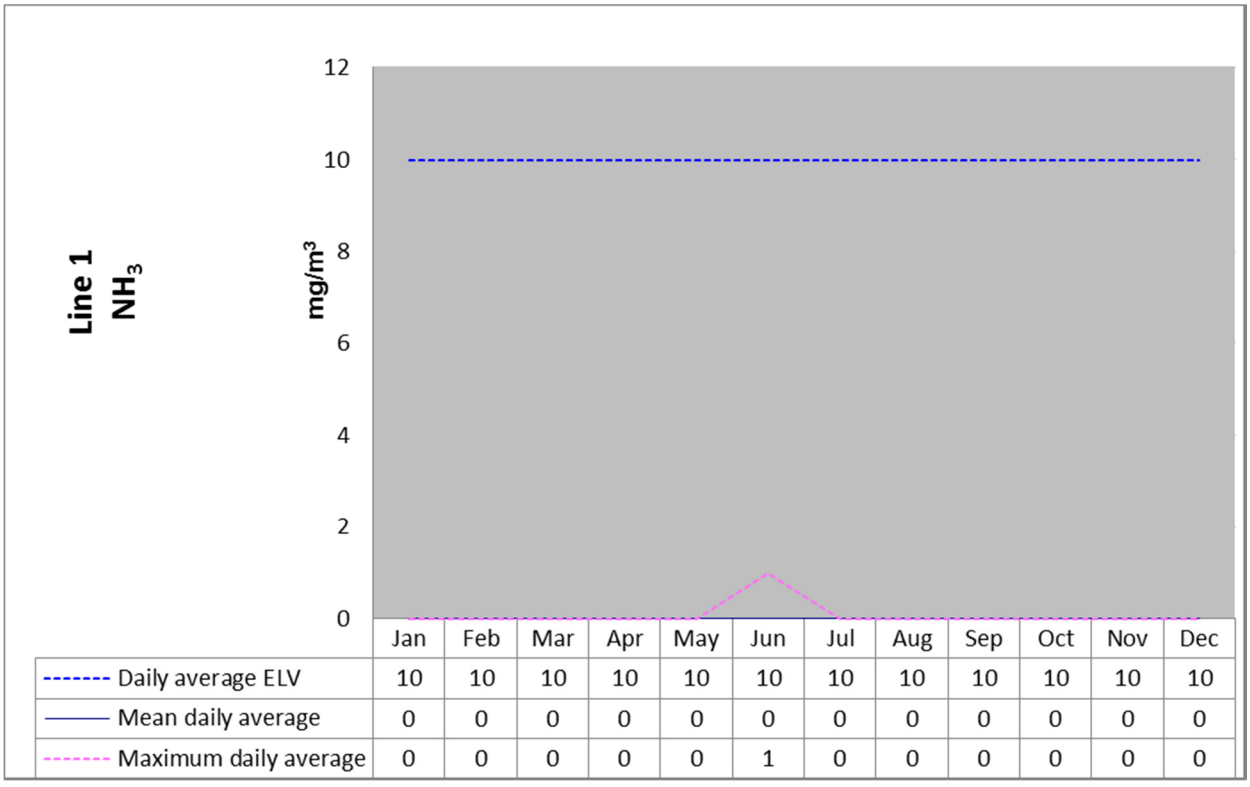
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	200	200	200	200	200	200	200	200	200	200	200	200
Mean daily average	127.6	136.7	127.2	139.5	136.9	132.8	136.1	138.7	139.9	138.4	127.5	138.7
Maximum daily average	140	147	144	151	144	141	145	147	150	150	146	151

Line 1 Total Organic Compound (TOC)



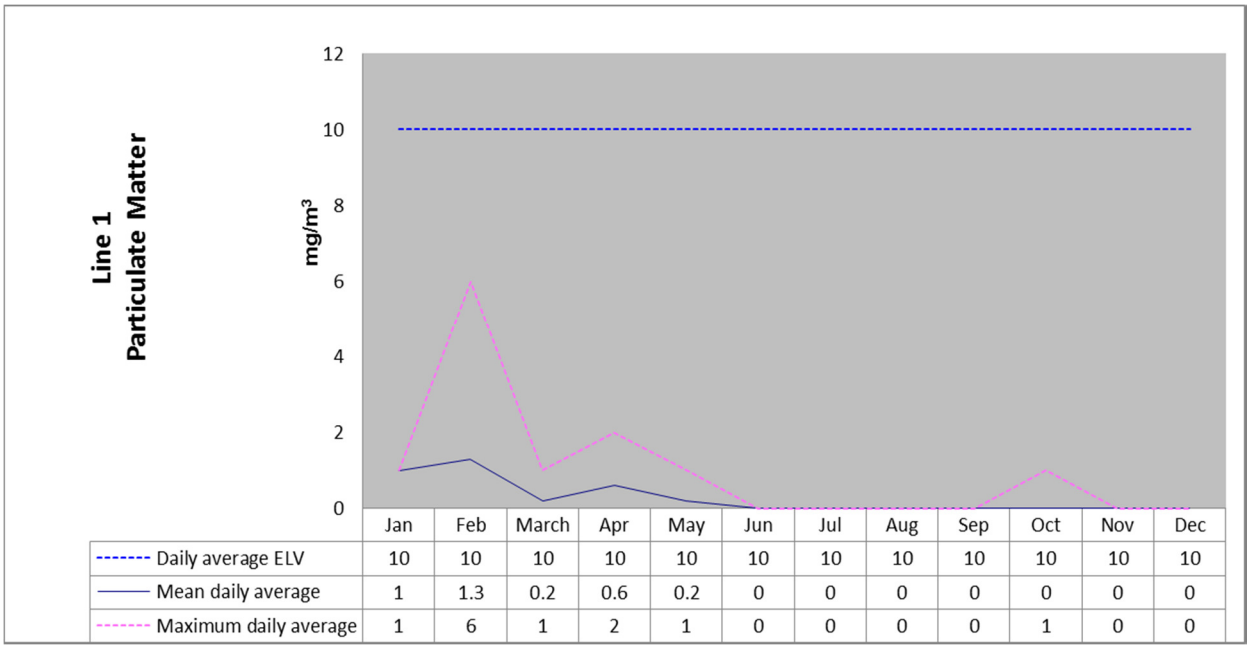
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	10	10	10	10	10	10	10	10	10	10	10	10
Mean daily average	0	0.1	0	0	0.1	0.6	0.1	0	0.1	0	0.1	0
Maximum daily average	0	1	1	0	1	2	1	0	1	0	1	0

Line 1 Ammonia (NH_3)



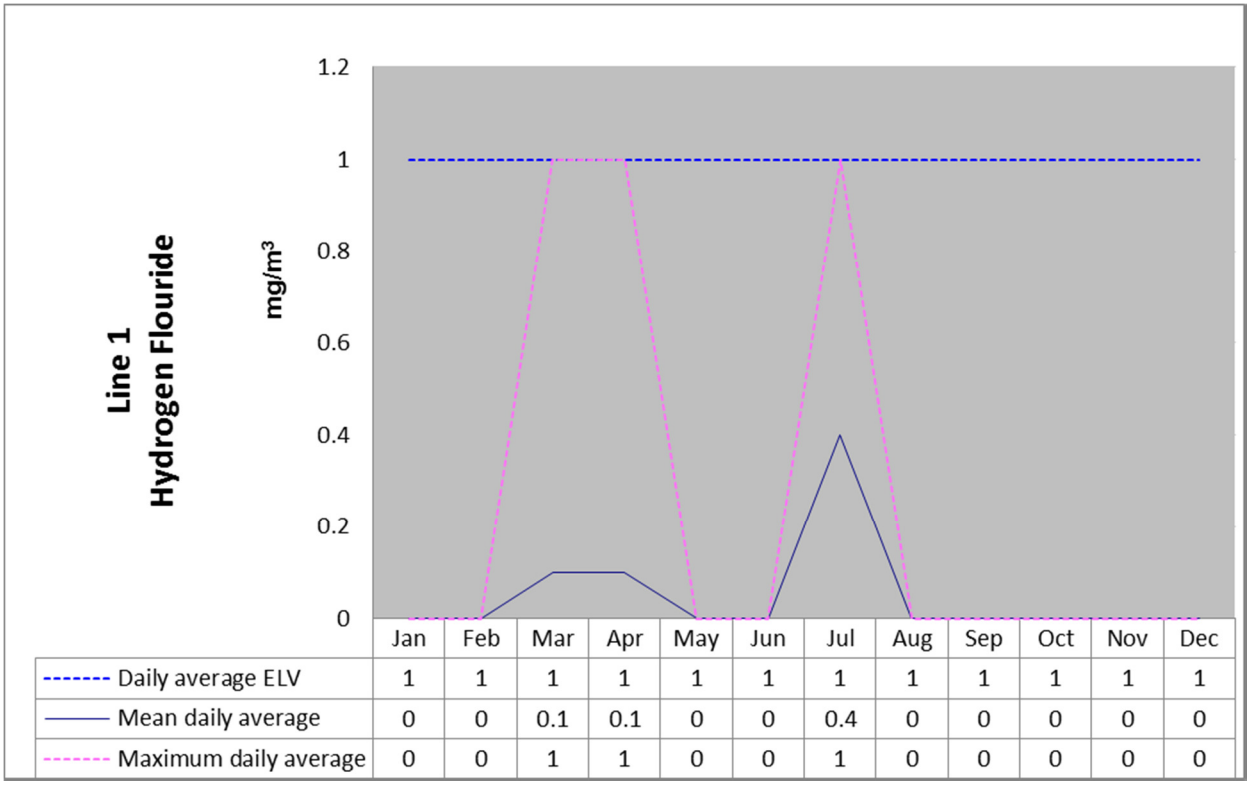
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	10	10	10	10	10	10	10	10	10	10	10	10
Mean daily average	0	0	0	0	0	0	0	0	0	0	0	0
Maximum daily average	0	0	0	0	0	1	0	0	0	0	0	0

Line 1 Particulates



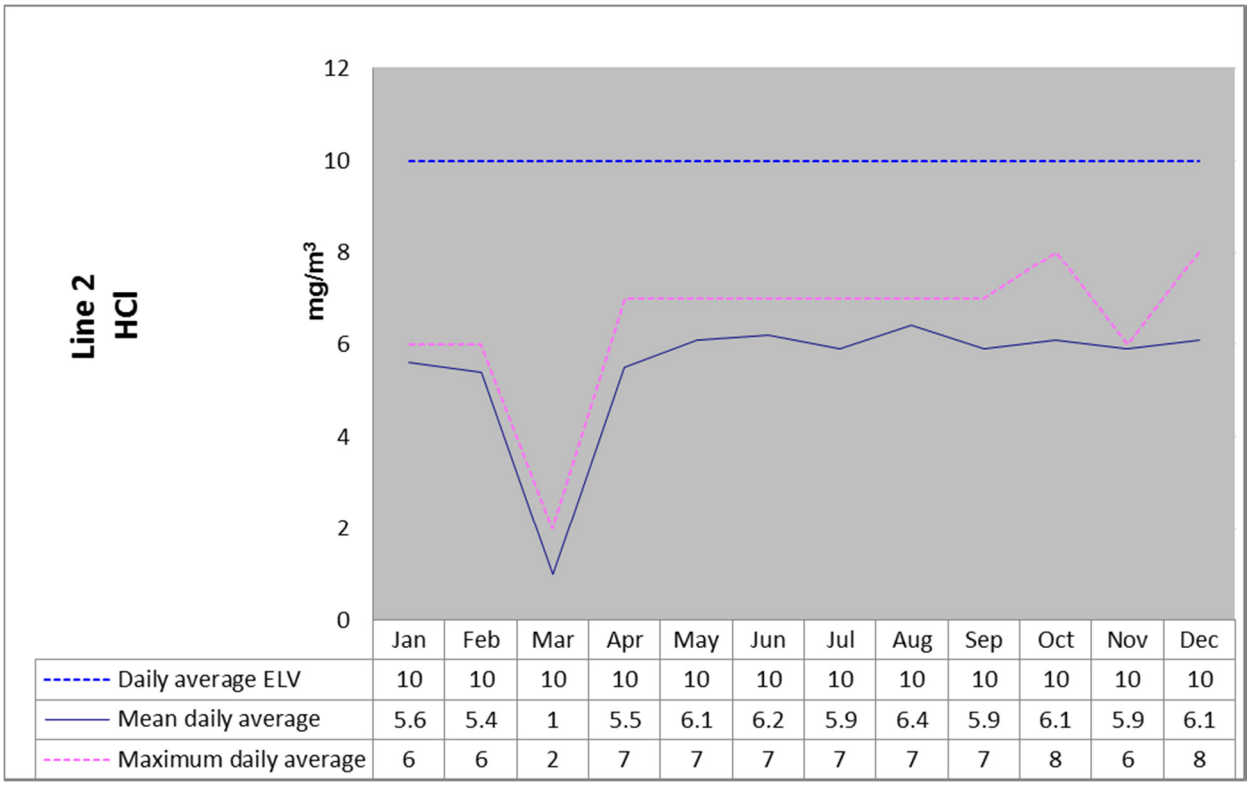
	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	10	10	10	10	10	10	10	10	10	10	10	10
Mean daily average	1	1.3	0.2	0.6	0.2	0	0	0	0	0	0	0
Maximum daily average	1	6	1	2	1	0	0	0	0	1	0	0

Line 1 Hydrogen Fluoride (HF)



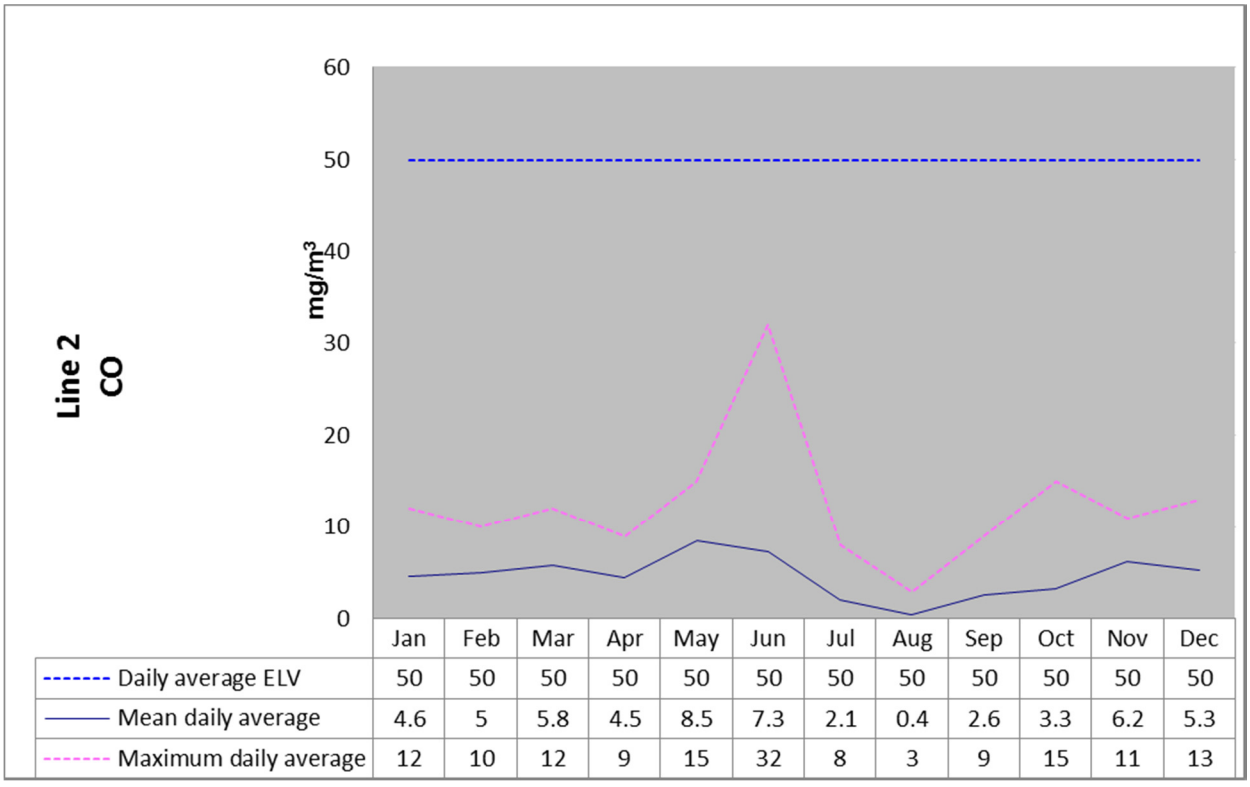
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	1	1	1	1	1	1	1	1	1	1	1	1
Mean daily average	0	0	0.1	0.1	0	0	0.4	0	0	0	0	0
Maximum daily average	0	0	1	1	0	0	1	0	0	0	0	0

Line 2 Hydrogen Chloride (HCl)



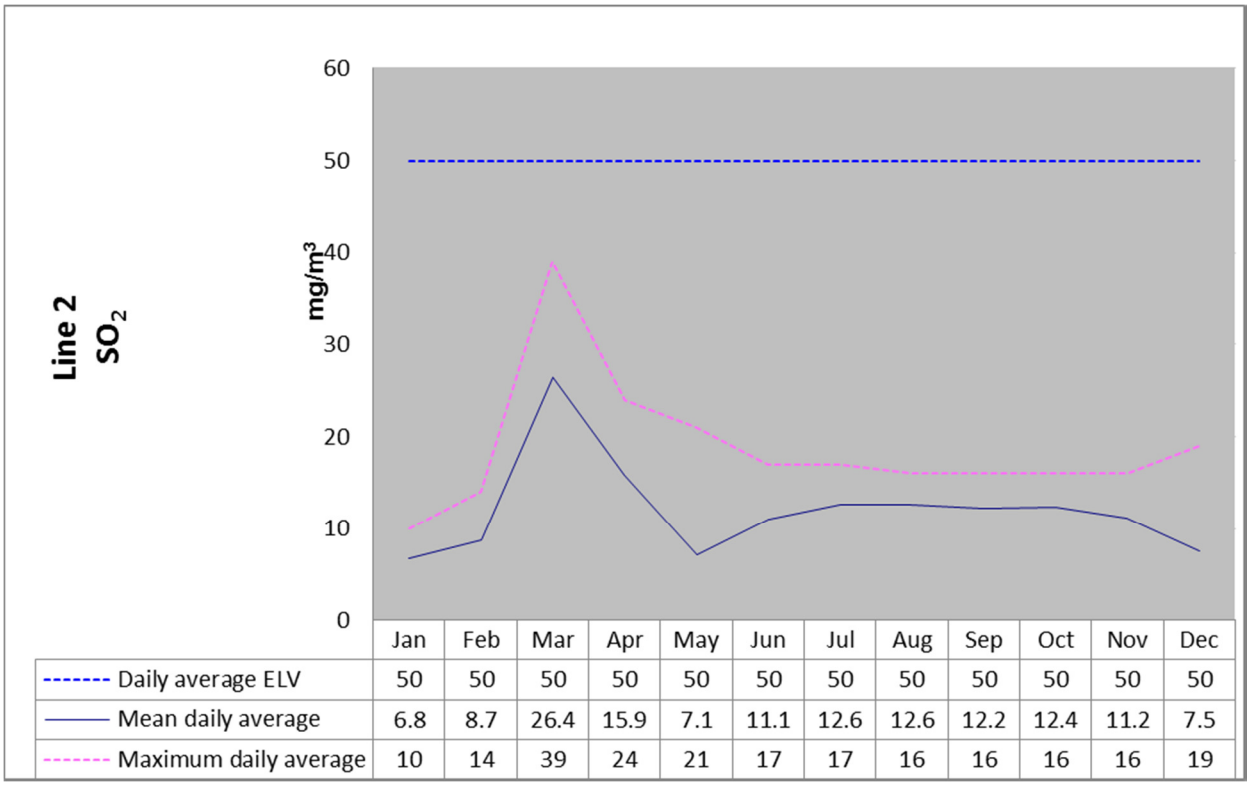
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	10	10	10	10	10	10	10	10	10	10	10	10
Mean daily average	5.6	5.4	1	5.5	6.1	6.2	5.9	6.4	5.9	6.1	5.9	6.1
Maximum daily average	6	6	2	7	7	7	7	7	7	8	6	8

Line 2 Carbon Monoxide (CO)



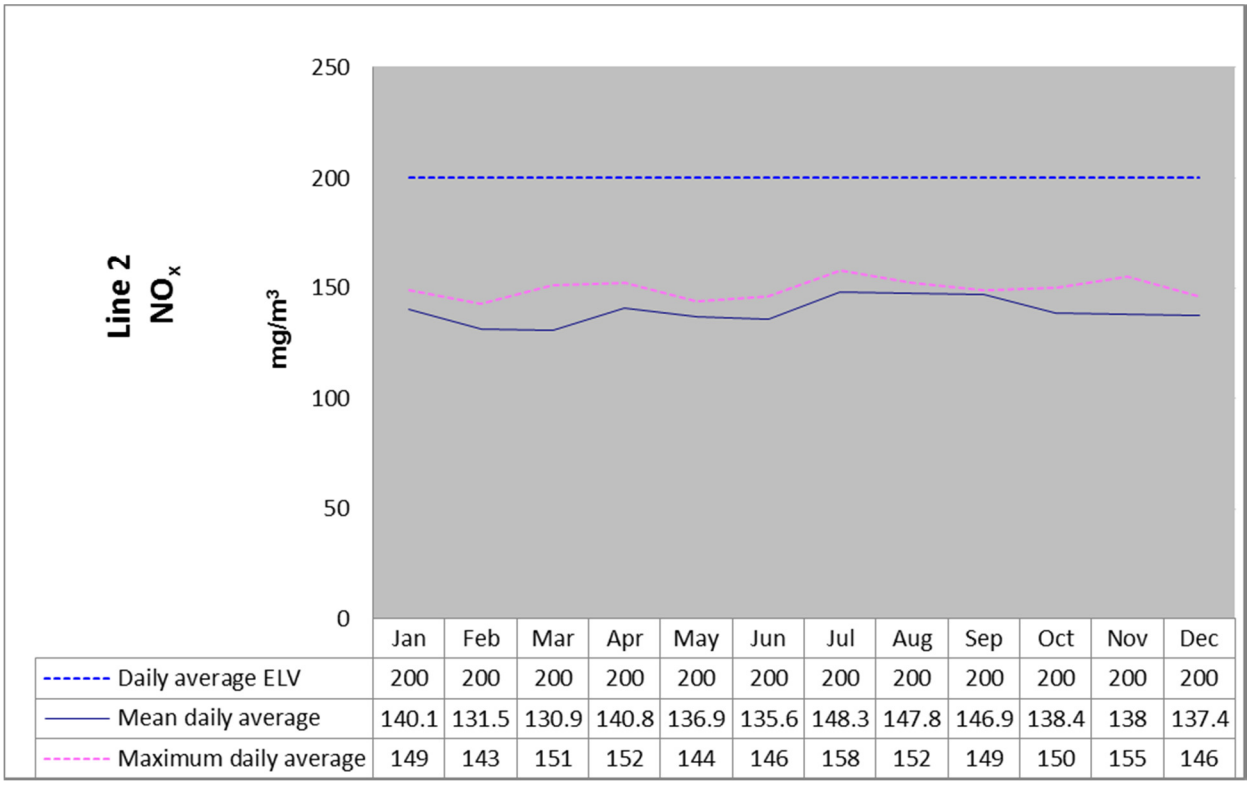
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	50	50	50	50	50	50	50	50	50	50	50	50
Mean daily average	4.6	5	5.8	4.5	8.5	7.3	2.1	0.4	2.6	3.3	6.2	5.3
Maximum daily average	12	10	12	9	15	32	8	3	9	15	11	13

Line 2 Sulphur Dioxide (SO_2)



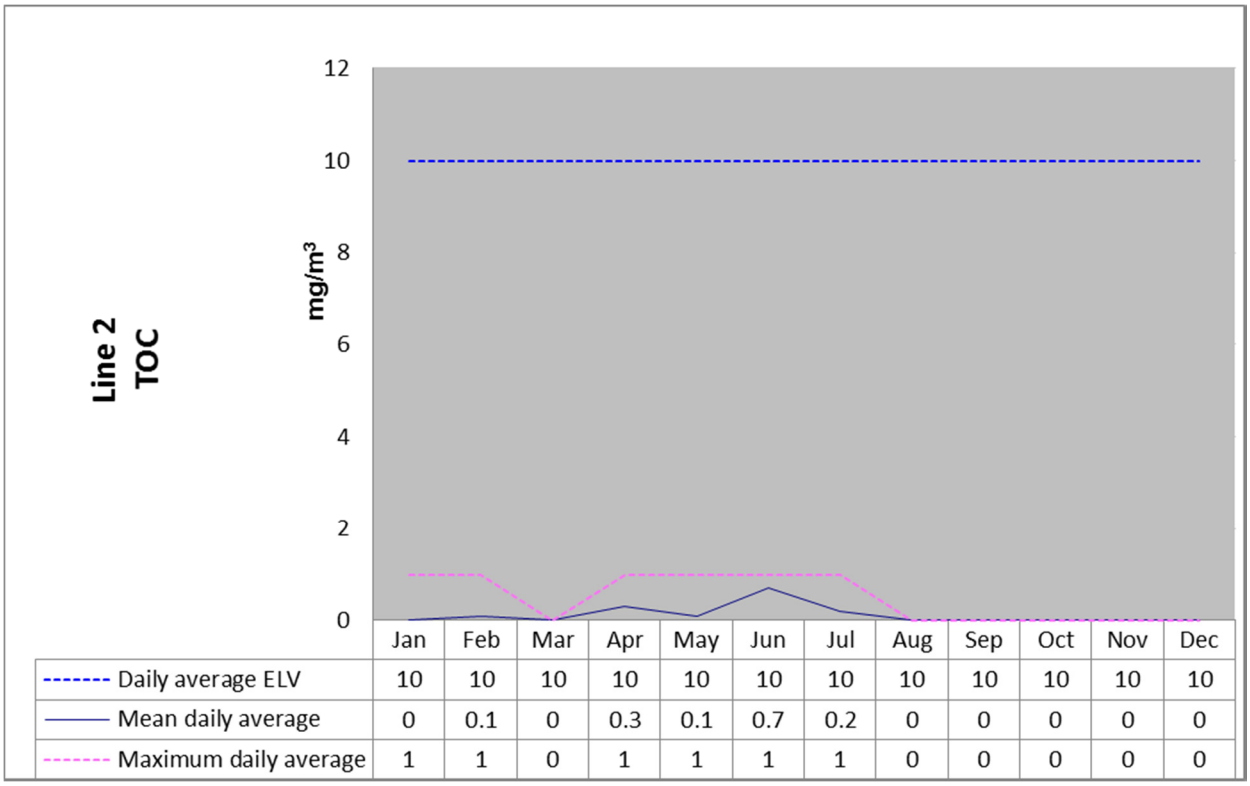
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	50	50	50	50	50	50	50	50	50	50	50	50
Mean daily average	6.8	8.7	26.4	15.9	7.1	11.1	12.6	12.6	12.2	12.4	11.2	7.5
Maximum daily average	10	14	39	24	21	17	17	16	16	16	16	19

Line 2 Nitrous Oxides (NO_x)



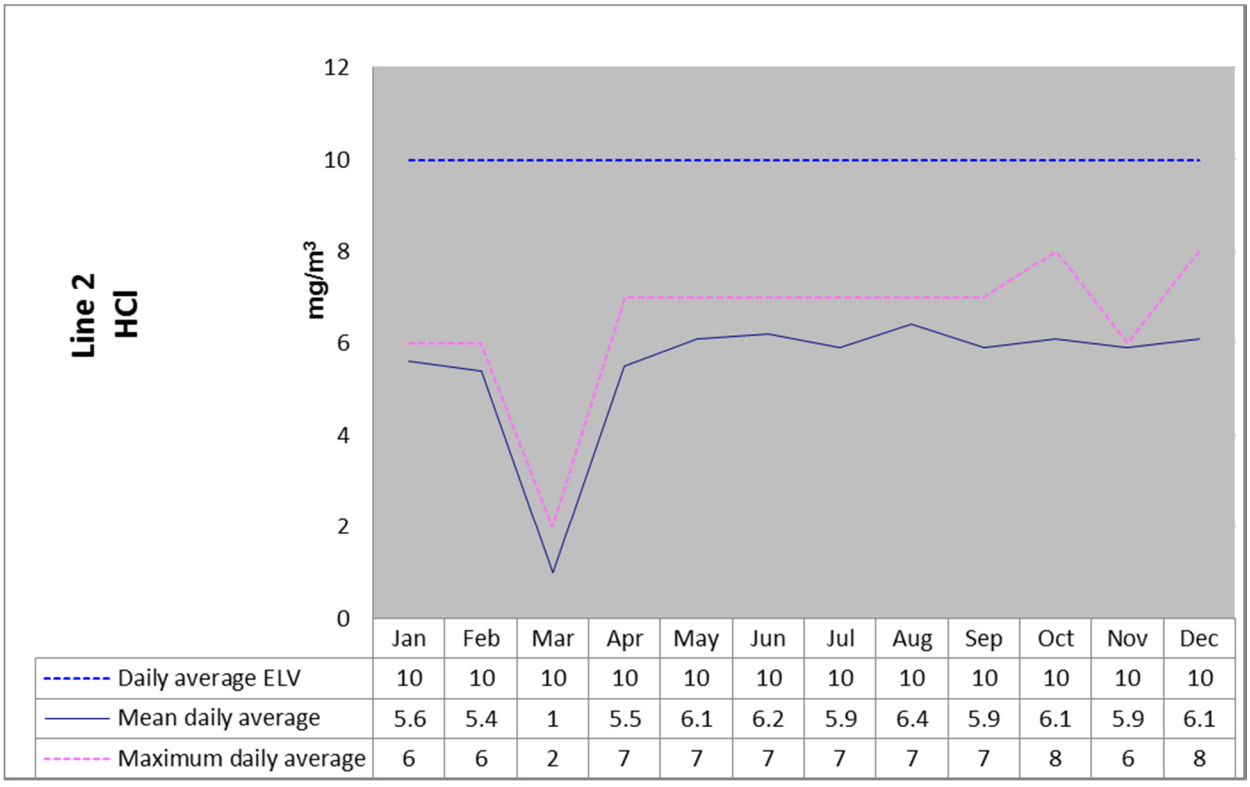
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	200	200	200	200	200	200	200	200	200	200	200	200
Mean daily average	140.1	131.5	130.9	140.8	136.9	135.6	148.3	147.8	146.9	138.4	138	137.4
Maximum daily average	149	143	151	152	144	146	158	152	149	150	155	146

Line 2 Total Organic Compound (TOC)



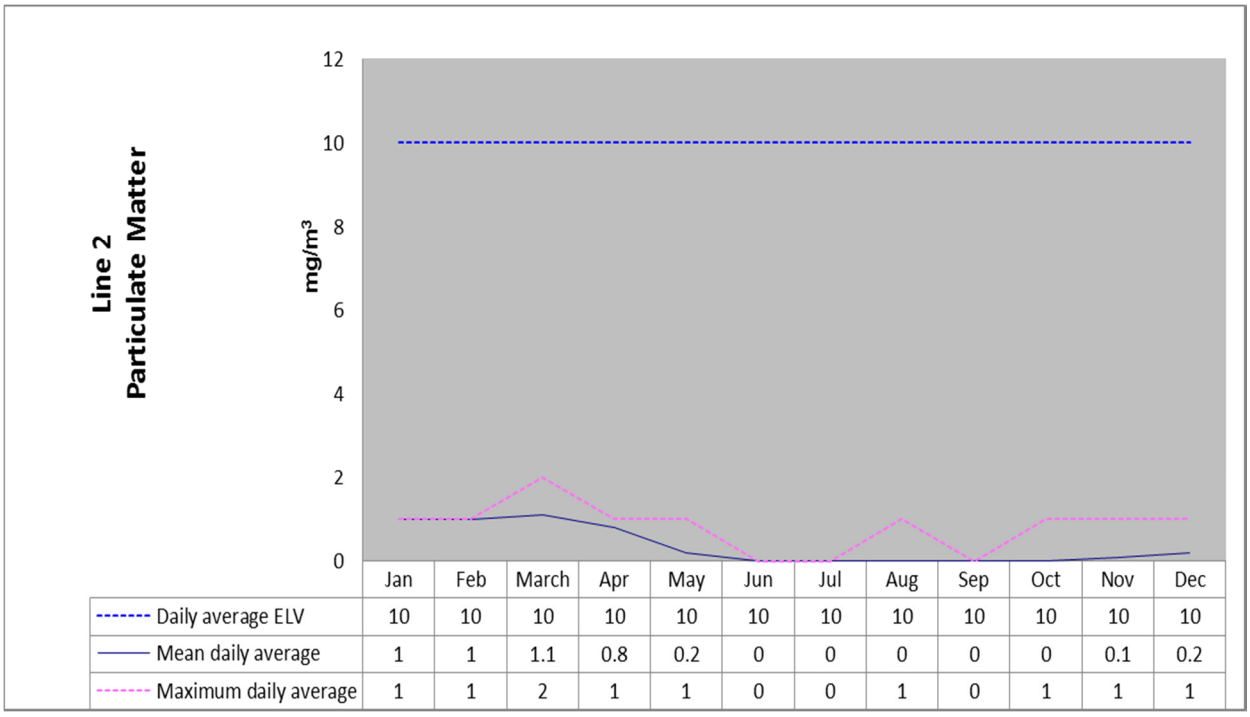
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	10	10	10	10	10	10	10	10	10	10	10	10
Mean daily average	0	0.1	0	0.3	0.1	0.7	0.2	0	0	0	0	0
Maximum daily average	1	1	0	1	1	1	1	0	0	0	0	0

Line 2 Ammonia (NH_3)



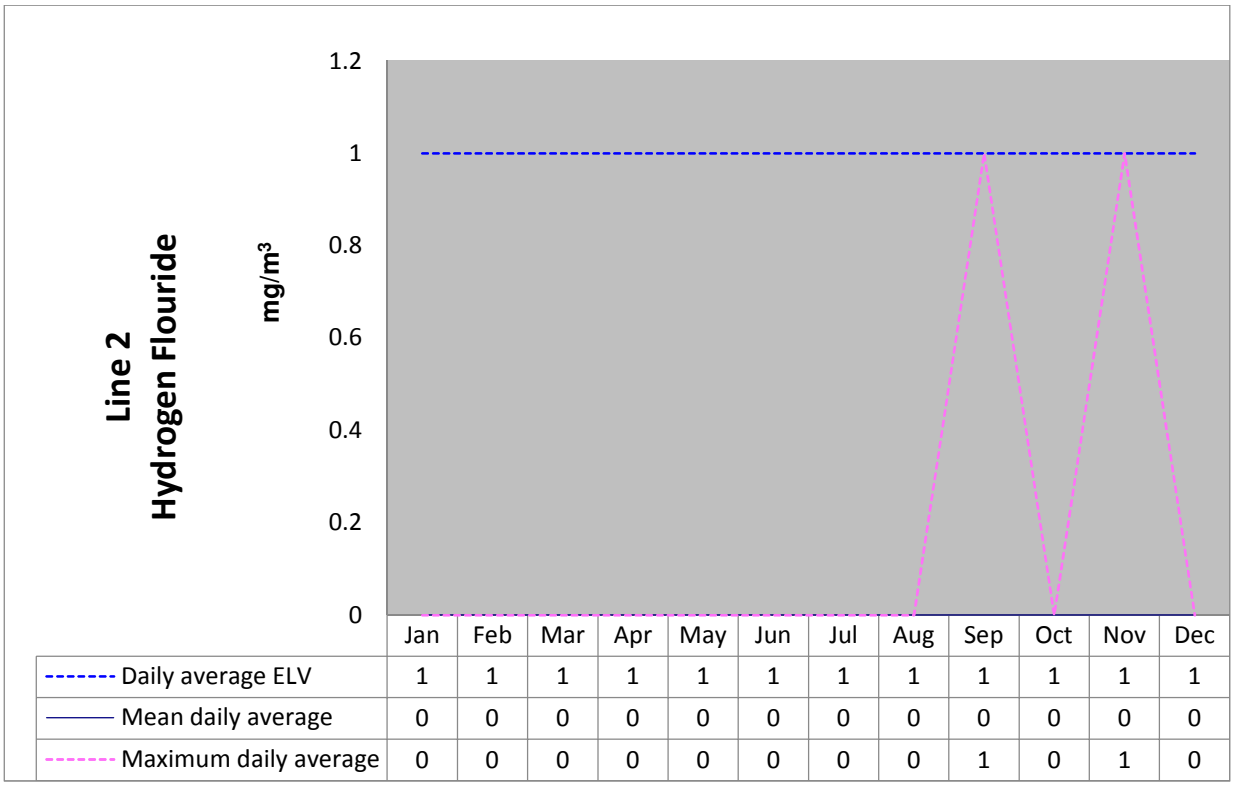
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	10	10	10	10	10	10	10	10	10	10	10	10
Mean daily average	5.6	5.4	1	5.5	6.1	6.2	5.9	6.4	5.9	6.1	5.9	6.1
Maximum daily average	6	6	2	7	7	7	7	7	7	8	6	8

Line 2 Particulates



	Jan	Feb	March	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	10	10	10	10	10	10	10	10	10	10	10	10
Mean daily average	1	1	1.1	0.8	0.2	0	0	0	0	0	0.1	0.2
Maximum daily average	1	1	2	1	1	0	0	1	0	1	1	1

Line 2 Hydrogen Fluoride (HF)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily average ELV	1	1	1	1	1	1	1	1	1	1	1	1
Mean daily average	0	0	0	0	0	0	0	0	0	0	0	0
Maximum daily average	0	0	0	0	0	0	0	0	1	0	1	0

Appendix B – Schedule 6 Notifications Details 2018

Date	Line	Parameter	Root Cause (Detailed in Part B)	Actions Taken (Detailed in Part B)
08.01.18	L1	CO	Primary air controller injecting excess air during restarting of waste feeding	Tuning of air injection controller
08.01.18	L1 & L2	Data Loss	Communications Failure	VINCI investigation with A1-CBISS
20.01.18	L2	CO	A trip of crane 2 necessitated a full reset where crane 1 fed both lines. This caused a delay in feeding line 2 causing a thin ash bed on the grate.	Manually reducing the steam set point and control of the waste crane allowed load recovery & increase in ash bed thickness
10.02.18	L1 & L2	Data Loss	Communications Failure	Reboot of CEMS system
18.02.18	L2	CO	Return to Waste after Safety Shutdown	Increased secondary air in DCS combustion control during the breach period to aid correct combustion. Also used burners to try to maintain steady conditions.
17.03.18	L1	CEMS Loss	Computer for line 1 failed causing a trip of a breaker, causing a trip of all systems.	Reset breakers and restored power. Line 1 swapped over to the standby analyser. CBISS Investigation.
18.03.18 (9:29)	L1	CO	Had issues with roller 6 and Primary Air Fan Vibrations	Waste feeding stopped. Burners used.
18.03.18 (16:00)	L1	CO	Restart of waste feeding following above.	Burners used to increase temperature and roller 6 damper placed back into auto control to reduce the amount of air being introduced to furnace.
19.03.18	L1	CO	PID controller in manual with fixed output, preventing combustion control	PID controller placed back into cascade mode
19.03.18	L2	Particulates	Bag house cell 3 issue	Excess dust found at top of chamber. Cell cleaned and placed back in service.
20.03.18	L2	Data Loss	Communications Failure	Reset of the L2 G52M unit
27.03.18	L1	SO2	Poor waste quality & lime injection issue	Review of crane mixing programmes and lime injection procedures.
07.04.18	L2	CO	Issue with waste feeder caused gap in waste bed	Investigated ram feeder issues.
08.04.18	L2	Data Loss	Communications Failure (TOC)	Investigated CEMS equipment, local FID restarted. CBISS Investigation.
13.04.18	IBA	TOC (%)	Possible lab error	Retest with different lab showed no exceedance. Investigation into sample procedure.
02.05.18	L2	CO	Ram Feeder Stoppage	Waste hopper flap shut. Once line was running correctly hopper flap opened and waste reintroduced.
08.05.18	L1	CO	Slow response of combustion control following stall on ram feeder	Education of shift team to drop the steam set point on receipt of over firing to prevent drum high pressure following combustion control response.

18.05.18	L1	CO	Issue with cooling pumps following planned maintenance caused turbine trip	Air flow reduced
20.05.18	L2	CO	Defective L2 conveyor caused the ash extractor to stop & therefore a grate stop	Waste stoppage on L2 and conveyor repair
24.05.18	L1	CO	Failure of hopper access gate	Control of primary air flow & investigation into hopper gate failure.
28.05.18	L1	CO	Failure of burners in auto	Burner taken into manual. Investigation into burner auto failure.
07.06.18	L1	CO	Feeder failure/error	Primary air placed in manual to reduce air under gap in waste on grate.
09.06.18	L1	CO	Ram feeder stall and issue with ingress of tramp air.	Level in conveyor recovered to remove tramp air.
16.06.18	L1	CO	Ram feeder fault	Manual intervention to rectify ram feeder fault. DCS alarm incorporated to alert when ram feeder not in correct position.
21.06.18	L1	CO	Ram feeder fault	Investigation of DCS alarm to alert the operator of issues with ram feeder cycle and cause of ram feeder misalignment.
24.06.18	L1	CO	Ash extractor failure causing loss of waste loading	Burners utilised until ash extractor issue was rectified
25.06.18	L2	CO	Unstable combustion following restart of L2	Secondary air was restored to normal levels once combustion was fully established.
13.07.18	L1	CO	Ram feeder fault in auto	Burners activated and global air reduced
04.08.18	L1	CO	Ram feeder fault in auto	Ram feeder placed into manual and global air removed.
21.09.18	L1	CO	T2S temperature loss	Burners activated and global air reduced
20.11.18	L1	CO	Drop in furnace temperature during planned shutdown	Manual control of burners. Review of temperature control set point.