



SUFFOLK

Energy from Waste Facility

2016 ANNUAL PERFORMANCE REPORT

DOCUMENT TITLE:	Suffolk – Energy from Waste Facility 2015 Annual Performance Report
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1. INTRODUCTION

Table 1: Plant details	
Name of Company	SUEZ Recycling and Recovery UK
Name of Plant	SUEZ Suffolk – Energy from Waste Facility
Permit Number	WP3438HZ
Address	Lodge Lane Great Blakenham Ipswich IP6 0JE
Phone	01473 839149
Contact Name/Position	Paul Leighton – 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 269,000 tonnes of municipal waste and commercial/Industrial waste. The plant has two furnace lines with a processing capacity of 269,000 tonnes per annum. The heat produced by waste incineration is used to raise superheated steam which generates 177,000 MWh/annum 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).

Suffolk EfW commissioning finished on 1st December 2014, when the plant was handed over from the EPC contractor to SITA UK. Permit conditions apply since then. The data included in this report corresponds to the following period: 1st January 2016 to 31st December 2016.

3. SUMMARY OF PLANT OPERATION

Incoming waste is delivered to site by refuse collection trucks. It is then checked in, weighed and delivered into the reception hall.

RECEPTION HALL

A large reception 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 EfW 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. An auxiliary burner 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 6 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 177,000 MWh/annum and exporting 147,000 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 urea 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 tankered away for recycling.

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	269,000 t/yr Two lines			
Annual waste throughputs	Mixed Municipal Waste Commercial and Trade Waste Not to exceed a combined total of 269,000t/yr			
Total plant operational hours in the year	Operating hours: Line 1 – 8122 h Line 2 – 7999.7 h			
Residues produced	Bottom ash	APCR	Metals	Other waste
Amount of each residue, including metals (where appropriate) recycled/land filled	49,830.48 t	6,250.64 t	10,532.36 t	N/A
Electricity	Produced: 171,178.01 MWh Exported: 150,541.54 MWh Parasitic load: 20,080.11 MWh			

Table 3: Annual waste throughput

Waste types	EWC code	Tonnes
Mixed Municipal Waste	20 03 01	234,974.92
Other	20 03 03	822.58
	19 12 12	28,865.74
	18 01 04	1,876.12

4. PERMIT VARIATION

A permit variation was applied for during 2016. The variation request was to alter the drain line from the RO concentrators to allow the water to go into the sewer. Following a meeting with our EA Officer we were advised this would be classed as a minor technical variation. The application has been submitted to the EA and we are awaiting confirmation of approval.

5. SUMMARY OF PLANT MONITORING

Table 4: Emission limits to air and monitoring during normal operation			
A1 and A2	Particulate matter	30 mg/m ³ ½-hr average	Continuous measurement
A1 and A2	Particulate matter	10 mg/m ³ Daily average	Continuous measurement
A1 and A2	Total Organic Carbon (TOC)	20 mg/m ³ ½-hr average	Continuous measurement
A1 and A2	Total Organic Carbon (TOC)	10 mg/m ³ Daily average	Continuous measurement
A1 and A2	Hydrogen chloride	60 mg/m ³ ½-hr average	Continuous measurement
A1 and A2	Hydrogen chloride	10 mg/m ³ Daily average	Continuous measurement
A1 and A2	Hydrogen fluoride	2 mg/m ³ Periodic over minimum 1-hour period	Bi-annual
A1 and A2	Carbon monoxide	150 mg/m ³ 95% of all 10-minute averages in any 24-hour period	Continuous measurement
A1 and A2	Carbon monoxide	50 mg/m ³ Daily average	Continuous measurement

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A1 and A2	Sulphur dioxide	200 mg/m ³ ½-hr average	Continuous measurement
A1 and A2	Sulphur dioxide	50 mg/m ³ Daily average	Continuous measurement
A1 and A2	Oxides of nitrogen (NO and NO ₂ expressed as NO ₂)	400 mg/m ³ ½-hr average	Continuous measurement
A1 and A2	Oxides of nitrogen (NO and NO ₂ expressed as NO ₂)	200 mg/m ³ Daily average	Continuous measurement
A1 and A2	Cadmium & thallium and their compounds (total)	0.05 mg/m ³ periodic over minimum 30 minute, maximum 8 hour period	Bi-annual
A1 and A2	Mercury and its compounds	0.05 mg/m ³ periodic over minimum 30 minute, maximum 8 hour period	Bi-annual
A1 and A2	Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m ³ periodic over minimum 30 minute, maximum 8 hour period	Bi-annual
A1 and A2	Dioxins / furans (I- TEQ)	0.1 ng/m ³ periodic over minimum 6 hours, maximum 8 hour period	Bi-annual

The annual mass emissions of monitored pollutants

(Data was taken from Pollution Inventory reporting Form)

Table 5: Annual mass emissions of monitored pollutants				
Pollutant	Reporting Threshold	brt (below recorded threshold) or releases		Notifiable releases
		Line 1	Line 2	
Carbon Dioxide CO ₂	10,000,000 kg	266,553,660 kg		Appendix 2
Ammonia NH ₃	1000 kg	12744.7	8596.3	
Antimony Sb	1 kg	brt	brt	
Arsenic As	1 Kg	brt	brt	
Cadmium Cd	1 kg	brt	brt	
Chromium Cr	10 kg	brt	brt	
Copper Cu	10 kg	brt	brt	
Lead Pb	100 kg	brt	brt	
Manganese Mn	10 kg	brt	brt	
Mercury Hg	1 kg	brt	brt	
Nickel Ni	10 kg	brt	brt	
Vanadium V	10 kg	brt	brt	
Chlorine and inorganic chlorine compounds – as HCL	10,000 kg	brt	brt	
Dioxins and furans (PCDDs/PCDFs) as WHO-TEQ	0.00001 kg	brt	brt	
Fluorine and inorganic fluorine compounds – as HF	1,000 kg	brt	brt	

Nitrogen oxides (NO and NO ₂) as NO ₂	100,000 kg	128495.14	127674.68	
Nitrous oxide N ₂ O	10,000 kg	brt	brt	
Non-methane volatile organic compounds	10,000 kg	brt	brt	
Particulate matter	10,000 kg	brt	brt	
Polychlorinated biphenyls (PCBs)	0.00001 kg	brt	brt	
Sulphur oxides (SO ₂ and SO ₃) as SO ₂	100,000 kg	brt	brt	
Carbon monoxide CO	100,000 Kg	brt	brt	

6. SUMMARY OF PLANT COMPLIANCE

Table showing percentage of the operating time the plant was in compliance with the permit conditions.

Table 6: Plant compliance with permit conditions		
Pollutants measured	% of operational time plant was in compliance	
	Line 1	Line 2
Particulates	100%	100%
Oxides of nitrogen	100%	99.70%
Sulphur dioxide	99.99%	99.97%
Carbon monoxide	99.68%	99.98%
Total Organic Carbon	99.94%	99.86%
Hydrogen chloride	99.70%	99.99%
Mercury	100%	100%

Cadmium & thallium	100%	100%
Sb, As, Pb, Cr, Co, Cu, Mn, Ni, and V, including their compounds	100%	100%
Dioxins/furans	100%	100%
Hydrogen fluoride	100%	100%

7. SUMMARY OF PLANT IMPROVEMENTS

No Improvement Conditions have been submitted to the EA yet. On 2014, the following Pre-Operational Conditions were submitted:

Table 7: Improvement programme requirements		
Ref.	Requirement	Date
IC1	The operator shall submit a written report to the Environment Agency on the implementation of its Environmental Management system and the progress made in the accreditation of the system by an external body or if appropriate submit a schedule by which the EMS will be subject to accreditation.	Completed.
IC2	The operator shall submit a written proposal to the Environment Agency to carry out tests to determine the size distribution of the particulate matter in the exhaust gas emissions to air from emission points A1 and A2, identifying the fractions within the PM ₁₀ , PM _{2.5} and PM _{1.0} ranges. The proposal shall include a timetable for approval by the Environment Agency to carry out such tests and produce a report on the results. On receipt of written agreement by the Environment Agency to the proposal and the timetable, the operator shall carry out the tests and submit to the Environment Agency a report on the results.	Completed.
IC3	The operator shall submit a written report to the Environment Agency on the commission of the installation. The report shall summarise the environmental performance of the plant as installed against the design parameters set out in the Application. The report shall also include a review of the performance of the facility against the conditions of this permit and details of procedures developed during commissioning for achieving and demonstrating compliance with permit conditions.	Completed.
IC4	The operator shall carry out checks to verify the residence time, minimum temperature and oxygen content of the exhaust gases in the furnace whilst operating under the anticipated most unfavourable operating conditions. The results shall be submitted in writing to the Environment Agency.	Completed.

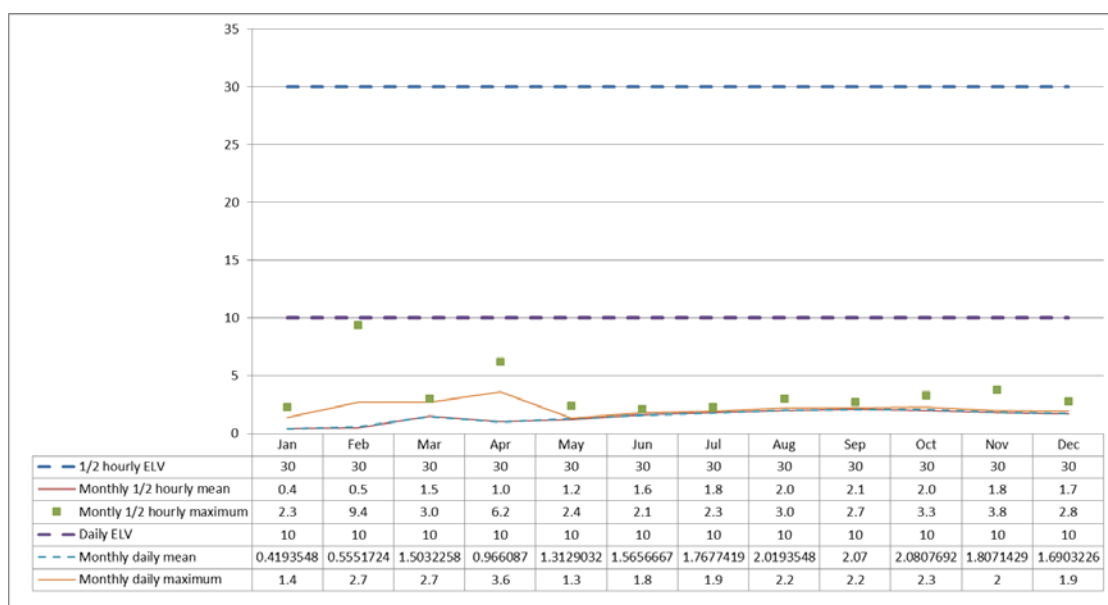
IC5	The operator shall submit a written report to the Environment Agency describing the performance and optimisation of the Selective Non Catalytic Reduction (SNCR) system and combustion settings to minimise oxides of nitrogen (NO _x) emissions within the emission limit values described in this permit with the minimisation of nitrous oxide emissions. The report shall include an assessment of the level of NO _x and N ₂ O emissions that can be achieved under optimum operating conditions.	Completed.
IC6	The operator shall carry out an assessment of the impact of emissions to air of all the component metals subject to emissions limit values, i.e. Cd, Tl, Hg, Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V. The assessment shall predict the impact of each metal against the relevant EQS/EAL through the use of emissions monitoring data during the first year of operator and air dispersion modelling. A written report on the assessment shall be made to the Environment Agency.	Completed
IC7	The operator shall submit a written summary report to the Environment Agency to confirm by the results of calibration and verification testing that the performance of Continuous Emission Monitors for parameters as specified in Table S3.1 and Table S3.1(a) complies with the requirements of BS EN 14181, specifically the requirements of QAL1, QAL2 and QAL3.	Completed
IC8	<p>The operator shall submit a revised odour management plan (OMP) taking into account the waste transfer activities to the Environment Agency in writing. The revised OMP shall take into account the required information as specified in the Environment Agency's technical guidance, 'How to comply' and 'H4 – odour management'.</p> <p>The notification requirements of condition 2.4.1 will be deemed to have been complied with on submission of the written proposals.</p> <p>The revised odour plan shall be subject to a written approval by the Environment Agency. The operator shall implement the procedures and measures as approved, and from the date stipulated by the Environment Agency.</p> <p>During the first waste transfer operator, an odour survey shall be carried out in accordance with the OMP. The OMP shall be reviewed by the operator and where appropriate improvements shall be added.</p> <p>The operator shall confirm in a letter that the survey and review have taken place.</p>	Completed

8. FURTHER INFORMATION

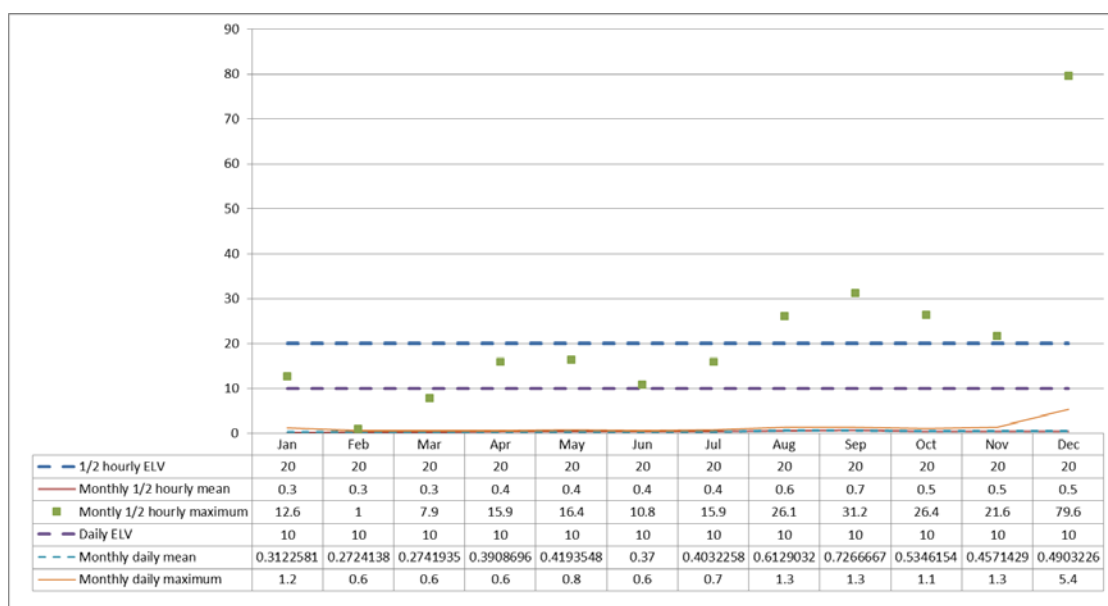
Further information available at: <http://www.suffolkefw.co.uk/>

APPENDIX 1. 2016 AIR EMISSIONS GRAPHS

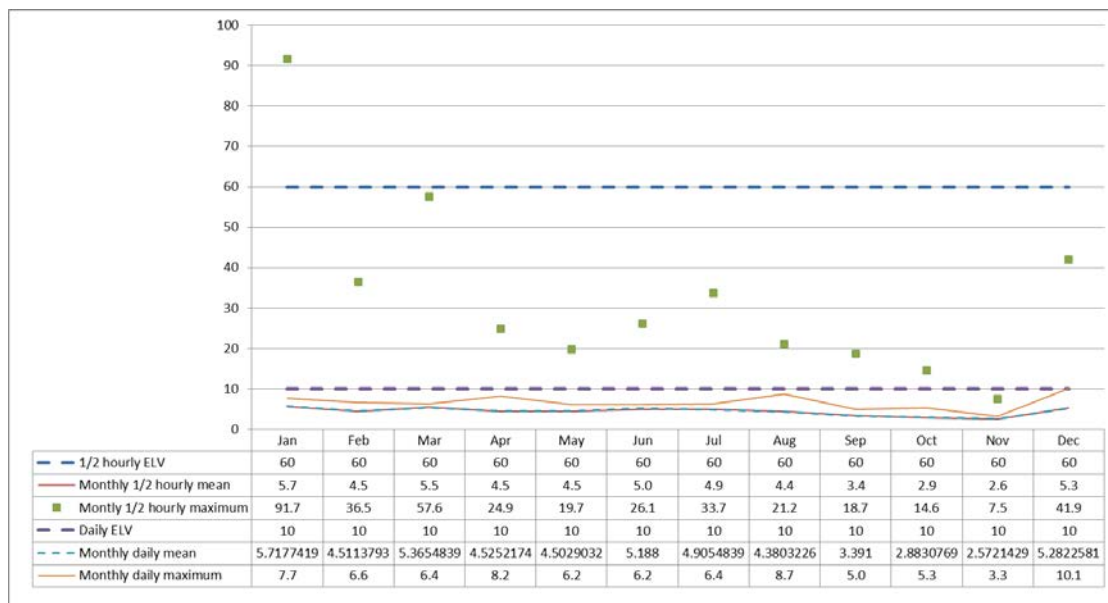
Line 1 Particulate Matter



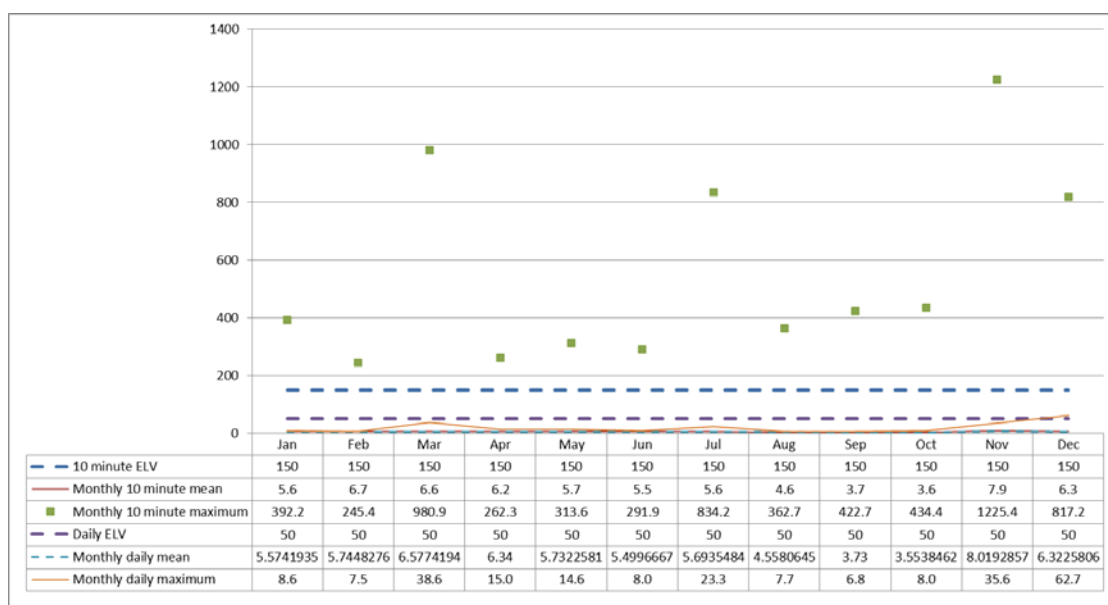
Line 1 Total Organic Carbon (TOC)



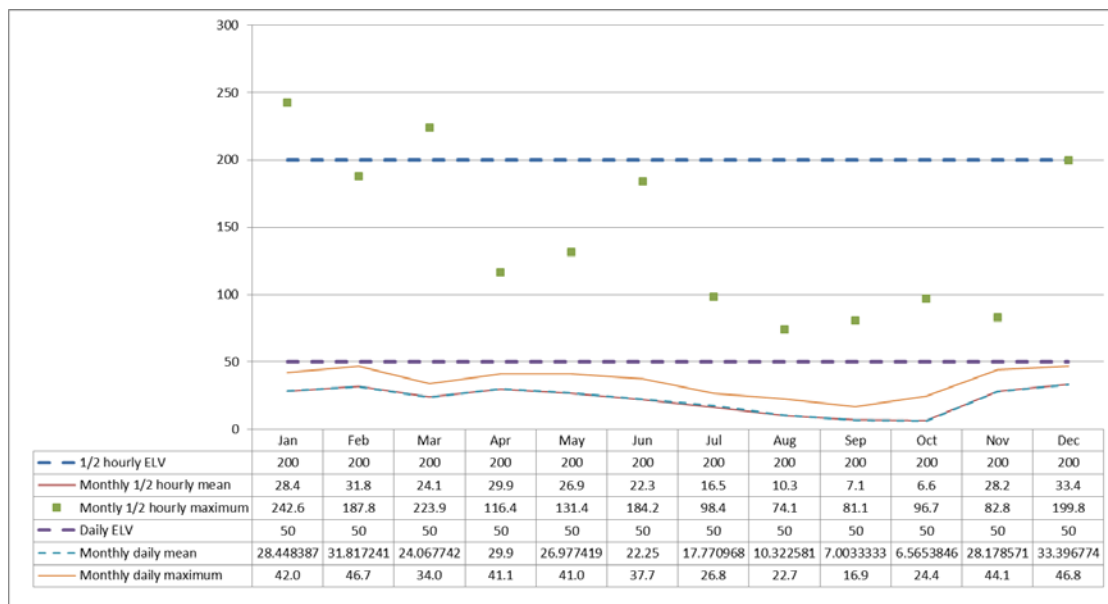
Line 1 Hydrogen Chloride (HCl)



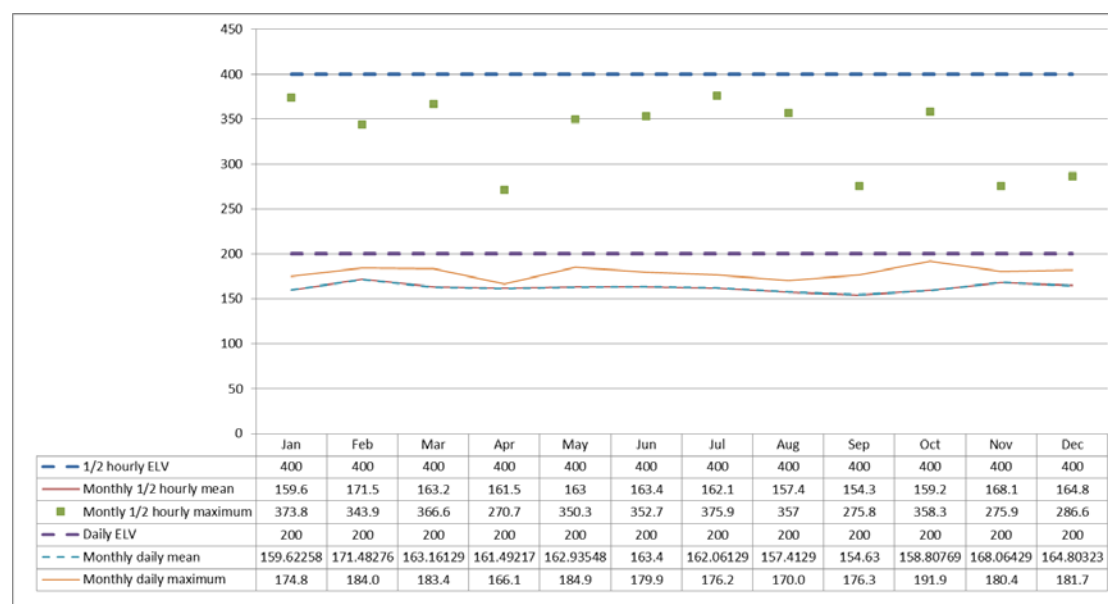
Line 1 Carbon Monoxide (CO)



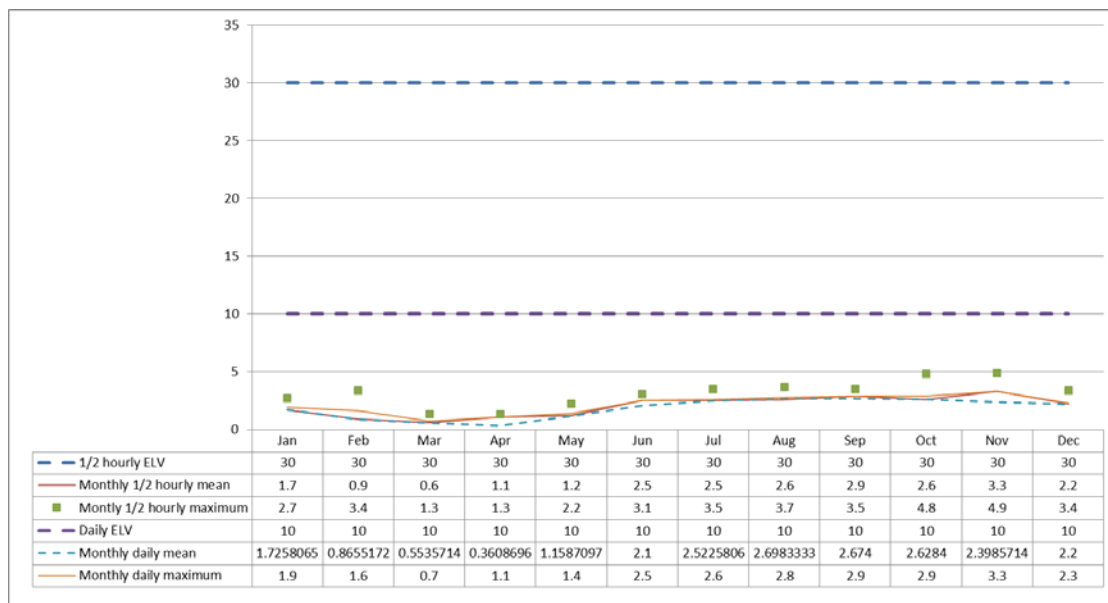
Line 1 Sulphur Dioxide (SO₂)



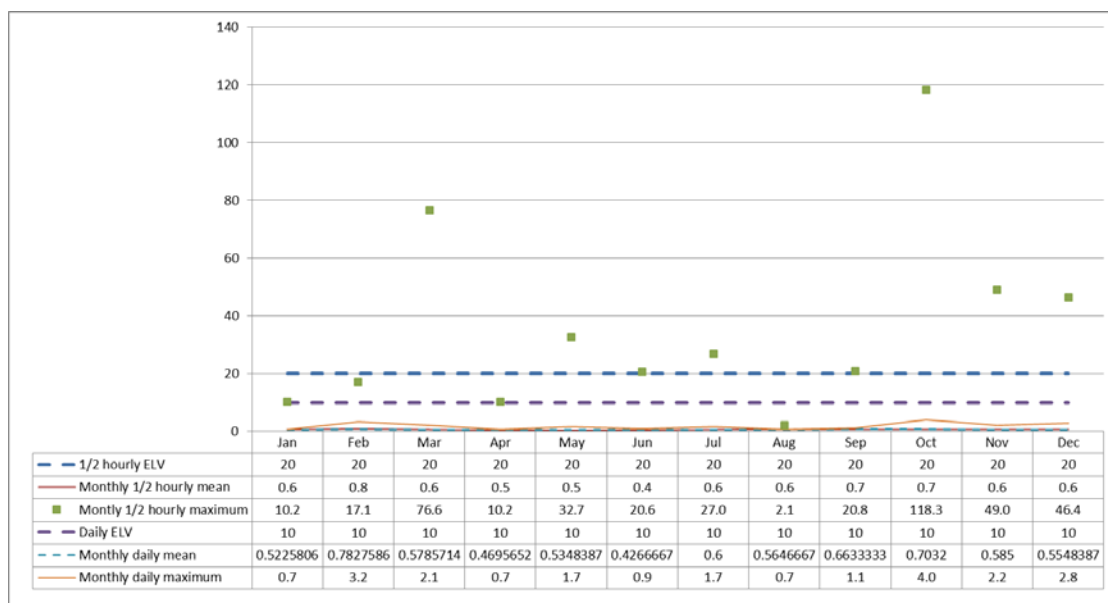
Line 1 Oxides of Nitrogen (NO_x)



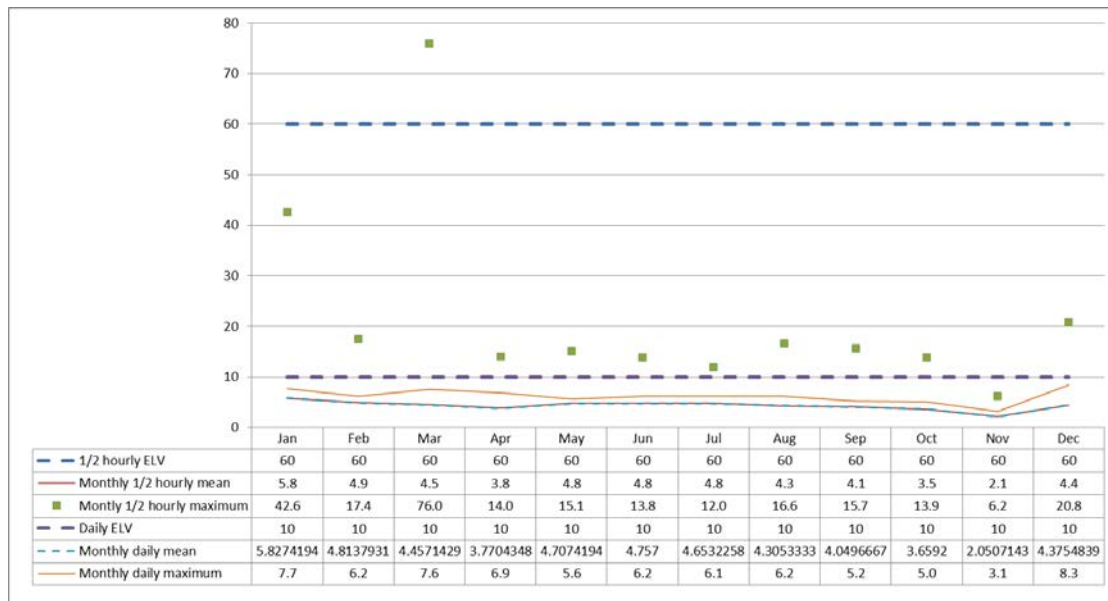
Line 2 Particulate Matter



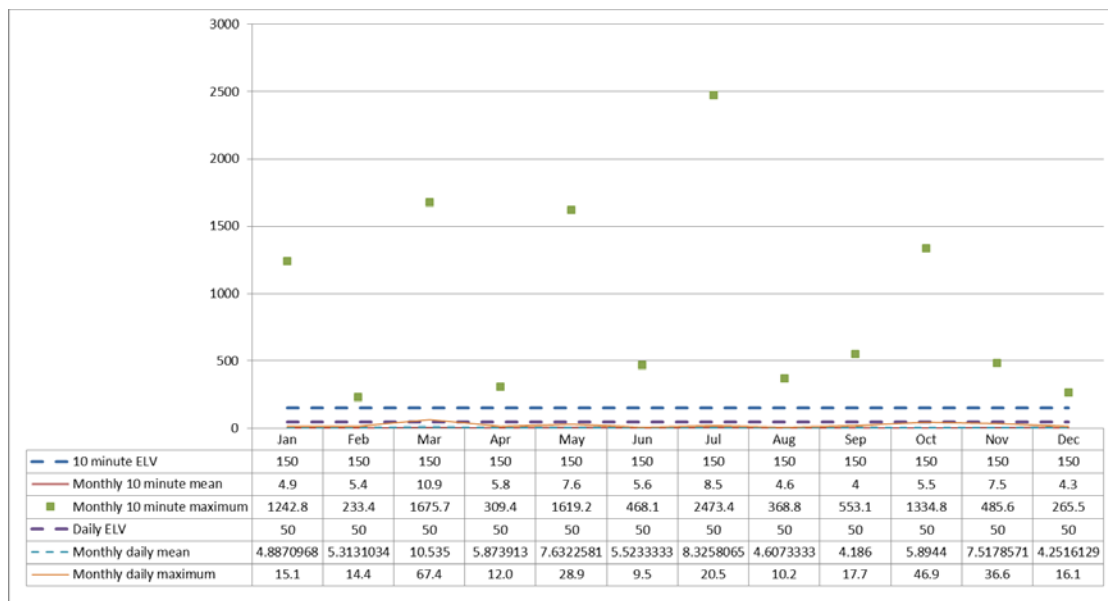
Line 2 Total Organic Carbon (TOC)



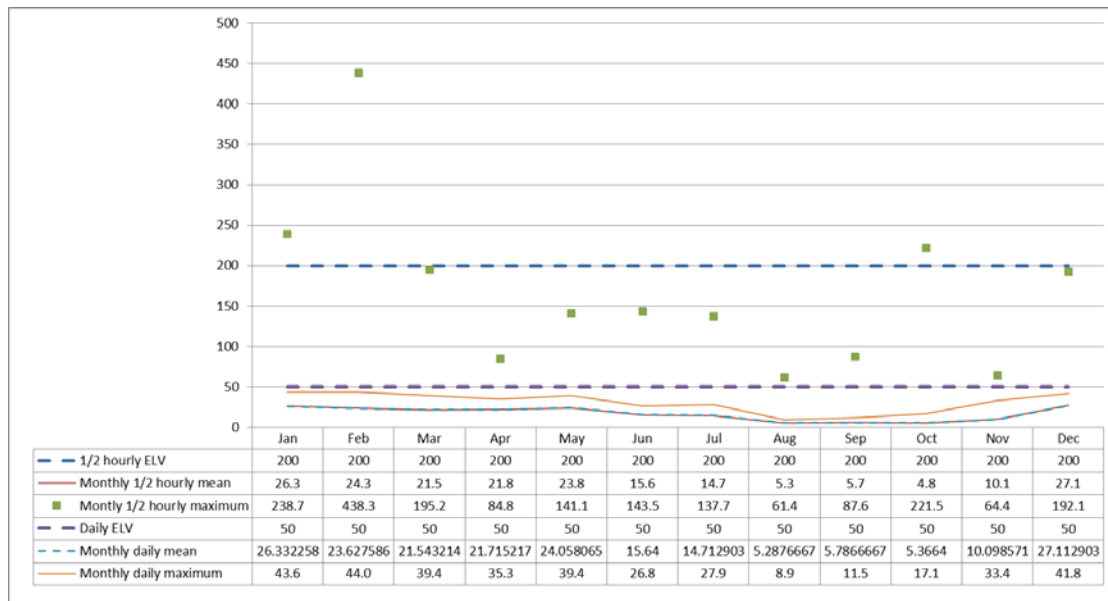
Line 2 Hydrogen Chloride (HCl)



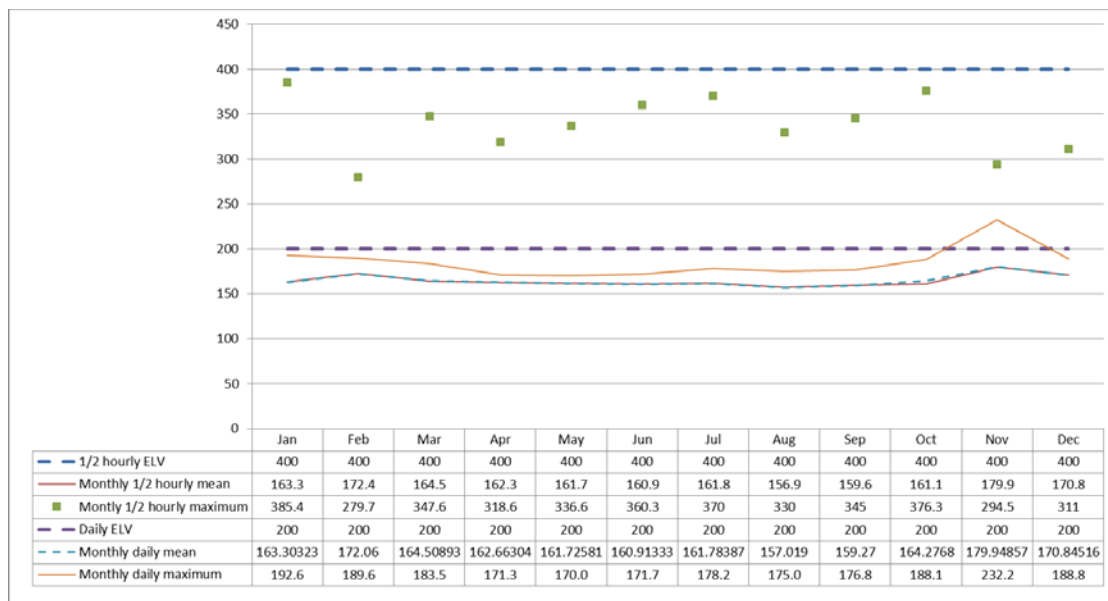
Line 2 Carbon Monoxide (CO)



Line 2 Sulphur Dioxide (SO₂)



Line 2 Oxides of Nitrogen (NO_x)



APPENDIX 2. 2016 NOTIFICATIONS

Table 1: 2016 Schedule 5 notifications					
Date	Line - parameter	Ref.	Root cause (extracted from Schedule 5 – part B)	Actions Taken (extracted from Schedule 5 – part B)	CCS score
13/01/2016	COMMON – TOC	SUF 001/16	In the days preceding the sample being taken the plant just returned from being on a planned shutdown from 29th October to 24th November. There was a large amount of old waste in the pit which was difficult to mix and this lead to problems with combustion and exceedances being recorded. These conditions would have had an effect on the IBA which was being produced. A retest of the sample was taken which showed a result of 3.8 so we are confident the results are accurate.	<ul style="list-style-type: none"> Continuous improvement project implement on SO² and HCl exceedances – root causes the same as IBA. Waste mixing procedure being monitored to ensure adherence. Waste inspections on 3rd party waste vehicles. Reminder to all waste customers to remind them of acceptable and non-conforming waste. 	
21/01/2016	Line 2 – SO ²	SUF 002/16	On the 21st January 2016 at 16:20 the raw HCl and SO ₂ began to progressively increase. The lime dosing automatically began increasing accordingly. At the same time the SO ₂ and HCl levels on the CEMS also began increasing at the same rate as the raw HCl and SO ₂ . At 16:47, seeing the continuous increase of the CEMS readings and the half hour average limit of SO ₂ close to being breached, the Senior Operations Technician put the dosing into manual and increased the lime flow to the maximum. Despite this, the CEMS readings kept increasing up to breach the levels for a few minutes. At 17:00 both the raw gas and CEMS readings began decreasing. Lime dosing remained at 100% until 17:11, when both the CEMS and raw gas readings were back to normal levels. Despite the lime dosing automatically increasing according to the raw gas increase (as per the lime dosing control loop), the CEMS readings were not affected as much as expected. This indicates the efficiency of the reaction might have dropped. Following an investigation and root cause analysis, it was found that lab loop temperature was above the design limits, which would have led to a drop of the lime reaction efficiency.	<ul style="list-style-type: none"> CI project implemented to analyse data and root causes. SOT's to monitor flue temperature and reduce boiler load if required. Explosive cleaning carried out in the final ECO of the boiler. Final ECO cleaning system has been repaired during outage. Grit blasting carried out on ECO during outage. 	
23/01/2016	Line 1 – HCl & SO ²	SUF 003/16	On 23rd January 2016 at 03:26 the raw HCl and SO ₂ began increasing and the duty lime dosing increased accordingly. At 03:43 the raw HCl went into I/O fault due to over range failure which caused the duty lime dosing to fall from 100% to 50%. The fault was intermittent so the duty lime dosing would go up to 100% before falling back to 50% again. At 04:02 the lime dosing was taken into manual by the Senior Operations Technician but it was not enough to stop the breaching of the half hourly limit on HCl and SO ₂ . Once the lime dosing was up to 100% the HCl and SO ₂ levels began to fall and shortly returned to normal.	<ul style="list-style-type: none"> Continuous improvement project implement on SO₂ and HCl exceedances – root causes the same as IBA. Waste mixing procedure being monitored to ensure adherence. Waste inspections on 3rd party waste vehicles. Reminder to all waste customers to remind them of acceptable and non-conforming waste. CI project implemented to analyse data and root causes. SOT's to monitor flue temperature and reduce boiler load if required. 	

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			Following an investigation and root cause analysis, it was found that lab loop temperature was above the design limits, which would have led to a drop of the lime reaction efficiency.	<ul style="list-style-type: none"> Explosive cleaning carried out in the final ECO of the boiler. Final ECO cleaning system has been repaired during outage. Grit blasting carried out on ECO during outage. 	
07/02/2016	Line 2 – HCl	SUF 004/16	<p>On 7th February 2016 at 12:09 there was a sharp increase of raw SO₂, the lime screws sped up automatically to 87%.</p> <p>At 12:10 the raw gas analyser went into Input/Output fault due to the readings being out of range (too high). The lime screw speed began to drop.</p> <p>At 12:12 the lime screws were taken into manual and raise to 100%. However it was not enough to avoid the breach.</p> <p>At 12:15 the SO₂ readings began decreasing, at 12:25 the SO₂ readings were back to normal but the lime screw was kept in manual at 100% until 12:31 as a precautionary measure.</p>	<ul style="list-style-type: none"> Continuous improvement project implement on SO₂ and HCl exceedances – root causes the same as IBA. Waste mixing procedure being monitored to ensure adherence. Waste inspections on 3rd party waste vehicles. Reminder to all waste customers to remind them of acceptable and non-conforming waste. CI project implemented to analyse data and root causes. SOT's to monitor flue temperature and reduce boiler load if required. Explosive cleaning carried out in the final ECO of the boiler. Final ECO cleaning system has been repaired during outage. Grit blasting carried out on ECO during outage. 	
12/02/2016	Line 2 – SO ₂	SUF 005/16	<p>On 12th February 2016 at 11:51 the raw SO₂ and HCl began increasing rapidly. The duty lime dosing increased which reduced the raw HCl levels but the SO₂ continued to increase.</p> <p>At 12:01 the lime dosing was taken into manual by the Senior Operations Technician and at 12:05 the levels began to decrease.</p> <p>At 12:17 the lime dosing was put back into automatic and by 12:30 the levels had returned to normal.</p>	<ul style="list-style-type: none"> A Continuous Improvement project has been implemented to minimise SO₂ and HCl exceedances. We are continuing to monitor that waste mixing procedure is being adhered to by carrying out daily waste pit audits. We will increasing inspections of vehicles delivering 3rd party and contract waste to site. We will be sending out a reminder to all waste customers to remind them of acceptance and non-conforming waste types. 	
03/03/2016	Line 2 – HCl	SUF 006/16	<p>On 3rd March 2016 at 11:42 the raw HCl began increasing rapidly. The duty lime dosing also increased.</p> <p>At 11:49 the duty lime dosing was at 110% however this was not sufficient to stop an HCl exceedance from occurring.</p> <p>At 11:54 the raw HCl began to fall and continued to fall until combustion conditions returned to normal.</p>	<ul style="list-style-type: none"> A Continuous Improvement project has been implemented to minimise SO₂ and HCl exceedances. We are continuing to monitor that waste mixing procedure is being adhered to by carrying out daily waste pit audits. We will increasing inspections of vehicles delivering 3rd party and contract waste to site. We will be sending out a reminder to all waste customers to remind them of acceptance and non-conforming waste types. 	
07/03/2016	Line 2 – TOC	SUF 007/16	On 7th March an Island Mode test was being carried out in response to the 33kv fire which occurred on 23rd May 2015.	<ul style="list-style-type: none"> The Island mode caused the turbine trip due to a fault which has since been resolved by the EPC. A further Island Mode 	

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			<p>The plant was successfully transferred into Island Mode but at 08:46 a turbine trip occurred which caused a blackout on the plant, rendering it uncontrollable by the Senior Operations Technician until the power was reinstated. As a result the Senior Operations Technician was unable to control the combustion and avoid the TOC breach.</p> <p>At 09:20 the plant was returned to service after power was restored by the EC&I technicians.</p>	<p>test will be carried out to ensure that the repairs have been successful.</p>	
07/03/2016	Line 2 – TOC	SUF 008/16	<p>On 7th March 2016 a second Island Mode test was being carried out following the turbine trip earlier in the day.</p> <p>The plant was successfully transferred into Island Mode however there was an issue with returning the plant to the main grid. In order for the plant to return to the grid the plant was required to go into blackout.</p> <p>As a result the plant was unable to be control and the consequently a TOC exceedance occurred.</p> <p>An investigation found that the configuration was not correct for the plant to reconnect with the grid following Island Mode.</p>	<ul style="list-style-type: none"> The fault was raised as a DNR and corrected the outage. A further Island Mode test will be carried out to ensure the configuration is correct. 	
07/03/2016	Line 2- CO	SUF 009/16	<p>On 7th March 2016 a second Island Mode test was being carried out following the turbine trip earlier in the day.</p> <p>The plant was successfully transferred into Island Mode however there was an issue with returning the plant to the main grid. In order for the plant to return to the grid the plant was required to go into blackout.</p> <p>As a result the plant was unable to be controlled and there was a large spike of CO which was too large to be averaged over the remaining work period.</p> <p>An investigation found that the configuration was not correct for the plant to reconnect with the grid following Island Mode.</p>	<ul style="list-style-type: none"> The fault was raised as a DNR and corrected the outage. A further Island Mode test will be carried out to ensure the configuration is correct. 	
12/03/2016	Line 1 – SO ₂	SUF 010/16	<p>On 12th March 2016 at 05:35 the raw HCl and SO₂ began increasing rapidly, possibly due to PVC doors being on the grate. The duty lime dosing increased to 100%.</p> <p>At 05:43 the raw HCl went into IO fault due to over range and dropped to 50%.</p> <p>At 05:50 the raw HCl returned to service and the duty lime dosing increased to 100%.</p>	<ul style="list-style-type: none"> A Continuous Improvement project has been implemented to minimise SO₂ and HCl exceedances. Conversations are ongoing with the EPC contractor about the raw gas analyser range. We are continuing to monitor that waste mixing procedure is being adhered to by carrying out daily waste pit audits. We will increasing inspections of vehicles delivering 3rd party and contract waste to site. We will be sending out a reminder to all waste customers to remind them of acceptance and non-conforming waste types. 	
15/03/2016	Line 2 – TOC	SUF 011/16	<p>On 15th March 2016 at 04:17 the burner comes in as T2S begins to drop.</p> <p>At 04:23 the oxygen began to increase.</p> <p>At 04:30 the grate began to automatically speed up.</p>	<ul style="list-style-type: none"> The configuration of Feeder 2 has been repaired by the Mechanical Maintenance technician and should cause no 	

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			<p>At 04:33 the grate was taken into manual as well as the Over fire and Under fire air. At 04:36 the grate was manually reduced as the TOC spiked. At 04:40 the TOC began to decrease and the Under fire air is increased in manual. At 04:54 the oxygen begins increasing. Further investigation found that the Feeder 2 was pushing at twice the rate of Feeder 1 and was pushing more waste onto the grate than required. This led to a thick waste bed covering the grate and disrupting combustion.</p>	<ul style="list-style-type: none"> • further issues. • A procedure is being developed to assistance with the management of TOCs during poor combustion. 	
15/03/2016	Line 2 – CO	SUF 012/16	<p>On 15th March 2016 at 04:17 the burner comes in as T2S begins to drop. At 04:23 the oxygen began to increase. At 04:30 the grate began to automatically speed up and a large CO spike occurred. At 04:33 the grate was taken into manual as well as the Over fire and Under fire air. At 04:36 the grate was manually reduced. At 04:40 the Under fire air is increased in manual and the second large spike of CO occurred. At 04:54 the oxygen begins increasing. Further investigation found that the Feeder 2 was pushing at twice the rate of Feeder 1 and was pushing more waste onto the grate than required. This led to a thick waste bed covering the grate and disrupting combustion.</p>	<ul style="list-style-type: none"> • The configuration of Feeder 2 has been repaired by the Mechanical Maintenance technician and should cause no further issues. • A procedure is being developed to assistance with the management of TOCs during poor combustion. 	
26/03/2016	Line 2 –TOC	SUF 013/16	<p>On 26th March 2016 at 22:12 the ID fan tripped due to a fault on the frequency converter. This also caused the Primary and Secondary Air fans to also trip. At 22:13 the ID fan, Primary and Secondary Air fans were put back into service. At 22:14 the Under fire air and Over fire air was placed into manual at 35% and 25% respectively. The oxygen began to fall rapidly and at 22:16 there was TOC spike. At 22:18 the TOC began decreasing and Over fire air was put back into automatic. At 22:23 the Under fire air was put into automatic. The waste pit was low as it was being prepared for the forthcoming outage which led to combustion issues due to the poor quality of the waste.</p>	<ul style="list-style-type: none"> • A procedure is being developed to assist with the management of TOC exceedances when dealing with difficult combustion issues. • The fault on the frequency converter was a snag, the settings were updated during the outage and the issue was resolved by the EPC. 	
29/03/2016	Line 2 – TOC	SUF 014/16	<p>On 29th March 2016 at 05:58 a thick bed of waste was developing on the grate. By 06:06 a very thick bed of waste had developed and caused the oxygen level to drop. At 06:11 the oxygen level was a 0% and the Over fire air was put into manual and increased to 100%. At 06:15 the TOC spiked and the Under fire air was put into manual and reduced to 85%. Immediately after the TOC began decreasing. At 06:31 the oxygen began increasing and the TOC returned to normal levels.</p>	<ul style="list-style-type: none"> • The configuration of Feeder 2 has been changed by the Mechanical Maintenance technicians and should no longer cause an issue. • A procedure is being developed to assistance with the management of TOCs during poor combustion. 	

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			Further investigation found that the Feeder 2 was pushing at twice the rate of Feeder 1 and was pushing more waste onto the grate than required. This led to a thick waste bed covering the grate and disrupting combustion.		
02/05/2016	Line 2 – TOC	SUF 015/16	<p>At 01:30 on 2nd May 2016, the Senior Operations Technician was experiencing problems with combustion due to poor quality waste and a low waste pit.</p> <p>At 02:27 the SOT had lowered the Primary Air set point in an attempt improve the combustion.</p> <p>At 02:29 the CO and TOC levels began to rapidly increase and the SOT increase the Primary and Secondary Air to 100% but it was not fast enough to prevent a TOC exceedance.</p> <p>Following a visual inspection of the grate it was found that one of the Primary Air valves was covered by a large lump of compacted waste which would have affected the amount of air which was able to get through the grate. This coupled with the wet and compact waste made the combustion conditions difficult to manage.</p>	<ul style="list-style-type: none"> Additional training including a toolbox talk to all Senior Operations Technicians has been developed by the Technical and Process Engineers to provide guidance on action to be taken when dealing with difficult combustion conditions. We are continuing to look at waste pit management following outages to ensure the waste is mixed as much as possible despite the restricted space. 	
03/05/2016	Line 2 – TOC	SUF 016/16	<p>On 3rd May 2016 at 05:40 the oxygen level on the furnace began to drop due to excessive waste on the grate.</p> <p>At 05:44 the Senior Operations Technician put the Secondary Air to 100% but this was not sufficient to prevent a TOC exceedance.</p> <p>The excessive waste was caused by compacted waste following the outage and the lack of fresh waste brought in following the preceding bank holiday.</p>	<ul style="list-style-type: none"> Additional training including a toolbox talk to all Senior Operations Technicians has been developed by the Technical and Process Engineers to provide guidance on action to be taken when dealing with difficult combustion conditions. We are continuing to look at waste pit management following outages to ensure the waste is mixed as much as possible despite the restricted space. 	
04/05/2016	Line 2 – TOC	SUF 017/16	<p>On 4th May we had a large amount of waste on the grate due to its compacted nature following the outage.</p> <p>At 06:58 the large amount of waste on the grate caused a low temperature event which implemented an automatic burner start up.</p> <p>By 07:08 this had led to a high steam temperature event which the SOT attempted to control using the desuperheaters.</p> <p>At 07:20 a second high steam temperature event occurred which was uncontrollable and it caused the furnace to trip. The large amount of waste consumed all the oxygen from the grate which then led to a TOC exceedance.</p>	<ul style="list-style-type: none"> Additional training including a toolbox talk to all Senior Operations Technicians has been developed by the Technical and Process Engineers to provide guidance on action to be taken when dealing with difficult combustion conditions. The waste feeder lengths are being investigated and reviewed. 	
18/06/2016	Line 2 – TOC	SUF 018/16	<p>On 18th June 2016 at 19:21 the Boiler Switchboard on Line 2 tripped.</p> <p>The Senior Operations Technician and Shift Operations teams reset the switchboard in the LV room. They also reset the grate, feeders, siftings and urea system then reinstated the MICC camera in the furnace and reset in the PLC room.</p>	<ul style="list-style-type: none"> The Boiler Switchboard is an electrical fault which is subject to a DNR with the EPC. 	

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			Whilst this was being done the oxygen level began to drop at 19:27 and the TOC levels began to rise at 19:29, the SOT increase the Secondary Air to 100% to regain oxygen but it was not fast enough to prevent a TOC exceedance.		
02/07/2016	Line 2 – TOC	SUF 019/16	<p>On 2nd July 2016, we had been experiencing poor combustion with the requirement to use the burner to maintain temperature.</p> <p>At 17:26 the oxygen level began to drop, the Senior Operations Technician (SOT) put the overfire air up to 100%, the underfire air was already at 100%.</p> <p>At 17:32 a thick bed of waste was covering the grate. The underfire air was dropped by the SOT to agitated the furnace and the Total Organic Carbon levels became to rise.</p> <p>At 17:34 the underfire air was set to 100%, the oxygen level was 0% and the TOC level continued to rise causing a 30 minute TOC exceedance.</p> <p>At 17:47 the TOC level begins to fall, the oxygen level continues to stay at 0% and the underfire air is again dropped to 45%.</p> <p>At 17:51 the underfire air is raised to 100%.</p> <p>At 18:00 the oxygen level began to rise.</p>	<ul style="list-style-type: none"> Following this and similar exceedances the Technical Plant Engineer and Process Engineer carried out a toolbox talk with the shift operations team on the correct way to manage difficult combustion conditions and TOC exceedances. 	
03/07/2016	Line 2 – TOC	SUF 020/16	<p>On 3rd July we were feeding waste from the bottle of the pit as we had not received any waste deliveries over the weekend and there was a lack of new waste to mix.</p> <p>At 17:44 the oxygen level in the furnace began to fall.</p> <p>At 17:50 the oxygen level was at 0% and the boiler temperature began to rise as well as the TOC level. The Senior Operations Technician put the overfire and underfire air to 100%.</p> <p>At 17:55 the TOC level began to fall.</p> <p>At 18:00 the oxygen level began to rise.</p>	<ul style="list-style-type: none"> Following this and similar exceedances the Technical Plant Engineer and Process Engineer carried out a toolbox talk with the shift operations team on the correct way to manage difficult combustion conditions and TOC exceedances. We investigating ways of managing and mixing waste when the pit level is low by reopening a Continuous Improvement project looking at TOC exceedances. 	
23/07/2016	Line 2 – TOC	SUF 021/16	<p>On 23rd July waste was being fed from the lower part of the pit and was compact as a result.</p> <p>At 20:02 the oxygen level in the furnace began to drop and a thick bed of waste was covering the grate. The Senior Operations Technician increased the overfire air and the underfire air remain at 87%.</p> <p>At 20:06 the SOT increased the overfire air to 100% but the oxygen level was at 0% at this point and the TOC level began to rise.</p> <p>At 20:09 the oxygen level began to rise.</p> <p>At 20:10 the TOC levels began to drop and by 20:14 combustions had returned to normal.</p>	<ul style="list-style-type: none"> Following this and similar exceedances the Technical Plant Engineer and Process Engineer carried out a toolbox talk with the shift operations team on the correct way to manage difficult combustion conditions and TOC exceedances. We investigating ways of managing and mixing waste when the pit level is low by reopening a Continuous Improvement project looking at TOC exceedances. 	
26/07/2016	Line 2 – TOC	SUF 022/16	<p>On 26th July 2016 some shredded waste was not mixed correctly and was fed directly into the hopper.</p>	<ul style="list-style-type: none"> Following this and similar exceedances the Technical Plant Engineer and Process Engineer carried out a toolbox talk 	

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			<p>At 08:10 the oxygen level in the furnace began to drop. The Senior Operations Technician increased the overfire air and the underfire air remained at 91%.</p> <p>At 08:13 the oxygen level was at 0% and the TOC began to rise. The overfire air was at 100% and underfire air was at 90%.</p> <p>At 08:17 the underfire air was dropped to 30% to help agitate combustion and the TOC level began to drop.</p> <p>At 08:18 the oxygen level began to rise.</p> <p>At 08:19 the underfire air was increased to 85%.</p>	<p>with the shift operations team on the correct way to manage difficult combustion conditions and TOC exceedances.</p> <ul style="list-style-type: none"> The shredding is carried out on bay 6 in the tipping hall and we looking at the possibility of moving the shredder to different bays in order to spread the shredded waste across the bunker. 	
31/07/2016	Line 2 – TOC	SUF 023/16	<p>On 27th and 28th July 2016 we had an overflow of water from the settling pit which flowed into the waste pit. This caused the waste stored in the bunker to become saturated with water.</p> <p>On 31st July at 11:57 the oxygen level in the furnace began to drop.</p> <p>At 12:00 the overfire air was increased to 100%, the underfire air was at 100% and the boiler temperature began to rise.</p> <p>At 12:03 the de-superheater was put to 100% but this was not enough to control the high temperatures so the safety valves released water to cool the steam and as a result Line 2 tripped at 12:06.</p> <p>At 12:09 the ID fan was restarted.</p> <p>At 12:12 the overfire air was restarted.</p> <p>On 31st July 2016 at 17:25 the oxygen level dropped in the furnace.</p> <p>At 17:27 the Senior Operations Technician increased the overfire air, the boiler temperature increased and the underfire air was at 95%.</p> <p>At 17:29 the oxygen level was at 0% and the TOC level began to rise.</p> <p>At 17:33 the SOT increased the underfire air to 100% and the TOC level began to fall.</p> <p>At 17:34 the oxygen level began to rise and at 17:53 the combustion conditions had return to normal.</p>	<ul style="list-style-type: none"> Following this and similar exceedances the Technical Plant Engineer and Process Engineer carried out a toolbox talk with the shift operations team on the correct way to manage difficult combustion conditions and TOC exceedances. The settling pit overflowing into the waste pit has been caused by access water in the boiler system which is currently being removed from site daily by a third party contractor. The site applying for a permit variation in order to discharge water to the mains sewer. 	
30/08/2016	Line 1 – TOC	SUF 024/16	<p>On 30th August 2016 highly combustible waste was fed into the hopper.</p> <p>At 18:37 the oxygen level dropped. This was not seen by the Senior Operations Technician as there were multiple disturbance alarms on the DCS due to a siftings blockage.</p> <p>At 18:45 the oxygen level began to steadily decline.</p> <p>At 18:49 the SOT increased the overfire to 100% and the underfire air to 90% as the oxygen level in the furnace hit 0%.</p> <p>The oxygen level remained at 0% and the TOC level began to rise peaking at 19:00.</p> <p>At 19:05 the oxygen level began to rise and at 19:08 the combustion control returned to auto as all readings were within limits.</p>	<ul style="list-style-type: none"> Following this and similar exceedances the Technical Plant Engineer and Process Engineer carried out a toolbox talk with the shift operations team on the correct way to manage difficult combustion conditions and TOC exceedances. The shredding is carried out on bay 6 in the tipping hall and we looking at the possibility of moving the shredder to different bays in order to spread the shredded waste across the bunker. 	

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12/09/2016	Line 2 – TOC	SUF 025/16	<p>On 12th September 2016 we were feeding old waste from the bottom of the pit as there had been no fresh waste delivered over the weekend.</p> <p>At 09:26 the oxygen level began to drop, there was think bed of compacted, old waste on the grate.</p> <p>At 09:27 there was an increase in boiler temperatures.</p> <p>At 09:29 the Senior Operations Technician increased the overfire air to 100% and the underfire air remained at 55%.</p> <p>At 09:33 the oxygen level was at 0% and the TOC levels began to rise.</p> <p>At 09:36 the TOC level peaked and began to fall.</p> <p>At 09:39 the oxygen levels began to rise and the combustion conditions had returned to normal by 09:50.</p>	<ul style="list-style-type: none"> Following this and similar exceedances the Technical Plant Engineer and Process Engineer carried out a toolbox talk with the shift operations team on the correct way to manage difficult combustion conditions and TOC exceedances. We investigating ways of managing and mixing waste when the pit level is low by reopening a Continuous Improvement project looking at TOC exceedances. 	
25/09/2016	Line 1 – TOC	SUF 026/16	<p>On 26th September 2016 the waste feeders were overfeeding the grate with compacted, old waste.</p> <p>At 18:52 the oxygen level began to drop.</p> <p>At 18:59 the Senior Operations Technician increased the overfire air to 100% and the underfire air remains at 73%.</p> <p>At 19:03 the underfire air is increased to 100% and the oxygen level continues to drop.</p> <p>At 19:04 oxygen is at 0% and the TOC level begins to rise.</p> <p>At 19:08 the TOC peaks and begins to drop.</p> <p>At 19:10 the oxygen level begins to increase and at 19:20 the combustion conditions have returned to normal.</p>	<ul style="list-style-type: none"> Following this and similar exceedances the Technical Plant Engineer and Process Engineer carried out a toolbox talk with the shift operations team on the correct way to manage difficult combustion conditions and TOC exceedances. We investigating ways of managing and mixing waste when the pit level is low by reopening a Continuous Improvement project looking at TOC exceedances. 	
02/10/2016	Line 2 – TOC SO ₂	SUF 027/16	Part B to be submitted shortly.		
09/10/2016	Line 2 – TOC CO	SUF 028/16	Part B to be submitted shortly.		
10/10/2016	Line 2 – TOC	SUF 029/16	Part B to be submitted shortly.		
11/10/2016	Line 1 – TOC	SUF 030/16	Part B to be submitted shortly.		
22/11/2016	Line 2 - NO _x	SUF 031/16	Part B to be submitted shortly.		
25/11/2016	Line 1 – TOC	SUF 032/16	Part B to be submitted shortly.		
27/11/2016	Line 2 – TOC	SUF 033/16	Part B to be submitted shortly.		

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04/12/2016	Line 1 – HCI TOC CO	SUF 034/16	Part B to be submitted shortly.		
10/12/2016	Line 2 – TOC	SUF 035/16	Part B to be submitted shortly.		
19/12/2016	Line 1 – TOC	SUF 036/16	Part B to be submitted shortly.		
19/12/2016	Line 1 – TOC CO	SUF 037/16	Part B to be submitted shortly.		
19/12/2016	Line 2 - CO	SUF 038/16	Part B to be submitted shortly.		
27/12/2016	Line 2 - TOC	SUF 039/16	Part B to be submitted shortly.		

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