Annual performance report for: Suez Recycling and Recovery UK Limited And Wilton 11 EfW

Permit Number: EPR/XP3436WB/V002

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

Name and address of plant	Wilton 11 – Energy from Waste Facility Wilton International Redcar TS10 4RG
Description of waste input	Municipal household waste from Merseyside County Council and various commercial customers.
Operator contact details if members of the public have any questions	Phil Stevens Phil.stevens@suez.com

2. Plant description

The Energy from Waste facility operates 24/7 and has a design capacity of 49.9 MW. This requires a fuel input with a maximum continuous rating of around 29.2 tonnes per hour of MSW (from Merseyside County Council and various commercial customers) with an average net calorific value of 9.8 MJ/kg. This equates to 467,200 tonnes per annum at 8000 hours operation per annum through two combustion lines.

The plant has two Lines capable of processing up to 500,000 tonnes of waste per year. Incoming waste is delivered to site by rail and bulk vehicle trucks. Rail waste is checked at SUEZ's Knowsley Transfer station, weighed and then loaded into ISO containers before being placed onto rail carriages and transported to the EFW facility.

Road waste is weighed via weighbridge at the Wilton site, and then tipped in the traditional way in the waste reception hall.

WASTE RECEPTION

The plant is designed to accept contractual waste from Merseyside County Council via rail in bespoke ISO containers. Once at the EFW plant, the containers are lifted off the rail carriages by a gantry crane and placed onto mechanical ‘tilters’ The tilters operate hydraulically and move to the edge of the waste pit waste before being tilted to a 60 degree angle, allowing the waste to fall into the waste pit.

Waste is also delivered by road via Bulk Transfer Vehicles in the standard operating way.

Air needed for combustion is drawn into the furnace from above the waste reception hall so that odour and dust do not escape from the building.

BUNKER

Mixing of waste occurs as the crane driver sorts the waste looking for unsuitable wastes to be removed, and to improve the homogeneity of the incinerator feedstock.

CONTROL ROOM

There is one control room which centralises the operation of all equipment, including the grab crane used to mix and load waste into hoppers 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 feed hoppers by the crane, from here waste falls into the furnace-charging chute and then onto the grate system for incineration. The thermal energy released from the burning is used to convert water to super-heated steam. At high pressure, this steam drives a turbine to generate electricity.

ENERGY GENERATION

Electricity is generated at 11kv, with an electric capacity of 49.9 MWh. The plant also has the capability of exporting steam at 3 different pressures, 58 bar(g), 17 bar(g) and 1.4 bar(g). Steam is exported into the Wilton International site headers

for use by a number of plants on site. Where possible the steam is taken from turbine extract to ensure maximum efficiency.

BOTTOM ASH

Ash left on the grate after incineration is carried by conveyor to a recycling facility opposite the EFW plant. Once operational (February 2017) the bottom ash recycling facility will use a magnet above the conveyor to extract ferrous material for recycling. The remaining bottom ash is processed for recycling following classification of its hazardous properties.

WATER-COOLED CONDENSERS

After exiting the turbine, the steam is cooled and condensed back into water through water cooled condensers. This recovered water is treated and reused in the boilers to produce more steam. The water cooled condenser is capable of taking the full load from the boiler to ensure continuous operation of the EfW Plant.

EMISSION CONTROL

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

AIR POLLUTION CONTROL RESIDUE (APCR)

The cleaned gas is passed 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, we have a semi dry lime injection system. It is stored in a sealed silo until it removed from site for disposal.

EMISSIONS MONITORING

As they pass through the stack, the residual flue gases from the process are continuously monitored before release. Each incinerator line has and independent stack and emissions monitoring system. This data is relayed automatically to the control room.

3. Summary of Plant Operation

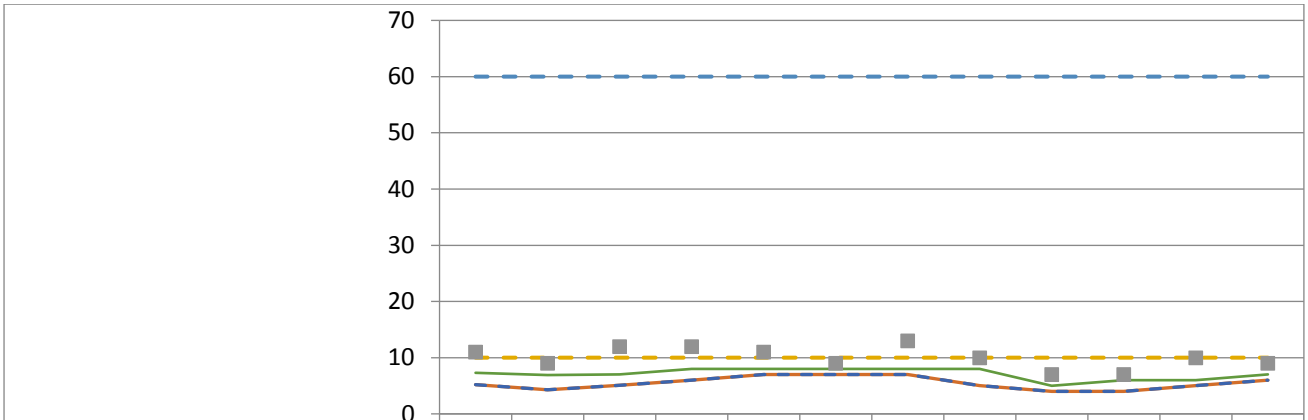
Municipal waste received	410,777.68 tonnes
Commercial and industrial waste received	55,207.33 tonnes
Refuse-derived fuel received	1407.66 tonnes
Total waste received	467,392.67 tonnes
Total plant operational hours	7528 hours Line 1 7411 hours Line 2
Total hours of “abnormal operation” (see permit for definition)	1 hour
Total quantity of incinerator bottom ash (IBA) produced	108,245.19 tonnes
Disposal or recovery route for IBA	Ballast Phoenix for further processing segregating Metals & Aggregates
Did any batches of IBA test as hazardous? If yes, state quantity	None
Total quantity of air pollution control (APC) residues produced	10,183.51 tonnes
Disposal or recovery route for APC residues	Augean Landfill
Total electricity generated for export to the National Grid	124,881 MWh
Total heat produced for export (e.g. to hospital or district heating scheme)	99,960 MWh

4. Summary of Plant Emissions

4.1 Summary of continuous emissions monitoring results for emissions to air

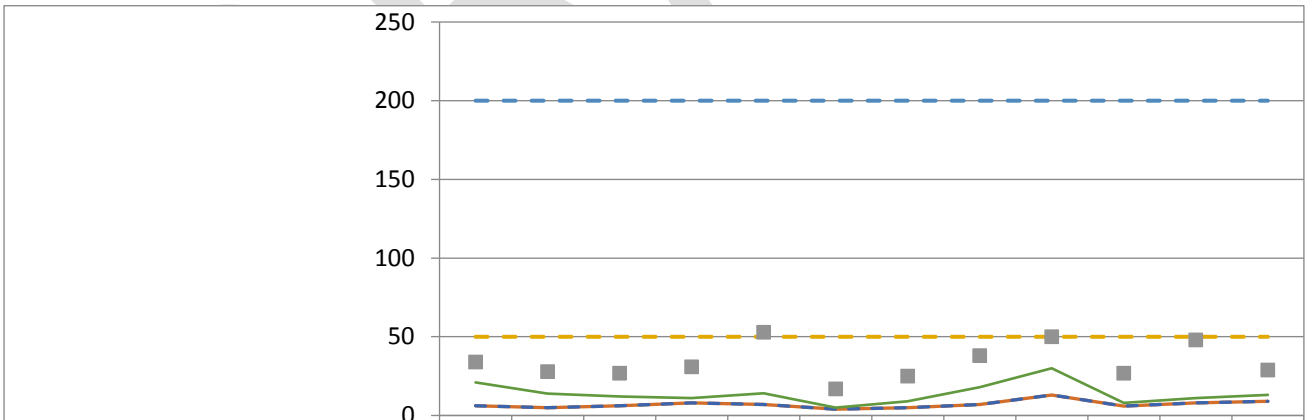
The following charts show the performance of the plant against its emission limit values (ELVs) for substances that are continuously monitored.

Line 1 - Hydrogen chloride



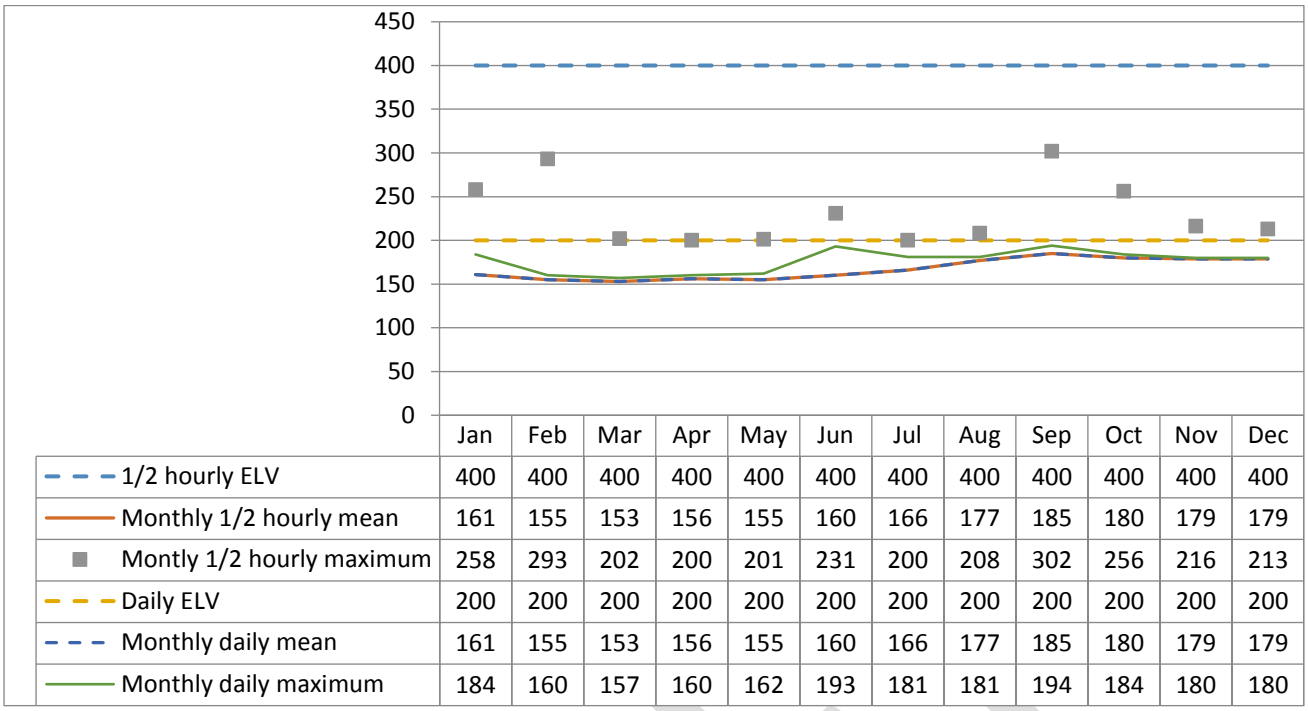
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly ELV	60	60	60	60	60	60	60	60	60	60	60	60
Monthly 1/2 hourly mean	5.2	4.3	5.1	6	7	7	7	5	4	4	5	6
Montly 1/2 hourly maximum	11	9	12	12	11	9	13	10	7	7	10	9
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	5.2	4.3	5.1	6	7	7	7	5	4	4	5	6
Monthly daily maximum	7.3	6.9	7	8	8	8	8	8	5	6	6	7

Line 1 – Sulphur dioxide



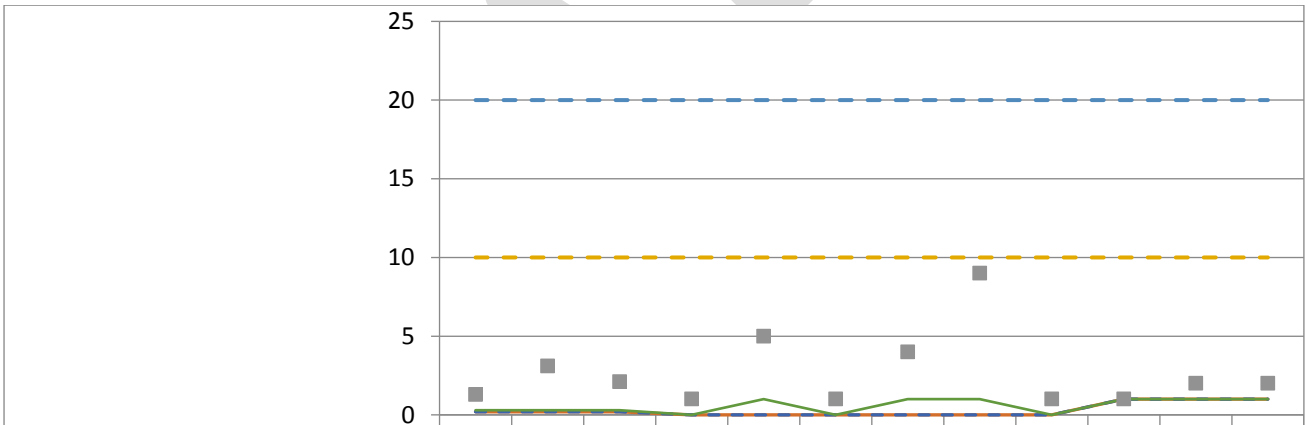
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly 1/2 hourly mean	6.1	4.9	6.1	8	7	4	5	7	13	6	8	9
Montly 1/2 hourly maximum	34	28	27	31	53	17	25	38	50	27	48	29
Daily ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	6.1	4.9	6.1	8	7	4	5	7	13	6	8	9
Monthly daily maximum	21	13.8	12	11	14	5	9	18	30	8	11	13

Line 1 – Oxides of nitrogen



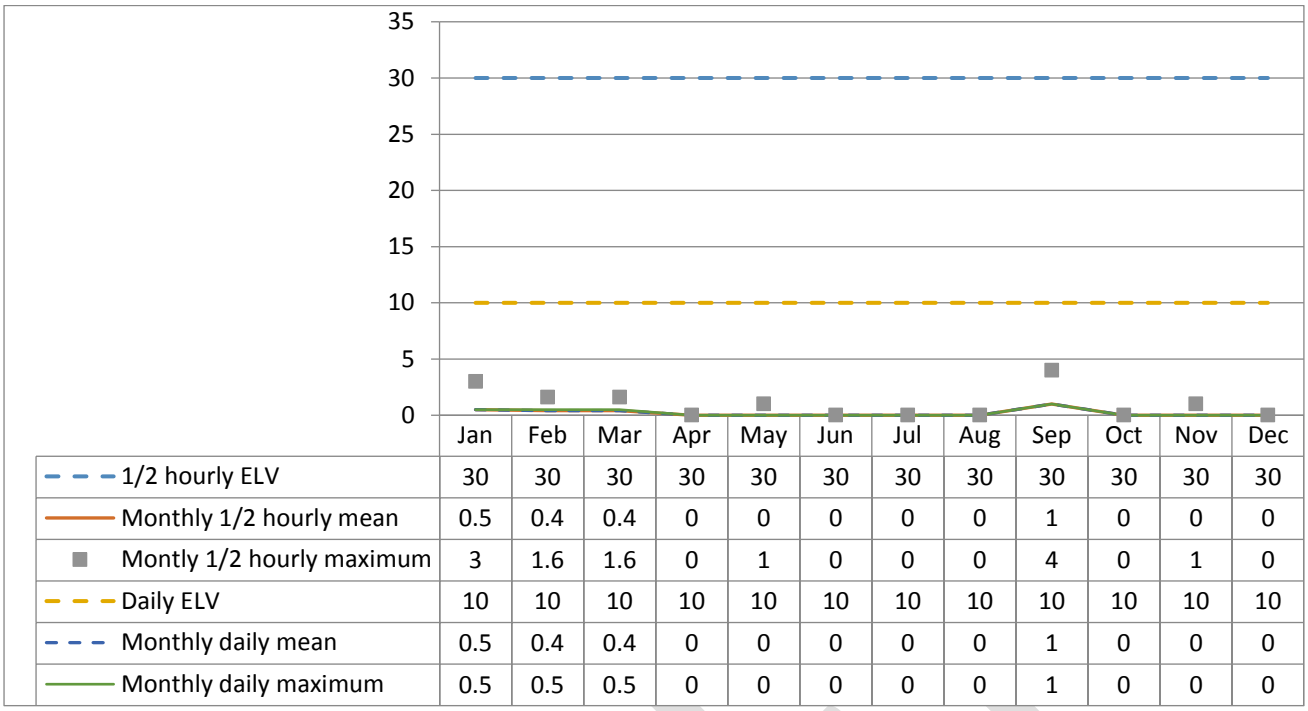
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly ELV	400	400	400	400	400	400	400	400	400	400	400	400
Monthly 1/2 hourly mean	161	155	153	156	155	160	166	177	185	180	179	179
Montly 1/2 hourly maximum	258	293	202	200	201	231	200	208	302	256	216	213
Daily ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly daily mean	161	155	153	156	155	160	166	177	185	180	179	179
Monthly daily maximum	184	160	157	160	162	193	181	181	194	184	180	180

Line 1 – Total organic carbon



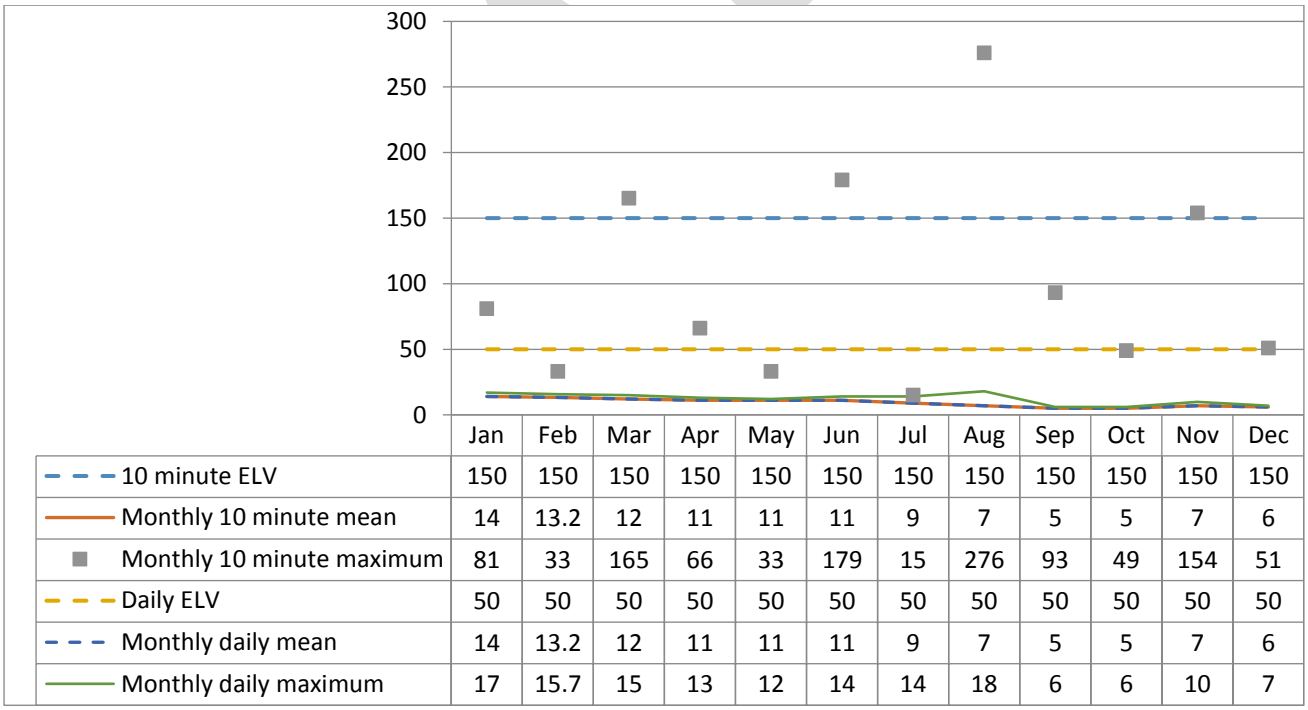
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hourly mean	0.2	0.2	0.2	0	0	0	0	0	0	1	1	1
Montly 1/2 hourly maximum	1.3	3.1	2.1	1	5	1	4	9	1	1	2	2
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.2	0.2	0.2	0	0	0	0	0	0	1	1	1
Monthly daily maximum	0.3	0.3	0.3	0	1	0	1	1	0	1	1	1

Line 1 – Particulates



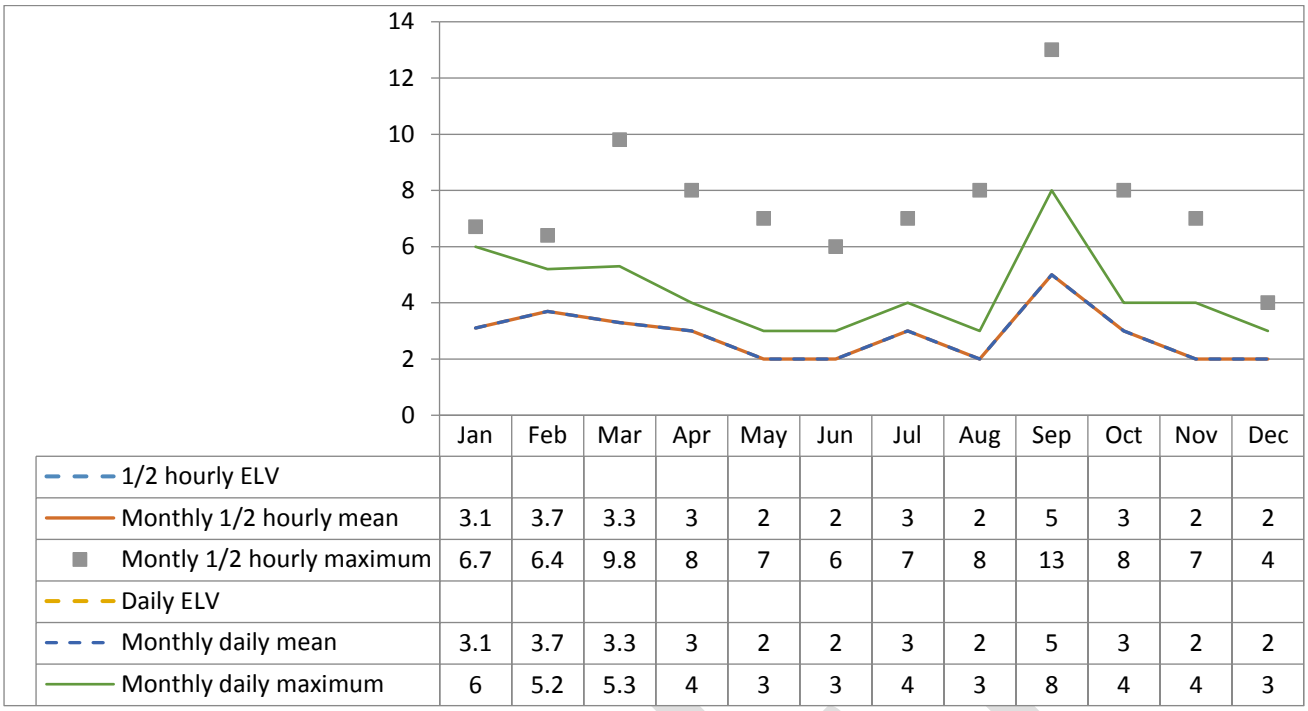
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly ELV	30	30	30	30	30	30	30	30	30	30	30	30
Monthly 1/2 hourly mean	0.5	0.4	0.4	0	0	0	0	0	1	0	0	0
Montly 1/2 hourly maximum	3	1.6	1.6	0	1	0	0	0	4	0	1	0
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.5	0.4	0.4	0	0	0	0	0	1	0	0	0
Monthly daily maximum	0.5	0.5	0.5	0	0	0	0	0	1	0	0	0

Line 1 – Carbon monoxide



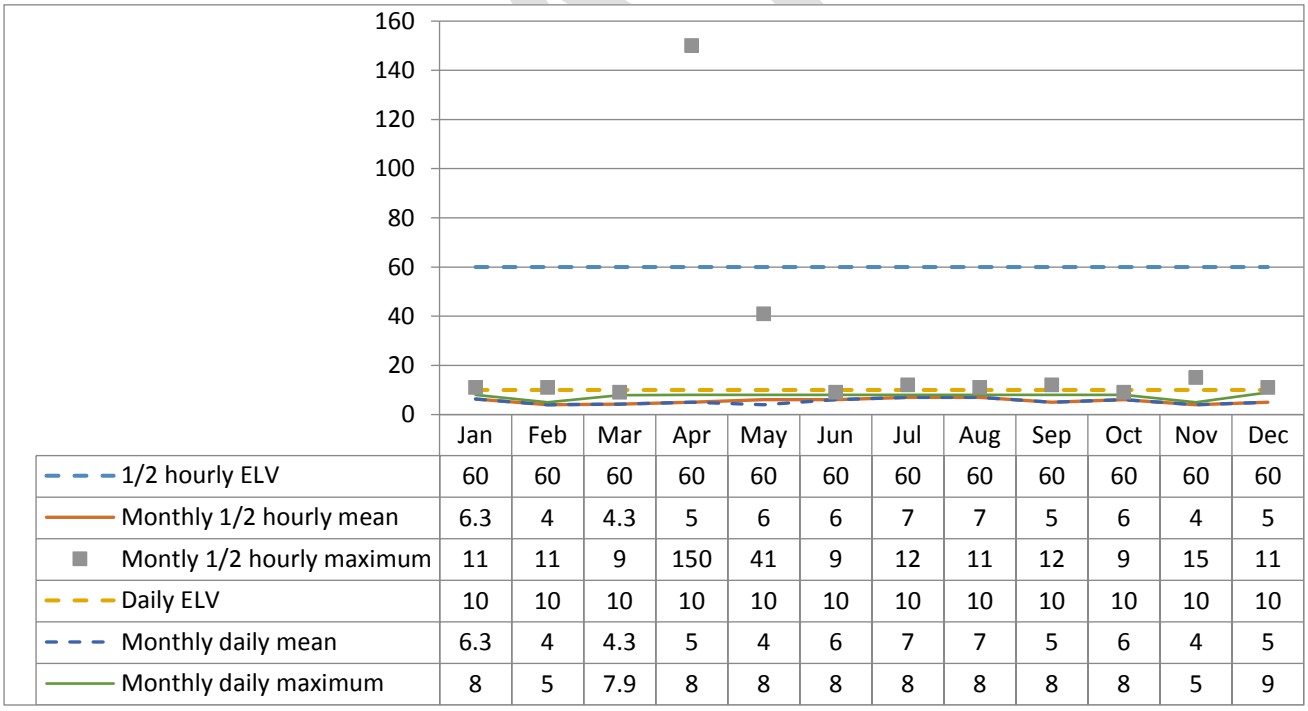
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10 minute ELV	150	150	150	150	150	150	150	150	150	150	150	150
Monthly 10 minute mean	14	13.2	12	11	11	11	9	7	5	5	7	6
Monthly 10 minute maximum	81	33	165	66	33	179	15	276	93	49	154	51
Daily ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	14	13.2	12	11	11	11	9	7	5	5	7	6
Monthly daily maximum	17	15.7	15	13	12	14	14	18	6	6	10	7

Line 1 – Ammonia



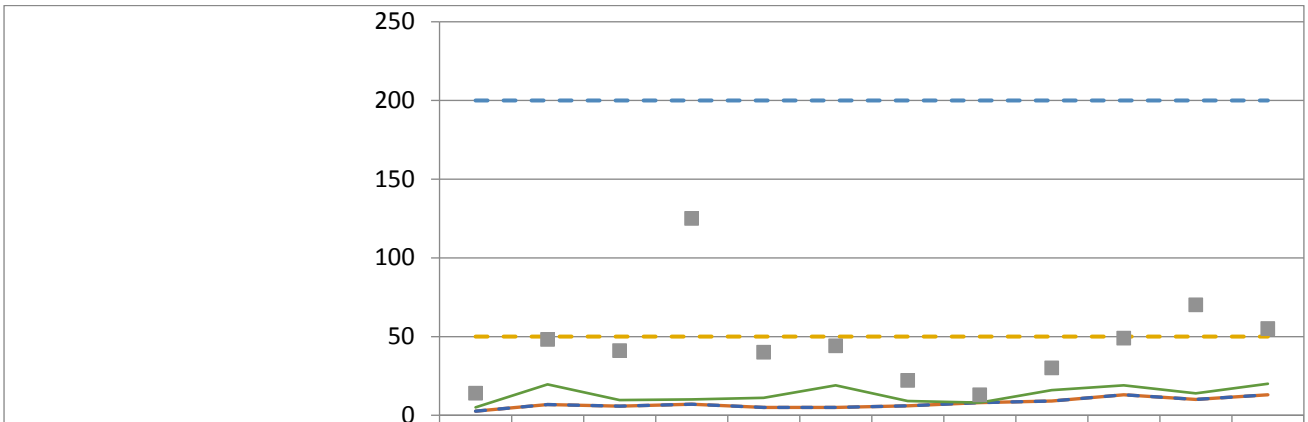
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly ELV												
Monthly 1/2 hourly mean	3.1	3.7	3.3	3	2	2	3	2	5	3	2	2
Montly 1/2 hourly maximum	6.7	6.4	9.8	8	7	6	7	8	13	8	7	4
Daily ELV												
Monthly daily mean	3.1	3.7	3.3	3	2	2	3	2	5	3	2	2
Monthly daily maximum	6	5.2	5.3	4	3	3	4	3	8	4	4	3

Line 2 Hydrogen Chloride



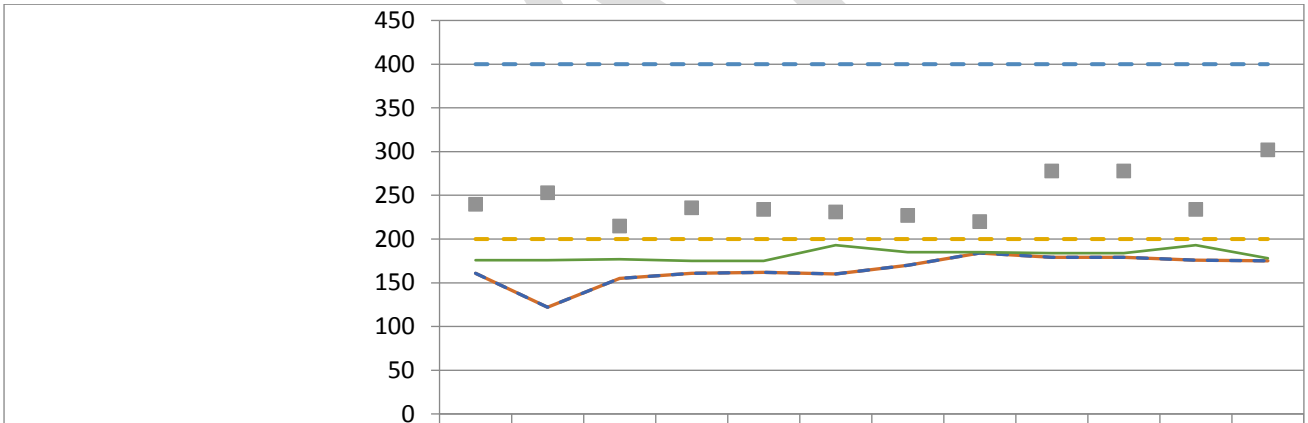
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly ELV	60	60	60	60	60	60	60	60	60	60	60	60
Monthly 1/2 hourly mean	6.3	4	4.3	5	6	6	7	7	5	6	4	5
Montly 1/2 hourly maximum	11	11	9	150	41	9	12	11	12	9	15	11
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	6.3	4	4.3	5	4	6	7	7	5	6	4	5
Monthly daily maximum	8	5	7.9	8	8	8	8	8	8	8	5	9

Line 2 Sulphur Dioxide



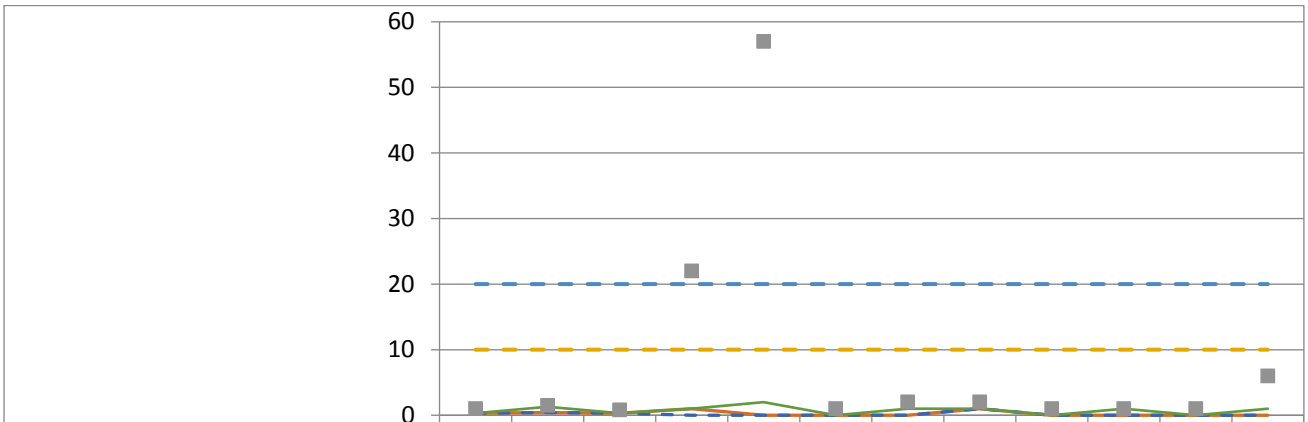
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly 1/2 hourly mean	2.6	6.8	5.7	7	5	5	6	8	9	13	10	13
Montly 1/2 hourly maximum	14	48	41	125	40	44	22	13	30	49	70	55
Daily ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	2.6	6.8	5.7	7	5	5	6	8	9	13	10	13
Monthly daily maximum	5	19.7	9.7	10	11	19	9	8	16	19	14	20

Line 2 Oxides of nitrogen



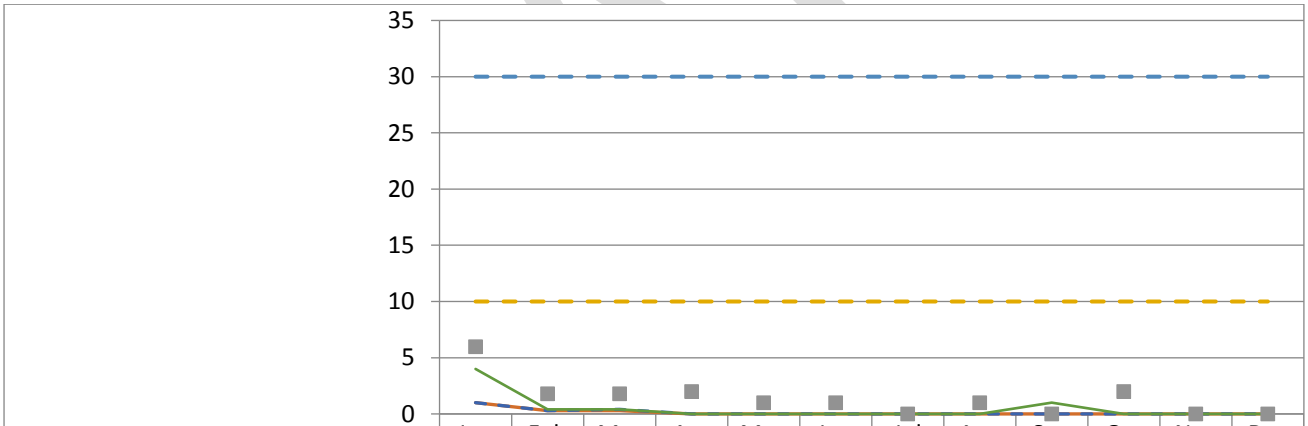
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly ELV	400	400	400	400	400	400	400	400	400	400	400	400
Monthly 1/2 hourly mean	161	122	155	161	162	160	170	184	179	179	176	175
Montly 1/2 hourly maximum	240	253	215	236	234	231	227	220	278	278	234	302
Daily ELV	200	200	200	200	200	200	200	200	200	200	200	200
Monthly daily mean	161	122	155	161	162	160	170	184	179	179	176	175
Monthly daily maximum	176	176	177	175	175	193	185	185	184	184	193	178

Line 2 Total Organic carbon



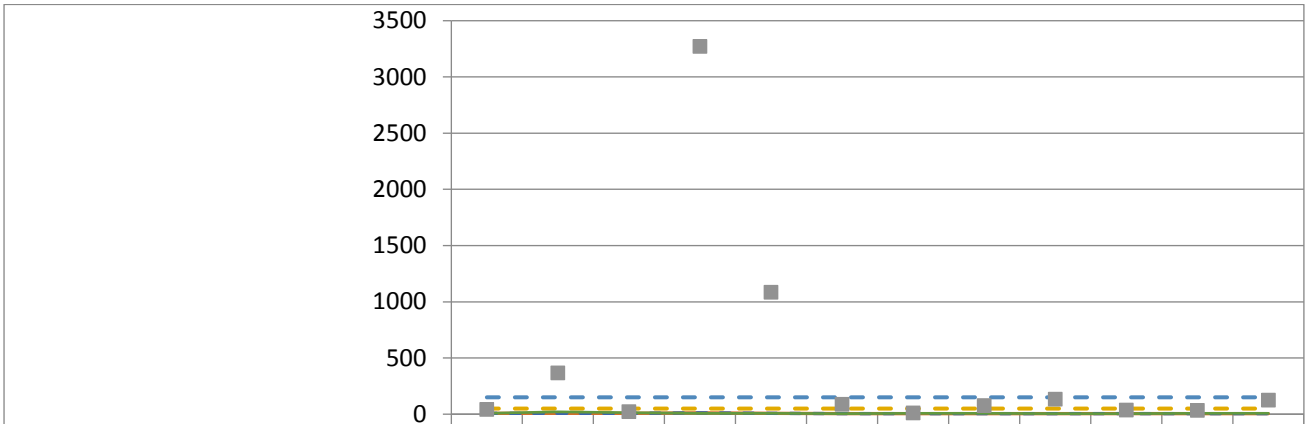
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly ELV	20	20	20	20	20	20	20	20	20	20	20	20
Monthly 1/2 hourly mean	0.3	0.4	0.3	1	0	0	0	1	0	0	0	0
Montly 1/2 hourly maximum	1	1.5	0.8	22	57	1	2	2	1	1	1	6
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	0.3	0.4	0.3	0	0	0	0	1	0	0	0	0
Monthly daily maximum	0.3	1.3	0.3	1	2	0	1	1	0	1	0	1

Line 2 Particulates



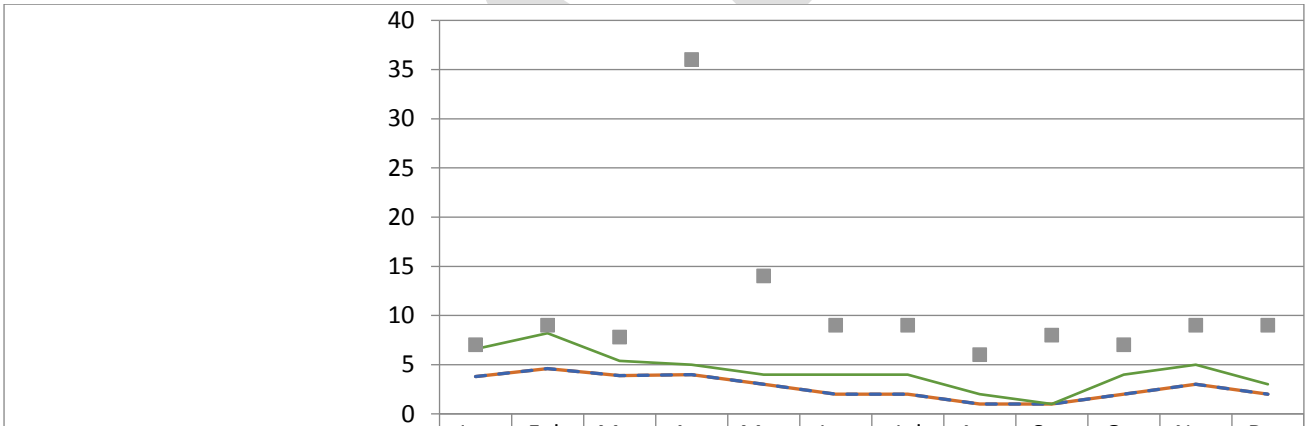
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly ELV	30	30	30	30	30	30	30	30	30	30	30	30
Monthly 1/2 hourly mean	1	0.3	0.3	0	0	0	0	0	0	0	0	0
Montly 1/2 hourly maximum	6	1.8	1.8	2	1	1	0	1	0	2	0	0
Daily ELV	10	10	10	10	10	10	10	10	10	10	10	10
Monthly daily mean	1	0.3	0.4	0	0	0	0	0	0	0	0	0
Monthly daily maximum	4	0.4	0.4	0	0	0	0	0	1	0	0	0

Line 2 Carbon monoxide



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
10 minute ELV	150	150	150	150	150	150	150	150	150	150	150	150
Monthly 10 minute mean	7	7.4	8	12	8	5	6	6	6	5	6	6
Monthly 10 minute maximum	43	366	23	3272	1083	88	11	77	132	35	33	125
Daily ELV	50	50	50	50	50	50	50	50	50	50	50	50
Monthly daily mean	7	7.4	8	12	8	5	6	6	6	5	6	6
Monthly daily maximum	9	21	12	9	8	6	7	9	5	6	7	8

Line 2 Ammonia



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1/2 hourly ELV												
Monthly 1/2 hourly mean	3.8	4.6	3.9	4	3	2	2	1	1	2	3	2
Montly 1/2 hourly maximum	7	9	7.8	36	14	9	9	6	8	7	9	9
Daily ELV												
Monthly daily mean	3.8	4.6	3.9	4	3	2	2	1	1	2	3	2
Monthly daily maximum	6.6	8.2	5.4	5	4	4	4	2	1	4	5	3

4.2 Summary of periodic monitoring results for emissions to air

The table below shows the results of periodically monitored substances.

Substance	Emission limit value	Results			
		13-15/02/18 Line 1	13-15/02/18 Line 2	30 Oct-2 Nov 18 Line 1	30 Oct-2 Nov 18 Line 2
Mercury and its compounds	0.05 mg/m^3	0.002 mg/m^3	0.003 mg/m^3	0.0036 mg/m^3	0.0034 mg/m^3
Cadmium & thallium and their compounds (total)	0.05 mg/m^3	0.001 mg/m^3	0.001 mg/m^3	0.0014mg/m^3	0.00072 mg/m^3
Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V and their compounds (total)	0.5 mg/m^3	0.057 mg/m^3	0.029 mg/m^3	0.025 mg/m^3	0.057 mg/m^3
Dioxins and furans (I-TEQ)	0.1 ng/m^3	0.0037ng/m^3	0.0039ng/m^3	0.0029 ng/m^3	0.0029 ng/m^3
Hydrogen Fluoride	2 mg/m^3	0.03 mg/m^3	0.03 mg/m^3	0.038 mg/m^3	0.025 mg/m^3

4.3 Summary of monitoring results for emissions to water

There are no emissions to water from the process other than clean surface water.

5. Summary of Permit Compliance

5.1 Compliance with permit limits for continuously monitored pollutants

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

Substance	Percentage time compliant during operation	
	Half-hourly limit	**Daily limit**
Particulates	100 % L1 100% L2	1100 % L1 100% L2
Oxides of nitrogen	100 % L1 100% L2	100 % L1 100% L2%
Sulphur dioxide	100 % L1	100 % L1
Carbon monoxide	100 % L1 100% L2	100 % L1 100% L2
Total organic carbon	100 % L1 99.97% L2	100 % L1 100% L2

Hydrogen chloride	100 % L1 100% L2	100 % L1 100% L2
Hydrogen fluoride	100 % L1 100% L2	100 % L1 100% L2

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

Date	Summary of notification or non-compliance	Reason	Measures taken to prevent reoccurrence
16/04/18	TOC – 20mg/m3 HCL – 60mg/m3 TOC – 220.76mg/m3 HCL – 150.11mg/m3	At around 12.10 on 16th April, both the high voltage (HV) breaker feeding transformer 22 (TR 22) and the low voltage (LV) breaker being fed from TR 22 unexpectedly opened and a plethora of alarms appeared on the DCS at the control room. The LV switchboard provides power to a number of drives on the plant, including the flue gas treatment and grate systems. As a result of the LV breaker opening, power to these systems was cut and subsequently abatement of the flue gas was interrupted and control of grate combustion was lost. A half hour breach of the TOC abnormal operation limit of 20mg/m3 from 12.00 to 12.29 was recorded. An elevated half hour HCL value was also recorded of 150.11mg/m3, but under abnormal operating conditions no half hour HCL limit is provided in the permit. Following detailed investigation by SUEZ's Technical Team and third party electrical engineers, the trip was identified as likely to be an issue with the protection system design of TR 22. The root cause of the trip and subsequent breach	The protection settings for the electrical systems on the plant were designed by a specialist from CNIM who was not available to attend site to conduct an investigation and complete remedial works. As a result testing was undertaken by a 3rd party contractor and no faults were found on the transformer. Limited testing and inspection of all outgoing LV drives took place on the low voltage board and no further faults were found. It was decided to reenergise the transformer and to restore power to the LV board in order to restart the line.

		appears to have been a result of an earth leakage on the LV board. This may have been caused by a fault in a drive, or by a summation of earth leakage currents from a number of consumers. This then caused the Ritz 421 relay to activate. Once activated, the Ritz 421 relay performs the following actions: - Opens the main LV breaker (in this case 400V switchboard incomer Line 2) - Opens the HV feeder (in this case the feeder to TR 22) - Attempts to close the LV buscoupler - Sends an alarm to the DCS If the protection grading of the LV system were correct, an earth fault in a drive or a series of smaller earth leakage currents should be dealt with by the protection of the device in question and not by the main LV breaker for this board.	
21.05.19	TOC – 56.96mg/m3	At around 11.10 on 21st May , both the high voltage (HV) breaker feeding transformer 22 (TR 22) and the low voltage (LV) breaker being fed from TR 22 unexpectedly opened and a number of alarms appeared on the DCS at the control room. The LV switchboard provides power to a number of drives on the plant, including the flue gas treatment and grate systems. As a result of the LV breaker opening, power to these systems was cut and subsequently abatement of the flue gas was interrupted and control of grate combustion was lost.	The transformer 22 wiring has been rewired so that the protection settings should now operate as per design. This means that any earth leakages on the LV board are dealt with by the protection of the device in question and not by the main LV breaker for this board. This should reduce the risk of a plant/line trip. We believe this fault (incorrect wiring of the current transformer) was the initiator of the trip on the 16th April which led to a previous abnormal operation ELV exceedance. Rectification of this fault should prevent any further trips of this nature.

		A half hour breach of the TOC abnormal operation limit of 20mg/m3 from 11.00 to 11.29 was recorded with a value of 56.96mg/m3. Third party electrical engineers attended site on the 21st May to investigate the incident and with information from the previous trip in April already established, efforts could be concentrated on tracing wiring on individual transformers. From carrying out this exercise it was determined that the current transformer for TR22 was wired incorrectly and this was the root cause of the protection grading of the LV system failing.	

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

Date of complaint	Summary of complaint	Reason for complaint including whether substantiated by the operator or the EA	If substantiated, measures to prevent reoccurrence
03/05/2018	Complaints from hauliers who are trying to use the weighbridges early (before 6am) that there are wagons from W11 sitting at the bridges blocking access and refusing to move and are waiting for someone to come over and do their paperwork. This is stopping other wagons getting on the bridges.		Comunicated hauliers/drivers that they only come to the weighbridge at 6am and no earlier. The weighbridge staff also communicate out the same info to all drivers who visit the weighbridge.
07/10/2018	Tony Matthews of Huntsman called the Control Room to complain about a smell which he was presuming was coming from the Wilton EFW.		Shift manager checked the perimeter of the building and the tipping hall doors were closed, ID fans were on. Spoke to the complainant to assure him that we would monitor this.

6. Summary of plant improvements

Summary of any permit improvement conditions that have been completed within the year and the resulting environmental benefits.
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_2O emissions that can be achieved under optimum operating conditions. IC6 - The Operator shall carry out an assessment of the impact of emissions to air of all the component metals subject to emission 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 operation and air dispersion modelling. A report on the assessment shall be made to the Environment Agency. IC7 - The operator shall submit a written summary report to the 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. IC8 - The Operator shall submit the written protocol referenced in condition 3.2.4 for the monitoring of soil and groundwater for approval by the Environment Agency. The protocol shall demonstrate how the Operator will meet the requirements of Articles 14(1)(b), 14(1)(e) and 16(2) of the IED. The procedure shall be implemented in accordance with the written approval from the Agency IC9 - The operator shall carry out noise monitoring to confirm the findings of the noise impact assessment submitted with variation application EPR/XP3436WB/V002. The operator shall submit to the Environment Agency a report that summarises the results of the monitoring results along with an assessment of whether any additional noise control measures are required.
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.

- Changes to boiler cleaning systems to maintain availability which could have a very slight impact on bottom ash composition (more boiler ash into bottom ash)
- Improvements to water balance and improved re-use of plant water which should reduce waste water disposal to the Sembcorp effluent treatment process.
- Changes to boiler water treatment which will permit increased steam export when required by Sembcorp which could have a marginal improvement in CHP efficiency
- Recommissioning of the steam turbine following repairs – will have an improvement on R1 efficiency