Procedure		Document No.	2788
Document Title	**Monitoring Program – Airborne Emissions**		
Area	Olympic Dam Shared Services	**Issue Date**	27 July 2018
Major Process	Environment	**Sub Process**	Environment
Authoriser	Laura Tyler – Asset President Olympic Dam	**Version Number**	17

TABLE OF CONTENTS

1 SCOPE

This Monitoring Program (MP) describes the environmental monitoring activities undertaken by BHP Billiton Olympic Dam Corporation Pty Ltd (ODC) in relation to airborne emissions from Olympic Dam. Emissions monitoring is undertaken by ODC for the purpose of quantifying changes to air quality as a result of operations, assessing the performance of the control measures used to limit these impacts, and to meet relevant legal and other requirements. This MP sets out the measures ODC uses to monitor **environmental aspects** such as gaseous, aerosol and particulate emissions (both radioactive and other), which, through their interaction with the environment, have the potential to result in an **environmental impact**.

This MP addresses a number of distinct elements of airborne emission monitoring. For each element, the MP sets out some background information, the purpose of the monitoring and the deliverables which are produced as a result of the monitoring The MP also includes a description of the methods for measuring achievement of **compliance criteria** and the movement of trends towards **leading indicators** (where applicable).

The copper bearing ore body processed at Olympic Dam contains uranium and, as a consequence, radioactive emissions occur as a result of the extraction process.

The Airborne Emissions MP outlines the airborne emissions monitoring requirements for the existing Olympic Dam operations. Ecological impacts arising from changes to air quality are monitored through the Flora and Fauna MPs. Impacts to human and non-human biota arising from radiation emissions are monitored through the Environmental Radiation MP.

1.1 Responsible ODC personnel

The Olympic Dam Asset President is responsible for ensuring that all legal and other requirements described in this MP are met.

ODC employs a Statutory Radiation Safety Officer acceptable to the Radiation Protection Division of the Environment Protection Authority (EPA), to establish, maintain and fulfil the requirements of this MP, thereby fulfilling its obligation with respect to clause 2.10.1(d) of the Code of Practice and Safety Guide for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing (2005) (MC 2.10.1d, MC 2.10.1f). ODC also employs other staff with the necessary experience and qualifications to fulfil the requirements of this MP.

1.2 Review and modification

This MP is reviewed annually. Major changes or amendments following the review are documented in the Annual EM Program Targets, Actions and Major Changes document.

It should be noted that as a result of operational activities or through optimisation of sample design some existing monitoring sites may be lost and others added (where possible) to maintain the integrity of the sampling program. Access restrictions can result in some sites occasionally being unable to be monitored.

2 DETAILED PROCEDURE

2.1 Smelter 2 emissions

2.1.1 Background

Smelter 2 is one of the major sources of airborne emissions at Olympic Dam and comprises a Concentrate Feed Preparation Plant, Flash Furnace, Electric Slag Reduction Furnace, two Anode Furnaces and an Acid Plant.

Copper concentrate is filtered and dried in the Feed Preparation Plant before being fed into the reaction shaft of the Flash Furnace. The concentrate is dried using two steam coil Myrens dryers, which each have an associated baghouse to remove particulates before being vented to a common stack.

Off-gas from the Flash Furnace is directed to the Electrostatic Precipitator, which removes particulate matter for recycling to the furnace before being directed to the Acid Plant. Here, the sulphur dioxide (SO_2) is converted and absorbed to produce sulphuric acid for use in the metallurgical plant. Unconverted SO_2 is directed to the Acid Plant Tails Gas Stack and discharged to the atmosphere.

Electric Furnace off-gas is directed to a quench tower and venturi scrubber gas cleaning system before release to the atmosphere via the Main Smelter Stack.

Anode Furnace off-gas is treated in gas cleaning systems similar to that of the Electric Furnace with the exception of sulphur dioxide-rich oxidation gases being directed to the Acid Plant for conversion to sulphuric acid.

All furnaces have gas cleaning system bypass stacks in addition to the Main Smelter Stack and the Acid Plant Tails Gas Stack, for use in abnormal or emergency situations. In addition, the Acid Plant also has a bypass stack for use in abnormal or emergency situations associated with the Acid Plant or during planned maintenance activities.

Further details on the specific airborne pollution management measures for the Smelter, Acid Plant and Feed Preparations dryers can be found in Quality Document no. 47738 – Management of Smelter Area Emissions.

2.1.2 Purpose

- Provide information that can be used to manage particulate and gaseous emissions from Smelter 2, to levels less than the prescribed limits.

2.1.3 Deliverable(s)

- Calibration records for SO_2 analysers on the Main Smelter Stack and Acid Plant Tails Gas Stack.
- Records of particulate and SO_2 emissions from Smelter 2 to assess compliance with the emission limits of **EPA Licence 1301** and to compare against Schedule 4 of the Environment Protection (Air Quality) Policy 2016, as shown in Table 2.1.
- Records to assess compliance with the monitoring and reporting requirements of **EPA Licence 1301** and the Environment Protection (Air Quality) Policy 2016 (see Table 3.1).
- Data to confirm that approximately 99 per cent of all SO_2 generated during the smelting process is captured.

2.1.4 Method

The impact of specific emissions on air quality is assessed through monitoring operational compliance, using real-time, in-stack analysers (EPA 1301.305-137) against the requirements and emission maximum pollutant levels (MPL) specified in **EPA Licence 1301**, and the Environment Protection (Air Quality) Policy 2016.

Olympic Dam maintains systems to report bypass and exceedance emission events in accordance with statutory and other obligations. If the Anode Furnaces, Electric Furnace, Flash Furnace or Acid Plant Bypass Stacks have been operated, a report is automatically generated by the process control system detailing the date, time and duration of the event (see Appendix A, Figure 5.1 to Figure 5.3). Each operation of a bypass stack that exceeds 10 minutes duration is reported (EPA 1301.4. (305 - 140)).

Similarly, at the completion of every 12-hour shift (at 6am and 6pm) a report is automatically generated by the process control system detailing the 30-minute average SO_2 concentrations for the Main Smelter Stack and the Acid Plant Tails Gas Stack for the duration of the shift (see Appendix A, Figure 5.5 to Figure 5.6). If at any time SO_2 emissions from the Main Smelter Stack or Acid Plant Tails Gas Stack exceed 2,400 mg/Nm^3 (as amended from EPA **Licence 1301**; and except during start-up and abnormal or emergency situations– see note in Appendix C), ODC is required to notify the EPA Regulation and Compliance Division of the EPA within one working day of the event (EPA 1301.37-43, 1301.305-141).

Continuous ambient SO_2 monitoring is undertaken at Roxby Downs and Olympic Village. The results of this monitoring are reported to in the Quarterly Emissions Report to the EPA. (EPA 1301.305-138). In the event of an exceedance of the NEPM limits, ODC is required to notify EPA Regulation and Compliance within one working day of the event (EPA 1301.305-139, 1301.305-140, 1301.305-141).

All information on bypass and exceedance emission events is reported as per licence conditions (EPA 1301.305-140, 1301.305-141). All other relevant information is available to EPA Regulation and Compliance on request.

Isokinetic stack sampling of the Main Smelter Stack and Acid Plant Tails Gas Stack is performed annually by a contractor holding appropriate NATA accreditation and in accordance with relevant SA EPA (or equivalent) Test Methods (EPA 1301.305-137). Particulate emissions from the Feed Preparation Concentrate Dryers are also measured where possible on a biannual basis by isokinetic stack sampling. Other smelter stack emissions and intermediate process gases are sampled as necessary to ensure gas cleaning systems are operating optimally and in compliance with prescribed limits based on process control data obtained from the process control system. This sampling typically includes analysis for SO_2, sulphur trioxide (SO_3), particulates, heavy metals, radionuclides and other chemical compounds. Results from this sampling are used to validate the continuous emission monitoring results and for the purpose of National Pollutant Inventory reporting.

Emission sampling results are recorded electronically and / or in hard copy (EPA 1301.305-137) and are evaluated against the EPA Licence 1301 limit values and Schedule 4 of the Environmental Protection (Air Quality) Policy 2016 shown in Table 2.1.EPA Licence 1301 limits may differ for some pollutants to the EP Air Quality Policy 2016.

Table 2.1: Summary of emission limits as per licence 1301 and Environment Protection (Air Quality) Policy 2016

Pollutant	EP Air Quality Policy Maximum pollutant level (mg/Nm^3)	Licence 1301 Maximum pollutant level (mg/Nm^3)	Notes
Antimony	10		
Arsenic	10		
Cadmium	3		
Chlorine	200		Or inorganic chlorine compounds.
CO	1,000		
Hydrogen sulphide	5		Gold Room
Hydrofluoric acid	50		Includes Fluorine and inorganic fluorine compounds.
Lead	10		
Mercury	3		
NO_x	350		Fuel burning equipment – gaseous fuels
	500		Fuel burning equipment – liquid or solid fuels
Particulates	250 *(100)		General processes, excluding the heating of metal ores. Calciner and Feed Preparation Concentrate Dryers. Due to the nature of the current plant 250mg/Nm^3 will continue to be used to assess plant performance until such time the Calciner or FeedPrep is upgraded.

Pollutant	EP Air Quality Policy Maximum pollutant level (mg/Nm^3)	Licence 1301 Maximum pollutant level (mg/Nm^3)	Notes
Particulates	100	100	Flash Furnace, Anode Furnace, Acid Plant Bypass Stack, Electric Furnace Bypass Stack, Main Smelter Stack, Acid Plant Tails Stack and the Gold Room Roaster Scrubber
Sulphur dioxide	1000	**2400	Acid Plant Tails Stack and Main Smelter Stack.
Sulphur trioxide	100	100	Flash Furnace Bypass Stack; Anode Furnace Bypass Stacks and Electric Furnace Bypass stack.
Sulphuric acid	100	100	Flash Furnace Bypass Stack; Anode Furnace Bypass Stacks and Electric Furnace Bypass stack.

* In accordance with the transitional provisions of the EP (Air Quality) Policy 2016 a new limit of 100 will apply within 2 years of the 1/9/2016. This will apply to the Calciner and Feed Prep stack emissions. Due to the nature of the current plant 250mg/Nm^3 will continue to be used to assess plant performance until such time the Calciner or FeedPrep is upgraded.

** see note in Appendix C

2.2 Calciner emissions

2.2.1 Background

The precipitation area of the Hydromet includes two Calciners (A and B), each with its own off-gas cleaning system and gas discharge stack. Ammonium diuranate enters the calciners after the completion of the solvent extraction and precipitation stages of the uranium recovery process. The ammonium diurinate is calcined to uranium oxide concentrate, which is subsequently packed and prepared for shipping. The off-gas from the individual Calciners passes through venturi scrubbers, droplet separators and mist eliminators to remove particulates before release to the atmosphere (MC 2.8.2(e)).

2.2.2 Purpose

- Provide information that can be used to manage particulate emissions from the Calciner.

2.2.3 Deliverable(s)

- Records of particulate emissions from Calciners A and B to assess against the relevant particulate pollutant level specified in the Environment Protection (Air Quality) Policy 2016 (see Table 2.1).

2.2.4 Method

The impact of specific emissions on air quality is assessed through monitoring the performance of processes against pollutant levels specified in the Environment Protection (Air Quality) Policy 2016.

Particulate emissions from Calciners A and B are measured quarterly by isokinetic sampling, where possible, depending on process reliability and plant availability. Sampling is undertaken by a NATA-accredited contractor in accordance with SA EPA Test Methods (or equivalent) for the measurement of particulate concentrations. Any measurement above the pollutant levels specified in Table 2.1 is investigated and reported to EPA Regulation and Compliance within one working day. The isokinetic stack-sampling filters used to capture particulates are also analysed quarterly for ^{238}U activity. Results from this, together with data obtained from the process control system, are used to estimate total uranium discharged from the stacks, which is subsequently reported in the **LM1** Radiation Annual Report.

2.3 Slimes Treatment Plant emissions

2.3.1 Background

The Slimes Treatment Plant, also referred to as the Gold Room, treats slimes generated during the electro-refining of copper anodes to produce ingots of gold and silver. This occurs inside a secure building with fume and emission extraction provided by one of three systems; either the roaster scrubber system, the nitrogen oxides (NO_x) scrubber system or general building ventilation.

The roaster scrubber principally treats off-gas from the various roaster and gold and silver furnaces via a high-pressure impaction scrubbing system with subsequent emission to atmosphere. The NO_x gas cleaning system treats fume from the electroplating and acidic processes with sodium sulphide (Na_2S), followed by scrubbing and emission to the atmosphere. The general building ventilation uses positive pressure created through constant air-conditioning to remove fumes via louvres.

2.3.2 Purpose

- Provide information that can be used to manage particulate and gaseous emissions from the Slimes Treatment Plant

2.3.3 Deliverable(s)

- Records of particulate and hydrogen sulphide emissions from the Slimes Treatment Plant to assess against the pollutant levels specified in the Environment Protection (Air Quality) Policy 2016 (see Table 2.1).

2.3.4 Method

The impact of specific emissions on air quality is assessed through monitoring the performance of processes with the pollutant levels specified in the Environment Protection (Air Quality) Policy 2016.

Particulate and hydrogen sulphide emissions from the Slimes Treatment Plant are measured biannually and annually respectively by isokinetic sampling, where possible, depending on process reliability and plant availability. Any measurement above 100 mg/Nm^3 for particulates from the roaster scrubber or above 5 mg/Nm^3 for hydrogen sulphide from the NO_x scrubber is investigated and reported to EPA Regulation and Compliance within one working day.

Emissions from the NO_x Scrubber Stack are sampled annually for the concentration of NO_x and other substances for the purpose of National Pollutant Inventory reporting and for assessing trends.

2.4 Ambient sulphur dioxide (SO2)

2.4.1 Background

The principal point sources of SO_2 at Olympic Dam are Smelter 2 and the Acid Plant. Small quantities of SO_2 are also emitted from diffuse sources (such as process vessels). ODC conducts an ongoing assessment of SO_2 generation and ambient concentrations (EPA 1301.305-139, 1301.305-140, 1301.305-141).

2.4.2 Purpose

- Provide monitoring results for the reporting of ambient ground-level SO_2 concentrations at Roxby Downs and Olympic Village.

2.4.3 Deliverable(s)

- Records of ground level SO_2 concentrations at Olympic Village and Roxby Downs Township to assess compliance with the ground level SO_2 concentration requirements of the Ambient Air Quality NEPM and the values contained in Schedule 2 of the Environment Protection (Air Quality) Policy 2016 (see Table 2.2).

2.4.4 Method

Continuous ambient SO_2 monitors are located in Roxby Downs and Olympic Village in accordance with relevant Australian Standards (EPA 1301.305-138). The monitors provide continuous measurement of SO_2 concentrations at Roxby Downs and Olympic Village.

A measured exceedance of the NEPM must be reported to EPA Regulation and Compliance within one working day of the event. Results of continuous monitoring are presented in the quarterly Notification of Emission Events report submitted to EPA Regulation and Compliance within 15 working days of the end of each quarter (EPA 1301.305-140, 1301.305-141).

Table 2.2: Summary of ground-level SO2 criteria

Emission	Criteria (ppm)	Averaging period
SO_2	0.20	1-hour
	0.08	1-day
	0.02	1-year

2.5 Raise bore ventilation shaft emissions

2.5.1 Background

The underground mine ventilation shafts pass through two aquifers (Arcoona Quartzite and Tent Hill). During normal operation, groundwater flows passively into the unlined raise bores, where it may be collected by the updraft of air and subsequently emitted at the surface as saline aerosols.

2.5.2 Purpose

- To provide data to allow assessment of the impact of emissions from underground mine ventilation shafts on populations of listed species and habitat supporting important populations of the Plains Rat at risk species through the monitoring and reporting of salt deposition rates.

2.5.3 Deliverable(s)

- Records from background salt deposition monitoring jars at the edge of the SML against the background limit of 20mg/m^2/day.
- A statement of impacts to the refuge habitat of the Plains Rat.

2.5.4 Method

A system of salt deposition monitoring jars are located on the edge of the SML, north, south, east and west, (see Appendix B, Figure 6.1). Salt jars are collected regularly and analysed for sodium chloride (NaCl), from which a deposition rate is derived. Comparison with background levels will ensure minimal impact to the Plains Rat habitat.

2.6 Particulate dust emissions from operational sources

2.6.1 Background

The operational infrastructure creates the potential for an increase in particulate emissions from the operation.

Compliance criteria need to be met at all times at Roxby Downs and is monitored at Olympic Village to ensure impacts are low and remain well controlled.

Monitoring results are used to determine impacts and provide real-time information for management control of potential dust-emitting activities (MC 2.8.2(e)).

2.6.2 Purpose

- Provide information for the modelling and reporting of ambient ground-level particulate concentrations at Roxby Downs and Olympic Village.

2.6.3 Deliverable(s)

- Records of real-time monitoring of particulates to ensure that concentrations at Roxby Downs remain within the **compliance criteria**.
- Provision of real-time particulate information to inform the management of dust-producing activities at the operation.

2.6.4 Method

Compliance monitoring stations are located in accordance with relevant Australian Standards at Roxby Downs and Olympic Village plus one background monitoring station to the north of the Special Mining Lease to enable the operationally contributed ground-level particulate concentrations at the sensitive receiver sites to be calculated. Each compliance and background monitoring station consists of:

- A real-time (eBAM) PM_{10} particulate monitor;
- A meteorological monitor collecting wind speed and direction, temperature, pressure and humidity data, with the Roxby Downs monitor also collecting solar radiation, rainfall and evaporation data.

All monitoring stations transmit real-time PM_{10} particulate information and meteorological information to a central location. Real-time monitoring provides information that can be used to manage dust generating activities in order to remain within the **compliance criteria**.

Twenty-four hour average PM_{10} ground-level particulate concentrations are derived from the monitoring data and reported in the Annual EPMP Report. Real-time TSP and $PM_{2.5}$ monitoring will be commissioned after the variation date (as defined in the **Amendment Act**).

3 COMMITMENTS

3.1 Reporting

The results and a discussion of the findings are presented in the Annual EPMP Report as outlined in the **Environmental Management Manua**l (EMM).

3.2 Summary of commitments

Table 3.1: Summary of commitments

Action	Parameter	Frequency
Monitor	SO_2 emissions – continuous emission monitoring reports	Daily
Monitor	Particulate emissions – continuous emission monitoring reports	Daily
Monitor	Background saline aerosol emissions	Monthly
Monitor	Calciner particulate emissions and ^{238}U activity via isokinetic sampling and laboratory analysis	Quarterly
Monitor	Calibration records for SO_2 and particulate analysers	Annually
Monitor	Acid Plant Tails Stack and Main Smelter Stack SO_2 and particulate emissions via isokinetic sampling	Annually
Monitor	Slimes Treatment Plant particulate emissions via isokinetic sampling	6-monthly
Monitor	Feed Preparation Concentrate Dryers particulate emissions via isokinetic sampling	6-monthly
Monitor	Slimes Treatment Plant NO_x and hydrogen sulphide emissions via isokinetic sampling	Annually
Report	Compliance with **EPA Licence 1301** and ground-level SO_2 concentration requirements of the Ambient Air Quality NEPM (i.e. results of ambient gas monitoring and information on bypass and exceedance emission events in Notification of Emission Events report)	Quarterly
Report	^{238}U emission from Calciner stacks in the **LM1** Radiation Annual Report	Annually
Report	Monitoring results in the Annual EPMP Report to the Indenture Minister	Annually
Review	The Airborne Emissions MP and modify as appropriate	Annually

4 DEFINITIONS AND REFERENCES

4.1 Definitions

Throughout the EPMP some terms are taken to have specific meaning. These are indicated in bold text in the documentation and are defined in the glossary in section 5 of the EMM. Defined terms have the same meaning wherever they appear in bold text. Some other terms and acronyms are also defined in the glossary, but do not appear in bold text.

4.2 References

Environment Protection (Air Quality) Policy 2016, Environment Protection Authority (SA).

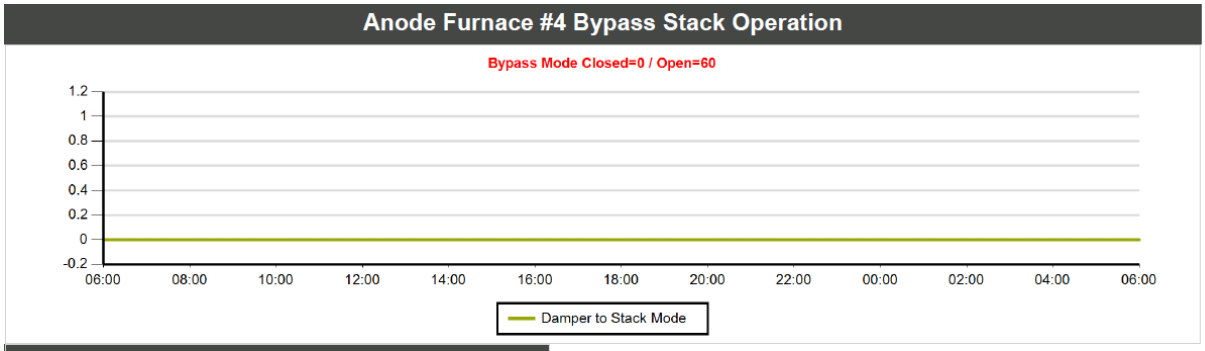
4.3 Bibliography

Kinhill Engineers 1997, 'Olympic Dam Expansion Project Environmental Impact Statement, Supplement', Kinhill Engineers Pty. Ltd., Adelaide.

5 APPENDIX A: AUTOMATICALLY GENERATED EMISSION REPORTS

These reports are automatically generated upon operation of any of the Bypass Stacks for the attention of Environment Section personnel.

Example:

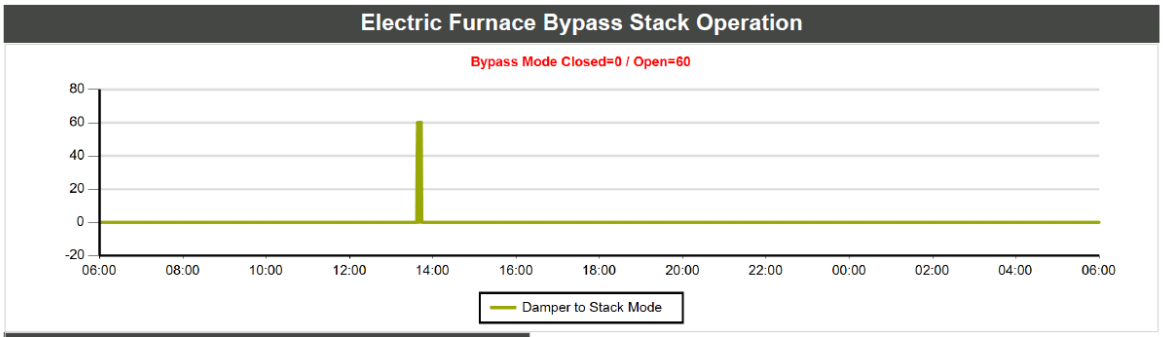


AF4 ByPass Events	
	N/A

	Unit	
Bypass Duration	HH:mm	0:0

AF4 Oxi Modes	
28/11/2016 06:36:26	Oxidation On
28/11/2016 07:36:27	Oxidation Off
29/11/2016 01:24:44	Oxidation On
29/11/2016 01:54:44	Oxidation Off
29/11/2016 02:12:45	Oxidation On

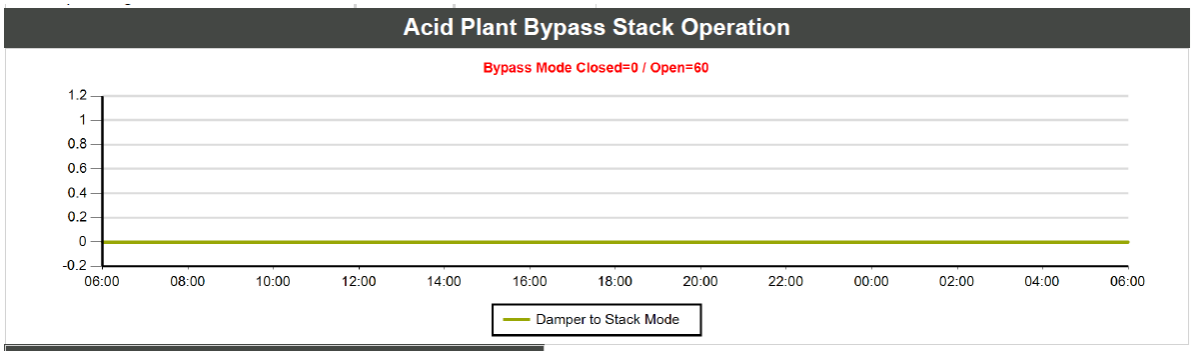
Figure 5.1: Anode Furnace Bypass Stack operation report



Electric Furnace ByPass Events	
28/11/2016 13:37:33	Damper to Stack Opened
28/11/2016 13:39:33	Damper to Stack Closed
28/11/2016 13:40:33	Damper to Stack Opened
28/11/2016 13:43:33	Damper to Stack Closed

	Unit	
Bypass Duration	HH:mm	0:5

Figure 5.2: Electric Furnace Bypass Stack operation report



Acid Plant ByPass Events	
	N/A

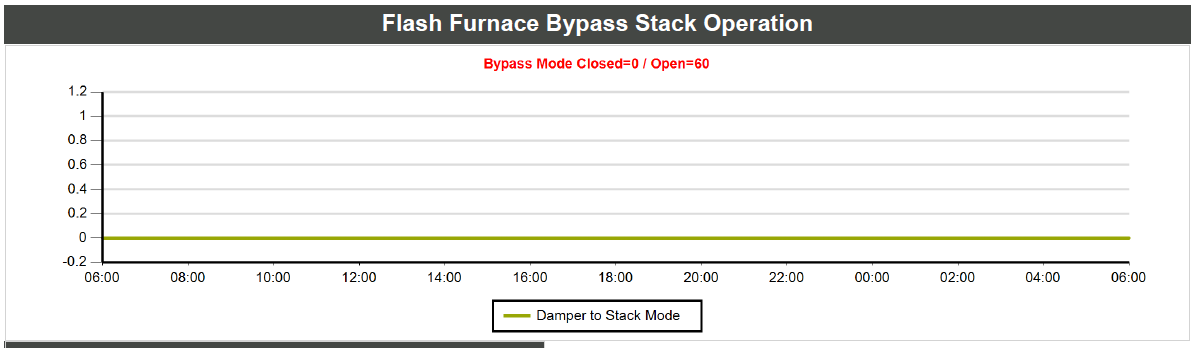
	Unit	
Bypass Duration	HH:mm	**0:0**

Flash Furnace Feed Operations	
28/11/2016 14:53:34	**Feed Off**
28/11/2016 17:08:36	**Feed On**

	Unit	
Operating Time	HH:mm	**21:45**
Bypass Duration during operating Time	HH:mm	**0:0**

Online Bypass Duration		
	Unit	
% of Operating Time	%	**0.0**

Figure 5.3: Acid Plant Bypass Stack operation report



Flash Furnace ByPass Events	
	N/A

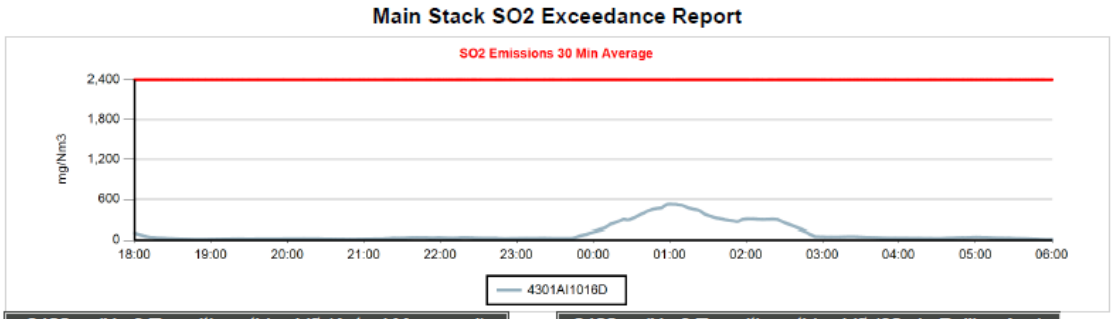
	Unit	
Bypass Duration	HH:mm	**0:0**

Flash Furnace Feed Operations	
28/11/2016 14:53:34	**Feed Off**
28/11/2016 17:08:36	**Feed On**

Figure 5.4: Flash Furnace Bypass Stack operation report

These reports are automatically generated at the conclusion of any shift for the attention of Environment Section personnel.

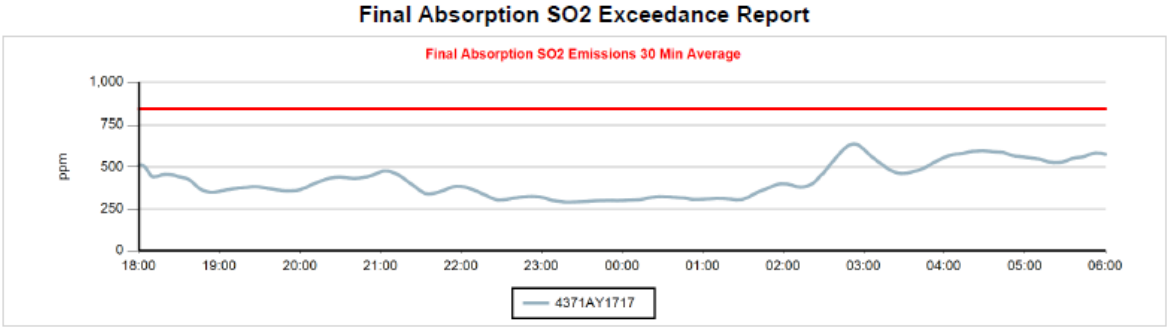
Example:



2400mg/Nm3 Transitions this shift (Actual Measured)	2400mg/Nm3 Transitions this shift (30min Rolling Avg)
N/A	N/A

	Unit	
Total Exceedance Duration	HH:mm	0:0
Exceedance Duration (% of Shift)	%	0.00

Figure 5.5: Main Smelter Stack SO_2 emission exceedance report



840 ppm Transitions this shift (Actual Measured)	840 ppm Transitions this shift (30min Rolling Avg)
N/A	N/A

	Unit	
Total Exceedance Duration	HH:mm	0:0
Exceedance Duration (% of Shift)	%	0.00

Figure 5.6: Acid Plant Tail Gas Stack SO_2 emission exceedance report

6 APPENDIX B: SALINE AEROSOL MONITORING SITES

Figure 6.1: Location of saline aerosol monitoring sites

7 APPENDIX C: METHOD – SMELTER EMISSIONS

The impact of specific emissions on the quality of the local atmosphere is assessed through monitoring the performance of processes with the requirements and emission limits specified in **EPA Licence 1301** and the values contained in the Environment Protection (Air Quality) Policy 2016.

SO_2 emissions from both the Acid Plant Tails Gas Stack and the Main Smelter Stack are monitored using continuous emission monitoring analysers. The analysers are maintained and calibrated in accordance with site procedures and practices, with appropriate records retained.

ODC maintains systems to report bypass and exceedance emission events in accordance with statutory and other obligations. If the Anode Furnaces, Electric Furnace, Flash Furnace or Acid Plant Bypass Stacks have been operated, a report is automatically generated by the process control system detailing the date, time and duration of the event (see Appendix A, Figure 5.1 to Figure 5.3). Each operation of a bypass stack that exceeds 10 minutes duration is reported (EPA 1301.305-140). The report contains the date, start and end time and duration of the event. Smelter and Environment personnel use this information to investigate the root causes and corrective actions of the bypass or exceedance emission event.

At the completion of every 12-hour shift (from 6 am to 6 pm and 6 pm to 6 am), a report is automatically generated by the process control system detailing the 30-minute average SO_2 concentrations for that shift for the Main Smelter Stack and the Acid Plant Tails Gas Stack (see Appendix A, Figure 5.5 and Figure 5.6). Designated Smelter and Environment personnel assess this data against ODC's legal and other obligations to determine whether **compliance criteria** have been exceeded. If an exceedance has occurred, the event is investigated for root causes and potential corrective actions.

If at any time SO_2 emissions from the Main Smelter Stack or Acid Plant Tails Gas Stack exceed 2,400 mg/Nm^3, except during start-up and abnormal or emergency situations, Olympic Dam is required to notify EPA Regulation and Compliance within one working day of the event.

All information on bypass and exceedance emission events is compiled quarterly to form the Notification of Emission Events report. This report is submitted to EPA Regulation and Compliance within the first 15 working days of the quarter. All other relevant information is available to EPA Regulation and Compliance on request.

Isokinetic stack sampling is performed in accordance with condition (EPA 1301.305-137) of **EPA Licence 1301**. Smelter stack emissions and intermediate process gases are sampled as necessary to ensure gas cleaning systems are operating optimally and in compliance with **compliance criteria** based on process control data obtained from the process control system. This sampling typically includes analysis for SO_2, sulphur trioxide (SO_3), particulates, heavy metals and other chemical compounds. Results from this sampling are used to update the emission profiles used in the generation of emission dispersion maps, and to validate the continuous emission monitoring results.

Sampled isokinetic data, together with data gathered from the in-stack analysers and flow meters, are used to derive a figure for total SO_2 recovery, expressed as a percentage. This figure is the ratio of the total SO_2 treated in the Acid Plant (total SO_2 generated from furnace operations minus SO_2 released from the Acid Plant Tails Gas Stack, Main Smelter Stack and bypass stacks) to the total SO_2 generated from furnace operations.

Note: Condition (EPA 1301.37-43), Section 2 of **EPA Licence 1301** defines the limit for total acid gas (expressed as SO_3 equivalent) emitted from the Main Smelter Stack and Acid Plant Tails Gas Stack as 3,000 mg/Nm^3, except during start-up, abnormal or emergency situations. Both the Main Smelter Stack and Acid Plant Tails Gas Stack use continuous SO_2 analysers to determine compliance with this condition.

It is very difficult to correlate SO_2 output to SO_3 concentrations as SO_3 cannot be continuously monitored. Based on stack sampling and monitoring, ODC utilises an internal SO_2 limit of 2,400 mg/Nm^3 for the Acid Plant Tail Gas Stack and the Main Smelter Stack. Concentrations above this limit are estimated to result in a total acid gas (expressed as SO_3) concentration greater than 3,000 mg/Nm^3.

Routine stack sampling, in accordance with condition (305-137) of **EPA Licence 1301**, has verified that measured SO_3 concentrations are within the limits specified in **EPA Licence 1301** Should future sampling indicate otherwise, notification will be provided to the EPA and predicted emission models/calculations as discussed above will be revised.