Heron Resources Limited
Tarago Operations Pty Limited

Woodlawn Mine

SML 20

Summary of Environmental Monitoring Data

Environmental Protection Licence Number 20821

Project Approval 07_0143MOD2

Record Update - 30 November 2017

Table of Contents

1. Introduction

1.1 Introduction

Tarago Operations Pty Ltd, a wholly owned subsidiary of Heron Resources Limited, holds Environment Protection Licence 20821 (EPL 20821) issued by the Environment Protection Agency (EPA) under the Protection of the Environment operations Act 1997 (the Act) and operates under the conditions of Project Approval 07_0143MOD2 granted by the NSW Department of Planning and Infrastructure for the Woodlawn Mine Project. This report has been prepared to satisfy the reporting requirements of the Act as directed by the EPA and also for Condition 11, Schedule 6 of the Project Approval.

This report summarises environmental monitoring results for the Woodlawn Mine for the period 1 – 30 November 2017. Historical depositional dust results recorded by Veolia since January 2015 are included in appendix A to this report to provide a background air quality baseline.

A summary of the EPL information is provided in the following tables. Table 1 shows the licence information and Table 2 summarises the frequency and units for monitoring data for the reporting period.

1.2 Explanation of units of measurement

- mg/m^3 = milligrams per cubic metre
- $g/m^2/month$ = grams per square metre per month
- $\mu g/m^3$ = micrograms per cubic metre
- Day = 7am to 6pm Monday to Saturday and 8am to 6pm Sunday and public holidays
- Evening = 6pm to 10pm on any day
- Night = 10pm to 7am Monday to Saturday and 10pm to 8am Sunday and public holidays

Table 1. Licence information

Environment Protection Licence number	20821
Licensee	Tarago Operations Pty Ltd
Licensee address	Level 7, Suite 702 191 Clarence Street SYDNEY NSW 2000
Premises	Woodlawn Mine Project 507 Collector Road TARAGO NSW 2580
Link to full licence on the EPA website	http://app.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=115339&SYSUID=1&LICID=20821
Link to Notice of Variation of EPA licence	http://app.epa.nsw.gov.au/prpoeoapp/ViewPOEONotice.aspx?DOCID=-1&SYSUID=1&LICID=20821
Complaints Telephone Number	Sydney Office (02) 9119 8111 Woodlawn Office (02) 9119 8140

Table 2. Supporting information of EPL monitoring requirements

Parameter	Monitoring site	Monitoring frequency	Unit of measure
Air quality monitoring: Deposited Dust (insoluble solids)	DG 22*, DG24*, DG28*, DG33*	Monthly	g/m^2/month
TSP	HVAS-1	24 hours every six days	$\mu g/m^3$
PM10	HVAS-2	24 hours every six days	$\mu g/m^3$

*Monitoring undertaken by Veolia

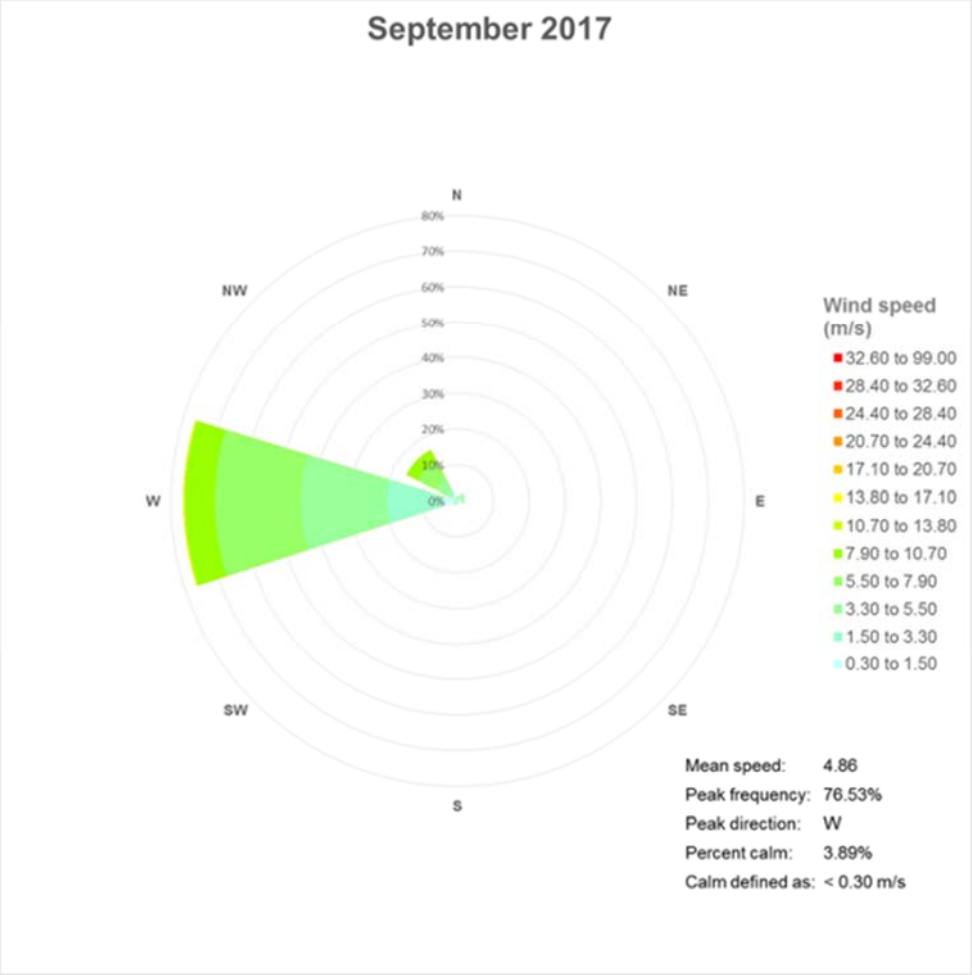
2. Meteorological Monitoring

Heron is required to undertake meteorological monitoring on site. Veolia operate an approved weather station (EPA licence 11436, Point 9). As weather may influence monitoring results for dust and noise a summary showing the rainfall, temperature and average wind speed is detailed in Table 3.

Table 3. Summary of weather conditions for previous 3 months (Sep – Nov 2017)

	Sep	Oct	Nov
Total rainfall (mm)	18	56.5	57.5
Total number of wet days	6	9	11
Average maximum temperature at 2m (°C)	15.6	20.2	21.6
Average minimum temperature at 2m (°C)	4.9	8.3	10.1
Average wind speed at 10m (m/s)	4.9	3.2	2.9

The prevailing wind direction trends for the previous 3 months is displayed using wind roses in Figure 1. The wind roses depict the number of hours of wind recorded at 10 m, by direction. During September the prevailing winds were from a westerly direction. During October the winds were recorded from both a westerly and easterly direction. Wind during November was largely from the east and north east.


September 2017
N
NE
E
SE
S
SW
W
NW
80%
70%
60%
50%
40%
30%
20%
10%
0%
Wind speed (m/s)
32.60 to 99.00
28.40 to 32.60
24.40 to 28.40
20.70 to 24.40
17.10 to 20.70
13.80 to 17.10
10.70 to 13.80
7.90 to 10.70
5.50 to 7.90
3.30 to 5.50
1.50 to 3.30
0.30 to 1.50
Mean speed: 4.86
Peak frequency: 76.53%
Peak direction: W
Percent calm: 3.89%
Calm defined as: < 0.30 m/s

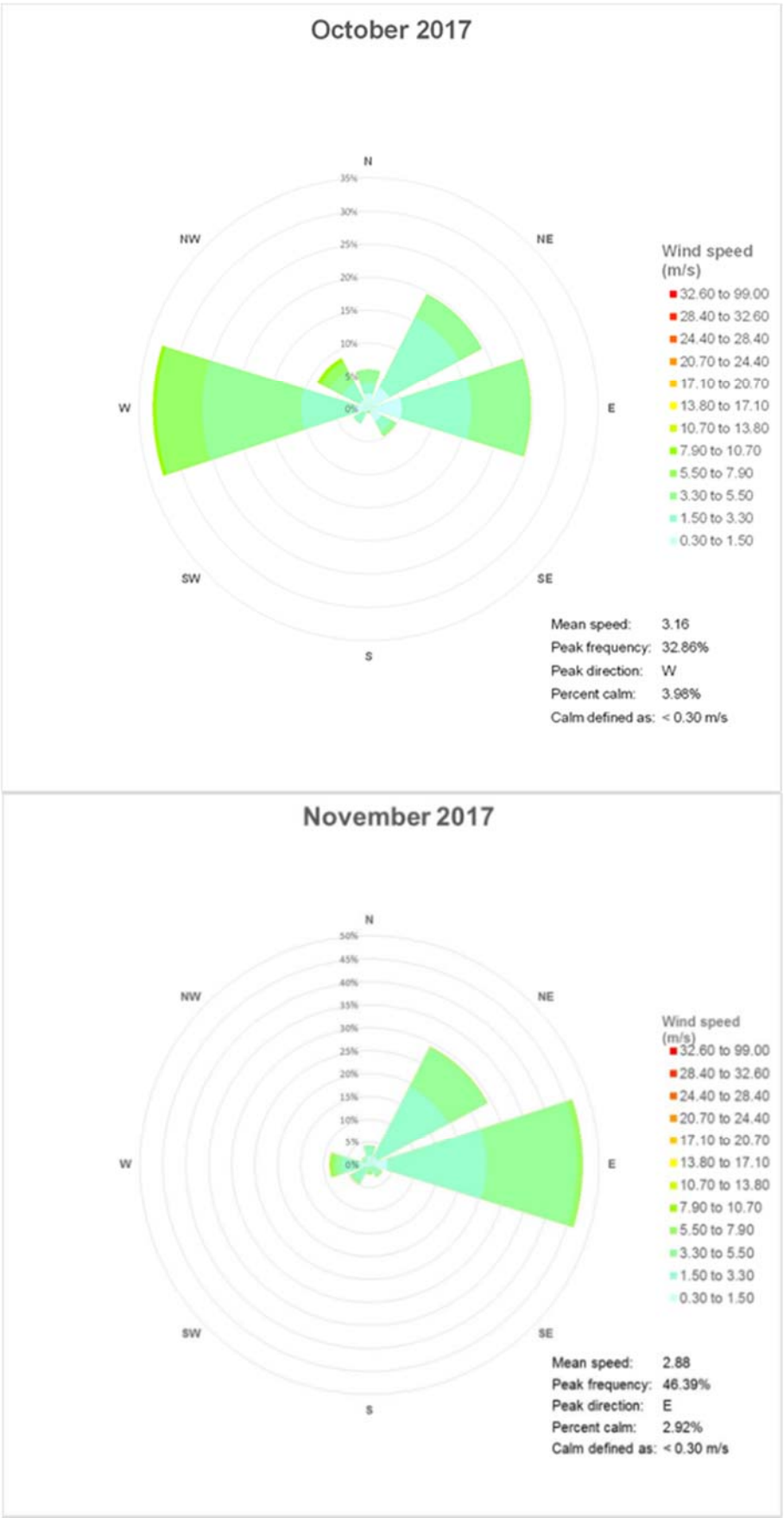


Figure 1. Prevailing wind direction (percentage for month) Sep, Oct and Nov 2017

3. Air Quality Monitoring

The Air quality monitoring results for Woodlawn Mine are summarised in the following sections.

3.1 Depositional Dust

Depositional dust monitoring around the Woodlawn site is undertaken on a monthly basis. Four depositional dust gauges DG22, DG24, DG28 and DG33 are present to monitor the levels of depositional dust. They are located on Site as follows:

- DG22 – East side of void
- DG24 – West side of void
- DG28 – Pylara
- DG33 – MBT plant

Historical monthly raw results for the period January 2015 – Apr 2017 are shown in Appendix A – Historical deposition dust record. These results were recorded prior to the issue of Heron's EPL and are presented for background air quality purposes only.

The EPA licence for the Woodlawn Mine project was issued on May 2017. The raw results for depositional dust commencing from that date are recorded in Table 4.

Table 4. Depositional dust (g/m^2/month - insoluble solids) recorded since May 2017

Date sampled	DG22	DG24	DG28	DG33
May 2017	3.3	0.6	0.8	<0.2
Jun 2017	1.4	0.4	<0.2	<0.2
Jul 2017	1.7	0.5	2.4	<0.2
Aug 2017	3.7	0.5	4.0	0.2
Sep 2017	4.8	0.8	2.1	0.4
Oct 2017	3.9	3.0	1.0	0.5

A graphical representation of raw depositional dust gauge monitoring results since 1 January 2015 is shown in Figure 2.

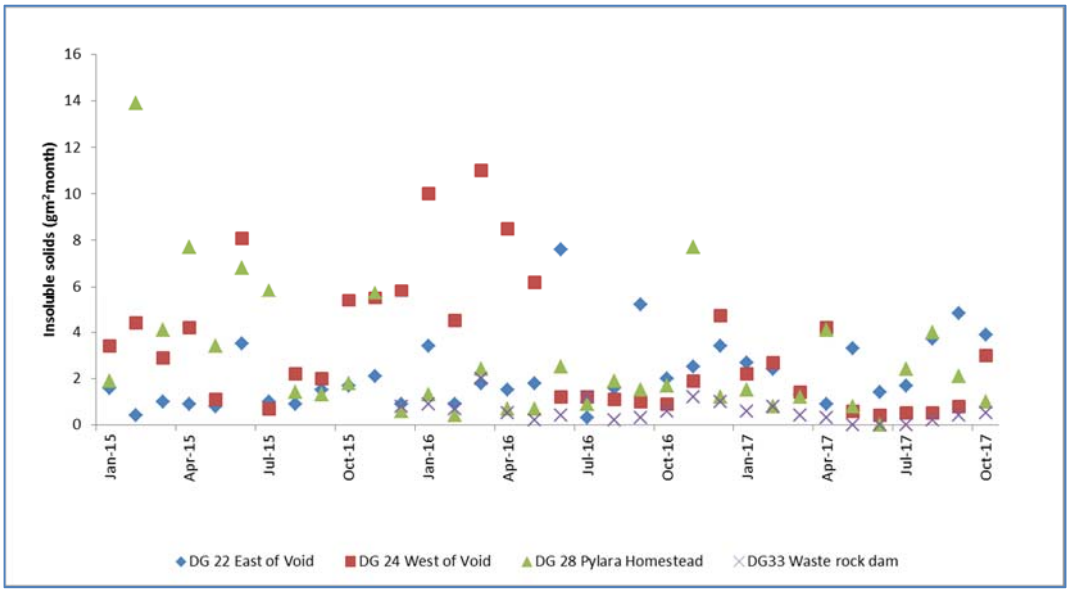


Figure 2. Monthly dust deposition gauge results

Figure 3 shows the annual rolling average for deposited dust (insoluble solids grams per m^2 per month) for the four monitoring sites.

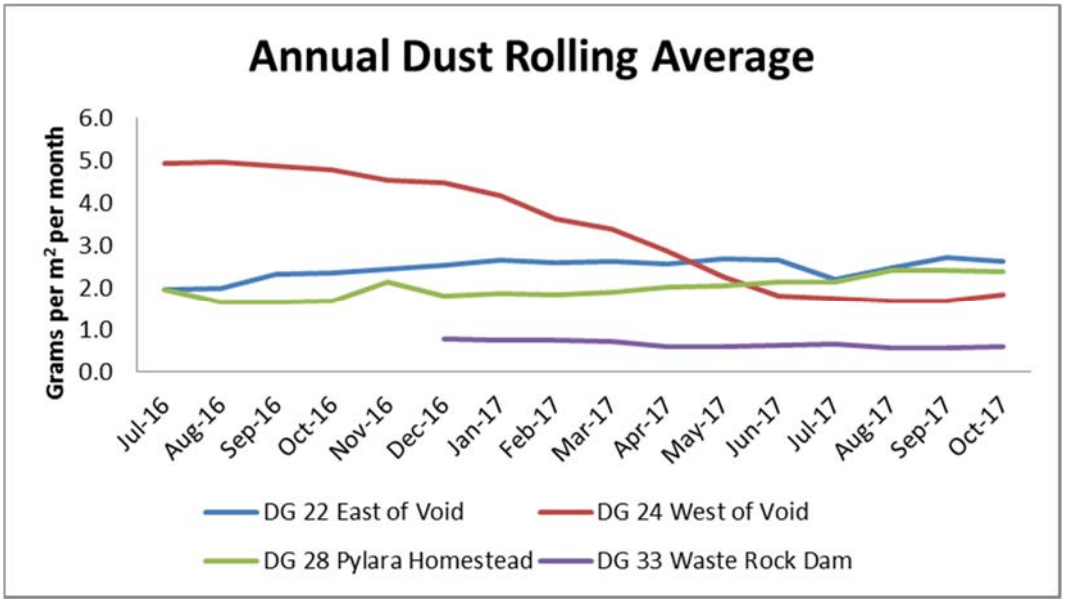


Figure 3. Annual rolling average for insoluble solids (g/m^2/month)

The limits for deposited dust are outlined in the Project Approval. The limits are detailed in Table 5.

Table 5. Deposited dust limits

Pollutant	Averaging period	Maximum increase in deposited dust level	Maximum total deposited dust level
[c]Deposited dust	Annual	[b]2 g/m^2/month	[a]4 g/m^2/month

- [a] Total impact (i.e. Incremental increase in concentrations due to the project plus background concentrations due to all other sources).
- [b] Incremental impact (i.e. incremental increase in concentrations due to the project on its own)
- [c] Deposited dust is to be assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air – Determination of Particulate Matter – Deposited Matter – Gravimetric Method.

Data recorded in Error! Reference source not found. prior to 14 Sep 2017 is summarised in Table 6 to show the average background deposited dust levels recorded prior to commencement of construction. The data shows that the annual average for all four depositional dust gauges did not exceed 4 g/m^2/month during the period Jan 2015 to Aug 2017 nor increase the background by more than 2 g/m^2/month.

Table 6. Background deposited dust values for Woodlawn

	DG22	DG24	DG28	DG33
Individual gauge background average	2.1	3.5	3.0	0.7
Overall background average	2.5			

Average raw deposited dust levels from each gauge for the period since construction commenced (Sep 2017 to Oct 2017) is shown in Table 7.

Table 7 Average deposited dust values since commencement of construction (Sep 2017)

	DG22	DG24	DG28	DG33
Individual gauge average	4.4	1.9	1.6	0.5
Overall average	2.1			

3.2 Atmospheric dust – particulate matter

The Project Approval requires monitoring of total suspended particulate (TSP) matter and particulate matter < 10µm (PM_{10}) to ensure particulate matter emissions generated by the project do not exceed the criteria listed at any residence on privately owned land. High volume air sampling (HVAS) equipment for atmospheric monitoring was installed on 16 October 2017 at Pylara, the nearest residence located to the east of Woodlawn Mine. Monitoring commenced on 17 October 2017 and will be undertaken for a 24 hour cycle every 6 days.

HVAS results for PM10 and TSP are detailed in Table 8 while Project Approval limits for PM10 and TSP are detailed in Table 9.

Table 8. Results for PM10 and TSP

Date start of 24 hour sampling run (7:00am – 7:00am)	PM10 µg/m^3	TSP µg/m^3
17 Oct 2017;	6.7	14.2
23 Oct 2017,	6.7	20.6
29 Oct 2017	8.6	16.8
4 Nov 2017	12.0	22.3
10 Nov 2017	9.5	14.4
16 Nov 2017	13.9	20.6
22 Nov 2017	11.8	20.9

Table 9. TSP and PM10 limits

Pollutant	Averaging Period	[d]Criterion
Total suspended particulate (TSP) matter	Annual	[a] 90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	[a] 30 µg/m^3
Particulate matter < 10 µm	24 hour	[a] 50 µg/m^3

- [a] Total impact (i.e. Incremental increase in concentrations due to the project plus background concentrations due to all other sources).
- [d] Excludes extraordinary events such as bushfires, prescribed burning, dust storms, fog, fire incidents or any other activity agreed by the Director-General.

Compliance summary: The results for PM10 and TSP are below Project Approval limits.

4. Noise Monitoring

The noise criteria to be met at any residence on privately owned land is contained in the project approval and described in Table 10.

The EPL requires that the premises must not emit noise exceeding an L_{Aeq}, 15 minute noise level of 35 dB(A) at any sensitive receivers during the operational phase. There are no specified limits covering the construction phase however the Interim Construction Noise Guideline allows for construction activities being undertaken during daytime to be 10 dB(A) above background.

The meteorological conditions to be met during noise monitoring include:

a) Wind speeds up to 3 m/s at 10 m above ground level; or
b) Temperature inversion conditions of up to 3^{o}C/100m and wind speeds up to 2 m/s at 10m above ground level

Table 10. Noise criteria (dB(A)

Receivers	Day/Evening/Night ($L_{Aeq(15minute)}$)	Night ($L_{A1(max)}$)
All residential receivers	35	45

Attended noise readings were carried out on 17 November 2017. Readings were taken at the Hickory Paddock construction site, Pylara and the Cowley Hills properties. The results of the first round showed that the construction activities are not audible at either of the receptor locations. Both locations represent the nearest receptors and are owned by Veolia.

Compliance statement: The construction program complies with the nominated construction noise guidelines.

5. Blasting

Airblast overpressure and the ground vibration level are required to be monitored for all blasts undertaken during operations. The criteria to be monitored are detailed in Table 11.

Blasting operations have not yet commenced.

Table 11. Blast Monitoring Results

Date	Time	Location	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)
Nil				

EPL and project approval limits experienced at any residence on privately owned land are detailed in

Time of blasting	Airblast overpressure (dB(Lin Peak))	Ground vibration (mm/s)	Allowable exceedance
Any time	120	10	0%
Day	115	5	5% of the total number of blasts over a period of 12 months
Evening	-	2	5% of the total number of blasts over a period of 12 months
Night, and all day on Sundays and public holidays	-	1	0%

Compliance statement: Blasting has not yet commenced at the Woodlawn mine site. Appropriate monitoring will be undertaken once blasting commences.

6. Complaints

No complaints occurred during the reporting period.

Table 12. Complaints register

Date and time	Complainant	Nature of complaint	Recorded by	Corrective action	Date closed

7. Weed control

During the November reporting period weed control spraying for serrated tussock was carried out across vegetated areas within Tarago Operations Project Area.

Appendix A – Historical deposition dust record

Date sampled	DG22	DG24	DG28	DG33
Jan 2015	1.6	3.4	1.9	
Feb 2015	0.4	4.4	13.9	
Mar 2015	1.0	2.9	4.1	
Apr 2015	0.9	4.2	7.7	
May 2015	0.8	1.1	3.4	
Jun 2015	3.5	8.1	6.8	
Jul 2015	1.0	0.7	5.8	
Aug 2015	0.9	2.2	1.4	
Sep- 2015	1.5	2.0	1.3	
Oct 2015	1.7	5.4	1.8	
Nov 2015	2.1	5.5	5.7	
Dec 2015	0.9	5.8	0.6	0.8
Jan 2016	3.4	10	1.3	0.9
Feb 2016	0.9	4.5	0.4	0.7
Mar 2016	1.8	11	2.4	2.0
Apr 2016	1.5	8.5	0.7	0.5
May 2016	1.8	6.2	0.7	0.2
Jun 2016	7.6	1.2	2.5	0.4
Jul 2016	1.2	0.3	23	1.2
Aug 2016	1.1	0.6	1.9	0.2
Sep 2016	1.0	1.2	6.0	0.3
Oct 2016	0.9	2.0	3.2	0.6
Nov 2016	1.9	2.2	2.6	1.2
Dec 2016	4.7	1.1	1.7	1.0
Jan 2017	2.2	2.3	4.7	0.6
Feb 2017	2.7	2.0	1.1	0.8
Mar 2017	1.4	0.9	3.9	0.4
Apr 2017	4.2	0.9	0.09	0.3