Licensee	Perilya Broken Hill Limited (PBHL)
Address	Argent St, Broken Hill, NSW 2880
Environmental Protection Licence	**2683** (North Mine and Potosi Operations)
Link to Environmental Protection Licence	http://www.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=31559&SYSUID=1&LICID=2683

Environmental Protection Licence 2683

Deposited Particulates Monitoring

Perilya Broken Hill Limited (PBHL) has eleven (11) deposited particulates monitoring points located around the North Mine and Potosi Operations (Figure 1). Licence point 20 is located on a private residence on Hall Street. A summary of Environmental Protection Licence (EPL) 2683 conditions is shown in Table 1.

Figure 1 Location of the deposited particulates monitoring points associated with EPL 2683

Table 1 Summary of EPL 2683 conditions for dust monitoring points

Dust Monitoring Points: EPL 2683 Conditions	
Condition	**Licence Requirement**
Licence Point	15,16,17,18,19,20,21,22,23,24,25
Pollutant/s	Total Deposited Particulates (TDP)
	Pb in Deposited Particulates (TDP-Pb)
Unit of measure	Grams per square meter per month (g/m^2/month)
Sampling Method	AM-19
Monitoring frequency	Every 30 days ± two (2) days

Deposited Particulates Monitoring Results

December 2020 TDP and TDP-Pb are presented in Table 2. Results of laboratory analyses were received by Perilya on 01/03/2021.

Table 2 December 2020 dust monitoring point results

Licence Point	Particulates – deposited matter (g/m^2/month)	Total Lead (g/m^2/month)
15	1.6	0.001
16	2.3	0.002
17	3.0	0.005
18	1.8	0.002
19	3.0	0.002
20	5.3	0.006
21	5.0	0.005
22	1.8	0.004
23	1.9	0.001
24	4.7	0.012
25	2.4	< 0.001

Ambient Air Monitoring

EPL 2683 requires three (3) ambient air monitoring sites, one located at the Potosi Operations and the other two at the North Mine (Figure 2). PBHL currently uses high volume air samplers (HVAS) for the ambient air monitoring program. The HVAS operate (sample) for 24 hours every six (6) days.

Figure 2 Locations of the ambient air monitoring points associated with EPL 2683

Table 3 provides a summary of EPL 2683 conditions.

Table 3 Summary of EPL 2683 conditions for ambient air monitoring points

Ambient Air Monitoring Points: EPL 2683 Conditions	
Condition	**Licence Requirement**
Licence Point	26 and 27
Pollutant/s	Total Suspended Particles
	Total Lead
Unit of measure	Micrograms per cubic meter (µg/m^3)
Sampling Method	AS 3580.9.15:2014
	AS/NZS 3580.9.3:2015
Monitoring frequency	Every 6 days for 24 hours

HVAS Results

TSP and TSP-Pb results are presented in Table 4. Monthly averages for TSP and TSP-Pb for the previous 12 months are shown in Figure 3 and Figure 4 respectively. The final set of results for December ambient air monitoring, were received on 20/01/2021.

Table 4 December HVAS total lead and TSP results

Licence Point	Pollutant	No. times measured during the month	Min. Value	Mean Value	Median Value	Max. Value
26	TSP (µg/m3)	5	25.2	53.6	49.1	96.5
	Total Lead (µg/m3)	5	0.054	0.153	0.170	0.230
27	TSP (µg/m3)	5	15.4	53.8	39.6	98.1
	Total Lead (µg/m3)	5	0.020	0.200	0.062	0.492
30	TSP (µg/m3)	5	23.0	40.5	39.1	56.3
	Total Lead (µg/m3)	5	0.046	0.080	0.085	0.105

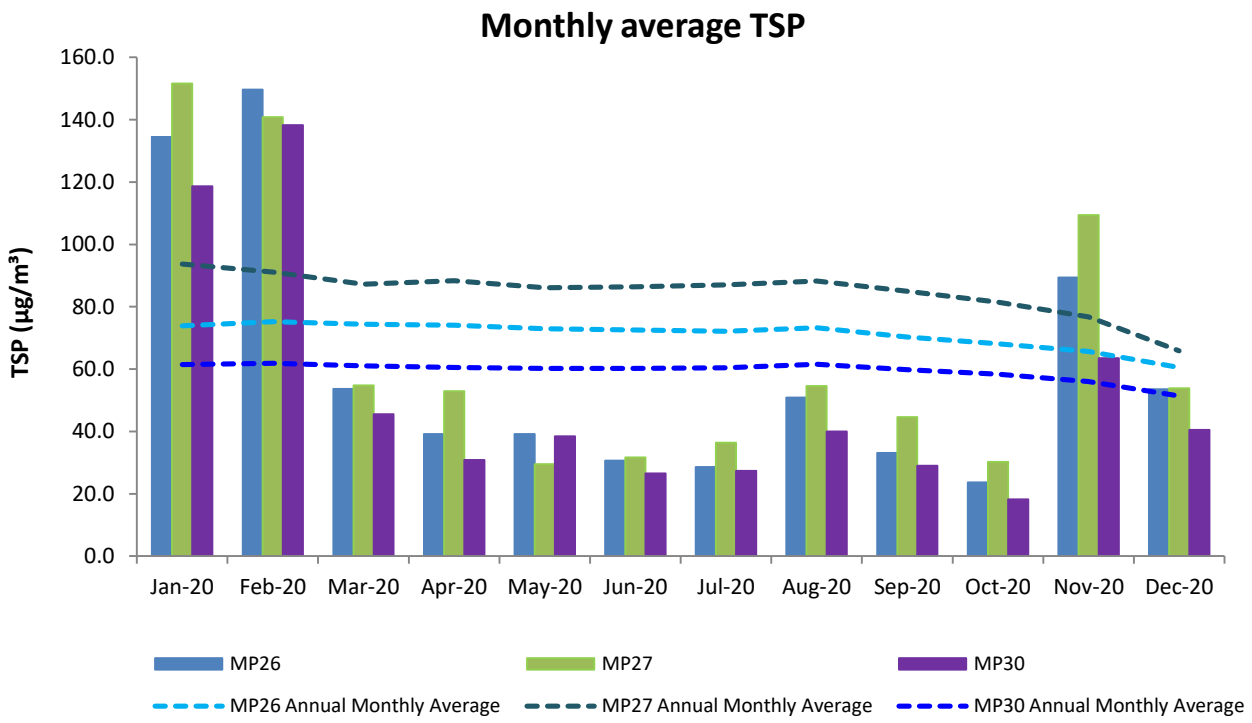

Figure 3 Average TSP results for the 12 months up to and including December 2020

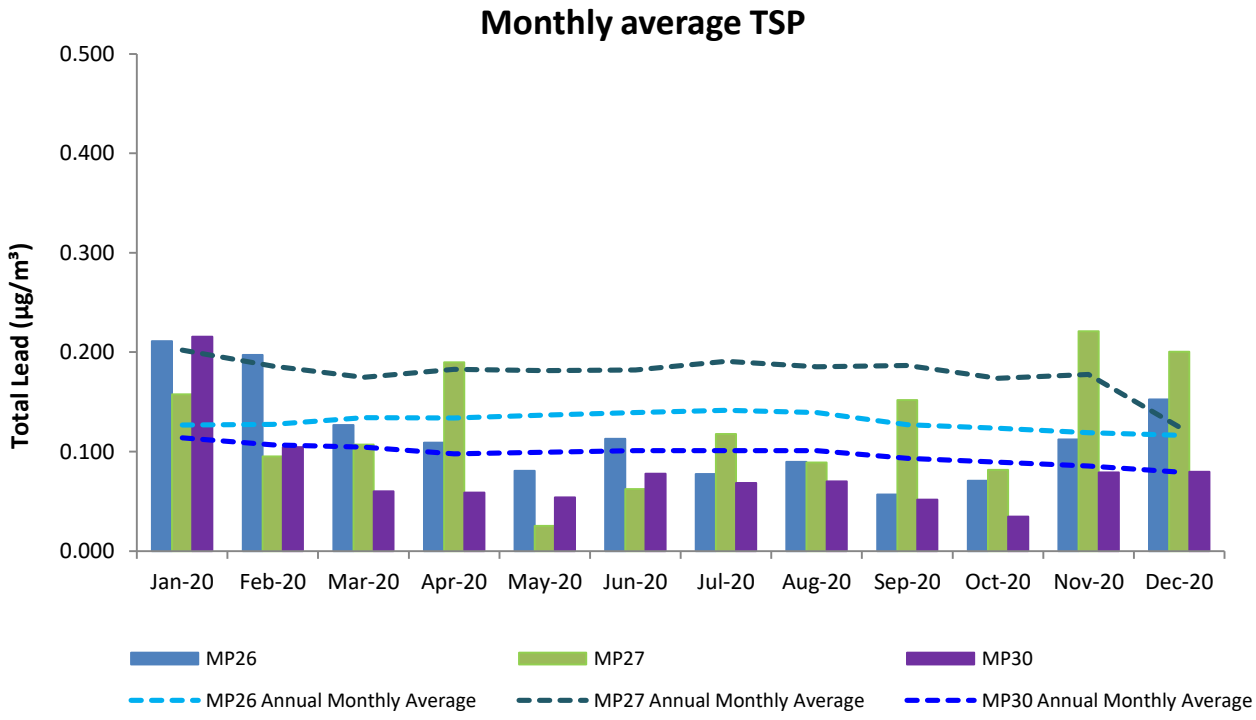

Figure 4 Average total lead results for the 12 months up to and including December 2020

Real Time Air Quality Monitoring

EPL 2683 requires two (2) real time air quality monitoring sites, one located on the Argent St side of the North Mine and the other located on the Menindee Rd side of the North Mine (Figure 5). PBHL currently uses Beta Attenuation Monitors (BAM) for the real time air monitoring program. The BAM operate (sample) for 24 hours every day.

Figure 5 Locations of the real time air monitoring points associated with EPL 2683

Table 5 provides a summary of EPL 2683 relevant conditions.

Table 5 Summary of EPL 2683 conditions for real time air monitoring points

Real Time Air Monitoring Points: EPL 2683 Conditions	
Condition	**Licence Requirement**
Licence Point	29 and 31
Pollutant	PM10
Unit of measure	Micrograms per cubic meter (µg/m^3)
Sampling Method	AS 3580.9.11 – 2008
Monitoring frequency	Continuous

BAM Results

PM10 results for the BAM (LP 29 and LP 31) are presented in Figure 6 and Figure 7 below. Wind pollution rose for events on the 1/12 and 5/12 are presented in Figure 8 and 9. Wind sensors at LP29 were not operational due to instrument error on 5/12; therefore the pollution rose is not available. Data validation excluded result from 26/12/20 to 31/12/20 at LP29 due to instrument error. Percentage of valid data capture complied with AAQ NEPM data availability requirements.

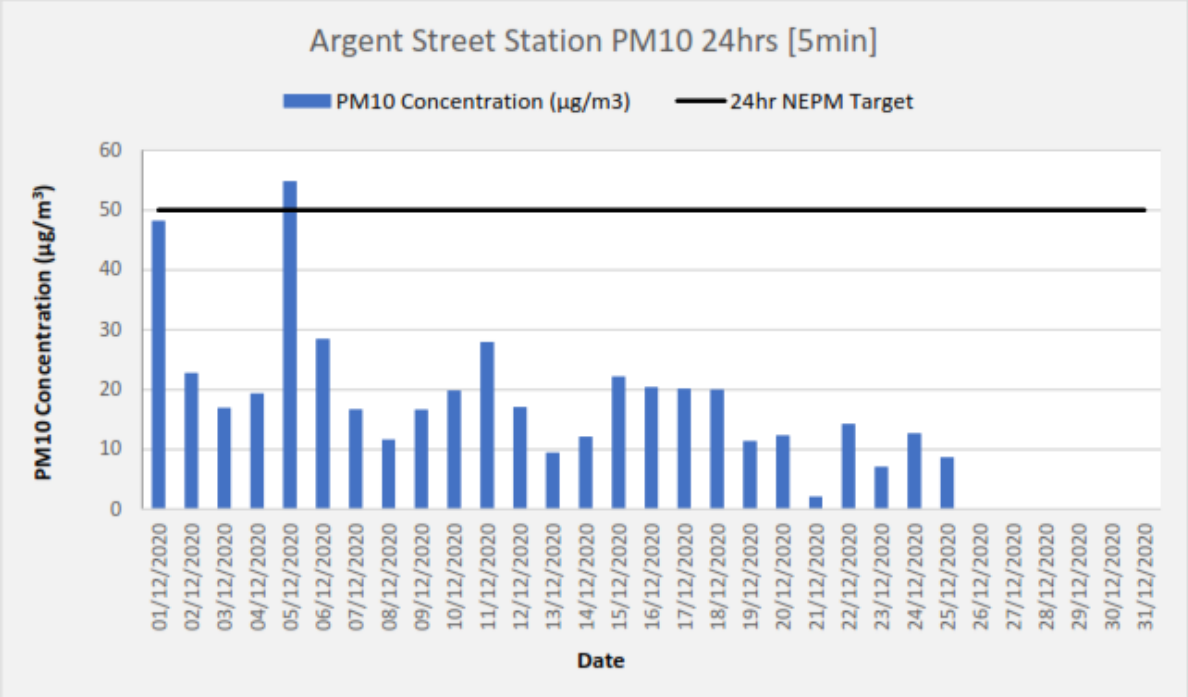

Figure 6 24 hr average PM10 BAM results LP 39 (Argent St)

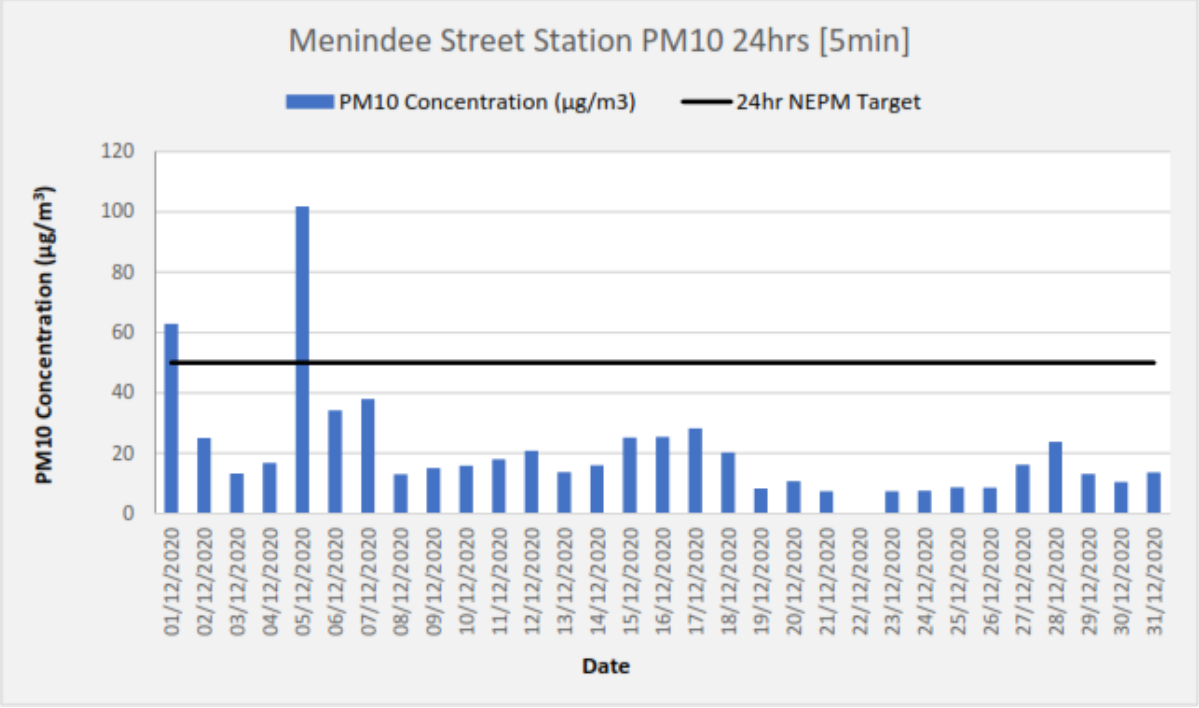

Figure 7 24 hr average PM10 BAM results LP31 (Menindee Rd)

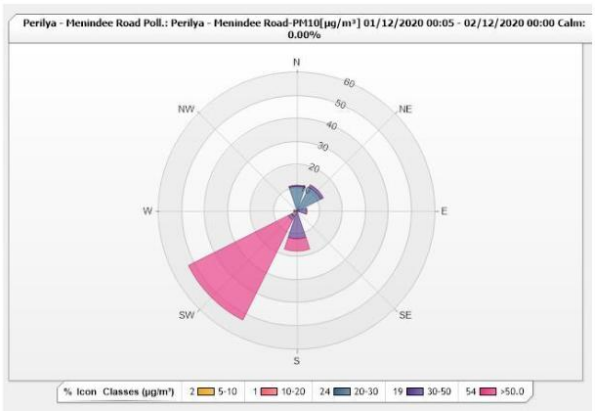

Figure 8 Pollution rose for 1 December 2020 Menindee Road

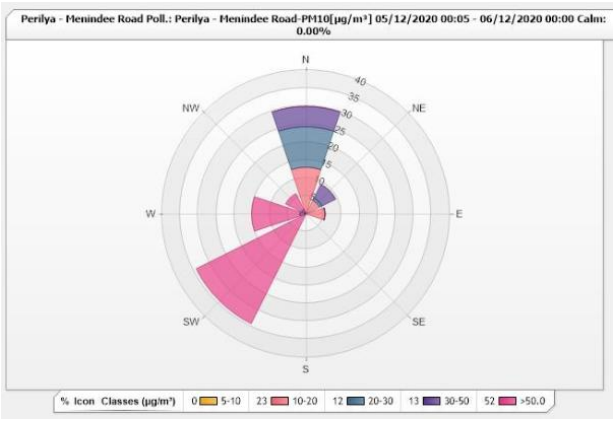

Figure 9 Pollution rose for 5 December 2020 Menindee Road

Groundwater Monitoring

Perilya holds a water supply works approval (60WA583325) for the underground workings of the North Mine as well as a water access licence (WAL40959) that allows for the extraction of up 1.466 gigalitres of groundwater per annum from Perilya operations.

A summary of the approval requirements for North Mine is shown in Table 6.

Table 6 Summary of relevant Water Licence conditions

Water Licence conditions	
Condition	**Licence Requirement**
Volume of use	Groundwater
Unit of measure	Gigalitres (GL)
Net Volume of Groundwater Produced	
Volume extracted (in combination with Potosi Mine, Southern Operations and While Leeds)	<1.466

North Mine pumping

	December(GL)	**Annual (GL)**
No 3 Shaft Dewatering	0.016	0.380
Transfer to Southern Operations	0.009	0.223
Transfer to Evaporation Dams	0.002	0.038

Noise Monitoring

Potosi Mine and North Mine have different conditions for noise monitoring under EPL2683.

Potosi

A summary of the EPL requirements for Potosi noise monitoring is shown in Table 7.

Table 7 Summary of the EPL 2683 conditions for Potosi noise monitoring

Noise EPL 2683 Conditions for Potosi	
Condition	**Licence Requirement**
Pollutant	Noise
Unit of measure	Decibels (dB)
Limits	
Monday to Friday - 0700 hours (h) to 1800 h	An *Leq (15 minute) of 40 decibels (A weighted)
Monday to Friday - 1800 h to 2200 h	An Leq (15 minute) of 39 decibels (A weighted)
All other times	An Leq (15 minute) of 35 decibels (A weighted)

*Leq is the equivalent continuous noise level – the level equivalent to the energy average of noise levels emitted by the premises over the stated measurement period (Source: Environmental Protection Licence 2683).

The location of the Potosi noise monitoring is shown in Figure 10.

Figure 10 The location of the noise monitoring associated with EPL 2683

Noise results

Attended monitoring was not conducted in December. The next quarterly monitoring is scheduled on January 2021.

The quarterly noise monitoring of Potosi Mine was last carried out by Muller Acoustic Consulting on Tuesday 20/10/2020 and Wednesday 21/07/2020. The noise monitoring consisted of daytime, evening and night measurements at the locations identified in the above map (Figure 10). All locations determined mine contributions were below EPL limits.

North Mine

A summary of the EPL requirements for North Mine noise monitoring is shown in Table

Table 8 Summary of the EPL 2683 conditions for North Mine noise monitoring

Noise EPL 2683 Conditions for North Mine										
Condition	**Licence Requirement**									
Pollutant	Noise									
Measurement frequency	Quarterly									
Unit of measure	Decibels (dB)									
Time Period	**Monitoring Point Limits (LAeq (15 minute))**									
	33	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42 (All others)**
Day	38	38	36	36	36	35	35	35	35	35
Evening	38	38	36	36	36	35	35	35	35	35
Night	35	35	35	35	35	35	35	35	35	35

*Leq is the equivalent continuous noise level – the level equivalent to the energy average of noise levels emitted by the premises over the stated measurement period (Source: Environmental Protection Licence 2683).

The locations of North Mine noise monitoring are shown in Figure 11.

Figure 11 Location of the North Mine noise monitoring associated with EPL 2683

Noise results

Attended monitoring was not conducted in December. The next quarterly monitoring is scheduled on January 2021.

The quarterly noise monitoring of North Mine was last carried out by Muller Acoustic Consulting on Tuesday 20/10/2020 and Wednesday 21/10/2020. The noise monitoring consisted of daytime, evening and night measurements at the locations identified in the above map (Figure 11). Sites MP38, MP40 and MP41 had no audible noise generated from the North Mine. MP33, MP34, MP35 MP36, MP37 and MP39 detected noise from the North Mine. All locations determined mine contributions were below EPL limits.

Blasting

The North Mine blast monitors are located on properties adjacent to the North Mine. Location of these monitors are shown in Figure and labelled as ‘North 56’ and ‘Junction Circle’. The Potosi blast monitor is located onsite and adjacent to the Potosi Offices and is shown in Figure 12 as ‘Potosi’.

Figure 12 Location of the blast monitors associated with EPL 2683

A summary of Licence conditions for blasting is provided in Table 9.

Table 9 Summary of EPL 2683 conditions for blasting

Blasting EPL 2683 Conditions	
Condition	**Licence Requirement**
Licence Points	56 North Mine, 48 Junction Circle, Potosi
Pollutant/s	Ground Vibration
	Overpressure
Unit of measure	Millimetres per second (mm/s), Decibels (dB)
Sampling method	AS 2187.2-2006
Monitoring frequency	All blasts
Data Reporting	All blasts
Date results received	Immediately following each blast
Limits	
Ground Vibration – 95% of blasts	Five (5) millimetres per second (mm/s)
Ground Vibration – Upper limit	Ten (10) millimetres per second (mm/s)
Overpressure – 95% of blasts (not including Potosi) between 0645 h -1915 h	115 decibels (dB)
Overpressure – upper limit (not including Potosi) between 0645 h -1915 h	120 decibels (dB)
Overpressure – upper limit (not including Potosi) between 1915 h -0645 h	95 decibels (dB)
Overpressure - 95% of blasts (Potosi) between 0700 h – 1900 h	130 decibels (dB)
Overpressure – upper limit (Potosi) between 0700 h – 1900 h	135 decibels (dB)
Overpressure – upper limit (Potosi) between 1900 h – 0700 h	110 decibels (dB)

Blasting Results

A total of 27 blasts were conducted at Potosi and a total of 113 blasts were conducted at North Mine during December 2020 (Table).

Table 10 December2020 blast results for EPL 2683

Licence Point	Parameter	No. times measured in the month	Min. Value	Mean Value	Median Value	Max. Value
Potosi	Overpressure (dB)	4	88.0	89.3	88.7	91.8
56 North Mine	Overpressure (dB)	17	88.0	93.9	93.8	101.3
Junction Circle	Overpressure (dB)	1	88.0	88.0	88.0	88.0
56 North Mine	Ground Vibration (mm/s)	17	0.36	0.54	0.44	0.96
Junction Circle	Ground Vibration (mm/s)	1	0.57	0.57	0.57	0.57
Production Blasts	14	Development Blasts	126	Total Blasts	140	
Calculations are based on blasts registering above 0.3 mm/s PVS						

It is significant that over-pressure is not a useful indicator of impacts on sensitive receptors from underground mining activities (compared to open pit mining), as any pressure gradients are rapidly attenuated in the underground environment.

Complaints

There were no complaints received for EPL 2683 during December 2020.