

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	<a href="http://www.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=31559&amp;SYSUID=1&amp;LICID=2683">http://www.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=31559&amp;SYSUID=1&amp;LICID=2683</a>

## 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 <sup>2</sup> /month)
Sampling Method	AM-19
Monitoring frequency	Every 30 days ± two (2) days

### Deposited Particulates Monitoring Results

July 2020 TDP and TDP-Pb are presented in Table 2. Results of laboratory analyses were received by Perilya on 27/08/2020.

Table 2 July 2020 dust monitoring point results

Licence Point	Particulates – deposited matter (g/m <sup>2</sup> /month)	Total Lead (g/m <sup>2</sup> /month)
15	0.9	0.001
16	0.8	0.001
17	0.7	0.005
18	0.5	< 0.001
19	0.6	0.001
20	1.2	0.002
21	1.1	0.003
22	0.8	0.003
23	0.6	0.003
24	1.0	0.008
25	0.7	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 ( $\mu\text{g}/\text{m}^3$ )
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 July ambient air monitoring, were received on 17/08/2020.

Table 4 July 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 ( $\mu\text{g}/\text{m}^3$ )	6	11.8	28.6	19.7	77.4
	Total Lead ( $\mu\text{g}/\text{m}^3$ )	6	0.049	0.077	0.080	0.101
27	TSP ( $\mu\text{g}/\text{m}^3$ )	6	8.5	36.4	25.0	100.5
	Total Lead ( $\mu\text{g}/\text{m}^3$ )	6	0.018	0.118	0.122	0.213
30	TSP ( $\mu\text{g}/\text{m}^3$ )	6	9.1	27.3	17.2	78.7
	Total Lead ( $\mu\text{g}/\text{m}^3$ )	6	0.036	0.069	0.070	0.091

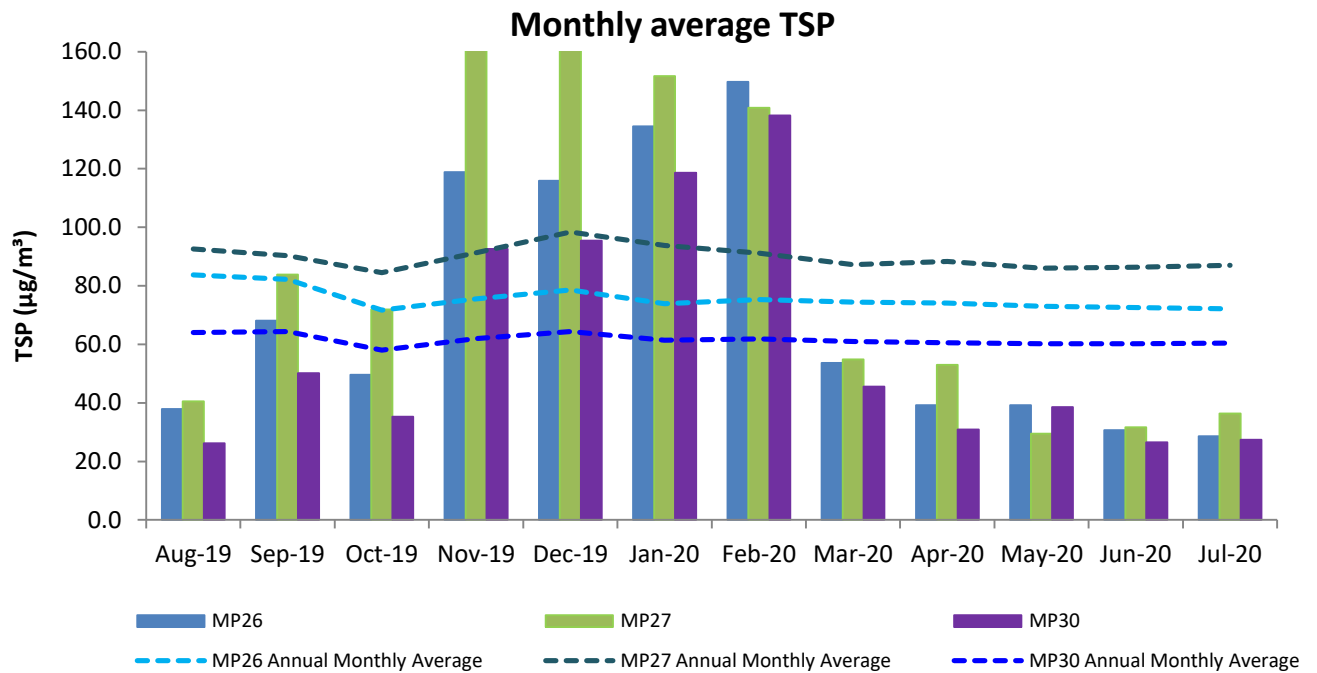


Figure 3 Average TSP results for the 12 months up to and including July 2020

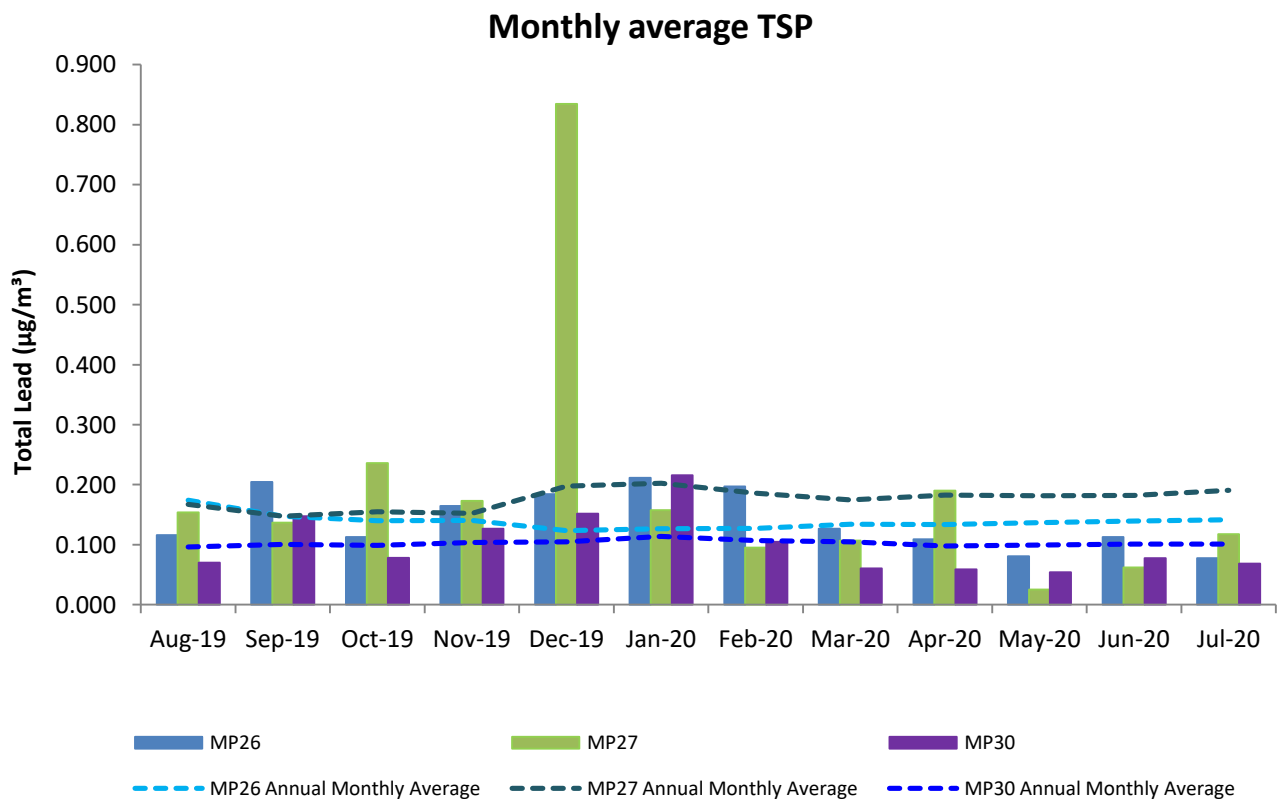


Figure 4 Average total lead results for the 12 months up to and including July 2020



## **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

<b>Real Time Air Monitoring Points: EPL 2683 Conditions</b>	
<b>Condition</b>	<b>Licence Requirement</b>
Licence Point	29 and 31
Pollutant	PM <sub>10</sub>
Unit of measure	Micrograms per cubic meter (µg/m <sup>3</sup> )
Sampling Method	AS 3580.9.11 – 2008
Monitoring frequency	Continuous

## BAM Results

PM<sub>10</sub> results for the BAM (LP 29 and LP 31) are presented in Figure 6 and Figure 7 below. For PM<sub>10</sub> parameters the percentage of valid data capture complied with AAQ NEPM regulations.

No 24-hour exceedance events occurred in July.

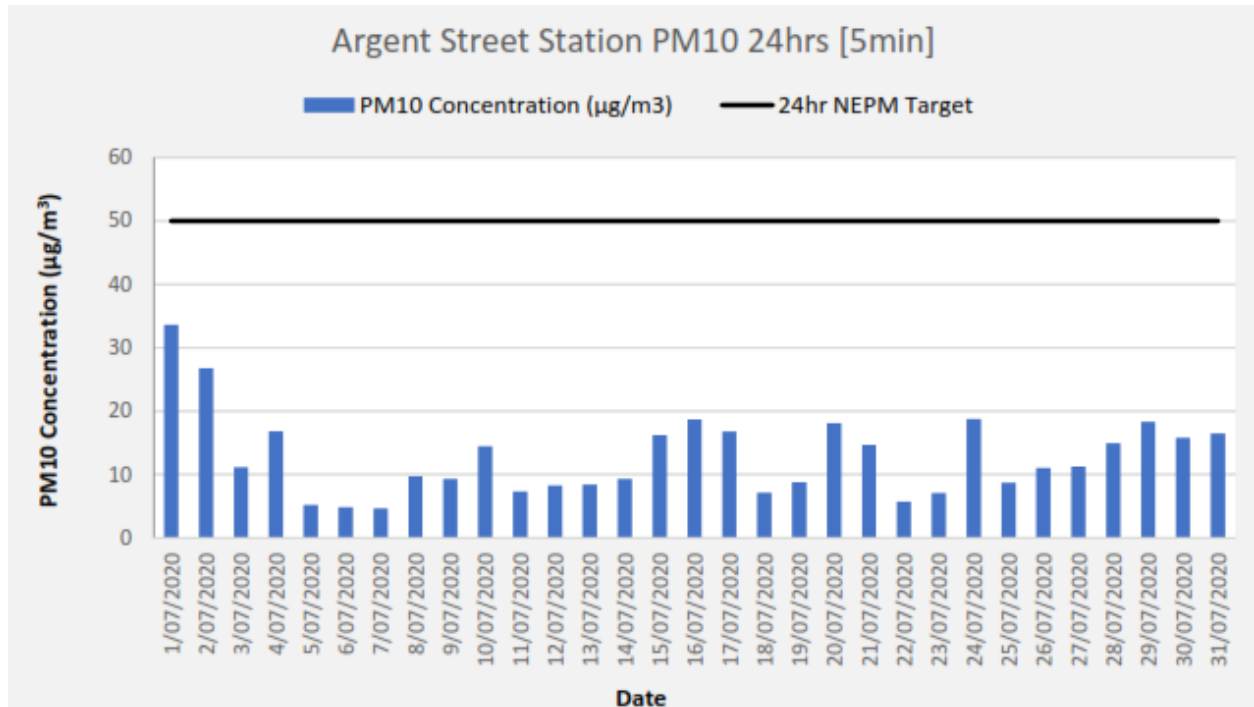


Figure 6 24 hr average PM<sub>10</sub> BAM results (Argent St)

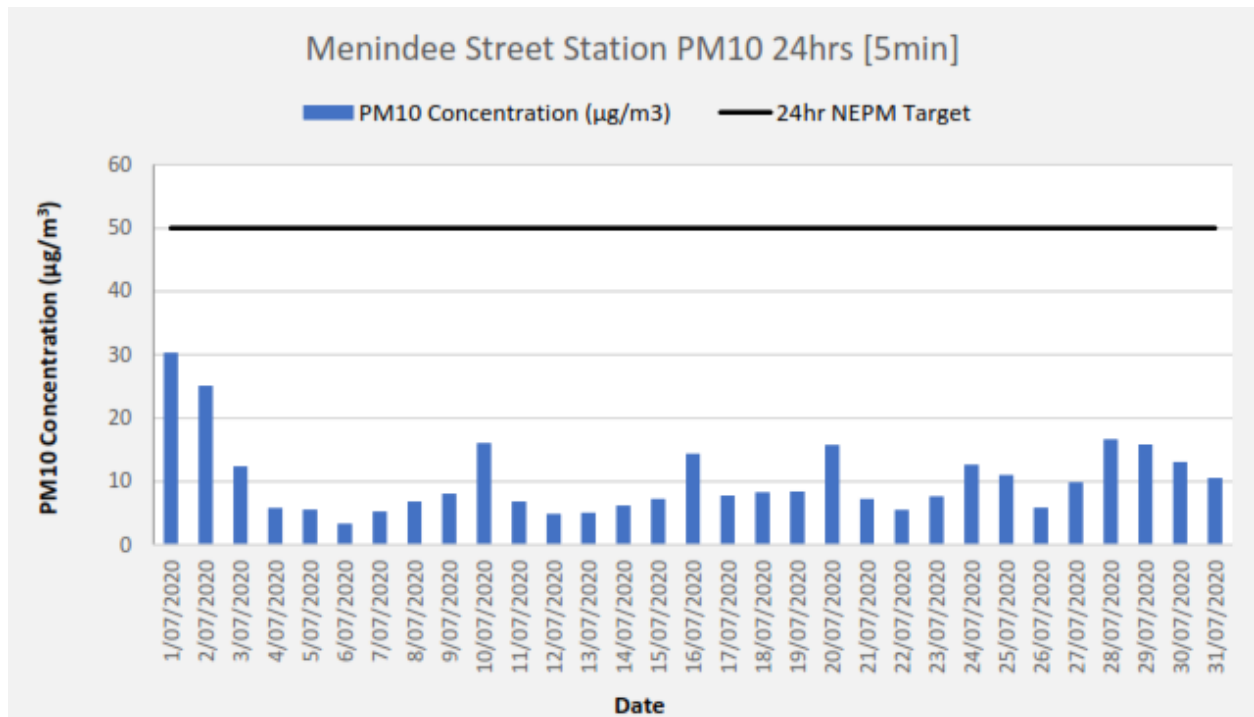


Figure 7 24 hr average PM<sub>10</sub> BAM results (Menindee Rd)

## **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

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

## **North Mine pumping**

	<b>July(GL)</b>	<b>Annual (GL)</b>
No 3 Shaft Dewatering	0.029	0.303
Transfer to Southern Operations	0.005	0.197
Transfer to Evaporation Dams	0.012	0.024



## **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

<b>Noise EPL 2683 Conditions for Potosi</b>	
<b>Condition</b>	<b>Licence Requirement</b>
Pollutant	Noise
Unit of measure	Decibels (dB)
<b>Limits</b>	
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 8.



Figure 8 The location of the noise monitoring associated with EPL 2683

## Noise results

The quarterly noise monitoring of Potosi Mine was last carried out by Muller Acoustic Consulting on Wednesday 15/07/2020 and Thursday 16/07/2020. The noise monitoring consisted of daytime, evening and night measurements at the locations identified in the above map (Figure 8). The following tables show the survey results for sites with mine contributions. All locations determined mine contributions were below EPL limits.

Table 8 Operator-Attended Noise Survey Results - Location P1.

Date	Time (hrs)	Descriptor (dBA re 20 µPa)				Meteorology	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>		
15/07/2020	23:13 (Night)	65	60	47	21	WD: S	Traffic 20-65
						WS: 0.1m/s	Dogs 20-25
						Rain: Nil	BHPM Vehicles ~20
							(4-7 minute duration)
		BHPM L <sub>Aeq</sub> (15min) Contribution					<35
		BHPM L <sub>A1</sub> (1min) Contribution					<40

Table 9 Operator-Attended Noise Survey Results - Location P2.

Date	Time (hrs)	Descriptor (dBA re 20 $\mu$ Pa)				Meteorology	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>		
15/07/2020	22:24 (Night)	55	46	37	28	WD: SW WS: 0.1m/s Rain: Nil	Generator 27-39
							Distant Traffic 25-46
							Dogs 27-55
							BHPM Haul Truck <27 (4-6 minute duration)
		BHPM L <sub>Aeq</sub> (15min) Contribution					<30
		BHPM L <sub>A1</sub> (1min) Contribution					<40

Table 10 Operator-Attended Noise Survey Results - Location P4.

Date	Time (hrs)	Descriptor (dBA re 20 µPa)				Meteorology	Description and SPL, dBA							
		L <sub>Amax</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>									
16/07/2020	11:58 (Day)	58	56	45	28	WD: S WS: 1.0m/s Rain: Nil	Traffic 30-58							
							Dogs 28-36							
							Train 40-55							
							Wind 28-40							
							BHPM Vehicles <25 (3-5 minute duration)							
BHPM L <sub>Aeq</sub> (15min) Contribution							<35							
15/07/2020	22:50 (Night)	40	35	29	25	WD: SW WS: 0.1m/s Rain: Nil	Traffic 24-40							
							BHPM Site Hum 24-28 (10-15 minute duration)							
							BHPM Vehicles 21-32 (6-8 minute duration)							
							BHPM L <sub>Aeq</sub> (15min) Contribution							<30
							BHPM L <sub>A1</sub> (1min) Contribution							<40

## North Mine

A summary of the EPL requirements for North Mine noise monitoring is shown in Table 11

Table 11 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 (L <sub>Aeq</sub> (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

\*L<sub>eq</sub> 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 9.





Figure 9 Location of the North Mine noise monitoring associated with EPL 2683

## Noise results

The quarterly noise monitoring of North Mine was last carried out by Muller Acoustic Consulting on Wednesday 15/07/2020 and Thursday 16/07/2020. The noise monitoring consisted of daytime, evening and night measurements at the locations identified in the above map (Figure 9).

Sites MP37, MP38, MP39, MP40 and MP41 had no audible noise generated from the North Mine. MP33, MP34, MP35 and MP36 detected noise from the North Mine. The following tables show the survey results for sites where North Mine noise was detected.

Table 12 Operator-Attended Noise Survey Results - Locations 33 and 34.

Date	Time (hrs)	Descriptor (dBA re 20 $\mu$ Pa)				Meteorology	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>		
16/07/2020	12:55 (Day)	72	68	55	40	WD: S WS: 1.0m/s Rain: Nil	Traffic 36-72
							Birds 35-48
							Aircraft 40-70
							Wind 33-40
							BHNM Machinery 35-43 (10 minute duration)
							BHNM Vehicles <38-40 (multiple 10-15s durations)
BHNM L <sub>Aeq</sub> (15min) Contribution							<38



Date	Time (hrs)	Descriptor (dBA re 20 $\mu$ Pa)				Meteorology	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>		
15/07/2020	19:32 (Evening)	76	65	54	35	WD: SW WS: 0.1m/s Rain: Nil	Traffic 31-76 Dogs 28-38 BHNH Vehicles <35-40 (multiple 10-15s durations)
							BHNH L <sub>Aeq</sub> (15min) Contribution <35
15/07/2020	23:35 (Night)	72	60	49	30	WD: S WS: 0.1m/s Rain: Nil	Traffic 26-72 Dogs 30-46 BHNH Vehicle 30-42 (4-6 minute duration) BHNH Haul Truck 26-30 (4-5 minute duration)
							BHNH L <sub>Aeq</sub> (15min) Contribution <35 BHNH L <sub>A1</sub> (1min) Contribution <45

Table 13 Operator-Attended Noise Survey Results - Locations 35 and 36

Date	Time (hrs)	Descriptor (dBA re 20 $\mu$ Pa)				Meteorology	Description and SPL, dBA
		L <sub>Amax</sub>	L <sub>A1</sub>	L <sub>Aeq</sub>	L <sub>A90</sub>		
15/07/2020	23:57 (Night)	78	69	55	31	WD: S WS: 0.1m/s Rain: Nil	Traffic 28-78 Residential Noise 30 -45 BHNH Haul Truck <30-37 (5-7 minute duration)
							BHNH L <sub>Aeq</sub> (15min) Contribution <35 BHNH L <sub>A1</sub> (1min) Contribution <45

## **Blasting**

The North Mine blast monitors are located on properties adjacent to the North Mine. Location of these monitors are shown in Figure 10 and labeled as 'North 56' and 'Junction Circle'. The Potosi blast monitor is located onsite and adjacent to the Potosi Offices and is shown in Figure 10 as 'Potosi'.



Figure 10 Location of the blast monitors associated with EPL 2683

A summary of Licence conditions for blasting is provided in Table 14 .

Table 14 Summary of EPL 2683 conditions for blasting

<b>Blasting EPL 2683 Conditions</b>	
<b>Condition</b>	<b>Licence Requirement</b>
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
<b>Limits</b>	
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 0700 h -1900 h	115 decibels (dB)
Overpressure – upper limit (not including Potosi) between 0700 h -1900 h	120 decibels (dB)
Overpressure – upper limit (not including Potosi) between 1900 h -0700 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 35 blasts were conducted at Potosi and a total of 115 blasts were conducted at North Mine during July 2020 (Table 15).

Table 15 July 2020 blast results for EPL 2683

<b>Licence Point</b>	<b>Parameter</b>	<b>No. times measured in the month</b>	<b>Min. Value</b>	<b>Mean Value</b>	<b>Median Value</b>	<b>Max. Value</b>
Potosi	Overpressure (dB)	6	88.0	88.6	88.5	89.6
56 North Mine	Overpressure (dB)	18	88.0	88.7	88.0	90.1
Junction Circle*	Overpressure (dB)	3	93.4	94.7	95.4	95.4
56 North Mine	Ground Vibration (mm/s)	18	0.38	0.52	0.48	1.26
Junction Circle*	Ground Vibration (mm/s)	3	0.33	0.34	0.33	0.36
Production Blasts		12	Development Blasts	138	Total Blasts	150
Calculations are based on blasts registering above 0.3 mm/s PVS						

\* Junction Circle was not operation for two production blasts during month due to software error.

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 July 2020.