



ENDEAVOR OPERATIONS PTY LTD

# ENDEAVOR MINE

## MONTHLY ENVIRONMENTAL REPORT

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November  
2019

<b>Name of Operation</b>	Endeavor Mine
<b>Name of Licensee</b>	Endeavor Operations Pty Ltd
<b>Environmental Protection Licence</b>	No: 1301
<b>Reporting Period Start Date</b>	1 November 2019
<b>Reporting End Date</b>	30 November 2019

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## 1 INTRODUCTION

We at Endeavor Mine conduct systematic and periodic environmental monitoring of our operations to substantiate the effectiveness of our environmental controls which are in place to protect the environment, the health of our workers, our neighbours and the greater community. The results in this report correspond to the **November 2019**. This report publishes the summary of the environmental monitoring carried during this month for dust deposition, tailings deposition and groundwater. All monitoring is conducted in accordance with regulatory requirements and the EOPL Annual Environmental Monitoring Plan. Samples are collected and handled in accordance and compliance with regulatory requirements and taken to laboratories accredited by the National Association of Testing Authorities (NATA) for analysis.

## 2 MONITORING RESULTS

### 2.1 Dust Monitoring

Air quality aspects and impacts associated with site operations are managed in accordance with the Air Quality Management Plan (END-PLN-ENV-006) and the requirement detailed in NSW Environmental Protection Licence 1301.

The Endeavor Mine is located 47 km from the nearest town (Cobar) and 4.5 km away for its nearest sensitive receptor (residential property). Therefore, dust deposition at these potential receptors is considered a low environmental risk.

Nevertheless, dust deposition on and beyond the boundary of the lease has the potential to cause environmental harm. Therefore Endeavor Mine manages airborne contaminants on site through the use of water sprays and a water trucks with depositional dust monitoring stations strategically located along the boundary of ML158/159/160/161 to measure performance.



**Figure 2.1** Dust monitoring gauge located in the project

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### 2.1.1 Dust Monitoring Methodology and Limits

The Endeavor Mine Dust Monitoring Program measures dust deposition rates on a monthly basis at the main mining lease boundary (4 locations) and at a background location located 11km from the operating mine site (DDG 5 – Point ID 5). EP Licence 1301 does not set limits for dust deposition. However, these results are compared to the recommended limits outlined in *Approved Methods and Guidance for the Modelling and Assessment of Air Pollutants in NSW 2005*. This guidance document recommends that the deposition rate for total insoluble matter when expressed as a 12 month rolling average should not exceed 4 g/m<sup>2</sup>/month and that site activities should not generate dust emissions which result in a dust deposition rate greater than 2 g/m<sup>2</sup>/month above background levels on an annual average. Table 2-1 describes the Pollutant, Units of Measure, Monitoring Frequency and Method of Sampling.

### 2.1.2 Monitoring Locations

**Table 2-1** Endeavor Mine Air Monitoring Requirements

Point ID	Pollutant	Unit of measure	Frequency	Sampling Method
1	Particulates - Deposited matter	grams per square metre per month	Monthly	AM-19
2	Particulates - Deposited matter	grams per square metre per month	Monthly	AM-19
3	Particulates - Deposited matter	grams per square metre per month	Monthly	AM-19
4	Particulates - Deposited matter	grams per square metre per month	Monthly	AM-19
5	Particulates - Deposited matter	grams per square metre per month	Monthly	AM-19

As shown in the satellite image (Figure 2.2), there are 5 dust monitoring locations on the boundary of the lease, with one located 11kms from the site at the turnoff to the Mine site near the Louth Road. This station was positioned to establish background levels.

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**Figure 2.2 Endeavor Mine Dust Monitoring Locations**

### 2.1.3 Dust Monitoring Data and Discussion

This report shows the results from the dust monitoring activities carried during the month of November 2019 (Table 2-2). All values remain well under the recommended guidance values.

**Table 2-2. Dust monitoring results November 2019.**

Monitoring locations (Monitoring from 13/11/2019 to 13/12/2019)						
Parameters	Unit	DDG1	DDG2	DDG3	DDG4	DDG5
Total soluble matter	g/m2*month	0.3	0.3	0.3	0.8	0.5
Total insoluble matter	g/m2*month	2.9	2.2	2.1	2.7	2.1



## 2.2 Groundwater Monitoring

Deep regional groundwater flows to the south west, conforming to the structural dip of the underlying sedimentary rocks. Groundwater inflow into the mine is observed at a depth range of between 60 to 80 m below ground surface. A shallow, perched aquifer occurs is found in the vicinity of the Central Tailings Discharge CTD between approximately 0.5 to 13 m below ground surface. This aquifer is recharged by rainfall and seepage water from the operational TSF via a permeable gravelly soil layer in the area.

A review of groundwater characteristics undertaken by consultants Environmental Earth Sciences (EES) in 2013 indicates there is no interface between the shallow perched water and the deep regional aquifer.

Groundwater quality at the mine is generally poor due to the high salinity. The water has been sampled by NSW Water Conservation and Irrigation for the original Environmental Impact Statement (EIS) could be considered “brackish” and was found to have an electrical conductivity (EC) of 26,000  $\mu\text{S}/\text{cm}$  (sea water is approximately 30,000  $\mu\text{S}/\text{cm}$ ). Further, it was noted that the water was not suitable for stock, domestic or farm use. Potential contamination of the groundwater would be of low risk due to the naturally poor quality of the water.

### 2.2.1 Monitoring Locations

Endeavor Mine’s groundwater monitoring locations are concentrated around the perimeter of the Central Tailings Discharge (CTD) and the Sector 5 Tailings Storage Facility (CTF), while surface water monitoring locations are focused on water storages that could potentially discharge to environment during a major rain or storm event. Table 2-3 describes the monitoring stations, where Figure 2.3 shows the locations of the piezometers. Depending on availability of water or flow, unfortunately on some occasions, piezometers cannot be monitored as a result of being dry. Parameters to be monitored are described in

Table 2-4.

**Table 2-3 EPA Monitoring Stations**

<b>EPA ID</b>	<b>Type of monitoring point</b>	<b>Location description</b>
<b>9</b>	Groundwater monitoring point	PZ Labeled as BH02
<b>10</b>	Groundwater monitoring point	PZ Labeled as BH02B
<b>11</b>	Groundwater monitoring point	PZ Labeled as BH03
<b>12</b>	Groundwater monitoring point	PZ Labeled as BH06
<b>13</b>	Groundwater monitoring point	PZ Labeled as BH08A
<b>14</b>	Groundwater monitoring point	PZ Labeled as BH09
<b>15</b>	Groundwater monitoring point	PZ Labeled as BH10
<b>16</b>	Groundwater monitoring point	PZ Labeled as BH10B
<b>17</b>	Groundwater monitoring point	PZ Labeled as BH12B
<b>18</b>	Groundwater monitoring point	PZ Labeled as BH14
<b>19</b>	Groundwater monitoring point	PZ Labeled as BH15
<b>20</b>	Groundwater monitoring point	PZ Labeled as BH16
<b>25</b>	Groundwater monitoring point	PZ Labeled as BH13

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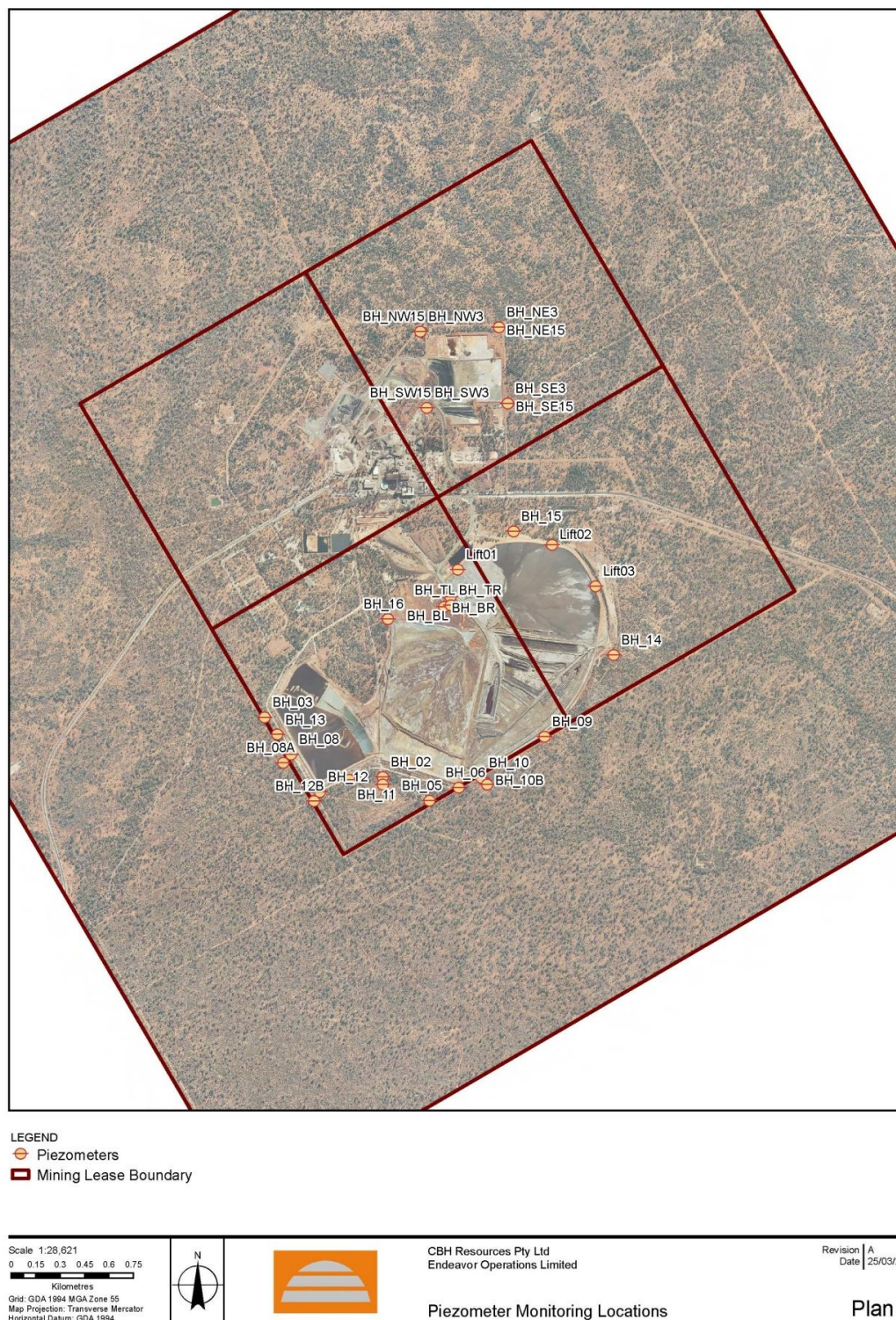
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**Table 2-4 EPA Monitoring Stations**

<b>Pollutant</b>	<b>Unit of measure</b>	<b>Frequency</b>	<b>Sampling method</b>
<b>Arsenic</b>	milligrams per litre	Quarterly	Representative sample
<b>Cadmium</b>	milligrams per litre	Quarterly	Representative sample
<b>Calcium</b>	milligrams per litre	Quarterly	Representative sample
<b>Chloride</b>	milligrams per litre	Quarterly	Representative sample
<b>Copper</b>	milligrams per litre	Quarterly	Representative sample
<b>Cyanide (total)</b>	milligrams per litre	Quarterly	Representative sample
<b>Electrical conductivity</b>	milligrams per litre	Quarterly	Representative sample
<b>Iron</b>	milligrams per litre	Quarterly	Representative sample
<b>Lead</b>	milligrams per litre	Quarterly	Representative sample
<b>Magnesium</b>	milligrams per litre	Quarterly	Representative sample
<b>Manganese</b>	milligrams per litre	Quarterly	Representative sample
<b>Mercury</b>	milligrams per litre	Quarterly	Representative sample
<b>pH</b>	pH	Quarterly	Representative sample
<b>Potassium</b>	milligrams per litre	Quarterly	Representative sample
<b>Sodium</b>	milligrams per litre	Quarterly	Representative sample
<b>Standing water level</b>	metres	Quarterly	Representative sample
<b>Sulfate</b>	milligrams per litre	Quarterly	Representative sample
<b>Total dissolved solids</b>	milligrams per litre	Quarterly	Representative sample
<b>Zinc</b>	milligrams per litre	Quarterly	Representative sample

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**Figure 2.3** Location of the Piezometer Monitoring Locations

### 2.2.2 Monitoring Results Discussion

No groundwater monitoring was carried during November; the next quarterly monitoring will be done in December 2019.



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### 2.3 Tailings Deposition

Tailings (also known as tails or residue) are the material left over after the process of separating the valuable fraction from the uneconomic fraction (waste) of the ore. Tailings are distinct from overburden or waste rock or other material that overlies an ore or mineral body and is displaced during mining without being processed.

The volumes of tailings can be large and require an engineered storage and capacity to safely house them, Depending on the nature of the ore or the type of extraction process, tailings can have the potential to harm the environment unless they are deposited and managed correctly.

The reporting of monthly tailings deposition is a legislative requirement as part of EPL 1301.

#### 2.3.1 Tailings Deposition: Data and Discussion

Table 2-5 shows the volumes of tailings deposited for November 2019. All tailings were deposited in Sector 5.

**Table 2-5** Tailings Deposition for November 2019

	Environment Protection Licence Monitoring Point 7		Environment Protection Licence Monitoring Point 8		TOTAL
	Volume of tailings deposited (m <sup>3</sup> )	Mass of tailing solids deposited (DMT)	Volume of tailings deposited (KL)	Mass of tailing solids deposited (DMT)	Mass of tailing solids deposited (DMT) YTD
November 2019	0	0	24,649	26,140	<b>243,991</b>