ENDEAVOR OPERATIONS PTY LTD

ENDEAVOR MINE

MONTHLY ENVIRONMENTAL REPORT

December 2019

Name of Operation	Endeavor Mine
Name of Licensee	Endeavor Operations Pty Ltd
Environmental Protection Licence	No: 1301
Reporting Period Start Date	1 December 2019
Reporting End Date	31 December 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 **December 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

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^2/month and that site activities should not generate dust emissions which result in a dust deposition rate greater than 2 g/m^2/month above background levels on a 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.

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 December 2019 (Table 2-2). All values remain well under the recommended guidance values.

Table 2-2. Dust monitoring results December 2019.

	Monitoring locations (Monitoring from 13/12/2019 to 15/01/2020					
Parameters	**Unit**	**DDG1**	**DDG2**	**DDG3**	**DDG4**	**DDG5**
Total soluble matter	g/m2*month	0.7	1.0	0.4	0.8	1.8
Total insoluble matter	g/m2*month	5.6	5.5	3.6	5.0	5.0

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 µS/cm (sea water is approximately 30,000 us/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

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

Table 2-4 EPA Monitoring Stations

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

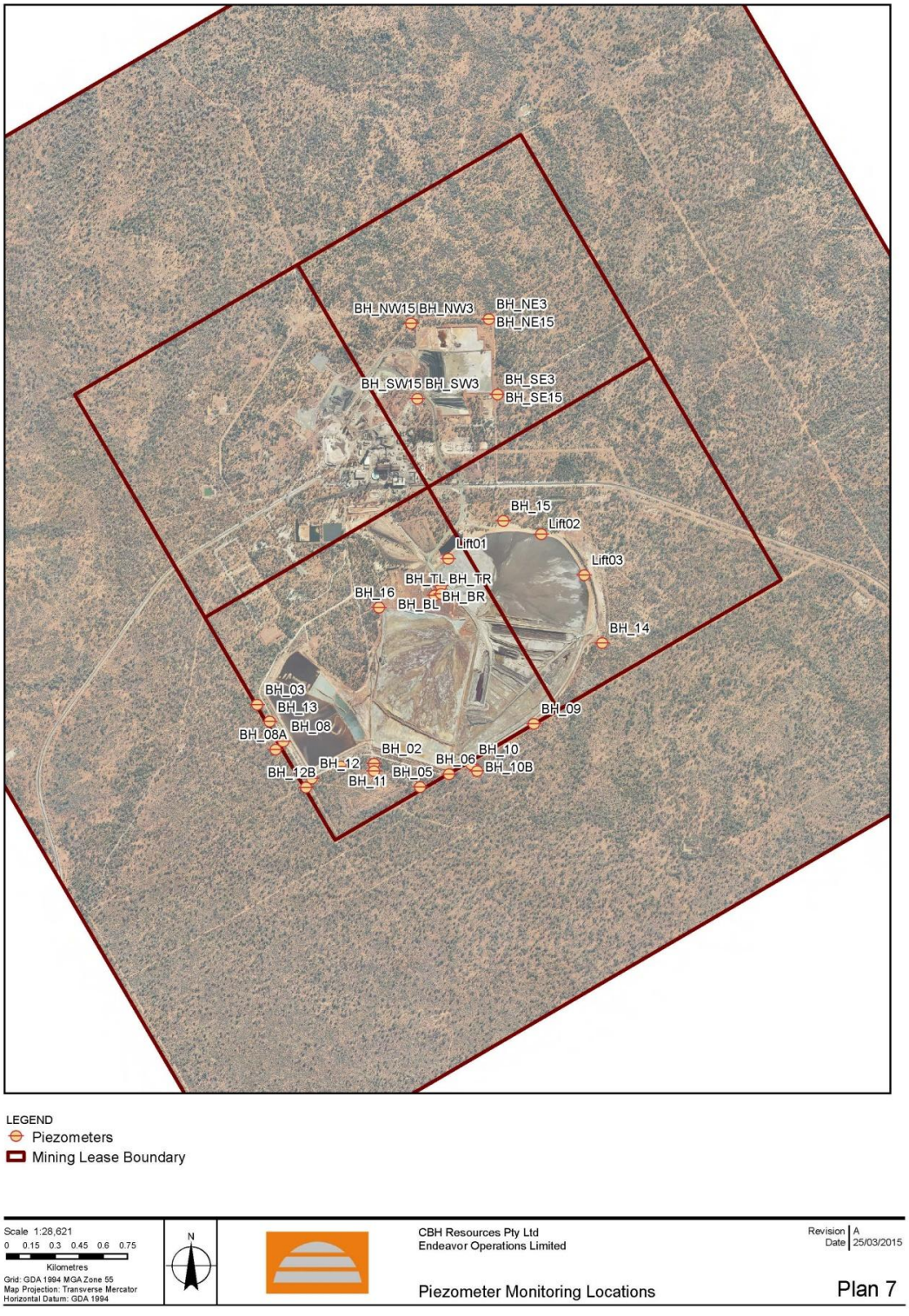

Figure 2.3 Location of the Piezometer Monitoring Locations

2.2.2 Monitoring Results Discussion

Groundwater monitoring was carried on the 1st and 2nd of December 2019, the results are presented in Table 2-5.

Table 2-5 Groundwater monitoring results December 2019

Sample and Date - December 2019														
Monitoring Locations (EPA ID)			9	10	11	12	13	14	15	16	17	18	19	20	25
Standing Water Levels (m)			3.4	4.12	3.62	3.8	5	4.05	12.07	5.9	8.25	6.49	12.8	4.38	2.93
pH Value	Field	pH Unit	6.11	6.24	6.5	5.71	6.97	6.46	Not enough water to sample	6.38	6.36	6.53	Not enough water to sample	6.27	6.14
Electrical Cond.	Field	µS/cm	12900	15830	29100	12250	23600	15800		16460	22800	13810		13740	24800
pH Value	(ALS)	pH Unit	7.16	7.07	7.14	6.29	7.22	7.25		7.26	7.17	7.43		6.85	7.24
Temp	Field	C	26.7	24.8	25	22.6	27	24		24.2	28.1	24		23.7	26
Electrical Conductivity @ 25Â°C		µS/cm	15400	18600	31800	15100	27800	19000		20000	28200	16900		15200	28900
Total Dissolved Solids @180Â°C		mg/L	13400	16400	21000	15100	20900	17800		20400	22200	15700		10800	23400
Sulfate as SO4 -		mg/L	6390	7280	6180	6000	6520	9330		10200	5530	6860		3480	5780
Chloride		mg/L	2970	3840	8710	2710	7500	2940		2820	7820	2920		3750	7950
Calcium		mg/L	628	599	394	585	772	546		586	842	566		656	908
Magnesium		mg/L	1040	1300	1140	1260	1410	1580		1990	1320	1540		505	1720
Sodium		mg/L	1940	2340	5740	1550	4050	2360		2320	4110	1820		2030	3810
Potassium		mg/L	115	110	248	92	184	249		196	258	155		83	185
Arsenic		mg/L	0.078	0.07	0.009	2.66	0.003	0.008		0.006	0.007	0.008		0.002	0.009
Cadmium		mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001
Copper		mg/L	0.002	0.003	0.002	<0.001	0.002	0.001		0.002	0.001	0.001		<0.001	<0.001
Lead		mg/L	<0.001	0.004	<0.001	<0.001	<0.001	0.055		<0.001	<0.001	0.108		<0.001	<0.001
Manganese		mg/L	9.62	4.61	2.82	8.89	8.49	4.18		7.61	0.59	0.008		17.7	22.4
Zinc		mg/L	<0.005	0.006	0.007	0.415	0.028	0.025		<0.005	0.016	0.007		0.278	<0.005
Iron		mg/L	3.06	<0.05	3.1	466	<0.05	0.07		<0.05	<0.05	<0.05		13.1	3.51
Mercury		mg/L	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	0.0001		<0.0001	0.0001	<0.0001		<0.0001	<0.0001
Total Cyanide		mg/L	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004		<0.004	<0.004	<0.004		<0.004	<0.004

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 2-6 shows the volumes of tailings deposited for December 2019. All tailings were deposited in Sector 5 (Monitoring Point 8).

Table 2-6 Tailings Deposition for December 2019

	Environment Protection Licence Monitoring Point 7		**Environment Protection Licence Monitoring Point 8**		**TOTAL**
	Volume of tailings deposited (m^3)	Mass of tailing solids deposited (DMT)	Volume of tailings deposited (KL)	Mass of tailing solids deposited (DMT)	Mass of tailing solids deposited (DMT) YTD
December 2019	0	0	22,446	23804	**267,795**