



**DURGAMANWADI  
BAUXITE MINE**

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**RADHANAGARI TALUKA,  
KOLHAPUR DISTRICT  
MAHARASHTRA**

**M/S HINDALCO INDUSTRIES LIMITED**

**ENVIRONMENTAL QUALITY  
MONITORING REPORT**

**MONSOON 2018  
( JUNE, JULY, AUGUST)**

**IND.BH.41.17.0348/HSR**

**Bhagavathi Ana Labs Pvt. Ltd.,**

**7-2-C-14, Industrial Estate,  
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500 018**

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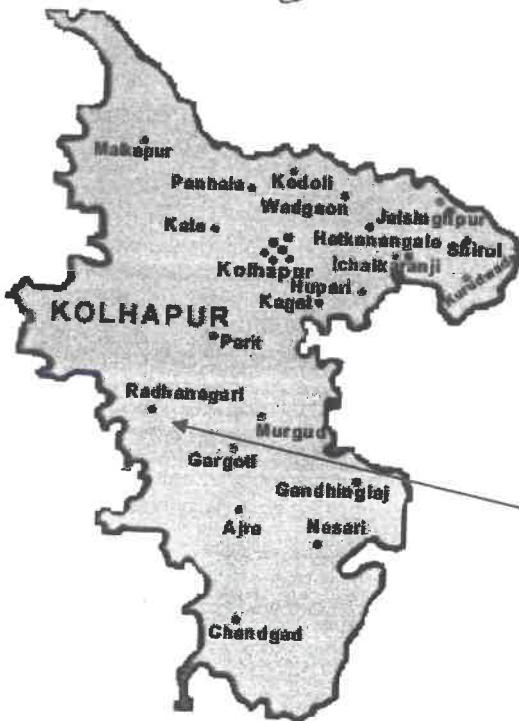


INDIA



MAHARASTRA

ARABIAN SEA



KOLHAPUR

(Mine Lease Area)

**DURGMANWADI BAUXITE MINE**

M/s Hindalco Industries Limited

NOT TO SCALE

## PREFACE

**M/S Hindalco Industries Limited** entrusted environmental quality monitoring at **Durgmanwadi Bauxite Mine** situated Radhanagari Taluka, Kolhapur district, Maharashtra to **Bhagavathi Ana Labs Pvt. Limited, Hyderabad** during monsoon season of the year 2018.

The environmental monitoring was carried out in core zone and buffer zone. Accordingly, ground & surface water samples were collected during the month of August 2018.

Bhagavathi Ana Labs Pvt. Limited, Hyderabad gratefully acknowledges the cooperation extended by management and staff of M/S Hindalco Industries Limited and the village people to the field staff.



## EXECUTIVE SUMMARY

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Durgamanwadi Bauxite Mine environmental quality monitoring includes the monitoring of water quality in core zone and buffer zone around the mine lease area.

### **WATER QUALITY MONITORING**

Water quality monitoring consists of the study of surface and ground water sources and its quality in the core and buffer zone of the lease area. Assessment of water quality in the study area and in the mine area includes the quality assessment of parameters as per the Indian Standard IS 10500 (Drinking water standard). Water samples were collected from selected locations during study period and analyzed in the laboratory as per the standard IS&APHA procedures.

## ENVIRONMENTAL QUALITY

Environmental monitoring includes water quality status within core zone and buffer zone around the Durgmanwadi Bauxite Mines Lease area at Radhanagari Taluka, Kolhapur district, Maharashtra.

### WATER QUALITY

Water quality monitoring consists of the study of water sources and its quality in the core and buffer zone of the lease area. Its study consists of following two important systems of water bodies:

- Surface water quality.
- Ground water quality.

The buffer zone is good in ground and surface water source. The rainwater regularly recharges this ground water during rainy season. There are two streams flowing in the nearby area, which are considered to be good source of water.

water quality in the study area and in the mine area includes the quality assessment of parameters as per the IS 10500 (Drinking Water Standard). A total of 7 quality monitoring stations selected for sample collection in the study area. Location of water quality monitoring stations is given in Table.

### WATER QUALITY MONITORING LOCATIONS

Sl. No	Name of Sampling Station	Source of Water
1	W1 Talgaon village	Ground water
2	W2 Durgamanwadi village	Ground water
3	W3 Chavanwadi village	Ground water
4	W4 Padsali village	Surface water
5	W5 Tulsi stream	Surface water
6	W6 Mine Accumulated water	Surface water
7	W7 Surface run-off	Surface water







**SAMPLING DETAILS**

The water samples were collected from selected sampling locations, which are coming under core zone and buffer zone around the mine lease area. Samples were collected in the Monsoon season 2018 as per the prescribed sample collecting methods and analyzed as per the IS & APHA standard procedures. Complete analysis report of water samples are given in tables.



# WATER QUALITY LOCATIONS

## LEGEND

-  MINING LEASE
-  METAL ROAD
-  UNMETAL ROAD
-  WATER COURSES
-  FOREST AREA
-  WATER LOCATIONS



PROJECT : DURGAMANWADI

BAUXITE MINES

TITLE : WATER LOCATIONS

PREPARED BY

M/S BHAGAVATHI ANALABS PVT.L

HDYERABAD





**TALGAON VILLAGE**

Location Name	:	Talgaon village
Date	:	13.08.2018
Sample Type	:	Ground water

Sl. No.	Parameter	Unit	Result
1	Odour		Un-objectionable
2	Taste		Agreeable
3	Colour		
4	pH	Hazen Units	<5
5	Turbidity		6.53
6	Dissolved Oxygen	NTU	<5
7	Total Dissolved Solids	mg/l	4.9
8	Total Suspended Solids	mg/l	77
9	Alkalinity as CaCO <sub>3</sub>	mg/l	43
10	Total Hardness as CaCO <sub>3</sub>	mg/l	30.0
11	Nitrates NO <sub>3</sub>	mg/l	42.0
12	Phosphates PO <sub>4</sub>	mg/l	0.47
13	Chlorides as Cl	mg/l	0.02
14	Sulphates as SO <sub>4</sub> <sup>2-</sup>	mg/l	18
15	Sodium as Na.	mg/l	2.9
16	Potassium as K	mg/l	7.3
17	Calcium as Ca	mg/l	5.1
18	Magnesium as Mg	mg/l	10
19	Lead (Pb)	mg/l	4.6
20	Manganese as Mn	mg/l	BDL
21	Cadmium (Cd)	mg/l	0.02
22	Chromium (Cr)	mg/l	BDL
23	Copper (Cu)	mg/l	BDL
24	Zinc (Zn)	mg/l	BDL
25	Iron as Fe	mg/l	BDL
26	Fluoride as F	mg/l	0.18
27	Mercury as (Hg)	mg/l	0.01
28	Selenium as Se	mg/l	BDL
29	Arsenic as As	mg/l	BDL
30	Cyanide as CN	mg/l	BDL
31	Boron as B	mg/l	BDL
32	B.O.D (3 days 27°C)	mg/l	BDL
			<3

BDL: Below Detectable Limit

mg/l: - Milligram per liter

**DURGAMANWADI VILLAGE**

<b>Location Name</b>	:	Durgamanwadi village
<b>Date</b>	:	13.08.2018
<b>Sample Type</b>	:	Ground water

Sl. No.	Parameter	Unit	Result
1	Odour		Un-objectionable
2	Taste		Agreeable
3	Colour		
4	pH	Hazen Units	<5
5	Turbidity		6.63
6	Dissolved Oxygen	NTU	<5
7	Total Dissolved Solids	mg/l	5.00
8	Total Suspended Solids	mg/l	166
9	Alkalinity as CaCO <sub>3</sub>	mg/l	23
10	Total Hardness as CaCO <sub>3</sub>	mg/l	66
11	Nitrates NO <sub>3</sub>	mg/l	70.0
12	Phosphates PO <sub>4</sub>	mg/l	1.9
13	Chlorides as Cl	mg/l	0.02
14	Sulphates as SO <sub>4</sub> <sup>2-</sup>	mg/l	33
15	Sodium as Na.	mg/l	13
16	Potassium as K	mg/l	20
17	Calcium as Ca	mg/l	11
18	Magnesium as Mg	mg/l	13.3
19	Lead (Pb)	mg/l	6.7
20	Manganese as Mn	mg/l	BDL
21	Cadmium (Cd)	mg/l	0.03
22	Chromium (Cr)	mg/l	BDL
23	Copper (Cu)	mg/l	BDL
24	Zinc (Zn)	mg/l	BDL
25	Iron as Fe	mg/l	BDL
26	Fluoride as F	mg/l	0.11
27	Mercury as (Hg)	mg/l	0.02
28	Selenium as Se	mg/l	BDL
29	Arsenic as As	mg/l	BDL
30	Cyanide as CN	mg/l	BDL
31	Boron as B	mg/l	BDL
32	B.O.D (3 days 27°C)	mg/l	BDL
	BDL: Below Detectable Limit		<4

mg/l: - Milligram per liter

**CHAVANWADI VILLAGE**

<b>Location Name</b>	:	Chavanwadi village
<b>Date</b>	:	13.08.2018
<b>Sample Type</b>	:	Ground water

Sl. No.	Parameter	Unit	Result
1	Odour		Un-objectionable
2	Taste		Un-objectionable
3	Colour		Agreeable
4	pH	Hazen Units	<5
5	Turbidity		6.58
6	Dissolved Oxygen	NTU	<5
7	Total Dissolved Solids	mg/l	5.30
8	Total Suspended Solids	mg/l	55
9	Alkalinity as CaCO <sub>3</sub>	mg/l	14
10	Total Hardness as CaCO <sub>3</sub>	mg/l	22.0
11	Nitrates NO <sub>3</sub>	mg/l	35.0
12	Phosphates PO <sub>4</sub>	mg/l	0.44
13	Chlorides as Cl	mg/l	0.02
14	Sulphates as SO <sub>4</sub> <sup>2-</sup>	mg/l	11
15	Sodium as Na.	mg/l	4.3
16	Potassium as K	mg/l	4
17	Calcium as Ca	mg/l	1.1
18	Magnesium as Mg	mg/l	9.9
19	Lead (Pb)	mg/l	3
20	Manganese as Mn	mg/l	BDL
21	Cadmium (Cd)	mg/l	0.02
22	Chromium (Cr)	mg/l	BDL
23	Copper (Cu)	mg/l	BDL
24	Zinc (Zn)	mg/l	BDL
25	Iron as Fe	mg/l	BDL
26	Fluoride as F	mg/l	0.13
27	Mercury as (Hg)	mg/l	0.01
28	Selenium as Se	mg/l	BDL
29	Arsenic as As	mg/l	BDL
30	Cyanide as CN	mg/l	BDL
31	Boron as B	mg/l	BDL
32	B.O.D (3 days 27°C)	mg/l	BDL
			<3

BDL: Below Detectable Limit

mg/l: - Milligram per liter

**PADSALI VILLAGE**

<b>Location Name</b>	:	Padsali village	
<b>Date</b>	:	13.08.2018	<b>Sample Type</b> : Surface water

Sl. No.	Parameter	Unit	
1	Odour		Un-objectionable
2	Taste		
3	Colour		
4	pH	Hazen Units	<5
5	Turbidity		6.68
6	Dissolved Oxygen	NTU	<5
7	Total Dissolved Solids	mg/l	4.80
8	Total Suspended Solids	mg/l	48
9	Alkalinity as CaCO <sub>3</sub>	mg/l	32
10	Total Hardness as CaCO <sub>3</sub>	mg/l	22
11	Nitrates NO <sub>3</sub>	mg/l	30.0
12	Phosphates PO <sub>4</sub>	mg/l	0.55
13	Chlorides as Cl	mg/l	0.02
14	Sulphates as SO <sub>4</sub> <sup>2-</sup>	mg/l	8.4
15	Sodium as Na.	mg/l	2.4
16	Potassium as K	mg/l	2.3
17	Calcium as Ca	mg/l	1.4
18	Magnesium as Mg	mg/l	6
19	Lead (Pb)	mg/l	3
20	Manganese as Mn	mg/l	BDL
21	Cadmium (Cd)	mg/l	0.02
22	Chromium (Cr)	mg/l	BDL
23	Copper (Cu)	mg/l	BDL
24	Zinc (Zn)	mg/l	BDL
25	Iron as Fe	mg/l	BDL
26	Fluoride as F	mg/l	0.09
27	Mercury as (Hg)	mg/l	0.01
28	Selenium as Se	mg/l	BDL
29	Arsenic as As	mg/l	BDL
30	Cyanide as CN	mg/l	BDL
31	Boron as B	mg/l	BDL
32	B.O.D (3 days 27°C)	mg/l	BDL
			<3

BDL: Below Detectable Limit

mg/l: - Milligram per liter

**TULSI STREAM**

<b>Location Name</b>	:	Tulsi stream
<b>Date</b>	:	13.08.2018
<b>Sample Type</b>	:	Surface Water

Sl. No.	Parameter	Unit	Result
1	Odour		Un-objectionable
2	Taste		Un-objectionable
3	Colour		Agreeable
4	pH	Hazen Units	<5
5	Turbidity		6.50
6	Dissolved Oxygen	NTU	<5
7	Total Dissolved Solids	mg/l	8.00
8	Total Suspended Solids	mg/l	156
9	Alkalinity as CaCO <sub>3</sub>	mg/l	56
10	Total Hardness as CaCO <sub>3</sub>	mg/l	53
11	Nitrates NO <sub>3</sub>	mg/l	66.0
12	Phosphates PO <sub>4</sub>	mg/l	0.1
13	Chlorides as Cl	mg/l	0.03
14	Sulphates as SO <sub>4</sub> <sup>2-</sup>	mg/l	39
15	Sodium as Na.	mg/l	10
16	Potassium as K	mg/l	19
17	Calcium as Ca	mg/l	10
18	Magnesium as Mg	mg/l	14.3
19	Lead (Pb)	mg/l	6
20	Manganese as Mn	mg/l	BDL
21	Cadmium (Cd)	mg/l	0.01
22	Chromium (Cr)	mg/l	BDL
23	Copper (Cu)	mg/l	BDL
24	Zinc (Zn)	mg/l	BDL
25	Iron as Fe	mg/l	BDL
26	Fluoride as F	mg/l	0.11
27	Mercury as (Hg)	mg/l	0.01
28	Selenium as Se	mg/l	BDL
29	Arsenic as As	mg/l	BDL
30	Cyanide as CN	mg/l	BDL
31	Boron as B	mg/l	BDL
32	B.O.D (3 days 27°C)	mg/l	BDL
			<5

BDL: Below Detectable Limit

mg/l: - Milligram per liter

**MINE ACCUMULATED WATER**

<b>Location Name</b>	:	Mine Accumulated Water
<b>Date</b>	:	13.08.2018
<b>Sample Type</b>	:	Surface Water

Sl. No.	Parameter	Unit	Result
1	Odour		Un-objectionable
2	Taste		Agreeable
3	Colour		
4	pH	Hazen Units	<5
5	Turbidity		6.44
6	Dissolved Oxygen	NTU	<5
7	Total Dissolved Solids	mg/l	6.70
8	Total Suspended Solids	mg/l	58
9	Alkalinity as CaCO <sub>3</sub>	mg/l	24
10	Total Hardness as CaCO <sub>3</sub>	mg/l	20
11	Nitrates NO <sub>3</sub>	mg/l	34.0
12	Phosphates PO <sub>4</sub>	mg/l	0.9
13	Chlorides as Cl	mg/l	0.01
14	Sulphates as SO <sub>4</sub> <sup>2-</sup>	mg/l	14
15	Sodium as Na.	mg/l	2
16	Potassium as K	mg/l	4
17	Calcium as Ca	mg/l	1.3
18	Magnesium as Mg	mg/l	10
19	Lead (Pb)	mg/l	3
20	Manganese as Mn	mg/l	BDL
21	Cadmium (Cd)	mg/l	0.02
22	Chromium (Cr)	mg/l	BDL
23	Copper (Cu)	mg/l	BDL
24	Zinc (Zn)	mg/l	BDL
25	Iron as Fe	mg/l	BDL
26	Fluoride as F	mg/l	0.07
27	Mercury as (Hg)	mg/l	0.01
28	Selenium as Se	mg/l	BDL
29	Arsenic as As	mg/l	BDL
30	Cyanide as CN	mg/l	BDL
31	Boron as B	mg/l	BDL
32	B.O.D (3 days 27°C)	mg/l	BDL
			<3

**SURFACE RUNOFF**

<b>Location Name</b>	:	Surface Run off
<b>Date</b>	:	13.08.2018
<b>Sample Type</b>	:	Surface Water

Sl. No.	Parameter	Unit	Result
1	Odour		
2	Taste		Un-objectionable
3	Colour		Agreeable
4	pH	Hazen Units	<5
5	Turbidity		6.12
6	Dissolved Oxygen	NTU	<5
7	Total Dissolved Solids	mg/l	3.00
8	Total Suspended Solids	mg/l	45
9	Alkalinity as CaCO <sub>3</sub>	mg/l	100
10	Total Hardness as CaCO <sub>3</sub>	mg/l	19
11	Nitrates NO <sub>3</sub>	mg/l	16.0
12	Phosphates PO <sub>4</sub>	mg/l	0.45
13	Chlorides as Cl	mg/l	0.03
14	Sulphates as SO <sub>4</sub> <sup>2-</sup>	mg/l	9.2
15	Sodium as Na.	mg/l	2.4
16	Potassium as K	mg/l	7
17	Calcium as Ca	mg/l	3
18	Magnesium as Mg	mg/l	4
19	Lead (Pb)	mg/l	1.7
20	Manganese as Mn	mg/l	BDL
21	Cadmium (Cd)	mg/l	0.03
22	Chromium (Cr)	mg/l	BDL
23	Copper (Cu)	mg/l	BDL
24	Zinc (Zn)	mg/l	BDL
25	Iron as Fe	mg/l	BDL
26	Fluoride as F	mg/l	0.05
27	Mercury as (Hg)	mg/l	0.01
28	Selenium as Se	mg/l	BDL
29	Arsenic as As	mg/l	BDL
30	Cyanide as CN	mg/l	BDL
31	Boron as B	mg/l	BDL
32	B.O.D (3 days 27°C)	mg/l	BDL
			5

**DOMESTIC EFFLUENT ANALYSIS**Sample Type: **Canteen waste water**Date of sampling: **13.08.2017**

Sl.No	Test	Result
<b>1</b>	<b>Total Suspended Solids, mg/l</b>	<b>58</b>
<b>2</b>	<b>Total Dissolved Solids, mg/l</b>	<b>79</b>
<b>3</b>	<b>COD, mg/l</b>	<b>17</b>
<b>4</b>	<b>BOD for 3 days at 27°C, mg/l</b>	<b>9</b>
<b>5</b>	<b>Total Solids</b>	<b>45</b>
<b>6</b>	<b>Oil and Grease, mg/l</b>	<b>4</b>

Sample Type: **Canteen waste water**Date of sampling: **14.08.2017**

Sl.No	Test	Result
<b>1</b>	<b>Total Suspended Solids, mg/l</b>	<b>95</b>
<b>2</b>	<b>Total Dissolved Solids, mg/l</b>	<b>97</b>
<b>3</b>	<b>COD, mg/l</b>	<b>20</b>
<b>4</b>	<b>BOD for 3 days at 27°C, mg/l</b>	<b>7</b>
<b>5</b>	<b>Total Solids</b>	<b>100</b>
<b>6</b>	<b>Oil and Grease, mg/l</b>	<b>4</b>



## RESULTS & DISCUSSION

- The pH of the study area varies from 6.12 to 6.68 in the study area. The permissible range of pH is 6.5 to 8.5.
- Dissolved Oxygen content of the study area has been found to be in the range of 4.80 to 8.400.
- Total Dissolved Solids found to be in the range of 45 to 166 mg/l in the water sample collected in study area. As per IS 10500 standard for drinking water, the desirable limit is 500 mg/l and maximum permissible limit is 2000 mg/l.
- Alkalinity as  $\text{CaCO}_3$  is found to be in the range of 19 to 66 in the water sample collected in study area. As per IS 10500 standard for drinking water, the desirable limit is 200 mg/l and maximum permissible limit is 600 mg/l.
- Total hardness as  $\text{CaCO}_3$  of the water sample collected in the study area is found to be in the range of 16 to 70.00 mg/l. As per IS 10500 standard for drinking water, the desirable limit is 300 mg/l and maximum permissible limit is 600 mg/l.
- Chloride content of the water in the study area found to be in the range of 8.4 to 39 mg/l. As per IS 10500 standard for drinking water, the desirable limit 250 mg/l and maximum permissible limit is 1000 mg/l.
- Calcium content of the water in the study area found to be in the range of 4.0 to 14.30 mg/l. As per IS 10500 standard for drinking water, the desirable limit 75 mg/l and maximum permissible limit is 200 mg/l.
- Magnesium content of the water in the study area found to be in the range of 1.7 to 6.7 mg/l.
- Iron content of the water in the study area found to be in the range of 0.05 to 0.18 mg/l. As per IS 10500 standard for drinking water, the desirable limit 0.3 mg/l and maximum permissible limit is 1.0 mg/l.



**DRINKING WATER STANDARDS  
AS PER IS: 10500**

Sl. NO	PARAMETER	UNIT	DESIRABLE LIMIT AS PER IS: 10500	MAXIMUM PERMISSIBLE LIMIT AS PER IS: 10500
1	Odour		Un-objectionable	
2	Taste		Agreeable	
3	Colour	Hazen Units	5	25
4	pH		6.5 -8.5	
5	Turbidity	NTU	5	10
6	Dissolved Oxygen	mg /l	-----	
7	Total Dissolved Solids	mg /l	500	2000
8	Alkalinity as CaCo3	mg /l	200	600
9	Total hardness as CaCo3	mg /l	300	600
10	Nitrates NO3	mg /l	45	100
11	Phosphates PO4	mg /l	-----	
12	Chlorides as Cl	mg /l	250	1000
13	Sulphates, SO42-	mg /l	200	400
14	Sodium as Na	mg /l	-----	
15	Potassium as K	mg /l	-----	
16	Calcium as Ca	mg /l	75	200
17	Magnesium, Mg	mg /l	30	100
18	Lead (Pb)	mg /l	0.05	0.05
19	Manganese	mg /l	0.1	0.3
20	Cadmium (Cd)	mg /l	0.01	0.01
21	Chromium (Cr)	mg /l	0.05	0.05
22	Copper (Cu)	mg /l	0.05	1.5
23	Zinc (Zn)	mg /l	5	15
24	Iron as Fe	mg /l	0.3	1.0
25	Fluoride as F	mg /l	1	1.5
26	Mercury as Hg	mg /l	0.001	0.001
27	Selenium as se	mg /l	0.01	0.01
28	Arsenic as As	mg /l	0.05	0.05
29	Cyanide as CN	mg/l	0.05	0.05
30	Boron as B	mg/l	1	5

## DURGAMANWADI MINES

### WELL DEPTHS OF VILLAGES

S.NO.	LOCATION	NAME OF THE MINE AREA	TOTAL DEPTH IN MTS	WATER LEVEL FROM SURFACE IN MTS
				13.08.2018
1	PADSALI VILLAGE	DMW	4.1	3.65
2	CHAVANWADI VILLAGE	DMW	2.80	2.40