QUATERLY COMPLIANCE REPORT
(MARCH-2020 TO MAY-2020)

ON

ENVIRONMENTAL MONITORING

AT

BANDHAMANDI GRAPHITE MINES & BENEFICIATION PLANT

(M/s PRADHAN INDUSTRY)
Village-Bandhamandi
RAYAGADA

Prepared by:-

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ISO 14001:2004
ISO 9001: 2008
OHSAS 18001:2007

CONTENTS

ANNEXURE

METHODOLOGY OF ENVIRONMENTAL MONITORING STUDY

1.0 INTRODUCTION :

M/s Visiontek Consultancy Services Pvt. Ltd. carried out the environmental monitoring for the M/s Bandhamadi Graphite Mines & Beneficiation Plant, Rayagada.

Environmental monitoring was carried out at various locations inside the plant site. The Monitoring was carried out with respect to the qualities of Ambient Air, Ground & Surface Water, Ground Water Level & Noise.

2.0 STUDY PERIOD:

The study was conducted during month of from March 2020 to May 2020

3.0 METHODOLOGY:

The environmental monitoring was carried out as per the standard methodology of Bureau of Indian Standard (IS: 11255), American Public Health Association (APHA), & Central Pollution Control Board (CPCB).

4.0 SELECTION OF MONITORING LOCATIONS:

The location for Ambient Air, Ground & Surface Water, Ground Water Level & Noise Level Survey has been selected by Bandhamadi Graphite representative.

4.2 AMBIENT AIR QUALITY:

The ambient air quality (AAQ) of the study region was monitored at four locations selected within the premises. Ambient air quality (AAQ) in respect of Particulate Matter (size less than 10 µm or PM_{10}), Particulate matter (size less than 2.5 µm or $PM_{2.5}$), Sulphur di-oxide (SO_2), Oxides of Nitrogen (NOx), Carbon Monoxide (CO), Ozone (O_3), Ammonia (NH_3), Nickel (Ni), Lead (Pb), Arsenic (As), Benzene (C6H6) and Benzo(a) Pyrene (BaP). Respirable Dust Sampler (APM 460BL) of ENVIROTECH make, FPS (APM) of ENVIROTECH make, Organic Vapour Sampler,

ENVIROTECH make, model APM 850 were used for monitoring of ambient air quality at all the identified locations. The sampling method was carried out as per the guidelines for planning IS: 5182 (part 14): 2000. And the analysis methods are outlined in the table as shown below:

AMBIENT AIR QUALITY ANALYSIS METHOD

SL. NO.	PARAMETER	ANALYSIS METHOD
1.	Particulate Matter (size less than 10 µm or PM_{10}), µg/m^3	Gravimetric method
2.	Particulate matter (size less than 2.5 µm or $PM_{2.5}$), µg/m^3	Gravimetric method
3.	Sulphur di-oxide (SO_2), µg/m^3	Improved west & Geake method
4.	Oxides of Nitrogen (NO_x), µg/m^3	Jacob and Hochheiser Modified method
5.	Carbon Monoxide (CO), mg/m^3	NDIR Spectroscopy method
6.	Ozone (O_3), µg/m^3	Chemical Method
7.	Ammonia (NH_3), µg/m^3	Indophenol Blue Method
8.	Benzene (C_6H_6), µg/m^3	Absorption & Desorption followed by GC analysis
9.	Benzo(a) Pyrene (BaP), ng/m^3	Solvent extraction followed by GC analysis.
10.	Nickel (Ni) , ng/m^3	AAS method after sampling
11.	Lead (Pb), µg/m^3	AAS method after sampling
12.	Arsenic(As), ng/m^3	AAS method after sampling

4.2.1 AMBIENT AIR QUALITY SAMPLING STATIONS (CORE ZONE):

Details of the sampling locations are given below.

Field ID	Station
AAQ-1	At Mine Office
AAQ-2	At Mine Face
AAQ-3	At Dump Site
AAQ-4	At Plant Site

The detailed Ambient Air Quality report (Core Zone) is given in the **Annexure-2.**

4.2.2 AMBIENT AIR QUALITY SAMPLING STATIONS (BUFFER ZONE):

Details of the sampling locations are given below.

Field ID	Station
AAQ-1	Bandhamadi Village
AAQ-2	Kachama Village
AAQ-3	Podeng Village
AAQ-4	Bartibali Village

The detailed Ambient Air Quality report (Buffer Zone) is given in the **Annexure-3.**

4.3 WATER QUALITY:

Water quality monitoring was carried out at fourteen waste water locations. Samples were collected manually during study period. Considering several possibilities of interference the poly tetrafluoroethylene (PTFE) sample bottles were used. These bottles were sterilized properly before being used for water sample collection.

The methodology for sample collection, preservation and analysis was as per Standard methods for the Examination of Water and Wastewater, 23rd Edition, 2017 APHA.

WATER QUALITY ANALYSIS METHOD

SL.NO.	PARAMETER	TESTING METHOD
1	Colour	APHA 2120 B, C
2	Odour	APHA 2150 B
3	Taste	APHA 2160 C
4	Turbidity	APHA 2130 B
5	pH	APHA 4500H^+ B
6	Total Hardness (as $CaCO_3$)	APHA 2340 C
7	Iron (as Fe)	APHA 3500Fe, B
8	Chloride (as Cl)	APHA 4500Cl^- B
9	Residual Free Chlorine	APHA 4500Cl, B
10	Total Dissolved Solids	APHA 2540 C
11	Calcium as Ca	APHA 3500Ca B
12	Magnesium as Mg	APHA 3500Mg B
13	Copper as Cu	APHA 3111 B,C
14	Manganese as Mn	APHA 3500Mn B
15	Sulphate as SO_4	APHA 4500 SO_4^{2-} E
16	Nitrate as NO_3	APHA 4500 NO_3^- E
17	Fluoride as F	APHA 4500F^- C
18	Phenolic Compounds as C_6H_5OH	APHA 5530 B,D
19	Mercury as Hg	APHA 3500 Hg

20	Cadmium as Cd	APHA 3111 B,C
21	Selenium as Se	APHA 3114 B
22	Arsenic as As	APHA 3114 B
23	Cyanide as CN	APHA 4500 CN^- C,D
24	Lead as Pb	APHA 3111 B,C
25	Zinc as Zn	APHA 3111 B,C
26	Anionic Detergents as MBAS	APHA 5540 C
27	Chromium as Cr^{+6}	APHA 3500Cr B
28	Mineral Oil	APHA 5220 B
29	Alkalinity	APHA 2320 B
30	Aluminium as Al	APHA 3500Al B
31	Boron	APHA 4500B, B
32	Poly Aromatic Hydrocarbon as PAH	APHA 6440 B
33	Pesticides	APHA 6630 B,C

4.3.1 GROUND WATER SAMPLING LOCATIONS :

Detail of the sampling location is given below:

Field ID	Location
GW-1	Bore well Near Project Site
GW-2	Open Well at Bandhamadi Village
GW-3	Open Well at Kachama Village
GW-4	Open Well at Podeng Village
GW-5	Open Well at Baligurha Village

The detailed Ground water analysis report is mentioned in **Annexure-3.**

4.3.2 SURFACE WATER SAMPLING LOCATIONS :

Detail of the sampling location is given below:

Field ID	Location
SW-1	Dalakona Nallah Near Panasagurha Upstream
SW-2	Dalakona Nallah Near Panasagurha Downstream
SW-3	Settling Pond
SW-4	Uagarh Nadi Near Bandhamadi Upstream

The detailed Surface water analysis report is mentioned in **Annexure-4.**

4.4 GROUND WATER LEVEL:

Ground water level was measured by pizeometer.

4.4.1 GROUND WATER LEVEL SAMPLING LOCATIONS :

Detail of the sampling location is given below:

Field ID	Location
GWL-1	Openwell at Bandhamadi
GWL-2	Openwell at Bhitardarba
GWL-3	Openwell at Panasagurha
GWL-4	Openwell at Birda
GWL-5	Open well at Baligurha

The detailed Ground water Level analysis report is mentioned in **Annexure-5**

4.5 NOISE LEVEL MONITORING:

Noise Levels were recorded by Digital Sound Level Meter of LUTRON make at two locations within the plant premises. Monitoring was carried out once in a month at each location during the study period for day time and night time. According to CPCB (Noise Pollution (Regulation & Control) rules, 2000 day time is considered from 6.00 am to 10.00 pm and night time is considered from 10.00 pm to 6.00 am.

Locations of Noise level monitoring stations are as follows:

4.5.1 NOISE LEVEL SAMPLING STATIONS:

Field ID	Location ID
N-1	Mining Quarry
N-2	Dump Site
N-3	Residential Area

The detailed noise measurement data is given in **Annexure-6.**

Annexure-1

AMBIENT AIR QUALITY ANALYSIS REPORT

Visiontek Consultancy Services Pvt. Ltd.
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ISO 9001 : 2008
ISO 14001: 2015
OHSAS 45001: 2018

Ref:

Date:

AMBIENT AIR QUALITY MONITORING REPORT(CORE ZONE)- MAR 20 TO MAY 20

1. Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **Monitoring Station No.- AAQ 1 (Mine Office)**
3. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer.
4. Sample Collected By : VCSPL representative in presence of Client's representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
10.03.2020	52.8	31.68	6.1	12.4	10.2	0.28	24.2	BDL	BDL	BDL	BDL	BDL
11.03.2020	53.2	31.92	6.2	12.8	10.6	0.32	24.8	BDL	BDL	BDL	BDL	BDL
08.04.2020	53.6	32.16	6.4	13.2	11.2	0.34	22.6	BDL	BDL	BDL	BDL	BDL
09.04.2020	52.6	31.56	6.8	13.6	11.6	0.36	21.8	BDL	BDL	BDL	BDL	BDL
13.05.2020	51.8	31.08	6.2	13.8	10.8	0.31	23.2	BDL	BDL	BDL	BDL	BDL
14.05.2020	50.6	30.36	6.4	14.2	10.4	0.32	23.6	BDL	BDL	BDL	BDL	BDL
Monthly Average	**52.43**	**31.46**	**6.35**	**13.33**	**10.80**	**0.32**	**23.37**	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
CPCB, New Delhi AAQ Standard	100	60	80	80	100	4	400	1	20	6	5	1
Testing Method	Gravimetric IS 5182: Part 23	Gravimetric EPA CFR-40 (pt 50) Appendix-1	Improved West & Geake Method IS 5182 (Part-2) RA2006	Modified Jacob & Hochheiser Method IS 5182 (Part-6) RA2006	Chemical Method IS 5182 (Part-9) RA2006	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182 (Part - 22):2004	AAS Method USEPA/ IO3.2	AAS Method USEPA/ IO3.2	Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

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Ref: Date:

AMBIENT AIR QUALITY MONITORING REPORT(CORE ZONE)- MAR 20 TO MAY 20

1.Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2.Sampling Location : **Monitoring Station No.- AAQ 3 (Dump Site)**
3.Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer.
4.Sample Collected By : VCSPL representative in presence of Client's representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
10.03.2020	51.2	30.72	6.1	14.8	12.6	0.32	25.8	BDL	BDL	BDL	BDL	BDL
11.03.2020	51.6	30.96	6.4	14.4	13.2	0.34	25.2	BDL	BDL	BDL	BDL	BDL
08.04.2020	50.8	30.48	6.2	13.8	13.8	0.38	25.6	BDL	BDL	BDL	BDL	BDL
09.04.2020	51.4	30.84	6.8	13.6	14.2	0.32	25.4	BDL	BDL	BDL	BDL	BDL
13.05.2020	52.2	31.32	7.1	14.1	14.6	0.36	25.2	BDL	BDL	BDL	BDL	BDL
14.05.2020	51.8	31.08	6.2	14	12.8	0.33	25.4	BDL	BDL	BDL	BDL	BDL
Monthly Average	**51.50**	**30.90**	**6.47**	**14.12**	**13.53**	**0.34**	**25.43**	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
CPCB, New Delhi AAQ Standard	100	60	80	80	100	4	400	1	20	6	5	1
Testing Method	Gravimetric IS 5182: Part 23	Gravimetric EPA CFR-40 (pt 50) Appendix-1	Improved West & Geake Method IS 5182 (Part-2) RA2006	Modified Jacob & Hochheiser Method IS 5182 (Part-6) RA2006	Chemical Method IS 5182 (Part-9) RA2006	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182 (Part - 22):2004	AAS Method USEPA/ IO3.2	AAS Method USEPA/ IO3.2	Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

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AMBIENT AIR QUALITY MONITORING REPORT (CORE ZONE)- MAR 20 TO MAY 20

1. Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **Monitoring Station No.- AAQ 4 (Plant Site)**
3. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer.
4. Sample Collected By : VCSPL representative in presence of Client's representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
10.03.2020	48.2	28.92	6.8	13.2	11.6	0.32	23.2	BDL	BDL	BDL	BDL	BDL
11.03.2020	50.6	30.36	6.2	13.4	12.1	0.31	23.6	BDL	BDL	BDL	BDL	BDL
08.04.2020	51.2	30.72	7.1	13.8	12.4	0.32	23.8	BDL	BDL	BDL	BDL	BDL
09.04.2020	51.8	31.08	7.2	14.2	12.6	0.33	23.6	BDL	BDL	BDL	BDL	BDL
13.05.2020	52.2	31.32	6.4	14.1	12.8	0.33	23.4	BDL	BDL	BDL	BDL	BDL
14.05.2020	52.8	31.68	6.2	13.6	12.2	0.32	23.8	BDL	BDL	BDL	BDL	BDL
Monthly Average	**51.13**	**30.68**	**6.65**	**13.72**	**12.28**	**0.32**	**23.57**	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
CPCB, New Delhi AAQ Standard	100	60	80	80	100	4	400	1	20	6	5	1
Testing Method	Gravimetric IS 5182: Part 23	Gravimetric EPA CFR-40 (pt 50) Appendix-1	Improved West & Geake Method IS 5182 (Part-2) RA2006	Modified Jacob & Hochheiser Method IS 5182 (Part-6) RA2006	Chemical Method IS 5182 (Part-9) RA2006	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling, 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182(Part -22):2004	AAS Method USEPA/ IO3.2	AAS Method USEPA/ IO3.2	Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

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AMBIENT AIR QUALITY MONITORING REPORT(BUFFER ZONE)- MAR 20 TO MAY 20

1.Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant,Rayagada**
2.Sampling Location : **Monitoring Station No.- AAQ 1 (Bandhamandi Village)**
3. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer.
4. Sample Collected By : VCSPL representative in presence of Client's representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
11.03.2020	40.8	24.48	6.2	12.4	9.4	0.28	20.8	BDL	BDL	BDL	BDL	BDL
09.04.2020	43.6	26.16	6.6	13.2	9.6	0.31	23.6	BDL	BDL	BDL	BDL	BDL
14.05.2020	44.8	26.88	6.8	13.8	9.8	0.32	24.2	BDL	BDL	BDL	BDL	BDL
Monthly Averages	**43.07**	**25.84**	**6.53**	**13.13**	**9.60**	**0.30**	**22.87**	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
CPCB, New Delhi AAQ Standard	**100**	**60**	**80**	**80**	**100**	**4**	**400**	**1**	**20**	**6**	**5**	**1**
Testing Method	Gravimetric IS 5182: Part 23	Gravimetric EPA CFR-40 (pt 50) Appendix-1	Improved West & Geake Method IS 5182 (Part-2) RA2006	Modified Jacob & Hochheiser Method IS 5182 (Part-6) RA2006	Chemical Method IS 5182 (Part-9) RA2006	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182 (Part - 22):2004	AAS Method USEPA /IO3.2	AAS Method USEPA/ IO3.2	Gas Chroma tography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

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1. Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **Monitoring Station No.- AAQ 2 (Kachama Village)**
3. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer.
4. Sample Collected By : VCSPL representative in presence of Client's representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
11.03.2020	40.6	24.36	5.6	12.2	9.2	0.24	19.2	BDL	BDL	BDL	BDL	BDL
09.04.2020	41.8	25.08	5.8	13.8	9.6	0.32	20.2	BDL	BDL	BDL	BDL	BDL
14.05.2020	42.6	25.56	6.4	13.6	10.2	0.36	21.8	BDL	BDL	BDL	BDL	BDL
Monthly Averages	**41.67**	**25.00**	**5.93**	**13.20**	**9.67**	**0.31**	**20.40**	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
CPCB, New Delhi AAQ Standard	**100**	**60**	**80**	**80**	**100**	**4**	**400**	**1**	**20**	**6**	**5**	**1**
Testing Method	Gravimetric IS 5182: Part 23	Gravimetric EPA CFR-40 (pt 50) Appendix-1	Improved West & Geake Method IS 5182 (Part-2) RA2006	Modified Jacob & Hochheiser Method IS 5182 (Part-6) RA2006	Chemical Method IS 5182 (Part-9) RA2006	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182 (Part - 22):2004	AAS Method USEPA /IO3.2	AAS Method USEPA/ IO3.2	Gas Chroma tography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

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AMBIENT AIR QUALITY MONITORING REPORT (BUFFER ZONE)- MAR 20 TO MAY 20

1. Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant,Rayagada**
2. Sampling Location : **Monitoring Station No.- AAQ 3 (Podeng Village)**
3. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer.
4. Sample Collected By : VCSPL representative in presence of Client's representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
11.03.2020	35.12	21.67	5.1	11.8	10.2	0.28	28.8	BDL	BDL	BDL	BDL	BDL
09.04.2020	37.89	22.13	5.4	12.2	10.8	0.36	29.6	BDL	BDL	BDL	BDL	BDL
14.05.2020	34.54	20.56	5.6	12.6	11.4	0.34	30.4	BDL	BDL	BDL	BDL	BDL
Monthly Averages	**35.85**	**21.45**	**5.37**	**12.20**	**10.80**	**0.33**	**29.60**	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
CPCB, New Delhi AAQ Standard	100	60	80	80	100	4	400	1	20	6	5	1
Testing Method	Gravimetric IS 5182: Part 23	Gravimetric EPA CFR-40 (pt 50) Appendix-1	Improved West & Geake Method IS 5182 (Part-2) RA2006	Modified Jacob & Hochheiser Method IS 5182 (Part-6) RA2006	Chemical Method IS 5182 (Part-9) RA2006	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling, 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182 (Part - 22):2004	AAS Method USEPA /IO3.2	AAS Method USEPA/ IO3.2	Gas Chroma tography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

For **Visiontek Consultancy Services Pvt.**

Date:

Plot No.-IV-22&23, Chandaka Industrial Estate, Patia, Bhubaneswar-751024, Dist-Khurda, Odisha Tel.: 7152017505
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Visiontek Consultancy Services Pvt. Ltd.
(An Enviro Engineering Consulting Cell)
ISO 9001 : 2008
ISO 14001: 2015
OHSAS 45001: 2018

Ref:

Date:

AMBIENT AIR QUALITY MONITORING REPORT(BUFFER ZONE)- MAR 20 TO MAY 20

1. Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **Monitoring Station No.- AAQ 4 (Bartibali Village)**
3. Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Analyzer.
4. Sample Collected By : VCSPL representative in presence of Client's representative

Date	PARAMETERS											
	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	O_3 ($\mu g/m^3$)	CO (mg/m^3)	NH_3 ($\mu g/m^3$)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)	C_6H_6 ($\mu g/m^3$)	BaP (ng/m^3)
11.03.2020	43.8	26.28	5.6	12.8	11.6	0.28	25.6	BDL	BDL	BDL	BDL	BDL
09.04.2020	42.6	25.56	6.4	13.6	10.8	0.32	28.8	BDL	BDL	BDL	BDL	BDL
14.05.2020	42.8	25.68	6.8	14.4	10.6	0.34	30.2	BDL	BDL	BDL	BDL	BDL
Monthly Averages	**43.07**	**25.84**	**6.27**	**13.60**	**11.00**	**0.31**	**28.20**	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
CPCB, New Delhi AAQ Standard	**100**	**60**	**80**	**80**	**100**	**4**	**400**	**1**	**20**	**6**	**5**	**1**
Testing Method	Gravimetric IS 5182: Part 23	Gravimetric EPA CFR-40 (pt 50) Appendix-1	Improved West & Geake Method IS 5182 (Part-2) RA2006	Modified Jacob & Hochheiser Method IS 5182 (Part-6) RA2006	Chemical Method IS 5182 (Part-9) RA2006	Non Dispersive Infrared Method IS 5182 (Part-10):1999	Indo Phenol Blue Method Air Sampling , 3rd Edn.By James P. Lodge (Method-401)	AAS Method IS 5182 (Part-22):2004	AAS Method USEPA /IO3.2	AAS Method USEPA/ IO3.2	Gas Chromatography IS 5182 (Part-11):2006	Solvent Extraction IS 5182 (Part-12):2004

For Visiontek Consultancy Services Pvt.Ltd.

Plot No.-M-22&23, Chandaka Industrial Estate, Patia, Bhubaneswar-751024, Dist-Khurda, Odisha Tel.: 7752017505
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Annexure-2

GROUND WATER QUALITY REPORT

Visiontek Consultancy Services Pvt. Ltd.
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ISO 9001 : 2008
ISO 14001 : 2015
OHSAS 18001 : 2007

Ref.:

GROUND WATER QUALITY ANALYSIS REPORT- MARCH 2020 TO MAY 2020

1. Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **GW-1: Bore well at Near Bhitardarba**
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameter	Unit	Testing Methods	Standard as per IS:10500:2012 Amended on 2015 & 2018		Analysis Results			
						MARCH-20	APRIL-20	MAY-20	Averages
				Desired Limit	Permissible Limit	18.03.20	28.04.2020	22.05.2020	
Essential Characteristics									
1.	Colour	Hazen	**Visual Comparison Method** APHA 23RD Ed,2017 : 2120 B, C	5	15	CL	CL	CL	CL
2.	Odour	--	**Threshold Odour Test** APHA 23RD Ed,2017 :2150 B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	Taste	--	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4.	Turbidity	NTU	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	1	5	<1	<1	<1	<1
5.	pH	--	**pH Meter** APHA 23RD Ed,2017 : 4500H+ B	6.5-8.5	No Relaxation	7.26	7.34	7.38	7.35
6.	Total Hardness (as $CaCO_3$)	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	200	600	50.6	48.0	50.2	49.95
7.	Iron (as Fe)	mg/l	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	1.0	No Relaxation	0.24	0.28	0.32	0.275
8.	Chloride (as Cl)	mg/l	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl- B	250	1000	14.8	15.1	15.0	15.1
9.	Residual Free Chlorine	mg/l	**Iodometric Method** APHA 23RD Ed,2017 : 4500Cl, B	0.2	1	ND	ND	ND	ND
Desirable Characteristics									
10	Total Dissolved Solids as TDS	mg/l	**Gravimetric Method** APHA 23RD Ed,2017 : 2540 C	500	2000	96.0	94.0	106.0	102.5
11.	Calcium as Ca	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	75	200	31.2	26.4	27.8	28.55
12.	Magnesium as Mg	mg/l	**Calculation Method** APHA 23RD Ed,2017 : 3500Mg B	30	100	10.8	11.6	12.4	12
13.	Copper as Cu	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	0.05	1.5	BDL	BDL	BDL	BDL
14.	Manganese as Mn	mg/l	**Persulfate Method** APHA 23RD Ed,2017: 3500Mn B	0.1	0.3	BDL	BDL	BDL	BDL
15.	Sulphate as SO_4	mg/l	**Turbidimetric Method** APHA 23RD Ed,2017: 4500 SO_4^{2-} E	200	400	5.6	5.4	5.8	5.75
16.	Nitrate as NO_3	mg/l	**By UV-Screen Method** APHA 23RD Ed,2017: 4500 NO_3^- E	45	No Relaxation	0.26	0.28	0.34	0.31
17.	Fluoride as F	mg/l	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed,2017: 4500F- C	1.0	1.5	ND	ND	ND	ND

Date:

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18.	Phenolic Compounds as C_6H_5OH	mg/l	**Chloroform extraction by Colorimric Method** APHA 23RD Ed,2017: 5530 B,D	**0.001**	**0.002**	BDL	BDL	BDL	BDL
19.	Mercury as Hg	mg/l	**AAS Method** APHA 23RD Ed,2017: 3112 B	**0.001**	**No Relaxation**	BDL	BDL	BDL	BDL
20.	Cadmium as Cd	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 B	**0.003**	**No Relaxation**	BDL	BDL	BDL	BDL
21.	Selenium as Se	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3500 Se C	**0.01**	**No Relaxation**	BDL	BDL	BDL	BDL
22.	Arsenic as As	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3114 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	BDL
23.	Cyanide as CN	mg/l	**Distillation followed by Spectophotometric Method** APHA 23RD Ed,2017: 4500 CN- C,D	**0.05**	**No Relaxation**	ND	ND	ND	ND
24.	Lead as Pb	mg/l	**By AAS Method** APHA 23RD Ed,2017 3111 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	BDL
25.	Zinc as Zn	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	**5**	**15**	BDL	BDL	BDL	BDL
26.	Chromium as Cr^{+6}	mg/l	Diphenyl Carbazide Method APHA 23RD Ed,2017: 3500Cr B	--	--	BDL	BDL	BDL	BDL
27.	Mineral Oil	mg/l	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	**0.5**	**No Relaxation**	BDL	BDL	BDL	BDL
28.	Alkalinity	mg/l	**Titration Method** APHA 23RD Ed,2017:2320 B	**200**	**600**	54.0	58.0	62.0	59.5
29.	Aluminium as Al	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 D	**0.03**	**0.2**	BDL	BDL	BDL	BDL
30.	Boron	mg/l	**Curcumin Method** APHA 23RD Ed,2017: 4500B, B	**0.5**	**2.4**	BDL	BDL	BDL	BDL
31.	Anionic Detergents as MBAS	mg/l	**APHA 5540 C**	**0.2**		ND	ND	ND	ND
32.	Poly Aromatic Hydrocarbon as PAH	mg/l	**GC Analysis Method** APHA 23RD Ed,2017: 6440 B	**0.0001**	--	BDL	BDL	BDL	BDL
33.	Pesticides	µg/l	**GC Analysis Method** APHA 23RD Ed,2017 6630 B,C	**Absent**	**Absent**	Absent	Absent	Absent	Absent

Note: CL: Colourless, AL: Agreeable,
BDL (Below Detection Limits) Values: Cu<0.02 mg/l, Mn<0.05 mg/l, F<0.1 mg/l, C_6H_5OH<0.05 mg/l, Hg<0.002 mg/l, Cd<0.01 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.01 mg/l, Zn<0.03 mg/l, Cr^{+6}<0.01 mg/l, Al<1 mg/l, B<0.01 mg/l, PAH<0.0001 mg/l.

For Visiontek Consultancy Services Pvt. Ltd

Date:

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ISO 9001 : 2008

Visiontek Consultancy Services Pvt. Ltd.
(An Enviro Engineering Consulting Cell)

ISO 14001 : 2015
OHSAS 18001 : 2007

Ref.:

Date:

GROUND WATER QUALITY ANALYSIS REPORT- MARCH 20 TO MAY 20

1. Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **GW-2: Open Well at Bandhamandi Village**
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameter	Unit	Testing Methods	Standard as per IS:10500:2012 Amended on 2015 & 2018		Analysis Results			
				Desired Limit	Permissible Limit	MARCH-20 18.03.20	APRIL-20 28.04.2020	MAY-20 22.05.2020	Averages
Essential Characteristics									
1.	Colour	Hazen	**Visual Comparison Method** APHA 23RD Ed,2017 : 2120 B, C	5	15	CL	CL	CL	**CL**
2.	Odour	--	**Threshold Odour Test** APHA 23RD Ed,2017 :2150 B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**
3.	Taste	--	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**
4.	Turbidity	NTU	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	1	5	<1	<1	<1	**<1**
5.	pH	--	**pH Meter** APHA 23RD Ed,2017 : 4500H+ B	6.5-8.5	No Relaxation	7.28	7.22	7.3	**7.26**
6.	Total Hardness (as $CaCO_3$)	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	200	600	52.2	58.0	56.0	**56.55**
7.	Iron (as Fe)	mg/l	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	1.0	No Relaxation	0.24	0.26	0.22	**0.25**
8.	Chloride (as Cl)	mg/l	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl- B	250	1000	18.8	19.6	20.2	**20.00**
9.	Residual Free Chlorine	mg/l	**Iodometric Method** APHA 23RD Ed,2017 : 4500Cl, B	0.2	1	ND	ND	ND	**ND**
Desirable Characteristics									
10	Total Dissolved Solids as TDS	mg/l	**Gravimetric Method** APHA 23RD Ed,2017 : 2540 C	500	2000	96.0	104.0	108.0	**105.00**
11.	Calcium as Ca	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	75	200	38.0	42.0	44.0	**41.00**
12.	Magnesium as Mg	mg/l	**Calculation Method** APHA 23RD Ed,2017 : 3500Mg B	30	100	13.4	14.6	15.2	**14.35**
13.	Copper as Cu	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	0.05	1.5	BDL	BDL	BDL	**BDL**
14.	Manganese as Mn	mg/l	**Persulfate Method** APHA 23RD Ed,2017: 3500Mn B	0.1	0.3	BDL	BDL	BDL	**BDL**
15.	Sulphate as SO_4	mg/l	**Turbid metric Method** APHA 23RD Ed,2017: 4500 SO_4^{2-} E	200	400	5.2	5.6	5.8	**5.70**
16.	Nitrate as NO_3	mg/l	**By UV-Screen Method** APHA 23RD Ed,2017: 4500 NO_3^- E	45	No Relaxation	0.98	0.94	0.92	**0.93**
17.	Fluoride as F	mg/l	**Distillation followed by Spectrophotometric Method**	1.0	1.5	0.014	0.018	0.021	**0.02**

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GROUND WATER QUALITY ANALYSIS REPORT- MARCH 20 TO MAY 20

1. Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **GW-2: Open Well at Bandhamandi Village**
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameter	Unit	Testing Methods	Standard as per IS:10500:2012 Amended on 2015 & 2018		Analysis Results			
						MARCH-20	APRIL-20	MAY-20	Averages
				Desired Limit	Permissible Limit	18.03.20	28.04.2020	22.05.2020	
Essential Characteristics									
1.	Colour	Hazen	**Visual Comparison Method** APHA 23RD Ed,2017 : 2120 B, C	5	15	CL	CL	CL	**CL**
2.	Odour	--	**Threshold Odour Test** APHA 23RD Ed,2017 :2150 B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**
3.	Taste	--	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**
4.	Turbidity	NTU	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	1	5	<1	<1	<1	**<1**
5.	pH	--	**pH Meter** APHA 23RD Ed,2017 : 4500H+ B	6.5-8.5	No Relaxation	7.28	7.22	7.3	**7.26**
6.	Total Hardness (as $CaCO_3$)	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	200	600	52.2	58.0	56.0	**56.55**
7.	Iron (as Fe)	mg/l	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	1.0	No Relaxation	0.24	0.26	0.22	**0.25**
8.	Chloride (as Cl)	mg/l	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl- B	250	1000	18.8	19.6	20.2	**20.00**
9.	Residual Free Chlorine	mg/l	**Iodometric Method** APHA 23RD Ed,2017 : 4500Cl, B	0.2	1	ND	ND	ND	**ND**
Desirable Characteristics									
10	Total Dissolved Solids as TDS	mg/l	**Gravimetric Method** APHA 23RD Ed,2017 : 2540 C	500	2000	96.0	104.0	108.0	**105.00**
11.	Calcium as Ca	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	75	200	38.0	42.0	44.0	**41.00**
12.	Magnesium as Mg	mg/l	**Calculation Method** APHA 23RD Ed,2017 : 3500Mg B	30	100	13.4	14.6	15.2	**14.35**
13.	Copper as Cu	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	0.05	1.5	BDL	BDL	BDL	**BDL**
14.	Manganese as Mn	mg/l	**Persulfate Method** APHA 23RD Ed,2017: 3500Mn B	0.1	0.3	BDL	BDL	BDL	**BDL**
15.	Sulphate as SO_4	mg/l	**Turbid metric Method** APHA 23RD Ed,2017: 4500 SO_4^{2-} E	200	400	5.2	5.6	5.8	**5.70**
16.	Nitrate as NO_3	mg/l	**By UV-Screen Method** APHA 23RD Ed,2017: 4500 NO_3^- E	45	No Relaxation	0.98	0.94	0.92	**0.93**
17.	Fluoride as F	mg/l	**Distillation followed by Spectrophotometric Method**	1.0	1.5	0.014	0.018	0.021	**0.02**

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			APHA 23RD Ed,2017: 4500F⁻ C						
18.	Phenolic Compounds as C_6H_5OH	mg/l	**Chloroform extraction by Colorimric Method** APHA 23RD Ed,2017: 5530 B,D	**0.001**	**0.002**	BDL	BDL	BDL	**BDL**
19.	Mercury as Hg	mg/l	**AAS Method** APHA 23RD Ed,2017: 3112 B	**0.001**	**No Relaxation**	BDL	BDL	BDL	**BDL**
20.	Cadmium as Cd	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 B	**0.003**	**No Relaxation**	BDL	BDL	BDL	**BDL**
21.	Selenium as Se	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3500 Se C	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
22.	Arsenic as As	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3114 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
23.	Cyanide as CN	mg/l	**Distillation followed by Spectophotometric Method** APHA 23RD Ed,2017: 4500 CN⁻ C,D	**0.05**	**No Relaxation**	ND	ND	ND	**ND**
24.	Lead as Pb	mg/l	**By AAS Method** APHA 23RD Ed,2017 3111 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
25.	Zinc as Zn	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	**5**	**15**	BDL	BDL	BDL	**BDL**
26.	Chromium as Cr^{+6}	mg/l	**Diphenyl Carbazide Method** APHA 23RD Ed,2017: 3500Cr B	--	--	BDL	BDL	BDL	**BDL**
27.	Mineral Oil	mg/l	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	**0.5**	**No Relaxation**	BDL	BDL	BDL	**BDL**
28.	Alkalinity	mg/l	**Titration Method** APHA 23RD Ed,2017:2320 B	**200**	**600**	44.0	46	48.0	**47.50**
29.	Aluminium as Al	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 D	**0.03**	**0.2**	BDL	BDL	BDL	**BDL**
30.	Boron	mg/l	**Curcumin Method** APHA 23RD Ed,2017: 4500B, B	**0.5**	**2.4**	BDL	BDL	BDL	**BDL**
31.	Anionic Detergents as MBAS	mg/l	**Anionic Surfactants APHA23RD Ed,2017: 5540 C**	**0.2**		ND	ND	ND	**ND**
32.	Poly Aromatic Hydrocarbon as PAH	mg/l	**GC Analysis Method** APHA 23RD Ed,2017: 6440 B	**0.0001**	--	BDL	BDL	BDL	**BDL**
33.	Pesticides	µg/l	**GC Analysis Method** APHA 23RD Ed,2017 6630 B,C	**Absent**	**Absent**	Absent	Absent	Absent	**Absent**

Note: CL: Colourless, AL: Agreeable,
BDL (Below Detection Limits) Values: Cu<0.02 mg/l, Mn<0.05 mg/l, F<0.1 mg/l, C_6H_5OH<0.05 mg/l, Hg<0.002 mg/l, Cd<0.01 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.01 mg/l, Zn<0.03 mg/l, Cr^{+6}<0.01 mg/l, Al<1 mg/l, B<0.01 mg/l, PAH<0.0001 mg/l.

Date:

*For **Visiontek Consultancy Services Pvt. Ltd***

Visiontek Consultancy Services Pvt. Ltd.
(An Enviro Engineering Consulting Cell)
ISO 14001 : 2015
OHSAS 18001 : 2007
ISO 9001 : 2008

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ISO 14001 : 2015
OHSAS 18001 : 2007

Ref.:

Date:

GROUND WATER QUALITY ANALYSIS REPORT- MARCH 20 TO MAY 20

1. Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **GW-3: Open Well at Panasgurha Village**
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameter	Unit	Testing Methods	Standard as per IS:10500:2012 Amended on 2015 & 2018		Analysis Results			
				Desired Limit	Permissible Limit	MARCH-20 18.03.20	APRIL-20 28.04.2020	MAY-20 22.05.2020	Averages
Essential Characteristics									
1.	Colour	Hazen	**Visual Comparison Method** APHA 23RD Ed,2017 : 2120 B, C	5	15	CL	CL	CL	CL
2.	Odour	--	**Threshold Odour Test** APHA 23RD Ed,2017 :2150 B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	Taste	--	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4.	Turbidity	NTU	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	1	5	<1.0	<1.0	<1.0	<1.0
5.	pH	--	**pH Meter** APHA 23RD Ed,2017 : 4500H+ B	6.5-8.5	No Relaxation	7.41	7.32	7.36	7.37
6.	Total Hardness (as $CaCO_3$)	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	200	600	108.0	112.0	116.0	113.5
7.	Iron (as Fe)	mg/l	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	1.0	No Relaxation	0.24	0.26	0.28	0.28
8.	Chloride (as Cl)	mg/l	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl- B	250	1000	20.2	20.8	18.6	20.2
9.	Residual Free Chlorine	mg/l	**Iodometric Method** APHA 23RD Ed,2017 : 4500Cl, B	0.2	1	ND	ND	ND	ND
Desirable Characteristics									
10	Total Dissolved Solids as TDS	mg/l	**Gravimetric Method** APHA 23RD Ed,2017 : 2540 C	500	2000	182.0	176.0	178.0	180
11.	Calcium as Ca	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	75	200	21.0	20.2	20.8	21.0
12.	Magnesium as Mg	mg/l	**Calculation Method** APHA 23RD Ed,2017 : 3500Mg B	30	100	18.2	18.8	19.2	19.2
13.	Copper as Cu	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	0.05	1.5	BDL	BDL	BDL	BDL
14.	Manganese as Mn	mg/l	**Persulfate Method** APHA 23RD Ed,2017: 3500Mn B	0.1	0.3	BDL	BDL	BDL	BDL
15.	Sulphate as SO_4	mg/l	**Turbid metric Method** APHA 23RD Ed,2017: 4500 SO_4^{2-} E	200	400	6.2	6.8	7.2	6.95
16.	Nitrate as NO_3	mg/l	**By UV-Screen Method** APHA 23RD Ed,2017: 4500 NO_3^- E	45	No Relaxation	2.8	3.2	3.6	3.05
17.	Fluoride as F	mg/l	**Distillation followed by Spectrophotometric Method**	1.0	1.5	0.018	0.020	0.024	0.023

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			APHA 23RD Ed,2017: 4500F⁻C						
18.	Phenolic Compounds as C_6H_5OH	mg/l	**Chloroform extraction by Colorimetric Method** APHA 23RD Ed,2017: 5530 B,D	**0.001**	**0.002**	BDL	BDL	BDL	**BDL**
19.	Mercury as Hg	mg/l	**AAS Method** APHA 23RD Ed,2017: 3112 B	**0.001**	**No Relaxation**	BDL	BDL	BDL	**BDL**
20.	Cadmium as Cd	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 B	**0.003**	**No Relaxation**	BDL	BDL	BDL	**BDL**
21.	Selenium as Se	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3500 Se C	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
22.	Arsenic as As	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3114 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
23.	Cyanide as CN	mg/l	**Distillation followed by Spectophotometric Method** APHA 23RD Ed,2017: 4500 CN⁻ C,D	**0.05**	**No Relaxation**	ND	ND	ND	**ND**
24.	Lead as Pb	mg/l	**By AAS Method** APHA 23RD Ed,2017 3111 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
25.	Zinc as Zn	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	**5**	**15**	BDL	BDL	BDL	**BDL**
26.	Chromium as Cr^{+6}	mg/l	**Diphenyl Carbazide Method** APHA 23RD Ed,2017: 3500Cr B	--	--	BDL	BDL	BDL	**BDL**
27.	Mineral Oil	mg/l	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	**0.5**	**No Relaxation**	BDL	BDL	BDL	**BDL**
28.	Alkalinity	mg/l	**Titration Method** APHA 23RD Ed,2017:2320 B	**200**	**600**	60.8	62.0	64.0	62.7
29.	Aluminium as Al	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 D	**0.03**	**0.2**	BDL	BDL	BDL	**BDL**
30.	Boron	mg/l	**Curcumin Method** APHA 23RD Ed,2017: 4500B, B	**0.5**	**2.4**	BDL	BDL	BDL	**BDL**
31.	Anionic Detergents as MBAS	mg/l	**Anionic Surfactants APHA23RD Ed,2017: 5540 C**	**0.2**		ND	ND	ND	**ND**
32.	Poly Aromatic Hydrocarbon as PAH	mg/l	**GC Analysis Method** APHA 23RD Ed,2017: 6440 B	**0.0001**	--	BDL	BDL	BDL	**BDL**
33.	Pesticides	µg/l	**GC Analysis Method** APHA 23RD Ed,2017 6630 B,C	**Absent**	**Absent**	Absent	Absent	Absent	**Absent**

Note: CL: Colourless, AL: Agreeable,
BDL (Below Detection Limits) Values: Cu<0.02 mg/l, Mn<0.05 mg/l, F<0.1 mg/l, C_6H_5OH<0.05 mg/l, Hg<0.002 mg/l, Cd<0.01 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.01 mg/l, Zn<0.03 mg/l, Cr^{+6}<0.01 mg/l, Al<1 mg/l, B<0.01 mg/l, PAH<0.0001 mg/l.

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GROUND WATER QUALITY ANALYSIS REPORT- MARCH 20 TO MAY 20

1. Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **GW-4: Open Well at Birda**
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameter	Unit	Testing Methods	Standard as per IS:10500:2012 Amended on 2015 & 2018		Analysis Results			
				Desired Limit	Permissible Limit	MARCH-20 18.03.20	APRIL-20 28.04.2020	MAY-20 22.05.2020	Averages
Essential Characteristics									
1.	Colour	Hazen	**Visual Comparison Method** APHA 23RD Ed,2017 : 2120 B, C	5	15	CL	CL	CL	CL
2.	Odour	--	**Threshold Odour Test** APHA 23RD Ed,2017 :2150 B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	Taste	--	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4.	Turbidity	NTU	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	1	5	<1.0	<1.0	<1.0	<1.0
5.	pH	--	**pH Meter** APHA 23RD Ed,2017 : 4500H+ B	6.5-8.5	No Relaxation	7.22	7.28	7.26	7.24
6.	Total Hardness (as $CaCO_3$)	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	200	600	106.0	112.0	116.0	109.5
7.	Iron (as Fe)	mg/l	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	1.0	No Relaxation	0.26	0.28	0.22	0.25
8.	Chloride (as Cl)	mg/l	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl- B	250	1000	40.0	42.0	44.0	43
9.	Residual Free Chlorine	mg/l	**Iodometric Method** APHA 23RD Ed,2017 : 4500Cl, B	0.2	1	ND	ND	ND	ND
Desirable Characteristics									
10	Total Dissolved Solids as TDS	mg/l	**Gravimetric Method** APHA 23RD Ed,2017 : 2540 C	500	2000	182.0	180.0	186.0	184.5
11.	Calcium as Ca	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	75	200	40.0	36.0	38.0	37.5
12.	Magnesium as Mg	mg/l	**Calculation Method** APHA 23RD Ed,2017 : 3500Mg B	30	100	20.2	20.6	21.4	21.2
13.	Copper as Cu	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	0.05	1.5	BDL	BDL	BDL	BDL
14.	Manganese as Mn	mg/l	**Persulfate Method** APHA 23RD Ed,2017: 3500Mn B	0.1	0.3	BDL	BDL	BDL	BDL
15.	Sulphate as SO_4	mg/l	**Turbid metric Method** APHA 23RD Ed,2017: 4500 SO_4^{2-} E	200	400	4.2	4.4	5.2	4.85
16.	Nitrate as NO_3	mg/l	**By UV-Screen Method** APHA 23RD Ed,2017: 4500 NO_3^- E	45	No Relaxation	2.6	2.4	2.5	2.4
17.	Fluoride as F	mg/l	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed,2017: 4500F- C	1.0	1.5	0.026	0.028	0.022	0.025

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18.	Phenolic Compounds as C_6H_5OH	mg/l	**Chloroform extraction by Colorimric Method** APHA 23RD Ed,2017: 5530 B,D	**0.001**	**0.002**	BDL	BDL	BDL	BDL	
19.	Mercury as Hg	mg/l	**AAS Method** APHA 23RD Ed,2017: 3112 B	**0.001**	**No Relaxation**	BDL	BDL	BDL	BDL	
20.	Cadmium as Cd	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 B	**0.003**	**No Relaxation**	BDL	BDL	BDL	BDL	
21.	Selenium as Se	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3500 Se C	**0.01**	**No Relaxation**	BDL	BDL	BDL	BDL	
22.	Arsenic as As	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3114 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	BDL	
23.	Cyanide as CN	mg/l	**Distillation followed by Spectophotometric Method** APHA 23RD Ed,2017: 4500 CN- C,D	**0.05**	**No Relaxation**	ND	ND	ND	ND	
24.	Lead as Pb	mg/l	**By AAS Method** APHA 23RD Ed,2017 3111 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	BDL	
25.	Zinc as Zn	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	**5**	**15**	BDL	BDL	BDL	BDL	
26.	Chromium as Cr^{+6}	mg/l	Diphenyl Carbazide Method APHA 23RD Ed,2017: 3500Cr B	--	--	BDL	BDL	BDL	BDL	
27.	Mineral Oil	mg/l	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	**0.5**	**No Relaxation**	BDL	BDL	BDL	BDL	
28.	Alkalinity	mg/l	**Titration Method** APHA 23RD Ed,2017:2320 B	**200**	**600**	50.0	52.0	54.0	51.8	
29.	Aluminium as Al	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 D	**0.03**	**0.2**	BDL	BDL	BDL	BDL	
30.	Boron	mg/l	**Curcumin Method** APHA 23RD Ed,2017: 4500B, B	**0.5**	**2.4**	BDL	BDL	BDL	BDL	
31.	Anionic Detergents as MBAS	mg/l	**Anionic Surfactants APHA** 23RD Ed,2017: **5540 C**	**0.2**		ND	ND	ND	ND	
32.	Poly Aromatic Hydrocarbon as PAH	mg/l	**GC Analysis Method** APHA 23RD Ed,2017: 6440 B	**0.0001**	--	BDL	BDL	BDL	BDL	
33.	Pesticides	µg/l	**GC Analysis Method** APHA 23RD Ed,2017 6630 B,C	**Absent**	**Absent**	Absent	Absent	Absent	Absent	

Note: CL: Colourless, AL: Agreeable,
BDL (Below Detection Limits) Values: Cu<0.02 mg/l, Mn<0.05 mg/l, F<0.1 mg/l, C_6H_5OH<0.05 mg/l, Hg<0.002 mg/l, Cd<0.01 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.01 mg/l, Zn<0.03 mg/l, Cr^{+6}<0.01 mg/l, Al<1 mg/l, B<0.01 mg/l, PAH<0.0001 mg/l.

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Date:

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GROUND WATER QUALITY ANALYSIS REPORT- MARCH 20 TO MAY 20

1. Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **GW-5: Open Well at Baligurha**
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameter	Unit	Testing Methods	Standard as per IS:10500:2012 Amended on 2015 & 2018		Analysis Results			
						MARCH-20	APRIL-20	MAY-20	Averages
				Desired Limit	Permissible Limit	18.03.20	28.04.2020	22.05.2020	
Essential Characteristics									
1.	Colour	Hazen	**Visual Comparison Method** APHA 23RD Ed,2017 : 2120 B, C	5	15	CL	CL	CL	CL
2.	Odour	--	**Threshold Odour Test** APHA 23RD Ed,2017 :2150 B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3.	Taste	--	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4.	Turbidity	NTU	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	1	5	2.4	2.6	2.0	2.225
5.	pH	--	**pH Meter** APHA 23RD Ed,2017 : 4500H^+ B	6.5-8.5	No Relaxation	7.26	7.31	7.34	7.30
6.	Total Hardness (as $CaCO_3$)	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	200	600	106.0	112.0	114.0	110.5
7.	Iron (as Fe)	mg/l	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	1.0	No Relaxation	0.24	0.28	0.30	0.285
8.	Chloride (as Cl)	mg/l	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl^- B	250	1000	34.0	38.0	40.0	38.5
9.	Residual Free Chlorine	mg/l	**Iodometric Method** APHA 23RD Ed,2017 : 4500Cl, B	0.2	1	ND	ND	ND	ND
Desirable Characteristics									
10	Total Dissolved Solids as TDS	mg/l	**Gravimetric Method** APHA 23RD Ed,2017 : 2540 C	500	2000	182.0	184.0	190.0	188
11.	Calcium as Ca	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	75	200	38.0	40.0	42.0	41
12.	Magnesium as Mg	mg/l	**Calculation Method** APHA 23RD Ed,2017 : 3500Mg B	30	100	21.2	22.6	23.2	22.95
13.	Copper as Cu	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	0.05	1.5	BDL	BDL	BDL	BDL
14.	Manganese as Mn	mg/l	**Persulfate Method** APHA 23RD Ed,2017: 3500Mn B	0.1	0.3	BDL	BDL	BDL	BDL
15.	Sulphate as SO_4	mg/l	**Turbid metric Method** APHA 23RD Ed,2017: 4500 SO_4^{2-} E	200	400	4.8	4.6	5.2	5
16.	Nitrate as NO_3	mg/l	**By UV-Screen Method** APHA 23RD Ed,2017: 4500 NO_3^- E	45	No Relaxation	2.8	3.2	3.4	3.125
17.	Fluoride as F	mg/l	**Distillation followed by Spectrophotometric Method**	1.0	1.5	0.014	0.018	0.021	0.019

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			APHA 23RD Ed,2017: 4500F⁻ C						
18.	Phenolic Compounds as C_6H_5OH	mg/l	**Chloroform Extraction by Colorimetric Method** APHA 23RD Ed,2017: 5530 B,D	**0.001**	**0.002**	BDL	BDL	BDL	**BDL**
19.	Mercury as Hg	mg/l	**AAS Method** APHA 23RD Ed,2017: 3112 B	**0.001**	**No Relaxation**	BDL	BDL	BDL	**BDL**
20.	Cadmium as Cd	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 B	**0.003**	**No Relaxation**	BDL	BDL	BDL	**BDL**
21.	Selenium as Se	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3500 Se C	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
22.	Arsenic as As	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3114 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
23.	Cyanide as CN	mg/l	**Distillation followed by Spectophotometric Method** APHA 23RD Ed,2017: 4500 CN⁻ C,D	**0.05**	**No Relaxation**	ND	ND	ND	**ND**
24.	Lead as Pb	mg/l	**By AAS Method** APHA 23RD Ed,2017 3111 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
25.	Zinc as Zn	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	**5**	**15**	BDL	BDL	BDL	**BDL**
26.	Chromium as Cr^{+6}	mg/l	Diphenyl Carbazide Method APHA 23RD Ed,2017: 3500Cr B	--	--	ND	ND	ND	**ND**
27.	Mineral Oil	mg/l	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	**0.5**	**No Relaxation**	BDL	BDL	BDL	**BDL**
28.	Alkalinity	mg/l	**Titration Method** APHA 23RD Ed,2017:2320 B	**200**	**600**	54.0	60.0	62.0	**60.0**
29.	Aluminium as Al	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 D	**0.03**	**0.2**	BDL	BDL	BDL	**BDL**
30.	Boron	mg/l	**Curcumin Method** APHA 23RD Ed,2017: 4500B, B	**0.5**	**2.4**	BDL	BDL	BDL	**BDL**
31.	Anionic Detergents as MBAS	mg/l	**Anionic Surfactants APHA23RD Ed,2017: 5540 C**	**0.2**	--	ND	ND	ND	**ND**
32.	Poly Aromatic Hydrocarbon as PAH	mg/l	**GC Analysis Method** APHA 23RD Ed,2017: 6440 B	**0.0001**	--	BDL	BDL	BDL	**BDL**
33.	Pesticides	µg/l	**GC Analysis Method** APHA 23RD Ed,2017 6630 B,C	**Absent**	**Absent**	Absent	Absent	Absent	**Absent**

Note: CL: Colourless, AL: Agreeable,
BDL (Below Detection Limits) Values: Cu<0.02 mg/l, Mn<0.05 mg/l, F<0.1 mg/l, C_6H_5OH<0.05 mg/l, Hg<0.002 mg/l, Cd<0.01 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.01 mg/l, Zn<0.03 mg/l, Cr^{+6}<0.01 mg/l, Al<1 mg/l, B<0.01 mg/l, PAH<0.0001 mg/l.

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GROUND WATER QUALITY ANALYSIS REPORT-MARCH 20 TO MAY 2020

1. Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **GW-6: Bore Well Near Project Site**
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameter	Unit	Testing Methods	Standard as per IS:10500:2012 Amended on 2015 & 2018		Analysis Results			
				Desired Limit	Permissible Limit	MARCH-20 18.03.20	APRIL-20 28.04.2020	MAY-20 22.05.2020	Averages
Essential Characteristics									
1.	Colour	Hazen	**Visual Comparison Method** APHA 23RD Ed,2017 : 2120 B, C	5	15	CL	CL	CL	**CL**
2.	Odour	--	**Threshold Odour Test** APHA 23RD Ed,2017 :2150 B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**
3.	Taste	--	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	**Agreeable**
4.	Turbidity	NTU	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	1	5	2.0	1.7	1.5	**1.7**
5.	pH	--	**pH Meter** APHA 23RD Ed,2017 : 4500H+ B	6.5-8.5	No Relaxation	7.22	7.3	7.32	**7.3**
6.	Total Hardness (as $CaCO_3$)	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	200	600	96.0	102.0	108.0	**104.5**
7.	Iron (as Fe)	mg/l	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	1.0	No Relaxation	0.16	0.21	0.24	**0.218**
8.	Chloride (as Cl)	mg/l	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl- B	250	1000	44.0	46.0	40.0	**43**
9.	Residual Free Chlorine	mg/l	**Iodometric Method** APHA 23RD Ed,2017 : 4500Cl, B	0.2	1	ND	ND	ND	**ND**
Desirable Characteristics									
10	Total Dissolved Solids as TDS	mg/l	**Gravimetric Method** APHA 23RD Ed,2017 : 2540 C	500	2000	190.0	196.0	206.0	**201**
11.	Calcium as Ca	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	75	200	40.0	44.0	36.0	**40.5**
12.	Magnesium as Mg	mg/l	**Calculation Method** APHA 23RD Ed,2017 : 3500Mg B	30	100	19.2	21.4	20.6	**20.85**
13.	Copper as Cu	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	0.05	1.5	BDL	BDL	BDL	**BDL**
14.	Manganese as Mn	mg/l	**Persulfate Method** APHA 23RD Ed,2017: 3500Mn B	0.1	0.3	BDL	BDL	BDL	**BDL**
15.	Sulphate as SO_4	mg/l	**Turbid metric Method** APHA 23RD Ed,2017: 4500 SO_4^{2-} E	200	400	5.2	4.6	4.8	**5.0**
16.	Nitrate as NO_3	mg/l	**By UV-Screen Method**	45	No Relaxation	3.6	4.2	4.1	**3.925**

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			APHA 23RD Ed,2017: 4500 NO_3^- E						
17.	Fluoride as F	mg/l	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed,2017: 4500F⁻C	**1.0**	**1.5**	0.018	0.024	0.026	**0.023**
18.	Phenolic Compounds as C_6H_5OH	mg/l	**Chloroform extraction by Colorimetric Method** APHA 23RD Ed,2017: 5530 B,D	**0.001**	**0.002**	BDL	BDL	BDL	**BDL**
19.	Mercury as Hg	mg/l	**AAS Method** APHA 23RD Ed,2017: 3112 B	**0.001**	**No Relaxation**	BDL	BDL	BDL	**BDL**
20.	Cadmium as Cd	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 B	**0.003**	**No Relaxation**	BDL	BDL	BDL	**BDL**
21.	Selenium as Se	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3500 Se C	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
22.	Arsenic as As	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3114 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
23.	Cyanide as CN	mg/l	**Distillation followed by Spectophotometric Method** APHA 23RD Ed,2017: 4500 CN⁻ C,D	**0.05**	**No Relaxation**	ND	ND	ND	**ND**
24.	Lead as Pb	mg/l	**By AAS Method** APHA 23RD Ed,2017 3111 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
25.	Zinc as Zn	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	**5**	**15**	BDL	BDL	BDL	**BDL**
26.	Chromium as Cr^{+6}	mg/l	Diphenyl Carbazide Method APHA 23RD Ed,2017: 3500Cr B	--	--	BDL	BDL	BDL	**BDL**
27.	Mineral Oil	mg/l	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	**0.5**	**No Relaxation**	BDL	BDL	BDL	**BDL**
28.	Alkalinity	mg/l	**Titration Method** APHA 23RD Ed,2017:2320 B	**200**	**600**	68.0	72.0	74.0	**71.0**
29.	Aluminium as Al	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 D	**0.03**	**0.2**	BDL	BDL	BDL	**BDL**
30.	Boron	mg/l	**Curcumin Method** APHA 23RD Ed,2017: 4500B, B	**0.5**	**2.4**	BDL	BDL	BDL	**BDL**
31.	Anionic Detergents as MBAS	mg/l	**Anionic Surfactants APHA** 23RD Ed,2017:**5540 C**	**0.2**		ND	ND	ND	**ND**
32.	Poly Aromatic Hydrocarbon as PAH	mg/l	**GC Analysis Method** APHA 23RD Ed,2017: 6440 B	**0.0001**	--	BDL	BDL	BDL	**BDL**
33.	Pesticides	µg/l	**GC Analysis Method** APHA 23RD Ed,2017 6630 B,C	**Absent**	**Absent**	Absent	Absent	Absent	**Absent**

Note: CL: Colourless, AL: Agreeable,
BDL (Below Detection Limits) Values: Cu<0.02 mg/l, Mn<0.05 mg/l, F<0.1 mg/l, C_6H_5OH<0.05 mg/l, Hg<0.002 mg/l, Cd<0.01 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.01 mg/l, Zn<0.03 mg/l, Cr^{+6}<0.01 mg/l, Al<1 mg/l, B<0.01 mg/l, PAH<0.0001 mg/

For Visiontek Consultancy Services Pvt. Ltd

Date:

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GROUND WATER QUALITY ANALYSIS REPORT-MARCH 2020 TO MAY 2020

1. Name of Industry : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **GW-7: Bore Well Project Site (Core Zone)**
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameter	Unit	Testing Methods	Standard as per IS:10500:2012 Amended on 2015 & 2018		Analysis Results			
						MARCH-20	APRIL-20	MAY-20	Averages
				Desired Limit	Permissible Limit	18.03.20	28.04.2020	22.05.2020	
Essential Characteristics									
1.	Colour	Hazen	**Visual Comparison Method** APHA 23RD Ed,2017 : 2120 B, C	5	15	CL	CL	CL	**CL**
2.	Odour	--	**Threshold Odour Test** APHA 23RD Ed,2017 :2150 B	**Agreeable**	**Agreeable**	Agreeable	Agreeable	Agreeable	**Agreeable**
3.	Taste	--	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	**Agreeable**	**Agreeable**	Agreeable	Agreeable	Agreeable	**Agreeable**
4.	Turbidity	NTU	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	1	5	1.9	1.8	1.6	**1.875**
5.	pH	--	**pH Meter** APHA 23RD Ed,2017 : 4500H+ B	6.5-8.5	No Relaxation	7.28	7.32	7.31	**7.318**
6.	Total Hardness (as $CaCO_3$)	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	200	600	96.0	102.0	108.0	**105.2**
7.	Iron (as Fe)	mg/l	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	1.0	No Relaxation	0.14	0.16	0.18	**0.176**
8.	Chloride (as Cl)	mg/l	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl- B	250	1000	42.0	44.0	40.0	**42.8**
9.	Residual Free Chlorine	mg/l	**Iodometric Method** APHA 23RD Ed,2017 : 4500Cl, B	0.2	1	ND	ND	ND	**ND**
Desirable Characteristics									
10	Total Dissolved Solids as TDS	mg/l	**Gravimetric Method** APHA 23RD Ed,2017 : 2540 C	500	2000	186.0	196.0	204.0	**199**
11.	Calcium as Ca	mg/l	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	75	200	38.0	44.0	36.0	**40**
12.	Magnesium as Mg	mg/l	**Calculation Method** APHA 23RD Ed,2017 : 3500Mg B	30	100	19.2	20.6	21.2	**20.8**
13.	Copper as Cu	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	0.05	1.5	BDL	BDL	BDL	**BDL**
14.	Manganese as Mn	mg/l	**Persulfate Method** APHA 23RD Ed,2017: 3500Mn B	0.1	0.3	BDL	BDL	BDL	**BDL**
15.	Sulphate as SO_4	mg/l	**Turbid metric Method** APHA 23RD Ed,2017: 4500 SO_4^{2-} E	200	400	5.2	4.6	4.8	**5**
16.	Nitrate as NO_3	mg/l	**By UV-Screen Method** APHA 23RD Ed,2017: 4500 NO_3^- E	45	No Relaxation	3.6	4.2	3.6	**3.8**

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17.	Fluoride as F	mg/l	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed,2017: 4500F⁻C	**1.0**	**1.5**	0.018	0.016	0.021	**0.020**
18.	Phenolic Compounds as C_6H_5OH	mg/l	**Chloroform extraction by Colorimetric Method** APHA 23RD Ed,2017: 5530 B,D	**0.001**	**0.002**	BDL	BDL	BDL	**BDL**
19.	Mercury as Hg	mg/l	**AAS Method** APHA 23RD Ed,2017: 3112 B	**0.001**	**No Relaxation**	BDL	BDL	BDL	**BDL**
20.	Cadmium as Cd	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 B	**0.003**	**No Relaxation**	BDL	BDL	BDL	**BDL**
21.	Selenium as Se	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3500 Se C	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
22.	Arsenic as As	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3114 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
23.	Cyanide as CN	mg/l	**Distillation followed by Spectophotometric Method** APHA 23RD Ed,2017: 4500 CN⁻ C,D	**0.05**	**No Relaxation**	ND	ND	ND	**ND**
24.	Lead as Pb	mg/l	**By AAS Method** APHA 23RD Ed,2017 3111 B	**0.01**	**No Relaxation**	BDL	BDL	BDL	**BDL**
25.	Zinc as Zn	mg/l	**By AAS Method** APHA 23RD Ed,2017: 3111 B	**5**	**15**	BDL	BDL	BDL	**BDL**
26.	Chromium as Cr^{+6}	mg/l	Diphenyl Carbazide Method APHA 23RD Ed,2017: 3500Cr B	--	--	BDL	BDL	BDL	**BDL**
27.	Mineral Oil	mg/l	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	**0.5**	**No Relaxation**	BDL	BDL	BDL	**BDL**
28.	Alkalinity	mg/l	**Titration Method** APHA 23RD Ed,2017:2320 B	**200**	**600**	65.0	65.8	66.7	**66.375**
29.	Aluminium as Al	mg/l	**AAS Method** APHA 23RD Ed,2017: 3111 D	**0.03**	**0.2**	BDL	BDL	BDL	**BDL**
30.	Boron	mg/l	**Curcumin Method** APHA 23RD Ed,2017: 4500B, B	**0.5**	**2.4**	BDL	BDL	BDL	**BDL**
31.	Anionic Detergents as MBAS	mg/l	**Anionic Surfactants APHA23RD Ed,2017 5540 C**	**0.2**	--	ND	ND	ND	**ND**
32.	Poly Aromatic Hydrocarbon as PAH	mg/l	**GC Analysis Method** APHA 23RD Ed,2017: 6440 B	**0.0001**	--	BDL	BDL	BDL	**BDL**
33.	Pesticides	µg/l	**GC Analysis Method** APHA 23RD Ed,2017 6630 B,C	**Absent**	**Absent**	Absent	Absent	Absent	**199**

Note: CL: Colourless, AL: Agreeable,
BDL (Below Detection Limits) Values: Cu<0.02 mg/l, Mn<0.05 mg/l, F<0.1 mg/l, C_6H_5OH<0.05 mg/l, Hg<0.002 mg/l, Cd<0.01 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.01 mg/l, Zn<0.03 mg/l, Cr^{+6}<0.01 mg/l, Al<1 mg/l, B<0.01 mg/l, PAH<0.0001 mg/

For Visiontek Consultancy Services Pvt. Ltd

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Annexure-3

SURFACE WATER QUALITY REPORT

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ISO 9001 : 2008
ISO 14001 : 2015
OHSAS 18001 : 2018

Ref.:

Date:

SURFACE WATER QUALITY ANALYSIS REPORT- MAR 20 TO MAY 20

1. **Name of Industry** : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **SW-1:** Dalakona Nalla Near Panasagurha (Upstream)
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameter	Testing Methods	Unit	Standards as per IS-2296:1992 Class –'C'	Analysis Results			
					Mar-20	Apr-20	May-20	Average
					14.03.2020	18.04.2020	14.05.2020	
1.	pH Value	APHA 23rd Edition 2017: 4500H+ B	--	6.0-9.0	7.44	7.42	7.44	**7.43**
2.	Dissolved Oxygen (minimum)	APHA 23rd Edition 2017: 4500 O C	mg/l	4.0	5.6	5.8	5.2	**5.53**
3.	Total Dissolved Solids as TDS	APHA 23rd Edition 2017: 2540 C	mg/l	1500	88.0	92.0	94.0	**91.33**
4.	Total Suspended Solids as TSS	APHA 23rd Edition 2017: 2540 D	mg/l	--	28.0	32.0	32.0	**30.67**

For Visiontek Consultancy Services Pvt. Ltd.

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ISO 14001 : 2015
OHSAS 18001 : 2018

Ref.:

Date:

SURFACE WATER QUALITY ANALYSIS REPORT- MAR 20 TO MAY 20

1. **Name of Industry** : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **SW-2:** Dalakona Nalla Near Panasagurha (Downstream)
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl No.	Parameter	Testing Methods	Unit	Standards as per IS-2296:1992 Class –'C'	Analysis Results			
					Mar-20	Apr-20	May-20	Averages
					14.03.2020	18.04.2020	14.05.2020	
1.	pH Value	APHA 23rd Edition 2017: 4500H' B	--	6.0-9.0	7.32	7.41	7.46	**7.40**
2.	Dissolved Oxygen (Minimum)	APHA 23rd Edition 2017: 4500 O C	mg/l	4.0	5.8	6.6	6.8	**6.40**
3.	Total Dissolved Solids as TDS	APHA 23rd Edition 2017: 2540 C	mg/l	1500	128.0	132.0	138.0	**132.67**
4.	Total Suspended Solids as TSS	APHA 23rd Edition 2017: 2540 D	mg/l	--	32.0	28.0	34.0	**31.33**

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SURFACE WATER QUALITY ANALYSIS REPORT- MAR 20 TO MAY 20

1. **Name of Industry** : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **SW-3:** Water from Settling Pond
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameter	Testing Methods	Unit	Standards as per IS-2296:1992 Class –'C'	Analysis Results			
					Mar-20	Apr-20	May-20	Averages
					14.03.2020	18.04.2020	14.05.2020	
1.	pH Value	APHA 23rd Edition 2017: 4500H+ B	--	**6.0-9.0**	7.46	7.48	7.52	**7.49**
2.	Dissolved Oxygen (Minimum)	APHA 23rd Edition 2017: 4500 O C	mg/l	**4.0**	7.1	6.8	7.4	**7.10**
3.	Total Dissolved Solids as TDS	APHA 23rd Edition 2017: 2540 C	mg/l	**1500**	118.0	116.0	124.0	**119.33**
4.	Total Suspended Solids as TSS	APHA 23rd Edition 2017: 2540 D	mg/l	--	40.0	36.0	36.0	**37.33**

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SURFACE WATER QUALITY ANALYSIS REPORT- MAR 20 TO MAY 20

1. **Name of Industry** : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. Sampling Location : **SW-4:** Uagarh Nadi Near Bandhamandi Upstream
3. Sample Collected By : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameter	Testing Methods	Unit	Standards as per IS-2296:1992 Class –'C'	Analysis Results			
					Mar-20	Apr-20	May-20	Averages
					14.03.2020	18.04.2020	14.05.2020	
1.	pH Value	APHA 23rd Edition 2017: 4500H+ B	--	6.0-9.0	7.46	7.52	7.51	**7.50**
2.	Dissolved Oxygen (minimum)	APHA 23rd Edition 2017: 4500 O C	mg/l	4.0	5.8	5.4	5.6	**5.60**
3.	Total Dissolved Solids as TDS	APHA 23rd Edition 2017: 2540 C	mg/l	1500	134.0	128.0	138.0	**133.33**
4.	Total Suspended Solids as TSS	APHA 23rd Edition 2017: 2540 D	mg/l	--	30.0	36.0	32.8	**32.93**

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Annexure-4

GROUND WATER LEVEL ANALYSIS REPORT

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ISO 9001 : 2008
ISO 14001 : 2015
OHSAS 18001 : 2018

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GROUND WATER LEVEL ANALYSIS REPORT- MAR 20 TO MAY 20

1. **Name of Industry** : **M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada**
2. **Sampling Locations** : GWL1 : Open Well at Bhitardarba
   GWL2 : Open Well at Bandhamandi Village
   GWL3 : Open Well at Panasagurha Village
   GWL4 : Open Well at Birda
   GWL5 : Open Well at Baligurha Village
   GWL6 : Bore Well Near Project Site
   GWL7 : Bore Well at Project Site (Core Zone)
3. **Sample Collected By** : VCSPL Representative in presence of Client's Representative

Location Id	Date of Sampling	Unit	Analysis Result
GWL1	14.03.2020	mt/bgl	6.1
GWL2	14.03.2020		6.4
GWL3	14.03.2020		6.2
GWL4	18.04.2020		5.8
GWL5	18.04.2020		6.0
GWL6	18.04.2020		6.2
GWL7	14.05.2020		6.0
GWL8	14.05.2020		6.1

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Annexure-5

NOISE MONITORING REPORT

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ISO 14001 : 2015
OHSAS 18001 : 2018

Ref.: Date:

NOISE MONITORING REPORT- MAR 20 TO MAY 20

1. Name of Industry : M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada

2.Sample Collected By : VCSPL Representative in presence of Client's Representative

Location ID	Monitoring Station Location	Day time Equivalent (Noise Level in dB(A) leq)			Night time Equivalent (Noise Level in dB(A) leq)		
		Mar-20	Apr-20	May-20	Mar-20	Apr-20	May-20
		14.03.2020	18.04.2020	14.05.2020	14.03.2020	18.04.2020	14.05.2020
N-1	Mining Quarry	68.8	63.6	64.4	49.6	50.6	50.4
N-2	Dump Site	63.4	64.1	63.8	49.2	51.2	50.8
N-3	Residential Area	62.6	64.6	62.9	48.8	51.6	51.2
Standard as per CPCB		75			70		

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SILICA ANALYSIS REPORT – MAR 20 TO MAY 20

1. Name of Industry : M/s Bandhamandi Graphite Mines & Beneficiation Plant, Rayagada
2. Sample Collected By : VCSPL Representative in presence of Client's Representative

Location Id	Date of Sampling	Unit	Analysis Result
			Silica as SiO_2
AAQ1: Mines Office	14.03.2020	%	0.019
AAQ2:Mines Face			0.012
AAQ3:Dump Site			0.014
AAQ4: Plant Site			0.010

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