



- Infrastructure Engineering
- Water Resource Management
- Environmental & Social Study

- Surface & Sub-Surface Investigation
- Quality Control & Project Management
- Renewable Energy

- Agricultural Development
- Information Technology
- Public Health Engineering

- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

Ref : Envlab/23-24/R-00733

Date : 08.04.2023

AMBIENT AIR QUALITY (CORE ZONE) MONITORING REPORT- MAR 2023

Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
Name of the Project : KALARANGIATTA CHROMITE MINES , KALIAPANI, JAJPUR
Monitoring Instruments: RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Monitor, VOC Sampler
Sample Collected by : VCSPL Representative in presence of Client's Representative

Monitoring Date	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO _x (µg/m ³)	CO (mg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	C ₆ H ₆ (µg/m ³)	Bap (ng/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)
AAQMS-1: Near Office Building												
06.03.2023	53.7	30.6	7.9	16.4	0.55	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.03.2023	55.8	30.9	8.8	16.2	0.61	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.03.2023	54.9	33.6	8.3	17.1	0.57	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.03.2023	52.7	27.8	8.1	15.4	0.45	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.03.2023	50.1	26.9	7.6	13.3	0.42	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Monthly Average	53.4	29.9	8.14	15.7	0.52	BDL	BDL	BDL	BDL	BDL	BDL	BDL
NAAQ Standard	100	60	80	80	4	100	400	5	01	01	20	06
Monitoring Date	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO _x (µg/m ³)	CO (mg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	C ₆ H ₆ (µg/m ³)	Bap (ng/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)
AAQMS-2: Near ETP												
06.03.2023	56.9	30.9	8.2	17.6	0.55	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.03.2023	53.8	32.8	7.9	17.2	0.64	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.03.2023	51.5	34.1	7.3	18.3	0.59	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.03.2023	49.8	30.6	6.9	15.9	0.52	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.03.2023	47.6	28.1	6.5	15.2	0.47	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Monthly Average	51.9	32.3	7.4	16.8	0.55	BDL	BDL	BDL	BDL	BDL	BDL	BDL
NAAQ Standard	100	60	80	80	4	100	400	5	01	01	20	06
Testing Method	Gravimetric	Gravimetric	Improved West and Geake method	Modified Jacob & Hochheiser (Na-Arsenite)	NDIR Spectroscopy	Chemical Method	Indo Phenol Blue Method	Absorption & Desorption followed by GC	Solvent Extraction Followed by GC	AAS Method	AAS Method	AAS Method

BDL (Below Detection Limit) PM₁₀ <20 µg/m³, PM_{2.5} <10 µg/m³, SO₂ <4 µg/m³, NO₂ <6 µg/m³, O₃ <4 µg/m³, NH₃ <20 µg/m³, C₆H₆ <4 µg/m³, Bap <0.5 ng/m³, As < 1 ng/m³, Ni < 2.5 ng/m³, Pb <0.02 µg/m³

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Laboratory Services

Environment Lab
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Material Lab
Soil Lab
Mineral Lab
&
Microbiology Lab

Ref : Envlab/23-24/R-00734

Date : 08.04.2023

AMBIENT AIR QUALITY (CORE ZONE) MONITORING REPORT- MAR 2023

Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK

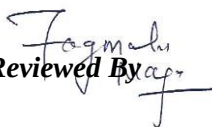
Name of the Project : KALARANGIATTA CHROMITE MINES , KALIAPANI, JAJPUR

Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Monitor, VOC Sampler

Sample Collected by : VCSPL Representative in presence of Client's Representative

Monitoring Date	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO _x (µg/m ³)	CO (mg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	C ₆ H ₆ (µg/m ³)	Bap (ng/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)
AAQMS-3: Near Electrical Substation												
06.03.2023	71.6	42.9	8.7	20.1	0.66	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.03.2023	74.2	40.6	9.2	20.7	0.57	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.03.2023	70.9	41.4	9.4	18.6	0.59	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.03.2023	67.5	37.8	8.1	15.9	0.48	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.03.2023	64.8	32.9	7.9	15.2	0.45	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Monthly Average	69.8	39.12	8.66	18.1	0.55	BDL	BDL	BDL	BDL	BDL	BDL	BDL
NAAQ Standard	100	60	80	80	4	100	400	5	01	01	20	06
Monitoring Date	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO _x (µg/m ³)	CO (mg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	C ₆ H ₆ (µg/m ³)	Bap (ng/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)
AAQMS-4: View Point												
06.03.2023	70.6	40.9	9.5	16.8	0.63	BDL	BDL	BDL	BDL	BDL	BDL	BDL
11.03.2023	73.5	40.6	8.8	16.2	0.59	BDL	BDL	BDL	BDL	BDL	BDL	BDL
13.03.2023	71.1	39.7	8.1	18.1	0.48	BDL	BDL	BDL	BDL	BDL	BDL	BDL
18.03.2023	67.3	35.5	7.7	15.7	0.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL
20.03.2023	65.2	34.1	6.9	14.3	0.43	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Monthly Average	69.54	38.16	8.2	16.22	0.52	BDL	BDL	BDL	BDL	BDL	BDL	BDL
NAAQ Standard	100	60	80	80	4	100	400	5	01	01	20	06
Testing Method	Gravimetric	Gravimetric	Improved West and Geake method	Modified Jacob & Hochheiser (Na-Arsenite)	NDIR Spectroscopy	Chemical Method	Indo Phenol Blue Method	Absorption & Desorption followed by GC	Solvent Extraction Followed by GC	AAS Method	AAS Method	AAS Method

BDL (Below Detection Limit) PM₁₀ <20 µg/m³, PM_{2.5} <10 µg/m³, SO₂ <4 µg/m³, NO₂ <6 µg/m³, O₃ <4 µg/m³, NH₃ <20 µg/m³, C₆H₆ <4 µg/m³, Bap <0.5 ng/m³, As < 1 ng/m³, Ni < 2.5 ng/m³, Pb <0.02 µg/m³

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Laboratory Services
Environment Lab
Food Lab
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Soil Lab
Mineral Lab
&
Microbiology Lab

Ref : Envlab/23-24/R-00735

Date: 08.04.2023

AMBIENT AIR QUALITY (BUFFER ZONE) MONITORING REPORT- MAR 2023

Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
Name of the Project : KALARANGIATTA CHROMITE MINES , KALIAPANI, JAJPUR
Monitoring Instruments : RDS (APM 460 BL), FPS (APM 550) Envirotech, CO Monitor, VOC Sampler
Sample Collected by : VCSPL Representative in presence of Client's Representative

Monitoring Date	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO _x (µg/m ³)	CO (mg/m ³)	O ₃ (µg/m ³)	NH ₃ (µg/m ³)	C ₆ H ₆ (µg/m ³)	Bap (ng/m ³)	Pb (µg/m ³)	Ni (ng/m ³)	As (ng/m ³)
AAQMS-1: Near Village Bhimtanagar												
18.03.2023	54.2	31.4	7.8	13.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
AAQMS-2: Near Village Ransol												
18.03.2023	51.2	29.7	7.2	13.6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
AAQMS-3: Near Kaliapani Township												
18.03.2023	48.8	28.8	6.9	12.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
AAQMS-4: Near Village Baragaji												
18.03.2023	58.6	34.5	6.3	14.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
AAQMS-5: Near Village Godisahi												
18.03.2023	61.2	33.6	6.7	13.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Fagmali
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Laboratory Services
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 Soil Lab
 Mineral Lab
 &
 Microbiology Lab

Ref : Envlab/23-24/R-00736

Date: 08.04.2023

GROUND WATER QUALITY ANALYSIS REPORT- MAR 2023

1. Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
2. Name of the Project : Kalarangiatta Chromite Mines , Kaliapani, Jajpur
3. Sampling Location : GW1: Tube Well Near TISCO Main Gate
 GW2: Tube Well inside the Lease hold Area
 GW3: Open Well at Ransol Village
4. Method of Sampling : APHA 1060 B
5. Date of Sampling : 11.03.2023
6. Date of Analysis : 13.03.2023 TO 18.03.2023
7. Sample Collected by : VCSPL Representative in presence of Client's Representative

7. Sample Collected by : VESLE Representative in presence of Client's Representative								
Sl. No.	Parameter	Unit	TEST METHOD	Standard as per IS -10500:2012 Amended on 2015 & 2018		GW1	GW2	GW3
				Acceptabl e Limit	Permissabl e Limit			
Physical Parameter								
1	Colour	Hazen,Max	APHA 23 rd Ed,2017 : 2120 B, C	5	15	<5	<5	<5
2	Odour	--	APHA 23 rd Ed,2017 :2120 B	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	pH at 25°C	--	APHA 23 ^{Rnd} Ed,2017 : 4500H ⁺ B	6.5-8.5	6.5-8.5	7.02	6.78	6.91
3	Taste	--	APHA 23 rd Ed,2017 : 2160 C	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU,Max	APHA 2130 B	1	5	0.5	0.6	0.7
5	Dissolved Solids	mg/l,Max	APHA 23 rd Ed,2017 : 2540 C	500	2000	324	286	313
CHEMICAL PARAMETER								
1	Aluminium as(Al)	mg/l,Max	APHA 3500Al B	0.03	0.2	BDL	BDL	BDL
2	Ammonical Nitrogen(NH ₃ .N)	mg/l,Max	APHA 4500 NH ₃ C	0.5	0.5	BDL	BDL	BDL
3	Anionic Detergents (as MBAS)	mg/l,Max	APHA 5540 C	0.2	1.0	ND	ND	ND
4	Barium(Ba)	mg/l,Max	APFA 3111,B	0.7	0.7	BDL	BDL	BDL
5	Boron (as B)	mg/l,Max	APHA 4500 B,B	0.5	1.0	BDL	BDL	BDL
6	Calcium (as Ca)	mg/l,Max	APHA 23 rd Ed,2017 : 3500Ca B	75	200	53.8	52.1	50.6
7	Chloramines (as Cl ₂)	mg/l,Max	APHA 4500 –Cl G	4.0	4.0	ND	ND	ND
8	Chloride (as Cl)	mg/l,Max	APHA 23 rd Ed,2017 : 4500Cl ⁻ B	250	1000	50	42.5	57.5
9	Copper (as Cu)	mg/l,Max	APHA 3111 B,C	0.05	1.5	BDL	BDL	BDL
10	Fluoride (as F)	mg/l,Max	APHA 4500 F,C	1.0	1.5	0.23	0.28	0.30
11	Residual, free Chlorine	mg/l,Min	APHA 4500 Cl B	0.2	1.0	ND	ND	ND
12	Iron (as Fe)	mg/l,Max	APHA 23 rd Ed,2017 : 3111, B	0.3	0.3	0.28	0.21	0.23



Visiontek Consultancy Services Pvt. Ltd.

(Committed For Better Environment)

Certified for : ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 (OH&S), ISO/IEC 17025:2017

Accredited by : NABET-A Grade, MOEF & CC/CPCB & SPCB-A Grade

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13	Magnesium (as Mg)	mg/l,Max	APHA 3500 Mg B	30	100	16.2	13.6	16.7
14	Manganese (as Mn)	mg/l,Max	APHA 3500Mn B	0.1	0.3	BDL	BDL	BDL
15	Mineral Oil	mg/l,Max	APHA 5520 B	0.5	0.5	BDL	BDL	BDL
16	Nitrate (as NO ₃)	mg/l,Max	APHA 4500 NO ₃ ⁻ E	45	45	6.4	5.3	7.1
17	Phenolic Compounds(as C ₆ H ₅ OH)	mg/l,Max	APHA 5530 B,D	0.001	0.002	BDL	BDL	BDL
18	Selenium (as Se)	mg/l,Max	APHA 23 rd Ed,2017: 3500 Se C	0.01	0.01	BDL	BDL	BDL
19	Silver(asAg)	mg/l,Max		0.1	0.1	BDL	BDL	BDL
20	Sulphate (as SO ₄)	mg/l,Max	APHA 4500 SO ₄ ²⁻ E	200	400	29.2	30.1	32.2
21	Sulphide (as H ₂ S)	mg/l,Max	0.05	0.05	0.05	ND	ND	ND
22	Alkalinity	mg/l,Max	APHA 2320 B	200	600	170	190	185
23	Total Hardness (as CaCO ₃)	mg/l,Max	APHA 23 rd Ed,2017 : 2340 C	200	200	183	186	195
24	Zinc (as Zn)	mg/l,Max	APHA 23 rd Ed,2017: 3111 B	5	5	BDL	BDL	BDL

Toxic Parameters

1	Chromium (as Cr ⁺⁶)	mg/l,Max	APHA 3500Cr B	0.05	0.05	BDL	BDL	BDL
2	Cadmium as(Cd)	mg/l,Max	APHA 23 rd Ed,2017: 3111 B	0.003	0.003	BDL	BDL	BDL
3	Cyanide as (CN ⁻)	mg/l,Max	APHA 23 rd Ed,2017: 4500 CN ⁻ C,D	0.05	0.05	BDL	BDL	BDL
4	Lead as(Pb)	mg/l,Max	APHA 23 rd Ed,2017 3111 B	0.1	0.1	BDL	BDL	BDL
5	Mercury as (Hg)	mg/l,Max	APHA 23 rd Ed,2017: 3111 B	0.001	0.001	BDL	BDL	BDL
6	Nickel (Ni)	mg/l,Max	IS 5185 (Part-22)	0.02	0.02	BDL	BDL	BDL
7	Arsenic as (As)	mg/l,Max	APHA 23 rd Ed,2017: 3114 B	0.01	0.01	BDL	BDL	BDL
8	Polychlorinated biphenyls	mg/l,Max	APHA 23 rd Ed,2017 :6440 B	0.0005	0.0005	ND	ND	ND
9	Polyaromatic hydrocarbons (PAH)	mg/l,Max	APHA 23 rd Ed,2017 :6440 B	0.0001	0.0001	ND	ND	ND
10	Total Chromium	mg/l,Max	APHA 3500Cr B	0.05	0.05	BDL	BDL	BDL
11	Bromoform	mg/l,Max	APHA 6232	0.1	0.1	ND	ND	ND
12	Dibromochloromethane	mg/l,Max	APHA 6232	0.1	0.1	ND	ND	ND
13	Bromodichloromethane	mg/l,Max	APHA 6232	0.06	0.06	ND	ND	ND
14	Chloroform	mg/l,Max	APHA 6232	0.2	0.2	ND	ND	ND
15	Molybdenum (Mo)	mg/l,Max	IS 3025 (Part 2)	0.07	0.07	BDL	BDL	BDL

Bacteriological Parameter

1	Total Coliform	MPN/100 ml	APHA 23 rd Ed,2017: 9221 B	Shall not be detectable in any 100 ml sample	ABSENT	ABSENT	ABSENT
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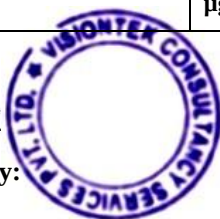
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PESTICIDES							
1	Endosulfan à	µg/l,Max	APHA 23rd edition: 6630 C	0.4	<0.005	<0.005	<0.005
2	Endosulfan ß	µg/l,Max	APHA 23rd edition: 6630 C	0.4	<0.005	<0.005	<0.005
3	Endosulfan sulphate	µg/l,Max	APHA 23rd edition: 6630 C	0.4	<0.005	<0.005	<0.005
4	Alachlor	µg/l, Max	APHA 23rd edition: 6630 C	20	<0.01	<0.01	<0.01
5	Atrazine	µg/l, Max	APHA 23rd edition: 6630 C	2.0	<0.01	<0.01	<0.01
6	Aldrin	µg/l, Max	APHA 23rd edition: 6630 C	0.03	<0.01	<0.01	<0.01
8	Alpha HCH	µg/l, Max	APHA 23rd edition: 6630 C	0.01	<0.01	<0.01	<0.01
9	Beta HCH	µg/l, Max	APHA 23rd edition: 6630 C	0.04	<0.01	<0.01	<0.01
10	Delta HCH	µg/l, Max	APHA 23rd edition: 6630 C	0.04	<0.01	<0.01	<0.01
11	Butachlor	µg/l, Max	APHA 23rd edition: 6630 C	125.0	<0.01	<0.01	<0.01
12	Chloropyriphos	µg/l, Max	APHA 23rd edition: 6630 C	30.0	<0.01	<0.01	<0.01
13	2,4-Dichlorophenoxyacetic acid	µg/l, Max	APHA 23rd edition: 6630 C	30.0	<0.05	<0.05	<0.05
14	p p DDE	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
15	p p DDD	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
16	p p DDT	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
17	o p DDE	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
18	o p DDD	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
19	o p DDT	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
20	Ethion	µg/l, Max	APHA 23rd edition: 6630 C	3.0	<0.01	<0.01	<0.01
21	Lindane	µg/l, Max	APHA 23rd edition: 6630 C	2.0	<0.01	<0.01	<0.01
22	Isoproturon	µg/l, Max	APHA 23rd edition: 6630 C	9.0	<0.01	<0.01	<0.01
23	Malathion	µg/l, Max	APHA 23rd edition: 6630 C	190.0	<0.01	<0.01	<0.01
24	Methyl parathion	µg/l, Max	APHA 23rd edition: 6630 C	0.3	<0.01	<0.01	<0.01
25	Monocrotophos	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.01	<0.01	<0.01
26	Phorate	µg/l, Max	APHA 23rd edition: 6630 C	2.0	<0.01	<0.01	<0.01

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Microbiology Lab

Ref : Envlab/23-24/R-00737

Date: 08.04.2023

GROUND WATER QUALITY ANALYSIS REPORT- MAR 2022

1. Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
2. Name of the Project : Kalarangiatta Chromite Mines , Kaliapani, Jajpur
3. Sampling Location : GW4: Tube Well at Kalarangiatta Village
GW5: Tube Well at Bhimta Nagar Village
4. Method of Sampling : APHA 1060 B
5. Date of Sampling : 11.03.2023
6. Date of Analysis : 13.03.2023 TO 18.03.2023
7. Sample Collected by : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameter	Unit	TEST METHOD	Standard as per IS -10500:2012 Amended on 2015 & 2018		GW4	GW 5
				Acceptabl e Limit	Permissabl e Limit		
Physical Parameter							
1	Colour	Hazen,Max	APHA 23 rd Ed,2017 : 2120 B, C	5	15	<5	<5
2	Odour	--	APHA 23 rd Ed,2017 :2120 B	Agreeable	Agreeable	Agreeable	Agreeable
3	pH at 25 ⁰ C	--	APHA 23 Rd Ed,2017 : 4500H ⁺ B	6.5-8.5	6.5-8.5	7.49	6.77
3	Taste	--	APHA 23 rd Ed,2017 : 2160 C	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU,Max	APHA 2130 B	1	5	0.6	0.8
5	Dissolved Solids	mg/l,Max	APHA 23 rd Ed,2017 : 2540 C	500	2000	324	283
CHEMICAL PARAMETER							
1	Aluminium as(Al)	mg/l,Max	APHA 3500Al B	0.03	0.2	BDL	BDL
2	Ammonical Nitrogen(NH ₃ .N)	mg/l,Max	APHA 4500 NH ₃ .C	0.5	0.5	BDL	BDL
3	Anionic Detergents (as MBAS)	mg/l,Max	APHA 5540 C	0.2	1.0	ND	ND
4	Barium(Ba)	mg/l,Max	APFA 3111,B	0.7	0.7	BDL	BDL
5	Boron (as B)	mg/l,Max	APHA 4500 B,B	0.5	1.0	BDL	BDL
6	Calcium (as Ca)	mg/l,Max	APHA 23 rd Ed,2017 : 3500Ca B	75	200	44.7	51.2
7	Chloramines (as Cl ₂)	mg/l,Max	APHA 4500 –Cl G	4.0	4.0	ND	ND
8	Chloride (as Cl)	mg/l,Max	APHA 23 rd Ed,2017 : 4500Cl ⁻ B	250	1000	37.5	35
9	Copper (as Cu)	mg/l,Max	APHA 3111 B,C	0.05	1.5	BDL	BDL
10	Fluoride (as F)	mg/l,Max	APHA 4500 F,C	1.0	1.5	0.32	0.28
11	Residual, free Chlorine	mg/l,Min	APHA 4500 Cl B	0.2	1.0	ND	ND
12	Iron (as Fe)	mg/l,Max	APHA 23 rd Ed,2017 : 3111, B	0.3	0.3	0.27	0.25
13	Magnesium (as Mg)	mg/l,Max	APHA 3500 Mg B	30	100	20.5	18
14	Manganese (as Mn)	mg/l,Max	APHA 3500Mn B	0.1	0.3	BDL	BDL



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15	Mineral Oil	mg/l,Max	APHA 5520 B	0.5	0.5	BDL	BDL
16	Nitrate (as NO ₃)	mg/l,Max	APHA 4500 NO ₃ ⁻ E	45	45	8.1	7.2
17	Phenolic Compounds(as C ₆ H ₅ OH)	mg/l,Max	APHA 5530 B,D	0.001	0.002	BDL	BDL
18	Selenium (as Se)	mg/l,Max	APHA 23 rd Ed,2017: 3500 Se C	0.01	0.01	BDL	BDL
19	Silver(asAg)	mg/l,Max		0.1	0.1	BDL	BDL
20	Sulphate (as SO ₄)	mg/l,Max	APHA 4500 SO ₄ ²⁻ E	200	400	0.32	0.28
21	Sulphide (as H ₂ S)	mg/l,Max	0.05	0.05	0.05	ND	ND
22	Alkalinity	mg/l,Max	APHA 2320 B	200	600	165	160
23	Total Hardness (as CaCO ₃)	mg/l,Max	APHA 23 rd Ed,2017 : 2340 C	200	200	196	192
24	Zinc (as Zn)	mg/l,Max	APHA 23 rd Ed,2017: 3111 B	5	5	BDL	BDL
1	Chromium (as Cr ⁺⁶)	mg/l,Max	APHA 3500Cr B	0.05	0.05	BDL	BDL
2	Cadmium as(Cd)	mg/l,Max	APHA 23 rd Ed,2017: 3111 B	0.003	0.003	BDL	BDL
3	Cyanide as (CN ⁻)	mg/l,Max	APHA 23 rd Ed,2017: 4500 CN ⁻ C,D	0.05	0.05	BDL	BDL
4	Lead as(Pb)	mg/l,Max	APHA 23 rd Ed,2017 3111 B	0.1	0.1	BDL	BDL
5	Mercury as (Hg)	mg/l,Max	APHA 23 rd Ed,2017: 3111 B	0.001	0.001	BDL	BDL
6	Nickel (Ni)	mg/l,Max	IS 5185 (Part-22)	0.02	0.02	BDL	BDL
7	Arsenic as (As)	mg/l,Max	APHA 23 rd Ed,2017: 3114 B	0.01	0.01	BDL	BDL
8	Polychlorinated biphenyls	mg/l,Max	APHA 23 rd Ed,2017 :6440 B	0.0005	0.0005	ND	ND
9	Polyaromatic hydrocarbons (PAH)	mg/l,Max	APHA 23 rd Ed,2017 :6440 B	0.0001	0.0001	ND	ND
10	Total Chromium	mg/l,Max	APHA 3500Cr B	0.05	0.05	BDL	BDL
11	Bromoform	mg/l,Max	APHA 6232	0.1	0.1	ND	ND
12	Dibromochloromethane	mg/l,Max	APHA 6232	0.1	0.1	ND	ND
13	Bromodichloromethane	mg/l,Max	APHA 6232	0.06	0.06	ND	ND
14	Chloroform	mg/l,Max	APHA 6232	0.2	0.2	ND	ND
15	Molybdenum (Mo)	mg/l,Max	IS 3025 (Part 2)	0.07	0.07	BDL	BDL
BACTERIOLOGICAL PARAMETER							
1	Total Coliform	MPN/100 ml	APHA 23 rd Ed,2017: 9221 B	Shall not be detectable in any 100 ml sample	ABSENT	ABSENT	



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PESTICIDES							
1	Endosulfan à	µg/l,Max	APHA 23rd edition: 6630 C	0.4	<0.005	<0.005	<0.005
2	Endosulfan ß	µg/l,Max	APHA 23rd edition: 6630 C	0.4	<0.005	<0.005	<0.005
3	Endosulfan sulphate	µg/l,Max	APHA 23rd edition: 6630 C	0.4	<0.005	<0.005	<0.005
4	Alachlor	µg/l, Max	APHA 23rd edition: 6630 C	20	<0.01	<0.01	<0.01
5	Atrazine	µg/l, Max	APHA 23rd edition: 6630 C	2.0	<0.01	<0.01	<0.01
6	Aldrin	µg/l, Max	APHA 23rd edition: 6630 C	0.03	<0.01	<0.01	<0.01
8	Alpha HCH	µg/l, Max	APHA 23rd edition: 6630 C	0.01	<0.01	<0.01	<0.01
9	Beta HCH	µg/l, Max	APHA 23rd edition: 6630 C	0.04	<0.01	<0.01	<0.01
10	Delta HCH	µg/l, Max	APHA 23rd edition: 6630 C	0.04	<0.01	<0.01	<0.01
11	Butachlor	µg/l, Max	APHA 23rd edition: 6630 C	125.0	<0.01	<0.01	<0.01
12	Chloropyriphos	µg/l, Max	APHA 23rd edition: 6630 C	30.0	<0.01	<0.01	<0.01
13	2,4-Dichlorophenoxyacetic acid	µg/l, Max	APHA 23rd edition: 6630 C	30.0	<0.05	<0.05	<0.05
14	p p DDE	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
15	p p DDD	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
16	p p DDT	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
17	o p DDE	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
18	o p DDD	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
19	o p DDT	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
20	Ethion	µg/l, Max	APHA 23rd edition: 6630 C	3.0	<0.01	<0.01	<0.01
21	Lindane	µg/l, Max	APHA 23rd edition: 6630 C	2.0	<0.01	<0.01	<0.01
22	Isoproturon	µg/l, Max	APHA 23rd edition: 6630 C	9.0	<0.01	<0.01	<0.01
23	Malathion	µg/l, Max	APHA 23rd edition: 6630 C	190.0	<0.01	<0.01	<0.01
24	Methyl parathion	µg/l, Max	APHA 23rd edition: 6630 C	0.3	<0.01	<0.01	<0.01
25	Monocrotophos	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.01	<0.01	<0.01
26	Phorate	µg/l, Max	APHA 23rd edition: 6630 C	2.0	<0.01	<0.01	<0.01

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Ref : Envlab/23-24/R-00738

Date : 08.04.2023

EFFLUENT WATER DISCHARGE ANALYSIS REPORT- MAR 2023

1. Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
2. Name of the Project : Kalarangiatta Chromite Mines , Kaliapani, Jajpur
3. Sampling Location : EW1: ETP Mines Final Discharge Water
4. Method of Sampling : APHA 1060 B
5. Date of Sampling : 11.03.2023
6. Date of Analysis : 13.03.2023 to 18.03.2023
7. Sample Collected by : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameters	Testing Methods	Unit	Standards As Per CTO	Analysis Results
					EW-1
1	Colour	Visual Comparison Method APHA 2120 B; 23 rd Edition, 2017	Hazen	Colourless	<5
2	Odour	Threshold Odour Method APHA 2150 B; 23 rd Edition, 2017	--	Odourless	Agreeable
3	pH at 25°C	pH Meter APHA 4500 H ⁺ B; 23 rd Edition, 2017	--	5.5-9.0	8.64
4	Total Suspended Solids	Gravimetric Method APHA 2540 D; 23 rd Edition, 2017	mg/l	100	52
5	Copper as Cu	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	3	BDL
6	Fluoride as F	Distillation followed by Spectrophotometric Method APHA 4500 F ⁻ C,D; 23 rd Edition, 2017	mg/l	2	0.41
7	Total Residual Chlorine	Iodometric Method APHA 23RD Ed, 2017 : 4500Cl ₂ B	mg/l	1	ND
8	Iron as Fe	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	3	0.47
9	Manganese as Mn	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	2	BDL
10	Nitrate as NO ₃	By UV-Screen Method APHA 4500 NO ₃ ⁻ B; 23 rd Edition, 2017	mg/l	10	8.2
11	Phenolic Compounds as C ₆ H ₅ OH	Distillation Followed by Spectrophotometric Method APHA 5530-B, D; 23 rd Edition, 2017	mg/l	1	BDL
12	Selenium as Se	By AAS Method APHA 3500 Se C; 23 rd Edition, 2017	mg/l	0.05	BDL
13	Cadmium as Cd	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	2.0	BDL
14	Cyanide as CN	Distillation Followed by Spectrophotometric Method APHA 4500 -CN-C,E; 23 rd Edition, 2017	mg/l	0.2	BDL
15	Lead as Pb	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	0.1	BDL
16	Mercury as Hg	By AAS Method APHA 3112 B; 23 rd Edition, 2017	mg/l	0.01	BDL
17	Nickel as Ni	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	3	BDL
18	Arsenic as As	By AAS Method APHA 3114 B; 23 rd Edition, 2017	mg/l	0.2	BDL
19	Total Chromium as Cr	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	2	0.26
20	Zinc as Zn	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	5	0.030
21	Hexavalent Chromium as Cr ⁺⁶	By AAS Method APHA 3500 Cr B; 23 rd Edition, 2017	mg/l	0.05	BDL
22	Vanadium as V	By AAS Method APHA 3500 V; 23 rd Edition, 2017	mg/l	0.2	BDL



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23	Temperature	By Thermometer APHA 2550 B; 23 rd Edition, 2017	°C	Shall not exceed 5°C above the receiving water temperature	35
24	Biochemical Oxygen Demand as BOD	Oxygen Depletion Method IS 3025 (Part 44):2003	mg/l	30	6.2
25	Chemical Oxygen Demand as COD	Open Reflux Method APHA 5220 B; 23 rd Edition, 2017	mg/l	250	36
26	Oil & Grease	Gravimetric Method (Solvent Extraction) APHA 5520 B; 23 rd Edition, 2017	mg/l	10	6.0
27	Ammonical Nitrogen as N	By TKN Method APHA 4500-NH ₃ C; 23 rd Edition, 2017	mg/l	50	5.9
28	Total Kjeldahl Nitrogen as N	By TKN Method APHA 4500-N _{org} C; 23 rd Edition, 2017	mg/l	100	6.2
29	Sulphide as S	By Methylene Blue Method APHA 4500-S D; 23 rd Edition, 2017	mg/l	2	BDL
30	Free Ammonia as NH ₃	By Calculation	mg/l	5	3.98
31	Dissolve Phosphate as PO ₄	APHA 23rd Edition 4500 P D	mg/l	5	1.52
32	Particulate Size of Suspended Solids	Gravimetric Method APHA 2540 D; 23 rd Edition, 2017	μ	Shall pass 850 micron IS Sieve	<850
33	Bio-assay Test	Evaluating Acute Toxicity IS 6582 (P-2) 2008	%	90% survival of fish after 96 hours in 100% effluent	96% Survival of Fish after 96 Hrs in 100% Effluent

CL – Colorless, ND – Not detected.

BDL (Below detection limit) Values : (Cu<0.02 mg/l, Mn<0.025 mg/l, C₆H₅OH<0.05mg/l, Hg<0.004mg/l, Cd<0.01 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.02 mg/l, Zn<0.65 mg/l, Cr⁶⁺<0.01 mg/l, Al<0.1 mg/l, B<0.1 mg/l, NO₃<1 mg/l)

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Ref : Envlab/23-24/R-00739

Date : 08.04.2023

EFFLUENT WATER DISCHARGE ANALYSIS REPORT-MAR 2023

1. Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
2. Name of the Project : Kalarangiatta Chromite Mines , Kaliapani, Jajpur
3. Sampling Location : EW1: ETP INLET
4. Method of Sampling : APHA 1060 B
5. Date of Sampling : 11.03.2023
6. Date of Analysis : 13.03.2023 to 18.03.2023
7. Sample Collected by : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameters	Testing Methods	Unit	Analysis Results
				EW-1
1	Colour	Visual Comparison Method APHA 2120 B; 23 rd Edition, 2017	Hazen	15
2	Odour	Threshold Odour Method APHA 2150 B; 23 rd Edition, 2017	--	pungent smell
3	pH at 25°C	pH Meter APHA 4500 H ⁺ B; 23 rd Edition, 2017	--	10.3
4	Total Suspended Solids	Gravimetric Method APHA 2540 D; 23 rd Edition, 2017	mg/l	76
5	Copper as Cu	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	BDL
6	Fluoride as F	Distillation followed by Spectrophotometric Method APHA 4500 F ⁻ C,D; 23 rd Edition, 2017	mg/l	0.75
7	Total Residual Chlorine	Iodometric Method APHA 23RD Ed, 2017 : 4500Cl ₂ B	mg/l	ND
8	Iron as Fe	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	1.66
9	Manganese as Mn	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	BDL
10	Nitrate as NO ₃	By UV-Screen Method APHA 4500 NO ₃ ⁻ B; 23 rd Edition, 2017	mg/l	16.3
11	Phenolic Compounds as C ₆ H ₅ OH	Distillation Followed by Spectrophotometric Method APHA 5530-B, D; 23 rd Edition, 2017	mg/l	BDL
12	Selenium as Se	By AAS Method APHA 3500 Se C; 23 rd Edition, 2017	mg/l	BDL
13	Cadmium as Cd	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	BDL
14	Cyanide as CN	Distillation Followed by Spectrophotometric Method APHA 4500 -CN-C,E; 23 rd Edition, 2017	mg/l	BDL
15	Lead as Pb	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	BDL
16	Mercury as Hg	By AAS Method APHA 3112 B; 23 rd Edition, 2017	mg/l	BDL
17	Nickel as Ni	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	BDL
18	Arsenic as As	By AAS Method APHA 3114 B; 23 rd Edition, 2017	mg/l	BDL
19	Total Chromium as Cr	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	1.52
20	Zinc as Zn	By AAS Method APHA 3111 B; 23 rd Edition, 2017	mg/l	0.56
21	Hexavalent Chromium as Cr ⁺⁶	By AAS Method APHA 3500 Cr B; 23 rd Edition, 2017	mg/l	0.80
22	Vanadium as V	By AAS Method APHA 3500 V; 23 rd Edition, 2017	mg/l	BDL
23	Temperature	By Thermometer APHA 2550 B; 23 rd Edition, 2017	°C	34



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24	Dissolved Oxygen	Modified Winkler Method APHA 4500 O. C; 23 rd Edition, 2017	mg/l	6.2
25	Biochemical Oxygen Demand as BOD	Oxygen Depletion Method IS 3025 (Part 44):2003	mg/l	10.2
26	Chemical Oxygen Demand as COD	Open Reflux Method APHA 5220 B; 23 rd Edition, 2017	mg/l	292
27	Oil & Grease	Gravimetric Method (Solvent Extraction) APHA 5520 B; 23 rd Edition, 2017	mg/l	14.0
28	Ammonical Nitrogen as N	By TKN Method APHA 4500-NH ₃ C; 23 rd Edition, 2017	mg/l	8.8
29	Total Kjeldahl Nitrogen as N	By TKN Method APHA 4500-N _{org} C; 23 rd Edition, 2017	mg/l	13.1
30	Sulphide as S	By Methylene Blue Method APHA 4500-S D; 23 rd Edition, 2017	mg/l	BDL
31	Free Ammonia as NH ₃	By Calculation	mg/l	20.9
32	Dissolve Phosphate	APHA 23rd Edition 4500 P D	mg/l	6.4
33	Particulate Size of Suspended Solids	Gravimetric Method APHA 2540 D; 23 rd Edition, 2017	μ	<850
34	Bio-assay Test	Evaluating Acute Toxicity IS 6582 (P-2) 2008	%	No Survival of Fish after 96 Hrs in 100% Effluent

CL – Colorless, ND – Not detected.

BDL (Below detection limit) Values : (Cu<0.02 mg/l, Mn<0.025 mg/l, C₆H₅OH<0.05mg/l, Hg<0.004mg/l, Cd<0.01 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.02 mg/l, Zn<0.65 mg/l, Cr⁶⁺<0.01 mg/l, Al<0.1 mg/l, B<0.1 mg/l, NO₃<1 mg/l)

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Ref : Envlab/23-24/R-00740

Date : 08.04.2023

SURFACE WATER QUALITY ANALYSIS REPORT- MAR-2023

- Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
- Name of the Project : Kalarangiatta Chromite Mines , Kaliapani, Jajpur
- Sampling Location : SW1:Damsala Nallah Upstream Water (100 mtr Up)
 SW2: Damsala Nallah Downstream Water (100 mtr Down)
 (with impact of other mines discharge)
- Method of Sampling : APHA 1060 B
- Date of Sampling : 11.03.2023
- Date of Analysis : 13.03.2023 to 18..03.2023
- Sample Collected by : VCSPL Representative in presence of Client's Representative

Sl. No	Parameter	Testing Method	Unit	Standards as per IS-2296:1992 Class -'C'	Analysis Results	
					SW-1	SW-2
1	Colour (max)	Visual Comparison Method APHA 23 RD Ed.2017 : 2120 B. C	Hazen	300	<5	5
2	pH Value	pH Meter APHA 23 RD Ed.2017 : 4500H ⁺ B	--	6.0-9.0	7.34	7.30
3	Suspended solids	Gravimetric Method APHA 23 RD Ed.2017 : 2540 D	mg/l	--	72	89
4	Dissolved Oxygen (minimum)	Modified Winkler Method APHA 23 RD Ed.2017 : 2540 C	mg/l	4.0	6.2	6.5
5	Turbidity	Nephelometric Method APHA 23 RD Ed.2017: 2130 B	NTU	--	2.8	3.9
6	Chloride (max)	Titrimetric Method APHA 23 RD Ed.2017: 4500Cl ⁻ B	mg/l	600	17.5	20
7	Total Dissolved Solids	Gravimetric Method APHA 23 RD Ed.2017: 2540 C	mg/l	1500	102	136
8	BOD (3) days at 27°C (max)	IS 3025(P-44) : 1993 RA 2003	mg/l	3.0	BDL	BDL
9	Arsenic as As	By AAS Method APHA 23 RD Ed.2017: 3114 B	mg/l	0.2	BDL	BDL
10	Lead as Pb(max)	By AAS Method APHA 23 RD Ed.2017 3111 B	mg/l	0.1	BDL	BDL
11	Cadmium as Cd (max)	By AAS Method APHA 23 RD Ed 2017: 3111 B	mg/l	0.01	BDL	BDL
12	Hexa Chromium as Cr ⁺⁶	Diphenyl Carbazide Method APHA 23 RD Ed.2017: 3500Cr B	mg/l	0.05	<0.01	<0.01
13	Copper as Cu (max)	By AAS Method APHA 23 RD Ed.2017: 3111 B	mg/l	1.5	BDL	BDL
14	Zinc as Zn(max)	By AAS Method APHA 23 RD Ed.2017: 3111 B	mg/l	15	BDL	BDL
15	Selenium as Se (max)	By AAS Method APHA 23 RD Ed.2017: 3500 Se C	mg/l	0.05	BDL	BDL
16	Cyanide as CN (max)	Distillation followed by Spectrophotometric Method APHA 23 RD Ed.2017: 4500	mg/l	0.05	BDL	BDL
17	Fluoride as F (max)	Distillation followed by Spectrophotometric Method APHA 23 RD Ed.2017: 4500F ⁻ C	mg/l	1.5	0.28	0.33
18	Sulphates (SO ₄) (max)	Turbidimetric Method APHA 23 RD Ed.2017: 4500 SO ₄ ²⁻ F	mg/l	400	0.95	1.11
19	Phenolic Compounds as C ₆ H ₅ OH (max)	Chloroform Extraction By Colorimetric Method APHA 23 RD Ed.2017: 5530 B,D	mg/l	0.005	BDL	BDL



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20	Iron as Fe (max)	By AAS Method APHA 23 RD Ed,2017: 3500Fe, B	mg/l	0.5	0.076	0.069
21	Nitrate as NO ₃ , (max)	By UV-Screen Method APHA 23 RD Ed,2017: 4500 NO ₃ ⁻ E	mg/l	50	3.1	3.5
22	Anionic Detergents (max)	Anionic Surfactants as MBAS APHA 23 RD Ed,2017: 5540 C	mg/l	1.0	ND	ND
23	Total Coli form	By Multiple Tube Fermentation Technique APHA 23 RD Ed,2017: 9221 B	MPN/ 100 ml	5000	920	1600

CL – Colorless, ND – Not detected.

BDL (Below detection limit) Values : (Cu<0.02 mg/l, Mn<0.025 mg/l, C₆H₅OH<0.05mg/l, Hg<0.004mg/l, Cd<0.01 mg/l, Se<0.001 mg/l, As<0.004 mg/l, Pb<0.02 mg/l, Zn<0.65 mg/l, Cr⁺⁶<0.01 mg/l, Al<0.1 mg/l, B<0.1 mg/l, NO₃<1 mg/l)

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Ref : Envlab/23-24/R-00741

Date : 08.04.2023

MEASUREMENT OF GROUND WATER QUALITY ANALYSIS REPORT MAR-2023

1. Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
2. Name of the Project : KALARANGIATTA CHROMITE MINES , KALIAPANI, JAJPUR
3. Sampling Location : GW1: Tube Well Near TISCO Main Gate
GW2: Tube Well inside the Lease hold Area
GW3: Open Well at Ransol Village
GW4: Tube Well at Kalarangiatta Village
GW5: Tube Well at Bhimta Nagar Village
4. Method of Sampling : APHA 1060 B
5. Date of Analysis : 11.03.2023
6. Sample Collected by : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018		Analysis Result				
				Acceptable Limit	Permissible Limit	GW1	GW2	GW3	GW4	GW5
						DOS:11.03.2023	DOS:11.03.2023	DOS:11.03.2023	DOS:11.03.2023	DOS:11.03.2023
1	Hexavalent Chromium as Cr ⁶⁺	By AAS Method APHA 23 RD Ed, 2017: 3500 Cr B	mg/l	--	--	BDL	BDL	BDL	BDL	BDL

BDL Values: 0.01 mg/l

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Ref : Envlab/23-24/R-00742

Date : 08.04.2023

SOIL QUALITY ANALYSIS REPORT- MAR 2023

1. Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
2. Name of the Project : KALARANGIATTA CHROMITE MINES , KALIAPANI, JAJPUR
3. Sampling Location : S1 : Near Ore Plot Area
S2 : Near Truck Parking Area
S3 : Near Dump Area
S4 : Near Lease Hold Area
4. Date of Sampling : 13.03.2023
5. Date of Analysis : 14.03.2023 to 17.03.2023
6. Sample Collected by : VCSPL Representative in presence of Client's Representative

Sl. No.	Name of the Parameters	Unit	Testing Method	Analysis Result			
				S1	S2	S3	S4
1	Mercury as Hg	mg/kg	EPA 3050B, 7000B Rev 02, 1996	ND	ND	ND	ND
2	Nickel as Ni	mg/kg	EPA 3050B, 7000B Rev 02, 1996	ND	ND	ND	ND
3	Cobalt as CO	mg/kg	EPA 3050B, 7000B Rev 02, 1996	ND	ND	ND	ND
4	Arsenic as As	mg/kg	EPA 3050B, 7000B Rev 02, 1996	ND	ND	ND	ND

BDL Value : Ni <50 mg/kg, CO < 10 mg/kg, As < 10 mg/kg, Hg <10 mg/kg

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Ref : Envlab/23-24/R-00743

Date : 08.04.2023

NOISE QUALITY ANALYSIS REPORT- MAR 2023

1. Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
2. Name of the Project : KALARANGIATTA CHROMITE MINES , KALIAPANI, JAJPUR
3. Date of Sampling : 01.03.2023
4. Sample Collected by : VCSPL Representative in presence of Client's Representative

Location ID	Location		Result in dB (A)	
			Day Time (6.00 am to 10.00pm)	Night Time (10.00pm to 6.00 am)
N1	Near Middle of the Quarry	Ambient	66.2	59.7
N2	Near Office Building		59.6	55.4
N3	At project site		62.3	60.3
N4	Near main gate		66.8	61.4
N5	Near Chromite Quarry colony		54.5	42.3
N6	Near Bhimtangar Chromite colony		50.3	44.3
N7	Near Kaliapani bus stand		57.6	54.5
N8	At Kalarangi Village		51.9	42.7
N9	At Godisahi village		54.1	44.8
N10	At Chadeiragada village		53.9	43.6
N11	Naer to TATA hospital area		48.7	38.9
N12	At Tarini market, TATA mines chhak		64.5	54.7
N13	Near Ransol Village		52.3	49.1

AMBIENT NOISE LEVEL STANDARD

Category Area/Zone	Limit in dB (A)	
	Day Time (6.00 am to 10.00pm)	Night Time (10.00pm to 6.00 am)
Industrial Area	75	70
Residential Area	55	45
Commercial Area	65	55
Silence Zone	50	40

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Ref : Envlab/23-24/R-00744

Date : 08.04.2023

GROUND WATER LEVEL REPORT- MAR2023

1. Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
2. Name of the Project : KALARANGIATTA CHROMITE MINES , KALIAPANI, JAJPUR
3. Sample Collected by : VCSPL Representative in presence of Client's Representative

SL.No.	Locations	DOS	Unit	Analysis Result
1	Tube Well Water Near TISCO Main Gate	11.03.2023	mt/bgl	8.1
2	Tube Well Inside the Lease Hold Area	11.03.2023	mt/bgl	7.7
3	Open Well Water of Ransol	11.03.2023	mt/bgl	8.4
4	Tube Well Water of Kalarangiatta	11.03.2023	mt/bgl	7.0
5	Tube Well Water of Bhimtanagar	11.03.2023	mt/bgl	7.3
6	Open Well Village Goramian	11.03.2023	mt/bgl	7.5
7	Tube Well Near OMC Labour Colony	11.03.2023	mt/bgl	7.6
8	Open Well at Village Chingudipal	11.03.2023	mt/bgl	8.0
9	Open Well at Village Kusumundia	11.03.2023	mt/bgl	8.3

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Ref : Envlab/23-24/R-00745

Date : 08.04.2023

FUGITIVE EMISSION ANALYSIS REPORT- MAR2023

1. Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
2. Name of the Project : KALARANGIATTA CHROMITE MINES , KALIAPANI, JAJPUR
3. Sampling Location : F1- Near Mines Ore Plot Area
F2- Near Office
4. Method of Sampling: IS 5182(P-5) 1975 RA 2014
5. Date of Sampling : 13.03.2023
6. Date of Analysis : 14.03.2023 to 18.03.2023
7. Sample Collected by : VCSPL Representative in presence of Client's Representative

SL. No.	Test Parameters	Test Method	Standard as per MoEF & CC Notification 03 rd Feb,2006	Unit	Analysis Result	
					F1	F2
1	Suspended Particulate Matter as SPM	IS 5182 (P-4)1999 RA 2014 Gravimetric Method	1200	µg/m ³	229	305

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Ref : Envlab/23-24/R-00746

Date : 08.04.2023

DUSTFALL ANALYSIS REPORT- MAR 2023

1. Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
2. Name of the Project : KALARANGIATTA CHROMITE MINES , KALIAPANI, JAJPUR
3. Sampling Location : DF1-Near Roof Top of Office Building
4. Date of Sampling : 13.03.2023
5. Sample Collected by : VCSPL Representative in presence of Client's Representative

SL.No.	Parameters	Unit (mg of deposit per square meter per day)	Analysis Result
			DF1
1	Mercury as Hg	mg/m ² d	ND
2	Nickel as Ni	mg/m ² d	ND
3	Cobalt as CO	mg/m ² d	ND
4	Arsenic as As	mg/m ² d	ND

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Ref : Envlab/23-24/R-00747

Date : 08.04.2023

STP WATER QUALITY ANALYSIS REPORT- MAR 2023

Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK

Name of the Project : KALARANGIATA CHROMITE MINES , KALIAPANI, JAJPUR

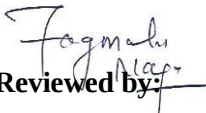
Sampling Location: W1: 20 KLD STP Near Nursery

Method of Sampling: APHA 1060 B

Date of Sampling: 11.03.2023

Date of Analysis: 13.03.2023 to 18.03.2023

SL. NO.	PARAMETERS	Unit of Measurement	Method of Testing	MOEF & CC Standard Dt:13.10.2017	RESULT
					W1
1	pH Value (at 25°C)	--	APHA 4500H ⁺ B	6.5-9.0	6.84
2	Suspended Solids	mg/l	APHA 2540 D	<100	75
3	Oil & Grease	mg/l	APHA 5520 B	--	4.4
4	BOD(3) days at 27°C	mg/l	APHA 5210 B	30	8.6
5	COD	mg/l	APHA 5220 C	--	18.0
6	Total Chromium (as Cr)	mg/l	APHA 3111 B	--	<0.01
7	Faecal Coliform	MPN/100ml	APHA 9221 E	<1000	32

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Ref : Envlab/23-24/R-00749

Date : 08.04.2023

SOURCE EMISSION ANALYSIS REPORT-MARCH 2023

Name & Address of the Client: Kalarangiata Chromite Mines (M/S Ferro Alloys Corporation Limited),
Sukinda, Jajpur

Sample Type : Stack Sample
Date of Sampling : 13.03.2023
Date of Analysis : 14.03.2023 to 18.03.2023
Sampling Done by : VISIONTEK CONSULTANCY SERVICE PVT LTD

Sl.No.	Parameters	Stack-1 COB DG I	CPCB Standard for DG ≥ 800 KW (≥ 1000 KVA)
		Capacity: 15 KVA	
1	Stack °C	174	--
2	Stack Velocity m/sec	14.91	--
3	Particulate Matter (PM), mg/Nm ³	46	75 g/Nm ³
4	Oxides of Nitrogen (NO _x), ppm	41	710 ppm
5	Carbon Monoxide, mg/Nm ³	38.5	150 mg/Nm ³
6	Non Methyl Hydro Carbon as C, mg/Nm ³	18.7	100 mg/Nm ³

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heresults stated in the test report are refer only to the sample tested. Test report shall not be reproduced in full without written approval of the Company

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Ref : Envlab/23-24/R-00750

Date : 08.04.2023

Silica Content in AAQ

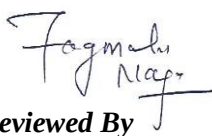
Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK

Name of the Project : Kalarangiatta Chromite Mines , Kaliapani, Jajpur

Sample Collected By : VCSPL representative in presence of Client's representative

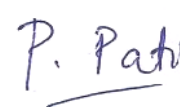
Sl. No.	Date of monitoring	Sampler attached to person	Personal Respirable Dust (mg/m ³)	Respirable free Silica (%)
1	13.03.2023	Nalmohan Sardar	0.52	2.1
2	13.03.2023	Sarla Mohanta	0.62	2.6
3	13.03.2023	Suresh Mahanta	0.74	2.2
4	13.03.2023	Gopi Tingua	0.70	2.4

DGMS Standards: Average concentration during each shift 3 mg/m³ where free silica in air borne dust is 5% or less.

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Ref : Envlab/23-24/R-00751

Date : 08.04.2023

HAZARDOUS WASTE ANALYSIS REPORT

Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK

Name of the Sample : S1:Used Oil of Kalarangiatta Chromite Mines

Date of Sampling : 18.03.2023

Date of Analysis : 19.03.2023 to 23.03.2023

SL. No.	Name of the Parameters	Unit	Conc. Limit as per schedule-II of Hazardous waste Rule,2016	Analysis Result S1
1	Arsenic	mg/kg	5.0	<0.004
2	Cadmium	mg/kg	1.0	0.55
3	Chromium and/or chromium(III) compound	mg/kg	5.0	1.76
4	Lead	mg/kg	5.0	0.44
5	Manganese	mg/kg	10.0	<0.05
6	Mercury	mg/kg	0.2	<0.002
7	Selenium	mg/kg	1.0	<0.001
8	Cobalt	mg/kg	80.0	<0.05
9	Copper	mg/kg	25.0	0.37
10	Molybdenum	mg/kg	35.0	<1.0
11	Nickel	mg/kg	20.0	0.55
12	Zinc	mg/kg	250.0	<5.0
13	Fluoride	mg/kg	180.0	1.3
14	Polychlorinated Biphenyls (PCBs)	mg/kg	<2	0.5
15	Polyaromatic Hydrocarbons (PAH)	%	6.0	0.8
Hazardous Characteristics as per Schedule-II Class C of Hazardous Waste Rule,2016				
16	Flammable	--	--	Liquid
17	Corrosive(pH)	--	--	5.5
18	Reactive or Explosive	--	--	Reactive

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Ref : Envlab/23-24/R-00752

Date: 08.04.2023

DRINKING WATER QUALITY ANALYSIS REPORT- MAR 2023

1. Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
2. Name of the Project : Kalarangiatta Chromite Mines , Kaliapani, Jajpur
3. Sampling Location : DW1:Canteen
4. Method of Sampling : APHA 1060 B
5. Date of Sampling : 11.03.2023
6. Date of Analysis : 12.03.2023 TO 16.03.2023
7. Sample Collected by : VCSPL Representative in presence of Client's Representative

7. Sample Collected by : VSE Representative in presence of Client's Representative						
Sl. No.	Parameter	Unit	TEST METHOD	Standard as per IS -10500:2012 Amended on 2015 & 2018		GW1
				Acceptable Limit	Permissible Limit	
Physical Parameter						
1	Colour	Hazen,Max	APHA 23 rd Ed,2017 : 2120 B, C	5	15	<5
2	Odour	--	APHA 23 rd Ed,2017 :2120 B	Agreeable	Agreeable	Agreeable
3	pH at 25°C	--	APHA 23 Rd Ed,2017 : 4500H ⁺ B	6.5-8.5	6.5-8.5	7.25
3	Taste	--	APHA 23 rd Ed,2017 : 2160 C	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU,Max	APHA 2130 B	1	5	0.6
5	Dissolved Solids	mg/l,Max	APHA 23 rd Ed,2017 : 2540 C	500	2000	259
CHEMICAL PARAMETER						
1	Aluminium as(Al)	mg/l,Max	APHA 3500Al B	0.03	0.2	BDL
2	Ammonical Nitrogen(NH ₃ -N)	mg/l,Max	APHA 4500 NH ₃ -C	0.5	0.5	BDL
3	Anionic Detergents (as MBAS)	mg/l,Max	APHA 5540 C	0.2	1.0	ND
4	Barium(Ba)	mg/l,Max	APFA 3111,B	0.7	0.7	BDL
5	Boron (as B)	mg/l,Max	APHA 4500 B,B	0.5	1.0	BDL
6	Calcium (as Ca)	mg/l,Max	APHA 23 rd Ed,2017 : 3500Ca B	75	200	41.5
7	Chloramines (as Cl ₂)	mg/l,Max	APHA 4500 –Cl G	4.0	4.0	ND
8	Chloride (as Cl)	mg/l,Max	APHA 23 rd Ed,2017 : 4500Cl ⁻ B	250	1000	30
9	Copper (as Cu)	mg/l,Max	APHA 3111 B,C	0.05	1.5	BDL
10	Fluoride (as F)	mg/l,Max	APHA 4500 F,C	1.0	1.5	0.23



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11	Residual, free Chlorine	mg/l,Min	APHA 4500 Cl B	0.2	1.0	ND
12	Iron (as Fe)	mg/l,Max	APHA 23 rd Ed,2017 : 3111, B	0.3	0.3	0.25
13	Magnesium (as Mg)	mg/l,Max	APHA 3500 Mg B	30	100	17.1
14	Manganese (as Mn)	mg/l,Max	APHA 3500Mn B	0.1	0.3	BDL
15	Mineral Oil	mg/l,Max	APHA 5520 B	0.5	0.5	BDL
16	Nitrate (as NO ₃)	mg/l,Max	APHA 4500 NO ₃ ⁻ E	45	45	5.4
17	Phenolic Compounds(as C ₆ H ₅ OH)	mg/l,Max	APHA 5530 B,D	0.001	0.002	BDL
18	Selenium (as Se)	mg/l,Max	APHA 23 rd Ed,2017: 3500 Se C	0.01	0.01	BDL
19	Silver(asAg)	mg/l,Max		0.1	0.1	BDL
20	Sulphate (as SO ₄)	mg/l,Max	APHA 4500 SO ₄ ²⁻ E	200	400	25.8
21	Sulphide (as H ₂ S)	mg/l,Max	0.05	0.05	0.05	ND
22	Alkalinity	mg/l,Max	APHA 2320 B	200	600	130
23	Total Hardness (as CaCO ₃)	mg/l,Max	APHA 23 rd Ed,2017 : 2340 C	200	200	178
24	Zinc (as Zn)	mg/l,Max	APHA 23 rd Ed,2017: 3111 B	5	5	BDL
1	Chromium (as Cr ⁺⁶)	mg/l,Max	APHA 3500Cr B	0.05	0.05	BDL
2	Cadmium as(Cd)	mg/l,Max	APHA 23 rd Ed,2017: 3111 B	0.003	0.003	BDL
3	Cyanide as (CN ⁻)	mg/l,Max	APHA 23 rd Ed,2017: 4500 CN ⁻ C,D	0.05	0.05	BDL
4	Lead as(Pb)	mg/l,Max	APHA 23 rd Ed,2017 3111 B	0.1	0.1	BDL
5	Mercury as (Hg)	mg/l,Max	APHA 23 rd Ed,2017: 3111 B	0.001	0.001	BDL
6	Nickel (Ni)	mg/l,Max	IS 5185 (Part-22)	0.02	0.02	BDL
7	Arsenic as (As)	mg/l,Max	APHA 23 rd Ed,2017: 3114 B	0.01	0.01	BDL
8	Polychlorinated biphenyls	mg/l,Max	APHA 23 rd Ed,2017 :6440 B	0.0005	0.0005	ND
9	Polyaromatic hydrocarbons (PAH)	mg/l,Max	APHA 23 rd Ed,2017 :6440 B	0.0001	0.0001	ND
10	Total Chromium	mg/l,Max	APHA 3500Cr B	0.05	0.05	BDL
11	Bromoform	mg/l,Max	APHA 6232	0.1	0.1	ND
12	Dibromochloromethane	mg/l,Max	APHA 6232	0.1	0.1	ND
13	Bromodichloromethane	mg/l,Max	APHA 6232	0.06	0.06	ND
14	Chloroform	mg/l,Max	APHA 6232	0.2	0.2	ND
15	Molybdenum (Mo)	mg/l,Max	IS 3025 (Part 2)	0.07	0.07	BDL
BACTERIOLOGICAL PARAMETER						
1	Total Coliform	MPN/100 ml	APHA 23 rd Ed,2017: 9221 B	Shall not be detectable in any 100 ml sample		ABSENT



Visiontek Consultancy Services Pvt. Ltd.

(Committed For Better Environment)

Certified for : ISO 9001:2015, ISO 14001:2015, ISO 45001:2018 (OH&S), ISO/IEC 17025:2017

Accredited by : NABET-A Grade, MOEF & CC/CPCB & SPCB-A Grade

Laboratory Services

Environment Lab
Food Lab
Material Lab
Soil Lab
Mineral Lab
&
Microbiology Lab

- Infrastructure Engineering
- Water Resource Management
- Environmental & Social Study

- Surface & Sub-Surface Investigation
- Quality Control & Project Management
- Renewable Energy

- Agricultural Development
- Information Technology
- Public Health Engineering

- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

PESTICIDES							
1	Endosulfan à	µg/l,Max	APHA 23rd edition: 6630 C	0.4	<0.005	<0.005	<0.005
2	Endosulfan ß	µg/l,Max	APHA 23rd edition: 6630 C	0.4	<0.005	<0.005	<0.005
3	Endosulfan sulphate	µg/l,Max	APHA 23rd edition: 6630 C	0.4	<0.005	<0.005	<0.005
4	Alachlor	µg/l, Max	APHA 23rd edition: 6630 C	20	<0.01	<0.01	<0.01
5	Atrazine	µg/l, Max	APHA 23rd edition: 6630 C	2.0	<0.01	<0.01	<0.01
6	Aldrin	µg/l, Max	APHA 23rd edition: 6630 C	0.03	<0.01	<0.01	<0.01
8	Alpha HCH	µg/l, Max	APHA 23rd edition: 6630 C	0.01	<0.01	<0.01	<0.01
9	Beta HCH	µg/l, Max	APHA 23rd edition: 6630 C	0.04	<0.01	<0.01	<0.01
10	Delta HCH	µg/l, Max	APHA 23rd edition: 6630 C	0.04	<0.01	<0.01	<0.01
11	Butachlor	µg/l, Max	APHA 23rd edition: 6630 C	125.0	<0.01	<0.01	<0.01
12	Chloropyrifos	µg/l, Max	APHA 23rd edition: 6630 C	30.0	<0.01	<0.01	<0.01
13	2,4-Dichlorophenoxyacetic acid	µg/l, Max	APHA 23rd edition: 6630 C	30.0	<0.05	<0.05	<0.05
14	p p DDE	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
15	p p DDD	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
16	p p DDT	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
17	o p DDE	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
18	o p DDD	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
19	o p DDT	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.05	<0.05	<0.05
20	Ethion	µg/l, Max	APHA 23rd edition: 6630 C	3.0	<0.01	<0.01	<0.01
21	Lindane	µg/l, Max	APHA 23rd edition: 6630 C	2.0	<0.01	<0.01	<0.01
22	Isoproturon	µg/l, Max	APHA 23rd edition: 6630 C	9.0	<0.01	<0.01	<0.01
23	Malathion	µg/l, Max	APHA 23rd edition: 6630 C	190.0	<0.01	<0.01	<0.01
24	Methyl parathion	µg/l, Max	APHA 23rd edition: 6630 C	0.3	<0.01	<0.01	<0.01
25	Monocrotophos	µg/l, Max	APHA 23rd edition: 6630 C	1.0	<0.01	<0.01	<0.01
26	Phorate	µg/l, Max	APHA 23rd edition: 6630 C	2.0	<0.01	<0.01	<0.01

Reviewed by



Approved by

P. Patil