OCM/ENV/ 960 /2022 Dated: 30.05.2022

To,

The Joint Director(s)
Ministry of Environment, Forest & Climate Change,
Eastern Regional Office,
Bhubaneswar

Sub.: Submission of Six-monthly compliance report to the conditions stipulated in the grant order of Environmental Clearance (EC) pertaining to Ostapal Chromite Mines of M/s FACOR LTD.

Ref.: MoEF EC Letter No.: J-11015/38/2006-IA II(M) dtd.06-12-2006

Dear Sir,
With reference to the captioned subject & cited reference, we are herewith submitting six monthly compliance reports pertaining to Ostapal Chromite Mines of M/s FACOR Ltd for the period from October'2021 to March'2022 for your kind perusal.
The Monthly & quarterly Environmental monitoring data for the period October'2021 to Mar'2022 comprising AAQ, Water, Noise & Soil are enclosed herewith as Annexures.

This is for your Kind information & necessary action.

Thanking You

Yours faithfully,
for Ferro Alloys Corporation LTD

MINES MANAGER

Encl.: A/a

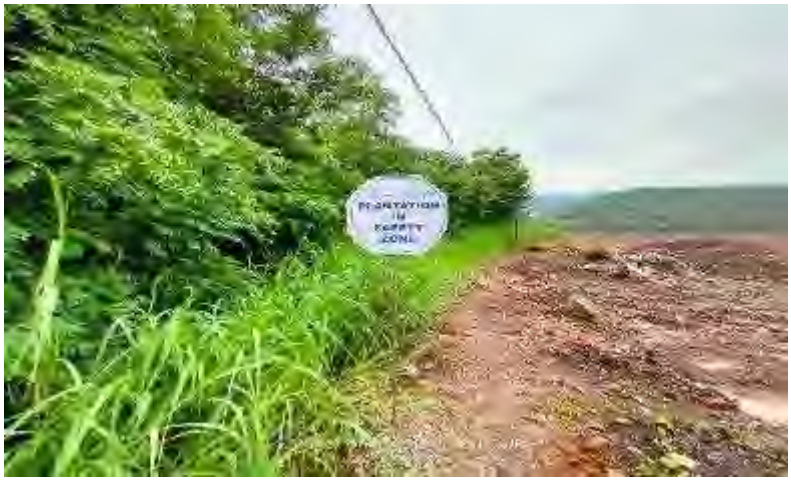
Name of the Project **OSTAPALCHROMITEMINES, M/S.FACORLTD.**

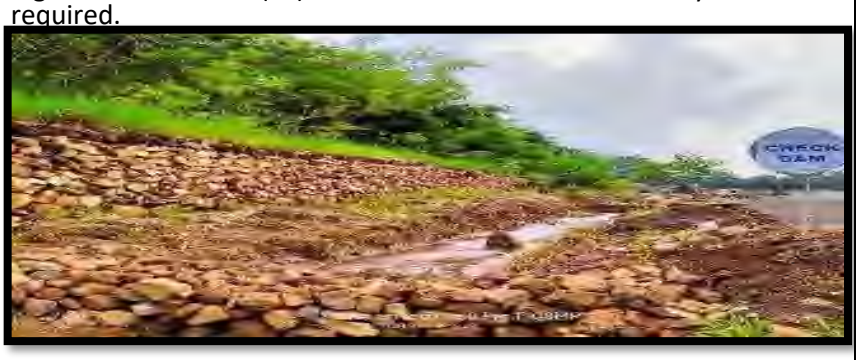
Project Code **Mining Non-Coal**

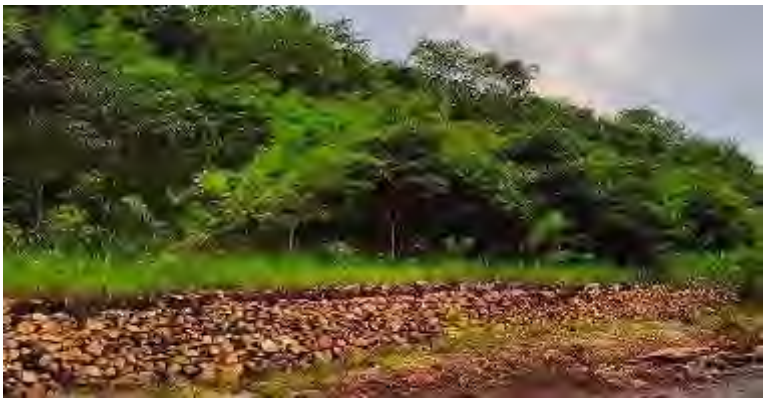
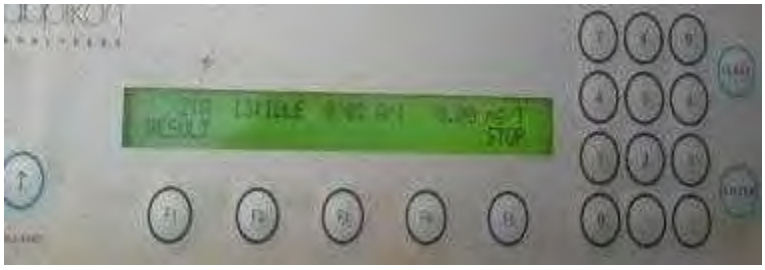
Clearance Letter No. With date **No. 11015/38/2006-IA-II M dt.06-12- 2006**

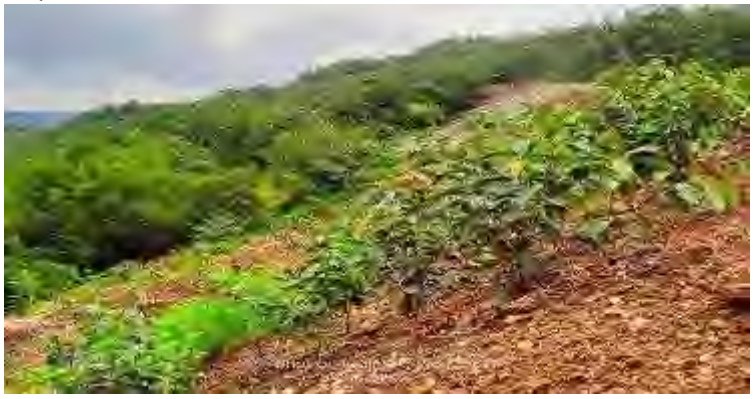
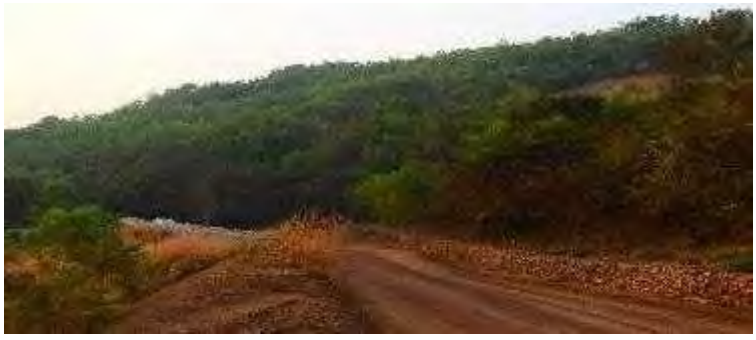
Period of Compliance Report **Oct'2021 to March'2022**

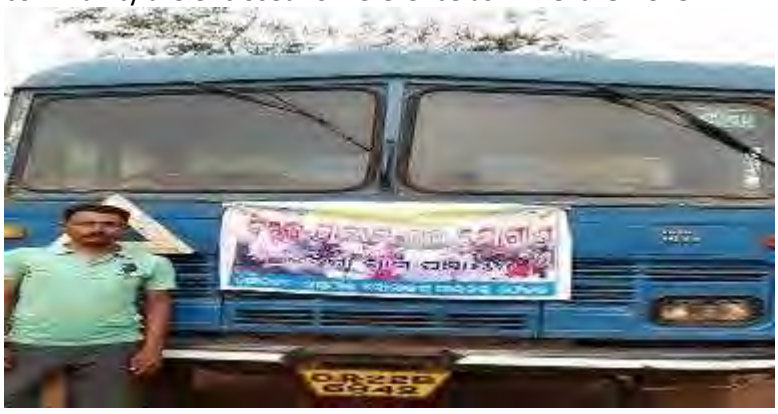
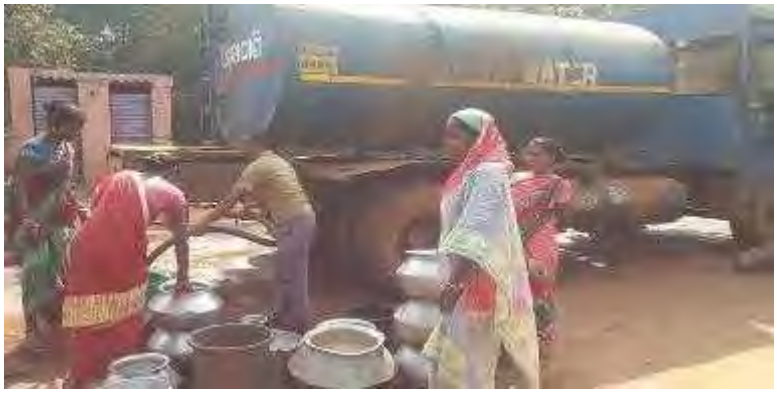
Specific Condition

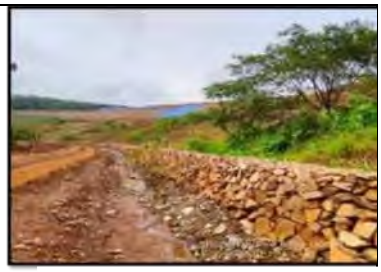
Sl. No.	Condition	Compliance Status
1.	All the conditions stipulated by the State Pollution control Board, in their Consent to establish should be effectively implemented.	All the stipulated conditions are being effectively implemented.
2.	Necessary forestry clearance under the Forest (Conservation) Act, 1980 for an area of 4.07 hectares forest land shall be obtained before starting mining operation in that area. Till such time mining activities shall be restricted to an area of 64.354 ha for which in principle forestry clearance has been obtained from the Ministry on 03.10.2005	This area is left as Safety Zone area for greenbelt around periphery of forest land of M.L. area and mining operations in this area will not be done.  **Plantation In Safety Zone**
3.	Topsoil should be stacked properly with proper slope at earmarked site(s) with adequate measures and should be used for reclamation and rehabilitation of mined out area.	No topsoil has been generated during the period Oct'2021 to March '2022.
4.	Over burden shall be stacked at earmarked dump site(s) only and should not be kept active for long period. The total height of the dump(s) should not exceed 45m in three stages of 15 m each, keeping overall slope of the dumps below 28^0. The proponent shall carry out slope stability study and submit report to the Ministry. The OB dumps should be scientifically vegetated with suitable native species to prevent erosion and surface run off. In critical areas, use of geo textiles shall be taken for stabilization of the dump. Monitoring and management of rehabilitated areas should continue until the vegetation becomes self - sustaining.	The inactive benches are being vegetated by suitable native species and massive grass plantation to prevent erosion & surface runoff. The management of the rehabilitated areas of the dumps has been continuing until the vegetation becomes self-sustaining. Further, in the weaker zone/part of the dump is being covered with Geo-textile to prevent erosion & to make it stable by planting the native species scientifically as follows: 

	Compliance status should be submitted to the Ministry of Environment & Forests on six monthly basis.	 **Plantation in Dump**
5.	Trace Metals such as Ni,Co,As, and Hg should be analyzed in dust fall and soil samples for at least one year during summer, monsoon and winter seasons. If concentrations of these metals are found below the standards, then with prior approval of MOEF this specific monitoring could be discontinued.	Collection and analysis of dust & soil samples is done, and the test reports are enclosed in **Annexure No.1.**
6.	Catch drains and siltation ponds of appropriate size should be constructed to arrest silt and sediment flows from soil, OB and mineral dumps. The water so collected should be utilized for watering the mine area, roads, plantation etc. The drains should be regularly de -silted and maintained properly. Garland drain (size, gradient and length) shall be constructed for both mine pit & waste dump and sump capacity should be designed keeping 50% safety margin over and above peak sudden rainfall (based on 50 years data) and maximum discharge in the area adjoining the mine site. Sump capacity should also provide adequate retention period to allow proper settling of silt material. Storm water return system should be provided. Storm water should not be allowed to go to the effluent treatment plant during high rainfall / super cyclone period. A separate storm water sump for this purpose should be created.	Catch drains around OB dumps and mineral stockyard have already been constructed with siltation ponds at regular intervals to arrest silt and sediments. Whenever required the silts and sediments are being cleaned from catch drains and siltation ponds and maintained regularly. Mine pumped out water is sufficient for dust suppression and plantation purposes. Hence catch drain water is dis-charging outside M.L. area through ETP process. Hence there is no need for collection of water from catch drains from mine area, roads, plantation etc. Garland drains of width 2m, depth 1.5m and length 3424 m with gradient have been constructed for maximum discharge of rainfall in the adjoining areas. There is no chance of flow of storm water into the effluent treatment plant during high rain fall/super cyclone period became the plant is at high reduced level (RL). Hence storm water return system is not required.  **Garland Drain with Chec Dam**

7.	Dimensions of retaining wall at the toe of OB dumps & benches within the mine to check run -off and siltation should be based on the rain fall data.	Retaining wall of width 1.5m and height 1.2m has already been constructed all around the toe of dumps up to a length of 3424 m to check the run -off and siltation.  **Retaining Wall**
8.	Effluents containing of Cr^{+6} shall be treated to meet the prescribed standards before reuse/discharge. Effluent Treatment plant should be provided for treatment of mine water discharge and wastewater generated from the workshop and mineral separation plant. Run off from OB dumps and other surface run off should be analyzed for Cr^{+6} and in case its concentration is found higher than the permissible limit the water should be treated before reuse/discharge.	An Effluent Treatment Plant is operating for treatment of Mines discharge water. The conc. of Cr^{+6} in treated discharge water is <0.05mg/l.  **ETP Outlet Cr^{+6} conc. data** The tailing water (waste water of mineral separation plant) also is being treated by adding $FeSO_4$ before discharge into tailing pond. The treated tailing pond water is being collected in an intake pond and being re -used in beneficiation plant. Thus, zero discharge from Beneficiation Plant is being maintained. Almost all mining machineries and transporting vehicles are being engaged on contract basis for transportation of OB and chrome ore. The company has few nos. of vehicles. The major repairing of these vehicles is being done at outside workshop and minor repairing is being done in our garage. Hence, discharge of workshop effluent is nil. The total surface runoff water is being collected in settling pond which are pumped to the ETP for treatment before final discharge.
9.	Separate impervious concrete pits for disposal of sludge shall be provided for the safe disposal of sludge generated from the mining operations.	Separate impervious pit has been provided for sludge generated from the treatment of effluent water through ETP.

10.	The Project proponent shall ensure that the quality of decanted effluents from the tailing pond confirm to the prescribed standards before discharge.	The effluents from tailing pond are not discharged outside. The supernatant water of the tailing pond is being collected in a sump adjacent to the tailing pond and re-circulated in Beneficiation Plant.
11.	The Project proponent shall explore the possibility to reduce concentration of Cr $^{+6}$ in the tailing pond in consultation with an Expert Scientific Institution like NEERI.	The Conc. of Cr $^{+6}$ in tailings is being reduced by adding $FeSO_4$ solution and disposed in the tailing pond. Further, NIT, Rourkela has been engaged for carrying out the study & to provide suitable technology to reduce the Cr+6. This study is under process.
12.	Plantation shall be raised in an area of 33.02 Ha including green belt in an area of 6.56 Ha by planting native species around ML area, OB dumps, and roads around worked out area etc. in consultation with local DFO/Agriculture Department . The density of the trees should be around 2000 plant species per hectare.	Plantation has been done over inactive/dead benches of OB dumps, Roadside, around C.O.B. Plant and other places in an area of 34.92 Ha. Plantation is being carried out in consultation with local Forest Department.  **Plantation in Benches of the Inactive/dead dump**  **Plantation along the haul road**
13.	Regular monitoring of ground water level & quality should be carried out by establishing a network of existing wells and constructing new piezometers during the mining operation. The monitoring should be carried out four times in a year– pre-monsoon (April -May), monsoon (August), post - monsoon (November) and winter (January) and the data thus collected may be sent regularly to MOEF, Central Ground Water Authority and Regional Director Central Ground Water Board.	Monitoring of ground water level & quality is being carried out by third party accredited agency. Further, DWLR with telemetry system fitted in Piezometer holes to carried out the real time monitoring of Ground water level.  The Monitoring reports has been sent & the monitoring report for the period from Oct'2021 to Mar'2022 is enclosed as: Ground water level & Quality : **Annexure No.-2 & 3**

14.	The project proponent shall carry out regular monitoring of ground water quality in all the 14 wells. The frequency of monitoring in 8 wells where concentration of Cr^{+6} is within permissible limits, will be quarterly while in the remaining 6 wells it will be on monthly basis.	The monitoring test reports of ground water quality in 14 wells have been analyzed & concentration of Cr^{+6} are within the limit. Copy enclosed as **Annexure No. - .**
15.	Project Authorities should meet water requirement of the peripheral village(s), especially, if the village wells go dry due to mine de - watering.	As a part of peripheral development nos. of borewell have been constructed in nearby villages and also potable water is being provided to nearby villages by water tankers. Reading of the abstraction structures, used for water supply to local community are enclosed for reference as **Annexure No.5**   **Water provided to near y village y tan ers**
16.	Permission from the competent authority should be obtained for drawl of ground water for domestic use.	NOC has been obtained from Central Ground Water Authority, Ministry of Water Resources, New Delhi vide NOC No.: CGWA/NOC/MIN/REN/1/2021/6481.

17.	Suitable rain water harvesting measures on long-term basis shall be planned and implemented in consultation with Regional Director, CGWB.	Rainwater has been collected in different structures for suitable rain water harvesting measures.  **Rooftop Rain-Water Harvesting**  **Garland drain**
18.	Drills should be wet operated or operated with dust extractors.	Wet Drilling is being practiced.
19.	Blasting operation should be carried out only during the daytime. Controlled blasting should be practiced. To mitigate measures for control of ground vibrations and to arrest fly rocks and boulders should be implemented.	Blasting operation is being carried out in day time only. Controlled blasting is being practiced by following Nonel & muffle blasting. Delay detonators are used for providing delay timings between rows and within rows of holes. Numbers of rows in a blast are restricted to less than three to get good fragmentation and to reduce fly rocks and ground vibration.
20.	The voids created at the end of mining shall be converted into water Body with shallow depths not exceeding 30m.The higher benches of the excavated void/mine pit shall be terraced and plantation done to stabilize the slopes. Peripheral fencing shall be done along the excavated area.	The same will be implemented at the end of mining operation. It has already been prepared in Mining Plan & submitted to IBM, Bhubaneswar
21.	Vehicular emissions should be kept under control and regularly monitored. Measures shall be taken for maintenance of vehicles used in mining operations and in transportation of mineral. The vehicles should be covered with a tarpaulin and shall not be overloaded.	Vehicular emission of all machinery used in mining operations are being monitored regularly and kept under control of rigorous maintenance of all engines and changing of lubricants as per the recommendation of the manufacturer. HEMMs have valid PUC Certificate which is only allowed for operation inside the Mines. All the transporting vehicles are being covered with tarpaulin and over loading are strictly avoided.
22.	Consent to operate should be obtained from SPCB before enhancing Production capacity of the mine.	Consent to operate has been obtained from SPCB, Bhubaneswar CTO has been enclosed for as **Annexure No.-6**

23.	Sewage treatment Plant should be installed for the colony. ETP should also be provided for workshop and wastewater generated from Mining operations.	Two nos. of STP have been installed. One is 20 KLD & another capacity is 10 KLD. All domestic wastewater generated point connected with STP and being treated there.  `  10 KLD STP Near Office | 20 KLD STP Near Dispensary Almost all mining machineries and transporting vehicles are being engaged on contract basis for transportation of OB and chrome ore. The company has few Nos. Of vehicles. However, major repairing of the vehicles are being done at outside workshop and minor repairing is being done in our garage. Hence, discharge of workshop effluent is nil. An ETP has already been established for treatment of mines water.   **Effluent Treatment Plant**
24.	A final mines closure plan along with details of corpus fund should be submitted to the Ministry of Environment & Forests 5 years in advance of final mine closure for approval.	The same will be submitted in due time to MOEF for approval.

GENERAL CONDITIONS

Sl. No.	Condition	Compliance Status
1	No change in mining technology & sco working should be made without approval of the MoEF.	The Mining technology & scope of working has not been changed.
2	No change in the calendar plan includi excavation, quantum of mineral Chromi and waste should be made.	The calendar plan including excavation, quantum of mineral Chromite and waste over burden has not been changed. The calendar plan including excavation, quantum of mineral chromite and waste over burden has been generated during the period (April 2021 to March, 2022) is given in **Annexure No. -7**.
3	Conservation measures for protection of flora & fauna in the Core & Buffer Zone should be drawn up in consultation with local forest & wildlife department.	As per the advice of Forest Department, we are maintaining vehicles, watchman and infrastructural facility as measures to protect Flora & Fauna in core & buffer zone. Further, Biodiversity study & Wildlife Management study has been conducted by accredited agency.
4	Four ambient air quality -monitoring stations should be established in the Core zone as well as in the Buffer zone for RPM, SPM, SO_2& NO_x monitoring. Location of the stations should be decided based on the meteorological data, topographical features, and environmentally and ecologically sensitive targets in consultation with the State Pollution Control Board.	Ambient Air quality monitoring stations has already been established in consultation with SPCB.  **Amient Air Quality Monitoring System**
5	Data on ambient Air Quality (RPM, SPM, SO_2 & NO_x) should be regularly submitted to the Ministry including its Regional Office at Bhubaneswar and the State Pollution Control Board / Central Pollution Control Board once in six months.	Test reports on Ambient Air Quality monitoring viz., PM_{10}, $PM_{2.5}$, SO_x, NO_x & CO is being monitored & submitted regularly. Monitoring report for the period Oct'2021 to March'2022 is enclosed as follows: **Annexure No.-8 Core Zone** **Annexure No.- Buffer Zone**

6	Fugitive dust emissions from all the sources should be controlled regularly. Water spraying arrangement on haul roads, loading & unloading and at transfer points should be provided and properly maintained.	Control of fugitive dust emissions is being carried out by water spraying on haul roads, Ore handling yard, loading and unloading points regularly. The test report of the same is enclosed as **Annexure No.-10**.  **Water sprin□ling in haul road**
7	Measures should be taken for control of noise levels below 85 dB (A) in work environment. Workers engaged in operations of HEMM, etc. should be provided with ear plugs / muffs.	Control measures such as maintenance of all machines including checking of silencers regularly, controlled blasting using delay detonators, installing immovable machinery on foundations with suitable rubber pad and closed rooms is being followed -up. The workers engaged at noise generating areas are allowed to work on rotation basis with providing earplugs/muffs. Location wise noise level at work environment is enclosed as **Annexure No. -11**.
8	Industrial wastewater (workshop & wastewater from the Mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May 1993 and 31st December 1993 or as amended from time to time. Oil & grease trap should be installed before discharge of workshop effluents.	The Mines wastewater is being pumped out directly in to the intake tank of the ETP for treatment of Cr^{+6} and part of the treated water is used for plantation, dust suppression and surplus treated water is finally discharged to outside ML area. The analysis of this water shows that all parameters are well within the prescribed limit. The analysis report of Mines final discharge water after treatment in E.T.P., for the period Oct'2021 to Mar'2022 is enclosed as **Annexure No.-12.** Almost all mining machineries and transporting vehicles are being engaged on contract basis for transportation of OB and chrome ore. The company has few nos. of vehicles. The major repairing of these vehicles is being done outside mines and minor repairing is being done in our garage. Hence, discharge of workshop effluent is not envisaged.

9	Personnel working in dusty areas should wear protective respiratory devices and they should also be provided with adequate training and information on safety and health aspects. Occupational health surveillance program of the workers should be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures, if needed.	In addition to water spraying to suppress dust generation, workers engaged in dusty areas such as drillers, dumper drivers, HEMM Operators are being provided with nose masks as precautionary measure. Training & information on safety, health hazards are being given to all categories of deserved workers. Occupational health surveillance program to all categories of workers and employees are being conducted.
10	A separate Environment Management Cell with suitable qualified personnel should be set -up under the control of a Senior Executive, who will report directly to the Head of the Organization.	A separate Environment Management Cell with qualified personnel and well-equipped Environment Engineering Laboratory is functioning under the control of a Senior Executive. Besides we are carrying out all Environmental monitoring & analysis through a MoEF & NABL accredited laboratory M/S VisionTek Consultancy Services Pvt. Ltd., Bhubaneswar & the monitoring reports are enclosed as Annexures.
11	The Project authorities should inform to the Regional Office located at Bhubaneswar regarding date of financial closures and final approval of the Project by the concerned authorities and the date of start of land development work.	The final approval of the Project is 06.12.2006. It is a mining industry. Hence, land development work is a continuous process.
12	The funds earmarked for environmental protection measures should be kept in separate account and should not be diverted for other purpose. Year wise expenditure should be reported to the Ministry and its Regional Office located at Bhubaneswar.	Separate funds provision is made to carryout environmental protection measures. Details of expenses during the year 2021-22 is given in **Annexure No. -13**

Annexure – 1

Analysis Of Dust Fall

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

- 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

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

Ref : Envlab/21/R-0063 Date : 12.01.2022

DUSTFALL ANALYSIS REPORT- DECEMBER- 2021

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 : 14.12.2021**
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^2d	ND
2	Nickel as Ni	mg/m^2d	ND
3	Cobalt as CO	mg/m^2d	ND
4	Arsenic as As	mg/m^2d	ND

Reviewed By

Approved By

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

- Infrastructure Enginering
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- Quality Control & Project Management
- Renewable Energy
- Agricultural Development
- Information Technology
- Public Health Engineering
- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

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

Ref : Envlab/21/R-5014 **Date : 31.03.2022**

DUST FALL ANALYSIS REPORT- MARCH 2022

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. **Sampling Location** : **DF1- Near Roof Top of Office Building**
4. **Date of Sampling** :**15.03.2022**
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^2d	ND
2	Nickel as Ni	mg/m^2d	ND
3	Cobalt as CO	mg/m^2d	ND
4	Arsenic as As	mg/m^2d	ND

Reviewed By

Approved By

Analysis of Soil Sample

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

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

Ref : Envlab/21/R-0022 **Date : 10.01.2022**

SOIL QUALITY ANALYSIS REPORT- DECEMBER- 2021

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. Sampling Location : **S1 : East Side Quarry**
   S2 : West Side Quarry
   S3 : North Side Quarry
   S4 : South Side Quarry
4. **Date of Sampling** : **14.12.2021**
5. Date of Analysis : **15.12.2021 TO 16.12.2021**
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

Reviewed By

Approved By

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

- Infrastructure Enginering
- 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

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

Ref : Envlab/21/R-5010 **Date : 31.03.2022**

SOIL QUALITY ANALYSIS REPORT- FEBRUARY 2022

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. Sampling Location : **S1 : East Side Quarry**
   S2 : West Side Quarry
   S3 : North Side Quarry
   S4 : South Side Quarry
4. **Date of Sampling** : **15.03.2022**
5. Date of Analysis : **16.03.2022 TO 18.03.2022**
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

VISIONTEK CONSULTANCY SERVICES PVT. LTD. Reviewed By

VISIONTEK CONSULTANCY SERVICES PVT. LTD. Approved By

Annexure – 2

GROUND WATER LEVEL MEASUREMENT

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

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- Infrastructure Enginering
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- Agricultural Development
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- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

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

Ref : Envlab/21/R-0067 **Date : 12.01.2022**

GROUND WATER LEVEL REPORT- DECEMBER 2021

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. **Date of Sampling : 14.12.2021**
4. Sample Collected by : VCSPL Representative in presence of Client's Representative

SL. No.	Locations	Unit	DOS	Analysis Result
1	Bore well Near Workshop of Mines	mt/bgl	14.12.2021	11.4
2	Bore well Near Main Gate of OCM	mt/bgl	14.12.2021	10.8
3	Open Well Near Ostia Village	mt/bgl	14.12.2021	4.1
4	Open Well Near Ostapal Village	mt/bgl	14.12.2021	5.6
5	Tube well inside Shiva Temple of the Village Gurujanga	mt/bgl	14.12.2021	10.8
6	Tube well outside Shiva Temple of the Village Gurujanga	mt/bgl	14.12.2021	11.4
7	Eastern side of the Quarry (PZ-1)	mt/bgl	14.12.2021	4.6
8	Southern side of the Quarry (PZ-2)	mt/bgl	14.12.2021	4.2
9	Watstern side of the Quarry (PZ-3)	mt/bgl	14.12.2021	4.1

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Annexure No.-2

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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- Mineral/Sub-Soil Exploration
- Waste Management Services

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

Ref : Envlab/21/R-5012 **Date : 31.03.2022**

GROUND WATER LEVEL REPORT- MARCH 2022

2. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
3. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
4. **Date of Sampling : 15.03.2022**
5. Sample Collected by : VCSPL Representative in presence of Client's Representative

SL. No.	Locations	Unit	DOS	Analysis Result
1	Bore well Near Workshop of Mines	mt/bgl	15.03.2022	11.6
2	Bore well Near Main Gate of OCM	mt/bgl	15.03.2022	10.8
3	Open Well Near Ostia Village	mt/bgl	15.03.2022	4.8
4	Open Well Near Ostapal Village	mt/bgl	15.03.2022	5.6
5	Tube well inside Shiva Temple of the Village Gurujanga	mt/bgl	15.03.2022	11.2
6	Tube well outside Shiva Temple of the Village Gurujanga	mt/bgl	15.03.2022	11.8
7	Eastern side of the Quarry (PZ-1)	mt/bgl	15.03.2022	4.8
8	Southern side of the Quarry (PZ-2)	mt/bgl	15.03.2022	4.2
9	Watstern side of the Quarry (PZ-3)	mt/bgl	15.03.2022	5.2

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Annexure No.-3

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

Ref : Envlab/21/R-0064 **Date : 12.01.2022**

GROUND WATER QUALITY ANALYSIS REPORT- DECEMBER 2021

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. Sampling Location : **GW1**: Bore well Near Work Shop of the Mines
   GW2 : Bore Well Near Main Gate of OCM
   GW3 : Open Well Near Ostio Village
4. Method of Sampling : **APHA 1060 B**
5. **Date of Sampling** : **16.12.2021**
6. Date of Analysis : **17.12.2021 TO 24.12.2021**
7. 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
Essential Characteristics								
1	Colour	**Visual Comparison Method** APHA 23rd Ed.2017 : 2120 B, C	Hazen	5	15	<5	<5	<5
2	Odour	**Threshold Odour Test** APHA 23rd Ed.2017 :2150 B	—	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	**Flavour Threshold Test** APHA 23rd Ed.2017 : 2160 C	—	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	**Nephelometric Method** APHA 23rd Ed.2017 :2130 B	NTU	1	5	6.1	7.1	7.4
5	pH Value @ 25°C	**pH Meter** APHA 23rd Ed.2017 :4500H B	—	6.5-8.5	No Relaxation	6.74	6.82	6.89
6	Total Hardness (as $CaCO_3$)	**EDTA Titrimetric Method** APHA 23rd Ed.2017 : 2340 C	mg/l	200	600	181	188	172
7	Iron (as Fe)	**By AAS Method** APHA 23rd Ed.2017 : 3111 B	mg/l	1.0	No Relaxation	0.21	0.24	0.21
8	Chloride (as Cl)	**Argentometric Method** APHA 23rd Ed.2017 :4500Cl B	mg/l	250	1000	42	38	36
9	Residual free Chlorine	**Iodometric Method** APHA 23rd Ed.2017 :4500Cl B	mg/l	0.2	1	ND	ND	ND
Desirable Characteristics								
10	Dissolved Solids	**Gravimetric Method** APHA 23rd Ed.2017 : 2540 C	mg/l	500	2000	276	326	260
11	Calcium (as Ca)	**EDTA Titrimetric Method** APHA 23rd Ed.2017 : 3500Ca B	mg/l	75	200	48.8	50.6	51.4
12	Magnesium (as Mg)	**Calculation Method** APHA 23rd Ed.2017 : 3500Mg B	mg/l	30	100	20.6	21.6	24.2
13	Copper (as Cu)	**By AAS Method** APHA 23rd Ed.2017 :3111 B	mg/l	0.05	1.5	<0.05	<0.05	<0.05
14	Manganese (as Mn)	**Persulfate Method** APHA 23rd Ed.2017 :3500Mn B	mg/l	0.1	0.3	<0.05	<0.05	<0.05
15	Sulphate (as SO_4)	**Turbidimetric Method** APHA 23rd Ed.2017 :4500-SO_4^{2-} E	mg/l	200	400	28.9	30.2	36.4
16	Nitrate (as NO_3)	**By UV-Spectrophotometric Method** APHA 23rd Ed.2017 :4500-NO_3^- B	mg/l	45	No Relaxation	7.1	7.3	7.0
17	Fluoride (as F)	**Distillation followed by Spectrophotometric Method** APHA 23rd Ed.2017 :4500F C	mg/l	1.0	1.5	0.16	0.12	0.18
18	Phenolic Compounds (as C_6H_5OH)	**Chloroform Extraction by Colorimetric Method** APHA 23rd Ed.2017 :5530 D	mg/l	0.001	0.002	<0.001	<0.001	<0.001
19	Mercury (as Hg)	**AAS Method** APHA 23rd Ed.2017 :3112 B	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001
20	Cadmium (as Cd)	**AAS Method** APHA 23rd Ed.2017 :3113 B	mg/l	0.003	No Relaxation	<0.001	<0.001	<0.001
21	Selenium (as Se)	**By AAS Method** APHA 23rd Ed.2017 :3500 Se C	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01
22	Arsenic (as As)	**By AAS Method** APHA 23rd Ed.2017 :3114 B	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01
23	Cyanide (as CN)	**Distillation followed by Spectrophotometric Method** APHA 23rd Ed.2017 :4500 CN- G	mg/l	0.05	No Relaxation	<0.01	<0.01	<0.01
24	Lead (as Pb)	**By AAS Method** APHA 23rd Ed.2017 :3111 B	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01

25	Zinc (as Zn)	**By AAS Method** APHA 23RD Ed.2017: 3111 B	mg/l	5	15	1.9	2.4	1.8
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed.2017: 5540 C	mg/l	0.2	--	ND	ND	ND
27	Chromium (as Cr^{+6})	**Diphenyl Carbazide Method** APHA 23RD Ed.2017: 3500Cr B	mg/l	--	--	0.012	0.014	0.012
28	Mineral Oil	**Partition-Gravimetric Method** APHA 23RD Ed.2017: 5520 B	mg/l	0.5	No Relaxation	ND	ND	ND
29	Alkalinity	**Titration Method** APHA 23RD Ed.2017:2320 B	mg/l	200	600	190	208	168
30	Aluminium as(Al)	**AAS Method** APHA 23RD Ed.2017: 3111 D	mg/l	0.03	0.2	<0.01	<0.01	<0.01
31	Boron (as B)	**Curcumin Method** APHA 23RD Ed.2017: 4500B. B	mg/l	0.5	2.4	0.54	<0.1	<0.1
32	Total Coliform as TC	**MPN Method** APHA 23RD Ed.2017 : 9221 b	MPN/ 100ml	Shall not be detectable in any 100ml sample	--	<1.8	<1.8	<1.8

CL – Colourless, U/O – Unobjectionable, ND – Not detected.

BDL (Below detection limit) Values :(Cu<0.05 mg/l., Mn<0.005 mg/l, C_6H_5OH<0.001 mg/l, Hg<0.005mg/l, Cd<0.001 mg/l ,Se<0.001 mg/l, As<0.001 mg/l,Pb<0.01 mg/l, Zn<0.05 mg/l, Cr^{+6}<0.05 mg/l, Al<0.001 mg/l., B<0.01 mg/l, NO_3<0.01 mg/l)

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Reviewed By

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- Infrastructure Engineering
- Water Resource Management
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- 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/21/R-0065 Date : 12.01.2022

GROUND WATER QUALITY ANALYSIS REPORT- DECEMBER- 2021

1. Name of Client : M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK
2. Name of the Project : OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR
3. Sampling Location : GW4: Open Well Near Ostapal Village
   GW5: Tube Well inside the Shiva Temple of Village Gurupanga
   GW6: Tube Well outside Shiva Temple of Village Gurupanga
4. Method of Sampling : APHA 1060 B
5. Date of Sampling : 16.12.2021
6. Date of Analysis : 17.12.2021 TO 24.12.2021
7. 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	GW4	GW5	GW6
Essential Characteristics								
1	Colour	Visual Comparison Method APHA 23rd Ed.2017 : 2120 B	Hazen	5	15	<5	<5	<5
2	Odour	Threshold Odour Test APHA 23rd Ed.2017 :2150 B		Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	Flavor Threshold Test APHA 23rd Ed.2017 :2160 C	–	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	Nephelometric Method APHA 23rd Ed.2017 :2130 B	NTU	1	5	0.5	6.8	7.2
5	pH Value	pH Meter APHA 23rd Ed.2017 : 4500H+ B	–	6.5-8.5	No Relaxation	7.36	7.54	7.42
6	Total Hardness (as $CaCO_3$)	EDTA Titrimetric Method APHA 23rd Ed.2017 : 2340 C	mg/l	200	600	112	92	70
7	Iron (as Fe)	By AAS Method APHA 23rd Ed.2017 : 3111 B	mg/l	1.0	No Relaxation	0.21	0.18	0.16
8	Chloride (as Cl)	Argentometric Method APHA 23rd Ed.2017 : 4500Cl- B	mg/l	250	1000	42	46	48
9	Residual free Chlorine	Iodometric Method APHA 23rd Ed.2017 : 4500-Cl- B	mg/l	0.2	1	ND	ND	ND
Desirable Characteristics								
10	Dissolved Solids	Gravimetric Method APHA 23rd Ed.2017 : 2540 C	mg/l	500	2000	180	112	90
11	Calcium (as Ca)	EDTA Titrimetric Method APHA 23rd Ed.2017 : 3500Ca B	mg/l	75	200	44	32	28
12	Magnesium (as Mg)	Calculation Method APHA 23rd Ed.2017 : 3500Mg B	mg/l	30	100	20.8	12.9	10.9
13	Copper (as Cu)	By AAS Method APHA 23rd Ed.2017 :3111 B	mg/l	0.05	1.5	<0.05	<0.05	<0.05
14	Manganese (as Mn)	Persulfate Method APHA 23rd Ed.2017 : 3500Mn B	mg/l	0.1	0.3	<0.05	<0.05	<0.05
15	Sulphate (as SO_4)	Turbidimetric Method APHA 23rd Ed.2017 :4500-SO4 2- E	mg/l	200	400	4.6	4.4	4.0
16	Nitrate (as NO_3)	By UV Screen Method APHA 23rd Ed.2017 :4500-NO3- B	mg/l	45	No Relaxation	1.6	0.81	0.62
17	Fluoride (as F)	Distillation followed by Spectrophotometric Method APHA 23rd Ed.2017 :4500F-	mg/l	1.0	1.5	0.012	0.015	0.011
18	Phenolic Compounds (as C_6H_5OH)	Chloroform Extraction by Colorimetric Method APHA 23rd Ed.2017 :5530 B&D	mg/l	0.001	0.002	<0.001	<0.001	<0.001
19	Mercury (as Hg)	AAS Method APHA 23rd Ed.2017 :3112 B	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001
20	Cadmium (as Cd)	AAS Method APHA 23rd Ed.2017 :3111 B	mg/l	0.003	No Relaxation	<0.001	<0.001	<0.001
21	Selenium (as Se)	By AAS Method APHA 23rd Ed.2017 :3500-Se F	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01
22	Arsenic (as As)	By AAS Method APHA 23rd Ed.2017 : 3114 B	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01
23	Cyanide (as CN)	Distillation followed by Spectrophotometric Method APHA 23rd Ed.2017 :4500-CN- E	mg/l	0.05	No Relaxation	<0.05	<0.05	<0.05

		C.D						
24	Lead (as Pb)	**By AAS Method** APHA 23RD Ed,2017 3111 B	mg/l	**0.01**	**No Relaxation**	<0.01	<0.01	<0.01
25	Zinc (as Zn)	**By AAS Method** APHA 23RD Ed,2017: 3111 B	mg/l	**5**	**15**	2.1	2.8	3.2
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed,2017: 5540 C	mg/l	**0.2**	--	ND	ND	ND
27	Chromium (as Cr^{+6})	**Diphenyl Carbazide Method** APHA 23RD Ed,2017: 3500Cr B	mg/l	--	--	0.012	0.011	0.010
28	Mineral Oil	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	mg/l	**0.5**	**No Relaxation**	ND	ND	ND
29	Alkalinity	**Titration Method** APHA 23RD Ed,2017-2320 B	mg/l	**200**	**600**	82	28	20
30	Aluminium as(Al)	**AAS Method** APHA 23RD Ed,2017: 3111 D	mg/l	**0.03**	**0.2**	<0.01	<0.01	<0.01
31	Boron (as B)	**Curcumin Method** APHA 23RD Ed,2017: 4500B, B	mg/l	**0.5**	**2.4**	<0.1	<0.1	<0.1
32	Total Coliform as TC	**MPN Method** APHA 23RD Ed,2017 : 9221 b	MPN/ 100ml	Shall not be detectable in any 100ml sample	--	<1.8	<1.8	<1.8

CL – Colourless, U/O – Unobjectionable, ND – Not detected.
BDL (Below detection limit) Values :(Cu<0.05 mg/l , Mn<0.005 mg/l, C_2H_5OH<0.001 mg/l, Hg<0.005mg/l, Cd<0.001 mg/l ,Se<0.001 mg/l, As<0.001 mg/l,Pb<0.01 mg/l, Zn<0.05 mg/l, Cr^{+6}<0.05 mg/l, Al<0.001 mg/l , B<0.01 mg/l, NO_3<0.01 mg/l)

Reviewed By

Approved By

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

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- Mineral/Sub-Soil Exploration
- Waste Management Services

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

Ref : Envlab/21/R-0066 **Date : 12.01.2022**

GROUND WATER QUALITY ANALYSIS REPORT- DECEMBER- 2021

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. Sampling Location : **GW7:** Eastern Side of the Quarry (PZ-1)
   GW8: Southern Side of the Quarry (PZ-2)
   GW9: Western Side of the Quarry (PZ-3)
4. Method of Sampling : **APHA 1060 B**
5. **Date of Sampling** : **16.12.2021**
6. Date of Analysis : **17.12.2021 TO 24.12.2021**
7. 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		
				Permissible Limit	Permissible Limit	GW7	GW8	GW9
Essential Characteristics								
1	Colour	**Visual Comparison Method** APHA 23RD Ed,2017 : 2120 B, C	Hazen	5	15	<5	<5	<5
2	Odour	**Threshold Odour Test** APHA 23RD Ed,2017 :2150 B	–	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	–	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	NTU	1	5	6.2	7.1	7.6
5	pH Value	**pH Meter** APHA 23RD Ed,2017 : 4500H+ B	–	6.5-8.5	No Relaxation	7.41	7.54	7.48
6	Total Hardness (as $CaCO_3$)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	mg/l	200	600	124	116	84
7	Iron (as Fe)	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	mg/l	1.0	No Relaxation	0.34	0.24	0.18
8	Chloride (as Cl)	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl- B	mg/l	250	1000	44	40	38
9	Residual, free Chlorine	**Iodometric Method** APHA 23RD Ed,2017 : 4500Cl, B	mg/l	0.2	1	ND	ND	ND
Desirable Characteristics								
10	Dissolved Solids	**Gravimetric Method** APHA 23RD Ed,2017 : 2540 C	mg/l	500	2000	218	194	144
11	Calcium (as Ca)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	mg/l	75	200	48	40	36
12	Magnesium (as Mg)	**Calculation Method** APHA 23RD Ed,2017 : 3500Mg B	mg/l	30	100	20.8	11.4	10.2
13	Copper (as Cu)	**By AAS Method** APHA 23RD Ed,2017: 3111 B	mg/l	0.05	1.5	<0.05	<0.05	<0.05
14	Manganese (as Mn)	**Persulfate Method** APHA 23RD Ed,2017: 3500Mn B	mg/l	0.1	0.3	<0.05	<0.05	<0.05
15	Sulphate (as SO_4)	**Turbidimetric Method** APHA 23RD Ed,2017: 4500 SO_4^{2-} E	mg/l	200	400	4.2	4.6	3.8
16	Nitrate (as NO_3)	**By UV-Screen Method** APHA 23RD Ed,2017: 4500 NO_3^- E	mg/l	45	No Relaxation	1.68	0.87	0.78
17	Fluoride (as F)	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed,2017: 4500F C	mg/l	1.0	1.5	0.014	0.016	0.014
18	Phenolic Compounds (as C_6H_5OH)	**Chloroform Extraction by Colorimric Method** APHA 23RD Ed,2017: 5530 B,D	mg/l	0.001	0.002	<0.001	<0.001	<0.001
19	Mercury (as Hg)	**AAS Method** APHA 23RD Ed,2017: 3112 B	mg/l	0.001	No Relaxation	<0.001	<0.001	<0.001
20	Cadmium (as Cd)	**AAS Method** APHA 23RD Ed,2017: 3111 B	mg/l	0.003	No Relaxation	<0.001	<0.001	<0.001
21	Selenium (as Se)	**By AAS Method** APHA 23RD Ed,2017: 3500 Se C	mg/l	0.01	No Relaxation	<0.01	<0.01	<0.01

22	Arsenic (as As)	**By AAS Method** APHA 23RD Ed.2017: 3114 B	mg/l	**0.01**	**No Relaxation**	**<0.01**	**<0.01**	**<0.01**
23	Cyanide (as CN)	**Distillation followed by Spectophotometric Method** APHA 23RD Ed.2017: 4500 CN C,D	mg/l	**0.05**	**No Relaxation**	<0.05	<0.05	<0.05
24	Lead (as Pb)	**By AAS Method** APHA 23RD Ed.2017 3111 B	mg/l	**0.01**	**No Relaxation**	<0.01	<0.01	<0.01
25	Zinc (as Zn)	**By AAS Method** APHA 23RD Ed.2017: 3111 B	mg/l	**5**	**15**	4.2	4.6	4.4
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed.2017: 5540 C	mg/l	**0.2**	–	ND	ND	ND
27	Chromium (as Cr^{+6})	**Diphenyl Carbazide Method** APHA 23RD Ed.2017: 3500Cr B	mg/l	–	–	0.024	0.028	0.022
28	Mineral Oil	**Partition-Gravimetric Method** APHA 23RD Ed.2017: 5520 B	mg/l	**0.5**	**No Relaxation**	ND	ND	ND
29	Alkalinity	**Titration Method** APHA 23RD Ed.2017:2320 B	mg/l	**200**	**600**	52	44	30
30	Aluminium as(Al)	**AAS Method** APHA 23RD Ed.2017: 3111 D	mg/l	**0.03**	**0.2**	<0.01	<0.01	<0.01
31	Boron (as B)	**Curcumin Method** APHA 23RD Ed.2017: 4500B, B	mg/l	**0.5**	**2.4**	<0.1	<0.1	<0.1
32	Total Coliform as TC	**MPN Method** APHA 23RD Ed.2017 : 9221 b	MPN/ 100ml	Shall not be detectable in any 100ml sample	--	<1.8	<1.8	<1.8

CL – Colourless, U/O – Unobjectionable, ND – Not detected.

BDL (Below detection limit) Values :(Cu<0.05 mg/l , Mn<0.005 mg/l, C_2H_5OH<0.001 mg/l, Hg<0.005mg/l, Cd<0.001 mg/l ,Se<0.001 mg/l, As<0.001 mg/l,Pb<0.01 mg/l, Zn<0.05 mg/l, Cr^{+6}<0.05 mg/l, Al<0.001 mg/l , B<0.01 mg/l, NO_3<0.01 mg/l)

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- Information Technology
- Public Health Engineering
- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

Laboratory Services: Environment Lab, Food Lab, Material Lab, Soil Lab, Mineral Lab & Microbiology Lab

Ref : Envlab/21/R-5005 **Date : 31.03.2022**

GROUND WATER QUALITY ANALYSIS REPORT- MARCH 2022

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. Sampling Location : **GW1:** Bore well Near Work Shop of the Mines
   GW2: Bore Well Near Main Gate of OCM
   GW3: Open Well Near Ostia Village
4. Method of Sampling : **APHA 1060 B**
5. **Date of Sampling** : **15.03.2022**
6. Date of Analysis : **16.03.2022 TO 23.03.2022**
7. 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
Essential Characteristics								
1	Colour	**Visual Comparison Method** APHA 23RD Ed.2017 : 2120 B, C	Hazen	5	15	<5	<5	<5
2	Odour	**Threshold Odour Test** APHA 23RD Ed.2017 :2150 B	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	**Flavor Threshold Test** APHA 23RD Ed.2017 : 2160 C	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	**Nephelometric Method** APHA 23RD Ed.2017 :2130 B	NTU	1	5	<1	<1	<1
5	pH Value at 25°C	**pH Meter** APHA 23RD Ed.2017 : 4500H+ B	--	6.5-8.5	No Relaxation	6.82	6.84	6.93
6	Total Hardness (as $CaCO_3$)	**EDTA Titrimetric Method** APHA 23RD Ed.2017 : 2340 C	mg/l	200	600	191	190	182
7	Iron (as Fe)	**By AAS Method** APHA 23RD Ed.2017 : 3111, B	mg/l	1.0	No Relaxation	0.24	0.28	0.24
8	Chloride (as Cl)	**Argentametric Method** APHA 23RD Ed.2017 : 4500CT B	mg/l	250	1000	44	40	40
9	Residual, free Chlorine	**Iodometric Method** APHA 23RD Ed.2017 : 4500CL B	mg/l	0.2	1	0.18	0.12	0.21
Desirable Characteristics								
10	Dissolved Solids	**Gravimetric Method** APHA 23RD Ed.2017 : 2540 C	mg/l	500	2000	284	332	272
11	Calcium (as Ca)	**EDTA Titrimetric Method** APHA 23RD Ed.2017 : 3500Ca B	mg/l	75	200	50.6	52.8	52.6
12	Magnesium (as Mg)	**Calculation Method** APHA 23RD Ed.2017 : 3500Mg B	mg/l	30	100	21.8	23.6	24.8
13	Copper (as Cu)	**By AAS Method** APHA 23RD Ed.2017: 3111 B	mg/l	0.05	1.5	<0.02	<0.02	<0.02
14	Manganese (as Mn)	**Persulfate Method** APHA 23RD Ed.2017: 3500Mn B	mg/l	0.3	0.3	<0.025	<0.025	<0.025
15	Sulphate (as SO_4)	**Turbidimetric Method** APHA 23RD Ed.2017: 4500 SO_4^{2-} E	mg/l	200	400	29.6	31.8	38.2
16	Nitrate (as NO_3)	**By UV-Screen Method** APHA 23RD Ed.2017: 4500 NO_3- E	mg/l	45	No Relaxation	7.6	7.4	7.2
17	Fluoride (as F)	**Distillation followed by Spectophotometric Method** APHA 23RD Ed.2017: 4500F C	mg/l	1.0	1.5	0.19	0.14	0.21
18	Phenolic Compounds (as C_6H_5OH)	**Chloroform Extraction by Colorimetric Method** APHA 23RD Ed.2017: 5530 B,D	mg/l	0.001	0.002	<0.05	<0.05	<0.05
19	Mercury (as Hg)	**AAS Method** APHA 23RD Ed.2017: 3112 B	mg/l	0.001	No Relaxation	<0.004	<0.004	<0.004
20	Cadmium (as Cd)	**AAS Method** APHA 23RD Ed.2017: 3111 B	mg/l	0.003	No Relaxation	<0.01	<0.01	<0.01
21	Selenium (as Se)	**By AAS Method** APHA 23RD Ed.2017: 3500 Se C	mg/l	0.01	No Relaxation	<0.001	<0.001	<0.001
22	Arsenic (as As)	**By AAS Method** APHA 23RD Ed.2017: 3114 B	mg/l	0.01	No Relaxation	<0.004	<0.004	<0.004
23	Cyanide (as CN)	**Distillation followed by Spectophotometric Method** APHA 23RD Ed.2017: 4500 CN- C,D	mg/l	0.05	No Relaxation	<0.01	<0.01	<0.01

24	Lead (as Pb)	**By AAS Method** APHA 23RD Ed,2017 3111 B	mg/l	**0.01**	**No Relaxation**	<0.02	<0.02	<0.02
25	Zinc (as Zn)	**By AAS Method** APHA 23RD Ed,2017: 3111 B	mg/l	**5**	**15**	1.8	2.2	2.3
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed.2017: 5540 C	mg/l	**0.2**	–	<0.2	<0.2	<0.2
27	Total Chromium as Cr	**AAS Method** APHA 23RD Ed,2017: 3111B	mg/l	0.05	**No Relaxation**	0.014	0.016	0.015
28	Mineral Oil	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	mg/l	**0.5**	**No Relaxation**	<0.5	<0.5	<0.5
29	Alkalinity	**Titration Method** APHA 23RD Ed,2017:2320 B	mg/l	**200**	**600**	196	198	172
30	Aluminium as(Al)	**AAS Method** APHA 23RD Ed,2017: 3111 D	mg/l	**0.03**	**0.2**	<0.1	<0.01	<0.01
31	Boron (as B)	**Curcumin Method** APHA 23RD Ed,2017: 4500B, B	mg/l	**0.5**	**2.4**	0.41	<0.1	<0.1
32	Total Coliform as TC	**MPN Method** APHA 23RD Ed,2017 : 9221 b	MPN/ 100ml	Shall not be detectable in any 100ml sample	–	<1.8	<1.8	<1.8

CL – Colourless, ND – Not detected.

BDL (Below detection limit) Values :(Cu<0.02 mg/l , Mn<0.025 mg/l, C_2H_5OH<0.05 mg/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<0.03 mg/l, Cr^{+6}<0.01 mg/l, Al<0.1 mg/l , B<0.1 mg/l, $NO_3$1 mg/l)

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- Information Technology
- Public Health Engineering
- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

Laboratory Services: Environment Lab, Food Lab, Material Lab, Soil Lab, Mineral Lab & Microbiology Lab

Ref : Envlab/21/R-5006 **Date : 31.03.2022**

GROUND WATER QUALITY ANALYSIS REPORT- MARCH 2022

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. Sampling Location : **GW4:** Open Well Near Ostapal Village
   GW5: Tube Well inside the Shiva Temple of Village Gurujanga
   GW6: Tube Well outside Shiva Temple of Village Gurujanga
4. Method of Sampling : **APHA 1060 B**
5. **Date of Sampling** : **15.03.2022**
6. Date of Analysis : **16.03.2022 TO 23.03.2022**
7. 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	GW4	GW5	GW6
Essential Characteristics								
1	Colour	**Visual Comparison Method** APHA 23RD Ed.2017 : 2120 B, C	Hazen	5	15	<5	<5	<5
2	Odour	**Threshold Odour Test** APHA 23RD Ed.2017 :2150 B	—	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	**Flavor Threshold Test** APHA 23RD Ed.2017 : 2160 C	—	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	**Nephelometric Method** APHA 23RD Ed.2017 :2130 B	NTU	1	5	<1	<1	<1
5	pH Value	**pH Meter** APHA 23RD Ed.2017 : 4500H+ B	—	6.5-8.5	No Relaxation	7.39	7.42	7.32
6	Total Hardness (as $CaCO_3$)	**EDTA Titrimetric Method** APHA 23RD Ed.2017 : 2340 C	mg/l	200	600	116	88	66
7	Iron (as Fe)	**By AAS Method** APHA 23RD Ed.2017 : 3111 B	mg/l	1.0	No Relaxation	0.21	0.23	0.14
8	Chloride (as Cl)	**Argentometric Method** APHA 23RD Ed.2017 : 4500Cl- B	mg/l	250	1000	40	44	46
9	Residual, free Chlorine	**Iodometric Method** APHA 23RD Ed.2017 : 4500Cl2 B	mg/l	0.2	1	0.21	0.18	0.24
Desirable Characteristics								
10	Dissolved Solids	**Gravimetric Method** APHA 23RD Ed.2017 : 2540 C	mg/l	500	2000	188	121	98
11	Calcium (as Ca)	**EDTA Titrimetric Method** APHA 23RD Ed.2017 : 3500Ca B	mg/l	75	200	48	36	32
12	Magnesium (as Mg)	**Calculation Method** APHA 23RD Ed.2017 : 3500Mg B	mg/l	30	100	21.2	14.8	11.6
13	Copper (as Cu)	**By AAS Method** APHA 23RD Ed.2017:3111 B	mg/l	0.05	1.5	<0.02	<0.02	<0.02
14	Manganese (as Mn)	**Persulfate Method** APHA 23RD Ed.2017: 3500Mn B	mg/l	0.1	0.3	<0.025	<0.025	<0.025
15	Sulphate (as SO_4)	**Turbidimetric Method** APHA 23RD Ed.2017: 4500 SO_4^{2-} E	mg/l	200	400	5.1	4.8	4.6
16	Nitrate (as NO_3)	**By UV-Screen Method** APHA 23RD Ed.2017: 4500 NO_3^- E	mg/l	45	No Relaxation	1.8	0.89	0.69
17	Fluoride (as F)	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed.2017: 4500F- C	mg/l	1.0	1.5	0.011	0.014	0.013
18	Phenolic Compounds (as C_6H_5OH)	**Chloroform Extraction by Colorimric Method** APHA 23RD Ed.2017: 5530 B,D	mg/l	0.001	0.002	<0.05	<0.05	<0.05
19	Mercury (as Hg)	**AAS Method** APHA 23RD Ed.2017: 3112 B	mg/l	0.001	No Relaxation	<0.004	<0.004	<0.004
20	Cadmium (as Cd)	**AAS Method** APHA 23RD Ed.2017: 3111 B	mg/l	0.003	No Relaxation	<0.01	<0.01	<0.01
21	Selenium (as Se)	**By AAS Method** APHA 23RD Ed.2017: 3500 Se C	mg/l	0.01	No Relaxation	<0.001	<0.001	<0.001
22	Arsenic (as As)	**By AAS Method** APHA 23RD Ed.2017: 3114 B	mg/l	0.01	No Relaxation	<0.004	<0.004	<0.004
23	Cyanide (as CN)	**Distillation followed by Spectophotometric Method** APHA 23RD Ed.2017: 4500 CN- C,D	mg/l	0.05	No Relaxation	<0.01	<0.01	<0.01
24	Lead (as Pb)	**By AAS Method**	mg/l	0.01	No	<0.02	<0.02	<0.02

		APHA 23RD Ed.2017 3111 B			Relaxation			
25	Zinc (as Zn)	**By AAS Method** APHA 23RD Ed.2017: 3111 B	mg/l	5	15	2.6	3.2	2.8
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed.2017: 5540 C	mg/l	0.2	--	<0.2	<0.2	<0.2
27	Total Chromium as Cr	By AAS Method APHA 23RD Ed.2017: 3111B	mg/l	0.05	No Relaxation	0.011	0.011	0.012
28	Mineral Oil	**Partition-Gravimetric Method** APHA 23RD Ed.2017: 5520 B	mg/l	0.5	No Relaxation	<0.5	<0.5	<0.5
29	Alkalinity	**Titration Method** APHA 23RD Ed.2017:2320 B	mg/l	200	600	80	30	26
30	Aluminium as(Al)	**AAS Method** APHA 23RD Ed.2017: 3111 D	mg/l	0.03	0.2	<0.1	<0.1	<0.1
31	Boron (as B)	**Curcumin Method** APHA 23RD Ed.2017: 4500B. B	mg/l	0.5	2.4	<0.1	<0.1	<0.1
32	Total Coliform as TC	**MPN Method** APHA 23RD Ed.2017 : 9221 b	MPN/ 100ml	Shall not be detectable in any 100ml sample	--	<1.8	<1.8	<1.8

CL – Colorless, ND – Not detected.

BDL (Below detection limit) Values :(Cu<0.02 mg/l , Mn<0.025 mg/l, C_3H_7OH<0.05 mg/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<0.03 mg/l, Cr^{+6}<0.01 mg/l, Al<0.1 mg/l , B<0.1 mg/l, $NO_3$1 mg/l)

Reviewed By

Approved By

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- Renewable Energy
- Agricultural Development
- Information Technology
- Public Health Engineering
- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

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

Ref : Envlab/21/R-5007 **Date : 31.03.2022**

GROUND WATER QUALITY ANALYSIS REPORT- MARCH 2022

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. Sampling Location : **GW7:** Eastern Side of the Quarry (PZ-1)
   GW8: Southern Side of the Quarry (PZ-2)
   GW9: Western Side of the Quarry (PZ-3)
4. Method of Sampling : **APHA 1060 B**
5. **Date of Sampling** : **15.03.2022**
6. Date of Analysis : **16.03.2022 TO 23.03.2022**
7. 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		
				Permissible Limit	Permissible Limit	GW7	GW8	GW9
Essential Characteristics								
1	Colour	Visual Comparison Method APHA 23RD Ed.2017 : 2120 B, C	Hazen	5	15	<5	<5	<5
2	Odour	Threshold Odour Test APHA 23RD Ed.2017 :2150 B	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	Flavor Threshold Test APHA 23RD Ed.2017 : 2160 C	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	Nephelometric Method APHA 23RD Ed.2017 :2130 B	NTU	1	5	<1	<1	<1
5	pH Value	pH Meter APHA 23RD Ed.2017 : 4500H+ B	--	6.5-8.5	No Relaxation	7.38	7.41	7.39
6	Total Hardness (as $CaCO_3$)	EDTA Titrimetric Method APHA 23RD Ed.2017 : 2340 C	mg/l	200	600	121	116	88
7	Iron (as Fe)	By AAS Method APHA 23RD Ed.2017 : 3111, B	mg/l	1.0	No Relaxation	0.34	0.28	0.19
8	Chloride (as Cl)	Argentometric Method APHA 23RD Ed.2017 :4500Cl- B	mg/l	250	1000	46	40	32
9	Residual, free Chlorine	Iodometric Method APHA 23RD Ed.2017 :4500Cl- B	mg/l	0.2	1	ND	ND	ND
Desirable Characteristics								
10	Dissolved Solids	Gravimetric Method APHA 23RD Ed.2017 : 2540 C	mg/l	500	2000	218	192	148
11	Calcium (as Ca)	EDTA Titrimetric Method APHA 23RD Ed.2017 : 3500Ca B	mg/l	75	200	46	40	36
12	Magnesium (as Mg)	Calculation Method APHA 23RD Ed.2017 : 3500Mg B	mg/l	30	100	24.8	18.6	11.8
13	Copper (as Cu)	By AAS Method APHA 23RD Ed.2017: 3111 B	mg/l	0.05	1.5	<0.02	<0.02	<0.02
14	Manganese (as Mn)	Persulfate Method APHA 23RD Ed.2017: 3500Mn B	mg/l	0.1	0.3	<0.025	<0.025	<0.025
15	Sulphate (as SO_4)	Turbidimetric Method APHA 23RD Ed.2017: 4500 SO_4^{--} E	mg/l	200	400	4.2	4.8	3.9
16	Nitrate (as NO_3)	By UV-Screen Method APHA 23RD Ed.2017: 4500 NO_3^- E	mg/l	45	No Relaxation	1.71	0.88	0.78
17	Fluoride (as F)	Distillation followed by Spectrophotometric Method APHA 23RD Ed.2017: 4500F C	mg/l	1.0	1.5	0.014	0.016	0.011
18	Phenolic Compounds (as C_6H_5OH)	Chloroform Extraction by Colorimetric Method APHA 23RD Ed.2017: 5530 B,D	mg/l	0.001	0.002	<0.05	<0.05	<0.05
19	Mercury (as Hg)	AAS Method APHA 23RD Ed.2017: 3112 B	mg/l	0.001	No Relaxation	<0.004	<0.004	<0.004
20	Cadmium (as Cd)	AAS Method APHA 23RD Ed.2017: 3111 B	mg/l	0.003	No Relaxation	<0.01	<0.01	<0.01
21	Selenium (as Se)	By AAS Method APHA 23RD Ed.2017: 3500 Se C	mg/l	0.01	No Relaxation	<0.001	<0.001	<0.001

22	Arsenic (as As)	**By AAS Method** APHA 23RD Ed.2017: 3114 B	mg/l	**0.01**	**No Relaxation**	<0.004	<0.004	<0.004
23	Cyanide (as CN)	**Distillation followed by Spectophotometric Method** APHA 23RD Ed.2017: 4500 CN C,D	mg/l	**0.05**	**No Relaxation**	<0.01	<0.01	<0.01
24	Lead (as Pb)	**By AAS Method** APHA 23RD Ed.2017 3111 B	mg/l	**0.01**	**No Relaxation**	<0.02	<0.02	<0.02
25	Zinc (as Zn)	**By AAS Method** APHA 23RD Ed.2017: 3111 B	mg/l	**5**	**15**	3.8	4.6	4.9
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed.2017: 5540 C	mg/l	**0.2**	–	ND	ND	ND
27	Total Chromium as Cr	**AAS Method** APHA 23RD Ed.2017: 3111B	mg/l	0.05	**No Relaxation**	0.012	0.024	0.018
28	Mineral Oil	**Partition-Gravimetric Method** APHA 23RD Ed.2017: 5520 B	mg/l	**0.5**	**No Relaxation**	ND	ND	ND
29	Alkalinity	**Titration Method** APHA 23RD Ed.2017:2320 B	mg/l	**200**	**600**	54	48	32
30	Aluminium as(Al)	**AAS Method** APHA 23RD Ed.2017: 3111 D	mg/l	**0.03**	**0.2**	<0.1	<0.1	<0.1
31	Boron (as B)	**Curcumin Method** APHA 23RD Ed.2017: 4500B, B	mg/l	**0.5**	**2.4**	<0.1	<0.1	<0.1
32	Total Coliform as TC	**MPN Method** APHA 23RD Ed.2017 : 9221 b	MPN/ 100ml	Shall not be detectable in any 100ml sample	–	<1.8	<1.8	<1.8

CL – Colorless, ND – Not detected.

RDL (Below detection limit) Values :(Cu<0.02 mg/l , Mn<0.025 mg/l, C_6H_5OH<0.05 mg/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<0.03 mg/l, Cr^{6+}<0.01 mg/l, Al<0.1 mg/l , B<0.1 mg/l, $NO_3$1 mg/l)

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- 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

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

Ref : Envlab/21/R-0550 **Date : 05.01.2022**

BORE WELL MONITORING FOR HEXAVALENT ANALYSIS
OSTAPAL CHROMITE MINE

Date of Sample Collection : 27.12.2021

Monitoring Well No	Location	Local Co-ordinates		Hexavalent Analysis Result
		Easting	Northing	
1	Bore well Near Main gate of Mine	3106	2494	<0.01
2	Bore well Near Mechanical Office	2840	2425	<0.01
3	Eastern side of the quarry	3156	2833	<0.01
4	Eastern side of the quarry	3154	2828	<0.01
5	Near North dump Toe	2984	3182	0.013
6	Near North dump Toe	2924	3182	0.011
7	Near North dump Toe	2880	3178	0.012
8	Near North dump Toe	2826	3178	<0.01
9	Eastern side of the quarry	3234	2949	<0.01
10	Eastern side of the quarry	3230	2810	<0.01
11	Eastern side of the quarry	3210	2760	<0.01
12	Eastern side of the quarry	3195	2835	<0.01
13	Eastern side of the quarry	3203	2833	0.011
14	Eastern side of the quarry	3190	2840	0.011

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(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

- 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

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

Ref : Envlab/22/R-2326 **Date : 05.04.2022**

BORE WELL MONITORING FOR HEXAVALENT ANALYSIS
OSTAPAL CHROMITE MINE

Sample Collection Date: 7.03.2022

Monitoring Well No	Location	Local Co-ordinates		Hexavalent Analysis Result	Remarks
		Easting	Northing		
1	Bore well Near Main gate of Mine	3106	2494	<0.01	Bore well used for Drinking water purpose & Monatoring purpose
2	Bore well Near Mechanical Office	2840	2425	<0.01	
3	Eastern side of the quarry	3156	2833	<0.01	Dedicated Bore well used for Monitoring Purpose
4	Eastern side of the quarry	3154	2828	<0.01	
5	Near North dump Toe	2984	3182	<0.01	
6	Near North dump Toe	2924	3182	0.012	
7	Near North dump Toe	2880	3178	0.012	
8	Near North dump Toe	2826	3178	<0.01	
9	Eastern side of the quarry	3234	2949	<0.01	
10	Eastern side of the quarry	3230	2810	<0.01	
11	Eastern side of the quarry	3210	2760	<0.01	
12	Eastern side of the quarry	3195	2835	<0.01	
13	Eastern side of the quarry	3203	2833	0.013	
14	Eastern side of the quarry	3190	2840	0.012	

VISIONTEK CONSULTANCY SERVICES PVT. LTD. Reviewed

VISIONTEK CONSULTANCY SERVICES PVT. LTD. Approved

Annexure No.-5

WATER WITHDRAWAL FROM GROUND WATER FOR SUPPLY TO NEARBY VILLAGES

AND DOMESTIC USE

GROUND WATER ABSTRACTION DATA FROM ABSTRACTION STRUCTURE FOR THE YEAR 2021-22									
Month	Bore Well -1			Bore well -2			TOTAL Withdrawal (A+B) in KL	Avg. Withdrawal Per day	Remarks
	Initial Reading	Final Reading	A.Total withdrawal (In KL)	Initial Reading	Final Reading	B.Total withdrawal (In KL)			
April'21	78488	80269	1781	85868	86990	1122	2903	97	
May'21	80269	82301	2032	86990	87949	959	2991	96	
June'21	82301	84302	2001	87949	88891	942	2943	98	
July'21	84302	86389	2087	88891	89861	970	3057	99	
Aug'21	86389	808.455	1156.455	89861	459.55	739.55	1896	61	Conventional flow meter withdrawn , Digital water flow meter fitted on 10.08.2021
Sept'21	808.455	1959.236	1150.781	459.55	1192.154	732.604	1883	63	
Oct'21	1959.236	3498.548	1539.312	1192.154	2026.129	833.975	2373	77	
Nov'20	3498.548	5128.23	1629.682	2026.129	2861.88	835.751	2465	82	
Dec'21	5128.23	6461.96	1333.73	2861.88	3022.03	160.15	1629	53	
Jan'22	6461.96	7390.96	929	3022.03	3545.75	523.72	1629	53	
Feb'22	7390.96	8159.53	768.57	3545.75	4344.5	798.75	1629		
Mar'22	8159.53	8386.5	226.97	4344.5	4839.5	495	1629		
		TOTAL	16635.5	TOTAL		9112.5	27028	778	
Avg. withdrawal per day is 77.0 KL									

Annexure No.-6

BY REGD. POST WITH AD

STATE POLLUTION CONTROL BOARD, ODISHA

A/118, Nilakantha Nagar, Unit-VIII, Bhubaneswar-751012
Phone-2561909, Fax: 2562822, 2560955

CONSENT ORDER

No. 5320 / IND-I-CON- 1163 Dt. 27.03.2021

CONSENT ORDER NO. 366

Sub: **Consent for discharge of sewage and trade effluent under section 25/26 of Water (PCP) Act, 1974 and for existing / new operation of the plant under section 21 of Air (PCP) Act, 1981.**

Ref: **Your online application No. 3216555 dated 28-11-2020 and Online reply dated 30.12.2020**

Consent to operate is hereby granted under section 25/26 of Water (Prevention & Control of Pollution) Act, 1974 and under section 21 of Air (Prevention & Control of Pollution) Act, 1981 and rules framed thereunder to

Name of the Industry: **OSTAPAL CHROMITE MINES OF M/S. FACOR LTD.**

Name of the Occupier & Designation: **SRI SAUVICK MAZUMDAR, DIRECTOR**

Address: **AT: GURUJANG, PO: KALIAPANI, DIST: JAJPUR**

This consent order is valid for the period **up to 31.03.2022 from the date of issue of this order.**

This consent order supersedes the earlier consent order issued vide letter No. 2430 dated 5.02.2016.

Details of Products Manufactured

Sl. No	Product	Quantity
01.	Chrome ore(ROM)	0.2 MTPA

Details of Mineral Handing Plants/Units

01.	Operation of COB Plant of capacity	0.1 MTPA (chrome ore concentrate)

This consent order is valid for the specified outlets, discharge quantity and quality, specified chimney/stack, emission quantity and quality of emissions as specified below. This consent is granted subject to the general and special conditions stipulated therein.

Annexure No.-7

Calender Plan Including Production & Excavation

For the year 2021-22

Item	Target FY 2021-22	Achievement FY 2021-22
Ore	2.0 Lac MT	1.99 MT
Overburden	4.78 Lac Cub Mt	4.75 Lac Cub Mt

Annexure No.-8

AMBIENT AIR QUALITY MONITORING REPORT OF CORE ZONE

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

- 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

Laboratory Services: Environment Lab, Food Lab, Material Lab, Soil Lab, Mineral Lab & Microbiology Lab

Ref : Envlab/21/R-0019 **Date : 10.01.2022**

AMBIENT AIR QUALITY (CORE ZONE) MONITORING REPORT- DECEMBER-2021

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

Monitoring Date	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)	O_3 (µg/m³)	NH_3 (µg/m³)	C_6H_6 (µg/m³)	Bap (ng/m³)	Pb (µg/m³)	Ni (ng/m³)	As (ng/m³)
	AAQMS-1: Near Dispensary											
01.12.2021	68.8	41.3	11.6	13.8	1.24	20.8	5.4	BDL	BDL	BDL	BDL	BDL
04.12.2021	66.6	40.0	11.8	13.6	1.22	20.6	5.6	BDL	BDL	BDL	BDL	BDL
08.12.2021	62.6	37.6	12.4	12.8	1.18	21.4	5.2	BDL	BDL	BDL	BDL	BDL
11.12.2021	58.8	35.3	12.6	12.2	1.16	21.6	5.1	BDL	BDL	BDL	BDL	BDL
15.12.2021	52.6	31.6	10.8	14.6	1.12	22.8	4.4	BDL	BDL	BDL	BDL	BDL
18.12.2021	60.8	36.5	10.6	14.8	1.08	22.6	4.2	BDL	BDL	BDL	BDL	BDL
22.12.2021	64.2	38.5	11.2	13.4	1.02	20.4	4.1	BDL	BDL	BDL	BDL	BDL
25.12.2021	63.2	37.9	11.1	13.1	1.11	20.2	4	BDL	BDL	BDL	BDL	BDL
Monthly Average	**62.2**	**37.3**	**11.5**	**13.5**	**1.14**	**21.3**	**4.8**	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
NAAQ Standard	100	60	80	80	4	100	400	5	01	01	20	06
Monitoring Date	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)	O_3 (µg/m³)	NH_3 (µg/m³)	C_6H_6 (µg/m³)	Bap (ng/m³)	Pb (µg/m³)	Ni (ng/m³)	As (ng/m³)
	AAQMS-2: Near Weighbridge											
01.12.2021	44.6	26.8	9.4	6.6	1.14	16.6	4.6	BDL	BDL	BDL	BDL	BDL
04.12.2021	42.8	25.7	9.6	6.2	1.12	17.4	4.4	BDL	BDL	BDL	BDL	BDL
08.12.2021	40.6	24.4	9.1	7.4	0.98	17.2	4.3	BDL	BDL	BDL	BDL	BDL
11.12.2021	38.8	23.3	9.4	7.7	0.94	17.1	4.1	BDL	BDL	BDL	BDL	BDL
15.12.2021	36.6	22.0	9.2	7.8	0.96	16.6	4.4	BDL	BDL	BDL	BDL	BDL
18.12.2021	32.2	19.3	8.6	6.4	1.12	16.4	4.8	BDL	BDL	BDL	BDL	BDL
22.12.2021	31.6	19.0	8.2	6.2	1.08	18.1	4.6	BDL	BDL	BDL	BDL	BDL
25.12.2021	30.8	18.5	9.1	7.1	1.06	17.2	4.4	BDL	BDL	BDL	BDL	BDL
Monthly Average	**37.3**	**22.4**	**9.1**	**6.9**	**1.05**	**17.1**	**4.5**	**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 Gaeke 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

Reviewed By

Approved By

Ref : Envlab/21/R-0020 **Date : 10.01.2022**

AMBIENT AIR QUALITY (CORE ZONE) MONITORING REPORT- DECEMBER-2021

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

Monitoring Date	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)	O_3 (µg/m³)	NH_3 (µg/m³)	C_6H_6 (µg/m³)	Bap (ng/m³)	Pb (µg/m³)	Ni (ng/m³)	As (ng/m³)
	AAQMS-3: At the Middle of the Open Cast Quarry											
01.12.2021	56.6	34.0	11.6	13.4	1.12	20.8	5.4	BDL	BDL	BDL	BDL	BDL
04.12.2021	52.2	31.3	11.8	13.8	1.14	20.6	5.6	BDL	BDL	BDL	BDL	BDL
08.12.2021	54.8	32.9	12.2	14.6	1.08	19.4	5.8	BDL	BDL	BDL	BDL	BDL
11.12.2021	66.6	40.0	12.4	14.8	1.06	19.2	4.6	BDL	BDL	BDL	BDL	BDL
15.12.2021	62.8	37.7	9.8	15.2	1.02	18.6	4.4	BDL	BDL	BDL	BDL	BDL
18.12.2021	60.6	36.4	9.6	15.6	1.12	18.8	4.3	BDL	BDL	BDL	BDL	BDL
22.12.2021	58.8	35.3	10.6	14.4	1.14	19.1	5.6	BDL	BDL	BDL	BDL	BDL
25.12.2021	58.2	34.9	10.2	14.2	1.11	20.2	5.2	BDL	BDL	BDL	BDL	BDL
Monthly Average	**58.8**	**35.3**	**11.0**	**14.5**	**1.10**	**19.6**	**5.1**	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
NAAQ Standard	100	60	80	80	4	100	400	5	01	01	20	06
Monitoring Date	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)	O_3 (µg/m³)	NH_3 (µg/m³)	C_6H_6 (µg/m³)	Bap (ng/m³)	Pb (µg/m³)	Ni (ng/m³)	As (ng/m³)
	AAQMS-4: At the Middle of the COB Plant											
01.12.2021	65.8	39.5	10.8	14.8	1.09	21.6	5.8	BDL	BDL	BDL	BDL	BDL
04.12.2021	66.4	39.8	10.2	14.6	1.12	22.4	6.4	BDL	BDL	BDL	BDL	BDL
08.12.2021	67.2	40.3	11.6	15.4	1.11	23.8	6.6	BDL	BDL	BDL	BDL	BDL
11.12.2021	66.8	40.1	11.8	15.6	1.14	23.4	6.2	BDL	BDL	BDL	BDL	BDL
15.12.2021	64.6	38.8	12.2	16.1	0.88	22.8	6.1	BDL	BDL	BDL	BDL	BDL
18.12.2021	63.8	38.3	12.4	15.1	0.89	25.6	5.4	BDL	BDL	BDL	BDL	BDL
22.12.2021	62.6	37.6	10.6	14.6	0.82	25.8	5.2	BDL	BDL	BDL	BDL	BDL
25.12.2021	65.2	39.1	10.2	14.2	0.78	24.6	6.1	BDL	BDL	BDL	BDL	BDL
Monthly Average	**65.3**	**39.2**	**11.2**	**15.1**	**0.98**	**23.8**	**6.0**	**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 Gaake 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

Reviewed By

Approved By

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

- 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

Laboratory Services: Environment Lab, Food Lab, Material Lab, Soil Lab, Mineral Lab & Microbiology Lab

Ref : Envlab/21/R-5002 Date : 31.03.2022

AMBIENT AIR QUALITY (CORE ZONE) MONITORING REPORT- MARCH 2022

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

Monitoring Date	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)	O_3 (µg/m³)	NH_3 (µg/m³)	C_6H_6 (µg/m³)	Bap (ng/m³)	Pb (µg/m³)	Ni (ng/m³)	As (ng/m³)
	AAQMS-1: Near Dispensary											
01.03.2022	71.6	43.0	11.6	14.6	1.19	21.6	5.8	BDL	BDL	BDL	BDL	BDL
04.03.2022	54.6	32.8	11.2	14.2	1.12	21.8	5.6	BDL	BDL	BDL	BDL	BDL
08.03.2022	72.2	43.3	10.8	13.8	1.14	20.6	5.2	BDL	BDL	BDL	BDL	BDL
11.03.2022	48.6	29.2	10.6	13.2	1.15	20.8	5.1	BDL	BDL	BDL	BDL	BDL
15.03.2022	69.2	41.5	11.2	13.1	1.12	20.6	5.1	BDL	BDL	BDL	BDL	BDL
18.03.2022	68.8	41.3	11.4	12.6	1.24	20.8	5.6	BDL	BDL	BDL	BDL	BDL
22.03.2022	59.6	35.8	12.2	12.9	1.28	21.2	5.2	BDL	BDL	BDL	BDL	BDL
25.03.2022	52.8	31.7	12.1	13.2	1.22	20.2	5.1	BDL	BDL	BDL	BDL	BDL
Monthly Average	**62.2**	**37.3**	**11.4**	**13.5**	**1.2**	**21.0**	**5.3**	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
NAAQ Standard	100	60	80	80	4	100	400	5	01	01	20	06
Monitoring Date	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)	O_3 (µg/m³)	NH_3 (µg/m³)	C_6H_6 (µg/m³)	Bap (ng/m³)	Pb (µg/m³)	Ni (ng/m³)	As (ng/m³)
	AAQMS-2: Near Weighbridge											
01.03.2022	48.6	29.2	9.6	7.2	1.18	17.4	4.8	BDL	BDL	BDL	BDL	BDL
04.03.2022	49.2	29.5	9.8	7.7	1.12	17.2	4.6	BDL	BDL	BDL	BDL	BDL
08.03.2022	51.6	31.0	9.2	7.6	0.99	15.6	5.2	BDL	BDL	BDL	BDL	BDL
11.03.2022	51.2	30.7	9.4	7.1	0.98	15.4	5.6	BDL	BDL	BDL	BDL	BDL
15.03.2022	50.6	30.4	9.2	7.3	1.22	16.6	5.4	BDL	BDL	BDL	BDL	BDL
18.03.2022	50.8	30.5	9.1	7.2	1.24	16.8	4.9	BDL	BDL	BDL	BDL	BDL
22.03.2022	43.8	26.3	10.63	7.4	1.28	17.2	4.6	BDL	BDL	BDL	BDL	BDL
25.03.2022	44.6	26.8	10.4	7.1	0.92	17.8	5.2	BDL	BDL	BDL	BDL	BDL
Monthly Average	**48.8**	**29.3**	**9.7**	**7.3**	**1.1**	**16.8**	**5.0**	**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

Reviewed By

Approved By

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

- 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

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

Ref : Envlab/21/R-5003 Date : 31.03.2022

AMBIENT AIR QUALITY (CORE ZONE) MONITORING REPORT- MARCH 2022

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

Monitoring Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	CO (mg/m^3)	O_3 ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	C_6H_6 ($\mu g/m^3$)	Bap (ng/m^3)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)
	AAQMS-3: At the Middle of the Open Cast Quarry											
01.03.2022	59.6	35.8	10.8	13.8	1.12	21.6	5.4	BDL	BDL	BDL	BDL	BDL
04.03.2022	48.6	29.2	10.6	12.8	1.12	22.8	5.8	BDL	BDL	BDL	BDL	BDL
08.03.2022	60.8	36.5	11.6	12.6	1.24	23.6	5.6	BDL	BDL	BDL	BDL	BDL
11.03.2022	46.6	28.0	11.2	12.8	1.38	23.8	5.2	BDL	BDL	BDL	BDL	BDL
15.03.2022	52.8	31.7	9.8	11.6	1.41	24.6	4.6	BDL	BDL	BDL	BDL	BDL
18.03.2022	60.6	36.4	9.6	11.8	1.32	22.8	4.8	BDL	BDL	BDL	BDL	BDL
22.03.2022	60.8	36.5	9.9	11.2	1.31	21.6	5.1	BDL	BDL	BDL	BDL	BDL
25.03.2022	61.6	37.0	10.6	12.4	1.26	20.8	5.3	BDL	BDL	BDL	BDL	BDL
Monthly Average	**56.4**	**33.9**	**10.5**	**12.4**	**1.3**	**22.7**	**5.2**	**BDL**	**BDL**	**BDL**	**BDL**	**BDL**
NAAQ Standard	100	60	80	80	4	100	400	5	01	01	20	06
Monitoring Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	CO (mg/m^3)	O_3 ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	C_6H_6 ($\mu g/m^3$)	Bap (ng/m^3)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)
	AAQMS-4: At the Middle of the COB Plant											
01.03.2022	68.8	41.3	11.6	14.9	1.12	21.6	5.8	BDL	BDL	BDL	BDL	BDL
04.03.2022	69.6	41.8	11.8	14.6	1.18	22.8	5.4	BDL	BDL	BDL	BDL	BDL
08.03.2022	70.2	42.1	12.4	14.2	1.08	22.4	5.2	BDL	BDL	BDL	BDL	BDL
11.03.2022	71.4	42.8	12.6	13.8	0.88	23.6	4.8	BDL	BDL	BDL	BDL	BDL
15.03.2022	72.8	43.7	11.6	13.6	0.89	23.8	4.2	BDL	BDL	BDL	BDL	BDL
18.03.2022	72.6	43.6	11.8	13.2	0.92	24.6	5.6	BDL	BDL	BDL	BDL	BDL
22.03.2022	70.6	42.4	10.6	14.1	1.08	25.2	5.8	BDL	BDL	BDL	BDL	BDL
25.03.2022	66.8	40.1	11.2	14.2	1.12	24.8	5.2	BDL	BDL	BDL	BDL	BDL
Monthly Average	**70.4**	**42.2**	**11.7**	**14.1**	**1.0**	**23.6**	**5.3**	**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 Gaeke 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

VISIONTEK CONSULTANCY SERVICES PVT. LTD. — Reviewed By

VISIONTEK CONSULTANCY SERVICES PVT. LTD. — Approved By

Annexure No.-9

AMBIENT AIR QUALITY MONITORING REPORT OF BUFFER ZONE

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

- 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

Laboratory Services: Environment Lab, Food Lab, Material Lab, Soil Lab, Mineral Lab & Microbiology Lab

Ref : Envlab/21/R-0021 **Date : 10.01.2022**

AMBIENT AIR QUALITY (BUFFER ZONE) MONITORING REPORT- DECEMBER-2021

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

Monitoring Date	PM_{10} (µg/m³)	$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_x (µg/m³)	CO (mg/m³)	O_3 (µg/m³)	NH_3 (µg/m³)	C_6H_6 (µg/m³)	Bap (ng/m³)	Pb (µg/m³)	Ni (ng/m³)	As (ng/m³)
	AAQMS-1: Near Village Ostia											
03.12.2021	62.2	39.4	8.4	14.2	0.54	BDL	6.4	BDL	BDL	BDL	BDL	BDL
AAQMS-2: Near Village Kaposi												
10.12.2021	53.6	33.2	8.6	14.1	0.58	BDL	BDL	BDL	BDL	BDL	BDL	BDL
AAQMS-3: Near Village Kaliapani Township												
17.12.2021	62.2	41.6	8.9	13.8	1.24	6.8	21.4	BDL	BDL	BDL	BDL	BDL
AAQMS-4: Near Village Ostapal												
24.12.2021	56.2	38.8	7.4	10.8	0.42	4.8	BDL	BDL	BDL	BDL	BDL	BDL

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Visiontek Consultancy Services Pvt. Ltd.

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

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- Quality Control & Project Management
- Renewable Energy
- Agricultural Development
- Information Technology
- Public Health Engineering
- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

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

Ref : Envlab/21/R-5004 **Date : 31.03.2022**

AMBIENT AIR QUALITY (BUFFER ZONE) MONITORING REPORT- MARCH 2022

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

Monitoring Date	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_x ($\mu g/m^3$)	CO (mg/m^3)	O_3 ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	C_6H_6 ($\mu g/m^3$)	Bap (ng/m^3)	Pb ($\mu g/m^3$)	Ni (ng/m^3)	As (ng/m^3)
	AAQMS-1: Near Village Ostia											
07.03.2022	62.8	39.6	8.4	14.6	0.53	BDL	6.6	BDL	BDL	BDL	BDL	BDL
	AAQMS-2: Near Village Kaposi											
07.03.2022	53.08	34.6	8.8	13.9	0.62	BDL	BDL	BDL	BDL	BDL	BDL	BDL
	AAQMS-3: Near Village Kaliapani Township											
14.03.2022	62.2	41.6	9.4	14.8	1.19	6.9	21.6	BDL	BDL	BDL	BDL	BDL
	AAQMS-4: Near Village Ostapal											
21.03.2022	55.8	40.6	8.1	11.8	0.52	5.6	BDL	BDL	BDL	BDL	BDL	BDL

Reviewed By

Approved By

Annexure – 10

FUGITIVE EMISSION ANALYSIS REPORT

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

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- 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

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

Ref : Envlab/21/R-0068 **Date : 12.01.2022**

FUGITIVE EMISSION ANALYSIS REPORT- DECEMBER- 2021

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. Sampling Location : **F1-** Near Mines Ore Plot Area
   F2- Near COB Plant Area
   F3- Near Mines Loading & Unloading Point
4. Method of Sampling : IS 5182(P-5) 1975 RA 2014
5. Date of Sampling : 16.12.2021
6. Date of Analysis : 17.12.2021 TO 18.12.2021
7. Sample Collected by : VCSPL Representative in presence of Client's Representative

SL. No.	Test Parameters	Test Method	Unit	Analysis Result		
				F1	F2	F3
1	Suspended Particulate Matter as SPM	IS 5182 (P-4)1999 RA 2014 Gravimetric Method	$\mu g/m^3$	128	232	188

Reviewed By *Approved By*

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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- 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

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

Ref : Envlab/21/R-5013 **Date : 31.03.2022**

FUGITIVE EMISSION ANALYSIS REPORT- MARCH 2022

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. Sampling Location : **F1-** Near Mines Ore Plot Area
   F2- Near COB Plant Area
   F3- Near Mines Loading & Unloading Point
4. Method of Sampling : IS 5182(P-5) 1975 RA 2014
5. Date of Sampling : 15.03.2022
6. Date of Analysis : 16.03.2022 TO 19.03.2022
7. Sample Collected by : VCSPL Representative in presence of Client's Representative

SL. No.	Test Parameters	Test Method	Unit	Analysis Result		
				F1	F2	F3
1	Suspended Particulate Matter as SPM	IS 5182 (P-4)1999 RA 2014 Gravimetric Method	$\mu g/m^3$	131	218	168

Reviewed By *Approved By*

Annexure – 11

NOISE LEVEL SURVEY REPORT

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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- 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

Laboratory Services: Environment Lab, Food Lab, Material Lab, Soil Lab, Mineral Lab & Microbiology Lab

Ref : Envlab/21/R-0023 **Date : 10.01.2022**

NOISE QUALITY ANALYSIS REPORT- DECEMBER 2021

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. **Date of Sampling : 14.12.2021**
4. Sample Collected by : VCSPL Representative in presence of Client's Representative

Location ID	Location		Result in dB (A)	
		Ambient	Day Time (6.00 am to 10.00pm)	Night Time (10.00pm to 6.00 am)
N1	Open Cast Quarry		70.8	63.2
N2	COB Plant		66.6	60.8
N3	Mines Loading & Unloading		68.2	61.2

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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VISIONTEK CONSULTANCY SERVICES PVT. LTD. — *Approved By*

Visiontek Consultancy Services Pvt. Ltd.

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

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- 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

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

Ref : Envlab/21/R-5011 **Date : 31.03.2022**

NOISE QUALITY ANALYSIS REPORT- MARCH 2022

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. **Date of Sampling** : **15.03.2022**
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	**Open Cast Quarry**	Ambient	66	61
N2	**COB Plant**		63	56
N3	**Mines Loading & Unloading**		68.2	60.2

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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VISIONTEK CONSULTANCY SERVICES PVT. LTD. Approved By

Annexure – 12

Effluent Water Discharge

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

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- Quality Control & Project Management
- Renewable Energy
- Agricultural Development
- Information Technology
- Public Health Engineering
- Mine Planning & Design
- Mineral/Sub-Soil Exploration
- Waste Management Services

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

Ref : Envlab/21/R-9177 **Date : 13.12.2021**

EFFLUENT WATER DISCHARGE ANALYSIS REPORT- DECEMBER-2021

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPALCHROMITE MINES , KALIAPANI, JAJPUR**
3. Sampling Location : **EW1:** ETP Mines Final Discharge Water
4. Method of Sampling : **APHA 1060 B**
5. **Date of Sampling : 03.12.2021**
6. Date of Analysis : **04.12.2021 TO 10.12.2021**
7. Sample Collected by : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameters	Testing Methods	Unit	Standards (In land Surface water)	Analysis Results EW-1
1	Colour	**Visual Comparison Method** APHA 2120 B; 23rd Edition, 2017	Hazen	**Colourless**	10
2	Odour	**Threshold Odour Method** APHA 2150 B; 23rd Edition, 2017	–	**Odourless**	pungent smell
3	pH at 25°C	**pH Meter** APHA 4500 H+ B; 23rd Edition, 2017	–	**5.5-9.0**	7.98
4	Total Suspended Solids	**Gravimetric Method** APHA 2540 D; 23rd Edition, 2017	mg/l	**100**	32
5	Copper as Cu	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**3**	<0.05
6	Fluoride as F	**Distillation followed by Spectophotometric Method** APHA 4500 F- C,D; 23rd Edition, 2017	mg/l	**2**	0.38
7	Total Residual Chlorine	**Iodometric Method** APHA 23RD Ed.2017 : 4500Cl- B	mg/l	**1**	ND
8	Iron as Fe	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**3**	0.42
9	Manganese as Mn	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**2**	<0.05
10	Nitrate as NO_3	**By UV-Screen Method** APHA 4500 NO_3^- B; 23rd Edition, 2017	mg/l	**10**	7.46
11	Phenolic Compounds as C_6H_5OH	**Distillation Followed by Spectophotometric Method** APHA 5530-B, D; 23rd Edition, 2017	mg/l	**1**	<0.001
12	Selenium as Se	**By AAS Method** APHA 3500 Se C; 23rd Edition, 2017	mg/l	**0.05**	<0.01
13	Cadmium as Cd	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**2.0**	<0.001
14	Cyanide as CN	**Distillation Followed by Spectophotometric Method** APHA 4500 -CN-C,E; 23rd Edition, 2017	mg/l	**0.2**	<0.05
15	Lead as Pb	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**0.1**	<0.01
16	Mercury as Hg	**By AAS Method** APHA 3112 B; 23rd Edition, 2017	mg/l	**0.01**	<0.001
17	Nickel as Ni	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**3**	<0.05
18	Arsenic as As	**By AAS Method** APHA 3114 B; 23rd Edition, 2017	mg/l	**0.2**	<0.05
19	Total Chromium as Cr	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**2**	0.28
20	Zinc as Zn	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**5**	0.024
21	Hexavalent Chromium as Cr^{+6}	**By AAS Method** APHA 3500 Cr B; 23rd Edition, 2017	mg/l	**0.1**	<0.001
22	Vanadium as V	**By AAS Method** APHA 3500 V; 23rd Edition, 2017	mg/l	**0.2**	<0.001

Ref : Envlab/21/R-9177 **Date : 13.12.2021**

23	Temperature	**By Thermometer** APHA 2550 B; 23rd Edition, 2017	°C	**Shall not exceed 5°C above the receiving water temperature**	33
24	Dissolved Oxygen	**Modified Winkler Method** APHA 4500 O. C; 23rd Edition, 2017	mg/l	–	6.1
25	Biochemical Oxygen Demand as BOD	**Oxygen Depletion Method** IS 3025 (Part 44):2003	mg/l	**30**	2.2
26	Chemical Oxygen Demand as COD	**Open Reflux Method** APHA 5220 B; 23rd Edition, 2017	mg/l	**250**	16
27	Oil & Grease	**Gravimetric Method (Solvent Extraction)** APHA 5520 B; 23rd Edition, 2017	mg/l	**10**	3.8
28	Ammonical Nitrogen as N	**By TKN Method** APHA 4500-NH_3 C; 23rd Edition, 2017	mg/l	**50**	2.4
29	Total Kjeldahl Nitrogen as N	**By TKN Method** APHA 4500-N_{org} C; 23rd Edition, 2017	mg/l	**100**	3.9
30	Sulphide as S	**By Methylene Blue Method** APHA 4500-S D; 23rd Edition, 2017	mg/l	**2**	<0.001
31	Free Ammonia as NH_3	**By Calculation**	mg/l	**10**	4.4
32	Particulate Size of Suspended Solids	**Gravimetric Method** APHA 2540 D; 23rd 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**	98% Survival of Fish after 96 Hrs in 100% Effluent

Reviewed By

Approved By

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

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

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

Ref : Envlab/21/R-5008 **Date : 31.03.2022**

EFFLUENT WATER DISCHARGE ANALYSIS REPORT- MARCH 2022

1. Name of Client : **M/s FERRO ALLOYS CORPORATION LIMITED , BHADRAK**
2. Name of the Project : **OSTAPAL CHROMITE MINES , KALIAPANI, JAJPUR**
3. Sampling Location : **EW1:** ETP Outside Discharge Point
4. Method of Sampling : **APHA 1060 B**
5. **Date of Sampling** : **15.03.2022**
6. Date of Analysis : **16.03.2022 TO 23.03.2022**
7. Sample Collected by : VCSPL Representative in presence of Client's Representative

Sl. No.	Parameters	Testing Methods	Unit	Standards (In land Surface water)	Analysis Results EW-1
1	Colour	Visual Comparison Method APHA 2120 B; 23rd Edition, 2017	Hazen	Colourless	5
2	Odour	Threshold Odour Method APHA 2150 B; 23rd Edition, 2017	–	Odourless	Pungent Smell
3	pH at 25°C	pH Meter APHA 4500 H B; 23rd Edition, 2017	–	5.5-9.0	7.88
4	Total Suspended Solids	Gravimetric Method APHA 2540 D; 23rd Edition, 2017	mg/l	100	20
5	Copper as Cu	By AAS Method APHA 3111 B; 23rd Edition, 2017	mg/l	3	<0.02
6	Fluoride as F	Distillation followed by Spectrophotometric Method APHA 4500 F C,D; 23rd Edition, 2017	mg/l	2	0.24
7	Total Residual Chlorine	Iodometric Method APHA 23RD Ed.2017 : 4500Cl, B	mg/l	1	0.24
8	Iron as Fe	By AAS Method APHA 3111 B; 23rd Edition, 2017	mg/l	3	0.58
9	Manganese as Mn	By AAS Method APHA 3111 B; 23rd Edition, 2017	mg/l	2	<0.025
10	Nitrate as NO_3	By UV-Screen Method APHA 4500 NO_3^- B; 23rd Edition, 2017	mg/l	10	4.6
11	Phenolic Compounds as C_6H_5OH	Distillation Followed by Spectrophotometric Method APHA 5530-B, D; 23rd Edition, 2017	mg/l	1	<0.05
12	Selenium as Se	By AAS Method APHA 3500 Se C; 23rd Edition, 2017	mg/l	0.05	<0.001
13	Cadmium as Cd	By AAS Method APHA 3111 B; 23rd Edition, 2017	mg/l	2.0	<0.01
14	Cyanide as CN	Distillation Followed by Spectrophotometric Method APHA 4500 -CN-C,E; 23rd Edition, 2017	mg/l	0.2	<0.01
15	Lead as Pb	By AAS Method APHA 3111 B; 23rd Edition, 2017	mg/l	0.1	<0.02
16	Mercury as Hg	By AAS Method APHA 3112 B; 23rd Edition, 2017	mg/l	0.01	<0.004
17	Nickel as Ni	By AAS Method APHA 3111 B; 23rd Edition, 2017	mg/l	3	<0.1
18	Arsenic as As	By AAS Method APHA 3114 B; 23rd Edition, 2017	mg/l	0.2	<0.004
19	Total Chromium as Cr	By AAS Method APHA 3111 B; 23rd Edition, 2017	mg/l	2	0.36
20	Zinc as Zn	By AAS Method APHA 3111 B; 23rd Edition, 2017	mg/l	5	0.021
21	Hexavalent Chromium as Cr^{+6}	By AAS Method APHA 3500 Cr B; 23rd Edition, 2017	mg/l	0.1	<0.01
22	Vanadium as V	By AAS Method APHA 3500 V; 23rd Edition, 2017	mg/l	0.2	<0.001
23	Temperature	By Thermometer APHA 2550 B; 23rd Edition, 2017	°C	Shall not exceed 5°C above the receiving water temperature	35
24	Dissolved Oxygen	Modified Winkler Method APHA 4500 O. C; 23rd Edition, 2017	mg/l	–	6.1
25	Biochemical Oxygen Demand as BOD	Oxygen Depletion Method IS 3025 (Part 44):2003	mg/l	30	3.1
26	Chemical Oxygen Demand as	Open Reflux Method	mg/l	250	10

	COD	APHA 5220 B; 23rd Edition, 2017			
27	Oil & Grease	Gravimetric Method (Solvent Extraction) APHA 5520 B; 23rd Edition, 2017	mg/l	10	4.2
29	Ammonical Nitrogen as N	By TKN Method APHA 4500-NH_3 C; 23rd Edition, 2017	mg/l	50	1.8
30	Total Kjeldahl Nitrogen as N	By TKN Method APHA 4500-N_{org} C; 23rd Edition, 2017	mg/l	100	5.1
31	Sulphide as S	By Methylene Blue Method APHA 4500-S D; 23rd Edition, 2017	mg/l	2	<0.001
32	Free Ammonia as NH_3	By Calculation	mg/l	10	3.8
33	Particulate Size of Suspended Solids	Gravimetric Method APHA 2540 D; 23rd Edition, 2017	µ	Shall pass 850 micron IS Sieve	<850
34	Bio-assay Test	Evaluating Acute Toxicity IS 6582 (P-2) 2008	%	90% survival of fish after 96 hours in 100% effluent	98% Survival of Fish after 96 Hrs in 100% Effluent

VISIONTEK CONSULTANCY SERVICES PVT. LTD. *Reviewed By*

VISIONTEK CONSULTANCY SERVICES PVT. LTD. *Approved By*

Annexure No.-13

ENVIRONMENTAL PROTECTION EXPENSES FOR THE FY 2021-22 OSTAPAL CHROMITE MINE,M/s FACOR LTD		
Sl. No.	**I T E M**	**Expenses for the year 2021-22** **(in Rupees ₹)**
1	**AFFORESTATION 2897 FY 21**	
a)	Seedlings	173,820
b)	Fertilizer/Insecticide/Cow -dung	57,940
c)	Digging of Pits/Planting (Laborcost)	101,395
d)	Post Plantation care(Watering, Weeding, basin making etc.)	362,125
e)	Supervising	490,000
	Sub-Total	**1,185,280**
2	**WATER MANAGEMENT & TREATMENT**	
a)	ETP Operation & Maintenance (including costs of chemical & Manpower)	2,570,897
b)	Power Consumption	512,100
c)	Sludge disposal	80,000
d)	Water sample analysis	71,160
e)	Water Tax Payment	369,360
	Sub-Total	**3,234,157**
3	**DUST SUPRESSION & AIR MONITORING**	
a)	Water spraying at dust generating points by water tanker 2111 No. trip	1,023,835
b)	Air monitoring charges	1,126,400
c)	Fusitive dust emission	18,804
c)	Noise level measurement	1,800
	Sub-Total	2,170,839
	Grand Total	**6,590,276**