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transforming elements

OSTAPAL CHROMITE MINES
P.O. - KALIAPANI-755047
DIST. JAJPUR, ODISHA, INDIA

FACOR
CHROME ORE MINING DIVISION

OCM/ENV/ 157 /2021

Dtd: 31.05.2021

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'2020 to March'2021 for your kind perusal.

The Monthly & quarterly Environmental monitoring data for the period October'2020 to Mar'2021 comprising AAQ, Water, Noise & Soil are enclosed herewith as Annexures. The soft copy of the same is being sent to your good office by email.

This is for your Kind information & necessary action.

Thanking You

Yours faithfully,
for FERRO ALLOYS CORPORATION LTD.

MINES MANAGER
Encl.: A/a

Ferro Alloys Corporation Limited
Charge Chrome Plant, D.P. Nagar, Randia - 756 135, Dist. Bhadrak, Odisha, India.
Phone : 06784 240320/240347/240272, Fax : 06784 240626.
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CIN : L45201OR1955PLC008400

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

Project Code : **Mining(Non-Coal)**

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

Period of Compliance Report : **October,2020 to March,2021**

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 ha 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 on03.10.2005	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.
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 2020 to March'2021
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. Compliance status should be submitted to the Ministry of Environment & Forests on six monthly basis.	The OB is being dumped at earmarked sites only. The OB dump is not kept active for long period. The present height of the dump is within the limit & over all slope 25 ^{0}. In future also the overall slope will be maintained below 28degrees. 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.
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 -silt ed 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 ML area through upgraded ETP. 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.
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.
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 <0.005mg/l. 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 two settling pits 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.	The sludge generated from mining operations contains chrome ore. It is being fed in Beneficiation Plant to separate the Chrome.

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 super natant 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.
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.
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 . The Monitoring reports has been sent & the monitoring report for the period from Oct,2020 to March 2021 is enclosed as: Ground water level : **Annexure No.-2** Ground water quality: **Annexure No.-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 6 Bore wells & 3 Nos. of piezometer holes for concentration of Cr^{+6} are enclosed as **Annexure No.- 4.**
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, the Project Authority has constructed Bore wells at 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**
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 letter no.21 - 4/1456/OR/MIN/2017 -1735 dated 28.08.2018 for ground water withdrawal. The approved NOC is enclosed as **Annexure No.-6**. Renewal of NOC has been applied.
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 pits for suitable rain water harvesting measures.

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. The mitigative 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. There is no proposal of enhancing the production capacity of the mine. CTO has been enclosed for as **Annexure No.-7**
23.	Sewage treatment Plant should be installed for the colony. ETP should also be provided for workshop and wastewater generated from Mining operations.	There is no colony inside the ML area. 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 is 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.
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 & scope of working should be made without prior approval of the MoEF.	The Mining technology & scope of working has not been changed.
2	No change in the calendar plan including excavation, quantum of mineral Chromite 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 2020 to March, 2021) is given in **Annexure No. -8**.
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.
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.
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_2, NO_x & CO is being monitored & submitted regularly. Monitoring report for the period Oct, 2020 to March, 2021 is enclosed as follows: **Annexure No.-9 : Core Zone** **Annexure No.-10 : 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.-11**.
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. -2**.

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 waste water 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 October 2020 to March,2021 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 programme to all categories of workers and employees is being conducted periodically by lung function test, audiometry test, vision tests and other tests. Workers/employees with defects are advised for suitable treatment or engaged on suitable rotation duty.
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 2020-21 is given in **Annexure No. -13**.

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PERIOD: OCT-2020 TO MAR-2021

9. DUST FALL

DF1- Near Roof Top of Office Building						
SL.No.	Parameters	Unit (mg of deposit per square meter per day)		Analysis Result DEC-20	Analysis Result MAR-21	Annual Avg
1	Mercury as Hg	mg/m^2d		ND	ND	ND
2	Nickel as Ni	mg/m^2d		ND	ND	ND
3	Cobalt as CO	mg/m^2d		ND	ND	ND
4	Arsenic as As	mg/m^2d		ND	ND	ND

10. SOIL QUALITY

S1 : Near Ore Plot Area

Sl. No.	Name of the Parameters	Unit	Testing Method		Analysis Result DEC-20	MAR-21	Annual Avg
1	Mercury as Hg	mg/kg	EPA 3050B, 7000B Rev 02, 1996		N	ND	ND
2	Nickel as Ni	mg/kg	EPA 3050B, 7000B Rev 02, 1996		N	ND	ND
3	Cobalt as CO	mg/kg	EPA 3050B, 7000B Rev 02, 1996		N	ND	ND
4	Arsenic as As	mg/kg	EPA 3050B, 7000B Rev 02, 1996		N	ND	ND

S2: Near Truck Parking

Sl. No.	Name of the Parameters	Unit	Testing Method		Analysis Result DEC-20	MAR-21	Annual Avg
1	Mercury as Hg	mg/kg	EPA 3050B, 7000B Rev 02, 1996		ND	ND	ND
2	Nickel as Ni	mg/kg	EPA 3050B, 7000B Rev 02, 1996		ND	ND	ND
3	Cobalt as CO	mg/kg	EPA 3050B, 7000B Rev 02, 1996		ND	ND	ND
4	Arsenic as As	mg/kg	EPA 3050B, 7000B Rev 02, 1996		ND	ND	ND

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S3 : Near Dump Area

PERIOD: OCT-2020 TO MAR-2021

Sl. No.	Name of the Parameters	Unit	Testing Method	Analysis Result			
					DEC-20	MAR-21	Annual Avg
1	Mercury as Hg	mg/kg	EPA 3050B, 7000B Rev 02, 1996		ND	ND	ND
2	Nickel as Ni	mg/kg	EPA 3050B, 7000B Rev 02, 1996		ND	ND	ND
3	Cobalt as CO	mg/kg	EPA 3050B, 7000B Rev 02, 1996		ND	ND	ND
4	Arsenic as As	mg/kg	EPA 3050B, 7000B Rev 02, 1996		N	ND	ND

S4 : Near Lease Hold Area

Sl. No.	Name of the Parameters	Unit	Testing Method	Analysis Result			
					DEC-20	MAR-21	Annual Avg
1	Mercury as Hg	mg/kg	EPA 3050B, 7000B Rev 02, 1996		N	ND	ND
2	Nickel as Ni	mg/kg	EPA 3050B, 7000B Rev 02, 1996		N	ND	ND
3	Cobalt as CO	mg/kg	EPA 3050B, 7000B Rev 02, 1996		N	ND	ND
4	Arsenic as As	mg/kg	EPA 3050B, 7000B Rev 02, 1996		N	ND	ND

Reviewed By

Approved By

Plot No.-M-22&23, Chandaka Industrial Estate, Patia, Bhubaneswar-751024, Dist-Khurda, Odisha Tel.: 0674-3511721

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6. GROUND WATER LEVEL ANALYSIS REPORT

GROUND WATER LEVEL ANALYSIS REPORT					
Locations	**Unit**		**DEC-20**	**MAR-21**	**Avg**
GW1: Borewell Near Workshop of the Mines	mt/bgl		11.2	11.4	**11.3**
GW2: Borewell Near Main Gate of OCM	mt/bgl		10.2	10.6	**10.4**
GW3: Open well near Ostia Village	mt/bgl		3. ;	4.2	**3.7**
GW4: Open well near Ostapal Village	mt/bgl		5. !	5.6	**5.3**
GW5: Tubewell inside the shiva temple of VillagE Gurujanga	mt/bgl		10.2	10.8	**10.5**
GW6: Tubewell Outside the shiva temple of Village Gurujanga	mt/bgl		11.1	11.4	**11.1**
GW7: Eastern Side of the Quarry (Pz-1)	mt/bgl		4.	4.4	**4.3**
GW8: Southern Side of the Quarry (Pz-2)	mt/bgl		4.	4.3	**4.1**
GW9: Western Side of the Quarry (Pz-3)	mt/bgl		4.	4.1	**4.2**

7. NOISE QUALITY ANALYSIS REPORT

Location ID	Location			**DEC-20**	**MAR-21**	**Avg**
				Result in dB (A)	**Result in dB (A)**	
				Day Time	Day Time	
N1	**Open cast Qu rry**	Ambient		71	73	**72**
N2	**COB Plant**			64	66	**66**
N3	**Mines loading & unloading**			**71.6**	**72.8**	**72.67**

Location ID	Location			**Result in dB (A)**	**Result in dB (A)**	**Avg**
				Night Time	Night Time	
N1	**Open cast Quarry**	Ambient		68	66	**67.3**
N2	**COB Plant**			58	59	**59.7**
N3	**Mines loading & unloading**			68.4	69.6	**69.3**

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2. GROUND WATER QUALITY ANALYSIS REPORT:

GW1: Bore well Near Workshop of the Mines

Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result	Analysis Result	Annual Average
				Acceptable Limit	Permissible Limit		DEC-20	MAR-21	
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 : 216 C	--	**Agreeable**	**Agreeable**		Agreeable	Agreeable	**Agreeable**
4	Turbidity	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	NTU	**1**	**5**		6.4	6.6	**6.5**
5	pH Value at 25^0C	**pH Meter** APHA 23RD Ed,2017 : 450 H^+ B	--	**6.5-8.5**	**No Relaxation**		6.78	6.84	**6.8**
6	Total Hardness (as $CaCO_3$)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	mg/l	**200**	**600**		188	189	**186.3**
7	Iron (as Fe)	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	mg/l	**1**	**No Relaxation**		0.28	0.26	**0.3**
8	Chloride (as Cl)	**Argentometric Method** APHA 23RD Ed,2017 : 450 Cl^- B	mg/l	**250**	**1000**		38	38	**37.3**
9	Residual, free Chlorine	**Iodometric Method** APHA 23RD Ed,2017 : 450 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**		288	292	**296.7**
11	Calcium (as Ca)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 35 0Ca B	mg/l	**75**	**200**		50.6	51.2	**131.3**
12	Magnesium (as Mg)	**Calculation Method** APHA 23RD Ed,2017 : 3500Mg B	mg/l	**30**	**100**		21.2	22.8	**31.6**
13	Copper (as Cu)	**By AAS Method** APHA 23RD Ed,2017: 3111 B	mg/l	**0.05**	**1.5**		<0.05	<0.05	**20.0**
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**	mg/l	**200**	**400**		30.2	31.4	**30.5**

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		APHA 23RD Ed,2017: 4500 $SO4^{2-}$ E							
16	Nitrate (as NO_3)	**By UV-Screen Method** APHA 23RD Ed,2017: 4500 NO_3^- E	mg/l	**45**	**No Relaxation**		7.1	7.4	**7.1**
17	Fluoride (as F)	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed,2017: 4500F^- C	mg/l	**1**	**1.5**		0.16	0.18	**0.16**
18	Phenolic Compounds (as C_6H_5OH)	**Chloroform Extraction by Colorimetric Method** APHA 23RD Ed,2017: 553 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**		<0.002	<0.002	**<0.002**
20	Cadmium (as Cd)	**AAS Method** APHA 23RD Ed,2017: 311 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: 311 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: 450 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**		1.6	1.8	**1.53**
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed,2017: 5540 C	mg/l	**0.2**	--		ND	ND	**ND**
27	Mineral Oil	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	mg/l	**0.5**	**No Relaxation**		ND	ND	**ND**
28	Alkalinity	**Titration Method** APHA 23RD Ed,2017:2320 B	mg/l	**200**	**600**		187	190	**189**
29	Aluminium as(Al)	**AAS Method** APHA 23RD Ed,2017: 3111 D	mg/l	**0.03**	**0.2**		<0.001	<0.001	**<0.001**
30	Boron (as B)	**Curcumin Method** APHA 23RD Ed,2017: 4500B, B	mg/l	**0.5**	**2.4**		0.51	0.45	**0.49**
31	Total Coli form 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**

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TC-7944

OSTAPAL CHROMITE MINES

PERIOD: OCT-2020 TO MAR-2021

GW2: Bore well Near Main Gate of OCM

Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
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**		7.1	7.3	**7.1**
5	pH Value at 25^0C	**pH Meter** APHA 23RD Ed,2017 : 4500H^+ B	--	**6.5-8.5**	**No Relaxation**		6.91	6.91	**6.9**
6	Total Hardness (as $CaCO_3$)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	mg/l	**200**	**600**		192	194	**193.3**
7	Iron (as Fe)	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	mg/l	**1**	**No Relaxation**		0.32	0.24	**0.3**
8	Chloride (as Cl)	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl^- B	mg/l	**250**	**1000**		40	41	**39.7**
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 : 254 C	mg/l	**500**	**2000**		332	278	**316.7**
11	Calcium (as Ca)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	mg/l	**75**	**200**		52.8	55.2	**54.7**
12	Magnesium (as Mg)	**Calculation Method** APHA 23RD Ed,2017 : 3500Mg B	mg/l	**30**	**100**		23.8	31.2	**26.3**
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**		31.4	37.4	**33.3**
16	Nitrate (as NO_3)	**By UV-Screen Method** APHA 23RD Ed,2017: 4500 NO_3^- E	mg/l	**45**	**No Relaxation**		7.4	7.2	**7.27**
17	Fluoride (as F)	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed,2017: 4500F^- C	mg/l	**1**	**1.5**		0.18	0.24	**0.19**
18	Phenolic Compounds	**Chloroform Extraction by Colorimetric Method**	mg/l	**0.001**	**0.002**		<0.001	<0.001	**<0.001**

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19	Mercury (as Hg)	**AAS Method** APHA 23RD Ed,2017: 3112 B	mg/l	**0.001**	**No Relaxation**		<0.002	<0.002	**<0.002**
20	Cadmium (as Cd)	**AAS Method** APHA 23RD Ed,2017: 3 11 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: 3 14 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: 500 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**		1.8	1.8	**1.67**
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed,2017: 5540 C	mg/l	**0.2**	--		ND	ND	**ND**
27	Mineral Oil	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	mg/l	**0.5**	**No Relaxation**		ND	ND	**ND**
28	Alkalinity	**Titration Method** APHA 23RD Ed,2017:2320 B	mg/l	**200**	**600**		206	168	**194.7**
29	Aluminium as(Al)	**AAS Method** APHA 23RD Ed,2017: 3111 D	mg/l	**0.03**	**0.2**		<0.001	<0.001	**<0.001**
30	Boron (as B)	**Curcumin Method** APHA 23RD Ed,2017: 45 0B, B	mg/l	**0.5**	**2.4**		<0.1	<0.1	**<0.1**
31	Total Coli form as TC	**MPN Method** APHA 23RD Ed,2017: 9221 B	MPN/ 100 ml	Shall not be detectable in any 100ml sample	--		<1.8	<1.8	**<1.8**

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OSTAPAL CHROMITE MINES

PERIOD: OCT-2020 TO MAR-2021

GW3: Open well near Ostia Village									
Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
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**		7.6	7.8	**7.6**
5	pH Value at 25^0C	**pH Meter** APHA 23RD Ed,2017 : 4500H^+ B	--	**6.5-8.5**	**No Relaxation**		6.89	6.91	**6.9**
6	Total Hardness (as $CaCO_3$)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	mg/l	**200**	**600**		191	194	**191.7**
7	Iron (as Fe)	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	mg/l	**1**	**No Relaxation**		0.22	0.24	**0.2**
8	Chloride (as Cl)	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl^- B	mg/l	**250**	**1000**		41	41	**42.0**
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**		272	278	**276.7**
11	Calcium (as Ca)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	mg/l	**75**	**200**		54.6	55.2	**56.6**
12	Magnesium (as Mg)	**Calculation Method** APHA 23RD Ed,2017 : 3500 gMB	mg/l	**30**	**100**		30.8	31.2	**30.7**
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**		36.6	37.4	**36.0**

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16	Nitrate (as NO_3)	**By UV-Screen Method** APHA 23RD Ed,2017: 4500 NO_3^- E	mg/l	**45**	**No Relaxation**	6.2	6.9	7.2	**6.77**
17	Fluoride (as F)	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed,2017: 4500F^- C	mg/l	**1**	**1.5**	0.21	0.22	0.24	**0.22**
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	**<0.001**
19	Mercury (as Hg)	**AAS Method** APHA 23RD Ed,2017: 3112 B	mg/l	**0.001**	**No Relaxation**	<0.002	0.002	<0.002	**<0.002**
20	Cadmium (as Cd)	**AAS Method** APHA 23RD Ed,2017: 3111 B	mg/l	**0.003**	**No Relaxation**	<0.001	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	**<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	**<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	**<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	**<0.01**
25	Zinc (as Zn)	**By AAS Method** APHA 23RD Ed,2017: 3111 B	mg/l	**5**	**15**	1.6	1.6	1.8	**1.67**
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed,2017: 5540 C	mg/l	**0.2**	--	ND	ND	ND	**ND**
27	Mineral Oil	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	mg/l	**0.5**	**No Relaxation**	ND	ND	ND	**ND**
28	Alkalinity	**Titration Method** APHA 23RD Ed,2017:2320 B	mg/l	**200**	**600**	180	172	168	**173.3**
29	Aluminium as(Al)	**AAS Method** APHA 23RD Ed,2017: 3111 D	mg/l	**0.03**	**0.2**	<0.001	0.001	<0.001	**<0.001**
30	Boron (as B)	**Curcumin Method** APHA 23RD Ed,2017: 4500B, B	mg/l	**0.5**	**2.4**	<0.1	<0.1	<0.1	**<0.1**
31	Total Coli form 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	**<1.8**

Reviewed By

Approved By

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OSTAPAL CHROMITE MINES

PERIOD: OCT-2020 TO MAR-2021

GW4: Open well near Ostapal Village

Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
		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**		\greeable	Agreeable	Agreeable
3	Taste	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	--	**Agreeable**	**Agreeable**		greeable	Agreeable	Agreeable
4	Turbidity	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	NTU	**1**	**5**		6.6	6.8	**6.7**
5	pH Value at 25^0C	**pH Meter** APHA 23RD Ed,2017 : 4500H^+ B	--	**6.5-8.5**	**No Relaxation**		7.4	7.46	**7.4**
6	Total Hardness (as $CaCO_3$)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	mg/l	**200**	**600**		112	114	**112.0**
7	Iron (as Fe)	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	mg/l	**1**	**No Relaxation**		0.22	0.26	**0.2**
8	Chloride (as Cl)	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl^- B	mg/l	**250**	**1000**		40	42	**41.3**
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**		188	192	**190.0**
11	Calcium (as Ca)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	mg/l	**75**	**200**		44	50	**45.3**
12	Magnesium (as Mg)	**Calculation Method** APHA 23RD Ed,2017 : 3500Mg B	mg/l	**30**	**100**		20.8	21.4	**21.1**
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**		4.6	4.8	**4.5**
16	Nitrate (as NO_3)	**By UV-Screen Method** APHA 23RD Ed,2017: 4500 NO_3^- E	mg/l	**45**	**No Relaxation**		1.2	1.8	**1.37**

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17	Fluoride (as F)	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed,2017: 4500F- C	mg/l	**1**	**1.5**		0.012	0.016	**0.01**
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**		<0.002	<0.002	**<0.002**
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**		2.4	2.6	**2.53**
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed,2017: 5540 C	mg/l	**0.2**	--		ND	ND	**ND**
27	Mineral Oil	**Partition-Gravimetric Metho** APHA 23RD Ed,2017: 5520 B	mg/l	**0.5**	**No Relaxation**		ND	ND	**ND**
28	Alkalinity	**Titration Method** APHA 23RD Ed,2017:2320 B	mg/l	**200**	**600**		84	82	**84.7**
29	Aluminium as (Al)	**AAS Method** APHA 23RD Ed,2017: 3111 D	mg/l	**0.03**	**0.2**		<0.001	<0.001	**<0.001**
30	Boron (as B)	**Curcumin Method** APHA 23RD Ed,2017: 4500B,	mg/l	**0.5**	**2.4**		<0.1	<0.1	**<0.1**
31	Total Coli form 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**

Reviewed By

Approved By

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OSTAPAL CHROMITE MINES

PERIOD: OCT-2020 TO MAR-2021

GW5: Tubewell inside the shiva temple of Village Gurujanga									
Sl. No.	**Parameter**	**Testing Method**	**Unit**	**Standard as per IS -10500:2012 Amended on 2015 & 2018**			**Analysis Result**	**Analysis Result**	**Annual Average**
				Acceptable Limit	**Permissible Limit**		**DEC-20**	**MAR-21**	
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**		greeable	Agreeable	Agreeable
3	Taste	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	--	**Agreeable**	**Agreeable**		greeable	Agreeable	Agreeable
4	Turbidity	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	NTU	**1**	**5**		7.1	7.4	**7.3**
5	pH Value at 25^0C	**pH Meter** APHA 23RD Ed,2017 : 4500H^+ B	--	**6.5-8.5**	**No Relaxation**		7.6	7.62	**7.5**
6	Total Hardness (as $CaCO_3$)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	mg/l	**200**	**600**		92	90	**90.7**
7	Iron (as Fe)	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	mg/l	**1**	**No Relaxation**		0.18	0.22	**0.2**
8	Chloride (as Cl)	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl^- B	mg/l	**250**	**1000**		48	52	**50.0**
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**		114	116	**113.3**
11	Calcium (as Ca)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	mg/l	**75**	**200**		32	36	**32.7**
12	Magnesium (as Mg)	**Calculation Method** APHA 23RD Ed,2017 : 3500 gB	mg/l	**30**	**100**		12.1	12.8	**12.6**
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**		4.2	5.1	**4.6**
16	Nitrate (as NO_3)	**By UV-Screen Method**	mg/l	**45**	**No Relaxation**		0.78	0.84	**0.78**

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		APHA 23RD Ed,2017: 4500 NO_3^- E							
17	Fluoride (as F)	**Distillation followed by Spectrophotometric Method** / APHA 23RD Ed,2017: 4500F^- C	mg/l	**1**	**1.5**		0.013	0.014	**0.01**
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**		<0.002	<0.002	**<0.002**
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**		3.1	3.4	**3.23**
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** / APHA 23RD Ed,2017: 5540 C	mg/l	**0.2**	--		ND	ND	**ND**
27	Mineral Oil	**Partition-Gravimetric Method** / APHA 23RD Ed,2017: 5520 B	mg/l	**0.5**	**No Relaxation**		ND	ND	**ND**
28	Alkalinity	**Titration Method** / APHA 23RD Ed,2017:2320 B	mg/l	**200**	**600**		26	32	**28.7**
29	Aluminium as(Al)	**AAS Method** / APHA 23RD Ed,2017: 3111 D	mg/l	**0.03**	**0.2**		<0.001	<0.001	**<0.001**
30	Boron (as B)	**Curcumin Method** / APHA 23RD Ed,2017: 4500B, B	mg/l	**0.5**	**2.4**		<0.1	<0.1	**<0.1**
31	Total Coli form 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**

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OSTAPAL CHROMITE MINES

PERIOD: OCT-2020 TO MAR-2021

GW6: Tube well Outside the shiva temple of Village Gurujanga									
Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
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**		7.6	7.5	**7.6**
5	pH Value at 25^0C	**pH Meter** APHA 23RD Ed,2017 : 4500H^+ B	--	**6.5-8.5**	**No Relaxation**		7.44	7.48	**7.4**
6	Total Hardness (as $CaCO_3$)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	mg/l	**200**	**600**		66	68	**64.7**
7	Iron (as Fe)	**By AAS Method** APHA 23RD Ed,2017 : 3111, I	mg/l	**1**	**No Relaxation**		0.16	0.18	**0.2**
8	Chloride (as Cl)	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl^- B	mg/l	**250**	**1000**		46	48	**47.3**
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**		92	96	**92.7**
11	Calcium (as Ca)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	mg/l	**75**	**200**		26	28	**26.0**
12	Magnesium (as Mg)	**Calculation Method** APHA 23RD Ed,2017 : 3500 gMB	mg/l	**30**	**100**		10.6	11.2	**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**		3.8	4.2	**3.7**
16	Nitrate (as NO_3)	**By UV-Screen Method**	mg/l	**45**	**No Relaxation**		0.66	0.71	**0.66**

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		APHA 23RD Ed,2017: 4500 NO_3^- E							
17	Fluoride (as F)	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed,2017: 4500F^- C	mg/l	**1**	**1.5**		0.011	0.012	**0.01**
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**		<0.002	<0.002	**<0.002**
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 e 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**		3.6	4.2	**3.87**
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed,2017: 5540 C	mg/l	**0.2**	--		ND	ND	**ND**
27	Mineral Oil	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	mg/l	**0.5**	**No Relaxation**		ND	ND	**ND**
28	Alkalinity	**Titration Method** APHA 23RD Ed,2017:2320 B	mg/l	**200**	**600**		18	22	**20.0**
29	Aluminium as(Al)	**AAS Method** APHA 23RD Ed,2017: 3111 D	mg/l	**0.03**	**0.2**		<0.001	<0.001	**<0.001**
30	Boron (as B)	**Curcumin Method** APHA 23RD Ed,2017: 4500B, B	mg/l	**0.5**	**2.4**		<0.1	<0.1	**<0.1**
31	Total Coli form 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**

Reviewed By

Approved By

Visiontek Consultancy Services Pvt. Ltd.

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OSTAPAL CHROMITE MINES

PERIOD: OCT.-2020 TO MAR-2021

GW7: Eastern Side of the Quarry (Pz-1)									
Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
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**		greeable	Agreeable	Agreeable
3	Taste	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	--	**Agreeable**	**Agreeable**		greeable	Agreeable	Agreeable
4	Turbidity	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	NTU	**1**	**5**		6.88	6.8	**6.8**
5	pH Value at 25^0C	**pH Meter** APHA 23RD Ed,2017 : 4500H^+ B	--	**6.5-8.5**	**No Relaxation**		7.31	7.36	**7.3**
6	Total Hardness (as $CaCO_3$)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	mg/l	**200**	**600**		124	120	**122.7**
7	Iron (as Fe)	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	mg/l	**1**	**No Relaxation**		0.29	0.24	**0.3**
8	Chloride (as Cl)	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl^- B	mg/l	**250**	**1000**		38	40	**38.7**
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**		212	216	**212.7**
11	Calcium (as Ca)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	mg/l	**75**	**200**		44	48	**46.7**
12	Magnesium (as Mg)	**Calculation Method** APHA 23RD Ed,2017 : 3500 gMB	mg/l	**30**	**100**		20	21	**19.7**
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**		3.6	4.1	**3.6**
16	Nitrate (as NO_3)	**By UV-Screen Method**	mg/l	**45**	**No Relaxation**		1.4	1.2	**1.27**

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		APHA 23RD Ed,2017: 4500 NO_3^- E							
17	Fluoride (as F)	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed,2017: 4500F⁻ C	mg/l	**1**	**1.5**		0.012	0.014	**0.01**
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**		<0.002	<0.002	**<0.002**
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**		3.2	3.6	**3.53**
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed,2017: 5540 C	mg/l	**0.2**	--		ND	ND	**ND**
27	Mineral Oil	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520 B	mg/l	**0.5**	**No Relaxation**		ND	ND	**ND**
28	Alkalinity	**Titration Method** APHA 23RD Ed,2017:2320 B	mg/l	**200**	**600**		50	52	**51.3**
29	Aluminium as(Al)	**AAS Method** APHA 23RD Ed,2017: 3111 D	mg/l	**0.03**	**0.2**		<0.001	<0.001	**<0.001**
30	Boron (as B)	**Curcumin Method** APHA 23RD Ed,2017: 4500 B B	mg/l	**0.5**	**2.4**		<0.1	<0.1	**<0.1**
31	Total Coli form 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**

Reviewed By

Approved By

Visiontek Consultancy Services Pvt. Ltd.

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OSTAPAL CHROMITE MINES

PERIOD: OCT-2020 TO MAR-2021

GW8: Southern Side of the Quarry (Pz-2)									
Sl. No.	**Parameter**	**Testing Method**	**Unit**	**Standard as per IS -10500:2012 Amended on 2015 & 2018**			**Analysis Result**	**Analysis Result**	**Annual Average**
				Acceptable Limit	**Permissible Limit**		**DEC-20**	**MAR-21**	
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**		greeable	Agreeable	Agreeable
3	Taste	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	--	**Agreeable**	**Agreeable**		greeable	Agreeable	Agreeable
4	Turbidity	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	NTU	**1**	**5**		7.44	7.7	**7.5**
5	pH Value at 25^0C	**pH Meter** APHA 23RD Ed,2017 : 4500H^+ B	--	**6.5-8.5**	**No Relaxation**		7.5	7.52	**7.5**
6	Total Hardness (as $CaCO_3$)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	mg/l	**200**	**600**		110	76	**98.7**
7	Iron (as Fe)	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	mg/l	**1**	**No Relaxation**		0.18	0.16	**0.2**
8	Chloride (as Cl)	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl^- B	mg/l	**250**	**1000**		42	40	**41.3**
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**		192	148	**179.3**
11	Calcium (as Ca)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	mg/l	**75**	**200**		38	32	**35.3**
12	Magnesium (as Mg)	**Calculation Method** APHA 23RD Ed,2017 : 3500 gMB	mg/l	**30**	**100**		10.8	10.6	**10.5**
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	3.2	**4.2**
16	Nitrate (as NO_3)	**By UV-Screen Method**	mg/l	**45**	**No Relaxation**		0.81	0.76	**0.80**

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		APHA 23RD Ed,2017: 4500 NO_3^- E							
17	Fluoride (as F)	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed,2017: 4500F^- C	mg/l	**1**	**1.5**		0.014	0.012	**0.01**
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	mg/l	**0.001**	**No Relaxation**		<0.002	<0.002	**<0.002**
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 e 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	mg/l	**5**	**15**		4	4.2	**4.13**
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed,2017: 5540 C	mg/l	**0.2**	--		ND	ND	**ND**
27	Mineral Oil	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520	mg/l	**0.5**	**No Relaxation**		ND	ND	**ND**
28	Alkalinity	**Titration Method** APHA 23RD Ed,2017:2320 B	mg/l	**200**	**600**		38	26	**34.7**
29	Aluminium as(Al)	**AAS Method** APHA 23RD Ed,2017: 3111	mg/l	**0.03**	**0.2**		<0.001	<0.001	**<0.001**
30	Boron (as B)	**Curcumin Method** APHA 23RD Ed,2017: 4500 ,B	mg/l	**0.5**	**2.4**		<0.1	<0.1	**<0.1**
31	Total Coli form 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**

Reviewed By

Approved By

Visiontek Consultancy Services Pvt. Ltd.

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OSTAPAL CHROMITE MINES

PERIOD: OCT-2020 TO MAR-2021

GW9: Western Side of the Quarry (Pz-3)									
Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
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**		greeable	Agreeable	Agreeable
3	Taste	**Flavor Threshold Test** APHA 23RD Ed,2017 : 2160 C	--	**Agreeable**	**Agreeable**		greeable	Agreeable	Agreeable
4	Turbidity	**Nephelometric Method** APHA 23RD Ed,2017 :2130 B	NTU	**1**	**5**		7.82	6.8	**7.5**
5	pH Value at 25^0C	**pH Meter** APHA 23RD Ed,2017 : 4500H^+ B	--	**6.5-8.5**	**No Relaxation**		7.49	6.4	**7.1**
6	Total Hardness (as $CaCO_3$)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 2340 C	mg/l	**200**	**600**		80	192	**117.3**
7	Iron (as Fe)	**By AAS Method** APHA 23RD Ed,2017 : 3111, B	mg/l	**1**	**No Relaxation**		0.12	0.26	**0.2**
8	Chloride (as Cl)	**Argentometric Method** APHA 23RD Ed,2017 : 4500Cl^- B	mg/l	**250**	**1000**		41	42	**41.3**
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**		142	310	**199.3**
11	Calcium (as Ca)	**EDTA Titrimetric Method** APHA 23RD Ed,2017 : 3500Ca B	mg/l	**75**	**200**		30	54.8	**38.9**
12	Magnesium (as Mg)	**Calculation Method** APHA 23RD Ed,2017 : 3500 gB	mg/l	**30**	**100**		9.6	21.8	**13.5**
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**		3	34	**13.4**
16	Nitrate (as NO_3)	**By UV-Screen Method**	mg/l	**45**	**No Relaxation**		0.72	7.6	**3.02**

Visiontek Consultancy Services Pvt. Ltd.

(Committed For Better Environment)

(ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified)

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		APHA 23RD Ed,2017: 4500 NO_3^- E							
17	Fluoride (as F)	**Distillation followed by Spectrophotometric Method** APHA 23RD Ed,2017: 4500F^- C	mg/l	**1**	**1.5**		0.013	0.21	**0.08**
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	mg/l	**0.001**	**No Relaxation**		<0.002	<0.002	**<0.002**
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 e 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	mg/l	**5**	**15**		4.4	<0.05	**4.50**
26	Anionic Detergents (as MBAS)	**Anionic Surfactants as MBAS** APHA 23RD Ed,2017: 5540 C	mg/l	**0.2**	--		ND	ND	**ND**
27	Mineral Oil	**Partition-Gravimetric Method** APHA 23RD Ed,2017: 5520	mg/l	**0.5**	**No Relaxation**		ND	ND	**ND**
28	Alkalinity	**Titration Method** APHA 23RD Ed,2017:2320 B	mg/l	**200**	**600**		24	220	**90.0**
29	Aluminium as(Al)	**AAS Method** APHA 23RD Ed,2017: 3111	mg/l	**0.03**	**0.2**		<0.001	<0.001	**<0.001**
30	Boron (as B)	**Curcumin Method** APHA 23RD Ed,2017: 4500 ,B	mg/l	**0.5**	**2.4**		<0.1	<0.1	**<0.1**
31	Total Coli form 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**

Reviewed By

Approved By

Visiontek Consultancy Services Pvt. Ltd.

(Committed For Better Environment)

(ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified)

TC-7944

OSTAPAL CHROMITE MINES

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8. GROUND WATER LEVEL

GW1: Bore well Near Workshop of the Mines

Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
1	Hexavalent Chromium as Cr6+	**Diphenyl Carbazide Method** APHA 23RD Ed,2017 : 3500 Cr B	mg/l	5	15		<0.05	<0.05	**<0.05**

GW2: Bore well Near Main Gate of OCM

Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
1	Hexavalent Chromium as Cr6+	**Diphenyl Carbazide Metho** APHA 23RD E ,2017 : 3500 Cr B	mg/l	5	15		<0.05	<0.05	**<0.05**

GW3: Open well near Ostia Village

Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
1	Hexavalent Chromium as Cr6+	**Diphenyl Carbazide Metho** APHA 23RD E ,2017 : 3500 Cr B	mg/l	5	15		<0.05	<0.05	**<0.05**

GW4: Open well near Ostapal Village

Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
1	Hexavalent Chromium as Cr6+	**Diphenyl Carbazide Metho** APHA 23RD E ,2017 : 3500 Cr B	mg/l	5	15		<0.05	<0.05	**<0.05**

GW5: Tube well inside the shiva temple of Village Gurujanga

Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
1	Hexavalent Chromium as Cr6+	**Diphenyl Carbazide Method** APHA 23RD Ed,2017 : 3500 Cr B	mg/l	5	15		<0.05	<0.05	**<0.05**

OSTAPAL CHROMITE MINES

PERIOD: OCT-2020 TO MAR-2021

GW6: Tubewell Outside the shiva temple of Village Gurujanga

Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
1	Hexavalent Chromium as Cr6+	**Diphenyl Carbazide Method** APHA 23RD d,2017 : 3500 Cr B	mg/l	5	15		<0.05	<0.05	**<0.05**

GW7: Eastern Side of the Quarry (Pz-1)

Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
1	Hexavalent Chromium as Cr6+	**Diphenyl Carbazide Method** APHA 23RD d,2017 : 3500 Cr B	mg/l	5	15		<0.05	<0.05	**<0.05**

GW8: Southern Side of the Quarry (Pz-2)

Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
1	Hexavalent Chromium as Cr6+	**Diphenyl Carbazide Method** APHA 23RD d,2017 : 2120 B, C	mg/l	5	15		<0.05	<0.05	**<0.05**

GW9: Western Side of the Quarry (Pz-3)

Sl. No.	Parameter	Testing Method	Unit	Standard as per IS -10500:2012 Amended on 2015 & 2018			Analysis Result DEC-20	Analysis Result MAR-21	Annual Average
				Acceptable Limit	Permissible Limit				
1	Hexavalent Chromium as Cr6+	**Diphenyl Carbazide Method** APHA 23RD Ed,2017 : 3500 Cr B	mg/l	5	15		<0.05	<0.05	**<0.05**

Reviewed By

Approved By

ANNEXURE NO.-5

GROUND WATER ABSTRACTION & SUPPLY TO NEARBY VILLAGES

GROUND WATER ABSTRACTION DATA FROM ABSTRACTION STRUCTURE FOR THE YEAR 2020-21 OSTAPAL CHROMITE MINES,M/s FACORL TD								
Month	Bore Well -1			Bore well -2			TOTAL Withdrawal (A+B) in KL	Avg. Withdrawal Per day in KL
	Initial Reading	Final Reading	A.Total withdrawal (In KL)	Initial Reading	Final Reading	B.Total withdrawal (In KL)		
April'20	63061	64500	1439	73940	75025	1085	2524	84.13
May'20	64500	65880	1380	75025	76044	1019	2399	77.39
June'20	65880	67217	1337	76044	77064	1020	2357	78.57
July'20	67217	68321	1104	77064	77999	935	2039	65.77
Aug'20	68321	69178	857	77999	78099	100	957	30.87
Sept'20	69178	70063	885	78099	79037	938	1823	60.77
Oct'20	70063	71010	947	79037	80225	1188	2135	68.87
Nov'20	71010	72325	1315	80225	81400	1175	2490	83.00
Dec'20	72325	73751	1426	81400	82505	1105	2531	81.65
Jan'21	73751	75280	1529	82505	83668	1163	2692	86.84
Feb'21	75280	76685	1405	83668	84695	1027	2432	78.45
Mar'21	76685	78488	1803	84695	85868	1173	2976	96.00
TOTAL			15427	TOTAL		11928	27355	892.31
Avg. withdrawal per day is 74.35 KL								

ANNEXURE N0.-6

Regional Director

भारत सरकार
केन्द्रीय भूमि जल प्राधिकरण
जल संसाधन, नदी विकास
और गंगा संरक्षण मंत्रालय

Government of India
Central Ground Water Authority
Ministry of Water Resources,
River Development & Ganga Rejuvenation

File No: - 21-4/1456/OR/MIN/2017 - 1735

NOC No: - CGWA/NOC/MIN/ORIG/2018/3957

Date:- 28 AUG 2018

To

M/s Facor Ltd.
Ostapal Chromite Mines
Village Gurujanga, Block Sukinda,
District Jajapur, Odisha – 755028

Sub: - NOC for ground water withdrawal to M/s Facor Ltd. in respect of their existing "Ostapal Chromite Mines" located at Village Gurujanga, Block Sukinda, District Jajapur, Odisha – reg.

Refer to your application for grant of NOC for ground water withdrawal dated 28/08/2017. Based on recommendations of Regional Director, Central Ground Water Board, Central Ground Water Board, South Eastern Region, Bhubaneswar vide his letter dated 17/06/2018 and further deliberations on the subject, the NOC of Central Ground Water Authority for ground water withdrawal is hereby accorded to **M/s Facor Ltd. in respect of their existing "Ostapal Chromite Mines" located at Village Gurujanga, Block Sukinda, District Jajapur, Odisha.** The NOC is valid from 02/08/2018 to 01/08/2020 and is subject to the following conditions:-

1. The firm may abstract **100 cu.m/day** of ground water (and not exceeding **36,500 cu.m/year**) through two (2) existing bore wells and **3,300 cu.m/day** (not exceeding **12,04,500 cu.m/year**) through dewatering mine seepage through two (2) existing mine pits on account of mining intersecting the water table. The total withdrawal should not exceed **3,400 cu.m/day** (not exceeding **12,41,000 cu.m/year**). No additional dewatering and ground water abstraction structure shall be constructed for this purpose without prior approval of the CGWA. Any unexpected variation in inflow of ground water into the mine pit should be reported to the concerned Regional Director, Central Ground Water Board, South Eastern Region, Bhubaneswar.
2. Both the wells as well as dewatering structures shall be fitted with digital water meters by the firm at its own cost and monitoring of monthly ground water abstraction data of each ground water abstraction structures shall be recorded in a log book. Compliance to this condition shall be reported within one month from the date of issue of this letter.
3. **M/s Facor Ltd, Ostapal Chromite Mines,** in consultation with the Regional Director, Central Ground Water Board, South Eastern Region, Bhubaneswar shall implement ground water recharge measures atleast to the tune of **23,630 cu.m/year** as proposed, for augmenting the ground water resources of the areas where post monsoon water level is more than 5 meter below ground level. Firm shall report the compliance within six months from the date of issuance of this letter. Firm shall also undertake periodic maintenance of recharge structures at its own cost.
4. The photographs of the recharge structures after completion of construction of the same shall be furnished immediately to the Regional Director, Central Ground Water

Board, South Eastern Region, Bhubaneswar for verification under intimation to this office.

5. The firm, at its own cost, shall construct four (4) observation wells (piezometers) at suitable locations and install digital water level recorders along the periphery of the mine for monthly ground water level monitoring. Further, the firm shall execute ground water level monitoring four (4) times a year (January, May, August and November) in core and buffer zone by establishing sufficient number of key wells in consultation with the Regional Director, Central Ground Water Board, South Eastern Region, Bhubaneswar. Firm shall install telemetry system on one of the piezometer and share the user ID and password of the telemetry system with the Regional Director, Central Ground Water Board, South Eastern Region, Bhubaneswar.
6. The ground water quality shall be monitored once in a year (during pre monsoon period).
7. The monitoring data in respect of S. No. 2, 5 & 6 shall be submitted to the Regional Director, Central Ground Water Board, South Eastern Region, Bhubaneswar on regular basis at least once in a year.
8. The firm shall ensure proper recycling and reuse of waste water after adequate treatment.
9. Action taken report in respect of S. No. 1 to 8 shall be submitted to CGWA within one year period.
10. The NOC is liable to be cancelled in case of non-compliance of any of the conditions as mentioned in S. No. 1 to 9.
11. This NOC is subject to prevailing Central/State Government rules/laws or Court orders related to construction of tubewell/ground water withdrawal/construction of recharge or conservation structure/discharge of effluents or any such matter as applicable.
12. The firm shall report self compliance online in the website (www.cgwa-noc.gov.in) within one year from the date of issue of this NOC.
13. This NOC does not absolve the applicant / proponent of this obligation / requirement to obtain other statutory and administrative clearances from other statutory and administrative authorities.
14. The NOC does not imply that other statutory / administrative clearances shall be granted to the project by the concerned authorities. Such authorities would consider the project on merits and be taking decisions independently of the NOC.

Regional Director

Copy to:

1. The Member Secretary, Odisha Pollution Control Board, Paribesh Bhawan, A/118, Nilakantha Nagar, Unit- VIII, Bhubaneswar- 751012, Odisha **with a request to ensure that the conditions mentioned in the NOC are complied by the firm in consultation with the District Collector & Magistrate, District Jajapur, Odisha.**
2. The District Collector & Magistrate, District Jajapur, Odisha for necessary action.
3. The Regional Director, Central Ground Water Board, South Eastern Region, Bhubaneswar. This has reference to your recommendation dated 17/06/2018.
4. Guard File 2018-19.

Regional Director

ANNEXURE NO.-7

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.

A. Discharge permitted through the following outlet subject to the standard

Outlet No.	Description of outlet	Point of discharge	Quantity of discharge KL/hr	Pre-scribed Standard						
				pH	TSS (mg/l)	BOD (mg/l)	COD (mg/l)	Oil & Grease (mg/l)	Cr+6 (mg/l)	Total Chromium (mg/l)
01.	***Septic tank (Domestic effluent)***	***Soak pit***	--	***5.5 to 9.0***	***200***	***100***	--	--	--	--
02.	***Mine drainage water / surface run off/ other wastewater***	***On land / inland surface water body***	***5205.09 KLD(Max.)***	***5.5 to 9.0***	***100***	--	--	***10***	***0.05***	***2.0***

B. Emission permitted through the following stack subject to the prescribed standard

Chimney Stack No.	Description of Stack	Stack height (m)	Quantity of emission	Prescribed Standard				

C. Disposal of solid waste permitted in the following manner

Sl. No.	Type of Solid waste	Quantity generated (TPD)	Quantity to be reused on site(TPD)	Quantity to be reused off site(TPD)	Quantity disposed off (TPD)	Description of disposal site.
01.	Top soil / overburden	As per approved mining plan	--	--	--	As per approved mining plan

D. GENERAL CONDITIONS FOR ALL UNITS

1. The consent is given by the Board in consideration of the particulars given in the application. Any change or alternation or deviation made in actual practice from the particulars furnished in the application will also be the ground liable for review/variation/revocation of the consent order under section 27 of the Act of Water (Prevention & Control of Pollution) Act, 1974 and section 21 of Air (Prevention & Control of Pollution) Act, 1981 and to make such variations as deemed fit for the purpose of the Acts.

2. The industry would immediately submit revised application for consent to operate to this Board in the event of any change in the quantity and quality of raw material / and products / manufacturing process or quantity /quality of the effluent rate of emission / air pollution control equipment / system etc.

3. The applicant shall not change or alter either the quality or quantity or the rate of discharge or temperature or the route of discharge without the previous written permission of the Board.

4. The application shall comply with and carry out the directives/orders issued by the Board in this consent order and at all subsequent times without any negligence on his part. . In case of non-compliance of any order/directives issued at any time and/or violation of the terms and conditions of this consent order, the applicant shall be liable for legal action as per the provisions of the Law/Act.

5. The applicant shall make an application for grant of fresh consent at least 90 days before the date of expiry of this consent order.

6. The issuance of this consent does not convey any property right in either real or personal property or any exclusive privileges nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Central, State laws or regulation.

7. This consent does not authorize or approve the construction of any physical structure or facilities or the undertaking of any work in any natural water course.

8. The applicant shall display this consent granted to him in a prominent place for perusal of the public and inspecting officers of this Board.

9. An inspection book shall be opened and made available to Board's Officers during the visit to the factory.

10. The applicant shall furnish to the visiting officer of the Board any information regarding the construction, installation or operation of the plant or of effluent treatment system / air pollution control system / stack monitoring system any other particulars as may be pertinent to preventing and controlling pollution of Water / Air.

11. Meters must be affixed at the entrance of the water supply connection so that such meters are easily accessible for inspection and maintenance and for other purposes of the Act provided that the place where it is affixed shall in no case be at a point before which water has been taped by the consumer for utilization for any purposes whatsoever.

12. Separate meters with necessary pipe-line for assessing the quantity of water used for each of the purposes mentioned below:

    a) Industrial cooling, spraying in mine pits or boiler feed,

    b) Domestic purpose

    c) Process

13. The applicant shall display suitable caution board at the lace where the effluent is entering into any water-body or any other place to be indicated by the Board, indicating therein that the area into which the effluents are being discharged is not fit for the domestic use/bathing.

14. Storm water shall not be allowed to mix with the trade and/or domestic effluent on the upstream of the terminal manholes where the flow measuring devices will be installed.

15. The applicant shall maintain good house-keeping both within the factory and the premises. All pipes, valves, sewers and drains shall be leak-proof. Floor washing shall be admitted into the effluent collection system only and shall not be allowed to find their way in storm drains or open areas.

16. The applicant shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems install or used by him to achieve with the term(s) and conditions of the consent.

17. Care should be taken to keep the anaerobic lagoons, if any, biologically active and not utilized as mere stagnation ponds. The anaerobic lagoons should be fed with the required nutrients for effective digestion. Lagoons should be constructed with sides and bottom made impervious.

18. The utilization of treated effluent on factory's own land, if any, should be completed and there should be no possibility of the effluent gaining access into any drainage channel or other water courses either directly or by overflow.

19. The effluent disposal on land, if any, should be done without creating any nuisance to the surroundings or inundation of the lands at any time.

20. If at any time the disposal of treated effluent on land becomes incomplete or unsatisfactory or create any problem or becomes a matter of dispute, the industry must adopt alternate satisfactory treatment and disposal measures.

21. The sludge from treatment units shall be dried in sludge drying beds and the drained liquid shall be taken to equalization tank.

22. The effluent treatment units and disposal measures shall become operative at the time of commencement of production.

23. The applicant shall provide port holes for sampling the emissions and access platform for carrying out stack sampling and provide electrical outlet points and other arrangements for chimneys/stacks and other sources of emissions so as to collect samples of emission by the Board or the applicant at any time in accordance with the provision of the Act or Rules made therein.

24. The applicant shall provide all facilities and render required assistance to the Board staff for collection of samples / stack monitoring / inspection.

25. The applicant shall not change or alter either the quality or quantity or rate of emission or install, replace or alter the air pollution control equipment or change the raw material or manufacturing process resulting in any change in quality and/or quantity of emissions, without the previous written permission of the Board.

26. No control equipments or chimney shall be altered or replaced or as the case may be erected or re-erected except with the previous approval of the Board.

27. The liquid effluent arising out of the operation of the air pollution control equipment shall be treated in the manner and to ion of standards prescribed by the Board in accordance with the provisions of Water (Prevention and Control of Pollution) Act, 1974 (as amended).

28. The stack monitoring system employed by the applicant shall be opened for inspection to this Board at any time.

29. There shall not be any fugitive or episodal discharge from the premises.

30. In case of such episodal discharge/emissions the industry shall take immediate action to bring down the emission within the limits prescribed by the Board in conditions/stop the operation of the plant. Report of such accidental discharge /emission shall be brought to the notice of the Board within 24 hours of occurrence.

31. The applicant shall keep the premises of the industrial plant and air pollution control equipments clean and make all hoods, pipes, valves, stacks/chimneys leak proof. The air pollution control equipments, location, inspection chambers, sampling port holes shall be made easily accessible at all times.

32. Any upset condition in any of the plant/plants of the factory which is likely to result in increased effluent discharge/emission of air pollutants and / or result in violation of the standards mentioned above shall be reported to the Headquarters and Regional Office of the Board by fax / speed post within 24 hours of its occurence.

33. The industry has to ensure that minimum three varieties of trees are planted at the density of not less than 1000 trees per acre. The trees may be planted along boundaries of the industries or industrial premises. This plantation is stipulated over and above the bulk plantation of trees in that area.

34. The solid waste such as sweeping, wastage packages, empty containers residues, sludge including that from air pollution control equipments collected within the premises of the industrial plants shall be disposed off scientifically to the satisfaction of the Board, so as no to cause fugitive emission, dust problems through leaching etc., of any kind.

35. All solid wastes arising in the premises shall be properly classified and disposed off to the satisfaction of the Board by :
    i) Land fill in case of inert material, care being taken to ensure that the material does not give rise to leachate which may percolate into ground water or carried away with storm run-off.
    ii) Controlled incineration, wherever possible in case of combustible organic material.
    iii) Composting, in case of bio-degradable material.

36. Any toxic material shall be detoxicated if possible, otherwise be sealed in steel drums and buried in protected areas after obtaining approval of this Board in writing. The detoxication or sealing and burying shall be carried out in the presence of Board's authorized persons only. Letter of authorization shall be obtained for handling and disposal of hazardous wastes.

37. If due to any technological improvement or otherwise this Board is of opinion that all or any of the conditions referred to above requires variation (including the change of any control equipment either in whole or in part) this Board shall after giving the applicant an opportunity of being heard, vary all or any of such condition and thereupon the applicant shall be bound to comply with the conditions so varied.

38. The applicant, his/heirs/legal representatives or assignees shall have no claim whatsoever to the condition or renewal of this consent after the expiry period of this consent.

39. The Board reserves the right to review, impose additional conditions or condition, revoke change or alter the terms and conditions of this consent.

40 Notwithstanding anything contained in this conditional letter of consent, the Board hereby reserves to it the right and power under section 27(2) of the Water (Prevention & Control of Pollution) Act, 1974 to review any and/or all the conditions imposed herein above and to make such variations as deemed fit for the purpose of the Act by the Board.

41. The conditions imposed as above shall continue to be in force until revoked under section 27(2) of the Water (Prevention & Control of Pollution) Act, 1974 and section 21 A of Air (Prevention & Control of Pollution) Act, 1981.

42. In case the consent fee is revised upward during this period, the industry shall pay the differential fees to the Board (for the remaining years) to keep the consent order in force. If they fail to pay the amount within the period stipulated by the Board the consent order will be revoked without prior notice.

43. The Board reserves the right to revoke/refuse consent to operate at any time during period for which consent is granted in case any violation is observed and to modify/ stipulate additional conditions as deemed appropriate.

GENERAL CONDITIONS FOR UNITS WITH INVESTMENT OF MORE THAN Rs 50 CRORES, AND 17 CATEGORIES OF HIGHLY POLLUTING INDUSTRIES (RED A).

1. The applicant shall analyse the emissions every month for the parameters indicated in TABLE .B & C as mentioned in this order and shall furnish the report thereof to the Board by the 10th of the succeeding month.

2. The applicant shall provide and maintain at his own cost three ambient air quality monitoring stations for monitoring Suspended Particulate Matter, Sulphor Dioxide, Oxides of Nitrogen, Hydro-Carbon, Carbon-Monixide and monitor the same once in a day/week/fortnight/month. The data collected shall be maintained in a register and a monthly extract be furnished to the Board.

3. The applicant shall provide and maintain at his own cost a meteorological station to collect the data on wind velocity, direction, temperature, humidity, rainfall, etc. and the daily reading shall be recorded and the extract sent to the Board once in a month.

4. The applicant shall forward the following information to the Member Secretary, State Pollution Control Board, Odisha, Bhubaneswar regularly.
   a. Report of analysis of stack monitoring, ambient air quality monitoring meteorological data as required every month.
   b. Progress on planting of trees quarterly.

5. The applicant shall install mechanical composite sampling equipment and continuous flow measuring / recording devices on the effluent drains of trade as well as domestic effluent. A record of daily discharge shall be maintained.

6. The following information shall be forwarded to the Member Secretary on or before 10th of every month.
   a. Performance / progress of the treatment plant.
   b. Monthly statement of daily discharge of domestic and/or trade effluent.

7. **Non-compliance with effluent limitations**

a) If for any reason the applicant does not comply with or is unable to comply with any effluent limitations specified in this consent, the applicant shall immediately notify the consent issuing authority by telephone and provide the consent issuing authority with the following information in writing within 5 days of such notification.

   i) Causes of non-compliance

   i) A description of the non-compliance discharge including its impact on the receiving waters.

   ii) Anticipated time of continuance of non-compliance if expected to continue or if such condition has been corrected the duration or period of non-compliance.

   iii) Steps taken by the applicant to reduce and eliminate the non-complying discharge and

   iv) Steps to be taken by the applicant too prevent the condition of non-compliance.

b) The applicant shall take all reasonable steps to minimize any adverse impact to natural waters resulting from non-compliance with any effluent limitation specified in this consent including such accelerated or additional monitoring as necessary to determine the nature and impact of the non-complying discharge.

c) Nothing in this consent shall be construed to relieve the applicant from civil or criminal penalties for non-compliance whether or not such non-compliance is due to factors beyond his control, such as break-down, electric failure, accident or natural disaster.

8. The applicant shall at his own cost get the effluent samples collected both before and after treatment and get them analysed at an approval laboratory every month for the parameters indicated in Part-D and shall submit in duplicate the report thereof to the Board.

9. The addition of various treatment chemicals should be done only with mechanical dosers and proper equipment for regulation of correct dosages determined daily and for proper uniform feeding. Crude practices such as dumping of chemicals in drains or sumps or trickling of acids or alkalies arbitrarily and utilizing poles for stirring etc. should not be resorted to.

10. In the disposal of treated effluent on land for irrigation, the industry shall keep in view of the need for;

    Rotation of crops

    Change of point of application of effluent on land

    A portion of land kept fallow.

11. The adoption of these would avoid soil becoming sick or slate, the industry may ensure this in consultation with the Agriculture Department.

12. It is the sole responsibility of the industry to ensure that there are no complaints at any time from the royats in the surrounding areas as a result of discharge of sewage or trade effluent if any.

13. Proper housekeeping shall be maintained by a dedicated team.

14. The industry must constitute a team of responsible and technically qualified personnel who will ensure continuous operation of all pollution control devices round the clock (including night hours) and should be in a position to explain the status of operation of the pollution control measures to the inspecting officers of the Board at any point of time. The name of these persons with their contact telephone numbers shall be intimated to the concerned. Regional Officer and Head Office of the Board and in case of any change in the team it shall be intimated to the Board immediately.

E. SPECIAL CONDITIONS:

1. Mining operation is subject to availability of all other statutory clearances required under relevant Acts/Rules.
2. Wet drilling shall be practiced or suitably designed dust extractor shall be provided for dry drilling to prevent generation of dust.
3. Pre-wetting of blasting site and controlled blasting shall be practiced.
4. Water sprinkling through mobile water tankers / fixed sprinklers shall be carried out at the desired intervals on mine haulage roads to keep the roads in wet condition so as to prevent generation of fugitive dust. The vehicles carrying ore for transportation from the mine shall be covered with tarpaulin (both bottom & top).
5. Regular water sprinkling on mineral transportation roads passing through the habitation area as well as other strategic point on the National Highway shall be done jointly by the mining lessees in consultation with the Regional Officer.
6. All mine haulage roads and other transportation roads shall be maintained properly to avoid creation of ruts and pot holes.
7. Mechanized wheel washing facility for the ore transport vehicles shall be provided at the exit point of the mine. The wheel washing facility shall be integrated with complete recirculation system.
8. Regular monitoring of ambient air quality shall be carried out at the appropriate places (four places) and monitoring report shall be furnished to the Board once in six months. The permanent monitoring stations shall be fixed in consultation with the Regional Officer of the Board.
9. Ambient air quality of the mine shall meet the prescribed standards for industrial area.
10. Overburden / waste rock shall be properly stacked in the earmarked areas approved by IBM and shall be suitably terraced and stabilized through vegetative cover or otherwise.
11. Retention wall shall be constructed at the toe of OB dump & mineral stockyard. The runoff from OB, ore stack yard and other areas of the mine shall be diverted to the ETP. Garland drains, channels and sedimentation pits constructed for the purpose shall be desilted as and when required and after monsoon.
12. Mine drainage water shall be used for wet beneficiation of sub-grade ore. Excess water if any, shall be discharged into surface water body after adequate treatment in the ETP.

The treated wastewater of ETP shall also be utilized for sprinkling activities at various sources of generation of dust.

13. The ETP, online continuous monitoring system at the inlet & outlet of ETP with data transfer facility to SPCB server shall be effectively operated and the quality of treated wastewater shall not exceed the prescribed standards(Part A, Sl. No. 2). The online continuous monitoring system shall be properly maintained and calibrated from time to time to ensure that spurious data are not transmitted to the SPCB server and correct data shall be transmitted continuously to the SPCB server.
14. Wastewater generated from the ore beneficiation plant shall be completely reused.
15. The slime generated from the ore beneficiation plant shall be disposed of safely as per mining plan and action shall be taken to prevent the contamination of ground water due to its disposal.
16. Domestic effluents shall be treated in a sewage treatment plant (STP) and or shall be discharged to soak pit via septic tank constructed as BIS specification. The treated wastewater quality of STP shall remain within the following standards and shall be used for plantation:

pH	-	6.5 -9.0
TSS	-	<100 mg/l
BOD	-	30 mg/l
Fecal Coliform	-	<1000 MPN/100 ml

17. Oil and grease trap with sedimentation pit shall be provided for treatment of workshop effluent and treated effluent shall remain within the prescribed standards. Efforts shall be made to reuse the treated wastewater from the workshop.
18. Seasonal monitoring of ground water level and its quality shall be carried out four times a year and report shall be submitted to the Board.
19. Adequate measures shall be taken for control of noise levels below the following limits.

    (6.00 AM - 9.00 PM) - Leq 75 dB(A)

    (9.00PM - 6.00 AM) - Leq 70 dB(A)
20. Ambient Air Quality monitoring data, Noise Monitoring data & Water/Waste Water Quality Monitoring data shall be electronically displayed at the entry point of the mine or at a suitable location of the mine.

21. Plantation of trees shall be undertaken in the colony/ township, over top soil dumps, OB dumps, back filled areas, along the side of haul road and in other areas of the mines not being utilized for mining activities. The mine shall take up avenue plantation and plantation in nearby village areas in consultation with DFO/Horticulture Department. The plantation details shall be submitted to the Board before end of April every year.

22. A copy of the annual return (annual return submitted to IBM, Govt. of India/ Directorate of Mines, Govt. of Odisha) shall be submitted to the Board every year.

23. The environmental statement report for the financial year ending 31st March shall be submitted to the Board in form-V on or before 30th September every year

24. The mine shall submit a declaration by 30th April every year that all pollution control systems are in good condition, are operated efficiently and ambient air quality as well as wastewater quality are conforming to the prescribed standards.

MEMBER SECRETARY
STATE POLLUTION CONTROL BOARD, ODISHA

TO,

THE DIRECTOR,
OSTAPAL CHROMITE MINES OF M/S. FACOR LIMITED,
AT: GURUJANGA, PO: KALIAPANI, DIST: JAJPUR
PIN- 755028.

Memo No._____/Dt.

Copy forwarded to :

i) Regional Officer, State Pollution Control Board, **Kalinganagar.**
ii) District Collector, **Jajpur**
iii) Director of Mines, Govt. of Odisha, Bhubaneswar,
iv) Director, Environment -cum-Special Secretary, F & E. Dept. Govt. of Odisha, Bhubaneswar.
v) D.F.O, **Cuttack**
vi) Deputy Director of Mines, **Jajpur Road**
vii) Chief. Env. Engineer (Hazardous waste management cell)
viii) Chief Env. Scientist, Central Lab. SPCB, Bhubaneswar
ix) Consent Register

CHIEF ENV. ENGINEER (M)
STATE POLLUTION CONTROL BOARD, ODISHA

GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS

GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS PART –A : EFFLUENTS

Sl.No.	Parameters	Standards			
		Inland surface	Public sewers	Land for irrigation	Marine Costal Areas
		(a)	(b)	(c)	(d)
1.	Colour & odour	Colourless/Odourless as far as practible	------	See 6 of Annex-1	See 6 of Annex-1
2.	Suspended Solids (mg/l)	100	600	200	For process wastewater – 100 b. For cooling water effluent 10% above total suspended matter of influent.
3.	Particular size of SS	Shall pass 850	-----	------	
5.	pH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
6.	Temperature	Shall not exceed 5^0C above the receiving water temperature	-------	--------	Shall not exceed 5^0C above the receiving water temperature
7.	Oil & Grease mg/l max.	10	20	10	20
8.	Total residual chlorine	1.0	----	------	1.0
9.	Ammonical nitrogen (as N) mg/l max.	50	50	------	50
10.	Total Kajeldahl nitrogen (as NH_3) mg/1 max.	100	----	------	100
11.	Free ammonia (as NH_3) mg/1 max.	5.0	----	------	5.0
12.	Biochemical Oxygen Demand (5 days at (20^0C) mg/1 max.	30	350	100	100
13.	Chemical Oxygen Demand, mg/1 max.	250	----	------	250
14.	Arsenic (as As) mg/1 max.	0.2	0.2	0.2	0.2
15.	Mercury (as Hg) mg/1 max.	0.01	0.01	------	0.001
16.	Lead (as pb) mg/1 max.	01.	1.0	------	2.0

17.	Cardmium (as Cd) mg/1 max.	2.0	1.0	------	2.0
18.	Hexavalent Chromium (as Cr + 6) mg/l max.	0.1	2.0	--------	1.0
19.	Total Chromium (as Cr) mg/l max.	2.0	2.0	---------	2.0
20.	Copper (as Cu) mg/l max.	3.0	3.0	---------	3.0
21.	Zinc (as Zn) mg/l max.	5.0	15	---------	15
22.	Selenium (as Sc) mg/l max.	0.05	0.05	---------	0.05
23.	Nickel (as Nil) mg/l max.	3.0	3.0	---------	5.0
24.	Cyanide (as CN) mg/l max.	0.2	2.0	0.2	0.02
25.	Fluoride (as F) mg/l max.	2.0	15	---------	15
26.	Dissolved Phosphates (as P) mg/l max.	5.0	-------	---------	--------
27.	Sulphide (as S) mg/l max.	2.0	--------	---------	5.0
28.	Phennolic compounds as (C_6H_5OH) mg/l max.	1.0	5.0	---------	5.0
29.	Radioactive materials a. Alpha emitter micro curle/ml. b. Beta emitter micro curle/ml.	10^7 10^6	10^7 10^6	10^8 10^7	10^7 10^6
30.	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent
31	Manganese (as Mn)	2 mg/l	2 mg/l	---------	2 mg/l
32.	Iron (Fe)	3 mg/l	3 mg/l	---------	3 mg/l
33.	Vanadium (as V)	0.2 mg/l	0.2 mg/l	---------	0.2 mg/l
34.	Nitrate Nitrogen	10 mg/l	--------	---------	20 mg/l

NATIONAL AMBIENT AIR QUALITY STANDARDS

Sl. No.	Pollutants	Time Weighed Average	Concentrate of Ambient Air		
			Industrial Residential, Rural and other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1.	Sulphur Dioxide (SO_2), $\mu g/m^3$	Annual * 24 Hours **	50 80	20 80	-Improved west and Gaeke - Ultraviolet fluorescence
2.	Nitrogen Dioxide (NO_2), $\mu g/m^3$	Annual * 24 Hours **	40 80	30 80	- Modified Jacob & Hochheiser (Na-Arsenite) - Chemiluminescence
3.	Particulate Matter (size less than 10µm) or $PM_{10}\mu g/m^3$	Annual * 24 Hours **	60 100	60 100	-Gravimetric - TOEM - Beta Attenuation
4.	Particulate Matter (size less than 2.5µm) or $PM_{2.5}$ $\mu g/m^3$	Annual * 24 Hours **	40 60	40 60	-Gravimetric - TOEM - Beta Attenuation
5.	Ozone (O_3) $\mu g/m^3$	8 Hours ** 1 Hours **	100 180	100 180	- UV Photometric - Chemiluminescence - Chemical Method
6.	Lead (Pb) $\mu g/m^3$	Annual * 24 Hours **	0.50 1.0	0.50 1.0	-AAS/ICP method after sampling on EMP 2000 or equivalent filter paper. - ED-XRF using Teflon filter
7.	Carbon Monoxide (CO) mg/m^3	8 Hours ** 1 Hours **	02 04	02 04	- Non Dispersive Infra Red (NDIR) Spectroscopy
8.	Ammonia (NH_3) $\mu g/m^3$	Annual* 24 Hours**	100 400	100 400	-Chemiluminescence - Indophenol Blue Method
9.	Benzene (C_6H_6) $\mu g/m^3$	Annul *	05	05	-Gas Chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10.	Benzo (a) Pyrene (BaP)-Particulate phase only, ng/m^3	Annual*	01	01	-Solvent extraction followed by HPLC/GC analysis
11.	Arsenic (As), ng/m^3	Annual*	06	06	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12.	Nickel (Ni),ng/m^3	Annual*	20	20	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

** Annual arithmetic mean of minimum I04 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 08 hourly or 0I hourly monitored values, as applicable, shall be complied with 98% of the time in a year, 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

ANNEXURE NO.-8

CALENDAR PLAN INCLUDING PRODUCTION & EXCAVATION FOR THE YEAR 2020-2021

ITEM	TARGET FY 2020-21	ACHIEVEMENT FY 2020-21
ORE	97600	97577.774
OVERBURDEN	261000.00	286566.00

Visiontek Consultancy Services Pvt. Ltd.

(Committed For Better Environment)

(ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified)

TC-7944

OSTAPAL CHROMITE MINES

PERIOD: OCT-2020 TO MAR-2021

AMBIENT AIR QUALITY (CORE ZONE)									
AAQ1: Near Dispensary									
Parameters	**Unit**	**CPCB AAQ Standard 2009**	**Oct-20**	**Nov-20**	**Dec-20**	**Jan-21**	**Feb-21**	**Mar-21**	**Annual Avg**
PM_{10}	µg/m³	100	7.8	66.6	83.2	79.4	76.8	77.2	70.4
$PM_{2.5}$	µg/m³	60	43.7	38.8	48.8	48.8	48.2	50.6	46.9
SO2	µg/m³	80	10.2	9.4	10.8	11.8	11.2	11.6	10.4
NOX	µg/m³	80	14.2	13.8	14.4	14.8	14.2	14.8	14.2
CO	mg/m³	4	1.2	1.1	1.31	1.28	1.22	1.26	1.2
O3	µg/m³	100	4.6	4.8	4.6	5.6	5.2	5.6	4.8
NH3	µg/m³	400	21.2	20.8	22.4	22.1	21.8	22.6	21.6
Pb	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Ni	ng/m³	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL
As	ng/m³	6	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bap	ng/m³	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL
C6H6	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL

AAQ2: Near Weigh Bridge									
Parameters	**Unit**	**CPCB AAQ Standard 2009**	**Oct-20**	**Nov-20**	**Dec-20**	**Jan-21**	**Feb-21**	**Mar-21**	**Annual Avg**
PM_{10}	µg/m³	100	74.2	68	48.8	48.2	46.8	48.8	**57.5**
$PM_{2.5}$	µg/m³	60	46.4	40.2	19.6	21.6	20.8	22.4	**31.0**
SO2	µg/m³	80	10.6	9.6	11.8	12.4	11.6	12.8	**11.0**
NOX	µg/m³	80	14.8	13.2	5.6	6.8	6.2	6.8	**8.1**
CO	mg/m³	4	1.2	.0	1.26	1.24	1.18	1.22	**1.2**
O3	µg/m³	100	5.2	5.1	4.2	4.8	4.6	4.8	**4.6**
NH3	µg/m³	400	21.8	21.2	21.2	21.4	20.6	21.2	**21.0**
Pb	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
Ni	ng/m³	20	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
As	ng/m³	6	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
Bap	ng/m³	5	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
C6H6	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**

Reviewed By

Approved By

OSTAPAL CHROMITE MINES

PERIOD: OCT-2020 TO MAR-2021

AAQ3: At Middle Of the Open Cast Quarry									
Parameters	**Unit**	**CPCB AAQ Standard 2009**	**Oct-20**	**Nov-20**	**Dec-20**	**Jan-21**	**Feb-21**	**Mar-21**	**Annual Avg**
PM_{10}	µg/m³	100	73.8	62.4	61.4	61.2	60.8	61.2	**61.3**
$PM_{2.5}$	µg/m³	60	45.2	41.8	33.4	34.5	32.6	33.8	**35.6**
SO2	µg/m³	80	11.4	9.4	8.8	9.2	9.8	10.2	**9.0**
NOX	µg/m³	80	15.2	14.1	12.1	12.6	12.2	12.6	**12.2**
CO	mg/m³	4	1.3	1.4	1.32	1.32	1.26	1.31	**1.3**
O3	µg/m³	100	6.1	5.4	5.4	6.1	5.8	6.1	**5.5**
NH3	µg/m³	400	21.8	21.4	22.8	23.1	22.8	23.4	**22.4**
Pb	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
Ni	ng/m³	20	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
As	ng/m³	6	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
Bap	ng/m³	5	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
C6H6	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**

AAQ4: At Middle Of the COB Plant									
Parameters	**Unit**	**CPCB AAQ Standard 2009**	**Oct-20**	**Nov-20**	**Dec-20**	**Jan-21**	**Feb-21**	**Mar-21**	**Annual Avg**
PM_{10}	µg/m³	100	68.4	64.4	78.2	78.2	77.4	75.6	**74.6**
$PM_{2.5}$	µg/m³	60	41.2	39.6	44.2	44.6	42.8	40.8	**43.3**
SO2	µg/m³	80	9.8	10.1	10.8	11.4	11.2	11.6	**10.6**
NOX	µg/m³	80	13.2	13.6	14.8	15.2	14.8	15.2	**14.2**
CO	mg/m³	4	1.1	1.2	1.29	1.26	1.22	1.28	**1.2**
O3	µg/m³	100	4.2	4.6	5.2	5.8	5.6	6.1	**5.0**
NH3	µg/m³	400	BDL	BDL	23.8	24.4	23.6	24.2	**23.3**
Pb	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
Ni	ng/m³	20	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
As	ng/m³	6	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
Bap	ng/m³	5	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
C6H6	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**

Reviewed By

Approved By

Visiontek Consultancy Services Pvt. Ltd.

(Committed For Better Environment)

(ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018 Certified)

TC-7944

OSTAPAL CHROMITE MINES

PERIOD: OCT-2020 TO MAR-2021

AMBIENT AIR QUALITY (CORE ZONE)									
AAQ1: Near Dispensary									
Parameters	**Unit**	**CPCB AAQ Standard 2009**	**Oct-20**	**Nov-20**	**Dec-20**	**Jan-21**	**Feb-21**	**Mar-21**	**Annual Avg**
PM_{10}	µg/m³	100	7.8	66.6	83.2	79.4	76.8	77.2	70.4
$PM_{2.5}$	µg/m³	60	43.7	38.8	48.8	48.8	48.2	50.6	46.9
SO2	µg/m³	80	10.2	9.4	10.8	11.8	11.2	11.6	10.4
NOX	µg/m³	80	14.2	13.8	14.4	14.8	14.2	14.8	14.2
CO	mg/m³	4	1.2	1.1	1.31	1.28	1.22	1.26	1.2
O3	µg/m³	100	4.6	4.8	4.6	5.6	5.2	5.6	4.8
NH3	µg/m³	400	21.2	20.8	22.4	22.1	21.8	22.6	21.6
Pb	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Ni	ng/m³	20	BDL	BDL	BDL	BDL	BDL	BDL	BDL
As	ng/m³	6	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Bap	ng/m³	5	BDL	BDL	BDL	BDL	BDL	BDL	BDL
C6H6	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL

AAQ2: Near Weigh Bridge									
Parameters	**Unit**	**CPCB AAQ Standard 2009**	**Oct-20**	**Nov-20**	**Dec-20**	**Jan-21**	**Feb-21**	**Mar-21**	**Annual Avg**
PM_{10}	µg/m³	100	74.2	68	48.8	48.2	46.8	48.8	**57.5**
$PM_{2.5}$	µg/m³	60	46.4	40.2	19.6	21.6	20.8	22.4	**31.0**
SO2	µg/m³	80	10.6	9.6	11.8	12.4	11.6	12.8	**11.0**
NOX	µg/m³	80	14.8	13.2	5.6	6.8	6.2	6.8	**8.1**
CO	mg/m³	4	1.2	.0	1.26	1.24	1.18	1.22	**1.2**
O3	µg/m³	100	5.2	5.1	4.2	4.8	4.6	4.8	**4.6**
NH3	µg/m³	400	21.8	21.2	21.2	21.4	20.6	21.2	**21.0**
Pb	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
Ni	ng/m³	20	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
As	ng/m³	6	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
Bap	ng/m³	5	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
C6H6	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**

Reviewed By

Approved By

OSTAPAL CHROMITE MINES

PERIOD: OCT-2020 TO MAR-2021

AAQ3: At Middle Of the Open Cast Quarry									
Parameters	**Unit**	**CPCB AAQ Standard 2009**	**Oct-20**	**Nov-20**	**Dec-20**	**Jan-21**	**Feb-21**	**Mar-21**	**Annual Avg**
PM_{10}	µg/m³	100	73.8	62.4	61.4	61.2	60.8	61.2	**61.3**
$PM_{2.5}$	µg/m³	60	45.2	41.8	33.4	34.5	32.6	33.8	**35.6**
SO2	µg/m³	80	11.4	9.4	8.8	9.2	9.8	10.2	**9.0**
NOX	µg/m³	80	15.2	14.1	12.1	12.6	12.2	12.6	**12.2**
CO	mg/m³	4	1.3	1.4	1.32	1.32	1.26	1.31	**1.3**
O3	µg/m³	100	6.1	5.4	5.4	6.1	5.8	6.1	**5.5**
NH3	µg/m³	400	21.8	21.4	22.8	23.1	22.8	23.4	**22.4**
Pb	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
Ni	ng/m³	20	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
As	ng/m³	6	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
Bap	ng/m³	5	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
C6H6	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**

AAQ4: At Middle Of the COB Plant									
Parameters	**Unit**	**CPCB AAQ Standard 2009**	**Oct-20**	**Nov-20**	**Dec-20**	**Jan-21**	**Feb-21**	**Mar-21**	**Annual Avg**
PM_{10}	µg/m³	100	68.4	64.4	78.2	78.2	77.4	75.6	**74.6**
$PM_{2.5}$	µg/m³	60	41.2	39.6	44.2	44.6	42.8	40.8	**43.3**
SO2	µg/m³	80	9.8	10.1	10.8	11.4	11.2	11.6	**10.6**
NOX	µg/m³	80	13.2	13.6	14.8	15.2	14.8	15.2	**14.2**
CO	mg/m³	4	1.1	1.2	1.29	1.26	1.22	1.28	**1.2**
O3	µg/m³	100	4.2	4.6	5.2	5.8	5.6	6.1	**5.0**
NH3	µg/m³	400	BDL	BDL	23.8	24.4	23.6	24.2	**23.3**
Pb	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
Ni	ng/m³	20	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
As	ng/m³	6	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
Bap	ng/m³	5	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**
C6H6	µg/m³	1	BDL	BDL	BDL	BDL	BDL	BDL	**BDL**

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Approved By

Visiontek Consultancy Services Pvt. Ltd.

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OSTAPAL CHROMITE MINES

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5. FUGITIVE EMISSION ANALYSIS REPORT

F1- Near Mines Ore Plot Area							
SL. No.	**Test Parameters**	**Test Method**	**Unit**	**Analysis Result**			
					DEC-20	**MAR-21**	**Avg**
1	Suspended Particulate Matter as SPM	IS 5182 (P-4)1999 RA 2014 Gravimetric Method	µg/m^3		126	132	127.33
F2- Near COB Plant Area							
SL. No.	**Test Parameters**	**Test Method**	**Unit**	**Analysis Result**			
					DEC-20	**MAR-21**	**Avg**
1	Suspended Particulate Matter as SPM	IS 5182 (P-4)1999 RA 2014 Gravimetric Method	µg/m^3		228	230	228.66
F3-Near Mines Loading & Unloading Point							
SL. No.	**Test Parameters**	**Test Method**	**Unit**	**Analysis Result**			
					DEC-20	**MAR-21**	**Avg**
1	Suspended Particulate Matter as SPM	IS 5182 (P-4)1999 RA 2014 Gravimetric Method	µg/m^3		182	186	164

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4. ETP WATER QUALITY ANALYSIS REPORT

ETP1: ETP Mines Final Discharge Water

Sl. No.	Parameters	Testing Methods	Unit	Standards (In land Surface water)		Analysis Results DEC-20	Analysis Results MAR-21	Annual Average
1	Colour	**Visual Comparison Method** APHA 2120 B; 23rd Edition, 2017	Hazen	**Colourless**		5	5	**5.0**
2	Odour	**Threshold Odour Method** APHA 2150 B; 23rd Edition, 2017	--	**Odourless**		pungent smell	pungent smell	**pungent smell**
3	pH at 25^0C	**pH Meter** APHA 4500 H^+B; 23rd Edition, 2017	--	**5.5-9.0**		7.84	7.92	**7.9**
4	Total Suspended Solids	**Gravimetric Method** APHA 2540 D; 23rd E ition, 2017	mg/l	**100**		18	22	**20.0**
5	Copper as Cu	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**3**		<0.05	<0.05	**<0.05**
6	Fluoride as F	**Distillation followed y Spectophotometric Method** APHA 4500 F^- C,D; 2 rd Edition, 2017	mg/l	**2**		0.26	0.28	**0.3**
7	Total Residual Chlorine	**Iodometric Method** APHA 23RD Ed,2017 : 4500Cl, B	mg/l	**1**		ND	ND	**ND**
8	Iron as Fe	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**3**		0.51	0.54	**0.5**
9	Manganese as Mn	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**2**		<0.05	<0.05	**<0.05**
10	Nitrate as NO_3	**By UV-Screen Method** APHA 4500 NO_3^- B; 23rd Edition, 2017	mg/l	**10**		7.8	8.1	**8.0**
11	Phenolic Compounds as C_6H_5OH	**Distillation Followed by Spectophotometric Method** APHA 5530-B, D; 23rd Edition, 2017	mg/l	**1**		<0.001	<0.001	**<0.001**
12	Selenium as Se	**By AAS Method** APHA 3500 Se C; 23rd Edition, 2017	mg/l	**0.05**		<0.01	<0.01	**<0.01**
13	Cadmium as Cd	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**2**		<0.001	<0.001	**<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	<0.05	**<0.05**
15	Lead as Pb	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**0.1**		<0.01	<0.01	**<0.01**
16	Mercury as Hg	**By AAS Method** APHA 3112 B; 23rd Edition, 2017	mg/l	**0.01**		<0.001	<0.001	**<0.001**
17	Nickel as Ni	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**3**		<0.05	<0.05	**<0.05**
18	Arsenic as As	**By AAS Method** APHA 3114 B; 23rd Edition, 2017	mg/l	**0.2**		<0.05	<0.05	**<0.05**

19	Total Chromium as Cr	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l		0.31	0.34	**0.3**
20	Zinc as Zn	**By AAS Method** APHA 3111 B; 23rd Edition, 2017	mg/l	**5**	0.026	0.031	**0.028**
21	Hexavalent Chromium as Cr^{+6}	**By AAS Method** APHA 3500 Cr B; 23rd Edition, 2017	mg/l	**0.1**	<0.001	<0.001	**<0.001**
22	Vanadium as V	**By AAS Method** APHA 3500 V; 23rd Edition, 2017	mg/l	**0.2**	<0.001	<0.001	**<0.001**
23	Temperature	**By Thermometer** APHA 2550 B; 23rd Edition, 2017	Oc	**Shall not exceed 5degree C above the receiving water temperature**	30	34	**30.7**
24	Dissolved Oxygen	**By Modified Winkler Method** APHA4500 O C; 23rd Edition, 2017	mg/l		7.1	6.8	**7.1**
25	Biochemical Oxygen Demand as BOD	Oxygen Depletion Method IS 3025 (Part 44):2003	mg/l	**30**	6	6.2	**6.2**
26	Chemical Oxygen Demand as COD	Open Reflux Method APHA 5220 B; 23rd Edition, 2017	mg/l	**250**	18	20	**19.3**
27	Oil & Grease	Gravimetric Method (Solvent Extraction) APHA 5520 B; 23rd Edition, 2017	mg/l	**10**	5	4.2	**4.8**
29	Ammonical Nitrogen as N	By TKN Method APHA 4500-NH_3 C; 23rd Edition, 2017	mg/l	**50**	1.4	1.6	**1.6**
30	Total Kjeldahl Nitrogen as N	By TKN Method APHA 4500-N_{org} C; 23rd Edition, 2017	mg/l	**100**	5.1	4.8	**5.1**
31	Sulphide as S	By Methylene Blue Method APHA 4500-S D; 23rd Edition, 2017	mg/l	**2**	<0.001	<0.001	**<0.001**
32	Free Ammonia as NH_3	By Calculation	mg/l	**10**	4.2	4.1	**4.3**
33	Particulate Size of Suspended Solids	Gravimetric Method APHA 2540 D; 23rd Edition, 2017	µ	**Shall pass 850 micron IS Sieve**	<850	<850	**<850**
34	Bio-assay Test	Evaluating Acute Toxicity IS 6582 (P-2) 2008	%	**90% survival of fish after 96 hours in 100% effluent**	92% Survival of Fish after 96 Hrs in 100% Effluent	96% Survival of Fish after 96 Hrs in 100% Effluent	**92% Survival of Fish after 96 Hrs in 100% Effluent**

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Annexure No.-13

DETAILS OF EXPENDITURE INCURRED ON ENVIRONMENTAL PROTECTION MEASURES DURING THE YEAR 2020-21 OSTAPAL CHROMITE MINES		
Sl. No.	**I T E M**	**Expenses for the year 2020-21 (in Rupees ₹)**
1	**AFFORESTATION 5250 FY 21**	
a)	Seedlings @ ₹ 60/ - each	3,15,000
b)	Fertilizer/Insecticide/Cow - dung(@ ₹ 20)	1,05,000
c)	Digging of Pits/Planting (Labor cost)@ ₹35	1,83,750
d)	Post Plantation care @ ₹ 120/ - (Watering, Weeding, basin making etc.)	6,30,000
e)	Supervising	4,90,000
	Sub-Total	17,23,750
2	**WATER MANAGEMENT & TREATMENT**	
a)	ETP Operation & Maintenance (including costs of chemical & Manpower)	23,80,460
b)	Power Consumption	4,78,598
c)	Sludge disposal	70,961
d)	Water sample analysis	71,196
	Sub-Total	30,01,215
3	**DUST SUPRESSION & AIR MONITORING**	
a)	Water spraying at dust 3389 trips (FY 21) generating points by water tanker.	9,94,090
b)	Air monitoring charges	2,11,200
c)	Noise level measurement	1,800
	Sub-Total	12,07,090
	Grand Total	**59,32,055**