FERRO
ALLOYS
CORPORATION
LIMITED

OSTAPAL CHROMITE MINES
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CHROME ORE MINING DIVISION

OCM/ENV/ 718 /2019 Date: 25.11.2019

To

The Joint Director (S)
Ministry of Environment, Forest & Climate change
Govt. of India
Eastern Regional Office
Bhubaneswar

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

Ref:- MoEF Letter No. J-11015/38/2006-IA-II(M), dtd. 06.12.2006.

Dear Sir,

With reference to the captioned subject and cited reference, we are herewith submitting six monthly compliance reports pertaining to Ostapal Chromite Mines of M/s. FACOR Ltd. for the period from April, 2019 to September, 2019 for your kind perusal.

The Monthly & Quarterly Environmental monitoring data for the period from April, 2019 to September, 2019 comprising of Ambient air, Noise, Water and Soil is enclosed herewith as Annexures. The soft copy of the same is being sent by mail to your good office.

This is for your kind information & necessary action.

Thanking You,

Yours faithfully,
for FERRO ALLOYS CORPORATION LTD.

MINES MANAGER
Encl: As above.

CC – The Director (IA), MOEF, 3rd Floor, Indira Paryavaran Bhawan, Jorbagh Road, New Delhi – 110032.

NameoftheProject : **OSTAPAL CHROMITE MINES, M/S. FACOR LTD.**

ProjectCode : Mining(Non-Coal)

ClearanceLetterNo.withdate :No.J-11015/38/2006-IA-II(M)dt.06-12-2006

PeriodofComplianceReport : April, 2019 to September, 2019

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 on 03.10.2005	This area is left as Safety Zone area for greenbelt around periphery of forest land of M.L. area and mining operations in this area will not be done.
3.	Top soil 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 top soil has been generated during the period April, 2019 to September'2019
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. Monitor ing 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 41m with overall slope 25 ^{0}. In future also the overall slope will be maintained below 28 degrees. 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 -1 & 2**. There is no standards for Ni, Co, As and Hg for dust fall and soil samples.

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. Thedrains should be regularly de -silt ed andmaintained 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 tr eatment 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 di s charging outside ML area through upgraded ETP. Hence there is no need for collection of water from catch drains from mi ne area, roads, plantationetc. Garland drains of width 2m, depth 1.5m and length 4 325 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 re quired.
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 rainfall 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 3020 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 <0.005 mg/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 tran sportation of OB and chrome ore. The company has few n os. 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	The sludge generated from mining operations contains chrome ore. It is being fed in Beneficiation Plant to separate the Chrome.

	mining operations.	
10.	The Project proponent shall ensure that the quality of decanted effluents from the tailing pond conform to the pre scribed 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 . Th e den sity of the trees should be around 2000 plant species per hectare.	Plantation has been done over inactive benches of OB dumps, Road side, around C.O.B Plant and inside the colony in an area of 32.49 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 in 6 Nos. of existing wells (2 Nos. bore wells in Core Zone & 2 Nos. open wells & 2 Nos. of tube well in Buffer Zone.) and 3 Nos. of piezometer holes inside the Mine. The monitoring report for the period from April,2019 to September, 2019 is enclosed as **Annexure -3 to 4I.**
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 - 5.,**
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.
16.	Permission from the competent authority should be obtained for drawal 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 –12**.
17.	Suitable rain water harvesting measures on longterm basis shall be planned and implemented in consultation with Regional Director, CGWB.	Rain water 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 day time. 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.
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 over loaded.	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.
23.	Sewage treatment Plant should be installed for the colony. ETP should also be provided for workshop and waste water 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 forapproval.	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	The Mining technology & scope of working has not been changed.

	approval of the Ministry of Environment & Forests.	
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, 2019 to September, 2019) is given in **Annexure -6**.
3	Conservation measures for protection of flora & fauna in the Core & Buffer Zone should be drawn up in consultation with local forest & wild life 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 April, 2019 to September, 2019 is enclosed as **Annexure -7.**
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 -8**.
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 ear plugs/muffs. Location wise noise level at work environment is enclosed as **Annexure -9**.
8	Industrial waste water (workshop & waste water from the Mine) should be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19 th May, 1993 and 31 st December, 1993 or as amended from time to time.	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 in our COB Plant, plantation, dust suppression and surplus treated water is finally discharged to outside ML area.

	Oil & grease trap should be installed before discharge of workshop effluents.	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, 2018 to March, 2019 is enclosed as **Annexure -10**. 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 bei ng 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 Environmental Research and Services (India) Pvt. Ltd., Bhubaneswar & the monitoring reports are enclosed in 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 2018-19 and proposed budgeted amount for the year 2019-20 is given in **Annexure -11**.

Annexure – 1

MONITORING OF DUST FALL

Sample specification:

AAQD-1: Roof top of the Office Building

Sl. No	Parameter	Unit (Milligram of deposit per square meter per day)	Result	
			April - June'19	July – Sept.'19
1	Ni	mg / m^2d	ND	ND
2	Co	mg / m^2d	ND	ND
3	As	mg / m^2d	ND	ND
4	Hg	mg / m^2d	ND	ND

ND-Not Detected

Annexure – 2

MONITORING OF SOILQUALITY

Samplespecification :

SQ-1: Soil sample from Eastern side of the lease hold area

Sl. No	Parameters	Unit	Result	
			April - June'19	July – Sept.'19
1	Ni	Mg/Kg	10.5	8.1
2	Co	Mg/Kg	ND	ND
3	As	Mg/Kg	ND	ND
4	Hg	Mg/Kg	ND	ND

ND-Not Detected

Samplespecification :

SQ-2: Soil sample from Western side of the lease hold area

Sl. No	Parameters	Unit	Result	
			April - June'19	July – Sept.'19
1	Ni	Mg/Kg	10.2	6.7
2	Co	Mg/Kg	ND	ND
3	As	Mg/Kg	ND	ND
4	Hg	Mg/Kg	ND	ND

ND-Not Detected

Samplespecification :

SQ-3: Soil sample from Northern side of the lease hold area

Sl. No	Parameters	Unit	Result	
			April - June'19	July – Sept.'19
1	Ni	Mg/Kg	14.1	19.4
2	Co	Mg/Kg	ND	ND
3	As	Mg/Kg	ND	ND
4	Hg	Mg/Kg	ND	ND

ND-Not Detected

Samplespecification :

SQ-4: Soil sample from Southern side of the lease hold area

Sl. No	Parameters	Unit	Result	
			April - June'19	July – Sept.'19
1	Ni	Mg/Kg	8.2	10.6
2	Co	Mg/Kg	ND	ND
3	As	Mg/Kg	ND	ND
4	Hg	Mg/Kg	ND	ND

ND-Not Detected

Annexure - 3

Monitoring of Ground Water Level

Station No.	Location	Depth (bgL in metre)	
		April - June'19	July – Sept.'19
GWL-1	Borewell Near workshop of the Mines	13.54	9.32
GWL-2	Borewellnearmain gate ofOCM	13.92	9.25
GWL-3	Near Ostia Village (Open Well)	3.76	1.02
GWL-4	Near Ostapal Village (Open well)	7.98	1.75
GWL-5	Tube well inside the Shiva Temple of Village Gurujanga	13.59	8.92
GWL-6	Tube well outside of theShivaTempleof VillageGurujanga	14.07	8.94
GWL-7	Easternsideofthe quarry, (PZ-1)	5.72	1.58
GWL-8	Southernsideofthe quarry,(PZ-2)	6.53	1.35
GWL-9	Westernsideofthe quarry,(PZ-3)	7.80	1.42

Annexure – 4A

Monitoring of Ground Water Quality

Sampling Specification :

GWQ-1: Borewell Near workshop of the Mines

Sl. No.	Parameters Analysed	Unit	Permissible Limit as per IS:10500, 2012	Result	
				April - June'19	July – Sept.'19
01	Colour	Hazen	5.0	<5.0	<5.0
02	Odour	--	Agreeable (A)	A	A
03	Taste	--	Agreeable (A)	A	A
04	Turbidity	NTU	1.0	0.3	0.1
05	pH	No	6.5 to8.5	6.58	6.52
06	Total Hardness as $CaCO_3$	mg/L	200.0	78.4	75.24
07	Total Iron	mg/L	0.3	<0.07	<0.07
08	Chloride	mg/L	250.0	15.54	15.65
09	Residual Free Chlorine	mg/L	0.2 (min)	Nil	Nil
10	Total Dissolved Solids	mg/L	500.0	102.20	86.4
11	CalciumasCa	mg/L	75.0	10.99	9.52
12	Magnesium as Mg	mg/L	30.0	12.40	12.53
13	Copper	mg/L	0.05	<0.02	<0.02
14	Manganese	mg/L	0.1	<0.01	<0.01
15	Sulphate as $SO^{--}4$	mg/L	200.0	1.80	1.0
16	Nitrateas NO_3	mg/L	45.0	5.40	5.0
17	Fluoride	mg/L	1.0	<0.1	<0.1

18	Phenolic Compound	mg/L	0.001	ND	ND
19	Mercury	mg/L	0.001	ND	ND
20	Cadmium	mg/L	0.003	ND	ND
21	Selenium	mg/L	0.01	ND	ND
22	Total Arsenic	mg/L	0.01	ND	ND
23	Cyanide	mg/L	0.05	ND	ND
24	Lead	mg/L	0.01	ND	ND
25	Zinc	mg/L	5.0	<0.1	<0.1
26	Anionic detergents	mg/L	0.2	ND	ND
27	Total Chromium	mg/L	0.05	0.05	0.04
28	Polynuclear aromatic hydrocarbons	mg/L	0.0001	ND	ND
29	Mineral Oil	mg/L	0.5	ND	ND
30	Pesticides	mg/L	---	ND	ND
31	Total Alkalinity as $CaCO_3$	mg/L	200.0	104.0	68.0
32	Aluminium	mg/L	0.03	ND	ND
33	Boron	mg/L	0.5	ND	ND
34	Nickel	mg/L	0.02	ND	ND
35	Hexavalent Chromium	mg/L	xx	<0.03	<0.03

ND-Not Detected

Annexure – 4B

Sampling Specification :

GWQ-2: Bore well near main gate of OCM

Sl. no.	Parameters Analysed	Unit	Permissible Limit as per IS:10500, 2012	Result	
				April - June'19	July – Sept.'19
01	Colour	Hazen	5.0	<5.0	<5.0
02	Odour	--	Agreeable (A)	A	A
03	Taste	--	Agreeable (A)	A	A
04	Turbidity	NTU	1.0	0.4	0.3
05	pH	No	6.5 to8.5	6.53	6.58
06	Total Hardness as $CaCO_3$	mg/L	200.0	66.64	99.0
07	Total Iron	mg/L	0.3	<0.07	<0.08
08	Chloride	mg/L	250.0	5.82	13.69
09	Residual Free Chlorine	mg/L	0.2 (min)	Nil	Nil
10	Total Dissolved Solids	mg/L	500.0	84.4	127.20
11	Calcium as Ca	mg/L	75.0	6.28	7.93
12	Magnesium as Mg	mg/L	30.0	12.40	19.28
13	Copper	mg/L	0.05	<0.02	<0.02
14	Manganese	mg/L	0.1	<0.01	<0.01
15	Sulphate as $SO^{--}4$	mg/L	200.0	3.40	<1.0
16	Nitrate as NO_3	mg/L	45.0	<5.0	<5.0
17	Fluoride	mg/L	1.0	<0.1	<0.1
18	Phenolic Compound	mg/L	0.001	ND	ND
19	Mercury	mg/L	0.001	ND	ND

20	Cadmium	mg/L	0.003	ND	ND
21	Selenium	mg/L	0.01	ND	ND
22	Total Arsenic	mg/L	0.01	ND	ND
23	Cyanide	mg/L	0.05	ND	ND
24	Lead	mg/L	0.01	ND	ND
25	Zinc	mg/L	5.0	<0.1	<0.1
26	Anionic detergents	mg/L	0.2	ND	ND
27	Total Chromium	mg/L	0.05	0.04	0.05
28	Polynuclear aromatic hydrocarbons	mg/L	0.0001	ND	ND
29	Mineral Oil	mg/L	0.5	ND	ND
30	Pesticides	mg/L	---	ND	ND
31	Total Alkalinity as $CaCO_3$	mg/L	200.0	12.0	64.0
32	Aluminium	mg/L	0.03	ND	ND
33	Boron	mg/L	0.5	ND	ND
34	Nickel	mg/L	0.02	ND	ND
35	Hexavalent Chromium	mg/L	xx	<0.03	<0.03

ND - Not Detected

Annexure – 4C

Sampling Specification :

GWQ-3: Open well near Ostia Village

Sl	Parameters Analysed	Unit	Permissible Limit as per IS:10500, 2012	Result	
				April - June'19	July – Sept.'19
01	Colour	Hazen	5.0	<5.0	<5.0
02	Odour	--	Agreeable (A)	A	A
03	Taste	--	Agreeable (A)	A	A
04	Turbidity	NTU	1.0	0.5	0.7
05	pH	No	6.5 to8.5	5.44	5.57
06	Total Hardness as $CaCO_3$	mg/L	200.0	23.52	59.4
07	Total Iron	mg/L	0.3	<0.07	<0.07
08	Chloride	mg/L	250.0	9.71	13.69
09	Residual Free Chlorine	mg/L	0.2 (min)	Nil	Nil
10	Total Dissolved Solids	mg/L	500.0	31.40	86.6
11	Calcium as Ca	mg/L	75.0	1.57	6.34
12	Magnesium as Mg	mg/L	30.0	4.77	10.6
13	Copper	mg/L	0.05	<0.02	<0.02
14	Manganese	mg/L	0.1	<0.01	<0.01
15	Sulphate as $SO^{--}4$	mg/L	200.0	<5.0	1.3
16	Nitrateas NO_3	mg/L	45.0	2.48	<5.0
17	Fluoride	mg/L	1.0	<0.1	<0.1
18	Phenolic Compound	mg/L	0.001	ND	ND
19	Mercury	mg/L	0.001	ND	ND

20	Cadmium	mg/L	0.003	ND	ND
21	Selenium	mg/L	0.01	ND	ND
22	Total Arsenic	mg/L	0.01	ND	ND
23	Cyanide	mg/L	0.05	ND	ND
24	Lead	mg/L	0.01	ND	ND
25	Zinc	mg/L	5.0	<0.1	<0.1
26	Anionic detergents	mg/L	0.2	ND	ND
27	Total Chromium	mg/L	0.05	0.025	0.19
28	Polynuclear aromatic hydrocarbons	mg/L	0.0001	ND	ND
29	Mineral Oil	mg/L	0.5	ND	ND
30	Pesticides	mg/L	---	ND	ND
31	Total Alkalinity as $CaCO_3$	mg/L	200.0	16.0	8.0
32	Aluminium	mg/L	0.03	ND	ND
33	Boron	mg/L	0.5	ND	ND
34	Nickel	mg/L	0.02	ND	ND
36	Hexavalent Chromium	mg/L	xx	<0.03	0.04

ND - Not Detected

Annexure – 4D

Sampling Specification :

GWQ-4: Open well near Ostapal Village

Sl. no.	Parameters Analysed	Unit	Permissible Limit as per IS:10500, 2012	Result	
				April - June'19	July – Sept.'19
01	Colour	Hazen	5.0	<5.0	<5.0
02	Odour	--	Agreeable (A)	A	A
03	Taste	--	Agreeable (A)	A	A
04	Turbidity	NTU	1.0	0.6	1.0
05	pH	No	6.5 to8.5	5.40	5.27
06	Total Hardness as $CaCO_3$	mg/L	200.0	27.44	51.48
07	Total Iron	mg/L	0.3	<0.07	<0.07
08	Chloride	mg/L	250.0	7.77	11.74
09	Residual Free Chlorine	mg/L	0.2 (min)	Nil	Nil
10	Total Dissolved Solids	mg/L	500.0	42.20	98.20
11	Calcium as Ca	mg/L	75.0	3.14	3.17
12	Magnesium as Mg	mg/L	30.0	4.77	10.60
13	Copper	mg/L	0.05	<0.02	<0.02
14	Manganese	mg/L	0.1	<0.01	<0.01
15	Sulphate as $SO^{--}4$	mg/L	200.0	1.80	1.20
16	Nitrate as NO_3	mg/L	45.0	<5.0	<5.0
17	Fluoride	mg/L	1.0	<0.1	<0.1
18	Phenolic Compound	mg/L	0.001	ND	ND
19	Mercury	mg/L	0.001	ND	ND

20	Cadmium	mg/L	0.003	ND	ND
21	Selenium	mg/L	0.01	ND	ND
22	Total Arsenic	mg/L	0.01	ND	ND
23	Cyanide	mg/L	0.05	ND	ND
24	Lead	mg/L	0.01	ND	ND
25	Zinc	mg/L	5.0	<0.1	<0.1
26	Anionic detergents	mg/L	0.2	ND	ND
27	Total Chromium	mg/L	0.05	0.24	0.22
28	Polynuclear aromatic hydrocarbons	mg/L	0.0001	ND	ND
29	Mineral Oil	mg/L	0.5	ND	ND
30	Pesticides	mg/L	---	ND	ND
31	Total Alkalinity as $CaCO_3$	mg/L	200.0	52.0	16.0
32	Aluminium	mg/L	0.03	ND	ND
33	Boron	mg/L	0.5	ND	ND
34	Nickel	mg/L	0.02	ND	ND
35	Hexavalent Chromium	mg/L	xx	<0.03	<0.03

ND - Not Detected

Annexure – 4E

Sampling Specification:
GWQ-5: Tube well inside the Shiva Temple of Village Gurujanga

Sl. no.	Parameters Analysed	Unit	Permissible Limit as per IS:10500, 2012	Result	
				Apr' - Jun'19	July-Sept.'19
01	Colour	Hazen	5.0	<5.0	<5.0
02	Odour	--	Agreeable (A)	A	A
03	Taste	--	Agreeable (A)	A	A
04	Turbidity	NTU	1.0	0.3	1.0
05	pH	No	6.5 to8.5	6.50	6.39
06	Total Hardness as $CaCO_3$	mg/L	200.0	62.72	91.08
07	Total Iron	mg/L	0.3	<0.07	<0.07
08	Chloride	mg/L	250.0	11.65	11.74
09	Residual Free Chlorine	mg/L	0.2 (min)	Nil	Nil
10	Total Dissolved Solids	mg/L	500.0	87.4	138.40
11	Calcium as Ca	mg/L	75.0	7.85	14.28
12	Magnesium as Mg	mg/L	30.0	10.50	13.49
13	Copper	mg/L	0.05	<0.02	<0.02
14	Manganese	mg/L	0.1	<0.01	<0.01
15	Sulphate as $SO^{--}4$	mg/L	200.0	2.20	4.9
16	Nitrateas NO_3	mg/L	45.0	5.0	5.0
17	Fluoride	mg/L	1.0	<0.1	<0.1
18	Phenolic Compound	mg/L	0.001	ND	ND
19	Mercury	mg/L	0.001	ND	ND

20	Cadmium	mg/L	0.003	ND	ND
21	Selenium	mg/L	0.01	ND	ND
22	Total Arsenic	mg/ L	0.01	ND	ND
23	Cyanide	mg/L	0.05	ND	ND
24	Lead	mg/L	0.01	ND	ND
25	Zinc	mg/L	5.0	<0.1	<0.1
26	Anionic detergents	mg/L	0.2	ND	ND
27	Total Chromium	mg/L	0.05	0.18	0.19
28	Polynuclear aromatic hydrocarbons	mg/L	0.0001	ND	ND
29	Mineral Oil	mg/L	0.5	ND	ND
30	Pesticides	mg/L	---	ND	ND
31	Total Alkalinity as $CaCO_3$	mg/L	200.0	60.0	56.0
32	Aluminium	mg/L	0.03	ND	ND
33	Boron	mg/L	0.5	ND	ND
34	Nickel	mg/L	0.02	ND	ND
35	Hexavalent Chromium	mg/L	xx	<0.03	<0.03

ND - Not Detected

Annexure – 4F

Sampling Specification:
GWQ-6: Tube well outside of the Shiva Temple of Village Gurujanga

Sl. No.	Parameters Analysed	Unit	Permissible Limit as per IS:10500, 2012	Result	
				Apr' - Jun'19	July - Sept.'19
01	Colour	Hazen	5.0	<5.0	<5.0
02	Odour	--	Agreeable (A)	A	A
03	Taste	--	Agreeable (A)	A	A
04	Turbidity	NTU	1.0	0.4	0.5
05	pH	No	6.5 to8.5	6.13	6.45
06	Total Hardness as $CaCO_3$	mg/L	200.0	70.56	102.96
07	Total Iron	mg/L	0.3	<0.07	<0.07
08	Chloride	mg/L	250.0	13.59	17.61
09	Residual Free Chlorine	mg/L	0.2 (min)	Nil	Nil
10	TotalDissolved Solids	mg/L	500.0	127.40	186.90
11	Calcium as Ca	mg/L	75.0	10.99	12.69
12	Magnesium as Mg	mg/L	30.0	10.50	17.35
13	Copper	mg/L	0.05	<0.02	<0.02
14	Manganese	mg/L	0.1	<0.01	<0.01
15	Sulphate as $SO^{--}4$	mg/L	200.0	1.80	4.0
16	NitrateasNO_3	mg/L	45.0	5.0	5.0
17	Fluoride	mg/L	1.0	<0.01	<0.1
18	Phenolic Compound	mg/L	0.001	ND	ND
19	Mercury	mg/L	0.001	ND	ND

20	Cadmium	mg/L	0.003	ND	ND
21	Selenium	mg/L	0.01	ND	ND
22	Total Arsenic	mg/L	0.01	ND	ND
23	Cyanide	mg/L	0.05	ND	ND
24	Lead	mg/L	0.01	ND	ND
25	Zinc	mg/L	5.0	<0.1	<0.1
26	Anionic detergents	mg/L	0.2	ND	ND
27	Total Chromium	mg/L	0.05	0.24	0.21
28	Polynuclear aromatic hydrocarbons	mg/L	0.0001	ND	ND
29	Mineral Oil	mg/L	0.5	ND	ND
30	Pesticides	mg/L	---	ND	ND
31	Total Alkalinity as $CaCO_3$	mg/L	200.0	32.0	60.0
32	Aluminium	mg/L	0.03	ND	ND
33	Boron	mg/L	0.5	ND	ND
34	Nickel	mg/L	0.02	ND	ND
35	Hexavalent Chromium	mg/L	xx	<0.03	0.04

ND - Not Detected

Annexure – 4G

Sampling Specification:
GWQ-7: Eastern side of the quarry, (PZ-1)

Sl. no.	Parameters Analysed	Unit	Permissible Limit as per IS:10500, 2012	Result	
				Apr' - Jun'19	July - Sept.'19
01	Colour	Hazen	5.0	<5.0	<5.0
02	Odour	--	Agreeable (A)	A	A
03	Taste	--	Agreeable (A)	A	A
04	Turbidity	NTU	1.0	0.81	0.1
05	pH	No	6.5 to8.5	6.58	7.11
06	Total Hardness as $CaCO_3$	mg/L	200.0	35.28	83.16
07	Total Iron	mg/L	0.3	<0.07	<0.07
08	Chloride	mg/L	250.0	09.71	7.82
09	Residual Free Chlorine	mg/L	0.2 (min)	Nil	Nil
10	TotalDissolved Solids	mg/L	500.0	47.8	107.4
11	Calcium as Ca	mg/L	75.0	4.71	11.11
12	Magnesium as Mg	mg/L	30.0	5.72	13.49
13	Copper	mg/L	0.05	<0.02	<0.02
14	Manganese	mg/L	0.1	<0.01	<0.01
15	Sulphate as $SO^{--}4$	mg/L	200.0	1.6	1.8
16	NitrateasNO_3	mg/L	45.0	<5.0	<5.0
17	Fluoride	mg/L	1.0	<0.01	<0.1
18	Phenolic Compound	mg/L	0.001	ND	ND
19	Mercury	mg/L	0.001	ND	ND

20	Cadmium	mg/L	0.003	ND	ND
21	Selenium	mg/L	0.01	ND	ND
22	Total Arsenic	mg/L	0.01	ND	ND
23	Cyanide	mg/L	0.05	ND	ND
24	Lead	mg/L	0.01	ND	ND
25	Zinc	mg/L	5.0	<0.1	<0.1
26	Anionic detergents	mg/L	0.2	ND	ND
27	Total Chromium	mg/L	0.05	0.04	0.05
28	Polynuclear aromatic hydrocarbons	mg/L	0.0001	ND	ND
29	Mineral Oil	mg/L	0.5	ND	ND
30	Pesticides	mg/L	---	ND	ND
31	Total Alkalinity as $CaCO_3$	mg/L	200.0	28.0	48.0
32	Aluminium	mg/L	0.03	ND	ND
33	Boron	mg/L	0.5	ND	ND
34	Nickel	mg/L	0.02	ND	ND
35	Hexavalent Chromium	mg/L	xx	<0.03	<0.03

ND - Not Detected

Annexure – 4H

Sampling Specification:
GWQ-8: Southern side of the quarry, (PZ-2)

Sl. no.	Parameters Analysed	Unit	Permissible Limit as per IS:10500, 2012	Result	
				Apr' - Jun'19	July - Sept.'19
01	Colour	Hazen	5.0	<5.0	<5.0
02	Odour	--	Agreeable (A)	A	A
03	Taste	--	Agreeable (A)	A	A
04	Turbidity	NTU	1.0	0.8	0.1
05	pH	No	6.5 to8.5	6.58	7.20
06	Total Hardness as $CaCO_3$	mg/L	200.0	35.28	63.36
07	Total Iron	mg/L	0.3	<0.07	<0.07
08	Chloride	mg/L	250.0	9.71	11.74
09	Residual Free Chlorine	mg/L	0.2 (min)	Nil	Nil
10	TotalDissolved Solids	mg/L	500.0	47.8	92.1
11	Calcium as Ca	mg/L	75.0	4.71	7.93
12	Magnesium as Mg	mg/L	30.0	5.72	10.6
13	Copper	mg/L	0.05	<0.02	<0.02
14	Manganese	mg/L	0.1	<0.01	<0.01
15	Sulphate as SO^{--}_4	mg/L	200.0	6.4	2.2
16	NitrateasNO_3	mg/L	45.0	<5.0	<5.0
17	Fluoride	mg/L	1.0	<0.1	<0.1
18	Phenolic Compound	mg/L	0.001	ND	ND
19	Mercury	mg/L	0.001	ND	ND

20	Cadmium	mg/L	0.003	ND	ND
21	Selenium	mg/L	0.01	ND	ND
22	Total Arsenic	mg/L	0.01	ND	ND
23	Cyanide	mg/L	0.05	ND	ND
24	Lead	mg/L	0.01	ND	ND
25	Zinc	mg/L	5.0	<0.1	<0.1
26	Anionic detergents	mg/L	0.2	ND	ND
27	Total Chromium	mg/L	0.05	0.04	0.04
28	Polynuclear aromatic hydrocarbons	mg/L	0.0001	ND	ND
29	Mineral Oil	mg/L	0.5	ND	ND
30	Pesticides	mg/L	---	ND	ND
31	Total Alkalinity as $CaCO_3$	mg/L	200.0	28.0	40.0
32	Aluminium	mg/L	0.03	ND	ND
33	Boron	mg/L	0.5	ND	ND
34	Nickel	mg/ L	0.02	ND	ND
35	Hexavalent Chromium	mg/L	xx	<0.03	<0.03

ND - Not Detected

Annexure – 4I

Sampling Specification:
GWQ-9: Western side of the quarry, (PZ-3)

Sl. no.	Parameters Analysed	Unit	Permissible Limit as per IS:10500, 2012	Result	
				Apr' - Jun'19	July - Sept.'19
01	Colour	Hazen	5.0	<5.0	<5.0
02	Odour	--	Agreeable (A)	A	A
03	Taste	--	Agreeable (A)	A	A
04	Turbidity	NTU	1.0	0.7	0.9
05	pH	No	6.5 to8.5	7.19	7.33
06	Total Hardness as $CaCO_3$	mg/L	200.0	50.96	91.08
07	Total Iron	mg/L	0.3	0.17	<0.07
08	Chloride	mg/L	250.0	9.71	9.78
09	Residual Free Chlorine	mg/L	0.2 (min)	Nil	Nil
10	Total Dissolved Solids	mg/L	500.0	67.7	157.3
11	Calcium as Ca	mg/L	75.0	6.28	9.52
12	Magnesium as Mg	mg/L	30.0	10.50	116.39
13	Copper	mg/L	0.05	<0.02	<0.02
14	Manganese	mg/L	0.1	<0.01	<0.01
15	Sulphate as $SO^{--}4$	mg/L	200.0	2.9	1.0
16	Nitrate as NO_3	mg/L	45.0	1.80	<5.0
17	Fluoride	mg/L	1.0	<0.02	<0.1

18	Phenolic Compound	mg/L	0.001	ND	ND
19	Mercury	mg/L	0.001	ND	ND
20	Cadmium	mg/L	0.003	ND	ND
21	Selenium	mg/L	0.01	ND	ND
22	Total Arsenic	mg/L	0.01	ND	ND
23	Cyanide	mg/L	0.05	ND	ND
24	Lead	mg/L	0.01	ND	ND
25	Zinc	mg/L	5.0	<0.1	<0.1
26	Anionic detergents	mg/L	0.2	ND	ND
27	Total Chromium	mg/L	0.05	0.05	0.05
28	Polynuclear aromatic hydrocarbons	mg/L	0.0001	ND	ND
29	Mineral Oil	mg/L	0.5	ND	ND
30	Pesticides	mg/L	---	ND	ND
31	Total Alkalinity as $CaCO_3$	mg/L	200.0	52.0	51.0
32	Aluminium	mg/L	0.03	ND	ND
33	Boron	mg/L	0.5	ND	ND
34	Nickel	mg/L	0.02	ND	ND
35	Hexavalent Chromium	mg/L	xx	<0.03	0.04

ND - Not Detected

Annexure –5

ANALYSIS REPORT OF GROUND WATER SAMPLE

Station No.	Location	Hexavalent Chromium (in mg/L)	
		Apr'19 - Jun'19	July'19 - Sept.'19
GWQ-1	Borewell Near workshop of the Mines	<0.03	<0.03
GWQ-2	Borewellnearmain gate ofOCM	<0.03	<0.03
GWQ-3	Near Ostia Village (Open Well)	<0.03	<0.03
GWQ-4	Near Ostapal Village (Open well)	<0.03	<0.03
GWQ-5	Tube well inside the Shiva Temple of Village Gurujanga	<0.03	<0.03
GWQ-6	Tube well outside of the Shiva Temple of Village Gurujanga	<0.03	<0.03
GWQ-7	Easternsideofthe quarry, (PZ-1)	<0.03	<0.03
GWQ-8	Southernsideofthe quarry, (PZ-2)	<0.03	<0.03
GWQ-9	Westernsideofthe quarry, (PZ-3)	<0.03	<0.03

ANNEXURE – 6

CALENDAR PLAN INCLUDING EXCAVATION, QUANTUM OF MINERAL CHROMITE AND WASTE GENERATED DURING THE PERIOD 2019-20 IN OSTAPAL CHROMITE MINES

SL. NO.	MATERIALS	CALENDER PLAN PER ANNUM (2019-20)	QUANTITY GENERATED DURING THE PERIOD FROM APRIL, 2019 TO SEPTEMBER,2019
01.	CHROME ORE	1.046 Lakh Tonnes	0.624 Lakh Tonnes
02.	WASTEOVERBURDEN	3.884 Lakh M^3	0.250 Lakh M^3

Annexure-7

AMBIENT AIR QUALITY MONITORING AT OSTAPAL CHROMITE MINES

Sl.No.	STATIONS	PARAMETERS	Oct'18	Nov'18	Dec'18	Jan'19	Feb'19	Mar'19	NAAQ STD(µg/m 3)
CORE ZONE									
1	Weigh bridge/Mines Main Gate	PM_{10}	73.39	76.0	80.73	70.80	82.09	74.53	100
		$PM_{2.5}$	31.64	31.15	30.40	32.11	28.36	33.50	60
		SO_2	7.04	7.85	7.11	7.72	6.75	<60.0	80
		NOx	12.51	14.74	13.34	11.78	12.53	12.74	80
		CO(mg/m3)	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	2
2	Near Dispensary	PM_{10}	75.74	70.43	75.10	85.20	75.49	73.14	100
		$PM_{2.5}$	33.32	37.97	30.09	34.10	29.85	29.61	60
		SO_2	6.59	8.67	<6.0	<6.0	7.54	7.77	80
		NOx	14.03	16.09	12.30	10.77	11.43	10.62	80
		CO(mg/m3)	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	2
3	Middle of the Opencast Quarry	PM_{10}	78.85	74.65	83.46	78.64	77.93	80.21	100
		$PM_{2.5}$	31.49	28.70	31.77	37.96	33.59	32.05	60
		SO_2	<6.0	<6.0	6.17	6.60	7.85	<6.0	80
		NOx	11.19	12.35	13.71	14.00	13.57	13.24	80
		CO(mg/m3)	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	2
4	Middle of the COB Plant	PM_{10}	82.95	74.47	81.58	81.40	78.93	77.67	100
		$PM_{2.5}$	33.33	35.91	37.72	29.72	26.19	27.13	60
		SO_2	6.51	8.45	6.93	6.81	7.17	6.63	80
		NOx	10.50	10.33	12.19	13.11	16.78	13.50	80
		CO(mg/m3)	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	2
BUFFER ZONE									
5	VILLAGE – OSTIA	PM_{10}	71.52	69.90	69.37	72.48	75.13	69.63	100
		$PM_{2.5}$	27.51	31.75	27.17	28.54	33.65	31.88	60
		SO_2	8.59	7.27	7.60	9.26	9.11	<6.0	80
		NOx	13.36	11.72	17.19	11.29	15.49	9.27	80
		CO(mg/m3)	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	2
6	VILLAGE – OSTAPAL	PM_{10}	67.04	79.01	67.44	70.57	71.09	72.51	100
		$PM_{2.5}$	26.51	34.11	34.43	29.07	30.84	32.25	60
		SO_2	7.51	8.42	6.83	8.72	6.75	<9.0	80
		NOx	11.41	10.29	10.27	11.72	10.15	10.22	80
		CO(mg/m3)	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	2
7	KALIAPANI TOWNSHIP	PM_{10}	72.19	75.49	75.78	75.52	69.92	67.50	100
		$PM_{2.5}$	30.30	29.49	33.57	29.81	27.22	28.15	60
		SO_2	<6.0	7.32	7.90	8.91	8.55	6.26	80
		NOx	10.47	11.93	11.37	13.40	14.64	9.83	80
		CO(mg/m3)	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	2
8	VILLAGE KOIPOSI	PM_{10}	69.71	67.85	70.06	68.56	70.39	70.45	100
		$PM_{2.5}$	32.81	28.93	28.68	26.19	35.78	28.54	60
		SO_2	7.44	7.18	6.53	<6.0	6.62	7.24	80
		NOx	12.26	13.90	12.77	13.46	12.93	11.67	80
		CO(mg/m3)	<1.14	<1.14	<1.14	<1.14	<1.14	<1.14	2

Annexure –8

MONITORING OF AIR QUALITY FUGITIVE EMISSION

Samplespecification :

AAQF-1: Near Mines Ore Plot Area

Sl. No	Parameters	Unit	Result	
			April'19 - June'19	July'19 – Sept.'19
1	Suspended Particulate Matter (SPM	µgm/M^3	222.68	183.54

Samplespecification :

AAQF-2: Near COB Plant area

Sl. No	Parameters	Unit	Result	
			April'19 - June'19	July'19 – Sept.'19
1	Suspended Particulate Matter (SPM	µgm /M^3	197.90	200.47

Samplespecification :

AAQF-3: Near Mines Loading Unloading Point

Sl. No	Parameters	Unit	Result	
			April'19 - June'19	July'19 – Sept.'19
1	Suspended Particulate Matter (SPM	µgm /M^3	288.04	223.66

Annexure – 9

Monitoring of Noise Level

DAY TIME READING

Station No.	Location	Result in dB(A)	
		April- June'19	July-Sept'19
N-1	Opencast quarry	68.40	59.7
N-2	COB Plant Area	64.20	68.9
N-3	Mines Loading Unloading Point	52.90	52.7
PERMISSIBLE LIMIT			
Industrial Area		**75.0**	
Residential Area		**55.0**	

NIGHT TIME READING

Station No.	Location	Result in dB(A)	
		April- June'19	July-Sept'19
N-1	Opencast quarry	53.4	50.8
N-2	COB Plant Area	58.2	52.4
N-3	Mines Loading Unloading Point	47.2	48.2
PERMISSIBLE LIMIT			
Industrial Area		**75.0**	
Residential Area		**45.0**	

Annexure –10

Monitoring of Effluent Water Sample

SamplingSpecification: EWQ1- Mines Final Discharge Water after Treatment in ETP

Sl. No.	Parameters Analysed	Unit	Permissible Limit As per *G.S.R. 422(E)* dated 19.05.1993	Result	
				April-June'19	July-Sept'19
01	Colour	Hazen	5.0	<5.0	<5.0
02	Odour	--	Agreeable (A)	A	A
03	Suspended Solids	mg/L	100.0	<10.0	<10.0
04	pH value	No.	5.5 – 9.0	7.50	7.49
05	Temperature	^{0}C	Shall not exceed 5^{0}C above the receiving water temperature	NOT APPLICABLE	
06	Oil & Grease	mg/L	10.0	<10.0	<10.0
07	Total Residual Chlorine	mg/L	1.0	Nil	Nil
08	Ammonical Nitrogen (as N)	mg/L	50.0	1.62	1.26
09	Total Kjeldahl Nitrogen (as NH_3)	mg/L	100.0	3.6	2.4
10	Free Ammonia (as NH_3)	mg/L	5.0	0.2	0.1
11	BOD @ 27^{0}C 3Days	mg/L	30.0	<2.0	<2.0
12	COD	mg/L	250.0	8.0	16.0
13	Arsenic (as As)	mg/L	0.2	ND	ND
14	Mercury (as Hg)	mg/L	0.01	ND	ND
15	Lead (as Pb)	mg/L	0.1	ND	ND
16	Cadmium (as Cd)	mg/L	2.0	ND	ND
17	Hexavalent Chromium CRVI	mg/L	0.1	<0.03	<0.03
18	Total Chromium (as Cr)	mg/L	2.0	0.26	0.29
19	Copper (as Cu)	mg/L	3.0	ND	ND
20	Zinc (as Zn)	mg/L	5.0	ND	ND

21	Selenium (as Se)	mg/L	0.05	ND	ND
22	Nickel (as Ni)	mg/L	3.0	ND	ND
23	Cyanide (as CN)	mg/L	0.2	ND	ND
24	Fluoride (as F)	mg/L	2.0	<0.1	<0.1
25	Dissolved Phosphates (as P)	mg/L	5.0	0.24	<0.1
26	Sulphide (as S)	mg/L	2.0	<0.1	<0.1
27	Phenolic Compounds(as C_6H_5OH)	mg/L	1.0	ND	ND
28	Manganese (as Mn)	mg/L	2.0	ND	ND
29	Iron (as Fe)	mg/L	3.0	0.46	0.53
30	Vanadium (as V)	mg/L	0.2	ND	ND
31	Nitrate Nitrogen	mg/L	10.0	<5.0	<5.0
32	Particle Size of Suspended Solids	--	shall pass 850micron IS Sieve	Passed 850 micron IS Sieve	NA
33	Bio-assay Test	--	90%survivaloffish after 96hrsin100% effluent	94% Survival of fish after96hrsin 100% effluent	92%Survivaloffish after 96hrsin100% Effluent
34	Dissolved Oxygen	mg/L	--	3.0	5.5
35	Total Coliform	MPN/100 ml	--	8.0	7.0

ND - Not Detected

Annexure -11

DETAILS OF EXPENDITURE INCURRED ON ENVIRONMENTAL PROTECTION MEASURES DURING THE YEAR 2018-19 AND PROPOSED BUDGETED AMOUNT FOR THE YEAR 2019-20 FOR OSTAPAL CHROMITE MINES

Sl. No.	I T E M	Expenses during the Year 2018-19 (in Rupees ₹)	Proposed budgeted amount for the year 2019-20 (in Rupees ₹)
1.	**AFFORESTATION**		
a)	Seedlings @ ₹ 65/ - each	4,98,745	3,84,800
b)	Fertilizer/Insecticide/Cow - dung(@ ₹ 20)	1,53,460	1,18,400
c)	Digging of Pits/Planting (Labor cost)@ ₹35	2,68,555	2,07,200
d)	Post Plantation care@₹120/- (Watering, Weeding, basin making etc.)	9,20,760	7,10,400
e)	Supervising	4,80,000	4,90,000
	Sub-Total	**23,21,520**	**19,10,800**
2.	**WATER MANAGEMENT & TREATMENT**		
a)	ETP Operation & Maintenance (including costs of chemical & Manpower)	15,50,000	16,00,000
b)	Power Consumption	9,37,595	9,00,000
c)	Sludge disposal	62,800	70,000
d)	Water sample analysis	69,036	70,000
	Sub-Total	**26,19,431**	**26,40,000**
3.	**DUST SUPRESSION & AIR MONITORING**		
a)	Water spraying at dust generating points by water tanker.	17,63,000	18,00,000
b)	Air monitoring charges	2,30,000	2,30,000
c)	Noise level measurement	1800	10,000
	Sub-Total	**19,94,800**	**20,40,000**
	Grand Total	**Rs.69,35,751/ -**	**Rs.65,90,800/ -**

Annnexure-12

Regional Director

सत्यमेव जयते

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