

OCM/ENV/ 150 /2017

Date : 16.05.2017

To

Dr. Amit Kumar Gupta  
Joint Director  
Ministry of Environment & Forests  
Govt. of India  
Eastern Regional Office  
A/3, Chandrasekharpur  
BHUBANESWAR - 751 023

Sub: Six monthly compliance of conditions stipulated vide Environmental Clearance Letter No. J-11015/38/2006-IA.II(M), dtd. 06-12-2006 in respect of Ostapal Chromite Mines of M/s. FACOR Ltd.

Dear Sir,

With reference to above stated Environmental Clearance letters, we are herewith submitting hard copies of six monthly compliance report in respect of our Ostapal Chromite Mines of M/s.FACOR Ltd. for the period from October, 2016 to March, 2017 for your kind perusal. The soft copy of the same has already been sent by E-mail to your good Office.

Thanking you.

Yours faithfully,  
for FERRO ALLOYS CORPORATION LTD.

  
GENERAL MANAGER

Encl: As above

Copy to: The Director, MOEF, N.Delhi – for favour of kind information.

Name of the Project : **OSTAPAL CHROMITE MINES, M/S. FACOR LTD.**

Project Code : Mining (Non-Coal)

Clearance Letter No. with date : No. J-11015/183/2007-IA-II(M) dt.13-05-09

Period of Compliance Report : October 2016 to March 2017

**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 Oct., 2016 to March, 2017 where as till 31.03.2016 54,168 M <sup>3</sup> of top soil had been generated and total quantity of top soil has already been utilized for filling in plantation pits and spreading over plantation area. As the quarry area is active, there is no scope of reclamation and rehabilitation of mined out area during the period of Oct., 2016 to March, 2017.
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°. 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 41m with overall slope 25°. 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	Collection and analysis of dust & soil samples were continued since summer 2002 and the results of the same is being submitted to MOEF regularly. The result of summer and monsoon is enclosed in Annexure-1. There is no standards for Ni, Co, As and Hg for dust fall and soil

	discontinued.	samples.
6	<p>Catch drains and siltation ponds of appropriate size should be constructed to arrest silt and sediment flows from soil, OB and mineral dumps. The water so collected should be utilized for watering the mine area, roads, plantation etc. The drains should be regularly de-silted and maintained properly.</p> <p>Garland drain (size, gradient and length) shall be constructed for both mine pit &amp; 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.</p> <p>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.</p>	<p>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 discharging outside ML area through upgraded ETP. Hence there is no need for collection of water from catch drains from mine area, roads, plantation etc..</p> <p>Garland drains of width 2m, depth 1.5m and length 4325m with gradient have been constructed for maximum discharge of rainfall in the adjoining areas.</p> <p>There is no chance of flow of storm water into the effluent treatment plant during high rainfall/super cyclone period because the plant is at high reduced level (RL). Hence storm water return system is not required.</p>
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 upto a length of 2870m to check the run-off and siltation.
8	<p>Effluents containing of Cr<sup>+6</sup> 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.</p> <p>Run off from OB dumps and other surface run off should be analysed for Cr<sup>+6</sup> and in case its concentration is found higher than the permissible limit the water should be treated before reuse/discharge.</p>	<p>An Effluent Treatment Plant has been commissioned for treatment of Mines discharge water. The conc. of Cr<sup>+6</sup> in treated discharge water is &lt;0.005 mg/l. The tailing water (waste water of mineral separation plant) also is being treated by adding FeSO<sub>4</sub> before discharge into tailing pond. The treated tailing pond water is being collected in a intake pond and being re-used in beneficiation plant. Thus zero discharge from Beneficiation Plant is being maintained.</p> <p>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 are being done at outside workshop and minor repairing is being done in our garage. Hence, discharge of workshop effluent is nil.</p> <p>The total surface runoff water is being collected in two settling pits which are pumped to the ETP for treatment before final discharge.</p>
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 conform to the prescribed standards before discharge.	The effluents from tailing pond are not discharged outside. The supernatant water of the tailing pond is being collected in a sump adjacent to the tailing pond and re-circulated in Beneficiation Plant.
11	The Project proponent shall explore the possibility to reduce concentration of Cr <sup>+6</sup> in the tailing pond in consultation with an Expert Scientific Institution like NEERI.	The Conc. of Cr <sup>+6</sup> in tailings is being reduced by adding FeSO <sub>4</sub> 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 benches of OB dumps, Road side, around C.O.B Plant and inside the colony in an area of 25.21 Ha. Out of proposed 33.02Ha. 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 have been constructed inside the Mine. One bore well near Tarini Temple of the Ostapal Mines inside the Core Zone and 2 Nos. of tube wells (one is inside of the Shiva Temple of Gurujanga and other is outside of the Shiva Temple) are in Buffer Zone. Above three wells are in network system. The monitoring data for the period from Oct., 2016 to March, 2017 is given in <b>Annexure-2 to 11</b> .
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 <sup>+6</sup> is within permissible limits, will be quarterly while in the remaining 6 wells it will be on monthly basis.	The monitored results of ground water quality in 9 Bore wells are enclosed in <b>Annexure-12</b> . Other 5 Nos. of Bore wells have been damaged due to quarry expansion.
15	Project Authorities should meet water requirement of the peripheral village(s), especially, if the village wells go dry due to mine de-watering.	It is established by our ground water level monitoring that the water level of nearby village wells (Ostia, Gurujanga & Ostapal) has not gone dry even during summer seasons. However 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.	Permission obtained from Central Ground Water Authority, Ministry of Water Resources, New Delhi vide letter no.21-4(13)/SER/CGWA/2007-1460 dated 6.12.2007 and the same has been submitted to Eastern Regional Office of M.O.E.F., Bhubaneswar.
17	Suitable rain water harvesting measures on long term 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.	Drilling operation is being carried out with dust extractors.
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 flyrocks 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 stabilise 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. Which HEMMs have valid PUC Certificate are only allowed for operation inside the Mines. All the transporting vehicles are being covered with tarpaulin and over loading is 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 before enhancing 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. 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. An ETP has already 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 Ministry of Environment & Forests.	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, 2016 to March, 2017) is given in <b>Annexure-13</b> .
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 <sub>2</sub> & NO <sub>x</sub> 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 <sub>2</sub> & NO <sub>x</sub> ) 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.	Data on Ambient Air Quality monitoring with respect PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , NO <sub>x</sub> & CO for the period Oct, 2016 to March, 2017 is enclosed in <b>Annexure 14A &amp; 14B</b> . The copy of the same has been submitted to the Ministry and SPCB, Bhubaneswar. In future also the same will be continued.
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, loading and unloading points and Ore handling yard regularly. The monitored results of the same are enclosed in <b>Annexure 15</b> .
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. The present noise level of work environment is below 68 dB(A).

		Location wise noise level at work environment is enclosed in <b>Annexure – 16</b> .
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 <sup>th</sup> May, 1993 and 31 <sup>st</sup> 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 <sup>+6</sup> 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. 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 from Oct., 2016 to March, 2017 is enclosed in <b>Annexure -17</b> . 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.
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 a precautionary measure. Training & information on safety, health hazards are being given to all categories of deserved workers. Occupational health surveillance programme of all categories of workers and employees are being conducted periodically by lung function test, audiometry test, vision tests and other tests. The defects workers/employees 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 are functioning since 1989 under the control of Senior Executive.
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 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 2016-17 and proposed budgeted amount for the year 2017-18 are given in <b>Annexure -18</b> .

**SOIL AND DUSTFALL SAMPLE ANALYSIS REPORT**

PROJECT : OSTAPAL CHROMITE MINES  
 PERIOD : OCT., 2016 TO MARCH, 2017  
 SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR

**1-SOIL SAMPLE**

Unit : Mg/Kg(PPM)

Sl. No.	LOCATION	SEASON	PARAMETERS			
			Ni	Co	As	Hg
1	Soil sample from eastern side of the lease hold area	Summer	119	<0.05	<0.01	<0.01
		Monsoon	94	<0.05	<0.01	<0.01
2	Soil sample from western side of the lease hold area	Summer	70	<0.05	<0.01	<0.01
		Monsoon	67	<0.05	<0.01	<0.01
3	Soil sample from Northern side of the lease hold area	Summer	182	<0.05	<0.01	<0.01
		Monsoon	168	<0.05	<0.01	<0.01
4	Soil sample from Southern side of the lease hold area	Summer	90	<0.05	<0.01	<0.01
		Monsoon	83	<0.05	<0.01	<0.01

**2- DUST FALL SAMPLE:**

Sl. No.	LOCATION	SEASON	PARAMETERS			
			Ni	Co	As	Hg
1	Dust fall sample from Roof top of the Type -I Building	Summer	<0.05	<0.05	<0.01	<0.01
		Monsoon	<0.05	<0.05	<0.01	<0.01

**ANNEXURE -2****MONITORING DETAILS OF GROUND WATER LEVEL FROM SURFACE**

PROJECT : OSTAPAL CHROMITE MINES

PERIOD : OCT., 2016 TO MARCH, 2017

SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR

Sl. No.	LOCATION	Collar RL(Mtr)	Depth of the Well/Hole (Mtr)	NOV.,2016 (In mtr.)	JAN.,2017 (In mtr.)	Quality of Water enclosed as Annexure
<b>I</b>	<b>TUBE WELL</b>					
1	Near 2R Qrts, OCM	135	45.0	15.00	14.0	3
2	Bore well near main gate of OCM	135	50.0	12.50	14.20	4
3	Near Ostia Village (Open Well)	135	10.0	7.50	8.30	5
4	Near Ostapal Village(Open well)	152	15.0	8.10	9.40	6
5	Tube well inside the Shiva Temple of Village Gurujanga	132	50	9.40	11.50	7
6	Tube well outside of the Shiva Temple of Village Gurujanga	132	45	9.10	10.40	8
<b>II</b>	<b>PIEZO METER HOLES</b>					
1	Eastern side of the quarry, (PZ-1)	126	15.00	2.40	3.20	9
2	Southern side of the quarry, (PZ-2)	112	16.00	4.04	3.80	10
3	Western side of the quarry, (PZ-3)	117	18.00	10.50	10.10	11

**GROUND WATER ANALYSIS REPORT AS PER IS-10500**

PROJECT : OSTAPAL CHROMITE MINES  
 LOCATION: Bore Well Near Maingate of the Mines  
 (.i.e Old location named as 2-R COLONY BORE WELL WATER )

PERIOD : Oct., 2016 TO March, 2017

**SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR**

SL. NO.	CHARACTERISTICS	Limit as Per IS-10500	RESULTS	
			Season IV Oct.-Dec	Season I Jan. -March
01.	Colour	10	Colourless	Colourless
02.	Odour	Unobjectionable	Unobjectionable	Unobjectionable
03.	Taste	Agreeable	Agreeable	Agreeable
04.	Turbidity	10	Transparent	Transparent
05.	Dissolved solids, mg/l	500	129	136
06.	pH value	6.5 – 8.5	7.7	7.8
07.	Total hardness (CaCO <sub>3</sub> )mg/l	300	152	151
08.	Calcium (Ca)mg/l	75	28.80	26.50
09.	Magnesium(Mg),mg/l	30	19.20	19.40
10.	Iron (Fe)mg/l	0.3	0.022	0.022
11.	Chlorides(Cl)mg/l	250	28	30
12.	Sulphates(SO <sub>4</sub> )mg/l	150	3.24	3.78
13.	Nitrates(NO <sub>3</sub> ) mg/l	45	5.35	5.42
14.	Anionic detergent (MBAS) mg/l	0.2	All are absent	
15.	Residual Chlorine(Cl) Mg/l	0.2		
16.	Coliform organisms MPN/100ml	Absent		
17.	Copper (Cu) mg/l	0.05	Below detection limit	
18.	Manganese(Mn)mg/l	0.1		
19.	Fluorides(F)mg/l	0.6 – 1.2		
20.	Phenolic Compounds (C <sub>6</sub> H <sub>5</sub> OH) mg/l	0.001		
21.	Mercury (Hg) mg/l	0.001		
22.	Cadmium (Cd) mg/l	0.01		
23.	Selenium(Se)mg/l	0.01		
24.	Arsenic (As)mg/l	0.05		
25.	Cyanide (CN) mg/l	0.05		
26.	Lead (Pb) mg/l	0.1		
27.	Hexavalent Chromium (Cr <sup>+6</sup> )mg/l	0.05		
28.	Zinc (Zn) mg/l	5.0		
29.	Mineral oil mg/l	0.01		

**GROUND WATER ANALYSIS REPORT AS PER IS-10500**

PROJECT : OSTAPAL CHROMITE MINES  
 LOCATION: BOREWELL NEAR MECHANICAL WORKSHOP  
 (i.e Old location named as Bore well Near Tarini Temple )

PERIOD : OCT.2016 TO MARCH, 2017

**SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR**

SL. NO.	CHARACTERISTICS	Limit as Per IS-10500	RESULTS	
			Season IV Oct.-Dec	Season I Jan. -March
01.	Colour	10	Colourless	Colourless
02.	Odour	Unobjectionable	Unobjectionable	Unobjectionable
03.	Taste	Agreeable	Agreeable	Agreeable
04.	Turbidity	10	Transparent	Transparent
05.	Dissolved solids, mg/l	500	135	134
06.	p <sup>H</sup> value	6.5 – 8.5	7.7	7.7
07.	Total hardness (CaCO <sub>3</sub> )mg/l	300	135	162
08.	Calcium (Ca)mg/l	75	22	25.92
09.	Magnesium(Mg),mg/l	30	19.20	23.33
10.	Iron (Fe)mg/l	0.3	0.022	0.024
11.	Chlorides(Cl)mg/l	250	26	30
12.	Sulphates (SO <sub>4</sub> )mg/l	150	3.78	5.16
13.	Nitrates(NO <sub>3</sub> ) mg/l	45	5.16	5.58
14.	Anionic detergents (MBAS)mg/l	0.2	All are absent	
15.	Residual Chlorine(Cl) Mg/l	0.2		
16.	Coliform organisms MPN/100ml	Absent		
17.	Copper (Cu) mg/l	0.05	All are below detection limit	
18.	Manganese(Mn)mg/l	0.1		
19.	Fluorides(F)mg/l	0.6 – 1.2		
20.	Phenolic Compounds (C <sub>6</sub> H <sub>5</sub> OH) mg/l	0.001		
21.	Mercury (Hg) mg/l	0.001		
22.	Cadmium (Cd) mg/l	0.01		
23.	Selenium(Se)mg/l	0.01		
24.	Arsenic (As)mg/l	0.05		
25.	Cyanide (CN) mg/l	0.05		
26.	Lead (Pb) mg/l	0.1		
27.	Hexavalent Chromium (Cr <sup>+6</sup> )mg/l	0.05		
28.	Zinc (Zn) mg/l	5.0		
29.	Mineral oil mg/l	0.01		

**GROUND WATER ANALYSIS REPORT AS PER IS-10500**

PROJECT : OSTAPAL CHROMITE MINES  
 LOCATION : OPEN WELL WATER FROM VILLAGE OSTIA  
 PERIOD : OCT.2016 TO MARCH, 2017

**SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR**

SL. NO.	CHARACTERISTICS	Limit as Per IS-10500	RESULTS	
			Season IV Oct.-Dec	Season I Jan. -March
01.	Colour	10	Colourless	Colourless
02.	Odour	Unobjectionable	Unobjectionable	Unobjectionable
03.	Taste	Agreeable	Agreeable	Agreeable
04.	Turbidity	10	Transparent	Transparent
05.	Dissolved solids, mg/l	500	106	116
06.	pH value	6.5 – 8.5	7.7	7.7
07.	Total hardness (CaCo <sub>3</sub> )mg/l	300	143	145
08.	Calcium (Ca)mg/l	75	22.80	25.20
09.	Magnesium(Mg),mg/l	30	20.64	19.00
10.	Iron (Fe)mg/l	0.3	0.020	0.022
11.	Chlorides(Cl)mg/l	250	24	26
12.	Sulphates(SO <sub>4</sub> )mg/l	150	3.230	3.44
13.	Nitrates(NO <sub>3</sub> ) mg/l	45	5.51	5.68
14.	Anionic detergents (MBAS) mg/l	0.2	All are absent	
15.	Residual Chlorine(Cl) Mg/l	0.2		
16.	Coliform organisms MPN/100ml	Absent		
17.	Copper (Cu) mg/l	0.05	All are below detection limit	
18.	Manganese(Mn)mg/l	0.1		
19.	Fluorides(F)mg/l	0.6 – 1.2		
20.	Phenolic Compounds (C <sub>6</sub> H <sub>5</sub> OH) mg/l	0.001		
21.	Mercury (Hg) mg/l	0.001		
22.	Cadmium (Cd) mg/l	0.01		
23.	Selenium(Se)mg/l	0.01		
24.	Arsenic (As)mg/l	0.05		
25.	Cyanide (CN) mg/l	0.05		
26.	Lead (Pb) mg/l	0.1		
27.	Hexavalent Chromium (Cr <sup>+6</sup> )mg/l	0.05		
28.	Zinc (Zn) mg/l	5.0		
29.	Mineral oil mg/l	0.01		

**GROUND WATER ANALYSIS REPORT AS PER IS-10500**

PROJECT : OSTAPAL CHROMITE MINES  
 LOCATION: OPENWELL WATER OF VILLAGE OSTAPAL  
 PERIOD : OCT.2016 TO MARCH, 2017

**SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR**

SL. NO.	CHARACTERISTICS	Limit as Per IS-10500	RESULTS	
			Season IV Oct.-Dec	Season I Jan. -March
01.	Colour	10	Colourless	Colourless
02.	Odour	Unobjectionable	Unobjectionable	Unobjectionable
03.	Taste	Agreeable	Agreeable	Agreeable
04.	Turbidity	10	Transparent	Transparent
05.	Dissolved solids, mg/l	500	120	124
06.	pH value	6.5 – 8.5	7.6	7.6
07.	Total hardness (CaCO <sub>3</sub> )mg/l	300	128	142
08.	Calcium (Ca)mg/l	75	21.20	23.9
09.	Magnesium(Mg),mg/l	30	18.0	19.20
10.	Iron (Fe)mg/l	0.3	0.02	0.022
11.	Chlorides(Cl)mg/l	250	24	28
12.	Sulphates(SO <sub>4</sub> )mg/l	150	3.10	3.23
13.	Nitrates(NO <sub>3</sub> ) mg/l	45	5.16	5.26
14.	Anionic detergents (MBAS) mg/l	0.2	All are absent	
15.	Residual Chlorine(Cl) Mg/l	0.2		
16.	Coliform organisms MPN/100ml	Absent		
17.	Copper (Cu) mg/l	0.05	All are below detection limit	
18.	Manganese(Mn)mg/l	0.1		
19.	Fluorides(F)mg/l	0.6 – 1.2		
20.	Phenolic Compounds (C <sub>6</sub> H <sub>5</sub> OH) mg/l	0.001		
21.	Mercury (Hg) mg/l	0.001		
22.	Cadmium (Cd) mg/l	0.01		
23.	Selenium(Se)mg/l	0.01		
24.	Arsenic (As)mg/l	0.05		
25.	Cyanide (CN) mg/l	0.05		
26.	Lead (Pb) mg/l	0.1		
27.	Hexavalent Chromium (Cr <sup>+6</sup> )mg/l	0.05		
28.	Zinc (Zn) mg/l	5.0		
29.	Mineral oil mg/l	0.01		

**GROUND WATER ANALYSIS REPORT AS PER IS-10500**

PROJECT : OSTAPAL CHROMITE MINES

LOCATION: TUBE WELL INSIDE THE SHIVA TEMPLE OF VILLAGE GURUJANGA

PERIOD : OCT.2016 TO MARCH, 2017

**SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR**

SL. NO.	CHARACTERISTICS	Limit as Per IS-10500	RESULTS	
			Season IV Oct.-Dec	Season I Jan. -March
01.	Colour	10	Colourless	Colourless
02.	Odour	Unobjectionable	Unobjectionable	Unobjectionable
03.	Taste	Agreeable	Agreeable	Agreeable
04.	Turbidity	10	Transparent	Transparent
05.	Dissolved solids, mg/l	500	156	122
06.	pH value	6.5 – 8.5	7.2	7.6
07.	Total hardness (CaCO <sub>3</sub> )mg/l	300	144	156
08.	Calcium (Ca)mg/l	75	9.20	8.70
09.	Magnesium(Mg),mg/l	30	5.6	4.3
10.	Iron (Fe)mg/l	0.3	0.028	0.026
11.	Chlorides(Cl)mg/l	250	7.9	9.2
12.	Sulphates(SO <sub>4</sub> )mg/l	150	9.3	10.20
13.	Nitrates(NO <sub>3</sub> ) mg/l	45	3.80	4.60
14.	Anionic detergents (MBAS) mg/l	0.2	} All are absent	
15.	Residual Chlorine(Cl) Mg/l	0.2		
16.	Coliform organisms MPN/100ml	Absent		
17.	Copper (Cu) mg/l	0.05	} All are below detection Limit	
18.	Manganese(Mn)mg/l	0.1		
19.	Fluorides(F)mg/l	0.6 – 1.2		
20.	Phenolic Compounds (C <sub>6</sub> H <sub>5</sub> OH) mg/l	0.001		
21.	Mercury (Hg) mg/l	0.001		
22.	Cadmium (Cd) mg/l	0.01		
23.	Selenium(Se)mg/l	0.01		
24.	Arsenic (As)mg/l	0.05		
25.	Cyanide (CN) mg/l	0.05		
26.	Lead (Pb) mg/l	0.1		
27.	Hexavalent Chromium (Cr <sup>+6</sup> )mg/l	0.05		
28.	Zinc (Zn) mg/l	5.0		
29.	Mineral oil mg/l	0.01		

**GROUND WATER ANALYSIS REPORT AS PER IS-10500**

PROJECT : OSTAPAL CHROMITE MINES  
 LOCATION : TUBE WELL OUTSIDE OF THE SHIVA TEMPLE OF VILLAGE GURUJANGA  
 PERIOD : OCT.2016 TO MARCH, 2017

**SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR**

SL. NO.	CHARACTERISTICS	Limit as Per IS-10500	RESULTS	
			Season IV Oct.-Dec	Season I Jan. -March
01.	Colour	10	Colourless	Colourless
02.	Odour	Unobjectionable	Unobjectionable	Unobjectionable
03.	Taste	Agreeable	Agreeable	Agreeable
04.	Turbidity	10	Transparent	Transparent
05.	Dissolved solids, mg/l	500	128	116
06.	pH value	6.5 – 8.5	7.20	6.9
07.	Total hardness (CaCO <sub>3</sub> )mg/l	300	145	138
08.	Calcium (Ca)mg/l	75	10.30	11.0
09.	Magnesium(Mg),mg/l	30	6.0	7.3
10.	Iron (Fe)mg/l	0.3	0.20	0.23
11.	Chlorides(Cl)mg/l	250	7.40	8.3
12.	Sulphates(SO <sub>4</sub> )mg/l	150	7.90	8.6
13.	Nitrates(NO <sub>3</sub> ) mg/l	45	4.80	5.03
14.	Anionic detergents (MBAS) mg/l	0.2	} All are absent	
15.	Residual Chlorine(Cl) Mg/l	0.2		
16.	Coliform organisms MPN/100ml	Absent		
17.	Copper (Cu) mg/l	0.05	} All are below detection Limit	
18.	Manganese(Mn)mg/l	0.1		
19.	Fluorides(F)mg/l	0.6 – 1.2		
20.	Phenolic Compounds (C <sub>6</sub> H <sub>5</sub> OH) mg/l	0.001		
21.	Mercury (Hg) mg/l	0.001		
22.	Cadmium (Cd) mg/l	0.01		
23.	Selenium(Se)mg/l	0.01		
24.	Arsenic (As)mg/l	0.05		
25.	Cyanide (CN) mg/l	0.05		
26.	Lead (Pb) mg/l	0.1		
27.	Hexavalent Chromium (Cr <sup>+6</sup> )mg/l	0.05		
28.	Zinc (Zn) mg/l	5.0		
29.	Mineral oil mg/l	0.01		

**ANNEXURE - 9**

**GROUND WATER ANALYSIS REPORT AS PER IS-10500**

PROJECT : OSTAPAL CHROMITE MINES

LOCATION: PIEZOMETER HOLE (EASTERN SIDE OF THE QUARRY AT 126 RL)

PERIOD : OCT.2016 TO MARCH, 2017

**SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR**

SL. NO.	CHARACTERISTICS	Limit as Per IS-10500	RESULTS	
			Season IV Oct.-Dec	Season I Jan. -March
01.	Colour	10	Colourless	Colourless
02.	Odour	Unobjectionable	Unobjectionable	Unobjectionable
03.	Taste	Agreeable	Agreeable	Agreeable
04.	Turbidity	10	Transparent	Transparent
05.	Dissolved solids, mg/l	500	127	128
06.	pH value	6.5 – 8.5	7.6	7.6
07.	Total hardness (CaCO <sub>3</sub> )mg/l	300	124	122
08.	Calcium (Ca)mg/l	75	23.8	24.1
09.	Magnesium(Mg),mg/l	30	19.91	18.5
10.	Iron (Fe)mg/l	0.3	0.022	0.02
11.	Chlorides(Cl)mg/l	250	33	22
12.	Sulphates(SO <sub>4</sub> )mg/l	150	27.60	4.06
13.	Nitrates(NO <sub>3</sub> ) mg/l	45	4.39	5.60
14.	Hexavalent Chromium (Cr <sup>+6</sup> ), mg/l	0.05	0.16	0.15
15.	Anionic detergents (MBAS) mg/l	0.2	} All are absent	
16.	Residual Chlorine(Cl) Mg/l	0.2		
17.	Coliform organisms MPN/100ml	Absent		
18.	Copper (Cu) mg/l	0.05	} All are below detection limit	
19.	Manganese(Mn)mg/l	0.1		
20.	Fluorides(F)mg/l	0.6 – 1.2		
21.	Phenolic Compounds (C <sub>6</sub> H <sub>5</sub> OH) mg/l	0.001		
22.	Mercury (Hg) mg/l	0.001		
23.	Cadmium (Cd) mg/l	0.01		
24.	Selenium(Se)mg/l	0.01		
25.	Arsenic (As)mg/l	0.05		
26.	Cyanide (CN) mg/l	0.05		
27.	Lead (Pb) mg/l	0.1		
28.	Zinc (Zn) mg/l	5.0		
29.	Mineral oil mg/l	0.01		

**ANNEXURE - 10****GROUND WATER ANALYSIS REPORT AS PER IS-10500**

PROJECT : OSTAPAL CHROMITE MINES  
 LOCATION: PIEZOMETER HOLE (SOUTHERN SIDE OF THE QUARRY AT 112RL)  
 PERIOD : OCT.2016 TO MARCH, 2017  
**SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR**

SL. NO.	CHARACTERISTICS	Limit as Per IS-10500	RESULTS	
			Season IV Oct.-Dec	Season I Jan. -March
01.	Colour	10	Colourless	Colourless
02.	Odour	Unobjectionable	Unobjectionable	Unobjectionable
03.	Taste	Agreeable	Agreeable	Agreeable
04.	Turbidity	10	Transparent	Transparent
05.	Dissolved solids, mg/l	500	165	116
06.	pH value	6.5 – 8.5	7.6	7.5
07.	Total hardness (CaCO <sub>3</sub> )mg/l	300	143	141
08.	Calcium (Ca)mg/l	75	24.17	34.5
09.	Magnesium(Mg),mg/l	30	18.21	20.30
10.	Iron (Fe)mg/l	0.3	0.02	0.02
11.	Chloride(Cl)mg/l	250	25	25
12.	Sulphate(SO <sub>4</sub> )mg/l	150	4.60	3.69
13.	Nitrates(NO <sub>3</sub> ) mg/l	45	5.65	5.24
14.	Hexavalent Chromium (Cr <sup>+6</sup> )mg/l	0.05	0.15	0.13
15.	Anionic detergents (MBAS) mg/l	0.2	All are absent	
16.	Residual Chlorine(Cl) Mg/l	0.2		
17.	Coliform organisms MPN/100ml	Absent		
18.	Copper (Cu) mg/l	0.1	All are below detection limit	
19.	Manganese(Mn)mg/l	0.6 – 1.2		
20.	Fluorides(F)mg/l	0.001		
21.	Phenolic Compounds (C <sub>6</sub> H <sub>5</sub> OH) mg/l	0.001		
22.	Mercury (Hg) mg/l	0.01		
23.	Cadmium (Cd) mg/l	0.01		
24.	Selenium(Se)mg/l	0.05		
25.	Arsenic (As)mg/l	0.05		
26.	Cyanide (CN) mg/l	0.1		
27.	Lead (Pb) mg/l	0.05		
28.	Zinc (Zn) mg/l	0.01		
29.	Mineral oil mg/l	0.01		

**ANNEXURE - 11****GROUND WATER ANALYSIS REPORT AS PER IS-10500**

PROJECT : OSTAPAL CHROMITE MINES

LOCATION : PIEZOMETER HOLE (WESTERNSIDE OF THE QUARRY AT 117RL)

PERIOD : OCT.2016 TO MARCH, 2017

**SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR**

SL. NO.	CHARACTERISTICS	Limit as Per IS-10500	RESULTS	
			Season IV Oct.-Dec	Season I Jan. -March
01.	Colour	10	Colourless	Colourless
02.	Odour	Unobjectionable	Unobjectionable	Unobjectionable
03.	Taste	Agreeable	Agreeable	Agreeable
04.	Turbidity	10	Transparent	Transparent
05.	Dissolved solids, mg/l	500	137	139
06.	pH value	6.5 – 8.5	7.6	7.4
07.	Total hardness (CaCO <sub>3</sub> )mg/l	300	148	131
08.	Calcium (Ca)mg/l	75	24.97	29
09.	Magnesium(Mg),mg/l	30	20.17	17
10.	Iron (Fe)mg/l	0.3	0.022	0.021
11.	Chloride(Cl)mg/l	250	29	33
12.	Sulphates(SO <sub>4</sub> )mg/l	150	4.35	5.21
13.	Nitrates(NO <sub>3</sub> ) mg/l	45	5.57	6.17
14.	Hexavalent Chromium (Cr <sup>+6</sup> )mg/l	0.05	0.09	0.10
15.	Anionic detergents (MBAS) mg/l	0.2	All are absent	
16.	Residual Chlorine(Cl) Mg/l	Absent		
17.	Coliform organisms MPN/100ml	0.05	All are below detection limit	
18.	Copper (Cu) mg/l	0.1		
19.	Manganese(Mn)mg/l	0.6 – 1.2		
20.	Fluorides(F)mg/l	0.001		
21.	Phenolic Compounds (C <sub>6</sub> H <sub>5</sub> OH) mg/l	0.001		
22.	Mercury (Hg) mg/l	0.01		
23.	Cadmium (Cd) mg/l	0.01		
24.	Selenium(Se)mg/l	0.05		
25.	Arsenic (As)mg/l	0.05		
26.	Cyanide (CN) mg/l	0.1		
27.	Lead (Pb) mg/l	0.05		
28.	Zinc (Zn) mg/l	0.01		
29.	Mineral oil mg/l	0.01		

**MONITORING OF GROUND WATER QUALITY (Cr<sup>+6</sup>) IN 9 BORE HOLES AROUND TAILING POND**

PROJECT : OSTAPAL CHROMITE MINES  
 PERIOD : OCT.2016 TO MARCH, 2017  
 SURVEY CONDUCTED BY : ENVIRONMENTAL ENGINEERING LABORATORY – FACOR

**1) GROUND WATER QUALITY OF 5 BOREHOLES WHERE Cr<sup>+6</sup> CONCENTRATION IS WITHIN PERMISSIBLE LIMIT**

HOLE No.	Location w.r.t. Tailing Pond/Collar RL (Mtr)	Distance from Tailing Pond (Mtr.)	CONCENTRATION OF Cr <sup>+6</sup> IN mg/l	
			Season IV Oct.-Dec	Season I Jan. –March
T1	SW/135	30	<0.005	<0.005
T2	SW/136	40	<0.005	<0.005
T3	E/139	10	<0.005	<0.005
T12	E/140	30	<0.005	<0.005
T14	S/136	30	<0.005	<0.005

**2) GROUND WATER QUALITY OF 4 BORE HOLES WHERE Cr<sup>+6</sup> CONCENTRATION IS BEYOND PERMISSIBLE LIMIT:**

HOLE No.	Location w.r.t. Tailing Pond/Collar RL (Mtr)	Distance from Tailing Pond (Mtr)	CONCENTRATION OF Cr <sup>+6</sup> IN mg/l					
			Oct'16	Nov'16	Dec'16	Jan'17	Feb.'17	Mar.'17
T4	E/140	05	0.14	0.16	0.13	0.12	0.09	0.05
T8	S/136	20	0.16	0.14	0.14	0.10	0.10	0.06
T9	E/140	20	0.17	0.13	0.12	0.10	0.09	0.07
T13	S/136	10	0.14	0.16	0.17	0.12	0.12	0.09

**CALENDAR PLAN INCLUDING EXCAVATION, QUANTUM OF MINERAL CHROMITE AND  
WASTE GENERATED DURING THE PERIOD FROM APRIL, 2016 TO MARCH, 2017  
IN OUR OSTAPAL CHROMITE MINES**

SL. NO.	MATERIALS	CALENDER PLAN PER ANNUM	QUANTITY GENERATED DURING THE PERIOD FROM APRIL, 2016 TO SEPTEMBER, 2016
01.	CHROME ORE	1.042 Lakh Tonnes	1.035 Lakh Tonnes
02.	WASTE OVER BURDEN	4.80 Lakh M <sup>3</sup>	2.42 Lakh M <sup>3</sup>

**ANNEXURE-14A****AIR QUALITY (CORE ZONE)**

PROJECT : OSTAPAL CHROMITE MINES  
 PERIOD : OCT.2016 TO MARCH, 2017  
 SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR

**UNIT- $\mu\text{g}/\text{M}^3$** 

Sl.No.	STATION	PARAMETERS	Season IV Oct.-Dec	Season I Jan. -March	NAAQ STD
1.	Mines Main Gate (i.e old location named as Near Type-II Quarters)	PM <sub>10</sub>	41.23	60.82	100
		PM <sub>2.5</sub>	18.04	22.49	60
		SO <sub>2</sub>	5.20	6.20	80
		NO <sub>x</sub>	12.37	11.46	80
		CO	<1000	<1000	2000
2.	Near Tarini Temple (i.e old location named as Near Weighbridge)	PM <sub>10</sub>	45.80	50.40	100
		PM <sub>2.5</sub>	18.83	15.70	60
		SO <sub>2</sub>	5.10	3.90	80
		NO <sub>x</sub>	12.11	7.31	80
		CO	<1000	<1000	2000
3.	Middle of the Opencast Quarry	PM <sub>10</sub>	60.25	53.46	100
		PM <sub>2.5</sub>	24.92	18.11	60
		SO <sub>2</sub>	7.61	6.39	80
		NO <sub>x</sub>	12.56	11.55	80
		CO	<1000	<1000	2000
4.	Middle of the COB Plant	PM <sub>10</sub>	51.31	56.90	100
		PM <sub>2.5</sub>	19.16	20.28	60
		SO <sub>2</sub>	7.20	4.55	80
		NO <sub>x</sub>	11.48	10.47	80
		CO	<1000	<1000	2000

FREQUENCY: i) For residential area twice in a week 24 hourly continuous for a month of a season  
 ii) For Industrial area/work environment twice in a week 8 hourly continuous for a month of a Season.

**ANNEXURE-14B****AIR QUALITY (BUFFER ZONE)**

PROJECT : OSTAPAL CHROMITE MINES

PERIOD : OCT.2016 TO MARCH, 2017

SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR

**UNIT- $\mu\text{g}/\text{M}^3$** 

Sl.No.	S T A T I O N S	PARAMETERS	Season IV Oct.-Dec	Season I Jan. -March	NAAQ STD.
1.	VILLAGE – OSTIA	PM <sub>10</sub>	39.7	78.59	100
		PM <sub>2.5</sub>	11.81	37.34	60
		SO <sub>2</sub>	5.93	6.46	80
		NO <sub>x</sub>	5.91	8.48	80
		CO	<1000	<1000	2000
2.	VILLAGE – OSTAPAL	PM <sub>10</sub>	38.76	61.58	100
		PM <sub>2.5</sub>	12.50	23.57	60
		SO <sub>2</sub>	5.62	3.20	80
		NO <sub>x</sub>	7.0	10.12	80
		CO	<1000	<1000	2000
3.	KALIAPANI TOWNSHIP	PM <sub>10</sub>	49.12	68.42	100
		PM <sub>2.5</sub>	18.60	25.25	60
		SO <sub>2</sub>	7.34	3.99	80
		NO <sub>x</sub>	12.81	8.47	80
		CO	<1000	<1000	2000
4.	VILLAGE KOIPOSI	PM <sub>10</sub>	50.28	68.23	100
		PM <sub>2.5</sub>	18.51	32.41	60
		SO <sub>2</sub>	6.24	4.77	80
		NO <sub>x</sub>	12.12	10.45	80
		CO	<1000	<1000	2000

FREQUENCY: For residential area twice in a week 24 hourly continuous for a month of a season.

**FUGITIVE DUST EMISSION DATA**

PROJECT : OSTAPAL CHROMITE MINES

PERIOD : OCT.2016 TO MARCH, 2017

**SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR**

**UNIT- $\mu\text{g}/\text{M}^3$**

Sl. No.	Stations	Season	PARAMETERS	
			PM <sub>10</sub>	PM <sub>2.5</sub>
1.	Mines Ore Plot Area	IV	53.75	21.20
		I	58.41	20.50
2.	COB Plant area	IV	49.84	17.25
		I	50.10	18.50
3.	Near Loading point	IV	56.50	21.30
		I	60.95	22.40

**SOUND PRESSURE LEVEL MEASUREMENT**  
**(WORK ENVIRONMENT)**

PROJECT : OSTAPAL CHROMITE MINES  
PERIOD : OCT.2016 TO MARCH, 2017  
SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR

UNIT : dB(A)

Sl.No.	Area / Location	Position	Measured Noise Level	
			Season IV Oct.-Dec	Season I Jan. -March
1.	Opencast quarry	Middle of the Manual working face	46.00	45.00
2.	Workshop & Garage	Middle	61.30	60.50
3.	COB Plant Area	Middle	67.80	66.70

**ANNEXURE- 17**

**EFFLUENT WATER ANALYSIS REPORT AS PER IS-2490 & MOEF GUIDELINE 19.05.93**

PROJECT : OSTAPAL CHROMITE MINE  
 STATION : MINES FINAL DISCHARGE WATER AFTER TREATMENT IN ETP  
 PERIOD : OCT.2016 TO MARCH, 2017  
 SURVEY CONDUCTED BY: ENVIRONMENTAL ENGINEERING LABORATORY, FACOR

SL. NO.	CHARACTERISTICS	Limit as Per IS-2490 & MOEF Guideline	R E S U L T	
			IV Season Oct.-Dec	I Season Jan. -March
01.	Colour	-	Colourless	Colourless
02.	Odour	Unobjectionable	Unobjectionable	Unobjectionable
03.	Suspended solids mg/l	100	16	15
04.	Particle size of suspended solids	Shall pass 850 micron IS sieve	100% passed	100% passed
05.	pH Value	5.0 – 9.0	7.6	7.4
06.	Total residual chlorine(Cl)mg/l	1.0	Absent	Absent
07.	Ammonical Nitrogen(N) mg/l	50	1.2	1.4
08.	Total Kjeldahl Nitrogen(N)mg/l	100	4.1	4.5
09.	BOD(O <sub>2</sub> )mg/l(3 days at 27°C)	30	1.2	1.1
10.	COD (O <sub>2</sub> ) mg/l	250	5.0	5.1
11.	Total Chromium(Cr)mg/l	2.0	0.28	0.28
12.	Nitrate Nitrogen(N)mg/l	10	1.26	1.32
13.	Iron (Fe) mg/l	3.0	1.04	0.74
14.	Bio-Assay Test	90% survival of fish in 100% effluent after 96 hrs.	100% survived	100% survived
16.	Oil & grease mg/l	10	} All are below detection limit	
16.	Free Ammonia(NH <sub>3</sub> )mg/l	5		
17.	Arsenic(As)mg/l	0.2		
18.	Mercury(Hg),mg/l	0.01		
19.	Lead(Pb)mg/l	0.1		
20.	Cadmium(Cd),mg/l	2.0		
21.	Hex. Chromium(Cr <sup>+6</sup> )mg/l	0.1		
22.	Copper(Cu)mg/l	3.0		
23.	Zinc (Zn),mg/l	5.0		
24.	Selenium(Se)mg/l	0.05		
25.	Nickel mg/l	3.0		
26.	Cyanide (CN)mg/l	0.2		
27.	Fluorides(F) mg/l	2.0		
28.	Dissolved Phosphate(P)mg/l	5.0		
29.	Sulphide(S) mg/l	2.0		
30.	Phenolic compounds (C <sub>6</sub> H <sub>5</sub> OH),mg/l	1.0		
31.	Manganese(Mn),mg/l	2.0		
32.	Vanadium(V) mg/l	0.2		

**ANNEXURE - 18****DETAILS OF EXPENSES FOR ENVIRONMENT PROTECTION MEASURES DURING THE YEAR 2016-17 AND PROPOSED BUDGETED AMOUNT FOR THE YEAR 2017-18****PROJECT : OSTAPAL CHROMITE MINE**

Sl. No.	I T E M	Expenses during the Year 2016-17 (in Rs.)	Proposed budgeted amount for the year 2017-18 (in Rs.)
<b>01</b>	<b>AFFORESTATION</b>		
a	Seedlings @ Rs.27/- each	2,72,000	1,38,000
b	Fertilizer/Insecticide/Cow-dung	1,01,000	1,08,000
c	Digging of Pits/Planting	1,71,000	1,53,000
d	Post Plantation care @ Rs. 85/- (Watering, Watching & Weeding etc.)	8,56,000	4,34,000
	<b>Sub-Total</b>	<b>14,00,000</b>	<b>8,33,000</b>
<b>02</b>	<b>WATER MANAGEMENT &amp; TREATMENT</b>		
a	ETP Operation & Maintenance (including costs of chemical & Manpower)	21,88,340	22,00,000
b	Water sample analysis	6,80,000	7,00,000
c	Power Consumption	7,65,187	8,00,000
d	Sludge disposal	1,16,000	1,50,000
	<b>Sub-Total</b>	<b>37,40,527</b>	<b>38,50,000</b>
<b>03</b>	<b>DUST SUPPRESSION &amp; AIR MONITORING</b>		
a	Water spraying at dust generating points by 4 Nos. of water tanker around 205 days in a year @ Rs.350/- per trip costing 10 trips per day (10 x 360 x 205)	7,13,650	7,00,000
b	Air monitoring charges @ Rs.1600/- per sample for 320 samples in a year.	5,20,000	5,30,000
c	Noise level measurement	30,000	40,000
	<b>Sub-Total</b>	<b>12,63,650</b>	<b>12,70,000</b>
	<b>Grand Total</b>	<b>64,04,177</b> <b>≈ Rs.64,04,000/-</b>	<b>Rs.59,53,000/-</b>