Gomardih Dolomite Quarry
TATA STEEL LIMITED

Ref: EC No. J-11015/5/92-IA-II(M), Dated 18th May 1994

Condition (i): This clearance is valid only for mining operation limited to 146.66 ha. (112.13 ha. of Gomardih Block and 34.53 ha. of Khotkuribahal Block), which includes the area under application for mining rights.

Compliance: The Government of Odisha, vide letter no. III (B) SM4 /94-10757/SM, Bhubaneswar , dated 28.11.1997 had granted second renewal of mining lease in respect of the area over 372.796 ha at Gomardih in the villages of Tunmura and Jharbeda of Sundargarh district for a period of 20 years from 06.03.1993 to 05.03.2013. The application for 3rd RML was filed on 27.02.2012 over the entire area of 372.796 ha under Rule 24A(1) of MCR 1960.

The Govt. of Odisha has been pleased to extend the validity period of the mining lease from 06.03.2013 to 31st Mar 2020 under section 8A of the MMDR Act 1957 as amended by the MMDR Amendment Act 2015. The extension order in this regard has been received from the Additional Secretary, Govt. of Odisha vide letter No. III (LD) SM-45/2013/3231/SM, Bhubaneswar, dated-17.04.2015. The execution and registration of the supplementary lease deed has been done on the 12th May 2015 vide document no. 11761500385.

The Mining Lease area of 372.796 ha includes 112.13 ha of Gomardih Block as mentioned in the condition (i) of EC No. J-11015/5/92-IA-II (M), Dated 18th May 1994. The mine is now operating within 62.96 ha of surface right area.

The Khotkuribahal Blocks (ii & iv) which include the area of 34.53 ha as mentioned in the EC No. J-11015/5/92-IA-II (M), dated 18th May 1994 was surrendered to the Govt. of Odisha in the year 2000.

The surface plan showing the Mining Lease area and surface right area is furnished as **Annexure-I.**

Condition (ii): The levels of SPM concentration should not exceed 500 μg/m^3 at any station within the mine leasehold. Emission of SO2, NO2 and CO should be maintained below the levels prescribed by competent authority. The measures suggested in the EMP in this regard should be strictly implemented.

Compliance: As per the MoEF notification, vide no. G.S.R-826(E) dated 16th November 2009; we are monitoring $PM_{2.5}$ and PM_{10} instead of SPM. The levels of $PM_{2.5}$, PM_{10}, SO2, NO2, and CO concentration are maintained well below the prescribed limits.

All Environmental protection measures suggested in the EMP are being followed and are enumerated below

- Two nos. of water sprinklers are engaged in all shifts for dust suppression in road and mine
- Grass covering of Dump slope and periodic wetting of OB Dump
- Wet Drilling Process
- Plantation has been done at the dump slope for stabilization
- Toe wall has been made along the foot of the OB dump and at the ore stack yard
- Garland drains and settling pits have been made to channelize the surface run-off

- Hazardous waste management has been carried out as per the guidelines of Odisha State Pollution Control Board
- Dry fog system installed in the crusher plant and all transfer points
- Green belt created along the northern and southern lease boundary
- Control blasting technique adopted for noise and dust control
- Periodic maintenance of all HEMM and other vehicle to control the vehicular emission
- Avoiding overloading of Tippers
- Part of the permanent haul road near crusher plant has been covered under permanent sprinkling system.

The six monthly Ambient Air Quality Monitoring data for the period April'16 to Sept'16 are furnished in **Annexure II.**

All Environmental protection measures suggested in the EMP are being followed and are enumerated below.

- Two nos. of water sprinklers are engaged in all working shifts for dust suppression
- Control blasting technique adopted for noise and dust control
- Dry fog system installed in the crusher plant
- Part of the permanent haul road near crusher plant has been covered under permanent sprinkling system.
- Green belt created along the northern and southern lease boundary.
- Plantation has been done at the dump slope for stabilization.
- Toe wall has been made along the foot of the OB dump and at the ore stack yard.
- Garland drains and settling pits have been made to channelize the surface run-off.
- Hazardous waste management has been carried out as per the guidelines of Odisha State Pollution Control Board.
- Schedule maintenance of all mining machinery is done to control the vehicular emission.

Condition (iii): The quality of effluent finally discharged into the main water course should conform to the standards prescribed under CSR 422 (E) dated 19.5.1993.

Compliance:

- The ROM of Gomardih is processed in a dry crusher plant. Only crushing and screening is done here and it involves no process of beneficiation
- So, no effluent is discharged in the process. The sludge generated in the process of crushing and screening is stacked separately as mineral rejects.
- Mine discharge (accumulated rain and seepage water) is allowed to settle in the settling pits before it is allowed to go outside.
- Oil & Grease separation pit has been provided to treat the effluent generated during HEMM washing.
- Toe wall, Garland drains and settling pits have been made along the foot of the OB dump and at the ore stack yard to channelize the surface run-off.

The six monthly average of mine discharge Water Quality Monitoring data for the period April'16 to Sept'16 is given in **Annexure-III, IV,V & VI**.

Condition (iv): Regular monitoring of air and water quality should be made in and around the core zone. The sampling points and frequency should be decided in consultation with State Pollution Control Board. The quarterly data should be furnished to Ministry regularly.

Compliance:

- Ambient Air Quality is being monitored taking samples from 5(five) different locations as given below:
  - Near Sub-station
  - Near First Gate of Mines
  - Near Crusher Plant
  - Near V.T. Centre
  - Near Hospital

- Water Quality is monitored taking samples from 4 (four) different locations as given below:-

  - Intake surface water: Intake point at Nakti nala
  - Drinking water: Tab water at Guest House
  - Mine Effluent: Mine discharge water
  - Domestic Effluent: Canteen effluent
- The sampling points and the frequency of taking samples have been decided as per the guidelines of the SPCB, Odisha. Presently Air Quality sampling is done twice a week and Water quality once in a month.

- The six monthly average report of the Ambient Air, Ambient Noise and Water Quality monitoring data are furnished to Odisha State Pollution Control Board & MoEF Regional Office on regular basis.

The six monthly average report of the Ambient Air, Ambient Noise and Water Quality monitoring data for the period April'16 to Sept'16 are furnished as annexure as follows:-

- **Annexure-II** : Ambient Air Quality monitoring report
- **Annexure-III** : Intake Water Quality monitoring report
- **Annexure-IV** : Drinking Water Quality monitoring report
- **Annexure-V** : Mine discharge (effluent) Water Quality monitoring report
- **Annexure-VI** : Canteen effluent Quality monitoring report

Condition (v): The authorities should implement adequate noise control measure as proposed in the EMP to keep the noise level within the prescribed limits.

Compliances: Adequate noise control measures have been implemented at Gomardih. Different measures taken either to curb noise at the source or to subdue it are enumerated below.

- Schedule maintenance of all mining machinery is being done to control the noise.
- Green belt created along the northern and southern lease boundary.
- Control blasting technique adopted for noise and dust control.
- Rubber liners provided at each transfer points like hopper and screens inside the crusher plant.
- All employees working at the HEMM and plant have been provided with ear-muffs as a contingency measure.

The six monthly average of the ambient noise monitoring data for the period April'16 to Sept'16 is furnished as **Annexure-VII**.

Condition (vi): No change in method of working (including Calendar Plan excavation), be made without prior consent of this Ministry.

Compliances:

- The Production of Dolomite ore has been restricted to the 0.816 MTPA (ROM) approved in the previous EC approved by the Ministry.
- The mechanized opencast working is carried out as per the approved Mining Plan and subsequent schemes of mining. The present working of the mine is being carried out as per the Mining Plan approved vide letter No.2 MXV (b)-10/12-2257, dt.28.02.2013.

Condition (vii): The reclamation plan and land use plan as envisaged in the EMP should be strictly implemented. Also green belt should be developed in other areas like mine colony interface. OBR area etc. to attenuate noise level and also to arrest fugitive dust.

Compliances: The reclamation plan and land use plan as envisaged in the EMP is being followed.

- During the year, we have planted 550 numbers of saplings covering an area of 0.0.175 ha at the slope of the OB dump by terracing and pitting.

- Besides the above, the saplings planted at different locations of the mine like OB dump, northern lease boundary and around the mineral storage area are being maintained by watering and guarding. Similarly, the saplings planted along both side of the roads leading from Mine to Sonakhan railway siding and that connecting SH-10 and mine are being maintained. A team of gardeners have been engaged to take care of the plantation, park and garden inside the colony throughout the year to maintain greenery.

In order to comply with the EMP following measures are being followed.

- Water sprinkling is done along the haul road and dump area in all the shifts. Dry fog system is used in the crusher plant area. Wet drilling along with prescribed speed is followed. Fixed type water sprinkling arrangements made along one of the permanent haul road.
- Overloading of transport equipment is not allowed.
- It has been proposed in the approved Mining Plan to construct 180 meters of retaining/parapet wall at the toe of the OB dump in the year 2014-16; which has been already completed.. Another 100mtrs of retaining wall has been also done .
- Similarly it has been proposed in the approved Mining Plan to make 190 meters of garland drain during the year 2014-15; About 700mts of garland drain was made around the periphery of the dumps and mine during the financial year FY 2015-16. They are being maintained regularly.
- The silt of all the garland drains and settling pits had been cleaned before and after monsoon..

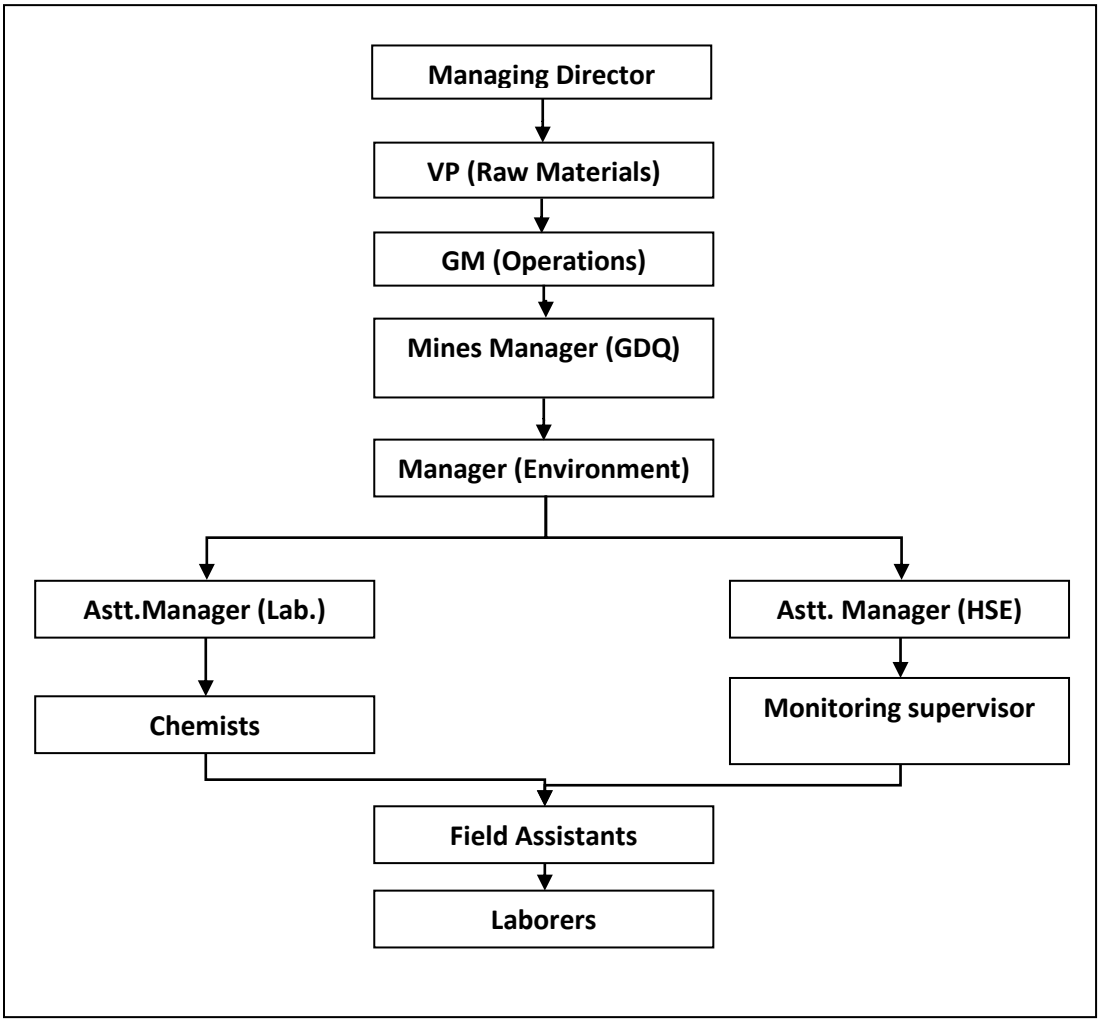
Condition (viii): Details of chemicals used for dust suppression with regard to their toxicity and the techniques employed for same should be furnished to the Ministry for observing the performance and non-toxicity of such methods.

Compliances: No chemical is used for dust suppression.

Condition (ix): Environmental Management cell has to be established to carry out functions relating to environmental management action plans. The head of the Cell should directly report to the Chief Executive.

Compliances: Gomardih Dolomite Quarry has a separate and dedicated team for carrying out environmental management action plan. Team consists of two labours, one field assistant and one monitoring supervisor who report to Assistant Manager (HSE). Team has also two chemists who report to Assistant Manger Lab. Manager (Environment) is overall in charge of this Environmental Management Cell who report to Manger GDQ. Complete structure of this Environmental Management Cell is given below.

Organization Structure of Environmental Management Cell



Condition (x): Adequate fund provision (capital and recurring expenditure) should be made for implementation of all safeguard measures and the funds should not be diverted for other purpose.

Compliances: Adequate fund have been provided for implementation of environmental safeguard measures. Around Rs. 0.47crores rupees have been spent for the construction of a new ETP in the colony area. The planned environmental expenditure for FY2016-17 and the actual up to SEPT'16 is depicted in the following tables.

EXPENDITURE PLANNED & INCURRED FOR DIFFERENT ENVIRONMENTAL ACTIVITIES DURING 2016-17 UP TO SEPT'2016

Items	Expenditure :2016-17 (Planned) in Rupees	Expenditure: 2016-17 (Actual) up to Sept' 2016 in Rupees.
Afforestation	900,000.00	380,000.00
Dust Suppression	1,893,100.00	946,550.00
Environment & weather , exhaust monitoring	2,400,000.00	1,200,000.00
Horticulture development	472,320.00	236,160.00
Drinking water Supply	682,000.00	332,500.00
Sanitation	450,000.00	225,000.00
Malaria eradication	151,100.00	75,555.00
Garland drain & storm water drain	300,000.00	181,000.00
Environment awareness (EMS)	24,000.00	40,000.00
Hazardous waste management	20,000.00	-
Total (in Rupees)	**7,292,520.00**	**3,616,765.00**

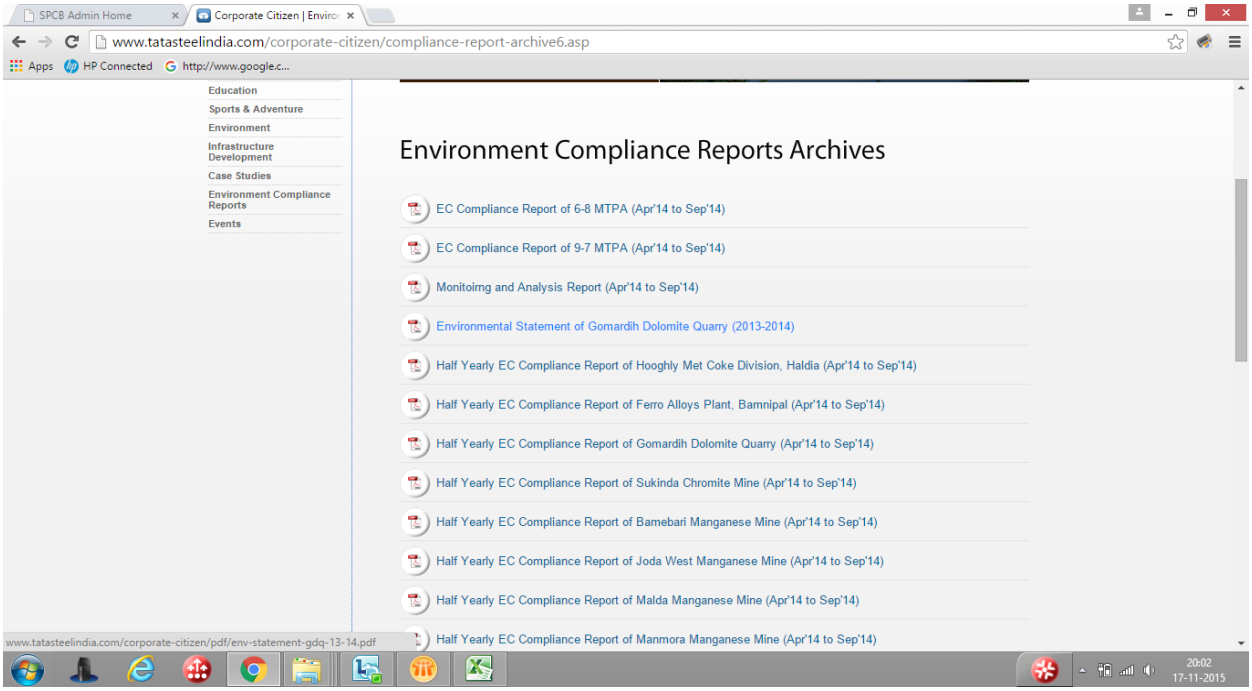
Condition (xi): The Ministry of any other concerned competent authority may stipulate any other conditions at any stage. The Ministry reserves the right to modify the conditions to revoke the approval. If necessary, either due to change in scope and consequent environmental scenario of feedback from field monitoring of the impacts.

Compliances: No such conditions have been imposed so far.

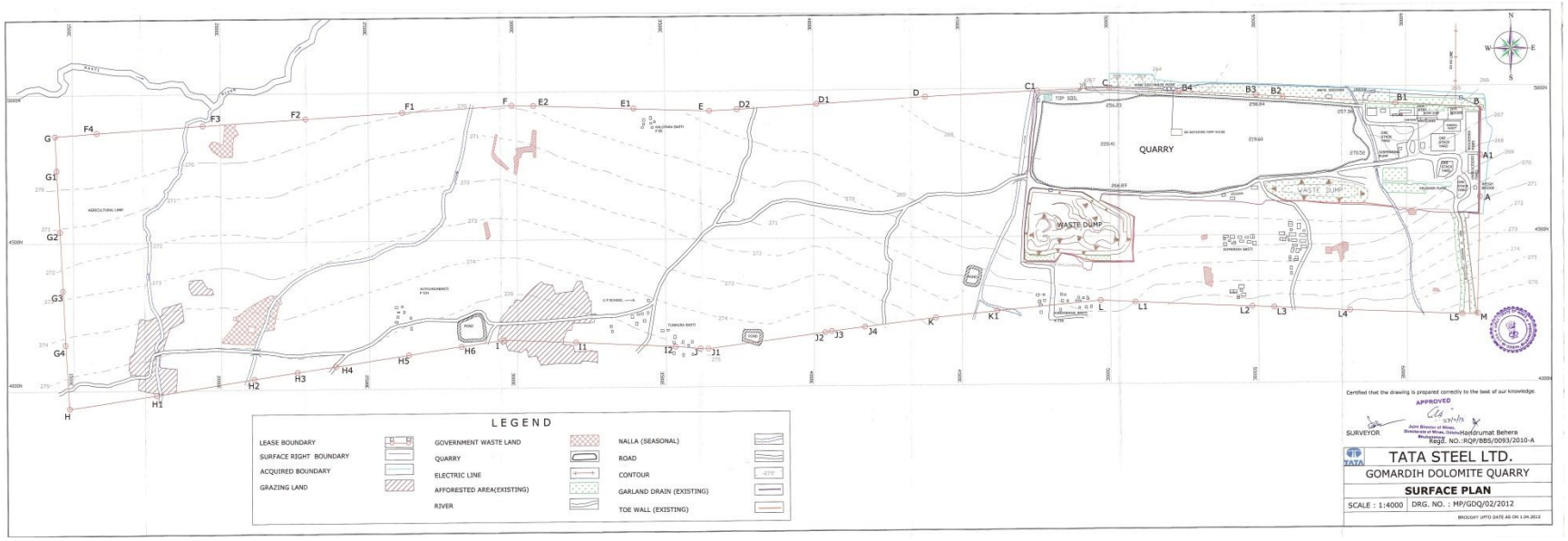
Condition (xii): Environmental compliance status report vis-à-vis progress should be submitted for the scrutiny of this Ministry once in six months regularly.

Compliances:

- Environmental Condition compliance status report is furnished to the Ministry in every six months as per the EIA Notification, 2006. The last six monthly report was submitted to the Ministry vide letter no GD/204/126A, dated.25.05.2014.
- Same has been uploaded in the Company website www.tatasteelindia.com.



Annexure-I
Surface Plan for GDQ



Annexure II

Ambient Air Quality

Six Monthly Average (APR-16 TO SEP-16**)**

Monitoring Location: Near Sub station

Parameters	Method of Measurement	Detection Limit	Time Weighted Average	Standards (unit)	Months (APR-16 TO SEP-16)						Six monthly Avg.
					APR	MAY	JUN	JUL	AUG	SEP	
P.M-10	Gravimetric method	.....	24 Hrly	100 (µg/m3)	67.0	60.0	56.9	32.7	36.3	36.6	46.7
P.M.-2.5	Gravimetric method	.....	24 Hrly.	60 (µg/m3)	34.0	29.0	27.5	15.6	17.4	17.2	22.44
SO2	Improved West Gaeke method.	4	24 Hrly.	80 (µg/m3)	5.2	5.0	5.4	<4.0	<4.1	<4.2	<4.53
Nox	Jacob &Hochhelser modified (Na-Arsenite) method	9	24 Hrly	80 (µg/m3)	20.8	21.0	21.5	<9.0	<9.23	<9.9	<14.91
O3	Chemical Method	4	8 Hrly.	100(µgm3)	22.01	20.1	19.62	<4.0	<4.0	<4.0	<12.61
CO	NDIR Spectroscopy method	0.1	1 Hrly.	4(mg/m3)	0.21	0.23	0.24	<0.1	<0.11	0.2	<0.17
NH3	Indophenol Blue Method	20	24 Hrly.	400(µg/m3)	10.8	10.1	10.0	<20.0	<20.0	<20.0	<15.25
C6H6	AAS method after sampling	0.001	Annual	05(µg/m3)	2.08	2.08	2.08	<0.001	<0.001	<0.001	<1.04
BaP	AAS method after sampling	0.002	Annual	01(ng/m3)	0.4	0.4	0.4	<0.002	<0.002	<0.002	<0.2
Ni	AAS method after sampling	0.01	Annual	20(ng/m3)	4	4	4	<0.01	<0.01	<0.01	<2.01
Pb	Absorption & Desorption followed by GC analysis	0.001	24 Hrly.	01(µg/m3)	0.02	0.02	0.02	<0.001	<0.001	<0.001	<0.01
As	Solvent extraction followed by GC analysis.	0.001	Annual	6(ng/m3)	1.0	1.0	1.0	<0.001	<0.001	<0.001	<0.5

Ambient Air Quality

Six Monthly Average (APR-16 TO SEP-16**)**

Monitoring Location: Near first gate

Parameters	Method of Measurement	Detection Limit	Time Weighted Average	Standards (unit)	Months (APR-16 TO SEP-16)						Six monthly Avg.
					APR	MAY	JUN	JUL	AUG	SEP	
P.M-10	Gravimetric method	.....	24 Hrly	100 (µg/m3)	65.0	58.0	54.5	32.3	34.5	35.6	46.7
P.M.-2.5	Gravimetric method	.....	24 Hrly.	60 (µg/m3)	33.0	28.0	25.4	15.6	16.3	16.6	22.4
SO2	Improved West Gaeke method.	4	24 Hrly.	80 (µg/m3)	5.1	5.0	5.1	<4.0	<4.0	<4.1	<4.5
Nox	Jacob &Hochhelser modified (Na-Arsenite) method	9	24 Hrly	80 (µg/m3)	20.5	21.0	20.7	<9.0	<9.3	<9.4	<14.9
O3	Chemical Method	4	8 Hrly.	100(µgm^3)	24.0	20.0	19.62	<4.0	<4.0	<4.0	<12.61
CO	NDIR Spectroscopy method	0.1	1 Hrly.	4(mg/m^3)	0.23	0.21	0.21	<0.1	0.12	<0.1	<0.17
NH3	Indophenol Blue Method	20	24 Hrly.	400(µg/m^3)	11.2	10.0	10.0	<20.0	<20.0	<20.0	<15.3
C6H6	AAS method after sampling	0.001	Annual	05(µg/m^3)	2.08	2.08	2.08	<0.001	<0.001	<0.001	<1.04
BaP	AAS method after sampling	0.002	Annual	01(ng/m^3)	0.4	0.4	0.4	<0.002	<0.002	<0.002	<0.2
Ni	AAS method after sampling	0.01	Annual	20(ng/m^3)	4.0	4.0	4.0	<0.01	<0.01	<0.01	<2.0
Pb	Absorption & Desorption followed by GC analysis	0.001	24 Hrly.	01(µg/m^3)	0.02	002	0.02	<0.001	<0.001	<0.001	<0.01
As	Solvent extraction followed by GC analysis.	0.001	Annual	6(ng/m^3)	1.0	1.0	1.0	<0.001	<0.001	<0.001	<0.5

Ambient Air Quality

Six Monthly Average (APR-16 TO SEP-16**)**

Monitoring Location: Near Crusher Plant

Parameters	Method of Measurement	Detection Limit	Time Weighted Average	Standards (unit)	Months (APR-16 TO SEP-16)						Six monthly Avg.
					APR	MAY	JUN	JUL	AUG	SEP	
P.M-10	Gravimetric method	.....	24 Hrly	100 (µg/m3)	70.0	64.0	62.0	45.0	44.0	40.0	54.0
P.M.-2.5	Gravimetric method	.....	24 Hrly.	60 (µg/m3)	37.0	33.0	31.1	22.0	21.0	19.0	27.2
SO2	Improved West Gaeke method.	4	24 Hrly.	80 (µg/m3)	5.4	6.0	6.0	<4.0	<4.0	<4.0	<4.8
Nox	Jacob &Hochhelser modified (Na-Arsenite) method	9	24 Hrly	80 (µg/m3)	21.7	22.0	24.0	10.0	10.0	10.0	16.3
O3	Chemical Method	4	8 Hrly.	100(µgm^3)	22.8	20.3	19.62	<4.0	<4.0	<4.0	<12.45
CO	NDIR Spectroscopy method	0.1	1 Hrly.	4(mg/m^3)	0.2	0.24	0.24	0.14	0.14	0.15	0.19
NH3	Indophenol Blue Method	20	24 Hrly.	400(µg/m^3)	10.9	10.5	10.0	<20.0	<20.0	<20.0	<15.2
C6H6	AAS method after sampling	0.001	Annual	05(µg/m^3)	2.08	2.08	2.08	<0.001	<0.001	<0.001	<1.04
BaP	AAS method after sampling	0.002	Annual	01(ng/m^3)	0.4	0.4	0.4	<0.002	<0.002	<0.002	<0.2
Ni	AAS method after sampling	0.01	Annual	20(ng/m^3)	4.0	4.0	4.0	<0.01	<0.01	<0.01	<2.0
Pb	Absorption & Desorption followed by GC analysis	0.001	24 Hrly.	01(µg/m^3)	0.02	0.02	0.02	<0.001	<0.001	<0.001	<0.01
As	Solvent extraction followed by GC analysis.	0.001	Annual	6(ng/m^3)	1.0	1.0	1.0	<0.001	<0.001	<0.001	<0.5

Ambient Air Quality

Six Monthly Average (APR-16 TO SEP-16**)**

Monitoring Location: Near VT Centre

Parameters	Method of Measurement	Detection Limit	Time Weighted Average	Standards (unit)	Months (APR-16 TO SEP-16)						Six monthly Avg.
					APR	MAY	JUN	JUL	AUG	SEP	
P.M-10	Gravimetric method	.....	24 Hrly	100 (µg/m3)	65.0	57.0	53.0	32.0	33.97	32.11	45.5
P.M.-2.5	Gravimetric method	.....	24 Hrly.	60 (µg/m3)	33.0	27.0	26.0	16.0	16.15	14.42	22.1
SO2	Improved West Gaeke method.	4	24 Hrly.	80 (µg/m3)	4.8	5.0	5.0	<4.0	<4.0	<4.0	<4.4
Nox	Jacob &Hochhelser modified (Na-Arsenite) method	9	24 Hrly	80 (µg/m3)	17.6	19.5	21.2	<9.0	<9.0	<9.0	<14.2
O3	Chemical Method	4	8 Hrly.	100(µgm^3)	19.62	19.62	19.62	<4.0	<4.0	<4.0	<11.81
CO	NDIR Spectroscopy method	0.1	1 Hrly.	4(mg/m^3)	0.13	0.15	0.2	<0.1	0.1	<0.11	<0.13
NH3	Indophenol Blue Method	20	24 Hrly.	400(µg/m^3)	10.2	10.3	10.3	<20.0	<20.0	<20.0	<15.1
C6H6	AAS method after sampling	0.001	Annual	05(µg/m^3)	2.08	2.08	2.08	<0.001	<0.001	<0.001	<1.04
BaP	AAS method after sampling	0.002	Annual	01(ng/m^3)	0.4	0.4	0.4	<0.002	<0.002	<0.002	<0.2
Ni	AAS method after sampling	0.01	Annual	20(ng/m^3)	4.0	4.0	4.0	<0.01	<0.01	<0.01	<2.0
Pb	Absorption & Desorption followed by GC analysis	0.001	24 Hrly.	01(µg/m^3)	0.02	0.02	0.02	<0.001	<0.001	<0.001	<0.01
As	Solvent extraction followed by GC analysis.	0.001	Annual	6(ng/m^3)	1.0	1.0	1.0	<0.001	<0.001	<0.001	<0.5

Ambient Air Quality

Six Monthly Average (APR-16 TO SEP-16**)**

Monitoring Location: Near Hospital

Parameters	Method of Measurement	Detection Limit	Time Weighted Average	Standards (unit)	Months (APR-16 TO SEP-16)						Six monthly Avg.
					APR	MAY	JUN	JUL	AUG	SEP	
P.M-10	Gravimetric method	.....	24 Hrly	100 (µg/m3)	57.0	54.0	52.0	33.0	33.0	30.68	43.3
P.M.-2.5	Gravimetric method	.....	24 Hrly.	60 (µg/m3)	29.0	25.0	25.0	16.0	16.0	14.03	20.8
SO2	Improved West Gaeke method.	4	24 Hrly.	80 (µg/m3)	4.5	<4.0	5.0	<4.0	<4.0	<4.0	<4.2
Nox	Jacob &Hochhelser modified (Na-Arsenite) method	9	24 Hrly	80 (µg/m3)	19.1	17.9	19.0	<9.0	<9.0	<9.0	<13.8
O3	Chemical Method	4	8 Hrly.	100(µgm^3)	21.3	19.62	19.62	<4.0	<4.0	<4.0	<12.09
CO	NDIR Spectroscopy method	0.1	1 Hrly.	4(mg/m^3)	0.16	0.16	0.18	<0.1	<0.1	<0.1	<0.13
NH3	Indophenol Blue Method	20	24 Hrly.	400(µg/m^3)	10.5	10.2	10.2	<20.0	<20.0	<20.0	<15.2
C6H6	AAS method after sampling	0.001	Annual	05(µg/m^3)	2.08	2.08	2.08	<0.001	<0.001	<0.001	<1.04
BaP	AAS method after sampling	0.002	Annual	01(ng/m^3)	0.4	0.4	0.4	<0.002	<0.002	<0.002	<0.2
Ni	AAS method after sampling	0.01	Annual	20(ng/m^3)	4.0	4.0	4.0	<0.01	<0.01	<0.01	<2.0
Pb	Absorption & Desorption followed by GC analysis	0.001	24 Hrly.	01(µg/m^3)	0.02	0.02	0.02	<0.001	<0.001	<0.001	<0.01
As	Solvent extraction followed by GC analysis.	0.001	Annual	6(ng/m^3)	1.0	1.0	1.0	<0.001	<0.001	<0.001	<0.5

Ambient Air Quality
Six Monthly Average (APR-16 TO SEP-16**)**
Monitoring Location: Buffer Zone

Parameters	Method of Measurement	Detection Limit	NAAQ STANDARDS	BZ 1	BZ 2	BZ 3	BZ 4	BZ 5	BZ 6	BZ 7	BZ 8	BZ 9	BZ 10
P.M-10	Gravimetric method	.....	100 (µg/m^3)	53.3	55.2	43.9	48.7	46.6	41.2	43.9	41.1	44.0	41.5
P.M.-2.5	Gravimetric method	.....	60 (µg/m^3)	26.0	27.1	20.6	23.1	22.6	19.7	20.4	19.5	21.2	19.5
SO2	Improved West Gaeke method.	4	80 (µg/m^3)	4.9	4.9	<4.2	<4.5	<4.7	<4.3	<4.3	<4.4	<4.4	<4.4
Nox	Jacob &Hochhelser modified (Na-Arsenite) method	9	80 (µg/m^3)	17.6	17.8	13.7	<14.9	<15.7	<13.6	<14.0	<14.3	<14.3	<14.3
O3	Chemical Method	4	100(µgm^3)	<14.4	<14.4	<14.4	<14.4	<14.4	<14.4	<14.4	<14.4	<14.4	<14.4
CO	NDIR Spectroscopy method	0.1	4(mg/m^3)	0.2	0.2	0.1	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1
NH3	Indophenol Blue Method	20	400(µg/m^3)	<14.0	<13.6	<13.3	<13.5	<13.3	<13.3	<13.3	<13.3	<13.3	<13.3
Ni	AAS method after sampling	0.01	20(ng/m^3)	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7	<2.7
Pb	AAS method after sampling	0.001	01(µg/m^3)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
As	AAS method after sampling	0.001	6(ng/m^3)	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
C6H6	Absorption & Desorption followed by GC analysis	0.001	05(µg/m^3)	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
BaP	Solvent extraction followed by GC analysis.	0.002	01(ng/m^3)	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3

Annexure-III

Water Quality
Six Monthly Average (APR-16 TO SEP-16**)**
Sampling Location : SW-1: Surface Water (NaktiNala-Intake)

Sl. No	Parameter	Unit	Detection Limit	Standard as per IS: 2296:1992, Class'C'	APR	MAY	JUN	JUL	AUG	SEP	Six Monthly Avg
1	Colour (max)	Hazen	.....	300	<1.0	<1.0	<1.0				<0.5
2	pH Value	--	.....	6.0-9.0	7.48	7.77	7.55				3.8
3	Dissolved Oxygen (minimum)	mg/l	.....	4	6	6.2	6.2	5.2	5.4	5.6	5.77
4	Oil & Grease (max)	mg/l	0.2	0.1	<1.4	<1.4	<1.4				<0.7
5	BOD (3) days at 27^0C (max)	mg/l	.....	30	<2.0	<2.0	<2.0	2.1	<1.8	2.2	<2.02
6	Arsenic as As	mg/l	0.001	0.2	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.006
7	Lead as Pb(max)	mg/l	0.001	0.1	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.008
8	Cadmium as Cd (max)	mg/l	0.001	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
9	Hexa Chromium as Cr^{+6}	mg/l	0.002	0.05	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.03
10	Copper as Cu (max)	mg/l	0.001	1.5	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.035
11	Zinc as Zn(max)	mg/l	0.001	15	0.04	0.03	0.03	<0.05	<0.05	<0.05	<0.042
12	Selenium as Se (max)	mg/l	0.001	0.05	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.003
13	Cyanide as CN (max)	mg/l	0.1	0.05	<0.01	<0.01	<0.01	ND	ND	ND	<0.005
14	Fluoride as F (max)	mg/l	.....	1.5	0.48	0.36	0.79	0.14	0.12	0.15	0.34
15	Phenolic Compounds as C_6H_5OH (max)	mg/l	0.001	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
16	Iron as Fe (max)	mg/l	.....	3.0	0.75	0.76	1.5	0.46	0.48	0.44	0.73
17	Nitrate as NO_3 (max)	mg/l	.....	50	0.95	0.7	1.09	0.5	0.6	0.8	0.77
18	Anionic Detergents (max)	mg/l	0.2	1	<0.02	<0.02	<0.02	<0.2	<0.2	<0.2	<0.11
19	Total Coli form	MPN/100 ml	.....	5000	460	410	620	420	356	450	453

Annexure-IV

Water Quality
Six Monthly Average (APR-16 TO SEP-16**)**
Sampling Location : DW-1: Drinking water From Guest House

Sl. No	Parameter	Unit	Detection Limit	Standards as per IS: 10500, 1991	APR	MAY	JUN	JUL	AUG	SEP	Six Monthly Avg
Essential Characteristics											
1	Colour	Hazen	.....	5	<1.0	<1.0	<1.0	CL	CL	CL	<0.5
2	Odour	--	.....	U/O	U/O	U/O	U/O	U/O	U/O	U/O	U/O
3	Taste	--		Agreeable	AL	AL	AL	AL	AL	AL	AL
4	Turbidity	NTU	.....	5	<1.0	2.0	1	<2	<2	<2	1.67
5	pH Value	--	.....	6.5-8.5	7.81	7.65	8.29	6.1	6.7	6.8	7.23
6	Total Hardness (as $CaCO_3$)	mg/l	.....	300	194.04	256.0	205.6	32.0	28.0	29.0	124.11
7	Iron (as Fe)	mg/l	.....	0.3	0.19	0.18	<0.05	0.16	0.15	0.12	<0.14
8	Chloride (as Cl)	mg/l	.....	250	15.67	6.12	18.35	15.0	16.0	14.0	14.19
9	Residual, free Chlorine	mg/l	0.2	<0.2	<0.1	<0.1	<0.1	ND	ND	ND	<0.05
Desirable Characteristics											
10	Dissolved Solids	mg/l	.....	500	246.0	280.0	230.0	64.0	59.0	60.0	156.5
11	Calcium (as Ca)	mg/l	.....	75	36.4	60.5	29.49	9.6	9.6	9.6	25.87
12	Magnesium (as Mg)	mg/l	.....	30	24.71	25.14	31.66	1.9	1.0	1.2	14.27
13	Copper (as Cu)	mg/l	0.001	0.05	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.04
14	Manganese (as Mn)	mg/l	0.001	0.1	<0.02	<0.02	<0.02	<0.005	<0.005	<0.005	<0.013
15	Sulphate (as SO_4)	mg/l	.....	200	7.2	15.4	43.25	0.21	0.35	0.28	11.12
16	Nitrate (as NO_3)	mg/l	.....	45	3.6	<0.4	8.17	0.1	0.16	0.12	<2.09
17	Fluoride (as F)	mg/l	.....	1	0.51	0.4	0.22	<0.05	0.028	0.022	<0.21
18	Phenolic Compounds (as C_6H_5OH)	mg/l	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Sl. No	Parameter	Unit	Detection Limit	Standards as per IS: 10500,1991	APR	MAY	JUN	JUL	AUG	SEP	Six Monthly Avg
19	Mercury (as Hg)	mg/l	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
20	Cadmium (as Cd)	mg/l	0.001	0.01	<0.002	<0.002	<0.002	<0.001	<0.001	<0.001	<0.002
21	Selenium (as Se)	mg/l	0.001	0.01	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.003
22	Arsenic (as As)	mg/l	0.001	0.05	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.006
23	Cyanide (as CN)	mg/l	0.03	0.05	<0.01	<0.01	<0.01	ND	ND	ND	<0.005
24	Lead (as Pb)	mg/l	0.001	0.05	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.008
25	Zinc (as Zn)	mg/l	0.001	5	0.08	0.64	<0.02	<0.05	<0.05	<0.05	<0.15
26	Anionic Detergents (as MBAS)	mg/l	0.2	0.2	<0.02	<0.02	<0.02	<0.2	<0.2	<0.2	<0.11
27	Chromium (as Cr^{+6})	mg/l	0.002	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
28	Mineral Oil	mg/l	0.001	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
29	Alkalinity	mg/l	.....	200	199.92	248.2	152.4	42.0	30.0	33.0	117.59
30	Aluminium as(Al)	mg/l	0.001	0.03	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.006
31	Boron (as B)	mg/l	0.001	1	<0.5	<0.5	<0.5	<0.01	<0.01	<0.01	<0.26
32	Poly Aromatic Hydrocarbon as PAH	g/l	0.001	--	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
33	Pesticide	mg/l	.....	Absent	<0.0001	<0.0001	<0.0001	Absent	Absent	Absent	<0.00001

Note: CL: Colourless, U/O: Unobjectionable, AL: Agreeable.

Annexure-V

Water Quality (Mine Discharge Water)
Six Monthly Avg(APR-16 TO SEP-16**)**
Sampling Location: EW-1: Mine Water Discharge Point

Sl.No.	**Parameter**	**Unit**	**Detection Limit**	**Standards (In land Surface water)**	APR	MAY	JUN	JUL	AUG	SEP	**Six Monthly Avg**
1	Colour&Odour	Hazen	.....	Colourless/Odourless as far as practicable	<1.0	<1.0	<1.0	CL&U/O	CL&U/O	CL&U/O	<0.5
2	Suspended Solids	mg/l	.....	100	24.2	13.5	19.6	3.0	2.0	Nil	10.38
3	Particulate size of SS		.....	Shall pass 850 micron IS Sieve	Passes through 850 mm IS Sieve	Passes through 850 mm IS Sieve	Passes through 850 mm IS Sieve	<850	<850	<850	<850
4	pH Value	--	.....	5.5-9.0	7.29	8.32	7.98	8.0	7.8	7.6	7.83
5	Temperature	^{0}C	.....	Shall not exceed 5^{0}C above the receiving water temperature	28	28	28	25	23	24	26
6	Oil & Grease(max)	mg/l	0.2	10	1.7	<1.4	<1.4	ND	ND	ND	<0.75
7	Total Residual Chlorine	mg/l	0.2	1	<0.1	<0.1	<0.1	ND	ND	ND	<0.05
8	Ammonical Nitrogen (as N)	mg/l	.....	50	<0.1	<0.1	<0.1	ND	ND	ND	<0.05
9	Total Kjeldahl nitrogen (as NH_3)	mg/l	.....	100	0.56	<0.3	<0.3	ND	ND	ND	<0.19
10	Free ammonia (as NH_3)	mg/l	0.7	5	<0.1	<0.1	<0.1	ND	ND	ND	<0.05
11	BOD(3 days at 27^{0}C (max)	mg/l	.....	30	2.3	2.4	<2.0	<2.0	<2.0	<2.0	<2.12
12	Chemical Oxygen Demand as COD	mg/l	.....	250	4.8	12.0	<4.0	<3.0	<3.0	<3.0	<4.97

13	Arsenic as As	mg/l	0.001	0.2	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.006
14	Mercury (Hg)	mg/l	0.001	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
15	Lead as Pb(max)	mg/l	0.001	0.1	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.008
Sl. No.	**Parameter**	**Unit**	**Detection Limit**	**Standards (Inland Surface water)**	APR	MAY	JUN	JUL	AUG	SEP	**Six Monthly Avg**
16	Cadmium as Cd (max)	mg/l	0.001	2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
17	Hexavalent Chromium as Cr^{+6}	mg/l	0.002	0.1	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.03
18	Total Chromium (Cr)	mg/l	0.002	2	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.03
19	Copper as Cu (max)	mg/l	0.001	3	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.035
20	Zinc as Zn(max)	mg/l	0.001	5	0.09	0.06	<0.02	<0.05	<0.05	<0.05	<0.05
21	Selenium (Se) (max)	mg/l	0.001	0.05	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.003
22	Nickel (Ni)	mg/l	0.001	3	<0.02	<0.02	<0.02	<0.001	<0.001	<0.001	<0.011
23	Cyanide as CN (max)	mg/l	0.03	0.2	<0.01	<0.01	<0.01	ND	ND	ND	<0.005
24	Fluoride as F (max)	mg/l	.....	2	0.52	0.54	0.94	0.18	0.2	0.2	0.43
25	Dissolved Phosphates (P)	mg/l	.....	5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
26	Sulphide (S)	mg/l	.....	2	<0.1	<0.1	<0.1	ND	ND	ND	<0.05
27	Phenolic Compounds as C_6H_5OH (max)	mg/l	0.001	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Bio-assay test		.....	100% survival of fish after 96 hours in 100% effluent	All fish survival after 96 hours in 100% effluent	All fish survival after 96 hours in 100% effluent	All fish survival after 96 hours in 100% effluent	98% survival of fishes	98% survival of fishes	98% survival of fishes	97% survival of fishes
29	Manganese (Mn)	mg/l	0.001	2	<0.02	<0.02	<0.02	<0.005	<0.005	<0.005	<0.01

30	Iron as Fe (max)	mg/l	.....	3	0.52	0.93	1.3	0.78	0.72	0.64	0.82
31	Vanadium (V)	mg/l	0.001	0.2	<0.2	<0.2	<0.2	<0.001	<0.001	<0.001	<0.10
32	Nitrate Nitrogen	mg/l	.....	10	4.74	7.72	9.93	1.2	1.3	1.2	4.35

Annexure-VI

Water Quality (Canteen Effluent)
Six Monthly Avg(APR-16 TO SEP-16**)**
Sampling Location: EW-2: Canteen Outlet

Sl. No	**Parameter**	**Unit**	**Detection Limit**	**Standards (Inland Surface water)**	APR	MAY	JUN	JUL	AUG	SEP	**Six Monthly Avg**
1	Colour	Hazen	.....	Colourless	<1.0	<1.0	<1.0	2	CL	CL	0.83
	Odour		.....	Odourless	U/O	U/O	U/O	U/O	U/O	U/O	U/O
2	Suspended Solids	mg/l	.....	100	15.7	8.7	12.6	40.0	56.0	30.0	27.17
3	Particulate size of SS		.....	Shall pass 850 micron IS Sieve	Passes through 850 mm IS Sieve	Passes through 850 mm IS Sieve	Passes through 850 mm IS Sieve	<850	<850	<850	<850
4	pH Value	--	.....	5.5-9.0	8.06	7.09	7.32	6.9	6.8	6.9	7.18
5	Temperature	^{0}C	.....	Shall not exceed 5^{0}C above the receiving water temperature	28	28	27	25	23	24	25.83
6	Oil & Grease(max)	mg/l	.....	10	<1.4	<1.4	<1.4	ND	ND	ND	<0.7
7	Total Residual Chlorine	mg/l	.....	1	<0.1	<0.1	<0.1	ND	ND	ND	<0.05
8	Ammonical Nitrogen (as N)	mg/l	.....	50	<0.1	<0.1	<0.1	1.8	2.1	2.5	<1.12
9	Total Kjeldahl nitrogen (as NH_3)	mg/l	.....	100	<0.3	0.47	<0.3	4.4	1.8	2.6	<1.65

10	Free ammonia (as NH_3)	mg/l	0.7	5	<0.1	<0.1	<0.1	ND	ND	ND	<0.05
11	BOD(3 days at 27^0C (max)	mg/l	.....	30	4.2	3.3	<2.0	20.0	12.0	16.0	<9.58
12	Chemical Oxygen Demand as COD	mg/l	.....	250				80.0	50.0	48.0	29.67
13	Arsenic as As	mg/l	0.001	0.2	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.006
14	Mercury (Hg)	mg/l	0.001	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sl. No	**Parameter**	**Unit**	**Detection Limit**	**Standards (Inland Surface water)**	**April**	**May**	**June**	**July**	**Aug**	**Sept**	**Avg**
15	Lead as Pb(max)	mg/l	0.001	0.1	<0.005	<0.005	<0.005	<0.01	<0.01	<0.01	<0.008
16	Cadmium as Cd (max)	mg/l	0.001	2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
17	Hexavalent Chromium as Cr^{+6}	mg/l	0.002	0.1	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.03
18	Total Chromium (Cr)	mg/l	0.002	2	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.03
19	Copper as Cu (max)	mg/l	0.001	3	<0.02	<0.02	<0.02	<0.05	<0.05	<0.05	<0.035
20	Zinc as Zn(max)	mg/l	0.001	5	0.07	<0.02	<0.02	<0.05	<0.05	<0.05	<0.043
21	Selenium (Se) (max)	mg/l	0.001	0.05	<0.005	<0.005	<0.005	<0.001	<0.001	<0.001	<0.003
22	Nickel (Ni)	mg/l	0.001	3	<0.02	<0.02	<0.02	<0.001	<0.001	<0.001	<0.011
23	Cyanide as CN (max)	mg/l	0.03	0.2	<0.01	<0.01	<0.01	ND	ND	ND	<0.005
24	Fluoride as F (max)	mg/l	.....	2	0.55	0.42	1.31	0.16	0.14	0.24	0.47
25	Dissolved Phosphates (P)	mg/l	.....	5	<0.05	<0.05	<0.05	0.4	0.36	0.8	<0.29
26	Sulphide (S)	mg/l	.....	2	<0.1	<0.1	<0.1	0.8	ND	1.8	<0.48
27	Phenolic Compounds as C_6H_5OH (max)	mg/l	0.001	1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
28	Bio-assay test		.....	90% survival of fish after 96 hours in 100% effluent	All fish survival after 96 hours in 100%	All fish survival after 96 hours in 100%	All fish survival after 96 hours in 100%	94% survival of fishes	93% survival of fishes	92% survival of fishes	95% survival of fishes

					effluent	effluent	effluent				
29	Manganese (Mn)	mg/l	0.001	2	<0.02	<0.02	<0.02	<0.005	<0.005	<0.005	<0.013
30	Iron as Fe (max)	mg/l		3	0.53	0.13	<0.05	0.72	0.62	0.58	0.44
31	Vanadium (V)	mg/l	0.001	0.2	<0.2	<0.2	<0.2	<0.001	<0.001	<0.001	<0.1
32	Nitrate Nitrogen	mg/l		10	8.86	<0.5	4.52	1.6	1.7	1.9	<3.18

Annexure-VII
Ambient Noise Quality
Six Monthly Average (APR-16 TO SEP-16**)**

Sl. No	Category of Area/Zone	Sampling Location	Noise Level in dB(A) Leq six monthly avg. (APR-15 TO SEP-15)			
			Day time Equivalent		Night time Equivalent	
			Standard as per CPCB	Actual	Standard as per CPCB	Actual
1	**Industrial Area**	Mines Area	75	57.4	70	37.2
2		Crusher Plant		72.6		39.1
3	**Residential Area**	Colony	55	47.5	45	37.9
4		Gomardih Village		47.9		37.4
5	**Silence Zone**	Hospital	50	46.4	40	36.6

Note : Day Time : 6.00 AM -10.00 PM, Night Time: 10.00PM- 6.00AM

AMBIENT AIR QUALITY STANDARDS IN RESPECT OF NOISE

AS PER CPCB GUIDELINES

AREA CODE	CATEGORY OF AREA / ZONE	LIMITS IN dB (A)	
		DAY TIME	NIGHT TIME
A	INDUSTRIAL AREA	75	70
B	COMMERCIAL AREA	65	55
C	RESIDENTIAL AREA	55	45
D	SILENE ZONE	50	40

Annexure-VIII

PHOTOGRAPHS

DRY FOG SYATEM

FIXED TYPE WATER SPRINKLING SYSTEM

PORTABLE SPRINKLING ARRANGEMENTS

OB DUMP TOE WALL

MINERAL STACKYARD TOE WALL

SETTLING POND

GARLAND DRAIN

OB DUMP PLANTATION

ROAD SIDE PLANTATION (SH-10 TO COLONY)

RECHARGE PIT OF ROOF TOP RAIN WATER HARVESTING STRUCTURE OF GUEST HOUSE OF GOMARDIH

ARRANGEMENTS FOR PUMPING AND TREATMENT OF ACCUMULATED RAIN WATER OF THE QUARRY

FEW SNAP SHOTS OF THE NEW STP

COLONY PLANTATION

Intake Pump station

Screen Chamber &Collection Tank

View of the completed STP at Gomardih

Electronics Display Board for at Gomardih