



Ref: FAMD/SCM/210/FY20

Date: 28/SEP/2019

To

**The Member Secretary,
Odisha State Pollution Control Board,
Paribesh Bhawan,
A/118, Nilakantha Nagar,
Bhubaneswar, 751012**

Subject: Submission of Environmental Statement in FORM-V for the year ending 31st March 2019
in respect of Sukinda Chromite Mines of M/s Tata Steel Ltd.

Ref: Rule-14 under Environmental (Protection) Amendment Rule, 1993 (G.S.R.386,22.04.1993)

Dear Sir,

We are hereby submitting the Annual Environmental Statement in prescribed format "FORM-V" for the year ending 31st March 2019 in respect of Sukinda Chromite Mines of M/s Tata Steel Ltd., At/PO: Kalarangiatta, Dist-Jajpur, Odisha.

This is for your kind information and perusal please. Receipt of the same may please be acknowledged.

Thanking You.

Yours faithfully,
f: Tata Steel Limited


Mines Manager
Sukinda Chromite Mines

Enclosures: 1. Annual Environmental Statement (FORM-V) for the Financial Year ending 31st March 2019

Copy to: 1. Regional Officer, OSPCB, Kalinganagar, Dhabalagiri Chowk, Jajpur (Odisha)
2. MoEF&CC Eastern Regional Office, A/3, Chandrasekharpur, Bhubaneswar-751023

TATA STEEL LIMITED

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Registered Office Bombay House 24 Homi Mody Street Fort Mumbai 400 001 India
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Corporate Identity Number L27100MH1907PLC000260 Website www.tatasteel.com



ENVIRONMENTAL STATEMENT

PERIOD: 1st APRIL 2019 – 31st March 2019

For
SUKINDA CHROMITE MINES

A handwritten signature in blue ink, appearing to read 'A. K. Mohan'.

Submitted By:

Sukinda Chromite Mine

M/s. Tata Steel Limited

At/Po: Kalarangiatta, Block-Sukinda

District- Jajpur, Odisha -755028

Table of Contents

<u>S.No.</u>	<u>Title/Chapter</u>	<u>Page No.</u>
1.	Introduction	3-5
2.	Environmental Statement in Form-V.....	5-19
3.	Photographs of Env Management System	20-25

INTRODUCTION

Sukinda Chromite Mine, one of the raw material division of M/s Tata Steel Limited established in 1953, presently is operated over leased area of 406.0Ha in the Sukinda Block of Jajpur District in the State of Odisha. Schematic representation of the site is depicted in the fig.1 and its layout in fig.2 below.

Fig.1: Location of Sukinda Chromite Mine (Tata Steel Limited)

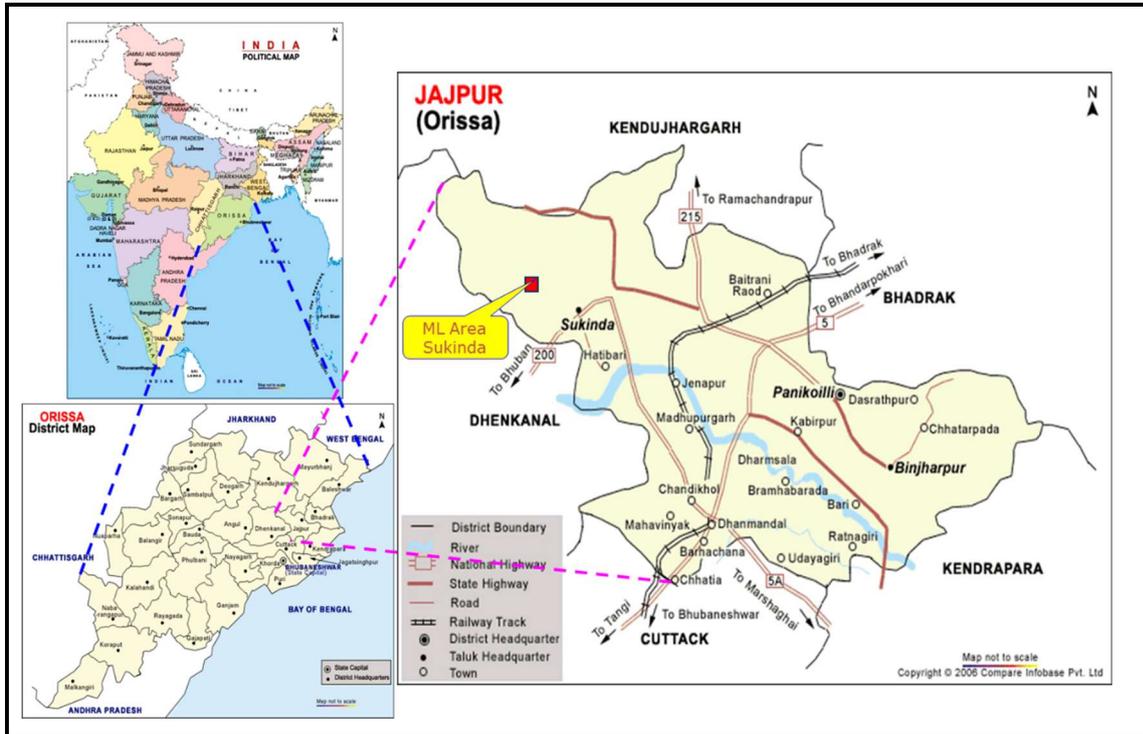
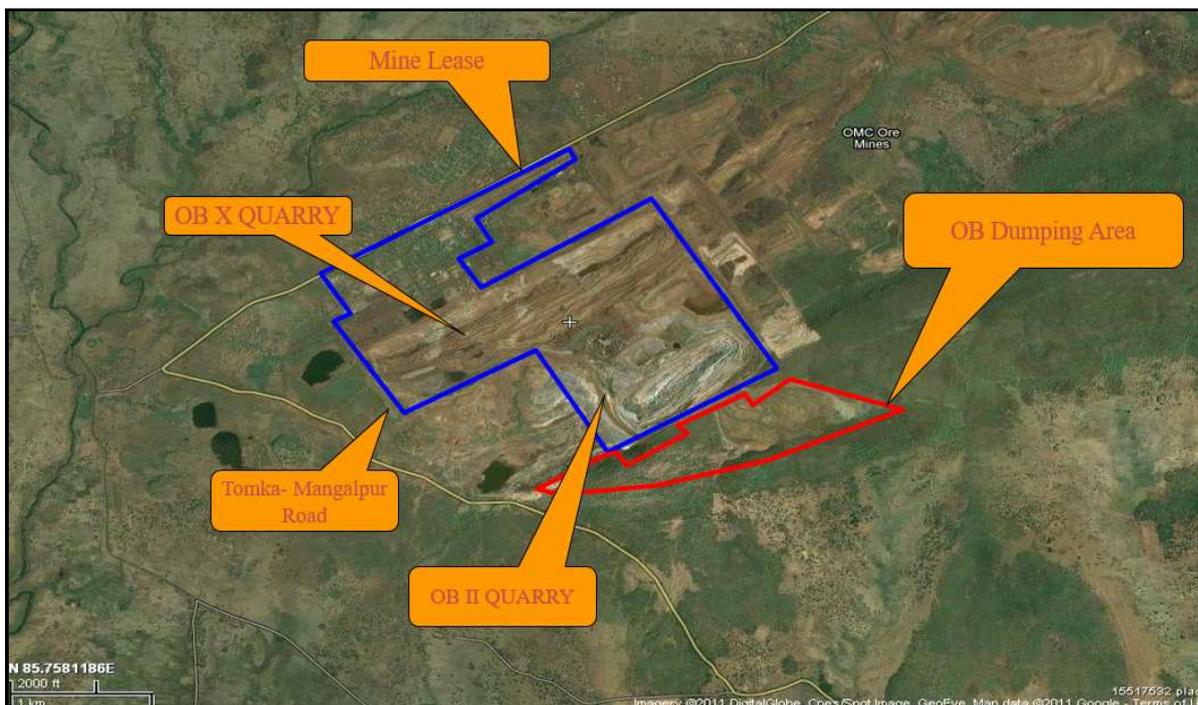


Fig.2 Mine Lay out (Aerial View of Sukinda Chromite Mine)



LOCATION FEATURES: The salient features on the environmental setting of the project is outlined in the Table.1 below. **Table.1 Environmental Setting of Sukinda Chromite Mine.**

S.No	Particulars	Details on the Particulars
01	Latitude	N 20 ⁰ 59'34.88" – N 21 ⁰ 02'5.81"
02	Longitude	E 85 ⁰ 44'27.10" – E 85 ⁰ 47'32.69"
03	Nearest Villages	Kalarangiatta, Kaliapani, Mahulkhal
04	Tehsil, District, State	Sukinda, Jajpur, Odisha
05	Elevation Above MSL	The Valley lies between Mahagiri Hill at 707.69m (South) and Tomka Range at 782.42m (North)
06	Climatic Condition as per IMD	Tropical, Semiarid and Hot climate however experiences bitter cold during winter and intense warm during summer.
07	Nearest Highway	NH-200 (29Km)
08	Nearest Railway	Jajpur-Keonjhar Road (52Km, SE)
09	Nearest Airport	Biju Patnaik International Airport, Bhubaneswar (135Km, SE)
10	Ecological Sensitivity	No such ecologically sensitive area/zone (as per Wildlife Protection Act,1972) prevails within 10km radius from the lease boundary of the mine.
11	Nearest Water Bodies	Dumsala Nallah (0.7Kms, NW) & Brahmani River (15Kms, S)
12	Nearby Industries	There are total 13 operating mines in the sukinda valley operating since 1960/80s.

SIZE OF THE PROJECT:

🚧 **As per EIA Notification, 2006:** The project is classified as category A project based on the extent of the operational area of 406Ha.

🚧 As per CPCB Classification of the industries: RED-B.

Table.2 Capacity of Sukinda Chromite Mine

S.No	Particulars	Details on the Particulars
01	Lease Area	406.00Ha
02	Forest Area	404.669Ha

S.No	Particulars	Details on the Particulars
03	Production Capacity	1. ROM Chrome: 2.4MTPA (Million Tons Per Annum) 2. ROM Pyroxenite: 0.5MTPA 3. Chrome Ore Concentrate: 0.65MTPA
04	Mining Method	Opencast Mining and Underground Mining <i>[Presently mining is done from opencast mines and planning for UG mine is under process]</i>
05	Capital Investment	<u>Opencast: 74.23.22,277/- (INR)</u> [Land: Nil; Buildings: 9,65.7Lakhs; Plant & Machineries: 52,08.2Lakhs; Others: 12,49.4Lakhs] Underground: 825Crores (INR) (Planned)

FORM – V

(See Rule -14)

ENVIRONMENT STATEMENT FOR THE FINANCIAL YEAR ENDING 31st MARCH, 2019

PART-A

i.	Name and address of the owner/Occupier of the industry, operation	:	Mr.T V Narendran (Owner) Address: Sukinda Chromite Mine, Tata Steel Ltd., At/P.O-Kalarangiatta, Dist. - Jajpur, Orissa -755028
ii.	Industry Category	:	Primary (SIC): 1000 (Metal Mining) Secondary (SIC): 1060 (Ferro Alloy Ore)
iii.	Production capacity	:	Chrome Ore (ROM): 2.4 MTPA* Pyroxenite Ore (ROM): 0.5 MTPA Chrome Concentrate: 0.65 MTPA
iv.	Year of establishment	:	1960. (20 th December 1960)
v.	Date of the last environmental statement submitted	:	29 th September 2018
<i>Note: *MTPA: Million tonnes per annum</i>			

PART-B

{WATER & RAW MATERIAL CONSUMPTION}

(1) Water Consumption:

A) Water Consumption for FY 2017-18 & FY 2018-19

S.No	Heads of Consumptions	Water Consumption (m ³)		Water Consumption (m ³ /day)		
		2017-18	2018-19	2017-18	2018-19	
01	Process	*Spraying in mine pit	3,90,831	3,12,379	1070.8	855.8
		Vehicle Washing	3,222	3,370	8.8	9.2

S.No	Heads of Consumptions	Water Consumption (m ³)		Water Consumption (m ³ /day)	
		2017-18	2018-19	2017-18	2018-19
01	Beneficiation	2,96,168	1,95,252	811.4	534.9
	Desludging	0	0	0	-
	Total Consumption	6,90,221	5,11,001	1891	1,400.0
02	Cooling (Ac Cooling)	2,215	3,110	6.07	8.5
03	Drinking Purpose	2,69,170	7,71,382	737.5	2,113.4
	Gardening Purpose	2,27,666	2,60,214	623.7	712.9
	Total Consumption	4,96,836	10,31,596	1361.2	2,826.3
04	Total Consumption (1+2+3)	11,89,272	15,45,707	3258.3	4234.8

Note: * Spraying in mine pit or haul road dust suppression is not exactly a process driven parameter, which is linked with the extent of haul road in usage during mining operation.

B. Specific Water Consumption- Water Consumption per unit of product output (Cu.M/Tonne)

Name of Product	Production (Tonnes)		Water Consumption (Cu.M/Tonne)#	
	FY:17-18	FY:18-19	FY:17-18	FY:18-19
Chrome Ore (ROM)	1550375.084	1586832.235	0.253	0.199
Pyroxenite Ore (ROM)	7400	0.0	0.253	0.0
Chrome Concentrate	287374.227	111131.945	1.03	1.76

Note: # for computing specific water consumption (Heads considered for Sp. Water)

1. ROM-Chromite Ore+Pyroxenite: spraying in mine pit (KL) +Vehicle washing (KL)

2. Chrome Concentrates: Beneficiation & De-sludging have been considered. (Ref.Table.A above)

3. Production of Chrome Ore (ROM): Exclusive of the production from dump working (segregation from old dumps) viz. 20050.360 Tonnes and 17953.068Tonnes and for FY 18 and FY 19 respectively.

(ii) Raw Material Consumption

Tata Steel is involved in extraction of chrome ore and pyroxenite (Run off Mine) from the mine/quarry. Mining is not a manufacturing process thus there are no such raw materials involved in the process, however there are number of indirect raw materials/consumables used to support the process of mining and beneficiation of ore e.g chrome concentrations. The details of major consumables and resources utilized is reflected in the Table.5 below:

Table.5: Indirect Consumables/ Resource Consumed

Name of Raw materials/Consumables	Consumption of Raw Material (Indirect)	
	During previous financial Year (2017 – 18)	During current financial Year (2018 – 19)
High Speed Diesel (Ltrs)	8534250	7711145
Lubricants (Ltrs)	28838	27141
Grease (Kg)	16170	5642
Explosives of all types	32613Kg,	26211Kg,
Electric Power Consumed (KhW)	19096950	12291450
Electric Power Generated(KhW)	87840	68640
Gas (Cu.M)	4907	5465

Name of Raw materials/Consumables	Consumption of Raw Material (Indirect)	
	During previous financial Year (2017 – 18)	During current financial Year (2018 – 19)
Tyres (Nos.)	56	40
Drill rods (Nos.)	2	18
Acids & Chemicals (Laboratory process for sampling and analysis)		
Nitric Acid (Ltrs)	278	220.0
Acetone (Ltrs)	1.5	1.0
Borax (Kg)	23	26.0
Hydrochloric Acid (Ltrs)	190	230.0

PART-C**{POLLUTION DISCHARGED TO ENVIROMENT/ UNIT OF OUTPUT}****(Parameters as specified in the consent issued)****A. Water Pollution:**

- ❖ The major source of water for undertaking various activities is the mine pit water (rain fall and surface runoff accumulated in the pit and ground water seepage). Mine pit water is collected through stage pumping and drains at the Inlet of the ETP where; it is treated to correct the load of suspended solids, pH, Hexavalent Chromium, etc. Treated effluent is then reused for various purposes such as vehicle washing, haul road dust suppression, greenbelt development and maintenance, chrome ore beneficiation process and the balance treated effluent is discharged beyond the premises conforming to the prescribed norms.
- ❖ Water consumed for industrial cooling (AC Cooling): 100% Recycled.
- ❖ Water Consumed for Vehicle Washing: 100% Recycled at Oil-Water Separation Pit
- ❖ Chrome ore Beneficiation Plant: 100% Recycled at the parallel filter press to generated dry tailings.
- ❖ Slimes de-watering facility: 90-95% of the total slimes generated in the plant are being de-watered at the COB Plant (parallel filter press); Approx. max. 5-10% of slurry is discharged in to slime pond, from where clarified water is recycled back to the plant.
- ❖ The only point at which the potential for the discharge of pollutant is with the discharge end (outlet of the ETP) which has been put under real-time monitoring for the analysis of critical parameters such as, TSS, pH and Hexavalent Chromium. The summary of the treated effluent quality is outlined in the Table.2 below:

Details of Water Quality Monitoring-FY19:

- ❖ **Table. 6: Quality of Treated Effluent from ETP Outlet (discharged to Damsala Nala)**

Sl. No	Parameter	Unit	Detecti on Limit	Result (Range)	Max. Permissible Standard ##	Variations from the prescribed standard (%)	Remarks for the deviations if any
1	PH	--	--	7.1-7.32	6.0-9.0	0.0	Within the prescribed limit
2	Suspended Solids	mg/ltr	--	10.0 – 14.0	100	-86.0	Within the prescribed limit
3	Oil & Grease	mg/ltr	0.01	BDL	10	-100	Not Detected in any of the samples.
4	BOD (3) days at 27°C.	mg/ltr	1.8	<1.8	30	-100	Below detection limit.
5	COD	mg/ltr	--	ND	250	-100	Below detection limit.

Sl. No	Parameter	Unit	Detecti on Limit	Result (Range)	Max. Permissible Standard ##	Variations from the prescribed standard (%)	Remarks for the deviations if any
6	Hexavalent Chromium as Cr ⁺⁶	mg/ltr	0.05	<0.05	0.1	-100	Range of Cr+6 lies within 0.008 to 0.01
7	Total Chromium as Cr	mg/ltr	0.05	0.011 – 0.06	2	-100.0	Detected only in few samples
8	Nickel as Ni	mg/ltr	0.001	BDL	3	-100.0	Not detected in any of the samples
9	Iron as Fe	mg/ltr	--	0.11 – 0.22	3	-100.0	much below the permissible value

Note: ## Standards mention is as per the consent to operate and/or general standards for discharge of effluent for inland surface water (Part-A of Schedule-VI to Environmental Protection Rules, 1986) whichever is capped at lower side of the max permissible value, BDL: Below Detection Limit)

B) Air Pollution:

❖ This is an opencast mine and does not have any potential point sources of emissions or processed stacks emanating pollutants to the environments. Hence, estimation of specific pollution load or air pollutants discharged in Kg/day cannot be ascertained, however ambient air quality for six core zone locations are monitored as per NAAQS-2009 and the summary of the monitoring results for FY 2018-19 is outlined as below in **Table.7: Ambient Air Quality at Sukinda Chromite Mines {average values}**

Monitoring Locations	Parameters (unit)	Results Annual Averages	Prescribed Standards 24 Average (NAAQS-2009)	Variations from prescribed standards (%) (variation w.r.t annual averages)	Reasons for +ive Variations (deviations from the standard values)
COB Plant	PM10 µg/m ³	64.32	100	-35.7	Note: Annual average standard not prescribed in NAAQS-2009. Average values of parameters based on 24 hourly reading is well within the NAAQS-2009 limits.
	PM2.5 µg/m ³	35.57	60	-40.7	
	SO ₂ µg/m ³	6.30	80	-92.1	
	NO _x µg/m ³	14.92	80	-81.4	
	#CO mg/m ³	0.36	4	-91.0	
Stack Yard	PM10 µg/m ³	65.73	100	-34.3	Note: Annual average standard not prescribed in NAAQS-2009. Average values of parameters based on 24 hourly reading is well within the NAAQS-2009 limits.
	PM2.5 µg/m ³	36.92	60	-38.5	
	SO ₂ µg/m ³	6.24	80	-92.2	
	NO _x µg/m ³	15.10	80	-81.1	
	CO mg/m ³	0.41	4	-89.8	

Monitoring Locations	Parameters (unit)	Results Annual Averages	Prescribed Standards 24 Average (NAAQS-2009)	Variations from prescribed standards (%) (variation w.r.t annual averages)	Reasons for +ive Variations (deviations from the standard values)
Laboratory Top	PM10 µg/m3	59.25	100	-40.8	Note: Annual average standard not prescribed in NAAQS-2009. Average values of parameters based on 24 hourly reading is well within the NAAQS-2009 limits.
	PM2.5 µg/m3	31.41	60	-47.7	
	SO2 µg/m3	5.79	80	-92.8	
	NOx µg/m3	14.05	80	-82.4	
	CO mg/m3	0.33	4	-91.8	
Hospital Top	PM10 µg/m3	55.20	100	-44.8	Note: Annual average standard not prescribed in NAAQS-2009. Average values of parameters based on 24 hourly reading is well within the NAAQS-2009 limits.
	PM2.5 µg/m3	30.22	60	-49.6	
	SO2 µg/m3	5.42	80	-93.2	
	NOx µg/m3	11.61	80	-85.5	
	CO mg/m3	0.29	4	-92.8	
Mining Complex	PM10 µg/m3	63.37	100	-36.6	Note: Annual average standard not prescribed in NAAQS-2009. Average values of parameters based on 24 hourly reading is well within the NAAQS-2009 limits.
	PM2.5 µg/m3	35.72	60	-40.5	
	SO2 µg/m3	6.51	80	-91.9	
	NOx µg/m3	14.09	80	-82.4	
	CO mg/m3	0.36	4	-91.0	
Near Tailing Pond	PM10 µg/m3	59.25	100	-40.8	Note: Annual average standard not prescribed in NAAQS-2009. Average values of parameters based on 24 hourly reading is well within the NAAQS-2009 limits.
	PM2.5 µg/m3	31.90	60	-46.8	
	SO2 µg/m3	5.90	80	-92.6	
	NOx µg/m3	12.62	80	-84.2	
	CO mg/m3	0.31	4	-92.3	

Note: # duration of monitoring is for 8hrs in a sampling event, (-) deviation implies values below the prescribed standards

- ❖ In addition to this there are five numbers of DG Sets of 1000KVA capacity installed and in operation for captive power utility purpose; however, these are not in continual operation on regular basis thus quantitative estimation (mass/day) of the air emissions is not carried out, however the stacks emission is monitored on quarterly basis and summarized result of the same is outlined in the Table-8 below.

Table.8: DG Set Emission Result:

	PARAMETERS	Average Range	Prescribed **Standards	Positive Variations from the prescribed standards (%)	Reasons for deviations if any
DG-1	Stack Temp ⁰ c (Range)	171.75	N/A	N/A	All the parameters Are well within the prescribed limits as per the reference to G.S.R. 489 (E), dated 9thJuly, 2002
	Stack Velocity in (m/sec)	15.45	N/A	N/A	
	Particulate Matter, PM (mg/Nm ³)	71.95	150	Nil	
	Oxides of Nitrogen as NOx (mg/Nm ³)	43	1100	Nil	
	Carbon Monoxide as (mg/Nm ³)	52.1	150	Nil	
	Non-Methyl Hydro Carbon (as C) (mg/Nm ³)	22.90	150	Nil	
DG-2	Stack Temp ⁰ c (Range)	182.5	N/A	N/A	
	Stack Velocity in (m/sec)	15.83	N/A	N/A	
	Particulate Matter, PM (mg/Nm ³)	64.95	150	Nil	
	Oxides of Nitrogen as NOx (mg/Nm ³)	34	1100	Nil	
	Carbon Monoxide as (mg/Nm ³)	47.8	150	Nil	
	Non-Methyl Hydro Carbon (as C) (mg/Nm ³)	20.68	150	Nil	
DG-3	Stack Temp ⁰ c (Range)	179.25	N/A	N/A	
	Stack Velocity in (m/sec)	16.45	N/A	N/A	
	Particulate Matter, PM (mg/Nm ³)	64.30	150	Nil	
	Oxides of Nitrogen as NOx (mg/Nm ³)	36	1100	Nil	
	Carbon Monoxide as (mg/Nm ³)	50.2	150	Nil	
	Non-Methyl Hydro Carbon (as C) (mg/Nm ³)	21.68	150	Nil	
DG-4	Stack Temp ⁰ c (Range)	183.5	N/A	N/A	
	Stack Velocity in (m/sec)	16.88	N/A	N/A	
	Particulate Matter, PM (mg/Nm ³)	67.60	150	Nil	
	Oxides of Nitrogen as NOx (mg/Nm ³)	38	1100	Nil	

	PARAMETERS	Average Range	Prescribed **Standards	Positive Variations from the prescribed standards (%)	Reasons for deviations if any
	Carbon Monoxide as (mg/Nm ³)	50.0	150	Nil	
	Non-Methyl Hydro Carbon (as C) (mg/Nm ³)	21.33	150	Nil	
DG-5	Stack Temp °c (Range)	175.5	N/A	N/A	
	Stack Velocity in (m/sec)	16.28	N/A	N/A	
	Particulate Matter, PM (mg/Nm ³)	66.83	150	-70.8	
	Oxides of Nitrogen as NOx (mg/Nm ³)	37	1100	Nil	
	Carbon Monoxide as (mg/Nm ³)	49.3	150	Nil	
	Non-Methyl Hydro Carbon (as C) (mg/Nm ³)	21.98	150	Nil	

Note: ** Emission Standards For Diesel Engines (Engine Rating More Than 0.8 Mw (800 Kw) For Power Plant, Generator Set Applications And Other Requirements notified vide G.S.R 489 (E),dt. 9th July 2002

PART-D

{HAZARDOUS WASTES}

(As specified under the Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016)

Hazardous Wastes	Total Quantity generated	
	During the Previous Financial Year (2017-18)	During the Current Financial Year (2018-19)
Used Oil	40.14KL	60.90 KL
Waste containing Oil	19.90 MT	3.2MT
Waste Battery	156Nos.	260Nos
ETP Sludge	244.57MT	314.05MT
From Pollution Control Facility: <ul style="list-style-type: none"> ▪ Waste oil from oil & grease separation pit ▪ Sludge from oil and grease separation pit 	Included in the above Items	Included in the above Items

PART-E
{SOLID WASTES}

Sources		TOTAL QUALITY	
		During the Current Year (2017-18)	During the Current Year (2018-19)
A.	Generated from process		
A1	From Mining as Overburden	65.5 Lakh Cu.M or (15068432 Tonnes)	53.2 Lakh Cu.M or (12232102 Tonnes)
A2	From COB as Tailings	514323.7Tonnes	168561 Tonnes
A3	Misc. waste from canteen/office/colony	0.65MT	0.65MT
B	Generation from Pollution Control Facility	-Nil-	-Nil-
C	Quantity Recycled/Reused/Sold/disposed off		
C1	Quantity recycled or reused within the unit Used in backfilling	-Nil-	53.2 Lakh Cu.M Or (12232102 Tonnes)
C2	Quantity Sold (General office waste)	1.3MT	0.65MT
C3	Quantity disposed-Overburden used in backfilling mine pit	50.3Lakh Cu.M	15068432 Tonnes
C4	Quantity disposed-colony waste/office garbage, dry leaves, horticultural waste	Reused in compost preparation	Approx. 10Tonnes

PART-F

(PLEASE SPECIFY THE CHARACTERISTICS (IN TERMS OF COMPOSITION AND QUANTUM) OF HAZARDOUS AS WELL AS SOLID WASTES AND INDICATE DISPOSAL PRACTICE ADOPTED FOR BOTH THESE CATEGORIES OF WASTES)

The Table.11 below outlines the details pertaining to the management of solid waste and hazardous waste at our site. **Table.11: Waste Management Aspects:**

Sl. No	Waste Description	Nature of Waste	Composition/ Characteristics	Qty (2018-19)	Management (Methods of Collection & Disposal)
01	Overburden Material	Non-Hazardous (Solid Waste)	Quartzite and talk serpentine, Nickeliferrous limonite	12232102 Tonnes	-Used in backfilling the mine void.
02	Mine Tailings	Non-Hazardous	Chemical composition:	168561 Tonnes	- Tailings produced are fed to thickener to increase the settling rate and producing clarified water

Sl. No	Waste Description	Nature of Waste	Composition/ Characteristics	Qty (2018-19)	Management (Methods of Collection & Disposal)
			SiO ₂ , Fe, MgO, CaO, Al ₂ O ₃ , Cr ₂ O ₃ , Mn, TiO ₂		- Thickener's discharge is fed to Tailings Dewatering Plant and Tailing pond. - Parallel Filter Press is in place for dry tailing generation. - Recently, company has installed one Tailing dewatering unit at the COB Plant to recover the water from the tailings and - Disposed in the form of dry cake in safe and environment friendly manner.
03	Solid Waste (from Canteen, camp, office)	Non-Hazardous & Solid Waste	Organic & biodegradable waste, garbage, dry leaves, etc.	Approx.:0.2MT	-Collected in buckets (3 cum capacity) disposed on the OB dumps to fasten the vegetation cover and reclamation process.
04	Food Waste (clubs, canteen, camps)	Non-Hazardous waste	Organic in nature	Approx..8-9MT	- Processed in bio-gas plant (two nos) and the gas recovered is used in cooking and the residual waste as manures
05	General Office Waste	Municipal Solid Waste & Other solid waste	Plastics, rubber, scraps, tins, jute bags, bottles, damaged stationaries	Approx..0.15MT	-recycled by a registered scrap recycler based at Cuttack. - construction waste (debris) used in backfilling.
06	Used Oil: Gear oil- SP460, 320, 220 & 90, Hydraulic oil: 68, 10, 46, and 100, Mobil oil: 20W40, 30, 40 Transformer oil, Grease: Senogem EP2, KG 10.	Hazardous Waste (HW-5.1)	PCBs, Lead, Arsenic, Cadmium, Chromium, Nickel, PAHs, etc.	Gen:60.9KL Recycled:40.74KL Bal:24.78KL Including the balance from the previous year stocks. (As on 31.03.2019)	- Collected and securely stored inside 200Ltr MS Barrels and stored above concrete pavement under shed. - Sold to M/s Raj Lubricants and M/s Jamshedpur Lubricants, authorized by SPCB.
07	ETP Sludge	Hazardous Waste (HW-35.3 & 35.4)	Contains- compounds of Cr, Fe, Ni, Al, Si, etc.	Gen:314.05MT Disposed off:314.05MT Bal:3.5MT (from previous year stock)	-stored over impervious structure preventing spillage - disposed off at CHWTSDF of M/s Orissa Waste Management Ltd.
				Gen:3.2MT Disposed off: Nil	-Stored in HDPE lined placer dumper buckets

Sl. No	Waste Description	Nature of Waste	Composition/ Characteristics	Qty (2018-19)	Management (Methods of Collection & Disposal)
08	Residual waste containing oil	Hazardous Waste (HW-5.2)	Consists of oil filters, and residues such as soaked sand/soil, jutes, etc.	Bal:1.0MT (from previous year stock)	- Soaked sand stored in vats at oil & grease separation system -Incinerable waste disposed off by M/s West Bengal Waste Management Ltd, Haldia, W.B as per the directive of Member secretary, OSPCB.

PART-G

{IMPACT OF POLLUTION ABATEMENT MEASURES TAKEN ON CONSERVATION OF NATURAL RESOURCES AND ON THE COST OF PRODUCTION}

A.) DUST SUPPRESSION:

- ❖ To limit the fugitive emissions, various control measures like water sprinkling on haul road, transfer points, Ore stack yard, etc. is being done and the ore transporting roads (except for mine haul roads) and areas in maintenance, stack yard and chrome ore beneficiation plant have been concreted and stationary water sprinklers have also been installed.
- ❖ Four graders have been deployed for grading all the haul roads to remove the accumulated muck. Ten water sprinklers (two of 28 KL, four of 25 KL, and four 8 KL) have been deployed in the mine area for dust suppression on haul road and at mineral storage yards.
- ❖ Water spraying is done through pressure water jets at feed hopper, transfer points, discharge chute to prevent dust generation. The process at COB Plant is totally wet and eliminates the chance of any dust generation. The concentrate stacks are now being covered using tarpaulin sheets to prevent finer concrete particle from getting air borne. The details of concrete road including provision of fixed water sprinkler is outlined in the Table.12 below:

Table.12: Dust Suppression/Control Measures at Sukinda Chromite Mines

Particulars	Location	Length(m)	Width(m)
Concrete road	Main Haulage road	1000	13
	COB Plant	100	10
	LOP Plant	200	06
	Workshop	200	06
Fixed water sprinkling system	Main Haulage road	1000	-
	COB Plant	100	-
	LOP Plant	200	-
	Workshop	100	-
	Mining Road	1500	11

- ❖ To reduce dust generation at dry tailing plant, floor concreting and peripheral drain construction had been made. Tarpaulin covers are being used in stack yard and COBP to reduce dust generation with the expenditure of Rs. 10 Lakh per year (Approx.)

B.) ENVIRONMENTAL MANAGEMENT AT ASSOCIATED MINERAL STORAGE AREAS:

- ❖ The process at COB Plant is totally wet and eliminates the chance of any dust generation. The concentrate stacks are now being covered using tarpaulin sheets to prevent finer concrete particle being getting air borne.
- ❖ Plantation of 5-20 m width has also been raised in between colony and mines to minimize any air borne problems to the inhabitants. All parameter w.r.t ambient air quality is complying with the prescribed limit.

- ❖ Garland drains around the mines of 15,755m stretch have been constructed and is maintained regularly at the toe of dumps, periphery of the quarries, stack yard, COB plant and camp area.

C.) ENVIRONMENTAL MANAGEMENT: OB Dump Reclamation:

- ❖ The maximum height of the overburden dumps from its toe to the top of the dump on sloping ground is being maintained within 110 m.
- ❖ Dump Stability Study was taken up in 2010-11 with IIT, Kharagpur as per advice of the Regional Office of the MoEF, Bhubaneswar, for assessing long term dump stability requirements. As per the Report of May'2011, dumps up to 110m height are stable. The topography of the already stabilised old area is undulated and hilly ranging from 140 mRL to 200 mRL. At present over burden is disposed only in to OB II quarry as backfilling. Benches have been provided and overall slope of the dumps are less than 28°.
- ❖ Each level of dump is provided with garland drain and water from upper level flow to next level via concrete patch path (channel) provided for same purpose at areas were feasible. The concrete patch path ensures less soil erosion and flow of water from designated path. Further, coir matting and vetiver plantation has been done on the dump slopes to prevent wash off during the monsoon. Garland drains with 10 nos. of settling pits for silt collection of 1.5 m-2m width and 1m-1.5m deep have been constructed on the toe of all the OB dumps to collect the surface run-off during rainy season. The collected run-off is treated in newly installed ETP of capacity 4500 m3/hr and is then discharged beyond the lease boundary.
- ❖ To prevent soil erosion and to stabilize the dump slope of associated minerals 54,000 no. of saplings have been planted during FY 2018-19 over 11 ha of additional area allotted for overburden dumping. The density of tree more than 2500 trees per ha is being maintained.

- ❖ **SOLID WASTE MANAGEMENT:** The strategy for solid waste management basically focuses at Reduction and Source followed by proper segregation to explore the possibility of re-use /recycle and ultimately disposal in case becomes inevitable.
- ❖ Organic waste of canteen was put to the bio-gas plant made near canteen for the purpose. Organic waste of Hospital, Guest House& Valley club are also put to the bio-gas plant made near Valley club and other biodegradable waste including plant wastes are put in the overburden dumps to improve the nutrient content and thereby the plant growth.
- ❖ Each work place has been provided with containers for segregation of solid wastes depending on its characteristics for proper management and all the houses in the camp have been provided with two separate buckets for storage of degradable and non-degradable waste separately for safe disposal.

D.) WATER CONSERVATION: TREATMENT & RECYCLING:

- ❖ During 2018-19 company has spent Rs.271 Lakh (INR) towards mine water treatment to ensure that the water quality meets all the parameters as prescribe by the statutory authorities. This is excluding the cost of treatment of domestic effluent and cost of operating WTP (drinking water treatment facility).
- ❖ For the workshop effluents: An oil -Water Separation Pit equipped with belt skimmer is in place for trapping the oil and grease splits in the effluents generated from the vehicle washing.
- ❖ The system of treatment for Mine Pit Water consists of an ETP of 4500 m3/hr (108MLD) having the facilities like, settling pit, flash mixture, clarri-focculator, automatic dosing system, dry sludge collection system, multi sand filters etc as per the Direction of State Pollution Control Board.
- ❖ Herbal Treatment Plant is in use at our COB Plant for treatment of Hexavalent Chromium in the chrome concentrate. The water from tailing dam is recycled back to COBP for further reuse.
- ❖ Rain water harvesting study had been conducted and one roof top harvesting structure had been constructed inside General Office premises which will be also extended to other buildings.

E.) ENVIRONMENTAL MONITORING:

- ❖ An amount of Rs.28.95 Lakh (INR) was spent towards monitoring of various environmental parameters in FY 2017-18. This consists of air quality monitoring at a frequency of twice in a week with 24 hourly sampling and water quality monitoring once in a month for all the parameters as prescribed under various applicable statute.
- ❖ Weather monitoring is done through automatic weather monitoring station and compiled report on rain fall, humidity, temperature, wind speed, wind direction etc.
- ❖ Monitoring has been entrusted to one of the Odisha State Pollution Control Board empanelled category A consultant.

F.) PREVENTION OF LAND CONTAMINATION:

- ❖ The entire area of the HEMM maintenance workshop had been “Epoxy Flooring” for preventing any oil to reach the soil or ground and practices of using movable oil collection tray with built in pneumatic oil pump during any kind of HEMM maintenance to reduce oil leakage incidents.
- ❖ Targets have been put at various concerned locations to reduce the leakage/ spillage of oil which are monitored in as per the laid down EMS procedure.
- ❖ Introduction of barrel handler for handling of oil barrels to reduce oil leakage and spillage.
- ❖ Introduction of off line oil cleaner resulting in enhancement of oil life (increased oil replacement interval) and thereby reducing waste oil generation.
- ❖ Modification of the hose kits in CAT dumper that has resulted in oil consumption. Separate dust bins have been provided at COB Plant and workshop for collection of oil soaked waste to prevent contamination of land.

G.) AFFORESTATION:

- ❖ The plantation programme is being carried out as per the approved Mining Plan & Progressive Mine Closure Plan as that was envisaged in the EIA report.
- ❖ During the past year ended on March’ 19, total 54,000 no. of saplings were planted over 10 ha area in the Additional area of 100 ha allotted for overburden dumping.
- ❖ In addition to above, company had taken up plantation programme in the nearby villages through TSRDS (Tata Steel Rural Development Society). Further, 3000 nos. of fruit bearing sapling were planted at the nearby schools, and community places by the interested villagers viz. Kansa, Chingudipal, Gauramia.

H.) NOISE REDUCTION:

- ❖ Noise monitoring is being done once in three months both in work zone and in ambient. The data on noise level for the period Apr’18 to March’19 indicate that the values of noise levels are well within the prescribed limits of 85dB(A) at all the workplaces.
- ❖ Due precautions at source and at the receiver end are being taken adequately. Wherever possible the noise is controlled at the source by replacement of metallic screens by rubber screens & polyurethane panels etc at Chrome Ore Beneficiation and Lumpy Ore Processing plant. DG sets have also been provided with acoustic enclosures to prevent noise propagation.
- ❖ The operator’s cabin of all the HEMM’s including drills and dozers has been made air conditioned which serves as acoustic barriers. Controlled blasting technique like presplit blasting, use of Nonel and SME (Site Mixed Emulsion) is being followed as per CIMFR, Dhanbad’s recommendation minimize noise pollution and fly rock generation. However, the people working in the noisy areas are provided with personal protective appliances to reduce exposure of high noise. Regular test of all the vehicles is being carried out to check whether the vehicles are meeting pollution under control (PUC) norms.
- ❖ In the crusher area polymer liners have been fitted to reduce noise.
- ❖ All the shovels and haul pack cabins have been air conditioned to prevent adverse impact of dust and noise on the operators. To start with two dozer cabins have been made air conditioned.
- ❖ The DG sets working inside the camp have been provided with acoustic enclosures. The noise outside the acoustic enclosure, at the time of running DG sets measures to be within 45 - 65 dB (A).

I.) BEAUTIFICATION:

- ❖ For landscaping and horticultural development in the colony and workplaces an amount of Rs.80 Lakh(INR) was spent including watering arrangement to different gardens and plantation sties, flower show exhibition, Mines and Mineral Conservation Week, etc.

J.) SANITATION & WATER SUPPLY:

- ❖ Towards potable water supply for the camp residents Rs.48.39Lakh (INR) was spent during financial year 2018-19 and Rs.67.0 Lakh (INR) on sanitation fonts incurred in maintenance of sewer lines and storm water drains.
- ❖ Towards operation & maintenance of full-fledged STP an amount of Rs.7.80 lakh was spent during 2018-19.

K.) MALARIA ERADICATION (expenditure of 3.5Lakhs INR):

- ❖ Integrated mosquito control management programme undertaken to eradicate malaria cases in the colony. TSRDS has done several mobile treatment programs in different villages regarding diseases and their remedial measures with full check-up.

L.) RESOURCE CONSERVATION:The establishment of Chrome ore beneficiation plant has been able to utilize low grade ore having no market to produce beneficiated ore of the desired market value. This has

been the best example of our dedication towards the conservation of natural resources, which would otherwise have been wasted.

- ❖ Tailing dewatering plant has been established in the Chrome Ore Beneficiation (COB) plant premises. Higher and instant recovery of clear water is now possible using parallel filter press process.
- ❖ **Water Conservation:** Chrome Ore Beneficiation Plant is Zero Discharge Plant. Tailings generated are in the forms of dry cakes and disposed of in the designated tailing pond.
- ❖ **Energy Conservation-1:** In COB plant, translucent sheets have been fixed on the roof for reducing wastage of electricity and to reduce water consumption.
- ❖ **Energy Conservation-2:** With the expenditure of Rs. 1.2 Lakhs company has modified the tailing management system which results as reduction of 8000 hours of 75 KW motor per year.
- ❖ **Energy Conservation-3:** Flocculent dosing was changed from pump dosing to gravity dosing, which reduced 8000 running hour of 2 KW motor per year.
- ❖ **Energy Conservation-4:** Installed sun reflectors in Chrome Ore Beneficiation Plant with the expenditure of Rs. 5 Lakhs, which results as 937 KWH energy per light per year
- ❖ **Energy Conservation-5:** With the expenditure of Rs. 1.5 Lakh we installed a single pump to remove slurry during COB plant maintenance, which results reduction of 4 hours of 1850 KW machineries per year and Turbo Ventilators in Chrome Ore Beneficiation Plant with the expenditure of Rs. 2.50 Lakhs, resulting savings of 1753 KWH energy per year per turbo ventilator.
- ❖ **Recovery of Resource from Waste:** Soil conditioning is one of key activities for Land Rehabilitation which uses all the organic waste from the mine and camp premises for mulching.
- ❖ Installation of Fuel indicator, Magnetizer and HSD additives reduces fuel consumption in mining machinery and vehicular exhaust monitoring for all diesel and petrol driven vehicles is done once in six months and result utilized in optimizing the HSD and petrol consumption by vehicles.

PART-H

{Additional Measures/ Investment Proposal for Environmental Protection Including Abatement of Pollution, Prevention of Pollution}

The management of sukinda chromite mines plans to undertake the environmental protection measures aiming at specific areas with defined budgetary provisions earmarked towards the environmental protection measures every year. Funds earmarked for this purpose for the year 2017-18 is outlined in the table below reflecting the comparative status b/w the planned provision and the actual expenditure.

Table.13: Environmental Budgets (Planned Vs Actual) for FY 2018-19

Sl.No.	Item	Expenditure (Lakh(s) INR) Year-2018-19	
		Planned	Actual
1	Afforestation	55	53.24
2	Dust suppression	190	188.75
3	Treatment of mine discharge & recycling	150	271
4	Environment & weather, exhaust monitoring	24	28.95
5	Horticulture development	65	80
6	Drinking water supply	38	48.39
7	STP Operation & Maintenance	7.5	7.8
8	Sanitation	62	67.67
9	Herbal Treatment	5	4.5

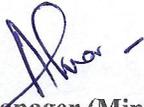
Sl.No.	Item	Expenditure (Lakh(s) INR) Year-2018-19	
		Planned	Actual
10	Malaria Eradication	7	3.54
11	Garland drain & storm water drain	2.5	23
12	Family planning	1	0
13	Slime dam management	12	10.7
14	Environment awareness (EMS)	12	10.24
15	Community development through TSRDS	615	616.74
16	Hazardous waste management	30	16.21
17	Bio medical waste	4	2.15
18	Total	1280	1432.88

PART-I

(ANY OTHER PARTICULARS FOR IMPROVING THE QUALITY OF THE ENVIRONMENT)

- ❖ Company is committed for prevention/abatement of pollution and minimize adverse environmental impacts of the business by ensuring continual improvement of environmental performance, and complying to the relevant environmental and other legislation, regulation & other requirements.
- ❖ The mine has already been certified with ISO-14001 (Environment Management System), ISO-9001 (Quality Management System), OHSAS-18001 (Occupational Health and Safety Assessment Series), (SA-8000) Social Accountability system and maintaining the systems satisfactorily. Apart from the above stated certifications our camp has also been certified with ISO-14001 (Environment Management System).
- ❖ The conventional technology also requires huge (~200lit/ton) amount of water for treatment whereas the Organic reductant method requires negligible amount of additional water due to its online nature in continuous production process. Therefore, the developed process technology saves huge quantity of water. Company was awarded DISR National Award for the Herbal Treatment Plant installed at our COB Plant for treatment of Hexavalent Chromium.
- ❖ **Environment awareness:** To make the camp residents and local people aware on the environment, the mine celebrated World Environment Day on 5th June' 2018.
- ❖ An innovative environmental sustainability awareness program was organized in the name of "GREEN SCHOOL" for the local school children in collaboration with TERI, New Delhi. This was a year-long initiative involving school students in exposure visits to nearby eco sensitive site, photography, painting and identification of biodiversity and appreciating the essence of sustainability through taking up sustainable projects on environment.
- ❖ **Celebration of MEMC Week:** Mines Environment and Mineral Conservation week was observed by participation of most of the mines of Bhubaneswar region, under the aegis of Indian Bureau of Mines, Govt. of India. The mine also hosted the environment awareness programme amongst school children, organized by SGAT.
- ❖ Biodiversity conservation program was started with the help of IUCN. The objective of this initiative was to adopt a comprehensive Biodiversity Conservation & Management Policy for Sukinda Chromite Mine to enhance the knowledge on biodiversity conservation among all the stake holders and develop a collaborative activity for its implementation. The Comprehensive Biodiversity Plan had been prepared and is under implementation.
- ❖ Campaign for safe segregation and disposal of household waste was organized among camp ladies and environmental awareness was developed.

❖ **PERIPHERAL DEVELOPMENT:** The Tata Steel Rural Development Society, an independent body of Tata Steel is engaged in peripheral development activities in the nearby villages around the mine. During 2018-19 a total amount of Rs.616.74Lakh(INR) spent on various plantation programmes, civil projects, agricultural extensions, medical facilities, sports, cultural and other developmental activities taken up in these villages. The above expenditure does not include statutory payments, the cost of in-built pollution control facilities in the Chrome ore beneficiation plant, and other equipment like wet drilling etc., the wages, medical facilities and other allowance/ facilities given to the concerned employees.



Manager (Mines)

Sukinda Chromite Mine

M/s Tata Steel Limited

ENVIRONMENTAL MANAGEMENT PRACTICES-SUKINDA CHROMITE MINE

COVERING OF LOADED TRUCK BY TARPAULIN



CONCRETE PATH:



DUST CONTROLLING MAEASURES



DUST SUPPRESSION AT HOPPER:



HAUL ROAD DUST SUPPRESSION SYSTEM:



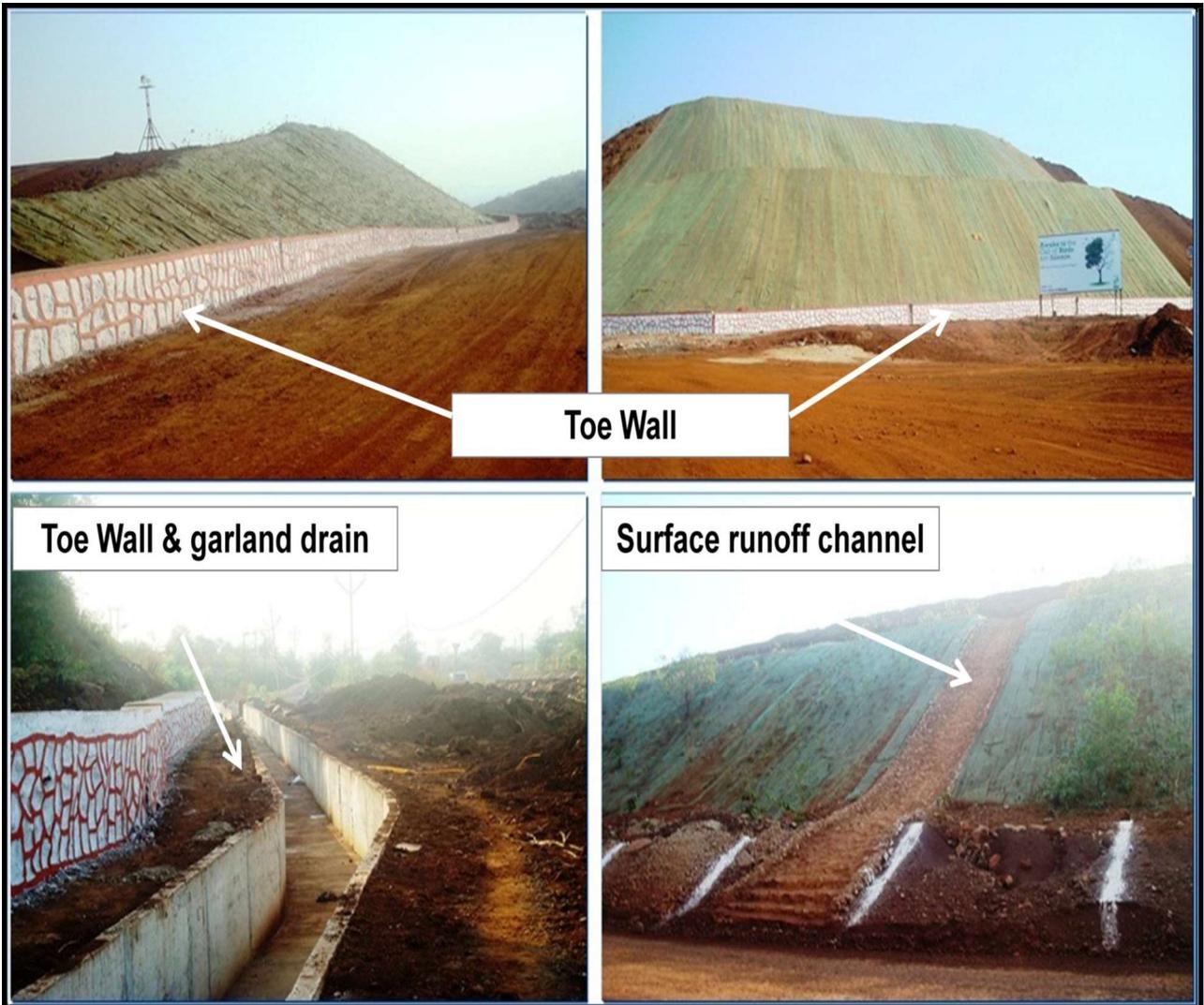
CONCRETE STACK WITH TRAUPLIN



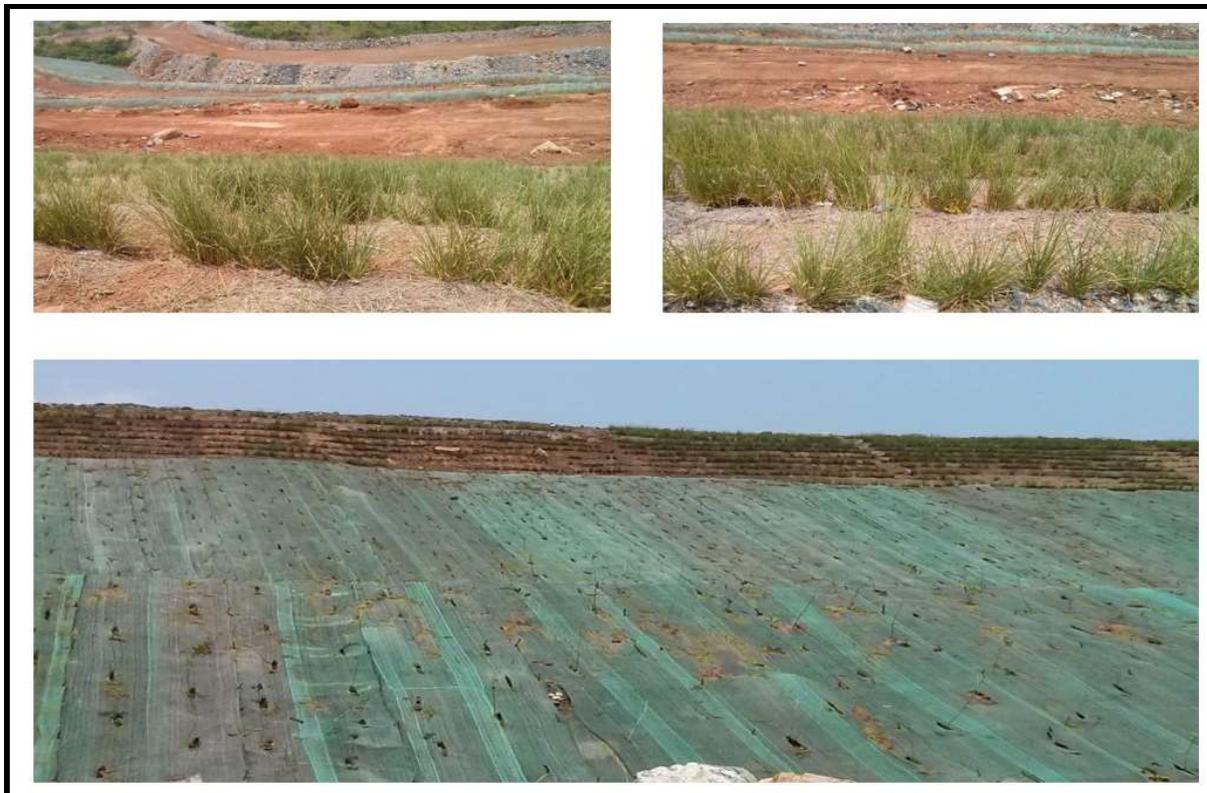
RAIN WATER HARVESTING STRUCTURE:



Toe wall, Garland Drain and Surface Runoff Channel



VERTIBER PLANTATION & GEONET APPROACH-DUMP SLOPE:



EFFLUENT TREATMENT PLANT:



HERBAL TREATMENT PLANT:



TAILING MANAGEMENT SYSTEM:



OIL-WATER SEPARATION PI

