Annexure-IV

RECLAMATION AND AFFORESTATION SCHEME

TIRINGPHAR IRON AND MANGANESE MINE
TATA STEEL LTD.

FOR TATA STEEL LTD.
By their Constituted Attorney

(GANESH PRASAD SAHU)
Head (Ferro Alloys Production)
Ferro Alloys & Minerals Division)

RECLAMATION AND AFFORESTATION SCHEME
BAMEBARI IRON AND MANGANESE MINE
Tata Steel Ltd.

1.0 Introduction

Tata Steel policy is to take care of and preserve the greenery in the leasehold area for ecological balance. Trees in non-mining area are protected unless otherwise cutting them becomes an absolute necessity. Only phase wise de-forestation is done by the company for advancement of mining and allied operation. The Reclamation and Afforestation Scheme of Tiringphar Iron & Manganese Mine consists of the following steps:

- Review of Afforestation already done
- Top Soil Management
- Dump and Pit Reclamation
- Budgetary Provision for Afforestation

2.0 Afforestation already done

Afforestation in the Tiringphar Iron & Manganese lease area has been taken up since long. These afforestation activities were restricted to the vacant spots and geologically barren areas along with the slopes of waste dumps in every stage. Presently, all the pits are in active stage. So, concurrent reclamation by back filling has been planned during conceptual period.

The Detailed year-wise data since 1985-86 is given below in the Table No. 1.

Table No.- 1

Tiringphar Plantation Data

Year	Actual	
	Nos	Area
1983-84	500	
1984-85	500	
1985-86	500	
1986-87	500	
1987-88	8780	
1988-89	7280	
1989-90	3550	
1990-91	3000	
1991-92	5000	
1992-93	5000	
1993-94	5000	
1994-95	4500	
1995-96	2000	
1996-97	3000	
1997-98		
1998-99	10000	4.0
1999-2000	10000	4.0
2000-2001	4500	1.8
2001-2002	4000	1.6
2002-2003	4000	1.6
2003-2004	5000	2.0
2004-2005	10000	4.0

2005-2006	0	0.0
2006-2007	2600	1.2
2007-2008	4000	1.6
2008-2009	3500	1.2
2009-2010	13519	1.2
2010-2011	5000	0.8
2011-2012	22260	2.0
2012-2013	4200	1.0
2013-2014	8500	2.0
2014-2015	20890	3.9
2015-2016	15400	1.2
Total	**196479**	**35.1**

Total area covered under afforestation is about 35.1 ha & the total no. of saplings planted is about 1.96 lakhs.

In the past all plantations had been taken up by TSRDS (Tata Steel Rural Development Society) which is a service oriented non- profit making organisation fully funded, supported & which is a sister concern of Tata steel. The self-help group of different nearby villages are actively participating & they are availing this opportunity from TSRDS. Saplings have been developed at our own nursery under horticultural guidance from TSRDS and District Forest Officials. We are using these saplings for plantation in our dumps and vacant areas. So this is a continuous effort given by Tata Steel from every corner for developing greenery all along.

3.0 Top Soil Management

Fresh forest area will be utilised for excavation of manganese and iron ore. Whatever topsoil generated will be removed separately before the commencement of mining activities and stacked separately at the earmarked site in 1 metre height topsoil dump. Top Soil will be preserved by planting grass on slopes and top of the dump. Such preserved topsoil will be utilised in subsequent monsoon for afforestation purpose in the mine lease area & waste dump slopes. The preservation manner is shown in **Sketch-1.**

4.0 Dump & Pit Reclamation

In the conceptual mining plan, the excavation of the pits of Guruda Block – A and Block – B pits. However, considering the higher rate of high grade production desired from the mine in order to meet the needs of our Ferro Alloy Plant, Joda it is now necessary to develop the mines further in order to exploit the reserves from the deeper levels.

It is envisaged that as mining pits will be expanded to go deeper as well as new area will be utilized for extraction of iron and manganese ore; reclamation of pit is not immediately possible. However, parts of the pits which have reached its ultimate depth will be backfilled. Moreover, attempts are being made to prove the barrenness in some of the bottom most areas of the pits already exhausted by DTH drilling so as to ascertain the existence of ore and subsequent preparation for back filling. While proposal for further back filling has been worked out it needs to be approved by the competent authority as per the Mining Plan / Scheme of Mining and Progressive Mine Closure Plan for subsequent plan periods, before the same can be taken up.

The process of inactive dump slopes being biologically stabilized with multi-species afforestation will continue. Parapet walls for some of the active dumps will be taken up during the first year itself.

The details of the area to be reclaimed and afforested in a phased manner is given in the table no. 2

Table 2 Plantation Plan

Year	Afforestation over inactive dump slope	Area (Ha)
2015-16	0	1.2
2016-17	13643	5.5
2017-18	17555	7.0
2018-23	17804	5.9
2023-2030	40442	13.5
Total	89444	33.1

5.0 Bio-diversified Afforestation /Reclamation.

The species to be planted in the reclamation programme are given in Table no.3.

Table No.- 3

Sl No.	Botanical Name	Common Name
1	Albizzia lebbek	Siris
2	Prosopia juliflora	Juliflora
3	Malia azadirachta	Bakain
4	Terminalia arjuna	Arjun
5	Luceana lucocephala	Subabul
6	Melina arborea	Gamhar
7	Psidium guajava	Guava
8	Acacia auriculiformis	Acacia
9	Azadirachta indica	Neem
10	Terminalla tomentose	Asan
11	Zizypus jujube	Ber
12	Shorea robusta	Sal
13	Tectona grandia	Teak
14	Delbergia sisso	Sisham

6.0 Method of Plantation

The steel company proposes to reclaim the mining pits and dumps by afforestation, when they are permanently abandoned. The afforestation of the dumps and mining benches will be done by the following methods.

(A) Method of Pitting & Planting:

i) The worked out mining benches will be reclaimed by making pits of 0.5m x 0.5m x 0.5m size, 2m apart. The pits will then be filled with sweet earth, sand and cow-dung.

ii) Neem cake powders are proposed to be applied in the pit to protect the plants from white ants.

iii) Such ground preparation is proposed to be done before monsoon after which appropriate varieties of saplings will be planted during the monsoon.

The method of pitting and planting has been explained in **Sketch-2**

(B) Method of Planting by Contour Trenching:

This method is proposed for slopes wherein contour trenches are dug at 3m interval along the contour. The excavated earth is stacked on the edge of the trench on the lower slope side to arrest the water flow that comes due to rains and accumulates on the trenches and gradually seeps through the strata enabling the planted saplings to get water and nutrients regularly for healthy growth.

The method of pitting and planting has been explained in **Sketch-3**

7.0 Present Organization and Man Power

Since 1989, an Environment Management Department has been set up exclusively for Tata Steel to monitor and executive all environment-related activities of all the mines of our Division including our Tiringphar Iron & Manganese Mine. This department has been occupied with well-experienced professionals drawn from different disciplines like mining, botany, horticulture and chemistry backgrounds and the organisational structure shown in Chart-1 These professionals are now regularly interacting with our TSRDS who has much expertise in this field and seeking advice from different Govt. forest officials & officials of MoEF to make the afforestation programme of each mine, a success. Tiringphar Iron & Manganese Mines, being an important mine of the Company, receives due attention and care in all the environmental matters including afforestation and reclamation.

8.0 Financial projections of the proposed reclamation scheme

The financial projection for the proposed reclamation and afforestation scheme, based on the current prices as indicated in Table No.: 4 & the rate has been calculated per hectare plated. Based on these projections the budgetary provisions that are necessary to be made for entire plan period are given in Table No.-5.

a) Cost estimate for reclamation & afforestation (estimation is for one ha.)

During the first year the Dept. will make the plantation of specified saplings & from second and subsequent year due take care will be taken for its better survival in future.

Table No.- 4

COST OF ESTIMATES FOR RECLAMATION AND AFFORESTATION OF ONE HECTARE OF LAND

Sl. No.	Item of work	Man days	Labour rate @ Rs. 280	Labour Cost	Material cost	Total
1	*2*	*3*	*4*	*5=3 x 4*	*6*	*7=5+6*
1st Year : Planting Operations						
2	Site preparation	8	0	2240	0	2240
4	Digging of pitting (30 cm^3)	40	0	11200	0	11200
5	Nursery cost (one year old seedling) part.	75	0	21000	25000	46000
6	Contingencies & overheads (10% of Sl. 1 to 5)	0	0	0		6088
Sub Total		127	0	35560	25000	65528
1st and 2nd Year : Maintenance During plantation year and one year maintained						
1	Carriage of seedlings to site cleaning including casuality replacement	25	0	7000	0	7000
2	Cost of insecticide & fertilizer	20	0	5600	2000	7600
3	1st Weeding (Complete Weeding)	7	0	1960	0	1960
4	Manuring	5	0	1400	2500	3900
5	2nd Weeding(Complete Weeding)	5	0	1400	0	1400
6	Soil working (50 cms. Radius around plants)	8	0	2240	0	2240
9	Watch & ward and brush wood/live fencing at 15% length of periphery to prevent cattle entry	7	0	1960	0	1960
10	Watering at least 6 days in a month for 8 month (April to July & Dec. to March) on LS		0	0	0	100000
11	Contigencies (10% of Sl 1 to 10)					12970
Sub Total		90	0	25200	4500	139030
Grand Total		**217**	**0**	**60760**	**29500**	**204558**

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Table No.-5

Budgetary Provisions for Plantation

Year	Nos. of sapling	Area (Ha.)	Provision for Budget (Rs.)
2015-16	0	1.2	245470
2016-17	13643	5.5	1125069
2017-18	17555	7	1431906
2018-23	17804	5.9	1206892
2023-End of Life	40442	13.5	2761533
Total	**89444**	**33.1**	**6770870**

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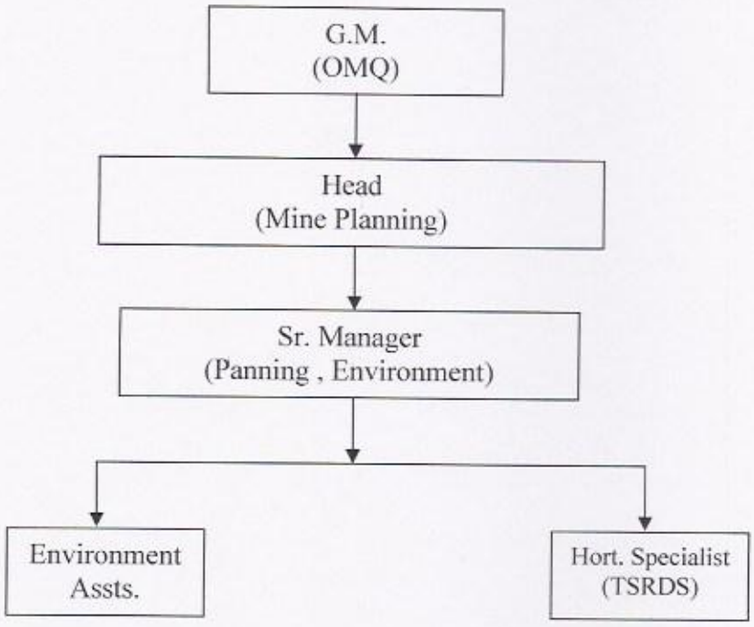
CHART-1

Organisation Chart
Mine Production Planning & Environment



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