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Disposal and utilization of steel plant waste

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INTRODUCTION

The industrial city of Jamshedpur, with the pioneer steel plant of India, is situated at 86.2 Longitude and 22.8 N Latitude, 600 ft above sea level in the state of Bihar. It is 250 Km west of Calcutta. In the process of industrialisation since 1904, Jamshedpur and its surrounding have developed into a conglomeration of about 500 industries of heavy, medium and small scale. The population as per 1981 census is 670,000. The city planners were and are visionary in solving many problems of disposing and utilizing the municipal and industrial waste.

In this paper we want to project the commendable work done by the Tata Iron Steel Co. in managing the township. The waste disposal and civic facilities are interrelated. The waste of Jamshedpur can be classified into municipal waste and industrial waste.

The municipal waste of sewage type have been taken care by the sewage treatment systems and the treated effluents are discharged into the river systems. It is one of the township in India which cared for sewage treatment since 1930. It also has developed the system of community latrines for the poor sections of the city dwellers. In last ten years it also has developed a system of "Sulabh Sauchalaya" by constructing public toilets at important locations, these toilets are self governed.

The main problem of Jamshedpur is to manage and maintain the solid industrial waste. The principal solid waste generating industry is the Steel plant and particularly its blast furnace and thermal power generating system.

The solid waste generated by the industries can be categorised as follows :-

- | | |
|------------------------|--------------------|
| 1) Blast Furnace | 2,000,000 ton p.a. |
| 2) Thermal Power Plant | 4,38,000 p.a. |
| 3) Other Industries | 50,000 ton p.a. |

The systematic disposal of the waste is the problem of the industries as well as the civic authorities. To meet this problem and to avoid solid waste or soil pollution, the management has met the problem on following grounds :-

- A) Recovery of valuable from the waste.
- B) Disposal and utilisation of waste in urban planning.
- C) Disposal of waste towards better environment and ecological balance.

(A) RECOVERY OF THE VALUABLE FROM THE WASTE :

1) From slag-the waste generated from the plants at first are sorted out and the metallic waste of larger size, such as pig iron jam, iron cutting etc. are recovered by its method. A contractor company used to do this job and now the job is done by a nationalised company "The Ferro Scrap Nigam". This company has a turnover of more than Rs.10,000,000 p.a. (Rs. 23 = 1₹).

The blast furnace waste of granular nature recovered from slag are used in cement industries and about 500,000 ton of slag is taken by the cement manufacturing industries at a nominal cost of Rs. 50 per ton.

The remelting solid waste are dumped at various places as desired by town planners. This supposedly useless waste when comes out of the industries and dumped, becomes the source of earning for the poor. The poor people further recover the materials of use from the thrown waste. Since 1980, they are working on an organised manner by forming a "Slag Pickers Co-operative Society". The Society is collecting the entire recovery and selling it to consumers. In 1986-87 the society had 1080 members or dependent families. The total turnover was around Rs.78,00,000. The items recovered are as follows :-

T A B L E - I

<u>I t e m</u>	<u>Sale rate per Ton in Rs.</u>
1. CAST IRON	
a) Above 5 Kg.	1700.00
b) Below 5 Kg.	1300.00
c) Chips	700.00
d) Hard Casting	700.00
e) Rounds	300.00
f) Scales	300.00
g) Rejected	800.00
2. MILD STEEL	
a) Jam Big	600.00
b) Jam below 1 Kg.	300.00
3. FERRO MANGANESE	5500.00
4. FERRO SILICON	11000.00
5. MAGNESITE BRICKS	1500.00
6. CHROME MAGNESITE BRICKS	400.00
7. FIRE BRICKS	400.00
8. MILD STEEL ROLLING	2300.00
9. MILD STEEL MELTING	1500.00
10. NON FERROUS (NON COPPER)	1500.00
11. NON FERROUS COPPER BEARING	5500.00
TOTAL TONNAGE OF ABOVE ITEM RECOVERED IN 1986-87 ABOUT 4500 TONS.	

2) Disposal of Fly Ash & Coal :

The another major waste is fly ash generated from the Thermal Power Plants. The generation of this ash is around 438,000 tons p.a. about three or fourth of it is given into river system as the slurry. The composition of the ash is as follows :

T A B L E - II

<u>FLY ASH COMPOSITION IN PERCENT</u>		
SiO	-	50.08
Al ₂ O ₃	-	23.52
C	-	11.20
FeO	-	1.55
Fe ₂ O ₃	-	6.15
CaO	-	2.00
MgO	-	.72
MnO	-	traces
P ₂ O ₅	-	1.5

The remaining fly ash is used in dumping as per the town planners desire.

The other waste is the ash and coal from the various furnaces of industries. There is further recovery from this waste. The coal is further recovered from this at an average of 7000 tonnes p.a. or about Rs.2,000,000 p.a. This coal is again used in catering the need of the house holds of the city. About 500 families are engaged in this work.

3) Other Waste Materials :

The other waste which includes degradable and non-degradable type are dumped at various sites as desired by the planners in the systematic manner.

(B) DISPOSAL AND UTILIZATION OF WASTE
IN URBAN PLANNING :

The solid waste is dumped after careful planning and selection of site. It has helped in the levelling of low land, in constructing the embankments for flood control, in constructing roads etc. By this planning the many areas have been developed for the housing and recreational purposes.

All along the river line of the Jamshedpur city, the industrial solid waste have been dumped in such a way that they have elevated the river banks and have been working as an embankment to keep away the flood water from the municipal limits of the city. It is also preventing the soil erosion.

(C) DISPOSAL FOR BETTER ENVIRONMENT AND
ECOLOGICAL BALANCE :

Due to rapid expansion of industries in the post independence era after 1974, Jamshedpur was heading towards a polluted city, but due to planning the rate has been checked.

There is awareness in this direction and so each year, massive afforestation programme is being carried out. In the year 1986-87 10 million trees were planted in the city of Jamshedpur, the after care was also been done by the Notified Area Committee and Park & Garden Dept. of the company. The overall survival rate of the planted saplings are 50-55%, in some areas it is 90-100%. There is a proposal to make and develop Jamshedpur as the greenest city in this part of India.

There is also a plan to develop the top soil on the dumped areas for natural growth of grasses and to check soil erosion. This will lead to the succession of plant communities, which, in course of time

can be developed into recreational parks or housing site.

However, the solid waste can be utilised still, on a better way and more valuable materials can be recovered, particularly P_2O_5 content of the slag and fly ash can be used as fertiliser. The high content of silica and aluminium in fly ash can be used in manufacturing of bricks. The Al_2O_3 content of the fly ash can further be utilised for the manufacture of aluminium based chemicals such as alum or aluminium hydroxide. No worker or entrepreneur has come forward as yet to work in this direction. At least 100,000 tons of Al_2O_3 is unutilised and is going for dumping, or going in river system or in making air polluted by the particles. Therefore there is a further scope to work in this direction.

SUMMARY :

Jamshedpur, has shown that by proper management, the industrial and urban planners can generate wealth from the waste. From various estimates it has been revealed that at present atleast Rs 20.00 per ton materials are recovered, leaving aside the benefit this solid waste management is giving in town planning, environmental management and ecological balance of the city. This example has given an idea for other steel plants also towards the solid waste management in India. But the Jamshedpur experience is the first mile stone in this direction.

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