Pre-Feasibility Report

For

Expansion of Ferro Alloys plant from 11,500 TPA to 37,500 TPA (product mix of Silico manganese, Ferromanganese and Ferro silicon within the allowed capacity) by M/s Shree Bholey Alloys Private Limited

At

Phase – IV/C- 1 (P) 3 Industrial Area,
Village: Goradih / Balidih, PO: Bokaro Steel City
District: Bokaro
Jharkhand

Schedule: 3 (a), Category: A

By:-
M/s Shree Bholey Alloys Private Limited
Registered Office

Barwaadda, P.O – Kalyanpur, Dhanbad-826004
Jharkhand
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<th>Page no</th>
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CHAPTER - I  
EXECUTIVE SUMMARY

1.0 Introduction

Ferro alloy refers to various alloys of iron, which are used in the production of mild steel, carbon steel, special alloy steel and stainless steel. India’s steel production is increasing every year; thereby the consumption of Ferro Alloys is also increasing. The Indian Ferro Alloy industry has a capacity of 5.15 million tones. It is accounting for nearly 10% of the world’s ferro alloy production. India, South Africa, China and the CIS countries represent a large source for Ferro Alloys.

Considering the potential ferro-alloys demand in India. M/s Shree Bholey Alloys Private Limited., decided to install additional 1 nos. of Submerged Arc Furnace (1x15 MVA) as an Expansion project to increase the existing production capacity of 11,500 TPA Ferro Alloys by adding 26,000 TPA capacity. The plant is located at Phase – IV/C- 1 (P) 3 Industrial Area, Village – Goradih/ Balidih, PO: Bokaro Steel City, Dist.- Bokaro Jharkhand-827104.

<table>
<thead>
<tr>
<th></th>
<th>Name of the Company</th>
<th>M/s Shree Bholey Alloys Private Limited.</th>
</tr>
</thead>
</table>
| 2 | Registered Office Plant & Admin Office | Plant:  
Phase – IV/C- 1 (P) 3 Industrial Area, Village – Goradih/ Balidih, Dist.- Bokaro, Jharkhand-827014.  
Corporate Office:  
Barwaadda, P.O – Kalyanpur, Dhanbad-826004 Jharkhand |
| 3 | Name of the Directors | Mr. Satyanand Singh  
Mr. Rakesh Kumar Singh |
| 4 | Proposed Sector | Ferro Alloys Plant |
| 5 | Area of plant | 5.64 Acre (2.28 Hectare) (No additional land is required for the Expansion) |
| 6 | Topo Sheet No | 73I1,73I2, 73E13 & 73E14 |
| 7 | Project Site Co-ordinates | Latitude | Longitude |
| | | 23°41'6.19"N | 86°3'3.40"E |
| | | 23°41'3.59"N | 86°3'41.81"E |
| | | 23°40'57.99"N | 86°3'35.15"E |
| | | 23°40'59.76"N | 86°3'33.00"E |
| 8 | Proposed Units & Total Capacity | Expansion project to increase the existing production capacity of 11,500 TPA Ferro Alloys to 37,500 TPA |
| 9 | Product & capacity | Ferro Manganese, Silico Manganese & Ferrosilicon Capacity (Existing + Expansion) – 37,500 TPA (11,500 TPA + 26,000 TPA) |
| 10 | Cost of Project | Rs.29,00 Lakhs |
1.2 Identification of Project and Project Proponent
M/s Shree Bholey Alloys Private Limited has proposed to expand the existing plant from 11,500 TPA by adding 26,000 TPA by installation 1x15 MVA Submerged Arc Furnace at the project site.

Project Promoters:
M/s Shree Bholey Alloys Private Limited. is promoted by,

- Mr Satyanand Singh
- Mr Rakesh Kumar Singh

1.3 Employment Generation – Manpower
During Operation Phase:-
Additional 64 persons who will include Executives, Engineers, Supervisors and Skilled and unskilled work force.

1.4 Site Location
The Project is proposed to be located at Phase – IV/C- 1 (P) 3 Industrial Area, Village – Gorabalidih, City/Block – Chas. Bokaro – Jharkhand-827104. Project site is well connected to Dumri-Bermo-Jaina Road which is 3 km distance toward NW also well connected to NH-23 is 1.70 KM towards South direction.

1.5 Raw Material Requirement & Source.
Major raw material constitutes are Manganese Ore, Iron Ore, Steam Coal, Coke, Quartz & Dolomite. Other ingredients are Refractory, Electrodes, Carbon Paste, Tamping Paste & furnace fettling materials, Industrial gases, etc.

Source
The main raw materials required for manufacture of Si, Mn, i.e., Mn ore Is available from the mines of Manganese Ore India Ltd, Nagpur, and also from private mine owners in Orissa & Jharkhand. Coal and Coke required for manufacture are available in and around Jharkhand and Orissa in sufficient quantity while dolomite is brought from Orissa. Other ingredients such as quartz are abundantly available from Jharkhand

Manganese Ore
Silico-manganese (SiMn), a ferroalloy with high contents of manganese and silicon, is made by heating a mixture of the oxides manganese oxide (MnO₂), Silicon dioxide (SiO₂), and Iron oxide (Fe₂O₃), with carbon in furnace. They undergo a thermal decomposition reaction. It is used as a de-oxidizer and an alloying element in steel. The standard grade Silica-manganese contains 14 to 16% of silicon, '5.5% to 68% of manganese and 2% of carbon. The low carbon grade SiMn has carbon levels from 0.05 to 0.10%.
Ferro manganese, a ferroalloy with high content of manganese, is made by hearing a mixture of the oxides (MnO$_2$), (Fe$_2$O$_3$), with carbon in a furnace. They undergo a thermal decomposition reaction. It is used as a de-oxidizer for steel.

The production of Ferro & Silico Manganese in a sub merged arc furnace calls for proper selection of Manganese are the Ideal choice of ore should be having Mn content of 46 to 50 % & Mn/ Fe ratio about 3.5 to 4.0, Si not exceeding 11% & low phosphorus content. The ore should ideally consist of 70% lumps & 3% fines for the proposed plant having Mn content of more than 40% is available in Nagpur & Barbil.

**Coke Breeze**
The ideal reducer for production of Ferro & Silico manganese should have low ash content, high electric resistance, a low content of volatile & a high strength of lumps on heating. Certain grades of anthracite & coke may be applicable for the purpose for the purpose but mainly in combination with other reducers, because they are liable to cracking on heating. The most common reducer is coke breeze i.e. fines remaining from the screening of blast furnace Coke. The major disadvantage of the coke breeze is its moisture content.

**Dolomite**
Dolomite is used for making slag in the smelting process as the Manganese ore contain substantial quantity of gangue. The amount of dolomite requirement will depend on the gangue content in raw material employed, grade of dolomite used, the process adopted etc. The dolomite should preferably contain 52 to 54% CaO with low insoluble & sulphur content. Dolomite is available in North Bengal/Bihar.

**Quartz**
The ore component of the charge for making Ferro alloys are material having a high content of silica such as quartz, quartzite & chalcedony. Since aluminum & phosphorus are detrimental Impurities In the charge, the lower contents of the same will ensure lesser slag & consequently lesser loss of electric energy. Quartz is available in Madhya Pradesh, Bihar, Meghalaya & Bhutan.

**Specific Raw Materials Consumption**

<table>
<thead>
<tr>
<th>Raw Materials/ source</th>
<th>Quantity/Ton of FeMn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese Ore (Mines in MP)</td>
<td>2.4 tons</td>
</tr>
<tr>
<td>Coke (Imported)</td>
<td>0.8 ton</td>
</tr>
<tr>
<td>Dolomite (locally available)</td>
<td>0.25 ton</td>
</tr>
<tr>
<td>Carbon Paste (direct purchase)</td>
<td>0.03 ton</td>
</tr>
<tr>
<td>Quartz (locally available)</td>
<td>0.1 ton</td>
</tr>
<tr>
<td>Total</td>
<td>3.58 tons/ton FeMn</td>
</tr>
</tbody>
</table>
**Material** | **Quantity/Ton of SiMn**
---|---
Manganese Ore | 1.6 tons
Coke | 0.8 ton
Dolomite | 0.25 ton
Carbon Paste | 0.03 ton
Ferro Slag | 0.7 ton
Total | 2.48 tons/ton SiMn

**Material** | **Quantity/Ton of FeSi**
---|---
Quartzite | 1.8 ton
Mill Scale | 0.3 ton
Coal | 0.9 ton
Coke Breeze | 0.5 ton
Scrap | 0.1 ton
Total | 3.6 tons/ton FeSi

### 1.6 Water and Power Requirement

The total water requirement for the project is 100 m³/day. Water requirement will be met through Bokaro Industrial Area Development Authority supply. Additional 22 MW power will be required for the project, which will be supplied by Damodar Valley Corporation.

### 1.7 Air Environment – Mitigation Measures

**Source of air pollution and control measures**

<table>
<thead>
<tr>
<th>Section</th>
<th>Source of Pollution</th>
<th>Pollutants</th>
<th>Air pollution control Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnace</td>
<td>Furnace</td>
<td>PM &amp; gases</td>
<td>Fume extractor followed by cyclone and Bag Filters, stack height will be 30 m as per CPCB norms.</td>
</tr>
<tr>
<td>Raw material handling &amp; sizing section</td>
<td>Pulverizer for grinding of raw material</td>
<td>Dust and particulate matter</td>
<td>Dust catcher and Bag filter</td>
</tr>
<tr>
<td>Over all Plant area</td>
<td>Open space</td>
<td>Fugitive dust emission</td>
<td>Pucca roads within the premises, water sprinkling in dusty areas and green belt/plantation to arrest the fugitive dust emission.</td>
</tr>
</tbody>
</table>
• The pollution control equipment will regularly be operated and maintained.
• Fugitive emission will be regularly monitored and suitable action like cleaning, water sprinkling will be taken.

1.8 Waste Generation and Management
Borewell water will be treated in water softener to bring the TDS of ground water 50-75 ppm and water will be used furnace & electrode cooling whereas used water will be recirculated using cooling towers. The storm water drains will be segregated and channelized to water harvesting area.

Hazardous waste: There is no hazardous waste from the plant except for used oil with approx quantity of 100 liters per annum, during course of production of and is also saleable to the registered recyclers in the market.

1.9 Site Analysis
The site is within Industrial Area and has all the facilities for the proposed project. Also it has good connectivity with the rail and road.

1. Road Connectivity: The project site is well connected to National Highway 23 which is at 1.70 KM towards South also surrounded by Industrial Area Road.
2. Rail Connectivity: The nearest railway station is Tupkadih railway station at 3.15 Km towards North direction and Bokaro railway station at a distance of 3.50 km towards South-East from the proposed project site.
3. Approach Road: Exists

1.10 Proposed Infrastructure

a) Industrial - Plant Area
Total land area available with company is 5.64 Acres

b) Green Belt & Plantation
Total greenbelt & plantation area provided is 1.88 Acres which is 33.31% of the total area. The main objective of the greenbelt is to provide a barrier between the plant and the surrounding areas.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Area</th>
<th>Green Belt</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.72 Acre (Existing)</td>
<td>0.89 Acre</td>
</tr>
<tr>
<td>2</td>
<td>2.92 Acre (Expansion)</td>
<td>0.99 Acre</td>
</tr>
<tr>
<td></td>
<td>Total Green Area (Existing + Expansion)</td>
<td>1.88 Acre</td>
</tr>
</tbody>
</table>
c) Rehabilitation and Resettlements (R & R) Plan

No R & R involved as it is an expansion project & Land already has been purchased which falls under industrial area.

1.11 Project Schedule and Cost Estimates

a) Project Schedule

The expansion project implementation schedule is 6 months from start date. The external agencies such as consultant, machinery suppliers, contractors of civil construction and equipment will be selected carefully well in advance.

b) Project Cost

An indicative estimated capital cost of the proposed Plant is around Rs. 29,00 Lakh.

1.12 Analysis of Proposal

The project is technically viable as located in industrial area. Also there are existing facilities which will be used by the project. Overall no negative impact on the socio economic environment is anticipated.
CHAPTER – 02
INTRODUCTION OF THE PROJECT/BACKGROUND INFORMATION

2.1 Identification of Project and Project Proponent
Considering the potential ferro-alloys demand in India and for better utilization of raw materials. M/s Shree Bholey Alloys Private Limited, decided to install one Submerged Arc Furnaces (1x15 MVA) as an Expansion project to increase the existing production capacity of 11,500 TPA Ferro Alloys by adding 26,000 TPA production, which is located at Phase – IV/C- 1 (P) 3 Industrial Area, Village – Gorabalidih, City/Block – Chas, Dist. - Bokaro, Jharkhand - 827104. No additional land will be acquired for the expansion. The availability of infrastructural facilities and logistics of operation were considered while evaluating the possible site.

Project Proponent & Promoters:

M/S Shree Bholey Alloys Private Limited has been promoted by following Directors:

<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mr. Satyanand Singh</td>
<td>The promoters have good experience in the field of Ferro Alloys manufacturing and marketing of same.</td>
</tr>
<tr>
<td>2</td>
<td>Mr. Rakesh Kumar Singh</td>
<td></td>
</tr>
</tbody>
</table>

2.1.1 Project Details
M/s Shree Bholey Alloys Private Limited has proposed to expand its existing unit at Phase – IV/C- 1 (P) 3 Industrial Area, Village – Gorabalidih, City/Block – Chas, Dist. - Bokaro, Jharkhand - 827104 for production of 26,000 tons per annum of Ferro Alloys by installation of additional 1 x 15MVA Submerged Arc Furnace for which environmental clearance is required from the Ministry of Environment, Forest & Climate Change.

2.2 Brief Description of Nature of the project
Project is for expansion of Shree Bholey Alloys Plant for total production (Existing + Expansion) of 37,500 TPA Ferro Alloys.

“The project falls under Category ‘A’ as per the EIA Notification, 2006 & Project was earlier granted Environmental Clearance from MoEF vide letter No - F.No. J-11011/317/2009-IA II (I) dated:-30th Sep 2010.”

Ferro Alloy is being used for manufacturing of Alloy Steel, Super Steel, Tool Steel such as tensile, elongation etc. and for manufacturing of Corrosion Resistant and Abrasion Resistant steel.
2.3 Need of the Project and its Importance to the Country and/or Region

Ferro-alloys are essential ingredients for production of various types of carbon and alloy steel as well as alloy iron. The basic element of a Ferro-alloy when added to steel tends to improve the physical properties, e.g. change in electricity, ultimate tensile strength, hardness, etc. Sometimes addition of some elements in the form of Ferro-alloy is done deliberately to liquid steel and other alloys for developing abrasion resistance, wear resistance and corrosion resistance properties. The production/consumption of steel in any country may be directly related to the growth, steel is an essential commodity and therefore need of Ferro-alloys are independent. Apart from using Ferro-alloys like for alloying the steel, they are also widely used for de-oxidation, desulphurization & refining of steel. Smaller quantities of ferroalloys are used as are used reductants in order to produce other metals. Besides their use in plain carbon steel and alloy steel plants, a significant quantity of ferroalloys is consumed by the foundries & electrodes industries.

Silico-Manganese and Ferro-silicon is widely used in the production of various types of carbon steel, its rate of consumption 3-4 kg per tone of crude steel for mild steel production and 10 kgs per tone of crude steel for special & alloy steel products. It would be worthwhile to mention that ministry of steel constituted various sub groups to assist the working group on Iron & Steel Industry for the NITI Aayog and then up to 2016-17. According to the report submitted by the task force, the total production of the finished steel has been 20.75 million tones in 2010-11 as compared to 14.30 million tones 2006-07 indicating an increase of 44.8%. The task force committee projected demand of finished steel at 21.225 million tones in 2010-11, 32.68 million tones in 2011-12 and estimated 48.8 million tones in 2016-17. However, the task force has not made any projection for the period 2017-18 to (2021-22. Similarly, the domestic demand for bulk Ferro-alloys has been projected up to 2016-17. Projection of demand for steel as well as bulk ferro-alloys are given in below:-

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand of Steel</td>
<td>21.225</td>
<td>23.139</td>
<td>25.225</td>
<td>27.499</td>
<td>29.978</td>
<td>32.680</td>
<td>48.80</td>
</tr>
<tr>
<td>Manganese Alloy</td>
<td>0.344</td>
<td>0.355</td>
<td>0.368</td>
<td>0.382</td>
<td>0.395</td>
<td>0.410</td>
<td>0.586</td>
</tr>
<tr>
<td>Ferro Silicon</td>
<td>0.108</td>
<td>0.115</td>
<td>0.122</td>
<td>0.129</td>
<td>0.137</td>
<td>0.145</td>
<td>0.195</td>
</tr>
<tr>
<td>Ferro Chrome</td>
<td>0.165</td>
<td>0.187</td>
<td>0.213</td>
<td>0.242</td>
<td>0.275</td>
<td>0.312</td>
<td>0.533</td>
</tr>
<tr>
<td>Total</td>
<td>0.617</td>
<td>0.657</td>
<td>0.703</td>
<td>0.753</td>
<td>0.807</td>
<td>0.867</td>
<td>1.314</td>
</tr>
</tbody>
</table>

Silico-Manganese and Ferro-Manganese is an essential additive for production of carbon steel. It acts as a double deoxidizer and is ideally suited for steel making. Silico-Manganese is very much more active (compared to individual additive of Ferro-manganese or silico-manganese) to keep working molten "flat" to enable finishing the heat. Restriction of silicon addition is to be decided by increase of manganese contact in the bath compared to the top limit of manganese specification, The
normal addition of silico-manganese per ton of liquid steel is 4 to 5 Kg per tonne of molten metal. Keeping this in mind and based on the increase in steel production in the integrated steel plant of TISCO and SAIL alone, the requirement of Silico-manganese has been projected in exceed of 250,000 MT. This quantity does not reflect the number of new integrated steel plant coming up in the region which would require additional Ferro-alloys and the export potential of this product.

2.4 Demand – Supply Gap
In addition to steel plants, several steel casting plants have been set up in the country which consumes Ferro Alloys. With a Proactive Make in India policy of Govt. of India and the consumption of Indigenously manufactured Steel in the Infrastructural Projects the demand will rise significantly and the expected projected figures may be as follows:
Projected Requirement (annual)

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>DEMAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRESENT</td>
<td>2018-19</td>
</tr>
<tr>
<td>LC FERRO CHROME</td>
<td>36000 Tons</td>
</tr>
<tr>
<td>LC FERRO MANGANESE</td>
<td>30000 Tons</td>
</tr>
</tbody>
</table>

There is huge gap between demand and supply which is being fulfilled by Imports. This proposed project will save Dollars by reducing Imports. The best part of this project is that the raw material is available in our Country abundantly and hence it will be complete replacement from Import.

2.5 Export Possibility and Domestic/Export Market
The primary markets of interest for M/s Shree Bholey Alloys Private Limited will be essentially in the state of Jharkhand and neighboring states. Primary purpose of the project is to cater the demand of products within the country and fill gap between demand and supply. The Eastern India is the hub of manufacturing Steel. Moreover the items are High value and hence there is no factor of freight in the cost and hence the entire India is the suitable market. The entire world procures LC Ferro Chrome and Ferro Manganese from Russia and China. Since the raw material is indigenously available, our cost of production will be cheaper and can comfortably compete with Overseas manufacturer. The product can be Exported to Japan, Middle East, South Korea and Europe.

2.6 Employment Generation (Direct and Indirect) Due to the Project
A well-structured manpower is essential for uninterrupted operation and proper maintenance of plant facilities. Employment will be generated during implementation of the project. There will be total employment of 64 persons including Chief Executive, Commercial Managers, Production Manager, Chemist, Shift Incharge and Skilled Technicians.
CHAPTER - 3
PROJECT DESCRIPTION

3.1 Type of Project Including Interlinked & Interdependent Projects
The Project involves production of Ferro Alloys using Manganese Ore, Coke, Dolomite, Quartz, Mill Scale, and Coal as raw material. It is a Category A project as per EIA Notification and requires Environment Clearance from MoEF & CC.

3.2 Location
The project is located in Bokaro district of Jharkhand. Currently, the project is in operation phase and has the production capacity of 11,500 TPA by the 2x3.5 MV submerged Arc Furnace at Phase – IV/C- 1 (P) 3 Industrial Area, Village – Gorabalidih, City/Block – Chas, Dist.-Bokaro, Jharkhand

Fig 1: Google Image of project Site (500 meter Radius)
3.2.2 Plant Layout

The layout of the plant will be developed taking into following considerations:

1. Process will be consolidated into comprehensive production units. The major utilities and service facilities available for the existing unit will be used.
2. Sufficient space for storage of raw materials and finished products.
3. Green belt, plantation, RWH & space for pollution control facilities will be provided.
Expansion of Ferro Alloys Plant
At Phase – IV/C- 1 (P) 3 Bokaro Industrial Area
Village – Goradih/ Balidih, PO; Bokaro Steel City, District: Bokaro , Jharkhand-827014

**Fig 3:** Layout Plan (Preliminary / Conceptual)
3.3 Site Selection
The selection of project site/location has been based on the factors as given below:-

1. Availability of adequate flat land for the expansion.
2. Proximity to raw materials.
3. Proximity to finished goods market.
4. Existence of road connection in the vicinity for transportation of incoming & outgoing materials.
5. Availability of industrial infrastructure facilities, e.g. power, water & skilled personnel.

3.4 Size or Magnitude of Operation
Current plant is in operation having the total capacity of 11,500 TPA ferro alloys with 2 x 3.5 MVA Furnace. Now project proponent has gone for the expansion of the project in terms of production capacity of additional 26,000 TPA by an additional installation of 1x15 MVA furnace within the existing premises.

3.5 Project Description with Process Details
Currently Ferro Alloy plant consisting of 2 nos. of 3.5 MVA Submerged arc furnaces for making Ferro Manganese, Sillco Manganese & Ferro Silicon the major raw material constitutes are Manganese Ore, Coke, Quartz & Dolomite. Besides these items good quality the other ingredients such as Refractory, Electrodes, Carbon Paste, Tamping Paste & furnace fattling materials, Industrial gases, etc.

Ferro-alloy production is a direct reduction of ores of respective metals with the help of carbon as reducing agent and electricity as heat source. Ores as in the form of oxides of respective metals In Manganese dioxide (MnO₂) for manganese alloys, silicon dioxide (SiO₂) for Silicon alloys etc. Most of the ferroalloys e.g. Ferro-silicon, Ferro-manganese, Silico-manganese etc. are produced by smelting process. Smelting of the charged materials is carried out in submerged electric furnaces equipped with transformer of proper ratings. The process developed recently in India during the decade of 90 is based on basic process parameters as offered by ELKEM, Sweden, in past. Various Indian furnace manufacturers successfully developed furnace design upto 12.5 MVA electrical ratings for manufacture of different grades of ferroalloys based on ELKEM, Sweden Technology.
3.6 PROCESS DETAILS

Submerged Arc Furnace
In the submerged arc furnace electric power heats the raw materials and provide energy to reduce the ore to a metallic state. Carbon serves as reducing agent and fluxes are often added to facilitate removing the gangue materials present in ore as slag. The practice is to mix the ore materials, the reducing agent, and any flux outside of the furnace and then periodically charge this mixture (often called charge mixture) into furnace. Although the charge mix is added periodically, the reduction reaction and the metal production proceed continuously. The metal is usually allowed accumulate until tapping occurs at appropriate intervals.

The term “submerged arc” is used because the carbon electrode is usually buried deep in the furnace charge mix and the reduction reaction takes place near the tip of the electrode. At the top of the charge mix little current flows between the electrodes because of the high resistivity of the unmelted charge. As the charge mix descends in the furnace, the non carbon portion of the charge begins to melt. As the carbon heats, its resistance decreases providing a conductivity path between the electrodes. This current flow creates intense heat needed for the high temperature and energy required for the reduction reactions.

Most submerged arc furnace that produce ferroalloys uses self-baking electrode system invented by the team led by C.W Soderberg. This system takes advantage of the electric power used for the process to bake the electrode in place. A series of cylindrical steel casings welded on the top of each other forms the electrode column. Operators periodically add solid green carbon “paste” blocks to the top of the column. The paste blocks melt to form the unbaked electrode shape. Vertical fins which are attached to the casing carry the power into the carbon paste so that the paste bakes to a solid carbon electrode in the casing. As the process consumes the baked electrode, more electrode is slipped into the furnace. The self-baking electrode system reduces electrodes cost then the purchase of prebaked amorphous carbon electrodes. It allows the furnace to be larger since prebaked electrodes are limited to some size.

Process:-
The ferroalloys are manufactured in a submerged electric furnace by using the following raw materials:
1. Manganese Ore
2. Carbonaceous/Reducing agent such as coke/coal
3. Fluxes like quartz, dolomite.

The raw materials are mixed at a desired proportion in a weigh hopper and charged into the furnace through charging tubes. Input of electrical energy through Soderberg electrodes cause generation of heat energy, as the charge is having definite resistance. Due to evolved heat, smelting of charges (Manganese / Silicon etc.) takes place according to the following chemical reactions:
Expansion of Ferro Alloys Plant
At Phase – IV/C-1 (P) 3 Bokaro Industrial Area
Village – Goradih/ Balidih, PO; Bokaro Steel City, District: Bokaro, Jharkhand-827014

\[
\begin{align*}
\text{MnO} + 2\text{C} & \rightarrow \text{Mn} + 2\text{CO} \\
\text{SiO}_2 + 2\text{C} & \rightarrow \text{Si} + 2\text{CO} \\
2\text{CO} + \text{O}_2 & \rightarrow 2\text{CO}_2
\end{align*}
\]

The respective ores and reducing agent (Carbon) is having gangue material like SiO2, CaO, BaO, MgO etc. Addition of fluxes makes the reaction exothermic which ultimately removes the gangue material present in ore & reductants.

During the process at an interval of 3-4 hrs. (Depending upon the capacity to handle liquid Alloy & Slag), the liquid Alloy & Slag is tapped & drained out from the furnace tap hole. The metal & slag are separated by virtue of difference in density by providing a skimmer block placed in the sand pit. After cooling for 2-3 hours metal is removed from the beds and allowed to cool further before it is sent for onward processing as per desired size fraction. The alloys in lump from are then manually broken and sieved for sizing.

Input/Output ratio of metallurgical process is not constant and purely depends on quality/ size of input material like ore, reductants & fluxes. This also depends on operating parameters while producing different alloys.
Figure 4: Process Flow
3.6 Safety Envisaged In the Project

Fire Protection Facilities: In order to combat any occurrence of fire in plant premises the following fire protection facilities have been envisaged for the various units of the plant.

Portable Fire Extinguishers: All plant units, office buildings, stores, laboratories etc will be provided with adequate number of portable fire extinguishers to be used as first aid fire appliances. The distribution and selection of extinguishers will be done in accordance with the requirement of IS: 2130-92.

Hydrant System: Internal hydrants will be provided at suitable locations and at different levels inside the major plant units. Yard hydrants will be provided normally along the road and in the close vicinity of the units to meet the additional requirement of water for existing fire.
3.8 Resource Optimisation

3.8.1 Water Requirement (Existing + Expansion)
Water is pre-dominantly required in the Ferro Alloys Plant for cooling. In addition, it shall be used for control of dust and for drinking and sanitation, for fire fighting and for miscellaneous purposes. The plant water system comprises a make-up water system, drinking water and fire fighting water system as well as emergency water supply system for the vital units of the plant.

The total water requirement for the project is estimated to be 110 m$^3$/day. Water will be supplied by BIADB.

3.8.2 Power Requirement (Existing + Expansion)
Total requirement of power for the unit is 22 MW. The total power demand of the plant will be met from Damodar Valley Corporation.

3.9 Quantity of Wastes to Be Generated (Liquid and Solid) and Scheme for Their Management/Disposal

3.9.1 Air Environment – Mitigation Measures

<table>
<thead>
<tr>
<th>Section</th>
<th>Source of Pollution</th>
<th>Pollutants</th>
<th>Air pollution control Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furnace</td>
<td>Furnace</td>
<td>PM &amp; gases</td>
<td>Fume extractor followed by cyclone and Bag Filters, stack height will be 30 m as per CPCB norms.</td>
</tr>
<tr>
<td>Raw material handling &amp; sizing</td>
<td>Pulverizer for</td>
<td>Dust and particulate</td>
<td>Dust catcher and Bag filter</td>
</tr>
<tr>
<td>section</td>
<td>grinding of raw</td>
<td>matter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over all Plant area</td>
<td>Open space</td>
<td>Fugitive dust emission</td>
<td>Pucca roads within the premises, water sprinkling in dusty areas and green belt/plantation to arrest the fugitive dust emission.</td>
</tr>
</tbody>
</table>

- The pollution control equipment will regularly be operated and maintained.
- Fugitive emission will be regularly monitored and suitable action like cleaning, water sprinkling will be taken.
3.9.2 Waste Water Generation and Management

No water is required in the manufacturing process. However water will be used for cooling purpose. Water will be kept in closed circuit, but on increase in TDS it will be taken to Settling. The water will be reused for sprinkling for dust suppression / slag. The storm water drains will be segregated and channelized to water harvesting area.

### Waste Water Generation and Reuse (Existing + Expansion)

<table>
<thead>
<tr>
<th>Section</th>
<th>Water Consumption (m³/day)</th>
<th>Waste water qty (m³/day)</th>
<th>Waste water characteristics</th>
<th>Waste water management</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAF (cooling of furnace and electrodes)</td>
<td>100 (make-up, soft water)</td>
<td>10 CT blowdown &amp; Softner washing (@10% max)</td>
<td>(increased TDS)</td>
<td>Treated in Settling Tank and used for dust suppression</td>
</tr>
<tr>
<td>Domestic Use</td>
<td>10</td>
<td>8 (@80% max)</td>
<td>TSS, BOD, Oil &amp; Grease etc.</td>
<td>Toilet wastes treated in septic tank and disposed in soak pits. Canteen wastes will be treated and reused for gardening</td>
</tr>
</tbody>
</table>

3.9.3 Solid Waste Generation and Management (Tons/year)

<table>
<thead>
<tr>
<th>Type of Waste</th>
<th>Quantity, TPA</th>
<th>Mode of Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slag from production of Ferro Manganese</td>
<td>600 Kg/T</td>
<td>Ferro Manganese Slag is being used as Raw Materials for manufacturing of High Carbon Silico Manganese.</td>
</tr>
<tr>
<td>Slag from production of Silico Manganese</td>
<td>650 Kg/T</td>
<td>Silico Manganese Slag first Granulated and 50% quantity used in Road making and balance 50% quantity sale to various Cement Plants</td>
</tr>
<tr>
<td>Bag Filter Dust</td>
<td>500 TPA</td>
<td>Recycled in the process</td>
</tr>
</tbody>
</table>

**Hazardous waste**: There is no hazardous waste from the plant except for used oil with approx quantity of 100 Liters per annum, during course of production of and is also saleable to the registered recyclers in the market.
3.9.4 Noise Levels
There is no major noise prone process except equipment for crushing, milling, separators, compressors etc. The noise control will be done in three ways namely:

- By selecting low noise generating equipment, which would have below 75 dBA at 1m distance. This is taken care at the equipment design stage.
- By isolating the noise unit from the working personnel’s continuous exposure by providing acoustic aids for plant personnel.
- By administrative & safety measures, providing noise level monitoring, remedial measures, providing noise safety appliances.

3.9.5 Green Belt Development
The Greenbelt & plantation will be developed in 1.88 Acre (Existing + Expansion) of plant area so as to mitigate the effects of emissions from the plant. The treated waste water from the plant will be utilized for the greenbelt development. Roads for vehicular movement will be paved and adequate mitigation measures will be provided to prevent fugitive emissions. Tree density of 2500 trees per hectare with local board leaf specification will be planted.

3.10 Schematic Representations of the Feasibility Drawing Which Give Information of EIA Purpose.
Environment Impact Assessment and Environment Management Plan is an important tool in achieving the sustainable development of the project. The process is depicted below:
CHAPTER-04

SITE ANALYSIS
4.1 Connectivity
The site is within notified Industrial Area and has all the facilities for the proposed project. Also it has good connectivity with the rail and road.

- **Road Connectivity:** The project site is well connected to National Highway 23 which is at 1.70 KM towards South also surrounded by Industrial Area Road.
- **Rail Connectivity:** The nearest railway station is Tupkadih railway station at 3.15 Km towards North direction and Bokaro railway station at a distance of 3.50 km towards South-East from the proposed project site.
- **Airport:** Nearest airport to the project site is Bokaro Airport, Jharkhand at distance of 9.40 KM towards South-East direction from the project site & Birsa Munda Airport at distance 85.10 KM towards WSW direction.
- **Approach Road:** Dumri-Bermo-Jaina road towards North-West direction.

4.2 Existing Land Use Pattern
Total land requirement for the proposed unit is about 5.64 Acre (2.28 Hec) which already has been purchased. The project site falls under the notified industrial area.

4.3 Nearby Industries

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name</th>
<th>Direction</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hanumman Allos Pvt. Ltd</td>
<td>0.50 km</td>
<td>WSW</td>
</tr>
<tr>
<td>2</td>
<td>Indane Botling Plant(LPG)</td>
<td>0.95 km</td>
<td>N</td>
</tr>
<tr>
<td>3</td>
<td>HP Botling Plant(LPG)</td>
<td>0.60 km</td>
<td>N</td>
</tr>
<tr>
<td>4</td>
<td>Dalmia Cement East Ltd.</td>
<td>1.35</td>
<td>NNE</td>
</tr>
<tr>
<td>5</td>
<td>Bokaro Jaypee Cement Plant</td>
<td>2.82 km</td>
<td>NE</td>
</tr>
<tr>
<td>6</td>
<td>Bokaro Steel Plant</td>
<td>2 km</td>
<td>E</td>
</tr>
<tr>
<td>7</td>
<td>Chandrapura Thermal Power Station</td>
<td>8.42 km</td>
<td>NE</td>
</tr>
<tr>
<td>8</td>
<td>Bharat Refractories Ltd.</td>
<td>7.55 km</td>
<td>N</td>
</tr>
<tr>
<td>9</td>
<td>Anannya Industries</td>
<td>0.20 km</td>
<td>ESE</td>
</tr>
</tbody>
</table>
CHAPTER – 05
PLANNING BRIEF

5.1 Planning Concept
M/s Shree Bholey Alloys is a private limited company established by Mr Satyanand Singh and Mr Rakesh Kumar Singh his Association with its registered office at Barwaadda, P.O : Kalyanpur, Dhanbad-826004, Jharkhand. The main object of the company to be pursued is to manufacture & deal in Ferro Alloys. Currently the plant is in operational phase having the total capacity of 11,500 TPA of ferro alloys by 2 nos of submerged arc furnace having the capacity of 3.5 MVA each at Phase – IV/C- 1 (P) 3 Industrial Area, Village – Gorabalidih, City/Block – Chas, Dist.-Bokaro Jharkhand-827104 now promoters have decided to set up additional 1 numbers of 15 MVA submerged Arc to enhance the production capacity from 11,500 TPA to 37,500 TPA of ferro alloys production. The plant will also be equipped with the most efficient auxiliary sub- systems, material handling facilities and pollution control equipment.

5.2 Employment & Population Projection
A well-structured manpower is essential for uninterrupted operation and proper maintenance of plant facilities. Employment will be generated during implementation of the project. There will be permanent employment of 64 persons including chief Executives, Commercial Managers, Administrators, Engineers, Supervisors and Skilled Technicians.

5.3 Land Use Planning
Total land available with the PP is 5.64 acres. Land is industrial category purchased from Bokaro Industrial Area Development Authority. This land is sufficient for the production of 37,500 TPA Ferro alloys. 33% land has been earmarked for greenbelt asper standard norms.

5.4 Assessment of Infrastructure Demand (Physical & Social)
The existing infrastructure facility is adequate in the proposed project site. The social infrastructure like school, college, temples and playground already exist in this area. The above infrastructure facilities need no further development for the project nor is any major change in the infrastructure envisaged due to the project.

System Design for high Unit availability
The high availability of the Unit and associated auxiliaries objectives will be achieved by adopting the following principles:

- Use of equipment and systems of design performance and high availability which has been fully established by a considerable record of successful operation for similar service conditions in coal fired utility stations.
- Use of only proven design concepts and conservative designs.
- Strict implementation of quality assurance norms during design, manufacture as well as installation and commissioning stage.
Strict compliance with the project company approved pre-commissioning and commissioning procedures as well as standard checklists forming a part of commissioning documents for the project.

**Sizing of critical equipment- margins & redundancy/standby**
Adequate margins will be provided while sizing all important auxiliaries and sub-systems to ensure operation of the Unit at full rated capacity under the worst conditions and taking into consideration normal wear & tear.

**Design for efficient operation**
Centralized maintenance system will be followed. All repairs of capital nature, heavy maintenance jobs, refractory maintenance and plant civil maintenance will be done by engaging specialized external agencies.

5.5 **AMENITIES / FACILITIES**

The following facilities shall be provided at the project site:
- Canteen and welfare center
- Toilets and Rest rooms
- Car parks and cycle / scooter stands
- Time and security offices
- First aid and fire fighting station
CHAPTER – 06
PROPOSED INFRASTRUCTURE

6.1 Processing Area – industrial use
The processing area will comprise of various plant facilities within the premises they are – Raw material handling & processing area, reactor area, & product handling area.

6.2 Residential Area (Non-Processing Area)
There is no proposal of any residential colony as the required manpower will be sourced from local populace. Few highly skilled posts may be filled from outsiders for whom houses will be leased in nearby residential area. Non-processing area will comprise of facilities within the premises such as – administrative block, road & pollution control equipment area etc. Other social infrastructure like housing, schooling and medical facilities area already developed in nearby area, hence, no residential colony/township is envisaged for employees.

6.3 Green Belt
A greenbelt development plan will be prepared and implemented along with the implementation of project. Total green belt & plantation area shall be 1.88 Acre. The main objective of the greenbelt is to provide a barrier between the plant and the surrounding areas. Tree density of 2500 trees per hectare with local board leaf specification will be planted. The species selection will depend upon type of soil and local species with good survival rate will be selected.

6.4 Socio-Economic Benefits & Social Infrastructure
This is an industrial land with adequate facilities. The existing infrastructure facility is adequate in the proposed project site. The social infrastructure like school, college, temples and play ground already exist in this area. The above infrastructure facilities need no further development for the project nor is any major change in the infrastructure envisaged due to the project. Only direct and indirect employment generation is envisaged.

6.5 Sewage System
Sufficient and suitable toilet facilities of proper standard and hygiene shall be provided.

6.6 Industrial Waste Management
There will be no waste water discharge from the plant. Treated water shall be used for gardening and dust suppression. Cooling water shall be recycled after cooling in the Cooling Towers. Zero discharge shall be maintained.

6.8 Solid Waste Management.
Fines collected at Bag Filter from Submerged Arc Furnace shall be recycled in the process and / or sold to vendors. Si-Mn and M.C. Fe-Mn Slag shall be utilized in road / land development. Fe-Si Slag shall be reused in the Si-Mn production. A separate yard within the premises would be earmarked to store the same temporarily.
CHAPTER – 07
REHABILITATION AND RESETTLEMENT (R & R) PLAN

7.1 Policy to Be Adopted for R & R Plan With Respect To Project - Not Required

This is an industrial land and it’s an expansion project thus the project does not require any R & R plan.
CHAPTER – 08
PROJECT SCHEDULE & COST ESTIMATES

8.1 Project Schedule
In this industry, any one of the following three alternate modes of project execution will be adopted:

- Turnkey
- Semi Turnkey
- Packaged procurement mode

Statutory Clearances
The proposed project will require various statutory approvals and clearances from various authorities of the Government. Clearances required for the proposed project are identified and necessary action initiated to obtain the same.

Project Schedule
It is envisaged that expansion project will be completed within a period of 6 months from 'Go-ahead'. The external agencies such as consultant, machinery suppliers, contractors for civil construction and equipment will be selected well in advance. An effective project team has been formulated with Director as its leader.

8.2 Project Cost
An indicative estimated capital cost of the proposed Plant is Rs. 29, 00 Lakhs.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Amount (in Rs. Lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Construction</td>
<td>505</td>
</tr>
<tr>
<td>Plant &amp; Machinery</td>
<td>680.48</td>
</tr>
<tr>
<td>Other Fixed Assets/Electricals</td>
<td>1212.60</td>
</tr>
<tr>
<td>Pre-Operative Expense</td>
<td>122.72</td>
</tr>
<tr>
<td>Contingencies</td>
<td>11.99</td>
</tr>
<tr>
<td>Preliminary Expenses</td>
<td>5.00</td>
</tr>
<tr>
<td>Margin Money for Working Capital</td>
<td>362.81</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2900.60 say 29,00</strong></td>
</tr>
</tbody>
</table>

M/s Shree Bholey Alloys Private Limited
CHAPTER – 09

ANALYSIS OF PROPOSAL

Over the last few years, there has been a great change in the Indian Economic Scenario due to Global slowdown which affected the whole world including India. The major sector which took the toll was Steel & Power Sector.

Ferro alloy refers to various alloys of iron, which are used in the production of mild steel, carbon steel, special alloy steel and stain less steel. India’s steel production is increasing every year, thereby the consumption of Ferro alloys is also increasing. The Indian Ferro Alloy industry has a capacity of 5.15 million tonnes. It is accounting for nearly 10% of the world’s ferro alloy production and is among the 10 largest producers of the material in the world.

The Directors / Vice Presidents of M/s Shree Bholey Alloys Private Limited are experienced Industrialist in the field of production of Ferro Alloys.

The technology involved in the project is well proven and reliable. Many plants are operating all over the country in this pattern are successful. All equipment purchased shall be brand new & latest in model and will be purchased from reputed suppliers. For O&M of the plant, experienced Engineers /Technicians are available in the region.

The region shall also be benefited from the project as there will be direct employment of people in the Steel plant. Preference will be given to the people of the state possessing requisite skill and qualification criteria. Also there will be lot of scope for indirect employment of the people of the state in and around the project site like in transportation sector.

In view of the above the proposed Project of M/s Bholey Alloys Private Limited, is technically feasible and financially viable thus, we request EAC to recommend TOR for conducting the EIA Study for obtaining Environmental Clearance from Ministry of Environment, Forest & Climate Change.
<table>
<thead>
<tr>
<th>PROMOTERS</th>
<th>M/s Shree Bholey Alloys Private Limited</th>
</tr>
</thead>
</table>
| Project   | Expansion project to increase the existing production capacity of 11,500 TPA Ferro Alloys to 37,500 TPA  
Existing: 2 x 3.5 MVA SAF  
Proposed: 1 x 15 MVA SAF |
| Plant location | Phase – IV/C- 1 (P) 3 Bokaro Industrial Area, Village – Gorabaidih, City/Block – Chas. Bokaro – Jharkhand-827104 |
| Markets | Local & export |
| Plant capacity | 37,500 TPA max (11,500 TPA Existing + 26,000 TPA Expansion) |
| Water requirement | For process and domestic use – 100 m3/day + 10 m3/day |
| Water sources | Bokaro Industrial Area Development Authority |
| Max. power demand | 22 MW |
| Main storages | For raw materials and products – space available |
| Manpower | 64 Nos. |
| Implementation period | 6 months (Expansion Part) |
| Proposed Investment | Rs. 29,00 lakhs |

**Conclusion**

Based on the performance indicators, the project is technically & financially viable, Under both normal and contingent conditions.