PRE FEASIBILITY REPORT

Expansion of Ferro Alloys Unit

(From 4 x 9 MVA to 6 x 9 MVA Submerged Electric Arc Furnace)

at

Plot No.368, APIIC Growth Centre, Bobbili Village & Mandal, Vizianagaram District, Andhra Pradesh

Project Proponent:

M/s. Berry Alloys Limited

Plot No.368, APIIC Growth Centre, Bobbili Village & Mandal, Vizianagaram District, Andhra Pradesh.

Environment Consultant:

SSMNT

Sri Sai Manasa Nature Tech Pvt. Ltd.,

QCI/NABET Accredited Vide S. No. 138, (Dated 16.12.2016 displayed on NABET website)

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

M/s Berry Alloys Limited, incorporated in 2007 under companies act 1956 with their registered office at Suit No: 308, Ashoka House, 3A, Hare Street, Kolkata – 700001.

The company has obtained Environmental Clearance for the existing unit vide order No. J-11011-1129/2007-IA II (I), dated 19.06.2008 for production capacity of 36,000 MTPA of Ferro Manganese and Silico Manganese by operating 2 nos. 9.0 MVA submerged Arc Furnaces at Plot No.368, APIIC Growth center, Bobbili (Mandal), Vizianagaram (District), Andhra Pradesh. Berry Alloys Limited again obtained Environmental Clearance from MOEFCC vide letter no. J-11011/1129/2007-IA-II (I) dated 7th July 2017 for additional 2 X 9 MVA submerged Electric Arc Furnace. Now, company is proposing to install another 2 x 9 MVA furnace. After expansion total furnace capacity will be 6 x 9 MVA.

The company already acquired 13.42 acres of land and set up the existing plant at APIIC Growth center, Bobbili (Mandal), Vizianagaram (District), Andhra Pradesh and now proposes to expand the production capacity to meet the increasing market demand.

The salient features of the project are given **Table 1.**

Table 1-Salient Features of the Project

Project Name	M/s. Berry Alloys Limited
Total Area	13.42 Acres
Location of Project	Plot no. 368 APIIC Growth Centre,(Industrial Estate) Bobbili(Village &Mandal), Vizianagaram(District), Andhra Pradesh (State).
Production Capacity	**Existing Capacity** Ferro Manganese - 86400 TPA or Silico Manganese – 72000 TPA or Ferro Silica – 25200 TPA or Ferro Chrome -36000 TPA **Proposed Additional Capacity** Ferro Manganese - 43200 TPA or

	Silico Manganese – 36000 TPA
Raw Material	Manganese Ore, Ferro-manganese Slag (generated in Ferro - manganese process), Dolomite and Quartz
Water demand	90 KLD Source: APIIC Growth Center
Sources of water	APIIC Limited
Man power	Existing – 120 Nos. Proposed- 50 Nos.
Electricity Consumption	45.0 MVA Source: Eastern Power Distribution Company of Andhra Pradesh Limited
Nearest railway station	Bobbili Railway Station – 2.0 Km
Nearest airport	Visakhapatnam Airport – 110.0 Km
Proposed Expansion Project Cost	Rs. 12.0 Crores

2.0 INTRODUCTION OF THE PROJECT/ BACKGROUND INFORMATION

2.1 Identification of Project and Project Proponent

Mr. Vijay Guptha is the Director of the Company. He is having strong background and experience in Construction, Production and marketing lines. The Same promoters are successfully running their other business since a decade.

2.2 Brief Information about the Project

The company proposing to expand the Ferro Alloys plant capacity by installing 2 X 9 MVA Arc Furnaces to produce Ferro-manganese and Silico-manganese with a production capacity of 40,150 MTPA & 32,400 MTPA respectively at Plot No: 368, Growth Centre, Bobbili, which is notified industrial estate developed by Andhra Pradesh Industrial Infrastructure Corporation. After expansion total capacity will be Ferro Manganese - 129600 TPA or Silico Manganese – 108000 TPA or Ferro Silica – 25200 TPA or Ferro Chrome -36000 TPA.

2.3 Need for the Project and Its Importance to the Country or Region

Ferro alloys, in particular Ferro-manganese and Silico-manganese are used by steel and stainless steel industry. In steel industry, these above mentioned Ferro-alloys are being used as a de-oxidizing agents and also adding as an alloy to improve the properties of steel for different applications. As the nickel become costlier day-by-day, R&D is taking place to replace nickel with manganese. This has become successful in some grades of stainless steel. Demand for Ferro-manganese, medium carbon silicon-manganese and low carbon Silico-manganese has gone up due to usage of these Ferro-alloys in stainless steel.

Ferro alloy industry, which is totally dependent on the steel industry in the country, has touched another mile stone in production as well as exports. The overall production has increased considerably during 2006-07 and achieved a record highest production of 2.00 million tons as compared to 1.65 million tons in 2005-06, registering a growth of 21.21 % due to higher domestic consumption, exports and increase in steel production. The units have continued to register profitability over the previous year.

2.4 Demands-Supply Gap

Driven by the continued growth in developing and emerging economies, global growth is likely to remain robust. The International Iron and Steel Institute (IISI) forecast global steel consumption to grow by 5.9% in 2007 and 6.1% in 2008, driven by strong demand from Asia, Africa and South America. The apparent steel demand is likely to increase by 65 million tons in 2007 and 72 million tons in 2008 to reach a level of 1250 million tons in 2008.

Similarly, stainless steel industry globally has witnessed compounded growth of around 6.8% per annum during the last four years. The growing segment is Asia, where stainless steel production grew around 20.6% to 15.2 million tons. Asia now produces more than half of stainless steel in the world. Following the strong pace of global economic development in 2006, 2007 is also expected to be a bright year for the world economy. Demand for stainless steel is expected to be firm from all key end users.

The Indian Steel Industry is poised for a demand growth of 10% in 2007-08. Stainless steel market entered into high growth segment of around 11-14% which is much higher than the world average of approximately 6%.

The increasing demand in carbon steel and stainless steel within the country and globally is a welcome sign for the Ferro alloy industry for the coming years. Consumption of manganese alloys and chrome alloys have increased considerably in line with increase in steel and stainless steel production, and is expected to increase further with higher growth rate in both the steel sectors.

Further, potentially tight supply conditions of mined raw materials like coal and iron ore, shortage of international bulk carrying capacities and high transportation costs, possibilities of global destabilization through rising oil prices and high rates of inflation and interest in the developed world – also remain major causes of concern for the world steel industry including India in the near future.

The National Steel Policy projects an export ratio (i.e., percentage of production exported) in the range of 25-26% by 2019-20. Currently, India exports about 10% of its total finished steel production. The milestone export ratio for the Eleventh Plan period is estimated to remain within a range of 12% - 15% of total production.

In the last 15 years (i.e., 1991-92 to 2005-06) import of steel as a percentage of total consumption in India has varied between a high of 10% in 2005-06 and a low of 4.8% in 1998-99. Import of steel during the 11th Five Year Plan is forecast to be in the range of 3-7 million tons per year.

2.5 Domestic/ Export Markets

The industry recorded highest exports of Ferro alloys surpassing 0.5 million tons at 581,158 tons (453,600 tons) during 2006-07, and registered 28.12 % increase over the previous year. In terms of value, export realization has increased by around 41.79 %, over that of the previous year, mainly due to higher international prices of Ferro alloys.

2.6 Employment Generation

This plant will keep the skilled manpower hence the local village people are exposed to the skilled jobs and get feeding to their livelihood. The estimated manpower requirement is 170. Employment will be provided for the surrounding village's people those who are educated also. The status of socio economic will improve in these rural areas. The arc of the project site will not be affected by natural disasters

3.0 PROJECT DESCRIPTION

3.1 Type of Project Including Interlinked and Interdependent Projects, If Any.

No interlinked projects were associated with this project. As this is an expansion project

3.2 Location

M/s Berry Alloys Limited is located at Plot No: 368, APIIC Industrial Growth Center Bobbili town, Vizianagaram District of Andhra Pradesh and falls between the longitude 83^{o}20'48.25" E and latitude 18°32’17.96” N. The industry is situated on the right side of NH 60 at around 80 km from Visakhapatnam harbor; around 20 km form NH-5 and 3 km from Bobbili Railway Station. Location of the mining lease in Vizianagaram District is shown in **Figure –** 1 and study area map is given in **Figure -2.**

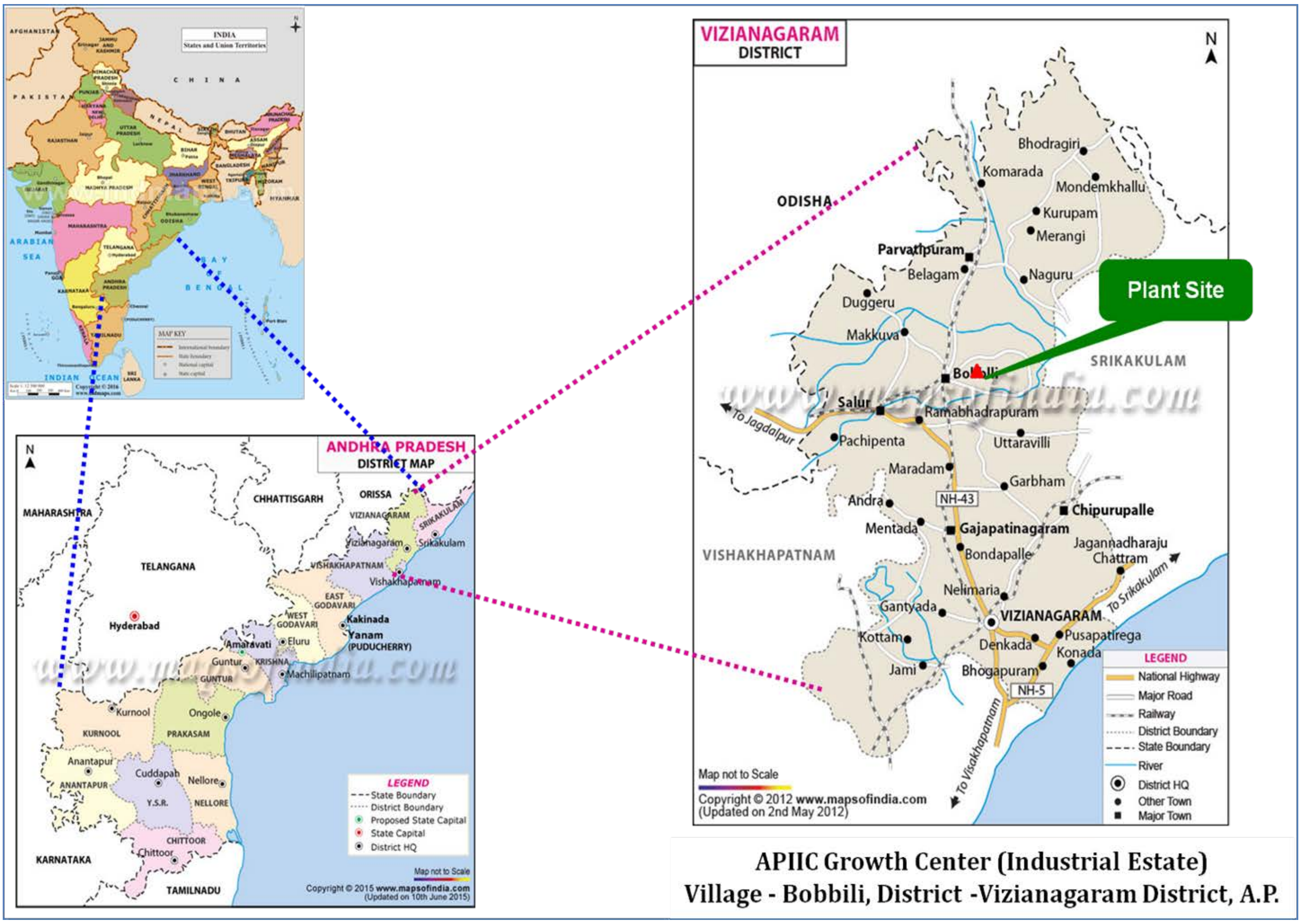


FIGURE – 1: LOCATION MAP

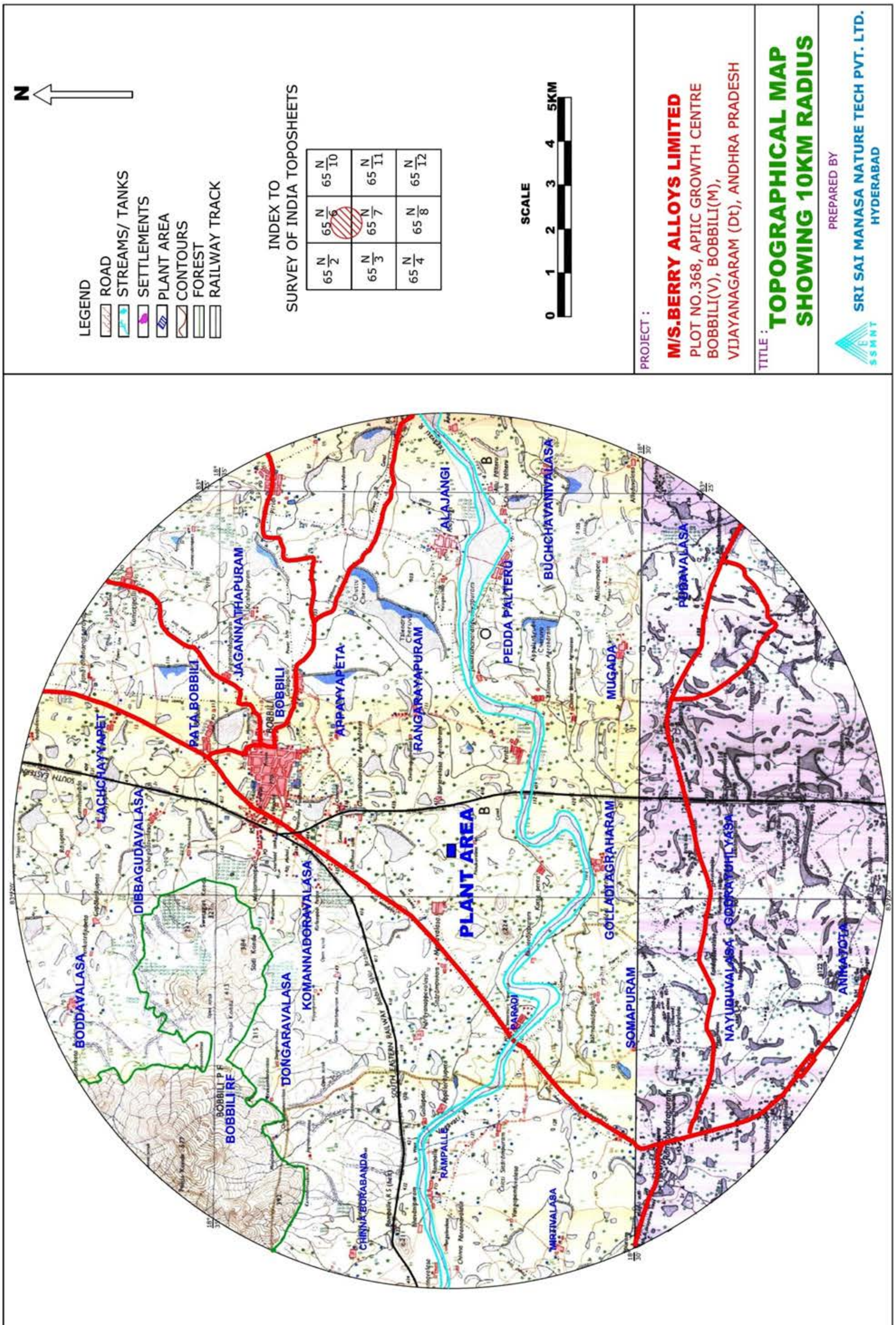


FIGURE – 2: 10 KM TOPOGRAPHICAL MAP

3.3 Details of Alternate Sites

No alternate site was considered. As this is an expansion project, the land adjacent to the existing land has been selected.

3.4 Size or Magnitude of Operation

Existing Furnace Capacity 4 x 9 MVA	
Ferro Manganese	86400 TPA or
Silico Manganese	72000 TPA or
Ferro Silica	25200 TPA or
Ferro Chrome	36000 TPA or
Proposed Furnace Capacity 2 x 9 MVA	
Ferro Manganese	43200 TPA or
Silico Manganese	36000 TPA

3.5 Project Description with Process Details

3.5.1 Basic Process

Ferro-alloys are produced by reducing metals from their oxides contained in ores by using a suitable reduction under conditions created to ensure a high recovery of the valuable elements from the starting materials. Such reduction reactions are characterized by stability of an oxide at high temperatures. The stability of all oxides will become more stable with increasing temperature. An element which forms a stronger oxide can under appropriate conditions be used as reluctant for a less strong oxide. The reaction will proceed successfully if the difference of oxygen involved with a small difference, favorable conditions should be formed to make the reaction proceed.

The presence of iron or iron oxides can facilitate some reduction processes. Iron dissolves the reduced element, forms a compound with it, and thus lowers the melting point of an iron element alloy is lower than that of the pure element, e.g. in Ferro-manganese production, and therefore the reaction of reduction of the element can proceed at a lower temperature.

3.5.2 Ferro-Manganese Process

Ferro Manganese is produced from manganese ores, which have the principle constituent of manganese mainly in the form of Oxides the balance usually being iron, aluminum, magnesium oxides and Silicon. For making Ferro-manganese, coke is used as a reductant and fluxes like limestone or dolomite are added to the reaction mixture if the Calculation of the slag composition demands such additions. Such reactions are carried out in submerged arc furnaces, which operate, as a rule, by continuous process. The electrodes in these furnaces are immersed into the solid charge. The furnace is recharged as the solid is being smelted and the alloy & slag are periodically removed.

3.5.3 Smelting Procedure:

The charge for smelting high-carbon Ferro-manganese is made up with the mixture of Manganese ore, reductant and dolomite.

The charge is loaded into the furnace from a charging apparatus which essentially is an electrically driven carriage moving on a monorail. The carriage has a loading chute. Coke breeze is first loaded from furnace bins to the charging apparatus, followed by ore. This sequence of charging ensures more thorough mixing of the charge and prevents sticking of moist ore fines to the walls of charging apparatus. In order to prevent separation of the charge into components, the entire batch is poured into a pile on the charge and a specific amount of dolomite is added to it. After that the piles are gathered into cones around the electrodes.

The charging apparatus can deliver the charge only to the front side of electrodes. The materials are pushed to the rear side of electrodes by means of long rabbles and are partly thrown by shovels from piles prepared on the working stage at the rear corners of the furnace.

Charging is continued as the materials settle down at the electrodes. A cone around an electrode should be 300-400 mm above the charge level. The electrodes are maintained at a depth of 1100-1400 mm with their ends being spaced 600-800 mm from the furnace bottom. Owing to deep placing of the electrodes, the high temperature zone is covered with a layer of charge 800-1000 mm thick. The spacing between the electrodes and furnace bottom prevents overheating of the metal and evaporation of manganese.

Gases should evolve evenly over the whole surface of the furnace top. With fine materials used for smelting Ferro-manganese, gases tern to escape through blowholes they from near an electrode and therefore in that case it is especially important to maintain a high cone of charge at the electrodes and pierce the materials at the cone base.

When the charge is moist, hot charge may fall down or even be splashed together with slag from beneath the electrodes. This can occur owing to accumulation of gases in the melting zone with a poor gas permeability of the charge.

Drying of manganese ore is an indispensable operation in the process. The use of dry ore and coke breeze ensures a higher productivity, lower consumption of electric energy, stable process conditions and better labor conditions.

With a deficiency of reductant in the charge, manganese cannot be reduced fully and the content of manganese oxide in the slag and that of phosphorus in the metal increase. With a large excess of reductant the content of silicon in the metal increase the depth of electrode placing diminished, the high-temperature zone rises to a higher level and the heat and reducing ability of gases are utilized less efficiently.

The position of electrodes in the furnace is controlled by giving manganese ore beneath them if a deeper immersion of an electrode is needed, or coke breeze, if an electrode should be raised higher.

The metal and slag are tapped successively from all the two tap holes. The slag ratio in the smelting of Ferro-manganese by a flux less process is within 1.0 – 1.2. The slag is separated from metal during tapping by means of a skimmer arrangement. Moulds are arranged in a cascade under the spout; a partition is placed into the first mould, with its lower edge 60 – 70 mm below the pouring nose of the mould. Slag is retained by the partition and flows over into the ladle while.

3.5.4 Silico-Manganese Process:

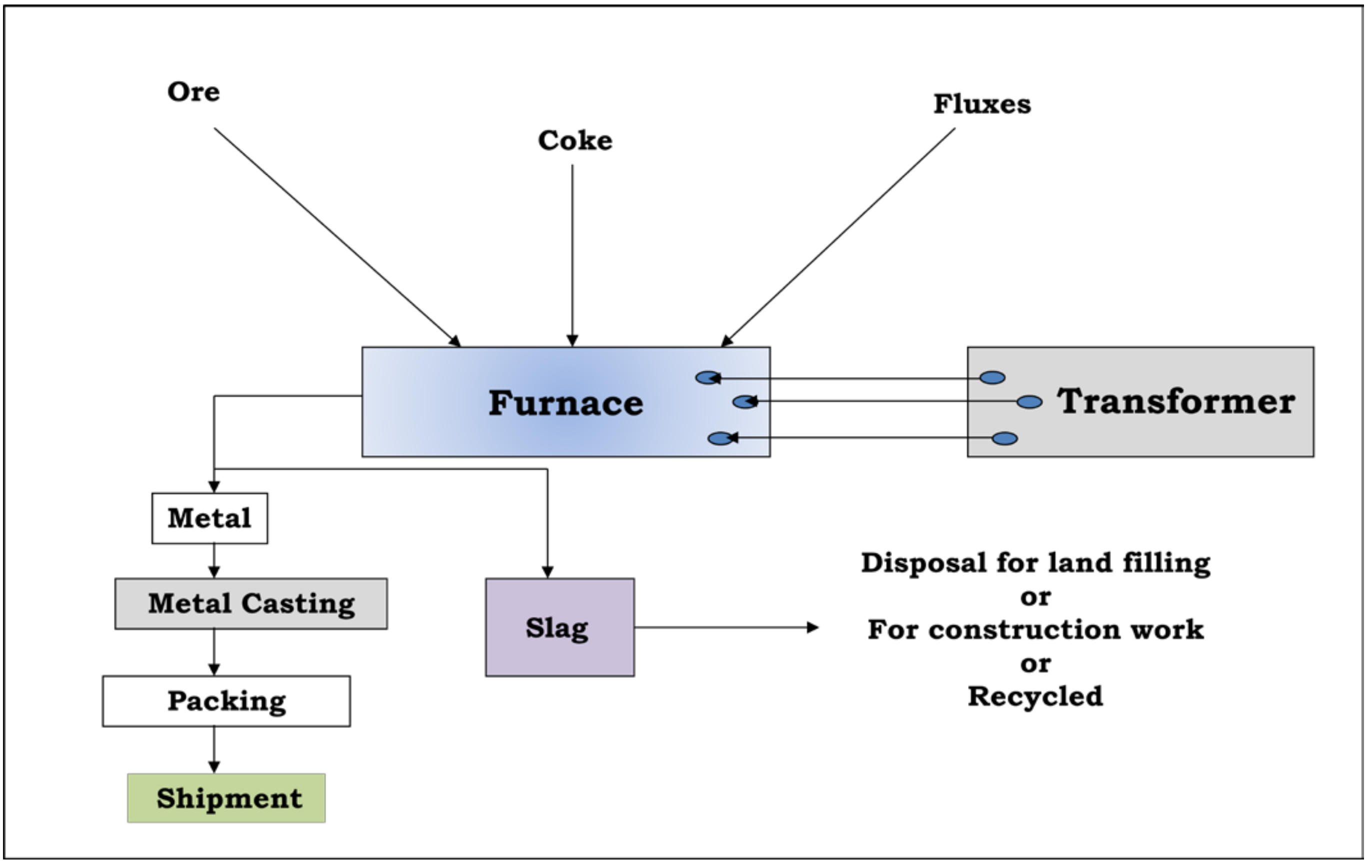
Silico-manganese an alloy of manganese with silicon and iron is a semi-product used for smelting of medium and low carbon Ferro-manganese. As mentioned earlier, Silico-manganese is also employed as a complex deoxidant in steel making and (upon melting together with aluminium) to produce a complex manganese-silicon-aluminium (M-K-A) deoxidant.

The process for smelting Silico-manganese essentially consists in manganese and silicon being simultaneously reduced from manganese Silicontes, slag, ore and quartzite. The process relies on a higher temperature than that needed for smelting Ferro-manganese. The process is carried out continuously under slag having a ratio of 1:1.

Charging and furnace top maintenance are done essentially in the same way as in Ferro-manganese. The metal and slag are tapped from the furnace every two hours. The thick slag at tapping entrains much of metal beads, which has a negative effect on manganese recovery. The slag can be made more fluid by adding raw dolomite.

The metal and slag are tapped through same tap hole in a similar way to Ferro-manganese.

Process flow chart of Ferro Alloy plant



3.6 Raw Material Required Along With Estimated Quantity, Likely Source, Marketing Area of Final Product/S, Mode of Transport of Raw Material and Finished Product

The raw materials required for the production of Ferro-manganese and Silico-manganese consists of different grades of manganese ore, Ferro-manganese slag, quartz and dolomite.

While the manganese content of the finished product is derived from the manganese ore and Ferro-manganese slag, the silicon content is derived from quartz. Coal and coke are used as reductant, whereas quartz and dolomite function as fluxes.

Properties of Raw Materials

	Physical	**Chemical**
Manganese Ore	Size : 6-50mm Size : 6-75mm Moisture : 5% max	Mn : 44% Al_2O_3 : 5% SiO_2 : 6% MgO : 1.3% P : 0.6% S : 0.005%

		CaO : 0.6%
Ferro-manganese Slag (gene in Ferro - manganese proces	Size : 25 - 75mm Moisture : 0.5% max	MnO : 32.0 – 35.0% FeO : 0.8% Al_2O_3 : 10.5% SiO_2 : 30.0% CaO : 10.0% MgO : 9.0%
Dolomite	Size : 25 - 50mm Moisture : 0.5% max	MgO : 21.0% CaO : 31.0% SiO_2 : 0.8%
Quartz	Size : 25 - 50mm Moisture : 0.5% max	SiO_2 : 97.0%

3.6.1 Use of Mineral

Ferro alloys, in particular Ferro-manganese and Silico-manganese are used by steel and stainless steel industry. In steel industry, these above mentioned Ferro-alloys are being used as a de-oxidizing agents and also adding as an alloy to improve the properties of steel for different applications. As the nickel become costlier day-by-day, R&D is taking place to replace nickel with manganese. This has become successful in some grades of stainless steel. Demand for Ferro-manganese, medium carbon silicon-manganese and low carbon Silico-manganese has gone up due to usage of these Ferro-alloys in stainless steel

3.7 Resource Optimization/ Recycling and Reuse

Water will used for cooling system. Ferro manganese slag will be reused in silico manganese manufacturing. Silico manganese slag will be used in filling low lying areas. Bag filter dust will be sent to brick manufacturing unit.

3.8 Availability of Water Its Source, Energy/ Power Requirement and Source

3.8.1 Water Requirement

The manufacturing process of Ferro Alloys does not require water at any stage. The water requirement in the Project will be for cooling purpose, domestic consumption and green belt development. The first phase requires 30 KLD of water and second phase (proposed phase) requires 30 KLD of water. Total initial water requirement for the project will be 60 KLD. This requirement will be met from APIIC Growth Centre. The details of water requirement for different purposes are presented below:

Water Requirement

Item	Water Requirement in KLD (4 x 9 MVA)	Water Requirement in KLD (2 x 9 MVA)	Total Water Requirement (KLD)
Cooling Purpose	50	25	75
Domestic Purpose	10	5	15
Dust Suppression			
Greenbelt			
Total	**60**	**30**	**90**

3.9 Quantity Of Wastes To Be Generated (Liquid And Solid) And Scheme For Their Management/ Disposal

3.9.1 Solid Waste Generation& its Disposal

Ferro manganese slag will be reused in silico manganese manufacturing. Silico manganese slag will be used in filling low lying areas. Bag filter dust will be sent to brick manufacturing unit.

3.9.2 Liquid Effluent

No liquid effluent will be generated at the plant site. The domestic wastewater generated will be sent to septic tanks followed by soak pits.

4.0 SITE ANALYSIS

4.1 Connectivity

4.1.1 Nearest Railway Station

Bobbili Railway Station - 2Km from the plant site.

4.1.2 Nearest Airport

Visakhapatnam international airport is 110 km from the plant site.

4.2 Landform, Landuse and Land Ownership

The project site is in notified industrial area.

4.3 Topography

The topography of the region is mostly plain dry industrial land and the climatic conditions are semi-arid. The average annual rainfall is 700 mm, and the maximum and minimum temperatures are 45 ^{o}C & 16^{o}C respectively.

There are no Ecological and Sensitive areas like Religious and Historic places, Archeological Monuments, Scenic Areas, Hill Resorts, Biosphere reserves, National Parks and Sanctuaries, Seismic Zones and Defense installations within the circular area of 10 km radius from plant site.

5.0 PLANNING BRIEF

5.1 Planning Concept

The proposed project involves additional install of 2 x 9 MVA submerged Arc Furnace with production capacity Ferro Manganese – 43200 MTPA and Silico Manganese – 36000 MTPA

5.2 Population projection

The man power of plants includes manager, Engineer, skilled and unskilled Labours and medical officers etc. As for the socio-economic is concerned from the plant activity near by villagers shall get direct employment for about 170 persons. The proposed plant activities also shall bring the positive change in the villages as the mine shall provide indirect employment to more than 30 people indirectly.

5.3 Land use planning

The project is located in 13.42 Acres. of Government land. There will be change in land use as the Plant will be working.

5.4 Assessment of Infrastructure Demand (Physical & Social)

On the basis of the preliminary site visit, the infrastructure demand in the villages was assessed on the basis of need and priority. The assessment will be made in the socio economic survey &will be submitted at the time of final presentation regarding EC.

5.5 Amenities/Facilities

Rest shed, first-aid centre, ambulance service, drinking water facilities, will be provided.

6.0 PROPOSED INFRASTRUCTURE

6.1 Plant Area (Processing Area)

The main plant area comprises of Ferro alloy plant area, raw material handling area, storage area and greenbelt area etc.

6.2 Residential Area (Non Processing Area)

As the local persons will be given employment, no residential area/ housing is proposed within the mining lease area.

6.3 Green Belt

More than 1/3rd (4.44 acres) of total land availability is reserved for plantation i.e. greenery. Greenbelt development plan

- Local DFO will be consulted in developing the green belt.
- Greenbelt of 33% of the area will be developed in the plant premises as per CPCB guidelines.
- The tree species to be selected for the plantation are pollutant tolerant, fast growing, wind firm, deep rooted. A three tier plantation is proposed comprising of an outer most belt of taller trees which will act as barrier, middle core acting as air cleaner and the innermost core which may be termed as absorptive layer consisting of trees which are known to be particularly tolerant to pollutants.

6.4 Water Management

About 90 KLD will be required for ferro alloys. This water will be supplied from APIIC Limited.

6.5 Sewerage System

The domestic wastewater generated will be sent to septic tanks followed by soak pits.

6.6 Industrial Waste Management

No industrial waste will be generated at the plant site. The domestic wastewater generated will be sent to septic tanks followed by soak pits. Ferro manganese slag will be reused in silico manganese manufacturing. Silico manganese slag will be used in filling low lying areas. Bag filter dust will be sent to brick manufacturing unit.

6.7 Solid Waste management

Ferro manganese slag will be reused in silico manganese manufacturing. Silico manganese slag will be used in filling low lying areas. Bag filter dust will be sent to brick manufacturing unit

7.0 REHABILITATION AND RESETTLEMENT (R&R) PLAN

There will be no displacement of houses. Hence rehabilitation and resettlement is not envisaged.

8.0 PROJECT COST ESTIMATES

The total cost for expansion project will be around Rs. 12.0 Crores

9.0 ANALYSIS OF PROPOSAL (FINAL RECOMMENDATIONS)

9.1 Financial and Social Benefits with Special Emphasis on the Benefit to the Local People Including Tribal Population, If Any, In the Area.

The proposed plant will provide employment to about 170 local people and helping them earn livelihood. The infrastructure facilities also will be improved in the surrounding area.

10.0 CONCLUSION

The project details are given below:

1. The proposed project comes under the notified industrial area.
2. No additional land is required for the proposed expansion.
3. Addition in 50% in production.
4. Capital cost of expansion will be INR 12.0 Crores
5. Public hearing for 4 x 9 MVA was conducted on 29th April 2017.
6. Baseline study was conducted during December 2016 to February 2017.

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Annexure 1: Plant layout