REPORT FOR REGULARIZATION OF FACILITIES UNDER EC VIOLATION

For

SHIVAM IRON & STEEL CO LTD

BANDI DIGDHU, CHANDWARA , KODERMA, JHARKHAND

Prepared by

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CHAPTER-1
EXECUTIVE SUMMARY

INTRODUCTION

M/s Shivam Iron & Steel Company Ltd. Is located at BandiDigdhu, PO: Chandwara, Jhumri Telaiya, Koderma in the state of Jharkhand, at Latitude 24^0 24' 49.55'' N and longitude 85^0 28' 59.87'' E with 387m AMSL.

The unit is running with 2x100 TPD DRI Kilns and producing and selling 64,000 TPA sponge Iron.

The company now has install additional 1x100 TPD DRI kiln but not commissioned , EC has not been obtained for this kiln and hence comes under case of violation.

Mr. Arun Kumar Agarwala is promoter cum director of M/s Shivam Iron & Steel Co Ltd & No, litigation or court cases are pending against the project and/or no direction/order has been passed by any court of law against the project.

India has vast natural resources of good quality iron ore and poor quality non-coking coal, both abundantly available. These two resources can be profitably exploited producing sponge iron.

Sponge Iron is substitute of Iron scrap and production of steel from sponge iron requires lee investment than Blast Furnace route and plant does not take much time to give production.

The project location is well connected with road & rail. The AH-42 Ranchi Patna Road is only 0.5 Km away from the project site.

The Ministry of Environment, Forest and Climate Change (MoEF&CC) has issued a notification, giving a six-month window period to project proponents, who have been operating without obtaining a prior environmental clearance (EC), to apply for the same. The **notification, issued on March 14, 2018** clarifies that this opportunity can only be availed for projects or activities which are observed to be in violation till the date of the notification, thus, making this a one-time opportunity.

A clear timeframe for implementation of the remediation and augmentation plans is crucial. Also, the government must ensure compliance by specifying monitoring intervals and detailed reporting on the same. In all cases of non-compliance or improper implementation of remedial plans, the project proponent must be held for serious offence and should be held liable for stiff penalty.

LAND

Land in possession is 22.837 Ac. (9.24 ha) on which existing two sponge Iron plants are running and third sponge iron plant has also been installed.

WATER

Make up water requirement for the project is 7.5m^3/day and miscellaneous use is 2m^3/day totalling to 9.5 m3/day

POWER

Power requirement for the project is <1MW and there is no captive generation, hence power is drawn from Jharkhand state power grid.

MANPOWER

Direct employment of the project for 1x100 TPD DRI Kilns is 15 with about 25 contract labour engaged for housekeeping, canteen and security.

RAW MATERIAL REQUIREMENT FOR THE PROJECT

Raw material requirement for the project will be Iron ore 51200 TPA, DRI grade coal 38,500 TPA and 1300 TPA dolomite/Lime stone.

TOPOGRAPHY

The section line from south to north from Jharkhand to Bihar passing through Hazaribag plateau. Buffer zone of the project area is just above Hazaribag. The rock at the edge of this plateau has been cut deeply by innumerable streams. There are a number of rills & gullies of various type such as figure or shoe-lace gullies.

The area exhibits undulating topography comprising hills, hillocks, mounds and plains. Valley fills with low to moderate frequency of lineaments, Pedi plains with moderate frequency of lineaments and Pedi plains are major geomorphological units of the district. Concentrations of lineaments are more in Chandwara in which the project is located.

RIVER AND WATER BODIES

Barakar River flows from W to E in the southern part of the district of Koderma and supports Telaiya Hydel project, a multipurpose dam construction on it. River flows from West to East Poanchkhara, Keso, Akto, Gurio, Gukhana Nadi are the main tributaries of the Barakar river.

SOIL CHARACTERISTIC OF BUFFER ZONE

The soil of the project study area is laterite soil. This soil is characterized by its acidic nature and not suitable for traditional agriculture. Most of the land is usar (barren) land. Due to the laterite condition of the soil, deficiency in rainfall, and no major rivers the land use pattern is different from the Gangetic plain. Some irrigated area takes into account of rabi, kharif and oilseeds crops. But generally, it is best suited for vegetables, medicinal plants growing and floriculture due to natural drainage of water and no waterlogging conditions

CLIMATIC DATA FROM SECONDARY SOURCE

The climate of Koderma can be described as a transition between the dry and moderately extreme climate of the northern India and the warm, humid climate of Bengal Basin. The climatic year of Koderma district can be divided into four principal seasons.

Its climate is moderately hot and humid. The average rain fall is 1192 mm and the temperature ranges from 4°c in winter to 42°c in summer.

SOCIAL INFRASTRUCTURE AVAILABLE

As per the 2011 census the total number of literates in Chandwara CD Block was 43,936 (63.75% of the population over 6 years) out of which males numbered 27,432 (76.82% of the male population over 6 years) and females numbered 16,504 (49.69%) of the female population over 6 years). The gender disparity (the difference between female and male literacy rates) was 27.13%.

As per the 2011 census, literacy in Koderma district was 66.84%, up from 52.20% in 2001.Literacy in Jharkhand (for population over 7 years) was 66.41% in 2011. Literacy in India in 2011 was 74.04%.

The 79.7 km long first stage railway project from Koderma to Hazaribagh costing Rs. 936 crore was inaugurated by Prime Minister Narendra Modi on 20 February 2015. Therailway line passes through this CD Block and there are stations at Pipradih and Urwan.

About 41% part of the Koderma district is covered with forests.The total forest area of Koderma district is 64796.90 hectare is scattered in 309 forest villages as preotected forest under administrative control of Koderma Forest Division together with 15062.77 hectare scattered in 35 forest villages as a reserved forest.

The per capita forest area in hectare is 0.14. Sal is the main forest crop together with Bija, Gamhar, Khair, Palash, Salai, Semal, Bair, Arjun, Karam, Siris, Kaj, Kend, Mahulan, Mahua, Karanj, Ratti etc. Koderma forest area having Barakar, Sakri, Dhadhar and Telaiya River are the main river of koderma forest.

Solid waste Management

Dolchar produced as waste material from DRI kilns is being sold to units using FBC.FBC are to burn dolchar with fresh coal support to generate power for a plant. The Solid wastes will be treated as by products and these will be fully utilized.

Waste water management

In DRI rotary cooler heat from hot Sponge Iron is removed by indirect cooling, hence no such waste water is generated. Water from DRI kilns cooler is being reused after cooling in cooling tower. Cooling tower sludge is the only waste. There is zero waste water discharge outside plant boundary.

POLLUTION CONTROL MEASURES

To control dust emissions from DRI kilns water scrubber, ESP, ID fan and high stack has been used. On line monitoring of stack emission has also been installed. DG sets have stack extended above the roof as per guide line of CPCB. Green belt is working as dust sink. Water sprinklers, spraying of water on internal roads is reducing fugitive emission.

Silent type DG sets will be used to reduce level of noise. Again, green belt all around the boundary line is helping to reduce noise pollution.

Personal protective appliances have been provided to workmen for protection from dust & noise.

PROJECT COST & COMPLETION SCHEDULE

Project cost has been 20.00 crores. Own financial source has been utilized.

CHAPTER-2
INTRODUCTION OF THE PROJECT

2.1 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

M/s Shivam Iron & Steel Company Ltd. Is located at Bandi Digdhu, PO: Chandwara, Jhumri telaiya, Koderma in the state of Jharkhand, at Latitude**24^0 24' 49.55'' N** and longitude **85^0 28' 59.87'' E** with **387m** AMSL.

The unit is running with 2x100 TPD DRI Kilns and producing and selling 64,000 TPA sponge Iron. The company has also installed 1x100 TPD DRI kilnsfor which EC has not been accorded and comes under case of violation.

M/s Shivam Iron & Steel Co Ltd. was incorporated on 16th September 1998.It is now a well-established company with its another running unit manufacturing TMT rods and Ferro-alloys at Jambad in Giridh district of Jharkhand.

Mr. Arun Kumar Agarwala is promoter cum director of M/s Shivam Iron & Steel Co Ltd with three other directors namely Mr. Binod Kumar Agarwala, Mr. Pramod Kumar Agarwala and Mr. Shiva Kumar Agarwala.

2.2 BRIEF DESCRIPTION OF NATURE OF THE PROJECT

The project is a primary metallurgical (ferrous) unit producing Sponge iron for sale and hence comes under category-A.

2.3 IMPORTANCE OF THE PROJECT TO THE COUNTRY AND REGION

India hasvast natural resources of good quality iron ore and poor quality non-coking coal, both abundantly available. These two resources can be profitably exploited producing sponge iron. This promises a new era when India could once again produce the cheapest steel in the world within the next 25 year if all our endeavours are focussed on the Sponge Iron Process with zeal, assiduity and determination to bring about and hasten the new Breakthrough in Iron and Steel Technology as early as possible. Many of our future steel plants would then have large Sponge Iron Plants. Steel is a basic commodity for all industrial activity and its consumption marks industrial prosperity. The steel industry has tremendous forward and backward linkages in terms of material flow, income and employment generation.

Sluggish demand for finished steel products amid stubborn iron ore rates in the domestic market is giving sponge iron producers a tough time.

The market for sponge iron has been further dented with steel makers preferring imported steel scraps to sponge iron to cut production cost. Besides, traders find it competitive to buy finished steel than producing it,

Metal scraps are easy to melt and require less fuel. Since scrap rates have come down globally and are competing with sponge iron in the domestic market, buyers are preferring scrap and Imported steel scraps available at Indian ports between Rs 18,000 and Rs 19,000 a tonne, around similar levels at which sponge iron makers are offering their products.

Restrictions and court orders to ban iron ore mining in Odisha, the top iron ore producing state has pushed down domestic iron ore output.

However, with the opening up of key mines in Odisha, raw material rates would fall, said sponge iron producers. They added that the products would once again have competitive advantage than scrap.

Steel is a core industry and thus its demand is strongly linked to the overall economic activity of the nation. Given the inherent long-term potential of the Indian economy and its cyclical nature, the long-term prospects of the steel industry are fairly comfortable.

It has been estimated by certain major investment houses such as Credit Suisse that India's steel consumption will continue to grow at 16 % rate annually fuelled by demand for construction projects worth US $1 trillion. The scope for raising the total consumption for steel is huge, Per capita consumption of steel at current levels is about 65 kg. As a comparison per capita steel consumption in China is 430 kg and the world steel consumption per capita average is 180 kg.

By 2020-21 the demand at 7 % and 8 % GDP growth is estimated to be 123 million tons and 137.5 million tons respectively. Taking a mean figure of 130 million ton, there is a need of 65 million ton in 10 years time. This translates into an average growth requirement of about 10 million tons per year.

So there is future for sponge Iron Industries.

2.3.1 DOMESTIC SCENARIO

- The Indian steel industry has entered into a new development stage from 2007-08, riding high on the resurgent economy and rising demand for steel.
- Rapid rise in production has resulted in India becoming the 3 rd largest producer of crude steel in 2015 and the country continues to be the largest producer of sponge iron or DRI in the world.

As per the report of the Working Group on Steel for the 12th Five Year Plan, there exist many factors which carry the potential of raising the per capita steel consumption in the country. These include among others, an estimated infrastructure investment of nearly a trillion dollars, a projected growth of manufacturing from current 8% to 11-12%, increase in urban population to 600 million by 2030 from the current level of 400 million, emergence of the rural market for steel currently consuming around 10 kg per annum buoyed by projects like Bharat Nirman, Pradhan Mantri Gram Sadak Yojana, Rajiv Gandhi Awaas Yojana among others.

India produced 88.97 mt , 89.79 mt and 96 mt of crude steel during 2014, 2015 and 2016 respectively. India's steel exports grew 150.0 per cent year-on-year to 0.75 MT in February 2017, while steel imports declined 46 per cent year-on-year to 0.49 MT. Total consumption of finished steel grew by 3.4 per cent year-on-year to 76.22 MT during April 2016-February 2017.

This was on account of higher output by the major Indian steel companies. The imposition of Minimum Import Price (MIP) encouraged the producers to increase their output. Care Ratings said that the consumption of steel, on the other hand, grew by just 3.2% to 73.75 MT during April-December 2016.

The National Steel Policy 2017, released by the government, aims to increase steel production. Thus, both production and consumption of steel is expected to remain buoyant in 2017-18, the report said.

More steel production will demand more sponge iron.

Government Initiatives

Some of the other recent government initiatives in this sector are as follows:

- The Government of India has approved a joint venture (JV) between MSTC Ltd and Mahindra Intertrade Ltd, for setting up India's first greenfield auto shredding and recycling facility, which will aide in saving of foreign currency, as a result of import substitution of scrap.
- Union Minister of Steel, Mines, Labor and Employment, has launched the National Mineral Exploration Policy (NMEP), which will help to adopt comprehensive exploration of non-fuel and non-coal mineral resources that would give a major boost to the economy.
- Metal Scrap Trade Corporation (MSTC) Limited and the Ministry of Steel have jointly launched an e-platform called 'MSTC Metal Mandi' under the 'Digital India' initiative, which will facilitate sale of finished and semi-finished steel products.
- The Parliament of India has cleared amendments to the Mines and Minerals Development and Regulation (MMDR) Act, which will enable companies to transfer captive mines leases similar to mines won through an auction, and which is expected to lead to increased Mergers and Acquisitions (M&A) of steel and cement companies.
- The Ministry of Steel has announced to invest in modernization and expansion of steel plants of Steel Authority of India Limited (SAIL) and Rashtriya Ispat Nigam Limited (RINL) in various states to enhance the crude steel production capacity in the current phase from 12.8 MTPA to 21.4 MTPA and from 3.0 MTPA to 6.3 MTPA respectively.
- The Minister of Steel &Mineshas reiterated commitment of Central Government to support the steel industry to reach a production target of 300 Million Tonne Per Annum (MTPA) in 2025.
- The Ministry of Steel is facilitating setting up of an industry driven Steel Research and Technology Mission of India (SRTMI) in association with the public and private sector steel companies to spearhead research and development activities in the iron and steel industry at an initial corpus of Rs 200 crore (US$ 30 million).
- The Central Board of Excise and Customs (CBEC) has issued a notification announcing zero export duty on iron ore pellets, which will help the domestic industry to become more competitive in the international market.
- Government has planned Special Purpose Vehicles (SPVs) with four iron ore rich states i.e., Karnataka, Jharkhand, Orissa, and Chhattisgarh to set up plants having capacity between 3 to 6 MTPA.
- SAIL plans to invest US$ 23.8 billion for increasing its production to 50 MTPA by 2025. SAIL is currently expanding its capacity from 13 MTPA to 23 MTPA, at an investment of US$ 9.6 billion.

Some of the major investments in the Indian steel industry are as follows:

- Tata Steel has signed an agreement to purchase a majority 51 per cent stake in Creative Port Development (CPDPL), which has a concession agreement with the Odisha government to develop a 10 million-tonnes-per-annum (MTPA) Subarnarekha port at Chamukh village in Balasore district of Odisha.
- Tidfore Heavy Equipment Group, the China-based infrastructure giant, is looking to enter the Indian market by signing an investment agreement worth US$ 150 million with Uttam Galva Metallics, to expand its Wardha unit along with South Korean steel major Posco.
- ArcelorMittal SA is looking to set up a joint venture (JV) factory in India with state-owned Steel Authority of India Ltd (SAIL), to manufacture high-end steel products which could be used in defence and satellite industries.
- JSW Group plans to invest around Rs 10,000 crore (US$ 1.5 billion) at Salboni in West Bengal to set up 1,320 Megawatt (MW) coal-based power plant, 4.8 million tonne cement plant and paints factory over a period of next five to seven years.
- National Mineral Development Corporation (NMDC) has planned to invest Rs 40,000 crore (US$ 6 billion) in the next eight years to achieve mining capacity of 75 Million Tonnes Per Annum (MTPA) by FY2018-19 and 100 MTPA by FY2021-22, compared to 48 MTPA current capacity.
- Posco Korea, the multinational Korean steel company, has signed an agreement with Shree Uttam Steel and Power (part of Uttam Galva Group) to set up a steel plant at Satarda in Maharashtra.
- Arcelor Mittal, world's leading steel maker, has agreed a joint venture with Steel Authority of India Ltd (SAIL) to set up an automotive steel manufacturing facility in India.
- Iran has evinced interest in strengthening ties with India in the steel and mines sector, said ambassador of the Islamic Republic of Iran, Mr Gholamreza Ansari in his conversation with Minister of Steel and Mines, Mr Narendra Singh Tomar.
- Public sector mining giant NMDC Ltd will set up a green field 3-million tonne per annum steel mill in Karnataka jointly with the state government at an estimated investment of Rs 18,000 crore (US$ 2.7 billion).
- JSW Steel has announced to add capacity to make its plant in Karnataka the largest at 20 MT by 2022.

2.3.2 GLOBAL STEEL SCENARIO

- Steel production in the world is dominated by China followed by Japan. In 2016, the world crude steel production reached 1628 million tonnes (MT) and showed a growth of 0.8% over 2015.
- China remained world's largest crude steel producer in 2016 (808 MT) followed by Japan (105 MT), India (96 MT) and the USA (79 MT).
- World Steel Association has projected Indian steel demand to grow by 5.4% in 2016 and by 5.7% in 2017 while globally, steel demand has been projected to grow by 0.2% in 2016 and by 0.5% in 2017. Chinese steel use is projected to decline in both these years - by 1% in 2016 and by 2% in 2017.
- Per capita finished steel consumption in 2015 is placed at 208 kg for world and 489 kg for China by World Steel Association

Steel is a key driver of the world's economy. The industry directly employs more than two million people worldwide, with a further two million contractors and four million people in supporting industries. According to the World Steel Dynamics (WSD) organization, global steel production (as also demand for it or consumption) will grow at an annual average compounded rate of growth of 1.28 per cent during 2015-2025 to reach only 1873 million tonnes by 2025. Other well known forecasts, this figure was to be achieved by 2020.

[Source: Ministry of Steel]

2.4 EMPLOYMENT GENERATION DUE TO PROJECT

The project has created employment opportunities to skilled & unskilled workers by Direct & Indirect Employment. The total direct man power in position is 15 with 25 nos of contract labours engaged in housekeeping, canteen service and security.

2.5 METHODOLOGY OF THE STUDY

Environmental issues has been addressed during project planning before the actual project is executed. In the same way as economic, financial, institutional, or technical analysis,

2.6 ENVIRONMENTAL MANAGEMENT PLAN:

Following environmental management plan is proposed to reduce the predicted adverse impacts and to make provision to compensate for any residual adverse impact

- Air Pollution control Equipments (APE) to be setup.
- Disposal management of the solid waste and effluents generated from these APC equipments will be chalked out.
- Fugitive dust emission from the different storage & transfer point and haul road emissions and their detailed control aspects shall be covered.
- Considering water as important and valuable utility, company will formulate a water management plan for minimum use of the fresh water.
- Waste water management dealing with treatment methodologies and recycling/reuse of treated waste will be prepared.
- Storage of storm water in the monsoon in water harvesting ponds and the use of the same water in lean season will be planned.
- Zero discharge norms with a comprehensive water and waste water management plan will be evaluated.
- A detail of the solid waste inventory, its characterization and their usage potentiality will be discussed. Solid waste plant process and reuse of the solid waste for different purposes will be examined.
- Noise control devices with different equipments at design stage, protective measures at work zone sites and supply of protective gears to affected personnel will given in detail.
- Realizing the need for the greenbelt cover as a very good sink for pollutants and the aesthetical aspects the company will go for a comprehensive plantation program as per MoEF Norms.
- Detailed plan for greenbelt development with respect to allocation of area, fund allocation, selection of the species and maintenance plan will be

covered. Peripheral development plan that includes development in infrastructure, health education and socio-cultural aspects will be emphasized.

- Details of the EMP cell with respect to monitoring laboratory, technical man power and fund allocation is discussed. Details of monitoring program with respect to pollutant parameters. Monitoring scheduled and reporting as per statutory requirement will be planned.
- Safety and disaster management plan with onsite emergency plan to deal with the unforeseen accidents will be covered.
- Beneficial aspects of project with respect to direct and indirect employment, business opportunities and peripheral development will be discussed. Trickledown effect of all the project benefits to affected local population will be analyzed.
- Taking in to consideration of the environmental degradations due to the project implementation and the consequent environmental management plan followed by the post project benefits, the subjective assessment with a Total Impact Score will be analyzed to draw a summary conclusion.

2.7 LITIGATION/COURT CASE AGAINST THE COMPANY

No, litigation or court cases are pending against the project and/or no direction/order has been passed by any court of law against the project.

2.8 AUTHORIZATION

M/s. Shivam Iron & Steel Co.Ltd has entrusted M/S Global Tech Enviro Experts Pvt. Ltd., Bhubaneswar for the preparation of report for regularisation of violation to Environmental Clearance by installing 1x100 TPD DRI kiln without prior EC. M/s. GTEEPL team has visited the project site to take actual position of facilities inside project boundary and availability of infrastructure facilities like raw materials, water, power and transportation facilities in detail.

2.9 ACKNOWLEDGEMENT:

M/s GLOBAL TECH ENVIRO EXPERTS PVT LTD, Bhubaneswar expresses its deep gratitude to M/s. Shivam Iron & Steel Co. Ltd, Koderma for the assignment entrusted to them.

CHAPTER-3
PROJECT DESCRIPTION

3.1 TYPE OF PROJECT INCLUDING INTERLINKED AND INTERDEPENDENT PROJECTS IF ANY.

The Project of M/s Shivam Iron & Steel Co. Ltd is a primary metallurgical(ferrous)Project of Sponge Iron manufacturing unit, coming under schedule 3(a) and category "A".

No other project is interlinked or interdependent to this project. However, the product will be supplied to its sister unit at Giridih and for sale in open market.

3.2 LOCATION OF THE PROJECT

M/s Shivam Iron & steel Co Ltd. Is located at: Bandi Dighu, PO-Chadwara, Jhumri telaiya, Koderma district of Jharkhand with latitude 240 24' 49.55'' N and longitude 850 28' 59.87'' E with 387m AMSL.

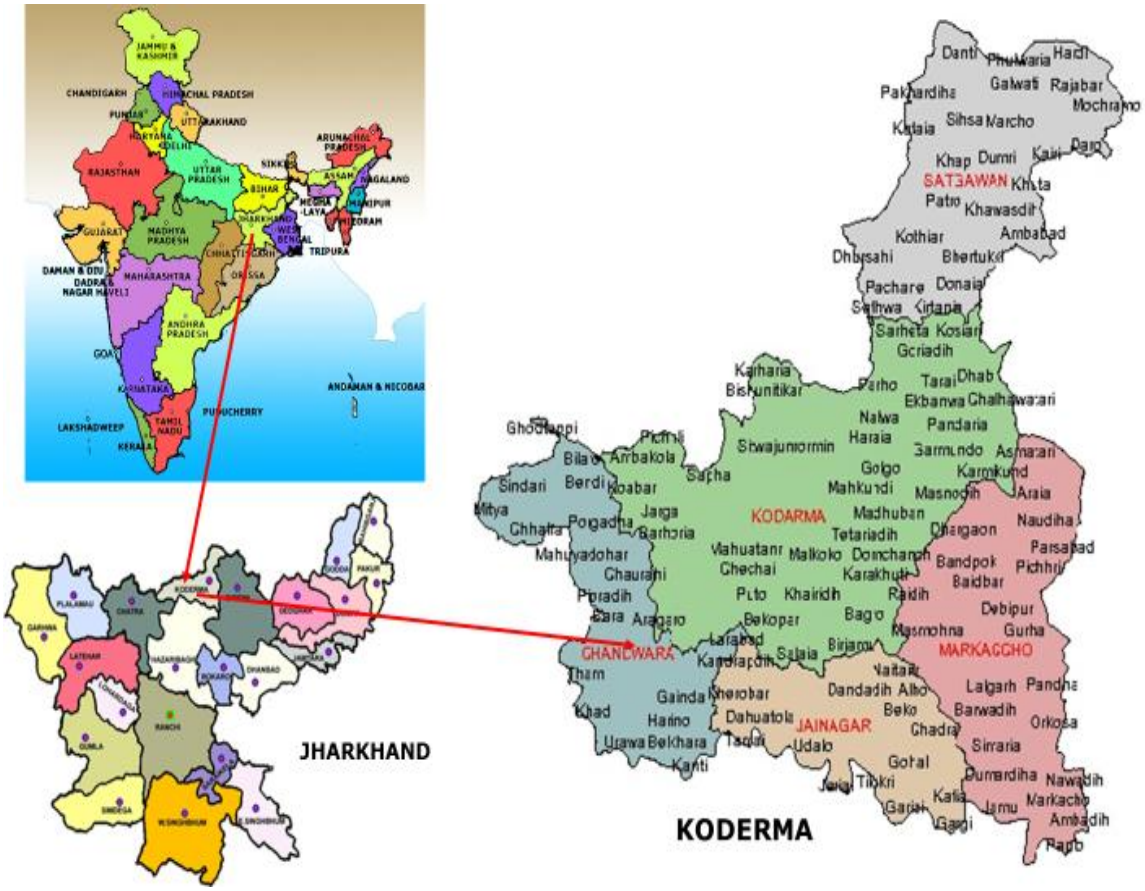


Fig 3.1 Map showing general location, specific location

The corner co-ordinates are: North $24^0 24'50.91''$ N $85^0 29'4.16''$ E

South $24^0 24'44.94''$ N $85^0 28'51.19''$ E

West $24^0 24'52.38''$ N $85^0 28'54.93''$ E

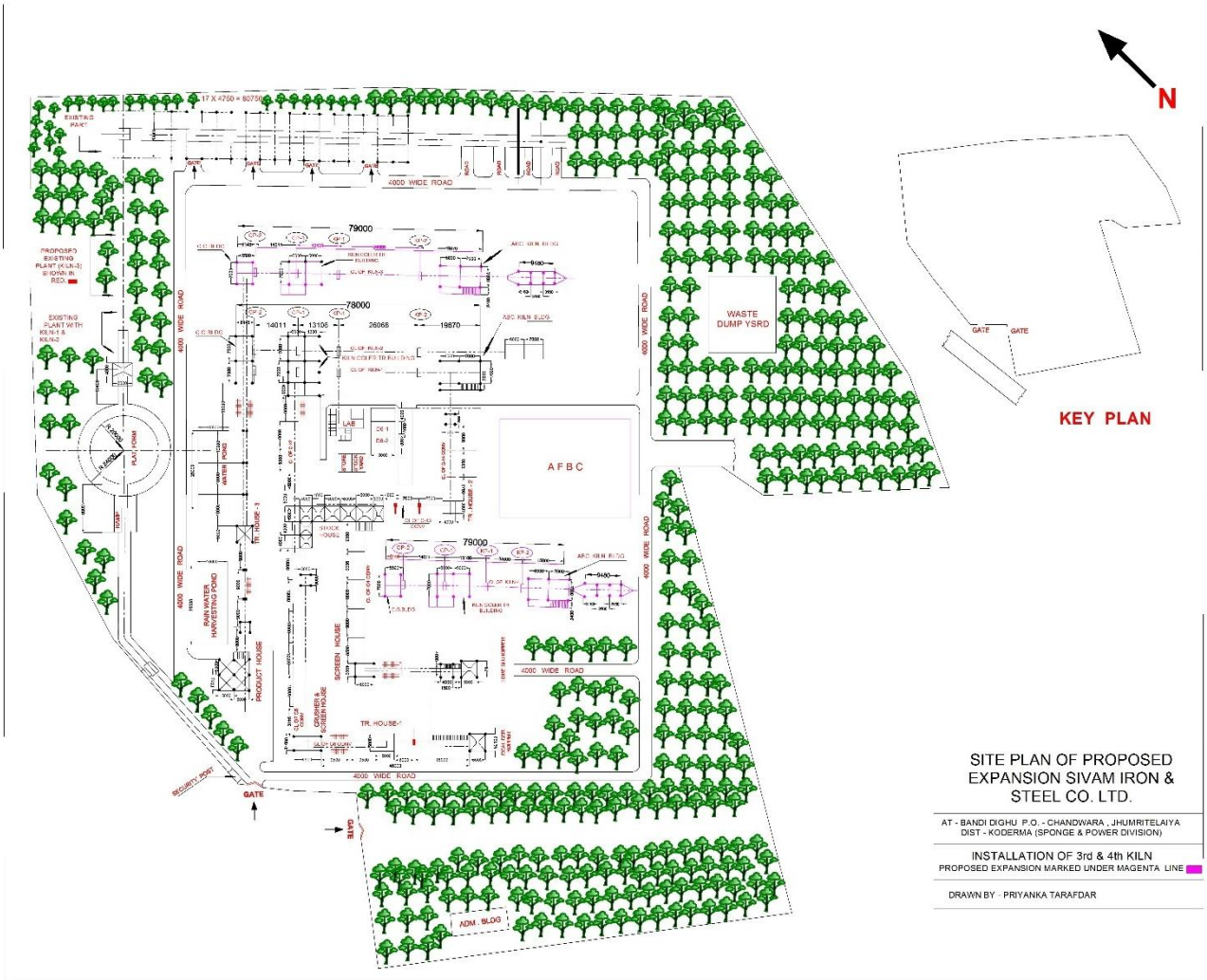
East $24^0 24'44.39''$ N $85^0 29'0.74''$ E

The location is well connected with road & rail. The AH-42 Ranchi Patna Road is only0.5 Kmaway from the project site.

Layout map of project site

Layout map of Project site showing existing facilities, expansion facilities, water reservoir, rain water harvesting pond, solid waste storage yard and green belt etc.

3.3 DETAILS OF ALTERNATE SITES



M/s SISCL existing plant is running on an acquired land of 9.24 ha. As the present location has well connectivity with established roads and rail, no alternative site has been considered.

3.4 SIZE OR MAGNITUDE OF OPERATION

M/s SISCLis at present running with 2x100 TPD DRI kilns and producing 64,000 TPA sponge Iron and one more 1x100 TPD DRI kilns has been installed but not commissioned without valid EC

The total capital cost of proposed project will beabout Rs14.92crores

3.5 PROCESS DESCRIPTION

DRI kiln

Sponge iron is the metallic form of iron produced from reduction of iron oxide below the fusion temperature of iron ore (1535^0C) by utilizing hydrocarbon gases or carbonaceous fuels as coal. The reduced product having high degree of metallization exhibits a 'honeycomb structure', due to which it is named as sponge iron. As the iron ore is in direct contact with the reducing agent throughout the reduction process, it is often termed as direct reduced iron(DRI).

Sponge iron, also known as "Direct Reduced Iron" (DRI) and its variant Hot Briquetted Iron (HBI) have emerged as prime feed stock which replace steel scrap in EAF/IF as well as in other steel-making processes. It is the resulting product (with a metallization degree >85%) of solid state reduction of iron ores or agglomerates (generally of high grade), the principal constituents of which are metallic iron, residual iron oxides, carbon and impurities such as phosphorus, sulphur and gangue (principally silica and alumina). The final product can be in the form of fines, lumps, briquettes or pellets. Sponge iron when briquetted in hot condition at elevated temperature is called hot briquetted iron (HBI).

M/s Shivam Iron & steel co Ltd is proposing 1x100 TPD and 1x300 TPD coal based DRI kilns with SL/RN Technology using Hematite ore and Non-coking coal.

Reduction Process

The charge into the kiln consists of a mixture of iron oxide lump, fluxes such as limestone and/or dolomite (amount depending of sulphur content of the coal) and medium volatile non-coking coal. In the pre-heating zone, the moisture is driven off first, and then the hydrocarbons and hydrogen evolve by thermal decomposition of the coal.

As the combustible gases rise from the bed of solid material, a portion of the gases is burnt in the free board above the bed by controlled quantities of air introduced through the air tubes. As the kiln rotates, the primary mode of heat transfer is by radiation to the tumbling charge and subsequently by internal solids mixing and renewal of the exposed bed surface.

In the pre-heat zone, the reduction of iron oxide proceeds only to ferrous oxide (FeO) (Equation 1).

$Fe203 + CO = 2\ FeO + CO2$ ..... (I)

Final reduction to metallic iron occurs in the metallization zone by reaction of CO with FeO to form CO2 and metallic iron (Equation II).

$FeO + CO = Fe + CO2$ ..... (II)

Most of the CO2 reacts with the excess solid fuel in the kiln and is converted to CO according to the Boudouard reaction (Equation III).

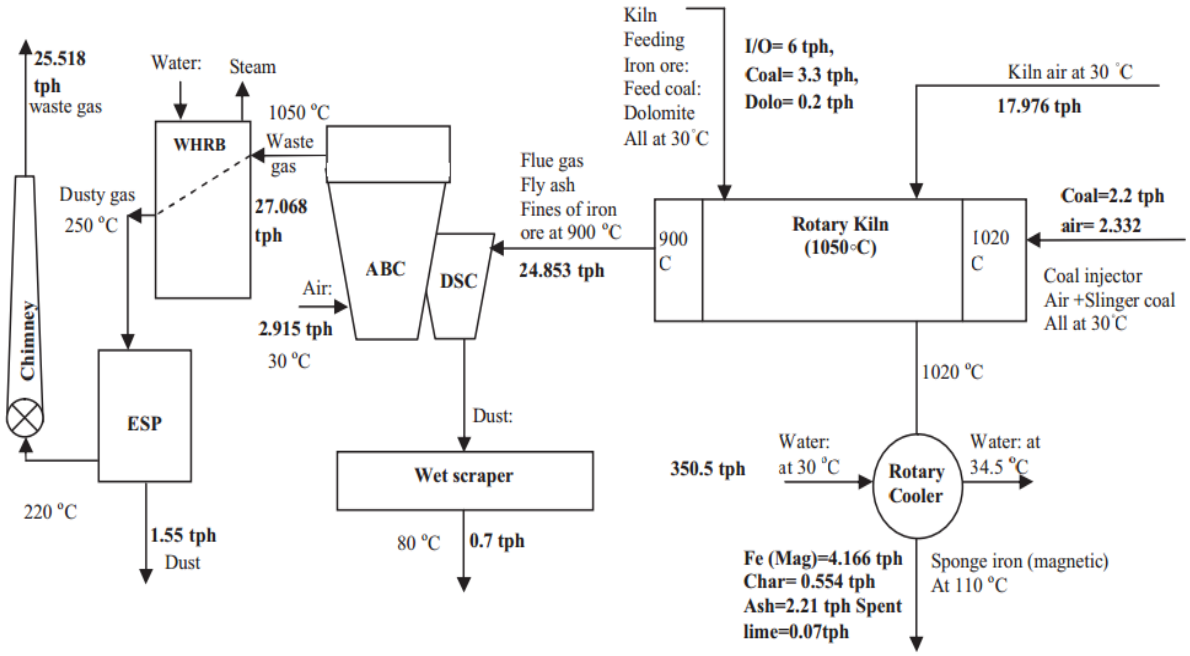
$CO_2 + C = 2CO$ ..... (III)

Coals with higher reactivity are preferred as they provide rapid conversion of CO_2 to CO, thereby maintaining reducing conditions in the kiln metallization zone. The highly endothermic reaction of coal with CO_2 prevents the bed from overheating and attaining high temperature that could lead to melting or sticking of the charge.

High coal reactivity decreases the reduction zone bed temperature but increases the relative capacity. Desired bed and gas temperature in the freeboard can be achieved with high reactivity fuels even with very high throughput rates.

Air admitted to the ports below the bed in the pre-heat zone will burn some of the gases that otherwise leave the kiln unburnt to improve fuel consumption

Process flow sheet for 100 TPD DRI Kiln



3.6 ANNUAL RAW MATERIAL INVENTORY

The estimated gross annual quantity of major raw materials to be handled and their mode of receipt are tabulated in Table below

Materials	Gross quantity in TPA	Source	Mode ofTransport
DRI grade Coal	38,500	Eastern Coal Field Ltd	Rail / Road
DRI grade Iron Ore	51,200	Barbil & Banspani,	Rail / Road
Dolomite/Lime stone	1300	Biramitrapur	Rail / Road

Material will be transported fully covered and through environmentally compliant Bharat-III/ Euro-III vehicles

In addition to the above indicated major raw materials LDO/HSD, & lubricating oil will also be required to be purchased as every start-up of DRI kiln LDO/HSD will be required.

3.7 WATER REQUIREMENT

Water will be required to control cool hot sponge iron in rotary kilns. This cooling is indirect cooling by spraying water over rotary cooler of DRI Kiln. This non-contaminated water will be reused in the process after cooling in Cooling Tower.Loss of water as non-recoverable waste water and through evaporation are to be made up to circulating circuit as fresh make up water.

Sl. No	Facilities	Make up water requirement Cum/day
1	1 X 100TPD, DRI plants	7.5
3	Domestic & AC use	02
	Total water requirement	9.5

3.8 MANPOWER

The total requirement of direct employment manpower for the including facilities proposed is about 15 persons and about 25 numbers contract labourers have been engaged for security, housekeeping and canteen services.

CHAPTER-4
SITE ANALYSIS

4.1 CONNECTIVITY

The existing sponge iron plant project site is located at Bandi Dighu, Jhumri telaiyain Koderma district of Jharkhand. The area is industrially developed and has necessary infrastructure facilities such as motorable road up to the project site. Koderma Rly. stn is 5.5km from project site and Jhumritelaiya is 4nm.AH 42, previously NH 31

4.2 LAND

The total land acquired by M/s Shivam Iron & Steel Co. ltd is 22.837 Ac. (9.24 ha) vide Khata No-1,4,5&6 and Plot No-15 to 18, 26 & 30 to 40.

4.3 TOPOGRAPHY

The site is geographically located at240 24’ 49.55’’ Nand longitude 850 28’ 59.87’’ E with 387m AMSL. The area mostly is a plain area. The nearby industries of M/s Shivam Iron & Steel Co. Ltd are:

The section line from south to north from Jharkhand to Bihar passing through Hazaribag plateau. Buffer zone of the project area is just above Hazaribag. The rock at the edge of this plateau has been cut deeply by innumerable streams. There are a number of rills & gullies of various type such as figure or shoe-lace gullies.

The area exhibits undulating topography comprising hills, hillocks, mounds and plains. Valley fills with low to moderate frequency of lineaments, Pedi plains with moderate frequency of lineaments and Pedi plains are major geomorphological units of the district. Concentrations of lineaments are more in Chandwara, Koderma and Jainagar blocks. Upper part of Chandwara block consists of dissected plateau and lowest part by pediplain. Saluja Steel. The entire district as well as the project area is underlain by the rocks of wide variety of geological formation ranging in age from Archean to Recent. The main being Archean proterozoic, pemocarboniferous and recent.. Phyllite, Mica Schist, Granite gneiss and intrusive granite are the main geological formation of the district. Sporidic occurrence of Dolerite, Quartz pegmatite veins and Quartzites are also found. Thin deposits of alluvium are found along the course of rivers.

In Chandwara block depth to water level becomes deeper from north to south. In northern portion the depth to water level varies between 3-5 mbgl where as in southern portion it varies between 7-10 mbgl in pre-monsoon period where as post-monsoon depth of water level varies between 2-3 mbgl.

Fig 4.1: Toposheet No G 45 T 7 showing project location

4.4 LAND USE PATTERN

River and water bodies

Barakar River flows from W to E in the southern part of the district of Koderma and supports Telaiya Hydel project, a multipurpose dam construction on it. River flows from West to East Poanchkhara, Keso, Akto, Gurio, GukhanaNadi are the main tributaries of the Barakar river.

Soil characteristic of buffer zone

The district forms the northern edge of the chhotanagpur plateau. Topography of the district is hilly. Upland covers major part of cultivable land, but due to inadequate irrigation facility only one crop namely paddy is grown, however multi cropping pattern is adopted in a few area.

The soil of the project study area is laterite soil. This soil is characterized by its acidic nature and not suitable for traditional agriculture. Most of the land is usar land. Land Use Due to the laterite condition ofthe soil, deficiency in rainfall, and no major rivers the land use pattern is different from the Gangetic plain. Some irrigated area takes into account of rabi, kharif and oilseeds crops. But generally it is best suited for vegetables, medicinal plants growing and floriculture due to natural drainage of water and no waterlogging conditions.