Gmail

Jharkhand <jam.env2018@gmail.com>

Regarding compliance for the period April, 2023 to September, 2023 to the conditions of Environment Clearance for Expansion of Sponge Iron Plant to mini Steel plant for production of 67,500 TPA rolled product by installation of 2X12 Ton induction furnace with billet caster, Iron ore crushing & beneficiation and 15 MW Captive Power Plant.

1 message

Jharkhand <jam.env2018@gmail.com> Sat, Dec 16, 2023 at 10:15 AM
To: ro.ranchi-mef@gov.in
Cc: rdkolkata.cpcb@gov.in, ranchijspcb@gmail.com, jspcb_hazaribagh@rediffmail.com

MCCIPL/110/2023-24 04/12/2023

To,
The Additional Principal Chief Conservator of Forests (C),
Government of India,
Ministry of Environment, Forest & Climate Change,
Integrated Regional Office (Eastern Central Zone),
2nd Floor, Headquarter-Jharkhand State Housing Board,
Harmu Chowk, Ranchi, Jharkhand- 834002

Sub:-Regarding compliance for the period April, 2023 to September, 2023 to the conditions of Environment Clearance for Expansion of Sponge Iron Plant to mini Steel plant for production of 67,500 TPA rolled product by installation of 2X12 Ton induction furnace with billet caster, Iron ore crushing & beneficiation and 15 MW Captive Power Plant.

Ref: - Environment Clearance Letter No. F.NO.J – 11011/215/2016 – IA.II (I) dated 07/08/2019.

Dear Sir,
In reference to the above subject matter & reference letter, the point wise Half Yearly compliance status for the period of April, 2023 to September, 2023 is being submitted for your kind perusal please.

Hope you will find this in order and oblige.

Thanking you.
Yours faithfully
For Maa Chhinnmastika Cement & Ispat Pvt Ltd.

Director

MCCIPL - EC Compliance - April 23 to Sep 23.pdf
4301K

MAA CHHINNMASTIKA CEMENT AND ISPAT PRIVATE LIMITED

Registered Office & Works:
At- Hehal, Post - Barkakana - 829103, Dist.- Ramgarh (Jharkhand)
CIN:U26941JH2004PTC010665
ramgarh.jh@rediffmail.com

O/C

MCCIPL/110/2023-24

04/12/2023

To,
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Thanking you.
Yours faithfully
For Maa Chhinnmastika Cement & Ispat Pvt Ltd.
Maa Chhinnmastika Cement & Ispat Pvt. Ltd.
Director

12/12/23

Enclosures: Compliance status Report.

Cc to:-

1) The Zonal office Incharge, Central Pollution Control Board, Southernd Conclave, Block 502, 5th & 6th Floors, 1582 Rajdanga Main Road, Kolkata - 700 107 (W. B.).
2) The Member Secretary, Jharkhand State Pollution Control Board, T.A. Division Building (Ground Floor), HEC Campus, P.O. Dhurwa, Ranchi - 834004, Jharkhand.
3) Regional Officer, Regional Office, State Pollution Control Board, Hazaribagh, Jharkhand.

Jharkhand State Pollution Control Board

Online Consent Management & Monitoring System

Ministry of Environment, Forest and Climate Change
Government of India

- Apply For Consent
- Change Password
- Industry Profile
- Compliance Management
- Laboratory Monitoring Report
- Online Payment Verification
- Fee Calculator
- e-Wallet Management
- Delete InProgress Applications
- Delete InProgress LAB Applications
- View Notices 0

Welcome MAA CHHINNMASTIKA CEMENT N ISPAT PRIVATE LIMITED

Date : 4-12-2023

Your Compliance details has been Submitted. Your Acknowledgement Number is 17927472. Thank You!.

General

General Details

Industry Name:	**MAA CHHINNMASTIKA CEMENT N ISPAT PRIVATE LIMITED**
Industry Address:	**VILL- HEHAL, P.O- BARKAKANA, RAMGARH**
Industry Pin:	**829103**
Industry S.T.D. Code(Phone):	**06553**
Industry Phone No:	**226846**
Industry E-Mail Address:	**cementispat@rediffmail.com**
Occupier Name:	**SANTOSH KUMAR GUPTA**
Occupier Designation:	**Director**
Occupier Address:	**HEHAL, BARKAKANA, DIST-RAMGARH (JHARKHAND)**
Occupier Pin:	**829103**
Occupier Mobile No:	**9852630503**
Occupier Email Address:	**cementispat@rediffmail.com**
Industry Category:	**RED**
Industry Type:	**Iron & Steel (involving processing from ore/ integrated steel plants) and or Sponge Iron units**
Last Consent Granted App. No:	15354540
Last Consent Granted Uploaded Certificate:	View Uploaded Certificate
Last Consent Granted App. Type:	**CTO**
Authorization to file Compliance:	View File

Proposal No.	State	Proposal Name	Category	User Agency Name	Proposal Recieved on	File No	Date of grant

General Condition:	View
Specific Condition:	View

Environment Clearance Compliance Status
Period from April 2023 to October 2023

Name of Project:	Maa Chhinnmastika Cement & Ispat Pvt. Ltd.
Capacity:	Expansion of Sponge Iron Plant to mini Steel plant for production of 67,500 TPA rolled product by installation of 2X12 Ton induction furnace with billet caster, Iron ore crushing & beneficiation and 15 MW Captive Power Plant.
Location:	Village - Hehal, P.O – Barka kana, Distt. – Ramgarh, Jharkhand.
EC letter No.	F. NO. J-11011/215/2016-IA.II (I) Dated- 07/08/2019.

A. SPECIFIC CONDITION:

Sl.No	CONDITION	COMPLIANCE
1.	Particulate matter in the Stack emissions shall not exceed 30 mg/Nm3.	Being complied.
2.	Water for its plant operations shall be sourced by the project proponent from Damodar River, and no ground water shall be abstracted by them.	Being complied.
3.	Project proponent shall undertake rain water harvesting and recharge, and the quantum of water so channelized shall be more than the water consumption in the project area.	Being complied. Unit has constructed 2 nos of Rain Water Harvesting pits within plant area.
4.	The CER activities shall be implemented within a period of 3 years utilizing the earmarked funds of Rs. 1.45 crores.	Being complied on regular basis. Unit has installed 2 nos of hand pumps in Hehal village & purchases one number of Ambulance (24X7) for nearby villagers.

B. GENERAL CONDITION:

Sl.No	CONDITION	COMPLIANCE
I	Statutory compliance :	
1.	The project proponent shall obtain Consent to Establish/Operate under the provisions of Air (Prevention & Control of Pollutions) Act, 1981 and the Water (Prevention & Control Pollution) Act, 1974 from the concerned State Pollution Control Boards/Committee.	Being complied.
2.	The project proponent shall obtain the necessary permission from the Central Ground Water Authority, in case of drawl of ground water/from the competent authority concerned in case of drawl of surface water required for the project.	Agree with. Water drawl agreement executed with DVC for drawl of water from Damodar River.

3.	The project proponent shall obtain authorization under the Hazardous and other Waster Management Rules, 2016 as amended from time to time.	Being complied.
II.	**Air Quality monitoring and preservation:**	
1.	The project proponent shall install 24x7 continuous emission monitoring system at process stacks to monitor stack emission with respect to standards prescribed in Environment (Protection) Rules 1986 vide G.S.R 277 (E) dated 31st March 2012 (applicable to IF/EAF) as amended from time to time ; S.O. 3305(E) dated 7TH December 2015(Thermal Power Plants) as amended from time to time) and connected to SPCB and CPCB online servers and calibrate these system from time to time according to equipment supplier specification through labs recognized under Environment (Protection) Act, 1986 or NABL accredited laboratories.	Being complied. Online monitoring systems are installed for monitoring of PM & SO2 emission of stack and it is connected online with Central Pollution Control Board and Jharkhand State Pollution Control Board URL server.
2.	The project proponent shall monitor fugitive emissions in the plant premises at least once in every quarter through laboratories recognized under Environment (Protection) Act, 1986 or NABL accredited laboratories.	Being complied on regular basis. Fugitive monitoring report is enclosed as **Annexure – 1.**
3.	The project proponent shall install system carryout Continuous Ambient Air Quality monitoring for common/criterion parameters relevant to the main pollutants released (e.g. PM10 and PM2.5 in reference to PM emission, and SO2 and NOX in reference to SO2 and NOX emissions) within and outside the plant area(at least at four locations one within and three outside the plant area at an angle of 120º each), covering upwind and downwind directions.	Unit has installed Ambient Air Quality monitoring station (PM10, PM2.5, SO2 & NOx) near plant main gate. Photographs enclosed as **Annexure – 2.**
4.	The project proponent shall submit monthly summary report of continuous stack emission and air quality monitoring and results of manual stack monitoring and manual monitoring of air quality/fugitive emissions to Regional Office of MoEF& CC, Zonal office of CPCB and Regional Office of SPCB along with six monthly monitoring report.	Monitoring Report is enclosed as **Annexure – 3.**
5.	Appropriate Air Pollution Control (APC) system shall be provided for all the dust generating points including fugitive dust from all vulnerable sources.	Being complied. Unit has installed 4 nos of ESP, 10 nos of Bag filters at each transfer points and Fifty nos of water sprinklers at various places within plant premises to control fugitive emission & stack emission. Unit has already installed bag

		filter at raw material handling area and all conveyor belts are covered.
6.	The project proponent shall provide leakage detection and mechanized bag cleaning facilities for better maintenance of bags.	Being complied.
7.	Sufficient number of mobile or stationery vacuum cleaners shall be provided to clan plant roads, shop floors roofs, regularly.	Adequate arrangement of cleaning and sprinkling of water has been made.
8.	Recycle and reuse iron ore fines, coal and coke fines, lime fines and such other fines collected in the pollution control devices and vacuum cleaning devices in the process after briquetting/agglomeration.	Agree with.
9.	The project proponent shall use leak proof trucks/dumpers carrying coal and other raw materials and cover them with tarpaulin.	Being complied.
10.	The project proponent shall provide covered sheds for raw materials like scrap and sponge iron, lump ore, coke, coal, etc.	Units has provided covered storage shed have been provided for all raw materials like coal, Iron ore etc.
11.	The project proponent shall provide primary and secondary fume extraction system at all melting furnaces.	Complying with.
12	Design the ventilation system for adequate air changes as per ACGIH document for all tunnels, motor houses, Oil Cellars.	Complying with.
III.	**Water quality monitoring and preservation :**	
1.	The project proponent shall install 24x7 continuous effluent monitoring system with respect to standards prescribed in Environment(Protection)Rules 1986 vide G.S.R 277 (E) dated 31st March 2012 (applicable to IF/EAF) as amended from time to time; S.O. 3305(E) dated 7th December 2015 (Thermal Power Plants) as amended from time to time) and connected to SPCB and CPCB online servers and calibrate these system from time to time according to equipment supplier specification through labs recognized under Environment (Protection) Act, 1986 or NABL accredited laboratories.	Complying with.
2.	The project proponent shall monitor regularly ground water quality at least twice a year (pre and post monsoon) at sufficient numbers of piezometers/sampling wells in the plant and adjacent areas through labs recognized under Environment(Protections) Act, 1986 and NABL accredited laboratories.	Being Complied on regular basis. Ground water quality monitoring testing & Piezometer reading report are enclosed as **Annexure – 4.**

3.	The project proponent shall submit monthly summary report of continuous effluent monitoring and results of manual effluent testing and manual monitoring of ground water quality to Regional Office of MoEF& CC, Zonal office of CPCB and Regional Office of SPCB along with six monthly monitoring report.	Noted, Report is enclosed as **Annexure – 4.**
4.	Adhere to 'Zero Liquid Discharge'	Agree with.
5.	Sewage Treatment Plant shall be provided for treatment of domestic waste water to meet the prescribed standards.	For domestic waste, we are using septic tank with soak pit.
6.	The project proponent shall provide the ETP for effluents of rolling mills to meet the standards prescribed in G.S.R 277(E) 31st March 2012 (applicable to IF/EAF) as amended from time to time.	Noted.
7.	Garland drains and collection pits shall be provided for each stock pile to arrest the run-off in the event of heavy rains and to check the water pollution due to surface run off.	Noted.
8.	The project proponent shall practice rainwater harvesting to maximum possible extent.	Being complied. Unit has constructed 2 nos of Rain Water Harvesting pits within plant area.
9.	The project proponent shall made efforts to minimize water consumption in the steel plant complex by segregation of used water, practicing cascade use and by recycling treated water.	Being complied.
IV.	**Noise monitoring and prevention:**	
1.	Noise level survey shall be carried as per the prescribed guidelines and report in this regards shall be submitted to Regional Officer of the Ministry as a part of six monthly compliance report.	Being complied. Noise Monitoring Report is enclosed as **Annexure – 5.**
2.	The ambient noise levels should conform to the standards proscribed under E(P) A Rules, 1986 viz. 75 dB(A) during day time and 70 dB(A) during night time.	Being complied.
V.	**Energy Conservation measures**	
1.	The project proponent shall provide waste heat recovery system (pre-heating of combustion air) at the flue gases of reheating furnaces.	Complying with.
2.	Practice hot charging of slabs and billets/blooms as far as possible.	Complying with.
3.	Ensure installation of regenerative type burners on tall reheating furnaces.	Complying with.
4.	Practice hot charging of slabs and billets/blooms as far as possible.	Complying with.

5.	Ensure installation of regenerative type burners on all reheating furnaces.	Complying with.
6.	Provide solar power generation on roof tops of buildings, for solar light system for all common areas, street lights, parking around project area and maintain the same regularly.	Noted.
7.	Provide the project proponent of LED lights in their offices and residential areas.	Complying with.
VI.	**Waste management:**	
1.	Used refractories shall be recycled as far as possible.	Being complied.
2.	Oily scum and metallic sludge recovered from rolling mills ETP shall be mixed, dried, and briquetted and reused melting Furnaces.	Noted.
3.	100% utilization of fly ash shall be ensured. All the fly ash shall be provided to cement and brick manufactures for further utilization and Memorandum of Understanding in this regard shall be submitted to the Ministry's Regional Office.	Noted.
4.	The waste oil, grease and other hazardous waste shall be disposed of as per the Hazardous & Other waste (Management & Trans boundary Movement) Rules, 2016.	Being complied.
VII.	**Green Belt :**	
1.	Green belt shall be developed in an areaequal to 33% of the plant area with a native tree species in accordance with CPCB guidelines. The greenbelt shall inter alia cover the entire periphery of the plant.	Being complied in regular basis.
2.	The project proponent shall prepare GHG emissions inventory for the plant and shall submit the programed for reduction of the same including carbon sequestration including plantation.	GHG emission inventory report is enclosed as **Annexure – 6.**
VIII.	**Public hearing and Human health issues :**	
1.	Emergency preparedness plan based on the Hazard identification and Risk Assessment (HIRA) and Disaster Management Plan shall be implemented.	Being complied.
2.	The project proponent shall carry out heat stress analysis for the workmen who work in high temperature work zone and provide Personal Protection Equipment (PPE) as per the norms of Factory Act.	Agree with.

3.	Provision shall be made for the housing of construction labour within the site which all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, creche etc. The housing may be in the for of temporary structures to be removed after the completion of the project.	Noted.
4.	Occupational health surveillance of the worker shall be done on a regular basis and records maintained as per the Factories Act.	Periodical health check-up are being carried and record are maintained on regular basis.
IX.	**Corporate Environment Responsibility**	
1.	The project proponent shall comply with the provisions contained in this Ministry's OM vide F.No. 22-65/2017-IA III dated 1st May 2018, as applicable, regarding Corporate Environment Responsibility.	Noted.
2	The company shall have a well laid down environmental policy duly approve by the Board of Directors. The environmental policy should prescribe for standard operating procedures to have proper check and balances and to bring into focus any infringements/deviation/violation of the environmental / forest /wildlife norms/conditions. The company shall have defined system of reporting infringements/deviation/violation of the environmental/forest/wildfirenorms/conditions and/or shareholders/stake holders. The copy of the boards resolution in this regards shall be submitted to the MoEF& CC as a part of six monthly report.	The copy of the boards resolution is enclosed as **Annexure – 7.**
3.	A separate Environmental Cell both at the project and company head quarter level, with qualified personnel shall be set up under the control of senior Executive, who will directly to the head of the organization.	Being complied. Organization chart of environment cell is enclosed as **Annexure – 8.**
4.	Action plan for implementing EMP and environmental conditions along with responsibility matrix of the company shall be prepared and shall be duly approved by competent authority. The year wise funds earmarked for environmental protection measures shall be kept in separate account and not to be diverted for any other purpose. Year wise progress of implementation of action plan shall be reported to the Ministry/Regional Office along with the Six Monthly Compliance Report.	Noted.

5.	Self – environmental audit shall be conducted annually. Every three years third party environmental audit shall be carried out.	Being Complied on regular basis.
6.	All the recommendations made in the Charter on Corporate Responsibility for Environment Protection (CREP) for the pants shall be implemented.	Being Complied on regular basis.

X. MISCELLANEOUS:

1.	The project proponent shall make public the environmental clearance granted for their project along with the environmental conditions and safeguards at their cost by prominently advertising it at least in two local newspapers of the District or State, of which one shall be in the vernacular language within seven days and in addition this shall also be displayed in the project proponent's website permanently.	Advertised in two local newspapers of the District, Prabhat Khabar and Danik Bhaskar published on 18/08/2019. Environmental conditions and safeguards will be complied in due course. EC letter has been put on our web site www.mccipl.in
2.	The copies of the environmental clearance shall be submitted by the project proponents to the Heads of local bodies, Panchayats and Municipal Bodies in addition to the relevant offices of the Government who in turn has to display the same for 30 days from the date of receipt.	Copy of environment clearance letter has been sent to the followings:- 1) The Member Secretary, Jharkhand State Pollution Control Board, Ranchi, Jharkhand dated 12/08/2019. 2) The Regional officer, Jharkhand State Pollution Control Board, Hazaribagh, Jharkhand dated 12/08/2019. 3) The District Industries Centre, District - Ramgarh, Jharkhand dated 10/08/2019. 4) The Deputy Commissioner, District-Ramgarh, Jharkhand dated 12/08/2019. 5) President, Ramgarh Nagar Parishad, District-Ramgarh, Jharkhand dated 22/08/2019.
3.	The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and update the	Noted, being complied on regular basis.

	same on half-yearly basis.	
4.	The project proponent shall monitor the criteria pollutants level namely; PM10, SO2, NOx (ambient levels as well as stack emissions) or critical sectorial parameters, indicated for the projects and display the same at a convenient location of disclosure to the public and put on the website of the company.	Being complied on regular basis. Display board has been displayed on main gate.
5.	The project proponent shall submit six-monthly reports on the status of the compliance of the stipulated environmental conditions on the website of the ministry of Environment, Forest and Climate Change at environment clearance portal.	Noted, being complied on regular basis.
6.	The project proponent shall submit the environmental statement for each financial year in Form-V to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently and put on the website of the company.	Being complied on regular basis. Environment Statement Report has been uploaded on the company web site www.mccipl.in Environment Statement Report enclosed as **Annexure -9.**
7.	The project proponent shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities, commencing the land development work and start of production operation by the project.	Noted.
8.	The project authorities must strictly adhere to the stipulations made by the State Pollution Control Board and the State Government.	Noted.
9.	The project proponent shall abide by all the commitments and recommendations made in the EIA/EMP report, commitment made during Public Hearing and also that during their presentation to the Expert Appraisal Committee.	Noted.
10.	No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment, Forests and Climate Change (MoEF& CC).	Agree with.
11.	Concealing factual data or submission of false / fabricated data may result in revocation of this environmental clearance and attract action under the provisions of Environment (Protection) Act, 1986.	Noted.
12.	The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.	Agree with.
13.	The Ministry reserves the right to stipulate additional conditions if found necessary. The Company in a time bound manner shall implement these conditions.	Agree with.

14.	The Regional Office of this Ministry shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer(s) of the Regional Office by furnishing the requisite data/information/monitoring reports.	Agree with.
15.	The above conditions shall be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air(Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 , Hazardous and Other wastes(Management and Tranbsounary Movement) Rules, 2016 and the Public Liability Insurance Act, 1991 along with their amendments and Rules and any other order passed by the Hon'ble Supreme Court of India/ High Courts and any other order passed by the Hon'ble Supreme Court of India/High Court and any other Court of Law relating to the subject matter.	Noted.
16.	Any appeal against this EC shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.	Noted.

Thanking you.

Yours faithfully

Maa Chhinnmastika Cement & Ispat Pvt. Ltd.

Director

Enclosures: - As above.

YUGANTAR BHARATI
ANALYTICAL & ENVIRONMENTAL ENGINEERING LABORATORY

Accredited by: - Jharkhand State Pollution Control Board (JSPCB)
Certified by : - An ISO 9001:2015 & ISO 45001:2018

State Pollution Control Board

Test Report

Discipline	Chemical	Group	Atmospheric Pollution	Sample Description	Fugitive Dust Emission
Report Release Date		20th October, 2023		Report ID	YBAEEL - 231011 -143512 - F01
W. Order/ JSPCB App. No.		MCCIPL/110/2022-23		Work Order Date	06.01.2023
Type of Industry (If any)		Sponge Iron Unit		Job code/ Ref. no.	YBAEEL/WA/L/A/Oct. -23/12
Report Issue to		M/s Ma Chhinnmastika Cement And Ispat Pvt. Ltd. At.- Hehal, PO- Barkakana - 829103, Dist.- Ramgarh , Jharkhand			
Sampling Period		16/10/2023		Mode of sample collection	By YBAEEL Team
Sampling Protocol		IS:5182			
Sampling Locations		A. Product Handling Area		23°37'08"N, 85°25'39"E	
		B. Material Handling Area		23°37'03"N, 85°25'39"E	
Meteorological Cond. of Field		W.C.– Clear	RH % - 46	Temp. - 32°C	W.D.– North-South
Sample receipt Date		18/10/2023	Analysis Started on 18/10/2023	Analysis completed on	20/10/2023

******Test Results ******

Parameters	Test Methods	Units	Sampling Location		Limits
			Site A	Site B	
Particulate matter (RSPM)	Gravimetric Method	µg/m³	1625.6	1818.4	2000

******End of Report******

Limit is specified as	G.S.R. 414 (E), 30th May, 2008
Abbreviation	MDL : Minimum detection limit, BDL : Below detection limit,
Env. Condition of Lab	Laboratory is maintaining, Temperature 27 ± 2°C and Relative Humidity 65 ± 5% in all testing areas as per IS 196:1966 (C).
Specific contractual notes	All values are expressed in as unit and results listed refer only to the tested sample and applicable parameter in Lab's Permanent Facility
	This report, in full or in part, shall not be used for advertising or as evidence in any court of law.
	This report cannot be reproduced, except when in full, without the written permission of the CEO.
	The samples collected shall be destroyed after 7 days from the date of issue of the certificate unless specified otherwise
	The liability of the laboratory is limited to the invoiced amount.
	All disputes are subjected to the Ranchi Jurisdiction.
Remarks	Samples comply with prescribed limits.

Sample Drawn By – Pawan Kumar Singh
Tested By – Akash Khalkho (Lab Analyst)

20/10/23	20/10/23
Verified by	Issued by
Sumit Kant Srivastava	Sanjeev Kumar Singh
(Sr. Lab Analyst)	(Technical Manager)

Authorized Signatory
Atmospheric Pollution
Yugantar Bharati Analytical & Environmental Engineering Laboratory

Annexure - 2


PM 2.5 MONITOR
VASTHI
GUNTUR - 522 002. Andhra Pradesh. India
E-mail : info@vasthi.com, sales@vasthi.com
Contact : +91 7382708685, +91 9581578583

Annexure - 3

Maa Chhinnmastika Cement & Ispat Pvt Ltd

Stack emission Report (PM All values in mg/Nm3)

Sl. No.	Month	Stack 1	Stack 2
		PM	PM
1	April, 2023	28	29
2	May, 2023	27	28
3	June, 2023	29	28
4	July, 2023	28	27
5	August, 2023	29	27
6	September, 2023	27	29

Ambient Air Quality Monitoring

Location	Parameters	Unit	April, 23	May, 23	June, 23	July, 23	August, 23	September, 23
Nr. Main Gate	PM 10	µg/m3	91	94	93	92	89	90
	PM 2.5		52	54	54	56	56	55
North East side of the Unit	PM 10		93	83	82	87	94	93
	PM 2.5		58	51	53	51	55	54
West side of the Unit	PM 10		91	90	89	90	92	93
	PM 2.5		56	55	56	57	54	56

YUGANTAR BHARATI
ANALYTICAL & ENVIRONMENTAL ENGINEERING LABORATORY

Accredited by: - Jharkhand State Pollution Control Board (JSPCB)
Certified by : - ISO 9001:2015 & ISO 45001:2018

TC-4032

Test Report

ULR (Unique Lab Report) No.		T C 4 0 3 2 2 3 0 0 0 0 1 4 4 5 F			
Discipline	Chemical	Group	Water	Sample Description	Ground Water
Report Release Date		26th October, 2023		Report ID	YBAEEL-231019-121821-GW01
W. Order/ JSPCB App. No.		Via - Telephonic		Work Order Date	19.10.2023
Type of Industry(If any)		Sponge Iron Unit		Job code/ Ref. no.	YBAEEL/WA/L/C/Oct.-23/11
Report Issue to		M/s Maa Chhinmastika Cements and Ispat Pvt. Ltd. At.- Hehal, Post - Barkakana - 829103, Dist.- Ramgarh, Jharkhand.			
Sampling Date		20/10/2023		Mode of sample collection	By YBAEEL Team
Sampling Protocol		IS : 17614 (Part-1): 2021		Sample Code	231021-GW-W01
Sampling Location		Bore Well		Sampling Source	Ground Water
Sample pkg. Condition		Sealed Pack in PP Bottle		Sample Quantity	3000 ml
Meteorological Cond. of Field		W.C.– Clear		RH % - 57	Temp. – 26°C
Sample receipt Date		21/10/2023	Analysis Started on	21/10/2023	Analysis completed on 26/10/2023

******Test Results******

Sl	Parameter	Test Method	Units	Results	Limits
1.	pH value	IS 3025 (P-11):2022 (Electrometric Method)	pH	7.30	6.5-8.5
2.	Colour	IS 3025 (P-04):2021 (Visual Comparison Method)	Hazen	10	5-15
3.	Conductivity	IS 3025 (P-14):2013, RA 2019	µs/cm	438.0	--
4.	Turbidity	IS 3025 (P-10):2023 (Nephelometric Method)	NTU	1.0	1-5
5.	Total Alkalinity (as $CaCO_3$)	IS 3025 (P-23):1986, RA 2019 (Indicator Method)	mg/l	178.0	200-600
6.	Total Hardness (as $CaCO_3$)	IS 3025 (P-21):2009, RA 2019 (EDTA Method)	mg/l	168.0	200-600
7.	Total dissolved solids	IS 3025 (P-16):2023 (Gravimetric Method)	mg/l	262.0	500-2000
8.	Chlorine Residual	IS 3025 (P-26):2021 (Iodometric Method)	mg/l	BDL (MDL 0.07)	0.2-1
9.	Chloride (as Cl)	IS 3025 (P-32):1988, RA 2019 (Argentometric Method)	mg/l	8.60	250-1000
10.	Fluoride (as F^-)	APHA 4500 F-C 24th edition 2023 (Ion Selective Electrode Method)	mg/l	0.72	1.0-1.5
11.	Nitrate (as NO_3^-- N)	APHA 4500 NO_3- (B) 24th edition 2023 (UV Screening Method)	mg/l	0.80	45-No relaxation
12.	Sulphate (as SO_4^{2-})	IS 3025 (P-24-Sec 1):2022 (Turbidity Method)	mg/l	16.8	200-400
13.	Calcium (as Ca)	IS 3025 (P-40): 1991, RA 2019 (EDTA Titrimetric Method)	mg/l	34.5	75-200
14.	Magnesium (as Mg)	APHA 3500 Mg B 24th edition 2023	mg/l	19.9	30-100

Limit is specified as	IS 10500:2012, RA 2018.
Abbreviation	MDL : Minimum detection limit, BDL : Below detection limit.
Env. Condition of Lab	Laboratory is maintaining, Temperature 27 ± 2°C and Relative Humidity 65 ± 5% in all testing areas as per IS 196:1966 (C).
Specific contractual notes	All values are expressed in as unit and results listed refer only to the tested sample and applicable parameter in Lab's Permanent Facility
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	The samples collected shall be destroyed after 15 days from the date of issue of the certificate unless specified otherwise
	The liability of the laboratory is limited to the invoiced amount.
	All disputes are subjected to the Ranchi Jurisdiction.
Remarks	Sample complies with prescribed limits.

Sample Drawn By – Angad Munda
Tested By – Satyam Kumar (Lab Analyst)

Verified by	Issued by
Shivani Kumari Singh	Sanjeev Kumar Singh
(Authorized Signatory)	(Technical Manager)

Authorized Signatory
Chemical Section
Yugantar Bharati Analytical & Environmental Engineering Laboratory

******End of Report******

Test Report

Discipline	Chemical	**Group**	Water	**Sample Description**	Ground Water
Report Release Date		26th October, 2023		**Report ID**	YBAEEL-231019-121821-GW01
W. Order/ JSPCB App. No.		Via - Telephonic		**Work Order Date**	19.10.2023
Type of Industry(If any)		Sponge Iron Unit		**Job code/ Ref. no.**	YBAEEL/WA/L/C/Oct.-23/11
Report Issue to		M/s Maa Chhinmastika Cements and Ispat Pvt. Ltd. At.- Hehal, Post - Barkakana - 829103, Dist.- Ramgarh, Jharkhand.			
Sampling Date		20/10/2023		**Mode of sample collection**	By YBAEEL Team
Sampling Protocol		IS : 17614 (Part-1): 2021		**Sample Code**	231021-GW-W01
Sampling Location		Bore Well		**Sampling Source**	Ground Water
Sample pkg. Condition		Sealed Pack in PP Bottle		**Sample Quantity**	3000 ml
Meteorological Cond. of Field		W.C.– Clear		RH % - 57	**Temp.** – 26°C
Sample receipt Date		21/10/2023	**Analysis Started on**	21/10/2023	**Analysis completed on** 26/10/2023

******Test Results ******

Sl	Parameter	Test Method	Units	Results	Limits
1.	**Odour**	IS 3025 (P-05):2018	--	**Agree.**	Agreeable
2.	**Taste**	IS 3025 (P-07 & 08):2017&2023	--	**Agree.**	Agreeable
3.	**Phosphate (as PO_4^{3-})**	IS 3025 (P-31/Sec1):2022 (Stannous Chloride Method)	mg/l	**BDL (MDL 0.003)**	--
4.	**Cyanide(as CN^-)**	IS 3025 (P-27/Sec1):2021 (Titrimetric Method)	*mg/l*	**BDL (MDL 1.0)**	0.05-No relaxation

Limit is specified as	IS 10500:2012, RA 2018.
Abbreviation	MDL : Minimum detection limit, BDL : Below detection limit.
Env. Condition of Lab	Laboratory is maintaining. Temperature 27 ± 2°C and Relative Humidity 65 ± 5% in all testing areas as per IS 196:1966 (C).
Specific contractual notes	All values are expressed in as unit and results listed refer only to the tested sample and applicable parameter in Lab's Permanent Facility
	This report, in full or in part, shall not be used for advertising or as evidence in any court of law.
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	The samples collected shall be destroyed after 15 days from the date of issue of the certificate unless specified otherwise
	The liability of the laboratory is limited to the invoiced amount.
	All disputes are subjected to the Ranchi Jurisdiction.
Remarks	**Sample complies with prescribed limits.**

Sample Drawn By – **Angad Munda**
Tested By – **Satyam Kumar (Lab Analyst)**

Verified by	Issued by
Shivani Kumari Singh	Sanjeev Kumar Singh
(Technical Signatory)	(Technical Manager)

Authorized Signatory
Chemical Section
Yugantar Bharati Analytical & Environmental Engineering Laboratory

******End of Report******

Test Report

ULR (Unique Lab Report) No.			T C 4 0 3 2 2 3 0 0 0 0 0 1 4 4 6 F		
Discipline	Chemical	**Group**	Residue in Water	**Sample Description**	Ground Water
Report Release Date		26th October, 2023		**Report ID**	YBAEEL-231019-121821-GW01
W. Order/ JSPCB App. No.		Via - Telephonic		**Work Order Date**	19.10.2023
Type of Industry(If any)		Sponge Iron Unit		**Job code/ Ref. no.**	YBAEEL/WA/L/R/Oct.-23/09
Report Issue to		M/s Maa Chhinmastika Cements and Ispat Pvt. Ltd. At.- Hehal, Post - Barkakana - 829103, Dist.- Ramgarh, Jharkhand.			
Sampling Date		20/10/2023		**Mode of sample collection**	By YBAEEL Team
Sampling Protocol		IS : 17614 (Part-1): 2021		**Sample Code**	231021-GW-W01
Sampling Location		Bore Well		**Sampling Source**	Ground Water
Sample pkg. Condition		Sealed Pack in PP Bottle		**Sample Quantity**	1000 ml
Meteorological Cond. of Field		W.C.– Clear		RH % - 57	Temp. – 26°C
Sample receipt Date		21/10/2023	**Analysis Started on**	21/10/2023	**Analysis completed on** 26/10/2023

******Test Results******

Sl	Parameter	Test Method	Units	Results	Limits
1.	**Arsenic (as As)**	APHA 3114 C 24th edition 2023 (Continuous Hydride Generation Method)	*mg/l*	BDL (MDL 0.003)	0.01-No relaxation
2.	**Copper (as Cu)**	APHA 3111 B 24th edition 2023 (Direct Air Acetylene Flame Method)	*mg/l*	BDL (MDL 0.01)	0.05-1.5
3.	**Iron (as Fe)**	APHA 3111 B 24th edition 2023 (Direct Air Acetylene Flame Method)	*mg/l*	0.42	1.0-No relaxation
4.	**Lead (as Pb)**	APHA 3111 B 24th edition 2023 (Direct Air Acetylene Flame Method)	*mg/l*	BDL (MDL 0.02)	0.01-No relaxation
5.	**Zinc (as Zn)**	APHA 3111 B 24th edition 2023 (Direct Air Acetylene Flame Method)	*mg/l*	0.18	5-15
6.	**Cadmium (as Cd)**	APHA 3111 B 24th edition 2023 (Direct Air Acetylene Flame Method)	*mg/l*	BDL (MDL 0.02)	0.003-No relaxation
7.	**Mercury (as Hg)**	APHA 3112 B 24th edition 2023 (Cold Vapour AAS Method)	*mg/l*	BDL (MDL 0.003)	0.001-No relaxation
8.	**Chromium (as Cr)**	APHA 3111 B 24th edition 2023 (Direct Air Acetylene Flame Method)	mg/l	BDL (MDL 0.02)	0.05-No relaxation
9.	**Nickel (as Ni)**	APHA 3111 B 24th edition 2023 (Direct Air Acetylene Flame Method)	mg/l	BDL (MDL 0.02)	0.02-No relaxation

Limit is specified as	IS 10500:2012, RA 2018.
Abbreviation	MDL : Minimum detection limit, BDL : Below detection limit,
Env. Condition of Lab	Laboratory is maintaining, Temperature 27 ± 2°C and Relative Humidity 65 ± 5% in all testing areas as per IS 196:1966 (C).
Specific contractual notes	All values are expressed in as unit and results listed refer only to the tested sample and applicable parameter in Lab's Permanent Facility
	This report, in full or in part, shall not be used for advertising or as evidence in any court of law.
	This report cannot be reproduced, except when in full, without the written permission of the CEO..
	The samples collected shall be destroyed after 15 days from the date of issue of the certificate unless specified otherwise
	The liability of the laboratory is limited to the invoiced amount.
	All disputes are subjected to the Ranchi Jurisdiction.
Remarks	**Sample complies with prescribed limits.**

Sample Drawn By – Angad Munda

Tested By – Satyam Kumar (Lab Analyst)

Tested by	Verified & Issued by
Shivani Kumari Singh	Sanjeev Kumar Singh
(Lab Analyst)	(Authorized Signatory)

Authorized Signatory
Chemical Section
Yugantar Bharati Analytical & Environmental Engineering Laboratory

******End of Report******

Test Report

Discipline	Chemical	**Group**	Residue in Water	**Sample Description**	Ground Water
Report Release Date		26th October, 2023		**Report ID**	YBAEEL-231019-121821-GW01
W. Order/ JSPCB App. No.		Via - Telephonic		**Work Order Date**	19.10.2023
Type of Industry(If any)		Sponge Iron Unit		**Job code/ Ref. no.**	YBAEEL/WA/L/R/Oct.-23/09
Report Issue to		M/s Maa Chhinmastika Cements and Ispat Pvt. Ltd. At.- Hehal, Post - Barkakana - 829103, Dist.- Ramgarh, Jharkhand.			
Sampling Date		20/10/2023		**Mode of sample collection**	By YBAEEL Team
Sampling Protocol		IS : 17614 (Part-1): 2021		**Sample Code**	231021-GW-W01
Sampling Location		Bore Well		**Sampling Source**	Ground Water
Sample pkg. Condition		Sealed Pack in PP Bottle		**Sample Quantity**	1000 ml
Meteorological Cond. of Field		W.C.– Clear		RH % - 57	Temp. – 26°C
Sample receipt Date		21/10/2023	**Analysis Started on**	21/10/2023	**Analysis completed on** 26/10/2023

******Test Results ******

Sl	Parameter	Test Method	Units	Results	Limits
1.	**Aluminium (as Al)**	IS 3025 (P-55):2003, RA 2019 (Eriochrome Cyanine R Method)	*mg/l*	BDL (MDL 0.02)	0.03-0.2

Limit is specified as	IS 10500:2012, RA 2018.
Abbreviation	MDL : Minimum detection limit, BDL : Below detection limit.
Env. Condition of Lab	Laboratory is maintaining, Temperature 27 ± 2°C and Relative Humidity 65 ± 5% in all testing areas as per IS 196:1966 (C).
Specific contractual notes	All values are expressed in as unit and results listed refer only to the tested sample and applicable parameter in Lab's Permanent Facility
	This report, in full or in part, shall not be used for advertising or as evidence in any court of law.
	This report cannot be reproduced, except when in full, without the written permission of the CEO..
	The samples collected shall be destroyed after 15 days from the date of issue of the certificate unless specified otherwise
	The liability of the laboratory is limited to the invoiced amount.
	All disputes are subjected to the Ranchi Jurisdiction.
Remarks	**Sample complies with prescribed limits.**

Sample Drawn By – **Angad Munda**
Tested By – **Satyam Kumar (Lab Analyst)**

Tested by	Verified & Issued by
Shivani Kumari Singh	Sanjeev Kumar Singh
(Lab Analyst)	(Authorized Signatory)

26/10/23

Authorized Signatory
Chemical Section
Yugantar Bharati Analytical & Environmental Engineering Laboratory

******End of Report******

Test Report

ULR (Unique Lab Report) No.			T	C	4	0	3	2	2	3	0	0	0	0	0	1	4	4	1	F

Discipline	Biological	Group	Water	Sample Description	Ground Water
Report Release Date		26th October, 2023		Report ID	YBAEEL-231019-121821-GW01
W. Order/ JSPCB App. No.		Via - Telephonic		Work Order Date	19.10.2023
Type of Industry(If any)		Sponge Iron Unit		Job code/ Ref. no.	YBAEEL/WA/L/M/Oct.-23/06
Report Issue to		M/s Maa Chhinmastika Cements and Ispat Pvt. Ltd. At.- Hehal, Post - Barkakana - 829103, Dist.- Ramgarh, Jharkhand.			

Sampling Date	20/10/2023		Mode of sample collection	By YBAEEL Team	
Sampling Protocol	IS : 15185		Sample Code	231021-GW-W01	
Sampling Location	Bore Well		Sampling Source	Ground Water	
Sample pkg. Condition	Sealed Pack in PP Bottle		Sample Quantity	250 ml	
Meteorological Cond. of Field	W.C.– Clear	RH % - 57		Temp. – 26°C	
Sample receipt Date	21/10/2023	Analysis Started on	23/10/2023	Analysis completed on	25/10/2023

******Test Results ******

Sl	Parameter	Test Method	Units	Results	Limits
1.	Total coliform	APHA 9221B 24th Edition 2023 (Multiple Tube Fermentation Technique)	MPN/100 ml	< 1.1	Shall not to be Detectable in any 100 ml sample
2.	Fecal coliform	APHA 9221E 24th Edition 2023 (Thermotolercut (Fecal) Coliform Procedure)	MPN/100 ml	< 1.1	

******End of Report******

Limit is specified as	IS 10500: 2012
Abbreviation	MDL : Minimum detection limit, BDL : Below detection limit. <1.8 / < 1.1 MPN/100 ml denotes that the presence probability of bacteria is absent in the tested sample.
Env. Condition of Lab	Laboratory is maintaining, Temperature 27 ± 2°C and Relative Humidity 65 ± 5% in all testing areas as per IS 196:1966 (C).
Specific contractual notes	All values are expressed in as unit and results listed refer only to the tested sample and applicable parameter in Lab's Permanent Facility.
	This report, in full or in part, shall not be used for advertising or as evidence in any court of law.
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	The samples collected shall be destroyed after 7 days from the date of issue of the certificate unless specified otherwise
	The liability of the laboratory is limited to the invoiced amount.
	All disputes are subjected to the Ranchi Jurisdiction.
Remarks	Sample complies with prescribed limit.

Sample Drawn By – Angad Munda

Madhuri Sinha 26.10.23	Mukesh Kumar
Tested by	Verified & Issued by
Madhuri Sinha	Mukesh Kumar
(Lab Analyst)	(Authorized Signatory)

Authorized Signatory
Microbiological Section
Yugantar Bharati Analytical &
Environmental Engineering Laboratory

Test Report

Report Release Date	22nd October, 2023	**Report ID**	YBAEEL-231019-121821-WL01
W. Order/ JSPCB App. No.	Via -Telephonic	**Work Order Date**	19.10.2023
Type of Industry(If any)	Sponge Iron Unit	**Job code/ Ref. no.**	YBAEEL/WA/L/C/Oct.-23/14
Report Issue to	M/s Maa Chhinmastika Cements and Ispat Pvt. Ltd. At.- Hehal, Post - Barkakana - 829103, Dist.- Ramgarh, Jharkhand.		
Sampling Date	20/10/2023	**Mode of sample collection**	By YBAEEL Team
Meteorological Cond. of Field	W.C.– Clear	**RH % - 57**	**Temp.– 26^{0}C**

******Test Results ******

Sl	Location	Ground Water Level (mbgl)
1.	Near Weight Bridge	6.4

******End of Report******

Abbreviation	MDL : Minimum detection limit, BDL : Below detection limit, MBGL : Meter below ground level.
Env. Condition of Lab	Laboratory is maintaining, Temperature 27 ± 2^{0}C and Relative Humidity 65 ± 5% in all testing areas as per IS 196:1966 (C).
Specific contractual notes	All values are expressed in as unit and results listed refer only to the tested sample and applicable parameter in Lab's Permanent Facility
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	The liability of the laboratory is limited to the invoiced amount.
	All disputes are subjected to the Ranchi Jurisdiction.
Remarks	----------

Tested by	Issued by
Angad Munda	Sanjeev Kumar Singh
(Field Analyst)	(Technical Manager)

Technical Manager
Yugantar Bharati Analytical & Environmental Engineering Laboratory

Sabz Care
Environmental Consultancy Pvt. Ltd.
TC-9948
lets start thinking about nature for tomorrow

TEST REPORT

Unique Lab Report No. (ULR No.)		**TC994823000001605F**	
Name of Customer	**M/s Maa Chhinnmastika Cement & Ispat Private Limited**	**Work order No.-**	**17412516 (Date-03.10.2023**
Address	**Vill- Hehal, P.O.-Barkakana District- Ramgarh, State-Jharkhand**	**Type of Industry**	**Integrated Steel Plant**
Discipline	**Chemical**	**Group**	**Atmospheric Pollution**
Date of Study	**04.10.2023 to 05.10.2023**	**Sample Collected By**	**Ranjeet Yadav**
Sample Receiving Date	**05.10.2023**	**Time of Duration**	**24 Hours**
Sample ID	**SCECPL/TR/23/312/NR-202**	**Sample Drawn by**	**Sabz Care Lab**
Sample details	**Ambient Noise**	**Report Release Date**	**06.10.2023**
Sampling Method	**IS:9989-1981 (Reaffirmed-2020)**	**Remarks**	**----------**
Meteorological Information	**Average Ambient Temperature : 28.0°C, Barometric Pressure :752 mmHg Relative Humidity : 81%, Weather Condition - Cloudy**		

Limit in Leq dB(A)

(CENTRAL POLLUTION CONTROL BOARD, MINISTRY OF ENVIRONMENT, FORESTS & CLIMATE CHANGE, GOVERNMENT OF INDIA)

S.N.	CATEGORY OF AREA	DAY TIME	NIGHT TIME
1.	Industrial Area	75	70
2.	Commercial Area	65	55
3.	Residential Area	55	45
4.	Silence Zone	50	40

***Day time is reckoned in between 6:00 A.M. & 10:00 P.M.**
*** Night time is reckoned in between 10:00 P.M. & 6:00 A.M.**

PERMISSIBLE NOISE EXPOSURE FOR INDUSTRIAL WORKERS

Exposure time (in hours per day)	Limit in dB(A)
8	90
4	93
2	96
1	99
½	102
¼	105
1/8	108
1/16	111
1/32	114

AMBIENT NOISE QUALITY REPORT

Sampling Location	NOISE LEVEL IN dB(A)				
	Minimum	Ld-Mean (Day)	Ln-Mean (Night)	L_{eq} Mean	Maximum
1. Near Main Gate (Coordinates- 23°37'15.35"N to 85°25'51.80"E)	53.2	72.8	58.4	71.7	76.6
2 North East Side of the Unit (Coordinates- 23°37'8.73"N to 85°25'40.13"E)	57.6	74.4	59.1	73.2	79.5
3. West Side of the Unit (Coordinates- 23°36'59.40"N to 85°25'33.87"E)	52.4	73.0	60.1	72.3	78.2

***** END OF REPORT *****

Remarks- dB(A) L_d & L_n denotes the time weighted average of the level of sound in decibels on scale(A) in day and night respectively and L_{eq} denotes average of 24 hours which is relatable to human hearing.

Authorized Signatory
Piyush 6/10/23
Quality Manager
(Piyush Ranjan)

Annexure - 6

Report
on
GHG Emissions inventory & Its Reduction Including Carbon Sequestration Through Plantation for Sponge Iron Plant

MAA CHHINMASTIKA CEMENT & ISPAT PVT. LTD.

Vill: Hehal, P.O.: Barkakhana, Dist.: Ramgarh, Jharkhand

Prepared By

REDUCE • REUSE
RECYCLE • RESPECT

Institute for Environmental Management
Ranchi, Jharkhand, 834002

November – 2022

Preface

A report on GHG emission Inventory and its reduction including Carbon Sequestration through plantation for sponge iron plant has been prepared existing sponge iron plant of M/s Maa Chhinnmastika Cement & Ispat Pvt. Ltd. (MCCIPL) operating a Sponge Iron Plant having three (3) Nos .of coal based Rotary Kilns, each of 100 TPD capacity, with an annual capacity of 90,000 Metric Tons at village: Hehal, District: Ramgarh in the state of Jharkhand since 2005. The report is prepared based on the secondary data provided by MCCIPL

Name and address of manufacturing facility:

Maa Chhinnmastika Cement & Ispat Pvt. Ltd.

At- Hehal, Post- Barkakana - 829 103,

Dist. - Ramgarh (Jharkhand)

E-mail: ramgarhjh@rediffmail.com

Within the ambit of this study, the following units were considered:

GHG emissions have been estimated considering a system boundary from gate-to-gate which is from raw materials entering a sponge iron plant producing sponge iron or DRI used for manufacturing of steel. The system boundary in this study include the

- Sponge Iron process

The purpose of this study is to highlight the potential areas of GHG emission of sponge iron production for reducing GHG emissions. The main sources of GHG emissions during sponge iron manufacturing are considered and the key groups of measures that can reduce the GHG emissions are identified.

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Chapter – 1

Introduction

The production of iron through direct reduction (Direct-Reduced Iron; DRI) involves the use of natural gas or coal to reduce iron ore to iron through carbothermic reactions at a temperature below its melting point, negating the need for a blast furnace as otherwise required. In India, around 25% of iron is produced through direct reduction. However, there is a high reliance on coal (79% of DRI production capacity) causing significant energy use and emissions from production. Also, a large portion of raw materials (especially coal) is imported due to low quality of domestic resources. Weighted average specific energy use and emissions is calculated for seven such clusters (using total cluster capacity), based on regional raw material qualities and transport distances from various mines, ports and beneficiation plants. The results suggest an overall specific (per tonne DRI) energy consumption of 27.24 GJ with an emission of 2.8 tCO_2eq, 2.6 kgNOx, 1.8 kgSOx and 1.4 $kgPM_{2.5}$. The specific energy and emission values are used to calculate the total annual emissions by multiplying with the 2019 DRI production amount of 27.8 million tonnes. The annual midpoint and endpoint impacts as per ReCiPe 2016 (country-wise factors where applicable) are then calculated. The DRI industry causes 77.31 million tCO_2eq/year in global warming potential, 59.02 thousand tSO_2eq/year in acidification potential and 287.2 thousand $tPM_{2.5}eq$/year in fine dust formation potential. It is estimated to cause approximately 270,000 years of reduction in overall human life and 230 species years of species loss (mainly in terrestrial ecosystems). Different sensitivities are carried out to understand the impact of some key influencing parameters (effect of ore quality and coal quality, effect of imports of ore and coal). Some development scenarios, such as increasing coal washery capacity, shifting land transport from road to rail, increasing waste-heat recovery penetration, effect of stricter regulations, etc. are discussed, along with pathways for fuel-switching from coal to natural gas, and then from natural gas to hydrogen.

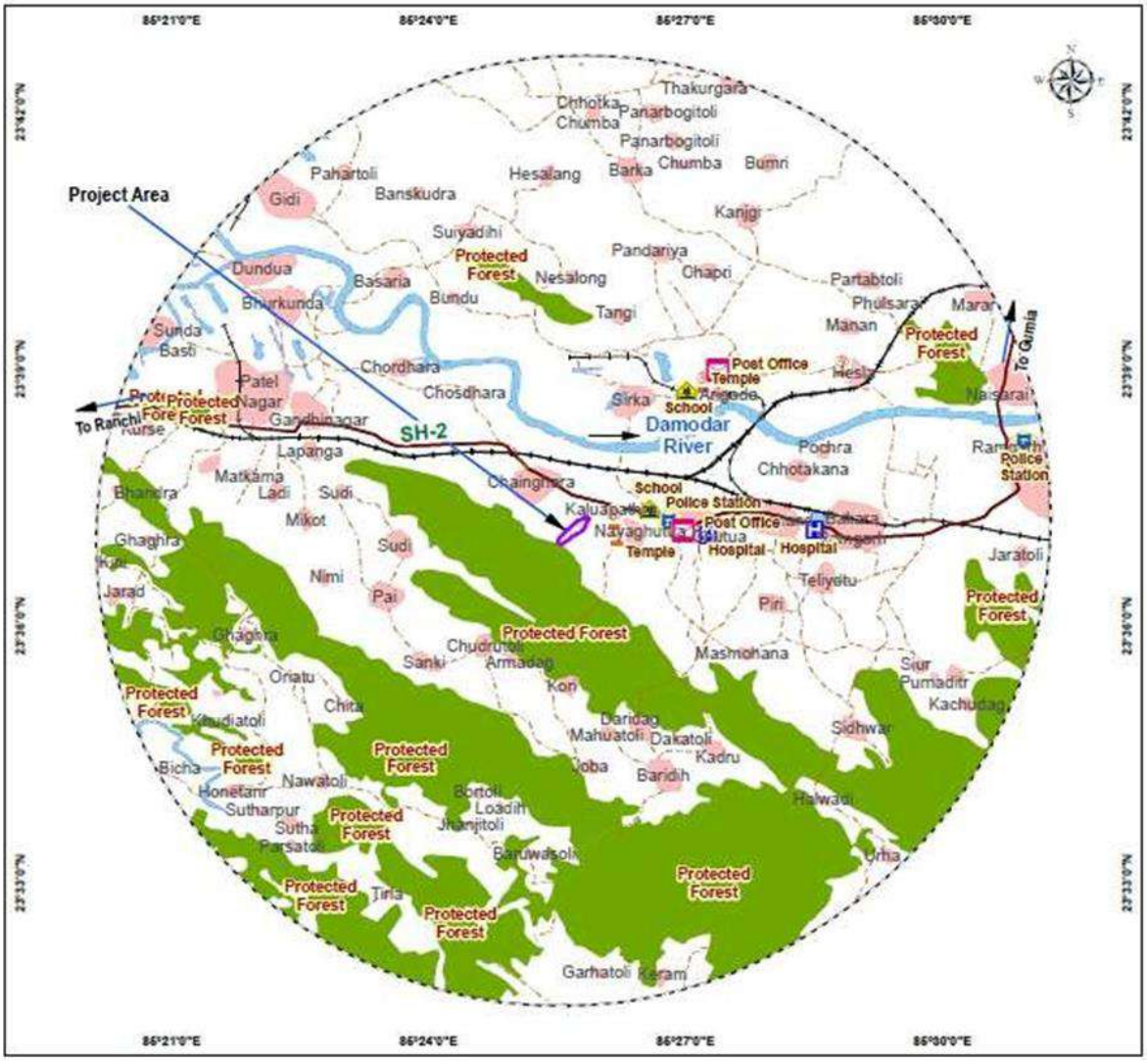
M/s Maa Chhinnmastika Cement & Ispat Pvt. Ltd. (MCCIPL) is a registered company under the Company's Act. It is operating a Sponge Iron Plant having three (3) Nos .of coal based Rotary Kilns, each of 100 TPD capacity, with an annual capacity of 90,000 Metric Tons at village: Hehal, District: Ramgarh in the state of Jharkhand since 2005. Sponge Iron is presently sold to other steel producers for making finished steel products.

GHG emission inventory is comprised of carbon footprint analysis where it is historically been defined as "the inventory of greenhouse gas (GHG) emissions caused by an organization, event, product or person". In this report the estimation of carbon emission for sponge iron production, carbon budgeting/balancing, carbon sequestration activities and carbon offsetting strategies are discussed. GHG emission calculation has been carried out using IPCC guidelines as overall principal and following standard methodology of GHG protocol for GHG estimation. Estimations for this green field project are majorly for scope 1 where direct use of materials and energy for the plant is considered.

MCCIPL has installed 3x100TPD (Sponge Iron plants) DRI Units with annual production capacity of 90,000 Metric Tons at village: Hehal, District: Ramgarh in the state of Jharkhand in 2005 after getting NOC from Jharkhand Pollution Control Board (JSPCB) and subsequently Consent to Operate from JSPCB.

Now MCCIPL intends to use the waste heat energy from the DRI units in Waste Heat Recovery Boilers and dolochar produced in plant in AFBC Boiler, supplemented by coal, for production of 15MW power. A new 2 x 12T Induction furnace with 67,500 MTPA Rolling Mill and Iron Ore Cushing & Beneficiation facility, 201,000 TPA (throughput) and 12,000 TPA capacity Slag Crushing Plant are also proposed at Plot No: 563, 386, 383, 384, 385, 387, 388, 362 Khata No: 86, 69, 33, 24, 86, 30, 83, 86 in village Hehal, P.O.- Barkakhana, Ramgarh District, Jharkhand State. Maa Chhinnmastika Cement & Ispat Pvt. Ltd. Village: Hehal, District: Ramgarh, State: Jharkhand Expansion of Sponge Iron plant with addition of Power plant, SMS, Rebar Rolling Mill & Iron ore crushing & Beneficiation Facility

Fig.:1 Digitized Key plan of project site



Chapter - 2

Project Description

Overview of direct reduction process

The basic mechanism behind iron production involves two main pathways,

i. Using a blast furnace (heated using coal or natural gas) for reduction of iron ore (iron oxides) into pig iron by reaction with coke and fluxes (usually limestone) (SAIL, 2012). The molten pig iron is then converted to steel (through the steelmaking process, usually with a basic oxygen furnace) or processed and sold as such. In 2019, 46.7% of India's steel industry utilized the blast furnace-basic oxygen furnace (BF-BOF) method (World Steel Association, 2019b).

ii. Using coal (solid or gas) or reformed natural gas to perform a direct reduction of the iron ore into Direct-Reduced Iron (DRI) or Sponge iron at high heat (but below melting point) (Sarangi and Sarangi, 2011). The sponge iron is then converted to steel (with an electric arc or electric induction furnace) or processed and sold. The share of electric induction/arc furnace processes in India constituted 53.3% in 2019 (World Steel Association, 2019b).

The SL/RN process (developed by **S**teel Company of Canada, **L**urgi Chemie, **R**epublic Steel Company and **N**ational Lead Corporation in 1964) forms the basis of rotary kiln technologies used in India (Sarangi and Sarangi, 2011); the process uses a rotary kiln into which iron ore pellets, non-coking coal (for reduction) and limestone/dolomite (flux) is supplied. From the other end, air and coal (for combustion) are supplied. The resulting high temperatures (900 to 1020 °C) form a reducing atmosphere of CO which reduces the iron ores to sponge iron. The sponge iron is subsequently separated out of the remaining reaction products through magnetic separation. The kiln is inclined at an angle of ~2.5° to facilitate movement of the charge

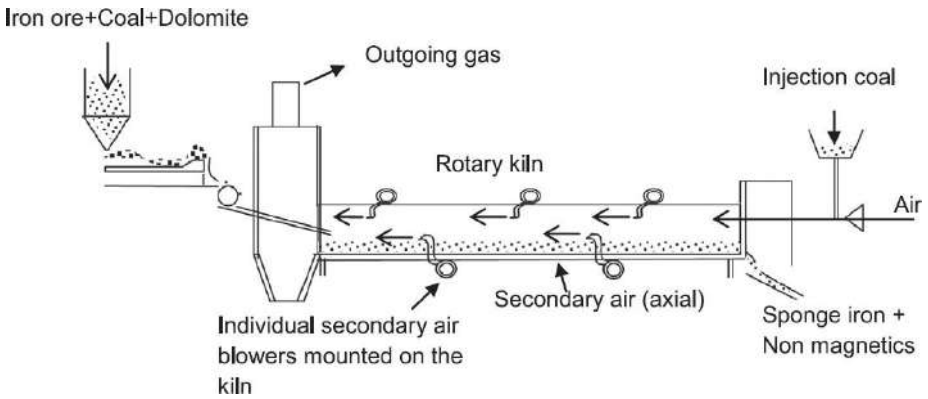


Figure 2: Rotary kiln *(SL/RN process) (Source: Dey et al, 2015)*

From the feed end to the exit. The rotary motion encourages even reaction of the charge through mixing with the reducing gases (Dey et al, 2015). The basic process is shown in Figure 2.

Around a third of the kiln length is typically required for preheating the charge consisting of iron ore, coal and dolomite. The dolomite flux is added to control sulphurisation. The coal supplied along with the ore is mainly meant to produce reducing gas by reacting with atmospheric oxygen at high temperature. In this stage, the iron ore (predominantly hematite - Fe_2O_3) is partially reduced to ferrous oxide. After reaching the ideal reaction temperature of 900-1100 °C, the ore is reduced to metal in the latter portion of the kiln through further reduction. The following are the main reactions taking place within the kiln, at a temperature of 1067 °C (Sarangi and Sarangi, 2011).

$$3Fe_2O_3 + CO \rightarrow 2Fe_3O_4 + CO_2 - 44.46\ kJ/mol \quad (1)$$

$$Fe_3O_4 + CO \rightarrow 3FeO + CO_2 + 3.07\ kJ/mol \quad (2)$$

$$FeO + CO \rightarrow Fe + CO_2 - 11.12\ kJ/mol \quad (3)$$

The CO required for the above reduction reactions is produced when fixed carbon of the feed-end coal reacts with CO_2 produced by the reductions, in a perpetual, reversible reaction called Boudouard reaction.

$$C + CO_2 \leftrightharpoons 2CO + 167.52\ kJ/mol \quad (4)$$

This reaction is crucial to maintaining the reducing atmosphere and kiln temperature. The ratio of CO/ ($CO+CO_2$) depends on the temperature inside the kiln; ideally a CO concentration of ~50-60% is maintained (Dey, Prasad and Singh, 2015) to ensure optimum reduction of ore. Since the forward reaction (4) is highly endothermic, it serves to maintain kiln temperature for a regulated combustion of injection coal. By combining the above reactions, we get

$$2Fe_2O_3 + 3C \rightarrow 4Fe + 3CO_2 + 432.52\ kJ/mol \quad (5)$$

Note that only one part of CO produced in (4) is used for the reduction, whereas the other part is combusted into CO_2 resulting in a net output of CO_2 from the kiln. Various other reactions take place due to the combustion of injection coal fixed carbon and volatiles, causing the formation of additional CO and CO_2 along with H_2O and CH_4. The sulphur present in coal is removed by dolomite, as the $CaCO_3$ and $MgCO_3$ decompose into CaO and MgO to act as desulphurising agents. The addition of dolomite is crucial to control the sulphur content in the DRI (to prevent embrittlement in steel production), and also to control SOx emissions (Sarangi and Sarangi, 2011).

After the reduction process, the metal (now known as sponge iron or DRI) is separated from the remaining slag (consisting of coal char, unreacted coal, sulphurated dolomite) through magnetic separation. The product CO_2 reacts further with incoming/excess coal to produce more CO. Thus, for a low ash coal with high reactivity, the reduction efficiency will be higher as the quantity of coal input would be reduced. Also, the retaining time of the ore within the kiln can be lower, thus improving output (Dey et al, 2015).

Maa Chhinnmastika Cement &Ispat Pvt. Ltd. has installed 3x100TPD (Sponge Iron plants) DRI Units at Village: Hehal, Barkakana, Ramgarh Cantt, Jharkhand in the year 2005 after getting NOC from Jharkhand State Pollution Control Board (JSPCB).

MCCIPL management has realized that for its business to survive, the Company should stop selling sponge iron and should produce TMT Reinforcement Bars as value added product and also take measures to reduce cost of production. The project is a stand alone project for creating Steel Making facility at one location without dependence on other projects.

1. Installation of a Captive Power Plant of 15 MW Capacity to produce cheaper electrical power by utilizing;
   - Waste Heat from Sponge Iron Kiln Flue Gases.
   - Utilizing char produced as solid waste from Sponge Iron Production Process, toserve as a part of fuel for the proposed Power Plant.
   - Use of coal from captive mines of the group to meet the balance requirement of fuel for the Power Plant.
2. Install a Steel Melting Shop having Two (2) Nos. Induction Furnaces each of 12 Ton capacity and a 2-Strand 6/11 M Radius Continuous Casting Machine with an annual capacity of 72,000 Metric Tons of Billets using 80% Sponge Iron and 20% Scrap /Pig Iron as charge-mix.
3. Install 14 Strand Rolling Mill downstream of Continuous Casting of Steel Melt Shop to carry out direct rolling of hot billets without any additional heating in a Reheating Furnace. This will save on fuel cost of reheating the billets which has to be incurred if billets produced are cooled, transported and rolled in a rolling millfar away.
4. Iron Ore Crushing & Beneficiation Facility to process 201,000 T/year throughout of iron ore is proposed to be installed for providing beneficiated iron ore to the DRI Kilns for their optimum operation.
5. Slag Crushing Facility for crushing of SMS Slag and recover metallic componentfrom Slag.

Table 2.1: Salient Features of the Project

S. No	Particulars	Details
1.	Latitude	23˚37’07.56” N
2.	Longitude	85˚25’ 42.82” E
3.	Altitude	260 m above MSL
4.	Toposheet	73 E/6 & 73 E/10
5.	Plot/Survey/Khasra No.	Plot No: 563, 386, 383, 384, 385, 387, 388, 362 Khata No: 86, 69, 33, 24, 86, 30, 83, 86
6.	Seismicity	Area falls under least affected earthquakes zone II Source-as per IS 1893 – 2002
7.	Present land use	Within existing industrial premises
8.	Climatic condition (Annual Average)	Ambient Air temp 10o C to 37o C Avg. annual rainfall 1462.8 mm
9.	Nearest village/Habitation	Nayaghutua- 01 Km (E)
10.	Nearest Town	Ramgarh- 9.5 km, East
11.	Nearest Police Station	Ghutu Police Station, 1.5 Km in E
12.	Nearest Post office Ghutu Post office	1.8 Km in E direction from the project site.
13.	Nearest River	Damodar River -2 km.
14.	Nearest Railway station	Barkakhana Ramgarh– 1.5 km
15	Nearest Temple	Sankat Mochan Mandir - 0.5 km in E direction
16.	Nearest College	MaaBanjari ITI college Ghutwa-1.1 km in E direction
17.	Nearest Bus Stop	Jharkhand state highway 2 bus stop 1.7 km in NW direction
18.	Nearest Medical	Ghutua Hospital 2.3 Km in E
19.	Nearest airport	Ranchi Airport, 50 km
20.	Sanctuaries /National Parks/ Biospheres, etc	Nil
21.	Topography	Gently undulating
22.	Defense Installations	RamgarhCantt. - 15 km
23.	Historical Places	Chinnamastika Temple which is located 69.3 Km in E direction
24.	Reserve Forest/ Protected Forest	No reserve forest within 15 kms. from the project site, PF Forest – 0.6 Km (S), Bundu PF Forest – 4.5 Km (N).
25.	Total Land Area	30.692Acres (12.42 ha.)
26	Total Water Requirement	Existing (m3/day) Proposed (m3/day)

		Total (m3/day) 247 2088 2335 Surface water will be sourced through Damodar River for industrial, domestic and other allied uses in the plant.
27.	Total Power Requirement	15 MW Power requirement at present is 950 KVA which is being met from JVUNL Grid. After the commissioning of power plant the integrated unit will fulfill its power requirements from the 15 MW Captive power plant Company has also installed 1×1010 KVA 1×500 KVA & 1×320 KVA DG sets.
28.	Total Manpower	Existing Proposed Total 95 396 491
29.	Total capital cost	Existing (Crores) Proposed (Crores) Total (Crores) Rs. 35.76 Rs. 156.92 Rs.192.68

Table 2.2: Summary of the Project (Existing & Proposed)

PRODUCTION FACILITY	PLANT SIZE	ODUCTION (TPD)	ODUCTION(TPA)
EXISTING			
Sponge Iron Plant	3x 100 T /day of DRI	300 TPD	90,000T
PROPOSED			
Steel Making Shop, Induction Furnaces and Billet Caster	2 x 12 T	240 T	72,000 T
Rolling Mill – TMT Rebar Mill	15 Stand Mill with Direct Hot Charging	225 T	67,500 T

Power Plant Waste Heat Boilers AFBC Boiler	Total 15 MW 3 x 2 MW 1 x 9 MW	15 MW	15MW (Captive use)
Iron Ore Crushing & Beneficiation Plant	80 – 100 TPH single stream(throughput)	670 T	201,000 T
Slag Crushing Plant for SMS Slag	Single stream 5 TPH	40 T	120,00 T

SPONGE IRON PLANT (Existing)

Sponge Iron Plant is having three (3) Nos. Coal Based Rotary Kilns each of 100 TPD Capacity, with an annual capacity of 90,000 Metric Tons. Sponge Iron Plant has its own material storage and handling facilities and other auxiliary plant units.

Process Description:

To produced sponge iron, sized lump ore is fed along with coal, and flux in to the Rotary Kiln wherein iron ore gets converted to metallic iron. Flux helps in scavenging Sulphur content from coal. Brief features of the process are as follows:

- Kiln process of DRI production involves tumbling of iron ore with select grade of non- coking coal and dolomite in a rotary kiln.
- The kiln is supported on roller stations and rotated by means of a variable speed AC motor and girth gear mechanism. Refractory lined rotary kiln of suitable size is placed on two or four support stations and is kept inclined at 2.5 % slope.
- The transport rate of materials through the kiln can be controlled by varying its slope and speed of rotation. There are inlet and outlet cones at opposite ends of the kiln that are cooled by individual fans.
- The kiln shell is provided with small sampling ports, large ports for rapid removal of the contents in emergency or for lining repairs. Longitudinal positioning of the kiln on its riding rings is controlled hydraulically.
- The coal and iron ore are metered into the high end of the inclined kiln. A portion of the coal in pulverized form is also injected pneumatically from the discharge end. The burden first passes through a pre-heating zone where coal de-volatilization takes place and iron ore is heated to pre-

heating temperature for reduction.

- Temperature and process control in the kiln are carried out by installing suitable no. of air injection tubes made of heat-resistant steel. These are spaced evenly along the kiln length and countercurrent to the flow of iron ore. Tips of the air tubes are equipped with special internal swirls to improve uniformity of combustion.
- A central burner located at the kiln discharge end is used with LDO for heating the cold kiln. After initial heating, the fuel supply is turned off and the burner is used to inject air for coal combustion.
- The kiln temperatures are measured with fixed thermocouples and Quick Response Thermocouples (QRT). Fixed thermocouples are located along the length of the kiln to monitor temperature profile of kiln. Fixed thermocouples, at times, may give erratic readings due to coating with ash, ore or accretion. In such a case QRT are used to monitor the kiln temperatures.
- The product (DRI) is discharged from the kiln at about 1000°C. An enclosed chute at the kiln discharge end is used to transfer the hot DRI to a rotary cooler. The cooler is a horizontal revolving cylinder of appropriate size, wherein DRI is cooled indirectly by water spray on the cooler upper surface. The cooling water collected in troughs below is pumped to the cooling tower for recycling along with make-up water.
- DRI is cooled to about 100°C without exposure to atmospheric air. A grizzly in the chute removes accretions that are large enough to plug up or damage the cooler discharge mechanisms.
- The product is screened to remove the plus 30 mm DRI. The undersize – a mix of DRI, dolochar and coal ash are screened into +/- 3mm fractions. Each fraction passes through a magnetic separator. The non-magnetic portion of the plus 3 mm fraction is mostly char and can be used in AFBC Boiler for power generation.
- The nonmagnetic portion of –3mm fraction, mostly spent lime, ash and fine char is discarded.
- Magnetic portion of each fraction is DRI. Of this the +3mm fraction can be used directly for steel making and the finer fraction is either briquetted or collected in bags.
- The kiln waste gases leave at about 850-900°C. These are passed through dust settling chamber where heavier particles settle down due to sudden decrease in velocity of gases. The flue gases are then passed through an After Burning Chamber (ABC) where un-burnt combustibles are burnt by blowing excess air. The temperature of the

after burner chamber, at times, is controlled by water sprays.

- Burnt gases are passed through a down duct into an evaporation cooler where its temperature is brought down and balance dust particles are separated through a pollution control equipment namely ESP / Bag filter/ scrubber. The gas is let off into the atmosphere through stack via ID fan.
- The thermal energy in outgoing flue gases is recovered through Waste Heat Recovery Boiler (WHRB) where sensible heat of the gases is extracted and then let off into the atmosphere after passing through pollution control equipment like ESP, ID fan and stack.

Table2.3: Raw Material Requirement for Existing Sponge Iron Plant

Unit	**Installed Capacity**	**Working Days**	**Annual Production**
Sponge Iron Plant	3x100 TPD	300	90,000 MT of Sponge Iron
Water Requirement	Make Up Water	300	247 m^3/day
Power Requirement		300	950 KVA
Raw Material Requirement	**Raw Material**	**Size (mm)**	**Quantity (MT/Annum)**
	Iron Ore	5-18	1,71,000
	Coal	20 & below	1,44,000
	Dolomite/Limestone	2-4	2300

Process flow diagram of sponge iron plant is given below in **Figure 2.4**. **Raw Material Handling System**

Main Raw materials Iron Ore, Coal & Dolomite are fed to the ground hoppers with the help of Pay Loaders and Tippers and carried by belt conveyors to the Crusher House having Crusher for crushing and Vibrating Screen. Screened and Crushed Material carried out by belt Conveyers to the stock house having 2 days bins for Iron Ore, Feed coal, Dolomite, and Injection coal (Lumps and Fines). Injection Coal is screened in –5 mm. and –18mm sizes and stored in separate bins. The main raw material handling consists of iron ore crusher, vibrating screen and conveyor belts for preparation of raw material as mentioned above.

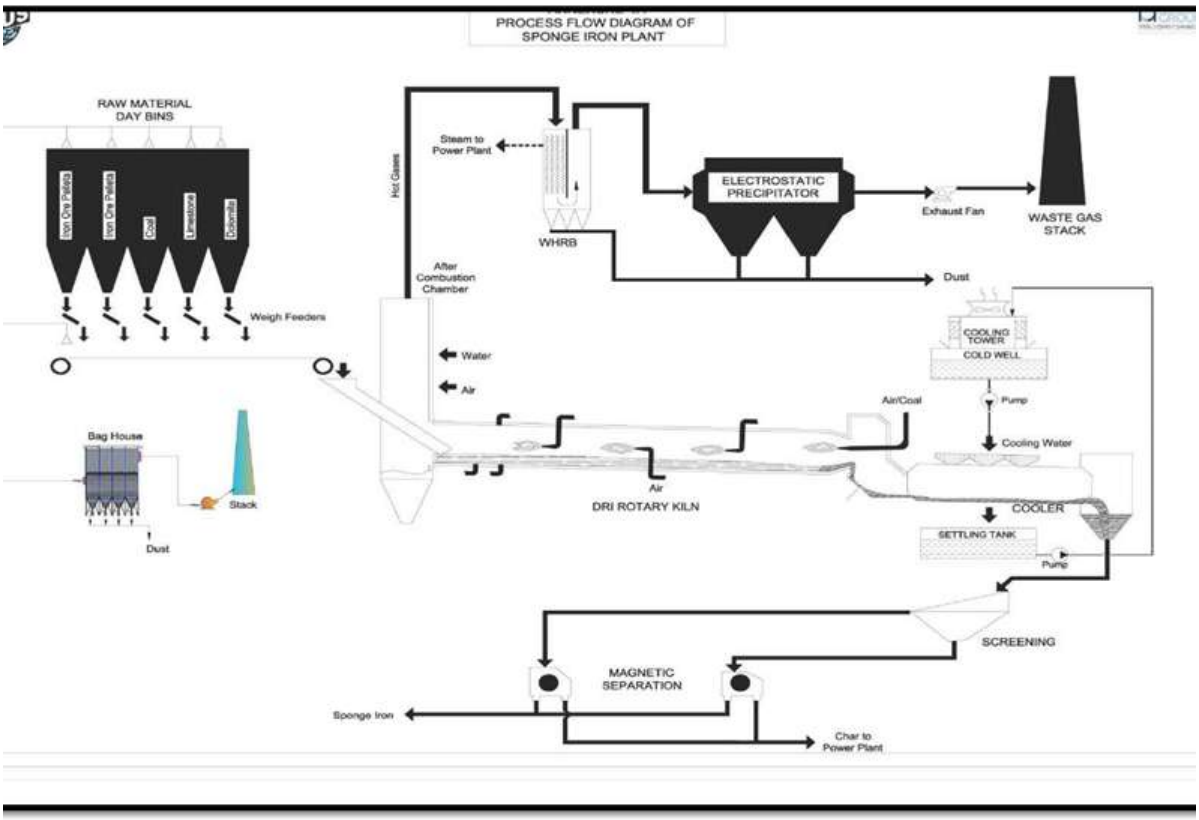


Figure3: Process flow diagram of Sponge Iron Plant

Brief outline for resource utilization

Resource utilization by optimization has been envisaged from design stage itself for plant related activities. The various resources likely to be used are detailed below.

i) Iron ore
ii) Coal
iii) Dolomite
iv) Water &
v) Power

These resources are effectively used in the plant. Rainwater harvesting is being envisaged on large scale to utilize the rain water and reduce the water requirement from external sources. The effluent generated from various units will be treated and recycled back into system to ensure zero discharge.

3.0. Greenhouse Gas Emission

In this section emission of Green House Gases (GHG) has been calculated for the existing Sponge iron plant. GHG emissions have been estimated for the units involves in sponge iron production. GHG emission calculation has been done understanding the IPCC guidelines and following standard methodology of GHG protocol for GHG estimation. Calculations are done majorly for scope 1 where direct use of materials and energy for the proposed plant is considered.

Figure 4: Material flow for sponge iron plant

Section	Technology	Process flow
Sponge Ironplant	Coal Based RotaryKiln Process	Feeding of RM to the Rotary Kiln through feed tube Cooling in the rotary cooler Screening magnetic separation of the product spongeiron Other outputs - Char

Table 3.1: Raw Material Requirement

Sponge Iron Plant (300 TPD / 90000 TPA) – EXISTING						
1	Iron Ore	1.9	570	171,000	In-house from Beneficiation plant	---
2	Coal	1.6	480	144,000	Different Collieries of CCL	Mode: Road, Rail Approx. – 150 KM
3	Dolomite	0.025	7.66	2300	Daltonganj, Jharkhand. Katni, M.P.	Mode: Road Daltonganj – 250 KM(appx.) Katni – 700 KM (appx.)
	TOTAL	**3.525**	**1057.66**	**317,300**		

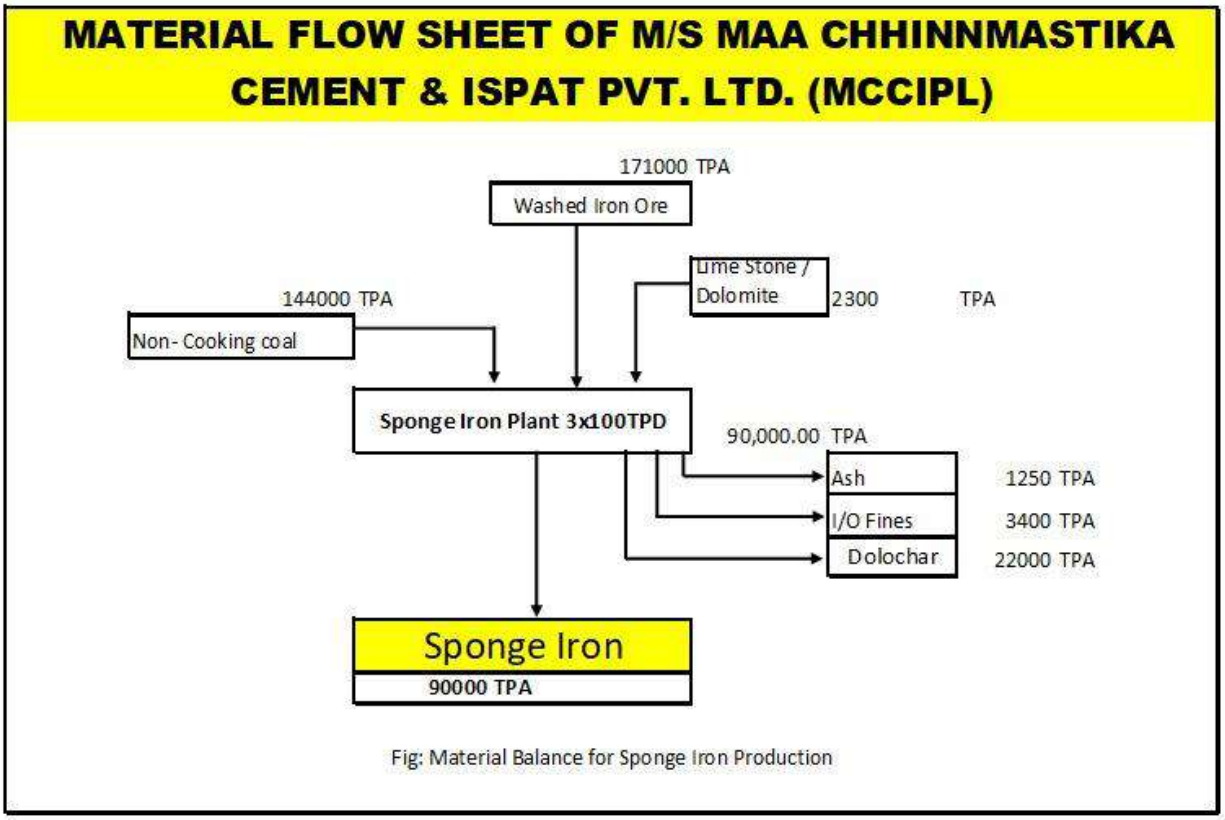


Figure5: Material Flow Sheet

LAND USE

The total project area is about 30.629 acres (12.42 Ha.). The area will be used for construction and development of Production lines, Warehouses & Stores, Utilities, R&D, QC, Administrative Blocks and Common facilities etc., apart from the above, internal road sand green belt will be development as per the norms. About 10 acres (4.1 Ha.), after earmarking 1.0 acre for temporary ash store yard, will be developed as greenbelt.

This greenbelt will serve as a buffer between the peripheries and the industry, thereby controlling the air emissions and noise levels. The probable land use is given below in Table:

Table 3.2: Land Use of Plant Layout

SL No	TYPE OF USE	Area	
		Acres	Hectares
1	Existing Units (3 nos. Kiln of Sponge Iron)	7.01	2.84
2	Power Plant with WHRB	1.62	0.66
3	Steel Melting Shop	2.73	1.11
4	Rolling Mill	2.5	1.01
5	Iron Ore Beneficiation Plant	1.0	0.40
6	Slag Crushing Plant	0.8	0.32
7	Area Tailing Pond	0.69	0.28
8	Green Belt	10.78	4.36
9	Area for Parking	0.5	0.20
10	Vacant land	3.062	1.24
	Total Land Area	**30.692**	**12.42**

Table3.3: Emission factors of GHG gases from different energy fuel sources

Energy sources	kg CO_2/kg fuel	kg CH_4/kg fuel	kg N_2O/kg fuel
Coal	2.42	2.82E-04	4.00E-05
Electricity	0.43 kg CO2/kwh	0.0223 kg CH4/kwh	0.00342kg N2O/kwh
Natural gas	2.69	2.40E-04	5.00E-06

Methodology for Estimationg GHG Emissions

In this report, the system boundary is gate-to-gate which is from raw materials entering a coke oven to the steel leaving the continuous casting machine (Figure 4). The system boundary in this study includes the Coke oven, sintering, pelletizing, beneficiation, blast furnace, basic oxygen furnace, continuous casting, lime and dolo plant and captive power plant. The major GHG emissions i.e. CO_2, CH_4, and N_2O have been calculated and reported in the form of CO_2-equvalent. Within the defined system boundary, mass and energy inputs for the processes within the boundary are included.

CO_2 Emission:

The GHG emissions has been estimated based on the mass and energy used in the individual process of steel manufacturing. The mass and energy data used in this study are specified for the major steel manufacturing processes including Coke oven, sintering, pelletizing, beneficiation, blast furnace, basic oxygen furnace, continuous casting, lime and dolo plant and captive power plant. CO_2 emissions have been calculated using carbon content data that are expressed on a mass or volume basis. (Equation no___)

Mass basis: $$E = A_{f,v}.F_{c,v}.F_{ox}.\frac{44}{12}$$ ---- 1

Volume basis: $$E = A_{f,m}.F_{c,m}.F_{ox}.\frac{44}{12}$$ ---- 2

Equation No. 1 &2: Calculating CO_2 emissions using carbon content data that are expressed on a mass or volume basis

Where:

E = Amount of CO_2 emitted (metric tons)

$A_{f,v}$ = Volume of fuel consumed (e.g., liters, gallons, m^3, etc.)

$A_{f,m}$ = Mass of fuel consumed (e.g., kg, short ton, etc.)

$F_{c,v}$ = Carbon content of fuel on a volume basis (e.g., short tons carbon / gallon)

$F_{c,m}$ = Carbon content of fuel on a mass basis (e.g., short tons carbon / short ton)

F_{OX} = Fraction oxidation factor

44/12 = The ratio of the molecular weight of carbon to that of CO_2

$$E = A \,.\, HV_f . F_{c,h} . F_{ox} . \frac{44}{12} \qquad \text{---- 3}$$

Equation No. 3: Calculating CO_2 emissions from stationary combustion sources using carbon content data expressed on an energy basis

Where:

E = Amount of CO_2 emitted (metric tonnes)

A = Mass of fuel consumed (e.g., metric tonnes)

HV_f = Heating value of fuel (e.g., MJ/Kg or thousand Btu/lb)

$F_{c,h}$ = Carbon content of fuel on a heating value basis (e.g., short tons C/million Btu or metric tonnes C/GJ)

F_{OX} = Fraction oxidation factor

44/12 = The ratio of the molecular weight of carbon to that of CO_2.

CH_4 and N_2O emissions:

The N_2O and CH_4 emissions from Electricity Generation and Reheating Furnaces can be calculated using Equation 4.

$$E = A_f . HHV_f . EF \,.\, GWP \qquad \text{---- 4}$$

$$E = A_f . HHV_f . ESEF \,.\, GWP \qquad \text{---- 5}$$

Equation :: Calculating N_2O and CH_4 emissions

Where:

E = Amount of either N_2O or CH_4 emitted (metric tonnes CO_2-equivalent)

A_f = Amount of fuel combusted on a mass or volume basis

EF = fuel-specific emission factor

ESEF = Equipment-specific emission factor

GWP = 21 for CH_4 or 310 for N_2O

Table 3.4: Carbon contents for materials consumed in process sources

Process Materials	**Carbon Content*** (kg C/kg)
Blast Furnace Gas	0.17
Charcoal[a]	0.91
Coal	0.67[1]
Coal tar	0.62
Coke	0.83
Coke Oven gas	0.47
Coking Coal	0.73
Direct reduced Iron (DRI)	0.02
Dolomite	0.13
EAF Carbon Electrodes	0.82[2]
EAF Charge Carbon	0.83[3]
Fuel Oil	0.86[4]

Gas Coke	0.83
Hot Briquetted iron	0.02
Limestone	0.12
Natural Gas	0.73
Oxygen Steel Furnace Gas	0.35
Petroleum Coke	0.87
Purchased pig Iron	0.04
Scrap Iron	0.04
Steel	0.01

Table 3.5: Typical Values for CH_4 & N_2O contents for materials consumed in process sources

Fuel		**Lower Heating Value(LHV)/Net Calorific Value (NCV) Basis**				**Higher Heating Value(HHV)/Gross Calorific Value (GCV) Basis**			
		kg GHG / TJ fuel		kg GHG / ton fuel		kg GHG / TJ fuel		kg GHG / ton fuel	
		CH_4	N_2O	CH_4	N_2O	CH_4	N_2O	CH_4	N_2O
Crude oil and	Crude oil	3.000	0.600	0.134	0.027	2.850	0.570	0.127	0.025

derived substances	Orimulsion	3.000	0.600	0.087	0.017	2.850	0.570	0.083	0.017
	Natural Gas Liquids	3.000	0.600	0.140	0.028	2.850	0.570	0.133	0.027
	Motor Gasoline	3.000	0.600	0.140	0.028	2.850	0.570	0.133	0.027
	Aviation Gasoline	3.000	0.600	0.140	0.028	2.850	0.570	0.133	0.027
	Jet Gasoline	3.000	0.600	0.140	0.028	2.850	0.570	0.133	0.027
	Jet Kerosene	3.000	0.600	0.139	0.028	2.850	0.570	0.132	0.026
	Other Kerosene	3.000	0.600	0.138	0.028	2.850	0.570	0.131	0.026
	Shale oil	3.000	0.600	0.120	0.024	2.850	0.570	0.114	0.023
	Gas/.Diesel oil	3.000	0.600	0.136	0.027	2.850	0.570	0.129	0.026
	Residual Fuel oil	3.000	0.600	0.128	0.026	2.850	0.570	0.121	0.024
	Liquified Petroleum Gases	1.000	0.100	0.053	0.005	0.900	0.090	0.047	0.005
	Ethane	1.000	0.100	0.052	0.005	0.900	0.090	0.046	0.005

	Naphtha	3.000	0.600	0.141	0.028	2.850	0.570	0.134	0.027
	Bitumen	3.000	0.600	0.127	0.025	2.850	0.570	0.121	0.024
	Lubricants	3.000	0.600	0.127	0.025	2.850	0.570	0.121	0.024
	Petroleum coke	3.000	0.600	0.103	0.021	2.850	0.570	0.098	0.020
	Refinery feedstocks	3.000	0.600	0.136	0.027	2.850	0.570	0.129	0.026
	Refinery Gas	1.000	0.100	0.055	0.006	0.900	0.090	0.050	0.005
	Paraffin waxes	3.000	0.600	0.127	0.025	2.850	0.570	0.121	0.024
	White Spirit & SBP	3.000	0.600	0.127	0.025	2.850	0.570	0.121	0.024
	Other petroleum products	3.000	0.600	0.127	0.025	2.850	0.570	0.121	0.024
Coal and derived products	Anthracite	1.000	1.500	0.028	0.042	0.950	1.425	0.027	0.040
	Coking coal	10.000	1.500	0.297	0.045	9.500	1.425	0.282	0.042
	Other bituminous coal	10.000	1.500	0.272	0.041	9.500	1.425	0.258	0.039

Sub-bituminous coal	10.000	1.500	0.199	0.030	9.500	1.425	0.189	0.028
Lignite	10.000	1.500	0.125	0.019	9.500	1.425	0.119	0.018
Oil shale and tar sands	10.000	1.500	0.094	0.014	9.500	1.425	0.089	0.013
Brown coal briquettes	10.000	1.500	0.218	0.033	9.500	1.425	0.207	0.031
Patent fuel	10.000	1.500	0.218	0.033	9.500	1.425	0.207	0.031
Coke oven coke & lignite coke	10.000	1.500	0.297	0.045	9.500	1.425	0.282	0.042
Gas coke	1.000	0.100	0.030	0.003	0.950	0.095	0.028	0.003
Coal tar	10.000	1.500	0.295	0.044	9.500	1.425	0.280	0.042
Gas works gas	1.000	0.100	0.043	0.004	0.900	0.090	0.039	0.004
Coke oven gas	1.000	0.100	0.043	0.004	0.900	0.090	0.039	0.004
Blast furnace gas	1.000	0.100	0.003	0.000	0.900	0.090	0.002	0.000
Oxygen steel furnace gas	1.000	0.100	0.008	0.001	0.900	0.090	0.007	0.001

Natural Gas	Natural Gas	1.000	0.100	0.053	0.005	0.900	0.090	0.051	0.005
Non-biomass waste	Municipal wastes (non-biomass fraction)	30.000	4.000	0.316	0.042	28.500	3.800	0.300	0.040
	Industrial wastes	30.000	4.000	N/A	N/A	28.500	3.800	N/A	N/A
	Waste oils	30.000	4.000	1.269	0.169	28.500	3.800	1.206	0.161
Peat	Peat	2.000	1.500	0.021	0.015	1.900	1.425	0.020	0.015
Biomass waste	Wood/Wood waste	30.000	4.000	0.493	0.066	28.500	3.800	0.468	0.062
	Sulphite lyes (Black liqour)	3.000	2.000	0.037	0.025	2.850	1.900	0.035	0.024
	Other primary solid biomass fuels	30.000	4.000	0.366	0.049	28.500	3.800	0.348	0.046
	Charcoal	200.000	4.000	6.211	0.124	190.000	3.800	5.900	0.118
	Biogasoline	3.000	0.600	0.085	0.017	2.850	0.570	0.081	0.016
	Biodiesels	3.000	0.600	0.085	0.017	2.850	0.570	0.081	0.016

Other liquid biofuels	3.000	0.600	0.087	0.017	2.850	0.570	0.082	0.016
Landfill gas	1.000	0.100	0.056	0.006	0.900	0.090	0.050	0.005
Sludge gas	1.000	0.100	0.056	0.006	0.900	0.090	0.050	0.005
Other biogas	1.000	0.100	0.056	0.006	0.900	0.090	0.050	0.005
Municipal wastes (biomass fraction)	30.000	4.000	0.366	0.049	28.500	3.800	0.348	0.046

Chapter-4

Action plan for Carbon off-setting

Re-use of Steel Scrap in Basic Oxygen Furnace

Scrap is a term used to describe steel that has generated during the manufacture of steel products. While the term 'scrap' may lead one to believe this is a waste product, it is actually a valuable raw material used in every steelmaking process. In blast furnace (BF) steelmaking, each charge of the basic oxygen furnace, in which carbon carbon-rich pig iron is refined into crude steel, typically contains 8%-10% scrap. Scrap acts as a cooling agent, absorbing excess heat from the exothermic decarbonisation process, and also as a source of iron units. Reuse of scrap in BOF helps reducing greenhouse gas emissions.

Table4.1: Heating and cooling reactions of BOF

Heating Reactions	Cooling Reactions
$c + \frac{1}{2}\, o_2 \rightarrow co$	
	$Fe_2O_3 + 3C \rightarrow 2Fe + 3CO$
$co + \frac{1}{2}\, o_2 \rightarrow co_2$	
$Si + o_2 \rightarrow SiO_2$	$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$
$Fe + \frac{1}{2}\, o_2 \rightarrow FeO$	
$2Mn + o_2 \rightarrow 2MnO$	
$4P + 5o_2 \rightarrow 2P_2O_5$	

Reuse of internal heat for power generation

The proposed plant is designed for optimum use of the recovered energy of hot off gases from major units such as Blast furnace, Basic oxygen furnace and coke oven plant. A plant is designed to integrate 74 % of the heat generated from coke oven gas to sinter plant, pellet plant & continuous casting machine. Approx. 52 % of the total heat generated from blast furnace will be reused in blast furnace & 20 % of the generated heat will be integrated to sinter plant, pellet plant & continuous casting machine. The surplus gases available in these units will be re-used for power generation. Out of 600 MW, 293 MW power will be generated from internal process heat.

CO_2 capture

The uses of coal for generation of 600 MW electricity produce approximately 5 MT of CO_2 annually. CPP's are one of the major contributors of CO_2 emissions in any steel plant. In view to limit the release of CO_2 in atmosphere it is necessary to capture CO_2. There are several approaches for CO_2 capture out of which amine based CO_2 absorption systems are the most suitable for combustion based power plants. The amine based CO_2 absorption is easy to use and can be retrofitted to existing power plants. Absorption processes are based on thermally regenerable solvents, which have a strong affinity for CO_2. They are regenerated at elevated temperature. In view to limit the CO_2 release, It is suggested to install amine based CO_2 absorption unit at 600 MW CPP.

The equilibrium reactions describing the solution chemistry of CO_2 absorption with MEA

$$MEA + H_3O^+ \rightleftharpoons \mathrm{MEA} + H_2\mathrm{O} \quad \text{(amine protonation)}$$

$$CO_2 + 2H_2O^+ \rightleftharpoons + H_3O^+ + HCO^{3-} \quad \text{(bicarbonate formation)}$$

$HCO_3^- + H_2O \rightleftharpoons + H_3O^+ + CO_3^{2-}$ (carbonate formation)

$MEA + HCO_3^- \rightleftharpoons + \mathrm{MEACO}O^- + H_2O$ (carbamate formation)

$2H_2O \rightleftharpoons + H_3O^+ + OH^-$ (water hydrolysis)

Chapter - 5

Terrestrial Sequestration

Terrestrial sequestration involves the capture and storage of carbon dioxide by plants and the storage of carbon in soil. During photosynthesis, carbon from atmospheric carbon dioxide is transformed into components necessary for plants to live and grow. As part of this process, the carbon present in the atmosphere as carbon dioxide becomes part of the plant: a leaf, stem, root, etc. Long-lived plants like trees might keep the carbon sequestered for a long period of time.

The existing greenbelt sure sequesters some amount of the carbon emitted through then industrial process. The greenbelt is spread over an area of 9 acres with total plantation of 5500 consisting of trees and shrubs. As the industry falls under the heavily polluted area, greenbelt needs to be enhanced and more trees are to be planted. Hence more carbon can be sequestered. New trees are suggested for plantation to cover approx. 40% of the total Plant Area.

Table 5.1: shows the existing greenbelt and its required expansion during the expansion phase:

1.	Total Area	30.692 acres
2.	Existing Greenbelt	9 Acres
3.	Existing no.of plants	5500
4.	Greenbelt Enhancement	3.25 Acres
5.	No. of trees to be planted	1800

Formula used for determination of Carbon sequestered by Trees

Step 1: Determine the total green weight of the tree:

The green weight is the weight of the tree when it is alive. First, you have to calculate the green weight of the above-ground weight as follows:

$W_{above\text{-}ground} = 0.25\ D^2\ H$ (for trees with D<11)
$W_{above\text{-}ground} = 0.15\ D^2\ H$ (for trees with D>11)
$W_{above\text{-}ground}$ = Above-ground weight in pounds
D = Diameter of the trunk in inches
H = Height of the tree in feet

The root system weight is about 20% of the above-ground weight. Therefore, to determine the total green weight of the tree, multiply the above-ground weight by 1.2:

$W_{total\ green\ weight} = 1.2 * W_{above\text{-}ground}$

Step 2: Determine the dry weight of the tree

The average tree is 72.5% dry matter and 27.5% moisture. Therefore, to determine the dry weight of the tree, multiply the total green weight of the tree by 72.5%.

$W_{dry\ weight} = 0.725 * W_{total\ green\ weigh}$

Step 3: Determine the weight of carbon in the tree

The average carbon content is generally 50% of the tree's dry weight total volume. Therefore, in determining the weight of carbon in the tree, multiply the dry weight of the tree by 50%.

$W_{carbon} = 0.5 * W_{dry\ weight}$

Step 4: Determine the weight of carbon dioxide sequestered in the tree

CO2 has one molecule of Carbon and 2 molecules of Oxygen. The atomic weight of Carbon is 12 (u) and the atomic weight of Oxygen is 16 (u). The weight of CO2 in trees is determined by the ratio of CO2 to C is 44/12 = 3.67. Therefore, to determine the weight of carbon dioxide sequestered in the tree, multiply the weight of carbon in the tree by 3.67.

$W_{carbon\text{-}dioxide} = 3.67 * W_{carbon}$

Selection of the trees is based on:

1. Tolerance towards pollution.
2. Fast Growth
3. High sequestration potential.
4. Indigenously growing species.
5. No exotic species has been suggested.
6. Average Growth period to be three years.
7. No vulnerable or endangered species has been chosen.

As per the study conducted the total carbon emissions mounts to 75,603 ton for the year 2021-2022. In this respect the sequestered carbon is calculated to be 2.3% approximately. List of existing plant is attached as Annexure1, Annexure 2, and Annexure 3 for >10 years, 5-10 years, < 5 years respectively. Therefore a suitable plan has been suggested for plantation attempting to take this sequestration to the rise of 4.5% approximately in an average period of 3 Years. Plantation plan is attached as Annexure 4. When it comes to sequestration through afforestation, it is the best possible way to sequester carbon and reap other benefits as well. However sequestration has its limits, plantation within the plant limits the area of plantation and therefore sequestration is limited. However developing thicker greenbelt outside the plant boundaries around 10-20 m allows more sequestration. Keeping in mind the existing plantation also adds significantly to the sequestration. Maintenance of the Greenbelt is another important aspect that can significantly impact the health of the plants, leading to maximum healthy growth. During construction phase due to excessive dust, a decline in survival rate was observed. It is hence suggested to go for expansion post construction.

Chapter - 6

Conclusions

The Indian DRI industry consumes 8.8% of national annual industrial energy use and emits 11% of national annual CO2 emissions. This represents a significant portion of the national contribution in terms of emissions and energy use. it is crucial to carefully examine the DRI industry for energy use and emissions abatement measures. The growing iron and steel industry in India is one of the key sectors to reform in order to meet the country's NDCs to the Paris Agreement, and the anticipated doubling of DRI capacity from 50 MTPA in 2018-19 to 114 MTPA by 2030-31 is further indication of the importance of this sector.

The ironmaking process is of key focus for reducing energy use, GHG, SOx and PM2.5 emissions. There is a large contribution of NOx emissions from transport at present.

The DRI process metrics suggest that in terms of efficiency, there is a potential for 20-30% improvement on average when considering the best technologies available. This can be brought about by improving the raw material quality, proper selection of materials and process parameters and waste-heat recovery, among others. To improve raw material quality, it is suggested to explore the expansion of domestic beneficiation capacity (particularly for coal) and reduce the import share to bring a gross benefit of up to 5% in GHG emissions and 6% in energy use. Newer and more efficient beneficiation technologies could be adopted to ensure sustainable growth. Land transport using trucks can be reduced in favour of railways to improve transport efficiency and reduce overall emissions by 1-2%. Improving regulations by revising the 12-year old emissions norms and bettering the monitoring framework by inducting CEMS can go a long way in preventing plants from flouting norms without detection and reprehension. Extending the PAT scheme with stricter targets and encouragement of adopting higher productivity, WHR systems and also for fuel switching could be greatly beneficial in accelerating development.

Over the next decade, however, considering the broad limitations of raw material quality/availability, technoeconomic uncertainties, etc., the development of a robust and

affordable natural gas network may be of significant potential for reduction in GHG emission from the DRI industry. In addition, capacity building must be taken up early on for accelerated hydrogen steel adoption. By enhancing research and development and deploying pilot production facilities, the overall infrastructure for a hydrogen economy can be stably built for ensured introduction of hydrogen-based steel in the coming decades. The hydrogen economy can revolutionize the industry by reducing GHG emissions by up to 94%.

In conclusion, short-term measures can be taken to increase coal-DRI performance to BAT standards. Over the medium term, natural gas adoption can be explored, whilst a suitable long-term goal is to introduce hydrogen and negate 300 million tonnes of GHG emissions, to enable truly sustainable development. A robust policy must be developed, and relevant stakeholders must be engaged in a timely manner to accelerate the GHG emission of this important industry and thus sustaining the economy over the long term.

CO_2 emissions data submission form for world steel sectoral approach

*Please do not change downloaded form

Mandatory to fill-in
Stainless steel only
Fill-in if available
Protected calculation
Fixed value

Site:	MCPL022
Organization:	MCMJ
Year(Report period):	2022

Site structure (the number of operated units)

Coke battery		BF > 1000 m^3		Open hearth		Cold rolling		A&P lines	
Sinter plant		100<BF<1000		Hot rolling		HDG lines		Bright A lines	
Pellet plant		BF < 100 m^3		Lime kilns		EG lines		Batch Annealing	
Gas DRI		BOF shops		Oxygen plant		Tining lines		Argon/Oxy Decarb	
Coal DRI		EAF units		Power plant		Smelting Reduction		Vacuum Oxy Decarb	

BASIC information

Total coke production (dry t)	
Sinter production (t)	
Pellet production (t)	
Hot metal production (t)	
DRI production (t)	69,284
BOF crude steel production (t)	
Open Hearth crude steel production (t)	0
EAF crude steel production (t)	0
Carbon crude steel production (t)	0
Hot rolled steel production (t)	
Austenitic stainless steel production (t)	
Ferritic stainless steel production (t)	
Martensitic stainless steel production (t)	
Other stainless steel production (t)	
Stainless steel production (t)	0
Total Steel Production (t)	**0**
Total Ironmaking slag production (t)	
Total steelmaking slag production (t)	
Granulated Ironmaking slag production (t)	
Granulated Steelmaking slag production (t)	
Total Granulated slag production (t)	11,880
Hot rolled stainless steel production (t)	
Cold rolled stainless steel production (t)	
Iron supply from upstream (t)	
Purchased carbon steel scraps (t)	
Purchased stainless steel scraps (t)	
Home carbon steel scraps (t)	
Home stainless steel scraps (t)	
Cr-Ni type scraps (%)	
Cr type scraps (%)	
Burnt lime production (t)	
Power generation (MWh)	0
Data verified by external body	Yes

Electricity grid Information

Source of information	Energy Equivalent GJ/MWh	Upstream CO_2 value t CO_2/MWh
Global average grid mix	9.800	0.504
IEA yearly update global grid mix	9.800	0.476
National or regional regulator mix		
Site power supply contract mix		

			Site data				Conversion factors		Calculation results				
	Materals /Energies	Unit	Purchased Procured	Sold Delivered	C content Site measurement	Energy Equivalent	Emission Factor	Upstream CO_2 value	Scope 1 Direct emissions	Scope 1.1 emissions	Scope 2 emissions	Scope 3 emissions	Total Energy
					t C/unit	GJ/unit	t CO_2/unit	t CO_2/unit	t CO_2	t CO_2	t CO_2	t CO_2	TJ
	Iron ore	dry t	1,17,300		0.010		0.037		4,340			-	-
	Coking coal	dry t			0.835	32.200	3.060		-			-	-
	BF injection coal	dry t			0.806	31.100	2.953		-			-	-
	Sinter/BOF coal	dry t			0.760	29.300	2.785		-			-	-
	Steam coal	dry t	88,000		0.672	25.900	2.462		2,16,656			-	2,279
	EAF coal	dry t			0.889	30.100	3.257		-			-	-
	SR/DRI coal	dry t			0.806	31.100	2.953		-			-	-
	Coke	dry t			0.889	30.100	3.257	0.224	-			-	-
	Charcoal	dry t		53,300		18.800			-			-	- 1,002
New	Petroleum coke	t			0.850	31.935	3.115		-			-	-
New	Used plastic	t				46.000	2.416		-			-	-
New	Used tires	t				35.000	2.199		-			-	-
	Heavy oil	m^3				37.700	2.907	0.276	-			-	-
	Light oil	m^3				35.100	2.601	0.247	-			-	-
	Kerosene	m^3				34.700	2.481	0.247	-			-	-
	LPG	t				47.300	2.985		-			-	-
	LNG	k.m^3N			0.550	35.900	2.015	0.665	-			-	-
	Natural gas	k.m^3N			0.550	35.900	2.015	0.000	-			-	-
New	Green hydrogen	t				120.000		0.000	-			-	-
New	Blue hydrogen	t				120.000		1.800	-			-	-
New	Grey hydrogen	t				120.000		19.800	-			-	-
New	Fossil free biogas	t			0.751	50.400		0.000	-			-	-
	Limestone	dry t			0.120		0.440		-			-	-
	Burnt lime	t				4.500		0.950	-			-	-
	Crude dolomite	dry t	23,000		0.130		0.476		10,948			-	-
	Burnt dolomite	t				4.500		1.100	-			-	-
	Sinter	t				2.450		0.262	-			-	-
	Pellets	t	50,000			2.100		0.137	-			6,850	105
	EAF electrodes	t					3.663	0.650	-			-	-
New	Low carbon iron units	t			0.047	20.900	0.172	1.855	-			-	-
	Pig Iron	t			0.047	20.900	0.172	1.855	-			-	-
	Cold Iron	t			0.047	20.900	0.172	1.855	-			-	-
	Ni pig iron	t			0.005		0.018	5.200	-			-	-
New	Charcoal based pig iron	t			0.047	20.900	0.172	1.855	-			-	-
New	Biomass	t			0.476	15.600		0.000	-			-	-
	Gas based DRI	t			0.020	14.100	0.073	0.780	-			-	-
	Coal based DRI	t		0	0.020	17.900	0.073	1.210	-			-	-
New	Low carbon DRI	t			0.020	14.100	0.073	0.780	-			-	-
	Ferro-Nickel	t			0.010		0.037	8.676	-			-	-
	Nickel oxides	t			0.001		0.004	20.279	-			-	-
	Nickel metal	t			0.001		0.004	13.579	-			-	-
	Ferro-Chromium	t			0.075		0.275	5.987	-			-	-
	Molybdenum oxides	t			0.001		0.004	6.500	-			-	-
	Ferro-Molybdenum	t			0.005		0.018	8.500	-			-	-
	Ferro-Manganese	t			0.050		0.183	2.789	-			-	-
New	Ferro-Silicon	t			0.001		0.004	4.000	-			-	-
New	Silico-Manganese	t			0.005		0.018	1.400	-			-	-
New	Silicon (Metal)	t			0.001		0.004	5.000	-			-	-
	Electricity	MWh	3,405			9.800		0.504	-		1,716		33
	Steam	t				3.800		0.195	-		-		-
	Oxygen	k.m^3N				6.900		0.355	-			-	-

	Nitrogen	$k.m^3N$				2.000		0.103	-			-	-
	Argon	$k.m^3N$				2.000		0.103	-			-	-
	Coke oven gas	$k.m^3N$			0.228	19.000	0.835	0.977	-	-	-		-
	Blast furnace gas	$k.m^3N$			0.243	3.300	0.890	0.170	-	-	-		-
	BOF gas	$k.m^3N$			0.413	8.400	1.513	0.432	-	-	-		-
New	Waste heat	GJ				1.000		0.051	-		-		-
New	Ethanol	m^3			0.410	23.575		1.494	-			-	-
New	Methanol	m^3			0.293	15.662		1.369	-			-	-
New	Ammonia	t				37.500		1.600	-			-	-
	BF slag	t		11,880				0.550	-			- 6,534	-
	BOF slag	t		11,880				0.300	-			- 3,564	-
New	EAF slag	t						0.300	-			-	-
	CO2 to external use	t					1.000		-			-	-
New	Permanently sequestered CO2	t					1.000		-			-	-
	Coal tar	t				37.000	3.389		-			-	-
	Benzole	t				40.570	3.382		-			-	-
	w/o undecided credits	CO2 Intensity	-	tCO2/tCrudeSteel	Grand Total	**2,40,510**	tCO2	Sub Total	**2,31,944**	**-**	**1,716**	**6,850**	
	w/ undecided credits	CO2 Intensity	-	tCO2/tCrudeSteel	Grand Total	2,30,412.00	tCO2	Sub Total	2,31,944	-	1,716	- 3,248	1,415
		CI by Slags	-	tCO2/tCrudeSteel	Slags	- 10,098.00	tCO2	Slags	-	-	-	- 10,098	
		CI External CO2	-	tCO2/tCrudeSteel	External CO2	-	tCO2	External CO2	-	-	-	-	
		Sequestered CI	-	tCO2/tCrudeSteel	Sequestered CO2	-	tCO2	Sequestered CO2	-	-	-	-	
		CCU Products	-	tCO2/tCrudeSteel	CCU Products	-	tCO2	CCU Products	-	-	-	-	
	Energy Intensity		-	GJ/tCrudeSteel									

Useful unit conversions

Volume	1	scf	0.026862	m3N
Volume	1	gal	0.003785	m3
Weight	1	lb	0.453592	kg
Weight	1	nt	0.907184	mt
Energy	1	mmBTU	1.054349	GJ
Energy	1	mBTU/scf	39.251136	MJ/m3N
Energy	1	mBTU/nt	1.162222	MJ/mt
Energy	1	BTU/gal	0.278530	MJ/m3

3.274

GREENBELT PLANTATION PLAN FOR MCCIPL AND ITS SEQUESTRATION POTENTIAL

Common Name	Plant Spieces	Family	Number	Average Height above the ground (feet)	Average Diameter of the trunk (inches)	Weight of the tree above ground (pounds)	Total Weight of the tree (pounds)	Dry weight of the tree (pounds)	Weight of the carbon present (pounds)	Weight of carbon dioxide sequestered (pounds)	Weight of the carbon sequestered (tonne)	Weight of the carbon sequestered (tonne/annum)
TREES												
Ashoka Tree	Monoon Longifolium	Annonaceae	300	49	20	1470000	1764000	1278900	639450	2346781.5	1066.718864	355.5729545
Akashmoni	Acacia auriculiformis	Fabaceae	50	78	25	609375	731250	530156.25	265078.125	972836.7188	442.1985085	147.3995028
Mimosa	Acacia farnesiana	Fabaceae	50	82	18	332100	398520	288927	144463.5	530181.045	240.9913841	80.33046136
Chiku	Achrassapota	Sapotaceae	50	75	20	375000	450000	326250	163125	598668.75	272.1221591	90.70738636
	Ailanthus excels	Simaroubaceae	40	65	26.3	449598.5	539518.2	391150.695	195575.3475	717761.5253	326.2552388	108.7517463
Siris	Albizia amara	Fabaceae	50	64	45	1620000	1944000	1409400	704700	2586249	1175.567727	391.8559091
Frywood	Albizia lebbeck	Fabaceae	30	70	27	382725	459270	332970.75	166485.375	611001.3263	277.7278756	92.57595852
Karoi	Albizia procera	Fabaceae	30	42	54	918540	1102248	799129.8	399564.9	1466403.183	666.5469014	222.1823005
Milkwood	Alstonascholaris	Apocynaceae	30	36	12	38880	46656	33825.6	16912.8	62069.976	28.21362545	9.404541818
Neem	Azadirachtaindica	Meliaceae	200	55	19	992750	1191300	863692.5	431846.25	1584875.738	720.3980625	240.1326875
Bidi leaf	Bauhinia recemosa	Fabaceae	25	16	10	10000	12000	8700	4350	15964.5	7.256590909	2.418863636
White Orchid	Bauhinia acuminata	Fabaceae	25	7	12	6300	7560	5481	2740.5	10057.635	4.571652273	1.523884091
Butterfly Tree	Bauhinia purpurea	Fabaceae	20	15	6	2700	3240	2349	1174.5	4310.415	1.959279545	0.653093182
Shisham	Dalbergia sisoo	Fabaceae	75	76	70	6982500	8379000	6074775	3037387.5	11147212.13	5066.914602	1688.971534
Mango	Mangifera indica	Anacardiaceae	150	60	25	1406250	1687500	1223437.5	611718.75	2245007.813	1020.458097	340.1526989
Chinaberry	Melia azadirachta	Meliaceae	50	50	24	360000	432000	313200	156600	574722	261.2372727	87.07909091
Yellow Flame	Peltophorumpterocarpum	Fabaceae	50	60	35	918750	1102500	799312.5	399656.25	1466738.438	666.6992898	222.2330966
Manila Tamarind	Pithecellobium ducle	Fabaceae	55	45	20	247500	297000	215325	107662.5	395121.375	179.600625	59.866875
Java Plum	Syzygium cumini	Myrtaceae	25	47	25	183593.75	220312.5	159726.5625	79863.28125	293098.2422	133.2264737	44.40882457
Tulip Tree	Thespesia populnea	Malvaceae	25	62	32	396800	476160	345216	172608	633471.36	287.9415273	95.98050909
Teak	Gmelina arborea	Lamiaceae	350	100	14	1715000	2058000	1492050	746025	2737911.75	1244.505341	414.8351136
Indian Bael	Aegle marmelos	Rutaceae	25	26	8	10400	12480	9048	4524	16603.08	7.546854545	2.515618182
Banyan	Ficus benghalensis	Moraceae	20	87	112	5456640	6547968	4747276.8	2373638.4	8711252.928	3959.660422	1319.886807
			1725		8						18058.31837	6019.439458
					Flowering trees							
Golden Shower	Cassia Fistula	Fabaceae	20	40	36	259200	311040	225504	112752	413799.84	187.6643265	62.55477551
Champak	Michelia champaca	Magnoliaceae	20	85	62	1633700	1960440	1421319	710659.5	2608120.365	1182.821027	394.2736757
Coral Tree	Erythrina Blakei	Fabaceae	20	65	45	658125	789750	572568.75	286284.375	1050663.656	476.4914541	158.8304847
Mango-pine	Barringtonia Acutangula	Lecythidaceae	20	82	26	277160	332592	241129.2	120564.6	442472.082	200.6676109	66.88920363
Bottlebrush	Melaleuca citrina	Myrtaceae	20	25	24	72000	86400	62640	31320	114944.4	52.12897959	17.37632653
			100								2099.773398	699.9244661
												6719.363924

Annexure - 7

MAA CHHINNMASTIKA CEMENT AND ISPAT PRIVATE LIMITED

Registered Office & Works:
At - Hahal, Post - Barkakana - 829103, Dist.- Ramgarh (Jharkhand)
ramgarh_jh@rediffmail.com

EXTRACT OF THE MINUTE OF THE MEETING OF BOARD OF DIRECTORS OF M/S MAA CHHINNMASTIKA CEMENT & ISPAT PRIVATE LIMITED HELD ON THURSDAY 15th DAY OF FEBRUARY 2018 AT 02:30 P.M AT REGISTERED OFFICE OF THE COMPANY

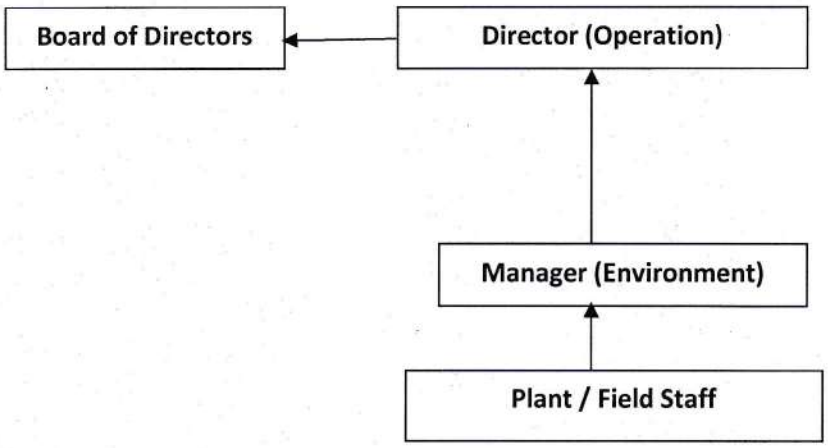
The Chairman informed the board a healthy and sustainable environment is important to our citizen, our economy & our future. Based on the principle of managing environment resources for the benefit & enjoyment of both current & future generation, the board decided to frame and adopt an Environmental Policy. After due deliberation following resolutions was passed in this regard:-

"RESOLVED THAT" the board hereby adopts the Environmental Policy (as discussed below). The mission of MCCIPL is to produce Steel & Steel product in an environment friendly manner and is strive to;

- Integrate sound environmental management practices in all our activities
- Conduct our operations in environmentally responsible manner to minimize pollution and its' impact on environment
- Comply with applicable legal and other requirements related to environmental aspects of our operations and strive to go beyond. The environment management cell will be headed by EHS Manager, a well qualified and experienced environment engineer.
- MCCIPL shall ensure that deviations from this policy and cases of violations/non-compliances of Environment or Forest Laws, if any, shall be reported to the Board of Directors through EHS Manager and shall identify designate responsible person for ensuring compliance with the Environmental Laws and Regulations.
- Conserve energy, and other natural resources, minimize waste generation and promote recovery, recycle and reuse.
- Increase greenery in and around the plant.
- Ensure continual improvement in environmental performance by setting & reviewing objectives & targets.
- Encourage environmental awareness amongst employees working for and on behalf of MCCIPL and the general populace around the plant.

Hierarchical systems - environmental issues and for ensuring compliance

Company EHS cell is responsible for the compliance of the environmental conditions. The Environmental Manager will functionally report to Director (Operation), and the environmental matters are placed to the Board of Directors through Director (Operation).



"**RESOLVED FURTHER THAT** Mr. Parashuram Singh of the Company be and is hereby severally authorized to make, sign and execute on behalf of the Company such all necessary document required in framing & adoption of "Environment Policy."

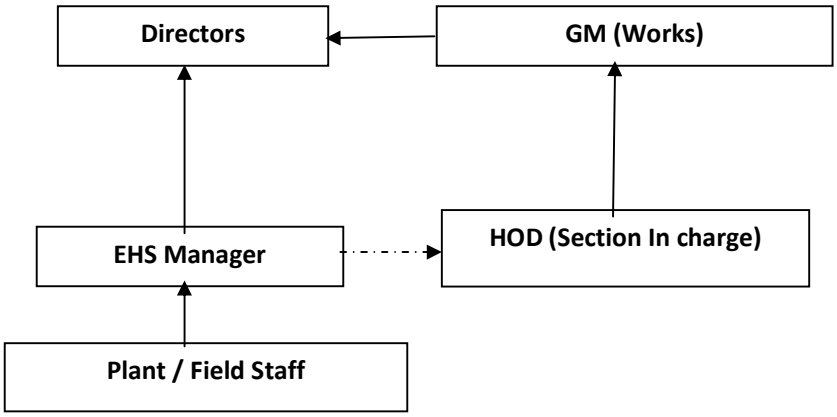
"**RESOLVED FURTHER THAT** the Board be and is hereby recommended to adopt Environment Policy, as the draft placed before the board, initiated by the chairman for the sake of identification".

Date: 15/02/2018

ALOK RUNGTA
(Director)
DIN: 01596258

Annexure – 8

Organization of Environment Management Cell



O/C

Annexure -9

MAA CHHINNMASTIKA CEMENT AND ISPAT PRIVATE LIMITED

Registered Office & Works:
At- Hehal, Post - Barkakana - 829103, Dist.- Ramgarh (Jharkhand)
CIN:U26941JH2004PTC010665
ramgarh jh@rediffmail.com

MCCIPL/076/2023-24 **14/09/2023**

To,
The Member Secretary,
Jharkhand State Pollution Control Board,
HEC Campus, TA Division Building,
Durwa, Ranchi - 834 004.
Jharkhand

Sub: Submission of Environmental Statement Report from the period of April 2022 to March 2023.

Dear Sir,

With reference to the above, we are enclosing herewith the Environmental Statement Report for the period from April 2022 to March 2023 of our Sponge Iron.

Please find above in order and do the needful.

Thanking you,

Yours faithfully,
For MAA CHHINNMASTIKA CEMENT & ISPAT PVT.LTD.

Manoj Kumar
Manager (Environment)

Encl: As above.

CC to: - The Regional Officer, Regional Office, State Pollution Control Board, Hazaribagh (Jharkhand)

ENVIRONMENTAL STATEMENT
Maa Chhinnmastika Cement & Ispat Pvt. Ltd.
Period from: April 2022 to March 2023

FORM – V

PART – A

1.	Name and address of the Owner / Occupier of the Industry operation or process	Maa Chhinnmastika Cement & Ispat Pvt. Ltd. Occupier name – Santosh Kumar Gupta Village – Hehal, P.O – Barkakana, Dist. – Ramgarh, Jharkhand – 829103
2.	Industry Category Primary (S.T.C. Code) Secondary (S.T.C. Code)	Red Category
3.	Production Capacity	Sponge Iron – 300 TPD Steel Melting Shop – 72000 TPA Rolling Mill – 67500 TPA WHRB – 6 MW AFBC – 9 MW
4.	Year of Establishment	2004 (DRI), 2023 (SMS with Rolling Mill & CPP)
5.	Date of the last Environmental Statement Submitted	27/06/2022

PART – B

WATER AND RAW MATERIAL CONSUMPTION

(I) Water consumption in m3/day:

Process & Cooling : 166.26 m3/day (Sponge Iron)
7.25 m3/day (SMS & Rolling Mill)
7.66 m3/day (CPP)

Domestic : 5.14 m3/day (Sponge Iron)
0.22 m3/day (SMS & Rolling Mill)
0.24 m3/day (CPP)

Name of Product	Process Water Consumption per Unit of Product Output	
	During Previous Financial Year (2021-22)	During Current Financial Year (2022-23)
Sponge Iron	0.9215	0.9215
SMS & Rolling Mill	-	0.9241
CPP	-	1.0185

(II) RAW MATERIAL CONSUMPTION:

Name of Raw Material	Name of Product	Consumption of Raw Material Per Unit of Output	
		During Current Financial Year (2021-22)	During Current Financial Year (2022-23)
Iron ore/Iron Ore Pellets	Sponge Iron	2.446	2.303
Coal		1.272	1.133
Dolomite		0.034	0.023
MS scrap	SMS & Rolling Mill	-	0.292
Pig Iron		-	0.037
Sponge Iron (I/F)		-	0.829

(III) POWER CONSUPTION (KWH/MT):

During Previous Financial Year (2021-22)	During Current Financial Year (2022-23)
49.147 KWH/MT of Sponge Iron	129.276 KWH/MT of Sponge Iron
-	993.000 KWH/MT of MS Billet & Roll. Mill

(IV) TOTAL PRODUCTION:

Product Name	During Previous Financial Year (2021-22)	During Current Financial Year (2022-23)
Sponge Iron (MT)	69,283.98	65851.100
SMS & Rolling Mill (MT)	-	2872.320
Power (KWH)	-	2746.33

PART – C

DISCHARGED TO ENVIRONMENTAL / UNIT OF OUTPUT

Pollutants	Quantity of Pollutants Discharged (Mass/Day)	Concentration of Pollutants in Discharge (Mass/Valume)	Percentage of variation from prescribed standard with reasons
(a) Water	• No industrial effluent is generated. In compliance to Zero Liquid Discharge (ZLD), the web camera and flow meter are installed with online monitoring facilities. • The waste water generated from the office toilet and mess has been discharged via septic tank and soak pits.		
(b) Air	• Online monitoring of PM & SO2 are installed with web connectivity with CPCB & SPCB. • Continuous Ambient Air Quality Monitoring System (CAAQMS) PM 10 parameter is installed.		

PART – D

HAZARDOUS WASTE

(As specified under Hazardous Wastes (Management, Handling & Trans boundary Movement Rule, 2010)

Hazardous Waste	Total Quantity (Ltrs.)	
	During Current Financial Year (2021-22)	During Current Financial Year (2022-23)
a)From Process	Used gear oil and lubricant are stored in drum and used in different Chain Drive within plant campus. Hazardous waste authorization issued vide letter no JSPCB / HO / RNC / HWM-1692559 /2018/25 dated 14/06/2018 valid up to 30/09/2022.	Used gear oil and lubricant are stored in drum and used in different Chain Drive within plant campus. Hazardous waste authorization issued vide letter no JSPCB / HO / RNC / HWM-13306410/ 2023/21 dated 09/04/2023 valid up to 20/08/2027.
(b) From Pollution Control Facilities	Not applicable	Not applicable

PART – E

SOLID WASTE

		Total Quantity (MT)	
		During Previous Financial Year (2021-22)	During Current Financial Year (2022-23)
(a)	From Process		
	1) Dolachar (Coal Chai)	53300.000	44892.640
	2) Other waste	92760.39	33227.660
(b)	From Pollution Control Facility	Nil	Nil
(c)	Quantity recycled or re- utilized within the unit		
	1) Sold	51449.22	52583.900
	2) Dispose	93048.76	35672.690

PART – F

Please specify the characterization (in terms of composition and quantum) of hazardous as well as solid wastes and indicate disposal practice adopted for both the categories of wastes.

- Used gear oil and lubricant are stored in drum and used in different Chain Drive within plant campus.
- Coal Char (Chhai), the solid waste generated in process are being sold at present, the earlier stock of coal char are also being sold as per demand.

PART – G

Impact Of The Pollution Control Measures on Conservation of Natural Resources And Consequently On The Cost Of Production

- Unit has 3X100 TPD Sponge Iron kilns, installed three numbers of ESP attached to each kiln stack to control stack emission.
- Unit has installed seven numbers of bag filters at various material transfer points to control fugitive emissions.
- Unit has installed one hundred five numbers of water sprinklers at various places within plant premises to control dust emission / fugitive emission from haul roads.
- All conveyor belts are covered with M.S.Plate.
- All raw materials are kept in covered shed.

PART – H

Additional Measures/Investments Proposal for Environment Protection Including Abatement of Pollution

- Plantation are done surrounding the boundary wall area and road side within campus. We are also doing support for plantation in nearby village during rainy season every year. New plantations are also made every year in the plant during rainy season.
- EC issued vide letter no F.No.J-11011/215/2016-IA.II(I)dated – 07th August,2019.
- CTE issued vide letter no. JSPCB/HO/RNC/CTE-6089357/2020/366 dt 24.09.2020 from JSPCB. Project work is going on.
- CTO issued vide letter no. JSPCB/HO/RNC/CTO-15354540/2023/501 Dt. 15/03/2023

PART – I

Any other particulates for improving the quality of environment

- Unit has installed two numbers of online Continuous Emission Monitoring System (CEMS) for measurement of particulate matter (PM) & SO_2.
- The web camera & flow meter has installed with online monitoring facilities.
- Continuous Ambient Air Quality Monitoring System (CAAQMS) PM 10, PM 2.5, SO2 & NOx parameters are installed with online monitoring facilities.
- Unit has installed Telemetry System at One no. of Bore well and piezometer.
- Data of CEMS, Camera & flow meter are continuously updated on CPCB & SPCB server.
- 6 numbers of CCTV cameras has been installed within plant premises to monitor the operationalization status of Air pollution Control Devices.
