# Pre-Feasibility Report
# for revised project configuration of
# 7.0 MTPA Modernization-Cum-Expansion Plan
# of
# Bhilai Steel Plant along with captive power plant

## Bhilai Steel Plant (BSP)
## M/s Steel Authority of India Limited (SAIL)

*At Bhilai, District Durg, Chhattisgarh*

**September, 2017**

**Project Proponent**

स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड
**STEEL AUTHORITY OF INDIA LIMITED**
**BHILAI STEEL PLANT (BSP)**
**ISPAT BHAWAN,**
**BHILAI, DIST. DURG**
**CHHATTISGARH, PIN – 490001**

**Environmental Consultant**

**MECON LIMITED**
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CERTIFICATE NO: NABET/EIA/1619/RA 0068

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## Bhilai Steel Plant (BSP)
## M/s Steel Authority of India Limited (SAIL)

*At Bhilai, District Durg, Chhattisgarh*

***Capacity :***

*Crude Steel capacity 7.0 MTPA*

*Total Power Generation 94 MW*

*[Captive Power Plant 76 MW+TRT 14 MW +CDCP 4 MW]*

***Area:***

*Total area under possession: 6286.75 ha.*

*Proposed Modernisation-cum-Expansion under existing plant premises of 3284.75 ha.*

*Environmental Clearance granted vide letter no. J-11011/28/2007-IA II (I) dtd. 31.03.2008 with subsequent amendments dated 23.06.2011 & 23.07.2014 and extension of validity dtd. 05.07.2013*

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**TABLE OF CONTENTS**

## EXECUTIVE SUMMARY

Bhilai Steel Plant (BSP) is established since 1956 and since then there has been phases of expansion. The 7.0 MTPA modernisation-cum-expansion is being executed within the existing integrated steel plant premises. The Plant is located in Durg District of Chhattisgarh State. The site is well connected with National Highway and Howrah – Mumbai Rail line. The nearest major railway station is Durg, about 12 km from the project site.

The Environmental Clearance (EC) for 7.0 MTPA Modernization-Cum-Expansion Plan of Bhilai Steel Plant along with Captive Power Plant has been accorded by MoEFCC dated 31.03.2008 with amendments dated 23.06.2011 and 23.07.2014. The EC validity was extended up to 30.03.2018.

However, during detailed engineering of the project, for techno-economic advantage, certain changes were envisaged viz. change in installed capacity of sinter plant & requirement of iron ore fines; change in finished steel product mix (rolling mills sections), change in operation regime of coke oven complex, and change in turbo-power generation capacity, while keeping the hot metal and crude steel production same as per the accorded EC. Some new units like Argon rinsing unit in SMS-III, Quenching and Tampering facility and secured landfill not considered at the time of earlier accorded EC is now envisaged. In SMS-III in place of thin-slab caster and continuous hot strip finishing train, now bloom-cum-beam-blank caster is envisaged.

Further being a brown field, site-specific technological hindrances during project execution delayed the envisaged units to come in to production / stabilization within the stipulated EC, i.e. 30.03.2018. Moreover, certain units like, BF 1,2 & 3, SMS-III, RMP-I and BBM, which were to be phased as per EC by 30.03.2018, due to delay in stabilization of new units, will continue to operate till stabilization, which is likely to take additional three years post March 2018.

In view of the above, the present application is for seeking ToR for Environmental Clearance for revised configuration of 7.0 MTPA modernization-cum-expansion of Bhilai Steel Plant along with captive power plant, while the crude steel production and project area same as per earlier accorded EC for the project.

# 1.0 INTRODUCTION

## Background

The present Pre-Feasibility Report (PFR) has been prepared as part of the application for obtaining Terms of Reference (ToR) for carrying out Environmental Impact Assessment and Environmental Management (EIA/EMP) studies for Plant as per present configuration under Modernization-Cum-Expansion Plan of Bhilai Steel Plant 7.0 MTPA along with Captive Power Plant incorporating changes in Project Configuration.

The Environmental Clearance (EC) for the Modernization-Cum-Expansion Plan of Bhilai Steel Plant from 4.0 MTPA to 7.0 MTPA along with Captive Power Plant has been accorded by MoEFCC vide letter no. J-11011/28/2007-IA II (I) dated 31.03.2008 and amendments dated 23.06.2011 and 23.07.2014. Further extension of validity of EC for another 5 years was granted vide letter dated 05.07.2013. Therefore, the EC is valid till 30.03.2018.

However, during detailed engineering of the project certain changes were envisaged viz. change in the capacity of units (sinter plant), change in finished steel product mix (rolling mills sections) and change in operation regime of coke oven complex, change in SMS-III casters and change in turbo-power generation capacity, while keeping the hot metal and crude steel production same as per the accorded EC by MoEFCC on 31.03.2008. The above changes were envisaged for techno-economic advantage during project operation. Further being a brown field, the site has its own inherent problems which resulted in delay of envisaged units to come in to production within the stipulated EC, i.e. 30.03.2018. Moreover, certain units which were to be phased out under the modernization-cum-expansion but due to delay in stabilization of the new units, will continue to operate till the new units under the modernization-cum-expansion gets stabilized, which is likely to take additional three years post March 2018.

In view of the above, the present application for ToR along with the Form-I and revised Pre-Feasibility Report has been prepared for seeking Environmental Clearance for the modernization-cum-expansion of 7.0 MTPA Bhilai Steel Plant as per the revised configuration.

As per Environmental (Protection) Act, 1986, all new projects or expansion of any existing project necessitates prior environmental clearance from appropriate statutory authorities. Also, in accordance with the objectives of National Environmental Policy as approved by the Union Cabinet on 18$^{th}$ May, 2006 and EIA Notification dated 14$^{th}$ September, 2006 and related guidelines, carrying out EIA/EMP study and preparation of the EIA/EMP report is part of the process for obtaining Environmental Clearance from Ministry of Environment, Forest and Climate Change (MoEFCC). As part of the process of obtaining EC, SAIL-BSP is submitting an online formal application to MoEFCC in the prescribed format (Form I) along with a Pre Feasibility Report.

**Reason for Project Delay**

During engineering and execution of modernisation-cum-expansion in a brown field site many unforeseen hindrances are encountered vis-a-vis changes in scope and quantum of work causing delay in engineering and execution of the project which results to delay in project to come under production / completion. Some of the factors with respect to the BSP modernization-cum-expansion are given below:

a. In many areas, old units were to be dismantled and relocated and getting clearance for the same consumes lot of time due to possible damage to existing underground and over ground facilities.
b. Re-engineering was necessitated for envisaged facilities due to under-ground / over ground infringements & site constraints, requiring multiple modifications leading to delay in handing over the front for respective package contractors.
c. Underground & over-ground infringements are to be cleared progressively and then the site handed over to contractor for execution of many packages.
d. Interfacing of various Packages resulting repeated submission and approval of drawings causing delay in finalising of Drawings.
e. Change in site layout and cutting and disposal of substantial over burden required, thus delaying the actual execution.
f. Relocation of new units from that envisaged in the contract.
g. Repeated change in design of civil foundation of units due to presence of existing underground soil condition, resulting in delay in civil & structural works, equipment erection.
h. Redesigning of civil foundations and structural work to avoid interferences with other packages.
i. Civil and structural jobs exceeded substantially beyond contractual quantum causing contractual completion.
j. Some of the units required shutdown, which are to be matched with maintenance shut down schedule of the unit as per requirement of shop.
k. In many of the major units the scope of work of process units were increased from that which was envisaged in the contract.
l. Delay in tendering process of interfacing packages as they are linked to the inputs from main package contractor.
m. In many packages the brown field engineering complexities not envisaged by the contractor and the package is quoted at low price and on realising the complexities, the contractor left the package in between and retendering for the balance work has to be done. For example, Water Packages (supplying water to major new units) like, Water Supply System for BOF & CCP (Pkg 77-01), Water Supply System for Bar & Rod Mill and Universal Rail Mill including Reheating Furnaces (beyond Battery Limit) (Pkg 77-02) and Make-up Water Supply System Augmentation (Pkg 78).
n. Delay in engineering and execution by respective package contractors because of finalization of design inputs/services and getting clearance for their works.

**PFR Coverage**

This report contains information on the proposed project which includes the following:

- Introduction of the Project / Background Information
  - Identification of the Project and the Project Proponent
  - Brief description of nature of the Project
  - Need for the Project and its Importance to the Country or Region
  - Demand-Supply Gap
  - Import vs. Indigenous Production
  - Export Possibilities
  - Domestic / Export Market
  - Employment Generation

- Project Description
  - Type of Project including Interlinked and Interdependent Project
  - Location
  - Details of Alternate Site considered
  - Size and Magnitude of Operation
  - Project Description with process details
  - Raw Material requirements
  - Resource Optimization / Recycling and Resource
  - Site Services
  - Wastes

- Site Analysis
  - Connectivity
  - Land Form, Land Use, Ownership
  - Topography
  - Existing infrastructure
  - Soil classification
  - Climate
  - Social infrastructure available

- Planning Brief
  - Planning Concept
  - Land Use Planning
  - Assessment of Infrastructure Demand
  - Amenities / Facilities

- Proposed infrastructure

- Resettlement and Rehabilitation (R&R) Plan

- Project Schedule and Cost Estimate

- Analysis of Proposal (Final Recommendation)

**ACKNOWLEDGEMENT**

MECON wishes to place on record its deep appreciation for the trust reposed in MECON by SAIL-BSP and for the active interest and help extended by SAIL-BSP officials.

## 2.0 INTRODUCTION OF THE PROJECT / BACKGROUND INFORMATION

### 2.1 IDENTIFICATION OF PROJECT AND THE PROJECT PROPONENT

Steel Authority of India Limited (SAIL), a Govt. of India undertaking, has planned major modernisation and capacity expansion programme to become more competitive and maintaining its share in the growing domestic steel market. Bhilai Steel Plant (BSP), one of the most efficient integrated steel plants in the country and is the jewel in the crown of SAIL. BSP has a focused long term strategic goal of being a key player in the world steel scenario. They intend to achieve this goal by being a low cost, high quality steel producer in the country with a rich product port-folio.

The national steel policy had set a target of 60 Million Tonnes (MT) of steel production by 2012. In line with this policy, Steel Authority of India Ltd (SAIL) had come up with a corporate plan for the expansion of their Bhilai Steel Plant (BSP) to enhance its steel production from 4.0 MTPA to 7.0 MTPA to meet the domestic demand for infrastructure growth of the country. Under this planning the Modernization-Cum-Expansion Plan of Bhilai Steel Plant 7.0 MTPA was proposed.

BSP was initially designed for production of 1 Million Tonnes of crude steel per year, over the years its capacity is expanded to 2.5 MT in 1967 and further to 4.0 MTPA steel productions at the premises in Bhilai. BSP planned to expand its capacity under Modernization-Cum-Expansion Plan of Bhilai Steel Plant 7.0 MTPA envisaged following areas while formulating the replacement/modernisation measures:

- Adoption of the state-of-the-art technology
- Phasing out of obsolete technology
- Optimum use of existing facilities
- Reduction of semies for sale by enhancing finished steel production
- Value addition in product-mix
- Enhancement of production and realisation of economy of scale
- Adoption of environmental friendly technology.
- Increase in capacity of hot metal, crude steel and saleable steel
- Broadening of product-mix for higher flexibility
- Improvement of energy efficiency
- Creation of infrastructure to sustain further growth in production

After implementation of the modernisation measures at BSP, the plant will be more environment friendly, energy efficient and competitive in the domestic/ international market.

Under Modernization-Cum-Expansion Plan of Bhilai Steel Plant 7.0 MTPA, the major facilities under the project broadly include the following:

- New Coke oven battery no. 11
- 2nd Sinter machine in SP-3
- New Blast furnace no. 8
- Augmentation of SMS-2
- SMS-3 (BOF) with complete refining and casting facility
- Universal Rail Mill
- Bar and Rod Mill
- Augmentation of Plate Mill
- Raw material handling system, Coal handling system, Oxygen plants, Lime and Dolomite plant, transport facilities, Electrical power and other facilities.

## 2.2 BRIEF DESCRIPTION OF NATURE OF THE PROJECT

The project falls under Category A [Sl.no. 3(a) - Metallurgical Industry (ferrous & nonferrous) of Schedule: "List of project or activities requiring prior Environmental Clearance"] of MoEFCC Notification dated 14th September, 2006, and its amendments in Nov.-2009 & April -2011.

## 2.3 NEED FOR THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY OR REGION

The Indian steel industry is poised for faster growth in the decades ahead as the industrial and economic development of the country gains pace. As per the report of the Working Group on Steel for the 12th Plan, the total steel consumption of finished steel has been estimated to touch 250 MT in 2025-26 (as per a study done by Boston Consulting Group (BCG) referred in Long Term Perspectives for Indian Steel Industry by Ministry of Steel) from the current level of 101.2 MT achieved in 2016-17. Even after approximately doubling the production capacity, stands at about 89 MT of total finished steel (alloy + non-alloy), the per capita domestic consumption would continue to be substantially below the world average of 225.2 Kg. There is good prospect of domestic steel consumption growing at about 6 – 7%. The national steel policy 2017 has set a target of 300 million tonne (MT) of steel production by 2030. Steel Authority of India, Limited is well positioned to fulfill its role in the nation's quest for higher growth and development in the new millennium.

Steel being a basic commodity for all industrial activities, quantum of its consumption is considered as an index of industrial prosperity. Since independence, there has been a substantial growth in the steel production in India from 1.5 Mt in 1950-51 to about 89 Mt in 2013-2014. Despite the above growth in the steel sector, the per capita finished steel consumption continues to remain at a level of about 63 kg only, compared to 225.2 kg in the world. Further, with nearly 20% of the world population, India's contribution is only of the order of 6% of world steel production. Hence, short-term and long-term strategies are necessary in planning the development of the steel industry in the country to improve the level of per capita steel consumption.

The growth of the steel industry significantly contributes to economic growth of the Nation as well as to the region as it generates employment both directly and also due to development of downstream industries. The infrastructural and other social amenities grow in the region leading to overall development of the region.

The present ongoing modernization-cum-expansion plan was needed to facilitate SAIL-BSP in meeting its production requirements and contribute to the Steel Production in the country as per National Steel Policy to bridge the gap between demand and supply.

## 2.4 DEMAND-SUPPLY GAP

The Indian Steel industry has entered into new development stage from 2005 -2006 riding high on the resurgent economy and rising demand of Steel. Rapid rise in production has resulted in India to become ~~5th~~3rd largest producer of Steel in 2016-17. It is estimated that, India's Steel consumption will continue to grow at nearly 10% average rate annually, fueled by the demand of construction project.

The National Steel Policy 2017 envisaged crude steel production to reach 300 million tonnes by 2030 and a robust finished steel per capita consumption of 158 Kgs by 2030-31, as against the current consumption of 61 Kgs. The policy also envisages to domestically meet the entire demand of high grade automotive steel, electrical steel, special steels and alloys for strategic applications. So considering the huge demand of steel, this project is important for partially fulfilling of demand. Thus modernization-cum-expansion plan is required to cater the demand of quality steel under sustainable approach.

## 2.5 IMPORT VS INDIGENOUS PRODUCTION

With Make-in-India concept and accelerated growth potential of Indian economy, utilizing existing natural resources using state of art technology to produce Iron and Steel. For further details see **clause 2.4** above.

## 2.6 EXPORT POSSIBILITIES

First priority will be to meet domestic demand and fulfill the requirements of infrastructure plan of the country. However, if possible should also take in account the large export possibilities.

## 2.7 DOMESTIC / EXPORT MARKET

Refer **clause 2.6** above.

## 2.8 EMPLOYMENT GENERATION:

Under the modernisaion-cum-expansion plan, it was estimated that an additional of about 5900 people will be employed.

## 3.0 PROJECT DESCRIPTION

Bhilai Steel Plant a unit of SAIL is presently based on Blast Furnace-Twin Hearth Furnace (BF-THF) and BF- Basic Oxygen Furnace (BF-BOF) routes for production of iron and steel. Under modernization-cum-expansion plan the crude steel production capacity is envisaged to be 7.0 MTPA within the existing premises of BSP.

The major emphasis given for the modernization-cum-expansion measures are as fallows.

a. Use of existing infrastructure for optimising capital expenditure.
b. Adoption of state-of-the–art technology and dismantling of non-efficient and polluting technologies for bringing competitiveness. As for example phasing out of polluting and energy in-efficient processes like Twin-Hearth Furnace (THF) – ingot casting- Primary rolling and installation of most energy efficient Basic Oxygen Furnace (BOF) – Continuous Casting (CC) process route.
c. Modernisation of existing old blast furnaces with state-of–the-art blast furnaces with technologies like coal dust injection for replacement of coke. It may be noted that availability of metallurgical coal, which is required for production of coke is limited in the country, and replacement of coke by non-coking coal is a major step towards energy efficiency.
d. Increase in productivity and energy efficiency of existing facilities by replacing existing rolling mill furnaces to walking beam furnaces.
e. Recovery of waste heat as well as waste material and utilisation of the same inside the plant, wherever possible to make the plant less pollution prone even after capacity expansion.

After implementation of the modernisation measures at Bhilai Steel Plant, the plant will be more environment friendly, energy efficient and competitive in the international market. As such the present modification-cum-expansion measures have been planned keeping in mind sustainable development of the area.

## 3.1 TYPE OF PROJECT INCLUDING INTERLINKED AND INTER-DEPENDENT PROJECT

The ongoing Modernization-Cum-Expansion Plan of Bhilai Steel Plant from 4.0 MTPA to 7.0 MTPA along with Captive Power Plant is undergoing inside the existing plant premises of Bhilai Steel Plant (BSP).

## 3.2 LOCATION

Bhilai Steel Plant is located in Bhilai, District -Durg, Chhattisgarh between North latitude 21°11' to 21°13' and East longitude 81°22'to 81°24'and falls under Survey of India topo-sheet No. F44P08. The site lies on the watershed between Kharun and Tandula Sheonath river system in Chhattisgarh plains. Nearest National Highway is Great Eastern Road (NH-6). Nearest big town is Durg at ~12 km distance and nearest Airport is Raipur which is ~45 km away. The central area is situated at a

slightly higher level having an average altitude of 294m above mean sea level. It slopes gradually towards East.

## 3.3 DETAILS OF ALTERNATE SITE CONSIDERED

Since the project envisages modernization-cum-expansion within the existing Bhilai Steel Plant boundary, therefore possibility of alternate site consideration does not arise.

## 3.4 SIZE AND MAGNITUDE OF OPERATION

Under the modernization-cum-expansion plan, Environmental Clearance (EC) for production of 7.0 MTPA of Crude Steel along with Captive Power Plant (72 MW) was accorded by MoEFCC.

SAIL-BSP is having total 6286.75 ha (15534 acre) of land under its possession. Proposed undergoing expansion is being carried out within the existing plant premises (3284.75 ha) thus no additional land was/is required for the ongoing modernization-cum-expansion plan. (Same as previous EC accorded for modernisation-cum-expansion project)

## 3.5 PLANT DESCRIPTION WITH PROCESS DETAILS

### 3.5.1 Process Details

Metallurgical coal, both Indian and Imported, are charged into Coke Ovens to produce coke which is charged in Blast Furnaces along with Iron ore (lump), Iron ore pellets, sinter and fluxes to produce hot metal. From the volatile matter evolved in Coke ovens, Ammonia, Tar, etc is separated. Chemicals like Benzene, Xylene, Toluene etc are also recovered in the by-product plant. Coke oven gas of high calorific value is recovered in the by-product plant.

The hot metal produced from Blast Furnace (BF) is fed to L.D. Converters (SMS – II & III). The liquid steel produced in basic oxygen furnaces of SMS-II and III is cast into Blooms/Billets/Slabs through Continuous Casting route. Slabs are fed to plate mill to make plates. The rail quality blooms are produced in continuous casting machines installed in SMS-II and SMS III. The Rail and Structural Mill (along with universal Rail Mill) will receive blooms/blanks from SMS-II and partly from SMS-III to produce Rails/ Structurals for the Indian Railways and other consumers. The rails produced will have a potential for export also.

BF gas from blast furnace and LD gas from Basic Oxygen Furnaces (BOF) are cleaned in Gas Cleaning Plant (GCP). The cleaned coke oven gas, blast furnace gas and LD gas are used either singly or mixed together as fuel in various shops for their energy need.

The Power Blowing stations, Oxygen Plants and Propane Plant are also there as auxiliary units.

BF slag is granulated and sold to nearby Cement Plants. The slag is also being utilized in Joint Venture Cement Plant (with JP Cements) set-up in 2011. All waste materials of metallurgical value are recycled. Fines of Iron Ore, Fluxes, Mill Scale, etc. are recycled in to sintering plant to produce sinter.

**Mineral Transport**

95-97% of raw materials and products are transported through Indian Railways, the BSP expansion projects will promote Railways network and its growth. Nearly 3 -5 % of raw materials and products are dispatched through roads.

### 3.5.2 Modernisation-cum-Expansion Proposal

Under the modernisation-cum-expansion Plan from 4.0 MTPA to 7.0 MTPA (for which Environmental Clearance was accorded by MoEFCC) of Bhilai Steel Plant, following up-gradations/new units were envisaged.

**Table 3.1: Units after completion of Modernization-cum-Expansion**

| Sl No | Description | Units in 4.0 MTPA stage | 7.0 MTPA Expansion (as per accorded EC) |
|---|---|---|---|
| | **SINTER PLANT COMPLEX** | | |
| 1. | Sinter Plant-1 | 4 x 50 $m^2$ | **Shall be Phased out** |
| 2. | Sinter Plant-2 | 3x75 $m^2$+ 1x 80 $m^2$ | 3x75 $m^2$+ 1x 80 $m^2$ |
| 3. | Sinter Plant-3 | 1x 320 $m^2$ | 1x 320 $m^2$(existing) +1x 320 $m^2$ **( new)** |
| | **COKE OVEN COMPLEX** | | |
| 4. | Battery 1 | 65 Oven 4.3 m tall | **Shall be phased out** |
| 5. | Battery 2 | 65 Oven 4.3 m tall | 65 Oven 4.3 m tall **(Rebuilding)** |
| 6. | Battery 3 | 65 Oven 4.3 m tall | 65 Oven 4.3 m tall |
| 7. | Battery 4 | 65 Oven 4.3 m tall | 65 Oven 4.3 m tall |
| 8. | Battery 5 | 65 Oven 4.3 m tall | 65 Oven 4.3 m tall **(Rebuilding)** |
| 9. | Battery 6 | 65 Oven 4.3 m tall | 65 Oven 4.3 m tall**(Rebuilding)** |
| 10. | Battery 7 | 65 Oven 4.3 m tall | **Shall be phased out** |
| 11. | Battery 8 | 65 Oven 4.3 m tall | |
| 12. | Battery 9 | 67 Oven 7 m tall | 67 Oven 7 m tall |
| 13. | Battery 10 | 67 Oven 7 m tall | 67 Oven 7 m tall |
| 14. | Battery 11 | 67 Oven 7 m tall | 67 Oven 7 m tall(**new battery**) with coke dry cooling and Associated facilities |
| | **BLAST FURNACE COMPLEX** | | |
| 15. | BF 1 with CDI | 1033 $m^3$ | Shall not be in operation |
| 16. | BF 2 with TIS | 1033 $m^3$ | |
| 17. | BF 3 with TIS | 1033 $m^3$ | |
| 18. | BF 4 | 1719 $m^3$ | 1719 $m^3$**(Relining )** |
| 19. | BF 5 with CDI | 1719 $m^3$ | 1719 $m^3$**(Relining )** |
| 20. | BF 6 with CDI | 1719 $m^3$ | 2000 $m^3$ **(Modernisation )** |
| 21. | BF 7 with CDI | 2000 $m^3$ | 2363 $m^3$**(Modernisation )** |
| 22. | BF 8 with CDI | - | 4060 $m^3$**(New)** with TRT |

| Sl No | Description | Units in 4.0 MTPA stage | 7.0 MTPA Expansion (as per accorded EC) |
|---|---|---|---|
| | **STEEL MAKING & CASTING UNITS** | | |
| 23. | SMS I | • 4x 500t Twin Hearth Furnace, Blooming and Billet mill | **Shall be Phased out.** |
| 24. | SMS II | • 3x 120 t BOF<br>• 1X120t LF<br>• 1x120t RH<br>• 1x120t VD<br>• 1x4 strand Bloom Caster(MC#5)<br>• 3x1 strand Slab Casters(MC#1,2,3)<br>• 1x4 strands combi caster (mc#4) | • 3x 120 t BOF<br>• 2 x120t LF ( **1 new**)<br>• 2x120t RH ( **1 new**)<br>• 1x120t VD<br>• Hot metal Desulphirisation **(New)**<br>• (1existing + 1 replacement + I replacement at new location 1x1 slab caster #mc 6 (**new).**)<br>• 1x4 strand Bloom Caster (**mc#5) modernise**<br>• #mc 4 will be replaced by 1x4 strands Bloom-cum-Beam Blank Caster **(new)** |
| 25. | SMS III **(New Unit)** | - | • 3x160 t BOF<br>• 3x160 t LFs<br>• 1x 160 t RH-OB<br>• 1x vacuum tank degassing unit (Space provision)<br>• 2x6 strand Billet Casters<br>• 1x6 strand Bloom cum Billet Casters<br>• 1x1 strand Thin Slab Caster &Continuous Hot strip finishing train of 6 stands |
| 26. | Raw Materials Preparation Plant (RMP) | Matching the production facilities | Matching the production facilities |
| 27. | Rail & Structural Mill | • 0.75 MTPA Rail & Structural | • 1.7 MTPA Rail & Structural with new universal beam rolling line |
| 28. | Plate Mill | • 0.95 MTPA Finished Plate | • 1.42 MTPA Plate Mill |
| 29. | Hot Strip Mill **(New Unit)** | - | • 1.2 MTPA HR Coils |
| 30. | New Bar & Rod Mill **(New Unit)** | - | • 0.9 MTPA bars & rods |
| 31. | Medium Merchant Mill | • 0.5 MTPA Merchant Product | • 0.6 MTPA Merchant Product |
| 32. | Wire Rod Mill | • 0.5 MTPA Wire Rods | • 0.54 MTPA Wire Rods |
| 33. | Lime & Dolo plant | RMP I<br>RMPII<br>• 2x 330 tpd Lime kiln<br>• 1x 144 tpd dolo rotary kiln | RMP I **shall be phased out**<br>**RMP-II**<br>• 2x 330 tpd + 1 x 144 tpd Lime kiln<br>• 1x 330 tpd kiln (**new**)<br>**RMP III**<br>• 5x450 tpd lime and dolo kiln for |

| Sl No | Description | Units in 4.0 MTPA stage | 7.0 MTPA Expansion (as per accorded EC) |
|---|---|---|---|
| | | | SMS-III **(new)** |
| 34. | Power and Blowing Station | 6 x 150 tph boiler<br>3 x 12 MW | 6 x 150 tph boiler<br>1 x 150 tph boiler (**new**)<br>1 x 12 MW + 3 x 15 MW<br>2 x 170 tph BF gas fired boiler (**new**) 1 x 15 MW |
| 35. | Oxygen Plant | 3 x 550 tpd | 3 x 550 tpd + 1 x 650 tpd (**new**)<br>2 x 1250 tpd (**new**) |
| 36. | Other Auxiliary facilities | Matching facilities | Matching facilities for achieving production |

### 3.5.3 Present Proposal

The proposed modernization-cum-expansion project of BSP is nearing completion. The envisaged revised project configuration and resource requirement for plant under the ongoing modernization-cum-expansion plan is given in **Table 3.2** below.

**Table 3.2: Revised project configuration and resource requirement for plant under the modernization-cum-expansion plan**

| SN. | Description | 7.0 MTPA Expansion EC Accorded Valid until 31.03. 2018 | Plant As Per Revised Configuration |
|---|---|---|---|
| **1.** | **Hot Metal Production** | 7.5 MTPA | No Change |
| **2.** | **Crude Steel Production** | 7.0 MTPA | No Change |
| **3.** | **Sinter Plant Complex** | | |
| a. | Sinter Plant-3 | 1x 320 $m^2$ (existing) +1x 320 $m^2$ (new) | 1x 320 $m^2$ (existing) +1x 360 $m^2$ (new) |
| b. | Total Sinter Production | 9.235MTPA | 9.772 MTPA (enhanced installed capacity - 0.537MTPA) |
| **4.** | **Coke Oven Complex** | | |
| a. | Old small Coke Oven Batteries, 4.3m & 1x65 ovens total eight in number (Battery No. 1 to 8). | Battery No. 1, 7 & 8 to be phased out and only 5 small batteries in operation | Battery No. 1, 7 & 8 to continue operation with 2 or 3 batteries to always be kept under repair / rebuilding cycle. |
| b. | Tall Coke Oven Batteries 7m tall with 67 ovens each. | Battery Bo. 9 & 10 (old) and Battery No. 11 (New) in operation | No Change |
| c. | Coke Production | 3.94MTPA | No Change |
| | Battery Operation Regime | 5 small and 3 tall batteries. | Envisaged operating regime :<br>• 5 small and 3 tall batteries<br>Or<br>• 7 small & 2 tall batteries |
| **5.** | **Blast Furnace Complex** | | |
| a. | BF 8 with CDI | 4060 m3 (New) with TRT | No Change |
| **6.** | **Steel Making & Casting Units** | | |
| a. | SMS III (New Unit) | 3x160 t BOF | No Change |
| | | - | 3x160t argon rinsing unit (ARU) New envisaged |
| | | 2x160 hot metal de-sulfurisation unit (HMDU) New | No Change |
| | | 3x160 t LFs | No Change |

| SN. | Description | 7.0 MTPA Expansion EC Accorded Valid until 31.03. 2018 | Plant As Per Revised Configuration |
|---|---|---|---|
| | | 1x 160 t RH-OB | No Change |
| | | 1x vacuum tank degassing unit (Space provision) | No Change |
| | | 2x6 strand Billet Casters | No Change |
| | | 1x6 strand Bloom cum Billet Casters | No Change |
| | | 1x1 strand Thin Slab Caster &Continuous Hot strip finishing train of 6 stands | 1x3 strand beam blank caster subject to modification into 3 strand bloom-cum-beam blank caster envisaged - **Will be confirmed by Uma mam** |
| **7.** | **Rolling Mills Complex** | | |
| a. | Rail & Structural Mill | • 1.7 MTPA Rail & Structural Mill (RSM) with new Universal Rail Mill (URM) | Capacity up-gradation of Rail & Structural Mill (RSM) with URM to 2.2MTPA envisaged |
| b. | Plate Mill | 1.42 MTPA Plate Mill | Capacity up-gradation of Plate Mill to 1.65 MTPA envisaged. |
| c. | Quenching and Tampering facility in Plate Mills | Not Envisaged | New facility envisaged |
| d. | Merchant Mill | 0.6 MTPA Merchant Products | Capacity up-gradation of Merchant Products to 0.85 MTPA envisaged |
| e. | Wire Rod Mill | 0.68 MTPA Wire Rods | Capacity up-gradation of Wire Rod Mill to 0.7 MTPA envisaged |
| f. | Universal Beam Mill | 1.0 MTPA | Now not coming |
| g. | Bar & Rod Mill | 0.9 MTPA | No Change |
| h. | Total finished steel production | 6.3 MTPA | No Change |
| **8.** | **Refractory Material Plant (RMP)** | | |
| a. | RMP-II | 2x 330 tpd + 1 x 144 tpd Lime kiln Production Capacity 0.29MTPA. | No Change |
| **9.** | **Power Blowing Station** | | |
| a. | PBS I | 6 x 150 tph boiler (existing) | No Change |
| | | 1 x 150 tph boiler (new) | No Change |
| | | 1 x 12 MW + 3 x 15 MW Turbo-generators. | 1 x 15 MW + 3 x 12 MW turbo-generators; |
| b. | PBS II | 2 x 170 TPH BF gas fired boiler and new 1 x 15 MW turbo-generator. | 2 x 150 TPH BF gas fired boiler with 1 x 25 MW turbo-generator with 40 TPH boiler. |
| | TRT | Power Generation Capacity not specified | 14MW |
| | CDCP | Power Generation Capacity not specified | 4MW |
| c. | Total Power Generation (MW) installed capacity & Steam Generation Boilers (TPH) | 72 MW with Steam Generation 1390 TPH boilers + Green power from TRT & CDCP | 76 MW with Steam Generation 1350 TPH boilers + Green power from TRT (14 MW) & CDCP (4 MW) |
| **10.** | **Lime &Dolo Plant (RMP-III)** | 1.58 MTPA | No Change |
| **11.** | **Oxygen Plant (OP)** | Existing 3x550 TPD;<br>New 1x650 TPD<br><br>New 2x1250 TPD | 3x550 TPD -No Change<br>1x700 –Amendment accorded by MoEFCC<br>2 x1250 TPD – On BOO basis to |

| SN. | Description | 7.0 MTPA Expansion EC Accorded Valid until 31.03. 2018 | Plant As Per Revised Configuration |
|---|---|---|---|
| | | | M/s. Praxair delinking permitted by MoEFCC. |
| **12.** | **Units to be Phased out** | | |
| a. | Coke Oven Complex | Battery No. 1, 7 & 8 to be phased out. | Battery No. 1, 7 & 8 to continue operation with 2 or 3 batteries to always be kept under repair / rebuilding cycle. |
| b. | Steel Melting Shop – I (SMS-I) | To be phased out by 30.03.2018 | SMS – 1 will continue to operate post 30.03.2018 for additional 3 years till SMS-III is stabilized. |
| c. | Blooming & Billet Mill (BBM) associated with SMS-I | To be phased out by 30.03.2018 | Will continue to operate post 30.03.2018 for additional 3 years till SMS-III is stabilized (i.e. till SMS-I is not phased out) |
| d. | Refractory Material Plant –I (RMP-I) associated with SMS-I | To be phased out by 30.03.2018 | Will continue to operate post 30.03.2018 for additional 3 years till SMS-III is stabilized (i.e. till SMS-I is not phased out) |
| e. | Blast Furnace 1, 2, & 3 | To be phased out by 30.03.2018 | Will continue to operate post 30.03.2018 for additional 3 years till Blast Furnace 8 & SMS-III is stabilized |
| **13.** | **Water Requirement ($m^3/h$)** | 15981 $m^3/h$ | No Change |
| **14.** | **Power Requirement** | 468 MW | No Change |
| **15.** | **Total area under Bhilai Steel Plant (BSP) and Plant Area** | Total area under BSP :*6286.75 ha. Plant area :**3284.75 ha**.* | No Change |
| **16.** | **Raw Material Requirement** | • *Iron ore fines: 7287000*<br>• *Iron Ore lumps : 4378000*<br>• *Limestone : 1847000*<br>• *Dolomite: 1114700*<br>• *Quartzite: 104600*<br>• *Coking Coal: 5697000* | • *Iron ore fines: 7699250 (envisaged)*<br>• *No Change*<br>• *No Change*<br>• *No Change*<br>• *No Change*<br>• *No Change* |
| **17.** | **Secured Land Fill (SLF)** | • *Not envisaged* | • *SLF 34250$m^3$* |

### 3.5.4 Brief Detail / Technical Justification : Change in proposed units

#### 1. Coke Oven Battery

As per the CPFR/EIA, it was envisaged that the total gross coke requirement for 7.0 MT production of crude steel under modernization-cum-expansion plan will be 3.94 MTPY. The same was envisaged to achieve by carrying out following activities under the modernization plan:

- Rebuilding of Battery No. 5, 6 and 9
- Installation of Battery No. 11 (New) with 67 nos. 7m tall ovens and coke dry cooling plant (CDCP) and new by-product plant

- Hot repair of Battery No. 10
- Modification of the existing by-product plant for sustenance of health
- Phasing out of Battery No. 1,7 and 8

Accordingly EC was accorded by MoEFCC under the modernisation-cum-expansion plan of 7.0MTPA of Bhilai Steel Plant (BSP).

The overall configuration of Coke oven batteries at BSP is mentioned under **Table 3.3** below.

**Table 3.3: Description of Coke oven batteries at BSP**

| Battery No. | Description | Rated Coke Production (MTPA) | | | Age (as on 31.03.2017) |
|---|---|---|---|---|---|
| | | Gross Coke | BF Coke | Skip Coke | |
| Battery 1 | 4.5 m | 0.4 | 0.352 | 0.317 | 31Y 7M |
| Battery 2 | 4.5 m | 0.4 | 0.352 | 0.317 | 34Y 8M |
| Battery 3 | 4.5 m | 0.4 | 0.352 | 0.317 | 27Y 2M |
| Battery 4 | 4.5 m | 0.4 | 0.352 | 0.317 | 24Y 8M |
| Battery 5 | 4.5 m | 0.4 | 0.352 | 0.317 | 7Y 7M |
| Battery 6 | 4.5 m | 0.4 | 0.352 | 0.317 | 5Y 9M |
| Battery 7 | 4.5 m | 0.4 | 0.352 | 0.317 | 43Y 2M (age as on closure date) |
| Battery 8 | 4.5 m | 0.4 | 0.352 | 0.317 | 38Y 1M |
| Battery 9 | 7m | 0.88 | 0.59 | 0.53 | 5days |
| Battery 10 | 7m | 0.88 | 0.59 | 0.53 | 20Y 4M |
| Battery 11 | 7m | 0.88 | 0.59 | 0.53 | 2Y 6M |

Coke oven batteries have an average operating life of thirty to forty years, depending upon operating conditions and battery maintenance. At BSP the coke oven batteries are taken in operation for 35 – 45 years due to correct operation and timely repairs. Usually a battery requires specific repairs to the refractories, steelwork or machinery. These repairs, if properly performed, extend the life of the battery.

In the average life span of 30yrs, the battery undergoes Hot repair/ Cold repairs/ Guniting repairs/ Ceramic welding/ Re-bricking of the hot coke oven walls/ other maintenance shut-downs.

Under the Hot repair operations, hot heating walls re-bricking to the various depth down to complete re-bricking is also a recognized effective method of repair. Brickwork repairs usually undertaken for:

- Replacement of end flues,
- Replacement of oven walls between oven floor and oven roof, and
- Emergency repairs inside the oven chamber.

These repairs are performed while the battery is in the hot condition making coke.

Under the Cold repair operations, the entire battery along with walls is replaced from the oven floor to the underside of the oven roof, the repair is performed with the

battery refractory cooled to atmospheric temperature. Average time required for cold repair is 2 years.

At BSP after rebuilding of a new battery it undergoes either one cold repair at an average age of 15yrs along with hot repairs or two cold repairs without any hot repairs during its entire lifespan. Presently BSP management has decided not to undertake hot repairs and take two cold repairs within the life cycle of the battery for maintaining the health of the battery.

In view of the above while undertaking the repair and maintenance of any battery, the battery is shut-down (not under production) for an average of, 2 years for cold repair and 3 years for rebuilding. At any time an average of 2-3 batteries is under various repairs/shut-down/ maintenance activity which hinders production of coke to the desired requirement in the plant. Thus, there is a substantial gap between the actual demand and production quantities of coke. Additionally, within the 4 years of a new rebuild battery the efficiency decreases by 4% and subsequently taking all the batteries with different age, the average efficiency of the complex comes down to 90%.

Presently, as per the above scenario, BSP is forecasting a shortage of coke to match the Blast furnace requirement of 3.94 MTPA, as envisaged for 7.0 MTPA Crude steel production under modernisation-cum-expansion plan of BSP.

As per the EC accorded by MoEFCC, Battery No. 1, 7 and 8 was to be phased out. However, at present BSP requests permission from MoEFCC for not phasing out the above said batteries and to undertake rebuilding of the same as to match / achieve its coke requirement (same as EC) keeping the overall production of coke within the capacity of earlier accorded EC.

In view of the above mentioned requirement of Coke now it has been envisaged that the total number of coke ovens batteries in operation at any period will be either 8 batteries (3 Tall and 5 small) or 9 batteries (2 Tall and 7 small) only. At the time of EC it was envisaged to operate 8 batteries (3 tall and 5 small). However during the shutdown/repair of 7m tall battery, two 4m battery will be required to meet the coke requirement. However the total production will be within the accorded EC production only.

It is to be noted that for first two years, one tall battery (Battery No. 10) will be down for Cold Repair then only 5 small batteries will be operating. The same is being permitted as during the said period the plant will be under stabilization stage (and not under full envisaged production) and thus the coke requirement will be less, which can be met from 5 small and 2 tall batteries. However, once the plant is running at its full capacity after stabilisation, the repair work of Battery No. 10 (Tall) and Batteries 1, 2 & 7 (small) will be completed and then the coke production can be met as per requirement of modernization-cum expansion stage. Rebuilding / Repair and operation schedule of coke oven complex is given in **Table 3.4** below.

**Table 3.4: Rebuilding / Repair and Operation Schedule of Coke Oven Complex**

| Coke Oven Battery | Commissioned | Age April 2018 | Last Rebuilt (RB) & Cold Repair (CR) | Year Wise Operation & repair Maintenance Schedule of Coke Oven Batteries Post March 2018 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 1st Yr | 2nd Yr | 3rd Yr | 4th Yr | 5th Yr | 6th Yr |
| Bat. 1 | 02/01/59 | 32 Yrs & 8 M | RB : 10.08.85<br>CR : 31.01.17 | CR | CR | OP | OP | OP | OP |
| Bat. 2 | 22/12/59 | 35 Yrs & 10 M | RB: 28.07.82<br>CR : 09.06.05<br>Stopped : 31.03.17 | SD | SD | CR | CR | OP | OP |
| Bat. 3 | 27/12/60 | 28 Yrs & 2 M | RB : 17.01.90<br>CR : 26.03.17 | OP | OP | OP | OP | OP | OP |
| Bat. 4 | 30/09/64 | 25 Yrs & 10 M | RB: 10.07.92<br>CR: 23.02.11 | OP | OP | CR | CR | OP | OP |
| Bat. 5 | 06/12/65 | 8 Yrs 1 M | RB : 04.08.09 | OP | OP | OP | OP | CR | CR |
| Bat. 6 | 25/11/66 | 6 Yrs & 5 M | RB : 19.06.11 | OP | OP | OP | OP | CR | CR |
| Bat. 7 | 25/01/72 | 44 Yrs & 2 M | RB : 19.04.15 | RB | RB | RB | OP | OP | OP |
| Bat. 8 | 11/02/79 | 39 Yrs & 3 M | CR: 27.02.13 | OP | OP | OP | RB | RB | RB |
| Bat. 9 | 31/03/88 | 30 Yrs | RB: 26.03.17 | OP | OP | OP | OP | OP | OP |
| Bat. 10 | 05/11/96 | 21 Yrs & 4 M | HR : Aug. 13 | CR | CR | OP | OP | OP | OP |
| Bat. 11 | 30/10/14 | 3 Yrs & 6 M | | OP | OP | OP | OP | OP | OP |
| Operating Schedule of Coke Oven Batteries Post 2018 : Number of operating Small (S) and Tall (T) Batteries | | | | 5 (S) & 2 (T) | 5 (S) & 2 (T) | 5 (S) & 3 (T) | 5 (S) & 3 (T) | 5 (S) & 3 (T) | 5 (S) & 3 (T) |
| RB : Rebuilding; CR : Cold Repair; HR : Hot Repair; SD : Shut Down; OP : Operating | | | | | | | | | |

## 2. Universal Beam Mill

At the time of EC it was envisaged to install a modern and state of the art Universal Beam Mill (UBM) of capacity 1.0 MTPA. The mill can roll continuous cast beam blanks into beams and channels. Presently, under the low market scenario SAIL management has dropped the proposal of installation of UBM under the ongoing modernization-cum-expansion plan. However, the crude steel production (7.0 MTPA) will be same as per the accorded EC. Various modifications/ up-gradations have been proposed in the existing other rolling mills units to utilize the crude steel (input material) of UBM and convert into finished steel.

## 3. Plate Mill

At the time of EC it was envisaged to enhance the production of the Plate mill complex to 1.42 MTPA by installation of walking beam furnace, modification of cooling beds. installation of new shear, roll grinding machine, automatic length measuring system, automatic plate edge marking machine, flame cutting machine, air plasma cutting machine, augmentation of laboratory facilities, etc. However, considering the dropping out of UBM in rolling mill complex, it has been envisaged to enhance the production capacity of plate mill from 1.42 MTPA to 1.65 MTPA. To achieve the proposed production it has been envisaged to up-grade the existing old pusher type reheating furnaces to walking beam furnace, addition of one cooling bed along with Level 2 operation (automatic operation).

## 4. Rail and Structural Mill

Under the modernization-cum-expansion plan, it was envisaged to enhance the production of Rail and Structural Mill Complex (RSM) which includes Universal Rail Mill (URM) to 1.70 MTPA. However in the view of the market demand and utilization of crude steel for maximizing the finished steel product, it has been envisaged to undergo various modification required in the existing complex for achieving the overall production of 2.20 MTPA. Various modification / up-gradations proposed are:

a. Installation of a new walking beam furnace.
b. Extension of Rolling Field Roll Tables (RFRT) with chain transfer and providing drives to idle rollers.
c. Replacement of old water hydraulic system by new system at RSM-Mill area.
d. 950 stand housing over-hauling, machining and replacement of 800 & 850 stand housing for better rigidity and section control.
e. Replacement of 3D pinion housing.
f. Replacement of existing hot saws with pendulum saws.
g. Installation of carbide saws in all the six groups in short rail area.
h. Installation of carbide saws in TB2 and TB3 for both ends cutting-2 nos. in TB2 and one no. in TB3.
i. Installation of 2nos. of NDT lines in short rail area.
j. Revival of roll tables in short rail area.
k. Revival and developing the open bay (GH bay) as are finishing complex.
l. Exploring the possibilities of installation of one more welding machine in the long rail area.
m. Up-gradation of EOT cranes for handling of 26m/more sectional weight rails like R68 kg & R110 kg.
n. Introduction of drives in the idle rollers in roll tables of LRP area for smooth transfer of long rails.
o. Up-gradation of HMI system of Long rail complex.
p. Replacement of PLCs and HMIs of Rail Handling (260m rails) telphers because of obsolescence.

## 5. Merchant Mill

The Merchant mill capacity envisaged at EC stage was 0.60 MTPA. However, presently considering the market demand and to utilise the crude steel the capacity of the Merchant mill is proposed to be 0.85 MTPA. Following modifications / up-gradations along with enhancement in rolling rate and hot hours are proposed to be under taken:

a. Replacement of the Stds 4, 6, 7, 8 and 11 by housing less Stands.
b. Digital drives in Stds 1 to 12 motors.
c. New Cold Shears/ Saw.
d. Automatic Nesting and packeting.
e. Supply of input billets from SMS-3
f. Enhance Rolling rate of TMT profile
g. Increasing Mill utilisation
h. Enhance Rolling Rate of Structurals

i. Rolling of productive profiles like TMT 28, 32, 36 , 40 in TMT bars and Angle 65, 75 and Channel 100*50 in Structurals (Avoid low productive profiles Like Angle 50 and Channel 75*40 ). This shall enhance per day production by 500 T.
j. Rolling of TMT 36, Angle 75 and Channel 100*50 shall be done by 110*110*6 cross section billets in place of 105*105*6 billets. This shall enhance per day production by 200 T.
k. Take repair of one furnace in every Structural campaign so that three furnaces are available for TMT rolling.
l. As concast billets shall be available cobbles due to bad metal shall be eliminated, yield shall improve due to billet length and cross section consistency, rejection due to pipe in TMT profile.

## 6. Wire Rod Mill

It was proposed to modernize the then existing Wire Rod Mill (WRM) for processing of continuously cast billets from SMS-III.

Under modernization-cum-expansion plan, the WRM will have a walking beam type re-heating furnace of 140 tph nominal capacity and shall be provided for heating of billets. The furnace will be fired with mixed gas. Strand C and D has been modified.

At the time of EC the capacity envisaged for the WRM complex was 0.68 MTPA. However, as per present configuration it has been envisaged that by implementing small modifications/up-gradations the capacity of the WRM can be enhanced to 0.70 MTPA. Following modification/ up-gradations are proposed along with enhancement in rolling rate and hot:

a. Provision of Billet weighing / metal tracking facility,
b. Upgradation of re-heating furnace,
c. High-pressure de-scalar,
d. Housing-less stands in roughing / intermediate Mill,
e. Modernisation of A-strand,
f. Online Profile gauge, bar coding, automatic bundling & strapping of coils.

The time required for implementation of the project is 30 months.

## 7. Sinter Plant Complex

A new second Sinter machine with grate area of 320$m^2$ was envisaged to be installed in Sinter Plant 3 Complex along with associated services facilities at a rated production of 3.168 MTPA of gross sinter.

However, during the detail engineering and tendering process, considering the burden optimization for efficient hot metal production, the Sinter plant grate area has been revised from 320 $m^2$ to 360 $m^2$. Additionally, due to economics of scale of operation specific resource consumption such as coke, energy, water for the sinter plant with grate area 360 $m^2$will be reduced. Moreover, foot print of installation space shall remain unchanged. Now the Sinter Plant 3 Complex rated production capacity will be 3.706

Mt/yr of gross sinter. Thus the overall sinter production capacity will increase from 9.235 MTPA to 9.772 MTPA. Additionally the enhanced capacity of machine has resulted in better recycling of steel plant wastes/rejects like Iron ore fines, coke breeze, mill scales, etc.

## 8. Captive Power Plant

Under the modernization-cum-expansion plan, it was envisaged to enhance the captive power generation by installing Power Blowing Station (PBS-II) and installing green power technologies like TRT and CDCP.

The captive power generation of 72MW plus the additional green power generation from TRT and CDCP was envisaged during the EC stage.

However, during detailed engineering, the process steam requirement of 7.0MTPA stage was reviewed and modifications were proposed under the modernization plan and as per present configuration the changes in captive power plant configuration is as follows:

EC taken for 1x12MW+3X15 MW in a view to upgrade / replace the earlier existing turbo-generators of capacity 3x12 MW in to 1x12MW+2x15MW turbo-generators and installation of new 1x15MW turbo-generator. But only 1x15MW new turbo-generator was installed as a standby unit and the remaining turbo-generators have not been upgraded as per EC and as per present configuration the configuration is 1x15MW+3x12MW, i.e total 51MW. The steam generation in PBS-I is same i.e. 1050tph as per EC.

In PBS-II in the EC 2x170 tph gas fired boilers with 1x15MW turbo-generator was envisaged but instead as per present configuration 2x150tph gas fired boilers with 1x25MW turbo-generators, i.e total electricity generation 25MW. The additional steam for increased power generation will be taken from 1x150tph gas fired boiler from PBS-I.

The 1x25MW turbo-generator is of extraction type turbo-generator (extraction-cum-condensing turbine) with increased thermal efficiency. The extraction condensing turbines are used when a constant pressure steam flow has to be extracted for process purposes. These turbines are typically used for co-generation where the turbine meets both the power and steam demand of the process plant. In these type of turbines the power generated can be maintained more or less at a steady level despite variation in process steam demands.

It can be seen that due to the efficient turbo-generator, even though the 2x170 TPH boilers envisaged in EC were replaced with lower capacity boilers (2x150 TPH), the power generation capacity is increased from 1x15MW to 1x25MW.

The turbo-generator has given two advantages, one increased efficiency in electricity generation and second with low carbon foot print.

## 9. Green Power Generation : Top Pressure Recovery Turbines (TRT)

At the time of EC accorded for modernization-cum-expansion plan for 7.0 MTPA Bhilai Steel Plant, TRT was envisaged in BF#8 but the power generation capacity of TRT was not mentioned. The same has now being envisaged as 14 MW, through the process as described hereunder.

During iron making process, BF gas with high pressure and temperature is produced in blast furnace. In conventional practice, the energy of BF gas is wastage by pressure reduction at septum valve. Equipping Top Pressure Recovery Turbine (TRT) unit is the best way to recover the pressure and thermal energy of BF gas.

At BSP, effective utilization of these by-product gases is achieved by taking advantage of Green Technology using a Top Recovery Turbine (TRT). TRT unit is installed in the downstream of gas cleaning equipment of new blast furnace (BF#8). TRT is a clean and efficient technology, mainly consisting of a gas expansion turbine with pressure control mechanism coupled to an alternator. The BF gas which is coming out at the top of a BF is cleaned to remove dust and the cleaned gas is used as a fuel for heating purpose at a relatively low pressure. In the process, a large amount of pressure energy is lost across the valve.

The Blast Furnace # 8 is being designed with a top pressure of 2.5 kg/cm$^2$(g). Clean off - gas from the BF shall pass through the Gas Cleaning Plant and shall be available at the outlet of Gas Cleaning Plant. Through TRT it has been envisaged that the Blast Furnace gas have an estimated potential to generate around 14 MW electric power through a TRT.

BSP generates green power to meet plant's energy needs through effective utilization of waste heat. It is also one of the most effective ways to reduce the Green-house Gas (GHG) Emissions.

## 10. Green Power Generation : Coke Dry Cooling Plant (CDCP)

At the time of EC accorded for modernization-cum-expansion plan for 7.0 MTPA Bhilai Steel Plant, CDCP was envisaged in Coke Oven Battery No. 11 but the power generation capacity of CDCP was not mentioned. The same has now being envisaged as 4 MW, through the process as described hereunder.

In a Coke Dry Cooling Plant (CDCP) red hot coke is cooled by inert gases. The heat energy from the red hot coke is recovered in a waste heat boiler for use as steam, resulting in energy conservation as well as a reduction in coke particle emissions. Around 80 % of sensible heat is recovered.

Hot coke is brought from the battery to the CDCP in bottom opening bucket kept on the quenching car. This bucket is lifted at the CDCP by a hoisting/charging device to the top of the CDCP chamber and red hot coke is discharged in the chamber for cooling. Hot coke (temperature around 1000 – 1100 deg C) is cooled in the chamber by the inert gas. The inert gas in a continuous running CDCP plant is a mix gas which consists

of mainly nitrogen (70 % -75 %) along with small amounts of $CO_2$ (0 % – 15 %), CO (8 % – 10 %), and $H_2$ (2 % – 3 %). In the chamber inert gas moves upwards while the coke moves downward by the gravity. The coke is discharged at the bottom. The passage time of the coke through the chamber is around 5-6 hours and the flow rate of inert gas is around 82,000 $Nm^3$/hr. The temperature of the coke at the time of discharge from the chamber is below 200 deg C. The hot inert gas, after picking heat from the hot coke, comes out from the top at around 800 deg C and is conveyed to the waste heat recovery boiler (WHRB) where the sensible heat of the inert gas is used to produce high pressure and temperature steam. This steam produces power in a back pressure turbine. The low temperature circulating inert gas at the WHRB exit is pressurized by a blower and its composition is corrected by addition of nitrogen gas and then the cooling gas is injected at the bottom of the CDCP chamber. The temperature of the cooling gas is around 170 deg C. Other important equipment in CDCP are cut off device for cutting out the coke from the chamber, dust removing system for removing the dust in the circulating inert gas and gas blower.

The CDCP proposed with the new coke oven battery will produce around 50 t/h high pressure steam at 66 ata, 500˚C.The CDCP have an estimated potential to generate around 4 MW electric power.

## 11. New Quenching and Tampering facilities in Plate Mill

Plate Mill of BSP is having normalizing facilities where the required plates are normalized as per the specifications. Proposed project of installation of quenching and tempering facility along with inline shot blasting facility in plate mill is identified as important project under Centre of excellence projects. This shall cater to market demand of special quality plate to the tune of 50,000 TPA. It has been decided to use existing normalizing furnace number 2 as tempering furnace so the facilities of shot blasting, austenising and quenching are to be aligned with this furnace.

Proposed installation of quenching and tempering facility along with inline shot blasting facility in plate mill, shall help in increasing production of value added products from plate mill. With installation of Q & T facilities in Plate Mill it shall be able to serve special demand of Indian defense sector's requirement of Ordnance factories Mine protected vehicles, navy & heavy vehicle factories and other sectors essentially requiring high strength plates like hydel and thermal power plants, dredging, mining equipment, crude oil storage tank, cement plants etc.

Industrial quality water shall be used for quenching purpose. Water system for quenching shall be re-circulating type. The recirculation system shall comprise of collection tank below quench station, water channel to take the water from the collection tank to a hot water reservoir (Hot well) outside the shop, Hot water reservoir, cold well, cooling tower, pumps, filter, scale separator & handling facilities, valves and interconnecting piping & fittings etc. Clean Mixed-gas will be used for firing in autenising furnace. The total requirement for the mixed gas is as follows: CV 2000 kcal/$Nm^3$, Pressure 750-900 mm WC, Flow Approx 1500 $Nm^3$/hr. Capacity of proposed quenching and tempering plant shall be 50,000 TPA.

All necessary pollution control measures will be provided for air, water, noise pollution in the respective equipment as per CPCB/MoEFCC norms.

### 12. Secured Landfill Facility

BSP has identified an area on the Steel Melting Shop muck dump for the construction of proposed Secured Landfill Facility (SLF). BSP has identified 11 different types of hazardous waste generated within the premises of BSP, under the categories of wastes defined under the schedule of "Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. Out of which except Acid tar sludge and waste asbestos all other wastes are either recycled or sold to the authorized dealers as per the authorization granted to BSP. This envisaged landfill will cater to the disposal requirement of the above two type of waste only, i.e acid tar sludge & waste asbestos.

Design criteria for the SLF are as under:

a. Total Landfill area (LFU) : 75 m x 75 m (5625 $m^2$)
b. Sectional area : 550 $m^2$
c. Depth of Landfill : 10 m
d. Total Volume (Space offered) : 34,250$m^3$
e. Side slope : 2:1

## 3.6 RAW MATERIALS REQUIREMENTS

The revised raw material requirements for the integrated steel plant for production of 7.0 MTPA crude steel are given in **Table 3.5**:

**Table 3.5: Revised Raw Material Requirement**

| S.No. | Description | Quantity (t/yr) |
|---|---|---|
| 1. | Iron ore fines | 7,699,245 |
| 2. | Iron Ore lumps | 4,378,000 |
| 3. | Limestone | 1,847,000 |
| 4. | Dolomite | 1,114,700 |
| 5. | Quartzite | 104,600 |
| 6. | Coking Coal | 5,679,000 |

The material flow for the project is shown in **Fig. 3.1** below:

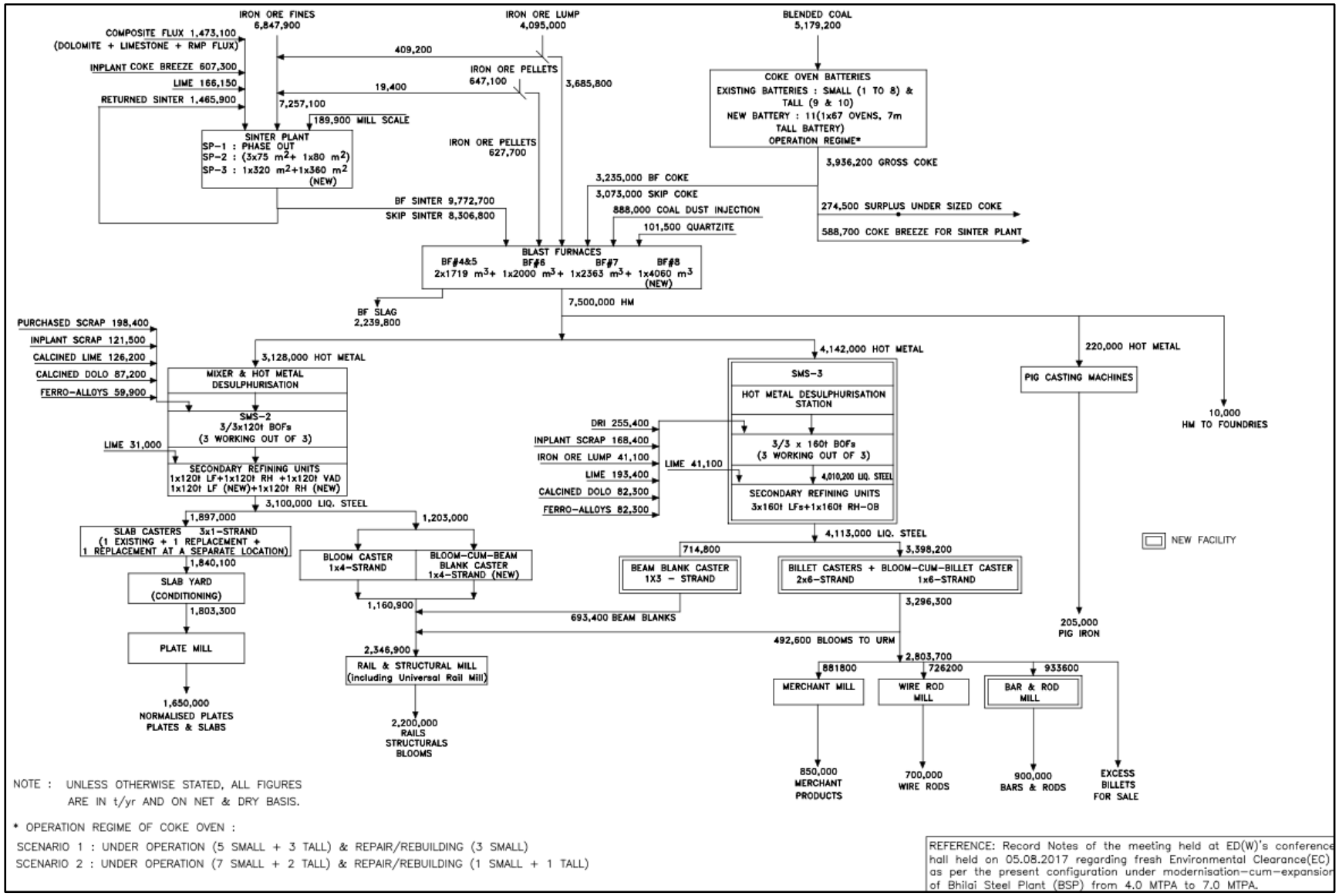


**Fig. 3.1: Material flow sheet for Modernization-cum-Expansion plan for 7.0 MTPA of BSP for Plant as per revised configuration**

## 3.7 RESOURCE OPTIMISATION / RECYCLING AND RESOURCE

To restore the receding underground water table, roof rain water harvesting has been implemented in schools in BSP Township. Moreover, this is also being extended to several other building in Township.

Inside the Plant rain water harvesting schemes are implemented on roof top of some of the shops/mill buildings. However, remaining roof rain water is diverted to Maroda-I recycling pond for reducing fresh water consumption.

**Table 3.6: Recharge potential of roof rainwater harvesting schemes implemented inside Plant**

| S.No. | Location | Total Ground Water Recharge per year |
|---|---|---|
| 1. | Plate Mill | 71,500 $m^3$ |
| 2. | MARS building | |


**Fig 3.1: Roof Rainwater Harvesting Schemes Implemented Inside Plant**

**Table 3.7: Recharge potential of both artificial recharge ponds built /dug in open areas and roof rainwater harvesting schemes implemented on buildings of Township**

| S.No. | Location | Total Ground Water Recharge per year |
|---|---|---|
| Recharge potential of artificial recharge ponds built /dug in open areas of township | | |
| 1. | Sector-3 near FSNL | 40,000 $m^3$ |
| 2. | Sector-3 near BTI Hostel | |
| 3. | Sector-5 behind Andhra Bhawan | |
| 4. | Hospital Sector near D-23 | |
| 5. | Jayanti Stadium | |
| Roof Rainwater Harvesting Schemes in Township Buildings | | |

| S.No. | Location | Total Ground Water Recharge per year |
|---|---|---|
| 1. | T A Building | 3,000 $m^3$ |
| 2. | BhilaiNiwas | |
| 3. | Bhilai Technical Institute | |
| 4. | S. S. School Khursipara | |
| 5. | S. S. School Sector-VII | |
| 6. | G. S. S. School-V | |
| Roof Rainwater Harvesting Schemes in Township | | |
| 1. | Rain water harvesting through charging of 73 nos of bore wells | 22,000 $m^3$ |
| 2. | Construction of Recharge pit /rain water diversion& holding pit near Bhilai Institute of Technology | 1,00,000 $m^3$ |


**Fig 3.2: Roof Rainwater Harvesting Schemes Implemented in Township**

## 3.8 SITE SERVICES

### 3.8.1 Water Requirement

The source of water for the Bhilai Steel Plant is the Tandula, the Gondli and the Kharkhara reservoirs. Water is fed to the storage reservoir of the plant (Maroda-II) through the Tandula Irrigation Canal.

Total water requirement after Modernisation-cum-expansion of 7.0 MTPA plant is 15981m3/hr(5.0 TMCft/y) and will be taken from Chhattisgarh Water Resource Department through Tandula Canal to Maroda-II reservoir of BSP. The water requirement of BSP is met from Maroda-I and Maroda-II reservoirs. The capacity of Maroda-I is 9.0 MM3 and Maroda-II reservoirs is 27.4 MM3.

Industrial water supply for most of the consumers of plant is met from the recirculation system comprising cooling pond (Maroda-I), pump houses, supply and return water channels and the distribution network. The losses in the system are made-up from the storage reservoir (Maroda–II), which supplies make-up water to the cooling pond periodically by gravity.

The overall water balance flow sheet for modernization-cum-expansion plan for 7.0 MTPA of BSP is given in **Fig. 3.3** below.

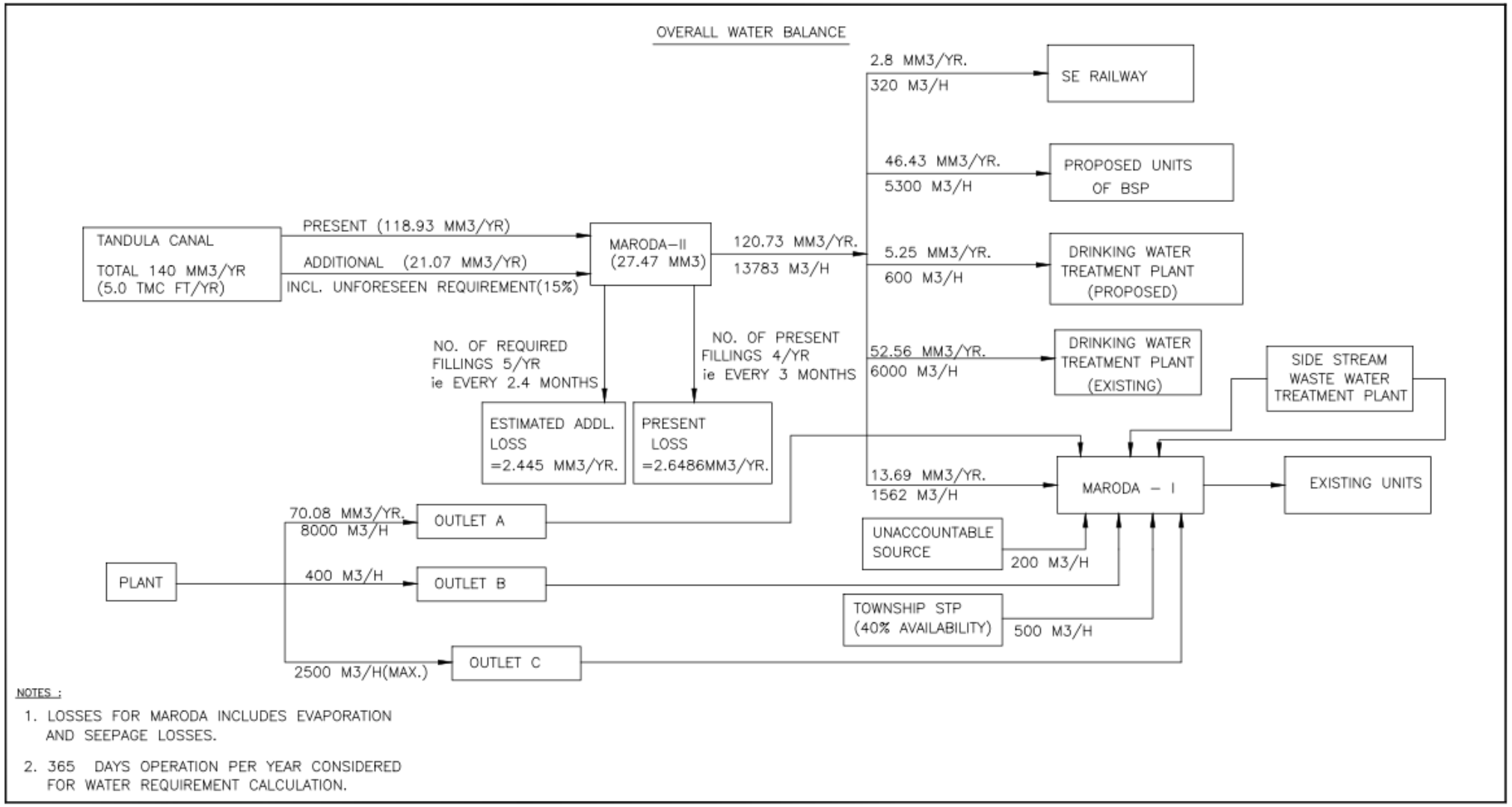


**Fig 3.3: Revised Overall Water balance flow sheet for Modernization-cum-Expansion plan for 7.0 MTPA of BSP**

### 3.8.2 Power & Fuel Requirement

The total estimated power demand for 7.0 MTPA modernization-cum-expansion plant has been estimated to be 468 MW. Only critical power and total process steam will be generated through the captive power plant. The balance power requirement will be met from outside sources.

The gas generated from Coke Ovens, BF and LD/BOF is being utilized inside the plant operation. The total generation of BF gas = 1380417 $Nm^3$/hr; BOF/LD gas = 71,529 $Nm^3$/hr; CO Gas = 189,195 $Nm^3$/hr is envisaged at 7.0 MTPA stage. The overall gas balance for Modernization-cum-Expansion plan for 7.0 MTPA of BSP is shown in **Fig 3.4** below.

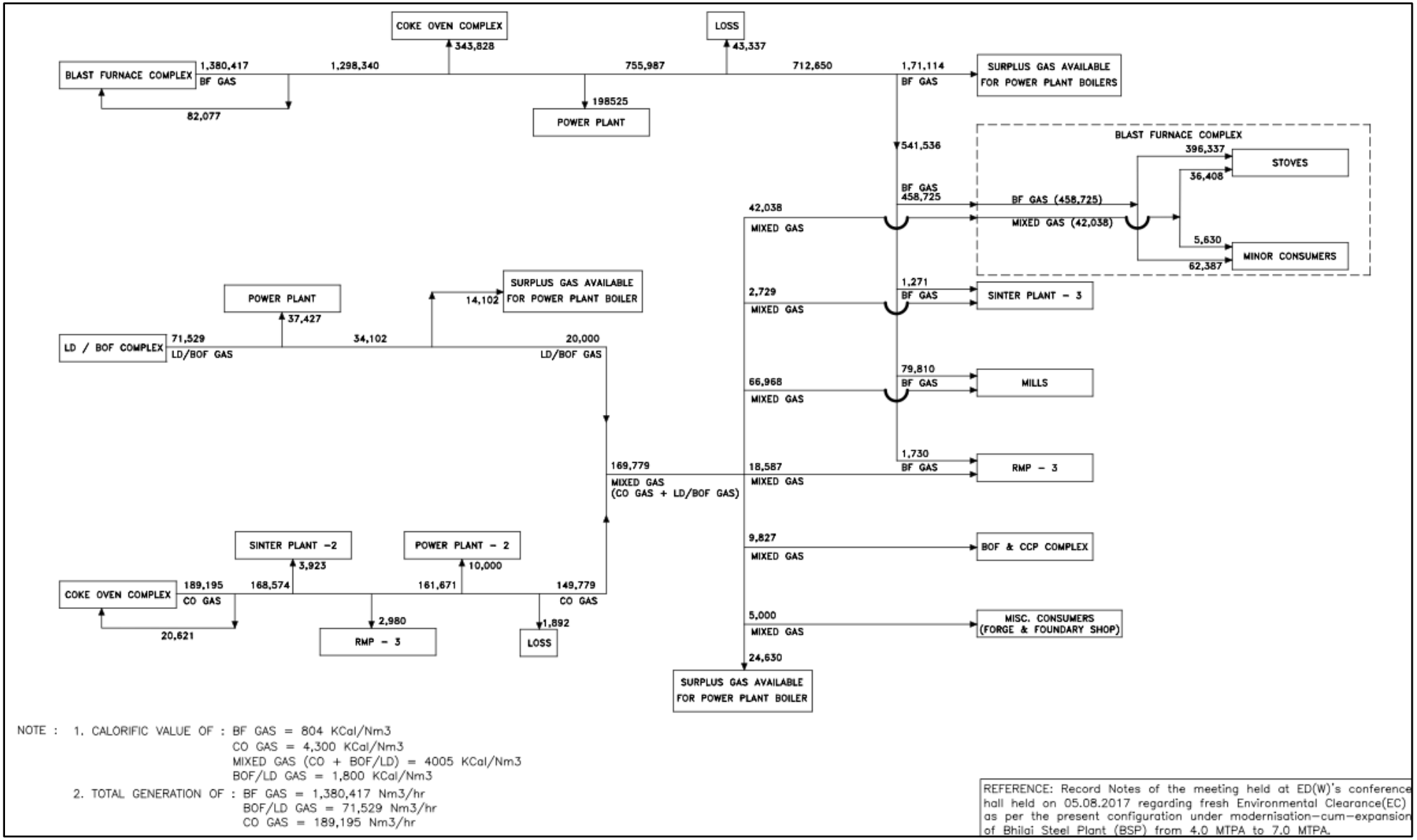


**Fig 3.3: Revised Overall Hourly Gas balance for Modernization-cum-Expansion plan for 7.0 MTPA of BSP**

### 3.8.3 Amenities

The road and rail infrastructure is already well developed in the area which is required for the transport of the raw material and finished goods to the various part of the country. The manpower is local and their social infrastructure is also developed. The inflow of money in terms of taxes to the government and salaries to the manpower will further improve the physical and social infrastructure.

Amenities and facilities for drinking water, medical facility, communication facilities, emergency preparedness during accident etc. already exist.

## 3.9 WASTES

BSP has taken various plans for utilisation of solid waste which is increasing over the time. BSP has capacity to granulate all the Blast Furnace slag. Presently 100% of total BF slag is granulated depending on the market demand in the plant and totally sold out to cement manufactures.

From the current re-utilisation practice of solid waste generated at BSP and the additional solid waste generated for the proposed expansion-cum-modernisation plan is expected that solid wastes like BF slag, BOF slag, lime and dolo fines, lime fines, mill scales and sinter plant ESP dust will be re-utilized / sold 100% and waste refractories will be partially re-utilised / sold.

The waste which cannot be reused / sold are being dumped within the plant boundary premises for which an approximate 50 ha area is earmarked for BOF slag dump and 75 ha area is earmarked for BF slag. The details of the estimated solid waste generation and its proposed utilization are given below in **Table 3.8** below:

**Table 3.8: Estimated Solid Waste Generation and its Utilization.**

| SN. | Solid wastes | Estimated generation (t/yr) | Utilisation/ Proposed disposal |
|---|---|---|---|
| 1. | BF slag | 2,239,800 | 100% Sold to cement plant |
| 2. | BF sludge | 52,500 | Partly used in the Sinter Plant and partly dumped. |
| 3. | BF flue Dust | 120,008 | Partly reused in the Sinter Plant and partly sold to cement plant. |
| 4. | SMS/BOF Slag | 747,000 | Partly recycled as flux in Sinter plant and partly used in construction and road making. |
| 5. | SMS sludge = Dust | 102,000 | Partly Reused in the Sinter plant after briquetting and partly dumped |
| 6. | Fly Ash | 15,000 | 100% Utilisation |

Other process wastes like Waste refractories, Dolo fines, Lime fines, Mill Scales and Cinder, will be 100% recycled/reused/sold.

As per Hazardous Waste (Management and handling) Rules, BSP has been authorized by Chhattisgarh Environment Conservation Board. The guidelines of MoEFCC are

followed in the handling, storage and transportation of Hazardous waste. BSP does not import or export any waste deemed Hazardous under the items of the BASEL convention.

Estimated Hazardous waste generation from various units considered under the present proposal is given in **Table 3.9** below. Hazardous wastes will be suitably disposed as per the applicable statutory regulations. A captive secured land fill facility for disposal of hazardous waste generated from the project is proposed to be implemented within BSP premises.

**Table 3.9: Hazardous waste generation**

| S.No. | Waste Description | Quantity (t/yr) |
|---|---|---|
| 1. | Benzol Acid Sludge - | 2,500 |
| 2. | Tar Storage tank residue | 1,500 |
| 3. | Decanter Tank Tar Sludge | 4,000 |
| 4. | Used / Spent oil | 500 |
| 5. | Spent solvent | 500 |
| 6. | Discarded containers/ barrels with Hazardous waste/ chemicals | 275 |
| 7. | Residues, dusts or filter cakes (from sulphuric acid plant) | 500 |
| 8. | Copper compounds | 400 |
| 9. | Lead and Lead compounds | 50 |
| 10. | Asbestos | 80 |
| BOD Plant Wastes | | |
| 11. | Oil & Grease Skimming Residues | 100 |
| 12. | Chemical Sludge from waste water | 2,500 |

## 4.0 SITE ANALYSIS

### 4.1 CONNECTIVITY

The proposed Modernization-Cum-Expansion project is being carried out within the existing Bhilai Steel Plant. BSP can be accessed through National highway NH-6 connecting Raipur – Nagpur. BSP is well connected by communication network. Telecommunication facility is available at Bhilai town. The site is well connected with rail network (Howrah – Mumbai Rail line- South East Central Rail Zone). The nearest major railway station is Durg, about 12km from the project site. Nearest Airport is situated at Raipur which is about 45 km away.

### 4.2 LAND FORM, LAND USE, OWNERSHIP

BSP is having total 6286.75 ha (15534 acre) of land under its possession. Proposed modernization-cum-expansion is being carried out within the existing plant premises (3284.75 ha) and thus no additional land is required for the proposed expansion. There is no forest land involved in the project.

## 4.3 TOPOGRAPHY

The topography of the area acquired for the project is more or less flat to gently undulating.

## 4.4 EXISTING INFRASTRUCTURE

The project office, plant building, rest shelters, canteens, workshop, stores, electrical sub-station, First Aid center, Weigh Bridge and other required infrastructure already exists.

BSP is already having a township (approx 3002 ha of land) along with all necessary social amenities. The township has 16 sectors and having 35954 house, 49 schools, 34163 students (13526 non-BSP students), 4 sports complex,13 Ispat clubs, 23 clubs and associations under SRG, 3 cultural centre,6 parks. Amenities centre, 5 hospital, 11 health centre, 3057 shops, 465 km roads.

Sewage from the township are treated in 5 nos. of sewage treatment plant known as oxidation pond and the treated water is be used for greenbelt development and the balance water is directed to Maroda I reservoir for recirculation.

## 4.5 SOIL CLASSIFICATION

The soil in the proposed site is Red sandy and Red loamy soils nature. Beneath the soil in Bhilai area is limestone and sandstone, which are reddish due to presence of Ironand clay particles. The main soil types found in the area include:

**Matasi :** It is a yellow sandy soil with a mixture of clay and its quite suitable for growing rice.

**Dorsa :**It is loamy soil, suitable for a variety of crops.

**Bhata :**It is a type of sandy soil with coarse texture and red in color. It is generally unproductive.

## 4.6 CLIMATE

This area is characterised by a hot summer and well distributed rainfall during South West monsoon season. May is the hottest month, wherein the mean maximum temperature is about 43°C and mean minimum is about 28$^{o}$C. The highest temperature during summer season rises upto as high as 46-47°C. The minimum temperature during winter season drops down to as low as 3°-4°C. The annual rain fall is 1277mm. About 86% of the annual rainfall is received during June to September. The area falls under Seismic zone II.

## 4.7 SOCIAL INFRASTRUCTURE AVAILABLE

All amenities and infrastructure, such as township, hospital, stores, workshop, community centre, school, bank etc. are already present in SAIL-BSP's township.

BSP is already having a township (approx 3002 ha of land) along with all necessary social amenities. The township has 16 sectors and having 35954 house, 49 schools, 34163 students (13526 non-BSP students), 4 sports complex, 13 Ispat clubs, 23 clubs and associations under SRG, 3 cultural centre,6 parks. Amenities centre, 5 hospital, 11 health centre, 3057 shops, 465 km roads.

# 5.0 PLANNING BRIEF:

## 5.1 PLANNING CONCEPT:

The present project envisages intimation of plant as per revised configuration of Bhilai Steel Plant to Ministry of Environment, Forest and Climate Change (MoEFCC) and permission for continuing and completing the remaining work proposed under the modernization-cum-expansion project for which prior EC has already been accorded by MoEFCC, valid till 30.03.2018.

Under the ongoing modernization-cum-expansion plan stabilisation of some of the units like BF 8, SMS 3 & RMP III, Bar & Rod Mill may go beyond 30.03.2018.

As per the proposal, SP-I has already been phased out and some of the units vis-à-vis SMS-I, RMP-I, BF-1,2,&3, BBM shall be phased out progressively after stabilisation of BF 8 and SMS-3 .

The project is being implemented scheme-wise and is expected to be stabilized within 3 years post March 2018. The delay in the schedule from the earlier accorded EC is due to site specific-technical and financial constraints.

## 5.2 LAND USE PLANNING:

BSP is established since 1956. Since then there has been phases of expansion with increase in intensity of land-use within the plant premises. In the present proposal no further change in land-use and intensity of land use is envisaged.

The modernisation-cum-expansion plan is being executed within the existing premises of integrated steel plant of BSP (already acquired), hence changes in land use and topography is not expected.

## 5.3 ASSESSMENT OF INFRASTRUCTURE DEMAND

Existing infrastructure facilities will be utilised under modernization-cum-expansion of BSP to 7.0 MTPA stage. The site is well connected with National Highway and Howrah – Mumbai Rail line (South East Central Rail Zone). The nearest major railway station is

Durg, about 12km from the project site. Therefore, any construction for infrastructure is not required.

## 5.4 AMENITIES / FACILITIES

All the amenities are available at Bhilai. BSP is also having a township along with all necessary social amenities. The township has 16 sectors and having residential house, schools, sports complex, clubs, cultural centre, parks, Amenities Centre, hospital, health Centre, shops etc.

## 6.0 PROPOSED INFRASTRUCTURE

No new infrastructure required. Available existing infrastructure facilities will be used for the expansion phase also.

### Green Belt & Plantations

Green belt is well developed within and around the project area. The total tree plantation in 4227 acre (1171.33 ha) is 4,192,144 trees.

### CSR Activities

For BSP-SAIL, CSR is an integral part of its operations ever since the establishment of its production units in remote locations of the country since the early 1950s. SAIL's CSR commitment to its stakeholders is to conduct business in an economically, socially and environmentally sustainable manner, whereby organizations serve the interests of society by taking responsibility for the impact of their activities.

Objectives of SAIL CSR Policy are as follows:

1. Create value for the stakeholders &society that are fundamentally linked to SAILs core business strategies and operations through its services, conduct & initiatives for their sustainable development.
2. Enhance value creation for the community in which it operates by identifying with the hamlet and foster good will from those living along the pipeline towards the Company by enhancing the quality of life of people in the direct impact zone.
3. Support the community by assisting the underprivileged.
4. Carry out developmental initiatives in order to meet the calls of the present without compromising the ability of future to meet its needs.
5. Support local populace by building the image of SAIL as patron of diverse pastoral sports, art &cultures.
6. To operate in a socially, environmentally and economically responsible manner, so as to succeed by seeking social license.

Annual expenditure towards CSR activities during the last three years are given hereunder.

Details of CSR Expenditure of BSP-SAIL in last 3 financial years are given in below.

- 2014 – 15: Rs. 12.10 Cr
- 2015 – 16: Rs. 25.46 Cr

- 2016 – 17: Rs. 12.89 Cr

SAIL-BSP is carrying out various socio-economic measures under Corporate Social Responsibility for all its projects at villages/town surrounding the projects site. Similar CSR measures are also been undertaken under the ongoing modernisation-cum-expansion project also.

CSR activities undertaken by BSP under modernization-cum-expansion plan in 2016-17 are given in **Table 6.1** below.

**Table 6.1: CSR Activities taken in 2016-17**

| S.No. | Projects/Activities |
|---|---|
| **1.** | **Education** |
| a. | Bhilai Ispat Vikas Vidyalaya - VI & XI |
| b. | Mid-day meal (Akshay Patra Foundation) |
| c. | Education of Tribal & Honhar children |
| d. | Medhavi Kanya Protsahan Yojana |
| e. | Education of adopted tribal students at Rajhara |
| f. | Career Counseling Program for Students |
| **2.** | **HEALTHCARE** |
| a. | Bhilai Ispat Kalyan Chikitsalaya |
| b. | Medical & eye camps at MSVs |
| c. | Arogya Niketan |
| d. | Medical waiver for Socially & Economically backward |
| e. | RCH (Reproductive & Child Healthcare) |
| f. | Medicines for Medical Camps |
| g. | Organizing medical camps in Rajhara mines area |
| h. | Medical camps in Hirri / Baraduar Mines |
| **3.** | **LIVELIHOOD GENERATION** |
| a. | Skill Training at BIKK and thru' VTPs |
| b. | Agriculture / Income Generation - Mahamaya Area |
| **4.** | **WOMEN EMPOWERMENT** |
| a. | Swayam Sidha |
| **5.** | **SPORTS, HERITAGE, ART & CULTURE** |
| a. | Lok Kala Mahotsava and village sports |
| b. | Grameen Lokotsav in 2 MSVs |
| **6.** | **RURAL DEVELOPMENT (INFRASTR DEV)** |
| a. | Development in and around Mahamaya area |
| b. | Infrastructure development in periphery of Dulki Mines |
| c. | Rural Infrastructure Jobs proposed by Hon'ble Pub. Reps. |
| d. | Sports Infrastructure Upliftment in Dalli-Rajhara |
| **7.** | **SOCIAL SECURITY (Sr.Citizens&PWDs)** |
| a. | Siyan Sadan |
| b. | Meals for Senior Citizens at Siyan Sadan |
| **8.** | **ENVIRONMENT SUSTAINABILITY** |

| | |
|---|---|
| a. | RSTP - 2015-16 –I ind Installment (50 kms) ask BSP what is this??? |
| b. | Solar-powered-pumps-cum-filtration units (12 nos.) in Balod distt. |
| c. | Provision of Structurals & Plates for Nature Trail, Doongargarh |
| **9.** | **PROJECT IDENTIFICATION & MONITORING** |
| a. | Cleaning / housekeeping services for CSR in stns. ask BSP what is this??? |
| b. | Transportation of MU Vehicles used in CSR |
| c. | Impact Assessment Study of CSR Activities |
| d. | Pending payment to SEED for Baseline Survey & Micro-planning study of 21 adopted villages |
| **10.** | **CAPACITY BUILDING OF PERSONNEL** |
| a. | Hon.,exhbn.,awards,trg./w.shops,conf., 5S cert., etc. |

## 7.0 REHABILITATION & RESETTLEMENT (R&R) PLAN

The project does not envisage any R&R as the modernization-cum-expansion plan is being carried out within the existing plant premises. No additional land was/is required for the modernization-cum-expansion plan. The project land is already under the possession of BSP-SAIL. Hence there will not be any land oustees who have to be resettled or rehabilitated.

## 8.0 PROJECT SCHEDULE & COST ESTIMATE

### 8.1 Likely Date of Start of Construction and likely date of completion

The modernization-cum-expansion plan is undergoing as per the MoEFCC EC accorded with few changes as specified earlier in **Table 3.2**. The project will be stabilized in 3 years post March 2018. The project is delayed due to site-specific technological and financial constrains which has now been managed by optimum utilisation of resources.

### 8.2 Estimated Project Cost Along and Economic Viability of the Project

The estimated cost for the modernisation-cum-expansion project in 2008 at the time of Environmental Clearance by MoEFCC was Rs. 12,954.30 Crores. The revised SAIL Board Approved cost is Rs. 17,265 Crores (Net of CENVAT) which is inclusive of foreign exchange component.

## 9.0 ANALYSIS OF PROPOSAL (FINAL RECOMMENDATION)

Financial Benefit:
The proposed project will generate revenue to the Centre & State Government in the form of taxes and duties. The people around the region will get direct benefit and indirect employment thus improves the quality of life of the region.

Social Benefit:
The modernization-cum-expansion project is proactively participating in the upliftment of socio economic index of the communities around the project site by way of financial and administrative support. The project will open up new employment opportunities,

both directly and indirectly. There shall be opportunities for entrepreneurs to engage in many service sectors directly or indirectly associated with the project.

The CSR approach of BSP is towards sustainable livelihood management of the community. It focuses on education, health, sanitation, drinking water, agriculture, culture identity preservation, welfare for the socially weaker sections and all stakeholders.

Keeping in view of the requirement of Iron & Steel for the development projects which in turn drive GDP of Indian economy and social development of the local region linked with the proposed project, implementation of the project will be beneficial.