PRE-FEASIBILITY REPORT

FOR

RESUMPTION OF MINING OPERATIONS

AT

PURNAPANI LIMESTONE AND DOLOMITE MINES
(Production : 1.5 Million Ton per Annum)

Lease Area : 230.525 ha
Area: Non-Forest
Category of Mine / Deposit : 'A' Category

Village : Karkatnasa and Purnapani
Sub-Division : Panposh
District : Sundergarh
(Odisha)

Proponent

60TH YEAR OF PRODUCTION
सेल SAIL
SINCE 1959

STEEL AUTHORITY OF INDIA LIMITED
RAW MATERIALS DIVISION

AUGUST 2018

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1.0 EXECUTIVE SUMMARY:

The Purnapani Limestone and Dolomite Mines was started by Rourkela Steel Plant (RSP) as captive mine in 1960 with manual working to produce blast furnace, sintering and fertilizer grade of limestone. Subsequently, mechanized mining was started in the year 1965. The mine is situated in the district of Sundergarh (Odisha) covering 230.525 ha. The mine forms a part of Survey of India Topo Sheet No. 73B/15 (Open Series Map No. F45G15) and is contained between latitudes of $22^0$24'20.62" and $22^0$24'56.88" and longitudes $84^0$51'38.54" and $84^0$53'15.21". All the tract of lands are situated at village Karkatnasa and Purnapani in Panposh sub-division in the Registration district of Sundergarh, Sub-district – Panposh and Thana Bisra. There is no forest land involved in the mines. The mine is well-connected through a metal road with the Rourkela Steel Plant which is at a distance of 42 km and broad gauge railway line connects Purnapani to Rourkela via Nuagaon.

The mining lease of Purnapani Limestone & Dolomite Mines in Sundergarh District of Odisha was granted by Government of Odisha covering an area of 230.525 ha for 20 years w.e.f 06.01.1960. 1st Renewal of Mining Lease (RML) was granted for 20 years with effect from 06.01.1980 to 05.01.2000. 2nd Renewal of Mining Lease was applied vide application dated 30.12.1998 for a period of 20 years w.e.f 06.01.2000 to 05.01.2020. However, the application was rejected by the State Govt. vide its order dated 23.10.2006 on the ground that the lessee is not interested to run the mine as it was suspended since 2004. SAIL filed Revision Application before the Mining Tribunal against the rejection order of State Govt. The Revision Authority, GoI, Ministry of Mines vide order dated 16.01.2009 set aside the rejection order of the State Govt. dated 23.10.2006. Subsequent to promulgation of MMDR Amendment Act 2015, SAIL requested Govt. of Odisha to grant extension of Purnapani lease as per provision under MMDR (Amendment) Act, 2015. Accordingly, Govt. of Odisha extended the Purnapani Limestone and Dolomite Mines vide order dated 14.03.2016 up to 31.03.2020. Supplementary lease deed was executed on 31.05.2016, which is valid up to 31.03.2020.

Mining Plan for Purnapani Limestone and Dolomite Mines prepared under Rule 12 of MCDR 1988 was approved by Indian Bureau of Mine (IBM) vide letter no. 314 (3)/97-MCCM(C)/MP-2, dated 15.06.98. Subsequently, Scheme of Mining for the

mine was approved by IBM vide letter no. BBS/SG/Lst&Dolo/MS-171, dated 15.02.2007.

The limestone under the mining lease is having higher percentage of Silica (SiO_2) in the range of 4.6 to 16.30 %. To meet the demand of RSP for supply of better quality of limestone, selective (boulder) mining was introduced in the year 1983 so that average grade of 6% SiO_2 is made available. However, subsequent to technological changes in Iron and Steel making, better quality of Limestone with 4% SiO_2 was required by the steel plants. Since the deposit is very thin and ore quality is having higher percentage of Silica, mining of limestone with 4% SiO_2 is not economical. Considering the quality of limestone and economic reasons, mining operations have been suspended in Purnapani Limestone & Dolomite Mines since 01.03.2004.

The quality of limestone at Purnapani Limestone and Dolomite Mines is considered suitable for cement making with SiO_2 upto 16% and MgO at < 5%. For effective utilization of the limestone from Purnapani Mine and long term sustainable economic solution for disposal of Blast Furnace Slag from the Rourkela Steel Plant, it is planned to set up a Cement Plant at Purnapani with a capacity of 2.0 MTPA for manufacturing blended slag cement. Accordingly, it has been planned to resume mining operations at Purnapani Limestone & Dolomite Mines with a capacity of 1.5 MTPA ROM.

The instant proposal is for obtaining TOR for conducting EIA study for obtaining Environmental Clearance for resumption of mining operations at Purnapani Limestone & Dolomite Mines at a capacity of 1.5 MTPA ROM.

Salient Features of the Project

Proposal	Limestone production 1.5 million tonnes per annum (MTPA) ROM
Location of Mine	At P.O – Purnapani, Village – Karkatnasa and Purnapani Sub-Division – Panposh, Dist. – Sundergarh, Odisha Pin- 770035
Latitude	$22^0$24’20.62” and $22^0$24’56.88”
Longitude	$84^0$51’38.54” and $84^0$53’15.21”.
Topo Sheet Number	73B/15 (Open Series Map No. F45G15)
Forest / Non Forest	Entirely Non Forest Land
Total Mineable Reserves	24.62 million tonnes of mineable reserve at 21% Acid Insoluble (AI) cut off

Life of Mine	16 Yrs.
Method of Mining	Open Cast Mechanized Mining.
Waste disposal	The wastes (OB & IB) generated will be dumped at designated dump areas within leasehold area as per the approved Mining Plan.
Mineral Processing	It is proposed to install a Crusher of 400 TPH capacity with Crushing Plant within lease area. After crushing, sized limestone will be conveyed from the mine to cement plant by conveyor.
Mineral Transport	Conveyor transport from mining lease to Cement Plant to be installed in adjoin surface lease.
Number of working days	310 days
Water Demand	Total water requirement : 300 m^3/day Industrial Purpose :: 175 m^3/day (Mine Pit water will be used) Domestic Purpose : 125 m^3/day. A full-fledged water supply system exist for township. Source of water is Katma Nallah.
Manpower	200
Explosive Consumption	750 Tonnes per annum
Proposed Investment	Rs. 35 Crores
CER Budget	Rs. 35 Lakhs

Purnapani Limestone and Dolomite Mine will produce Limestone and it will be used for manufacturing of cement in the Cement Plant located at Purnapani. This proposal will not only help in effective utilization of high Silica Limestone for the mine, but also provide long term economic solution for disposal of Blast Furnace Slag from the Rourkela Steel Plant. This will also generate much needed employment to the local people. Economy of the area will get a boost and there will be overall growth of the region in terms of education, health, training and transport etc. The local people's standard of living is expected to improve.

2.0 INTRODUCTION OF THE PROJECT / BACKGROUND INFORMATION :

2.1 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

The mining lease of Purnapani Limestone & Dolomite Mine in Sundergarh District of Odisha was granted by Government of Odisha covering an area of 569.64 acres or 230.525 ha for 20 years w.e.f 06.01.1960 to Steel Authority of India Limited (SAIL). 1st Renewal of Mining Lease (RML) was granted for 20 years with effect from 06. 01.1980 to 05.01.2000. 2nd Renewal of Mining Lease was applied vide application

dated 30.12.1998 for a period of 20 years w.e.f 06.01.2000 to 05.01.2020. Subsequent to promulgation of MMDR Amendment Act 2015 and SAIL requested State govt. of Odisha to grant extension of Purnapani lease as per provision under MMDR (Amendment) Act, 2015. Accordingly, Govt. of Odisha extended the Purnapani Limestone and Dolomite Mines mining lease vide Order dated 14.03.2016 up to 31.03.2020. Supplementary lease deed was executed on 31.05.2016 having validity up to 31.03.2020. Presently the mine is under the control of the Raw Materials Division (RMD) of Steel Authority of India Limited (SAIL).

Though the mining operations in Purnapani Limestone and Dolomite Mines started by Rourkela Steel Plant (RSP) as a captive mine in 1960, but the mining operations have been suspended since 01.03.2004 due to due to poor quality of limestone which was not meeting the quality norms i.e. 4% SiO_2 desired by steel plants. However, considering the suitability of limestone from the Purnapani Limestone & Dolomite Mines for cement making with SiO_2 upto 16% and MgO at < 5%, SAIL has planned to resume mining operations under Purnapani Limestone and Dolomite Mines with a capacity of 1.5 MTPA for supplying limestone to Cement Plant being set up at Purnapani.

Steel Authority of India Limited (SAIL), a Maharatna public sector undertaking under Ministry of Steel, Government of India, is the leading steel maker in the country and is having integrated steel plants at Bokaro, Durgapur, Rourkela, Bhilai & Burnpur, alloys steel plant at Durgapur, special steel plant at Bhadrawati and ferro alloy plant at Chandrapur. Also, SAIL has the captive iron ore, limestone, dolomite & coal mines in the states of Jharkhand, Orissa, Chhattisgarh, Madhya Pradesh & West Bengal.

2.2 BRIEF INFORMATION OF THE PROJECT

The present proposal envisages resumption of mining operations at Purnapani Limestone & Dolomite Mines for production of 1.5 MTPA limestone by mechanized opencast mining. The limestone will be supplied Cement Plant proposed to set up at Purnapani. The total mineable reserves available are 24.62 MT of limestone. The expected life of the expanded mine is 16 years.

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

Limestone is the principal raw material for the production of clinker for cement making. The need for mining of the cement grade limestone from the Purnapani Limestone & Dolomite Mines has arisen for effective utilization high silica limestone from the mines as well as BF slag from the Rourkela Steel Plant by setting up a Cement Plant at Purnapani.

Limestone mining is a very important economic activity in the Purnapani in Panposh sub-division of Sundergarh in Odisha. The proposed limestone mining from the Purnapani Limestone & Dolomite Mine including the proposed Cement Plant will generate revenue in terms of royalty and taxes etc. to the Govt. of odisha. This will generate employment to the people and ancillary industries around the area. It will also bridge the gap between demand and supply of Limestone to the Country. The Project will help in the overall growth of the Region.

2.4 DEMAND AND SUPPLY GAP

Limestone is the main raw material for cement production. The cement industry in India is set on the path of growth and modernization. Therefore, the demand for limestone in India is always in increasing trend.

In India, the production of limestone is 313.2 million tonnes during 2016-17 increased by 2% as compared to that in the previous year. Rajasthan was the leading producer of limestone (21%), followed by Madhya Pradesh and Andhra Pradesh (11% each), Chhattisgarh & Karnataka (10% each), Gujarat, Tamil Nadu & Telangana (8% each). About 97% of the total production of limestone during 2016-17 was of cement grade, 2% of iron & steel grade and the rest 1% consisted of chemical grade.

In 2016-17, the total consumption of limestone, as reported by different industries was 242.45 million tonnes. Cement was the major consuming industry accounting for 92% consumption, followed by iron & steel (5%) and chemical (2%). The remaining consumption was reported by aluminium, alloy steel, sugar, paper, fertilizer, glass, metallurgy, foundry, etc.

2.5 IMPORT VS INDIGENOUS PRODUCTION

In 2016-17 import of limestone was 17.8 million tonnes. Limestone was mainly imported from UAE (80.25%), Oman (12.44%), Malayasia (2.47%),Vietnam (1.79%)

& Iran (1.76%). Imports of limestone increased to 17.18 million tonnes in 2015-16 from 13.94 million tonnes in the previous year.

India has huge resources of limestone distributed over different parts of the country. It is comfortably placed in terms of annual capacity and production of cement. Cement-grade limestone occurs in all the limestone-bearing areas, while SMS, BF and chemical-grade limestones occur in selective areas.

2.6 EXPORT POSSIBILITIES

Limestone produced from this project will be exclusively consumed in proposed Cement Plant at Purnapani through JV. There is no proposal for export of Limestone from this project.

2.7 DOMESTIC / EXPORT MARKET

Not applicable, limestone proposed to be produced will be directly fed into Cement Plant to be located at Purnapani.

2.8 EMPLOYMENT GENERATION

Purnapani Limestone & Dolomite Mines will be headed by the Mines Manager who will be the responsible for the supervision, control and management of the mines. The Mines Manager shall report to the Mines Agent. All statutory supervision i.e. Mines Foreman, Mining Mate etc will be employed as specified in the Metalliferous Mines Regulation, 1961. Employment potential at Purnapani mines will be around 200 nos. Most of the unskilled, semi-skilled and skilled workers will be local persons. Apart from direct employment, there will be an indirect employment to more than 400 nos. from the project.

3.0 PROJECT DESCRIPTION

Purnapani Limestone and Dolomite Mines, Purnapani was started initially as a captive manual mine of Rourkela Steel Plant to produce blast furnace, sintering and fertilizer grade of limestone. Mining in this lease commenced in 1960 and the mechanized mining and integrated crushing and screening plant was commissioned at Purnapani in 1965. Since the deposit is very thin and ore quality is having higher percentage of Silica, mining of limestone with 4% SiO_2 is not economical. Accordingly, mining operations have been suspended in Purnapani Limestone & Dolomite Mines since 01.03.2004.

The quality of limestone at Purnapani Limestone and Dolomite Mines is considered suitable for cement making with SiO_2 upto 16% and MgO at < 5%. For effective utilization of the limestone from Purnapani Mine and economic solution for disposal of Blast Furnace Slag from the Rourkela Steel Plant, it has been planned to set up a Cement Plant at Purnapani with a capacity of 2.0 MTPA. Accordingly, it has been planned to resume mining operations at Purnapani Limestone & Dolomite Mines with a capacity of 1.5 MTPA ROM to supply the limestone to the Cement Plant.

3.1 TYPE OF PROJECT INCLUDING INTERLINKED AND INTER DEPENDED PROJECT

The proposed project falls under Category "A", as per EIA notification – 2006 and amendments thereon of the Ministry of Environment, Forest & Climate Change, New Delhi.

The proposed limestone production from the mine is 1.5 MTPA. The limestone extracted from the mine will be cement grade and will be used for production of blended cement at the Cement Plant to be set up at Purnapani.

3.2 LOCATION

The Purnapani Limestone & Dolomite Mines forms a part of Survey of India Topo Sheet No. 73B/15 (Open Series Map No. F45G15) and is contained between latitudes of $22^0$24'20.62" and $22^0$24'56.88" and longitudes $84^0$51'38.54" and $84^0$53'15.21". All the tract of lands are situated at village Karkatnasa and Purnapani in Panposh sub-division in the Registration district of Sundergarh, Sub-district – Panposh and Thana Bisra. There is no forest land involved in the mines. The mine is well-connected through a metal road with the Rourkela Steel Plant which is at a distance of 42 km and broad gauge railway line connects Purnapani to Rourkela via Nuagaon.

Geographical location of mine lease area is covered under Survey of India Toposheet 73B/15. Location Map of project site is enclosed as **Annexure-1.**

3.3 DETAILS OF ALTERNATE SITE

No alternate sites were considered as the project is site specific and envisages resumption of mining operations at the existing mine.

3.4 SIZE AND MAGNITUDE OF OPERATION :

The Purnapani Limestone & Dolomite Mining Lease is spread over 230.525 ha. It has been envisaged to resume mining operations for production of limestone with a rated capacity of 1.5 MTPA ROM.

3.5 MINE DESCRIPTION

3.5.1 Geology :

The limestone deposit of this area belongs to the Birmitrapur stage of Gangpur series of middle Dharwarian age. In the majority of the exposures, Limestone and Dolomite are associated with each other, dolomite forming the lower member over which the limestone is superposed. Dolomite and limestone are associated with carbon phyllites, epediorites, quartzite and schists. These bands from the northern limb of the major Gangpur anticlinorium, running in an almost east-west direction from Limbra in the east passing through Purnapani to Birmitrapur in the west.

Local geology consists of epidiorite in the northern side of the lease area in the form of sill (intrusion) at a distance of 250-300 m. On the southern side carbonaceous phyllites with thick alluvium cover is observed. Laterite patches and morrum patches are observed at surface in association with the limestone thin bands of dolomite are observed. These bands are inter-banded and due to tectonic movement, disharmonic folding is observed in limestone bands. The Limestone band continues below 60 m upto which drilling is done and bottom of limestone has not been encountered. The litho units consist of mainly limestone with occasional occurrence of thin dolomite bands at places. The general strike of the strata is E 60 N – W 60 S with an average southerly dip of 60^0 to near vertical.

3.5.2 Mineral Reserves :

The viability for limestone extraction from Purnapani Limestone and Dolomite Mines lease (spread over an area of 230.525 ha) was established on the basis of prospecting report prepared in 1956 based on preliminary investigation carried out by erstwhile OMQ Department of Rourkela Steel Plant.

During 1964 to 1969, 49 nos of bore holes were drilled with total meterage of 3030.17 m. Subsequently, in order to establish potentiality of the deposit at greater depth, it was decided to prove the limestone up to a depth of 60m. Accordingly, a

deep drilling program was chalked out for execution as per recommendation of M/s. Gewerkschaft Exploration, Dusseldorf, West Germany in the year 1970.

Further 124 nos. of bore holes were drilled with meterage of 11,112 m covering entire stretch of useful limestone boundary of Purnapani Limestone & Dolomite Mines, Purnapani. Therefore, the total 173 Nos of bore holes were drilled in two phases with total meterage of 14,142 m across the strike covering the entire east-west length of the deposit. The bore holes were drilled at an inclination of 50^o to 60^o towards north against the dip direction up to the depth varying from 70 to 125 m, depending upon the surface location at an interval ranging from 30 to 60 mtrs.

Based on data obtained from these bore holes the initial reserve at various Acid Insoluble (AI) cut-off has been established in the ore bearing zone of the mining lease by erstwhile OMQ Department of Rourkela Steel Plant (1975) is given below.

Cumulative Mineable Mineral Reserve as on 01.04.75 at various cut-offs given below:

Cut-off grade	Limestone (Mt)	Wt. Avg. Quality (AI)	Waste Rock (Mt)	Ore : Waste
0-6% AI	8.02	4.91 %	40.63	1 : 5.07
0-9% AI	19.13	6.49%	29.52	1 : 1.54
0-12% AI	25.77	7.54%	22.87	1 : 0.89
0-15% AI	31.32	8.59%	18.84	1 : 0.63
0-18% AI	35.35	9.48%	13.29	1 : 0.38
0-21% AI	36.57	9.81%	12.07	1 : 0.33

Since 01.04.75, a total quantum of 10.60 million tonnes has been exploited up to 01.04.97, leaving a balance mineable reserve of 25.97 MT at 21% AI Cut-off as on 01.04.97. Further, from 1997 – 98 to 2003-04, another 1.35 million tonnes of limestone has been exploited. As the mine is non – operative from 2004-05 onwards, the balance mineable reserve at 21% AI Cut off comes to 24.62 million tonnes.

Considering total depletion of ore of 11.97 MT (10.62 + 1.35 MT) after April'1975, the total quantum of waste generation upto conceptual period will be approximately 8.00 to 9.00 MT.

The corresponding content of CaO, MgO, SiO_2, & Al_2O_3 against various Acid Insoluble (AI) based on 9 samples collected are given below:

Quality of Limestone

Sample No.	AI %	CaO %	MgO %	SiO_2 %	Al_2O_3 %
1.	6.20	47.80	3.40	4.60	1.30
2.	8.10	46.50	3.60	6.10	1.40
3.	9.00	46.00	3.70	6.80	1.50
4.	11.00	44.20	4.00	8.40	2.20
5.	12.00	43.40	3.90	9.40	2.20
6.	13.20	42.80	4.20	10.10	2.40
7.	15.20	39.70	4.90	11.70	2.60
8.	18.00	38.00	5.50	14.20	2.50
9.	20.40	36.20	6.10	16.30	2.70
Average	**12.57**	**42.73**	**4.37**	**9.73**	**2.09**

3.5.3 Mining:

Mining parameters are fixed for ROM production of 1.50 million tonnes / year.

1. No. of Working Days in a Year - 300 days.
2. No. of Shifts Per Day - 3 shifts
3. No. of Working Days Per Month - 25 days.
4. Height of Each Bench - 6 m
5. Width of Each Bench (Minimum) - 12 m
6. Slope of faces - 60^o

Sequence of Mining

- The advancing face will be dressed by front-end loader and the backhoe excavator to make it free of cracks resulted from previous blasting.
- Then, drilling will be done by wagon drills having 110 mm dia. with dust extractor to minimize pollution of air. Drilling of holes will be done on staggered pattern in two rows. Spacing and burden in ore is kept at 3.0 m and 2.5 m respectively for obtaining required fragmentation. Depth of holes will be 6.5 m including sub-grade drilling of 0.5 m.
- Slurry explosive with 83 mm cartridge will be used for primary blasting. Slurry explosive, Plain, Delay and Nonnel Detonators, Detonating Fuse (6 gms / mtrs & 10 gms / mtrs) and Safety fuse will be used. Blasting will be carried out in single

/multi row blasting pattern. The blasting activity is proposed to be carried out once during day time.

Blasting Parameters are given below:

Dia of a Hole	110	mm
Prime charge	2.78	kg
2 Base charges i.e. 2 x 2.78	5.56	kg
Charge per hole (2.78 + 5.56)	8.34	kg
No. of row blasted	2	Nos

- Excavators of 0.9 m^3 bucket capacity and 2.0 m^3 front-end loader will be engaged for material handling i.e. for ore and waste loading into 20 tonne capacity dumpers.
- Since different quality of ore will be exposed at different benches, blending will be done to meet the quality requirement of the Steel Plants and the objective of mineral conservation.
- Waste materials will be transported to designated dumps by means of 20 tonne capacity dumpers. All the loading equipments and dumpers for transportation of ore from the mines to crushing unit will be as per capacity mentioned above.
- Water spraying on haul roads and mine roads will be done regularly on working days by 10 KL water tankers.

Further, since mining operations were suspended w.e.f 01.03.2004, the limestone quarries under the lease have been completely filled with water. The water needs to be pumped out for resumption of mining operations. The mining operations at the mine intersects the ground water level and hence the pit water is required to be pumped to enable mining operations at lower benches. Since the surrounding area of mining lease is mostly agriculture land, the mine pit will be supplied to the agriculture lands and nearby village ponds.

3.5.4 Mineral Processing & Transport :

A 400 TPH Crushing Plant will be installed within the lease. This plant will comprise Receiving Hopper, Primary Sizer, Secondary Sizer, set of conveyor belts, dusty suppression system etc. The ROM limestone will be initially fed Primary Sizer. After primary size reduction (to -200 mm) in the Primary Sizer, the entire material will be fed to Secondary Sizer through an apron feeder. Further size reduction (to – 60 mm)

will take place in the Secondary Sizer. After crushing the entire (-) 60 mm limestone will be transported by conveyor to Cement Plant to be set up Purnapani for captive consumption.

3.6 RAW MATERIALS

No raw material will be required for production of Limestone. The mined mineral shall be directly fed into the captive cement plant. The waste generated shall be carried through dumpers to the dump yard.

3.7 RESOURCE OPTIMIZATION/RECYCLING AND RESOURCE

Top soil will be utilized for plantation and development of greenbelt. Water pumped out from the mining pits will be supplied to ponds for further utilization by the villagers for agriculture & other purposes.

3.8 SITE SERVICES

3.8.1 Water Requirement

Water in the mine is mainly required for dust suppression, workshop, plantation & domestic purpose. About 300 m^3/day of water will be required for both industrial & domestic purposes at the mine. About 175 m^3/day water will be required for Industrial purpose i.e. dust suppression (100 m^3/day), vehicle washing (25 m^3/day) and plantation purpose (50 m^3/day), which will be supplied from mine pit water. About 125 m3/day will be required for domestic purpose i.e. Mine Site (25 m^3/day) & Township (100 m^3/day), which is drawn from Khatma nalla for drinking purpose. Water is being collected from Khatma nalla in a service reservoir in township where it is treated by pressure filter and subsequently chlorination is carried out using bleaching powder. Finally potable water is supplied to township through a network of pipelines to cater domestic demand.

3.8.2 Power Requirement

Power requirement of 1500 KVA received from OSEB at 33 KV grid from Rourkela through two supply lines via Kuarmunda and Birmitrapur.

3.8.3 Amenities

The mine shall have a site office. Rest shelters with drinking water facilities, toilets, bathing and washing facilities and canteen shall be provided. There shall be a First

Aid Centre with an ambulance always available. Other amenities and infrastructure, such as township, hospital, stores, workshop, community centre, schools exists.

3.9 WASTES

Limestone deposit at the Purnapani Limestone & Dolomite Mines is having thin fertile soil cover (average 0.5 m thick) and thereafter soil mixed with porcellanite of variegated colors which form as Over Burden (OB) on limestone. In addition to this, some waste material inherent is entrapped in limestone due to filling up of cavities, which is called as inter burden. Total quantum of waste generation upto conceptual period will be approximately 8 to 9 million tonnes. These wastes will be stacked at the designated waste dumps areas in non-mineralized areas within the lease area. For arresting run-off & wash-off of the dump materials into catch water drain retaining wall and garland drains will be made.

No top soil generation is envisaged since the mine is very old and most of the lease area is already broken. However, whenever, top soil is generated, the same will be used for rehabilitation of the areas.

4.0 SITE ANALYSIS

4.1 Connectivity

The mine is well-connected through a metal road with the Rourkela Steel Plant which is at a distance of 42 km and broad gauge railway line connects Purnapani to Rourkela via Nuagaon.

4.2 Land Form, Land Use, Ownership

The mine lease area covering 230.525 ha fall under two villages viz Karkatansa (0.643 ha) and Purnapani (229.882 ha) and is totally forest land. The entire land is in the name of SAIL.

4.3 TOPOGRAPHY & DRAINAGE

The topography of this area is gently undulated with small hillocks.The highest contour is 246 m on the north-east / northen side and the lowest contour of 222.50 m is on the southern side. The reduce level of ground surface is almost uniform except in the northern part of the lease and remains around 232-234 m. There is general gradual decrease in the surface level from north to south.

The normal drainage pattern of the area is controlled by topography of the region. There is no perennial streams within the mining lease. In rainy season, water flowing through the catchment area joins the small nallahs by flowing through the natural courses which finally meets at various points at Deo River and Khatma nallah. Water for domestic consumption for the mine township is drawn form the Khatma Nallah.

4.4 LAND USE

The mine lease area is devoid of any forest land. The existing Land Use pattern in the lease is as follows:

Existing Land Use of the Mining Lease

Sl. No.	Land Use	Area (ha)
1	Excavated Area (Mine working)	168.775
2	Waste Disposal Area	44.75
3	Reclaimed Area	7.00
4	Railways	3.50
5	Roads	3.00
6	Ore Processing Plant	1.50
7	Office Building	1.50
8	Workshop	0.50
	Total	**230.525**

SAIL has taken initiative to reclaim and rehabilitate the Mining Lease in collaboration with the Department of Bio-technology (DBT), Govt. of India in 2005 through University of Delhi. Over the years, Overburden Dumps have been biologically reclaimed. Presently, long term (5 years) maintenance of the Ecologically Restored site is continuing since December 2014 through the University of Delhi at a cost of Rs. 43 lakhs under supervision & control of EMD, SAIL.

4.5 Existing Infrastructure

Haul roads, mine office, rest shelters are already existing within the mine lease. These will be suitably augmented during resumption of mining operations. Other existing infrastructure such as Main Administrative Building, Offices, workshop, stores, hospital, township etc. shall also be augmented.

4.6 Soil Classification

Broadly three types of soils are seen in the area viz (i) Red Soil, (ii) Alluvium Soil and (iii) Laterite soil. The red soil is the most predominant soil type. The soil is acidic to neutral in reaction. Organic carbon is low to medium.

4.7 Climate

The area in and around Purnapani is primarily characterized by three district seasons: Summer (March to May), Monsoon (June to October) and Winter (Nov. to February). Summer is very hot and dry with temperature varies from 20^0C -47^0C. Winter is very pleasant with temperature mostly ranging from 6.0^0C to 18^0C. Annual rainfall in the area varies from around 1200 mm to 1800 mm. Annual rain fall record for the last 10 years shows variation between 870.0 mm to 1826.0 mm. Max. rainfall in one day is 157.5 mm.

4.8 Social Infrastructure Available

The company has built roads, community halls, bus shelters in villages. Village schools have been provided financial and material assistance. The deposit is well connected through a metal road with the Rourkela Steel Plant, which is at a distance of 42 kms. A twenty two bedded hospital with requisite medical facilities with two doctors and adequate staff care of the health and hygiene of the employees. 523 dwelling houses consisting of 3 BR, 2 BR, 1 BR and one roomed houses provide accommodation to the mines workforce.

5.0 PLANNING BRIEF

5.1 Planning Concept

The mining operations at Purnapani Limestone and Dolomite Mines were suspended since 2004. The mining operations at the proposed capacity of 1.5 MTPA will be resumed after obtaining Environmental Clearance from MoEFCC and Consent to Establish & Consent to Operate from Odisha State Pollution Control Board.

5.2 Land Use Planning

The mining operations in the Purnapani Limestone & Dolomite Mines were started since 1960 and all the mineralized area under the mining lease has already broken and reached up to 205 m RL. As the mineralization extends to 174 mRL, the mine will be

expanded vertically up to 174 m RL. The expected land use at the end of the mine's life is as follows:

Land Use Plan of the Mining Lease

Sl. No.	Land Use	Area (ha)
1	Excavated Area (Mine working)	168.775
2	Waste Disposal Area	44.75
3	Reclaimed Area	7.00
4	Railways	3.50
5	Roads	3.00
6	Ore Processing Plant	1.50
7	Office Building	1.50
8	Workshop	0.50
	Total	**230.525**

When the reserves are exhausted, the mined out area will be ecologically restored partly by backfilling and partly by creating a water reservoir as per the as per the approved Mine Closure Plan. All waste dumps will be stabilized and biologically reclaimed. Some of the infrastructure will be dismantled. Others will be handed over to the State Government or the local village panchayats.

5.3 Assessment of Infrastructure Demand

Most of the infrastructure necessary for resumption of mining are already in place. A full-fledged water supply scheme exists for mines & township. Power requirement of 1500 KVA received from OSEB at 33 KV grid from Rourkela through two supply lines via Kuarmunda and Birmitrapur. Mine is connected by Radiotelephone link with Rourkela and other captive mines at Barsua, Kalta, satna and Barajamda. 523 dwelling houses consisting of 3BR, 2BR and 1 BR and one roomed houses provide accommodation to the mines workforce. Two Railway sidings have been provided at Purnapani. The mine is well-connected through a metal road with the Rourkela Steel Plant which is at a distance of 42 km and broad gauge railway line connects Purnapani to Rourkela vis Nuagaon. Twenty two bedded hospital with requisite medical facilities with two doctors and adequate staff take care of the health and hygiene of the employees.

5.4 Amenities / Facilities

The mine has an administrative office, rest shelter with drinking water facilities etc. Other amenities and infrastructure such as township, hospital, community Centre, schools etc. already exist in the Purnapani Township.

Mine Office, Store, Workshop, VT Centre and other facilities like Rest Shelter, Canteen etc, are exist at the mine, which will be suitably augmented to cater the additional needs for proposed production of 1.5 MTPA.

6.0 PROPOSED INFRASTRUCTURE :

The area is well connected by road and rail network. The area is self sufficient to cater the needs of the proposed production, hence, no additional infrastructure, other augmenting existing facilities.

It is proposed to install a Crusher of 400 TPH capacity with Crushing Plant within lease area. After crushing, sized limestone will be conveyed from the mine to cement plant by conveyor.

7.0 REHABILITATION & RESETTLEMENT (R&R) PLAN :

The project does envisage any leasing or acquisition of private land. Hence there wont be any land oustees who have to be resettled our rehabilitated.

8.0 PROJECT SCHEDULE & COST ESTIMATE

8.1 Likely Date of Start of Construction and Likely Date of Completion:

The mine will be reopened within about one year after receipt of all the necessary statutory clearances. Initially the mine office, rest shelters and other amenities, which are lying unused since 01.03.2004 will be reopened and refurbished.

8.2 Estimated Project Cost and Economic Viability of the Project

The estimated project cost will be Rs. 35 Crore. The limestone produced form the project will be used for manufacturing of cement plant located at Purnapani. This proposal will not only help in effective utilization of high Silica Limestone for the mine but also provide long term economic solution for disposal of Blast Furnace Slag from the Rourkela Steel Plant.

9.0 ANALYSIS OF PROPOSAL (FINAL RECOMMENDATION)

The proposed resumption of the mining operations at Purnapani Limestone & Dolomite Mines will have the following benefits:

- The project will provide necessary limestone required for cement plant, which is proposed to be set-up at Purnapani through JV.
- Provide long term economic solution for disposal of Blast Furnace Slag from the Rourkela Steel Plant which is likely to increase in future due to expansion of RSP.
- In addition it will add to revenue generation to the State in the form of Royalty and DMF
- There will be social benefits from the mining operation in the region. The underlying benefits through the proposed project are :
  - It aims to provide additional direct or indirect employment
  - Economy of the area will get a boost and there will be overall growth of the region in terms of education, health, training and transport etc. The living standard of people is also expected to improve.
  - Vocational training to be provided to the persons for improving their skills in income generation techniques like stitching, Hatchery. Plumber, carpenter, blacksmith etc.
  - CSR activities by SAIL in the areas of education, health, infrastructure development, drinking water, sanitation, etc., will further improve socio-economic aspects of the area.

Considering the above points, resumption of mining operations at the Purnapani Limestone and Dolomite Mines with proposed capacity of 1.5 MTPA has become essential to supply limestone to the Cement Plant to be set-up at Purnapani to manufacture of blended slag cement.

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