

M/S NATIONAL ENTERPRISES, BARBIL
MINING PLAN
OF

SAGASAH I IRON ORE MINES

(41,144 Hectares)

District : SUNDARGARH - (ORRISSA)
(Prepared Under : M.C.R., 1960 rule 22 (4))



Prepared By

S. WELAYATALI ISMAIL
CONSULTING GEOLOGIST
VETENARY HOSPITAL ROAD
AT/PO : BARBIL - 758035
Dist : KEONJHAR (ORRISSA)
Regd No. : RQP/CAL/013/87-A

VIDE LETTER NO BDS/SACG/Fe/MP-15
DATED - 10-8-99

अनुमोदित
APPROVED

अधिकारी
10/8/99
क्षेत्रीय खान नियंत्रक
Regional Controller of Mines
भारतीय खान विभाग
Indian Bureau of Mines
कलकत्ता
Calcutta

NATIONAL ENTERPRISES

P. O. BOX NO. 41
AT & P. O. BARBIL-758 035
DIST. KEONJHAR (ORISSA)
TEL. : (06767) 30321
(06767) 30680

Dated 24.05.99

CONSENT FROM APPLICANT



The Mining Plan in respect of Sagasahi Iron Ore Mines over an area of 41.144 Hectares, Minerals - Iron Ore, District Sundargarh, State Orissa has been prepared by Sri S. Welayat Ali Ismail, Regd. No RQP/CAL/013/87-A.

We request the Regional Controller of Mines, Indian Bureau of Mines, 175, Ground Floor, Sahid Nagar, Bhubaneswar - 751 007 to make further correspondance regarding modification of the Mining Plan with said recognised person on his following address.

Sri S. Welayat Ali Ismail
Consulting Geologist,
Veterary Hospital Road,
At/P.O. : Barbil - 758 035,
Dist : Keonjhar (Orissa)

We hereby undertake that all modification so made in the mining Plan by the said recognised person be deemed to have been made with our knowledge and consent and shall be acceptable to us and binding on us in all respect.

For NATIONAL ENTERPRISES

PROPRIETOR

S. WELAYAT ALI ISMAIL
CONSULTING GEOLOGIST
Regd. No. ROP/CAL/013/87-A.

CERTIFICATE



In Sagasahi Iron Ore Mines project of M/s. ~~State Enterprises~~ Enterprises over 41.144 Hectares " The provisions of mineral Conservation and Development Rules, 1988 made thereunder have been observed in this Mining Plan and wherever specific permission are required the applicant will approach the Indian Bureau of Mines."

"The provisions of Mines Act, 1952, Mines Rule, 1955, Metalliferous Mine Regulation, 1961 made thereunder have been observed in this Mining Plan and wherever specific permission will be required the applicant will approach the Director General Mines Safety."

The information furnished in this Mining Plan are true and correct to the best of my knowledge.

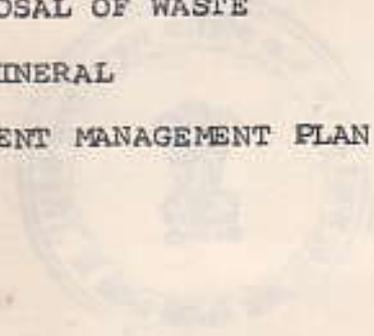
DEPARTMENT OF MINERAL RESOURCES
AND LIGNITE DEVELOPMENT
INDIAN BUREAU OF MINES
CENTRAL OFFICE
NEW DELHI

S. Welayat Ali Ismail
25.5.99

S. WELAYAT ALI ISMAIL
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MINING PLAN FORMAT
(A' and 'B' Category Mines)
As per MCDR, 1988



INTRODUCTORY NOTES

'A' category mines : all mines excluding 'B' category mines
'B' category mines : all 'B' category mines excluding very small 'B' category mines (small open cast mines not using explosives and where the average employment (as per explanation furnished in MCDR, 1988) does not exceed 25.

If more space is needed to fill out a block of information, use additional sheets and attach to form. All the plans and sections should be in accordance with MCDR 88 and or MMR 61.

GENERAL

- a) Name of applicant M/s National Enterprises
Address P.O. Box No 44, P.O. : Barbil - 758 035, Dist. Keonjhar
District Keonjhar State Orissa Pin code 758 035
Phone 06767 30321 Fax 06767 30631 Telex _____
- b) Status of applicant
- Private Individual Private Individual Cooperative Association X
Private Company X Public Company X
Public Sector Undertaking X
Joint Sector Undertaking X
Other (pl. specify) _____
- c) Mineral/s which are occurring in the area and which the applicant intends to mine Iron Ore
- d) Period for which the mining lease is granted/ renewed/proposed to be applied 20 (Twenty) Years
- e) Name of RQP preparing Mining Plan S. Welayat Ali Ismail, Consulting Geologist
Address Veterinary Hospital Road, P.O. : Barbil, Dist. Keonjhar (Orissa)
Phone 06767 31076 Fax _____ Telex _____
Registration No. RQP/CAL/013/87-A
Date of grant/renewal 18.09.1987
Valid up to 17.09.1999
- f) Name of prospecting agency Sri C. D. Badgayan, Msc. Agent
Address National Enterprises, Barbil
Dist : Keonjhar (Orissa) Phone X
11824/SM. Bhubaneswar
- g) Reference No and date of consent letter from the State Government III (B) SM-22/96 the 24.12.97

LOCATION AND ACCESSIBILITY

- Details of area (with location map) Refer Key Plan Plate No 1
District and State Sundargarh, Orissa
Taluka Bonai
Village Segasahi No 27
Khasra No./Plot No./Block Range/Felling Series etc. Land schedule enclosed
Lease Area (Hectares) 41.144 Hectares
Whether the area is recorded to be in forest (please specify whether protected, reserved etc.) P.R.F.
Ownership/ Occupancy Government
Existence of public road/railway line, if any nearby and approximate distance Village road within 100 m
Toposheet No. with latitude & longitude 73 G/5 1 : 50000
Latitude : 21° 56'.06" - 21° 56'.34"
Longitude : 85° 16'.52" - 85° 17'.23"

S. Welayat Ali

Land Use Pattern (Forest, Agricultural, Grazing, Barren etc.) Forest Land : Land Schedule Enclosed

- b) Attach a general location and vicinity map showing area boundaries and existing and proposed access routes. It is preferred that the area be marked on a Survey of India topographical map or a cadastral map or forest map as the case may be. However if none of these are available, the area should be shown on an accurate sketch map on a scale of 1:5000. **Area Marked on 1:50000 Enclosed refer Plate No. 1**

PART - A

3. GEOLOGY AND EXPLORATION

- a) Briefly describe the topography and general geology and local/ mine geology of the mineral deposit including drainage pattern. **Enclosed separately**
- b) The topographic plan of the lease area prepared on a scale of 1:1000 or 1:2000 with contour interval of 3 to 10 m depending upon the topography of the area should be taken as the base plan for preparation of geological plan. The details of exploration already carried out including evidences of mineral existence should be shown on the geological plan. **Geological Plan Plate No. 3 is enclosed**
- c) Geological sections should be prepared at suitable intervals on a scale of 1:1000/1:2000. **Geological section prepared at 100m. Interval is enclosed, refer Plate No 4**
- d) Broadly indicate the yearwise future programme of exploration, taking into consideration the future production programme planned in next five years as in table below:

Year	No. of boreholes	Total metreage	No. of Pits and Dimensions	No. of Trenches and Dimensions
First	7	70	6 Nos 4mx4mx5m	3 Nos 30mx10mx3m
Second	5	50	5 Nos 4mx4mx5m	2 Nos 25mx10mx3m
Third	x	x	6 Nos 4mx4mx5m	
Fourth	x	x	5 Nos 4mx4mx5m	
Fifth	x	x	8 Nos 4mx4mx5m	

- e) Indicate geological and recoverable reserves and grade, duly supported by standard method of estimation and calculations alongwith required sections (giving split up of various categories i.e. proved, probable, possible). Indicate cut-off grade. Availability of resources should also be indicated for the entire leasehold. **Refer chapter Geology and exploration enclosed separately**
- f) Indicate mineable reserves by slice plan/level plan method, as applicable, as per the proposed mining parameters.

4. MINING

- a) Briefly describe the existing/proposed method for developing/working the deposit with all design parameters. **The Sagasahi Iron Mines will be worked by National Enterprises after grant and execution of mining lease. Here open cast mining with drilling by Jack Hammer compressed Air and blasting with Safety Fuse, Ordinary Detonator will be practice, Method proposed of working is given in Development plan - Plate No 6. At Sagasahi Iron ore is as boulder, float & Insitu. Both will be exposed and worked**
 Note: In the case of pocket deposits, sequence of development/working may be indicated on the same plan.



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b) Indicate quantum of development and tonnage and grade of production expected pitwise as in table below: (in M³)

Year	Pit No (s)	Overburden	ROM ore	Saleable ore	Sub-grade ore	Mineral Rejects	Ore to Overburden ratio
First	Face A	-	-	3465	288.75	2021.25	NIL
Second	-do-	-	-	4725	393.75	2756.25	
Third	-do-	-	-	9072	756.00	5292.00	
Fourth	-do-	-	-	8316	693.00	4851.00	
Fifth	-do-	-	-	10773	897.75	6284.25	

c) Attach

individual yearwise plans & sections (in case of 'A' class mines)

composite plans & yearwise sections (in case of 'B' class mines) **Development Plan Plate No.6 is enclosed**

d) Attach supporting composite plan and section showing pit layouts, dumps, stacks of sub-grade mineral, if any. etc. **Refer Plate No. 6 & 8**

e) Indicate proposed rate of production when the mine is fully developed, and the expected life of the mine and the year from which effected. **Production will be 1818 M.T. per month which will increase as per demand from market, life of mine will be 41 years**

f) Attach a note furnishing a conceptual mining plan for the entire lease period (for 'B' category mines) and upto the life of mine (for 'A' category mines) based on the geological, mining and environmental considerations. **Conceptual mining plan is enclosed separately Refer Plate No. 8**

g) Opencast mines

i) describe briefly giving salient features of the mode of working (mechanised _____, semi-mechanised yes, manual Yes).

In the beginning manual mining with drilling and blasting will be practice. In early stage short holes i.e. 800m and 1200m will be drilled and blasted with Safety Fuse, Ordinary Detonator. After face of work be exposed 100mm dia holes will be drilled and will be blasted.

ii) describe briefly the layout of mine workings, the layout of faces and sites for disposal of overburden/waste. A reference to the plans enclosed under 4(b) and 4(d) will suffice

This is a fresh mining area where now mining operation will commence. Geological map of this lease hold had been prepared on its basis layout of mine working had been planned. Also spot for dumping is shown refer development plan, Conceptual plan Plate No. 6 & 8.

h) Underground mines **NOT APPLICABLE**

(i) mode of entry (adit _____, incline _____, shaft _____, ramp/decline _____) briefly describe the reason for choosing the mode of entry indicated above (keeping in mind the considerations of systematic mining and prevention of damage to the environment)

(ii) system of winding, hoisting, etc. note briefly describing the system and linking it with: it's advantage for the desired rate of production and raising/lowering of men and material the ventilation system



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NOT APPLICABLE

(iii) underground layout
 attach a note briefly describing the underground layout using longitudinal sections and level plans where necessary. Indicate
 - sizes and intervals of levels and raises/winszes with proper reasoning
 - proposed extent of development, yearwise, for the first five years alongwith the support system. **NOT APPLICABLE**

(iv) method and sequence of stoping. **NOT APPLICABLE**
 Describe briefly the method of stoping to be adopted illustrated by cross sections and longitudinal sections

(v) mine ventilation **NOT APPLICABLE.**
 attach a note outlining the steps to be taken for securing an adequate supply of air in all parts of the mine and prevention of noxious gases produced and excessive rise of temperature or humidity so as to ensure adequate ventilation of the mine, accompanied by mine ventilation plan/diagram.

i) Extent of mechanization
 Describe briefly including the calculation for adequacy and type of machinery and equipment proposed to be used in different mining operations.

(1) Drilling machines :

Type	Nos.	Dia. of hole (mm)	Size/ capacity	Make	Motive power	H.P.
1 2 3	1	35mm	800/1200			



(2) Loading equipment. **At present not required**

Type	Nos.	Bucket capacity in cu.m	Make	Motive power	H.P.
1 2 3					

(3) Haulage and transport equipment : **At present not required**

(a) Haulage within the mining lease-hold

Type	Nos.	Size / capacity	Make	Motive power	H.P.
1 2 3	1	10 M.T.	TELCO	35	35

whether the dumpers are fitted with exhaust conditioner should be indicated

(b) Transport from mine-head to the destination

Describe briefly the transport system (please specify) :
 - ore transported by : own trucks/ hired trucks
 - conveyor/rail/ropeway/pipeline

Will be by hired trucks and Tippers

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main destination to which ore is transported (giving to and fro distance)

Details of hauling /transport equipment :

Type	Nos.	Size / capacity	Make	Motive power	H.P.
1					
2					
3					

(4) Miscellaneous :
Describe briefly any allied operations and machineries related to the mining of the deposit not covered earlier.

(A) Operations :

Mining activity is going to commence at Sagasahi.
Here every care will be taken to follow laws. Proper Layout
of faces and dumping on selected ground will be done in
blasting, all precaution will be taken. Workers will be
provided Safety equipments.

(B) Machineries Deployed

Type	Nos.	Size/ capacity	Make	Motive power	H.P.
1					
2					
3					

5. **BLASTING** Enclosed in separate sheet

Describe briefly :

- broad blasting parameters like charge per hole, blasting pattern, charge per delay, maximum number of holes blasted in a round, manner and sequence of firing etc.
- type of explosives used /to be used
- powder factor in ore and overburden/waste/development heading/stope
- whether secondary blasting is needed, if so describe in brief
- storage of explosives (like capacity and type of explosive magazine).

6. **MINE DRAINAGE**

- likely depth of water table based on observations from nearby wells and water bodies 6m - 10m
- workings expected to be 20 m above/each below water table by the year 2020
- quantity and quality of water likely to be encountered, the pumping arrangements and places where the mine water is finally proposed to be discharged

Quantity and quality will be surveyed after grant of mining lease.



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7. STACKING OF MINERAL REJECTS AND DISPOSAL OF WASTE

- a) indicate briefly the nature and quantity of top soil, overburden/waste and mineral rejects likely to be generated during the next five years:

Year	Top Soil	Overburden/waste In M ³	Mineral Rejects* In M ³
First	-	2121.25	288.75
Second	-	2756.25	393.75
Third	-	5292.00	756.00
Fourth	-	4851.00	693.00
Fifth	-	6284.25	897.75

* Threshold values in respect of apatite and rock phosphate, bauxite, barytes, chromite, chinaclay/kaolin, fluorite, graphite, gypsum, iron ore, kyanite and sillimanite, limestone, manganese, magnesite, talc/steatite/soapstone, and wollastonite minerals as evolved by IBM may be adopted, as applicable.

- b) land chosen for disposal of waste with proposed justification

~~This is a fresh area where mining will commence after grant of mining lease. For dumping waste Western part of Plot No 245 to the North of Trial Pit No. 1 is selected for waste and overburden dumping also subgrade and top soil will be stack in this part.~~

- c) attach a note indicating the manner of disposal, and configuration, sequence of build up of dumps alongwith the proposals for the stacking of sub-grade ore, to be indicated itemwise

8. USE OF MINERAL

- a) describe briefly the end-use of the mineral (sale to intermediary parties, captive consumption, export, industrial use) **Iron Ore that will be produced at Sagasahi will be supplied to MMTCL Ltd; for Export and to M/s SAIL for internal consumption to**
- b) indicate physical and chemical specifications stipulated by buyers **Steel Plants and Sponge Iron Plant.**
- c) give details in case blending of different grades of ores is being practised or is to be practised at the mine to meet specifications stipulated by buyers. **Not Applicable as Iron Ore that will be produced will be marketable grade.**

9. OTHER

Describe briefly the following:

- a) Site services:

~~When mining operation will commence after grant of Mining lease then required site service will be arranged within lease area, i.e. Office, Housing Complex etc.~~

- b) Employment potential:

Highly Skilled **Mines Manager Cum Mining Engineer, Surveyor .**
 Skilled **Foreman, Driver, Operator, Blacksmith, Mining Mate, Clerk**
 Semi-Skilled **Miner, Driller & Helper**
 Un-skilled **Hazree Mazdoor, Pickers, Chowkidar.**

10. MINERAL PROCESSING **Will not be required**

- a) If processing/beneficiation of the ore or minerals mined is planned to be conducted on site or adjacent to the extraction area, briefly describe the nature of the processing/beneficiation. This should indicate size and grade of feed material and concentration of the marketable product(s), recovery rate.



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- b) Explain the disposal method for tailings or waste from the processing plant (quantity and quality of tailings proposed to be discharged, size and capacity of tailing pond, toxic effect of such tailings, if any, with process adopted to neutralise any such effect before their disposal and dealing of excess water from the tailing dam).
- e) A flow sheet or schematic diagram of the processing procedure should be attached.
- d) Specify quantity and type of chemicals to be used in the processing plant.
- e) Specify quantity and type of chemicals to be stored on site/ plant.
- f) Indicate quantity (cu. m. per day) of water required for mining and processing and sources of supply of water. Disposal of waste water and extent of recycling.

PART - B

11. ENVIRONMENTAL MANAGEMENT PLAN ENCLOSED SEPARATELY

- a) Attach a note on the status of baseline information with regard to the following :
- existing land use pattern indicating the area already degraded due to quarrying/pitting, dumping, roads, processing plant, workshop, township etc. in a tabular form.
- water regime
 - flora and fauna
 - quality of air, ambient noise level and water
 - climatic conditions
 - human settlements
 - public buildings, places of worship and monuments
 - attach plans showing the locations of sampling stations.
 - does area (partly or fully) fall under notified area under Water (Prevention & Control of Pollution) Act 1974
- b) Attach an Environmental Impact Assessment Statement describing the impact of mining and beneficiation on environment on the following over the next five years (and upto conceptual plan period for 'A' category mines).
- i) Land area indicating the area likely to be degraded due to quarrying/pitting, dumping, roads, workshop, processing plant, township etc.
 - ii) Air quality
 - iii) Water quality
 - iv) Noise levels
 - v) Vibration levels (due to blasting)
 - vi) Water regime
 - vii) Socio-economics.



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viii) Historical monuments etc.

c) attach an Environmental Management Plan (supported by appropriate plans and sections) defining the time-bound action proposed to be taken with sequence & timing in the following areas (or diagrams should be used):

- temporary storage and utilisation of topsoil

- yearwise proposal for reclamation of land affected by abandoned quarries and other mining activities during first five years (and upto conceptual plan period for 'A' category mines) clarifying the extent of back filling and recontouring and/or alternative use of unfilled/partially filled excavations/road sides/slopes and mine.

- In case abandoned quarries/pits are proposed to be used as reservoir, their size, water holding capacity and proposal for utilisation of such water be given.

- programme of afforestation, yearwise for the initial five years (and upto conceptual plan period for 'A' category mines) indicating number of plants with name of species to be afforested under different areas in hectares.

- stabilisation and vegetation of dumps alongwith waste dump management yearwise for the first five years (and upto conceptual plan period for 'A' category mines).

- measures to control erosion/sedimentation of water courses

- treatment and disposal of water from mine

- measures for minimising adverse effects on water regime

- protective measures for ground vibrations/air blast caused by blasting.

- measures for protecting historical monuments and for rehabilitation of human settlements likely to be disturbed due to mining activity

- socioeconomic benefits arising out of mining.

d) Monitoring schedules for different environmental components after the commencement of mining and other related activities. (for 'A' category mines only)

Note: Ground vibration studies are to be carried out for virgin areas/new leases after one year from the commencement of mining activities. (for 'A' category mines only).

Note: While preparing mining plans various circulars issued by CCOM particularly the circular No.2/91 regarding conceptual mining plan, 5/91 regarding requirement of exploration and existence of mineral, 3/92 regarding generation of baseline data by mechanised mines etc. may also be referred and taken into account.



.....
S. H. Khandelwal
Regd. No. RQP/CAL/013/87-A

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LAND SCHEDULE OF SAGASAHI IRON ORE MINES OF M/S NATIONAL ENTERPRISES

<u>PLOT NO</u>	<u>NAME OF TENANT</u>	<u>KISSAM</u>	<u>AREA</u>	<u>REMARKS</u>
245	ABAD AJOGYA ANABADI	JUNGLE	67.89	PART
378	-do-	-do-	14.48	PART
379	-do-	-do-	18.67	PART
380	-do-	-do-	0.63	PART
			101.67 Acres	
			OR	
			41.144 HECTARES	



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3.0 GEOLOGY AND EXPLORATION

LOCATION : The applied mining lease area of M/s National Enterprises forms a part of village Sagasahi No 27 in Bonai Su-Division of Sundargarh district of Orissa is contained in Survey of India Topo Sheet No 73 G/5, Scale 1 : 50,000 and is delineated between Latitude $21^{\circ}.56'.06''$ - $21^{\circ}.56''.34''$ and Longitude $85^{\circ} 16'.52''$ - $85^{\circ} 17'.23''$.

TOPOGRAPHY

The applied Mining Lease area of M/s National Enterprises over 41.144 Hectares in village Sagasahi No 27 under Koira Police Station of Bonai Sub-Division of Sundargarh district of Orissa in Revenue ^{Record} is recorded as Abad Ajogya Anabadi Kissam - Jungle being covered with shrub and bushes with full grown trees of Mango, Banyan etc. within applied area main hillock is in ENE - WSW direction small tungri to the South of B.P.D. and B.P.E. is in NE-SW and another tungri in Western part which is in NNW-SSE in these tungri are ferruginous laterites. The highest contour (elevation) within target area is of 740 metres above M.S.L. and the lowest is of 620 metres above M.S.L. on upper contour in Eastern part are Iron Ore. Within applied M.L. area are dry nallahs. In Southern part dry nallah is flowing from South to North West which is in between B.P.J. and B.P.K. from NNW of B.P.J. takes a turn in NW to NNW direction and finally moves to North East and joins perenneal nallah outside M.L. area to the ESE of village Sagasahi. This perenneal nallah drain out to Kalmong nallah which merges to Suna nadi. To the East of dry nallah are Iron Ore and its West are Laterite. In Southern part of M.L. area are ferruginous shale which is even in Mendha Maruni R.F. Also within M.L. area are two small dry nallah running from SW to NE.



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GEOLOGY : REGIONAL GEOLOGY

The slightly metamorphosed volcanic and sedimentary sequence of rock occurring in and around this lease hold area belong to the Iron Ore series of ProCambrian age (Jones 1934) and forms part of the Eastern dipping Western limb of the North plunging asymmetric synclinerium. Stratigraphy of the sedimentary rocks of Iron Ore series established by Jones(1934) was modified later by Dunn (1940), which was further modified by Misra (1961) and in 1982 by Sarkar and Saha and most recently by Saha, Ray and Sarkar 1988.

STRUCTURAL SET UP (REGIONAL)

The rocks of the Iron Ore group are folded into a major synclinerium as was first reported by Mr H.C. Jones (1934). It is best discerned by the band of Iron Ore formation, which consistently occurs for long distances and describes a major South facing closure to South around Khandadhar. It is a low North plunging syncline slightly overturned to East. The right side up Eastern limb strikes approximately in NE - SW direction and dips at low to moderate (15° to 45°) angle due NW. The overturned Western limb strikes in a general NNE - SSW direction and dips at very steep angles (55° to 85°) due Westerly.

GEOLOGY OF SAGASAH I (41.144 Hects) APPLIED MINING LEASE AREA OF M/S NATIONAL ENTERPRISES FOR IRON ORE

The Sagasahi Iron Mines M.L. area of M/s National Enterprises is East South East to South East of village Sagasahi, which is about 7 Kms North East of Koira town. The mining lease area in Revenue record is recorded as Abad Ajogya Anabadi Kissam Jungle and covers an area of 41.144 Hectares. In this area Iron Ore as float ore and Insitu Ore are found. The insitu Iron Ore in target area is in Eastern top part running in a North - South to NNE - SSE direction and is dipping towards West in between 15-30 degrees, Float Iron Ore in target area is on the Northern and Southern slope of main insitu hill which is in North - South direction. In Northern part in between insitu Iron Ore and Float Iron Ore are Brecciated Laterite



Laterite (Conga) having 30% recovery of Iron Ore in it. To the West of Nallah are Laterite upto Western boundary line. About 8 trial pits in past had been done by some persons to the West of dry nallah which shows signs of Ferruginous laterites with few pieces of Manganese Ores not of economic importance in present stage. In Southern part to the South of Nallah are grey to buff colour shale. In the Northern boundary from Boundary pillar C to B.P.I. are Alluvium.

Four samples from Insitu Iron Ore zone and 4 samples from other zone at Sagasahi was collected and analysed by M/s R. V. Briggs Ltd; and result declared vide certificate No SA/OC/316/323 dated 10th March, 1999 of Insitu ore is as follows :

INSITU IRON ORE

Fe	63.27%	64.01%	65.65%	65.89%
SiO ₂	3.04%	2.95%	1.96%	1.18%
Al ₂ O ₃	2.94%	3.01%	2.43%	1.67%
Phos	0.038%	0.034%	0.027%	0.034%

Result of other types of Iron Ore declared is as follows :

	<u>LATERITIC IRON ORE</u>	<u>FLOAT IRON ORE</u>		<u>SOFT IRON ORE</u>
Fe	61.29%	62.00%	65.04%	64.40%
SiO ₂	2.70%	1.69%	1.26%	1.27%
Al ₂ O ₃	4.43%	5.72%	3.35%	3.57%
Phos	0.076%	0.076%	0.078%	0.075%

Analysis certificate of M/s R. V. Briggs & Co (P) Ltd. is enclosed separately.

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CONTROL OF MINERALISATION

The characteristics of the mineralisation in the area have been dependent upon the disposition of host rocks, shales and laterites. The mineralisation in the area is governed by the following factors.

- i) Composition of the metasediments
- ii) Degree of leaching process as well as the intensity of recrystallisation.
- iii) Structural set up of the hostrocks.
- iv) Intensity and degree of weathering

STRIKE AND DIP

Iron ore as Insitu is in Eastern hill and is running in N - S to NNE - SSW direction and is dipping towards West in between 15-30 degree.

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EFFECTS OF WEATHERING

The weathering has led to the formation of laterite, which is highly erratic in nature, hence irregular/discontinuous pockets of laterite is a common feature in the Iron and Manganese Ore deposits.

ORE TYPE

The different ore types encountered in Sagasahi applied M.L. area of M/s National Enterprises have been classified based on the physical and chemical characteristics are as follows :

- i) Hematite Breccia (Float Iron Ore)
- ii) Insitu Iron Ore

The Insitu Iron Ore had been further classified as

- a) Hard Massive Ore (HMO)
- b) Hard Laminated Ore (HLO)
- c) Lateritic Iron Ore (LO)
- d) Soft Laminated Ore (SLO)



Thin Manganese Ore are mainly as float ore as boulders and pebbles as seen in old Trial Pit having very poor recovery.

DETAILS OF EXPLORATION

i) ALREADY CARRIED OUT IN THE AREA

The area applied for grant of Mining Lease by M/s National Enterprises had been prospected by some agency in past, whose record is not available with the applicant. Geological mapping on 1:1000 Scale for the applied area had been done by the Consultant and mineralised and non-mineralised area had been demarcated. Within target area 8(eight) numbers of shallow trial pits were found 7(seven) to the west and 1(one) to the East of main dry nallah . In trial pits examined no trace of Iron Ore was noticed only ferruginous laterite is found, but in few Trial Pits

Trial Pits pieces of Manganese Ore are found not of any economic importance. As trial pits are partly filled there logging given in Tabular form below :

DETAILS OF TRIAL PITS DONE AT SEGASAH

Trial Pit No	LOCATION	R.L. in METRE	DEPTH WORKED IN METRES			LITHOLOGY
			FROM	TO	RUN	
1.	N-362-W 110	638.00	G.L. 0.75	0.75	0.75	Soil with murrum
			0.75	3.00	2.25	Fe Laterite
			3.00	4.00	1.00	Yellow Shale
2.	N-312 W 110	636.50	G.L. 0.50	0.50	0.50	Soil mixed murrum
			0.50	3.00	2.50	pieces of Float Iron Ore with Laterite
3.	N 180 - W 160	642.00	G.L. 1.00	1.00	1.00	Soil mixed murrum
			1.00	3.50	2.50	Laterite
			3.50	4.50	1.00	Shale
4.	N-106 - W 116	653.00	G.L. 2.00	2.00	2.00	Soil mixed murrum
			2.00	4.00	2.00	pieces of Float Mn ore with Laterite
5.	N-146 - W 204	654.00	G.L. 0.50	0.50	0.50	Soil
			0.50	3.50	3.00	Manganese Ferrous Laterite
6.	N-110 - W 222	661.50	G.L. 3.00	3.00	3.00	Ferruginous Laterite
7.	N-44 - W 160	679.50	G.L. 0.20	0.20	0.20	Soil .
			0.20	3.20	3.00	Fe Laterite
8.	N-140 - W 150	644.00	G.L. 1.00	1.00	1.00	Soil
			1.00	3.50	2.50	Shaly Laterite



N-100 E-100	PTP No 5	5m	4x4x5.0m	To prove quality of Insitu Iron Ore	2nd year
N-200 E-300	PTP No 6	5m	4x4x5.0m	-do-	3rd year
N-200 E-200	PTP No 7	5m	4x4x5.0m	-do-	-do-
N-200 E-100	PTP No 8	5m	4x4x5.0m	-do-	-do-
N-300 E-300	PTP No 9	5m	4x4x5.0m	To prove Iron Ore in Brecciated Laterite Zone	-do-
N-300 E-200	PTP No 10	5m	4x4x5.0m	-do-	-do-
N-300 E-100	PTP No 11	5m	4x4x5.0m	-do-	-do-
N-400 E-200	PTP No 12	5m	4mx4mx5m	To prove Float Iron Zone	4th year
N-400 E-100	PTP No 13	5m	4mx4mx5m	-do-	-do-
N-400 WE 0.0	PTP No 14	5m	4mx4mx5m	To prove occurrence of mineral below laterite	-do-
N-300 WE 0.0	PTP No 20	5m	4mx4mx5m	-do-	-do-
N-300 W-100	PTP No 19	5m	4mx4mx5m	-do-	-do-
N-200 WE 0.0	PTP No 21	5m	4mx4mx5m	-do-	5th year
N-200 W-100	PTP No 22	5m	4mx4mx5m	-do-	-do-
N-100 WE 0.0	PTP No 25	5m	4mx4mx5m	-do-	-do-
N-S0.0 E-100	PTP No 26	5m	4mx4mx5m	-do-	-do-
N-S0.0 E-010	PTP No 27	5m	4mx4mx5m	-do-	-do-
N-S 0.0 W-100	PTP No 28	5m	4mx4mx5m	-do-	-do-
S-100 W.E 0.0	PTP No 29	5m	4mx4mx5m	-do-	-do-
S-100 E-100	PTP No 30	5m	4mx4mx5m	-do-	-do-

PHASEWISE FUTURE EXPLORATION PROGRAMME BY WAGON DRILL AT SAGASAH I
OF 100mm DIA

LOCATION	PROPOSED D.T.H. No	TOTAL DEPTH IN METRE	OBJECTIVE	TIME SCHEDULE
E.270-S.100	D.T.H. No 1	10	To prove quality at depth of Insitu Iron Ore	1st year
E.270-S 50	D.T.H. No 2	10	-do-	-do-
E.270 N-S0.0	D.T.H.No 3	10	-do-	-do-
E.270 N 50	D.T.H. No 4	10	-do-	-do-
E.270 N.100	D.T.H. No 5		-do-	-do-
E.270 N 150	D.T.H. No 6		-do-	-do-
E.270 N-200	D.T.H. No 7		-do-	-do-



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E-200 N-150	D.T.H. No 8	10	To prove quality at depth of Insitu Iron Ore	2nd year
E-200 N-50	D.T.H. No 9	10	-do-	-do-
E-150 N-150	D.T.H. No 10	10	-do-	-do-
E-150 N-100	D.T.H. No 11	10	-do-	-do-
E-100 N-150	D.T.H. No 12	10	-do-	-do-
E-100 N-150	D.T.H. No 12	10	-do-	-do-



METHOD OF RESERVE ESTIMATION

The applied Mining Lease area had been mapped and a Surface Geological Plan on 1 : 1000 RF had been prepared refer Plate No 3. In this plan Iron bearing area had been demarcated separately. The Geological cross section in 1:1000 RF have been drawn at 100 metres interval in Sagasahi applied area. While constructing the cross section due care has been taken to ensure probable configurations of the ore body and controlling factor of mineralisation as far as possible.

In an attempt to estimate the reserve of the area following norms have been considered.

- i) Physical limit of the ore body as obtained from Geological Mapping and the out crop pattern.
- ii) Structural behaviour i.e. strike and dip of the ore body and other indirect evidences. The strike of the ore body is N - S to NNE - SSW.

The estimation has been done on a very conservative basis. The volume multiplied by the tonnage factor gives the reserve tonnage. As no record of exploration already done in the area is available only proved and probable; ^{Possible} reserve, had been calculated from the Cross section and is given below in tabular form. The ore body exposed in INSITU is taken in proved category and ore body in Float and Brecciated Laterite Zone in Probable category.

TOTAL POSSIBLE RESERVE 902940 M.T.

ABSTRACT OF GEOLOGICAL RESERVE

PROVED ORE - 7,24,500 M.T.
PROBABLE ORE - 9,02,400 M.T.
POSSIBLE ORE - 9,02,940 M.T.
TOTAL RESERVE: 25,29,840 Metric Tonnes



CUT OFF GRADE

The cut off grade is based on present requirement of market for the final quality of product and as per data revealed by trial pits and surface exposures. The cut off grade for Iron Ore has been fixed as 58% Fe having 55% as the-reshold value.

TONNAGE FACTOR

To make a realistic and conservative estimate of the reserve tonnage the tonnage factor has been fixed at 3.0 Metric Tonnes per Cubic Metre. This tonnage factor for Iron Ore is based on the experience as well as the data observed from the neighbouring mines of similar nature.

RECOVERY PERCENTAGE

The recovery percentage is considered on result of trial pits and bore hole. As data of exploration done is not available on result of geological mapping and examination of Surface exposure is considered to be 60% for INSTPU IRON ORE and 40% for FLOAT IRON ORE and in Brecciated Laterite Zone is taken as 25%. After grant and execution of M.L. exploration work will be under taken then it will be confirmed.

GEOLOGICAL RESERVE AND GRADE

The reserve of Iron Ore within Sagasahi applied area (41.144 Hects) of M/s National Enterprises is tabulated below :

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PROVED ORE	-	7,24,500	Metric Tonnes
PROBABLE ORE	-	9,02,400	Metric Tonnes
POSSIBLE ORE	-	9,02,940	Metric Tonnes
<hr/>			
Total Geological Reserve	-	25,29,840	Metric Tonnes



The grade has been estimated based on the examination of exposure in the field in course of Geological mapping and its chemicals results.

Reserve of Iron Ore gradewise within Sagasahi applied area

+65% Fe	-	30%	=	7,58,952	Metric Tonnes	
+62% - 65% Fe	-	50%	=	12,64,920	Metric Tonnes	
+60 - 62% Fe	-	15%	=	3,79,476	Metric Tonnes	
-60% Fe	-	5%	=	1,26,492	Metric Tonnes	
				<hr/>	25,29,840	Metric Tonnes

MINEABLE RESERVE AND ANTICIPATED LIFE OF MINE

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Mineable reserve had not been defined in any standard text book. However it has been defined by the committee on "Standardisation of terminology and calculation of ore and mineral reserve" in G.S.I. miscellaneous publication No 58 as follows.

"It is that part of the demonstrated reserves which is likely to be extracted after allowing for loss on account of various mining method adopted."

It has been estimated by the committee that an average estimated loss in around 10% for opencast mining.

Geological estimated reserve (PROVED + PROBABLE)	-	16,26,900	Metric Tonnes
Mineable Reserve of Iron Ore	-	14,64,210	Metric Tonnes
Anticipated life of this mine at the rate of 36000 M.T./Annum	-	14,64,210	Metric Tonnes
			36,000 = 40.67 years Say 41 years

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देशीय खान नियंत्रक
 Regional Controller of Mines
 भारतीय खान ब्यूरो
 Ministry of Mines

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So anticipated life of this mines is 41 years which will increase when this lease hold area will be further explored to depth.

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4.0

MINING

a) Briefly describe the existing/proposed method for developing working the deposit with all design parametres.

Mining lease over an area of 58 Hectares area was applied by M/s National Enterprises, Barbil for grant of Mining Lease for Iron Ore in part of village Sagasahi in Bonai Sub-Division of Sundargarh district of Orissa state. State Government of Orissa had decided to grant Mining Lease over 41.144 Hectares to M/s National Enterprises, Barbil to win Iron Ore, vide letter No 11824/SM, Bhubaneswar, the 29.12.97 Xerox copy of letter is enclosed.

Within target area Iron Ore is as float and Insitu ore with Murrum and Laterites.

This disposition of the Iron Ore deposit in the area, their physical properties, the properties of hanging wall and foot wall rocks, the topography and the hydrological condition of the area are some of the factors which help in deciding to adopt open cast surface mining. These factors are also further influenced by certain other local conditions, such as safety availability of skilled and semi-skilled human resources, power and other infrastructure on deciding for open cast mining. As Sagasahi Iron Ore body is not uniform in gradewise distribution and this will need more or less selective mining. This also favours to win over the deposit by open cast Surface Mining mostly with manual manpower, with drilling and blasting. Within Sagasahi Insitu Iron Ore are mainly exposed on the Surface having inter burdens of Laterites and shale which can be removed manually.



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Metres width and of 6 metres height in Insitu face. Propsoed working is shown on development plan Plate No 6 and conceptual Plan Plate No. 8.

YEARWISE PRODUCTION FOR FIRST FIVE YEARS

Mining operation at Sagasahi will start only after mining lease is granted and executed in favour of M/s National Enterprises. As discussed in earlier para one INSITU faces after grant and execution of lease will be opened. Yearwise excavation, Waste generation, Production of marketable Iron Ore, subgrade is given in Table No 4. In this area Iron Ore is from Surface, so there is no overburden.

The quantum of production ~~during~~ ^{will be} 1st Five Years is as given below :

Total Excavation	-	60585 Cum
Total Waste	-	21204.75 Cum
Production of Sub-Grade	-	3029.25 Cum
Production of Iron Ore	-	36351.00 Cum
Production of Iron Ore in M.T.	-	109053 M.T.
Average Production per annum	-	21810.60 M.T.
Average Production per month	-	1817.55
Average Production per day	-	72.702 M.T.

GRADEWISE PRODUCTION

+65% Fe	-	30%
+62 - 65% Fe	-	50%
+60 - 62% Fe	-	15%
-60% Fe	-	5%



PROPOSED RATE OF PRODUCTION WHEN THE MINE WILL BE FULLY DEVELOPED

Sagasahi will be a new mine which during first five year will be developed and an optimum production of 1817.55 M.T. of Iron Ore per month can be achieved with proposed development. This is possible because of the following reasons.

- 1) At Sagasahi 41.144 Hectares area decided to be granted to M/s National Enterprises for mining lease for Iron Ore in this area one face in INSITU Iron Zone will be fully exposed in first five years.
- ii) Face will be developed within INSITU mineralised Zone.
- iii) Any abrupt increase in the production can be achieved by lateral as well as depth wise extensions.



PROPOSED METHOD OF MINING

At Sagasahi manual open cast mining will start after grant and execution of mining lease. Here Iron Ore as float and INSITU ORE occurs. After grant of mining lease tractor mounted compressor will be procured then drilling by Jack Hammer will be performed and INSITU face will be developed and will be blasted with Safety Fuse.

OPEN CAST MINING

Sagasahi is a new area where mining operation will commence after grant and execution of mining lease. The system of mines working will be by manual means with drilling and blasting and will have the following pattern.

As Iron mining will be newly started at Sagasahi within Insitu Zone during coming 5 (five) years 5 benches of 210 metres length and 8 Metres width and 6 metres height each will be exposed in between 710 and 740 metres contour and is shown in development Plan Plate No 6.

- 1) In Insitu 8m wide benches as given above will be developed of 6 metres height.
- ii) In Insitu Zone drilling will be performed by Jack Hammer and will be blasted with ordinary detonator and Safety Fuse.
- iii) Iron boulder will be broken by sledge hammer to sizeable piece by manual worker at the face as lumps and ruri as per buyers mechanical specification.

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LOADING

At Sagasahi due to small scale mining manual loading of Iron Ore Subgrade and waste will be done. Later machine can be used in loading when production increases. So manual loading of ore and waste will be done by manual labourers to fleet of Truck/Tippers.

TRANSPORT

When this mine will start transport of ore to destination/Railway siding and movement of waste and rejects to various dump earmarked for the purpose will be done by hired trucks/Tippers.

MISCELLANEOUS OPERATION

Ancillary operation of screening, road making and repairing etc. will be done by manual labourers.

During the operation of this mine every care will be taken to see that various provisions under Metaliferrous Mines Regulation 1961, Mines Act 1952, Mines Rules 1955 and Mineral Conservation and Development Rule, 1988 made thereafter are followed for which competent persons will be employed.



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Density 1 Cum = 3.0 M.T.

YEAR	SECTION	TOTAL EXCAVATION IN M ³	% of recovery of Ore	Volume of Ore in M ³	Quantity of Ore in M.T.	% of Sub-Grade & Fines	Volume of Sub-Grade & Fines	Volume of Waste in M ³
First Year	S - T	2625	60%	1575	4725	5%	131.25	918.75
	U - V	3150	60%	1890	5670	5%	157.50	1102.50
Second Year	S - T	5250	60%	3150	9450	5%	262.50	1837.50
	U - V	2625	60%	1575	4725	5%	131.25	918.75
Third Year	S - T	9450	60%	5670	17010	5%	472.50	3307.50
	U - V	5670	60%	3402	10206	5%	283.50	1984.50
Fourth Year	S - T	6300	60%	3780	11340	5%	315.00	2205.00
	U - V	7560	60%	4536	13608	5%	378.00	2646.00
Fifth Year	S - T	7875	60%	4725	14175	5%	393.75	2756.25
	U - V	10080	60%	6048	18144	5%	504.00	3528.00
TOTAL		60585		36351	109053		3029.25	21204.75



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APPROVED

(Signature)
10/9/87
देशीय खान नियंत्रक
Regional Controller of Mines
भारतीय खान ब्यूरो
Indian Bureau of Mines
कलकत्ता
Calcutta

(Signature)
Regd. No. RQP/CAL/013/87-A

4 (F) CONCEPTUAL MINING PLAN

Mining lease over an area of 58.598 Hectares on 24.06.1980 was applied by M/s National Enterprises for Iron ore in part of village Sagasahi No 27 in Bonai Sub-Division of Sundargarh district of Orissa State. Joint Secretary to Government of Orissa, Department of Steel & Mines vide letter No 1191/SM. dated 12.02.97 informed the applicant that State Government have recommended to Government of India, Ministry of Mines for grant of Mining Lease for Iron Ore over an area of 41.144 Hectares in village Sagasahi of Sundargarh district in favour of applicant for their approval. Again vide letter No 11824/SM. dated 29.12.97 had given terms and conditions for grant of mining lease which the applicant had accepted and sent to State Government. Xerox copies of both letter is enclosed with this Mining Plan for grant of Mining Lease in favour of M/s National Enterprises.

As this will be a new mining lease area having only 8(eight) shallow trial pits in Western part having laterites and shales. Details geological mapping on 1 : 1000 Scale was done first and a Geological plan refer Plate No 3 was prepared. In the target area to the East of dry nallah Iron Ore as Insitu and float ore are found Float ore are in Northern part and in Southern part which is plotted on Plate No. 3 enclosed. To the South of Northern float Iron zone are Brecciated Laterites with Iron Ore having 20-30% recovery of marketable Iron Ore and to its South on hill top Insitu Iron Ore running in N-S to NNE and SSW direction. To the South of Insitu ore are float Iron Ores on Southern slope of hill. In the beginning it is proposed to start mining in Insitu top part 210m long and 8 metres wide and 6 metres deep face will be open from which 21810.60 M.T. of Iron Ore will be produced per year. During 5 (five) years following forest land will be degraded.



For Quarry	-	12600 M ²
For Sub-Grade Stacking	-	2905 M ²
For Waste Dumping	-	9068 M ²
For Top Soil Stacking	-	1200 M ²
For Township Office	-	10000 M ²
For Road making	-	45900 M ²



82600 Sq. Metres

Therefore total forest land that will be degraded at Sagasahi for mining and allied work will come to 8.260 Hectares.

ULTIMATE EXTENT AND SIZE OF THE PIT

This is a new area it is proposed to commence mining operation in INSTU top zone starting from 740 metres to 705 metres contour benches in 210 metres in N-S and 60 metres in East - West will be worked of 6m. height each. Here 5 benches of same nature in 5 years will be developed at Sagasahi.

Quarry limit			
at the end of 5 years	-	210 x 60	= 12600 Sq metres
By end of 20th years	-		
Face A	-	210 x 60	= 12600 Sq. Metres
Face B	-	55 X 110	= 6650 Sq. Metres
Face C	-	194 x 47.50	= 9215 Sq. Metres
Ultimate Pit Limit			= 55477 Sq. Metres

The Conceptual position of quarry is marked on Conceptual plan Plate No. 8. The Conceptual position of this quarry will be 5.5477 Hectares and will be worked to 40 metres depth. Also a float Iron Ore face covering 0.9215 Hectares in Northern part marked Face 'C' will be developed during lease period.

FINAL SLOPE ANGLE AT THE CLOSE OF THE MINES

An Insitu ore will be worked final slope angle will be in between 45 - 60°.

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For Mining	-	5.548 Hectares
For Sub-Grade Stacking	-	0.290 -do-
For Waste dumping	-	0.907 -do-
For Top Soil Storing	-	0.120 -do-
For Road	-	4.590 -do-
For Township Office	-	1.000 -do-
For Magazine	-	0.0225 -do-
		<hr/>
		12.4775 Hectares

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5.0

BLASTING

- a) Broad blasting parametres like charge per hole, Blast Pattern, Charge Per delay, Maximum number of holes blasted in a round, manner and sequence of firing etc.

BLASTING PARAMETRES

At Sagasahi Iron Mines which is being granted to M/s National Enterprises, Barbil in the begining short holes will be drilled and blasted. As is a new working daily in INSITU zone holes will be drilled by Jack Hammer and will be blasted in Faces. In begining standard parametre for short holes will be followed i.e. spacing and burden for 1 metre depth of hole 0.6m burden and 0.7m spacing will be followed and in bouldary nature of deposit no difinite spacing and burden pattern can be followed as irregular fragmentation will be there.

At Sagasahi to control the throw of rock and minimise ground vibration, slurry explosives will be used in blasting. Here all the holes will be blasted with safety fuse firing system instead of instantaneous electric blasting system. This method of firing will be economical as it will control the throw and vibration.

Type of explosives to be used and typical charge pattern at target area will be as given below :

For 1.20 metres depth

Special Gelatine 60% or 80%	-	140 Gms (one Cartridge)
Indomite/Superdyne	-	70 gms (half cartridge)
Ordinary Detonator	-	One No.
Safety Fuse	-	1.25 metres

For 0.60 metres depth

Special Gelatine/Superdyne	-	140 Grams(One Cartridge)
Ordinary Detonator	-	One No.
Safety Fuse	-	1.25 Metres



Number of holes to be blasted in Ground : 10 numbers of holes will be blasted.

(b) Type OF EXPLOSIVES TO BE USED

For Sagasahi Iron Mines of M/s National Enterprises will apply to the Chief Controller of Explosives for grant of Explosives Licence to use and store following types of Explosives.

Class 2 and or Class 3	-	100 Kgs
Ordinary Detonator	-	10,000 Nos
Safety Fuse	-	3,000 Metres

Also a separate licence to use and manufacture of 100 Kg ANFO will be obtained.

After the grant of Explosives licence then only above explosives can be used at mines and store in a portable magazine.

(c) POWDER FACTOR IN ORE AND OVERBURDEN/WASTE/DEVELOPMENT HEADING/STOP

At Sagasahi Iron mines 1.2 metres and 0.6 metre holes in the beginning will be drilled and blasted, quantity of Iron Ore per Kg of explosive use will be as follows :

- i) When a hole of 1.20 m x 0.7m x 0.80m is charged the quantity which will be available after blast will be $0.672M^3$ considering 1 Cum = 3.0 M.T. IronOre quantity recovered per hole will be $0.672 \times 3.00 = 2.016$ M.T. with a charge of 210 gms of explosives. So quantity of Iron Ore per kg of explosives will be $2.016 \times 1000 / 210 = 9.61$ M.T.
- ii) When a hole of 0.6x0.6x0.6m is charged the quantity which will be available after blast will $0.216M^3$, Iron Ore quantity per hole will be $0.216 \times 3.00 = 0.648$ M.T. with a charge of 140 gms explosives.

So quantity of Iron Ore per Kg of explosives will be $0.648 \times 1000 / 140 = 4.628$ M.T.

Powder factor at Sagasahi Iron Mines comes to 7.114 Say 7 M.T. per Kg of explosives used.

- (d) Storage of explosives (like capacity and type of explosives magazine)

Within target area for secure and safety storage of explosives in a permanent portable magazine should be provided and a licence to use and store explosive should be obtained from the Explosives licencing department. Location of proposed magazine has been shown on conceptual plan Plate No. 8. Storage capacity of magazine should be as follows.

Class 2 and Class 3	-	100 Kg
Class 6 Division 1	-	3000 Mtres
Class 6 Division 3	-	10,000 Nos

The magazine will be as per the design laid down in Indian Explosives Rules and Safety distance will be maintained as per above Rules.



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6.0

MINE DRAINAGE

The applied mining lease area of M/s National Enterprises over 41.144 Hectares in village Sagasahi No 27, under Koira Police Station of Bonai Sub-Division of Sundargarh district, Orissa do not have any perenneal nallah. There are dry nallahs within applied area in which water flows during rainy season. In Southern part dry nallah is flowing from South to North West which is in between B.P.J. and B.P.K. From North of B.P.J. This nallah runs in a NNW direction and reaching Northern parts this nallah moves towards North East and Joins the perenneal nallah outside M.L. area to the ESE of village Sagasahi. In Western boundary there are two dry nallahs in the middle part running SW to NE which joins the main dry nallah. The perenneal nallah which is South and South East of village Sagasahi drain out to Kalmong nallah which merges to SUNA NADI and finally to Baitarni River. Mining activities in target area will be always 10-20m above surface water level for which there will be no danger. Here mining activity will start after Mining Lease is granted and executed, from begining regular contour drains will be cut around working faces to prevent any accumulation of water at the working faces, rain water either get absorbed in the Sub soil or seep through various cracks and exposures in the ore body which ultimately helps in the maintenance of level of ground water, table in target area due to manual mining there will no use of industrial water. The water table in wells and tube wells of nearby villages is in between 6-10 metres in wells and 20-30 metres in Tube wells.



S. W. Ali Ismail
Regd. No. ROP/CAL/013/87-A

8.0

USE OF MINERAL

The Iron Ore that will be produced at Sagasahi Iron Mines of M/s National Enterprises will be supplied to M/s MMTC Ltd; for Export to Foreign countries and to M/s Steel Authority of India Ltd; for internal Steel Plants and will also be supplied to Sponge Iron Plant within the country.

BUYER'S SPECIFICATION ARE AS FOLLOWS

1. M/s M.M.T.C. Ltd; Specification of Iron ore for Export

Fe	-	64% Rejection below 63.5%
SiO ₂	-	5% Maximum
SiO ₂ + Al ₂ O ₃	-	6% Maximum
Phos (P)	-	0.05% Maximum
Sulphur (s)	-	0.02% Maximum
Copper(Cu)	-	0.01% Maximum
Lead(pb)	-	Traces
Zinc(Zn)	-	Traces
Total of other metal (Except Mn, Mg & Ca)	-	0.11% Maximum
Moisture	-	5%
Size : Mechanical	-	1" to 4"



2. SPONGE IRON PLANT

Fe	-	65% Rejection below 64%
SiO ₂ + Al ₂ O ₃	-	6% Maximum
Phosphorus (P)	-	0.05% Maximum
Moisture	-	2% Maximum
Size : Mechanical	-	5mm to 20mm with tolerance of 5mm : 5% Maximum 20mm to 30mm tolerance 10% Maximum + 3mm : Nil

PART B

11.0

ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management plan deals with the vital aspects pertaining to Environmental protection and control of the target area earmarked for continuance of mining operation for Iron Ore, which will start after grant and execution of mining lease. A strict adherence to the said legislative steps is therefore obligatory, so that mining activity and ecological balance can continue in harmony. The complex aggregate of all the external condition which effect the life, development and survival of an organism is defined as the Environment. Thus it includes not only air, water plants and animals but also other natural and human modified features, constituting the totality of man's surroundings. Hence for preservation of environment and to obtain a basis for assessment of environmental impact in the mining area certain relevant parameters had been studied to arrive at baseline data.

BASELINE INFORMATION

i) EXISTING LAND USE PATTERN

The Sagasahi area proposed for mining lease to M/s National Enterprises for Iron Ore is part of Sagasahi village and in R.O.R. is recorded as ABAD AJOGYA ANABADI - Jungle and is to North of MENCHAMARUNI RESERVE FOREST. This area is to the South of Koira - Kalmong road having hilly Topography. The lowest and highest contour of this area is of 620 and 740 metres above mean sea level.

ii) WATER REGIME

Within Sagasahi proposed mining area there do not exist any perenneal nallah. To the South of Sagasahi village a perenneal nallah is flowing which is less than half a kilometre North of M.L. area and SUNA NADI is about 3 Kms East of target area for which there will be no pollution effect due to working of this lease hold to SUNA NADI.



FLORA AND FAUNA :

This lease hold area is part of village jungle and revenue record^{as} Abad Ajogya Anabadi - Jungle. There is about 2000 trees of mixed varieties such as Sal, Kusum, Asan, Dhola, Doka, Chehar, Harra Behara, Bhalia, Baniyan, Mango, Kendu, Sidha etc. As Mendhamaruni R.F. is to the South of this area. Elephant, Bear etc visit the area.

QUALITY OF AIR, AMBIENT NOISE LEVEL AND WATER

As observed during field study the air quality is fairly clean due to the fact that there is no running mines within radius of three Kilometres of the target area. Ambient noise level is also within tolerance limit. Water quality is even to the standard. Water of perenneal nallah is being used by local people of the area.

CLIMATE CONDITION

The Koira valley of Bonai Sub-Division of Sundargarh district enjoys a tropical climate. The average peak summer and lowest winter temprature as recorded at Barsuan Iron Mines office are around 42°C and 7°C. The annual recorded rainfall varies between 1109mm and 1857mm annually wind direction^{as} 20 Kms/hour SW - NE.

HUMAN SETTLEMENTS

The proposed area for grant of Mining Lease to M/s National Enterprises forms part of village Sagasahi No 27. This part of village area is recorded in R.O.R. as Jungle having no human settlement. Within 5 Kms of the applied lease area 13761 numbers of persons live in scattered formation in this surrounding villages and in Koira town and depend on their livelihood on agriculture, Forest product and mining.

PUBLIC BUILDING, PLACES AND MONUMENTS

Within 5 Kms of target area following public building exist.

- i) Government Hospital, Koira
- ii) Office of the Deputy Director of Mines, Koira
- iii) Block Office, Koira
- iv) High School and college at Koira
- v) P.W.D. Inspection Bunglow, Koira
- vi) Temple
- vii) Police Station



11 (b) ENVIRONMENTAL IMPACT ASSESSMENT

In Segasahi Iron Mines area over 41.144 Hectares being granted to M/s National Enterprises for mining Iron Ore impact due to commencement of mining in the area will not be much because of adoption of manual mining method with drilling and blasting. However whatever small it may be there will be some alteration in the existing ecosystem, which are being discussed in the following few lines.

1. Land area indicating the area likely to be degraded. As Mining operation will start in the area some quantity of land will be degraded which is as follows :

a) INSITU FACE 210m x 60m	-	12600 M ²
b) Stacking subgrade 80m x 40m	-	3200 M ²
c) For waste dumping 130m x 70m	-	9100 M ²
d) For construction of Road	-	45900 M ²
e) For stacking Top Soil 40m x 30m	-	1200 M ²
f) For office and Township 100m x 100m	-	10000 M ²
		<u>82600 M²</u>

Alteration in relief and land scape of 8.260 Hectares will take place scare of dumping will be visible from Koira - Kalmong road.

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1) AESTHETIC ENVIRONMENT

There will be some change due to mining which will be compensated by plantation.

1i) SOIL AND LAND USE PATTERN

In course of mining top soil which is murrum mixed will be removed and stored separately in spot selected for the purpose for use in afforestation - land use pattern in Sagasahi area will be 8.26⁷ Hectares which is given in Sl No. 1.

2) AIR QUALITY

Air pollution will be caused due to dust fines generated at the time of drilling, blasting, waste dumping and transport. As short holes will be drilled and blasted there will be some Air Pollution which will be controlled by up keep of machine and by providing dust extractor to drilling machine to control dust and proper maintainance of road will be done. Water sprinking arrangement on dumps and road will improve quality of Air.

3) WATER QUALITY

As the mine working will be much higher than the existing nallah level and here no pumping will be required, there will be no effect on water table.

At Sagasahi there will be no use of industrial water so the water of nearby nallah will not be polluted. Rain water flowing through the mine cuts may carry aluminous sediments which are non-toxic in nature. Quality of water will remain as usual.

4) NOISE LEVEL

Due to working at Sagasahi there will be some effect on noise level due to drilling and blasting, movement of vehicle and machine which will remain control by avenue plantation and up-keep of machine.

5) VIBRATION LEVELS (DUE TO BLASTING)

As short holes will be drilled and blasted there will be slight effect.

6) WATER REGIME

Due to commencement of mining at Sagasahi water regime will remain the same.

7) SOCIO ECONOMIC

The impact will be beneficial as due to commencement of mining operation at Sagasahi it will create more employment opportunity.

C. ENVIRONMENT MANAGEMENT PLAN

The environment management plan describes control measures and monitoring. An environment plan (Refer Plate No. 7) showing different features as required under M.C.D.R. 1988, Rule 28(5) (b) had been prepared for this area and is enclosed. In order to minimise the effects of mining on the local environment, adequate preventive steps have been planned and incorporated in the following lines. Most of the control measures are to be taken up alongwith mining operation and rest after completion of operation i.e. after final reclamation. Broadly under the management plan, Pollution control measures have been recommended to combat pollution of Air - Water and land as pointed out in the impact assessment statements.

1) TEMPORARY STORAGE AND UTILISATION OF TOP SOIL

Within Sagasahi the layer of Top Soil about 0.30 metres thick exists in float Iron Zone from where float Iron Ore can be produced. The top soil will be removed by manual labourers and in first stage will be stored near working faces, after accumulation, the same will be transported by trucks/tippers and will be stored in layers in the space specially earmarked for the

S. Welayat Ali



for the purpose which is shown in environment plan Plate No. 7 and conceptual plan Plate No. 8 to keep top soil.

- ii) Yearwise Proposal for reclamation of land effected by abandoned quarries and other mining activities

Mining activities will start at Sagasahi after the grant of mining lease to M/s National Enterprises. After the grant and execution of mining lease Insitu Iron faces will be exposed and will be worked till Iron Ore body get exhausted. New dumping yard for waste, subgrade and top soil will operate. As waste dump and top soil dump will be visible from village road it is proposed to do plantation 10 metres wide along boundary line. Before dumping, Top soil of the area will be stored separately for future use. The Iron face will be worked till ore body will get exhausted. After winning ore deposit back filling will be done. After filling a layer of top soil which is preserved will be spread and area will be afforested.

- iii) In case abandoned quarries/pits are proposed to be used as reservoir, their size, water holding capacity and proposed for utilisation of such water be given.

This is a fresh area where mining activity on hillock will start after the grant of M.L. Question of using as reservoir at present does not arise.

- iv) Programme of afforestation, yearwise for the initial five years indicating number of plants with name of species to be afforested under different areas in hectares.

Afforestation is defined as Plantation in area which have not contained any forest growth in the recent past. A detail scheme has been worked out which is shown on conceptual plan Plate No. 8 and Environmental Plan Plate No. 7.

The Sagasahi area is a Forest area and is covered with shrubs and bushes with mixed type of plants. Here plantation is proposed in between boundary pillar C to I covering 1185ft or 361.188 Mtrs.

S. WELAYAT ALI ISMAIL
CONSULTING GEOLOGIST
Regd. No. WOP/OAL 013/87-A.



Mining operation will be undertaken only after grant and execution of M.L. in favour of M/s National Enterprises. During first year before starting mining operation in between B.P.C. and B.P.I. covering 361 Metres will be afforested here 10 metres wide green belt will be made. Also on both side of road proposed in this new area avenue plantation will be done in coming years. Also plantation around proposed dumping site is proposed. As per M.C. Rule 27(3) and M.C.D.R. Rule 41(2)(a)(b)(c) afforestation will be done in area mentioned above and during five years about 2500 sapplings will be planted by the leasee.

Regarding the species to be planted on roads and slope of mining faces, dumps, green belt area, plants of quick growing varieties like Acacia, Auriculi formis, Melia Indica, Azardicta Indica, Dalbergia Sissoo, Casia Siamea, Pongamia - Pinnata, Albizzia Labak Terminalia Arjuna etc. will be planted on dumps at base agava, Bamboo, Babul will be planted.

The pattern of plantation may be 2.0m x 2.0m or 4m x 4m depending on type of species, location and space availability. The plantation area will not require extensive soil preparation (except dump) as the original soil cover is not yet disturbed.

- v) Stabilisation and vegetation of dumps alongwith waste dump management.

At Sagasahi after grant of Mining Lease ^{mining} operation will start and a spot near boundary pillar D & E had been selected for waste dump. As this spot in near to paddy field it need immediate attention for its protection and stabilisation following action should be taken.

- a) A 10m wide green belt along Northern boundary line will be made
- b) A boulder wall 1.20m high and 0.60m wide will be erected all around the dump to check wash off.
- c) Dumping will be by trucks and tippers and in between boulder wall

S. Welayat Ali Ismail

and toe of dump agava(Sisal) plantation will be done alongwith other species like Acacia, Auriculiformis, Casia Siamea, Pongomia pinnata/Glabera etc.

- d) On dump slope grasses and shrubs will be planted.
- e) As soon as the stage will be completed 5m high and 10m wide terrace (bench) will be formed and a layer of sweat soil will be spread then plantation on it will be done.

Plantation on and around dumping will stabilise the dump.

vi) MEASURES TO CONTROL EROSION/SEDIMENTATION OF WATER COURSE

At Sagasahi new mining operation will commence after the grant and execution of mining lease, from begining every care will be taken to check erosion and sedimentation of water course and had been partly discussed in programme of afforestation.

vii) MEASURES FOR MINIMISING ADVERSE EFFECTS ON WATER REGIME

Mining operation will be on hillock recorded in revenue record as Jungle. Perenneal nallah is far away still boulder wall around dump will be constructed to check wash off water, water regime will not be effected.

viii) TREATMENT AND DISPOSAL OF WATER FROM MINE

This will be a manual open cast mine where mining will commence from hill top. There will be no industrial use of water in Sagasahi area in first five years. So question of treatment of water does not arise.

ix) PROTECTIVE MEASURES FOR GROUND VIBRATION/AIR BLAST CARRIED BY BLASTING

Sagasahi mines short hols will be drilled and blasted due to which ground vibration and air blast and noise will be appreciable as the blasting operation in this area will be on minor scale. The main blasting hazards from this type of mining will be from fly rock fragments. Though by proper



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CONSULTING GEOLOGIST
Regd. No. ROP/CAL/013/87-A.

charging, stemming and muffle blasting the danger of fly rock may be minimised, but certain other preventive measures like marking danger zone by red flags, use of warning signals and providing blasting shelters will add to the safety of personnel working in or around the mines.

x) MEASURES FOR PROTECTING HISTORICAL MONUMENTS AND FOR REHABILITATION OF HUMAN SETTLEMENT LIKELY TO BE DISTURBED DUE TO MINING ACTIVITY

Within a radius of 10 kms no historical monuments exists. Within applied M.L. area there do not live any persons as is a Jungle area so question of rehabilitation does not arise.

xi) SOCIO ECONOMIC BENEFITS ARISING OUT OF MINING

Mining at Sagasahi will bring glory to area as it will create employment. By movement of vehicle there will be transport facility. Medical facilities to workers and their family will be provided.

अनुमोदित
APPROVED

S. Welayat Ali Ismail
Regd. No. ROP/CAL/013/87-A

- 50 -



10/8/88
क्षेत्रीय खान नियंत्रक
Regional Controller of Mines
भारत - खान विज्ञान
India Bureau of Mines
कलकत्ता
Calcutta

Government of Orissa
Department of Steel & Mines

No. 1191 /SM Ghubaneswar, the 12.2.97
111(B)SM-22/96

From,

Shri N. Mohanty,
Joint Secretary to Govt.

To

The Proprietor,
M/s National Enterprises,
Post Box No. 44,
At/P.O: Barbil,
Dist: Keonjhar (Orissa).



Sub: M.L. application dt. 24.6.80 for iron ore over an area of 58.598 Hects. in village Sagasahi in Sundergarh district in favour of M/s National Enterprises.

Sir,

I am directed to invite a reference to your letter No. NE/BHL/387/96 dt. 2.11.96 on the subject noted above and to say that state Govt. have recommended Govt. of India, Ministry of Mines for grant of mining lease for Iron Ore over an area of 41,144 Hects in village Sagasahi of Sundergarh district in favour of your company for their approval. The entire recommended area contains forest. As per forest conservation act prior approval of Govt. of India Ministry of forest & Environment is required for derereservation of forest land before grant of M.L. and approved mining plan is also required under section 5(2) of the M.M.(R&U) Act-1957.

You are therefore requested to take necessary steps to furnish the above wanting documents to this Deptt. within six months from the date of issue of this order.

Yours faithfully,

[Signature]
Joint Secretary to Government

Memo No. _____ /SM Ghubaneswar, the
Copy forwarded to Director of Mines, Orissa /
Deputy Director of Mines, Koira for information & necessary
action.

[Signature]
Joint Secretary to Government

Government of Orissa
Department of Steel & Mines

No. 11824 / 51, Uhubana, etc., etc.
III(0) 91. 27/96

3.9.12.97



From:

Joint Secretary to Government

To:

M/s National Enterprises,
Post Box No. 44, At/Po-Berbil,
Dist-Konjhar-751035.

Sub:

Application dated 24.6.90 of M/s National Enterprises
for M.L. for Iron Ore over 50.598 hecta. in Village-Sagasahi
in Sundergarh dist.

Sir,

I am directed to enquire whether you accept the following terms & conditions that would govern the grant of Mining Lease in respect of the area over 41.144 hecta. out of the above applied for area in the application read above. Your reply as per enclosed proforma should reach Government on or before 22.1.98 failing which it will be presumed that you do not accept the conditions:-

1. The lease will be subject to the general terms and conditions laid down in the Model form of Mining Lease adopted by the State Government and to the following conditions:-

i) Royalty and dead rent should be paid at rates provided in the Mines & Minerals (P.O) Act, 1957 as amended from time to time.

ii) Surface rent should be paid at the rate of Rs. 10.00 per hecta. per annum of waste lands and at rates not exceeding the land revenue and cesses in respect of the cultivated area and water rate as may be fixed from time to time by Government.

iii) The lease will be granted for a period of 20 years subject to submission of duly approved mining plan within a period of six months from the date of issue of this letter. If the approved mining plan is not received within the stipulated period of six months then action will be taken to reject the application without further reference to you.

iv) An amount of Rs. 2500/- should be deposited towards security deposit for due observance of the terms and conditions stated above. The deposit shall be forfeited to the State if the conditions are not observed in addition to such other remedies or action as may be available under the present law.

v) The assignment will be liable for cancellation if it be found that it was in excess of the limits of the authority possessed by the State Government;

vi) The assignment will be subject to the result of any appeal or revision that may be preferred by any aggrieved party against the decision of the State Government granting you lease. In the event of the cancellation of the assignment or the decision of Government of Orissa to issue out

the area to you either on such appeal or in revision you shall not be entitled to any compensation for anything done or attempted to be done in pursuance of the order.

vi) The grantee shall not cut any tree or clear the forest during the mining operation without prior approval of the Central Government. He shall not also encroach on any objectionable land during mining operation.

viii) The area should be surveyed and demarcated by the State Government at the expense of the lessee as required under rule-33 of the M.C.Rules, 1960. The party should deposit the required amount of survey and demarcation fees within two weeks of the receipt of the grant order.

ix) The mining area shall be reclaimed to the satisfaction of the State Government before the pit is abandoned.

x) The assignment is subject to the condition that subject to the provisions of Article-226 of the Constitution of India, any suit or petition in relation to any dispute arising out of the leased area should be filed in the Civil Courts in the State of Orissa.

xi) The assignment is subject to the further condition that approval of Government of India, MDEF under section-2, U/S-4, Forest Conservation Act, 1980 in respect of forest area of 41.144 hect. will be submitted prior to issue of grant of H.L.

Yours faithfully,

Joint Secretary to Government

Memo No. _____ / Sr. Bhubaneswar, the

Copy forwarded to the Collector, Sundergarh for information and necessary action.

Joint Secretary to Government

Memo No. _____ / Sr. Bhubaneswar, the

Copy forwarded to the Director of Mines, Orissa, Deputy Director of Mines, Kates for information & necessary action.

Joint Secretary to Government

SVN/-

Siva Prasad
Resd. No. RQP/CAL/013/87-A

