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Annexure

Scrutiny comments on examination of Review of Mining Plan including PMCP of Mahamaya-Dulki iron Ore Mine (area 1522.67 Hect.) of M/S SAIL/BSP in Balod & Rajnandgaon District of Chhattisgarh State inspected by Shri S. Kartikeya, Jr. Mining Geologist on 03.03.2017

General

1) Co-ordinate of lease boundary pillar given in annexue VIII but same are not mentioned on lease map/surface plan of mining lease . Boundary pillar shall be serially numbered and marked on each plate.

2) All referred letters may be enclosed as annexure for reference.

3) All the symbols may be drawn as per MMR 1961.

4) Lapse period of the MP/MMP/RMP should be mentioned in the cover page.

5) During inspection it has been observed that most of the lease boundary pillars has not been maintained and numbered properly. Therefore same may be maintained and suitable photographs of the boundary pillars may be enclosed for reference.

6) All the referred rules of MCDR, 1988 may be modified as per MCDR, 2017.

7) Page no. 2: Email Id and Mobile No. of the lessee/nominated owner has not been mentioned.

3.0 Location & Accessibility

8) Page no. 4, Para 3.7.2: Type of forest may be mentioned.

9) Page No. 4; Para 3.9: Name of the nearest highway and railway station may be written.

10) Page no. 5; Para 3.10: co-ordinate of main extreme boundary pillars needs to be given.

11) Weather the general location map showing area and access route has been prepared and enclosed with the document or not, should be discussed here.

12) Para 4.0-Reason for non submission of the review of mining plan timely, should be mentioned in this chapter.

5.0 Review of Earlier Approved Mining Plan/Scheme of Mining

13) Page no. 7, Para 5.1: Type of drilling may be mentioned. Further reason for non achievement of the proposal should be mentioned in remarks. GPS Co-ordinates of all the drilled bore holes during previous scheme period may be given and NABL accredited test reports of bore hole samples may be enclosed.

14) Page no. 7, Para 5.13: Reason for non achievement of the backfilling in 2.31 ha area should be given.

15) Page no. 8; Para 5.15: Suitable photographs of the 13 nos. of settling ponds may be enclosed for reference as well as same may be marked in the relevant plan.

16) Page no. 8; Para 5.22: The status of the violations pointed out by IBM from the date of execution of the lease may be given with their present status of compliance.

17) In this chapter, proposal given under mine development (Top and Bottom RL) as per earlier approved MP/SOM and their actual achievement may be incorporated.

6.0: Geology & Exploration

18) Page no. 11; Para 6.6: Detailed description of geology of the lease area such as shape and size of the mineral/ore deposit, disposition, various litho-units indicating structural features has not been elaborated properly as per the geology of the lease area.

19) Page no. 12; Para 6.8.2: Inclination, collar Level and depth of the drilled 126 nos. of core boreholes and 71 nos. of RC bore holes have not been given.

20) Page no. 12; Para 6.8.2: GPS co-ordinates (WGS84; degree minute second) of all the drilled boreholes may be incorporated in the text.

21) Page no. 12; Para 6.8.3: Details of sample analysis not furnished .

22) Point no. 1.0 (f), (g) & (h) of Part-A; Geology and Exploration of IBM manual on appraisal of Mining Plan 2014 may be discussed and necessary details may be incorporated.

23) The estimation of the reserve & resource does not fulfil the UNFC Norms, those are mentioned in the MEMC Rule, 2016. Therefore the entire reserve/ resource may be re-estimated with the compliance of the MEMC Rule, 2016.

24) The following deficiencies have been observed in the geological Plan of Mahamaya and Dulki area:

a) During inspection it was observed that in the lease area, the occurrence of iron ore is in different modes, i.e. lateritic ore, lateritic limonitic goethite ore, soft laminated ore, porous laminated ore, hard lumpy ore, hard laminated ore, powdery ore & silicious ore etc. Apart from the above, there were intercalated wastes in the form of ferruginous shale & BHJ/BHQ along with some lean Iron ore zone. Moreover, the geological plan does not reflect the actual litho-units of the lease area.

b) The boundary of block M1, M2 , M3 7 other considered for reserve calculation have not been distinctly marked on surface geological plan.

c) Area explored in G1, G2, G3 and G4 has not been demarcated in the plan.

d) Structural features, broken area boundary and Surface outcrops of the different litho-units have not been marked.

e) Symbol of the M.L. Boundary shown in the index does not match with the drawn M.L. boundary.

f) NABL accredited test reports of the bore hole samples have not been enclosed.

g) Structural features and litho-contacts have not been marked.

h) Out crops of the different lithological units have not been marked.

i) The orientation of Kep plan marked on each plate is not correct. The block for which plate is made should be shown with proper shading on key plan.

25) The following deficiencies have been observed in the geological section of Mahamaya and Dulki area:

a) Uniform grid interval for reserve and resource estimation has not been maintained, which is not acceptable as per MEMC Rule 2016.

a) The lateral influence is 50 m on both sides of the borehole/ quarry limit for G-1 & further 50 m for G-2 stage has not been considered.

b) For consideration of depth, the actual depth of each borehole/quarry depth in each section should be considered for G-1 & G-2 stage of exploration along with the influence of 50 % towards the other borehole, the same has not been done.

c) UNFC Codification has not been written in any section.

d) Area explored under G1, G2, G3 & G4 have not been demarcated in the plan.

e) Most of the mineral bearing area has been capped with the laterite/ lateritic soil. The same has not been shown in the plans & sections.

f) Outcrops of the different litho-units have not been marked.

g) Mineral/ore blocked due to five year pit limit, ultimate pit limit, safety zone /barrier zone (7.5 m), blasting, restrictions, broken area line etc. have not been shown in all the plans and sections.

b) Forest boundary and broken area boundary have not been shown in all the plans & sections.

c) Ultimate pit limit has not been drawn.

h) Year wise pit limit beyond lease area may not be accepted.

i) Since the grade of Iron Ore in this area varies from +45% to + 67%, therefore, the grade wise reserve has not been incorporated

j) Existing waste dump has not been marked and shown in relevant cross sections; e.g. CS-3,5,6&7.

26) Since the boreholes drilled in the lease area are not falling under any cross section line; to be written projected (P) in all the geological sections.

27) The classification of the reserve in respect to the feasibility & economic axis has not been mentioned. To be given in tabular form along with the study done with respect of the field guideline mentioned under MEMC, rule 2016.

Geological Axis		
Axis	**Field Guideline (As defined under & MEMC Rule 2016)**	**Study Done**
G1		
G2		
G3		
G4		
Feasibility Axis		
F1		
F2		
F3		
Economic Axis		
E1		
E2		
E3		

28) Reserve/resource estimation beyond lease area may not be accepted.

29) Detail calculation of each category of reserve/resource may be given.

30) Page no.18; Para 6.10: The following parameters may be considered for the proposal of future exploration programme:

a) Year wise proposal for the future exploration plan may be given.

b) Only core boreholes may be proposed for drilling.

c) GPS (WGS84; degree minute second) co-ordinates of all proposed boreholes may be given along with reason for site selection and ground RL.

d) In the mineralised part of the lease area, grid interval may be considered according to the UNFC norms for G1 exploration.

e) All the proposed boreholes may be marked in the geological plan with distinct colour for each year proposal.

31) All the relevant tables and calculations of this chapter may be updated after the re-estimation of the reserve/resource.

32) Area explored under G1, G2, G3 & G4 may be given in hectares.

33) Lumps and Fines ratio in ROM may be given.

34) The reserve and resource may be established on the basis of lithology (different modes of occurrence of iron ore) in the lease area.

7.0 Mining

35) This being a working mines proposal financial yearwise needs to be given .Chapter may be updated after re-estimation of reserve/resource.

36) The following deficiencies have been found in the mine during inspection:

a) It has been found that the mining activity in M3 block is continuing in the Eastern part of the lease area. In the submitted draft, the development has been proposed in the western central part to the south western part of the lease area. In view of the scientific and systematic development, the mine planning shall be carried out in accordance with the proposal given in the mining plan/scheme of mining/review of mining plan. Therefore the entire planning needs to be changed according to the present development of the mine. All the relevant plans and sections may be modified as per above comments.

b) In the M2 block it has been found that the mining is continuing in the bottom of the quarry which is not as per given proposal for development. Therefore the entire production planning may be updated as per present mining in the mine.

c) In the M1, M2 and M3 block of the lease, it has been found that bench width and slope gradient has not been maintained in respect of sustainable development. Therefore during this plan period, a proposal may be given for systematic development of all the benches in mine in view of the sustainable mining.

d) As per the physiographic features of the Dulki D1 block (about 5 ha. broken area); benches of 6m height and 10 m width will be feasible in view of sustainable mining. Therefore entire proposal for development during plan period in this block may be modified accordingly.

37) Page no. 20 para 7.2.1 (a): In the given tables Quantity of the total waste in CUM and in Tonnes could be same as most of the area is capped with the lateritic ore. Further bulk density of the waste rock may be mentioned for reference.

38) Para 7.2.1(b)- Quantity of ROM, Ore, sub grade needs to be given not % . with proper units..

39) Page no. 20; Para 7.2.1(b): Detail calculation for Ore,, Sub-grade, and Waste etc are not furnished ..

40) During inspection it has been observed that in the northern part of the M3 block is been used as temporary mineral stock yard for sub-grade ore. Therefore the same place may be marked in the relevant plan and sections for temporary mineral stock yard.

41) Page no. 21; Para 7.3: In view of the scientific and sustainable mining bench height and width may not be considered as same.

42) In the present document 'Cut of Grade' of the ore has not been discussed.

43) In most of the development plan and sections Ultimate pit limit, bench RL and haul road have not been marked. Since the entire mining has been proposed by the mechanised means. Therefore it is difficult to understand how the ore will be transported from the working quarry to stack yard.

44) Page no. 22, Para 7.4 Blasting: Since the blasting is in practice in the mine, therefore place for storage (magazine) for explosive may be shown in the plan.

45) Describe briefly the layout of mine workings (Top and Bottom RL) before and after development.

46) Page no. 26; Para 7.18: As per lease deed, mining lease will be expired on 03/11/2021 therefore, the conceptual mine planning may be prepared according to the validity of the mining lease. Further relevant plan and sections may be modified accordingly.

47) Yearly production plan may be proposed lithology wise as well as yearly slice plan may be drawn.

48) Conceptual plan - i)Conceptual plan shall cover , the proposal beyond five year period, for exploration , mine development , reclamation with five yealy blocks period and pits profile , bench height, width , slope and over all slope with pit bottom RL at ultimate conceptual stage and Post mining land use of area in ha.

49)) location of proposed waste dump is not mentioned in text part.

9.0 Mine Drainage

50) Meteorological data of the average rainfall may be enclosed for reference.

51) NABL accredited test report of air, water & noise has not been furnished.

10.0 Stacking of Mineral Reject/ Sub grade material & Disposal of Waste

52) Page no. 31; Para 10.1: Year wise generation of the sub-grade quantity may be mentioned as all the sub-grade material will be sent to Rajhara crushing plant. Further a detailed characterization of the sub grade ore may be given along with the NABL accredited test reports for Fe%.

53) The yearwise dump management plan and sections may be prepared to show the storage of waste. To stabilize the dump, plantation of the vertiber grass & other proper measures and terraces of the dump is to be proposed. Proposal for construction of the settling tank, garland drain and retaining wall may be given.

54) As per the local geology of the area, the waste rock is mostly BHQ and Shale therefore to stabilize dumps, terracing in every 10m interval may be proposed.

55) It has been observed that sometimes friable/fines ore will be sent to Dalli beneficiation plant, therefore a detail flow sheet of the Dalli beneficiation may be furnished.

12.0 Processing of ROM & Mineral Reject

56) Page no. 34: A detailed specification of the crushing units with their feed size & the finished size ore along with their chemical analysis may be furnished. Further flow diagram of the Rajhara Crushing plant may also be enclosed.

8.0 Progressive Mine Closure Plan

57) Page no. 37; Para (b) Flora & Fauna: The written species of the plants under this para may be proposed for plantation in future to protect and retain the local environment. A year wise proposal for plantation may be incorporated.

58) Page no.43; Para 14.3.9: Financial Assurance for 89.0 ha. area may be calculated@ 3. Lakhs per ha and F.A may be submitted accordingly.

13.0 Others

59) Page no. 35; Para 13.2: Calculation for the employment potential may be cross checked.

60) Feasibility report: The feasibility study report may be revised on the basis of the entire observation. The feasibility study should cover the following aspects & analysis thereof:

- **a)** A comprehensive framework of established & detailed facts concerning the mining projects.
- **b)** An appropriate scheme of exploration complete with plans, designs & equipment lists etc. In sufficient details for accurate cost estimation & associated economic result.
- **c)** Reserve Assessment: The details of the resource/ reserve established in this para may be changed after the re-estimation of the resource/ reserve estimated in chapter 6.0 Geology & Exploration.
- **d)** The most likely profitability on investment in the project, assuming the project is equipped & operated as specified in the report.
- **e)** An assessment of potential legal factors, financing alternatives, fiscal regimes, environmental regulations & risk and sensitivity analysis on important technical, economic, political & financial variables affecting the project.
- **f)** The economic viability on feasibility study report should include sensitivity study. The sensitivity study should discuss variations due to marginal changes in the sale price / grade/ operating cost/ delays in activating full production/ production level lower than designed etc.

Plates

61) Plate I Key Plan: Range of the latitude and longitude (From to To in WGS 84; degree minute second) of the lease area to be shown in the plan. Within buffer zone the entire lease area should be covered. Indexing has not been given.

62) Plate II Lease Plan: Boundary pillars shall be properly numbered..

63) Plate III & IV Surface Plan: orientation of kay plan shown on plate is not correct**.** surface plan should cover location and number of the boundary pillars along with its latitude and longitude values, every surface feature within the mining lease boundaries, such as building, telephone, power transmission line, water pipeline, tramline, railway, road, river, water-course, reservoir, tank, bore-hole, shaft and incline opening, opencast working, dumps and dumping ground, the waste land, forest, sanctuaries, agricultural land and grazing land and subsidence on the surface beneficiation plants, tailing ponds and other workings within the lease. Therefore same may be modified accordingly.

64) Plate XIII to XVII; Yearwise Excavation Plan: In most of the plans it has been observed that area marked in the plan for development in the form of close polygon but the sections it not close polygon therefore same may be rectified.

65) Yearwise dump management plan and sections may be drawn.

66) Ultimate pit limited may be marked on all the relevant plans and sections.

67) Plate XXVIII Environment Management Plan: All the surface features may be shown within 500 m radius from the lease area. All the aspects may be covered as defined under rule 32 of MCDR, 2017. The plan may be prepared in 1:5000 scale.

68) Plate XXIX Financial area Assurance Plan: Area put to use has not been calculated properly. Area shall be marked with figure in each block .Area of the Dulki D1 block may be added in the FA table.

69) Plate XXXII Conceptual Plan: Conceptual Sections have not been drawn.

Certificates

70) In the certificate of qualified persons, the provision of MCDR, 2017 may be written instead of MCDR, 1988.

71) Certificate from RQP: Instead of 'Recognised Qualified Person (RQP)' a term 'Technically Qualified Person (TQP)' may be written.

72) Certificate for PMCP: Rule of Progressive Mine Closure Plan may be mentioned in the certificate.

Annexure

1) NABL accredited test reports of borehole samples may be furnished.

2) Forest diversion letter for Dulki block may be enclosed.

3) Copy of Form K may be enclosed for reference.

4) Suitable photographs of all the blocks and working quarry may be furnished with their caption.

5) Board resolution for nominated owner may be furnished.

6) Self attested copy of identity proof of the nominated owner may be enclosed.

7) Copy of Form K of 71 drilled boreholes in earlier plan period may be enclosed for reference.

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