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Modified Ground Support with Alternative Fill Material for Ground Control at Munsar Underground Manganese Mine of MOIL Limited, India

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ABSTRACT

Key words: Heat Treatment, Hydraulic, Manganese, Plasticity, RMR

MOIL is operating 7 underground and 3 opencast mines in central India and producing annually more than 1 million tons of various grade of manganese ore and has been market leader in country and maintains more 50% share in production. The underground mines are operating at shallow to moderate depth, 90 m at Munsar Mine to 353 m below the surface at Balaghat Mine.

Geo-Technical Details of Munsar Mine: The compressive strength of the hangwall varied between 15 & 25 Mpa whereas computed Bieniawski's RMR was about 55. The underground excavation of the ore was carried out in three levels i.e. -270'L, 170'L & 70'L through an incline & below levels -30'L, -130'L, -230'L, -330'L is through vertical shaft sunk at ch.2600. Timber props, chocks and rock bolts are used to support the stopes and hydraulic sand stowing for filling the extraction voids is used.

Ore body: At 70'L the ore is hard, and is siliceous in nature. The contact between the ore body and the mica schist is incompetent, whereas the contact between the ore body with quartz mica schist is competent. The foot wall rock to the south of the ore zone is muscovite hard; well foliated.

With rock mechanics investigations modifications carried out in underground development & stoping:

- a) 1st Level (70'L): In this level stoping is carried out from Ch. 2850 to Ch. 3150. The ore drive & haulage is in manganese ore.
- b) 2nd Level (-30'L): In this level development in hang wall rock
- c) 3rd Level (-130'L): In this level exploration for ore is in progress.
- d) 4th Level (-230'L): In this level ore drive is developed from Ch.2450 to Ch. 2850 whereas haulage road is developed from 2550 to Ch. 2750.
- e) 5th Level (-330'L): In this level, provision for loading of tubs from ore pass is made then this loaded tubs are hoisted from this bottom most level.

Result & Conclusions: In the earlier stoping operations between 70'L to 170'L all the drifts drive has been developed in the ore body (sill drive) and it has locked around 20 to 25% of ore for stability & safety of the drift. Due to placement of haulage road & cross cut in hangwall rock, more than 20% of manganese ore is now available for exploitation. Moreover, in the place of sand as fill material in hydraulic stowing, treated overburden material has been used on experimental basis and found suitable. It has two advantages, firstly the old refused material can be used for underground filling and the compactness of this material is more, not found any expansion of this floor over the movement of men & machines.

The paper presents modified support system of rock bolts in drift and stoping and use of overburden refuse as a fill material in stope for better ground control at Munsar Mine of MOIL.