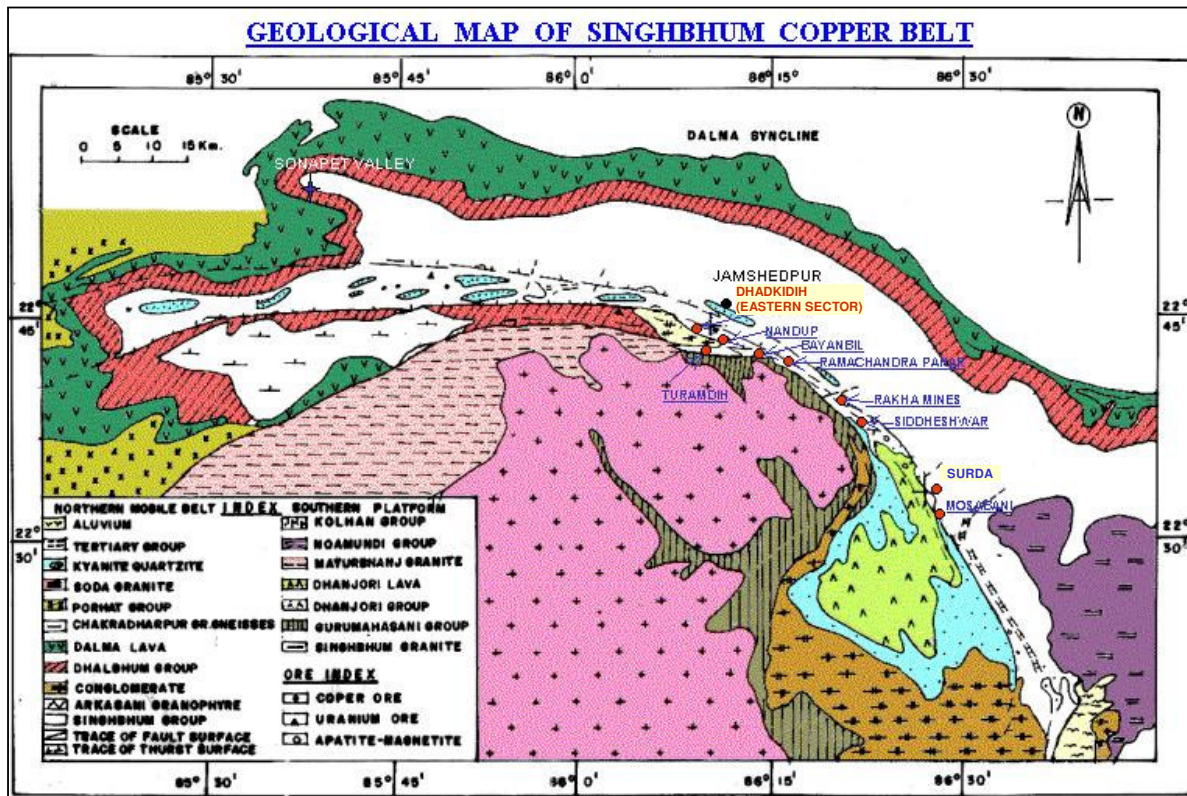


GEOLOGICAL REPORT ON EXPLORATION FOR COPPER DHADKIDIH (EASTERN SECTOR) BLOCK

DISTRICT - EAST SINGHBHUM, JHARKHAND

EXECUTIVE SUMMARY



MINERAL EXPLORATION CORPORATION LIMITED
(A Government of India Enterprise)

EASTERN ZONE
RANCHI

MARCH - 2006

**GEOLOGICAL REPORT ON EXPLORATION FOR COPPER ORE
IN DHADKIDIH (EASTERN SECTOR) BLOCK
SINGHBHUM COPPER BELT
DISTRICT : EAST SINGHBHUM, JHARKHAND**

EXECUTIVE SUMMARY

GENERAL

Copper, the metal with unique useful range of properties, continues to retain its strategic role in the industrial growth and therefore calls for self reliance. The demand for copper in India is likely to increase by the end of Xth plan and is further expected to rise in subsequent years. At present about 75% of India's copper requirement is being met through imports. The insitu copper ore reserves as estimated is about 712 million tonnes; of these only 224.50 million tones are in proved category. Domestic production of copper is not adequate to meet the demand, therefore import of copper is permitted.

In order to bridge the gap between demand and supply position and to reduce the burden on import, immediate all out effort are required to discover more viable copper deposits. The Singhbhum copper belt, which covers around 200 km. arc of copper mineralisation have many copper ore mining centers. Turamdih cluster of deposits is one such area identified as future mining center. The cluster includes Turamdih, Nandup, Dhadkidih, Bayanbil and Ramchandrapahar blocks.

The second meeting of Expert Group constituted by Ministry of Mines, Govt.of India for Strategy of Copper Exploration, Exploitation and Development in India, held in Nov-2004 under chairmanship of Shri Mangla Prasad, Dy.Director General, (IR & HR) GSI Kolkata. In this meeting a stress had been given for development of Turamdih cluster of deposits. Accordingly MECL formulated exploration scheme for assessment of open cast potential in Dhadkidih (Eastern sector) block, which was approved by Ministry as a promotional activity and consequently, exploratory drilling commenced in December-2004 and concluded in September- 2005.

LOCATION

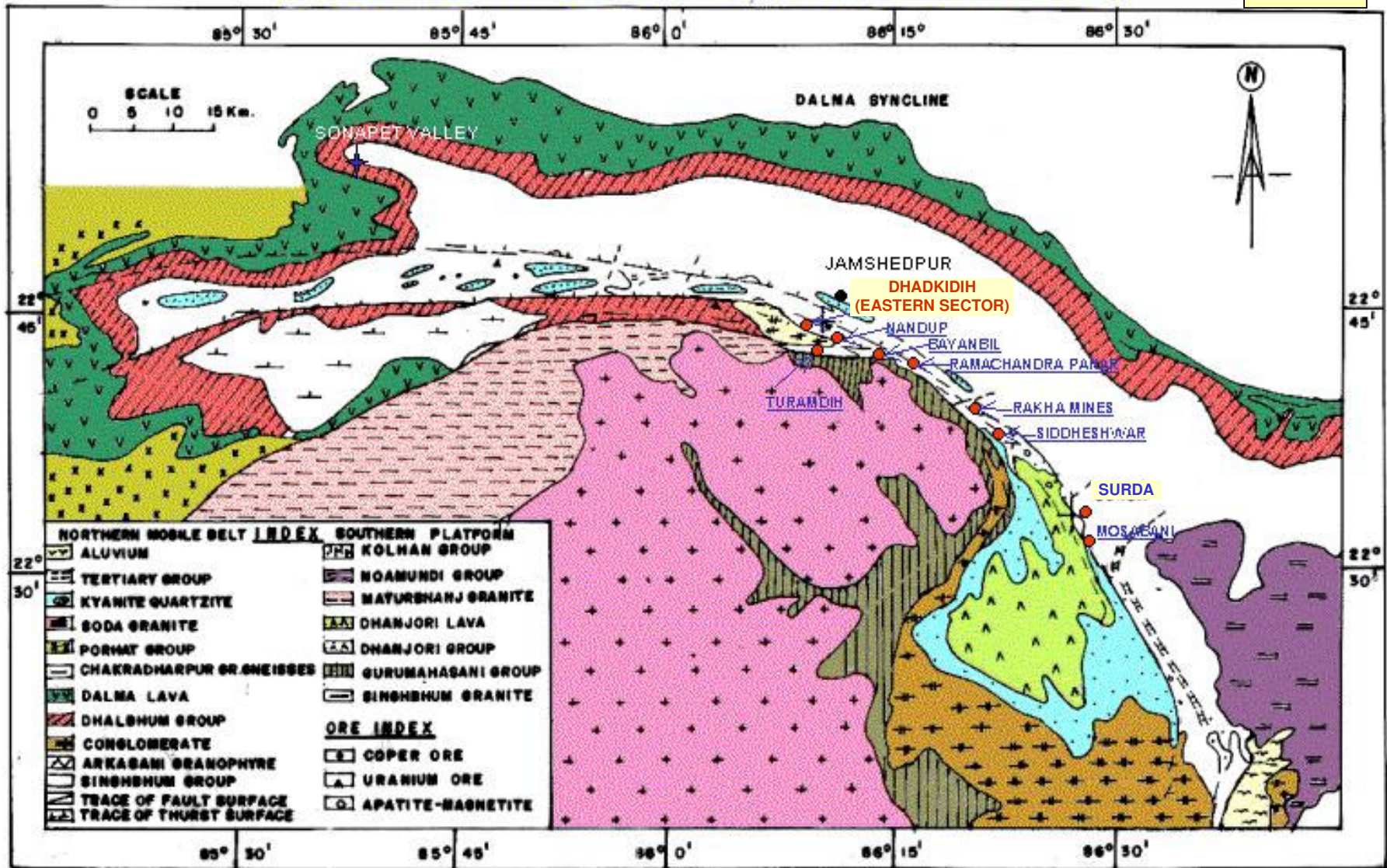
Dhadkidih block falls in the Survey of India, Toposheet No. 73 J/2 and lies in the Singhbhum East district of Jharkhand. The area is bounded by the latitudes 22° 45'40" and 22° 46'40" N and the longitudes 86° 09'15" and 86° 11'00" E (Fig-i).

INFRASTRUCTURAL FACILITIES

The copper deposit lies at a distance of about 40 km. NW of Maubhandar Copper Smelter of HCL/ICC. Banking, postal and other communication facilities are available at Sundernagar, a suburb of Jamshedpur, located at about 3 km. from the block. Jamshedpur, the steel city, has all types of workshop and marketing facilities.

GEOLOGICAL MAP OF SINGHBHUM COPPER BELT

FIG.-1



PREVIOUS WORK

Geological Survey of Indian had explored the prospect during the period 1973 to 1978 by proving the lodes at one level (110mRL) by drilling. GSI drilled 13 boreholes viz. DH-1 to 13 involving 2341 m. of drilling at strike interval ranging from 96m. to 225m. GSI delineated five copper lodes (I,II,IIA,III & IV) in chlorite-quartz schist aggregating total reserves of 3.596 million tonnes with 1.3% Cu at 1% Cu cut off.

GSI recommended further drilling, exploratory mining and beneficiation studies to assess the economic viability of the deposit.

HCL reassessed the reserves as 3.2 million tonnes of 1.42% Cu in the block. RRA, on evaluation of GSI data, re-estimated the reserves of the order of 5.0 million tonnes with an average copper content of 1.2% up to a depth of 200m.

A total of 8437m. of drilling has been done by MECL under phase-I&II in 36 boreholes along 13 cross sections (I to XIII) covering a strike length of 1300m. A total of 9.25 million tonnes of ore reserves with 1.12% copper in four lodes have been estimated. Besides gold, tellurium, selenium nickel, cobalt & silver are present in copper ores which could be recovered as by product.

PRESENT WORK

The broad objectives of the present scheme of exploration are:

- a. To firm up the data by infilling boreholes at closer interval along dip direction.
- b. To establish the shape, size and geometry of ore zones (Lode-II) at shallower level upto 80-100 m. below surface.
- c. To drill few deeper level boreholes for depth continuity as the lodes are open at explored depth.
- d. To estimate the total copper ore reserves in eastern sector.

A total of 2936.75m. of drilling in 18 boreholes and associated geological mapping, survey, sampling and laboratory studies have been carried out in the Dhadkidih Eastern Sector block. The copper ore body have been established over a strike length of 775 m. at upto 250 m. depth at 5 levels. The quantum of work carried out in the block is tabulated below:

Quantum of Work Carried out

Sl. No.	Item	Unit	Quantum
1	Geological and survey Work a) Geological Mapping b) Topographic Survey	Sq.K.m. Sq.K.m.	0.80 0.80
2	Exploratory Drilling a) No. of boreholes b) Meterage	Nos. Mtrs.	18 2936.75
3	Borehole Deviation Survey	Nos.	15
4	Chemical Analysis a) Primary Samples(Cu,Fe,S) b) Check Samples(Cu,Fe,S) c) Primary samples for gold d) Composite Samples(Cu,Mo,Co,Nc)	Nos. Nos. Nos. Nos.	574 25 30 39
5	Physical Analysis a) Emission Spectrography b) Fire Assay (Au & Ag) c) Petrography d) Mineragraphy e) Specific Gravity	Nos. Nos. Nos. Nos. Nos.	39 39 30 30 30
6	Ore Beneficiation Studies	No.	1
7	Geotechnical studies	BHs	1

GEOLOGY & STRUCTURE

The regional geology of Singhbhum Copper Belt is primarily based on the work of Dunn & Dey (1942). A major structural feature postulated by them was the existence of an anticlinorium comprising highly metamorphosed rocks of Iron Ore Series and a Great Shear/Thrust Zone, which according to them was formed along the over folded southern limb of the anticlinorium.

The most prominent structural element seen in the area is the axial plane schistosity (S_2). The bedding planes (S_1) are not seen clearly. Strain slip cleavage and crenulation cleavage (S_3) has developed along the axial planes of these folds. The end of tectonic activity is marked by post shearing faults. The different phases of deformation appear to have taken place during a single phase of orogeny.

The Dhadkidih (Eastern Sector) Copper prospect forms a part of the Singhbhum Shear Zone. The rock types occurring in the block are chlorite quartzite/quartz schist, talc-chlorite schist, chlorite-quartz schist, Kyanite-quartz rock and sericite-quartz schist with metabasic intrusives.

The host rock for copper mineralisation is chlorite-quartz schist. The rock formations exhibit well developed foliation (S_2). The primary bedding (S_1) has been obliterated due to intense deformation and the foliation (S_2) appears to have been superimposed on the bedding plane (S_1). The foliation strike varies from $N70^\circ W - S70^\circ E$ to $N80^\circ W-S80^\circ E$ with 40° to 50° northerly dip. The linear structure is seen mainly in form of puffers with plunge of 15° to 30° both towards east and west.

EXPLORATION ACTIVITY

Exploratory drilling has been carried out along 8 cross sections spaced at the strike interval ranging from 73m. to 130m. (Fig-ii). The exploration is confined to 150, 100, 50, 0 and $-50mRL$. A total of 2936.75m. of drilling has been completed in 18 boreholes. The drilling work commenced in December 2004 and concluded in September 2005.

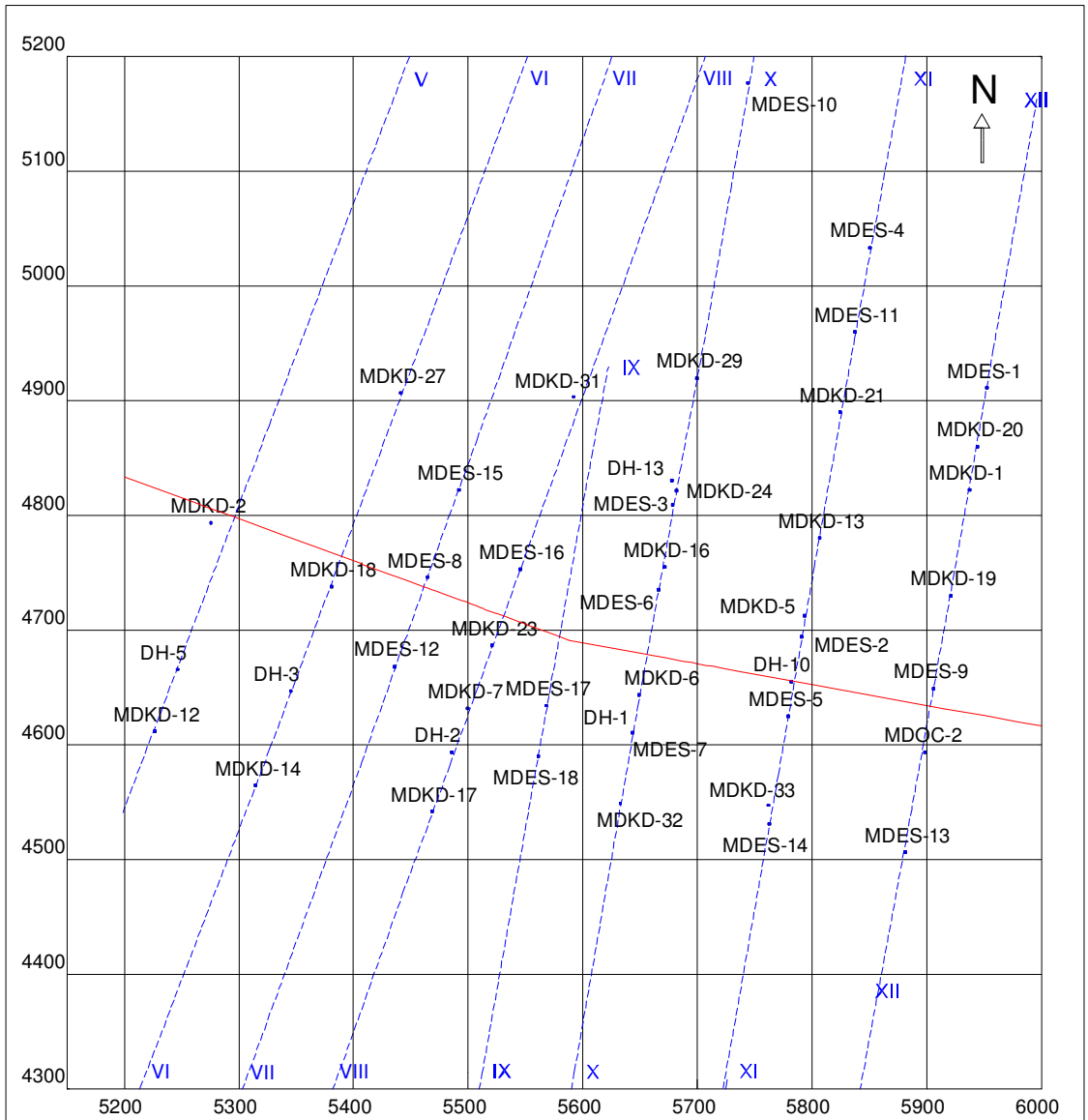
A total of 574 primary, 25 check and 30 primary samples for gold have been prepared and analysed for Cu, Au contents. A total of 39 composite samples were prepared and subjected to fire assay for determination of gold and silver contents and also for the Mo, Ni, Co & Cu contents. All the 39 composite samples were subjected to emission spectrographic analysis for determination of minor and trace elements.

A total of 30 rock samples each were subjected to petrographic, mineralogical studies and for determination of specific gravity. Ore beneficiation studies have been conducted on one bulk sample prepared from ore zones intersected in boreholes. The process yielded a concentrate assaying 24.95% copper with a recovery of 89%. The results obtained are promising and the concentrates produced meets the required specifications for its use in metallurgical industry.

One borehole cores were also sent to CMRI Dhanbad for geo-technical studies. The study results indicates that the rocks of the area is competent enough to support the open cast as well as under ground mining.

FIG.-2

BOREHOLE LOCATION PLAN DHADKIDIH (EASTERN SECTOR) BLOCK



MINERALISATION

The sulphide mineralization in the area is confined to chlorite-quartz schist and occurs as disseminations and stringers sympathetic to the foliation. Thus, both lithological and structural controls of mineralisation are evident in the area. Magnetite, chalcopyrite and pyrite are the major constituent minerals in the decreasing order of abundance.

ORE RESERVES AND GRADE

The ore zones have been demarcated at 0.2% Cu cut off, 0.8% Cu pay limit, 2.00m. minimum stopping width and 3.00m. parting width. Based on their spatial distribution four sets of lodes have been identified in the block, namely Lode-I (A&B), Lode-II (A&B), Lode-III (A&B) and Lode-IV. The lode designation is from footwall (Lode-I) to hanging wall (Lode-IV). Out of these four lodes, Lode-II most potential. One representative cross section is given as Fig-iii.

A total of 7.43 million tonnes of ore reserves with 0.94% Cu at 0.2% Cu cutoff and 7.10 million tonnes of ore reserves with 1.01 % Cu at 0.5% Cu cutoff has been estimated over a strike length of 775 m. between cross section V & XII and a vertical column of 200m. between 150mRL and -50 mRL and below. The reserves have been calculated by cross section method and were cross checked by level plan method. A composite level plan of Lode-II is given in Fig-iv. The difference in tonnage is 1.78% whereas the difference in grade is 0.44%.

The ore:OB Ratio is 1:6 for Lode IIA developed in the eastern part of the block over a strike length of 360m upto a vertical depth of 100m. The tonnage of ore estimated is 2.26 million tones with 0.94% cu, the average thickness of ore zone being 17.85m. The reserves upto 100 m. depth is a good open cast potential. The ore:OB ratio below 100m vertical depth increases sharply, which may be uneconomical for open cast.

Besides copper, the ore zones contain Mo (83ppm), Pb (13 ppm), Ni (312 ppm), Co (136 ppm), Ga (12 ppm), Au (0.1 gpt) which can be recovered as byproducts during the extraction of copper. Magnetite, which is associated with copper mineralisation in abundance may also be separated during beneficiation process and produced as another byproduct. Magnetite is about 53% by volume associated with ore.

CONCLUSION AND RECOMMENDATION

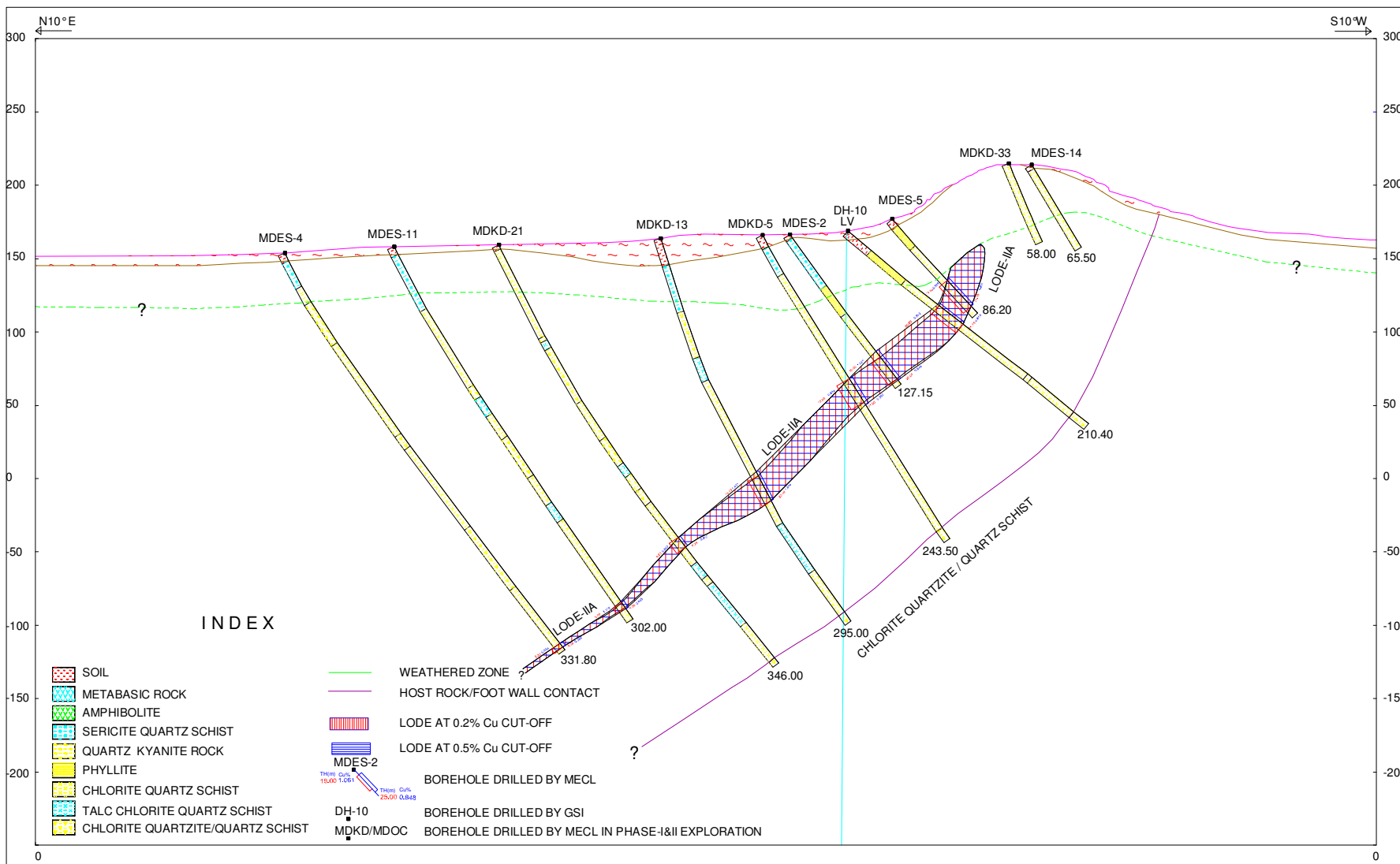
In Dhadkidih (Eastern) sector, four lodes namely Lode-I, Lode-II, Lode-III and Lode-IV have been demarcated over 775m. strike length upto (-) 100 mRL i.e. 250m. vertical depth of this Lode-IIA has developed over a strike 360 m. strike length upto 100 m. vertical depth, having average thickness 18.75 m. Reserves confined to Lode-IIA are 2.26 million tones which can be developed by open cast method. The ore:OB of 1:6 is good for open cast

mining. Beyond 100 m depth, lodes may be developed by underground method. Dhadkidih is part of Turamdih cluster, hence the reserves of this block can be developed along with other blocks. Under UNFC classification Code 322 may be assigned.

The lodes in Dhadkidih particularly L-IIA and L-III are most promising. These lodes are still open at depth, which warrants further depth proving. Techno – economic studies has to be carried out for assessing opencast potentiality.

GEOLOGICAL CROSS SECTION : S - II

FIG.-3



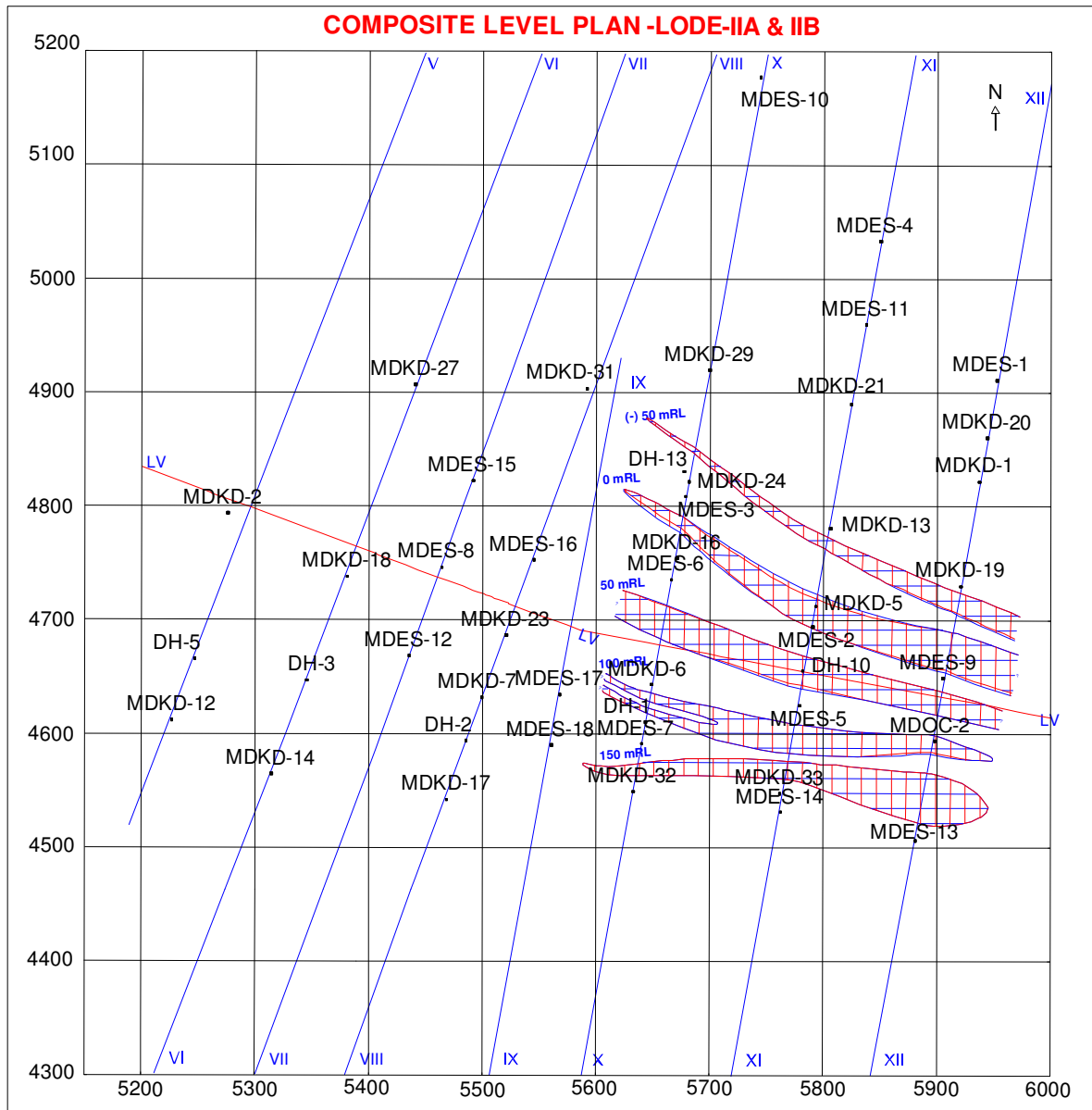


FIG.-4