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7.10.10

05/10/2010

To,
Chief Mining Geologist,
Indira Bhawan,
1st Floor D Block,
Civil Lines,
Nagpur-440102

Final Report

Subject: Reports of the RP area 880.79 sq km in Bhilwara & Ajmer distts, Rajasthan (RP-2/2001) granted to Hindustan Zinc Limited.

Reference: Your letter No. A-285(7)/GMMMC/2010-CMG dated 07.09.2010.

Dear Sir,

With reference to above the following is submitted herewith

Point-4: Copy of the following reports is attached.

Point4 (b): Second year annual progress report (26th August 2003 -25th August 2004).

Point4 (d): Letter of relinquishment submitted to Mining engineer Bhilwara & DMG, Rajasthan vide letter No.Geo/89/RP-Gulabpura/04-05 dated 27th August 2004.

Point4 (e): Final report.

Point-5: The exploration data is being sent to GSI in digital format.

Trust tis addresses gaps in the statutory compliances.

AMG (Gupta)
12.10

N.K.Kavdia
GM (Exploration)
Hindustan Zinc Limited,
Udaipur.

Encl:a/a

डायरीसख्या / Diary No 1495
तारीख / Date 14/10/10
भूवैज्ञानिक एवं खनिज मानचित्र प्रकोष्ठ
Geological Mapping & Mineral Map Cell

Reconnaissance Permit No. RP2/2001 (Bhilwara) over 880.79 sq km

YEARLY PROGRESS REPORT ON THE RECONNAISSANCE WORK

(26th August 2003 to 25th August 2004)

Location

The RP area of Gulabpura (881 sq. Km.) covers the Ajmer and Bhilwara district. The area is well connected by network of roads where NH-8 is the main artery of communication passing right across the area.

The following reconnaissance activities were undertaken during the period.

1. Review of earlier work
2. Regional Geological mapping using hand held GPS on 1:50,000 scale.
3. Collection of rock chip samples for analysis

Review of earlier work

The current RP area was flown by multi sensor airborne geophysical survey involving Magnetic and Electro Magnetic techniques (GeoTem deep) through M/s Geotrex, Australia under HZL-BHPM joint exploration program.

Review of magnetic data of HZL- BHPM survey indicates that the major part of the RP area is covered by Magnetically quiet package of rocks. In the southwest corner of the area linear magnetic features were observed which correspond to out crops of mainly amphibolites.

As per prevailing geological map of GSI the eastern edge of the RP is located more or less along the contact between the Mangalwar and Sandmata complex. However, this distinction is not visible in the airborne magnetic data because of the magnetically silent litho-package (similar to as that of Mangalwar complex).

HZL-BHPM aerial survey had also identified a few GEOTEM anomaly points (viz. KAR 01, 02, 36 and 40) within the instant RP limits. The previous ground follow-up work has indicated that the conductors at these locations are mainly due to the zones of graphite. One of the anomalies was also drill tested but no significant economic sulphides or base metal concentration was intersected. Current review of airborne GEOTEM data and subsequent field appraisal during the year led to the identification of four-anomaly points viz. KAR 46, 46A, 64, and 55 located near village Gagera and Jalampura dist, Bhilwara for further follow up involving soil geochemistry, and if results are positive ground geophysics and drilling will be undertaken.

Regional Geological Mapping

• **Regional Geology**

The area falls under the Sandmata complex of Bhilwara Supergroup (2500-3500 m.y.). The heterogenous assemblages of rocks deposited during Bhilwara orogenic cycle has been regionally metamorphosed to high-pressure amphibolite and granulite facies. These rocks are subjected to migmatization at various degrees. The formation exhibits a domal feature on the land sat imagery bounded by Kaliguman lineament in the west and Delwara lineament in the east. Migmatitic and gneissic rocks predominantly cover the permit area. The other associated rock types include quartzite, hornblende schist, biotite sillimanite schist/gneiss, amphibolites and calc-gneiss etc. The systematic geological mapping of the area has already been carried out by GSI in the past.

Present work

Regional mapping at 1:50,000 scale involving geological traversing, covering 880sq km area was carried out during the period under consideration. The major rock types in the area comprise of granite gneiss, biotite garnet gneiss, with enclaves of Biotite schists with or without sillimanite, migmatites showing alternate layers of leucocratic and melanocratic bands showing pygmetic folding, with associated

amphibolite, pegmatite, calc silicate and occasionally mylonite. A narrow band of meta-sedimentary rocks having a cumulative strike length of about 3km is located on the either side of NH 79 south of village Singhawal overlying granite gneiss. Similar meta-sedimentary rocks are also located over small area around village Barasani and Nathusingh ka khara in the form of isolated detached outcrops occupying small hillocks and overlying granite gneiss and are intruded by pegmatite.

The meta-sedimentary rocks consist of quartzite at the base, dolomite/calc-silicate followed upward by biotite schist. The quartzite is gritty to pebbly at the base gradually become fine grained and micaceous at the top. Dolomite / calc silicate is fine to medium grained. Dolomite is highly silicious due to secondary silicification and alternate carbonate rich and silica rich layers mark the primary bedding. Average thickness of these bands varies from 3 to 15 m and strike length of individual bands is varying between 150m to 200m. Thin beds of pebbly quartzite underlie the dolomite and the contact is normal. These quartzite beds are seems to be resting over granite gneiss but the exact relationship is not certain in the area. These dolomitic bands when plotted on the map appear to be disposed of in the form of synformal and corresponding antiformal folds of medium scale plunging due southeast at about 35-to 40°.

The biotite schist is very soft and composed of almost entirely of dark black biotite. The average trend of these rocks is N60°-65° E with moderate to steep dips towards southeast. Fig 1 & 2 shows location of litho points and generalized geological map of the mapped area based on these litho points respectively.

In the mapped area around village Ratakot subtle malachite stains in the amphibolites near its contact with granite gneiss are noted. Along with the mapping 25 rock samples are also collected and sent for analysis, the results are awaited.

Lithology

The brief description of the rock types exposed in the well and on the surface is observed is as follows.

Granite/Granite gneiss

The lithounit is widely exposed in the area in the form small isolated hillocks and slightly raised high grounds in the other wise flat landscape. Granite is whitish to buff in color leucocratic consists of Quartz, feldspar mica mainly muscovite and occasionally biotite, garnet, and opaques. The fine grained variety of this rock called aplite is exposed at some places Two types of granitic out crops are observed in the area (1) massive, compact and devoid of gneissic foliation and (2) granite show gneissic foliation. The exact relationship between these two is not precisely known, as the contact between the two is not exposed.

This gneissic rock shows alternate felsic and mafic bands. The felsic bands comprising mainly of quartzo-feldspathic material in while minerals like biotite, pyroxene, and amphibole are the main constituent of mafic band. It shows granitoid texture because of the coarse-grained felsic minerals. At places these bands are highly contorted while at other places show straight banding with parallel arrangement of hornblende or biotite alternating with fine-grained quartzo-feldspathic material

Quartzite

The quartzite is gritty to pebbly at the base gradually become fine grained and micaceous at the top. It consists of detrital quartz, feldspar, occasionally some hornblende and rarely magnetite.

Mica schist/gneiss

The mica bearing schist/gneiss occurs as enclaves in gneissic rock. The predominance of micaceous minerals likes biotite, muscovite and chlorite giving rise to schistose nature. It is composed of medium to coarse-grained micaceous minerals with or without garnets disseminated in the rock. The coarse grained nature of this rock is due its high degree of shearing. The foliation is crenulated and showing minor folds. The highly sheared and crenulated schist containing laths of sillimanite are observed in the wells at certain places. The staining of copper bearing mineral viz. malachite was observed in this rock. Therefore, this sillimanite bearing rock may be of importance. The schistose rock is more common towards the western and northwestern part of the permit area. As we approach towards eastern part the schist is becoming migmatized. The migmatization is due to the intimate admixture of quartzo-feldspathic material mica schist during partial at time of metamorphism. The migmatized schist shows alternate bands of felsic

and mafic minerals. These bands show tectonic folding and caught up patches of schist in the groundmass of felsic minerals.

Calc-silicate/Dolomite

It is exposed as very small hillocks at few places. The rock consists of mainly calcite and dolomite with subordinate amount of calc silicate minerals like tremolite, diopside etc. Dolomite / calc silicate is fine grained. Dolomite is highly silicious due to secondary silicification and alternate carbonate rich and silica rich layers mark the primary bedding. The calcite and dolomite are euhedral in nature and exhibiting granular texture. The impure dolomite contains majority of ferromagnesian minerals. The dolomitic beds are highly metamorphosed and coarse crystalline in nature. The other accessory minerals are quartz, sphe, garnet and some time feldspar.

Amphibolite

This rock is fine to medium grained, highly sheared showing schistosity it always have sharp but concordant contact with the gneisses. The foliation is parallel to the mica schist/gneiss. This is rich in amphiboles and plagioclase feldspar with subordinate amount of quartz and minor amount of mica, garnet and other minerals. Thin bands of altered feldspar are found along joints as kaolin. The medium to coarse-grained variety of this rock is devoid of schistosity may be from igneous source is called dolerite. At places at the contact of amphibolites with gneisses malachite staining and encrustations are noted near village Ratakot and its adjacent areas.

Pegmatite

The coarse-grained pegmatite showing pegmatoid texture seems to be intruded into the granite and schistose body. The books of mica mainly muscovite is irregularly distributed in the rock. It is always associated with the coarse-grained quartz vein containing vitreous quartz. The pegmatite consists both pink and white coloured feldspar mica mainly muscovite, occasionally biotite with crystals of tourmaline. Medium to coarse-grained garnets is found disseminated in the rock. In the study area many places Pegmatite has been mined for mica and other minerals. The contact of pegmatite and the wall rock may give an idea about the heat source with its placement and possible occurrence of mineralisation.

Structure

The regional trend of the group of lithological units is NE-SW dipping towards East/West. From the stereonet plotting of the foliation data of the area it reveals that the lithounits are trending towards N25-30°E to S25-30W dipping steeply (55-65°) east or west i.e. forming two limbs of the plunging fold. The axis of the plunging fold runs almost along the strike of the foliation and closure is towards North. Another fold formed by the limbs trending towards N45-50E to S45-50W (Fig.1&2). The plotting of joints observed in the field is mainly of two sets of joints striking apparently towards N-S and NW-SE a third set of joint which is less prominent is N85E-S85W. Besides these three sets of joints the other set of irregular set of joints are also observed throughout the area (Fig-3, 4, 5, and 6).

Area relinquishment

As per the provision of grant of reconnaissance permit 50% of the original area is to be relinquished at the end of 2nd year of pendency of the permit. Accordingly 50% of the most prospective area was retained based on the following

- The geological mapping so far in the area has not shown any encouraging signs with respect to the indication of mineralisation. However, review of entire available geological data viz, field traversing and geological mapping, regional geological mapping of GSI (1:250,000) and earlier airborne geophysical results (magnetic and electromagnetic of HZL-BHPM) was undertaken and assimilated to demarcate the best prospective area. The consideration for the area retention/relinquishment are enumerated as under:
 - The meta sediments associated with carbonate facies of rocks could be the ideal host for Sedex/BHT type ore bodies.

- Major part of the area is magnetically quite yet, the major structure west of Rampura Agucha which runs NE-SW in the northern part takes an East-West swing in the middle of permit area near Gulabpura and then gradually disappear in the magnetically quite litopackage. The area in the proximity of it considered prospective.
- The part of permit area around village Daulatgarh and Asind show magnetic alteration and linear magnetic feature. This area needs review and further follow up.
- Isolated GEOTEM anomalies (low priority 4/5) of HZL-BHPM survey are not considered prospective. However, continuous anomalies (any priority and at least 2 lines- at least 800m strike length) are considered prospective for re-examination.
- Earlier followed up anomalies to be retained for re-assessment of the area having graphite carbonate association.

Keeping the above consideration in mind, an area of 440.7 sq km has been relinquished as shown in the fig 7.

Target Identification

Based on the review of earlier TDEM anomalies and geological appraisal four anomalies/targets were identified for soil geochemical survey on 400x50 grid spacing. The survey work is in progress.

Person engaged for work

One full time and one part time geologist with driver were deployed to undertake the work. Helpers as and when required were hired locally.