MINUTES OF THE 5th MEETING OF TECHNICAL COMMITTEE OF NATIONAL MINERAL EXPLORATION TRUST HELD AT GSI, TRAINING INSTITUTE, HYDERABAD ON 27 & 28th SEPTEMBER, 2016

The 5th Meeting of Technical Committee of National Mineral Exploration Trust (NMET) was held at GSI, Training Institute, Hyderabad on 27-09-2016 & 28-09-2016 under the Chairmanship of Dr P. R. Golani, Dy. Director General, GSI Training Institute for technical appraisal of eleven (11) new proposals, review of two (2) proposal (discussed / evaluated in the 4th meeting) as well as review of two ongoing proposals undertaken under NMET funding.

Shri S.K. Thakur, G.M. (Exploration), MECL & Member Secretary Technical Committee of NMET welcomed all the members of the committee. He appraised the committee regarding new proposals to be discussed and to review of ongoing proposals.

Dr. Golani in his opening remarks welcomed all members and advised to proceed for block wise technical presentation of the proposals, starting with new proposals. He emphasised that technical committee will evaluate the proposal and based on the recommendation and revisions suggested, financial approval of proposals should be done by Executive body.

Shri B.P. Raturi, Dy. G.M. (Exploration), MECL presented the exploration proposals prepared by MECL for appraisal of the committee, starting with the new proposals.

The Committee recommendations in respect of various proposals are as under:

1. REGIONAL EXPLORATION PROPOSAL FOR MANGANESE ORE IN KALAKHUNTA BLOCK, KHUSHALGARH TEHSIL, DISTRICT: BANSWARA, RAJASTHAN

The proposal has been discussed in details and the Committee recommends approval of the proposal with the following observations.

1. Objective of the proposal has to be modified by mentioning that manganiferous phyllite should be checked as target of interest.
2. Geological mapping should be carried out at 1: 5000 scale.
3. Trench spacing which is 800 m in current proposal, should be changed to 200m and length of each trench will depend upon surface width of the mineralised zone.

4. In case of encouraging results, i.e. grade of manganese > 18% (current minimum end user's specification as per IBM) for at least 1 m stoping width, other components of exploration will be carried out which include:
    i. Geophysical exploration (Gravity and Magnetic) at 100 m profile with 25 m station interval.
    ii. 5 scout boreholes will be done to test depth persistence of ore body.

2. REGIONAL EXPLORATION PROPOSAL FOR MANGANESE ORE IN TAMBESARA BLOCK, KHUSHALGARH TEHSIL, DISTRICT: BANSWARA, RAJASTHAN

The proposal has been discussed in details and the Committee recommends for approval of the proposal with the following observations.

1. Objective of the proposal has to be modified by mentioning manganiferous phyllite should be checked as target of interest.
2. Geological mapping should be carried out at 1: 5000 scale.
3. Trench spacing which is 400 m in current proposal, should be changed to 200m and length of each trench will depend upon surface width of the mineralised zone
4. In case of encouraging results, i.e. grade of manganese > 18% (current minimum end user's specification as per IBM) for at least 1 m stoping width, other components of exploration will be carried out which include:
    i. Geophysical exploration (Gravity and Magnetic) at 100 m profile with 25 m station interval.
    ii. 5 scout boreholes will be done to test depth persistence of ore body.
5. Committee considered to combine both Kalakhunta and Tambesara blocks, manganiferous phyllite shown in regional map provided by DGM Rajasthan in Tambesara block is an extension of Kalakhunta block. However as the distance between these two blocks is approx. 2.5 km and there is a gap of 3.00 km between the manganiferous phyllite bodies of these two blocks, the committee decided that these should be treated as separate blocks.

3. REGIONAL EXPLORATION PROPOSAL FOR LIMESTONE IN GOTHRA-PARASRAMPURA BLOCK, TEHSIL- NAWALGARH, DISTRICT-JHUNJHUNU, RAJASTHAN

The proposal was discussed in detail and the Committee recommended for approval of the proposal with the following modifications:

The block boundary may be modified as indicated in the map provided by DGM, Rajasthan. In the first stage, drilling will be done within the inferred boundary of limestone (balloon shaped body).

1. A total of 40 boreholes which include 7 conditional borcholes on the margin of inferred limestone boundary will be drilled.
2. All boreholes will be drilled vertically as presented in current proposal.
3. Borehole will be closed after intersecting limestone band or up to a depth of 90 meter, whichever is earlier.
4. Conditional boreholes will be drilled if the borcholes, near the inferred limestone boundary, intersect limestone band.

4. PROPOSAL FOR ASSESSMENT OF RESOURCES OF TAILING DUMP AT KOLAR GOLD FIELD, DISTRICT- KOLAR, KARNATAKA

The Committee recommends for approval of the revised proposal as submitted by MECL with few changes to be incorporated in the body of the text.

5. BRH IRON ORE MINES, NEB RANGE M/S RMMPL, ML N0. 2010, VILLAGE – PAPINAYAKANAHALLI, DISTRICT- BALLARY, KARNATAKA

Detailed discussion was taken place by the committee about current situation of the block. Dr P. R. Golani, Dy. Director General, GSI Training Institute & Chairman Technical Committee of NMET informed the committee that he has visited the area and observed that the block has common boundary with 3 other leases and ore body is already excavated up to depth of 40 m. The ore body continues further below and enters to other lease area. To intersect this dipping ore body by borehole is not possible from the surface within this block. The available map has contours previous to mining activity, therefore a fresh contour map is needed to plan exploration works.

The committee recommends to carry out following works in the block:

a. To complete survey work and generate fresh contour map with help of survey at 1:1000 or 1:2000 scale with contour interval of 3-5 meters.
b. To demarcate all existing lease hold area surrounding the block.
c. To carry out geological mapping of the block.

6. FIVE PROPOSALS FOR RECONNAISSANCE STAGE OF EXPLORATION UNDER G-4 OUT OF 30 BLOCKS FROM 100 BLOCKS IDENTIFIED BY GSI.

MECL presented 5 proposals under G-4 stage of exploration out of 30 blocks from 100 blocks identified by GSI. These blocks are:

I. Regional Exploration proposal (G-4 level) for Base Metals in Agnigundala South Block (Block-ID-SRAP-10); District-Guntur, Andhra Pradesh.
II. Regional Exploration proposal (G-4 level) for Base Metals in Agnigundala North Block (Block-ID-SRAP-09); District-Guntur, Andhra Pradesh.
III. Regional Exploration proposal (G-4 level) for Copper & Gold in Deravad-Chargarhia-Bansra Area (Block-ID-Raj-02); District-Udaipur, Rajasthan.
IV. Regional Exploration proposal (G-4 level) for Copper in Isarwas-Karavalli - Baroliya-Angeni-Beras Area (Block-ID-WR, Raj-13); District- Udaipur, Rajasthan.
V. Regional Exploration proposal (G-4 level) for Copper in the Area South of Kasarpur (Block-ID-ER, ODSj-09); District- Mayurbhanj, Odisha.

For G-4 level of exploration, the technical committee of NMET proposed that all 30 blocks awarded to MECL should follow a standard template to carry out works. The template was discussed in detail and a two stage template was finalised by the committee.

The Committee recommends for approval of all five blocks with the following observations.

a. All proposals should be modified as per the template discussed above.
b. Stream sediments sampling to be carried out only if area is not covered by NGCM by GSI. GSI will provide dossiers for these blocks.
c. Quantum of bed rock and soil samples was discussed and committee recommended following number of samples for each 100 sq km area:-
    - 50-100 stream sediment samples where no NGCM has been done
    - 100-200 bed rock/ soil samples.
d. Geophysical exploration by using suitable geophysical methods may be applied viz. gravity, magnetic, SP, IP & resistivity.

e. Along interesting zones, pit/ groove and trench sampling (100 cum trenching and 100 trench samples)
f. 25 samples for petrographic study and 25 samples for mineragraphic study.
g. Drilling may be reduced from 1200 m to 600 m (5 scout boreholes in each block)

7. EXPLORATION PROPOSAL FOR ESTIMATION OF GOLD ORE RESOURCES IN BGML LEASEHOLD AREA FOR MC TAGGART WEST LODE AND EAST LOAD, DISTRICT KOLAR, KARNATAKA.

The Chairman of the committee wanted to know the background of the preparation of the proposal. Sri S. K Thakur, Member Secretary appraised the committee about the background of preparation of proposals of BGML lease hold area, Kolar Gold Field.

The Committee recommends for approval of the proposal with the following modifications:

a. First level boreholes are to be planned with 200 m spacing and the second level borehole are to be planned in staggered pattern in the spacing of 200 m upto a maximum vertical depth of 350 m.
b. Total 16 number of borcholes to be drilled against the proposed 32 boreholes.

8. EXPLORATION PROPOSAL FOR ESTIMATION OF GOLD ORE RESOURCES IN BGML LEASEHOLD AREA FOR ORIENTAL LODE, DISTRICT KOLAR, KARNATAKA.

The Committee recommends for approval of the proposal with the following modifications:

a. First level borcholes are to be planned with 200 m spacing and the second level borehole are to be planned in staggered pattern in the spacing of 200 m up to a maximum vertical depth of 450 m.
b. Total 21 number of boreholes to be drilled against the proposed 44 boreholes.

9. EXPLORATION PROPOSAL FOR ESTIMATION OF GOLD ORE RESOURCES IN BGML LEASEHOLD AREA FOR CHAMPION LODE, DISTRICT KOLAR, KARNATAKA.

After going through all previous data available with MECL, the committee had following observation:

a. The present assessment through exploration by drilling is to be confined in gap areas where data base is lacking.

b. All boreholes will be drilled from surface only.

c. Extensively mined out area is now represented by abandoned mines. The available L.V section of Champion Lode (Champion Reef Mine & Mysore Mine) indicates hardly any area to be explored from surface through drilling. Thus no exploration at Champion lode is recommended by the Technical Committee at this stage.

d. However the left out area towards south of Hancock's shaft (Mysore mine area) should be studied thoroughly to find out the possibility of exploration work.

REVIEW OF ONGOING PROJECTS

A. GHUNCHHAI LIMESTONE BLOCK, DIST. SATNA, MADHYA PRADESH

a. The analytical data of 5 scout boreholes was discussed and based on the results; the committee decided that the exploration in the block may be taken up for up gradation to G-3 level at 400 m grid interval.

b. The committee on the basis of borehole data again decided that borehole may be closed after intersecting limestone bands.

c. As the overburden thickness is gradually reduced to the north-eastern part, therefore the area of exploration may be extended in that area. Drilling may not be required for assessment of limestone bands, where the thickness of limestone band become less that 3.00 m in thickness.

B. SENDURKHAR BAUXITE , DIST. KABIRDHAM (KAWARDHA), CHHATTISGARH

On the basis of analytical results of the surface samples it was observed that the grade of Bauxite is good but the decision of continuation of G-3 level exploration will be taken up based on the receipt of analytical results of the samples of 5 scout boreholes.

C. PURHEIBAHAL – CHANDIPOSI IRON ORE BLOCK, DISTRICT-SUNDARGARH, ODISHA.

The Drilling work is completed and analytical results of the boreholes indicate that high grade and low grade of iron ore has been intersected in the block. The report will be submitted on receipt of analytical results of all the boreholes.

The meeting ended with vote of thanks.

(Dr. Joyesh Bagchi)
Director (MoM) &
Member Technical Committee, NMET

(Shri P. Tarafdar)
Director, GSI &
Member, Technical Committee, NMET

(Dr. Manoranjan Mohanty,)
Deputy Director General, GSI &
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(Sri Koteshwara Rao)
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(Shri S. K. Thakur)
GM- Exploration &
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(Dr. P.R Golani)
Dy. Director General
Geological Survey of India &
Chairman Technical Committee of NMET

TEMPLATE FOR REGIONAL EXPLORATION

G-4 level investigation is a scientific activity which is depended on the acumen and intuition of geoscientist. However, the following minimum requirements are recommended:

FIRST STEP

1. **Aerial Reconnaissance:** Satellite imagery/Photogeology/Airborne Geophysical Survey data study need to be carried out for the total area.
2. **Geological Mapping:** Geological Mapping to be carried out preferably in 1:12,500 or 1:10,000 scale. All lithological details and structural data are to be plotted alongwith continuous search for the ore minerals.
3. **Geochemical Survey:** (i) To check the rock types, their variation in chemical composition, sampling needs to be done for Whole Rock analyses (10-20 samples analysis depending on variation of lithotypes). Sampling is to be done at random from surface exposures, escarpments, nullah sections, etc. For a 100 sq km area, the number of samples to depend on mineral commodity and areal extent of the prospect. Stream sediments samples to be around 50-100. Bedrock/ soil samples to be around 100-200 samples.
4. **Geophysical Exploration:** If some target zones are identified then suitable methodology of geophysical exploration is to be carried out keeping in view the commodity of interest. It can be planned in a number of smaller areas in the total block. One or many of the geophysical methods may be applied viz. Gravity, magnetic, SP, IP & resistivity.
5. **Technological Survey:** If some zone is suspected to be mineralised on the basis of field observation, or, from some initial sample analyses some anomalous values indicate some zone of concentration or a block with high prospectivity, then to develop a target block whole zone can be brought under control with the help of groove sampling, pit sampling and trench sampling (100 cum trenching and 100 trench samples). Pits and trenches are preferred in covered areas as well as to collect samples from fresh bedrocks. If some positive zone is visualised at this level of work, to check the depth continuity of the mineralisation, if it is felt that help of drilling is necessary, then a few boreholes can be planned also(maximum 4 to 5).
6. **Petrographic and Mineragraphic Study:** Detailed study of petrography, proper nomenclature of the rocks, grade of metamorphism are very essential points. Study of ore forming minerals needs to be done in detail in the laboratory with the help of ore microscope, SEM studies and EPMA. Total number of samples will be 25 for petrographic study and 25 for mineragraphic study.
7. **Sample preparation for chemical analyses:** samples are to be crushed thoroughly with the mesh size as per demand of the chemical laboratory for respective commodity. As for example for basemetal 120 mesh size where as for gold and PGE it should be of 200 mesh size. Proper mixing, coning and quartering is necessary and

for every sample two packets of 200 gms are to be generated, one for sending to the laboratory and the other will remain with the project authority as duplicate for posterity.

8. **Analytical results**: Whole Rock analyses and commodity specific analyses with associated elements are to be analysed from an ISO certified laboratory or NABL accredited laboratory.
9. **Processing of data and interpretation:** Before receipt of analytical results the map with lithological boundaries and structural elements and their interpretation is to be finalised. After receipt of the analytical data if the data help to delineate some zone with anomalous concentration of some commodity, then the target block can be demarcated with proper justification.
10. **Progress Report:** A G-4 stage report is to be prepared incorporating all the information mentioned above. Progress Report must be prepared following the guidelines of MEMC Rule table-IV-A.

(If there is a positive outcome then second step needs to be followed)

SECOND STEP

1. **Geological Mapping**: Geological Mapping is to be carried out in the delineated block of expected mineralisation. The scale of mapping for the block should be 1:4,000 or 1:5,000 scale for limestone & bauxite but for other commodities it is to be prepared in 1:2,000 or 1:1000 scale with the help of surveyor with DGPS survey with WGS84 datum & UTM projection. All lithological details and structural data and sampling points, grooves, pits, trenches are to be plotted on it.
2. **Geochemical Survey**: Systematic surface sampling is to be carried out in the block. If the commodity is horizontally disposed tabular regular/irregular body of limestone or bauxite then sampling is to be carried out by putting pits with systematic grid spacing of G3 stage (spacing may be followed as per MEMC Rule 2015, Part-III). If the target body is of basemetal, gold, PGE, iron ore, Manganese etc. with steep dip then groove and trench sampling may be done following spacing of G3 stage of MEMC Rules 2015.
3. **Geophysical Exploration:** If geophysical exploration has not been done in this part in the first step then it is to be completed by applying one or many of the suitable geophysical methods viz. Gravity, magnetic, SP, IP & resistivity.
4. **Technological Survey**: With the availability of analytical results of pit, groove and trench samples, boreholes can be planned with wide spacing initially. Gradually with the available analytical results with the development of higher confidence level the G3 stage investigation with systematic drilling is to be done following the guideline of spacing of MEMC Rule 2015. For dipping bodies, as per convention, at least two levels (60m vertical and 120m vertical depth of intersection) may be explored by drilling. Skeletonised core in core boxes to be preserved in core

laboratories. One representative borehole with full length and all mineralised intersection of boreholes to be preserved.

5. **Petrographic and Mineragraphic Study**: Detailed study of petrography and mineragraphy will continue simultaneously. Total number of samples will be 20 for petrographic study and 20 for mineragraphic study.
6. **Sample preparation for chemical analyses**: samples of pits, grooves, trenches and borehole cores are to be crushed thoroughly with the mesh size as per demand of the chemical laboratory for respective commodity. As for example for basemetal 120 mesh size whereas for gold and PGE it should be of 200 mesh size. Proper mixing, coning and quartering is necessary and for every sample two packets of 200 gms are to be generated, one for sending to the laboratory and the other will remain with the project authority as duplicate for posterity.
7. **Analytical results**: commodity specific analyses with associated elements are to be analysed from an ISO certified laboratory or NABL accredited laboratory. Number of samples will be as per the borehole intersection of ore body and surface width.
8. **Processing of data and interpretation**: Before receipt of analytical results the map with contours reference points, borehole points, lithologies and structural elements and their interpretation is to be finalised. After receipt of the analytical data the geometrical shape of the mineralised body may be interpreted, the lode is to be defined, cut offs are to be finalised and the average grade is to be worked out.
9. **Bulk Density**: Bulk density determination is to be done for the mineralised rock mass.
10. **Resource estimation**: After working out the geometry of the lode and bulk density the resource may be estimated. The resources may be estimated following at least two methods, particularly for steeply dipping lodes (preferably by Cross Section method and LV Section method) and taking into consideration at least two cut offs. For bauxite and limestone, polygonal and isocore methods to be utilized.
11. **Geological Report**: A geological report is to be prepared incorporating all the information mentioned above. Progress Report must be prepared following the guidelines of MEMC Rule table-IV-A. The progress report is to be submitted with the map of G4 stage and detailed map of G3 stage, all borehole cross sections, LV section, level plan and field photographs in hard copy as well as digital format.