

भारत सरकार
Government of India



मिशन- II, Mission-II
प्राकृतिक संसाधन निर्धारण
NATURAL RESOURCES ASSESSMENT
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Sub: Guidelines for execution of Annual Programme of GSI for Natural Resource Assessment (Mission-II) for FS 2019 - 2020

GUIDELINES

The Annual Programme of GSI for the Field Season 2019-20 has commenced from 1st April 2019 onwards. All the pre-field studies for the FS 2019-20 are to be completed by the first quarter including finalization of reports for the FS 2018-19 as per schedule. Since a number of Mission-II officers will be participating in IGC-2020, that is scheduled in the 1st week of March 2020, the field work for current FS may be initiated in all projects as early as possible and completed before March, 2020. Therefore, all the HoDs and RMH-IIs of the Regions are requested to take all measures to initiate the field work in all the Mission-II projects at the earliest. The following guidelines should be taken into consideration while executing the Mission-II (IIA & IIB) FSP projects:

1. G4 Stage Reconnaissance Survey:

The objective is to identify potential areas worthy of further investigation towards mineral block identification.

- The G4 stage of exploration items should be executed with proper exploration techniques which may develop into potential blocks for G3 stage and G2 stage exploration.
- Pre-field Studies - All the literature that are reflected in the bibliography of respective FSP items should necessarily be consulted to understand the type and nature of work already completed and to identify the gap areas and plan the work accordingly in the proposed area.
- Thorough consultation of all the available geological reports (50K and 25K), mineral exploration / investigation reports, geophysical (both ground and aero geophysical) reports and geochemical reports with suitable buffer limit of the project area should be completed. The exploration work carried out by the other agencies (available in GSI Portal) should also be consulted. Extraction of litho-geochemical database (PCS / BRS etc) from the previous reports, which can be used as background values for mineral exploration.
- Processing and interpretation of the ASTER data is must for all metallic mineral exploration blocks, irrespective of the stage of exploration. In case of G4, it should be for 300 sq. km area, and in case of G3 it is around 100 sq. km. The proposed area should fall at the centre of the area considered for ASTER data processing. However, ASTER data processing and interpretation is excluded for the bulk minerals like iron ore, manganese, limestone / dolomite, glauconite etc.
- Processing and interpretation of aerogeophysical and ground geophysical data sets available for the proposed area to be integrated with the geological map to identify potential target area for exploration.
- Regolith samples are to be collected where alterations are observed in the surface depending upon the mineral commodity. This sampling is not required for bulk minerals. The paragenetic mineral association should be taken into consideration during sampling and chemical analysis. Possibility of targeting Ga, REE etc in bauxite and gold, vanadium, titanium in BIF as per genetic association should be considered. In addition, new target regions of REE in sediments, peat beds, zones of saprolite etc., and for nickel in ochres formed at basal portions of mafic ultramafic derived laterites should be taken into consideration.

- g. In case of gold, PGE and REE & RM items, preparation of drainage map is mandatory for stream sediment sampling to target the potential source rocks.
- h. Geochemical sampling density from various sampling media viz. SSS, SS, BRS, PTS, SW etc should be scientific based on the style & nature of mineralization and dispersion of the key elements in various sampling media.
- i. The LSM (1:12,500) should have proper lithological contacts, structural data, sample location points, mineralized zones with assay values. True scale and clear representation of geochemical anomaly maps of the target blocks should be prepared with global coordinates.
- j. The mapping and sampling should go coherently in a phased manner. The samples should be immediately processed after the collection and submitted to the lab for analysis. The chemical lab should provide the analytical data within 15 days from the date of sample submission. The analysis is most important for a G4 stage investigation to decide the potentiality of the area for mineralization and furthering of the exploration activities. Based on the analytical data, the strike extension of the mineralized zones could be traced.
- k. The personnel should be judiciously deployed in the project as per the work load / NQT. The NQT is flexible and any work component can be modified based on the necessity and the prevailing ground conditions with the approval of the ADG & Head, NM-II and PSS-P&M.
- l. There should be close interaction with the officers and the supervisory officers on Day-to-day basis for successful execution of the item.
- m. While writing report, chapter on geochemical prospecting should not be confused with GCM work in the toposheet.
- n. The scout boreholes in any of the G4 stage explorations should be limited to a maximum of 5 nos for a maximum of 500m.
- o. Prior forest permission should be obtained from the concerned Forest authorities for the areas falling in Reserved Forest / Protected Forest with wild life sanctuaries before taking up the field item.
- p. Prior intimation should be provided to the State Government, DGM, district administrations, local authorities etc., before taking up the field item for smooth execution.

2. G3 Stage Preliminary Exploration:

- a. Thorough consultation and understanding of the G4 stage exploration report of the target area and other mineral exploration / investigation reports, geophysical reports and geochemical reports should be made before proceeding to field.
- b. Detailed Mapping and Geophysical Surveys (suitable method as per the commodity) should be taken up on priority before taking up drilling. The base line for DM should be the same base line for geophysical and geochemical surveys. Accordingly, the ADG & HoDs of the Regions should ensure proper deployment of Survey and Geophysics Teams.
- c. Carrying out of geological (DM), geochemical and geophysical mapping should be initiated simultaneously in the G3 stage exploration for metallic minerals. This will enable the geoscientist to have better understanding of the mineralisation style, nature of conductive zones, structures that control mineralization etc. Limestone, bauxite and other bulk minerals are excluded from this approach.
- d. Geophysical mapping also required to be covered beyond demarcated exploration blocks (approximately few hundred meters along and across strike of mineralised zone) as per the scientific requirement to understand continuity of subsurface structures and host rocks.
- e. True scale geophysical anomaly maps prepared with various enhancements of linear and lateral patterns in addition to depth slices as per the geoscientific requirement should be done in close interactions between Geology and Geophysics teams at all levels i.e., from project initiation to report writing.
- f. For precious metals like gold and PGE, the DM should be carried out on 1:1000 scale, for base metals, it should be 1:2000 and for critical / strategic minerals, it is either 1:1000 or 1:2000, depending upon the dispositions & widths of the mineralized zones.
- g. For bulk minerals like limestone, iron ore, bedded manganese ore, bauxite etc, DM should be carried out in 1:4000 scale.

- h. The bounding coordinates of the block boundaries and the borehole locations should be marked by DGPS.
- i. Pitting and trenching should be carried out based on the surface values (BRS etc) as well as on the basis of geophysical signature to trace the strike extension of the mineralized zones.
- j. Selection of borehole location and drilling should be preceded by the integration of geological, geochemical & geophysical data sets and plotting the anomalous zones.
- k. The spacing of boreholes should be strictly followed as given in the MEMC guidelines. The BH spacing for precious metals like Au & PGE along strike may be 100m or closer interval with first level of intersection (30m – 60m vertical depth for PGE / 60m vertical depth for Au). The BH spacing for base metal along strike may be 200m or closer interval with first level of intersection (60m vertical depth). The BH spacing for critical / strategic minerals along strike may be 200m – 100m or closer depending upon the disposition & width of the mineralized zone with first level of intersection (60m vertical depth). All the G3 stage items may have 2 – 3 nos. of second level BHs also along the positive profile of the 1st level boreholes. For limestone, bauxite, potash and salt beds of regular habit, the grid spacing of boreholes may be 800m or closer and 400m or closer for irregular habit. For iron ore, manganese ore and chromite of regular habit, the BH spacing may be 400m or closer and 200m or closer for irregular habit (Refer MEMC, Rule 2015)
- l. All the profiles along which the BHs have been planned should have the surface analytical values (wt. avg of trench / channel / groove / chip samples etc) of the mineralized zones. The second level BHs should not be drilled without the data of the first level boreholes.
- m. The BH proposal should be submitted in the prescribed format and prior BH approval should be obtained from the DDG & RMH-II of the Regions before taking up drilling. A copy of the BH proposal and approval of DDG & RMH-II should be sent to the ADG & NM-II for information.
- n. The BH cores should be properly logged and sampled immediately after completion of the boreholes. Detailed lithology as well summarized lithology needs to be prepared for every BHs. The summarized lithology should come in the chapter on description of the boreholes and the detailed lithology should be annexed in the report.
- o. After logging and sampling, the cores need to be properly skeletonized with documentation and kept in the GI core boxes for handing over to the Regional Core Library, after closing the camp.
- p. The geological cross sections of the BHs should be finalized immediately after the completion of the BHs taking into consideration of the MZs intersected in the BHs and the core axis to foliation.
- q. The location of borehole point should be physically shown to the Drilling-In-Charge by the concerned field officer / Supervisory Officer of the project. During the anchoring of boreholes, the concerned field officer / Supervisory Officer along with surveyor should cross check the borehole point, bearing, BH angle etc.
- r. Along with the in-house, the outsourced drilling should also be closely monitored by the respective regional Drilling Division and submit the FDPR regularly. The Drilling Division should compulsorily visit the outsourced drill sites to ensure the quality of the drill rigs.
- s. The officer should plan well in advance and communicate to the Borehole Geophysical Logging Team to be in readiness to take up GP logging as soon as the BH is completed, as per the requirement. The ADG & HoD and RMH-II of the Regions should ensure the timely completion of BH geophysical logging to avoid idleness of the rigs.
- t. The deviation test along borehole should be completed immediately after the completion of the boreholes.
- u. The chemical lab should provide the analytical data of the samples (BRS / CS) within 15 days from the sample submission date.
- v. Lab studies to be taken up to identify the mineral phases, host mineral etc.

3. G2 Stage General Exploration:

- a. Thorough consultation of the G3 stage exploration report, trench sections, BH cross section, surface and sub-surface correlation of the mineralized zones.

- b. The bounding coordinates of the block boundaries and the BH locations should be marked by DGPS.
- c. Close spaced pitting and trenching / surface sampling should be carried out to establish the strike continuity of the mineralized zones.
- d. The spacing of boreholes should be strictly followed as given in the MEMC guidelines. The BH spacing for precious metals like Au & PGE along strike may be 50m or closer interval with two levels of intersection (30m-60m & 60m-90m vertical depth for PGE / 60m & 120m vertical depth for Au). The borehole spacing for base metal along strike may be 100m or closer with two levels of intersection (60m & 120m vertical depth of intersection). The BH spacing for critical / strategic minerals along strike may be 100m – 50m or closer depending upon the disposition & width of the mineralized zone with two levels of intersection (60m & 120m vertical depth). All the G2 stage items may have 2 – 3 nos of third level BHs also along the positive profiles of 1st and 2nd level boreholes. For limestone, bauxite, potash and salt beds of regular habit, the grid spacing of boreholes may be 400m or closer and 200m or closer for irregular habit. For iron ore, manganese ore and chromite of regular habit, the BH spacing may be 200m or closer and 100m or closer for irregular habit (Refer MEMC, Rule 2015).
- e. All the profiles along which the BHs have been planned should have the surface analytical values (wt. avg of trench / channel / groove / chip samples etc) of the mineralized zones. The second level and third level BHs should not be drilled without the data of the first and second level boreholes.
- f. The BH proposal should be submitted in the prescribed format and prior BH approval should be obtained from the ADG & Head, NM-II before taking up drilling.
- g. The BH cores should be properly logged and sampled immediately after completion of the boreholes. Detailed lithology as well summarized lithology needs to be prepared for every BHs. The summarized lithology should come in the chapter on description of the boreholes and the detailed lithology should be annexed in the report.
- h. After logging and sampling, the cores need to be properly skeletonized with documentation and kept in the GI core boxes for handing over to the Regional Core Library, after closing the camp.
- i. The samples for ore beneficiation studies should also be prepared from the BH cores.
- j. The bulk density of insitu ore / rock is to be used for estimation of resource for bulk mineral commodities such as iron ore, bedded manganese ore, limestone, bauxite etc. For other mineral commodities like base metals, precious metals, PGE etc., the specific gravity of the ore as prescribed in standard reference books may be used, owing to their erratic distribution and very little concentration in the ore body which may lead to inaccurate estimation of bulk density.
- k. The geological cross sections of the BHs should be finalized immediately after the completion of the BHs taking into consideration of the MZs intersected in the BHs and the core axis to foliation.
- l. The location of borehole point should be physically shown to the Drilling-In-Charge by the concerned field officer / Supervisory Officer of the project. During the anchoring of boreholes, the concerned field officer / Supervisory Officer along with surveyor should cross check the borehole point, bearing, BH angle etc.
- m. The officer should plan well in advance and communicate to the Borehole Geophysical Logging Team to be in readiness to take up GP logging as soon as the BH is completed, as per the requirement. The ADG & HoD and RMH-II of the Regions should ensure the timely completion of BH geophysical logging to avoid idleness of the rigs.
- n. The deviation test along borehole should be completed immediately after the completion of the boreholes.
- o. The chemical lab should provide the analytical data of the samples (BRS / CS) within 15 days from the sample submission date.
- p. Lab studies to be taken up to identify the mineral phases, host mineral etc.


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