

MINUTES OF THE 57th MEETING OF THE STATE GEOLOGICAL PROGRAMMING BOARD HELD ON 23rd AUGUST AT BHUBANESWAR

57.01.00	<p>The 57th meeting of the State Geological Programming Board (SGPB) was organized under the chairmanship of Sri Deoranjana Kumar Singh, IAS, Principal Secretary to Government of Odisha, Steel & Mines Department on 23rd August on the virtual platform.</p> <p>The list of participants is enclosed as ANNEXURE-I.</p>
57.02.00	<p>WELCOME ADDRESS BY THE DIRECTOR OF GEOLOGY, ODISHA & MEMBER SECRETARY, SGPB.</p>
	<p>Sri Manoranjan Panda, Director of Geology, Odisha, and Member Secretary, SGPB extended a warm & hearty welcome to Sri Deoranjana Kumar Singh, IAS, Principal Secretary to Government, Steel & Mines Department and Chairman SGPB, Sri Debidutta Biswal, IFS, Director of Mines, Odisha, Sri Kallola Behera, Dy. Director General, GSI, (SU) Odisha, Sri Deepak Mohanty, OSD-Cum-Special Secretary to Govt. Steel & Mines Department and all the delegates & participants in the 57th SGPB meeting.</p> <p>The Member Secretary highlighted the role of SGPB and contribution of the member organizations for the mineral development of the state. State Geological Programming Board (SGPB) meeting is being convened in the similar manner as that of Central Geological Programming Board (CGPB) to finalize the Annual Field Programmes of the State after detailed discussion and deliberation by participating organizations and review of the activities undertaken by the exploring agencies operating in the state. Consequent upon the Amendment of the Mineral (Evidence & Mineral Content) Rules-2015 & 2021, there is a great opportunity before the exploring agencies to provide more and more auctionable blocks. He highlighted the achievements of the Govt. in auctioning 26 mineral blocks last year. He also informed that as per the decision taken in the 56th SGPB, Directorate of Geology has undertaken 15 investigation programmes (7 at G2 level, 6 at G3 level and 2 at G4 level) during F.S 2020-21 for iron ore, manganese, graphite, limestone, coal, china clay, quartz and quartzite, dimension stone and soapstone. One outsourced iron ore investigation programme could not be executed due to want of Forest Clearance. The restrictive lockdown imposition by the second wave of Covid-19 Pandemic has adversely affected the field work and achievement of target within the time schedule. He apprised that the Directorate is taking all possible measures to expedite exploration activities in the State in order to facilitate the process of auction. He added that earlier, our State has auctioned 28 mineral blocks and 16 mineral blocks are now under progress in two phases which has been possible only due to the relentless efforts of GSI, MECL & DG (O). In order to facilitate sharing of expertise, technology and mutual co-operation for mineral development of the state, GSI has accepted the proposal of DG (O) to relook into the Gopur-Gajipur Gold prospect in Keonjhar district where officers</p>

	<p>of DG (O) and GSI will work together .The Member Secretary congratulated the GSI, AMD, IBM, OMC, CMPDI, MECL, NALCO, IDCOL, DGWD, SAIL, CGWB, OMECL and Chief Engineer Planning for their sincere harmonization with the mineral development of the State.</p>
57.03.00	<p>ADDRESS BY SRI KALLOLA BEHERA, DEPUTY DIRECTOR GENERAL, GSI, STATE UNIT, ODISHA</p>
	<p>Sri K. K Behera Deputy Director General, GSI, (SU) Odisha in his address synopsised the activities and achievements of GSI, Odisha during the year 2020-21.He indicated that GSI is continuing its comparative effort to prepare and update the geo-scientific data in Mission I and exploration of mineral resources in Mission II in order to augment the resource potential of the state. GSI is also committed to its social responsibility by the way of implementing geo-scientific projects of social importance including geotechnical investigation for different water resources projects as well as dissemination of geo-scientific information among the stakeholders.</p> <p>The baseline data forms the backbone of all sorts of geological investigations, whether it is mineral exploration, engineering and environmental projects or mitigation of natural hazards. As per the present structure, all the geo-scientific projects related to baseline data generation have been included in the mission-I activities. During the year from April 2020 to March 2021, 22 numbers of projects are carried out under Mission –I including 15 NGCM and 7 STM. Barring the inaccessible and disturbed areas, most of the OGP area and part of the Non-OGP areas have been covered by NGCM. The project will address some geological problems and will lead to identification of potential mineral blocks.</p> <p>During the period 2340 Km² have been carried out in the districts of Sambalpur, Sundergarh, Deogarh, Mayurbhanj, Nuapada, Malkangiri, Koraput. Under NGCM, 9000 sq km was covered in different parts of the state. A total of 26 mineral investigations in Mission-II have been taken up by state unit, Odisha encompassing Iron, Manganese, Base metal and coal. There are 18 items in G2 level including 5 items of coal exploration. Out of the remaining projects, 4 items are of G3 level (3 for iron & manganese ore & one for base metal) and 4 projects in G4 level.</p> <p>Forest clearance is the major problem for exploration project and authentication of cadastral details by the concerned revenue department consumes major time in order to complete the projects as per the schedule. State Government is requested to take a proactive step to reduce the time. However, the initiative taken by PCCF for holding the monthly coordination committee meeting for forest clearance proposal is a welcome step. During 2020-21, a total of more than 25000m drilling has been completed in coal and non-coal investigations. GSI handed over 10 geological reports. Priorities have been given on prospecting and reassessment of resources of 12 non-working mining leases which expired on 31st march 2020. During the last year GSI has</p>

	<p>handed over 10 geological reports on non-working MLs and in-house explored blocks. These 10 reports accounts for 433 mt of iron, 8.24 mt of manganese, 4.05 mt of copper with an average grade of 0.42% of copper.</p> <p>As per the recent Amendments in MMDR Act and MEMC Rules, based on geological information some geological potential areas have been allocated as G4 blocks which can be auctioned as composite license. Under Mission-II activities, the engineering geology division provides technical consultation to water resources and communication projects of Odisha as per request of the concerned authority.</p> <p>In the coming field season 36 field projects would be undertaken, which includes 11 NGCM, 5 STM, 17 mineral explorations and 3 engineering and environmental projects.</p>
57.04.00	ADDRESS BY DEBIDUTTA BISWAL, IFS, DIRECTOR OF MINES, ODISHA
	<p>Sri Debidutta Biswal, IFS, Director of Mines, Odisha in his address stated the importance and significance of SGPB meeting and role of exploration agencies. Mining Auction Rules and geological exploration activities are interdependent for putting the blocks into auction. Through GR, we can assess the quantity and quality of mineral which ultimately goes to determine the value of estimated resource (VER) of a mineral block which again determines the upfront payment, performance security, bid security to be deposited and the net-worth which is a very critical activity. I must congratulate all the exploration agencies for putting of their effort together and making the blocks ready for auction. DM, Odisha also recapitulated that Odisha is in the top of the states which have taken up auction of 31 blocks successfully. The NIT for 11 blocks has also been published and in the auction process is going on. State has also planned to auction another 14-15 blocks which are in pipeline during this financial year. So, kudos to all exploration agencies. Government of India is very kin that more and more blocks should to be taken up for auction so that the mineral sources can be explored scientifically and optimally. One of the important milestones in the history of mineral auction is the amendment of the MEMC Rules. Now the goal post has been changed. Instead of G2 level we need G3 level for ML and instead of G3 level we require G4 level for grant of composite license. All the exploration agencies must complete G3 and G4 level of exploration as the case may be and make them ready for auction. Another amendment of UNFC guidelines is to fix core template CRIRSCO which is actually of international standard of reporting for mineral resources.</p> <p style="text-align: right;">(Action: All Members)</p>
57.05.00	ADDRESS BY SRI DEORANJAN KUMAR SINGH, IAS, PRINCIPAL SECRETARY TO GOVT. OF ODISHA, STEEL & MINES DEPARTMENT AND CHAIRMAN, SGPB.
	<p>Sri Deoranjana Kumar Singh, IAS, Principal Secretary to Government of Odisha, Steel and Mines Department and Chairman, SGPB welcomed all the dignitaries and delegates to the 57th SGPB meeting. He opined that many mining leases are lapsed which lead to an apprehension that there will be shortage of minerals</p>

	<p>for the industries. All the exploration agencies and Directorate of Mines should work together to ensure that there is adequate availability of minerals available for scientific and sustainable mining. This is possible when new blocks are kept ready for auction. Now instead of G2 level exploration, G3 & G4 level of explorations need to be focused more which is a landmark for auction. Rather exploration should concentrate on new areas which are unexplored. DG (O) should look at the geological map of the state to find the unexplored areas. He appealed all the dignitaries and delegates to discuss various issues and make recommendations for better mineral development in the State.</p> <p style="text-align: right;">(Action: All Members)</p>
57.06.00	CONFIRMATION OF THE MINUTES OF THE 56TH SGPB MEETING
	<p>Member Secretary, SGPB placed the Minutes of the 56thSGPB meeting circulated vide Letter No. 6459/DG, dated 25.09.2020 before the members for confirmation and the Minutes was unanimously confirmed by the Board without any change.</p>

57.07.00	REVIEW OF ACTION TAKEN ON MINUTES OF THE 56TH SGPB MEETING
	<p>The Member Secretary, SGPB, initiated discussion on the follow up action on the Minutes of the 56th SGPB meeting with due permission of the chairman, SGPB.</p>
57.08.01	<p>In response to Para 56.05.00 :</p> <p>I. In order to put impetus to explore more and more geologically potential specified minor mineral blocks, to make them eligible for auction; Member Secretary, SGPB informed that exploration for specified minor minerals is not under the purview of GSI while DG (O) is regularly taking up exploration of specified minor mineral blocks at G3 stage of UNFC.</p> <p>I. Regarding the exploration of expired or lapsed mining leases for future auction, Member Secretary informed that GSI is carrying out exploration of non-working MLs. However, if a the few of the expired or lapsed mining leases for major, strategic and industrial minerals are allocated, GSI can take up such blocks based on their feasibility. DG (O) is regularly examining the mineral potentiality of the surrendered/ lapsed/ determined & taken over ML areas & upgrading their status of exploration.</p> <p>III.Regarding proposals for Forest Clearance; Member Secretary, SGPB informed that proposals for Forest Clearance by GSI are under process at different levels and documentation pertaining to cadastral details and their authentication takes much of time. DG (O) has already processed 3 proposals & FDP for one block has been obtained. One proposal is pending for administrative approval while another proposal is submitted to MoEF for reconsideration.</p> <p>IV.Regarding funds from NMET for intensifying the exploration in the state as Odisha is contributing about 30% to NMET Fund; Member Secretary, SGPB informed that GSI does not require NMET funding. Exploration projects are funded from its own budget while DG (O) has got approval of NMET for one</p>

project but could not accomplish it for public resistance. DG (O) is undertaking explorations from the State's budget provisions.

In response to Para: 56.06.00:

- I. Regarding the regional and detailed exploration to be carried out systematically, scientifically and intensively over the entire geologically conducive mineral bearing areas; Member Secretary, SGPB informed that GSI has always adopted a scientific and systematic approach towards mineral exploration also DG (O) has been undertaking systematic exploration in a scientific manner in the conducive mineral bearing areas to identify potential prospects for up scaling the resource upto G2 level.
- II. Regarding exploration of more and more deposits at G2 level for auction; Member Secretary, informed that GSI has carried out exploration under G3 and G2 stage successively in the conducive areas and DG (O) is formulating exploration programmes to upgrade the already known prospects on priority basis, so that more auctionable blocks can be opened for auction.
- III. Regarding preparation of the Geological Reports at par with the international standards with appropriate UNFC/MEMC codification; Member Secretary, informed that GSI is committed for up gradation of technical skill and equip its field officers through regular training and guidance. All the Geological Reports are being prepared by DG(O) as per the prescribed guidelines of Part- IV A of MEMC Rule -2015 and MEMC (Amendment) Rule 2021. The GRs are peer reviewed by the experts and then submitted for auction.
- IV. Regarding new ideas and proposals for sustainable mineral development in the state; Member Secretary, informed that a scientific, systematic and holistic approach to exploration will lead to sustainable mineral development.
- V. Regarding application of geophysical techniques in the mineral exploration Member Secretary, informed that GSI is employing geophysical techniques starting from aero-geophysical survey to ground geophysics and borehole logging for delineation of subsurface mineral prospects and their correlation, as per the requirement. DG (O) is deploying its geophysical team wherever necessary to decipher the subsurface geological information and causative bodies.

In response to Para: 56.08.01 on Agenda-1

Regarding 3D ore modeling, which needs to be done wherever necessary, particularly in case of G2 & G1 level of exploration; Member Secretary informed that 3-D ore body modeling of Kalamang West (Northern part) using SURPAC software has been prepared by GSI in collaboration with OMC. Making the software available and trained personnel, more blocks will be taken up for ore body modeling. 3D ore modeling of Khatkurbahal (North) Limestone & Dolomite was done by DG(O) by using SURPAC. This year, attempt will be made to prepare 3D model of Roida-D manganese body.

In response to Para: 56.08.01 on Agenda-2

Regarding proposal to cover the balance area of the state by Aeromagnetic

Survey, Member Secretary informed that on the basis of the aero-geophysical data shared by the State Government, few prospective blocks have been identified by the RSAS Division of GSI at Bangalore. It has been proposed to take up few blocks for Heliborn survey by RSAS Division, Bangalore to further highlight the prospects. Govt. is pursuing a Mineral Resource Mapping of the state for which a SLES & TAC have been constituted under the Chairmanship of Hon'ble Chief Secretary of Odisha with Technical experts from various Organizations.

In response to Para 56.09.09

- i. Regarding Systematic Marine & Coastal Survey along with seismic micro zonation of Puri coast to mitigate the effect of coastal erosion & suggest remedial measures, Member Secretary informed that as per the decision of the Ministry of Mines, seismic micro-zonation work can only be undertaken by GSI on specific requests from the State Government. Therefore, specific request need to be sent to the ADG & HoD, Eastern Region for taking up such study at desired locations of the State.
- ii. Regarding examination of the lithium potentiality of Bengpal Group of rocks by the exploring agencies, Member Secretary informed that during the FS 2020-21, two STM items had been taken up by GSI in Koraput and Malkangiri districts having litho units of Bengpal Group. However, no such pegmatite bodies with cassiterite and lepidolite have been encountered in the study area. Lithium Prospects in the state and the geologically conducive formation will be examined by DG (O) whenever those areas will be covered during exploration. MECL is ready to take up exploration for lithium on offer from the state government.
- iii. Regarding recommendation to the MoM, GoI for retaining G3 level of exploration for auctioning of PL-cum-ML blocks, Member Secretary informed that GoI has already made necessary Amendment in the MEMC Rule 2015, Mineral Auction Rule -2015 and M&M (D&R) Act 1957.
- iv. Regarding NMET fund availed by Govt/ PUS agencies to undertake detailed work of capital intensive exploration projects on various critical and strategic commodities like Li, K, REE, cobalt etc. which can be taken up parallel with conventional exploration of bulk minerals like iron ore, bauxite, manganese etc, Member Secretary informed that GSI is taking up exploration projects for major minerals as well as strategic and rare minerals funded from its own budget. Keeping in view the demand of recent Auction Policy of the Govt., major and specified minor mineral explorations are being targeted from the Govt. budget. The specialised exploration will be taken up from NMET funds. etc. DG(O) is also undertaking its exploration from State Govt. budget.

In response to Para 56.10.01

- i. Regarding assessment of metallogenic potentiality of Gangpur Group & ore bearing potentiality of Ichha nala formation, Member Secretary

	<p>informed that the area around Panposh has been proposed by GSI under Regional Mineral Targeting (RMT) Project along with scout drilling during the current FS.</p> <p>ii. Regarding study for gold mineralisation between Suriagora and south of Gorumahisani schist belt, GSI clarified that the area proposed around Suriagora in Mayurbhanj district has been covered under G-4 stage investigation during the FS 2019-20 and some encouraging results of gold value have been received. Based on these results, follow up programme will be proposed in the next year. (Action: GSI)</p> <p>iii. Regarding preparation of a comprehensive data base on graphite for the ease of exploration, Member Secretary informed the house that compilation of exploration data on graphite investigations undertaken by GSI has been completed. DG (O) is targeting the already reported graphite occurrences and Taken Over graphite ML areas to upgrade its exploration status.</p> <p>iv. Regarding exploration for establishing association of lithium within pegmatites in Odisha specifically in manganese deposits of southern part of Odisha, GSI suggested to take up projects for search of lithium minerals in pegmatites and manganese deposits of EGMB and BK belt while the data on pegmatites located during course of investigations are under compilation by DG(O). (Action: GSI)</p> <p>v. Regarding study of association of potash bearing minerals in the nepheline syenite bodies GSI responded that although it is known that nepheline syenites contain potash minerals, unless economical extraction of potash from nepheline syenite is established through pilot scale studies, it would be difficult to take up exploration of nepheline syenites by GSI as a source of potash fertilisers. Member Secretary opined that DG (O) will share the occurrence of nepheline synite rocks encountered during course of investigation. However, it is urged to take up pilot scale sampling of the known occurrences to ascertain its potash content through XRD studies. MECL expressed their affirmation to take up exploration for Nepheline Syenite for potash if the state Government gives consent for exploration. {Action: GSI/MECL/DM(O)}</p> <p>vi. Regarding reinterpretation of high resolution aero-geophysical survey of 75,000 sq km area (80m height and 250m grid interval) carried out by Geoscience Corporation of Australia and DG (O) and field work carried out by the geologists of RSAS, GSI, Bangalore during F.S. 2018-19 GSI informed that three areas can be taken up for Mineral Exploration (G4) in Odisha; Regarding exploration of REE, GSI informed that three G4 stage investigations have been taken up for REE in Nayagarh, Boudh and Koraput districts during the current FS.</p> <p>vii. Regarding possibility of striking BHJ underlying iron ore associated with Upper Shale Formation within Koira valley and Stratigraphic reassessment by number of boreholes, GSI informed that a STM item taken up in BK belt for resolving</p>
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	<p>the stratigraphic controversies and suggested for drilling of a few stratigraphic boreholes in different parts of the belt. Depending on the suitable high capacity drilling rigs, drilling of stratigraphic boreholes will be taken up. (Action: GSI)</p> <p>In response to Para 56.10.02</p> <p>i. Regarding action plan for revival of Non-working mines in the state, Member Secretary informed that presently, GSI is carrying out exploration of non-working mining leases. All non-working mines under section 10 A (2) (c) of MM (D& R) Act-2015 and its Amendment are assigned to GSI to complete the exploration.</p> <p>ii. Regarding information on NMET fund reconciliation as per supplied format on monthly basis; Member Secretary informed that DG (O) has undertaken one G4 level exploration for Mn around Tentuliguuda in Koraput district, but the objective of the project could not be achieved for public resistance & the work has been suspended.</p> <p>iii. Regarding forwarding of soft copy and hard copy of draft MP/MMP/RMP by Indian Bureau of Mines for comments of State Government, Member Secretary informed that DG (O) is yet to receive such proposals from IBM. It will be responded appropriately whenever required. (Action: IBM)</p> <p>iv. Regarding information on Auction Blocks/ DMF/PMKKY etc, Member Secretary informed that relevant information is available with DM (O). {Action: IBM & DM(O)}</p> <p>v. Regarding sharing of exploration reports carried during the year 2016-17 onwards by all Government agencies (State Govt. /GSI) with IBM as per Rule 72 of MCDR 2017, Member Secretary informed that it will be provided on specific request from IBM. (Action: Stake holders)</p>
57.09.00	PRESENTATION BY MEMBER ORGANISATIONS
57.09.01	<p>Dr J. P. Mohakul, Director, GSI, (SU) Odisha made an elaborate presentation on the exploration activities of GSI (SU) Odisha conducted during 2020-21. He explained regarding the activities of 15 NGCM project and 7 STM projects under Mission – I. He also presented on 26 projects under Mission – II which includes 15 projects in G-2 (coal-5, Iron & Mn-7, Basemetal-3), 2 projects in G-3 (Iron & Mn-1 and Base metal-1) and 9 spill over projects (G2 level -3, G3 level-2 & G4 level-4). Four reports on Gandhalpada (West), Alaghat (West) , Kedasala (NE) & Jhumkapathiriposi (West) of iron blocks, Bhanjikusum Manganese block and Dudhiasol basemetal block under Mission II have been handed over to State Government for auction. He presented a detailed account on the programme of the exploration activities for F.S. 2021-22 which includes 36 items. Out of which, 16 projects under Mission – I (11 NGCM project & 5 STM projects) and 17 projects under Mission – II and 3 Projects under M-IV.</p>

57.09.02	<p>Dr. P C Mishra, Deputy Director Geology, Directorate of Geology made an elaborate presentation on the exploration activities undertaken during 2020-21 in respect of coal, iron ore, manganese ore, chromite, limestone, graphite, china clay, decorative stone, soapstone, quartz & quartzite and one geophysical survey for graphite.</p> <p>Dr. Mishra mentioned that Coal exploration in Dipside of Block -IV of Ib valley achieved 1257m drilling in 3 boreholes and drilling in this block will be continued in the next F.S. Exploration for manganese at G2 level around Roida-D has been completed. Exploration of Mankarnacha iron ore block at G2 level is in progress and so far achieved 1500m of drilling meterage over 26BHs and in course of G4 level of investigation for iron ore around Thakurani potential iron ore exposures have been identified which will be upscaled. Exploration for graphite at G2 level around Khalpadar Block in Rayagada district encountered potential disseminated graphite and the block is spreading laterally. G3 level prospecting around Beheramunda of Balangir District revealed occurrence of graphite in the scout boreholes and will be continued in the next FS. Drilling by outsourcing agency for graphite around Karabira of Dhenkanal district was completed with achievements of 3812m of drilling over 50BHs. Investigation for graphite at G4 stage aided by geophysical survey was carried out in Bandhabhuin area of Dhenkanal district. Limestone exploration around Telipadar Block, Balangir district at G2 level was completed through drilling in 50 BHs and exploration for limestone at G3 level around Kantabanji of Balangir District was carried out and will be continued in the next field season. Exploration for china clay at G2 stage was completed around Dumuria of Mayurbhanj district. Investigation for Decorative stone was carried out in Garabandha of Gajapati district at G3 stage and identified 2 prospective blocks. Investigation for assessment of quartz and quartzite was taken up around Maharajpalli of Malkangiri District at G3 stage but could not be completed for restrictions of COVID-19. Investigation for soapstone around Bhaludunguri of Sundargarh District was carried out at G3 stage. Investigation for artisan grade stone at G3 stage carried out around Mathura of Ganjam District and identified a workable potential block for exploitation to cater to the needs of artisans. Dr Mishra briefly outlined the exploration programmes of the Directorate of Geology, Odisha for 2021-22. The programme comprises Coal – 1, Iron & Manganese ore-4 (3-G2 and 1-G3) Limestone – 2 (1-G3 and 1-G4), Graphite -4 (G2-2, G3-1 & G4-1), Base metal-1 (G4-1), Decorative stone/ Artisan grade stone – 3 (all are at G3 stage), Quartz & quartzite – 3 (G3 stage), Pyrophyllite-1(G3). The proposed Annual exploration programme was placed in the house for approval before finalization.</p>
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57.09.03	K. Chakrabarty, Regional Director, AMD, Jamshedpur presented the exploration activities of AMD in Odisha during 2020-21 for uranium, columbite-tantalite. Investigations were mostly carried out for QPC type uranium mineralisation and shear controlled hydrothermal vein type uranium mineralisation. He presented the activities of AMD during 2020-21 which were mostly concentrated in Bagiyabahal-Baratangra & Gangpur Basin in Sundargarh district & Pandikimal RMRE prospect in Jharsuguda district in Odisha for exploration of uranium & columbite-tantalite. He added that the investigation taken up during F.S 2020-21 will be continued for F.S 2021-22 based on the merit and forest clearance.
57.09.04	Sri R. Behera, Deputy Manager (Geology), OMECL presented the work undertaken during 2020-21 by OMECL. Forest clearance proposals for 4 bauxite blocks have been submitted and REC of MoEF & CC has approved Stage -1 clearance for all the blocks. Drilling in Nunapaimali bauxite block is completed by achieving 978.70m of drilling over 39 BHs and report is submitted to DM (O) for auction. The permission from the concerned Forest Department to use approach road to Tarhapani (W) is in progress. The community meetings with the local group are in progress to resolve the issue in Keluamali, Majhingamali and Karnapodikonda block for commencement of drilling. Geological mapping and surface sampling have been carried out in 7 iron and 1 fireclay blocks. All the blocks will be explored upto G2 stage as per UNFC.
57.09.05	Sri R. Ghosh, Manager (Geology) CMPDIL presented the work undertaken by CMPDIL during 2020-21 in Talcher and Ib valley Coalfields. He informed that CMPDIL has achieved 1,75,063m of drilling in total over 109 blocks which includes CIL block – 27,106m(43 blocks), Non CIL block – 1,47,957 m (66 blocks) . An estimated resource of 2054.701mt of coal in Talcher coal field and 547.889mt of coal in Ib valley coal field is added to National Inventory. He also presented a detailed programme for exploration of CMPDIL to be carried out during 2021-22 with a drilling target of 1,60,000 m. CMPDIL have to prepare 3 GRs i.e. 2 blocks from Talcher coalfields and one from Ib valley coalfields.
57.09.06	Mr Sri S. K Sit, General Manager (Geology), OMC Ltd. outlined the review of work of OMC during 2020-21 in their leaseholds of chromite, iron ore and bauxite prospects and also the programme of work for 2021-22. He briefly presented the exploration of chromite in south Kaliapani, base of Mahagiri, Kalarangi and Sukarangi mining leases in Jajpur district and Birasal mining lease in Dhenkanal, iron ore in Kurmitar in Sundargarh District and Gandhamardan-A, Gandhamardan-B, and Tiringpahar in Keonjhar District & bauxite in Sasubohumali in Rayagada District. He informed that a total of 66,808m has been drilled during 2020-21. He added that exploration work will continue in different leaseholds of OMC Ltd. as per the target envisaged in exploration programme for 2021-22. As mentioned 1,02,607 meters of core drilling is proposed to be undertaken in Chromite and Iron Mining Leases and PLs of OMC Ltd. for assessment of ore reserves subject to availability of required forest permission.

57.09.07	Sri M.W Wadaskar, Sr.Manager (Geology), MECL presented the exploration activities of MECL in Odisha during 2020-21. He highlighted the quantum of work done for Iron ore in Malangtoli 'H' sub-block Sundargarh & Keonjhar districts, Manganese ore in Babja block, Biarpali block, Dungripali block & Rengali block of Balangir district. He also briefed the house regarding their mineral exploration programme for F.S.2021-22.
57.09.08	Sri Debasis Mohanty, Geologist, O/o - Chief Engineer Planning of Water Resources Deptt., Odisha highlighted the achievement of the Department for F.S. 2020-21. He presented the work done in Padampur, IB (Sundargarh), Ganjam, Koraput, Mayurbhanj and Cuttack Investigation Divisions. He mentioned that 9 numbers of boreholes have been drilled in year 2020-21 and 32 numbers of boreholes to be drilled in year 2021-22.
57.09.09	<p>Sri G. B Mohapatra, Representative from SGAT participating in the discussion appreciated the work of GSI & DG (O) in the mineral development of the state and suggested for systematic Marine & Coastal Survey along with seismic micro zonation of Puri coast to mitigate the effect of coastal erosion & suggest remedial measures. GSI responded that the assignment can be taken up on specific request from the state Government.</p> <p style="text-align: right;">(Action: GSI)</p> <p>Dr B. M. Faruque, Member, SGAT suggested that lithium is found associated with Mathili cassiterite and lepidolite in pegmatites of Benggal Group of rocks from which lithium can be extracted. Exploring agencies have to examine the lithium potentiality of those stratigraphic horizons in view of the global climate change.</p> <p style="text-align: right;">(Action : All Stake holder)</p> <p>Sri S. K. Mohanty, Member, SGAT briefed the recent move of MoM, GoI to bring some Amendments to the MMDR Act encouraging private participation in regional exploration which may not be in the best interest of the state and the country. In order to achieve a holistic development of the mineral sector, robust monitoring mechanism should be in place because private players will undertake the exploration and resource estimation. With this backdrop, it is submitted that SGPB may recommend to the MoM, GoI for retaining G3 level of exploration for auctioning of PL-cum-ML blocks. Board should seek clarity on role of Govt. agencies and robust monitoring mechanism while finalising this amendment.</p> <p style="text-align: right;">(Action: DG (O), DM (O) & S & M Deptt.)</p> <p>Odisha is contributing a major share to total NMET fund and proportionate fund is not being availed from NMET for undertaking exploration in the state. States like Telengana and Chhattisgarh are moving aggressively in getting projects from NMET and their execution, though their contribution is comparatively low. Hence, it is submitted that SGPB may look at it and State's Govt. agencies/ PSUs may intensify their efforts to get large number of projects from NMET. NMET fund may be availed to undertake detailed work of capital intensive exploration projects on various critical and strategic commodities like Li, K, REE, cobalt etc. etc. These projects can be taken up parallel with conventional exploration for</p>

	<p>bulk minerals like iron ore, bauxite, manganese etc.</p> <p style="text-align: right;">(Action: All Stake Holders)</p>
57.10.00	DISCUSSION ON AGENDA ITEMS OF THE 57TH SGPB
57.10.01	<p>SUGGESTION FROM DG (O):</p> <p>1. In order to comply the recent Amendments in the Mineral Auction Rules & MEMC, Rules - 2021, the Part – IV A of MEMC Rule is inadequate and the area limit of CL blocks to be auctioned at G-4 level need to be defined. The format for reporting of mineral resources at G-4 level need to be included.</p> <p>K. K. Behera, GSI opined the MEMC Rule, 2021 has already been amended and notified in the Gazette on Dt. 18th June 2021. The three major minerals i.e Iron, Limestone and Bauxite, if it is stratiform and not structurally disturbed, can be auctioned on exploration conducted at G3 level. But for other major commodities it should go for G2 level of exploration for putting the block to auction. For G4 level blocks for auction, it must be clarified what should be the report format and area limit for G4 level CL blocks and be placed in the agenda item for the main CGPB.</p> <p style="text-align: right;">{Action: GSI/DG(O)}</p> <p>2. Exploring agencies are incurring expenditure from their own budget provision of the Government or from NMET to explore a mineral block at G-2 or G-3 levels and providing GRs to State Govt. for auction. Provisions in the Mineral Auction Rules may be made to include the cost of exploration of the block while finalising the Tender document; A clause may be inserted in the Tender document to reimburse the exploration cost so that exploring agencies can generate their own revenue.</p> <p>Sri Girija Mohapatra, SGAT suggested If the exploring agency is a non-government organization/ corporation they can demand the expenditure. It is not applicable for Government Organization. OMECL appreciated the proposal</p> <p style="text-align: right;">{Action: DM(O)}</p> <p>3. Major mineral PL blocks (Iron, Bauxite & Limestone) saved under Section 10 A (2)(b) of MM (D & R) Act, 1957 & Amendments in 2015 are under consideration by Government for auction after Amendment of MEMC Rules 2021 & Mineral Auction Rules 2021. It is proposed to reserve all the potential major mineral blocks for detailed exploration by Govt. agencies so that Govt. can be benefitted from the auction of those blocks.</p> <p>Sri K. K. Behera, GSI opined that in the recent Amendment, Section 10 A (2) (b) has been omitted. The next stage will be decided by Government of Odisha.</p> <p style="text-align: right;">{Action: DM(O)}</p> <p>On a proposal from CMPDIL to extend non-coal exploration for iron and bauxite exploration in Odisha, GSI Suggested that before undertaking the exploration background information must be collected, blocks are to be identified with</p>

	<p>specific proposal based on the geochemical and geological information.</p> <p style="text-align: right;">{Action: CMPDIL}</p>
	<p>SUGGESTION FROM MECL:</p> <ol style="list-style-type: none"> 1. MECL is ready to take up exploration for Li, K, REE, Cobalt, Nepheliesyenite etc. if the state Government indicate area and give consent for exploration. 2. However, MECL has already requested state government to give consent for exploration in the following blocks. <ol style="list-style-type: none"> i) Reconnaissance Survey (G-4) for Gold, PGE, Base Metals and REE in Baraghat-Gurundia Block, District-Sundargarh. ii) Reconnaissance Survey (G-4) for Gold, PGE, Base Metals and REE in Chandposh Block, District-Sundargarh. iii) Reconnaissance Survey (G-4) for Copper in Bankisho-Dumrudihakundi-yapani Block, Dist.-Mayurbhanj. iv) Reconnaissance Survey (G-4) for Copper, Lead and Zinc in Amatpani-Giringkella-Sargipalli-Baharatpur area, dist.- Sundargarh v) General exploration (G-2) for manganese Uchhabapalli, vi) General exploration (G-2) for manganese Thakurpalli, vii) General exploration (G-2) for manganese Tabalbanji, viii) General exploration (G-2) for manganese Dandpani and ix) General exploration (G-2) for manganese Khagsabahal blocks, Dist.- Balangir. <p>The consent for above mentioned blocks is still awaited.</p> <p>In response, Member Secretary appealed to MECL for not putting such type of agenda items in SGPB.</p> <p>The forest permission for 'H', 'C' & 'E' blocks are still awaited. MECL appealed for expeditious disposal of same.</p> <p>In reply, D. G. Odisha clarified that the issues may be placed in the forest cell of the Directorate of Mines, Odisha or in the monthly coordination meeting organized by PCCF (Nodal, FC Act), Government of Odisha.</p> <p>OMECL initiated a discussion and informed that Kisanmalli-Lingapadar Bauxite blocks falls on the vicinity of Kalrapat sanctuary. It has been notified since 2018. The ESZ zone has not been finalized yet by Environment and Forest Department. Only there is a draft notification. Kisanmalli is inside and Lingapadar is outside of the ESZ. One of the soapstone and fireclay block has the same issues. So long as it has not been solved, it can't be notified. Participating in the discussion, DG (O) opined that all the exploring agencies have the forest issues. We will move forward these issues to Steel & Mines Department and Director of Mines.</p> <p>GSI opined that OMECL is absolutely correct. The forest clearance cell in the Directorate of Mines has all the information. So, the exploration agencies can approach to DM. They can provide relevant information of the block so that it can be put into DSS (Decision Support System) to undertake further course of action.</p> <p style="text-align: right;">(Action: MECL and other stake holders)</p> <p>All exploring agencies unanimously opined that authentication of cadastral sheets for FDP as per SABIC status as on 25.10.1980 by Revenue Department is a</p>

cumbersome process that consumes lot of time in processing the FDP. Government should think of simplifying the same to save processing time.

{Action: DM(O)/S&M Deptt./PCCF}

SUGGESTION FROM AMD:

Directorate of Geology, Odisha is requested to take a lead in facilitating and expediting the forest clearance applications submitted by AMD, Eastern Region for carrying out reconnoitry and exploratory drilling activities in parts of Mayurbhanj, Sundargarh and Jharsuguda districts. It is suggested to conduct periodic meetings with concerned officials of State Forest Department and all the stake holders/ exploration agencies for the benefit of all the organisations involved in mineral exploration activity in the state.

In reply, Directorate of Geology, Odisha informed that Government has declared nodal agencies in different districts for this purpose. AMD can take up the issues with concerned Nodal officers.

{Action: AMD, DM(O), Steel & Mines Deptt}

Dr K. Chakraborty, AMD appealed all agencies to inform AMD, where any deep drilling is being undertaken, so that Gamma ray logging can be taken up immediately within two days and this can be accomplished over a phone call only i.e. deep drilling in IB valley coalfields or any other areas.

(Action: All stake holders)

SUGGESTION FROM SGAT

1. Investigation for manganese: In view of manganese potentiality, detailed exploration alongwith study of structure may be undertaken for two blocks i.e. Bagawanpur block (Angul district) and Sitalpani block (Boudh district) to establish their block-wise resources. The manganiferous band occurs as lenses, stringers, fragmental bands, stratiform and strata-bound within garnetiferous quartzite and calc-granulite as massive-lumpy ore with + 20% Mn. Dr. B. M. Faroque, representing SGAT opined that to address global climate change, battery operated vehicles and other gadgets will be depending on storage battery system in the coming days. It depends on Lithium and Manganese. The manufacture of battery depends on the purity of manganese. The requirement is of chemical grade. Hence these explorations may be prioritised.

(Action- All exploring agencies)

2. Investigation for base metal: Based on association of galena with the host rocks, exploration programmes may be drawn to assess the potentiality of base metal in Raidhanipur, Bhaludongri and Mundapala areas in Kalahandidist and Gangajal area in Deogarh dist. Mineralisation occurs as specks, stringers, dissemination pockets within quartz veins. Lateral extension, depth persistence may be established by drilling a few boreholes.

(Action- GSI)

3. Investigation for gold: Based on encouraging findings of last investigation by GSI, further investigation including close spaced sampling for Gold in

Baskeram-Charkadisahi and Champani-Hatia blocks of Gorumahisani belt, Mayurbhanj dist, Odisha, may be taken up, to strike the possible Primary lode. An area of sulphide mineralisation was observed at the contact of granodiorite and hornblede schist near Kalimati-Teleijhari villages of Champani-Hatia block. The silicified zone contains sulphides like pyrite, arsenopyrite and pyrrhotite. The area need to be scanned

(Action- GSI)

4. Airborne geophysical data to be acquired over state's OGP area: GSI

in its geophysical survey, specifically magneto-telluric and deep seismic reflection, may focus on parts of Bastar Craton and the supra-crustal and also cover the alkaline rocks within Eastern Ghats Mobile Belt in western Odisha, for targeting deep seated and concealed mineralisation. To develop a geophysical investigation programme in parts of Bastar Craton and the pockets of alkaline rocks within EGMB in western Odisha, NGCM and NGPM data can be referred to.

(Action-GSI)

5. Seismic micro-zonation of Puri town: In view of seismicity to the tune M_L 5.9 magnitude on 21st May, 2014, study on Seismic micro-zonation of Puri town, be carried out by GSI. Seismic micro-zonation is the first step in earthquake risk mitigation study and requires multidisciplinary approach with contributions from geology, seismology, geophysics, geotechnical, structural and engineering geology. The Peak Ground Acceleration (PGA), amplification / site response, predominant frequency, liquefaction and subsurface tectonic displacement, due to earthquakes are some of the important seismological attributes, to be brought under scanner.

Participating in the discussion, GSI reiterated that the study can be taken up on specific request from the State Government.

(Action-GSI)

6. Systematic coastal zone mapping: In conjunction with satellite images systematic coastal zone mapping may be carried out along the coast (480km) of Odisha by GSI. The study becomes relevant in view of rise in sea level due to climate change and increase in frequency of tropical cyclones. According to a study 2014, on regional coastal processes through the Integrated Coastal Zone Management Project (ICZMP), a World Bank-supported initiative, around 10 per cent of Odisha's coastline - mainly stretches in the districts of Puri, Kendrapara and Ganjam is highly vulnerable to coastal erosion.

(Action: GSI)

7. Placing location/ distribution of dimension and decorative stone deposits in public domain: Two separate inventories exclusively on the known locations (each deposit delineated by latitude-longitude of at least its

four corners) of the State's Dimension and Decorative Stone (DDS) deposits may be prepared by the two agencies i.e. Directorate of Geology, Odisha and GSI, Odisha based on their reports on discoveries of DDS deposits. Information based on both such lists shall be shared in the public domain for reference of all the Tahasildars and other revenue officials to facilitate them in selecting the road metal sairat sources, which does not fall in the said lists of DDS. The revenue office may also be provided with maps showing the distribution of DDS deposits online. District Geologist can play a vital role in executing the project. To make this drive full proof, locational information of other undiscovered DDS in the State may be collected through rapid reconnaissance survey and be shared publicly to help the Revenue Department, not to inadvertently auction and grant lease as a road metal sairat source, which otherwise come within DDS block.

Dr B M Farooque, SGAT suggested that the maps on decorative and dimension stone and road metals of the resource have to be separately prepared by GSI and DGO.

(Action: DGO, GSI)

8. SUB-GRADE IRON ORE

A. All Low grade Deposits of Iron Ore (+45% Fe upto 56% Fe) may be explored on priority: Reserves (grade-wise) to be estimated for adopting high tech Mineral Beneficiation to upgrade its Fe% to desired level for downstream economic utilisation, mainly in the Steel making sector.

In reply, it was opined that exploring agencies are estimating the sub-grade ore and beneficiation studies will be undertaken by the concerned end users.

B. Gap areas between two consecutive Iron ore mining leases are to be explored for possible mineralisation and reserve to be estimated.

G C Das, representative SGAT suggested that Special thematic mapping is required where the iron components in the intraband are substantially more which needs up gradation. The thickness of the hematite component with jasper can help to upgrade it to a desirable limit with low cost. (Action: IBM)

9. Potash fertiliser minerals: Exploration/reserve estimation of nepheline syenite rocks in Koraput and other districts of Odisha for its potassium values may be considered. There is paucity of sources of potash fertiliser minerals, not only in Odisha but also in India. Nepheline syenite may be considered as a source rock for its potash values. A multi-disciplinary approach may be attempted i.e. geophysical prospecting, geological investigation, mineral processing for separation of potash, and economics of the entire process may be considered.

(Action: GSI)

10. Specialised thematic mapping (STM), Geophysical investigation and Test Drilling: On the north-western part of Daitari hill range, occurs a geological set up with scope to probe the possibility of multi-metal mineral

	<p>assemblages. Within the milieu of granitic terrain (Singhbhum/Bonai), it shows two distinct litho-packages. The BHQ/ BMQ with actinolite-chlorite schist, quartzite, invasive granitic apophyses and a patch of Graphite. Small patches of iron ore on the hills to the west of Burhipada-Juang villages. A table top iron ore with lateritic ore variants and the old working could lead to some mineralisation, which needs further investigation.</p> <p style="text-align: right;">{Action : GSI/DG(O)/OMECL}</p>
57.11.00	<p>After detailed deliberation on the activities of the exploration agencies during 2020-21 and their programme of exploration for 2021-22 in the State, the Annual Field Season Programme of the Directorate of Geology, Odisha, has been approved by all the members as no overlapping or duplication is found in the field programme.</p>
57.11.01	<p>Sri K. K Behera, Deputy Director General, GSI, (SU) Odisha briefed the deliberations of all the member organizations. He emphasized on forest clearance issues. He appreciated all the exploration agencies involved in mineral exploration and auction process and appealed to execute the mandate of the SGPB for mineral development of the state.</p>
57.12.00	VOTE OF THANKS
	<p>Sri M.R Mahapatra, Additional Director, Geology, DG (O) proposed Vote of Thanks. He thanked hon'ble Principal Secretary to Govt., Steel & Mines Department and Chairman SGPB for his active participation, keen interest and valuable guidance. He further thanked all the members of SGPB for their active participation and hearty cooperation.</p>

ANNEXURE-I

LIST OF PARTICIPANTS OF 57TH SGPB MEETING HELD ON 23RD AUGUST 2021

**CHAIRMAN: SRI DEORANJAN KUMAR SINGH, IAS, PRINCIPAL SECRETARY,
STEEL & MINES DEPARTMENT, GOVT. OF ODISHA**

MEMBER SECRETARY: SRI MANORANJAN PANDA, DIRECTOR OF GEOLOGY, ODISHA

Sl. No.	Name	Designation	Organization
1.	Sri D. Mohanty, IFS	ODS-cum-Special Secretary to Govt. of Odisha	Steel & Mines Department
2.	Sri D. D. Biswal, IFS	Director of Mines, Odisha	Dir. of Mines, Odisha
3.	Sri K.K. Behera	Dy. Director General	GSI, SU: Odisha
4.	Sri K.C. Das	Sr. Geologist	GSI, SU: Odisha
5.	Dr J. P. Mahakul	Director	GSI, SU: Odisha
6.	Sri Goutam Chatterjee		CGPB Secretariat
7.	Sri M.R. Mahapatra	ADG	Dir. of Geology, Odisha
8.	Sri R.K. Kar	DDG	Dir. of Geology, Odisha
9.	Dr. P.C. Mishra	DDG	Dir. of Geology, Odisha
10.	Sri N.N. SinghDeo	DDG	Dir. of Geology, Odisha
11.	Dr. P.K. Chand	DDG	Dir. of Geology, Odisha
12.	Sri P.K. Panigrahi	DDG & I/c JDG, Sambalpur	Dir. of Geology, Odisha
13.	Sri S. Mishra	DDG	Dir. of Geology, Odisha
14.	Sri N.K. Mishra	DDG & I/c JDG, Balangir	Dir. of Geology, Odisha
15.	Sri T.B. Munda	DDG	Dir. of Geology, Odisha
16.	Sri M.K. Oram	DDG & I/c JDG, Koraput	Dir. of Geology, Odisha
17.	Sri S.P. Nanda	DDG & I/c JDG, Berhampur	Dir. of Geology, Odisha
18.	Dr. S.A. Jena	DDG & I/c JDG, Dhenkanal	Dir. of Geology, Odisha
19.	Sri S.K. Sahoo	DDG	Dir. of Geology, Odisha
20.	Sri D.K. Sahoo	DDG	Dir. of Geology, Odisha
21.	Dr. S.M. Monalisa	DDG	Dir. of Geology, Odisha
22.	Sri S.K. Dalai	DDG,	Dir. of Geology, Odisha
23.	Sri J.P. Nayak	Geologist & I/c JDG, Keonjhar	Dir. of Geology, Odisha
24.	Mrs. S.S. Aich	Geologist	Dir. of Geology, Odisha
25.	Mrs. Sitoshna Sahoo	Geologist	Dir. of Geology, Odisha
26.	Sri Sumankrishna Sit	General Manager (Geology)	Odisha Mining Corporation Ltd.
27.	Sri S.K. Nayak	DGM (Geology)	Odisha Mining Corporation Ltd.
28.	Sri B.B. Mishra	DGM(Geology)	Odisha Mining Corporation Ltd.
29.	Sri S. Sinha	Director, Geology (OMECL)	Odisha Mineral Exploration Corporation Ltd.
30.	Dr. P.K. Nayak	Manager (Geology)	OMECL
31.	Sri Vinod R.V.	Manager (Geology)	OMECL
32.	Sri Sumit Gupta	Dy Manager, Geology	OMECL
33.	Sri Rajdeep Behera	Dy Manager, Geology	OMECL

34.	Dr K. Chakrabarty	Regional Director	AMD, Jamshedpur
35.	Sri Amit Swain		SAIL
36.	Bikram Sahoo	Regional Director, SER, BBSR	CGWB
37.	Mrs. Mausumi Sahoo		CGWB
38.	Sri Manoj Wadaskar	Sr. Manager, Geology	MECL
39.	Sri Saroj Patnaik		NALCO
40.	Prof. D.S. Pattanaik	HoD, Deptt. of Geology	Utkal University
41.	Sri J.P. Behera	Dy. Director Geology	Chief Engineer, Planning, WR Deptt., Bhubaneswar
42.	Sri D. Mohanty	Geologist	-Do-
43.	Dr. D.S. Rao	Sr. Pr. Sc	CSIR-IMMT
44.	Sri G.P. Mahapatra	Representative, SGAT	SGAT, Bhubaneswar
45.	Dr. Faruque	Representative, SGAT	SGAT, Bhubaneswar
46.	Sri G.C. Das	Representative, SGAT	SGAT, Bhubaneswar
47.	R. Ghosh,	Manager (Geology)	CMPDIL
48.	R.K. Singh	GM(Geology)	CMPDIL

DIRECTORATE OF GEOLOGY, ODISHA
Exploration proposals for F.S. 2021-22

Sl. No.	Name of exploration block
1.	Exploration for Coal in Dipside, Ib Valley Coalfield, Jharsuguda district (G-2 level)
2.	Exploration for Iron ore in Mankarnacha Block, Keonjhar & Sundargarh districts (G-2 level) (Outsourcing)
3.	Exploration for Iron ore in Thakurani Block, Keonjhar district (G-3 level) (Outsourcing)
4.	Exploration for Iron ore in Baliapahar Block, Sundargarh district (G-2 level) (Outsourcing)
5.	Exploration for Graphite around Khalpadar, Rayagada district (G-2 level) (Outsourcing)
6.	Exploration for Graphite around Beheramunda, Balangir district (G-2 level)
7.	Exploration for Graphite around Bandhabhuin, Dhenkanal district (G-3 level)
8.	Investigation for Iolite around Bandoguda in Kalahandi District (G-3 level)
9.	Investigation for Manganese around Malda Manganese Mines over area 822 Hectare under Bonai Sub division of Sundargarh District & Keonjhar District (Ex lessee: M/s TATA STEEL Ltd) (G-3 level)
10.	Investigation for Dimension/Decorative Stone around Garabandha, Gajapati district (G-3 stage)
11.	Investigation for Decorative Stone of Artisan grade around Mathura, Ganjam district (G-3 stage)
12.	Investigation for Quartzite around Routalipat-Tangia in Mayurbhanj district (G-3 stage)
13.	Investigation for Pyrophyllite around Bhaliadihi in Keonjhar district (G-3 stage)
14.	Investigation for Quartz and Quartzite around Gobira in Sundergarh district (G-3 stage)
15.	Investigation for Base metal around Bhikabahali, Balangir district aided by Geophysical Survey (G-4 level)
16.	Investigation for Quartz and Quartzite around Kalimela, Malkangiri district (G-3 stage)
17.	Investigation for DDS around Pindikonda in Motu Tahasil of Malkangiri District(G-3 stage)
18.	Investigation for Limestone around Bimta, Sundergarh district (G-4 level)
19.	Exploration for Graphite around Faqirparha, Angul district (G-4 level)