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(Part- I :GENERAL REVIEWS)

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EXPLORATION & DEVELOPMENT

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GOVERNMENT OF INDIA
MINISTRY OF MINES
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NATIONAL MINERAL POLICY

The Hon'ble Supreme Court in its judgment dated 02.08.2017 in the Writ Petition (Civil) No.114 of 2014 inter alia directed the Union of India to revisit the National Mineral Policy (NMP), 2008 and announce a fresh and more effective and meaningful policy.

In compliance with the directions of the Hon'ble Supreme Court, Ministry of Mines (MoM) vide its Order No. 15/1/2017-MV dated 14.08.2017 had constituted a Committee. The Committee included representatives from Central Ministries, State Governments, Industry Associates, Professional Bodies and it also consulted NGOs and many other Stakeholders. The Committee went about the consultative process with problem-solving approach and held four meetings wherein exhaustive discussions on the issues raised by the stakeholders were deliberated.

The Committee submitted its report to the Ministry on 31.12.2017. Based on the report submitted by the committee, Ministry of Mines prepared a draft National Mineral Policy (NMP), 2018 and uploaded it on the official website of the Ministry on 10.01.2018 for seeking comments/ suggestions from the stakeholders.

Based on the Committee's Report and the inputs received from stakeholders during subsequent consultations, the Ministry of Mines prepared the National Mineral Policy 2019. The Union Cabinet in its meeting held on 28.02.2019 approved the "National Mineral Policy 2019". The salient features of the "National Mineral Policy 2019" are as follows:

- It proposes to increase the production of major minerals by 200% in 7 years. It also proposes to reduce trade deficit in Mineral Sector by 50% in 7 years.
- It aims to attract private investment through incentives like financial package, right of first refusal at the time of auction etc. or any other appropriate incentive as per international practice.
- Introduces the concept of Exclusive Mining Zones having in-principle statutory clearances for grant of mining lease. It also proposes to identify critically fragile ecosystem and declare such areas as 'no-go areas'/inviolate areas.
- It emphasises implementation of all relevant Acts/Rules related to rehabilitation & resettlement and welfare of tribal communities while grant of mineral concessions.
- Encourages States to auction mineral blocks with pre-embedded statutory clearances.
- To institutionalise the mechanism for ensuring sustainable growth of Mining Sector, an interministerial body is proposed.
- Endeavors shall also be made to grant mining the status of Industry.
- In case of small deposits of precious metals and base metals, the establishment of common smelting and refining facilities shall be encouraged.
- It seeks to align downstream regulations for the exploration, development and acquisition of overseas mineral assets for ensuring its adequate supply which are not available in the country.
- It focuses on a long-term export-import policy for the Mineral Sector to provide stability for investing in large-scale commercial mining activity.
- Efforts shall be made to benchmark and harmonise royalty and all other levies and taxes with mining jurisdiction across the world.
- It also introduces the concept of Inter-Generational Equity which is also recognised by the Hon'ble Supreme Court in various judgments.

MINERAL INVESTIGATIONS & EXPLORATION

Geological Survey of India (GSI)

Geological Survey of India (GSI) is an attached office of Ministry of Mines (MoM) and is responsible for mineral resource assessment of the country in addition to the updation of national geoscience information. Natural resource assessment is achieved through the mineral investigations and exploration by acquisition of surface and sub-surface data along with the available geoscience data, i.e., baseline geoscience data.

The exploration programmes of GSI for the field Season 2021-22, were prioritised based on the recommendations of CGPB meeting, CGPB committee meetings & SGPB meetings of different States and time to time guidelines received from MoM.

Mission II: Natural Resources Assessment is categorised into

1. Mission IIA: Mineral Resource Assessment (Non-energy)
2. Mission IIB: Natural Energy Resources (Coal, lignite, shale gas, geothermal etc.)

GSI as part of its activities carries out 'reconnaissance survey' [G4], 'preliminary exploration' [G3] and 'general exploration' [G2] [following the guidelines of United Nations Framework Classification (UNFC) and Mineral Evidence and Mineral Content Rules (MEMC)-2015]. During FS 2021-22, mineral exploration of the following commodities were prioritised: highest number of projects for Critical & Strategic minerals (Tin, Tungsten, Lithium, Antimony, Molybdenum, Nickel, Vanadium, REE, RM , Cobalt, Tantalum, Niobium, PGE) followed by Non- ferrous / Base metal (Copper, Lead, Zinc), Precious minerals (Gold, Diamond, Sapphire, Silver, Emerald), Industrial minerals (Limestone, Graphite, Bauxite), Ferrous (Iron, Manganese, Chromite), Fertiliser (Potash/Glauconite, Gypsum Phosphorite), Coal/ Lignite/ Shale Gas/ Geothermal, belonging to various States. Besides these, projects on RMT (regional mineral targeting), Uncover and research project on coal exploration were also taken up.

During FS 2021-22, a total of 251 programmes (including 11 exploration programmes of M&CSD) were taken up under Mission-II. The target vis-à-vis achievement made under Large-scale Mapping (LSM), Detailed Mapping (DM) and drilling pertaining to FS 2021-22 is tabulated as below:

The details of exploration work carried out by GSI and DMG, Rajasthan; NMDC; Hutti Gold Mine & GMDC are furnished in Tables-1 & 2 respectively.

Activity	Target	Achievement
LSM (sq. km)	10,000	12393.10
DM (sq. km)	120	200.11
Drilling (meter)	1,30,000	154957.30

Table 1- Exploration Carried out by GSI 2021-2022

Base Metal							
State/District	Location	Geological mapping		Drilling		Details of work done	Result obtained/Remark
		Scale	Area (sq. km)	Boreholes	Meterage		
Chhattisgarh, Balrampur	Burhabagicha area	1:12500	100 sq. km.	-	-	Mapping, Sampling	A G-4 stage exploration for base metal and associated minerlisation was carried out in Burhabagicha area, Balrampur District, Chhattisgarh. About 169 samples (101 bedrock, 50 pit/trench and 18 of stream sediment) were collected for trace element analysis, 23 for petrochemical studies and 45 for PS/SEM/OM studies. The area around Burhabagicha encompasses supracrustals of meta-volcano sedimentaries, meta-sedimentaries, meta-basics and granitoids. Acid- to intermediate- metavolcanic is the host rock for sulphide mineralisation. Oxidised zone was developed between west of Chilma and Kotaghna through Burhabagicha. Sphalerite and galena associated with pyrite were 40µm to 400µm and 2µm to 30µm in size. The values of Cu in acid to intermediate metavolcanic bedrocks ranged from 10 ppm to 90 ppm. Pb ranged from <10–140 ppm and Zn ranged from 10 ppm to 200 ppm. Ni <10 ppm to 170 ppm, Co <10 ppm to 30 ppm and Cr <10 ppm to 59 ppm in the host rock. Similarly, Ag values between <1 ppm and 3 ppm and Cd values <10 ppm were found in the yield. Au value in this unit was recorded <50 ppb. As in it ranged from 2 ppm to 749 ppm.
Maharashtra, Gadchiroli	Chamorshi, Kurul, Bhiwapur area	1:12500	100 sq. km.	-	-	Mapping, Sampling	A G-4 stage exploration for copper and associated base metal was carried out in this area. The investigation area was located in the southwestern part of Bastar Craton (BC) (G-). A NNW-SSE trending mineralised quartz reef located about 2 km north of Chamorshi town was approximately 1 km long and 30 to 50 m wide with a dip of 60° to 65° towards west. Mineralisation was observed in the form of pyrite, chalcopyrite and bornite along with secondary ores of malachite and azurite. The chemical analysis results of BRS from the Chamorshi quartz reef (n=45) indicated copper concentration ranging from 50 to 3,700 ppm (Avg.= 655 ppm). Channel samples showed copper values were ranging from 410 to 3,100 ppm (Avg.= 1,204 ppm). Overall analytical results indicate a higher concentration of copper in bedrock samples. Owing to the encouraging results of the bedrocks samples, the Chamorshi quartz reef with strike length of 1 km length and 30 to 50 m width was labelled most potential mineralised reef in the area.
Maharashtra, Chandrapur	Tambegadi-Pathari area	-	1.5 sq. km.	2	285 m	Mapping, Sampling, Drilling	Investigations with an objective to establish copper and associated mineralisation (G3) involved detailed geological mapping of 1.5 sq. km. covered around Tambegadi and Pathri blocks. The Bengpal gneiss in the area is feebly mineralized intermittently in the form of pyrite, galena and minor chalcopyrite. Two boreholes (MHCT-1, 2) with cumulative drilling of 285 m were completed in Tambegadi block. All the boreholes were planned at 60m vertical depth of intersection and 200 m strike spacing. Boreholes MHCT-1, 2 did not intersect any significant mineralisation. Mineralisation was seen to be confined to 250m x 120m zone in the Tambegadi block within the ferruginised basement granite gneiss. Mineralisation intermittently occurred with diminishing nature in lateral and also depth extent within this zone. However, it was observed from drill core analysis that the mineralisation was purely confined to the upper oxidative surficial level of not more than 40m in both the borehole cores. Mineralisation in the sub-surface was observed to be insignificant to almost non-existent. This was confirmed by chemical analytical results of borehole core samples. Demarcation of clear zones was not possible in this case due to lack of proper concentration and lateral continuity along the strike.
Madhya Pradesh, Jhabua	Balhati-Hiri Chhota-Chotyabarari-Burkui Badi area	1:12500	1.5 sq. km.	-	-	Mapping, Sampling	The objective of the work (G4) was to search for copper and associated scandium, vanadium mineralisation in the Deccan basalts. During the field visit, 100 BRS, 30 PTS, 50 Soil samples and 15 PCS were collected from the study area. The BRS collected from the study area showed highest value of 388 ppm of Cu over Flow number 3-4 of Kalisindh Formation near Dhamoi. Highest value of Vanadium as 441 ppm was reported from the contact zone between Kalisindh Flow 1 and Flow 2 near Hiri Bada. Anomalous values for Cu (270–345 ppm) were recorded from the soil zones developed over the Flow 1 of

							Kalisindh Formation near Balhati-Hiri Bada areas.
Madhya Pradesh, Alirajpur District	Kosduna South Block	1:2000	1.5 sq. km.	4	471.0 m	Mapping, Sampling, Drilling	Kosduna South block reveals presence of Phyllite, Biotite Granite, Sheared Quartz veins and calcareous gritty, pebbly sandstone, and fossiliferous limestone of Bagh group. Both phyllite and Biotite granite is intruded by sheared quartz veins. These quartz veins showed evidence of copper mineralisation in the form of malachite stains and at places very fine specks of pyrite and chalcopyrite was also noticed. During FS 2021-22 under G-3 stage exploration, a total of 471.0 m drilling with 4 boreholes of 1st levels were drilled across the mineralised quartz vein at 200 m strike spacing to intersect the mineralisation at 60 m vertical depth. Based on the chemical analyses of drilled boreholes data, it was found that the grade of Cu mineralisation was poor in Kosduna South block. Analytical results of core samples showed <0.1 % Cu. The Cu values were not significant in core samples, BRS/ Channel samples as well as in PTS samples. Dominantly dissemination and specks of pyrite were noticed both in chlorite schist and quartz veins along with rare to occasional occurrence of chalcopyrite mineralisation. The mineralisation is very sporadic in nature and irregular in habit. Due to poor mineralisation in the block, the project was prematurely closed as per recommendations/ suggestions from competent authority.
Madhya Pradesh, Dewas	Saktia, Bagda and Biloda Block	-	-	-	270 m	Sampling, Drilling	Dewas District comprised three blocks, namely, Saktia block (0.75 sq. km), Bagda block (1.0 sq. km) and Biloda block (0.75 sq. km). In Saktia block, promising base metal mineralisation (G3) was observed in association with smoky quartz vein which was found intruding into grey top ink medium-grained granite near contact with porphyritic granite. Channel sampling yielded two-meter zone in Ch-1 (Cu–7,880 ppm, Pb–2,430 ppm & Cu–5555 ppm, Pb–900 ppm) and one meter mineralisation in Ch-2 Cu–5,800 ppm, Pb–5820 ppm. MPDSB-1 was drilled up to a depth of 140 m which intersected the mineralisation at 60m vertical depth. Three small zones of mineralisation intersected in MPDSB-1, Z-I (56.5 m–57 m) having (0.1% Cu, 0.4% Pb & 0.23% Zn), Z-II (73.30 m–74.30 m) having 0.13% Cu, 0.47% Pb & 0.8% Zn), Zone-III (81.57 m–82.27 m) having (0.85% Cu & 0.40% Pb). Bedrock spot sample from the quartz vein yielded Cu–50 ppm to 395 ppm, Pb–505 ppm to 1.01% and Zn–980 ppm to 2,620 ppm with 25 ppb to 360 ppb of gold value. Based on the above background values, first Borehole MPDBB-1 was carried out in Bagda block aimed at intersecting quartz vein. A 2-meter zone (84.40 m–86.40 m, of 0.71% Zn) was encountered in the borehole. The quartz vein showed a few disseminated and sporadic specks of chalcopyrite, galena and pyrite. First Borehole MPDCB-1 was carried out in Biloda block aiming to intersect the quartz vein at first level and was drilled up to a depth of 130 m. The borehole data showed granite veins in the form of tongue and apophyses intruding into chlorite schist along with thin quartz veins. Pyritiferous zone was observed from 63 m–95.15 m depth with disseminated, occasional and sporadic grains of chalcopyrite.
Madhya Pradesh, Betul	Biskhan Block	-	1.28 sq. km.	13	2010 m	Mapping, Sampling, Drilling	In G-2 stage investigations, a total of 2,010 m drilling were carried out in 13 boreholes to assess the potential of remaining geochemical anomaly and to intersect already drilled boreholes of FS 2016-17 systematically at 120 m vertical depth of the geochemical anomaly to enhance ore resource in Biskhan block, Betul District, MP. Besides drilling, 40 cu.m pitting with 40 trench samples, 551 core samples, and 05 samples for SEMEDX. 10 L km geophysical mapping by SP, IP and magnetic method and geophysical logging of all boreholes were carried out in extended Biskhan block. Sulphide mineralisation comprising pyrite, sphalerite, pyrrhotite and occasional chalcopyrite occurred in the form of dissemination, streaks and occasionally thin veins associated with garnet. The borehole data indicated that the intersected ore bodies showed irregular distribution of ores with pinch and swell structure along the strike as well as depth. In Biskhan extended block, where G2 stage investigation was carried out over 1.28 sq. km area, ore resource was estimated with the help of cross-section method and LV method based on the data from the 39 boreholes at 1 % Zn cut off. The resource estimated by cross-section method at 1% Zn cut off was 33,82,833.688 tonnes or 3.383 million tonnes with an average grade of 1.136% Zn and average width of 10.25 m in three mineralised zones over 1.28 sq. km area. The reserve estimated by LV method at 1% Zn cut-off was 29,29,917.669 tonnes or 2.93 million tonnes with an average grade of 1.14% Zn and average width of 10.25 m in three mineralised zones over 1.28 sq. km area.

Madhya Pradesh, Balaghat & Chhattisgarh, Rajnandgaon	Ramgarhi, Pathratola and Rol village parts	1:12,500	100 sq. km.	-	-	Mapping	The objective was to identify and delineate Cu and associated mineralisation (G4) in the area and to study mineralogy, geochemistry, mode of occurrence of Cu mineralisation. The study area showed evidence of hydrothermal alteration in the form of epidotisation, chloritisation, sericitisation and potassic alteration in granites, however no zonation in alteration was observed. Surface indications of mineralisation included disseminations of chalcopyrite, pyrite, bornite, molybdenite and malachite stains in pink granites and oxidised coatings on brecciated quartz reef. Based on incidences of surface mineralisation four areas - near SE of Salghat, Sudhintola, Sivani and Pathratola were demarcated as potential zones for base metal mineralisation.
Madhya Pradesh, Shahdol and Sidhi	Parsili-Tal-Karmahi area	1:12,500	100 sq. km.	-	-	Mapping, Sampling, Pitting, Trenching	Large-scale mapping, Bedrock samples (100), Petrochemical samples (50), Petrological samples (20), stream/ soil samples (25), EPMA (10), PGE (15) and Pitting/Trenching samples (25) were collected and sent for chemical analysis (G4). Partially received analytical results revealed positive encouraging values of Cu, Ni, and Cr which ranged from <10 ppm to 3050 ppm, <10 ppm to 860 ppm, and <10 ppm to 0.48% respectively. BRS sample collected from laterite showed Vanadium value at 710 ppm. PCS samples collected from laterite showed value of Vanadium at 1,753 ppm & 36.87% Al_2O_3, PCS sample collected from reddish-brown tuff showed Vanadium value at 792 ppm & 23 % Al_2O_3, PCS sample collected from purple friable banded rock showed Al_2O_3 value as 16.41% & 12.17% K_2O, PCS collected from gabbro showed Cr value at 3,524 ppm & 450 ppm Ni, PCS collected from mafic-ultramafic near Parsili showed 3,611 ppm Cr & 462 ppm Ni.
Madhya Pradesh, Dewas District	Tipras area	1:12,500	-	-	-	Mapping, Sampling	The study area comprises of metavolcano sedimentary sequence of the Mahakoshal Group, Harda Granitoids and chert breccia along with stromatolitic as well as non-stromatolitic dolomite of Bijawar Group. The host rock of base metal mineralisation (G4) showed smoky grey quartz vein having dimension 70 m in length and 15 m width and was observed generally trending in east-west direction as intrusive body into medium-grained monzogranite near the contact with porphyritic granite. The surface manifestation for copper mineralisation was present in the form of stains of malachite along the fracture planes. Stain of malachite, usually found along the weak planes, suggest that the precipitation of secondary Cu mineral may have formed due to interaction of fresh sulphides with fluids and precipitated along the fracture planes. Chalcopyrite and galena were present in disseminated form in the quartz vein. In some other places, in Masuriya area, base metal mineralisation was observed near the contact of metasediment of Mahakoshal Group and foliated Hard granitoid, near Gaulaguthan, mineralisation indication was observed near the contact of foliated diorite of Harda granitoids and metasediment of Mahakoshal Group but their values of Cu, Pb and Zn did not show as promising as to be a mineralised zone. Chemical analysis results revealed Cu values varing from 520 ppm to 945 ppm from the 70 m*15 m Tipras quartz vein showed lead values less than 5 ppm and zinc values less than 20 ppm. Also, value of Ni (25 ppm to 56 ppm), Zn (20 ppm to 140 ppm), and Co (20 ppm to 35 ppm) in the Diorite. In this area trench and soil sampling were also carried out but values from both types of sampling showed less than 100 ppm.
West Bengal, Purulia District	In and around Kunchia	-	-	-	-	Sampling	Sulphide mineralization is noted only in Dalma Group of rocks, in which carbon phyllite contains more sulphide mineralization than any other lithounits. Sulphide minerals were found to be more abundant in the country rock i.e., carbon phyllite than those in quartz veins. Mineralised (G4) quartz veins were very thin, discrete, colourless showing parallel relationship with the main foliation (315°/45° towards 225°). Disseminated specks of arsenopyrite, chalcopyrite and bornite were observed in meta-basalt along Mirgichami-Rajagram road section. Malachite stains were observed in volcanic agglomerates exposed west of Kumaridih, where the country rock was highly sheared. Variolite basalt exposed south of Balidiha area was found to contain pyrite specks and disseminations. Outcrops of amphibolite containing chalcopyrite also showed malachite stains at places near Village Bangri.

Jharkhand, East Singhbhum District	In and around Kunchia	-	-	-	-	Sampling	The area (G4) exposed carbon phyllite, amphibolite/meta-gabbro, meta-basalt, amygdular basalt, variolite basalt, talc tremolite schist, meta- ultramafite, volcanic agglomerate, quartzite, chlorite schist and calc-silicate of Dalma Group and garnetiferous mica schist, staurolite-bearing garnetiferous mica schist and chlorite phyllite of Chaibasa Formation of Singhbhum Group. Sulphide mineralisation was noted only in Dalma Group of rocks, in which carbon phyllite contained more sulphide mineralisation than any other lithounits. Streaks and stringers of arsenopyrite, chalcopyrite, bornite, pyrite and pyrrhotite were noted in carbon phyllite and also in quartz veins present within carbon phyllite in Shisda, Doledih, Dulardih, Gobarghusi and south of Karakata along Jora Nala section. Groove samples were collected from the visible specks of sulphides present in carbon phyllite and trench samples were collected to know the extension of the mineralised zone.
Jharkhand, Palamau District	Sokra- Chando area	-	-	-	-	-	Hornblende biotite granite gneisses, garnet biotite gneiss, foliated alkali-feldspar granites and its coarse-grained variety were the major rock types found in the area. Garnet biotite gneiss was the most deformed rock overlaid by hornblende biotite granite gneiss. Calcsilicate/ Ferrugenous Quartzite/Amphibolite were seen to have wavy erosional contact with biotite hornblende granite gneiss. Foliated alkali feldspar granite was observed to have intrusive contact. Kyanite-Magnetite Schist, Dolomite and graphite with quartz veins were associated along shear planes and have sheared contact with other rocks. Mineralisation (G4) was found in the form of en-echelon hydrothermal veins mostly associated with calc-silicate (magnetite mineralisation) and quartz veins (graphite mineralisation).
Odisha, Mayurbhanj District	Kesharpur East block	-	-	-	2243.55 m	Mapping, Sampling, Pitting, Trenching	During the investigation 10 cu m pitting and trenching were carried out with collection of 335 CS, 10 PS, 10 OM., 10 XRD, 10 EPMA, 10 sulphur isotope and 10 fluid inclusion samples for petrographic and other laboratory studies. Different rock types exposed in the area were quartzite, hornblende biotite schist, augen gneiss, hornblende granite gneiss, leucogranite and dolerite with numerous quartz veins. The surface manifestation of mineralisation (G2) in the area was in the form of old workings, malachite and azurite stains. Surface investigation trenching was carried out along the borehole profile lines perpendicular to the strike to expose the host rock across the mineralised zone. The analytical results of trench varied from 79 ppm to 9,230 ppm. During FS 2020-22, total of 15 boreholes were drilled and the average thickness of sulphide zone was 40 m but varied from 15 m to 80 m. The cumulative thickness of copper lode intersected was 26.20 m. The average grade of Cu varied from 0.25% to 1.26% and thickness varied from 2.20 m to 22.65 m.
Odisha, Mayurbhanj District	Nimaidihi block	-	-	-	-	Sampling, Pitting, Trenching	On the basis of surface indications of mineralisation (G3) and pitting/trenching over 71cu.m and lodes intersected in boreholes drilled in FS 1971-77, a copper mineralised zone (MZ-I) with approximate strike length of 500 m and average width of 5m–35m (with partings in between) was delineated in the central part of the block. The average grade of the zone was around 0.2% Cu. In the northern part, two copper mineralised zones were delineated. In FS 2021-22 and FS 2022-23 (spillover), a total of 626.15 m drilling were carried out in four first level boreholes ODND-1, ODND-2, ODND-3 and ODND-4. The borehole ODND-1 has intersected mineralisation zone from 71.60 m to 78.50 m i.e.,6.90 m (0. 1% to 0.2% Cu (V.E.), from 78.50 m to 96.00 m i.e., 17.50m (0.2% to 0.3% Cu (V.E.) and 86 m to 91.40 m i.e., 5.40 m×0.33% Cu (part analysis), and from 96.0 m to 102.0 m i.e., 6.0 m (0.1% to 0.2% Cu (V.E.) in the form of specks, stringers, disseminations, vein filled and foliation parallel chalcopyrite and pyrrhotite. The Borehole ODND-2 intersected mineralisation zone from 67.40 m to 70.90 m i.e., 3.50 m, 75.40 m to 82.10 m i.e., 6.70 m, 87.10 m to 90.10 m i.e., 4.10 m, 109.0 m to 111.50 m i.e., 2.50 m, 115.0 m to 127.25 m i.e., 12.25 m, 130.30 m to 147.50 m i.e., 17.20 m and 154.60 m to 159.60 m i.e., 5.0 m with 0.1% to 0.3% Cu (V.E.) and 119.60 m to 121.60 m i.e., 2.0 m × 0.39% Cu value (part analysis). The Borehole ODND-3 intersected mineralisation zone from 109.50 m to 113.10 m i.e., 3.60 m (0.2% to 0.5 % Cu (V.E.), 125.0 m to 129.30 m i.e., 4.30 m and 133.70 m to 153.75 m i.e., 10.05 m with 0.1% to 0.2% Cu (V.E.) in the form of massive, chunk, cluster and vein filled pyrrhotite and chalcopyrite. The Borehole ODND-4 intersected mineralisation in the form of specks, disseminations, vein filled, stringers of chalcopyrite with pyrrhotite from 46.56 m to 76.67 m i.e., 30.11 m (0.1% to

							0.3% Cu (V.E.) and 123.95 m to 127.95 m i.e., 4.0 m (0.2% to 0.4 % Cu (V.E.).
Odisha, Bolangir District	Ampali-Badipura -Saintala area	1:12500	60 sq. km.	6	446.0 m	Mapping, Drilling, Sampling, Pitting, Trenching	During investigation 46 channel samples, 53 Pit/Trench samples, 21 Regolith samples and 37 core samples were collected. The occurrence (G4) of lead ore as stringers and specks of galena in a brecciated quartz vein at Badipura and Jalorpadar area were observed. The old workings near Badipura and Jalorpdar area for galena observed well within the brecciated quartz veins, on surface old working pits were of roughly 15 m X 20 m and 25 m X 20 m in dimension respectively. Channel sampling was carried out on the brecciated quartz veins and allanite-fluorite rock and sent for chemical analysis to test its potential for base metal and REE mineralisation respectively. The analytical results of channel samples (7) of allanite-rich rock showed total REE ranging from 12.60% to 14.29% and it showed an enrichment of LREE mostly La and Ce up to a value of 5.15% and 6.10% respectively while it was remarkably low in HREE which ranged from 398.71 ppm to 437.32 ppm. In almost all the boreholes, the brecciated zone were intersected and specks of sulphides mostly pyrite and few chalcopyrites were observed. In borehole 4.0 m thick sulphide zone consisting of pyrite and chalcopyrite in khondalite was observed.
Meghalaya, East Khasi Hills District	Mawlyndep to Mawmin-Nongbsap villages	1:12,500	50 sq. km.	-	-	Mapping, Sampling, Pitting, Tenching	During the investigation, pitting/trenching of 50 cu.m, 118 bedrock sampling and 50 soil samplings in the surrounding of Barapani Shear Zone (G4) were carried out. Bedrock samples from Carbonaceous phyllite, calc-silicate, meta-volcanoclastic and quartz veins showed >100 ppm As values and maximum up to 2,954 ppm in quartz vein. Sample collected from carbonaceous phyllite and calc-silicate rock showed>250 ppm Zn values and a maximum of up to 3,028 ppm Zn in one sample from calc-silicate rock. Samples from carbonaceous phyllite showed TiO_2 concentration at 4.47 and 5.06 % whereas samples from laterite showed 7 and 7.17 % TiO_2. Samples collected from meta-volcanoclatsic, meta-rhyolite, calc-silicate, quartz vein and carbonaceous phyllite showed Li content as >20 ppm and a maximum of up to 57 ppm in meta-volcanoclatic. About 29 bedrock samples collected from meta-volcanoclastic, carbonaceous phyllite, and calc-silicate showed Cs content as >10 ppm and a maximum of up to 23.31 ppm in meta-volcanoclastic and 23.01 ppm in carbonaceous phyllite. Scanning electron microscopic (SEM) showed, arsenopyrite, pyrrhotite, pyrite, colevllite, galena, chalcopyrite and LREE-bearing carbonate and phosphate phases.
Meghalaya, East Garo Hills District	Jalwagiri and Gambil area	1:12,500	-	-	-	Mapping	The main objective of the large scale mapping was to assess the potentiality of base metal mineralization in a thin body of calc silicate rock in and around Rongge village, East Garo Hills District, Meghalaya. The biotite and augen gneisses form a major part of the gneissic complex (G4). These were found intruded by Late Proterozoic porphyritic granite, pegmatite and Cretaceous dolerite dykes. The calc-silicate bodies trends ENE-WSW, with maximum dimension of 250 m x 5 m, near Village Rongge and 100 m x 5 m in Bongsi Dogru in the northern part. The occurrence of the minor sulphide mineralisation was seen structurally controlled along fold hinges. Blue staining of covellite along the trace of axial plane within the thin amphibolite bands and within the pegmatite veins was recorded. Sulphide mineralisation and covellite staining were also observed within the central part of the amphibolite band that swerves from NW-SE to NE-SW strike from south to north. At the north eastern part just in Village Rongge, thin band of calc-silicate rock was observed at the extreme north-eastern part of the mapped area with profuse development of sulphide mineralisation. The identified sulphide minerals were mainly pyrite, chalcopyrite and arsenopyrite. Outcrops of mineralised calc-silicate body with rib and groove structures showed apparent gossanisation. The trend of the mineralised body was NE-SW and was traced over a strike length of 250 m (which may continue) with 5 m width.

Uttarakhand, Pithoragarh District	Askot- Thal area	1:12,500	50 sq. km.	-	-	Mapping, Sampling, Pitting, Tenching	Investigation at Thal and Askot area of Pithoragarh District, Uttarakhand was conducted to assess the base metal and gold mineralisation (G4) potentiality of the study area. The area comprised rocks of Paleoproterozoic Age belonging to Lesser Himalayan Crystalline and Mesoproterozoic Age of Garhwal Group of rocks. Lithounits included gneissic rocks of granitic composition and quartzite, amphibolites, phyllite, schist, impure dolomite and limestone of Berinag and Pithoragarh Formation. Systematic bedrock and pitting-trenching sampling were carried out. A total of 150 bedrock samples (BRS), 50 pitting / trenching samples, 20 heavy mineral samples, 13 petrochemical samples, 38 petrographic samples and 10 ore microscopic samples were collected. Analytical results of Cu, Pb, Zn and Au were found varying from <5 to 597ppm, <20 to 198ppm, <5 to 711ppm & <0.05 to 1ppm respectively. The total 10-line km of surface induced potential (IP), self-potential (SP), resistivity and magnetic geophysical survey were carried out to identify areas of interest that stands out with the surficial minerallisation evidence and chemical results. Signature of high chargeability and low resistivity with prominent low negative SP anomaly was recorded in western part of the mapped area.
Jammu & Kashmir (UT), Reasi District	Sersandu to Kherikot to Rahotkot -Darabi areas	1:12,500	50 sq. km.	-	76.50 m	Mapping, Drilling, Sampling, Pitting, Tenching	During the investigation (G4), pitting / trenching of 25 cu.m was carried out. In 59 nos. BRS samples, the total REE varied from 61.6 ppm to 203.7 ppm. In 4 samples Pb ranged from 1,113 ppm to 1.2%; in 4 samples Zn ranged from 2,668 ppm to 5.0%. In Renkakot/Paddar area, 03 channel samples were collected from flaggy limestone adjoining the old workings which showed Zn values ranging from 5% to 15% and Pb values ranging from 1,025 ppm to 4,199 ppm. In Samatkhad area, 03 channel samples were collected from brecciated quartzite which analysed Pb values from 955 ppm to 5,577 ppm. Besides, 05 chip samples were collected from the brecciated quartzite unit in the T5 Tunnel area after analysis showed Pb values at 521 ppm to 11,995 ppm, and Zn at 588 ppm to 7558 ppm. Keeping in view the accessibility of these different locations, scout borehole drilling of 76.50 m was carried out in T5 Tunnel area.
Dehradun District	Tons Valley	1:12,500	50 sq. km.	-	-	Mapping, Sampling,	The area comprises the rocks of Lesser Himalaya of Mesoproterozoic Age. During investigation (G4) a total of 100 bedrock samples (including channel sample), 50 stream sediment samples were systematically collected to interpret the nature and extension of mineralisation. In addition, 20 petrographic samples, 3 ore microscopic samples were collected to identify lithologies, ore mineral present in the study area. The analytical value of Pb, Zn, Cu and Au of bedrock samples ranged from 20 ppm to 151 ppm, 5 ppm to 241 ppm, 2.5 ppm to 2,731 ppm and < 5 ppm respectively. Similarly, the analytical value of Pb, Zn, Cu and Au of stream sediment samples ranged from 20 ppm to 47 ppm, 28ppm to 192 ppm, 6 ppm to 123 ppm and <5 ppm respectively.
Uttarakhand, Pithoragarh District	Nachani road section, Dhari road section, Askote road section, and Pithoragarh road section	1:12,500	115 L km	-	-	Mapping, Sampling	The area (G4) was part of Lesser Himalaya, which comprises of lithounits, viz, Central Crystallines of Dharmagarh & Askot of undifferentiated Protereozoic Age, meta-sedimentaries of Rautgara Formation, Pithoragarh Formation and Berinag Formation of Garhwal Group of Proterozoic Age. Carbonaceous slate/phyllite was seen mainly associated with quartzite and phyllite and occurred within Pithoragarh Formation. Four prominent bands were delineated near Maspati, Bhunigaon, Pankholi and Ghatigad. Width of these bands varied from 30 cm to 30 m. A total of 121 samples for analytical studies, 34 samples for petrographic study, 08 samples for ore microscopy study, 32 samples for fixed carbon and sulphur content analysis, 10 samples for EPMA study and 04 samples for XRD study were collected. The total carbon content of 17 samples analysed varied from 0.54% to 6.38%. A few samples of carbonaceous phyllite did show element concentration (Rb- 158ppm, Sr-62.67 ppm, Th-16.97 ppm, U-5.35 ppm and Mo-5.06ppm).
Andhra Pradesh, Nellore and Kadapa districts	Adurupal li and Dasarapa lli area	-	-	-	-	Sampling, Trenching	The area for the G4 stage base metal investigation lies in the Vinjamuru domain of Nellore Schist Belt. The area mainly exposed meta-basic volcanic and bands of meta-acid volcanics along with metapelite, quartzite belonging to the Chaganam Formation of Gudur Group. Meta-basic volcanic rocks were represented by Plagioclase-actinolite-epidote-chlorite schist, garnet-bearing chlorite schist and amphibolite and the metapelites was represented by quartz muscovite schist. A few anomalous values of Cu were recorded in the north-eastern part of the study area, south of Village Kottavuru and mostly from the thin quartz veins associated with meta-acid volcanics. Bedrock samples and Trench sample showed values of Cu ranging from 0.06% to 0.14%. Maximum values obtained from

							chemical analysis in bedrock sample of the following elements Zn, Pb, Ge, In and Sb were 175 ppm, 40 ppm, 3.57 ppm, 0.93 ppm and 0.27 ppm respectively whereas maximum values of germanium, zinc and lead obtained from Trench sample were 5.02 ppm, 170 ppm and 50 ppm. Base metal mineralisation in the study area was very sporadic and discontinuous.
Andhra Pradesh, Nellore District	Masayapeta Block	-	-	-	1500 m	Drilling, Sampling	The G2 stage copper exploration item was taken up in Masayapeta block in Nellore District, Andhra Pradesh. A total of 1,500 m (± 20%) of drilling were planned with spacing of 100 m or closer in Masayapeta Block. Geophysical survey in 20 L km was completed which brought out four moderates to high Chargeability (> 8mV) which corroborate with high to moderate resistivity. A total of of 226 m drilling were completed in FS 2021-22. Occurrences of sulphides (chalcopyrite, covellite, digenite and pyrite) were observed in intercalated quartzite-schistose rock, quartzite and quartz vein lithounits at various levels in the depth ranged between ~69 m and ~170 m. With completion of the total drilling target and chemical analysis of core samples, the anomalous zone of copper mineralisation can be elucidated in detail with more accurate estimate of resource
Karnataka	Kennedlu-Kurmerdikere area, Chitradurga Schist Belt	1:12500	144 sq. km.	-	-	Mapping, Sampling	Copper mineralisation (G3) in Ingaldhal associated with the metavolcanic suite was referred as "VMS type" and its possible southern extension was examined by systematic geochemical prospecting by the collection of 152 BRS, 100 PTS, 30 PCS and PS each, 10 samples each for EPMA, SEM and XRD studies. Systematic gridded soil sampling in 500 m intervals has also been carried out to characterize the shear-related carbonatisation and possible secondary dispersion halo along the eastern limb. Surface manifestations of mineralisation were in the form of stockworks of smoky quartz characterised by malachite staining and disseminated chalcopyrite and pyrite in carbonated metabasalt; gossanised zone within metabasalt; limonitised brecciated metabasalt. Out of 252 BRS and 100 PTS samples, chemical results of base metals were received for 135 BRS and 60 PTS. Maximum value of Pb, Zn, Cu and Co assayed was 2,850 ppm, 1,400 ppm, 1,500 ppm and 345 ppm respectively.
Karnataka, Haveri District	Yelvatti block, Shiggaon Taluk	1:2000	2 sq. km.	5	738.15 m	Mapping, Drilling, Sampling, Tenching	During the period of investigation (G4) 100 cu.m trenching with 100 trench samples, 150 soil samples, 50 bedrock, 20 petrochemical and 20 petrology samples were collected. The area comprised rocks of meta-argillite, cherty quartzite which were intruded by later quartz veins. Meta- argillite and cherty quartzite showed a general trend of N-S with moderate dip due east. Meta-argillite was highly weathered and formed a low-lying area. Cherty quartzite formed a resistant ridge within themeta-argillite extending over the strike length of 750 m with varied width of 5 m to 25 m. Bedrock samples of cherty quartzite analysed Au from 30 ppb to 435 ppb and Pb+Zn from 623 ppm to 4,865 ppm and Cu from 197 ppm to 1,618 ppm. Soil samples collected in the strike extension of cherty-quartzite analysed Cu from 110 ppm to 1,115 ppm, Pb from 65 ppm to 30,110 ppm, Zn from 150 ppm to 5,230 ppm and Au from 25 ppb to 47 ppb. Four cherty quartzite trench samples analysed Pb+Zn from 990 ppm to 4,930 ppm, Cu from 310 to 505 ppm and Au from 35-100 ppb. Trench samples from altered meta-argillite in contact with cherty quartzite analysed Pb+Zn from 525 ppm to 4,385 ppm, Cu from 120 ppm to 565 ppm and 5 samples analysed Au from 35 ppb to 110 ppb. Trench samples of non-altered meta-argillite analysed Pb+Zn from 95 ppm to 1,090 ppm, Cu from 65 to 140 ppm. The drill core samples of KHY-1B showed 3 m Pb+Zn zone with average grade of 1.5%.
Telangana, Nalgonda District	Pedda Adisarlapalli block	1:12,500	125 sq. km.	-	-	-	During the period of investigation, BRS (75), soil (23) Pitting/trenching (51) samples were collected. The surface indications of mineralization (G4) were in the form of malachite staining and dissemination of sulphide minerals within quartz vein, pegmatite and associated granites. The major sulphide minerals were chalcopyrite, pyrite, galena with minor amount of azurites beside this sporadic occurrence of allanite and fluorite were observed in quartz-feldspathic vein and calcite vein. The analytical results of BRS, PT and soil samples showed no significant mineralisation in the investigated area.
Andhra Pradesh, West Godavari District	Velagapadu area	-	-	-	-	Sampling	The (G4) trough cross bedded sandstone contained thin layer (0.5 mm to 2 mm) of dark color mineral layers comprising heavies. Sandstones were broadly uniform in composition and contained 66% of clasts of quartz and minor feldspar set in a ferruginous cement. The quartz grains of trough cross bedded sandstone were dusted with inclusions of minerals viz. monazite, allanite and zircon. Grains of the REE-bearing phases were also seen to occur in the ferruginous cement. Magnetite, ilmenite,

							amphibole, haematite, monazite, zircon and rutile were the main constituents of the heavy minerals in stream sediments. The total REE values ranged from 137 ppm to 1,508 ppm in BRS; from 214 ppm to 717 ppm in PCS; from 298 ppm to 10,673 ppm in stream sediment samples; from 294 ppm to 1,337 ppm in PTS; from 232 ppm to 3,163 ppm in soil sample and 22,143 ppm to 56,462 ppm in heavy mineral samples. REE enrichment was observed mainly in the stream sediment and rarely in soil. Monazite, allanite, xenotime and zircon were the minerals that contributed to the REE enrichment in the stream sediment. Catchment areas of two streams were identified as potential area of REE enrichment.
Rajasthan, Sikar District	Ravji Ki Dhani, Nim Ka Thana Belt	1: 2,000	–	-	-	Mapping, Sampling	Copper mineralisation (G3) was observed in the form of malachite stains and disseminations of chalcopyrite, bornite and chalcocite. At some places quartz veins intruded into amphibole marble along and across the strike also carry disseminated bornite and chalcocite. The lithologies intersected along the boreholes were amphibole + biotite marble, biotite + amphibole marble, mica schist and amphibolite. The investigation established the occurrence of sub-surface copper mineralisation, hosted by amphibole marble and quartz biotite schist of the Kushalgarh Formation of the Ajabgarh Group. Sulphide mineralisation in the drilled boreholes was seen manifested in the form of fine disseminations, specks with occasional stringers, vein fillings and fracture fillings of the copper ore minerals, namely, chalcocite, bornite, chalcopyrite and occasionally covellite associated with pyrite.Mineralisation showed either foliation parallel or cross cutting relationship with the host rock.
Rajasthan, Sikar District	Tejawala North Block, NimKa Thana Belt	-	-	-	-	Mapping, Drilling	A G3 stage exploration in North Tejawala, Nim Ka Thana, was taken up to delineate the zones of base metal mineralisation. Detailed geological mapping reveals presence of quartzite, tremolite bearing dolomitic marble, quartz mica schist, amphibolite and conglomerate of the Kushalgarh Formation of the Ajabgarh Group of the Delhi Supergroup. The rocks were observed to have undergone three phases of deformation. Copper mineralisation was observed in the form of malachite stains and disseminations of chalcopyrite and bornite. Two mineralised zones MZ-I & II were delineated in central and eastern part of the block, respectively. Exploration by drilling indicated that the sulphide mineralisation were in the form of vein filled, fracture filled and along foliation planes in fine disseminations which took form as chalcopyrite, pyrite and pyrrhotite with few specks of bornite and covellite.
Rajasthan, Sikar District	Tejawala South Block, Nim Ka Thana Belt	-	-	-	-	Mapping, Drilling	The G3 stage exploration was taken up in South Tejawala, Nim Ka Thana, to delineate the zones of base metal mineralisation. Detailed mapping revealed presence of quartzite, tremolite-bearing dolomitic marble, quartz mica schist, oligomictic conglomerate and amphibolite. The copper mineralisation was observed in the form of malachite and azurite staining in amphibolite, quartz mica schist, conglomerate and quartzite. Exploration by drilling indicated that the sulphide mineralisation was in the form of vein, fracture and vugs filling type and along foliation planes as fine disseminations of chalcopyrite, pyrite and pyrrhotite with a few specks of bornite and covellite.
Rajasthan, Alwar District	Raipur-Mundawar area	1:12500	50 sq. km.	-	-	-	During the course of large-scale geological mapping copper mineralisation (G4) was recorded in the tremolite marble of the Thanagazi Formation and Impure Marble of Kushalgarh formation in the form of sulphides mainly chalcopyrite, bornite with malachite staining occurred as disseminations and occasionally as thin stringers. The copper mineralisation in the area was litho controlled. Towards south of Pehal, an old working pit (strike length: 30 m, width: 20 m and depth: 10 m) was demarcated in tremolite marble. It showed malachite staining and oxidised specks of chalcopyrite. A total of 150 samples (BRS and Channel samples) were collected from 6 channels and 2 trenches in area. The analytical result of the bedrock samples indicated the occurrences of different mineral in the range of Cu (<10 to 33,000 ppm), Co (<15 to 40 ppm), Ni (<15 to 70 ppm), Pb (<25 to 30 ppm), Zn (<5 to 10 ppm), Ag (<5 ppm) Cd (<5 ppm) and Au (<0.05 to 0.17 ppm). The mineralisation in these zones was observed as zones of malachite staining with minor occurrence of specks of chalcopyrite, pyrite, bornite and old working. MZ-I was observed just south of Pahel area. The analytical results of the Channel RM/CH1 and RM/CH/2 from MZ-I were encouraging. The Channel RM/CH/1, analysed a maximum of 0.45% and minimum of 20 ppm Cu. and the Channel RM/CH/2, analysed a maximum of 2% and minimum of 20 ppm Cu. The analytical

							results of the Channel RM/CH4 and RM/CH/5 from MZ-II were also encouraging. The Channel RM/CH/4, analysed a maximum of 1.10% and minimum of 30 ppm Cu and the Channel RM/CH/5, analysed a maximum of 0.10% and minimum of 165 ppm Cu.
Rajasthan Sikar District	west of Narda	1:2000	1.50 sq. km.	-	-	Mapping, Drilling	During the period of investigation (G3) a number of channels were laid across the scapolite-bearing banded impure marble over 1,000 m strike length and 11 m to 20 m width based on the presence of malachite stains and fresh specks of pyrite and chalcopyrite. On thebasis of surface anomalous values for Cu, a total 06 first-level boreholes RJSWN-01 to RJSWN-06 and 01 no. second-level borehole RJSWN-07 were drilled to evaluate the sub-surface potentiality of base metal and other precious metals in west of Narda block. All the boreholes intersected scapolite-bearing banded impure marble along with partings of biotite and amphibole-rich marble along with quartz and calcite veins. In Borehole no. RJSWN-07, apart from scapolite-bearing banded impure marble, quartzite with bands of garnetiferous quartz biotite schist was also intersected at a deeper level (approx. 193 m to 230 m). Fine disseminated pyrite, pyrrohtite, chalcopyrite and bornite along with fracture and vein filled pyrite and chalcopyrite were reported in the boreholes. The analytical results of channels WNRDCH-1 (1m x 0.35% Cu), WNRDCH-2 (2m x 0.10% Cu) and WNRDCH-4 (7m x 0.85% Cu) indicated anomalous values for Cu.
Rajasthan, Sikar District	Adharsh ila-Dariba Block, Nim Ka Thana	-	-	8	-	Mapping, Drilling	The G3 stage exploration was taken up. The different lithounits exposed in the study area were carbon phyllite, amphibole rich dolomitic marble, impure banded dolomitic marble, impure marble, scapolite-bearing dolomitic marble, brecciated dolomitic marble and ferrugenised breccia of Ajabgarh Group and quartzite of Alwar group of Delhi Supergroup. Two mineralisation zones MZ-I and MZ-II were delineated on the basis of surface indications of mineralisation within impure banded dolomitic marble. The width of MZ-I varied from 2 m to 6 m with grade variying from 0.15% Cu to 0.23 % Cu and width of MZ-II varied from 4 m to 10m with grade varying from 0.20% Cu to 0.45 % Cu. The main copper ore minerals identified in the area were bornite, chalcocite and chalcopyrite in ore petrography. Analytical results of samples from Borehole RJSAE-6 established one copper lode from 93.70 m to 98.70 m (5.00 m) with 0.42 % Cu. A total of 8 boreholes RJSAE-1 to RJSAE-8 were drilled to check the depth and lateral continuity of the copper mineralisation. All borehole intersected indication of sulphide mineralisation as per visual estimation.
Rajasthan, Jhunjhunu District	Pratappura block	1:2000	-	-	-	Mapping, Sampling	In the G3 stage exploration of the study area calcareous components were seen to be dominant. Garnet biotite schist that was exposed in the maximum part of the study area comprised of large garnet (diameter~4.2cm to 1cm) with biotite, plagioclase, and quartz. Dolomite was impure in nature and consisted of quartz, dolomite, calcite and ankerite. These exposed in eastern margin of the study area, showed elephant skin weathering. Quartzite mainly occurred at higher elevation in the study area bearing characteristics of yellowish white in colour, medium grain showed well-developed foliation planes. Amphibolite and granite occur as intrusive rocks in the area. Amphibolite dyke was melanocratic in nature, consisted of mainly plagioclase and pyroxene, and showed typical saltpepper texture. Evidences of at least three generations of deformations were observed within the lithounits. The surface evidences of mineralisation were observed to be well preserved in the form of malachite stain, box- work structure, gaussan zone, slag, old workings, and occurrences of Ocimum centraliafricanum or copper plant were noticed. Occurrence of old working was present mainly in the contact of quartzite and garnet-biotite-schist along F2 fold hinges. A total of 10 channels were laid mainly targeting the garnet-biotite schist and impure dolomite, on which EPCH-1, 2 and 9 on garnet- biotite schist and EPCH-4, 6 and 8 on impure dolomite that indicated positive results. The maximum copper zone identified on the channel at EPCH-2 showed 0.56% Cu with a thickness of 15.0 m. The maximum Pb concentration delineated at EPCH-4 showed 5.0 m thick with an average grade of 0.44%. The maximum Zn observed at EPCH-4 showed 7.0 m thickness with an average grade of 0.47%.

Rajasthan, Sikar District	East of Jaitpura	1:2000	2.52 sq. km.	09	1178 m	Mapping, Drilling, Sampling	G3 stage investigation in the area mainly exposed the metasedimentary rocks of Thanagazi Formation; with intrusive granite. A major portion of the study area was covered with the carbonate rocks, which included dolomitic marble, actinolite-bearing dolomitic marble, scapolite-bearing banded silicious marble and scapolite-bearing biotitic marble. The copper mineralisation was found to be associated along an estimated 1.5 km strike length and hosted within banded impure marble, dolomitic marble, actinolite-bearing marble and biotite-bearing marble. The dolomitic marble, actinolitic marble and the banded impure marble were the major and important host rock of the mineralisation. Occurrence of fresh copper sulphide minerals, such as, bornite, chalcocite and chalcopyrite along the quartz veins as well as along the bedding planes and foliations as disseminations were noted. Aggregates and clusters of bornite and chalcocite were observed mainly within dolomitic marbles. The sulphide minerals found in the area were chalcopyrite, pyrite, pyrrhotite, bornite and chalcocite. Specular haematite was also present in abundance. The copper sulphide minerals mainly occurred as fine disseminations through the host rock-dolomitic marble and banded impure marble, although occurrence of chalcopyrite was also noted as fracture filling, within quartz-calcite veins, both in hand specimens and core samples. A total of 12 channels were laid across the strike of the mineralisation covering the entire strike length of 1.5 km. Based on the chemical data from the channel samples, it was observed that the thickness of the mineralised zone varied from 2 m to 15 m on surface. Cu values as high as 3.42 % were noted in Channel no EJPCH-12 located at the eastern limb of the semi-regional fold. On the basis of analytical data from the surface samples (Channel samples and BRS), the study area was found to be prospective in terms of Cu mineralisation. 9 first-level boreholes with a total of 1,178 m drilling was carried out.
Rajasthan, Alwar District	Khan Ka Guwara Area, Pratapgarh, Thanagazi Tehsil	-	-	-	-	Mapping, Sampling	A G2 stage investigation revealed mineralisation in the study area in the form of fresh sulphide ores and malachite staining was also noted in the impure marble of the Dogeta Formation, near Buchar Bandh area and amphibolite and chlorite-garnet-amphibole schist of the Tehla Formation near Khan ka Village Guwara. The sulphides constituted pyrite, chalcopyrite ± pyrrhotite and chalcocite. Some sulphides occurred as fine disseminations while other sulphide minerals and malachite stains were seen to occur along the S1 foliation planes and veins running parallel to it. The malachite stains were mostly in situ in the impure marble of the Dogeta Formation and were present in close association with sulphides. Under the microscope, the primary sulphides, pyrite and chalcopyrite, showed disseminated as well as fracture filling textures, while the secondary chalcocite showed replacement texture, formed by partial replacement of the primary chalcopyrite along the grain boundaries and fractures. The malachite formation resulted from later oxidation of sulphides by the action of descending solutions. Chemical analysis of bedrock samples indicated Cu values ranging from 10 ppm-1.1%, while Au values showed a ranged of 100 ppb-380 ppb.The higher copper and gold values were from the amphibolite and chlorite-garnetamphibole schist of the Tehla Formation near Khan ka Guwara Village, while high Cu values were also reported from the impure marble of the Dogeta Formation near Buchar Bandh. A channel of 12 m length was cut across the strike in amphibolite of the Tehla Formation, in front of the old working near Village Kali Barkhari. Along the channel, Cu values ranged from 30 ppm to 0.18%, with an average of 603 ppm. Two mineralised zones were marked in the study area, namely, MZ I of 1.6 km×1 km dimension in amphibolite and chlorite-garnet amphibole schist of the Tehla Formation, near Kali Barkhari- Khan ka Guwara villages and MZ II in impure marble of the Dogeta Formation of 580 m×550 m dimension, near Buchar Bandh.
Rajasthan, Alwar District,	Suratgarh block, Thanagazi tehsil	1:2000	1.00 sq. km.	10	1251.30 m	Mapping, Sampling, Drilling, Trenching	As part of G3 stage investigation, a total of 180 core samples were prepared and 33 cu m pitting/trenching were carried out and a total of 20 PTS samples, 90 BRS/ channel samples, 10 petrological samples and 10 ore mineral samples were collected. The lithologies intersected in the boreholes drilled in Suratgarh block are brecciated quartzite, dolomitic marble intercalated with thin bands of quartzite, banded dolomitic marble and thin veins and vein lets of quartz and carbonate. Sulphide mineralisation was intersected in the form of specks, dissemination, vein and fracture filled bornite, chalcopyrite and pyrrhotite. Borehole RJAS-1 intersected 1 m thick lean mineralised zone of 0.12% Cu. Borehole RJAS-2 intersected

							two lean mineralised zones of 1 m thick with 0.11% and 0.13% Cu. The analytical results were awaited to estimate the resource of the block.
Rajasthan, Ajmer District	Harmara-Tiloniya areas, Kishang arh Tehsil	-	-	-	-	Mapping, Sampling	G4 stage investigation revelead that most of the area was peneplain and covered by cultivated land with 4 m to 5 m thick soil cover, scanty outcrops and hillocks. Surface indication of mineralisation was observed in the form of malachite staining in the central part. Whereas primary sulphides were observed in the well dumps near Village Bhojiyawas, Harmara and Tiloniya area in the form of specks, stringers as well as in dissemination in the form of pyrite, chalcopyrite and pyrrohtite. Mineralisation was observed mainly along foliation planes as well as dissemination. The major host rock in the Bhojiyawas area were magnetite-andalusite-quartzite with schist intercalation, Garnetiferous-mica-schist and quartzite whereas carbonate hosted sulphide mineralisation was recorded in the south-east of Tiloniya and small patches in the south-west of Bhojiyawas and near Ralavata area. Apart from base metal graphite-bearing mica-schist was recorded in the north-western part of the area near Sursura.
Rajasthan, Bhilwara District	Lanpiya-Mahuakhurd area	1:2000	-	-	-	Mapping, Sampling	In G3 stage investigation, it was observed that malachite staining was present at several places in Calc silicate rock. The BMQ band present in the area, showed signature of weakly developed oxidised and gossanised zone. The oxidised zones have direct relevance with the base metal as well as iron mineralisation in the study area. Sulphide mineralisation in the form of specks of sphalerite and veins of galena was observed in the lithounit. A total of 34 samples were tested for their Total Metal Content (TMC) in the field using Cold Extraction Titration method. About 29 bedrock samples and 5 soil samples were taken separately. The TMC of the BMQ as estimated by cold extraction method ranged between 6,000 ppm and 17,000 ppm and this was corroborated with analytical results of anomalous Pb+Zn values. All the bedrock samples collected from BMQ band yielded anomalous high (Pb+Zn) values ranging between 0.25% and 5.59%, averaging 1.53% (Pb+Zn) in 21 bedrock samples of BMQ. The BMQ band consistently yielded anomalous high Pb+Zn values in channel and trench samples in the range of 1.16%-2.24% and 0.28%- 2.46% respectively.
Rajasthan, Bhilwara and Chittorgarh Districts	Karjiyakhera-Manyas-Karas area	1:12500	100 sq. km.	-	-	Mapping, Sampling, Drilling, Trenching	In G4 stage the investigation that was carried out in the area which involved 111 cubic meters of trenching, collection of 152 bedrock samples (BRS) and 17 samples for petrochemical analysis (PCS) to trace the base metal potential of the area. About 23 samples for petrological studies, 8 samples for ore microscopic studies and 6 samples for XRD analysis were also collected. The surface indication of mineralisation in the study area was quite prominent. Old working, malachite stains and specks of sulphides like chalcopyrite, bornite and pyrite were observed in the calc-silicates of Rewara Formation. Based on the surface indications of mineralisation, favourable lithological and structural set up random litho samples were collected and analysed semi-quantitatively by Cold Extraction Kit (CX Kit) in the field itself. The amphibole-rich band of calc amphibole, calc silicate and ferruginised sheared dolomite analysed 3,200 ppm to 10,200 ppm TMC. Somi mineralised zone with 750 m X 100 m and Sankhli mineralised zone was 700 m X 95 m were established. The maximum value of Cu, Pb and Zn in the study area was 2,900 ppm, 2,100 ppm and 1,300 ppm respectively.
Rajasthan, Pali and Ajmer Districts	Kotra and Kalinjar villages	1: 12,500	100 sq. km.	-	-	Mapping, Sampling	The G4 stage surface geochemical evaluation of the area involved collection of 200 bedrock samples (random), 50 trench samples, 10 PCS, 10 thin polished sections each for petrographic studies and ore microscopy, 05 bedrock samples for XRD analysis and 05 samples for EPMA studies. Surface indications of base metal mineralisation were observed in the form of malachite stains, liminotisation in impure marble, calc schist of the Sendra Formation and horblende schist of the Phulad Ophiolite Suite and occasional specks of chalcopyrite and bornite in calc schist near Karuntiya. About 200 BRS samples were collected and sent for analysis. Analytical results of 200 BRS samples were received excluding that of Cr and Ba. Only three samples showed anomalous Cu values above 0.1%. BRS-30 near Karuntiya showed 0.51% Cu value in calc schist, BRS-63 west of Durgawas showed 0.12% Cu value in granite gneiss and BRS-68 in Northwest of Seliberi showed 0.12% Cu value in hornblende schist of Phulad Ophiolite Suite. Analytical results of 50 trench samples were received excluding that of Cr and Ba.

Rajasthan, Udaipur District	Rupatalai block	1:2000	1 sq. km.	6	778 m	Mapping, Sampling, Drilling	As part of G3 stage investigations, 108 core samples were generated. The study area comprises of Sawadri Group and Ran Igneous Complex of Mangalwar Complex of Bhilwara Supergroup which belongs to the Archean age. Lithologies mapped in the block area were granite gneiss, dolomite, ferruginous quartzite, micaceous quartzite, amphibolites and syenogranite. General trend of the foliations in all the lithology was almost the same and was seen striking in WNW-ESE direction with moderate dip amount varied from 40˚-50˚ northeasterly. Surfacial indication of sulphide mineralisation was mostly observed in the form of extensive ferruginisation and gossanisation within ferruginous quartzite, malachite staining and sometimes very tiny crystals of pyrite and chalcopyrite were found along foliation planes in micaceous quartzite and also in granite gneiss at some places. Six boreholes RJUR-01, RJUR-02, RJUR-03, RJUR-04, RJUR-05 and RJUR-06 were drilled in the block with drilling depth of 110 m, 85 m, 96 m, 124 m, 260 m and 103 m respectively that totaled to 778 m of drilling. In Borehole RJUR-01, two mineralised zones (3.75 m and 4.25 m) were intersected with visual estimation of 1% Cu sulphide and two sulphide zones (dominantly pyrite with very less amount of chalcopyrite) were intersected. In Borehole RJUR-02, 4 pyrite rich zones were intersected with very less Cu sulphide. In Borehole RJUR-03, 2 sulphide zones (dominantly pyrite with very less amount of chalcopyrite) were intersected. In Borehole RJUR-04, one pyrite rich zone (8 m) and one Cu sulphide zone (1.3 m) were intersected. In Borehole RJUR-05, one zone (3.25 m) of chalcopyrite (V.E. 0.4%) and one pyrite zone (69 m) were intersected. In Borehole RJUR-06, 4 zones (1 m, 3 m, 3 m and 2.95 m) of chalcopyrite (V.E. 0.4% Cu sulphide) were intersected.
Rajasthan, Bhilwara District	Balyakhera, Malikhera and Kotriareas	1:12,500	110 sq. km.	-	-	Mapping, Sampling, Drilling, Trenching	As part of G4 stage investigations, a total of 11 bedrock/channel samples and 56 trench samples have collected. About 10 petrochemical samples, 27 petrographic samples and 12 ore microscopic samples were also collected. Surface indications of mineralisation noted in the area were old workings, slag, ferruginisation, limonitisation, gosanisation, malachite-azurite stains as well as presence of fresh sulphides. Hornblende schist within muscovite schist of the Samodi Formation showed ferruginisation, limonitisation, gosanisation with encrustations of malachite and azurite. The copper and associated mineralisation was seen manifested by the occurrence of chalcopyrite, bornite, galena, sphalerite and occasional covellite specks, fracture-filled veins of malachite in amphibole marble of Samodi. Only malachite staining was observed along the fracture planes in both the walls of old workings in Village Salampura. However, appreciable degree of mineralisation was noted in the biotite- schist ±garnet of the Tiranga Formation in the form of vein fillings and stringers of chalcopyrite mainly along fracture and S2 foliation planes SW of Salampura Village. Malachite was also noted as stains along fractures in calc-gneiss of the Rewara Formation. Specks of pyrite and arsenopyrite with occasional chalcopyrite were also noted in quartzite of the Pur Formation. Pyrite, chalcopyrite, bornite, covellite, galena and sphalerite associated with calcite veins emplaced along the secondary planar features like foliation/fracture planes indicate hydrothermal activity in the area which in turn indicate epigenetic nature of mineralisation.
Rajasthan, Chittorgarh District	Hirakhedi Block	1:2000	3.5 sq. km.	-	-	Mapping, Sampling, Drilling, Trenching	In G3 stage investigation, during detailed geological mapping a total of 64 bed rock/channel samples, 50 pit/trench samples, 11 petrochemical samples, 15 petrological samples, 10 ore microscopic samples and 05 EPMA samples were collected. A zone of brecciation was seen in calc silicate rock and it extends in NE-SW direction. The surface indications of mineralisation observed in the area included the presence of malachite staining, small specks of pyrite, bornite, covellite and chalcopyrite in calc-silicate rock. Two potential Cu mineralisation zones trending roughly in NE-SW direction were demarcated on the surface based on anomalous Cu values (0.25% and 0.80% Cu) from well dump and strong IP anomaly. Pseudo section along S600 and S2000 traverse lines indicated that the mineralisation starts approx. at 24 m depth and the IP anomaly contours were open downwards.

Rajasthan, Bhilwara District	Lakhola Block	-	-	5	670.0 m	Mapping, Sampling, Drilling	In G3 stage investigation, a total of 200 core samples, 40 channel samples, 5 petrochemical samples, 25 petrographic and 5 samples for EPMA and XRD analysis were collected. Four first-level boreholes (RJLK-01, RJLH- 02, RJLK-03 and RJLK-05) were drilled at 200 m spacing along the mineralised zone (MZ-I) to check the sub-surface and strike continuity of mineralisation in the block. The first Borehole RJLK-01 was drilled along the profile of Channel- 03 (2.0 m x 0.21% Cu) in which a Cu zone of 2m x 0.21% was intersected from 99.50 m to 101.50 m depth along the borehole within altered calc-silicate rock. The second and third Boreholes (RJLK-02 and RJLK-03) did intersect copper mineralisation, but the analytical values were not significant. Maximum Cu value reported from Borehole RJLK-02 was 955 ppm and in RJLK-03 it was 700 ppm. The fifth Borehole RJLK-05 was drilled in the block to check the northward strike continuity of the mineralisation intersected in Boreholes RJLK-01 and RJLK-02. No significant Cu mineralisation could be intersected in this borehole except minor disseminations of chalcopyrite, pyrite and pyrrhotite in calc-silicate rock. The Boreholes RJLK-02, RJLK-03 and RJLK-05 intersected sulphides mostly fracture filled chalcopyrite, bornite, pyrite and pyrrhotite in the form of disseminations, specks and stringers with in the altered calc-silicate and garnetiferous mica-schist but copper sulphides in these boreholes were not significant enough for delineation of zones on the basis of visual estimation. One borehole intersected carbonaceous phyllite which was mineralised with pyrite and pyrohhotite in the form of very thin stringers and veins. No significant copper mineralisation was intersected in this borehole also.
Rajasthan, Alwar District	Baraud-Dooghera	1:12,500	100 sq. km.	-	-	Mapping, Sampling, Trenching	The G4 stage investigation included 700 sq. km. ASTER image processing and collection of a total of 150 bed rock/channel samples and 50 trench samples. Apart from this, 20 samples for petrography, 10 samples for ore microscopy, 10 samples for petrochemical analysis and 25 of water samples were collected. The surface indications of base metal mineralisation were present in the form of malachite stains and fresh sulphides i.e.,, chalcopyrite, covellite, bornite, pyrrhotite and pyrite within impure dolomitic marble, carbon phyllite and brecciated quartzite as well as in quartz veins. A mineralisation zone MZ-I was delineated on the basis of surface indications of mineralisation within impure dolomitic marbles of Kushalgarh Formation. Apart from this, surface indication of graphite mineralisation was also observed. Graphite present in the study area was thinly laminated/bedded with flaky to crystalline morphology. It was seen hosted by graphite-bearing mica schist, carbon phyllite and garnet-bearing mica schist. Copper mineralisation in the study area was seen manifested by presence of gossan zone in ferruginous brecciated quartzite of Sariska Fm. Based on these surface indications for copper mineralisation, one mineralised zone (MZ-I) was demarcated. The chemical result of 03 number of channel samples (DBCH-2, 3 and 4) showed Cu, Mn and Fe content from 10 ppm to 0.72%, 80 ppm to 0.17% and 0.70% ppm to 12.50% respectively. The channel samples (DBCH-4) analysed a maximum of 0.72% Cu, with 6m x 0.28% Cu, 2 m x 0.21%, 4 m x 0.1% and 3 m x 0.1%. The chemical result of 50 of pitting/trenching-cum-channel samples indicated insignificant amount of copper content (10 ppm to 160 ppm). Graphite mineralisation was also observed within graphite mica schist, carbonaceous phyllite and garnet-bearing mica schist.
Rajasthan, Alwar and Dausa districts	Golana, Kesupura, Goarah Gujar and Jamrauli areas	1:12,500	50 sq. km.	-	-	Mapping, Sampling, Trenching	During G4 stage investigation a total of 100 bedrock samples (90 random and grid bedrock samples and 10 channel samples collected from 01 channels), 50 trench samples, 20 Petrochemical Samples, 20 petrological samples, 10 ore microscopy samples, 05 samples for XRD and 05 samples for EPMA were collected and submitted for analysis. The rocks exposed in the study area belong to the Mangalwar complex and metasediments of the Delhi Supergroup (DSG). The meta-sediments of the Delhi Supergroup rest unconformably over gneissic basement of the Mangalwar Complex. In the area all three members of DSG, i.e. Raialo Group, Alwar Group and Ajabgarh Group are exposed. Surface manifestations of copper mineralisation were observed within the amphibolites of Tehla Formation and phyllite of Rajgarh Formation in the form of malachite staining along the S1 foliation plane. Random bedrock samples were collected from throughout the amphibolite body along with a 10 m channel near Jhajhi-Rampura area. BRS-81, BRS-82 and BRS-91 showed 7.83%, 3.14% and 0.20% copper values respectively.

Rajasthan, Nagaur District	Degana Gaon block	1:12,500	100 sq. km.	-	-	Mapping, Sampling, Trenching	As part of G4 stage investigation, during the geological mapping 200 bedrock sample (BRS), 10 PCS samples, 10 petrological samples and 10 OM sample and 50 trench (channel) samples were collected to assess the potential for base metal, REE associated mineral in the area. Moreover, 50 cu. m of trenching was also carried out to expose the various litho-units. Apart from the NQT 14 samples were collected from the graphitic schist to know the fix carbon content and to establish the strike continuity of the graphitic band. General trend of all the rock type occurring in the area was NNE-SSW to N-S dipping towards west. Graphitic schist was grey to black in color and fine to medium grain rock. Foliation planes were well developed and trending NNE-SSW to N-S dipping towards west. Mineralisation in the study area was present in the form of fresh sulphides i.e., chalcopyrite, pyrite and pyrrhotite. The host rock for this mineralization in the demarcated zone was either graphitic schist or andalusite- bearing graphitic schist. The area was evidenced by the presence of graphitic bands. Two major prominent laterally persistent band of graphitic schist was demarcated from Deganagaon to kumharon ki Dhani Village having strike length of 4 km. The thickness of the band ranged from 1 to 3 m with numerous thin bands. The fix carbon value was recorded in these bands was up to 4 %.
Rajasthan, Pali District	Chitar, Sanderiya and Kanecha Village	-	-	-	-	Mapping, Sampling	During G4 stage investigation, surface manifestations of mineralisation like malachite, azurite, ferruginisations, and sulphide leaching and skarn zones were noticed in the field. The petrographic study showed occurrences of bornite, chalcocite, covellite, digenite and chalcopyrite in the mineralised rock. The analytical values in channel samples received so far indicated encouraging values of Cu up to 3,200 ppm and 3,600 ppm. The analytical values of serpentinite showed encouraging values of Ni which was up to 3,000 ppm.
Rajasthan, Udaipur District	Bara-Parshad area	1:12,500	100 sq. km.	4	534 m	Mapping, Sampling, Drilling	During G4 stage investigation, the samples collected were as follows: 150 bedrock samples, 10 PT samples, 42 channel samples and 100 core samples for chemical analysis, 10 samples for petrochemical study, 5 samples for XRD and 30 samples for petrographic studies. Major surface indications of mineralisation were in the form of old workings, presence of chalcopyrite, pyrite, galena and sphalerite in dolomite and malachite staining. The old workings occurred as trenches along the strike and as vertical shaft in Dolomite band. Mineralisation in the dolomite occurred in the form of disseminations and fracture fillings concentrated along F2 deformation. The Boreholes RJBP-1 and RJBP-2 intersected significant concentration of sulphide mineralisation mainly in the form of disseminations and fracture filled galena, sphalerite, chalcopyrite and pyrite in the form of specks, stringers and veins in dolomite. The Boreholes RJBP-3 and RJBP-4 intersected sulphides in dolomite.
Gujarat Dahod District	-	1:12500	40 sq. km.	-	-	Mapping, Sampling, Trenching	During G4 stage investigation, the samples collected were as follows: 137 bedrock samples (BRS), 50 stream sediment and soil samples, 50 pit & trench samples. Manganese ore was observed in the shear zone in the form of veins, veinlets having width up to 8 cm. Surface indication of base metal mineralisation was observed in the form of malachite staining in dolomite in Khunta and Handia area. Manganiferrousphyllite and quartzite were observed in Sagan old working quarry. Manganese ore was also observed in the quartz veins in and around Ghora, Pipli area.
Rajasthan, Banswara District	Lakai, Handia and Pipali area	1:12500	40 sq. km.	-	-	Mapping, Sampling, Trenching	During G4 stage investigation, the samples collected were as follows: 137 bedrock samples (BRS), 50 stream sediment and soil samples, 50 pit and trench samples. Dolomite, quartzite and phylllite were the main lithologies observed in the area. Small outcrops of granite, meta-greywacke, chlorite schist and BIF were also observed in the area. Manganese was observed in the shear zone in the form of veins, veinlets having width up to 8 cm. Surface indication of base metal mineralisation was observed in the form of malachite staining in dolomite in Khunta and Handia area. Manganiferrousphyllite and quartzite were observed in Sagan old working quarry. Manganese was also observed in the quartz veins in and around Ghora, Pipli area.
Antimony							
Himachal Pradesh, Lahaul and Spiti (On expediti on basis)	Bara Shigri glacier	1:12,500	25 sq. km.	-	-	Mapping, Sampling	During the reconnaissance survey (G4) for antimony, associated base metals and REE, a total of 151 channel samples were collected across the pegmatite veins, granite bodies and pegmatite bodies to evaluate the potentiality of antimony, associated base metals and REEs. Besides, 30 samples for petrographic, 05 samples for XRD and 10 samples for EPMA, were also collected and studied. On the basis of field

							observations and analytical results, it was inferred that two phases of granite were exposed in the study area. The granite on the left bank of Bara Shigri nala was medium to coarse-grained, comprising of quartz, plagioclase feldspar, K feldspar, tourmaline, muscovite and biotite. Encouraging lithium values, i.e., >100 ppm were obtained in 39 channel samples.
Bauxite							
Maharashtra Sindhudurg	Math budruk	1:12500	-	-	-	Mapping, pitting, sampling	The Al_2O_3 content in BRS varied from 17.91% to 56.57 % and correspondingly SiO_2 content varied from 1.3% to 22.81%. Gallium values ranged from 31 ppm to 76 ppm. The Al_2O_3 content in pit samples ranged from 19.67 % to 59.23% and SiO_2 values ranged from 1.72% to 33.50%. Based on the Al_2O_3, SiO_2 and Fe_2O_3 value in bedrock and pit samples, laterite was classified into ferruginous laterite, aluminous laterite and bauxite. Cumulative area of 10.36 sq. km. and 34.68 sq. km. were delineated as potential for bauxite and aluminous laterite respectively. Bauxite was seen present as pockets as well as lenses in laterite. XRD and ore microscopic studies of representative samples collected from bauxite showed that gibbsite was the dominant ore mineral with minor minerals like anatase, haematite and goethite.
Madhya Pradesh Dindori (G3)	Khapripani block, Bajag Tehsil	1:4000	5 sq. km.	28	614.0 m	Mapping, drilling, sampling	A total of 599 core samples were generated and analysed for Al_2O_3, SiO_2, P_2O_5, Fe_2O_3, CaO, MgO, Na_2O, K_2O, TiO_2, MnO, Ga, V, REE, Reactive Silica & L.O.I. to assess the degree of laterisation and formation of bauxite and aluminous laterite. A total sum of 6.67 million tonnes (5.26 float & 1.41 in situ) of bauxite with an average of 39.41% Al_2O_3, 47.89 million tonnes (24.63 float & 23.26 in situ) of aluminous laterite with an average of 28.61% Al_2O_3 and 3.04 million tonnes (1.07 float & 1.96 in situ) of ferruginous laterite with an average of 15.93% Al_2O_3 resources was estimated in Khapripani block among which 4.74 million tonnes (4.24 float & 0.50 in situ) of bauxite, 23.07 million tonnes (15.63 float & 7.44 in situ) of aluminous laterite and 0.66 million tonnes (0.43 float & 0.22 in situ) of ferruginous laterite having more than 0.1% (cutoff) of vanadium mineralization are recoverable. Those mineralised zones also having some good values of gallium (up to 129 ppm) could also be recovered as by products.
Cobalt							
Karnataka, Shimoga (G4)	Gilalagundi	1:12500	100 sq. km.	-	-	Mapping & Sampling	Reconnaissance survey (G4) was carried out for Cobalt, Manganese and associated poly-metallic mineralization in Gilalagundi area. The area can be divided into 04 parts, the western, the central, the eastern and the north / north east part. The eastern part was dominated by quartz-chlorite-schist and its variants. The central by ferruginous phyllite, interbanded with brecciated chert / cherty quartzite and banded iron formations. The western domain was mainly characterised by meta-argillite-chert-volcanic suite. The mineralisation was observed to be confined to ferruginous phyllite and brecciated chert / cherty quartzite. Botryoidal, box work, cavity fillings, replacement structures were observed in the investigated block. A total of 19 samples have shown the assay values of Co as more than 125 ppm, the maximum being 0.26% reported from sample collected from brecciated chert / cherty quartzite, Arasalu RF, which falls in central domain of studied block and 03 samples have shown the assay value of manganese as more than 10 %. The analytical results of trench samples have shown the assay value of Cobalt in Trench no. 04 to a maximum up to 0.44 % with an average of 772 ppm x 10 m, carried out at Arasalu RF. The XRF analysis of petrochemical samples corroborated with BRS. A total of 11 numbers of pockets of Mn / Fe oxides were identified in the investigated block, making the Arasalu, Gilalagundi and Konehosuru segments.
Diamond							
Chhattisgarh, Raigarh District	Raigarh area	-	700 sq. km.	-	-	Mapping, Sampling	In G4 stage investigation PCS sample collected during the field season, showed that the SiO_2 ranged from (45.99 to 54.66) wt%, Al_2O_3 ranged from (9.65 to 18.89) wt%, Fe_2O_3 ranged from (7.57 to 15.98) wt%, MgO ranged from (1.15 to 9.95) wt%, K_2O ranged from (0.52 to 7.33) wt%, CaO ranged from (2.74 to 9.39) wt%. The Cr and Ni content ranged from (30-650) ppm, and (07-176) ppm respectively. EPMA study of HMS samples showed that the garnets were non-kimberlitic, spessertine to almandine of crustal origin.

Madhya Pradesh, Chattarpur, Sagar and Tikamgarh Districts & Uttar Pradesh Lalitpur District	Barayatha block	-	-	-	-	Mapping, Sampling	Geologically, the Barayatha block comprises Bundelkhand Granite Massif in the northern part whereas the southern part is occupied by Bijawar, Vindhyan, and Deccan Trap. As part of G4 stage investigations, during the fieldwork, delineated PGRS lineaments in the map were checked in-ground as structural lineaments, intersections that were favorable for the emplacement of kimberlite/lamproite. Besides field traverses, systematic stream sediment sampling was carried out with the help of a drainage map. Sample processing was done for recovering heavy mineral concentrate (HMC) which were examined for kimberlite indicator minerals under the stereo-microscope.
Odisha, Bargarh District	Padampur-Paikamal-Jharbandh area	-	675 sq. km.	-	-	Mapping, Sampling	During G4 stage investigation, it was observed that the cratonic lithounits included granite gneisses of different varieties mostly banded gneisses with minor migmatitic and porphyritic varieties, quartz mica schist and minor unmappable units of low-grade metasedimentary schists. The lithounits of EGMB occupied major parts of the study area which include garnetiferous granite gneiss, khondlite and quartzite. Heavy minerals, such as, garnet, ilmenite, spinel, zircon, amphiboles, pyroxenes and epidote were recovered after separation from the stream sediment samples. A total of 110 such suspected heavy mineral grains were selected for further analysis by EPMA and SEM, of which 67 grains were selected for EMPA and 43 grains were selected for SEM studies. These heavy minerals include 52 nos. of suspected garnets, 16 nos. of suspected ilmenites, 06 nos. of suspected spinel, 31 nos. of suspected diopside grains and 05 nos. of suspected grains which could not been identified by microscopic observation.
Andhra Pradesh, Anantapur District	Kanaganapalle-Dharmavaram area	1:50,000	790 sq. km.	-	-	Mapping, Sampling	In G4 stage investigation The study of stream sediment sample revealed that the present area contained heavy minerals like ilmenite, spinel, garnet, diopside, epidote, amphibole, zircon, apatite, tourmaline and sulphides. The ilmenites turned out to be magnesian ilmenites which was prime indicator mineral of Kimberlite Clan of Rocks. These picro ilmenites contained high MgO (7.43 to 8.68 wt%), high Cr_2O_3 (1 to 3 wt%) and low MnO (<0.5 wt%).
Tamil Nadu, Vellore, Tirupathur districts & Andhra Pradesh Chittoor District	-	-	700 sq. km.	-	-	Mapping, Sampling, Drilling, Trenching	The G4 stage investigation showed that the investigation area comprised Archaean rocks of charnockites, Archaean to Paleoproterozoic Peninsular Gneissic Complex to II (PGC to II), basic intrusive of Mesoproterozoic Age, Alkali Complex and acid intrusive of Neoproterozoic Age and Quaternary alluvium and the study area falls in the southern peripheral continuation of the Dharwar craton. Based on the integrated map of Geology, Drainage, Lineament data, NGCM, ground and aeromagnetic anomaly zones and target zones (Zone-I to Zone-X) were demarcated in the integrated map. During the course of field works, points of intersected lineaments, dyes, and anomaly zones were checked, 25 new mafic dykes and 04 of ultramafic dykes were identified and reported, 10 cu. m of pitting were excavated and 10 samples were collected alongwith 18 PS samples, 225 stream sediment samples.
Emerald							
Rajasthan, Rajsamand District	Kalaguman-Dhaneen-Nathela areas	1:12,500	100 sq. km	-	-	Mapping, Sampling, Trenching	During G4 stage investigation, a total of 200 bedrock samples, 37 petrographic samples (PS), 20 petrochemical samples (PCS), and 55 pitting/trenching samples (PTS) were collected. The studied deposits were formed by the metasomatic reaction between muscovite (± garnet ± tourmaline) pegmatites and lenticular bodies of altered ultramafic rocks that were seen hosted by the Bhilwara Supergroup gneisses (BGC). This reaction produced phlogopite schists containing the exometasomatic emeralds, as in all other granite-related emerald deposits. The concentration and distribution of chromium in the host rock and beryllium content of the hydrothermal fluids, derived from the pegmatites, seem to be the most significant factor for the development of emeralds. Field studies confirmed that a lithological association i.e., schistose, mafic/ultramafic intruded by beryllium-bearing pegmatites was a must for the mineralisation of emerald, apart from the lithological control and structural control.

Reginal Mineral Targeting (RMT) & Research Project (RP)							
Chhattisgarh	Bastar Craton, Sonakhan Greenstone Belt and its surrounding areas	-	4000 sq. km.	-	-	Mapping, sampling	Field work was carried in the delineated potential blocks - (1) Rajpur-Barnaidadar, (2) Rachpalpur- Karankhol-Arangi blocks and (3) Chandranagar- Lohadadar block in an around Rajpur, Barnaidadar, Remratola, Jarra, Kothari, Lohadar, Rajpur, Balenda, Karankhol areas. BRS samples collected systematically from this zone yielded anomalous values of Au in BRS- 42E (Au- 1.24 ppm); BRS-48D1 (Au-0.5 ppm), BRS-48D2 (Au-8.8 ppm) and BRS-42D (Au-0.8 ppm). This was further supported by presence of continuous high chargeability and low resistivity geophysical profile along this zone. Presence of numerous fracture/fault systems were also inferred from the magnetic maps towards the south of Rajpur-Barnidadar block near Tulsidipa. The rock types exposed in Rachpalpur- Arangi-Karankhol block were bimodal volcanic (Basalts and rhyolites), subvolcanics (rhyolitic granophyre) and gabbroic intrusives. In this block, the quartz-epidote alteration zone was identified near the contact of granophyre and gabbro. The altered granophyre showed impregnation of NE-SE trending small quartz-epidote veinlets, invariably laden with disseminated pyrite, arsenopyrite and native gold as well as oxidised box work and pits. Preliminary study showed that these quartz veins were mineralised and followed the fracture systems (Fr1, Fr2 and Fr3) present in the area.
Madhya Pradesh, Balaghat and Maharashtra, Nagpur and Bhandara	Sausar Mobile Belt	-	-	-	-	-	Regional mineral targeting to search for potential areas for tin, tungsten, manganese, cobalt and other mineralization was carried out in the Sausar Mobile area. The areas includes: Kachekhani area: At Kachekhani area a major NE-SW trending quartz vein with southerly dip of 50° was seen emplaced along the foliation of the quartz mica schist- quartzite sequence of Sausar Belt. This arsenopyrite-bearing quartz vein lies close to the boundary of CIS (Central Indian shear). This vein was intermittently traced over a stretch of 4 km from Kachekhani to Mohegaon Village. Skarn zones: During fieldwork skarn zones were identified at (i) Village Dhobitola, north of Tumsar (ii) Hivra area, near Mansar. Development of tremolite, actinolite, diopside, epidote and garnet skarn assemblage was established. REE & RM potential along the western extension of Dongarla area: Field studies revealed the presence of widespread in situ talus material of abundant feldspar and mica indicating a concealed zone of primary pegmatite within the basement biotite gneiss over an aerial extent of 1.5 sq km on the weathered pegmatite located 2 km west of Village Dongarla. Kawlapur mica bearing pegmatite: Test drilling carried out at Kawlapur area in Nagpur District indicated the presence of mica-bearing pegmatite within the basement gneiss. Muscovite books were noticed within the pegmatite core.
Madhya Pradesh, Jabalpur, Katni, Umariya, Rewa, Shahdol, Satna, Sidhi	Mahakoshal belt	-	1000 sq. km.	-	-	Mapping, sampling	The objective of this work was to assess the mineralization potentiality for gold, basemetal and critical minerals in the area. The project involved collection of data, consultation of literature, Aerial Reconnaissance and PGRS studies, preparation of prospectivity map and collection of 100 bedrock samples, 10 petrological samples, 4 EPMA samples and 20 XRD samples collection. Analytical value of Cu from 0.11% to 7.36% was recorded in 5 bedrock samples. Higher Cu was recorded in quartz vein in carb phyllite and Basic body. Au of 1.15 ppm was recorded in quartz vein at Dhandukau area.
Odisha, Deogarh, Sambalpur, Jharsuguda and Sundergarh	Adas-Sargipali mineralised belt	-	6000 sq. km.	2	415 m	Mapping & Drilling	The present work was proposed with the objective to validate the aero-geophysical anomaly zones marked in these areas through scout drilling, to establish sub-surface geology and assess their mineral potentiality. The areas identified for scout drilling were Iswarpali, Kolabira and Chottabanga. However, one more area i.e., Dengasargi was also taken up for scout drilling based on malachite stains and sulphide mineralisation observed in the outcrops of mafic granulite. During FS 2021-22, two scout boreholes were drilled, one each in Iswarpali and Dengasargi area located along the eastern strike extension of Adash-Rampalli copper prospect within the EGMB. A total of 415 m drilling in two boreholes were completed till 31st March, 2022. In both the boreholes, considerable thickness of sulphide mineralisation represented by chalcopyrite, bornite, covelite, pyrrhotite and pyrite were intersected. The mineralisation occurred in the form of dusty dissemination, stringers, fracture and vein filling. The host rock for sulphide mineralisation in Iswarpali and Dengasargi area was mafic granulite and amphibolites, respectively. Wall rock alteration/Hydrothermal alteration in the form of kaolinisation, sericitisation (white

							mica), albitisation and silicification with pyritisation was observed in the hanging wall side or close proximity to the shear zone. Epidotisation was observed at fracture planes. At places, the alteration was so intense that the primary textural features of the rock were obliterated. Analytical results of Borehole ODAS-01 drilled in Iswarpali indicated a copper mineralised zone of 4.5 m thickness with 0.43% Cu. Although, bedrock samples from Dengasargi area showed malachite stains, the presence of chalcopyrite exsolution lamellae within bornite was observed in polished sections. The result of drill core samples showed copper ranging from 7 ppm to 239 ppm. The Kolabira area was seen to be under the cover of thick pile of sediments with very few outcrops of sheared granite gneiss and sheared quartzite. However, the area was identified for scout drilling to verify the very sharp high magnetic anomaly. On analysis of NGCM data, it was observed that the composite samples showed significant ΣREE values going up to about 4,000 ppm and their distribution pattern more or less followed the trend of aeromagnetic anomaly.
Jharkhand, Ranchi, East and West Singhbhum, Khunti, Saraikela-Kharsawan districts	North Singhbhum Mobile Belt (NSMB)	5000 sq. km.	-	6	1200 m	Sampling & Drilling	The regional mineral targeting (RMT) was a three-year project (FS 2019-22) aimed to develop models to explore target areas potential for mineralisation covering 5,000 sq. km. area in and around North Singhbhum Mobile Belt (NSMB) in Jharkhand. A total 16 mineral prospect zones were demarcated out of which three zones from Lilam (73J/02) to Sankodih (73F/13) encompassing the Singhbhum Copper Belt were validated during FS 2021-22 using detailed geophysics, geochemical sampling and scout drilling. Mineralisation observed in the form of pyrite, chalcopyrite, bornite, arsenopyrite, sphalerite and covellite as stringers and fine dissemination in quartz chlorite schist, quartz chlorite sericite schist, silicious rock and chlorite schist. The mineralisation was in the form of stringers and dissemination mainly sheared controlled and hydrothermal in nature. Available results of BRS showed Cu in the ranged 1,114 ppm-40,514 ppm in 10 samples, 1,228 ppm-1,626 ppm Ni in two samples and 0.10 ppm-0.23 ppm Au in Semulbera and Rangamatiya blocks. In core samples of Semulbera, gold value ranged from 0.10 ppm-1.28 ppm in 35 samples; and Cu from 1,011 ppm-4,079 ppm in 21 samples. EPMA studies of core samples confirmed the presence of sulphide and oxide phases as chalcopyrite, chalcosite, sphalerite, arsenopyrite, pyrite, molybdenite, uraninite etc.
Haryana & Rajasthan	Base metal potential areas in parts of North Delhi fold belt	-	-	-	-	Mapping, Drilling, Sampling	The Regional Mineral Targeting (RMT) project was carried out to identify the potential unexplored/concealed areas for base metal mineralisation with predictive theoretical exploration models using GIS techniques. Based on the moderate to high chargeability, encouraging Cu value and final prospectivity map, three scout boreholes were drilled in Ghatesar (HMGBH-1), Raghunathpura (HMRBH-1) and Akoda (HMABH-1) areas, Mahendargarh District, Haryana. HMGBH-1 was drilled to a total depth of 440.85 m, HMRBH-1 292 m and HMABH-1 134.45 m respectively. Analytical results of core samples of HMGBH-1 showed the highest Cu value of 551 ppm with a mean of 115.01 ppm, Zn 1,359 ppm with a mean of 149.65 ppm, Pb 78 ppm with a mean of 19 ppm, V 847 ppm with a mean of 213 ppm, La 141.10 ppm with a mean of 73.60 ppm and Ce 1,629 ppm with a mean of 167.31 ppm. In HMRBH-1, the highest Cu value was 1,445 ppm with a mean of 189.6 ppm and Zn was 187 ppm with a mean of 72.58 ppm. A ground geophysical survey was carried out comprising a total of 60 L Km of SP, IP and Resistivity in Khoondroth Block and Baner Block. Surface, as well as sub-surface samples, showed scattered higher values of base metals and REE.
Karnataka, Eastern Dharwar Craton, Raichur Yadgir & Gulbarga districts	Hutti-Maski, Raichur-Deodurg, Gurgunta Schist Belts	-	-	-	-	Mapping. Drilling, Sampling	The Regional Mineral Targeting (RMT) around Raichur-Deodurg and Hutti-Maski Schist Belts was extended to the FS 2021-22 with scout drilling and data integration of two additional toposheets 56D/07 and 56D/08. A total of 1,495 m drilling were carried out in 07 different blocks, such as, Tintani, Hebbal Buzurg, Gonawatla, Mincheri, Gaudur, Goldinni and Chikkahonnakuni. The first five blocks were associated with breccia hosted copper and the other two were orogenic gold mineralisation. Traverse mapping was carried out for 100 lkm in different blocks, namely, Nilogal, Kodekal and Balshettihal to understand the nature and controls of mineralisation. The analysis of core samples from first Borehole KYT-01 reported an average Cu value of 0.22% over 17.8 m (from 109 to 126.8). The second Borehole KYT-02 located 550 m west of KYT-01 comprised three zones with average copper values 0.2% Cu over

							2 m, 0.16%/4.5 m (147 to 151.5m) and 0.17%/4.4 m (151.5 to 155.9 m). The scout borehole drilled at Hebbal which intersected lean mineralised zones was having fractured filled Py+Cpy. The analytical results showed a 2 m wide zone with average Cu of 0.17%. Boreholes drilled at Mincheri and Gonawatla intersected the brecciated silicified reef showing chlorite alteration in patches and pyrite disseminations. The scout borehole drilled at Gaudur intersected nine sulphidic zones characterised by pyrite-pyrhotite-chalcopyrite association. The borehole at Chikkahonnakuni intersected nearly 20 m wide brecciated meta-andesite and quartz breccia showing quartz-chlorite-tourmaline alteration and fracture filled Py+Cpy. Though the analysis of core samples did not report Au values, a 5m zone of Cu mineralisation with average of 0.2% was reported. Similarly, borehole at Goldinni intersected three sheared tourmaline-bearing pegmatite showing gold values 0.3g/t/2.5 m (23.5- 26 m). The sheared amphibolite at 166 m reported 1.2g/t Au over 0.5 m. The traverse mapping carried out around Balshettihal brought out a 250 m highly oxidised breccia zone with intense malachite staining and haematite alteration. It was found that the breccia was 6-7 km long and formed the western extension of Tintani breccia. The trenches excavated at south of Buddini exposed highly altered smoky quartz veins with Fe alteration and boxwork which reported gold values up to 1.27 ppm.
Karnataka, Eastern Dharwar Craton	Hungund Kushtagi schist belt	-	-	-	-	Drilling, Sampling	Based on the Geophysical survey and analytical data received, scout boreholes were drilled to test the mineralisation in the area. The chemical analysis of core samples of KKA-1 (Amrapur old working) showed high Au values for a length of 12 m with an average grade of 1.9 g/t. The Au mineralisation was mainly present in quartz-carbonate veins within felsic volcanics. The major sulphides were pyrite and pyrrhotite. The major alterations were chlorite and carbonate alteration. In Gadi Sunkapur area, high BRS values for gold was reported for the first time from a barite quarry. The high gold values (114 ppm, 17.4 ppm, 12.06 ppm, 1.58 ppm and 1 ppm) were reported from a quartz chlorite barite vein at Gadi Sunkapur barite quarry. Major alterations were carbonate, chlorite, haematite and biotite-chlorite- garnet alteration. One scout Borehole KRM-1 was drilled at Malatgud to test for Mo-Cu mineralisation exposed in a granite quarry. This borehole was drilled up to 199.60 m, and intersected medium-grained grey and pink granite with biotite, chlorite and haematite alterations. Mo mineralisation was observed from 90 to 118 m in the form of disseminations. Two other scout Boreholes KKN-1 and KKK-1 drilled in Naranhal and Kalmalli to test for Au-mineralisation intersected sulphide-bearing zones. The results of these scout boreholes were not encouraging. Another scout Borehole KKM-1 in Mudalgundi was to continue at Mudalgundi to test for Au-mineralisation. Spin-off proposals from RMT area will be prepared after receiving the analytical results of all the boreholes.
North-western Rajasthan, Barmer and Jodhpur districts	Malani Igneous Suite	-	-	-	-	Sampling	The main objective of this work was to identify the mineral system and delineate the areas for G-4 investigations for REE & RM and base metal mineralization in Malani Igneous Suite. The total area of RMT-II block was 3,500 sq. km. The geology of the area was marked by two different phases of volcanic episodes, sedimentary rocks and quaternary sediments. Two phases of igneous activities i.e.,, the Malani Igneous Suite (MIS) of Neoproterozoic Age (Ca. 750 ma) and Sarnu-Dandali Alkali complex of Upper Cretaceous to Eocene Age may be fertile for REE and RM mineralisation. In pursuance of envisaged targets during F.S 2021-22, rock, regolith and water sampling was carried out along ground geophysical survey (gravity and magnetic) of 276.5 L km survey at 100 m station interval and 300 m line spacing in selected five sub-blocks, to establish the ground control of buried ring structures and favourable host rock/structures for mineralisation. The maximum ΣREE+Y value analysed in rock samples was up to 0.41%. The ground water samples analysed maximum values of La (5.46 ppb), Ce (6.59 ppb) and Y (0.50 ppb), which was higher than that of samples from Siwana area. The EPMA analysis revealed the presence of parisite, thorite, monazite, allanite, britholite and rare-earth elements bearing ilmenite in porphyritic rhyolite. On the basis of geochemical and geophysical signatures, five sub-blocks (Shergarh-Tena, Nausar, Khatu, Gida and Chilanadi) were delineated for further probing by scout drilling in FS 2022-23, to check the possibility of REE & RM mineralisation in the block.

Northern Rajasthan, Sikar, Nagaur, Ajmer and Jaipur districts	Khandela-Kishangarh sectors	-	-	10	-	Drilling	Mineral Targeting (Phase -II) was carried out for basemetal and associated precious metals in the area in Northern Rajasthan with an objective to identify the mineral system and to extract information regarding sub-surface host lithology, possible mineralisation to generate new G3 block/blocks for future exploration. On the basis of surface evidences of mineralisation, analytical data, five areas/blocks were narrowed down for detailed ground geophysical surveys (magnetic survey, self-potential survey, induced polarisation survey and apparent resistivity survey). On the basis of this survey, boreholes were planned to delineate the sub-surface continuity of the mineralisation of the potential blocks. The borehole in Ladera block was drilled and intersected 115 m of cumulative sulphide zones along the borehole. In Harmara West Block, three scout boreholes were drilled and all the three boreholes intersected sulphide zones comprised of pyrite and chalcopyrite. Two scout boreholes were drilled in Kesharpura Block. The first borehole intersected ~160m of cumulative sulphide zones along BH associated with pyrrhotite, sphalerite, chalcopyrite, pyrite. In Kayad North Block, three scout boreholes were drilled and these intersected sulphide mineralisation in the form of sphalerite, pyrrhotite, and disseminations of pyrite and chalcopyrite. One scout borehole was drilled in Kesharpura West block which intersected 20m cumulative sulphides zones associated with disseminations of pyrite, pyrrhotite and chalcopyrite.
Gemstone							
Jammu & Kashmir Kishtwar District	West of Machail area	1:12,500	51 sq. km	-	-	Mapping, Sampling	During the period of investigation a total of 80 bedrock samples, 15 PCS, 30 heavy mineral samples, 30 stream sediment/ colluvial samples and 20 PT samples were collected (G4) to evaluate the potentiality of gemstone and REE in the study area. On the basis of field observations, the existing six mines (M1-M6) along south portal and one mine (M7) on the north portal of the Neelam Khan area is recommended to restore for further mining with proper Mine Plan involving Mining Engineer, Blasting Expert, Rock Mechanical Engineer and Geologist to avoid any subsidence or mishap during mining. The detailed geological mapping (DM) on 1:500/ 1:1000 scale of Neelam Khan area would be carried out to delineate the zone of resource- bearing pegmatite veins. It was also recommended to carryout grid pattern sampling of the scree/ stream sediments/ glacier moraine deposits in the SW slope/ area of the Neelam Khan along with bulk samples to establish concentration and distribution of placer gemstone deposit in the area.
Gold							
Jharkhand Seraikela-Kharsawan & West Bengal Purulia	Berasi-Hurrupat hardih area & Matkangara area	-	-	-	-	Sampling	During reconnaissance survey (G4) for gold and associated minerals, it was observed that the area was occupied by different varieties of acidic volcanic rock along with different other lithologies like granite gneiss, mica schist, amphibolite, ferruginous cherty quartzite, cherty quartz reef, black shale, younger sheared granitic intrusive, gabbro/ultramafic rock, and quartz veins. In terms of Au mineralisation, visible gold grains were observed in pan concentrate of stream sediments samples near Jugilang, Muru and in slopes of cherty quartz reef. Six samples showed positive anomalous values ranging 60 ppb to 300 ppb. Two samples showed anomalous value of 180 ppb and 300 ppb in cherty quartz reef extending from Suraidih to Sindurpur. Native gold grains were observed in the cherty variant in EPMA studies. Au value in the order of 250-300 ppb was also obtained in trace element analyses of pyrites from the cherty quartz reef. Around 230 ppb gold has also been noted within galena structure during EPMA studies in Matkangara area. In ferruginised cherty quartzite near Matkangara Cu up to 730 ppm, Pb up to 5.45%, Zn up to 2,552 ppm were recorded. In stream sediment sample, gold values upto 310ppb was noted. In ferruginized cherty quartzite nearMatkangara Cu upto 730 ppm, Pb upto 5.45%, Znupto 2552 ppm was recorded.
Odisha, Keonjhar	Gopur block area	1:1000	1.5 sq. km.	9	1563.15	Mapping, Sampling, Drilling	During the G3 stage investigation, Gold mineralisation in the IOG was seen associated with zone of intense silicification and hydrothermal alteration within the metabasalt. The NNE-SSW trending central lode was probed with 9 boreholes with 100 m spacing. Among which sulphide mineralisation zone was encountered in eight boreholes. In the southern part, there was another lode, where four first-level boreholes and one second level borehole OKG-16 were drilled with 100 m spacing. Among which sulphide mineralisation zone was encountered in three boreholes. The sulphide mineralisation, such as, pyrite,

							arsenopyrite, very few chalcopyrite and gold (observed from ore petrography study) were observed within metabasalt with quartz, epidote and carbonate veins. The sulphide mineralisation was observed along the foliation planes and in association with quartz and epidote veins.
UT Jammu & Kashmir, Kupwara	Lashteal, Mandma sou and Gagarnar area, Lolab valley	1:12,500	50 sq. km	-	-	Mapping, Sampling	Large scale mapping (LSM) was carried for gold and associated mineralization in Lashteal, Madmadou and Gagarnar areas in Lolab valley of Kupwara district, UT: J&K. The Cu concentration (G4) in 100 of BRS samples varied from 5.09 ppm to 3,256 ppm (Avg. 166.77 ppm), whereas in 50 channel samples it varied from 9.00 ppm to 11659.0 (1392.49 ppm).
Uttar Pradesh, Sonbhadra	Hasra-Raigarh-Kurkuti area	1:12,500	105 sq. km	-	-	Mapping, Sampling	The mapped (G4) area was covered by rocks of Parsoi Formation and Agori Formation of Mahakoshal Group. Au values above 0.05 ppm obtained in seven bedrock samples and varied from 0.05 to 0.21 ppm. Cu value ranged from 5 ppm to 67 ppm, Pb varied from 20 ppm to 206 ppm, Zn varied from 5 ppm to 124 ppm and Co varied from 39 ppm to 29.7 ppm. Au concentration in 50 channel and 50 trench samples obtained values below 0.05 ppm.
Andhra Pradesh, Kadapa district	Bhagampalle-Kasinag aram area	-	-	-	-	Mapping, Sampling	The gold mineralisation (G4) was seen associated with sheared and silicified syenogranite to highly stretched, fine-grained with prominent grain size reduction. The chemical analysis yielded 158- 5,500 ppb Au in sheared monozogranite 40.37 ppm As, 59.6 ppm Mo, 950-3446 ppm Ba, 26-33 ppb Au in syenogranite. Most of the quartz veins were barren and unstained. Among them, one ~10m wide ferruginised vuggy quartz vein with pockets of oxidised sulphide minerals and little malachite staining extending for approximately 1 km was recognised. Analysis showed 84.7- 1,089 ppm As, 105-188 ppb Au, 902-12,167 ppm Cu. Specks of REE-phases like xenotime, allanite, zircon were observed during petrographic and SEM studies with a very low ~200 ppm REE value.
Andhra Pradesh, Anantapur district	Varaddayakonda -Krisnagiri - Akkampale area	-	-	-	-	Mapping, Sampling, Pitting, Trenching	The quartz carbonate veins within quartz chlorite schist form the main zone of mineralisation (G4). Visible specks of pyrite, chalcopyrite and in rare cases, gold were observed within this zone. Most of the sample's showed <25 ppb gold and a few samples showed 40-120 ppb. The BIF (banded magnetite quartzite) bands gave up to 39% FeOt, but the width of the band was very less. The pitting/trenching and soil/stream sediment samples showed <25 ppb value for gold for all the samples.
Chhattisgarh, Jashpur	Pharsabahar - Tuba area	1:12,500	100 sq. km	-	-	Mapping, Sampling, Pitting, Trenching	During the period of investigation (G4), 50 cu m pitting, trenching and sampling were carried out in the potential areas along with the collection of 50 stream sediment samples and 100 bedrock samples respectively. Geologically, the area of investigation was composed of rocks of Chotanagpur Gneissic Complex that falls within Bilaspur-Raigarh-Sarguja belt consisting of granodiorite-gneiss, meta gabbro and amphibolite with its variants. These rocks were seen traversed by 3 generation of quartz veins of varying dimension. The second-generation quartz veins were generally mineralised with gold values. Pyrite, arsenopyrite, galena, azurite, chalcopyrite was often seen associated with this quartz vein. Five blocks identified were Tuba block, Mankarkunda block, Bangaon block, Northern most Pandripani block and Barkaspali block. Highest value for gold in PT/BRS/46 was 36.68 ppm collected from Tuba Village from intense ferruginised quartz venations within granodiorite; in association with Pb 0.23%, As 68.12 ppm and Hg 13 ppb.
Chhattisgarh Badoda bazar and Bhilaigarh	Saliha-parsapali areas	1:12,500	100 sq. km	-	-	Mapping, Sampling, Pitting, Trenching	During the G4 stage investigation petrochemical samples (PCS), 20 of petrographic samples (PS), 100 of bedrock samples (BRS) were collected (G4). About 100 cu. m pitting/trenching was carried out along with collection of 100 of pitting/trenching samples (PTS) (G4). In addition to these, 50 of stream sediment samples were collected from mostly first order streams (rarely from second order) and submitted for analysis. The area was observed to be represented by volcano-sedimentary sequence belonging to Sonakhan Group, basic and acid igneous suite belonging to Bilari Group and younger intrusive granitoids and basic dykes. Silt size gold grains were recovered during the panning of the stream sediments. Visible specks of sulphide (mostly pyrite) were recorded at the contact zones within metabasalt, metagabbro and metarhyolite. The highest value for gold (Au-3.64 ppm) was obtained from BRS-85 collected from intense ferruginised quartz venations within metarhyolite of Barkachhar area. The BRS-90 with Au of 0.26 ppm & BRS-92 with Au value of 0.25 ppm were recorded from soil samples of

							silicified metarhyolite collected to the south of Dhourabhata area and BRS-96 with Au value of 0.41 ppm was obtained from ferruginous chert to the SW of Village Pachperiya.
Karnataka, Haveri	Sidlapur Block, Singgaon Taluk	1:1000	2 sq. km.	8	671.20 m	Mapping, Sampling, Pitting, Trenching	During the period of investigation (G3), 186 cu. m trenching and 671.20 m of drilling were carried out. Apart from this, a Geophysical Survey (G3) involving IP, Resistivity and Magnetic method of 42.5 l km was also carried out. The mapping has brought out presence of two major and three minor banded ferruginous quartzite (BFQ) units within a meta-greywacke/ argillite. The general trend of the bedding (S0) were N10°W to S10°E dipping gently towards east. Mesoscopic folds of S-asymmetric nature were observed at many places with 10º to 35º plunge towards north. The bands were characterised by intense limonitisation, silicification, ferruginisation and sericitisation and often noticed with disseminated cubic pyrites and stringers of sulphides. The Total Field Magnetic anomaly contour map showed high intensity Magnetic signatures along two prominent trends, one was NNW to SSE to NS trending local geological trend. The detailed magnetic survey, IP and Resistivity survey by gradient array has revealed one prominent anomalous zone in the central part of the study area with a strike length of 2 km with depth varing from 10-20 m. Majority of the boreholes intersected silicified zone characterised with intense carbonitisation along with presence of pyrites in the form of lamination, chunks, smears, stringers and disseminations. This zone was also demarcated with magnetite laminations in rhythmic fashion and some borehole intersected BFQ also. While the silicified zone ranged in thickness from 2.05 to 6.45 m, portion with magnetite layering varied in thickness from 0.1 to 2.14 m. Sympathetic zone (Zone-II) marked with carbonitisation in the form of secondary veins and veinlets were marked in for about 300 m in KHSB-1 & 2 in the northern segment. The analytical results received till date revealed that the Borehole no. KHSB-1 showed 0.417 g/t/0.5m for Zone-I. The Zone-II in KHSB-1 showed the average Au value of 0.030g/t/0.5m. The Zone-I of Borehole no. KHSB-2 showed auriferous lode averaging 2.8 g/t/2m whereas Zone-II showed only 0.037g/t/0.5m. The corresponding trench i.e., STR-4 in the same profile line showed indication of Au value of 0.83g/t/1m. KHSB-3 showed 0.628 g/t/0.5m and KHSB-5 showed average assay value of 0.75g/t/0.5m.
Karnataka, Chikamaglur and Davangere	Hanni, Bukkumbudi, and adjoining areaS	-	-	-	-	Sampling	The area falls within the eastern margin of the Shimoga Schist Belt in western Dharwar craton (G4). The area comprised metavolcano- sedimentary suite of rocks unconformably lying over the basement granitic gneiss of the Peninsular Gneissic Complex (PGC). The volcano-sedimentary rocks were represented by basal conglomerate, quartzite, quartz-chlorite carbonate schist, quartz sericite schist belonging to Chitradurga Group. During the geological traverse the different lithologies observed were, Granite gneiss, Titaniferous- vanadiferous magnetite (TVM) bands, Meta- pyroxenite, Talc tremolite actinolite schist, Tremolite actinolite schist, Conglomerate, Quartz- Chlorite schist, Quartzite, Quartz sericite schist, Anorthositic gabbro, Serpentinite, gabbro and dolerite dykes. Based on the surface manifestation of magnetite, sulphide mineralisation and surface alteration fifteen feeble narrow anomalous zones were identified. The chemical analysis for Au received for 125 samples showed five samples that analysed>100 ppb (Au) ranging from 25 to 435 ppb in conglomerate, Meta pyroxenite and TVM rocks. The base metal analytical results received for 89 samples ahowed Cu in bedrock samples yielding a maximum of 1,655 ppm average 0.1% @ 3m in quartz-chlorite schist rock. Mn values ranged from 90 to 6,100 ppm and nine samples analysed >24% for Fe in TVM bands.
Kerala, Palakkad and Malappuram	Mulliakurss - Vattathur	1:12500	100 sq. km	-	-	Mapping, Sampling	During G4 stage investigations, 108 bedrock samples, 50 trench samples, 25 regolith samples and 50 stream sediment samples, 13 petrochemical samples, 5 XRD samples and 5EPMA samples were collected. The area exposed rocks viz. banded magnetite quartzite, pyroxene granulite, amphibolte and metapyroxenite of Wayanad Group, charnockite of Charnockite Group andbiotite gneiss and granite gneiss of Peninsular Gneissic Complex. Indications of mineralisation in the form of pyrite disseminations, chalcopyrite, pyrrhotite and bornite were observed in quartz veins, gneisses and banded magnetite quartzite. Intense limmonitisation and silicification of BMQ also acted as surface indications of mineralisation. About 23 old workings in the form of inclines, shafts and narrow trenches were observed near Maruthumppara,

							Vettathur, Nattukal, Thazhekkod and Telakkad in BMQ bands and associated laterites and the excavations followed the trend of BMQ bands. About 2 to 9 m wide and 10 to 40 m long NW-SE trending three leached zones were mapped around Pattikkad, Ponniyamkurussi, Vettathur and Mulliakurussi areas within charnockite and gneisses. In this leached/limonitic zone fresh pyrite, chalcopyrite was noticed and sensed smell of sulphur from this zone. These also were indications to show the evidence of mineralisation. Available analytical results showed Au values in bedrock samples as below detection level, i.e., <0.05ppm and that in stream sediments (2 nos.) analysed 0.2 ppm.
Tamil Nadu, Tiruvannamalai	Chengam - Uchimalaikuppam	1:12500	100 sq. km	-	-	Mapping, Sampling	As part of G4 stage investigation, reconnaissance survey was carried out in Chengam and Uchimalaikuppam areas to delineate potential zones for gold and associated mineralisation; collection of bedrock, groove as well as stream sediment samples were also carried out. LSM brought out seven lithologies in the investigated area. They were charnockite, pyroxene granulite, banded magnetite quartzite (BMQ), granite gneiss, quartzo-feldspathic rock, dolerite dyke and milky white quartz vein. Ore microscopic study revealed that the sulphide phases like chalcopyrite and pyrite occurred as disseminations in association with oxides and silicates. Sulphides also occurred along the fracture planes of garnet grains. The oxide phases include magnetite, haematite and ilmenite. Magnetite crystal retained its idiomorphic form but totally replaced by haematite giving rise to martitisation texture. About 50 samples were collected from higher to lower order streams covering the whole investigated area to delineate source of gold. Out of 50, 42 stream sediment samples were collected from 2nd/3rd order stream which were cutting across the BMQ bands. Out of 50, 9 stream samples yielded gold specks along with heavies during panning. The gold grains showed spherical, elliptical, dumble and ameboid shape and size varied from 252.17 µm to 1,610.65 µm. However, analytical results of 50 stream sediment did not yield any gold value. About 100 BRS were collected from BMQ and associated litho-units. Out of 40 BRS, 3 samples showed Au values ranging from 48 ppb to 102 ppb. Maximum values of Arsenic (As), Bismuth (Bi), Molybdenum (Mo) and Tungsten (W) were 14.74 ppm, 0.18 ppm, 44.45 ppm and 11.53 ppm respectively. Out of 10 prioritised samples collected from silicified BMQ, 2 samples showed Au value ranging from 0.08 ppm to 0.18 ppm. Cu values varied from 130 ppm to 1,160 ppm. Cobalt (Co) values varied from 30 ppm to 100 ppm, nickel (Ni) values varied from 40 ppm to 390 ppm and FeO (%) was analysed up to 31.38% in silicified BMQ. Out of 100 groove samples, 7 samples showed gold values varying from 26 ppb to 340 ppb. These 7 groove samples were collected from silicified and gossanised BMQ bands in the south western part of Uchimalaikuppam RF and northeast of Pudur.
Rajasthan, Udaipur District	Rathri-Harmatiya Khurd	1:12500	50 sq. km	-	-	Mapping, Sampling	The main objective of this work was to assess the nature and potentiality of gold and base metal mineralization. Geologically, the study area exposes the rocks of Mangalwar complex and Aravalli Supergroup. Different rock types observed during mapping (G4) included granite gneiss of Mangalwar complex and the rocks belonged to Aravalli Supergroup and comprised dolomitic marble, garnet-biotite-schist, calc-silicate, amphibolite, metavolcanics intruded by quartzo-feldspathic veins. Evidences of mineralisation in the area occurred in the form of small old workings/ pits, gossanisation, ferruginisation, malachite staining, silicification, dissemination of pyrite grains.
Rajasthan, Udaipur and Dungarpur	Bara Talav-Jharap- Bori	1:12500	50 sq. km	-	-	Mapping, Sampling, Trenching	Geologically, study area is occupied by the rocks of Mangalwar complex of Archaean age and Aravalli Supergroup of paleo-proterozoic age. Mangalwar complex is represented by the banded biotite granite gneiss. The banded biotite granite was observed as gneiss medium to coarse grains, dark greyish to white gray in colour (G4). The banding in the gneisses was marked by dark bands rich in ferromagnesian minerals mainly biotite and light-coloured band rich in quartzo-felspathic material. During mapping (G4), a gossan zone was also identified. It was seen associated near to the contact of dolomitic marble and garnetiferous mica schist around Bara-Talav area. The dimension of the zone was approximately 400 m length and 40-50 m in thickness. During the course of mapping, 50 cu. m trenching work was carried out through 6 trenches.

Rajasthan, Udaipur District	Devgaon Block	1:2000	1.5 sq. km	-	-	Mapping, Sampling	The area (G3) of 1.5 sq. Km falls in parts of the toposheet no. 45L/04. As per the objective, 200 samples were to be collected for surface sampling and 1,000 m drilling was to be completed. The lithounits exposed in the area belong to of Banswara Formation of Udaipur Group of AravalliSupergroup. The main lithounits were quartz biotite schist, metabasics and para-gneiss. Pegmatites, dolerite dykes and quartz veins occurred as intrusive. Gossan/ ferruginisation were developed within meta-basic and pegmatite lithounits. The surface evidences of mineralisation were seen in the form of malachite/ azurite stains, presence of ferruginous zones, gossan outcrops and fresh sulphide within gossan and hydrothermal alteration. On the basis of surface evidences of mineralisation and geochemical analytical results and detailed geological mapping, a surface mineralisation zone was delineated. This zone was mostly confined within metabasic and pegmatite rock. The dimensions of this zone were 800-900 m in length and 20-100 m in width. The results of most of the surface samples showed appreciable gold and copper mineralisation.
Rajasthan, Banswara	Ghatiyana Block	-	-	11	1249.00 m	Mapping, Sampling, Trenching, Drilling	The main lithounits were phyllite, quartz albite epidote rock, and impure marble and quartz veins. Phyllite was the most dominant lithounits having well-developed foliation. Central part of the area was occupied by thin impure marble bands and quartz albite epidote rock. The surface mineralisation in the area was manifested by malachite / azurite stain, hydrothermal alterations, gossans, ore grinding implements and presence of fresh sulphides like pyrite, pyrrhotite, chalcopyrite and bornite. Based on the detailed geological mapping (G3) and channel sampling at a regular interval of nearly 100 m along strike, trench sampling and bedrock sampling, one surface mineralisation zone (MZ-I) was delineated having dimension of nearly 1.3 km strike length and 6-10 m width. A total of thirteen channels of the various lengths were laid along the strike and a total of 161 channel samples, 31 trench samples and 50 bedrock samples were also collected. Channels showed encouraging value of copper. Chemical result of channels showed copper (Cu) in the ranged of 170 ppm to 2.00 % with an average value of 0.23 %, while gold (Au) varied from <0.05 ppm to 0.23 ppm with an average of 0.07 ppm. All boreholes intersected significant sulphide mineralisation in the form of chalcopyrite, bornite, and covellite (VE = 1% to 2%). A few native copper grains were also present in core samples.
Rajasthan, Sirohi District & Gujarat, Sabarkantha District	Shemlabhuj and Bahara area	1:12500	50 sq. km	-	-	Mapping, Sampling	As part of G4 stage investigation, total 100 bedrock samples/channel samples, 30 stream/soil samples, 20 samples for petrological study, 10 samples for ore microscopy study and 50 PTS samples were collected. In one dyke of gabbro, cumulates of mafic minerals were observed which may be potential in terms of PGE mineralisation. A well-developed Gossan of dimension 200 X 50m was observed over granite gneiss near Village Shemlabhuj showing pyrite and chalcopyrite at places. In western part of the block-brecciated quartz vein was observed in granite gneiss having pyrite and chalcopyrite at places.
Graphite							
Chhattisgarh, Balrampur	Oranga-Revatipur	1:4000	3.6 sq km	16	1392 m	Mapping, Sampling, Trenching, Drilling	A G3 stage investigation was carried out for graphite in Oranga-Revatipur area. Area mainly comprises of meta-sedimentary sequences of the Older Metamorphic Group and consist quartzite, quartz mica schist, graphite mica schist, calc silicate and amphibolite. A total of 59.2 cu. m of trenching was carried out and 55 trench/pit samples were analysed for fixed carbon analysis. A total of 10 petrochemical samples (PCS) and 20 petrological samples (PS) were analysed. A total of 16 first-level boreholes were drilled with 200 m spacing in the block area. A total of 1,392 m was drilled in first-level boreholes and 487 core samples were generated during Field Season 2020-21 & 2021-22 of G-3 stage mineral investigation. In borehole graphite mica schist was found to have varying thickness from 1 m to 60 m and was intercalated with quartz mica schist and calc silicates. Analytical result of drilled core samples reveals the fixed carbon content which was found ranging from 4.47% to 10.33%.
Madhya Pradesh, Jhabua District and Gujarat, Dahod District	Patra-Guvali-Satsera-Gopalpura area	1:12500	-	-	-	Mapping, Sampling, Pitting/ Trenching	Based on limited exposures and pitting / trenching in soil cover area, the graphite hosting carbonaceous phyllite body was traced over a cumulative strike length of 1.29 km from south of Village Patra to Village Dhebar. The north Patra mineralised zone was 650 m and thickness varied from 10 m to 140 m. The overall strike direction of the Patra south band varied from N730W-

							S730E to N400W- S400E. Sample no. B045 with maximum values of 8.21% was from north Patra mineralised zone. Keeping the cut-off value of fixed carbon at 2%, 8 m wide and 150 m long mineralised zone was established in Trench CH-03 with average fixed carbon content of 2.09%. A total of 05 graphite samples were studied through Laser Raman Spectroscope. It was confirmed that the entire sample contained graphite. The analytical data for MnO, V and Ni of 25 samples out of 100 were received. Spot samples showed MnO values of 42.39% and 42.11% from Anas River block. The same samples also showed V results of 194 ppm and Ni results of 141ppm. The Mn ore was found to occur in association with smaller exposed quartzite bodies in and around Mandli and Rampura. The strike of the quartzite varied from N5°E to N40°E and the dips ranged from 20°-65° to the west. The ore was chiefly psilomelane and braunite with some pyrolusite.
Madhya Pradesh, Alirajpur & Jhabua	Badi Miriyavat-Juwari Bari-Semlaya area	1:12500	-	-	-	Mapping	The rocks exposed in the study area (G4) showed a general trend in NW-SE direction with moderate to steep dip towards SW. During the large-scale mapping, five discontinuous lensoidal graphite bands were identified trending NW-SE direction, in which two major graphite bands varied in length from 870 m to 1.1 km and width from 77 m to 330 m, were exposed from Juwari Bari in the south up to Jawas in the northwest. In addition to these, three comparatively smaller bands varied in length from 300 m to 500 m and width from 50 m to 90 m of carbon phyllite/graphite schist/grey carbonaceous marble were demarcated in the eastern part of the study area. The graphite mineralisation in the study area was mainly associated with carbonaceous marble and carbon phyllite. It mostly occurred along the foliation planes as thin layers, small patches, pockets and lumps within the carbon phyllite/graphite schist/grey carbonaceous marble. Carbon phyllite/graphite schist/grey carbonaceous marble was seen to occur as lensoidal bodies on the surface. The presence of graphite in the mineralisation zones were confirmed by the study of thin polished sections. The carbonaceous marble was mainly associated with the carbon phyllite/graphite schist and phyllite which was in contact with the quartzite of Aravalli Supergroup.
Madhya Pradesh, Sidhi	Bahera-Goriara block (G3 stage), Mahakoshal group	1:2000	1 sq. km.	8	-	Mapping, sampling, drilling	A total of 10 PCS, 10 trace elements, 50 channel/groove samples, 10 PS, 05 BRS and 05 EPMA/Ore microscopy samples were collected. A total of 08 boreholes in a series pattern were planned from Bahera to Village Goriara at a 200 m interval so to intersect mineralisation at a 30 m vertical depth. About 03 boreholes were supported by channel/groove sampling of graphitic-bearing lenses carried out during G4 stage of exploration and 50 channel/groove sampling were carried out in front of section line of remaining 05 boreholes for borehole planning. Along Borehole no. MPSBG-1, detailed geological and geophysical logging for 82.70 m was under taken. Graphitic carbonaceous phyllite was intersected from 19.50 m to 23.50 m and 56.80 m to 81.30 m, totaling to 24.80 m of mineralised zone (true width 21.50m) for which sampling was completed and samples were submitted on priority basis. The mineralisation intersected along the borehole suggested continuity of graphite-bearing lenses till 30m vertical depth and ~300 m RL. Also, abundant malachite grains/encrustation was encountered during logging which suggest base metal potentiality of the area.
Jharkhand, Palamu	Adhmaniya block	-	-	13	-	Drilling, sampling	The area (G3) exposed rocks of i) Unclassified Metamorphics, ii) Chhotanagpur Gneissic Complex, and iii) acid and basic intrusive that have intruded in different rock types. The host rocks for mineralization in the area are graphite-bearing sillimanite schist and granite gneiss. The graphite mineralization is in the form of lenticular bands disposed of in an enchelon pattern. Two graphite schist bands trending in WNW-ESE were delineated. The southern band was 700 m in length with a moderate dip southwesterly. The northern band was bifurcated into two branches having an approximate strike length of 200m and 650m dipping moderately towards the southwest. The ground geophysical survey (SP) of 29 LKM was carried out in this block. Two anomalous zones were delineated on the SP map. Zone-I in the southern part of the block was approx. 700 m in strike direction whereas Zone-II was swerving and branched into two parts. Graphite mineralisation was picked up well by SP anomaly. Out of the total 13 boreholes, boreholes JHPA-01, JHPA-02, JHPA-03 and JHPA-04, and JHPA-05 were drilled in the southern band of the area. Proximate analysis of 55 BRS and 63 core samples were received. Fixed carbon up to 25.23 % and vanadium up to 1,359 ppm were obtained from Bedrock samples

							(n=55). In Borehole JHPA-01 weighted average was of 9.57%, FC for 63 m sample length with a maximum FC up to 17.28%. In Borehole JHPA-02 weighted average was of 9% FC for 30 m sample length with a maximum FC up to 15.1%. In Borehole JHPA-11, three enriched zones of vanadium were intersected. Zone-I, Zone-II and Zone-III had weighted average of 887 ppm (17 m sample length), 833 ppm (27 m sample length), and 660 ppm (17 m sample length) respectively. In Borehole JHPA- 02, 28 m sample length with a weighted average of 906 ppm of vanadium while in Borehole JHPA-13 a zone of 18 m sample length with a weighted average of 645 ppm were intersected.
Jharkhand, Palamau (G3)	Karma block	-	-	-	872 m	Drilling, sampling	The two graphite mineralised zones with strike lengths of 600 m and 550 m were established with the support of geological, geochemical, and ground geophysical surveys. The SP survey was carried out and the data were processed and analysed to identify the possible zone of occurrences of graphite mineralised body and its strike continuity in soil-covered areas. The sub-surface persistence of mineralised zones was validated by putting nine boreholes at an interval of 200 m with total drilling of 872 m, and 402 core samples of one-meter length were generated. The analytical results so far received, were encouraging for bedrocks and core samples. The average fixed carbon for BRS and PTS was 14.56% and 7.16% respectively. The Borehole JHPK-01 intersected a lode of 49 m length along the borehole with a weighted average of 8.5% Fixed carbon (FC) and in JHPK-02 three mineralised zones were intersected with 14 m, 6 m, and 3 m length and weighted average of 7.48%, 5.18% and 4.81% FC respectively. In Borehole JHPK- 04, two lodes of 36 m and 4 m along the borehole with a weighted average of 5.64% and 4.26% FC respectively were intersected. Three lodes of 8 m, 20 m, and 15 m of graphite were intersected in Borehole JHPK-07 with 2.02%, 6.44% and 4.99% FC respectively. In Borehole JHPK-08, a lode of 8 m length along the borehole with a weighted average of 4.54 % FC was intersected.
Jharkhand Palamu (G3)	Siuri block	-	-	14	-	Drilling, Sampling	The study area (G3) comprises a different variant of granite gneiss and granitoids of Chhotanagpur Granite Gneissic Complex (CGGC) and metasediments of the Proterozoic age. Based on the detailed mapping, the surface indication of mineralization and the geophysical survey (Self-Potential method), two mineralized zones has been delineated in the mapped area. Mineralised Zone-I has an extension of 550 m along the N-S strike length and a width of 170 m. However, Mineralised Zone-I was seen bifurcated into two parts in the northern part, the western part was nine-meter thick while the eastern part was 20m in width. Mineralised Zone-II in the northern part of the block was with a strike length of 400 m and with varying width from 25 m in the north to ten metres in the south. Another mineralised band was mapped in the northern part of the Mineralised Zone-II which was about 120 m in strike length and with a width of 25 m across the strike. Graphite schist is the important host rock for graphite mineralisation. Graphite occurred along the foliation plane as isolated flat, plate-like grains with broken, irregular or angular edges. Besides this, sulphide mineralisation mainly pyrite was observed both as dissemination and stringers within the graphite schist and calc-silicate. A total of 14 inclined boreholes at an angle of 45° except one borehole at 60° were planned at 200 m intervals along the strike that intersect the mineralised body at approx. 30 m vertical depth. In Mineralised Zone-1 (NE part of the block), eight boreholes (JHPS-01, JHPS-02, JHPS-03, JHPS-04, JHPS-05, JHPS-08, JHPS-09 and JHPS-14) were drilled. The graphite mineralised zones intersected approx. 32 m thick in JHPS-01, 20 m in JHPS-02, 19 m in JHPS-03, 5 m in JHPS-04, 22 m in JHPS-05, 05m in JHPS-08 and 11 m in JHPS-09 along the boreholes. In Mineralised Zone-2, six boreholes were drilled (JHPS-06, JHPS-07, JHPS-10, JHPS-11, JHPS-12, and JHPS-13). The graphite-bearing schist was approx. 42 m in JHPS-07, 28 m in JHPS-10, 10 m in JHPS-11, 12 m in JHPS-12 and 15 m in JHPS-13 along the boreholes. The chemical analyses received to date showed that in bedrock samples, fixed carbon varied from 5.11% to 18.57% and V concentration varied from 183 to 2,501 ppm.
Jharkhand, Palamu And Latehar (G4)	Nawadih-Gurha area	-	-	-	-	Sampling	During the G4 stage investigation, a total of 15 bands of graphite in the form of linear continuous and discontinuous bodies were delineated. The strike length of the band varied from 332 m to 1.07 km and the width varied from 84 m to 375 m. The host rocks for graphite mineralisation in the area were granite gneiss,

							quartzite and granulite. The analytical result of 102 BRS and 100 PTS yielded 13.46% average fixed carbon. About 79 BRS yielded more than 10% FC. So far 61 BRS for Vanadium were analysed and these showed encouraging concentrations in the ranged of 73 to 4,859 ppm and the average was 782 ppm. Seventeen samples out of 61 yielded more than, 1000 ppm of Vanadium which was very close to the present cut-off value.
Odisha, Nayagarh	Daspalla Block, Tumandi Village	2.3	-	23	1733.5	Mapping, pitting, trenching, drilling	The ore body (graphite) is hosted within khondalite and migmatised khondalite and graphite occurs as disseminations. About 50 cubic metre of pitting and trenching work were completed. Five occurrences of graphite mineralisation, near Tumandi-Narajipara area were observed in the quarry and pond. All the quarry sections were aligned in N-S direction. Apart from that 33 BRS samples and 36 trench and pit samples were collected in the study area as well as in the periphery of the study area. All the 69 samples were showing high values of fixed carbon (FC%). The FC value varied from 3.6% to 21.56% in trench samples and 2.13% to 25.02% in BRS in the study area. As the graphite body was seen mostly concealed beneath the surface, 1st level boreholes were planned on the N-S aligned quarry sections based on results of trenches. Out of 23 boreholes drilled so far, 20 were 1st level boreholes and 03 were 2nd level boreholes. About 410 core samples were collected so far from 23 boreholes. As per the visual estimation of all the drilled boreholes, 26 m of graphite occurrences were delineated in borehole no. ODT-6 from 26.5 m to 52.5 m and as per the chemical analysis, three graphite zones were delineated having 3.47% FC from 28 m to 38.5 m depth, 3.13% of FC from 41 m to 46 m and 3.04% of FC from 47.5 m to 53.5 m depth. All the boreholes intersected graphite zones except borehole ODT-9 & ODT-14. The thickest graphite zone was delineated in Borehole no. ODT-22, i.e., 29.5 m graphite zone from 24.5 m to 54 m depth. As per the visual estimation of graphite zones in all the 20 1st level boreholes, geological profile lines of 8 boreholes i.e., ODT-5, 6, 7, 8, 15, 16, 17 & 22 were selected for 2nd level drilling.
Arunachal Pradesh, West Siang (G3)	Kalamati area	1:2000	1.5 sq. km	-	194.55 m	Mapping, drilling, sampling	In Kalamati block, spot BRS samples from carbonaceous phyllite showed vanadium values up to 4,639 ppm with Fixed Carbon up to 8.6 %, channel samples showed vanadium values in the ranged from 106 to 1,282 ppm, Zn values up to 3,017 ppm and Ni up to 788 ppm. Trench samples showed vanadium values from 582 to 1,285 ppm with average of 912.3 ppm and Zn values from samples of one trench yielded from 409 to 1,904 ppm with average of 804.7 ppm. In fulfilling the objective, the carbonaceous band in Kalamati block was targeted by incline Borehole no. ARWSK- 01. Drilling in this borehole was done up to 194.55 m and the major lithologies intersected in the borehole were grey phyllite and quartzite. Only a thin band of carbonaceous phyllite mixed with grey phyllite was intersected from 147.0 m to 149.0 m.
Arunachal Pradesh, Lower Subansiri (G3)	Radhpu block	1:2000	1.5 sq. km.	10	1279.55 m	Mapping, sampling, drilling	A G3 stage of preliminary exploration for Graphite and Vanadium was taken up in Radhpu Block in Lower Subansiri District of Arunachal Pradesh. Surface sampling have yielded Vanadium values ranging from 525-2,189 ppm & Fixed Carbon ranging from 6.30% to 13.69%. Five boreholes were drilled on Band I and five on Band II with more or less 200 m spacing. The total drilling completed in both the bands was 1,279.55 m and a total of 498 core sample were generated from the mineralised zone intersected from all the boreholes. Band I intersected at first-level (30 m vertical intersection) in BH1 (True width of 20 m with wt. avg. value of 4,762 ppm V_2O_5 and 11.24% FC), BH3 (True width of 18.91 m with wt. avg. value of 4,069 ppm V_2O_5 and 11.47% FC), BH4 (True width of 59.8 m with wt. avg. value of 4,762 ppm V_2O_5, 11.24% FC), BH6 (True width of 40 m with wt. avg. value of 1,861 ppm V_2O_5, 11.45% FC), BH7 (True width of 25 m with wt. avg. value of 2,583 ppm V_2O_5, 10.58% FC) and intersected at deeper level (140 m vertical intersect) in BH8 (True width of 51.1 m with wt. avg. value of 1,828 ppm V_2O_5, 9.7% FC). Band II was intersected at first-level (30 m vertical intersection) in BH2 (True width of 6.23 m with wt. avg. value of 2,626 ppm V_2O_5, 15.23% FC), BH5 (True width of 7 m with wt. avg. value of 1,197 ppm V_2O_5, 5.17% FC), BH8 (True width of 9 m with wt. avg. value of 333 ppm V_2O_5, 18.03% FC), BH9 (True width of 12 m with wt. avg. value of 552 ppm V_2O_5, 6.31%FC) and BH10 (True width of 23 m with wt. avg. value of 431 ppm V_2O_5, 5.8% FC).

Andhra Pradesh East Godavari	Burugubanda	-	-	7	1171.5 m	Drilling	The investigation was taken up with an objective to delineate the graphite mineralisation zone and to assess the resource for graphite and associated elements in G2 stage. In G2 investigation, the first Borehole AEB-1 intersected graphite mineralised zone from 168.00 m to 178.00 m with total 10 m of apparent thickness with visual estimation of 7- 10% FC. The In Borehole AEB-5, the graphite zone intersected from 132.00 m to 137.30 m with visual estimation of 7-10% FC. In Borehole AEB-2, the graphite zone intersected from 152.39 m to 155.70 m with visual estimation of 8-10% FC. In Borehole AEB-1A, the graphite zone intersected from 97.00 m to 100.00 m. In Borehole AEB-4, the graphite zone was intersected from 175.00 m to 180.00 m with visual estimation of 7-10% FC. In Borehole AEB-6, one thin graphite zone was intersected from 18.75 m to 20.50 m with visual estimation of 1-2% FC and another zone at 1,11.25 m to 114.00 m with visual estimation of 5- 10% FC. The graphite mineralised zone was observed associated with quartzo-feldspathic pegmatite and garnet-bearing pegmatite. The graphite was fine-grained and flaky type in nature. The borehole geophysical logging of 586 m was completed. As per analytical result received for AEB-5 boreholes, the ranged of max. value observed were 1.40 % to 21.59 % FC & and in case of tungsten in 6.23 ppm to 142.49 ppm. The drilling is under progress—the depth continuity and the exact lateral extension of the mineralised zone in the area are yet to be confirmed.
Tamil Nadu, Sivaganga (G4)	Eastern part of Sivaganga Graphite Belt	1:12500	100 sq. km	-	-	Mapping	The general trend of the rock type noticed in the study area was N80°E-S80°W with dipping towards south direction but in some of the trenches it was found dipping towards northernly directions. Based on LSM mapping, graphite mineralisation associated with epidotised quartzo- feldspathic rock and carbonate vein was reported in north of Village Ulaganathapuram. The strike continuity extends 500 m long and trended till in WSW- ENE direction. Flake nature of graphite mineralisation was seen concentrated in sheared portion of host rock. Analytical results of 142 trench samples collected from 7 graphite occurring trenches indicated that the FC varied from 0.01 % to 31.63 %, VM varied from 2.03 % to 28.03 %, Moisture varied from 0.07 to 4.82 % and Ash varied from 60.88 to 92.61 %. However, 34 trench samples showed >20 % FC, 66 trench samples showing >10 and 5 and <10 % FC value.
Gypsum							
Himachal Pradesh, Lahaul and Spiti	Giu and Hurling	1:12500	25 sq. km	-	-	Mapping, sampling	Preliminary exploration (G3) was carried out for gypsum in Giu and Hurling area. Gypsum bands delineated in Nichala Chango area was observed to have a strike length of approx. 175 m with thickness of approx. 30 m. The weighted average of gypsum ($CaSO_4.2H_2O$) in Nichala Chango was 97.75%. In Chango area, the strike length of gypsum band was approx. 450 m with thickness of approx. 40 m. and weighted average of gypsum ($CaSO_4.2H_2O$) was 96.79%. In Sumdo area, the cumulative strike length of gypsum bands was approx. 500-600 m with thickness of approx. 30 m and weighted average of gypsum ($CaSO_4.2H_2O$) was 96.56%. On the basis of analytical data of Borehole (HPLSGBH-01) in Giu block, the cumulative true thickness of the gypsum band was 52.45 m with 85.60% weighted average of $CaSO_4.2H_2O$.
Iron							
Bihar, Jamui District	Bhanta block	-	-	7	-	Mapping, Sampling, Drilling	In G3 stage investigation, preliminary exploration for magnetite was taken up in Bhanta block to establish the continuity of the already proved ore body of adjoining Majos block with significant resource. Seven boreholes were drilled which intersected different types of ore-bearing zones viz. Lateritic soil, BMQ associated with intermittent quartz mica + amphibole schist and Biotite/ amphibole-bearing mica schist with thin bands of magnetite. In Boreholes BJB-02, BJB-04 and BJB 05, Biotite/amphibole bearing mica schist with thin bands of magnetite were intersected. The exploration works in the block established the continuity of the Major ore band for about 500 m.
Karnataka, Haveri and Devanagere districts	Melebnur area	1: 12,500	100 sq. km	-	-	Mapping, Sampling, Trenching	In G4 stage investigation a total of 165 BRS, 100 Soil samples and 35 trench samples were collected to assess the mineral potential zone. The primary mineralisation observed in BIF was magnetite, whereas manganese oxides were secondary mineralisation. A pocketiferous highly oxidised and limonitised zone was observed as yellowish and orange stain. The thickness of this oxidised zone was 2-3 cm and extended about 15 m. The metabasalt unit appeared as greenish, medium-grained, hard, compact or foliated, comprising of plagioclase + pyroxene +

							chlorite + garnet. This lithounit was observed to be intruded by sulphide-rich (chalcopyrite-pyrite) carbonate veins; also observed were disseminated specs of chalcopyrite in Metabasalt. Meta-quartz porphyry covered a significant area of toposheet and was well exposed at the central part of the block area as a folded sequence. The analytical results of BRS samples (74) collected from the BFC band-I in Malebennur area showed 10-35.85% Fe (Fe>25% , N=6), 0.09 to 3.8% Mn,<0.025% Ni, 130-900 ppm Zn, 10-600 ppm Cu and 10- 80 ppm Pb. Based on the Fe content, the sample was classed as very low grade. Au values received for 65 BRS samples and 44 soil/regolith samples showed values <25 ppb. Li values obtained for BRS samples (24 nos.) collected from BIF band showed average Li content as 9 ppm whereas 11 samples showed Li content as >10 ppm. Analytical results of PTS samples showed Fe content as 1-12% and Mn as 0.02-0.5 % whereas Cu, Pb, Zn, Ni and Cr content was not of significance from exploration point of view. About 15 Channel/groove samples collected from the highly oxidised limonitic zone located south- west of Village Bevinahalli showed Fe content ranging from 11 to 38.33% with an average of 28%.
Manganese							
Chhattisgarh Korea District	Devra-Jatashankar area	1: 12500	100 sq. km	-	-	Mapping, Sampling	The study area (G4) Devra-Jatashankar lies in the north- eastern part of Toposheet no. 64I/03 (~95%) and the northwestern part of Toposheet no. 64I/07 (~5%). These encrustations were mostly formed over the sandstone surface and in fracture, crack and joint zones. Further indications reveal that encrustation seems to form wherever it was exposed to the atmosphere. There were some penetrative encrustations in sandstones of Parsora Formation. The surface encrustation was thicker while those that were penetrative were thinner (<0.5cm). In BRS samples the MnO values ranged from 0.01% to 21.57% with an average of 1.05% and Ba values ranged from 45 ppm to 41,255 ppm. In PCS samples, the MnO values read 0.03% to 7.21% with an average of 1.34% and Ba values ranged from 91 ppm to 43,149 ppm. In PTS samples the MnO values varied from 0.01% to 0.19% with an average of 0.04% and Ba values ranged from 552 ppm to 4,710 ppm. Analytical results of BRS, PCS and PTS samples suggest that the encrustation was rich in iron (Fe_2O_3 ranged from 14.4% to 52.56%) while showing very low manganese value in most of the analysed samples.
Odisha, Kendujhar District	Kendudihi-Parulipada Block	-	-	1,163.75 m	24	Sanpling, Drilling	Under G2 stage investigation, a total of 1,163.75 m were drilled from 24 boreholes at 100 m x 100 m grid interval. Analytical results of borehole showed 10.53%, 12.40%, 10.17%, 16.57%, 14.09%, 11.86%, 12.36%, 13.24%, 13.42%, 13.86%, 10.90%, 10.10%, 12.31%, 29.09%, 14.08%, and 15.26% of Mn. Analytical results of core samples from 24 boreholes showed that the width of the mineralised zone varied from 0.50 m to 13.00 m with an average grade of 13.53% of Mn. Petrography study of ore samples showed that the Mn ores were psilomelane and pyrolusite.
Odisha, Bolangir District	Uchhabapalli - Thakurpalli Block	-	2.05 sq. km	-	386 m	Mapping, Drilling, Trenchin g	In G2 stage investigations, the major lithounits in the block were khondalite (quartz -feldspargarnet-sillimanite+graphite schist/ gneiss), calcsilicate rocks (calc gneiss and calc- granulite), quartzite, and late intrusives include pegmatite and quartz-veins. General strike varied from NNE-SSW directions with sub-vertical dip towards east in Thakurpalli block in the south to NW-SE directions in Uchhabapalli area in the north. The Mn ore occurred within shallow synformal structure of the calc-silicate rock. A total 2.05 sq km detailed geological mapping was carried out in the block along with 55 cu. m Pitting / trenching. The average grade of channel sample was 15.95% Mn. A total 386 m drilling were carried during FS 2021-22. All the boreholes intersected mineralised zone with cumulative thickness 2 m to 15 m except ODUT-3 and the strike length of mineralized zone was approximately 2700 m in Uchhabapalli-Thakurpalli area.
Odisha Bolangir District	Dandapani Block	-	1.60 sq. km	2	127.50 m	Mapping, Drilling, Pitting/ Trenching, Sampling	In G2 stage investigations, the major lithounits were found to be khondalite (quartz to feldspar-garnet-sillimanite+graphite schist/ gneiss), calc-silicate rocks (calc gneiss and calc-granulite), quartzite, meta-breccia and late intrusives that included pegmatite and quartz-veins. The general strike of lithounits in the block trends NE-SW directions with moderate to sub-vertical dip towards NW direction. Manganese ore bodies were bounded by calc-gneiss/calc-granulite either on footwall or hanging-wall or on both sides. The contact of calc-silicate and manganiferous quartzite was distinctly sharp. A total of 1.60 sq km detailed geological mapping along with 90 cu. m pitting / trenching were

							carried out with collection of PTS from Mn soil, Float ore and Mn ore areas. About 15 channel samples were also collected to correlate the surface and sub-surface potential of the area. The average grade of channel sample was 30% Mn. A total of 127.50 m drilling were carried during FS 2021-22. The two boreholes intersected mineralised zone with cumulative thickness of 3 m to 4.5 m. Part analytical results showed 15% Mn to 19% Mn.
Andhra Pradesh,Vizianagaram	Gurla-Madhupada area	-	-	-	-	Mapping, Trenching, Sampling	Under G4 stage investigation, the geology of study area shows different lithologies of Khondalite suite, Charnockite suite and Migmatite suite that were exposed with later intrusions of pegmatite veins, quartz veins and quaternary flood plain sediments. In the area major hills of garnet quartzofeldspathic gneiss ± manganese ± graphite ± sillimanite trending NNW-SSE were localised in the eastern part and the outcrops of calc granulite were discontinuous NW-SE trending band. A manganese zone with interpreted strike length of 500m and approximate width of 20m with an overburden of 5-6m was demarcated. However, the manganese mineralisation in Dummeda hill area was discontinuous and occurs in small pockets of a few meters dimension. The dimension and depth continuity of this zone was established with pitting and trenching. The exposed manganese zone in the profile section was abundant with float ores at top followed by kaolinised/altered zone and subsequent manganese mineralisation indicating supergene nature of mineralisation. The sub-surface continuity of the zone was tested by pitting/trenching in the area. A total of 79 bedrock samples were collected from possible manganese and molybdenum mineralisation zones. In total 43 channel bedrock samples were collected for manganese mineralisation across the strike of the manganese band at equal intervals and remaining 36 bedrock samples were collected for targeting Mo, W and Sn from quartz vein within calc-granulite and garnet-bearing granite. The assay value of the bedrock samples from study area indicated MnO value ranging from 0.29% to 24.46% with an average of 3.79%, similarly in pit and trench samples MnO value ranged from 0.07% to 7.99%. The molybdenum value in bedrock sample from the area ranged from 1.04 ppm to 18.38 ppm with majority of samples ranging from 10-15 ppm, in trench sample the assay value ranged from 0.62 to 19.67ppm. The tungsten value in the bedrock samples ranged from2.50ppm to 28.79ppm with mean of 4.51ppm and all the values for tin in the area were less than 5ppm.
Andhra Pradesh, Srikakulam and Vizianagaram	Batuva-Kondadi area	1:12,500	120 sq.km	-	-	Mapping, Trenching, Sampling	Under G4 stage investigation, 100 BRS samples, 95 PTS samples, 10 PCS samples, 20 PSsamples and 10 ore microscopy samples were collected. In the study area, rocks belonging to Khondalite and Migmatite Suites of EGMB were exposed. Manganese mineralisation observed at northeastern part of the study area near Gadabavalasa area. Series of abandoned Mn mine pit at varied dimensions identified wherein manganese occurred along with quartzite and garnet-sillimanitegneiss. The strike of the mineralisation zone occurred parallel to sub- parallel to S1 foliation plane that trends in N330° dipping 50°-75° due NE. Manganese occurrence in the abandoned pit was observed in the north-western part of the block near Mandiravalasa area where the ore body had dimension of 2 to 5 m width and 1.5 km strike length associated with quartzo-feldspathic gneiss and quartzite. The trend of the ore body was N330° dipping 60-75° due NE that was bordered by quartzite in NE and granite gneiss in NW. Low to medium grade manganese occurrence in the form of syngenetic type associated with quartzite was noticed near Batuva area in abandoned pits. Manganese occurred along with S1 foliation of quartzite having interpreted dimension of 2-5m width and 500m of strike length. The identified zone having strike direction of N320° having dip amount from 50°-65° due NE. Bedrock samples collected from Gadabavalasa area showed analytical values of MnO ranging from 5% to 29% with an average grade of 16%. Analytical values of MnO in bedrock samples collected from the abandoned Mn ore pit in Mandiravalasa ranged from 0.02% to 31% with an average grade of 6%. Analytical results of BRS samples from Batuva area showed =MnO value varying from 8% to 36% with average value of 19.5%. Analytical result of trench samples from Gadabvalasa and Batuva area encouraging value of Mn% ranging from 0.19 to 3 % and 0.22% to 15.09% respectively. Potential and sizeable manganese ore-bodies were persistent in Gadabavalasa, Mandiravalasa and Batuva area with encouraging dimension and MnO values. During Large-scale Mapping three

							potential manganesezones were identified in Gadabavalasa, Mandiravalasa and Batuva area.
Andhra Pradesh, Vizianagaram	Palavalasa and Laxmipuram Blocks, Eastern Ghat Mobile Belt	1:2000	2 sq km	-	-	Mapping, Drilling, Trenching, Sampling	Under G3 stage investigation, during detailed mapping the lithounits observed were laminated quartzite/feldspathic quartzite, garnet- sillimanite gneiss and garnetiferous quartzo-feldspathic gneiss. In Palavalasa Block, the dominant foliation trends in NW-SE direction with a variable dip of 55°- 70° towards SW. The Mn zone studied in old working also trends in N45°W-S45°E direction. While carrying out detailed mapping in Palavalasa Block, an old working with a strike length of about 80 m and width of about 20 m with 10 m depth was studied in detailed. In the extension of this old working few trenches were excavated at interval of 150m. These trenches expose the mineralised zone at depth of 1.5m. Hence, aninterpreted mineralised zone with a strike length ofabout 600 m and a varied width of about 10-20m in NW-SE direction was established. This interpreted mineralised zone was tested through first-level Borehole nos. AVP-1, AVP-2 and AVP-3 and second-level Borehole no. AVP-5. The litho-units encountered within these boreholes were mainly laminated quartzite/feldspathic quartzite, garnet-sillimanite gneiss, altered quartzo-feldspathic rock, calc-granulite and garnetiferous quartzofeldspathic gneiss (leptynite). The Mn mineralised zone was intersected in all the boreholes at different depth levels as bands of varied thickness of 2-7 m. The mineralised zone was found to be confined between feldspathic quartzite in association with altered quartzofeldspathic rock. While in Laxmipuram Block, four of old working were noticed and studied during detailed mapping. The mineralisation in this block trends NNW-SSE with steeply dip due EEN. Based on the disposition of mineralised zone within these old mines and litho-structural setup, an interpreted mineralised zone of about 400m strike length with a varied width of 10-20m was established. Trenches made to check this interpreted zone could not expose significant Mn mineralisation due to thick soil cover. Later two of first-level boreholes viz; AVL-1 and AVL-2 were planned and drilled to test this interpreted zone. The Borehole no. AVL-1 could not intersect any Mn zone whereas a 14m wide Mn zone was intersected in AVL-2. The analytical result of core samples from Borehole no. AVP-1A assay Mn in the ranged from 2.52% to 12.51% with an average of 6.08%. Only two core samples of AVP-1A could assayed Mn >10%. A channel of 5 BRS from old mine-1 in Laxmipuram block assayed Mn in the range of 7.03%-14.95%.
Rajasthan, Rajsamand	Negariya block	-	-	19	-	Mapping, Drilling, Trenching, Sampling	In G3 stage investigation, the area lies under Survey of India T.S. nos. 45H/9&13. The lithologies exposed in this block were brecciated ferruginised quartzite with or without manganese, quartzite, calcareous quartzite and intercalated phyllite with minor dolomite and granite gneiss exposed as basement rock. In the mapped area, manganese bearing horizons were exposed in 3 linear hills trending NS to N10°E in western, central and North-Eastern part. Manganese was associated with brecciated ferruginised quartzite. The manganese exposure on western hill extended discontinuously for a strike length of 900m, on central hill for a strike length of 650m and northeasterly hill for a strike length of 650m. A total of 7 trenches were excavated in all the three bands. Chemical analysis of Trench no. T1 has analysed 13.82 % MnO over 4m, Trench no. T2 indicated30.34% MnO over 9 m, Trench no. T3 indicated 20.8% MnO over 10 m, Trench no. T4 indicated 12.51% MnO over 6m and Trench no. T7 indicated MnO values of13.95% and 10. 17% MnO over 4m width. A total of 19 boreholes (2 inclined and 17 vertical) were drilled with total meterage of 710.54 m and the exploration was completed in this block. Maximum width of manganese mineralised zone exposed on the surface was35 m with average width of around 20m. The maximum thickness of manganiferous horizon intersected in the borehole was 17m in Borehole RJRN-04 and average thickness of manganiferous horizon was about 10 m. The maximum depth of manganiferous horizon was up to 28.5m in Borehole RJRJ-09.
Limestone							
Rajasthan, Sikar	Natha ka Nagal block, Maonda	1:2000	1.63sq.km	8	434.20m	Mapping, Sampling, Drilling	During the preliminary exploration for cement grade limestone, 08 of boreholes each having a depth of 50m with having borehole spacing of 400m were drilled. A total of 8 boreholes (RJNN-1 to RJNN-8) were drilled in the area, which involved 434.20 m of drilling. The rock types exposed in the block were micaceous quartzite, dolomitic marble, mica schist, quartz-feldspar vein and impure marble of the Kushalgarh Formation of

							the Ajabgarh group. During the investigation, 07 bedrock samples were collected and analysed. The chemical analysis of 07 of bedrock samples from impure marble indicated weighted average grade of CaO-48.97%, SiO2-5.71%, MgO-4.32%, Al2O3-0.56% and Fe_2O_3-0.57%. About 03 samples out of 07 have more the 5% MgO. Analytical results of bedrock samples indicate that impure marble unit (high CaO and low SiO_2 except high MgO) was suitable for cement grade. Impure marble was intersected in 05 bore holes out of 08 boreholes. Borehole RJNN-2, RJNN-6 and RJNN-7 intersected thick micaceous quartzite.
Rajasthan, Sikar	Jhilo Block, Maonda	1:2000	1.70sq. km	309	708m	Mapping, Sampling, Drilling	During the preliminary exploration (G3 stage) for cement grade limestone, course of investigation PCS samples, PS samples were collected. A total of 1.7 sq. km area was mapped on scale1:2000 of which 1.60 sq. km in 2021-22 & 0.10 sq. km in 2022-23 with total drilling of 708m. The general trend of the litho-units was NNE-SSW with moderate to steepdipping towards east. In general, lithounits of the area showedimprints of regional metamorphism. It was evident from the metamorphic mineral assemblage, that the lithounits of the area had undergone green schist to lower amphibolites facies of metamorphism. Development of amphiboles in impure carbonate indicated amphibolites facies of metamorphism.
Lithium							
Jharkhand, Koderma	Pihra	1:12500	100 sq. km	-	-	Sampling	During Reconnaissance survey (G4) for Li, Cs, REE and Rare metals, collection of 100 bedrock samples, 100 pitting and trenching samples, 100 soil samples for chemical analysis, 15 petrographic studies and 25 heavy mineral studies were undertaken to assess the potentiality of Rare metal and REE in the study area. Biotite, garnet and tourmaline at places were noticed. The area of investigation lies in the southernmost part of the Bihar Mica Belt (BMB). Major part of the study area is covered by the Metamorphic of Bihar Mica Belt whereas the rocks of CGGC are exposed in SE and NE part of toposheet. The BMB appears to be a nearly E-W trending anticlinorium with several subsidiary folds. The pegmatites in the study area of Bihar Mica Belt are oriented along N-S to NW-SE and NE-SW to E-W. The pegmatites are very coarse grained with quartz, feldspar (both orthoclase and plagioclase), muscovite as major constituents with minor amount of biotite, garnet and tourmaline at places. The pegmatites also contain beryl, columbite-tantalite and ilmenite, as accessory. Megascopically, a few of these pegmatites were of zoned type where as a well-developed quartz core was found in the middle portion of the lensand was surrounded by intergrowth zone of admixture of quartz and feldspar (both k-feldspar and plagioclase).
Jharkhand, Giridih	Gawan	-	-	-	-	Sampling	During Reconnaissance survey (G4) for Li, Cs, REE and Rare metals, numerous concordant and discordant pegmatite veins of variable dimensions were mapped. Pegmatites may be of two to three generation trending in N-S to NW-SE and NE-SW to E-W intruded into mica schist of BMB. Maximum dimension ofpegmatite having 20-70 m width and 50-250 m length intruded along the foliation plane of mica schist and quartzite mica schist. These pegmatites also contained beryl, columbite-tantalite, as accessory. Based on field observation and mineralogical composition, pegmatites were classified into two; Type-I: Pegmatites trending almost E-W to NW-SE and parallel to the major foliation planes and composed of quartz, feldspar, muscovite as major minerals, tourmaline and garnet crystals were also observed. Crystals of beryl were also found to be associated with some of the pegmatitesnear Rajpura Village. Type-II: Pegmatites trending almost N-S and NE-SW, some of the pegmatites were zoned pegmatites. It was observed that pegmatites intruded in Mica schist and quartz mica schist were composed of quartz, K-feldspar, Muscovite, tourmaline and garnet. Out of the results of 173 samples received so far, three samples showed >1000 ppm value for tREE. A trench sample (GW/T1/01) from Trench-01 excavated near Village Gumgi showed 1205.5 ppm values for tREE. A stream sediment sample (GW/SSS/07) collected near Kaha Pahar showed 1009.8 ppm value and a bedrock sampleof Hazaribaghgranite (GW/BRS/32) collected near west of KalaPahar showed 1028.1 ppm value for ΣREE.
Arunachal Pradesh, West Kameng	Nafra	1:12500	50sq.km	-	-	Mapping & Sampling	Reconnaissance survey (G4) for lithium, tin & tungsten minerals was carried out in Khellong-Khazalang areas, West Kameng district, Arunachal Pradesh. A total of 25 cu. m of trenching were

							done in areas of estimated strike extension of the pegmatite veins. However, the bedrock was not exposed in trenches. A total of 25 soil samples from the trenches yielded 33-110 ppm Li. Total 11 channels were made in the pegmatite, contact zones of gneiss, quartz vein, quartzite, greyphyllite, graphite schist, chlorite quartz mica schist. A total of 67 bedrock samples (including 28 channel samples), 30 stream sediment samples, 20 petrochemical samples, 20 petrological samples, 20 ore mountsamples, 10 regolith samples, 20 heavy mineral samples were collected. The stream sediment samples yielded 10 to 105 ppm Li, 3.5 to 15.9 ppm Sn, 0.9 to 5.1 ppm W. Regolith samples yielded <5 to 63 ppm Li from 10 samples, 3.5 to 11.8 ppm Sn, 1.1 to 2.5 ppm W. 9 nos of PCS samples yielded 48 to 330 ppm Li. Micaceous quartzite in chlorite schist reported the maximum of 330ppm. 11 nos PCS samples yielded 2.6 to 8.4 ppm Sn and 1 to 3.4 ppm W. Li value analysed from chlorite-quartz mica schist yielded 25 ppm to 302 ppm Li from 6 bedrock samples. Pegmatite veins yielded 14 ppm to 65 ppm Li from 10 samples. One sample of granite yielded 70 ppm Li. Quartz veins yielded <5 ppm to 21 ppm Li from 8 samples. Granite gneiss yielded <5 ppm to 116 ppm Li from 21samples. Sn values from available 26 nos bedrock samples have yielded upto 24 ppm. W values from available 26 nos bedrock samples yielded 0.6 to 52.5 ppm. W values from quartz/quartz-feldspathic veins yielded 0.6 ppm to 52.5 ppm. W values from granite gneiss yielded a maximum of 18 ppm. The chlorite quartz schist has sampled Li values of 280 to 330 ppm from three samples. The relative high values of Li in the schist may be attributed to the granite derived Li-rich fluids from the Bomdila gneiss. Based on the studies carried out and analysis results obtained, the Li, Sn, W values in the study area were not encouraging, except for some relatively higher values of Li from chlorite quartz mica schist up to 330 ppm.
Andhra Pradesh, Anantpur and Kadapa	Parnapalle-Lopatanutula	-	100sq.km	-	-	Mapping & Sampling	Large-scale Geological Mapping (G4 stage) covered in an area of 100 sq. km with collection of BRS, soil samplings in grid pattern, PTS and stream sediment sampling for chemical analysis. SEM. EPMA, Heavy Minerals and XRD samples for laboratory studies was carried out to ascertain the mineralisation potentialityof the area and to identify and delineate potential zone of lithium mineralisation. The Radiometric survey of 30 line km was conducted using portable gamma ray spectrometer and recorded K, U and Th count of the given area.The integrated map formed using LSM map and K count data clearly demarcate a common zone for tuffaceous sediment beds. As of now analytical results of 15 BRS were received which showed encouraging values and helped in demarcation of mineralised zone. Tuffaceous sediment having thickness in between 5-70 cm and associated shale with siltstone of 30 cm-3m identified as the source of anomalous values of lithium in stream sediment samples Li values in 8 tuff samples was in between 80-322 ppm and in 4 shale with siltstone samples was 47-252 ppm and a very low value was recorded in dolomite and chert.The mineralised zone comprised of tuffaceous beds and associated shale with siltstone beds and interbedded dolomite was approximately15-20 m thick, and having a strike length of approximately 12 km in discontinuous manner.
Molybdenum							
Madhya Pradesh, Satna & Uttar Pradesh, Banda	Patauda	-	-	-	-	Sampling	Reconnaissance Survey for Molybdenum and Associated Mineralisation (G4) was done in the area. The main stratigraphy units of the area were Bundelkhand Granitoid Complex (BGC), Vindhyan Supergroup and Banda Alluvium. The area comprised wide extent of rocks i.e., older supracrustals and metamorphics, gneiss, migmatites, granitoids, rhyolite, mafic dykes, quartz reefs which were mainly part of BGC and different sedimentary rocks of Semri and Kaimur Group of Vindhyan Supergroup which represented both carbonaceous and arenaceous lithounits. Occurrences of molybdenite as specks were observed mainly within the quartz and quartzo-feldspathic veins near Korari, Gonda, Gonda ka Pahar, Karin Pathar ka Pahar area which were exposed mainly at the rock quarry. At places molybdenite were associated with other sulphides i.e., pyrite, chalcopyrite which were confirmed during ore microscopy study. The quartz veins were mainly trending ENE-WSW to E-W and were also intruded in the migmatite. Sulphide mineralisation in the form of pyrite, chalcopyrite and few bornite specks were observed along the E-W to NE-SW trending slip plane which were parallel to the joint sets. As per the received analytical results, in seven samples including BRS, pit sample Cu values ranged from 550 ppm to1,140 ppm.The occurrences of all the sulphides present in the

							study area were extreme rarely exposed at or near the surface.These were mostly observed at an average depth of 15-20m from the surface and mostly observed in the quarry sections. The sulphide minerals mainly occurred as disseminated forms. Three bands of banded iron formation (BHQ) were observed near south of Nardaha Village having 100m length and 0.5m width and total Fe content was analysed up to 37%.
Assam, Kamrup Metropolitan	Helagog-Khaloibari	-	-	8	60m	Drilling & Sampling	A G3 stage investigation for molybdenum and associated mineralisation was carried out in Helagog- Khaloibari, area. Area lies at the NNE corner of the Shillong Plateau. The area exposed sillimanite garnet quartz mica schist of older metamorphic, migmatite of Assam Meghalaya Gneissic Complex, meta gabbro of Khasi metamafics and pegmatites. Migmatite were characterised by migmatitic textures like stromatic, dictyonitic, schollen/raft, ptygmatic, dilation and schlieren structures. In Helagog quarry, at least four molybdenite bearing pegmatite veins were noticed which occurred either as dikes (veins) or as segregations or as pods. Bed rock samples showed that the molybdenum values ranged from 0.25 to 276.75 ppm. The higher values of Mo i.e.,, 276.76 and 178.02 ppm were reported from the molybdenite bearing pegmatite vein in Helagog quarry where the population density of the molybdenite flakes was more. In Khaloibari quarry although molybdenite flakes were visible through naked eye only a few grab samples from the molybdenite- bearing pegmatite veins showed elevated values i.e.,56.21 and 30.85 ppm and remaining samplesdid not showany significant values of Mo which may be due to occurrences of highly disseminated molybdenite flakes. Eight inclined boreholes (ASKMH-01, 03, 05, 07 and ASKMK- 02, 04, 06, 08) were drilled in Helagog and Khaloibari blocks to intersect the molybdenite-bearing pegmatite body.
Andhra Pradesh, Anantapur	CR Palle-Indukurupalle	-	-	-	-	Sampling	Reconnaissance survey (G4) for molybdenum, gold and associated mineralization was carried out in Kadiri schist belt, Anantapur district. It was observed that molybdenum specks were generally associated with very thin (5 cm to 40 cm) pegmatite veins in Metarhyolite. Near Village Barrepalle sulphide mineralisationwas observed in pegmatite veins (20-30 cm). The strike of theseveins was NE, NNE and E-W directions. At few places, molybdenite was associated with 1-2 cm vein ofsulphides hosted by altered hornblende biotite granite near Village Barrepalle. Soil samples were collected from CR Palle and Barrepalle area to check the secondary dispersion of sulphides in soil which may lead to the hidden mineralisation.The host rock i.e., metarhyolite, pegmatite veins showed pale yellow to reddish brown color alterations along the mineralisation. In CR Palle area (1 sq.km) molybdenum mineralisation with in pegmatite veins (10 to 50 cm thick) having intermittent strike length of about 900m was observed. The chemical analyses of bedrock samples from CR Palle area showed maximum 672.92 ppm of Mo value while Au values were <25 ppb. About 6 samples showed >50 ppm Mo values and 18 samples showed >10 ppm of Mo values. In Barrepalle area molybdenum mineralisation within pegmatite veins (10 to 30 cm thick) trending in N40°E and also the molybdenum mineralization was carried along fractures planes (N60°E, N40°E,N340°W) of 1 to 5 mm thick which were traceable for strike length of about a few metres. The chemical analyses of bedrock samples from Barrepalle area showed maximum 2,980.03 ppm of Mo value while Au values were <25ppb. About 5 samples showed > 2000 ppm Mo values while 9 samples showed >50 ppm Mo values and 19 samples showed >10 ppm of Mo values.
Andhra Pradesh, Nellore	Chinna Varimadugu-Kanduravaripalle	-	-	-	-	Sampling	Under G4 stage intevtigation, the mapped area mainly consisted rocks of Gudur Group belonging to Malakonda formation followed up by PGC-II (variants of granite gneiss) and intruded by gabbro, dolerite, calc- silicate, pegmatite and quartz veins. Bedrock samples (90nos.) received showed TREE ranging from 7.54-967.42 ppm with an average of 397.3 ppm, LREE max. 946.01 ppm. Analytical values of Mo in bedrock samples ranged from 0.35-10.84 ppm with an average of 3.74 ppm. Besides, the bedrock sample of malachite staining taken from the quartz vein within calc-silicate showed Cu 7.4% with Cs value of 48 ppm.The principal REE mineral phases were represented by monazite, xenotime, allanite, apatite, thorite and parisite. EPMA study conducted on five samples showed monazite, apatite, zircon and quartz as the major phase associated with tourmaline bearing quartz vein and monazite, apatite, biotite, zircon with biotite granite gneiss. Yttrium phosphate along with monazite

							and biotite was observed in the garnet biotite granite gneiss.In the area, west of Ayyavaripalle, titano-magnetite and ilmenite were recorded within zoned pegmatites.
Andhra Pradesh, Anantapur	Charupalle-Kalasamudram-Batrepalle	-	-	-	-	Sampling	G4 stage mineral exploration work was taken up for delineation of potential zones and possible occurrences of Molybdenum, gold and other associated mineralisation, nature of causative rocks and their characterisation in the central part of Kadiri Schist Belt (KSB) and granitoids (PGC II)of Central and Eastern Dharwar Craton. KSB embodies amphibolite, diorite, meta-andesite, meta-basalt, meta-rhyodacite, meta- rhyolite, quartz feldspar porphyry and agglomerate which were overlain by PGC-II granitoids with quartz to pegmatite veins and dolerite dykes as younger intrusive. The base metal, molybdenum, nickel and gold mineralization was identified along 20º-200º trending quartz-calcite vein with potassic alteration (fracture filling type) intruded in sheared meta- rhyodacite and dolerite dyke at north of Patnam along Maddeleru river bed in form of grains and specks. The highest value of Zn obtained from Patnam zone was 4924 ppm with four values above 2000 ppm; highest valueof Cu was 568 ppmwith total four values above 300 ppm and highest value of Pb was 5.176% and four values were above 1%. Highest value of Mo obtained from thiszone was 19.05 ppm. Whereas, in Alampur zone, highest value of Mo recorded from evolved alkali feldspar granite was 2116 ppm with other two values over 30ppm. Anomalous values of Cu ranged from 90 to 1,518 ppm with two values above 400 ppm.
Karnataka, Yadgir	Devarapalli	1:12500	100sq.km	-	-	Mapping & Sampling	Reconnaissance survey (G4) was carried out for molybdenum and associated elements. An area of 100 sq. km was covered by LSM on 1:12,500 scale with 50 cu. m of trenching and collected 150 nos. of BRS, 50 nos. of PTS, 56 nos. of SS, 15 nos. of PCS, 25 nos. of TPS and 10 ORM samples. The LSM of the area comprises dominantly of granitoids and gneisses with lenses of amphibolite, BIF, acid & basic dykes and Deccan Volcanics. The BIF, talc actinolite schist and tremolite schist of Dharwar Supergroup (Archean) were seen as small linear outcrops within PGC-II. Older amphibolites were seen as smaller enclaves and xenoliths within the gneisses and granites. These veins were considered to be potential target zones for Mo and associated elements. One such pegmatite vein carried Mo mineralisation in the form of stringer observed in north east of Kamalanagar. However, no significant Mo occurrences were observed in the area.
Karnataka, Chitradurga	Doddaularthi	1:12500	500 sq. km	-	-	Mapping & Sampling	Reconnaissance survey (G4) was carried out for Molybdenum-tungsten and associated mineralization. The area forms the eastern part of the Western Dharwar Craton (WDC), represented by biotite gneiss & migmatite gneiss of Peninsular Gneissic Complex-I (PGC-I), granodiorite, younger intrusives of dolerite, pegmatite and quartz vein. Sargur rocks were represented by Amphibolite, garnet biotite ± sillimanite schist and Banded Magnetite Quartzite (BMQ) occurred as enclaves within the biotite gneiss in varied dimensions from few mm to few meters. Two sets of dolerite dykes were noticed in the mapped area. Earlier one was intruded along NNW-SSEdirection and later one intruded along the E-W direction.The trend of the gneissic plane varied fromN-S to NW-SE dipping moderate to steeply towards NE. At-least three sets of fracture plane were noticed out of which two sets of very prominent, first set offracture plane was NW-SE dipping moderately towards northeast and second set of fracture plane NNE-SSE dipping very steeply towards northwest. Few specks of fine grained molybdenite identified in the quartz vein associated k-feldspar alteration and iron oxidealteration intruded along the shear plane hosted in the biotite gneiss. Copper mineralisation noticed in the form of presence of chalcopyrite and malachite staining hosted in K-feldspar altered of Thippareddihalli. A total of 67 of soil samples were collected; 26 soil sample results were available out of which only one reported Mo values of 10.28 ppm. A total of 105 of BRS were collected; 63 of BRS results were available out of which three samples reported Mo values from 10.09 to 27.58 ppm and seven samples analysed W value from 10.90 ppm to 75.30 ppm. A total of 76 of trenching samples were collected, all the trench samples analytical results were available out of which one sample reported 12.31 ppm of Mo and 16 of samples reported W values from10.37 to 48.98 ppm.

Kerala, Wayanad	Mandat Block	1:1000	-	1	30 m	Mapping, Sampling & Drilling	Preliminary exploration (G3) stage of investigation was carried out for Molybdenum. The area forms northern part of Southern Granulite Terrain and the rock type exposed in this area was younger acid intrusive known as Kalpatta granite and associated pegmatite/quartz veins. The molybdenite was noticed as bluish grey flaky aggregate, associated with chalcopyrite, pyrite and fluorite in pegmatite and quartz veins. These pegmatites were pinkish coloured, consisted mainly orthoclase and 5 cm to 1 m wide. The compositional zoning with quartz at the core and orthoclase at the rim and quartz- orthoclase ladder type pattern also observed. The geophysical survey delineated chargeability zones approximately 180m west of established mineralized zone with trend parallel to established mineralised zone. The geophysical surveys ascertain that the mineralization was structurally controlled. Base on the integration of geological, geochemical and geophysical studies four first level boreholes were planned to intersect the mineralisation at 30m vertical depth.The available analytical results yielded Mo in bedrock samples ranged from 0.30 to 4624.61 ppm with an average of 175.97 ppm, Cu-8 to 200 ppm and ΣREE-9.27 to 495.03 ppm.
Tamil Nadu, Dharmapuri	Harur-Uttangarai	-	0.7	-	-	Mapping & Sampling	General exploration (G2) stage of investigation was carried out for molybdenum and associated mineralization. The block was covering an area of 0.7 sq. km having strike length of 1k m and width of 700 m. The geology of the area comprises of epditotised-horblende gneiss (EHG), quartzo- feldspathic gneiss, pyroxenite, pyroxene- granulite and quartz vein. The shear zone was mainly of sheread, mylonitised chloritised, sericitised gneiss with intercalation of pyroxenite and quartz veins.It was observed that the mineralised quartz vein bearing shear zone runs parallel to the regional foliation NNE-SSE with minor swings with dip varied from 50 m to 60 m towards SE and an average width of the shear zone was 25m. The mineralised, sheared quartz vein occurred as discontinuous pattern for strike length ranging from 50m to 300m. The analytical results received in part showed the value varied in ranged from 107 ppm to 3,200 ppm. There source will be calculated after receipt of complete analytical data.
Nickel-Ni-Cr-Pge/Cr-Ni-PGE							
Manipur	Champhai-Hermon	1:2000	3 sq. km	-	-	Mapping	During the Reconnaissance survey (G4 stage) in parts of SoI TS 83L/07 for nickeliferous laterite, the chemical data indicated an encouraging value of Ni in the saprolite zone (Ni to 15,822 ppm), of ultramafic-derived regolith.The concentrations of other trace elements in the saprolite/saprocks were Cr (4,472 ppm), Cu (32 ppm), Co (268 ppm), Pb (8 ppm) and Sc (5ppm).The limonitic layer of the laterite contained high value of Fe_2O_3 (T) (19.95-51.42%), Al_2O_3 (4.22-19.74 %) and low MgO (1.20-4.98 %). The limonitic laterite analysed Ni (1,962-7,992 ppm) with associated Co (110-336ppm), Cr (3693-12,380ppm), Cu (66-90ppm), Pb (<2-15 ppm), Sc (23-29 ppm) and V (64-262 ppm). Within the laterite profile, an abrupt decrease in MgO and gradual increases of TiO_2 and a drastic increase in Fe_2O_3 and Al_2O_3 from the protolith towards the oxidised lateritic soil were observed. The high content of iron in the lateritic soil was attributed to the release of FeO during the process of serpentinisation and weathering of olivine and pyroxene-rich rocks. The high SiO_2 content in the oxides zone may be due to the presence of localised thin silica veins within the oxide zone. MnOwas fairly uniform in both limonite and saprolite. CaO and Na_2O were fairly constant. While Cr content gradually increases from bedrock to the limonite, on average, the concentration of Ni was higher in saprock. This pattern was in good agreement with the principle of weathering or lateritisation process during which elements such asMg and Si become leached and others such Ni, Co, Y and Mn were secondarily enriched, while Fe, Cr, Al and Ti were residually concentrated within the laterite profile.

Manipur, Tengnoupal	Chalwa-Kwatha	1:5000	6.3 sq. km	-	-	Mapping, sampling	During the Reconnaissance Survey (G4 stage) in Manipur-Nagaland Ophiolite Belt for nickeliferous laterit, the lateritic soil capping developed above the mafic-ultramafic peridotite showed varied exposed thickness (1 to 8m). The well-developed lateritic soil capping showed six distinct lateritic soil profile horizons i.e.,, saprock mixed with saprolite, saprolite, oxidised zone rich in goethite nodules, plasmic and ferric duricrust. The lateritic soil samples in the studied area were characterized by the relative enrichment of Fe2O3 (14.60% to 46.75%), Ni (2,505 ppm to 14,494 ppm), Cr (2,466 ppm to 10,236 ppm) and Co (92 ppm to 405 ppm). The higher values of Ni correspond to the saprolite lateritic soil horizon. The significant depletion of MgO in the top lateritic profile (MgO - 1.15%) and relative enrichment at the base (22.63%) indicates the leaching effect induced by the meteoric water.The UMIA values for the lateritic soil ranged from 27.67 to 69.46, which indicate high degree of weathering of the protolith mafic-ultramafic peridotite (UMIA value of fresh bed rock peridotite ranged from 8.51 to 36.0).The index of laterisation (IoL) values for the lateritic soil mostly ranged from 30.52 to 65.33 indicating middle stage of advanced leaching, resulting from re-distribution of Ni, Si, and Mg from the limonite towards the saprolite horizon. Ternary plot of SiO_2-Al_2O3-Fe_2O_3 for lateritic soil showed clustering of plots in the three field of medium to low laterisation and kaolinisation, indicating less advanced stage of laterisation.
Union Territory of Ladakh, Leh	Khalsi-Dumkhar	1:12,500	55 sq. km	-	-	Mapping, sampling	During the reconnaissance survey (G4 stage) for Cr-Ni-PGE and associated mineralisation, in 102 of BRS samples chromium (Cr) ranged from 19 ppm to 3772 ppm (Avg.1363 ppm), nickel ranged from 32 ppm to 2529 ppm (Avg. 1222 ppm), MgO ranged from 1.93% to 39.88% (Avg. 27.51%). The ore microscopic study showed the sulphide mineralslike pentalandite, arsenopyrite, chalcopyrite and chromite minerals. The XRD study showed that Lizardite and clinochlore minerals were the major mineral and clinochlore & calcite were found in good amount.
Karnataka, Mandya	Sindhughatta	1:12500	-	-	-	Mapping	During the reconnaissance survey (G4) for Nickel, PGE and gold mineralisation included PGC comprised -migmatites and leucosomal granite gneiss and pegmatites defines marginal rocks; while ultramafic consisted of talc tremolite schist ± chlorite- actinolite, Birbiritised Talc tremolite chlorite schist, meta pyroxenite; rafts of hornblendite ± quartz epidoteveins/ amphibolite and quartz grunerite garnet schist marks major enclaves within shear zones hosting marginal facies. Basic intrusive, epidosite, chromitiites and tourmaline-rich pegmatite manifests deep crustal fault/ shear zones. Basic intrusions in the form of gabbro/dolerite dyke were noticed with NW-SE trend. In the mineralisation point of view Birbirite outcrops were seen prominently near Sindugatta, while chromite bearing Talc tremolites were observed near Jaginakere and Marenhalli. Based on Systematic sampling and LSM, few areas reported chromite bands (few cm to 1.5m) within talc-tremolite schist near south of Sindhughatta and Jagginakere areas. The chromiferous metapyroxenites occurred as discontinuous along major tectonic planes associated with epidosites. Evidence of mylonite development was ubiquitous.
Karnataka, Mandya	Krishnajpet	1:12500	125 sq. km	-	-	Mapping & sampling	During the reconnaissance survey (G4 stage) for Nickel, PGE & Associated Mineralisation the lithounits present were amphibolite, metapyroxenite, metagabbro, peridotite, talc-tremolite schist, talc tremolite Chlorite schist, birbirite, chromiferous metapyroxenite, osceliferous talc tremolit schist, hornblendite, Chlorite schist which were the part of Sargur (KR pet) Group of rocks, migmatite gneiss, grey granite, hornblende gneiss of PGC and pegmatoidal granite, dolerite dykes, pegmatite, fuchsite quartzite and quartz vein. The analytical results of 27 BRS samples, showed the Ni values ranged from 1,013 to 2,065 ppm in 18 samples of which samples KR/BRS-26 & 30 collected from north of Sadgonahalli has Ni values 2,043 & 2,065 respectively. The Cr values of these bedrock samples ranged from 2,347 to 4,897 ppm in 18 samples, the highest value in KR/BRS-3 from Khatrighatta area.
Rajasthan, Udaipur	Kolyari and Piplajara	-	-	-	-	Mapping, sampling, pitting/ trenching	During the reconnaissance survey (G4 stage) for Ni, Cr and associated base metals mineralization 154 BRS, 50 Channel Samples, 50 pitting/trenching samples and 5 XRD samples, 10 of PCS and 10 for PGE samples were collected. The Samlaji Formation of Palaeoproterozoic Age which comprisesof quartzites, garnetiferous mica schist and siliceous phyllites were the only rock. Indications of Cu mineralisation in the form of

							feeble malachite stains within the ultramafics in the northern part (North of Banswari) were observed. A few soapstone quarries occurred within talc-carbonate and extensively altered serpentinites. Nickel and Chromium seems tobe occurring in disseminated forms and were in association with distinct crystals of magnetite. The rock having chromite band have also been found near an abandoned pit near Barbali. Suspected Garnierite (Nickel ore) was observed only at one place (southof Damana).
Maharashtra, Raigad District	Khopoli area	1:12500	100 sq. km	-	-	Mapping & Sampling	Reconnaissance survey (G4) was carried out for PGE in picritic basalts and dykes in Khopoli area. The objective is to assess the PGE mineralisation in the picritic basalts and dykes present in the area. Out of the 101 BRS, 50 BRS showed Cu/Zr ratios of <1. The Cu/Zr ratios of these samples vary from 0.503 to 0.990. The MgO% in these 50 BRS varies from 3.39 to 26.08 with an average MgO content of 13.67%. The samples yielding high MgO values (greater than 12 %) and having Cu/Zr ratio less than 1 were targeted for channel cum chip sampling as well as for Pt-Pd analysis.
Madhya Pradesh, Shivpuri District	Nangali	1:12500	-	-	-	Mapping, Sampling, Drilling, Trenching	G4 stage of investigation carried out for PGE and basemetal mineralization. The study area covering parts of SoI T.S. Nos. 54G/15, 54K/3 & 54K/4 was characterised by presence of Tonalite-trondhjemite-granodiorite (TTG) suite of rocks, rhyolite-andesite, variants of granites which were traversed by quartz reefs, mafic-ultramafic dyke system and quartz veins. The mafic/ultramafic rocks also host sulphide mineralisation at various locations in the study area and were targeted for basemetals, Ni, Cr & PGE analysis. Copper, molybdenum and tungsten mineralization hosted within altered syeno-granites was observed. Sulphide mineralization (chalcopyrite, arsenopyrite and pyrite) in basic/ultramafic dykes was also observed around Umri Khurd, Kanchanpur and Tori areas.Based on analytical results of bedrock samples (mainly altered granites and mafic rocks), anomalous values of Cu, Mo & W were observed from the localities like Thuni (Cu-755-790 ppm, Mo-1,597 ppm & W-1,449 ppm), Kanchanpur (Cu-375- 390 ppm, Mo- 4,800 ppm & W-21.9 ppm), Tori (Cu: 520-6,000 ppm), Dargwan (Cu: 195-390 ppm) first scout borehole, namely MPBNG-1 (closing depth-99.90m) was drilled around Tori Village. It intersected sulphide mineralisation from 28.00-42.00m (stringers, blebs and sporadic disseminations of chalcopyrite and pyrite in quartz veins and mafic rocks and from 88-92m along the borehole (sporadic disseminations of chalcopyrite within altered granite). Based on the analytical results,a mineralised zone of 0.22% Cu was demarcated from 25.60-27.80m along the Borehole MPBNG-1. Second scout Borehole, i.e., MPBNG-2 was drilled around VillageThuni. It intersected alteration zones in granites hosting pyrite, chalcopyrite, molybdenite and scheelite mineralisation from 25.50 to 31.00m, 51.50-57.00 m and from 76-82 m along the borehole.
Tamil Nadu, ErodeDistrict	Mettuppalaiyam	1:12,500	-	-	-	Mapping, Sampling, Trenching	Reconnaissance survey for PGE, Ni and Cr was carried out. During G4 study, the major lithologies exposed in the area were hornblende-biotite gneiss, biotite gneiss gabbro + garnet, meta-pyroxenite, anthophyllite schist and pegmatite. Based on the mineralogy and reaction textures, it can be inferred that the rocks of the study area have undergone granulite facies to amphibolites facies metamorphism. Groove sampling was done on pyroxenite bodies, whereas grab samples were collected from pyroxenite, gabbro and anthophyllite schist. From the analysis of bedrock groove samples, the highest chromium value of 3037 ppm was noted in groove KTP-2 at Kuttipalaiyam Village and the highest Ni value of 574 ppm was noted in groove CVP-1 at ChinnaVadamalapalaiyam Village. Maximum Cr value of 3301 ppm and Ni value of 763 ppm for BRS grab samples were noted in anthophyllite schist sample from Oricheripudur. Fromthe BRS samples, twenty samples which showed higher Cr and Ni content and sulphide mineralisation were prioritised for PGE analysis and submitted for analysis.
Phosphate							
Chhattisgarh, Balod	Andi-Bhedi	1:5000	7.7 sq. km	25	1062.10 m	Mapping, drilling, sampling	The area is under G3 investigation for Phosphorite and associated mineralization. The lithologies intersected in the boreholes were clay, cherty limestone, sandstone and soil. Clay unit was mostly phosphatic in nature but P_2O_5% varied from borehole to borehole. 25 vertical boreholes in grid pattern with 500m spacing were drilled. Out of these 25 boreholes drilled, 24 boreholes intersected clay horizon (except borehole CBAB-03) and the thickness ranged from 7.7m to 43.64m. Similarly,

							limestone was intersected in 17 boreholes and the thickness of limestone varied from 0.8m to 35.7m. On the basis of analytical results of 653 of core samples from 25 of boreholes, the P_2O_5 content varied from 0.05 to 18.19% in clay whereas for Cherty limestone the P_2O_5 content was 52% at 1m stopping width the estimated inferred resource was 0.65MT. As per United Nations Framework Classification (UNFC), Andi-Bhedi block phosphorite deposit which can be categorised as 333.
Meghalaya, South Garo Hills	Siju Block	-	50 sq. km	-	-	Mapping, Sampling	A G4 investigation for phosphatic nodules has been taken up in the area with large scale mapping. The nodules occurred as rounded/sub-rounded/spherical/elliptical /sub-angular/elongated in shape within shales/ siltstone with fossils in the Kopili Formation only. Splintery grey shale and greenish fossiliferous siltstone were the host rock for phosphatic nodules and this horizon lies above the fossiliferous limestone of Shella Formation. Phosphatic nodules were light brown, dark grey and iron rusty color with shape varied from round, sub-round, angular, amorphous, spindle, rod- like, oval and elongated. The size the phosphatic nodules ranged from nucleated and 2) non-nucleated. Nucleus of the phosphatic nodules was usually crab fossils and rarely gastropods and detrital grains. Non-nucleated type sometimes gives zones of various colors. Petrography of nodules showed phosphorite peloids and francolite grains. Chemical analysis of phosphatic nodules showed P_2O_5 value ranging from 0.43 to 31.30 ppm and shale giving 0.39 to 4.2 ppm P_2O_5. High REEs were reported from the phosphatic nodules (total REE ranged from 241 to 4543 ppm). On the basis of analytical results received, there were six phosphatic nodule bearing zones of splintery greyshale and greenish fossiliferous siltstone in Kopili Formation.
Andhra Pradesh, Kadapa	Pullampet-Vattaluru	1: 12500	-	-	-	Mapping, Sampling	A G4 investigation was carried for Phosphorite with large scale mapping of the area at the scale of 1:12500. On the basis of reaction of Shapiro solution with suspected litho units (powdered form) and change of colour of solution (yellow-greenish yellow to reddish yellow), two mineralisation zones were demarcated in the study area. It occurred within the calcirudite, stromatolitic dolomite and shale with dolomite litho units. Two mineralised zones were Ramapuram to Venkatpalle zone and Vattalur-Dontiraikonda zone. It extends up to 500m discontinuously and width varied from 2m to 7m in the SW of Vattalur where as in the Ramapuram toVenkatpalle area the calcirudite extends up to150 m and width varied 2m to 5m discontinuously. Phosphorite was observed as pellets and fragments within the calcirudite. In the dolomite particularly stromatolitic dolomite near Devsamudram road and Pullaredipalle Village, the phosphorite occurrences were noticed with the help of Shapiro solution (yellow to greenish yellow). Trenches were made across the mineralised zone near Ramapuram to Venkatpalle zone and Vattalur-Dontiraikonda zones. Samples were collected for analysis. Total 100 BRS, 100 PTS, 20 PS, 10 PCS, 5 EPMA, 5 SEM and30 samples for ICPMS/IES REE analysis were submitted to Chemical and Petrology divisions, SR, Hyderabad. Till date, a total of 15 BRS sample result were received and no significant value of P_2O_5 was found.
Tamil Nadu, Perambalur	Aiyanapuram block	-	-	-	-	-	A G3 stage investigation was carried out for phosphatic nodules. The thickness of the nodule bearing beds/layers ranging from 10 to 50 cm with strike length ranged from 100 to 200 m. Generally, beds / layers of phosphatic nodules were concordant to the gypseous grey/brown mudstone and often occurred as intercalated sequence with glauconitic mudstone with trend varied fromN30ºW-S30ºE to N65ºE-S65ºW with dip varied from 13º to 29º towards both northerly and southerly directions. Based on the intensity of occurrence of phosphatic nodule bearing beds/layers and surface distribution of the nodules, at least eight phosphatic nodules rich zones were demarcated. Phosphatic nodules were massive with no concentric rings and characterised by calcareous / clayey / ferruginous coating with the core composed of greyish black phosphatic material traversed by random fracturesfilled with gypsum or celestite and occasionally with fluorapatite. In addition to the phosphatic nodules, beds/ layers of clay nodules of varied shape and size werealso evidenced which showed close spatial association with fossiliferous siltstone. Field evidences suggest that the shape of the phosphatic nodules was not always spherical; instead, it displays different shapes including oval, round, spheroidal, rod-like and irregular shape. In general, the size of the nodules ranged from 1.0 cmto 33 cm. The rod-like nodules were measured as long as 95 cm with the thickness ranged from 5 to 8

							cm. To quantify the yield of nodules in the area, two trenches (14 cu. m) were excavated i.e ABT-01 & ABT-03 in nodule rich zone where the nodule bearing layers were frequently occurring and another one trench i.e ABT- 02 (11 cu. m) was excavated where the nodule bearing layers were uncommon on the surface. In trench ABT- 01, except first one meter in the western side, phosphate nodules were encountered in the rest of the 10m along the trench with the content varied from 0.18 to 16.01 kg with an average of 3.2 kg per cu.m and in ABT-03 a total of 4.61 kgo f phosphatic nodules were recovered from this trench with an average of 2.3 kg per cu.m. In trench ABT-2 where nodules were less common, the yield of phosphate nodules in this trench was very low and a total of 7.8 kg nodules were recovered with the average of 0.65 kg per cu.m. The P_2O_5 content in phosphatic nodules from BRS samples showed value ranged from 23.479 to 27.67% and the ΣREE content ranged from 1,064 to 2,147 ppm with ΣLREE values ranged from 988 to 1,948 ppm and the ΣHREE content varied between 75 ppm and 212 ppm whereas PTS samples showed P_2O_5 content ranged from 13.77 to 25.35%. The K_2O content in glauconitic mudstone from BRS samples showed values ranged from 1.78 to 3.61% and PTS samples showed values ranged from 0.682 to 2.86 %.
Potash							
Chhattisgarh, Mahasamund	Bhalukona	1: 5000	10 sq. km	18	711.30m	Mapping, Drilling, Sampling	A G3 investigation is carried out in Bhalukona Block with an area of 10 sq km mapped on 1: 5000 scale and a total of 711.30m has been drilled in 18 vertical boreholes in grid pattern with 500m spacing for Glauconitic Shale/Sandstone. Thickness of Glauconitic sandstone varied from 0.8mto 18.30m in across the boreholes and depth of same varied from 0.00 m to 2.55m. The analytical results of core samples showed encouraging value of K_2O in the average of 4.05% to 7.56% for glauconitic shale, 4.02% to 5.86% for glauconitic sandstone and 4.14% to 6.30% for intercalation of sandstone and shale. In Bhalukona block, a total resource of 64.05 MT of glauconite with an average grade of 5.23% of K_2O was established. In the glauconitic shale 19.07 MT of resource was calculated with average grade of 5.49 % K_2O. In the glauconitic sandstone 10.58 MT resources was calculated with an average grade of 4.79 % K_2O. A total of 25.41MT resources were calculated in the intercalation of shale and sandstone with an average grade of 5.36% K_2O.
Bihar, Rohtas	Madhukupia-Katudanr	1: 4000	8 sq. km	10	725m	Mapping, Drilling, Sampling	Under G3 stage investigation, a total of 10 vertical boreholes were drilled at 800m X 400m (BRMK-01toBRMK-10) spacing in theblock to assess the glauconite resources of 8 sq. km area by 725m drilling. The glauconitic sandstone was intersected in boreholes BRMK-01, BRMK-02, BRMK-03, BRMK-04, BRMK-05, BRMK-06, BRMK-07, BRMK-08 & BRMK-10 and fine-grained sandstone with occasional intercalation of quartzarenite was intersected in BRMK-09. A total of 50 bedrock samples from anticipated mineralised horizons, 50 PTS from 50cu.m pitting/trenching were collected. In bedrock samples fine grained sandstone yielded a maximum of 4.35% K_2O, Glauconitic Sandstone a maximum of 3.26% K_2O and green shale (Fawn Limestone Formation) 4.93% K_2O. Pit sample comprising of fine-grained sandstone yielded maximum of 4.91% K_2O.
Rajasthan, Hanumangarh	Makkasar Block, Satipura sub-basin, Nagaur-Ganganagar Evaporate Basin	1: 4000	6 sq. km	8	6079.60 m	Mapping, Drilling, Sampling	During G3 stage investigation, the study 875 core samples and 20 thin section samples, 25 samples for XRD studies and 20 samples for geotechnical studies were also collected for potash. Out of 875 core samples, chemical analytical results of 215 samples of two boreholes were received. In Borehole RJNGM-04, potash mineralization (polyhalite+sylvite) was intersected at the depth from 636.00 to 636.90m with grade of 8.80% K, 644.80 to 645.30m with grade of 6.50% K and 646.30 to 647.40m with grade of 6.50% K. In Borehole RJNGM-01A, potash mineralisation was intersected at the depth from 641.45 to 641.76m with gradeof 5.40% K and 651.00 to 651.80m with grade of 5.60% K.

Rajasthan, Bikaner, Churu and Hanumangarh	Ghaniyasar-Sarupdesar areas inNagaur-Ganganagar Evaporite Basin	1: 12500	219 sq. km	4	3369m	Mapping, Sampling, Drilling	During G4 stage investigation for potash, the area was mapped at large scale 1:12500. The mapped area was dominantly covered by aeoliansand (Quaternary period) of fine to medium grain size. Apart from this, sand (fine)-silt admixed patches were documented with in the area of study, with varied degree of calcretisation. Apart from this, clay-silt admixed (mud) patches have also been documented at certain locales bearing evidences of calcretisation. The lithologies comprising Quaternary Sediments, Marh Formation (Tertiary), Nagaur Group of Marwar Supergroup (Cambrian), Hanseran Evaporite Group (HEG) of Marwar Supergroup (Neo-Proterozoic) and Jodhpur Group of Marwar Supergroup, were intersected in the boreholes drilled in descending order. Nine halite cycles were delineated within HEG in RJNGGS- 1, seven in RJNGGS-2 and RJNGGS-4, while in RJNGGS-3 eight such halite cycles were established. Suspected mineralisation in the form of sylvite and polyhaliteis noticed mainly within H3, H2 and H1 cycle, with minor occurrences reported fromthe younger cycles. These minerals were in association with halite and at places intercalated with clay in association with halite.The intervening zone, occurring in between successive halite cycles, comprise mainly of anhydrite, dolomite and clay/claystone. Analytical results of submitted samples are awaited.
Rajasthan, Hanumangarh	NaiBasti Block in Satipura sub-basin of Nagaur Ganganagar evaporite basin	1: 4000	6 sq. km	9	6590.50m	Mapping, Drilling	A G3 investigation is carried out for potash. Based on borehole logging data, the intersected litho- units were Quaternary sediments, Nagaur Group, Hanseran Evaporite Group (HEG) and Jodhpur Group. HEG consisted of halite, anhydrite/gypsum, dolomite, magnesite, polyhalite and sylvite with thin layers of red/greenish grey clay. Seven major halite cycles, were observed in HEG. Primary structures like bedding, laminations, graded bedding; burrow structure and penecontemporaneous deformational structure were present in Quaternary sediments and Nagaur Group. On the other hand, algal stromatolitic structures were also preserved in the dolomitic unit of HEG. Minor faults and slip planes were observed within the rocks of Nagaur Group and HEG. Jodhpur Group consisted of hard and compact reddish-brown sandstone. Potash mineralization was mainly associated with the H2 halite cycle, where visual mineralisation of sylvite and polyhalite occurred within depth ranged of 645m to 680m. The prominent sylvite rich zone varied from 0.30m to 2.00m thickness. Analytical results of submitted samples were awaited.
Silver							
Rajasthan, Bhilwara District	Bharak North Block	-	-	-	1200m	Mapping, Sampling, Drilling	Preliminary exploration was carried out for silver and base metal mineralization. In G3 study various litho units mapped during the F.S. 2021-22 were calc-silicate rock, amphibolite, siliceous dolomite, oxidised siliceous dolomite, stromatolitic dolomite, carbon phyllite, metachert, phyllite and ferruginised quartz amphibole rock. Surface indication of silver mineralisation was observed in the form of dendrites developed on bedding plane, fractured surfaces and joint plane of siliceous dolomite exposed at the contact of calc-silicate rock. Siliceous dolomitewas oxidised along two different planes. First zone of oxidised siliceous dolomite was exposed at the contact of calc-silicate rock and siliceous dolomite in the NE corner of the block. Second zone of oxidised siliceous dolomite was exposed well within siliceous dolomite where most of the boreholes were drilled in which significant silver mineralisation was intersected. Bed rock samples collected from oxidised siliceousdolomite exposed at the contact of calcsilicate rock and siliceous dolomite assayed for Pb, Zn and Ag. Chemical analysis data of 150 BRS as well as 120 channel samples were received. Chemical analysis data showed that 14 BRS were analysed anomalous for Cu, Pb, Zn and Ag. Channel sample anomalous assay values of 10 samples for Pb, Zn and Ag ranged from 0.16% to 0.33%, 0.11% to 0.98% and 5ppm to 25ppm respectively.The silver mineralization assayed in the siliceous dolomite indicated strong correlation with Pb and Zn.
Tin							
Arunachal Pradesh, East Kameng	Seppa	-	-	-	-	-	Under G4 stage investigation, Large Scale mapping of a 52 sq km block on 1:12,500 scale was carried out to evaluate the potential of Tantalum and Caesium mineralization in the assigned area. The area was located in the western part of Arunachal Pradesh exposing rocks of meta-sedimentaries comprising quartz mica schist & schistose quartzite belonging to

							the Seppa Formation (equivalent with Khetabari Fm.) and garnet biotite gneiss, biotite gneiss belonging to the Lumdung Gneiss (equivalent with Bomdila Gneiss) of the Bomdila Group of Palaeo-proterozoic Age, followed by amphibolite and tourmaline bearing pegmatites as the younger intrusive. The highest value of Cs was 23.24 ppm, with values ranging from 3.5 ppm - 23.24 ppm in stream sediment and 17.34 ppm in BRS and 15.678 ppm (Channel-CH1A), 15.652 ppm (Channel- CH4) and 20.66 ppm (Trench T4) all in pegmatite band 1. The highest value of W was 763.397 ppm (remarkably high), with values ranging from 2 ppm 19.22 ppm in stream sediment, and17.34 ppm in BRS and 11 ppm to 127.75 ppm in Channel-CH1A, 3 ppm to 10 ppm in Channel-CH4 all in pegmatite band 1,and less than 6 ppm in channels 3&4. The tantalum values were not as remarkable as the highest value 9.44 ppm in BRS. Two channel samples (CH-5) have high uranium values 58 ppm & 93 ppm. Few stream sediment samples have 20 ppm to 30 ppm U and 18 SSS have thorium values greater than 60 ppm.
Jammu &Kashmir, Udhampur and Kathua	Bikindra and Khabbi	1:12500	50 sq. km	-	-	-	A G4 investigation is carried out for Tin, Tungsten and associated minerals in this area. Lithounits were delineated 1) phyllite of Salkhala Formation 2) Jamotha/Kaplas Granite of Palaeozoic Age, with sharp contact between Salkhala Fm. and Kaplas Granite. Presence of tourmaline was observed in Kaplas Granite around Bikindra peak. Dolerite dike with dimension of 50 x 20 meters was observed within Kaplas Granite near Ute De Khabi.
Uttar Pradesh, Mahoba	Bilkhi and Bara	1:12500	100 sq. km	-	-	Mapping & Sampling	A G4 stage investigation involving large scale mapping of 100 sq. km on 1:12,500 scale was carried out for reappraisal of tin, tungsten and associated mineralization in this area. Total 54 bedrock samples and 50 trench samples. Night survey with the help of UV lamp was carried out in Gopalpur, Bilkhi, Murani and Bara areas. Bright fluorescent green minerals which may be REE phase/radioactive minerals and Powellite (Ca (MoO_4) in pegmatite veins with bluish white fluorescence were observed. Molybdenite (MoS_2) and sulphide phases do not showed any fluorescence.In BRS samples, the Cu value ranged from <5 ppm to 2,084 ppm (maximum in quartz vein intruded in medium grained granite). Mn values ranged from 13ppm to 1,326 ppm and Pb values ranged from <20 ppm to 1,320 ppm (maximum in quartz reef of Bilrahi RF). Chemical results for Zn, Sn, Mo and W did not show any encouraging values. Only one BRS sample showed 247.41 ppm Mo. Out of 50 trench samples, chemical results for base metal viz. Cu value ranged from <5 ppm to 2,478 ppm, Pb value ranged from <20 ppm to 129 ppm and Zn value ranged from17 ppm to 109 ppm. In Trench-1 from Medium grained K-feldspar granite Mn of 1,132 ppm was obtained. Results of 4 samples from Trench-3 excavated in Tola Shyam quartz reef showed Cu values 1,194 ppm,1,316 ppm,2,478 ppm and 2,472 ppm respectively. Analytical results for Sn, Wand Mo values were not very encouraging.
Tungsten							
Madhya Pradesh, Betul	Sonaghati-Chiklar-Rawanpudi - Khandara	1:12,500	100 sq. km	-	-	Mapping, Sampling & Pitting/ Trenching	A G4 stage investigation involving large scale mapping of 100 sq. km on 1:12,500 scale was carried out in this area. Tungsten and associated mineralisation in the area along with pitting and trenching of 30 cu.m., collection of bedrock samples, soil samples and petrological Four Calcsilicate bodies were found for possible Tungsten mineralisation based on their distinct litho assemblages and mode of occurrence, viz. Chikhlar Calc silicate, Ampani nala Calc silicate, Dharakhoh Calc silicate and lensoidal Calc Silicate bodies. The Calc silicate rock found in the west of Chikhlar was 5 to 7 m thick and extends for about 25-30 m in its strike direction of ENE-WSW and showed bluish-greenish fluorescence while subjected to UV lightindicating presence of Tungsten mineral. The Calc-silicate band of Ampaninala was80-100 m thick and 350-400 m in its strike direction of ENE- WSW. It was mainly composed of fine-grained silica and thin veins of calcite. The Dharakhoh Calc silicate body was having much higher calcite than Chikhlar body but it was slightly coarser than Calc silicate of Chikhlar. Some lensoidal calc silicate bodies having 2-3m in length were also recorded near Ampani nala area. Chemical analysis results reveal the presence of 150 ppm of Cu, 40 ppm Pb, 155 ppm Zn for, 91 ppm Vin calc silicate rock, whereas sheared porphyritic granite, which was adjacent to calcsilicate body, records 35 ppm Cu, 45 ppm Pb, 105 ppm Zn, <1 ppm Ag and Cd. Calc silicate body records <0.5 ppm Mo, 7.11 ppm Sn, whereas, sheared porphyritic granite records 1.04 ppm Mo and 12.22 ppm Sn as reported from chemical analysis of

							BRS samples.Values of 1.64 ppm and 2.03 ppm for Tungsten (W) were recorded in calc silicate and sheared porphyritic granite respectively. Samples collected from the contact between calc silicate and granite were showing gold values of <25 ppb and 30 ppb. Chemical analysis of PTS samples showed 55 ppm Cu, 25 ppm Pb, 105 ppm Zn, <1 ppm Ag, Cd. The analytical results of soil samples showed 7 5ppm Cu, 30 ppm Pb, 90 ppm Zn,<1 ppm Ag and Cd.
Jharkhand, Giridih	Kakakudar-Gaganpur	-	-	-	-	Sampling	Reconnaissance survey (G4) for tungsten, copper and gold was carried out. Copper, lead, zinc, etc at Gaganpur, Jhalakdiha, Kakakuddar and Chandio villages (east to west respectively) occurred within the granite and/ or granite with mica-schist enclaves. Surface manifestation of mineralization occurred as stains (malachite, azurite etc) in the Unclassified Metamorphics rock of Chandio, Gaganpur areas. Mineralisation can be correlated to skarn type in the area wherein previous sedimentary units were intruded by late granite fluxes resulting in contact metasomatism and subsequent formation of skarn minerals. From the available chemical analytical data significant values of copper (3,934mg/kg), Zn (2,587mg/kg), Mo (294.31 ppm) were observed near Kakakuddar old workings. An elevated Pb value of 5,961 mg/kg was analysed from trench-1 close to Kakakuddar old working. Panned stream sediment samples collected close to Kakakuddar old working gave Th value of 1,229.45 ppm. Pb value amounting to 3,752 mg/kg and Ag value of 3.22 ppm were reported near Chandio old working besides Au value as high as 0.18 ppm from the soil sample which was further corroborated by value of 0.80 ppm of Au from Trench-5 sample. Au value of 0.43 ppm was analysed from tremolite schist towards S of Chandio old working. The lab study was in progress.
Meghalaya, East Khasi Hills, Rhiboi and West Jaintia Hills	Kyrdem	1:12500	50 sq. km	-	-	Sampling & Mapping	G4 stage investigation for tungsten and associated mineralization was carried out in and around the contact between Shillong Group of rocks the Kyrdem Pluton. Large scale mapping (1:12,500) of 50 sq. km was carried out in the Kyrdem area and in and around the contact between Shillong Group of rocks the Kyrdem Pluton. The calc silicate band was reported in the Lumsyntung area. Three phases of deformation were recorded at Mawtari and Klew Village scheelite mineralisation which was associated with sulphide minerals was observed along the fracture plane developed in the ferruginous porphyritic granite. The control of mineralisation may be due to the hydrothermal fluid which has interacted or remobilised the wall rock along the fracture plane and given rise to the formation of tungsten bearing minerals like scheelite and wolframite. The tungsten value in 10 samples was 358 ppm, 225 ppm, 302 ppm and 152 ppm, 227 ppm, 132 ppm, 48 ppm 31 ppm, 30 ppm, 13.3 ppm respectively, in the porphyritic granite at Mawtari and Village Klew. Lithium values of 208 ppm, 131ppm, 112ppm, 83 ppm, 78 ppm were indicated from amphibolites and pegmatite vein intruded into it.
Uttarakhand,Bageshwar and Pithoragarh	Chaukori	1:12500	-	-	-	-	Reconnaissance survey (G4) was carried out for reappraisal of tungsten, tin, and REE mineralization. A total of 70 L km traverse mapping was carried out to assess aotentiality of W, Sn and REE mineralisation around Chaukori area, Bageshwar and Pithoragarh Districts of Uttarakhand in parts of toposheet nos. 53O/13 and 62C/01. Total 300 stream sediment samples (SSS), 30 bedrock samples (BRS), 24 petrological samples, 10 XRD samples and 05 EPMA samples were collected. Out of 300 SSS, 190 REE, W and Sn values ranged from 44.40 ppm to 435.49ppm, <0.51 ppm to16.78 ppm and 1.03 ppm to 39.26 ppm respectively. Analysis of 11 BRS samples showed REE, W and Sn ranged from 68.92 ppm to 344.54 ppm, 0.62 ppm to6.78 ppm and 2.83 ppm to 14.96 ppm, respectively.
UttarPradesh, Sonbhadra	Gulaljharia-Chakdumra	1:12500	100 sq. km	-	-	Sampling	Reconnaissance survey (G4) was carried out for reappraisal of tungsten and associated mineralization in parts of SoI Toposheet nos. 63P/4, P/7 and P/8. A total of 58 of BRS, 75 of SS and 75 of trench samples were analysed for assessing the potentiality of tungsten. During night survey, blue fluorescence confirming scheelite under UV light were observed in the K-feldspar granite gneiss (within catchment of Thema nadi) in Japla, Gulaljhariya,Dudhi RF and Mahuaria villages. From analytical results of one hundred forty-five samples, only five samples have yielded W value of 32.59 ppm, 48.53 ppm, 64.94 ppm, 149.35 ppm and 292.06 ppm. Highest value of tungsten of 292.06 ppm was obtained from the first order stream sediment sample collected from weathered phyllite intruded by quartz vein at Korgi Village. Thorium and Uranium values upto 163.95 ppm and 59.15 ppm respectively were obtained from the bedrock samples of K-feldspar granite gneiss.

Rajasthan, Pali	Mohangarh (Motiya)	1:2000	2 sq. km	-	-	Sampling & Mapping	Preliminary exploration (G3) was carried out for for tungsten, lithium and associated mineralization in an around Mohangarh (Motiya) where two major lithounits were identified and demarcated viz. mica schist/phyllite and granite gneiss. Mica schist was fine grained rock with quartz, mica as essential mineral composition. Granite Gneiss was coarse to medium grained leucocratic rock with Quartz (55- 60%), feldspar (35-40%), mica (3-4%), tourmaline (1- 2%) as major mineral phases. Total five major mineralised quartz and quartz tourmaline veins with visible wolfram grains of varied size from 1 mm to 6 cm were identified and recorded. These veins varied in thickness from 5 cm to 2m and exposed strike length was about 700m. The general trend of quartz and quartz tourmaline veins was NS, NNE-SSW with sub-vertical dip. These veins were branched, swirling in nature and dipping either side at places. Total 50 Channel samples, 100 bedrock samples, 50 polished sections, 30 petrochemical samples and 25 soil samples had been collected. The analytical results 21 bedrock samples were received from which one sample showed 28,000 ppm tungsten while another sample showed up to 6,000 ppm tungsten.
Vanadium							
Arunachal Pradesh, West Siang	Kaying	1:12,500	50 sq. km	-	-	Mapping & Sampling	Under G4 stage investigation during reconnaissance survey for vanadium, graphite, REE, and base metals, three bands of carbonaceous phyllite were delineated. In the northern part ofthe study area, a band of crystalline limestone was mapped, to the north-westof Village Kaying, 2 bands of tourmaline-bearing pegmatite have also been mapped. A total of 60 bedrock samples (including channel samples), 20 trench samples and 10 Petrochemical samples were systematically collected and analysed chemically. Analytical results for carbonaceous phyllite show vanadium values ranged from 101-1,303 ppm, chromium values ranged between 88-1,688 ppm, copper up to 1,262 ppm, rubidium values ranged from 76-830 ppm, lead up to 683 ppm, tin values ranged from 2-26 ppm, tungsten up to 100 ppm, chromium values up to1,062 ppm and arsenic values ranging from 2-1,360 ppm. PCS sample of quartzite exhibits LREE value of 221 ppm and HREE value of 27.5 ppm, dolomitic limestone exhibits LREE value of 4 ppm and HREE value of 0.8 ppm. Bedrock samples of carbonaceous phyllite exhibit LREE values ranging from 104-348 ppm and HREE value sranged from 3-26 ppm. Also, the chemical analysis of the samples from the study area has not given encouraging values for gold sofar with values of up to 50 ppb. Trench samples have yielded chromium values ranging from 342-1590 ppm with an average of 970 ppm. The petrochemical samples of carbonaceous phyllite/graphite have yielded vanadium values up to 3,125 ppm, chromium values up to 1,688 and copper up to 1,368 ppm.
Arunachal Pradesh, Kra- Daadi	Talangriang-Pakba-Jamin	1:12:500	50 sq. km	-	-	Mapping & Sampling	During reconnaissance survey (G4 stage) for vanadium, graphite and associated elements, 108 BRS, 52 PTS, 12 PS, 10 OM and 24 PCS were collected under LSM. During the course of LSM, five carbonaceous phyllite bands were identified and same were delineated. These were : Band 1: Carbonaceous phyllite band in the Talangiang area was traced for a strike length of 600m (0.6km) with the width varying from 80m to145m. Band 2: Carbonaceous phyllite band was exposed in the area south of zero point was traced for a strike length of 3.4 km within block and 1.2km strike length was observed outside of the this marked block with the width varying from 10 m to 35 m. Band 3: Carbonaceous phyllite band was exposed in the Pungrung-Pakba area was delineated for strike length of 9.7 km with the width varying from 10 m to 75 m. Band 4: First time reported a carbonaceous phyllite band in the Layang-Chate area was delineated for a strike length of 5.6 km with the width varying from 10m to 35m. Band 5: Carbonaceous phyllite band was exposed to the north of zero point was traced for a strike length of 1.5 km with width varyingfrom 10 to 15m. Leaching, ferruginisation, yellow and red colour alterations were noticed in the many spots in the carbonaceous phyllite bands and were indicative of sulphide mineralisation. The results of channel samples from carbonaceous phyllite showed the value of Vanadium varied from 289 ppm to 517 ppm and that of Au was less than 50 ppb. The results of pitting and trenching samples from carbonaceous phyllite showed that the Vanadium values ranged from 108 ppm to 665 ppm. The fixed carbon content in the carbonaceous phyllite varied from 0.52% to 8.95%. The analytical results of 24 PCS reveal that Fe_2O_3 content in the carbonaceous phyllite band varied from 8.81 - 10.90 % and one sample from yellow coloured encrustation found in

							thecarbonaceous phyllite in Chate area showed the values varied from17- 27%.
Arunachal Pradesh, Lower Subansiri	Sito- Sikhe	-	1 sq. km	-	-	Mapping, Sampling, Pitting & Trenching	A G3 stage of preliminary exploration for Graphite and Vanadium in Sito-Sikhe Block was proposed for one-year item in order to assess the economic potentiality of Vanadium in the Sito-Sikhe area. Detailed mapping of 1 km² was carried out in and around Sito-Sikhe villages of Lower Subansiri district in parts of Toposheet No. 83 E/10. During this preliminary exploration for vanadium, graphite and associated minerals Vanadium and graphite mineralisation showed close affinity with the meta sedimentaries of the area which comprise of NNE-SSW trending carbonaceous phyllite/schist bands of Khetabari Formation and were an integral part of Bomdila group. Surface explorations by systematic collection of BRS, pitting and trenching was also carried out. A total 76 BRS were collected through channel sampling from the entire strike of the mineralised band (carbonaceous phyllite) at regular intervals of 150 to 200 m which yielded weighted average of 2,350.02 ppm of Vanadium. Vanadiumvalues reach up to 18,500 ppmin some of the channel samples. They were also characterised by high ash content (approximately 80-85%), fixed carbon content ranging from 7.17to 17.56%. Sub-surface continuity of the mineralised band will be ascertained by drilling during F.S. 2022-23.
Arunach al Pradesh, Pakke Kessang	Pakro	1:2,000	1 sq. km	6	101.5m	Mapping & Drilling	During the preliminary Exploration (G3 stage) for Vanadium, Graphite and associated minerals, the study area exposed Bomdila Group of rocks of Palaeo-proterozoic Age and comprises NE-SW trending garnet muscovite/ biotite schist, amphibolites, graphite bearing zone of Khetabari Formation and granite gneiss, mylonitic granite gneiss of Ziro Gneiss. Cumulative strike length 1400m of graphite bearing mineralised zone was delineated having a variable thickness ranging between 3m -18m with partings of garnet muscovite/biotite schist in between. The presence of graphite and vanadium occurrences in Pakro block was restricted to garnet muscovite/biotite schist of Khetabari Formation. This mineralization was of stratified (bedded) type. The mineralization was sheared controlled, the host rock was deformed/sheared and evidence of shearing could be seen in the form of shear sense indicators present within graphite band and host rock. Surface sampling of the zone yielded vanadium values up to 3,300 ppm with an average of 1,100 ppm along with 10.33% Fixed Carbon and 0.45% TREE. Channel sampling has also yielded max value of 200 ppb of gold in graphitic schist. A total number of six boreholes were proposed to intersect the mineralised body, of which one borehole was completed at a depth of 101.5m.In the borehole three graphitic bands were intersected having varied thickness ranging from 2m to 13m.
Uncovered project							
West Bengal, Jharkhand and Odisha	Singhbhum Craton and North Singhbhum Mobile Belt	-	-	-	-	Mapping & Sampling	During traverse within Badampahar-Gorumahisani Belt, a completely different litho unit of andalusite schist in association with phyllite-micaceous quartzite was mapped. This unit was capped over the metabasalt- ultramafic sequence of Badampahar-Gorumahisani Belt near Tiring area. This litho-assemblage was similar to the Singhbhum Group of rocks and might be present here as a thrust nappe. A number of shear zones had been marked within Badampahar- Gorumahisani Belt and well within the central portion of Dhanjori basin and sampled judicially. A special emphasis, in the light of structural data collection and sampling, had been given on the unexplored central part of Dhanjori Basin. The geophysics team was engaged in the integration and interpretation of ground geophysical anomalies of regional geophysical mapping with the Aeromagnetic data obtained from RSAS, Bangalore. During the geophysical data study, interesting and unusual Bouger Gravity Anomaly and Magnetic anomaly was delineated within the metabasalts of Dhanjori Basin. During the course of fieldwork, the transect line to 1 had been extended from 130 l km to 160 l km in the southern direction and the 2nd transect line which was well within the Singhbhum Granitoids only, was discarded. Therefore, the surplus line kms will be utilised in the survey of anomalous central part of Dhanjori basin.
Rajasthan, Madhya Pradesh and Uttar Pradesh	Aravalli and Bundelk hand Cratons	-	-	-	-	Drilling	Drilling and related geological and geophysical logging was completed as part of Phase-II work during FS 2020-21 in Churu and Dausa sector. In FS2021-22, drilling was carried out near Gujar-guwara and Village Gadarwada-gujran of Dausa sector through five boreholes. Three boreholes were drilled near Gujar-

							guwara area whereas two boreholes were drilled around Village Gadarwada-gujran.Thethreeboreholes drilled near Village Gujar-Guwara have intersected sulphides in the form of mostly chalcopyrite and pyrite as dominant sulphide phases with minor amount of bornite and chalcocite in the shallow zone. In Gadarwada-gujranblock, the boreholes intersected veins, smears and dissemination of pyrrhotite-pyrite rich zone within the staurolite bearing quartz-biotite schist host.
Rajasthan,	Hanotiya, Vijainagar, Raila, Jaiswanpura	-	-	-	-	Samplig, Mapping, Drilling	The study area covered in the toposheet No. 45K/09 &10 is almost under soil cover except some outcrops which were observed along the nala section, trenches and in the form of hills, exposed near Sathana, Hanotiya and Pur-Banera areas. Systematic and detail bedrock samples were collected to know the chemical composition, petrography, ore microscopy and alteration mineralogy. Hydro-geochemical sampling was being carried out to identify the distal foot printing of mineral occurrences. Geological traverses were taken in the study area to observe exposed lithounits, collection of ground water samples, petrological and petrochemical samples. During FS2021-22 a total of 254 ground water samples, 40PCS, 15 PS and 10 OM sample were collected from the field area. Based on the analytical results samples collected during FS 2020-21 and 2021-22, 06 potential areas were identified for further detailed studies. Detailed ground geophysical survey was carried out in Lambia Kalan block which was selected based on results of hydro-geochemical sample having Zn-793 ppb, Pb-5.3 ppb and Cu-98 ppb. The Borehole RJABH-01 was drilled at Lambia kalan block where detailed ground geophysical surveys were carried out and two separated zones (Z-I & Z-II) were identified ~45- 50 m below the surface and having an estimated width of about 40 m for Z-Iand~38 m for Z-II. The borehole intersected garnetiferous granite gneiss with thin partings of amphibolites at places along the run. A sulphide zone was identified in the borehole from 92.0 m to 98.5 m in the rocks intersected by the borehole, few check samples were taken from the borehole An inclined borehole was planned at the location to test the anomalous values observed in water samples collected from the area and to intersect the litho-units for updation of predictive geological map. The borehole was drilled up to 260 m depth. The borehole intersected amphibolite and Gt-gneiss bands. Sulfide mineralisation was identified in the amphibolites band. The borehole intersected granite gneiss, Gt-bt-gneiss and bands of amphibolite. The inclined borehole intersected granite, Gt-bt-gneiss and thin bands of amphibolite in the area. Few sulphide-bearing bands confined to amphibolite were identified in the borehole and samples were collected from those bands. A 115.0m vertical borehole was drilled at Lakshmipura for this purpose.The borehole intersected Gt-bt-gniess, mica schist and thin bands of amphibolite in the area.

Rajasthan, Churu, Nagaur, Sikar	Salasar, Sujangarh, Ladnun, Nimbi Jodha area	-	-	7	1010	Samplig, Mapping, Drilling	The present study area includes SoI toposheet no. 45I/6 & 46I/10, covering an area of approximately 1400 sq. km in parts of Churu, Nagaur and Sikar Districts of Rajasthan. The Delhi Supergroup of rocks include chlorite schist (metabasic volcanics), Serpentinites (ultramafics) with minor metabasics, slate, phyllite with quartzite intercalations and amphibolite-dolerite -granitoid migmatite sequence. Rhyolites were the main rock type of the Malani Igneous Suite. Geophysical derivative maps prepared using aerogeophysical data and ground geophysical data were studied and utilised during reconnaitory traverses and sampling. In course of field work, 100 hydrogeochemical samples, 16 PCS, 24 PS, 10 EPMA and 10 XRD samples were collected and submitted for analysis. Using the results of anions and cations of water samples from FS 2020-21, Gibbs plot were prepared to identify the sample from zone of rock water interaction, and further only those values were plotted in the integrated map to identify favourable zone. Ultramafics and serpentinite exposure observed in excavation pit near Chaparra Village, which further supports the sub-surface continuity of the same lithological unit from Gunpaliya in the south west to Via Sardi-Chappara and further north wards. This finding well corroborates with the aeromagnetic analytical signal data. Petrographic studies were carried out for 21 sections including PS, TPS and OM sections. The geophysical derivative anomalies and hydro-geochemical anomalies to under stand the host rock and disposition of causative body under thick sand cover. The sub-surface data from the drill cores were used for preparation and updating of the predictive geological map. Low bouguer anomaly zone extending from Jaswanthgarh-Ladnun and Sujangarh was expected to be a part of Erinpura granite, was later concluded after drilling of borehole no RJCN05, Jaswanthgarh. Geological core logging for 07 boreholes were done along with submission of 74 processed core samples for chemical analysis, 14 petrochemical samples, 22 petrological samples. Analytical results of core samples and PCS were yet to be received.
Andhra Pradesh and Karnataka	Tumbiganur, Ramasagaram and Thimasamudram East blocks.	-	-	-	-	Samplig, Drilling	Based on geological traverses followed by petrography and SEM study in the geophysical anomaly area, drilling in the Ramasagram and Tumbiganur block were taken up to test the geophysical anomaly. Two scout boreholes were drilled in the Ramasagram block. The litho variants intersected in these boreholes were carbonate veins, diorite, porphyritic mafic dyke and PGC-II. In these two boreholes, feeble occurrences of mineralization were found as in the form of disseminated sulfides, particularly in association with the mafic-rich portions. The detailed SEM studies on these samples showed the presence of multi-metal sulfides like pyrrhotite, chalcopyrite, pyrite, gold, PGEs, sphalerite and pentlandite. A verticalborehole was drilled in the area based on the geophysical signature, intersected PGC and diorite (mafic enclaves). The detailed core logging studies revealed that disseminated sulphide was mostly pyrites, associated with mafic-rich portions. Petrography studies showed that these samples contain plagioclase, biotite, hornblende, chlorite, epidote, pyrite and chalcopyrite. SEM studies revealed the presence of palladium to tellurium to bismuth and palladium to gold association in the samples. Au mineralisation in the Ramagiri-Penakacherla greenstone belt.The main rock types encountered in deep borehole were altered chlorite schist, thin BIF, sericite chlorite schist and meta-basalt. Sulfide mineralisation intersected at various levels in the form of dissemination and minor stringers of sulphide. The analytical result of the samples has shown that Cu-35-275 ppm (n=59), Zn 40-165 ppm (n=49) and Ti 0.7%to 0.99% (n=49). The SEM and EPMA analysis display opaques were pyrites, chalcopyrite, and galena, with minor gold of 5-10-micron size. The geological setting, ore mineral assemblage, fluid nature, and alteration zone characterize the orogenic gold mineralisation at Bhadrampalli. Based on the SEM-EPMA study in Gooty mafic intrusion, few PGE grains were identified in association with sulphide and oxide phases. Preliminary classification of the Cr-Spinel indicates that the Gooty mafic rocks may belong to the Alaskan-type complex, which requires further detailed study to understand the nature and potential of Cr-Ni-PGE mineralisation and geodynamic significance.

REE & RM							
Chhattisgarh, Mahasamund	Sorid-Nawagaon	1:12,500.	110 sq.km	-	-	Mapping & Sampling	During reconnaissance survey (G4 stage) for locating REE (critical elements) mineralisation, a total of 60 of stream sediment samples, 35 of PCS samples, 35 of BRS, 25 nos of PS, 25 of soil samples and 25 of PTS were collected, 60 of heavy mineral samples were processed via panning, jigging, magnetic separation and there after bromoform separation and studied under microscope. Analytical results of samples were received showing the concentration of tREE in BRS samples ranged from 529.57 to 944.87 ppm, PTS samples ranged from 501.8 to 1,456.3 ppm and PCS samples ranged from 520.48 to 1,403.42 ppm. From the analytical results of REE, it was observed that bedrock samples from equigranular granite around Hadabandh area were better locales for REE concentrations. Pit samples from porphyritic granite, to the North of ArandVillage also provided higher tREE concentration of 1,403.42 ppm.
Chhattisgarh, Balrampur District & Jharkhand, Garhwa	-	-	-	-	-	Sampling	During the reconnaissance survey (G4 stage) for REE, the area was mainly occupied by granite and metasedimentary rocks of the Chhotanagpur Gneissic Complex (CGC). The area has anomalous zones of Total REE (TREE) mainly as secondary concentration along the stream as well as in soil profile. The maximum value of TREE in 1st/2nd orderstream sediment samples, soil sample, colluvial sample, and bedrock sample reported was 4718.47 ppm, 723.65 ppm, 3370 ppm and 2951 ppm respectively. Heavy mineral phases were monazite, zircon, allanite, tourmaline, magnetite, ilmenite, titanite, and cassiterite. Allanite bearing pegmatite mappedin south-western part and cassiterite bearing pegmatite vein discovered in southeastern area.tREE content of stream sediments defines anomalous zones in the central, southeastern and northeastern part of the study area.
Chhattisgarh, Korba District	Tarmaparah & Konkona area	1:12,500	100 sq. km.	-	-	Mapping	During reconnaissance survey in parts of SoI toposheets no 64J/06 and J/10. for lithium and associated rare metals, Five varieties of granitic rocks including (i) foliated granite, (ii) leucocratic equigranular granite, (iii) medium to coarse-grained syeno- to monzogranite, (iv) granitic pegmatite and (v) granodiorite were delineated and pegmatites were also mapped. Near Jongridongri, the pegmatites showed compositional zoning and were divided in to 3 distinct zones with different mineralogical variation. Values of Li ranged from 6.56-193.58 ppm. The analytical values only showed significant concentration of Rb in many granites (as high as 1,107 ppm). The values of Nb and Ta in the equigranular granite ranged from 1.39-105.94 ppm and 0.77-16.86 ppm respectively. In the pegmatitic Ta value ranged from 0.19-146.24 ppm and Nb value ranged from 1.44-197.34 ppm, respectively.
Chhattisgarh, Kanker	Daldali-Gattagurum	-	-	-	-	Sampling	During reconnaissance Survey for Locating REE Mineralisation, the Bengpal Group in the area consisting of granite gneiss/migmatite gneiss, quartz- sericite schist, banded haematite quartzite, and fuchsite quartzite along with Dongargarh Granitoids of equigranular monzogranite, porphyritic monzogranite, fine-grained monzogranite and granodiorite. Presence of REE phases of minerals like allanite, spinel and Zircon crystals was identified in pegmatite intruded within monzogranite and observed in Petrological and XRD studies. Geochemically, granite falls in the field of monzogranite and all the gneiss samples in quartz-rich granitoids field of QAP diagram. Monzogranites were peraluminous and enriched in LREE. The chondrite normalised REE patterns of granite and granodiorite samples were moderate to highly fractionated (La/YbN=1.34- 121.88), moderately enriched LREE (La/SmN=2.41- 9.75) with more or less flat HREE segment (Gd/YbN=0.60-5.51. In panned stream sediment samples, the ΣREE value varied from 221.4 to 31370 ppm of which the ΣLREE contributes from 200.65 to 30246.4 ppm and ΣHREE from 13.31 to 1181.68 ppm. Besides the other trace elements present were Nb (8.23-1932.97 ppm), Rb (19.13-240.15 ppm), Cs (1.5-22.3 ppm), Be (1-3.45 ppm), Ta (0.52-122.98 ppm), Th (27.09-4816.2 ppm), U (2.49-49.9 ppm), W(0.52to19.95 ppm), Mo (0.51 -8.57 ppm) and Cs (2.05-3.6 ppm). The analysed pegmatite sample in porphyritic granite has yielded ΣLREE values of 1,522.89 ppm. The trench samples showed ΣREE value of 543.23 ppm and the ΣLREE varied from 67.52 to 524.95 ppm and ΣHREE from 3.22 ppm to 22.22 ppm.

Chhattisgarh, Balrampur	Belangi	1:12,500	300 sq. km.	-	-	Mapping, Sampling, Pitting & Trenching	A G4 stage investigation was carried out in Belangi area. The block area falls in the SoI toposheet no. 64I/13. Aerial reconnaissance and PGRS study of 300 sq. km. area has been done of which an area of 100 sq. km. was covered by large scale mapping mapping on 1:12,500 scale. During the reconnaissance survey for rare metals the lithologies exposed in the area were quartz mica schist, calc-sillicate, banded ferruginous quartzite, migmatite, foliated monzogranite, porphyritic granite, sheared leucogranite, pillowed basalt, fault breccia, pegmatites, quartz veins and dolerite dykes. Rare metal bearing pegmatites were found near Belangi, NW of Belangi, near Karimati villages. The main rare metal bearing minerals identified were mostly coltan (columbite-tantalite group of minerals) and coarse light pinkish tinged mica (Li-mica). Pegmatites were coarse grained and mainly consisted of quartz, K-feldspar, mica (muscovite and biotite) and black tourmaline as accessory mineral along with columbite and tantalite. An old working (20m x 50m appox.) of base metal sulphide mineralisation (galena, malachite, limonite, azurite, bornite, sphalerite and pyrite) within brecciated quartzite and slag dump were recorded in Khani Pahar area. Graphite band was also recorded at place hosted in graphite schist. A total of 70 cu. m pitting and trenching done and 70 PTS/Channel samples, 10 PCS samples, 50 BRS (200m x 200m) samples, 10 PS samples, 10 EPMA samples, 10 SEM samples and 20 XRD samples were collected and submitted for analysis. A total of 25 heavy mineral samples were partially processed via panning, jigging, magnetic separation and thereafter bromoform separation. Microscopic study of processed HMS samples was going on. HMS samples mainly comprised of sphene and zircon.
Maharashtra, Nagpur	Ghotitola-Warghat	-	-	-	-	Mapping & sampling	During reconnaissance survey (G4 stage) for Rare Earth Elements (REE) and Rare Metals (RM) mineralisation, number of simple pegmatite and a few complex zoned pegmatite veins was mapped in the area. Petrological study of rock samples from this area has revealed the presence of allanite, apatite, monazite and zircon which may have contributed towards the relative high concentration of total REE in the rock. The Stream sediment samples collected from 1st order stream were panned and heavy minerals were segregated from it. SEM studies have confirmed the presence of REE minerals such as monazite, Zircon, etc. Signatures of fluid migration were seen both in field and thin section study. The chemical analytical results of 35 bedrock samples showed ΣREE ranging from 3.68 to 390.08 ppm. The chemical analytical results of 27 stream sediment samples out of 50 samples submitted showed ΣREE ranging from 529.33 to 46,644.99 ppm. Highest concentration of ΣREE in the stream sediment sample was observed in the North of Village Pauni.
Maharashtra,Sindhudurg	Pat-Parula	1:12,500	100 sq. km.	-	-	Mapping & sampling	During reconnaissance survey (G4 stage) in parts of toposheet 48 E/09 for REE a total of 50 groove samples were collected from 16 weathered profiles. Among them, 8 samples showed tREE values more than1,000 ppm, 3 samples showed more than 1,500 ppm and highest value was 2,951.76 ppm. In case of regolith samples, out of 50 samples, 9 samples showed more than 1,000 ppm, 16 samples showed values more than 500 ppm and highest value was 1,696.2 ppm. Among the 20 bedrock samples collected, 3 samples showed tREE values of greater than 800 ppm (highest tREE value of 914.59ppm), 3 samples showed more than 700 ppm, 4 samples showed more than 600 ppm and 4 samples showed more than 500 ppm. Based on analytical results, it can be concluded that REE enrichment was gradually increasing from bedrock to regolith and from regolith to weathered profile (B to lower A horizon) developed over granitoid. In SEM and EPMA studies, allanite, britholite, Bastnasite and Biraite were also present as REE bearing phases. On the basis of field observation, petrography and analytical results, 5 sq. km area was demarcated on surface (length 2.5km and average width 2km) as potential area for REEs.
Madhya Pradesh, Barwani Dhar	Kikarwas-Pipanpura-Ghongsi-Barkhedi	-	100 sq. km	-	-	Mapping & sampling	During reconnaissance survey (G4 stage) for REE and Associated Mineralisation, the study area comprises parts of Bagh Group, represented by sandstone and limestone, which were restricted to north-west of the area and Deccan traps, lies in SoI Toposheet number 46J/12. The XRD result indicated that the carbonate dykes primarily consist of quartz, calcite and limestone/dolomite along with a minor amount of ironoxide. The PCS results revealed that the carbonate dykes have high silica (about50%), alumina (about12%), Fe (about 12%), CaO (about 24%) and MgO (6%) which differs from the considerable criteria to carbonatite. They also have low Ba and Sr. XRD results also disclosed the high amount of silica.These may be hybrid

							carbonate rock which was emplaced along the fracture planes contemporaneously associated with the faulting activity which forms the clasts of basalt and carbonate which were further intruded by calcite veins. The analytical results did not yield any significant values of REE. Peculiarly, vanadium was present in considerable amounts, ranging up to 2,800 ppm. The copper was also reported up to 500 ppm.
Madhya Pradesh, Hoshangabad	Ramanagar formation of Narmada Alluvium	1:12,500	100 sq.km	25	182.50m	Mapping, Sampling & Drilling	A G4 satge investigation of the area which lies in SoI toposheet no 55F/14 was carried out. The major lithologies exposed in the area ranges from Precambrian to Recent. During the reconnaissance survey for Hf, Nb, Y and REE's andassociated mineralisation it was studiedthat the oldest rock types were Quartz arenite, carbonate- dolomites, phyllite and ultramafic rocks of Sleemanabad Formation belonging to Mahakoshal Super Group. Five of soil and stream samples collected from study area shown that the values of Σ REE varied from 108.41 ppm to 4,427.97 ppm. The study area was divided into four sub-blocks as Nimsadiya block, Anchalkheda block, Pahanbarriblock and Babai Block. A total of 150 soil and stream samples were collected from the sub-blocks, following a minimum 500 m distance away from the Tawa River on either side. A total of 182.50 m of auger drilling were carried out in 25 boreholes following a minimum distance of 1,600 m x 1,600 m between the boreholes. Depth of the boreholes kept between intersection of the pebble bed (about 6 to 7 m deep) or maximum up to 8.50 m. Samples were collected and processed for heavy mineral separation at Dhargaon Lab, CR, GSI, Nagpur. Out of 25 boreholes, 7 boreholes were drilled in older formations such as Banetha and Hirdepur to search the REE potential zones in older formations also. Out of 175 submitted samples (150 soil and stream samples and 25 auger drill samples), analytical results of 61 samples were received so far and the total REE values in the analysed samples varied from132.69 ppm to 1057.85 ppm, wherein, sample no. 20, collected from 1km North of Village Jasalpur was analysed maximum value of LREE and HREE as 1,012.76 ppm and 45.09 ppm respectively. The same sample showed higher values of Hf, Nb and Y also. Hf, Nb and Y valueswerevaried from 6.00 ppm to 61.28 ppm, 6.29 ppm to 38.75 ppm and 13.28 ppm to 84.32 ppm respectively. LREE values varied from 125.67 ppm to 1,012.76 ppm and HREE values from 6.87 ppm (sample no. 20) to 45.09 ppm (sample no. 22).
Madhya Pradesh, Chhatarpur	Chauka-Para	-	-	-	-	Sampling	During the reconnaissance survey (G4 stage) for REE mineralization in parts of SoI toposheet no. 54P/09, it was studied that the area was a part of Bundelkhand Granitoid Complex. The older metamorphics occurred as enclaves that comprised migmatite and gneiss. Coarse-grained granite and medium to grained granite were main constituents of BGC. As per the available chemical analysis data, BRS samples showed ΣREE value ranged from about1.84 ppm to 983.41 ppm. High REE values for BRS were recorded in syenite veins in Budhor area. ΣREE in the soil sediment samples in the area ranged from about 166.64 to 1107 ppm. High REE for soil samples were recorded in coarse grained granite near Budhor and Chauka areas.
Bihar, Banka	Karada Block	1:4,000	4 sq. km.	-	224m	Mapping, Sampling, Pitting/ Trenching & Drilling.	During preliminary exploration (G4 stage) for REE and Rare Metals 50 cu. m of pitting/trenching, 224 m of auger drilling and surface geochemical sampling viz. 50BRS, 53 PTS, 10 PCS and 194 auger soil samples were collected. Available analytical results of 104 auger soil samples indicated tREE value ranging from 98 ppm to 1,314 ppm, out of which 43 samples showed tREE value > 500 ppm with an average of 716 ppm. About 15 bedrock samples indicated tREE value ranging from 27.66 ppm to 877.5 ppm whereas, 4 samples yielded tREE value > 500 ppm.
Bihar, Bhagalpur	Batesarthan-Kasri-Jagarnathpur Block	1:4000	7.2 sq. km	8	706.25m	Mapping, Drilling & Sampling	During preliminary exploration (G3 stage) for REE, fireclay and aluminous laterite, the mapping, granitoids and granite gneiss of CGC, overlain by the gritty and ferruginous sandstone of Dubrajpur Formation were observed. A total of 706.25 meters in 400m x 400m spacing was drilled in Batesarthan and Kasri Block, to assess the fireclay along with the potentiality of REE and aluminous laterite. Two boreholes were drilled in Batesarthan Block and in the first borehole; alternate bands of clay and sandstone of Dubrajpur Formation were intersected up to a depth of 47.90 m, after which grey carbonaceous shale was intersected. Within the grey carbonaceous shale, streaks and patches of coal varied in thickness from 1cm to 15cm was intersected in a zone from 59.60 m to 77.90 m. In the secondborehole, intertrappean clay of Rajmahal Formation was intersected from 4.5m to 11.10 m, after which alternate bands of clay and sandstone of Dubrajpur Formation were intersected up

							to a depth of 56.95 m. In Kasri Block six boreholes were drilled and clay bands were intersected in all the boreholes. Laterite was intersected in four boreholes, with vertical thickness ranging from 4 m to 13.5 m.
Bihar Banka	Jogmaran Block	1:4000	4 sq. km.	-	179.35m	Mapping, Drilling & Pitting/ Trenching	During preliminary exploration (G3 stage) for REE and RM, The auger drilling of 179.35 m, pitting/trenching of 50 cu. m and collection of 196 auger soil samples, 102 bedrock samples was undertaken. The block forms part of Chhotanagpur Gneissic Complex and was represented by amphibolite, granite gneiss, and intrusives viz. granite, pegmatite and quartz vein. Auger drilling was carried out systematically on 200 m x 200 m grid pattern for sampling of in-situ soil profile developed over various litho-units and drilled up to maximum depth of 2.60 m. Results of 99 auger soil samples indicated ΣREE values ranging from 166.35 ppm to 1325.28 ppm, out ofwhich 21 samples showed ΣREE value > 500 ppm with an average of 825.75 ppm whereas, that of 18 bedrock samples indicated ΣREE values ranging from 151.23 ppm to 725.07 ppm where only one sample yielded ΣREE value > 500 ppm.
Bihar, Banka	Bhairoganj Block	1:2000	-	-	-	Mapping, Drilling & Sampling	During preliminary exploration (G3 stage) for REE and RM, the auger drilling in 200 m x 200m grid spacing and collection of auger soil samples, pit/ trench samples, bedrock samples, petrochemical samples, heavymineral samples and bulk samples withthe objective to estimate the resources of REE and RM in soil profile and weathered rock was undertaken. Geologically, the area was composed of the lithologies of the Chhotanagpur Gneissic Complex (CGC). The values of ΣREE in the pits/trenches samples varied from 110 to 1749 ppm (avg. 513 ppm with n=100). The total estimated resource of ΣREE for unprocessed auger soil samples by extended area method was 3.12 MT with an average grade of 401 ppm at a cut-off grade of 300-500 ppm and 1.17 MT with an average grade of 636 ppm at a cut-off grade of >500 ppm which can be categorised as 333 category as per the UNFC.
Bihar, Banka	Lattu Pahar Block	1:2000	3 sq. km.	-	-	Mapping, Sampling & Pitting/ Trenching	Preliminary exploration (G3 stage) for REE and RM in Lattu Pahar Block was carried out with the objective to estimate the resources of REE and RM in soil profile and weathered rock. The different soil horizons along with collection of auger soil samples, pit/trench samples, bedrock samples, petrochemical, petrological and bulk samples. Analytical results of 128 auger soil samples received so far indicated ΣREE values ranging from 38 ppm to 1,183 ppm where high valuesof ΣREE were observed over migmatite and granitic gneiss. Bedrock samples showed ΣREE values ranging from 12 ppm to 1,215 ppm and pit and trench samples showed ΣREE values ranging from 60 ppm to 1,065 ppm respectively with maximum value of ΣREE observed in pit dug over granitic gneiss country.
Bihar, Banka	Arpathal Block	1:4000	4 sq. km.	-	207.95	Drilling, Sampling & Pitting/ Trenching	During preliminary exploration (G3) for REE and Rare Metals, the block under investigation forms part of Chhotanagpur Gneissic Complex and was represented by migmatite gneiss, granite gneiss, intrusive granite, pegmatite and enclave of amphibolite. The area along with auger drilling, pitting/trenching and bedrock sampling. Auger drilling on 200 m x 200 m grid pattern was carried out over the in-situ soil profile. A total of 207.95 m auger drilling were carried out with 211 auger soil samples, 50 cu.m pitting with collection of 50 pit samples and 110 bedrock samples. Bedrock sampling was carried by means of channeling within all the lithounits present in the area and special emphasis was given to younger granites in which high REE values was reported earlier. Pitting on the flanks of streams, preferably at the meandering, was carried out to have idea about the placer pockets in the study area.The sediments collected from 1 cu. m. pit was weighed and panned to separate out heavies, and the heavies separated was processed and sent to Chemical lab for the analysis of REE/RM.
Jharkhand, Palamu	Sildag-Chhatarpur-Tenpa	-	-	-	-	Sampling	During reconnaissance survey (G4 stage) for REE and Rare metals, the area forms apart of CGGC and its regional trend varied from NE-SW to NW-SE. The major lithounits exposed in the area were migmatites, biotite granite gneiss (± garnet), granite gneiss, porphyritic granite, pink granite, grey granite, pegmatites, amphibolites, dolerite and ultramafics. In the NW part of the study towards south of Liwar Village, a bouldery outcrop of ultramafics was mapped. This ultramafic body showed NE-SW trend and lies with in the migmatites. Grey granite was exposed near Village Kangalidih. In these granites sulphides were observed which occurred as fracture filling and disseminations. Pegmatite vein of dimension (270 x 25) m has

							also been noted in this lithounit. Village Manea pyrite and chalcopyrite grains were alligned along the gneissic plane of the biotite gneiss.In bedrock samples, maximum concentration of 2,450 ppm of ΣREE was recorded east of Village Basdihar inmigmatites rock.
Jharkhand, Hazaribagh	Darudih, Jharpo and Banhe	-	-	-	-	Sampling	During reconnaissance survey (G4 stage) for REE and Rare metals, the area exposed rocks of Unclassified Metamorphics, represented by calc-silicate, calc- amphibolite, gneissose amphibolite and amphibolite; and granite gneiss suites of CGC, represented by granite gneiss, migmatite gneiss, garnet bearing granite gneiss, hornblende gneiss and quartzo-feldspathic gneiss. These rocks were invariably intruded by younger intrusives such as pegmatite, aplite and quartz vein. The area has subdued topography and largely peneplain supporting cultivation. The exposures were limited along the major river sections. From NGCM data and field conditions it appears that the REE/RM mineralization was of secondary origin and was concentrated within the weathered profile. The area also accommodates many linear pegmatite bodies along and across the Siwanenadi. The analytical results of 30 BRS samples showed that the tREE values in pegmatite ranged from 40 ppm to 1,124 ppm, in migmatite gneiss from77 ppm to 999 ppm and rest other showed very low values. The tREE values for 44 colluvial samples ranged from 74 ppm to 1,069 ppm and instream sediment samples collected from Bhandarbar and Hatwe area in the south it ranged from 1,546 ppm to 1,854 ppm. The REE-bearing mineral phases such as xenotime, monazite, zircon and a few apatites were identified. A few REE-bearing mineral phases such as monazite, zircon, allanite and apatite were observed in thin sections of hornblende gneiss, calc-silicate, gneissose amphibolite and migmatite gneiss.
Jharkhand, Palamau	Chiyanki-Leslieganj	-	-	-	-	Mapping, Sampling & Pitting/ Trenching	During reconnaissance survey (G4 stage) for REE and Rare metals, the major litho units included in Chhotanagpur Granite Gneissic Complex (CGGC) were mainly granite gneiss, migmatites and granite. The rare-earth elements (REE) and rare metals(RM) bearing minerals were not observed in the mapped area except for few allanites, non-magnetic black coloured mineral suspected RM, garnet and biotite-muscovite books and tourmaline in pegmatite near Jhabar. In case of stream sediments, ΣREE values ranged from 97 ppm 1,860 ppm. Results of 3 stream sediments samples showed ΣREE+Sc+Y values exceeding 1,000 ppm. Total REE values of PTS varied from 97 ppm to 1,433 ppm. Analysis of 44 PTS showed ΣREE+Sc+Y values ranging from 501 ppm-889 ppm and 3 PTS showed more than1000 ppm with values ranging from 1003.31- 1534.38 ppm. The pitting trenching samples also brought about some good concentrations of Nb.Trench samples, T3/CLG showed Nb, 70-276 ppm, T10/CLG sample showed Nb, 79-175 ppm and T10/CLG sample showed Nb>200 ppm from Ganke sector, Khairahi hillin western part.
Jharkhand, Palamau	Karke-Banutikar	-	-	-	-	Sampling	During reconnaissance survey (G4 stage) for REE and Rare metals, the REE mineralization in various intrusive like granite and different generation of pegmatite veins were targeted. The magnetite bearing pegmatites were observed mostly at the north-western part of the study area around Kusumahi and Baghmar villages, were quite thick (maximum upto 50 m) and had length (upto1.5 km). While the mica-bearing pegmatites were found mostly in the central and southern part of the studyarea, south of Gobardha and Samda villages which were of relatively smaller dimension. The part analytical results did not showed any encouraging values of total REE (ΣREE). The maximum ΣREE value for the BRS sample went up to 438 ppm (in the gneissose granite) and for the PTS samples maximum ΣREE value goes up to 584 ppm (in the pegmatite vein). In the stream sediment samples only one sample has ΣREE value of 1,232 ppm. All these values of ΣREE in the available analytical results of various sample media did not show any anomalous values worthy of any economic significance.
Jharkhand, Deoghar Bihar, Banka	Jamua-Punsiya	1:12500	100 sq. km.	-	-	Sampling, Drilling &Pitting/ Trenching	During reconnaissance survey (G4 stage) for REE and Rare metals, the litho-geochemical sampling in the form of bedrock sampling, pitting/ trenching and stream sediment & soil sampling and auger drilling by hand auger for chemical analysis, petrological samples for petrographic, ore microscopic & EPMA studies, to know the mineral potential and encouraging zone for REE and RM of the area was undertaken. NE-SW trending minor lineaments were noticed, which followed general trend of Bihar Mica Belt (BMB). The scrubby land and barren land cover low-

							lying undulating terrain was occupied by granitic gneisses. A total of 339 samples were collected, processed and submitted to the Chemical Laboratory, ER, Kolkata for analysis for copper REE and RM mineralisation. Soil, BRS and PTS samples were analysed for total REE, 7 samples showed tREE values more than 500 ppm. Four soil samples have tREE values as 610 ppm, 617 ppm, 661 ppm, 754 ppm and 763 ppm respectively. BRS collected near Village Birniya western part of the study block have tREE values as 667.43 ppm and Pit sample collected near Village Maheswar Kharbali north of Nandanpahad area have tREE values as946.13 ppm and 829.70 ppm from B and C horizon.
Jharkhand, Palamu	Bangasi-Chhotahasa	-	-	-	-	Mapping	During reconnaissance survey (G4 stage) for REE and Rare metals, two different phases of pegmatite unit were marked based on their disposition and trend pattern. The bedrock samples were concentrated from the younger intrusive only. In the west of Chothasa, an excavated weathered outcrop was exposed where quartz veins and syenite bodies were intruded into the amphibolite unit. The granites were quite variable in character ranging from fine-grained to porphyritic varieties containing feldspar phenocrysts size of 1mm to 3 cm max. The colour of granites varied from greyish to buff white. Two types of granite were observed aroundTalapara and south of Baranw Village. Mafic intrusive in the form of gabbro/diorite were intruded in the gneissic country rock. Analytical result of Rb value ranged from 2.85 ppm to 1,236 ppm. The total REE content in BRS samples ranged from 8.05 ppm to 623.90 ppm. Analytical results of Rb in pegmatite PTS samples ranged from 6.30 ppm to 1,567 ppm. The total REE content in PTS samples varied from 6.30 ppm to 869 ppm.
Jharkhand, Ranchi (G3)	Kutru-Dimra	1:4000	10 sq. km.	135	203.91m	Drilling & Sampling	During preliminary exploration (G3 stage) for REE and Rare metals, it was found that garnet-bearing quartz muscovite graphite schist was wide spread rock as major country rock in the block. Graphite mineralisation was found along foliation in this schistose litho-unit near Kotam, Asurkoratoli, Kusumtikra, Ludmu and Losera localities. Fixed carbon values ranged from0.92 to 5.12% FC out of 10 bed rock samples. Calcsilicate, and amphibolite/ metagabbro bodies and widely exposed in southern hillocks, central southeast and south-west and in the northern part of the study area. The E-W to WNW- ESE trending parallel to sub-parallel sets of pegmatite bodies were mapped in Ludmuto Losera-Kusumtikra to Asurkoratoli sector. Outcrop widths of these bodies were noticed from few centimetres to 10 meters which showed more persistent strike length up to several meters to kilometre. These bodies were suspected as major host rock for occurrences of REE and RM bearing minerals as based on surface indication and presence of suspected REE and RM bearing mineral phases like beryl, tourmaline, ferro columbite, tantalum columbite, yellowish green and dark brown mica, allanite, rutile, monazite and spinel which was later confirmed by XRD, petrography studies. A total of 203.91 m auger drilling was completed by 135 boreholes which were drilled in 200 m X 200 m grid pattern along with collection of 402 auger core samples.
Jharkhand, Ranchi	Tatisilwai North	-	-	-	400	Drilling & Sampling	During preliminary exploration (G3 stage) for REE and Rare metals, major rock types exposed in the study area comprised of porphyritic granite gneiss/ augen gneiss, sheared granite, granite gneiss, amphibolite and quartzo-feldspathic lenses along with quartz. The general trend of foliation planes in sheared granite/granite gneiss was E-W, dipping at 50° to 62° towards north. The area was highly sheared and falls within the North Purulia shear zone. Few old workings of barite area were also observed in the south-eastern and south-western part of the study area. A total of 400 m auger drilling was completed alongwith collection of 407 of soil samples, 50 of BRS. Analytical results of bedrock samples (n=50) showed ΣREE values ranged from 25.22 ppm to 6,553.78 ppm with a mean value of 552.38 ppm. Out of 50 samples, 1 bedrock sample (baritechunks) which was collected from barite old working showed ΣREE value of 6,553 ppm, another bedrock sample (barite bearing granite) showed ΣREE value of 2,224 ppm and another bedrock sample from granite showed ΣREE value of 644 ppm. From the above results, it was evident that barite-bearing granite or barite chunks were enriched in REE. Analytical result of soil samples from boreholes (n=387) showed that ΣREE valuesranged from 147.06 ppm to 3324.16 ppm with an average grade of 723.12 ppm. Out of 387 samples, 14 samples showed ΣREE values greater than 1,500 ppmand highest value of 3,324.16 ppm with an average grade of 1,856.49 ppm, 54 samples showed ΣREE values between 1,500-

							1,000 ppm with an average grade of 1166.34 ppm, 209 samples showed ΣREE values between 1,000-500 ppm with an average grade of 700.94 ppm, 99 samples showed ΣREE values between 500-300 ppm with an average grade of 420.70 ppm and 11 samples showed ΣREE value less than 300 ppm with an average gradeof 233.67ppm. A total of 20.10 MT resourceswere estimated. Out of 20.10 MT resources, 13.80 MT comes from B-horizon/layer-1 soil and rest of the resources comes from C-horizon/layer-2 soil.
Jharkhand, Ranchi	Tatisilwai south	-	10.3 sq. km.	-	-	Sampling	During preliminary exploration (G3 stage) for REE and Rare metals, the area exposed porphyritic granite, granite, granite gneiss, porphyritic granite gneiss, migmatite granite gneiss, amphibolite, pegmatite and quartzo-feldspathic lenses along with quartz vein and quartz reef. Two pits dug near barite old working showed ΣREE of 1,000 ppm (Pit-1) and in the ranged 2,000-2,500 ppm (Pit-4) with the presence of monazite, zircon and xenotime in heavies. The Pit-2, excavated along eastward extension of barite veins, yielded ΣREE of 1,132 ppm and 1,570 ppm from weathered rock samples of -80 mesh size and -120 mesh size respectively. Further eastward, in Pit-3, excavated on a river terrace, ΣREE was found to be 500 ppm. It was observed from the chemical analysis of orientation survey that higher values were obtained in the -120 fractions and higher ΣREE values were observed in the top horizon /first horizon. The heavy minerals were separated for 150 soil samples, of which 15 were studied and few REE-bearing minerals were identified such as xenotime, zircon and monazite, all belonging to phosphate phase. Available analytical results of 90 soil samples yielded ΣREE in the range of 86.33 ppm to 4,065.29 ppm with more than 1,000 ppm in 14 samples. A more fruitful assessment of resources can be drawn after the availability of all chemical and petrological results.
Odisha, Koraput	Koraput Alkaline Complex	-	-	-	-	Mapping	During Reconnaissance survey (G4 stage) for REE and RM, the area under investigation forms a part of Western Khondalite Zone (WKZ) and mainly constituted conformable interbanded sequence comprising khondalite and charnockite along with small patches of magnetite quartzite and pyroxene granulite which was intruded by granite and gabbro-dioritic suite of rocks associated with late phase intrusion of anorthosite, nepheline syenite, alkali syenite, and pegmatite. REE and RM mineralization was mainly confined to granite, pegmatite and syenite of the study area. Based on the available analytical results, the REE concentration of a regolith sample (C-horizon) collected from Bagharagurha syenite has analysed as 854 ppm. The four elements Nb, Sc, Y, and Zr of 49 regolith/soil samples have received. The Zr has analysed maximum 1,146 ppm while that of other elements were less than150 ppm.
Odisha, Nayagarh	Khuntapada-Purushottampura	1:12500	-	-	-	Sampling & Pitting/ Trenching	During reconnaissance survey (G4 stage) for REE and RM, the area of investigation being part of the EGMB, lithounits exposed in the area were khondalite, granite gneiss, leptynite, pyroxene granulite, leptynite and pegmatite. Large scale as well as detail mapping revealed that granite gneissic country rock was intruded by several leucocratic coarse grained to pegmatoidal syenite veins. Titanite crystals were found associated with the pyroxenite bodies which could be the source of REE. The petrographic studies of syenite, pyroxenite and their contact revealed that heavy minerals like alanite and titanite were present in pyroxenite and along the contact between pyroxenite and syenite which could be the possible source of REE. Analytical results for regolith samples indicated that tREE content in regolith varied from 184.90 ppm to 3847.48 ppm with an average of 782.83 ppm. Whereas, in BRS total REE varied from 84.409 ppm to 7436.458 ppm and in stream sediment samples it varied from 214.87 to 1118.19 ppm. Rubidium concentration in regoliths varied from 30.46 ppm to 314.23 ppm with an average of 166.18 ppm which was more than the average crustal abundance of 150 ppm in granitic rocks. After XRD and EPMA study, the mineral phases contributing for REE & RM content can be identified.
Odisha, Boudh and Subarnapur	Damamunda-Bilasapur	-	-	-	-	Mapping	During reconnaissance survey (G4 stage) for REE and RM, the mapped area lies in the Western Khondalite Zone of Eastern Ghats Mobile Belt (EGMB) in Boudh and Subarnapur districts of Odisha. The general strike of foliation observed in the rock types was NE-SW direction with moderate to steep dip towards southeast. In Damamunda-Bilaspur block, a total of 74 nos. of pegmatite veins have been mapped. These pegmatite veins occurred as clusters and were demarcated into five zones (Guruvelipadar, Bagira, Sanrahajor, Kadampal and

							Dumuriminda) which were suspected as potential zones of REE and RM. Both simple and zoned pegmatites were observed in the area. Pegmatites were composed of quartz, plagioclase, alkali feldspar, muscovite, biotite, tourmaline, magnetite, monazite and zircon. Four (4) of garnet rich zones within the granite gneiss in Tel River section were sampled for REE. Out of 270 samples submitted for chemical analysis, results of only 73 samples were received. The analytical results yielded maximum tREE value up to 1.14% (in heavy concentrate). Stream sediments yielded tREE value up to 5,340 ppm, soil/regolith yielded value up to 3,988 ppm where the BRS yielded value up to 908 ppm. Garnet rich veins in granite gneiss yielded tREE value up to 908 ppm. XRF analysis of one ilmenite sample collected from a stream nearer to pegmatite cluster of Dumuriminda (near Damamunda) area (demarcated as Zone-V) revealed that it contained Nb_2O_5: 555.4 ppm, Au: 42.1 ppm, TiO_2:46.9% and Fe2O3: 47.05%. The potentiality of the area can be established after getting complete analytical results.
Jharkhand, Ranchi & West Bengal, Purulia	Nawadih-Uparbarga-Brajapur	-	-	-	-	Sampling	During reconnaissance survey (G4 stage) for REE and RM, the surface manifestation of mineralisation inpegmatite was indicated by different features like the presence of radioactive halos, localisation of fine- grained dark minerals, presence of RM or REE mineral phases, and sometimes rare ferruginisation. Although the rock was mostly constituted of muscovite, in many portions, it contained well-developed brownish-black (zinnwaldite?) and greenish-colored mica books along with prominent rounded to sub-rounded, deep red to brownish red mineral phases. Occasionally, it contained brownish-black colored, non-magnetic mineral phases which were suspected as columbite-tantalite. The XRD study of one pegmatite sample with reddish-brown mineral phases reported the occurrence of ferro- columbite in a trace amount. Hence, the presence of these mineral phases possibly points to the fertile nature of the pegmatites. Out of various pegmatite bodies demarcated, the pegmatite bodies north of Sondimra-Ulladaka-Sargadih-west of Ambadih and north of Digardih area was found to be the prominent one reaching several km (~5 km) in length and ~ 150 m in width and it very closely falls in the strike extension of pegmatites of Belamu Pahar, West Bengal.
West Bengal, Purulia	Biltore-Golamara-Chalania	-	-	-	-	Sampling	Biltore-Golamara-Chalania block belongs to the gneissic rocks of Chhotanagpur Gneissic Complex (CGC) and falls in part of toposheet no 73I/7. During reconnaissance survey (G4 stage) for REE and RM, Discrete shear zones were noticed within PGG towards south of Village Kaluhar. Mineralised and non-mineralised pegmatite veins were observed in the mappedarea.Nonmineralised veins area coarse grained quartz, feldspar rich, often contained magnetite crystals. These veins were present in all the lithounits. The mineralised veins were thin, green/black colored epidote, amphibole, allanite, fluorite and apatite bearing veins ± sulphide. Quartz and feldspars were comparatively less. Thickness of these veins varied from few millimeters to 5 cm. These veins were observed to be restricted mainly within porphyroclastic granite gneiss. Clusters of REE veins were observed mainly in three locations. One cluster lies towards north of Village Golamara, second cluster occurred towards west of Jaleshwar, Village Mahuda and the third cluster was located towards south of Baikata and Village Baghra.
West Bengal, Darjeeling	Senada, Panchang	1:12500	50 sq. km.	-	-	Sampling	During reconnaissance survey (G4 stage) for REE and RM, 102 BRS, 50 PTS, 10 PCS and 15 PS samples were collected. The study area was covered pre-dominantly by Darjeeling Gneiss which comprised of banded migmatite gneiss and garnet biotite gneiss. Regional trend observed in Darjeeling gneiss was NE-SW with two major joint sets (NE-SWandE-W).Chungthang Formation comprising of garnet mica schist (± staurolite) and muscovite biotite schist and Daling Group represented by Chl-sericite schist with quartzite bands were exposed in the eastern part. REE bearing mineral phases like allanite, zircon, apatite, sphene, tourmaline and monazite with pleochroic halos were identified from Darjeeling gneiss and garnet mica schist during thin section studies. Sulphides i.e., pyrite and chalcopyrite observed in thin section slides of Darjeeling Gneiss. Chemical analysis results received till date showed that 17 BRS samplesover garnetiferous biotite gneiss of Darjeeling Gneiss had average tREE concentration with ranged from 329.14 ppm-827.01 ppm with an average of TREE-578.39 ppm; HREE-33.88 ppm and LREE- 544.51 ppm. Four PCS samples (received till date) showed TREE concentration ranged from 473.25 ppm - 652.39 ppm. The samples showed LREE enrichment in comparison to HREE.

Assam, Karbi Anglong	Lakhojan	1:12500	75 sq. km.	-	302.25	Drilling & Sampling	During reconnaissance survey (G4 stage) for REE and RM, the area was occupied by the migmatite gneisses of AMGC, Shillong group phyllites, quartzites, schists, and late Proterozoic granitoids. A total of 302.25 m auger drilling (52 nos.) was carried out at 800m spacing in a gridded pattern over soil developed over granitoids and migmatite gneisses. The chemical analysis of the 150 auger samples from B horizon which had thickness up to 2.0 m showed ΣREE values ranged from 156.68 to 2,067.53 ppm (average 577.71 ppm). The B+C horizon was often thick up to 9.0 m showed ΣREE varied from 154.67 to 1,467.39 ppm(average 481.60 ppm) and the C horizon of 1 to 6.0 m had the range of ΣREE from 180.29 to 1,294.83ppm (average 523.92 ppm). Resources of each mineralised zones in the boreholes were calculated by considering bulk density as 1.21 g/cm^3. The total REE resource in the block was estimated as 45.18 million tonnes with an average grade of 727 ppm. As per the UNFC classification, the present investigation of the mineral resources was codified as 334 and the average grade of 727 ppm for ΣREE was not encouraging for further exploration.
Haryana, Mahendragarh	Mosnuta and adjoining areas	-	-	-	-	Sampling	The investigated area is a part of the Delhi Supergroup and exposes the rocks of Golwa-Gangutana Formation and Deota-Dantal Formation of Ajabgarh Group which are intruded by the several younger pegmatites of Post Delhi Intrusive. Three bands of the carbonaceous phyllite from the Golwa-Gangutana Formation have been reported from the North Delhi Fold Belt (NDFB) located at three different locations in the investigated area during reconnaissance survey (G4 stage) for REE and RM, first band of about 100-120 m in thickness, having 1.0 km strike length observed near Golwa, the second band of 80-90m in thickness, having a strike length 800 m near SE of Patan & third band was having an outcrop exposure present in 1 sq. km of an area identified from west of Nangal Durgu. Chemical results of 18 of BRS samples from carbonaceous phyllite bands from various locations yielded vanadium values ranging from 229 ppm to 1,009 ppm (Avg.532 ppm) whereas in the pit samples (18nos.) vanadium values ranged from 244 ppm to 1,459 ppm (Avg. 744 ppm).
Uttarakhand, Pauri Garhwal and Chamoli	Thalisain	1: 12,500	5. 0 sq. km			Sampling	During reconnaissance survey (G4 stage) for REE and RM, 100 bedrock, 80 stream sediment and 10 petrochemical samples were collected. Besides, 27 samples were collected for petrographic study. Analytical results of bedrock samples yielded W values ranging from <0.50 ppm to 448.41 ppm, Sn from <1.00 ppm to 1,547.00 ppm, Ta from <0.20 ppm to 149 ppm, and V from 20 ppm to 1,686 ppm.
Uttarakhand, Uttarkashi	Gangotri Granite	1: 125,00	20 sq. km.	-	-	Mapping & Sampling	Reconnaissance survey (G-4 stage) was carried out to assess REE, Sn, W, Mo, and Rare Metals mineralisation, in and around Gangotri area, Uttarkashi District, Uttarakhand. The geological mapping of 20sq. km area on scale 1:12,500 and traverse mapping of 65 L. km on scale 1:25,000 was accomplished. A total of 110 bedrock samples, 30 stream sediment/slope wash samples, and 40 XRD samples were collected. Bedrock samples from Block-I containd the value of lead (Pb) from 10 ppm to 23%, Zinc (Zn) concentrations in these samples ranged from 10 ppm to 5,242 ppm. Copper (Cu) value varied from 2.5 ppm to 1,498 ppm and Silver (Ag) concentration ranged from 2.5 ppm to 168 ppm.
Uttar Pradesh, Sonbhadra	Khajuri-Pachpheri					Sampling	During reconnaissance survey (G4 stage) for REE and RM, Out of 100 BRS samples 89 samples showed ΣREE values ranged from 7 ppm to 1155 ppm, with an average of 305 ppm hosted in foliated K-feldspar granite with magnetite bearing K-feldspar Granite veins of few mm to 1.5cm thick. The highest value of REE was yielded from pegmatite vein (tourmaline-bearing) hosted in foliated K-feldspar granite exposed in Ahirantola area. Trench samples showed ΣREE values in 28 samples ranged from 57 ppm to 978 ppm, with an average of 373 ppm. Out of 30 soil samples, 25 samples showed ΣREE values of ranged from 88 ppm to 636 ppm, with an average of 317 ppm. Granites were classified under volcanic arc granites (VAG) to post orogeny granites (POG) setting.
Karnataka, Raichur	Kallingsugur and Niralkeri	-	100 sq. km.	-	-	Mapping & Sampling	During reconnaissance survey (G4 stage) for REE and RM, the major lithounits exposed in the investigated area were Pink granite, porphyritic granite, hornblende- granite, Syenite/Monzonite and dolerite. Younger intrusives occurred in the form of K-feldspar and plagioclase rich pegmatite vein and smoky quartz vein in pegmatite veins, bluish coloured minerals and presence of allanite; magnetite was also observed at some places such as villages Anehosur and Rampur. REE

							mineralization was associated with the smoky quartz vein in association with Syenite and Pink granite. Wall rock alteration was also observed in the form of limonitisation, silicification and brecciation was in quartz veins and pegmatite veins in the north and west of Village Anehosur. REE mineralization was associated with syenite, pink granite and younger intrusives such as quartz and pegmatite veins. It was lithologically controlled by the wall rock alteration in the form of limonitisation, ferruginisation, silicification and brecciation in smoky quartz veins and pegmatite veins in Syenite and Pink granite. On the basis of geochemical results, five samples of Syenite and Pink granite of Anehosur and Niralkeri area showed Total REE value ranged from 309.50 ppm up to 390.53 ppm. Ba values ranged from 506ppm to 2,085ppm in 28 samples, Sr value ranged from 384-1,400 ppm in 18 samples and Li ranged from 23-104 ppm.
Karnataka, Chamrajnagar	Gundlupet and Annurkeri	1:12500	50 sq. km.	3	469.50 m	Mapping & Sampling	During Reconnaissance survey (G4 stage) for REE and RM, Carbonatite occurred as linear detached bodies over a strike length of 1.7 km, there were six continuous carbonatite body with length varied from 300-1,000 m and variable thickness and numerous small detached discontinuous bodies. Three scout boreholes were drilled to check the sub-surface continuity of the mineralised body. Borehole KCGA-1 intersected 29.80 m REE zones with 0.56% cut-off of total REE. KCGA-2 and KCGA-3 intersected cumulative TREE zones of 15m and 12m respectively as per visual estimation. Mineralisation can be divided into three parts and the REE content was highest in carbonatite and then in carbonatite with syenite and after that syenite with carbonatite. As per the analytical results of borehole KCGA-1 LREE varied from 3,604 ppm to 8,529 ppm in carbonatites. Geophysical survey (magnetite and radiometric) was carried out in Gundlupet block. There was magnetic low over the carbonatite body trending ENE-WSW, thus magnetic anomaly well corroborates with the geology of thearea. Magnetic anomaly map has helped in delineating two faults or lineaments bounding the mineralised body. Variation of radiometric concentration could interpretate the presence of REE mineralisation in Carbonatite and associated syenite body. High concentration of Thorium and Uranium along withlow concentration of Potassium was corresponding to Carbonatite and associated syenite. Carbonatite and syenite from surface and sub-surface have similar petrographic characteristics. Carbonatite showed beautiful mosaic texture in the calcite grains. Rounded apatite, irregular monazite and euhedral to anhedral allanite were present as REE phase.
Karnataka, Tumkur Andhra Pradesh, Anantapur	Obaganapalli-Mushtivarlarnanda	-	-	-	-	Mapping & Sampling	During Reconnaissance survey (G4 stage) for REE and RM, The dominant litho types mapped in the area were alkali feldspar granite of PGC-II, alkali feldspar granite, syenogranite, monzogranite of Closepet Granite clan, porphyritic granodiorite and small granodiorite migmatite gneiss patches within syenogranite and alkalifeldspar granite. Pegmatite and quartz veins (acid intrusive) intruded into the granitoid rocks of the area. Dolerite dykes trending N310˚-330˚, N60˚-70˚ and E- W cut across these litho-units. Total 101 BRS, 52 SS, 25 PTS, 11 PCS, 21 PS, 25 SSS, 10 XRD, 10 HMS, 10 SEM and 10 EPMA samples from were collected Obaganapalli-Mushtivarlamanda area. REE mineralisation was observed within syenoganite and syenite and quartz syenite vein and in some pegmatite veins the form of well-developed allanite grains around area. To trace the continuity of mineralisation, Pit- trench mapping and soil sampling were carried out in Andepalle, Timmapuram, and Gudellaarea. Highest ΣREE were recorded in BRS-37(0.63%) in Andepalle area and BRS-9 (0.14%), BRS-18 (0.11%) from south of Kadiridevarpalle area, BRS-48 (0.09%) near Gudella Village and slight high value BRS 40 (0.08%) sample in syenogranite from Village Obaganapalle were also recorded. High ΣREE (0.38%) observed in PCS -11from quartz syenite Andepalle area. Petrographic study evidenced the presence of REE phases like zoned zircon, allanite, monazite, apatite and epidote. Sulphides viz. chalcopyrite, pyrite and covellite observed in syenogranite and alkali feldspar granite.An EPMA and SEM study on selected sections confirmed apatite, allanite, cesium, monazite, thorite,and rutile, bastanasite apart from epidote, zircon, and plagioclase phases.

Kerala, Idukki	Devikulam	1: 12500	100 sq. km.	-	-	Mapping & Sampling	During reconnaissance survey (G4 stage) for REE and RM, the area consisted of calc-granulite and garnetiferous hornblende-biotite gneiss of Khondalite Group, charnockite of Charnockite Group, hornblende-biotite gneiss of Peninsular Gneissic Complex-II with foliated granite, granite and pegmatite. The field study implied that the granite and associated pegmatites were the favorable rock for REE mineralisation. In the study area, number of non-mappable pegmatites was observed within different lithounits. Systematic sampling was carried out to know the concentration of REE along with Augur drilling was also carried out in gridded pattern where soil samples developed over granite. In hornblende biotite gneiss, the ΣLREE values ranged from 402.97 to 840.42 ppm with mean value of 621.70 ppm, the ΣHREE values ranged from 9.46 to 20.84 ppm with mean value of 15.15 ppm and the ΣREE values ranged from 412.44 to 861.26 ppm with mean value of 636.85 ppm. In foliated granite, the ΣLREE values ranged from 157.18 to 1,288.85 ppm with mean valueof 592.94 ppm, the ΣHREE values ranged from3.07 to 62.31 ppm with mean value of 24.29 ppm and the ΣREE values ranged from 161.39 to 1,351.18 ppm with mean value of 617.24 ppm. In granite, theΣLREE values ranged from 39.23 to 5,145.41 ppm with mean value of 533.05 ppm, the ΣHREE values ranged from 0.87 to 33.37 ppm with mean value of 9.31 ppm and the ΣREE values ranged from 40.19 to 5,178.79 ppm with mean value of 542.32 ppm. In pegmatite, the ΣLREE values ranged from 64.225 to 11,136.06 ppm with mean value of 820.72 ppm, the ΣHREE values ranged from 1.50 to 191.52 ppm with mean value of 16.44 ppm and the ΣREE values ranged from 66.96 to 1, 1327.59 ppm with mean value of 837.22 ppm. In regolith samples, the ΣLREE values ranged from 112.45 to 4994.51 ppm with mean value of 784.47 ppm, the ΣHREE value ranged from 6.12 to 82.89 ppm with mean value of 20.25 ppm and the ΣREE value ranged from 129.11 to 5,077.40 ppm with mean value of 804.73 ppm. In core samples, the ΣLREE values ranged from 85.80 to 4,149.8 ppm with mean value of 777.42 ppm, the ΣHREE value ranged from 11.11 to 43.50 ppm with mean value of 21.80 ppm and theΣREE value ranged from 97.50 to 4,169.27 ppm with mean value of 799.23 ppm. In stream sediment samples, the ΣLREE values ranged from 85.80 to 4,149.8 ppm with mean value of 777.42 ppm, the ΣHREE value ranged from11.11 to 43.50 ppm with mean value of 21.80 ppm and the ΣREE value ranged from 97.50 to 4,169.27 ppm with mean value of 799.23 ppm.
Tamil Nadu, Coimbatore	Somanur-Tekkalur	1:12500	-	-	-	Mapping & Sampling	During reconnaissance survey for REE and RM, the G4 stage investigation was taken up with an objective to delineate REE & RM mineralisation in granite and other associated lithology. Heavy mineral from bedrock sample and stream sediment sample were studied under SEM for identification of REE bearing mineral phases. A total of 73 BRS samples were received, of which 05 sample collected from fineto medium-grained granite has analysed >500 ppm of TREE. REE bearing mineral phases like Bastnasite, Allanite, Thorite, Xenotime and Monazite were identified by SEM-EDX. It was inferred that these mineral assemblages might have contributed to the REE values in the analysed samples.
Tamil Nadu, Vellore	Rasimalai Syenite Complex	1: 12500	104 sq. km.	-	-	Mapping & Pitting / Trenching	During reconnaissance survey (G4 stage) for REE and RM, the dominant lithology mapped during the investigation were charnockite, epidote-hornblende- biotite gneiss, syenite (pink syenite and grey syenite), dolerite dyke, metagabbro, pyroxene-granulite, pegmatite veins, quartzo-feldspathic vein, quartz vein and quartz-baryte vein. Garnetiferous charnockite were intruded by several criss-cross quartz veins which contain molybdenum mineralisation. Molybdenum occurred in the form of flakes as well as in the form of dissemination. In bedrock samples (BRS), it was observed that pegmatite exposed in the upstream direction of unit cell (63-C) yielded ΣREE of 498 ppm and the pink syenite in the Rasimalai area showed ΣREE up to 566 ppm and grey syenite has shown a maximum of 178 ppm ΣREE. Apart from REE, Ba occurrence in syenite ranged from 814 to 2,010 ppm and Sr varied from 374 to 1,375ppm. In south western part of Rasimalai area, quartz-baryte vein (~20mwidth and~200m length) was found to contain Ba value of 16.23%, Sr of 2,704ppm and ΣREE of 575 ppm and Mo 104 ppm. In regolith samples, ΣREE (La to Lu) ranged from 64.17 to 3,014.83 ppm with mean value of 283.80 ppm. In colluvial samples, ΣREE (La to Lu) was obtained up to 400 ppm. Ba value ranged up to 6.67% in colluvial sample of quartz barite vein.

Telangana, Mancherial	Jaipuram	1:12500	100 sq. km.	-	-	Mapping & Sampling	During reconnaissance survey (G4 stage) for REE and RM, the dominant lithounits of the Jaipuram area were feldspathic sandstone (Middle Kamthi Fm) and ferruginous sandstone belongs (Upper Kamthi Fm) and has gradational contact. Multiple deformation episodes viz., NNW-SSE, ENE-WNW and WNW-ESE observed in the area, which exhibited by joints and faults and, controls distribution of outcrops, shifting of rock, repetition of beds and, development of steps like cliff sections and erosional landforms. The REE mineralisation found as REE bearing minerals associated with heavy minerals. Ilmenite, magnetite, monazite and zircon were the major heavies. The visible high concentration of heavy minerals observed to be associated with Fe-soil areas, which dominantly developed from weathering of ferruginous sandstone. The available chemical analyses indicated that, in all media, Ti was the dominant element followed by Zr and TREE. The heavy minerals samples had 1.18-8.3% TREE (avg.3.47%), 3.3-27.35% Ti (avg. 11.17%), 0.99-13.64% Zr (avg.4.22%) and 0.18-1.16% Th (avg.0.51%), especially in +85 mesh size fraction. In bedrock samples, feldspathic sandstone contained average 0.05% TREE, 1% Ti and, 0.09% Zr, while the Fe-laminated feldspathic sandstone showed average values of 0.05% TREE, 0.66% Ti and, 0.06% Zr. The average 0.05% TREE, 0.75% Ti and 0.1% Zr were observed in ferruginous sandstone, which were comparable with analytical values of soil samples (wt. avg. 0.04% TREE,0.9% Ti and, 0.2% Zr). Based on geological and geochemical parameters, two potential Fe-soil zones were identified namely Zone-1 and Zone-2.
Telangana, Bhadradri-Kothagudem	Kamalapuram - Jagannadhapuram	-	135 sq. km.	-	-	-	During reconnaissance survey for REE and RM, G4 stage REE investigation was carried out in an area of about 135 sq. km.The area forms part of the Chintalapudi sub-basin, southeast extension of Pranhita to Godavari Gondwana main basin and was situated northeastern side of Telangana state. Study revealed that ΣREE value of HMS (heavy minerals) from stream sediment varied from 0.003 to 2.24 % with an average of 0.26% whereas, SSS showed 0.248% to 3.118%with an average of 1.41%. On the other hand, ΣREE value ranged between 126.88 and 3411.58 ppm (average 1214.0 ppm) in the heavy fraction separated from soil regolith sample and whereas it varied between 318.84 and 2602.19 ppm with an average of 893.27 ppm in clay fraction. However, it ranged between126.88 and 13249.96 (average 2102.91 ppm) in soil regolith (raw). The ΣREE values of BRS sample varied between 105.79 and10216.57 ppm with an average of 787.07 ppm as well.In all thecases, ΣLREE dominated over ΣHREE. Study also revealed that Monazite was the main contributing mineral phase for high REE incidence. The analytical results indicated that the REE bearing mineral phase was present in all the three mediums (bedrock, soil regolith and stream sediment) but the level of concentration varied significantly. The high values of REE in the stream sediments (HMS) were recorded in the peripheral zone particularly towards the south-eastern and southern part of the block.
Telangana, Bhadradri-Kothagudem	Gangaram Block	1:4000	10.7 sq. km.	-	-	-	A preliminary exploration for REE was carried out in Pata Gangaram block of 10 sq. km area on 1: 4,000 scale in parts of SoI Toposheet No. 65C/15. During this investigation, detailed mapping has been done for total 10.7 sq. km area. Soil sample from 31 locations and 11 stream sediment samples were collected within the 3 sq. km block area (considered for G3-stage Resource). Total 144 soil samples were collected from the selected 31 locations (as per MEMC guideline for G3-Stage resource estimation for placer type of deposit). Among these, sampling with 50cm vertical interval was done from the 17 exposed soil profiles. Samples were also collected from the pit of 1 m depth in rest of the 14 locations dueto absence of exposed soil profile. The SEM study revealed that the major mineral phases in different media of samples were Monazite, Zircon, Ilmenite, Rutile, and few silicates (mostly of quartz). Among the heavy mineral, Monazite was the only REE bearing mineral and ilmenite having higher modal abundance compared to both monaziteandzircon.Geophysicalmethodlike vertical electrical sounding (VES) was carried out to assess the soil thickness in the area. Bulk density for both stream sediment and soil was measured using cylindrical method and it was estimated as ~ 1.55 gm/cc and ~ 1.47 gm/cc respectively. The average modal proportion of heavy mineral present in stream sediment was calculated as 20 gm/kg and for soil it was about 1.52 gm/kg. REE resource will be estimated for this block based on chemical results.

Rajasthan, Sirohi	Mungthala-Mawal-Bhaisasing	1:12500	100 sq. km.	-	-	Sampling	Reconnaissance survey (G4 stage) for Niobium and Beryllium was carried out in these areas. A total of 167 bedrock sample, 30 pit/trench sample, 26 petro-chemical sample, 40 soil sample, 40 stream sediment sample and 20 heavy mineral samples were collected during field work. All the samples were submitted to chemical division, GSI, WR for chemical analysis. Apart from this, 24 petrological samples, 20 ore microscopy samples, 5 XRD and 5 EPMA samples were also collected for various studies. The litho-units observed during mapping were calc- silicate rock, impure marble, skarn, biotite granitoid, medium and coarse grained granitoid, gabbro, and sheared/brecciated cherty quartzo-feldspathic rock.
Rajasthan, Bhilwara	Mahendragarh - Gundli-Bawri	-	130 sq. km	-	-	Sampling & Pitting/ Trenching	Reconnaissance survey (G4 stage) for Neodymium and Associated Ree was carried out in these areas. Geologically the area exposed the Rajpura Dariba group of rocks of Bhilwara Supergroup along with Erinpura granite/Anjana granite and other intrusives. The main lithologies mapped during the fieldwork were sillimanite-garnet-muscovite-biotite schist / Garnet-mica-schist / Garnetiferous meta-psammite and garnetiferous meta-pellite of Bhinder formation, Quartzite of Dariba formation, Garnetiferous amphibolites / Metabasic rock as an intrusive, Porphyritic granite / gneiss of Erinpura / Anjana granite and other intrusive such as pegmatite granite/Leucogranite/Pinkgranite and pegmatite veins/reefs. A total of 65 bedrock samples, 50 pitting/trenching samples, 100 soil samples over bedrocks, 70 stream sediment samples from paleo-channels, 50 heavy mineral (fluorapatite, garnet, and magnetite observed in few samples) samples, 22 petrochemical samples, 21 petrological samples, 21 ore microscopy samples, 05 EPMA samples, 05 XRD samples were collected. Selective Pegmatites were sampled to check for Beryl enrichment.
Rajasthan, Barmer	Sainji Ki Beri-Meli	1:12,500	108 sq. km.	-	-	Mapping & Sampling	A G4 stage exploration in Sainji Ki Beri-Meli area in SoI toposheet no. 45C/06 was taken up to delineate zones of REE & associated RM mineralization and to demarcate younger intrusive phases. Large scale geological mapping was carried out along with collection of various sample media. During mapping, a total of 29 different flows of rhyolites were marked on the basis of the characteristics of groundmass colour, mineral composition of phenocrysts (viz. globular quartz, K-feldspar, Na- feldspar etc.), size and shape of the phenocrysts (viz. tabular, lath etc.) the ratio between groundmass and phenocrysts as well as presence of vesicles.
Rajasthan, Barmer	Nimale Ki Pahari-Dantala	1:12500	100 sq. km.	-	-	Mapping & Sampling	A G4 stage exploration in Nimale ki Pahari area in SoI toposheet 45C/06 & 10 was taken up to delineate zones of REE & associated RM mineralisation and to demarcate younger intrusive phases. Large scale geological mapping was carried out along with collection of various sample media. The area exposed rocks of volcanic origin (mostly variants of rhyolite, with basalt) and plutonic origin (mostly granite). General dip of volcanic flows near Dantala and Nimale ki Pahari were south to south-east with average dip of15-25degrees. Rocks of intermediate composition (andesitic and dacitic) were commonly observed in the eastern part of the study area comprising hillocks of Baloo and Arjiyana. Dykes showed varied width and length ranging from 2-3 meters and 400-500 meters respectively. Chemical results of most of the submitted samples were awaited.
Rajasthan, Barmer	Indrana-Siwana	1:12500	100 sq. km.	-	-	Mapping & Sampling	A G4 stage exploration in Indrana Siwana area in SoI toposheet 45C/06 & 10 was taken up to delineate zones of REE & associated RM mineralisation and to demarcate younger intrusive phases. Large scale geological mapping was carried out along with collection of various sample media. Rocks of volcanic and plutonic phases were mapped. The porphyritic and aphanitic varieties of rhyolite were the major volcanic phases observed in the area. The plutonic phases observed in the area are dominated by grey, coarse grained granodiorite / granite. Two sets of major joint patterns area observed in the area. These are along NNW-SSE and E-W in trend dipping westerly and southerly, respectively. The youngest intrusive phases in the area are dykes which have intruded along the joint planes with discordant as well as sheet type field relation.
Rajasthan, Barmer	Kundal-Dhiran	1:12500	100 sq. km.	-	-	Mapping & Sampling	A G4 stage exploration in Kundal Dhiran area in SoI toposheet no. 45C/06 was taken up to delineate zones of REE & associated RM mineralisation and to demarcate younger intrusive phases. Large scale geological mapping was carried out along with collection of various sample media. The lithounits mapped in the area were of older volcanic phase followed by plutonic Siwana

							granite which was further followed by younger felsic, basic and micro granite dykes. Chemical results of most of the submitted samples are awaited.
Rajasthan, Barmer	Sukleswar Ka Mandir	1: 2000	2.0 sq. km	-	-	Mapping & Sampling	A G3 stage exploration was taken up in the WNW of Sukleswar ka Mandir area near Siwana in SoI toposheet no. 45C/06 to establish the sub-surface continuity & estimate the resource of REE & RM mineralisation. Detailed geological mapping was carried out alongwith collection of various sample media. The area mapped exposed peralkaline Siwana granite which was classified into K-feldspar rich granite and porphyritic riebeckite granite along with a E-W trending andesite/rhyolite unit. Systematic bedrock sampling in grid pattern was carried out through out the area from the variants of granite. Younger sub vertical intrusive dyke in granite varied in composition from micro-granite, grano-diorite to felsites and roughly trend along N-S and some along E- W directions. The thickness of individual dykes varied from 2 cm to 2.7 m. Analytical results of channel samples received so far, indicated that most of thedykes cutting through granites were enriched in REE & RM content in comparison to variants of granite. ΣREE of 4,058 ppm and Zr up to 9,600 ppm was reported from the dyke. The ΣREE content in samples from granites varied between 1,100 ppm to 2,100 ppm. Complete analytical results of bedrock, soil and channel samples were awaited. Drilling operation was initiated on 27th February, 2022 and 87m was drilled in BH No. RBSM-1 till 31stMarch, 2022.
Rajasthan, Jaipur	Asalpur, Boraj, Bichun	-	-	-	-	Sampling	During reconnaissance survey (G4 stage) for Rare Earth Elements, Rare Metals and Base metals, in the BGC terrain around Bichun, Nayagaon, Asalpur, Dangarwara, albitite/ albitised zones with sizeable dimensions were identified. Albitites in the study area occurred as NNE to SSW, NE to SW and NW to SE trending bodies. A total of 60 Water sample showed values of Tantalum as 660, 600 and 660 (ppm) and Thorium as 620, 940 and 540 (ppm) in samples collected from Mokhampura, south of Bichun and SE of Bichun respectively. Eight water samples namely showed Zn value more than 1,000 pbb collected from 900 ms east of Village Akoda, 1.3 km SE of Akoda, near Mokhampura, 2 kms NE of Bichun,1.8 km SE of Bandhebalaji, Ugras, 1.3 km NE of Gopalpura and 1 km SW of Boraj respectively. Maximum value of Zn was 12,060.65 ppb, collected from 1.8km east of Bandhebalaji Village. Uranium value ranged from 0.5 to 90.7 ppb. There were two batches of samples one 4.8km SW of Bichun and another 2 km east of Bandhebalaji upon lithology granite gneiss which showed high concentrations of Cu, Pb and Zinc. The one occurring SWof Bichun have Cu, Pb and Zn concentrations as 232.73 ppb, 54.61 ppb and 2,175.487 ppb respectively and the other batch 2 km east of Bandhebalaji have Cu, Pb and Zn concentrations as 27.41 ppb, 101.74 ppb and 12,060.538 ppb respectively. The highest total concentration of La and Ce (3.26 ppb) was observed near Bicun over quartzite and the highest U concentration (90.75ppb) was observed 5km east of Asalpur in granite gneiss. The highest Ba concentration (264.25 ppb) was observed near Ugras in Granite Gneiss. Chemical analysis results (XRF) of 100 BRS was received which did not show any significant concentrations. Cu, Pb and Zn concentrations were lower than 100 ppm.
Rajasthan, Sikar	South East of Nanagwas	1:1000	1 sq. km.	-	-	Mapping & Sampling	A G3 stage investigation was carried out in tha area. The Southeast of Nanagwas area was located about 20 kms east of Neem ka Thana tehsil, Sikar District, Rajasthan. The area falls in SoI toposheet No. 45M/14. Geologically, the area exposed the rocks of the Ajabgarh Group of the Delhi Supergroup. The exposed lithounits were quartz biotite schist with magnetite band and banded impure marble of the Kushalgarh Formation, quartzite of the Seriska Formation and Jaitpura granite. Apart from this, numerous intrusive bodies, viz. pegmatite veins, quartz veins, calcite veins, albitite veins were present in the study area. General strike of rocks was NE to SW and dip varied from 55° to 85° towards west. The area had undergone three phases of deformation. Total 09 geochemical profiles were led across the quartz biotite schist with magnetite band/partings over 1500 m strike length and 0.50 to 03 m width. Occurrence of base metal mineralisation was also demarcated over 250 m strike length with very restricted width of about 1m in the form of fresh copper sulphides i.e., chalcocite, bornite and chalcopyrite along with pyrite and malachite stains. The analytical results of channels SENCH-01 (2m x 0.26% tREE), SENCH-02 (0.50m x 0.24% tREE), SENCH-03 (0.50m x 0.11% tREE), SENCH-04 (1.5m x 0.17% tREE), SENCH-05 (3.0m x 0.68% tREE), SENCH-06

							(1m x 0.19% total REE and 2m x 0.24% tREE), SENCH-07 (3m x 0.21% tREE) and SENCH-08 (2.5m x 0.14% tREE) indicated anomalous values of tREE on surface. On the basis of surface anomalous values of tREE, a total 09 nos. of first level boreholes RJSSN-01 to RJSSN-09 were drilled to evaluate the subsurface potentiality of REE and Rare Metals in SE of Nanagwas area.
Rajasthan, Jaisalmer	Jaisalmer-Pokran	-	-	-	-	Mapping & Sampling	A G4 stage investigation was carried out for REE & Rare metals in tha area. The basalts were mainly exposed in the southernand south-western part of mapped area around Marwa. This granite represents the second of Malani magmatism. Various aplitic veins, from where appropriate sampling was undertaken. REE mineralisation was reported from the granitoids in nearby areas. Grid sampling and appropriate number ofchannel sampling was carried out extensively in the granitoids of the area for the purpose of demarcation of potential REE zones. The last phase of MIS represented by dykes also was reported to have high potential for HREE and yttrium. A similar association was observed in the mapped area and samples were collected accordingly to check the REE potential in the mapped area. Thin felsic veins were observed within the rhyolites at places which showed intense kaolinitisation. These were also reported to be enriched in REE and samples were collected ofthe same for analysis.
Gujarat, Banaskantha	Jalotra-Vaghor	-	-	-	-	Mapping & Sampling	A G4 stage investigation was carried out for REE & Rare metals in tha area. Geologically, the area was comprised of Sendra Ambaji Granitoids intrusive in metasediments of Delhi Supergroup. A mafic dyke of nearly 2km length and 0.15 km width trending N-S was observed near Village Motipura which cut across by several aplite and microgranite dykes all trending almost along N50°W-S50°E. Two major shear zones trending in NS andNW-SE were present along with small scale shearing were observed in the study area characterised by mylonitic rock. Based on the field observations, petrographic study and proximity indicators, it seems that late phase microgranite, fluorite bearing quartz syenite and altered granite were potential host for the REE and RM mineralisation. In the thin section study, zircon, monazite, fluorite were observed in K-feldspar rich granite and quartz syenite. Alteration like epidotisation, silicification, greisenisations were observed in investigated block, which also indicated enrichment REE and RM bearing phases in altered zones in granite.
Gujarat, Panchmahal, Chhota Udepur and Dahod	Khokhra-Mithibor	-	-	-	-	Sampling	A G4 stage investigation was carried out for REE & Rare metals in tha area. Geologically (G4), the area was represented by granite gneisses, metasediments of Lunavada Group and Godhra Granitoids. Isolated and thin bands of impure marble are observed as enclave and cut off patches within K-feldspar rich two mica granite. Late magmatic activity in the form of syenite, pegmatites, aplites and quartz vein are found as intrusive into all the variants of Godhra granite throughout the study area. One panned heavy was collected by crushing 2kg of bedrock samples of syenite having metallic lustre mineral for identification of REE and RM mineral phases.
Gujarat, Kawant Taluka, Chhota Udepur	Ambadungar Carbonatite Complex	-	-	10	5727 m	Driliing & Sampling	A G2 stage Rare Earth Elements and Rare Metal exploration with drilling of 5,727 m to explore the occurrences of REE beneath the basalt of Deccan Trap was carried out in Central block Ambadungar area in Ambadongar Carbonatite Complex. Lithologically, the area comprises different varieties of carbonatite carbonate sandstone, phonolite, basalt, dolerite-dyke and quartz veins. The EPMA study of core samples indicated the presence of REE associated mineral phases like bastnasite, parasite, synchesite, apatite, fluoro apatite and monazite whereas the RM minerals were mainly associated with Pyrochlore. The drilling of 5,727 m was completed to assess the potentiality of carbonatites for REE and Niobium.A total of 10 vertical boreholes were drilled in the central block of Ambadungar area with 500 to 600 m vertical depth at 100 m x 100 m regular interval.The carbonatite occurred beneath the basalt at vertical depth of 55 m to 90 m whereas the average depth was 100 m. During the exploration out of 5,727 m of drilling 4,728 m of carbonatite zone which was favorable for REE and Niobium mineralisation was observed. The zoneof REE and Niobium mineralised carbonatite was observed in each borehole and their vertical depth varied from 450 to 500 m. Besides REE, Pyrochlore, sulphide and magnetite with pyrochlore mineralisation were also observed in core of different boreholes. Based on the previous analytical data of the core samples, these carbonatite showed encouraging value (0.4% average grade with 0.25% cut off) for REE and for Niobium.

Table-2-Exploration carried out by DMG, Rajasthan; NMDC; Hutti Gold Mine & GMDC

Agency/ Mineral/ State/ District	Location	Geological mapping		Drilling		Sampling (nos)	Remarks Reserves/resources estimated
		Scale	Area (sq. km)	Boreholes	Meterage		
DMG, Rajasthan Limestone	N/v - Hariyav, Jaspura Tehsil Vallabhnagar District - Udaipur	1:4000	1 sq. km	3	132 m	105	Core drilling for 105 m on three boreholes for sub-surface exploration was continued. A total 9 boreholes were drilled on this project. During field season: 2019-22 on Project LS-15 & LS-11 about 583 m drilling spread over 07 boreholes was carried out. Total 456 core samples were prepared and analysed for Cement Grade Limestone. On the basis of drilled borehole, the resource estimated about 74.21 MT, G2 level exploration was carried out.
DMG, Rajasthan Limestone	n/v Shyamgarh, Kanakhera, Pakriyawas, Kesarpura, Sivpuraghata etc. Tehsil-Masuda & Beawar, District-Beawar.	1:4000	1.50 sq. km	-	472 m	-	Geologically the area comprises of calc-schist, calc-silicate, limestone, quartzite & mica-schist of Kumbhalgarh Group of Delhi Supergroup along with intrusive of granite, pegmatite and vein quartz etc. A total 472 m diamond drilling was done in 1.5 sq.km area.
DMG, Rajasthan Limestone	n/v Nimana-Duniya etc. teh. Ramganj Mandi distt. Kota	-	16 sq. km	6	208 m	122	Limestone Exploration on the UNFC (G-2) level was initiated during the field season 2018-19 Later on as per MEMC Amendment Rules-2021 and Mineral Auction Amendment Rules-2021, the exploration work continued on G-3 level (800 x 800 m. grid pattern) in Nimana-Duniya area in field season 2021-22. Up to the end of field season 2020-21, a total 810.0 m. drilling work was achieved spreading over 22 boreholes i.e., NDBH-1 to NDBH-22 on UNFC G-2 level in Nimana-Duniya area. During field session 2021-22, a total 208.0 m. drilling work was achieved spreading over 6 boreholes i.e., NDBH-23 to NDBH-28. A total 122 core samples were prepared for detailed chemical analysis. A total 121.27 million tones inferred geological resources on visual estimation were estimated spreading over 6 boreholes.
DMG, Rajasthan Limestone	n/v Aughar, Tanda, Majola etc. teh. Shahbad distt. Baran	-	10.5 sq. km	17	306 m	220	Exploration was carried out in n/v Aughar, Tanda, Majola, etc. teh. Shahbad in Baran District for Limestone. In drilled boreholes one to two zones of limestone/siliceous/cherty limestone were intersected. A total 306 m core drilling in 17 boreholes was performed and a total 220 core samples were collected for analysis. A total 13.13 million tonnes of inferred geological resources on UNFC G-3 level were estimated spreading over 7 boreholes.
DMG, Rajasthan Basalt	N/v Mishroli, Gangaliya kheri Marlawada etc., Tehsil-Pachpahar, Dist Jhalawar.	1:50000	110.0 sq. km	-	-	9	A geological mapping was carried out in an area of N/v Mishroli, Tehsil-Pachpahar in Jhalawar District for Basalt. Regional Mineral Survey:- 110.0 sq. km.; Regional Geological Mapping: - 20.0 sq. km.; and Detailed Geological Mapping: 3.0 sq. km. carried out and total 9 spot samples were collected.
		1:10000	20.0 sq. km	-	-		
		1:4000	3.0 sq. km	-	-		
DMG, Rajasthan Sandstone	N/v Phaldi, Bansthuni, etc tehsil-Kishanganj, dist.-Baran.	1:50000	100.0 sq. km	-	-	-	A geological mapping was carried out in an area of N/v Phaldi, Bansthuni, etc tehsil- Kishanganj in Baran District for Sandstone. Regional Mineral Survey - 100.0 Sq. Km.; Regional Geological mapping - 20.0 Sq. Km. and Detailed Geological Mapping - 3.0 Sq. Km. carried out.
		1:10000	20.0 sq. km	-	-	-	
		1:4000	3.0 sq. km	-	-	-	
DMG, Rajasthan SMS and Cement grade limestone	N/v Sam, Tehsil & Distt Jaisalmer	RGM (R.F: 1:10000) DGM (R.F. 1:6336)	RGM-10 sq. km; DGM-02 sq. km	10	463 m	287	During the year 2021-22 total 463 m drilling spread over 10 of bore holes were carried out for SMS & cement grade limestone n/v Sam. Thickness of SMS grade limestone varied 4.50 to 12.75 m (Average thickness 8.83 m) in 9 boreholes & underlying chalky cement grade limestone varied from 20 to 36 m (Average thickness 30 m) in 10 boreholes. Visually chalky limestone (Cement grade) was 120 MT and Hard Compact Bouldary (SMS grade) limestone was 33.94 MT resource calculated.

DMG, Rajasthan Dimensio nal Stone / Masonry Stone	N/v Purohitsar, Tehsil Pokaran, Distt. Jaisalmer.	RGM (R.F: 1:1000 0) DGM (R.F. 1:6336)	RMG: 05 sq. km; DGM: 02 sq. km	-	-	-	Mapping and delineation of sandstone suitable for dimensional stone / masonry stone carried out. The total 05 sq. km RGM and 2 sq. km DGM were carried out n/v Hajiron Ki Dhani, Tehsil Pokaran, Distt. Jaisalmer. About 0.50 sq. km area comprised marron to reddish colour medium-grain sandstone, thickness varied from 0.50 to 3.50 m (cumulative thickness) and potential for masonry stone discovered.
DMG, Rajasthan Limestone	N/v Chakeri, Raitha kalan, Ninoni, Hingoli, Olwara and Dubbi Banas Tehsil; Tehsil Sawai madhopur & Malarna, District - Sawai madhopur.	1: 10000 1:4000	RMG- 30 Sq. Km.; DGM- 05 Sq. Km.	-	-	-	Geologically the area comprised sandstone with grit & limestone rock of Satola Group of Vindhyan Supergroup. The limestone bands were found discontinuously exposed in an area of about 2,200 m x 10-120 m n/v Chakeri, Raitha kalan, Tehsil Sawai madhopur, in about 3,600 m x 10-250 m area n/v Ninoni, Hingoli, Olwara, Tehsil Sawai madhopur and in about 4000m x 100-1,000 m area n/v Dubbi Banas river bridge, Tehsil Sawai madhopur & Malarna. The limestone was Cherty in nature at surface.
DMG, Rajasthan Sandstone (Splitable/ Blockable), Masonary Stone	N/v Chhakra, Teh- Wazirpur, District- Sawai madhopur; N/v Kota, Teh.- Masalpur and N/v Girwarpura, Raghuvansi, Teh.- Karauli & District- Karauli.	-	DGM- 2Sq. Km.	-	-	-	The Chhakra area was proposed for delineation of masonry stone and total 9 plots of masonry stone were delineated n/v Chhakra, Teh- Wazirpur, District- Sawai madhopur.
NMDC, Iron Ore (haematite)	Bacheli (D-5)	-	-	23	4102.0 m	-	Exploration was carried out in the area of Bacheli (D-5). A total 4,102 m drilling were done in 23 boreholes.
NMDC, Iron Ore (haematite)	Bacheli (D- 10)	-	-	26	2375 m	-	Exploration was carried out in the area of Bacheli (D- 10). A total 2,375 m drilling were done in 26 boreholes.
NMDC, Iron Ore (haematite)	Donimalali, Bellary	-	-	5	258.1 m	222	Total 5 boreholes were drilled with a total meterage of 2,58.10 m. (Two borehole started in the year 2021-22 were continued during 2022-23). The total resources as per UNFC were 111-97.81MT, 121 & 122-32.52 MT 211-4.10 MT & 333-14.20 MT. Total 148.62 MT.
Hutti Gold Mine Gold	Village: Hutti, Taluk: Lingasugur, Dist: Raichur, Karnataka	1:400	0.868 sq. km (under ground mappin g)	-	-	5293	The Hutti Gold Deposit had a definite Stratigraphic, lithological and structural control. The wall rock alteration, vein Formations and primary gold-quartz sulphide minertalisation occurred conternporaneously with first fold deformation. During 2021-22 the reserve calculated as per UNFC proved Category was 15.58 Million Tonnes @ 4.38 Au g/t. Tonnes; Probable} 3.36 Million Tonnes @ 4.10 Au g/t.
GMDC Lignite	Tadkeshwar, Surat	-	9.65 sq. km	-	-	-	Lignite seams were occurring as interbedded deposits within tertiary formation belonging to Eocene & Oligocene epochs, consisting of sandstone, limestone and carbonaceous shale.
GMDC Lignite	Matonnomadh , kutch	-	-	20	1279.8	-	To know the existence of mineral & ascertaining the reserve on the basis of 20 boreholes were drilled. A total 1.2 MT (Approx.) in Measured (STD 331) category resource calculated.
GMDC Lignite	Mine lease area in vill.- tagadi, Po malpar, Ta & dist.- Bhavnagar, Gujarat.	-	-	18	1275	-	Drilling was carried out to established Lignite Boundary & confirmation of lignite seams, hard strata etc.
GMDC Bauxite	Wandh-1 Bauxite Mine	-	-	15 (pit)	58.70	6	Pitting of 1.82 x 0.91 x 3.96 m was done for confirmation of qualitative bauxite adjoining to the mine pit edge.
GMDC Bauxite	Nana Goniyasar Bauxite Mine	-	-	7 (pit)	29.80	4	Pitting of 1.82 x 0.91 x 4.26 m was done for confirmation of qualitative bauxite adjoining to the mine pit edge.
GMDC Bauxite	Naredi-2 Bauxite Mine	-	-	8 (pit)	33.75	-	Pitting of 1.82 x 0.91 x 4.26 m was done for confirmation of qualitative bauxite adjoining to the mine pit edge.
GMDC Lignite/ Limestone (associate d mineral encountered in overburde n	Lignite project Panandhro, taluka-lakhpat, distt.- Kutch, Gujarat	1:10000	1.72 sq. Km.	-	-	-	This was a elliptical basin. The strata including the lignite seam. The Laki series of middle Eocene Age contained formations like shale, clay, lignite & gypsum.