

Report on National Seminar on ‘75 years of Mineral Exploration and Future Challenges in India’ – MEFCI-2022

Dr. D.K. Sinha, Director, Atomic Minerals Directorate for Exploration and Research AMD Complex, Begumpet, Hyderabad- 500 016
E-mail: director.amd@gov.in; dksjai@gmail.com

Received: 5 May 2022 / Accepted: 7 May 2022

© 2022 Geological Society of India, Bengaluru, India

The Atomic Minerals Directorate for Exploration and Research (AMD), Department of Atomic Energy in association with Geological Society of India, Bengaluru organised a National Seminar on ‘75 years of Mineral Exploration and Future Challenges in India – MEFCI-2022’ as part of the ‘Azadi Ka Amrit Mahotsav’ in Dr. Homi J. Bhabha Auditorium, AMD Complex, Hyderabad, during 5-6, April 2022. The entire proceedings of the Seminar were webcast in the virtual platform.

The Seminar was inaugurated on 05.04.2022 by Shri Roopwant Singh, IAS, Commissioner of Geology and Mining, Gujarat and Managing Director, Gujarat Mineral Development Corporation (GMDC), who was the Chief Guest of the seminar. The dignitaries on the dais included Guest of Honour Prof. O.P. Varma, President, Indian Geological Congress, Roorkee; Padma Shri Dr. H.K. Gupta, President Geological Society of India, Bengaluru; Dr. D.K. Sinha, Director, AMD and Co-Patron, MEFCI-2022 and Shri B. Saravanan, Additional Director, AMD and Convenor, MEFCI-2022.

The audience comprised of several retired and in-service senior officials from AMD and other DAE units, eminent geoscientists from professional organisations like Geological Survey of India, Hindustan Copper Limited, Mineral Exploration Corporation Limited, Uranium Corporation of India Limited, office bearers of Geological Society of India etc. besides faculty and research scholars from various Universities and academic institutions across the country. The dignitaries in the audience included Dr. K.K. Dwivedy, Shri P.S. Parihar and Shri L.K. Nanda, Former Directors, AMD; Dr. G. Amarendra, RRF & Former Director, Materials Science Group, Indira Gandhi Centre for Advanced Research (IGCAR); Dr. R.K. Vatsa, Head, PAD, DAE; Dr. T. Sreenivas, Head, MinD, BARC; Dr. T.S. Sunil Kumar

and Shri R. Mamallan, Additional Directors, AMD. Nearly 150 participants attended the seminar physically. In addition, a large number of participants including Dr. T.M. Mahadevan, Former Director, AMD joined the proceedings through virtual mode.

Shri B. Saravanan delivered the welcome address. The message of Chief Patron, MEFCI-2022, Shri K.N. Vyas, Chairman, Atomic Energy Commission and Secretary, DAE was recited by Shri R. Mamallan. Thereafter, Dr. D.K. Sinha enlightened the purpose of organising MEFCI-2022. Dr. H.K. Gupta speaking on the occasion elucidated the rationale behind his thought of fast-tracking exploration for gas hydrates in the country. In his address, the Guest of Honour, Prof. O.P. Varma expounded the importance of teacher-disciple tradition in nation building. Shri Roopwant Singh, Chief Guest, while addressing the audience recalled the association of GMDC and AMD and highlighted the progress achieved by Gujarat in building up a strong and resilient Rare Earth Elements industry in the state. Subsequently, Prof. K.V. Subba Rao, Vice President, Geological Society of India, Prof. O.P. Varma, Dr. H.K. Gupta and Dr. K.K. Dwivedy were felicitated for their lifetime contribution in geosciences. Dr. T.S. Sunil Kumar proposed the vote of thanks.

The seminar comprised of six (06) sessions, chaired by eminent personalities from AMD, BARC, GSI, Indian Bureau of Mines and IIT-Roorkee and each session had oral and poster presentations. A total of 75 presentations including six (06) keynotes and 69 research articles were made on six (06) themes related to various aspects of mineral exploration during the two-day proceedings of the seminar. One of the significant highlights of the seminar was the interactive poster session, which was conducted in both virtual and physical modes



Lighting of the lamp by the dignitaries on the dais during the inauguration Ceremony of the National Seminar



Release of the Abstract Volume of the National Seminar



Group photo of the delegates and expert members of panel discussion – MEFCI-2022

in the side-lines of the auditorium. Members of the audience and the online participants of the poster sessions interacted enthusiastically with each other over the virtual platform. Brief outline of the technical sessions and the highlights of the papers presented are as follows.

Session I was based on the theme “Historical perspectives of mineral exploration in India and characterisation of mineral systems” and chaired by Prof. O.P. Varma. The session comprised 07 oral presentations and 06 poster presentations. In the keynote address, Prof Varma emphasized the crucial role of economic geology in making meaningful mineral explorationists. Dr. D.K. Sinha in his talk enumerated the achievements of AMD during the last 75 years in atomic minerals exploration and the changes brought about in exploration strategy for achieving self-sufficiency in atomic minerals resources. Shri Roopwant Singh, stressed upon the need of collaboration between industry, academia and R&D institutions for the development of mineral industry in India, particularly Gujarat. Mr. Ashok Nandi, President, IBASS, briefed about the challenges in bauxite exploration in India. Ms. Sukanya Chakraborti, HCL, briefed about the copper exploration and resources in India along with historical perspective. Mr. S.V. Satyanarayana, GSI (Retd.), provided an insight on the diamond exploration in India. Mr. Intezar Alam, MECL provided an overview of gold exploration in India. The poster session – I, on the topics related to uranium exploration in North Delhi Fold Belt, Rajasthan; Bijawar Basin, Madhya Pradesh; Siwalik Basin, Himachal Pradesh and Dirang Formation, Arunachal Pradesh was conducted simultaneously along with the technical session.

Session II was based on the theme “Challenges and advancements in mineral exploration technology for metallic, non-metallic and atomic minerals” and chaired by Dr. S.N. Mahapatro, DDG, GSI, Hyderabad. The session comprised 06 oral presentations and 06 poster presentations. In the keynote address Dr. Mahapatro presented a synoptic view of the stages adopted by the Geological Survey of India for mineral exploration in India. Dr. A.V. Jeyagopal, AMD (Retd.), presented the evolution history of the Tummalapalle deposit, Andhra Pradesh - the largest uranium deposit in India. Shri Rajeeva Ranjan, AMD, presented the uranium potential of Chhotanagpur Granite Gneiss Complex. Ms. Sikta Patnaik, AMD presented the role of organic matter in uranium mineralisation in the sediments of Kaimur Group in Vindhyan Basin. Ms. Anubhooti Saxena, AMD, presented the petro-mineralogical aspects of uranium mineralisation in Geratiyon - Ki - Dhani, Rajasthan. Ms. Akhila, AMD presented the importance of thorite bearing bands in metallogeny of Singbhum Shear Zone. The poster session II comprised uranium exploration in Kaladgi Basin, Karnataka and near surface paleo-channel in western Rajasthan; manganese deposits of Dharwar Craton; Vengodu leucogranites; Daitari iron ore deposit, Odisha and geophysical signatures of Karimnagar Granulite Terrain.

Session III was on the theme “Advancements in mineral exploration techniques” and chaired by Shri P.S. Parihar, Former Director, AMD. The session comprised 04 oral presentations and 06 poster presentations. Shri Parihar in the key note address highlighted the effects of the paradigm shift in the strategy for exploration for atomic minerals in India. Shri Pradeep Pandey, AMD (Retd.), in his virtual presentation enumerated exploration efforts for uranium in the Himalayas during the last six decades. Dr. Navin Goyal, AMD, presented on the uranium exploration efforts in the Aravalli Supergroup, Rajasthan. Dr. V. Ramesh Babu, AMD, briefed about results of the integrated study of heliborne and ground geophysical data of Palnad Sub-basin of Cuddapah Basin for uranium exploration. The poster session III comprised integrated exploration in Pani manganese mine lease area, Gujarat; characterisation of Southern Granulite Terrain using geophysical data; use of partition coefficient as path finder for uranium mineralisation and integrated study of field



Inauguration Ceremony of the National Seminar



Section of the audience during Session-I of the National Seminar



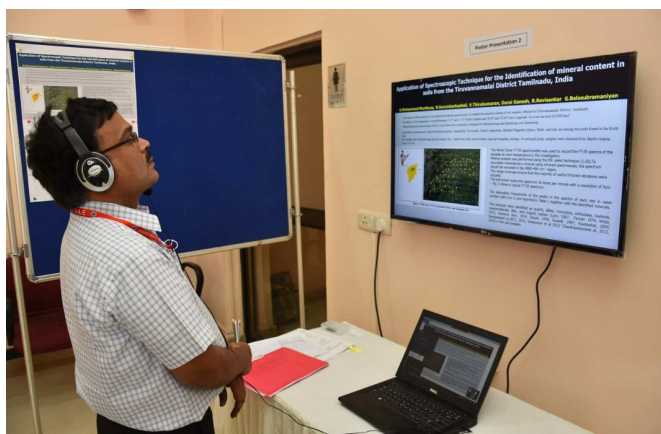
Expert members of the panel discussion in the National Seminar on ‘75 years of Mineral Exploration and Future Challenges in India’ – MEFCI-2022’

relations, petrography and mineral chemistry in deciphering the contrasting environs of mineralisation in Rohil uranium deposit.

Session IV was focussed on “Exploration of Rare Earth Elements, critical elements and heavy minerals in placers” and chaired by Shri K. Ramesh Kumar, Former Additional Director, AMD. The session comprised 07 oral presentations and 06 poster presentations. In the key note address Shri Ramesh Kumar presented an overview of beach sand heavy mineral resources in India. Shri S. Surya Kumar, IREL, emphasized the need for sustainable low carbon economy through effective utilisation of REEs. Dr.P. Krishnamurthy, AMD (Retd.) virtually presented on the overview of conceptual approaches in mineral exploration particularly uranium. Shri P. Jagadeesan, AMD, virtually presented the exploration efforts for REE in the Siwana Ring Complex, Rajasthan. Shri T.S. Shaji, AMD, presented an overview of heavy mineral resource potential of red sediments (Teris) of Tamil Nadu. Shri Poritosh Mahato, GSI, presented the details of the potash

mineralisation identified in Satipura sub-basin, Rajasthan. Shri Rohan Das, GSI, presented the details of the breccia hosted copper mineralisation along the Babai –Tonda lineament and its relevance to the IOCG deposit in Khetri copper belt, Rajasthan. The poster session IV comprised of study on critical minerals with Indian examples; report on euxenite form Nellore Mica Belt, Andhra Pradesh; study on auriferous veins in Mahakoshal belt, Uttar Pradesh; study of REE in coal ash from Rajmahal coalfield; study on the REE potential of nepheline syenites of western Odisha and the variants of allanite of Singhbhum Shear Zone and its implications in REE mineralisation.

Session V was based on the theme “Geochemistry, mineral chemistry and ore mineralogy of mineral deposits and developments in mineral processing” and chaired by Dr. T. Sreenivas, Head, MinD (BARC), Hyderabad. The session comprised 06 oral presentations, 05 poster presentations and 02 invited presentations from the industry.



Online poster session of the National Seminar - MEFCI-2022

Shri K. Anand Rao, MinD (BARC), Hyderabad highlighted the development of chemical process for preparation of highly pure heat treated uranium peroxide from sodium diuranate, which has effectively increased U_3O_8 concentration for use in pellets for nuclear power production. Dr. R. Krishnamurthi presented the petro-mineralogical studies carried out in Rohil uranium deposit, Rajasthan. Shri M.L. Dora presented the integrated studies carried out in the Ni-Cu-Te-PGE prospect of western Bastar craton. Shri Ram Karan presented the hydrometallurgical studies carried out for recovery of REE from microgranites of Bhatikhera area, Rajasthan. Shri Sujoy Biswas, BARC, briefed on removal of uranium from tailing pond using porous material. Shri Harshit Varshanay, AMD, presented the sedimentary facies analysis carried out in the sediments of Cave Temple Formation of Kaladgi Supergroup and its implications on uranium mineralisation. The poster session V comprised comparative mineralogical studies of low and lean grade iron ores during slow and rapid reduction roasting; attributes of hematite in iron ore and its geo-metallurgical implications; characterisation and leaching of REE from coal ash and multi stage alteration in the rocks of Khetri copper belt, Rajasthan.

The Session VI was focussed on “ore genesis, mineral economics and strategy for the development of resources” and chaired by Shri P.K. Jain, Chief Mineral Economist (Retd.), IBM, Nagpur. The session comprised 07 oral presentations and 05 poster presentations. Shri Jain in the key note address enumerated the legislative reforms and challenges to provide impetus to mineral exploration in India. Shri R. Shankar, IGEO, outlined about the marine mineral resources. Shri Pramod Kumar, AMD (Retd.) virtually presented the overview of mineral exploration scenario in India. Shri Sandeep Hamilton, (Retd.) presented the metallogenetic aspects of sandstone type of uranium deposits in Meghalaya. Shri P.C. Swain, ECIL, presented the advancements in the indigenously developed nuclear security systems in ECIL. Shri Sukanta Roy, BGRL, discussed the results of the geophysical studies carried out for exploration of basement rocks

beneath Deccan traps. Shri E.V.R. Parthasaradhi, IICT, briefed the Enterprise Geospatial Database Management System developed in AMD. The poster session VI comprised beneficiation studies of lepidolite bearing granite - pegmatite - aplite; REE mineralisation in phosphorite of Dombarahalli area, Karnataka; geophysical exploration in Pathargora fault, Singhbhum Shear Zone; application of microgravity data for delineation of rare metal bearing pegmatite in Karnataka and application of geospatial methods for exploration of beach placers.

The Seminar concluded with a panel discussion moderated by Dr. D.K. Sinha. The panel of experts drawn from a wide range of professional organisations and academia deliberated on the present status of mineral exploration and mining sectors and future challenges in the country. The recommendations of the seminar which emerged from the deliberations are as follows:

1. Steps to be taken for larger collaborations with academic and research / professional institutions for effective dissemination of knowledge.
2. Training of young researchers in mineral exploration with a prominent place for women research scholars.
3. Research and Development in the ‘knowledge gap’ areas in metallisation process of important minerals both by the academic and research / professional institutions.
4. Efforts to be taken to identify large multimetal deposits (like IOCG deposits) for improving the mineral economy in India.
5. Improving the understanding between exploration geoscientists and process scientists (mineral technology, etc.).
6. Efforts to be taken to improve the system of acquiring various administrative approvals (like forest permission) for mineral exploration. A ‘single window clearance system’ may be adopted for boosting mineral economy in India.
7. Use of modern technologies in mineral exploration like drone, Artificial Intelligence (AI) and Machine Learning (ML) and data integration using advanced GIS tools.
8. Data sharing on a regular basis between academic and research / professional institutions.
9. Suitable incentives to the professionals who come up with good mineral discoveries.
10. Metallogenetic maps for all the metals may be generated covering the entire country for use by the professionals taking up mineral exploration.

In the concluding session, Shri Harshit Varshanay and Ms. V.R. Akhila, Scientific Officers, AMD were honoured with the MEFCI awards for best oral and poster presentations respectively for participants below the age of 35 years. On the occasion, the Indian Society of Analytical Scientists (ISAS) has honoured Shri Rajeev Bidwai, AMD (Retd.) and Ms. Priyanka Mishra for their poster presentations.