Workshop cum Training on Geology and Exploration of the Ferrous Group of Minerals in Precambrian Milieu of Odisha – B.M. Faruque, Institution of Geoscientists, Odisha (E: bmfaruque@gmail.com)

With the promulgation of National Mineral Policy (NMP) 2016, Government of India has laid enormous thrust on regulation of minerals, roles of State in Mineral development, survey and exploration, handling of database of mineral resources and tenements and strategy of mineral development. Moreover, NMP 2016 aims at accelerating mineral exploration in the country by allowing higher participation of private sector by prioritizing public expenditure on detailed exploration activities. The just approved NMP 2019 encourages the private sector to take up exploration, which may help augment the exploration activity in the country. Odisha covering an area of 155,707 km², which is 4.87% of the total area of the country is endowed with huge resources of ferrous group minerals (34% iron, 28% manganese, 96% chromium, 95% nickel and 98% PGE of total national resources) confined to restricted areas within a complex geological milieu. Geological Survey of India, besides Directorate of Geology, Odisha are instrumental in discovering and exploration of most of the deposits of ferrous group minerals in Odisha and in the process have some of the finest geoscientists of the country.

The recently constituted Institution of Geoscientists Odisha (IGO) formed by highly experienced former geoscientists of Geological Survey of India undertook a maiden attempt to provide an interface between the experienced geoscientists and the young professionals engaged in exploration and exploitation of ferrous group minerals in the state. The five day workshop cum training on “Geology and Exploration of the Ferrous Group of Minerals in Precambrian Milieu of Odisha”, sponsored by NMDC was conducted during 6th to 10th March, 2019 with trainees from NMDC, Tata Steel, Rungta Mines and SPS Geomine. Inaugurated by Shri Deepak Mohanty, Director of Mines, Govt. of Odisha as the Chief Guest, the training programme started with a series of lectures delivered by domain experts and members of IGO. The lectures were: (i) Ferrous Group Metallogeny in Precambrian from global and Indian perspective by R.N. Sar, former Dy. D.G., GSI, (ii) Ferrous Group ore deposits: their geological setting and distribution in a Precambrian milieu from Odisha by B.K. Jena, former Dy. D.G., GSI, (iii) Orthomagmatic ore deposits in the Singhbhum Craton with special reference to the chromite mineralization in the Sukinda Ultramafic Complex by J.K. Nanda, former Dy. D.G., GSI, (iv) Modern Techniques of Mineral exploration by Dr. Manoranjan Mohanty, former Dy. D.G., GSI and (v) Lateritisation process: implications for ferrous group of mineral deposits by R.N. Patra, former Dy. D. G., GSI followed by an interactive sessions. This provided a platform for the trainees to refresh their knowledge on ferrous group of minerals, their distribution and exploration.

It was followed by a day long field traverse across the contact zone between the Eastern Ghats Mobile Belt (EGMB) and the Singhbhum Craton making the trainees abreast with the regional geological set-up in general and identification of various rock types (charnockite-enderbite, khondalite, and leptynite) in particular. Appraisal of Mobile belt-Craton relation, study of characteristic features of the Sukinda thrust, and zones of mylonite and pseudotachylite characterizing parts of the Brahmani lineament, contact zone granite, in the road section between Brahmani river and Duburi were also undertaken. The mine sections in Kaliapani

opencast chromite mine of Odisha Mining Corporation (OMC) were studied along with observation of the orthopyroxenite, chromitite and nickeliferous laterite. The cores of the boreholes presently being drilled by OMC were also scrutinized and nuances of borehole logging was demonstrated. In the evening, interactive session was conducted to clarify the doubts and further elaboration on the Sukinda chromite disposition and exploration methods.

The Mesoarchaeon Iron Ore Group (IOG) of rocks in Bonai-Keonjhar belt is disposed in a horseshoe shaped synclinorium structure in the western part of the Singhbhum Craton and is considered as a metal bowl because of huge iron and manganese resources. Hence, regional traverse across the Singhbhum craton examining the different components of the Singhbhum Granite (homophanous gneissic granite, stromatic to agmatic type migmatites and porphyritic granite) was undertaken. The archaeological site at Sitabinjhi, Kendujhar district, exhibiting type section of megacrystic Singhbhum Granite was examined. Newer dolerite dykes comprising dolerite and peridotite were studied. The unconformable contact of the Singhbhum Granite and the arkosic gritty sandstone of the Iron Ore Group as well as the amygdaloidal metabasalt (Malangtoli-Nuakot) overlying the arkosic quartzite was examined in Rugudi road section. Trainees visited the Chamakpur, detrital iron ore deposit (DID) along the eastern bank of the Baitarani river, considered to be part of the Kolhan Group. Here large boulders and cobbles of both haematite and BIF are embedded in a matrix varying from arenaceous to ferruginous in composition, thus making the deposit viable for mining since the last forty years. Traverse was undertaken in Kundra nala section to understand the structural disposition of the BIF and underlying tuffaceous unit on the eastern limb of the horse-shoe synclinorium. Control of iron ore mineralization and techniques to be deployed during exploration of these bodies were discussed in detail at the mine section of Joda (East) iron ore mine of Tata Steel and Kiriburu mine of SAIL. Similarly, control of manganese mineralization and its exploration strategy was examined at Joda (West) manganese mine of Tata Steel. On the last day, exploration methodology adopted by GSI in exploring the iron ore bodies within the valley portion of KBK belt was discussed in the drilling camps of GSI and the cores were examined. The drilling site at Gandalpara block, Kendujhar district was visited and unresolved issue of the stratigraphic position of valley iron ore bodies vis-à-vis the BIF hosted ones on the eastern and western limb of the synclinorium was elaborated. The dolomite horizon at Kasia containing oldest biota was also studied. Shri J.N.Das, former D.D.G., GSI and member IGO and Coordinator of the Workshop, organised the valedictory function at the conference hall of Joda (West) mine of Tata Steel. Shri Ansuman Dutta Gupta, Senior Director, Tata Steel and Chief Guest of the Valedictory Session, spoke about the complexity of manganese exploration in KBK belt and emphasized that this type of field training cum workshop with input from the experienced professionals would help in tackling these complex issues. Shri S.K. Jena, former Dy.D.G., GSI, delivered a talk on exploration of Iron ore in the valley areas of KBK belt and emphasized possibility of finding unexplored huge resources of iron ore in the region, concealed under alluvium or laterite. Certificates were distributed to the trainees by the Chief Guest.

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