Report on the International Seminar on Carbonatites-Alkaline Rocks and Associated Economic Mineral Deposits and Field Visit to Amba Dongar Carbonatite Complex – P. Krishnamurthy (Geol. Soc. India, Bangalore), Raymond A. Duraiswami (Pune University) and S.G. Viladkar (Carbonatite Res. Centre)

Inauguration and key-note addresses

An International Seminar on the above theme was organised jointly by the Gujarat Mineral Development Corporation (GMDC) and the Physical Research Laboratory, Ahmedabad. It was held at the hotel Regenta Inn, Vadodara, where most of the delegates also stayed. There was an informal inaugural session followed by eight (8) scientific sessions on 8th and 9th with a wrap up session on the evening of 9th. In all there were thirty four (34) presentations of scientific and technical papers including twelve (12) from foreign delegates from countries such as USA, Canada, Germany, Czech Republic, South Africa, Russia, Namibia and Ghana.

S. B. Vora, Senior General Manager, GMDC and currently Advisor to GMDC, Science and Research Centre, formally welcomed the delegates and briefly stated the objectives and scope of the Seminar. Vora highlighted the role of late Prof. R. N. Sukheswala of St. Xavier's College, Mumbai and his illustrious Ph.D student Dr. S.G. Viladkar in the study and researches on carbonatites at Amba Dongar for over 50 years, since the discovery of the first carbonatites at Amba Dongar in India in 963 by R.N. Sukheswala and G. R. Udas of the Atomic Minerals Division, Department of Atomic Energy. The deposit of fluorite at Amba Dongar, with 12 Mt resources, one of the largest deposits in the world, was proved by Dr. A.P. Subramaniam and M.L. Parimoo of the Geological Survey of India during the early 1960s.

Viladkar started his Ph.D studies on Amba Dongar in 1967 and completed it by 1972. Since 1980 he collaborated with a galaxy of experts on carbonatites from Germany, USA, Russia and others so as to understand the geology and mineralisation at Amba Dongar, often guiding the exploitation of fluorite by GMDC. His work culminated with the establishment of the Carbonatite Research Centre in honour of his supervisor and mentor, Prof. R.N. Sukheswala in 2006, Vohra recalled. He termed the present Seminar as the second Indian Carbonatite meet (Indo Carb. II), the first one that was by organised by GMDC and held at Amba Dongar in 1996, twenty years ago.

Arun Solanki, Managing Director, GMDC briefly outlined the exploration, beneficiation and exploiting activities of the Corporation in the sectors of bauxite, lignite, clay, mineral sands in Gujarat besides involvement in solar and wind-power generation. With a work force of 1500 personnel, GMDC represents a flag-ship company in Gujarat with a turn-around of Rs. 4000 crores per annum. Such Seminars, he hoped, would help in moving forward at Amba Dongar so as to revive mining and exploitation of fluorite besides other resources like rare earths and niobium, proved by AMD, that are closely associated with or without fluorite in the ground or within the waste or tailing dumps.

A message received from Prof. Gittins on the occasion was read out wherein Gittins recalled his maiden trip to Amba Dongar in 1996, which had included almost all the 1st generation carbonatite experts around the world such as D. P. Gold, J. B. Dawson, A. R. Woolley, W. J. Verwoerd and others In spite of his keen desire to attend the present, advancing age and an ailing wife precluded from attending the Seminar. He wished success and the very best for the current Seminar.

Prof. Robert Martin, McGill University, Montreal, Canada and Editor spoke on '*Snippets into the life and times of Prof. S. G. Viladkar'*. Born in 1943, SGV took his B.Sc. in 1965, M.Sc. in 1967 and Ph.D. in 1972 from the St. Xavier's College, Mumbai. He is rather unique in the sense that he kept Amba Dongar as his focus of carbonatite studies for 50 years besides studies on almost all the Indian carbonatites, collaborating with a number of experts on carbonatites in all its facets such as petrology, mineralogy, and geochemistry, stable and radiogenic isotopes. Martin appreciated the highly focussed study for 50 years at Amba Dongar by SGV, a rather rare feature in scientific pursuits, compared to his own way of a 'scientific butterfly' with diverse areas of interests.

This was followed by an informal lecture by Dr. Viladkar '*My 50 years in Amba Dongar'* and narrated the saga of field work in the late 1960s, living in hutments like the Bhil tribesmen and sharing their wells and streams in the thickly forested area. He recalled the challenges in mapping and living in the Amba Dongar area, infested with snakes

and occasional tigers located about 15 km from the nearest village at Kawant.

Dr. Bhadresh Mehta and Nitin Sukhla of GMDC also spoke on the occasion and appreciated the efforts of scientists led by Dr. Viladkar at the CRC, scientists from PRL, Ahmedabad and officers of AMD, past and present, in helping GMDC in its efforts to revive the fluorite mining at Amba Dongar. The case for reviving mining activities at Ambadongar has been strengthened by the proving of new resources of REE and Nb from exploration and drilling activities by AMD since 2015, they opined. The scientific and technical sessions began after this inauguration.

The points that emerged after a brief deliberations are as follows:

1. Considering the new resources on strategic metals such as REE and Nb identified by AMD at Amba Dongar (carbonatites and breccia from subsurface, mine dumps and tailings), GMDC's case for reopening the fluorite mine and the process plant at Kadipani has been strengthened.
2. The need for seamless interactions between various agencies involved in the beneficiation of ores (fine-size) and recovery of metals which need innovative techniques (ODS, NML and others) that represents a major challenge at Amba Dongar. The review group on REE at the national level should be involved considering our low intake of high-purity REE materials.
3. The new instruments and techniques in both physical and chemical characterisation of rocks and minerals should be used increasingly to understand the carbonatite complexes and associated silicate rocks and their genesis. New developments in the Ca and boron (B) isotopes have helped in such an endeavour.
4. The need to understand the alkaline-silicate rocks in more detail, especially the reported effusive lapilli and other components.
5. Use of geophysical tools to understand the subsurface geology.
6. Lack of funds, even in advanced nations such as USA, for researches on carbonatites and related rocks that host multi-metal resources.
7. The need to study more critically the silico-carbonatites (with silicate minerals such as the pyroxene sovite) vs. silicified carbonatites.

The delegates expressed their thanks to Dr. Viladkar of CRC, Dr. J.S. Ray of PRL, co-hosts of the Seminar and above all GMDC, the main hosts, for arranging the Seminar and conducting the proceedings and providing local hospitality at the Hotel Regenta Inn. The whole technical sessions were vanchored by Dr. Raymond A. Duraisawmi, Department of Geology, Savitribai Phule Pune University.

A detailed report is available on Society's website.