Journal of Applied Geochemistry
Vol.14 No.2 (2012) pp 221-222

BOOK REVIEW

Review of Memoir 79 published by Geological Society of India (GSI).

The Memoir on "Bengaluru: Water Problems of the Fastest Growing City of India", brought out as a part of the seminar proceedings by Geological Society of India, is an excellent compilation of 18 papers authored by many eminent scientists, technocrats belonging to various fields of water resources and environment. The Book edited by Shri Subhajyoti Das covers various topics related to water supply issues of the Bengaluru City. It encompasses all the relevant data, information on past and present status of water distribution and resource potential of the City. The articles are segregated into four broad chapters which together present the broad spectrum of water crisis, ecology and wastewater treatment aspects of Bengaluru urban agglomeration which in a broader sense reflects the scenario of a fast growing city in South East Asia.

The Editor Shri Subhajyoti Das, himself being the water resource scientist of eminence, had played a pivotal role in selecting the topics and papers so as to address all issues involving urban water supply. His rich expertise in groundwater is reflected in fine tuning the five papers exclusively on groundwater issues of the City apart from another five well organized papers on conjunctive use of surface water and groundwater. Shri Das in the introduction spelled out many details of current water supply position of Bengaluru city and suggested an integrated approach covering all elements of water resources, environment, ecology, etc to improve the water resources of the City.

Dr. B. P. Radhakrishna, the doyen of geo-sciences in India, who's papers are reproduced from JGSI Vol. 65, No. 4 published in the year 2005, has visualized the water scarcity scenario for Bengaluru city, many years earlier. One of his papers emphasized the need for rain water harvesting and suggested to make it mandatory for all upcoming buildings. He has not only stressed the need for enumeration of basic information of all groundwater structures but also painstakingly prepared a questioner for collection of general as well as hydrogeological details of all wells.

In Chapter I, Shri S V Srikantia, in his paper very elaborately described the physiography, climate, and geology of the Begaluru city. He has at length discussed the reasons for current crisis in water supply and proposed many alternate resource improvement measures like rainwater harvesting, lake revival, waste water treatment, etc. The paper by Shri M. N. Thippeswamy put forth the existing water supply capacity, its utilization and projected future demand. He has strongly advocated adopting water conservation measures, recycle/re-use and development of dual water distribution network. His pictorial presentation of many day to day water saving measures will be very useful for all. Dr K Md. Najeeb in his paper has eloquently brought out the present status of groundwater development and its quality deterioration due to improper sewerage and industrial effluent disposal mechanisms in the City. Dr. Najeeb has advised to drastically reduce transmission losses and urgent need for treatment and reuse to bridge the demand–supply gap. Shri V. S. Prakash in his paper has briefly and crisply mentioned the groundwater management issues and proposed many constructive suggestions for efficient utilization of available resources. Shri Mohan Kumar and others being technocrats have suggested many point-wise water management tools for improving the water distribution in the City. They have emphasized the urgent need to "reduce, recycle, re-use" which not only bring down the scope for water contamination but also boost the water supply position. The authors could have added another "r – recharge (to groundwater)" which would complete the cycle of water utilization process and enhance the sub-surface water potential. The paper proposes many modern techniques like modeling, GIS, etc as scientific and technical support system for judicious utilization of all available water resources.

In the first paper of Chapter II, the authors Shri T. M. Hunse and others have described the geology, physiography and hydrogeolgical setting of the Bangaluru city. Various information/data pertaining to groundwater quality, aquifer disposition, hydrological parameters, resource potential, scope for artificial recharge etc were furnished which will be very useful for taking up future groundwater development. Other papers in this chapter emphasize on indiscriminate exploitation of limited groundwater resources in the City which has resulted in deepening of water levels, decrease in well yields, and water quality deterioration. The authors have suggested various methods in improving the groundwater resources by employing latest techniques like remote sensing, GIS, periodic water level and quality monitoring, etc. In these papers the authors have presented exhaustive data on surface water bodies, groundwater wells, wastewater treatment techniques, water marketing etc. The efficacy of rain water harvesting is very strongly advocated in these papers.

The papers in Chapter III emphasized the water conservation and conjunctive use of surface and groundwater. The paper by Shri Muthuchami is an excellent contribution on long term (1961-2007) rainfall data analysis for the Bengaluru city. He has very eloquently described about the rainfall distribution in space and time which can be effectively utilized for planning rainwater harvesting structures in the City. Other papers in this Chapter, while depicting the present physical features and water resource potential of the city and its sub-urban areas, have stressed the need for rain water harvesting as the city is blessed with ample quantity of evenly distributed precipitation pattern. Mrs Nandini and others were very vocal about the preservation of greenery, wet lands and surface water bodies to sustain the water potentiality and maintain clean and green environment of the city. Many success stories and model schemes are presented in these papers which will be encouraging for the citizens to initiate measures to take up water conservation and rain water harvesting as a mission.

In Chapter IV three papers were included in which the need to initiate statutory measures is emphasized to control unplanned exploitation of limited water resources. Dr. Farooque and others have presented many examples to bring home the point of need for a strong legislation to control the over exploitation of groundwater. The paper by Shri Venugola is an outstanding contribution on this subject, he has presented the prevailing laws of different countries and States of India which will be helpful in designing an effective law to prevent misuse of precious resources and maintain ecological balance in the city. Shri Das as very precisely summed up the essence of all the articles which is a must-read matter for all those who are concerned about urban water resources management issues.

In spite of many highlights, the Memoir 79 has its own share of shortcomings. Many papers are too lengthy and descriptive and lack the credibility of scientific papers. References mentioned in the text are not listed and those listed are not mentioned in the text. Many authors have not followed standard journal pattern, viz ground water, tube well, bore well, etc are mentioned differently at different locations in each article. Much of the data referred is indistinct and without quoting the source (e.g. the words like- ***about***, ***nearly*** are used for the data**).** Basic information about the City and its water resources etc are repeated in many articles. However such minor deficiencies do not reflect on the overall quality of the book which is a well researched valuable document for water scientists , urban water managers and planners.

Date: 23-04-2012

A.G. S. Reddy
Hydrogeologist
Central Ground Water Board (CGWB)
Pune-MH
E- mail : sugerive_59@reddifmail.com

Journal of Applied Geochemistry
Vol.14 No.2 (2012) pp 223-225

BOOK REVIEW

Review of Volume 21, October, 2011 published by Atomic Minerals Directorate for Exploration and Research (AMD), Hyderabad, India.

The October, 2011 issue, volume.21 of "Exploration and Research for Atomic Minerals" is an in - house publication of the Atomic Minerals Directorate for Exploration and Research, Hyderabad. This volume contains 121 pages incorporating 12 papers covering topics such as: (a) Nature of Uranium (U) mineralization, (b) Age and isotope geochemistry of U-mineralization, (c) Identification of U-bearing ore minerals and their genesis, (d) Zircons from beach sands, (e) U, Th, K geochemistry, (f) Air borne gamma-ray spectrometric data enhancement and (g) Extraction of Uranium.

Muthamilselvan et al. ,describing the albitite and albitised metasediments hosted U-mineralization at Rela, Gashipura and Rayan Ka Bas areas in East Khetri Basin (EKB), Rajasthan, have observed higher concentration of soda over potash (Na_2O/K_2O ratio=1.39 to 1355) and 0.030 to o.510 % U_3O_8 coupled with low Th, mainly in the soda metasomatites, though the potash metasomatites also show higher values of U, suggesting that the EKB located in North Delhi Fold Belt can be a potential target for albitite-albitised metasediments hosted U-mineralization.

Ajay Kumar et al., describing for the first time, the occurrence of Au-REE ± Ag ± Pt in the IOG equivalent radioactive Archaean QPC-quartzites along the western margin of the Bonai granite pluton in Orissa have shown <20 to 382 ppb Au, <1.0 to 3.5 ppm Ag, 61.6 to 1245.9 ppm " REE and <10 to 188 ppb Pt in the QPC and <20 to 1527 ppb Au, <1.0 ppm Ag, 3.0 to 311.2 ppm " REE and <10 to 692 ppm Pt in the IOG quartzites. They state that Au-Ag-REE±Pt are concentrated in the radioactive QPC, while the non-radioactive quartzites have only Au-Pt-Rh and Ir. They attribute the presence of higher REE in QPC to detrital monazite, zircon, chromite, sphene, allanite, xenotime and AU-Ag-Pt to ultramafic-mafic enclaves in Singhbum granite or the ultramafic-mafic complex, intrusive into the 3.5 Ga old Daitari-Tomka IOG basin. According to them the AU-REE±Ag association in the QPC-quartzite assemblage reflects the Witwatersrand and Elliot Lake type QPC deposits. They suggest that higher concentrations of Au-U in QPC reported earlier from the eastern margin of Bonai granite in Koira basin and the IOG basins of Gorumahisani-Badampahar and Malyagiri-Banthol and in Dhanjori basin provides possibilities for locating QPC-type U-mineralization in association with Au-REE±Ag-Pt along the western margin of Bonai granite pluton and other IOG basins.

Shaji et al., reporting the occurrence of three distinct albitised zones, bearing davidite, brannerite and uraninite in the albitite and albitised gneisses of Bichun and Nayagaon areas in BGC, Rajasthan, have stated that samples have 6.4 % U_3O_8 coupled with low Th, higher Na_2O and low K_2O. Their studies have shown that davidite is the most abundant radioactive phase while brannerite and uraninite are minor phases. According to them, the high REE concentrations and the sizable extension of davidite –bearing host albitite coupled with high concentrations of uranium suggest a new vista for exploration of Uranium and REE in this part of the BGC in Rajasthan.

Pandey et al., reporting for the first time, the age of uranium mineralization, carried out by Pb-Pb (Pb-step leaching –PBSL) method in high-grade granulites of Pedduru, Karimnagar Granulite Belt (KGB) have suggested that the presence of uraninite in high-grade granulites is rare and that the radiogenic $^{206}Pb/^{204}Pb$ ratios were high (64298), while $^{208}Pb/^{204}Pb$ isotopic ratios were low ranging from39.37 to 130.8. They observed that the Pb/Pb isochron age was 2422±89 Ma. They suggest that the high radiogenic $^{206}Pb/^{204}Pb$ ratio is due to uraninite and that the low value of $^{208}Pb/^{204}Pb$ indicates that the sample was nearly free from Th.

They correlate the 2422±89 Ma age with the ages of high-grade metamorphism and granite emplacement in the KGB and infer that the high uranium content of 1.96% U_3O_8 in biotite gneisses in association with the intrusive potassic granites may be the source of uranium in the overlying sediments.

Rao et al. have described the development of a process flow sheet for separation of zircons occurring in the beach sand deposit of Srikurmam area, A.P. involving application of desliming of the beach sand, wet tabling of the sand fraction, low intensity magnetic separation of magnetite, perm roll and induced roll magnetic separation of the table concentrates. They followed up the above wet gravity and magnetic separation by microscopic observations to obtain ultrapure zircon fractions eliminating sillimanite and other phases.

XRD studies by **Yamuna Singh and Viswanathan** on radioactive ores hosted in the migmatitc complex in Rihand Valley, Chhotanagpur Granite Gneiss Complex, have shown association of uraninite with davidite, fergusonite, aeschyite, samarskite, columbite-tantalite, xenotime, monazite and thorite, suggesting high-T uranium mineralization. They suggest that the high unit cell dimension and very low oxidation grade of uraninites also reflects high-T conditions of formation. According to them, the binary relationship between unit cell dimension and oxidation grade indicates a genetic link of uranium mineralization with regional metamorphism, anatexis, metasomatism, contact metamorphosed granitoid-pegmatoid aureoles including redistribution of sedimentary uranium and its concentration along favorable structural features.

Rajaraman and Naidu, studying the U,Th and K abundance in the Proterozoic Shillong Group of rocks of Mawlaingut area, have stated that data obtained by using a portable gamma ray spectrometer is comparable with laboratory based data. They observed that the Barapani Formation contains a high average value of uranium (4.38 ppm) and low average potassium content (0.55%). According to them, the high content of uranium along NW-SE zones in the Barapani Formation indicates the role an oxygenated fluid in remobilization of uranium along fractures. They also state that in the Tyrsand Formation, remobilization and reconcentration of uranium is reflected by the low mean U/Th and U/K values with a gradual increment of uranium along the fracture system younger than the Barapani Formation.

According to **Kothari et al.,** the Middle Siwalik Formation in Hoshiarpur district of Punjab and Una district of Himachal Pradesh hosts uranium mineralization (0.005 to 0.021% U_3O_8) in calcareous concretions sand stone facies within the fine to medium grained, clast supported sandstones. Sedimentological studies by them indicate a land locked palaeoenvironment of deposition with stagnation and desiccated braided channel for the mineralized sandstone incorporating calcareous concretions. They have suggested a 5 km zone in the NE limb and a > 250m zone in the SW limb of the Janauri anticline, as having a potential for uranium mineralization.

Ramayya et al., describing improved techniques for data enhancement in airborne gamma-ray spectrometry, have demonstrated removal of artifacts for a given area by the global mean method. They suggest application of linear contrast enhancement for removing level differences prior to using the global mean method. They have applied the method of residuals to the uranium channel data by utilizing correlation between uranium and a combination of thorium and potassium, thus succeeding in removing artifacts to some extent. They state that there is good correlation between the profiles generated by residual method and microlevelling. According to them, more details in the image were revealed by the images of mean differences and derivatives and that the ternary images generated using different data types have highlighted details which are useful in uranium exploration.

Seshadrinath et al. have carried out uranium extraction studies on the brecciated uraniferous limestone and granite from Gogi area, Bhima basin in Karnataka and have developed a common flow sheet for these two different host rock types due to the common occurrence of uraninite in them. The alkaline leaching method was applied by them after blending the two types of ores. They opine that the process indicated 91% leachability of uranium on a laboratory scale.

Pandey et al., presenting the Rb-Sr, Sm-Nd and Pb-Pb ages of granites and andesites hosting the Mohar Cauldron in the Bundhelkhand Granite Complex, have shown that granites have an Rb-Sr whole rock age of 2409±89 Ma, while andesites have an Rb/Sr whole rock age of 2511±280 Ma and a Pb/Pb age of 2622±300 Ma indicating their emplacement age. According to them the Mesoarchaean age of their protolith is reflected by the Sm-Nd model ages (T_{DM}) of granites, c.3035-3204 Ma and andesites, c.2869-2955. They suggest that the age of Mohar Cauldron may be between 2000 and 1200 Ma.

Petrographic studies by **Asoori Latha et al.** on the two sub-horizontal zones in quartz arenite and one zone in the basal conglomerate which host uranium mineralization, in the Banganapalle Formation at Koppunuru in Guntur district of A.P, have shown that the pebbly arenite having a polymictic and poorly sorted nature coupled with abundant interstitial matrix and pore space has enabled migration of the mineralizing hydrothermal fluids. According to them, presence of colloform pyrite in pebbly arenite has acted as a reductant for uranium mineralization, coupled with the presence of carbonaceous matter which has enabled fixation of uranium carried by the mineralizing solutions either by complexation or reduction, thus making this rock type, a potential host for uranium mineralization.

Illustrations depicting maps, photomicrographs, geochemical variation diagrams and data tables in this issue are all very well done, informative and in support of the conclusions arrived at by the different authors. This volume will be very useful for students, teachers and professionals as it succinctly incorporates a gamut of themes related to uranium mineralization in the country.

Date: 07-06-12

S. Nirmal Charan
Scientist "G" (Retd)
National Geophysical Research Institute (NGRI)
Uppal Road,
Hyderabad - 500 606