

## ASSESSMENT OF GROUNDWATER QUALITY FROM PHREATIC AQUIFER AROUND OPENCAST COAL MINING AREAS OF KOTHAGUDEM, MANUGURU AND SATTUPALLY IN KHAMMAM DISTRICT, TELANGANA STATE (INDIA)

G. Prabhakar<sup>1,\*</sup>, M. Sudheer Kumar<sup>2</sup>, K. Srinivas Reddy<sup>1</sup> and N.C. Mondal<sup>3</sup>

<sup>1</sup>Department of Geology, University College of Science, Saifabad, Osmania University, Hyderabad, TS

<sup>2</sup>Central Ground Water Board, Southern Region, Hyderabad, TS

<sup>3</sup>Aquifer Mapping Group, CSIR-National Geophysical Research Institute, Hyderabad, TS

E-mail: project\_prabhakar@yahoo.co.in

### Abstract

Thirty groundwater samples were collected from phreatic aquifers during post-monsoon season (December, 2013) around the three different opencast coal mining areas of Kothagudem, Manuguru and Sattupally in Khammam district, Telangana State. The American Public Health Association (APHA, 1995) standard methods were followed for analyzing concentrations of the physicochemical parameters pH, EC, TDS, TH, Ca<sup>2+</sup>, Mg<sup>2+</sup>, Na<sup>+</sup>, K<sup>+</sup>, HCO<sub>3</sub><sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, Cl<sup>-</sup>, NO<sub>3</sub><sup>-</sup> and F. The results of these parameters were interpreted with the help of Piper, Gibbs and Wilcox diagrams along with correlation matrix. Results indicate that alkaline earth's Ca<sup>2+</sup> + Mg<sup>2+</sup> exceed alkalis Na<sup>+</sup> + K<sup>+</sup> while the weak acids CO<sub>3</sub><sup>-</sup> + HCO<sub>3</sub><sup>-</sup> exceed the strong acids SO<sub>4</sub><sup>2-</sup> + Cl<sup>-</sup>. The quality of groundwater is governed by rock dominance with no significant dominance by precipitation and evaporation. From correlation matrix, the highest correlation is found between EC and TDS with a correlation coefficient of 0.59. Further, suitability of groundwater for irrigation was examined with reference to different irrigation indices like electrical conductivity (EC), total dissolved solids (TDS), sodium percent (SP), sodium adsorption ratio (SAR), residual sodium carbonate (RSC) and Kelly's ratio (KR). It indicates that groundwater quality has EC value in about 77% of the samples under high salinity category while sodium percent (SP) value in 67% of the samples fall under excellent to permissible category. The RSC and KR values in about 73% samples and 53% samples, respectively, fall are in the safe category for irrigation purpose. Due to high concentration of fluoride (<1.5 mg/l), the groundwater quality is not suitable for drinking purposes around these opencast mining areas.

*Keywords:* Groundwater quality, Opencast mining areas, Khammam district, Telangana State.