Investigating the effect of sedimentary environment and diagenesis on karst development potential in Tirgan Formation (west of Kopet-Dagh, NE Bojnurd, Iran)

F. Shakiba*[1], Gh. Karami[2] and A. Taheri[3]

1- Ph. D. student in Hydrogeology, Faculty of Earth Sciences, Shahrood University of Technology, Shahrood

2- Assoc. Prof., Dept., of Geology, Faculty of Earth Sciences, Shahrood University of Technology, Shahrood

3- Prof., Dept., of Geology, Faculty of Earth Sciences, Shahrood University of Technology, Shahrood

* **f.shakiba1348@gmail.com**

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Abstract

Tirgan Formation in Kopt-Dagh structural zone is an important karstic formation which contains significant water resources. Numerous water wells have been drilled in this formation. They have very different discharges. Ninety (90) thin sections, geophysical logs, well discharge changes, karst morphology have been studied. The karst development potential of each rock unit of this formation has been studied in this area, which depends on the sedimentary environment, diagenesis and siliciclastic sediment. In this region, Tirgan Formation can be divided into three limestone rock units and two limestone-marl rock units. This formation has been deposited in a homoclinal ramp and four sedimentary belts of tidal, lagoon, shoal to the open sea and twelve micro-facies have been identified. Twelve microfacies were identified. Compaction, stylolitization as an effective diagenetic factor is reducing from the base to the top of the formation and dissolution is increased. Siliciclastic deposits, quartz and shale decreased and rate of carbonate deposition and the diversity of allochems have increased from the base to the top. These events, in principle, significantly increased the potential for karst development. There are varieties of large and Small-scale karst features such as sinkholes, dry valleys, caves, karren and grikes in Upper parts of formation. Higher discharge of water wells (60 l/sec) and their continuous discharge, higher transmissivity (1037 m2/day) in the upper rock unit of Tirgan formation shows that, this rock unit has the greatest potential for karst development and developed later.

Keywords: Tirgan formation, Microfacies, Karst development, Transmissivity