

Application of the Geostatistics to Identification of the High Water Escape Potential Locations in the Tangab Dam

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1. Introduction

In dam site studies, the study of permeability and joints and hydrogeomechanical behavior is one of the basic requirements of the exploration stages. Due to the complexity of geological conditions, measurements of hydrogeological data such as hydraulic conductivity and conductivity may indicate significant uncertainty. Accordingly, estimation and simulation of hydrogeological data are performed by different methods. Geostatistical methods have been widely used for estimating aquifer hydraulic parameters and investigating the uncertainty of hydrogeological and geotechnical parameters. One of the methods for modeling the geometry of permeable layers is the use of geostatistical simulation. In Fars province, Tangab Reservoir Dam provides part of the irrigation water of Firoozabad plain. The water balance calculations by Fars Regional Water Company and previous studies show that a large part of the reservoir water escapes through parts of the dam supports. Therefore, the question that arises is that geologically, which areas around this dam, the potential for water escape, is high. An attempt was made to answer this question by examining the spatial continuity of the data of Lugeon variables, RQD and cementing of exploratory boreholes, and finally the geostatistical simulations of the mentioned variables in the study area. Tangab Dam is located in 90 km south of Shiraz and on the Firuzabad River. This dam is in the Zagros zone (the Podenow anticline). This anticline is mainly composed of Asmari (Oligomyocene) calcareous Formation and is surrounded by Razak Formation and Pabdeh Gurpi Formation (Paleocene-Oligocene).

2. Method

In this study, geostatistical studies were performed on Lugeon data, RQD and cementing of exploratory wells in the vicinity of Tangab Dam, which include: exploratory-spatial analysis of data, declassification of data, histogram or box diagrams of various variables, investigating changes in variables at different altitudes, investigating the possible relationship between different variables using

scatter plots, preparing mapping maps and investigating the presence or absence of possible anisotropy and finally geostatistical modeling (using Isatis geostatistical software) Gaussian simulation.

3. Results

The variables of RQD, Lugeon, and cementing have high variation in different elevations. According to omnidirectional variograms, the spatial continuity of cementing estimated 100 m while pursuant to directional variograms for RQD and Lugeon ranged between 200-400 and 40-160, respectively.

4. Conclusion

According to the simulation maps in two locations in the center of the dam reservoir and northwest of the dam, areas with high permeability were identified. Therefore, there is a potential for water to escape in these places. The study of faults in the study area also showed that the density of faults is higher on the right side of the dam, therefore, the presence of faults can increase the permeability of rock units.

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