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Seismic vulnerability of the Sarcheshmeh open pit mine, SE Iran

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Sarcheshmeh copper mine is the largest open pit mine in Iran. Based on the development plan of the mine, the final shape of the pit will be an ellipse, 3100 m by 2200 m in diameters and the highest wall of the mine will be 850 m, in the west part. This mine is located in the seismotectonic zone of Central-Iran and the most important fault of the area is Rafsanjan fault, 35 km north of the mine.

In this study, the seismic hazard in the mine region and then vulnerability of mine, affected by the probable earthquake is estimated. Based on faulting system, the seismicity of the region, and determination of the seimogenic sources, seismic hazard zoning of the mine's region was conducted. To evaluate the mine vulnerability along the probable earthquakes, the Newmark displacement approach was used and factor of safety for the west wall, which is more susceptible to sliding, was calculated. Then the critical acceleration and the Arias Intensity of the mine site have been calculated by an empirical relation that is found suitable for Iran seismicity (Mahdavifar, 2006). Finally, the Newmark displacement of the critical slide of the west wall of the mine was estimated. With these data, the vulnerability of mine was calculated. Present study showed that this method could be a useful way for estimating seismic risk in open pit mines.