

Application of GIS In The Risk Analysis of the Buried Fuel Pipelines

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Abstract

Earthquakes are one of the most important natural disasters and cause severe financial, human and environmental damage every year. Iran is located on the Alpide earthquake belt and; thus, is one of the highly earthquake-prone areas of the world. Most of the structures were built before the compilation of earthquake resistant design regulations and, unfortunately, their construction quality is not satisfactory in many cases. Therefore, vulnerability assessment and seismic reinforcement are of grave importance. Fuel pipeline systems are one of the lifelines and have a key role in the increase and decrease of the damage and vulnerability to earthquakes. This paper, in respect of damage analysis, concentrates on the assessment of fuel pipeline systems buried underneath the city of Kermanshah, failure in pipelines and post-earthquake fires. Assessment of the seismic damage to buried fuel pipelines of Kermanshah is calculated for two probable scenario earthquakes in the study area. All the steps of damage assessment for buried pipelines were written in a GIS environment. Finally, the probability distribution function for the area, the population and the number of houses exposed to fire and explosion after the earthquake are calculated using the Monte Carlo simulation method through numerous repetitions (10,000 times). In summary, the damage inflicted on the fuel pipelines of Kermanshah is equal to 2 leaks, 1 break and 1 ignition for scenario 1, 5 leaks, 1 break and 4 ignitions for scenario 2, 1 leak, 0 break and 1 ignition for scenario 3 and 2 leaks, 0 break and 1 ignition for scenario 4.

Keywords: Fuel Pipelines, Leak, earthquake, Fire, Explosion.