8th International Conference on Seismology & Earthquake Engineering
11-13 Nov. 2019, Tehran, Iran

SEISMIC HAZARD ANALYZING AND EVALUATING IN ESFAHAN NUCLEAR SITE

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Keywords: Esfahan nuclear site, Earthquake catalogue, Kijko-Sellevol method, SHA, Kuh-Ghorouneh

Esfahan Nuclear site is located in Esfahan province, South-East of Esfahan great city. In geological point of view, the study area almost located at the boundary between Zagros and Central Iran. The study area experienced a wide variety of destructive earthquakes during historical and instrumental time span (Figure 1). In seismicity perspective, the western part of this area, on the high Zagros Mountains is more active than the others. In this study, at first step we try to create a comprehensive earthquake catalog considering the independence of events based on Poisson's distribution. Then, the seismicity parameters will be calculated using different parameters such as seismic attenuation and seismotectonic states based on Kijk - Sellevol method (Kijko and Sellevoll, 1989). Results are persisting on a few active faults, especially Kuh-Ghoruneh located in distance 12 km to site with high horizontal and vertical seismic acceleration. According to these results, we conclude that the site located in the very seismically active region, which can be affected by future earthquakes.

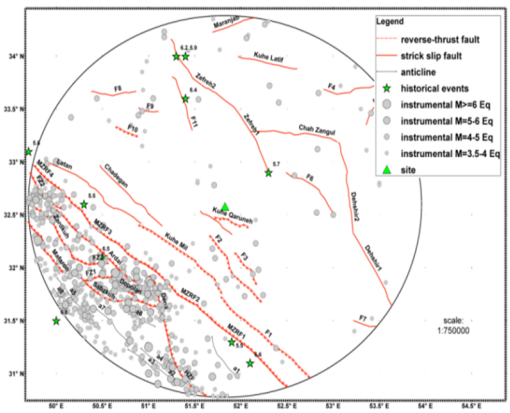

Figure 1. Distribution of historical and instrumental earthquakes in study area considering faults locations.

In this research, the Esfahan Nuclear Site was investigated based on seismic hazard assessment. The structure of the study area can be divided into two main geological blocks, Zagros and Central Iran. Hence, by dividing the region into two distinct boundaries, calculation was made for each region separately.

For this purpose, by investigating the faults distribution in the region and evaluating the seismic events including historical and instrumental records over the time, at the first step, we tried to find the seismicity pattern considering the Poisson relation to prepare a comprehensive earthquake catalogue and then the related parameters have been obtained. In the next step, using the finalized results, the strong ground motion parameters are defined considering the site effects and

seismicity background with probabilistic approach (Mulargia et al., 2017). The presented results indicate that the closest fault to the site is KuhGhoruneh fault, located about 12 km from the site. This fault experienced a severe 6.6 magnitude earthquake in the past. Based on the calculated parameters, all values for horizontal and vertical component of acceleration in 50% and 84% seismic levels are related to this fault, which expresses the high seismicity and possibility of occurrence of destructive earthquakes in the future (Table 1). Also, the results of analytical separation indicate the probability of a seismic event with a maximum magnitude of 6.5 in a distance of about 25 km from the site (Figure 2). In the following, the results indicate the maximum horizontal acceleration of 0.53 g for 475 return periods in the site location which is significant compared with the other regions in the Iranian plateau. This value is decreasing for the shorter return period. For instance, for the earthquakes with 200 year return period, this value reaches to 0.35 g. Generally, based on the presented results, the Esfahan Nuclear Site can be evaluated in term of the risk level of future earthquakes at a high level.

Table 1. Site and also calculated horizontal and vertical acceleration in different levels.

Fault Name	Max mag (M_w)	Surface distance (km)	PGAv 84%	PGAv 50%	PGAh 84%	PGAh 50%
Ardal	7.2	119	0.04	0.02	0.05	0.03
Chadegan	7.0	67	0.07	0.04	0.09	0.05
Dehshir	7.0	134	0.03	0.01	0.04	0.02
Dena	7.1	105	0.05	0.03	0.06	0.03
Dopolan	6.8	123	0.03	0.02	0.04	0.02
KuhMil	7.1	64	0.09	0.05	0.11	0.06
KuhGhorooneh	6.6	12	0.74	0.39	0.80	0.42
Latan	7.2	86	0.05	0.03	0.07	0.04
Mafaroon	7.0	178	0.02	0.01	0.02	0.01
Maranjab	6.8	183	0.01	0.01	0.02	0.01
SabzKuh	6.9	131	0.03	0.01	0.03	0.02
ShahKuh	6.6	17	0.25	0.13	0.32	0.17
Zefreh	7.1	56	0.09	0.05	0.11	0.06

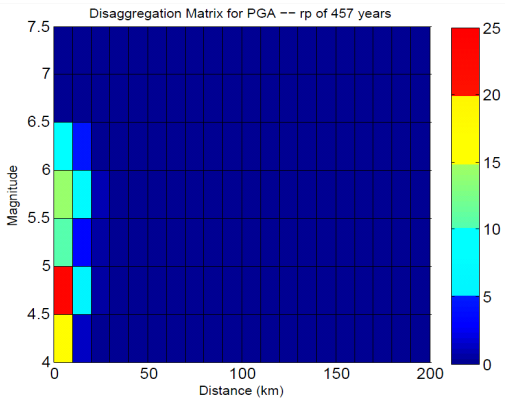

Figure 2. Analytical separation for 475 as return period (in maximum acceleration).

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