

# **APPENDIX E**

## **Design Ground Motions**

# Memo

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**Subject:** Design Ground Motions at Piñon Uranium Mill, Colorado

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This memorandum transmits the summary of Kleinfelder's design ground motions for the subject project. Kleinfelder understands that the subject facility is a PC2 facility. Therefore, buildings and structures at this site can be designed using International Building Code (IBC). Seismic design parameters presented in Tables 1 and 2 are based on the mapped values per 2006 IBC and can be used for the design of the buildings at this facility. According to Section 1613 of 2006 IBC, mapped acceleration values ( $S_S$  and  $S_1$ ) represent Maximum Considered Earthquake (MCE), defined as ground motions having 2 percent probability of exceedance in 50 years (return period of about 2,475 years). The site-modified spectral acceleration values ( $S_{MS}$  and  $S_{M1}$ ) are based on mapped spectral acceleration values at 0.2 sec ( $S_S$ ) and 1.0 sec ( $S_1$ ) and the Site Class and can be computed as follows.

$$S_{MS} = F_a S_S$$

$$S_{M1} = F_v S_1$$

$S_S$  = mapped acceleration value at 0.2 sec

$S_1$  = mapped acceleration value at 1.0 sec

where  $F_a$  and  $F_v$  are estimated from 2006 IBC Tables 1613.5.3(1) and 1613.5.3(2)

Kleinfelder has assumed that the site can be classified as Site Class D per Table 1613.5.2 of 2006 IBC. Kleinfelder has calculated the mapped acceleration values using Java calculator at the USGS website (<http://earthquake.usgs.gov/research/hazmaps/design/>) for Site Class D. The Design Earthquake (DE) spectral acceleration values, taken as two-thirds of MCE, ( $S_{DS} = 2/3 S_{MS}$ ;  $S_{D1} = 2/3 S_{M1}$ ) are presented in Table 2. It should be noted that mapped IBC values are based on USGS National Seismic Hazard Maps.

**Table 1: Seismic Design Parameters for the MCE**

<b>Parameter</b>	<b>Value</b>
Mapped spectral acceleration at short period, $S_S$	0.252g
Mapped spectral acceleration at 1 second, $S_1$	0.062g
Site Class	D
Site Coefficient, $F_a$	1.598
Site Coefficient, $F_v$	2.4
Site-modified spectral acceleration at short period, $S_{MS}$	0.403g
Site-modified spectral acceleration at 1 second, $S_{M1}$	0.150g
Peak Ground Acceleration, PGA	0.161g
Earthquake Magnitude, M	4.8
Earthquake Distance	15.5 km

**Table 2: Seismic Design Parameters for the DE**

<b>Parameter</b>	<b>Value</b>
Design spectral acceleration at short period, $S_{DS}$	0.269g
Design spectral acceleration at 1 second, $S_{D1}$	0.100g
Peak Ground Acceleration, PGA	0.107g
Earthquake Magnitude, M	4.8
Earthquake Distance	15.5 km