

To: Peter Clarke
Cyrus Anvil Mining Corporation
Vancouver

Re: Conversion of GRUM KA-coordinates to UTM and vice versa

1. KA-coordinates to UTM

$$N_{UTM} = N_0 + S * (N_{KA} * \cos \alpha + E_{KA} * \sin \alpha)$$

$$E_{UTM} = E_0 + S * (-N_{KA} * \sin \alpha + E_{KA} * \cos \alpha)$$

2. UTM-coordinates to KA

$$N_{KA} = ((N_{UTM} - N_0) * \cos \alpha - (E_{UTM} - E_0) * \sin \alpha) / S$$

$$E_{KA} = ((N_{UTM} - N_0) * \sin \alpha + (E_{UTM} - E_0) * \cos \alpha) / S$$

where N_{UTM}, E_{UTM} = UTM-coordinates of a point (DDH-collar)

N_{KA}, E_{KA} = KA-coordinates of a point (DDH-collar)

α = clockwise offset angle from KA-grid North to UTM-North

S = UTM distance scale factor

N_0, E_0 = UTM-coordinates of KA-grid origin

My analyses indicate that the following values are adequate for use in the above formulae for the GRUM property

$\alpha = 1.573611^\circ$ $\cos \alpha = 0.9996229$ (known value)
 $\sin \alpha = 0.0274612$

$S = 0.99950853$ (average value)

$N_0 = 6,844,007.1169$ $E_0 = 584,945.9084$ (least-square minimum)

J.R. Norton-Hambert