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FROM: Lee Pigage

RE: GRUM 8705 Grid Conversion Equations

The following equations convert between G8705 coordinates and UTM coordinates.

G8705 ->UTM

$$\begin{aligned}NUTM &= N_0 + SH * (N8705 * \cos X + E8705 * \sin X) \\EUTM &= E_0 + SH * (E8705 * \cos X - N8705 * \sin X) \\ZUTM &= Z8705\end{aligned}$$

UTM ->G8705

$$N8705 = \frac{(NUTM - N_0) * \cos X - (EUTM - E_0) * \sin X}{SH}$$

$$E8705 = \frac{(NUTM - N_0) * \sin X + (EUTM - E_0) * \cos X}{SH}$$

$$Z8705 = ZUTM$$

Where  $N_0 = 6,903,969.653$   
 $E_0 = 592,690.499$   
 $SH = 0.99950853$   
 $X = 47.7741667 \text{ degrees} = 0.833816 \text{ radians}$

I have a revised GRIDS.WRI spreadsheet file which contains the conversion equations for the following:

1. Grum 8705 = UTM
2. Grum 8606 = UTM
- 3.. Vangorda 8607 = UTM



Grum 8606 coords to UTM

Grum E:	6,300.00	6902768.47	Next pages for
Grum N:	8,850.00	580970.89	Grum 8705 & Vangor
UTM E:	591,578.52	0.99950853	
UTM N:	6,905,086.83	-42.2258330	-0.73697

UTM to Grum 8606 coords

UTM E:	591,578.52
UTM N:	6,905,086.83
Grum E:	6,300.00
Grum N:	8,850.00

Grum 8705 coords to UTM

Grum E:	80.00	6903969.65	Previous page for
Grum N:	1,575.00	592690.50	Grum 8606
UTM E:	591,578.52	0.99950853	Next page for
UTM N:	6,905,086.83	47.7741667	0.833816 Vangorda

UTM to Grum 8705 coords

UTM E:	591,578.52
UTM N:	6,905,086.83
Grum E:	80.00
Grum N:	1,575.00

Vangorda coords to UTM

Vang E:	9,346.30	6,889,052.74	Previous pages for
Vang N:	13,164.46	593,397.40	Grum 8606 & 8705
UTM E:	591,578.52	0.99950853	
UTM N:	6,905,086.83	-41.845278	-0.73033

UTM to Vangorda coords

UTM E:	591,578.52
UTM N:	6,905,086.83
Vang E:	9,346.30
Vang N:	13,164.46