

## OPUS-RS solution : 018506\_14\_240\_A0.14O OP1409696009708

opus &lt;opus@ngs.noaa.gov&gt;

Tue 9/2/2014 4:18 PM

To: John Freetly &lt;John.Freetly@neciusa.com&gt;;

FILE: 018506\_14\_240\_A0.14O OP1409696009708

## NGS OPUS-RS SOLUTION REPORT

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All computed coordinate accuracies are listed as 1-sigma RMS values.

For additional information: <http://www.ngs.noaa.gov/OPUS/about.jsp#accuracy>USER: john.freetly@neciusa.com  
RINEX FILE: 0185240a.14oDATE: September 02, 2014  
TIME: 22:18:11 UTCSOFTWARE: rsgps 1.37 RS53.prl 1.99.2      START: 2014/08/28 00:05:30  
EPHEMERIS: igr18073.eph [rapid]      STOP: 2014/08/28 01:15:30  
NAV FILE: brdc2390.14n      OBS USED: 3890 / 3955 : 98%  
ANT NAME: CHCX90D-OPUS      NONE      QUALITY IND. 6.24/ 46.47  
ARP HEIGHT: 1.8000      NORMALIZED RMS: 0.294

REF FRAME: NAD\_83(2011)(EPOCH:2010.0000)      IGS08 (EPOCH:2014.65487)

X: -1347053.913(m) 0.007(m)      -1347054.772(m) 0.007(m)  
Y: -4284438.554(m) 0.015(m)      -4284437.301(m) 0.015(m)  
Z: 4515164.692(m) 0.011(m)      4515164.651(m) 0.011(m)LAT: 45 20 41.18789 0.006(m)      45 20 41.20856 0.006(m)  
E LON: 252 32 47.51036 0.007(m)      252 32 47.45547 0.007(m)  
W LON: 107 27 12.48964 0.007(m)      107 27 12.54453 0.007(m)  
EL HGT: 1130.345(m) 0.017(m)      1129.657(m) 0.017(m)  
ORTHO HGT: 1144.633(m) 0.020(m) [NAVD88 (Computed using GEOID12A)]

## UTM COORDINATES      STATE PLANE COORDINATES

UTM (Zone 13)      SPC (2500 MT )

Northing (Y) [meters]      5024179.910      123772.067  
Easting (X) [meters]      307792.923      760343.168  
Convergence [degrees]      -1.74580512      1.49704578  
Point Scale      1.00005425      0.99981054  
Combined Factor      0.99987706      0.99963339

US NATIONAL GRID DESIGNATOR: 13TCL0779224179(NAD 83)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE(m)
DM7161	WYSH SHERIDAN CORS ARP	N444801.769	W1070035.715	69860.5
DI3062	BIL5 BILLINGS 5 CORS ARP	N455816.237	W1075947.298	81487.4
DG9745	MTEI ENGINC CORS ARP	N454447.035	W1083600.736	100076.5
DL7758	P722 YNPBASSRCHMT2005 CORS ARP	N452725.985	W1093415.586	166286.3
DI3425	P052 LRRNCHJRDNMT2006 CORS ARP	N472229.026	W1070107.185	228136.6

NEAREST NGS PUBLISHED CONTROL POINT

Information on nearest mark is not available due to database connectivity issues or has restrictions on when or how it can be published.

OPUS-RS Extended Output, Level 2

FINAL COORDINATES (ITRF at epoch of observations)

wysh	-1326396.424	-4335757.887	4472504.205
bil5	-1372156.896	-4223945.785	4563650.223
mtei	-1422329.051	-4226311.546	4546317.404
p722	-1501537.051	-4223566.602	4524171.121
p052	-1266648.345	-4138194.580	4670709.510
0185	-1347054.772	-4284437.301	4515164.651

Covariance matrix of the stations:

1	1.7890E-07	3.0690E-07	-3.6200E-07	1.3650E-08	-7.2820E-08	7.5350E-08	-2.7940E-09	-7.7350E-08	7.1720E-08	-2.8930E-08	-8.1900E-08	6.6810E-08	3.8900E-08	-7.4590E-08	1.4780E-07	7.2330E-08	6.3250E-08	-9.9270E-08
2	3.0690E-07	1.1160E-06	-1.1220E-06	-6.6400E-08	-2.2420E-07	2.6100E-07	-8.6170E-08	-2.2480E-07	2.5060E-07	-1.1750E-07	-2.2320E-07	2.3620E-07	-3.8050E-08	-2.4440E-07	3.7440E-07	4.5090E-08	1.3260E-07	-1.4340E-07
3	-3.6200E-07	-1.1220E-06	1.4500E-06	6.6350E-08	2.7050E-07	-2.6760E-07	1.1200E-07	2.7010E-07	-2.4140E-07	1.8390E-07	2.6210E-07	-2.0370E-07	4.9930E-10	3.1820E-07	-5.3730E-07	-9.7490E-08	-1.9520E-07	3.4940E-07
4	1.3650E-08	-6.6400E-08	6.6350E-08	1.6230E-07	3.0560E-07	-3.1720E-07	7.6410E-09	-8.0210E-08	8.3070E-08	3.8850E-09	-8.6600E-08	8.9060E-08	1.2440E-08	-7.2400E-08	7.8650E-08	3.9160E-08	-2.7270E-09	3.7550E-09
5	-7.2820E-08	-2.2420E-07	2.7050E-07	3.0560E-07	1.1390E-06	-1.1280E-06	-7.6990E-08	-2.3440E-07	2.8110E-07	-7.8290E-08	-2.3450E-07	2.8070E-07	-7.7610E-08	-2.4550E-07	2.9570E-07	-7.8340E-09	2.1110E-08	2.7460E-08
6	7.5350E-08	2.6100E-07	-2.6760E-07	-3.1720E-07	-1.1280E-06	1.3390E-06	7.7870E-08	2.7920E-07	-2.8090E-07	7.5790E-08	2.7680E-07	-2.7860E-07	8.8230E-08	3.1130E-07	-3.1170E-07	1.1360E-08	2.5560E-08	1.6770E-09
7	-2.7940E-09	-8.6170E-08	1.1200E-07	7.6410E-09	-7.6990E-08	7.7870E-08	1.7690E-07	3.2130E-07	-3.2940E-07	1.8430E-08	-8.7550E-08	9.5380E-08	-2.1570E-12	-7.0890E-08	4.4360E-08	2.4910E-08	-2.8420E-08	4.3520E-08
8	-7.7350E-08	-2.2480E-07	2.7010E-07	-8.0210E-08	-2.3440E-07	2.7920E-07	3.2130E-07	1.1370E-06	-1.1180E-06	-8.1060E-08	-2.3300E-07	2.7700E-07	-8.2010E-08	-2.4530E-07	2.9180E-07	-1.2250E-08	2.0270E-08	2.6590E-08
9	7.1720E-08	2.5060E-07	-2.4140E-07	8.3070E-08	2.8110E-07	-2.8090E-07	-3.2940E-07	-1.1180E-06	1.3190E-06	8.7330E-08	2.7430E-07	-2.7040E-07	8.6690E-08	3.1200E-07	-3.2600E-07	8.8550E-09	1.2350E-08	2.4920E-08
10	-2.8930E-08	-1.1750E-07	1.8390E-07	3.8850E-09	-7.8290E-08	7.5790E-08	1.8430E-08	-8.1060E-08	8.7330E-08	2.2690E-07	3.4500E-07	-3.3780E-07	-1.9860E-08	-6.8910E-08	-8.5580E-09	2.2070E-09	-6.8900E-08	1.0610E-07
11	-8.1900E-08	-2.2320E-07	2.6210E-07	-8.6600E-08	-2.3450E-07	2.7680E-07	-8.7550E-08	-2.3300E-07	2.7430E-									

```

07 3.4500E-07 1.1370E-06 -1.1080E-06 -8.7080E-08 -2.4650E-07 2.9480E-07 -1.7020E-08 2.3000E-08 1.8960E-08
12 6.6810E-08 2.3620E-07 -2.0370E-07 8.9060E-08 2.8070E-07 -2.7860E-07 9.5380E-08 2.7700E-07 -2.7040E-07
-3.3780E-07 -1.1080E-06 1.3030E-06 8.4850E-08 3.1410E-07 -3.5020E-07 5.6230E-09 -6.6400E-09 5.8350E-08
13 3.8900E-08 -3.8050E-08 4.9930E-10 1.2440E-08 -7.7610E-08 8.8230E-08 -2.1570E-12 -8.2010E-08 8.6690E-08
-1.9860E-08 -8.7080E-08 8.4850E-08 1.6820E-07 2.8550E-07 -2.6090E-07 6.1210E-08 3.6100E-08 -5.3580E-08
14 -7.4590E-08 -2.4440E-07 3.1820E-07 -7.2400E-08 -2.4550E-07 3.1130E-07 -7.0890E-08 -2.4530E-07 3.1200E-07
-6.8910E-08 -2.4650E-07 3.1410E-07 2.8550E-07 1.1830E-06 -1.2560E-06 -7.8040E-09 2.8510E-09 6.9980E-08
15 1.4780E-07 3.7440E-07 -5.3730E-07 7.8650E-08 2.9570E-07 -3.1170E-07 4.4360E-08 2.9180E-07 -3.2600E-07
-8.5580E-09 2.9480E-07 -3.5020E-07 -2.6090E-07 -1.2560E-06 1.7250E-06 7.1460E-08 1.6410E-07 -2.3410E-07
16 7.2330E-08 4.5090E-08 -9.7490E-08 3.9160E-08 -7.8340E-09 1.1360E-08 2.4910E-08 -1.2250E-08 8.8550E-09
2.2070E-09 -1.7020E-08 5.6230E-09 6.1210E-08 -7.8040E-09 7.1460E-08 1.5210E-06 3.7720E-06 -3.8190E-06
17 6.3250E-08 1.3260E-07 -1.9520E-07 -2.7270E-09 2.1110E-08 2.5560E-08 -2.8420E-08 2.0270E-08 1.2350E-08
-6.8900E-08 2.3000E-08 -6.6400E-09 3.6100E-08 2.8510E-09 1.6410E-07 3.7720E-06 1.4040E-05 -1.3990E-05
18 -9.9270E-08 -1.4340E-07 3.4940E-07 3.7550E-09 2.7460E-08 1.6770E-09 4.3520E-08 2.6590E-08 2.4920E-08
08 1.0610E-07 1.8960E-08 5.8350E-08 -5.3580E-08 6.9980E-08 -2.3410E-07 -3.8190E-06 -1.3990E-05 1.5730E-05
    
```

Covariance Matrix for the xyz OPUS Rover Position (meters^2).

```

0.0000015210  0.0000037720  -0.0000038190
0.0000037720  0.0000140400  -0.0000139900
-0.0000038190 -0.0000139900  0.0000157300
    
```

Covariance Matrix for the enu OPUS Position (meters^2).

```

0.0000004887  0.0000000435  0.0000007366
0.0000000435  0.0000009083  0.0000002517
0.0000007366  0.0000002517  0.0000298941
    
```

Horizontal network accuracy = 0.00207 meters.

Vertical network accuracy = 0.01072 meters.

		Vectors		
To	From	X	Y	Z
wysh	0185	20658.347	-51320.587	-42660.446
bil5	0185	-25102.124	60491.515	48485.572
mtei	0185	-75274.279	58125.755	31152.753
p722	0185	-154482.279	60870.699	9006.470
p052	0185	80406.427	146242.720	155544.859

Covariance matrix of the 5 vectors

```

1 1.5552E-06 3.9706E-06 -3.9842E-06 1.4232E-06 3.6438E-06 -3.6557E-06 1.4210E-06 3.6437E-06 -3.6569E-06
1.4175E-06 3.6439E-06 -3.6585E-06 1.4264E-06 3.6420E-06 -3.6434E-06
2 3.9706E-06 1.4891E-05 -1.4773E-05 3.6632E-06 1.3662E-05 -1.3611E-05 3.6692E-06 1.3662E-05 -1.3608E-05
3.6783E-06 1.3661E-05 -1.3604E-05 3.6528E-06 1.3660E-05 -1.3636E-05
3 -3.9842E-06 -1.4773E-05 1.6481E-05 -3.6589E-06 -1.3552E-05 1.5111E-05 -3.6530E-06 -1.3551E-05 1.5114E-05
-3.6437E-06 -1.3552E-05 1.5119E-05 -3.6674E-06 -1.3547E-05 1.5077E-05
4 1.4232E-06 3.6632E-06 -3.6589E-06 1.6050E-06 4.0882E-06 -4.1513E-06 1.4646E-06 3.7068E-06 -3.7485E-06
1.4835E-06 3.7051E-06 -3.7393E-06 1.4331E-06 3.7101E-06 -3.8156E-06
5 3.6438E-06 1.3662E-05 -1.3552E-05 4.0882E-06 1.5137E-05 -1.5171E-05 3.7313E-06 1.3764E-05 -1.3749E-05
3.7704E-06 1.3761E-05 -1.3730E-05 3.6661E-06 1.3771E-05 -1.3886E-05
6 -3.6557E-06 -1.3611E-05 1.5111E-05 -4.1513E-06 -1.5171E-05 1.7066E-05 -3.7960E-06 -1.3763E-05 1.5423E-05
-3.8607E-06 -1.3758E-05 1.5391E-05 -3.6886E-06 -1.3774E-05 1.5651E-05
    
```

7 1.4210E-06 3.6692E-06 -3.6530E-06 1.4646E-06 3.7313E-06 -3.7960E-06 1.6481E-06 4.1340E-06 -4.2008E-06  
1.5123E-06 3.7299E-06 -3.7728E-06 1.4349E-06 3.7373E-06 -3.8896E-06  
8 3.6437E-06 1.3662E-05 -1.3551E-05 3.7068E-06 1.3764E-05 -1.3763E-05 4.1340E-06 1.5136E-05 -1.5147E-05  
3.7721E-06 1.3764E-05 -1.3733E-05 3.6661E-06 1.3772E-05 -1.3889E-05  
9 -3.6569E-06 -1.3608E-05 1.5114E-05 -3.7485E-06 -1.3749E-05 1.5423E-05 -4.2008E-06 -1.5147E-05 1.6999E-05  
-3.8466E-06 -1.3747E-05 1.5376E-05 -3.6876E-06 -1.3760E-05 1.5613E-05  
10 1.4175E-06 3.6783E-06 -3.6437E-06 1.4835E-06 3.7704E-06 -3.8607E-06 1.5123E-06 3.7721E-06 -3.8466E-06  
1.7435E-06 4.2029E-06 -4.2685E-06 1.4377E-06 3.7798E-06 -4.0051E-06  
11 3.6439E-06 1.3661E-05 -1.3552E-05 3.7051E-06 1.3761E-05 -1.3758E-05 3.7299E-06 1.3764E-05 -1.3747E-05  
4.2029E-06 1.5131E-05 -1.5110E-05 3.6658E-06 1.3768E-05 -1.3878E-05  
12 -3.6585E-06 -1.3604E-05 1.5119E-05 -3.7393E-06 -1.3730E-05 1.5391E-05 -3.7728E-06 -1.3733E-05 1.5376E-05  
-4.2685E-06 -1.5110E-05 1.6916E-05 -3.6862E-06 -1.3739E-05 1.5556E-05  
13 1.4264E-06 3.6528E-06 -3.6674E-06 1.4331E-06 3.6661E-06 -3.6886E-06 1.4349E-06 3.6661E-06 -3.6876E-06  
1.4377E-06 3.6658E-06 -3.6862E-06 1.5668E-06 4.0292E-06 -4.0978E-06  
14 3.6420E-06 1.3660E-05 -1.3547E-05 3.7101E-06 1.3771E-05 -1.3774E-05 3.7373E-06 1.3772E-05 -1.3760E-05  
3.7798E-06 1.3768E-05 -1.3739E-05 4.0292E-06 1.5217E-05 -1.5480E-05  
15 -3.6434E-06 -1.3636E-05 1.5077E-05 -3.8156E-06 -1.3886E-05 1.5651E-05 -3.8896E-06 -1.3889E-05 1.5613E-05  
-4.0051E-06 -1.3878E-05 1.5556E-05 -4.0978E-06 -1.5480E-05 1.7923E-05

## Correlation matrix of the 5 vectors

1 1.0000E+00 8.2508E-01 -7.8696E-01 9.0078E-01 7.5099E-01 -7.0960E-01 8.8756E-01 7.5098E-01 -7.1121E-01  
8.6085E-01 7.5116E-01 -7.1327E-01 9.1375E-01 7.4863E-01 -6.9008E-01  
2 8.2508E-01 1.0000E+00 -9.4303E-01 7.4933E-01 9.1000E-01 -8.5384E-01 7.4066E-01 9.1003E-01 -8.5533E-01  
7.2191E-01 9.1011E-01 -8.5713E-01 7.5624E-01 9.0746E-01 -8.3470E-01  
3 -7.8696E-01 -9.4303E-01 1.0000E+00 -7.1142E-01 -8.5799E-01 9.0105E-01 -7.0092E-01 -8.5797E-01 9.0298E-01  
-6.7974E-01 -8.5815E-01 9.0545E-01 -7.2171E-01 -8.5539E-01 8.7725E-01  
4 9.0078E-01 7.4933E-01 -7.1142E-01 1.0000E+00 8.2942E-01 -7.9321E-01 9.0051E-01 7.5205E-01 -7.1765E-01  
8.8685E-01 7.5186E-01 -7.1764E-01 9.0371E-01 7.5073E-01 -7.1140E-01  
5 7.5099E-01 9.1000E-01 -8.5799E-01 8.2942E-01 1.0000E+00 -9.4392E-01 7.4705E-01 9.0933E-01 -8.5710E-01  
7.3395E-01 9.0931E-01 -8.5803E-01 7.5281E-01 9.0733E-01 -8.4304E-01  
6 -7.0960E-01 -8.5384E-01 9.0105E-01 -7.9321E-01 -9.4392E-01 1.0000E+00 -7.1578E-01 -8.5632E-01 9.0548E-01  
-7.0777E-01 -8.5615E-01 9.0586E-01 -7.1333E-01 -8.5475E-01 8.9488E-01  
7 8.8756E-01 7.4066E-01 -7.0092E-01 9.0051E-01 7.4705E-01 -7.1578E-01 1.0000E+00 8.2769E-01 -7.9365E-01  
8.9216E-01 7.4692E-01 -7.1453E-01 8.9294E-01 7.4628E-01 -7.1567E-01  
8 7.5098E-01 9.1003E-01 -8.5797E-01 7.5205E-01 9.0933E-01 -8.5632E-01 8.2769E-01 1.0000E+00 -9.4428E-01  
7.3428E-01 9.0947E-01 -8.5822E-01 7.5282E-01 9.0741E-01 -8.4323E-01  
9 -7.1121E-01 -8.5533E-01 9.0298E-01 -7.1765E-01 -8.5710E-01 9.0548E-01 -7.9365E-01 -9.4428E-01 1.0000E+00  
-7.0657E-01 -8.5716E-01 9.0675E-01 -7.1454E-01 -8.5555E-01 8.9448E-01  
10 8.6085E-01 7.2191E-01 -6.7974E-01 8.8685E-01 7.3395E-01 -7.0777E-01 8.9216E-01 7.3428E-01 -7.0657E-01  
1.0000E+00 8.1829E-01 -7.8599E-01 8.6989E-01 7.3382E-01 -7.1647E-01  
11 7.5116E-01 9.1011E-01 -8.5815E-01 7.5186E-01 9.0931E-01 -8.5615E-01 7.4692E-01 9.0947E-01 -8.5716E-01  
8.1829E-01 1.0000E+00 -9.4447E-01 7.5290E-01 9.0731E-01 -8.4274E-01  
12 -7.1327E-01 -8.5713E-01 9.0545E-01 -7.1764E-01 -8.5803E-01 9.0586E-01 -7.1453E-01 -8.5822E-01 9.0675E-01  
-7.8599E-01 -9.4447E-01 1.0000E+00 -7.1601E-01 -8.5633E-01 8.9336E-01  
13 9.1375E-01 7.5624E-01 -7.2171E-01 9.0371E-01 7.5281E-01 -7.1333E-01 8.9294E-01 7.5282E-01 -7.1454E-01  
8.6989E-01 7.5290E-01 -7.1601E-01 1.0000E+00 8.2518E-01 -7.7328E-01  
14 7.4863E-01 9.0746E-01 -8.5539E-01 7.5073E-01 9.0733E-01 -8.5475E-01 7.4628E-01 9.0741E-01 -8.5555E-01  
7.3382E-01 9.0731E-01 -8.5633E-01 8.2518E-01 1.0000E+00 -9.3734E-01  
15 -6.9008E-01 -8.3470E-01 8.7725E-01 -7.1140E-01 -8.4304E-01 8.9488E-01 -7.1567E-01 -8.4323E-01 8.9448E-01  
-7.1647E-01 -8.4274E-01 8.9336E-01 -7.7328E-01 -9.3734E-01 1.0000E+00

G-FILE for the vectors

```

Axx2014 8282014 828
B201408280000201408280100 5 rsgps 1.37IGS
lant_info.003 NGS
C00060001 206583474 12 -513205867 38 -426604459 40
C00060002 -251021243 12 604915154 38 484855722 41
C00060003 -752742793 12 581257547 38 311527526 41
C00060004 -1544822790 13 608706989 38 90064703 41
C00060005 804064268 12 1462427202 39 1555448590 42
D 1 2 8250761 1 3 -7869594 1 4 9007830 1 5 7509910 1 6 -7096026
D 1 7 8875561 1 8 7509755 1 9 -7112077 1 10 8608455 1 11 7511563
D 1 12 -7132746 1 13 9137479 1 14 7486316 1 15 -6900795 2 3 -9430332
D 2 4 7493266 2 5 9099999 2 6 -8538365 2 7 7406593 2 8 9100255
D 2 9 -8553280 2 10 7219050 2 11 9101144 2 12 -8571311 2 13 7562373
D 2 14 9074603 2 15 -8346987 3 4 -7114151 3 5 -8579945 3 6 9010454
D 3 7 -7009219 3 8 -8579738 3 9 9029824 3 10 -6797358 3 11 -8581520
D 3 12 9054470 3 13 -7217112 3 14 -8553945 3 15 8772517 4 5 8294236
D 4 6 -7932124 4 7 9005057 4 8 7520527 4 9 -7176515 4 10 8868471
D 4 11 7518597 4 12 -7176371 4 13 9037089 4 14 7507332 4 15 -7114039
D 5 6 -9439232 5 7 7470507 5 8 9093324 5 9 -8570999 5 10 7339500
D 5 11 9093095 5 12 -8580347 5 13 7528117 5 14 9073303 5 15 -8430401
D 6 7 -7157755 6 8 -8563237 6 9 9054818 6 10 -7077698 6 11 -8561528
D 6 12 9058646 6 13 -7133296 6 14 -8547468 6 15 8948809 7 8 8276867
D 7 9 -7936454 7 10 8921611 7 11 7469182 7 12 -7145254 7 13 8929389
D 7 14 7462837 7 15 -7156657 8 9 -9442761 8 10 7342782 8 11 9094737
D 8 12 -8582207 8 13 7528229 8 14 9074084 8 15 -8432330 9 10 -7065727
D 9 11 -8571576 9 12 9067472 9 13 -7145363 9 14 -8555518 9 15 8944784
D 10 11 8182915 10 12 -7859876 10 13 8698852 10 14 7338209 10 15 -7164704
D 11 12 -9444678 11 13 7528971 11 14 9073131 11 15 -8427396 12 13 -7160137
D 12 14 -8563301 12 15 8933567 13 14 8251757 13 15 -7732801 14 15 -9373389
    
```

ITRF position of 0185 as determined by individual baselines

	X	Y	Z
wysh	-1347054.778	-4284437.292	4515164.653
bil5	-1347054.764	-4284437.308	4515164.657
mtei	-1347054.775	-4284437.320	4515164.658
p722	-1347054.773	-4284437.290	4515164.650
p052	-1347054.764	-4284437.284	4515164.631

Residuals of position determined by individual baselines from the final position

	X	Y	Z	East	North	Up
wysh	-0.007	0.009	0.002	-0.009	0.006	-0.003
bil5	0.008	-0.008	0.006	0.010	0.001	0.008
mtei	-0.003	-0.020	0.007	0.003	-0.009	0.019
p722	-0.001	0.011	-0.001	-0.005	0.006	-0.008
p052	0.007	0.017	-0.020	0.002	-0.001	-0.027

STATE PLANE COORDINATES - International Foot

SPC (2500 MT )

Northing (Y) [feet] 406076.335  
Easting (X) [feet] 2494564.199  
Convergence [degrees] 1.49704578  
Point Scale 0.99981054  
Combined Factor 0.99963339

\*\* Orthometric Heights Above Future Geopotential Datum.

Prototype orthometric heights are now being made available as a precursor to the completion of GRAV-D and the replacement of NAVD 88 with a new geopotential reference system. The following height reflects the current best estimate of the true orthometric height, based on the existing gravimetric geoid model. This height is subject to change as data and modeling for the gravimetric geoid change throughout the lifetime of the GRAV-D project, or as new realizations of the ITRF are adopted. However, at the completion of GRAV-D, these heights will supersede the NAVD 88 heights

APPROX ORTHO HGT: 1143.773 (m) [PROTOTYPE (Computed using USGG2012,GRS80,IGS08)]

dop from interpolation is 0.391  
scatter (mean square distance from rover) is 26211.887  
average edop for rover is 0.650  
average ndop for rover is 1.070  
average hdop for rover is 1.252  
average vdop for rover is 2.520  
average gdop for rover is 3.250

This position and the above vector components were computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.