

## ***Appendix 3: Gravity Survey Report***

### **Introduction**

A detail GPS gravity survey designated as Calvert Hills Gravity Survey has been carried out in an area approximately 20 kilometres south-east of Calvert Hills Station, Borroloola in Northern Territory, Australia over 2 days from 12 November 2005 to 13 November 2005 on behalf of Alterra Services Pty Ltd.

The proposed Calvert Hills gravity survey consisted of 167 detail gravity stations in a single north-south trending line coincident with GDA94 with station intervals of 50 metres. The line was at GDA94 Zone 53 762350E, and bounded in the south by 8075100N and in the north by 8083400N. The line length was 8300 metres.

During the Survey the line was offset by 240m to the east of the original proposed survey.

The completed Calvert Hills gravity survey comprised of 167 stations in 1 line. All proposed gravity stations were completed. Note; some of the stations may have been slightly offset from their planned position due to vegetation and terrain.

There were 3 observations repeated for quality control purposes, giving a repeat percentage of 1.8%.

The Bouguer anomaly processing has been performed using a country rock density of 2.67 g/cc.

## **GPS Observations and Processing**

Carrier phase GPS data has been collected using *Trimble 4000* series geodetic receivers.

Measurements to existing control have been made using Static techniques. All static baselines have been processed to double difference fixed solutions resulting in horizontal and vertical precision of approximately 2 cm.

Measurements for detail gravity observations have been made using Real Time Kinematic (RTK) techniques giving horizontal and vertical precision of at least 5 cm.

Static baseline processing has been done using Trimble GPSurvey Version 2.35 software and RTK processing using Trimble Geomatics Office Version 1.01 software.

The GPS horizontal coordinates are set on the MGA94 datum from which WGS84 Latitude and Longitude is derived and is set on the MGA94 Zone 53.

The GPS ellipsoidal heights (WGS84 datum) have been corrected to orthometric heights (AHD) using the AusGeoid98 geoid model for the control and the gravity stations.

Details of Horizontal and Vertical control are given in the sections below.

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## **Gravity Observations**

Gravity measurements have been made using *Scintrex CG3 Autograv* instruments. The instrument numbers 9310217 and 9601307 were used in this project.

Readings of 120 seconds were taken at base station. Readings of 40 seconds were taken at all other gravity survey points.

Base station readings were taken at the beginning of the day and at the end of the day's fieldwork.

The CG3 instrument applies an instrument drift correction to its final gravity reading. Any residual drifts between base station readings are corrected by the gravity post processing software. The instrument also applies Earth Tide Correction to its final gravity reading at each station. The instrument calibration constants are contained in the daily gravity data files.

### **Survey Control**

A base station was established in the survey area. It was placed on a hill central to the project to provide good VHF radio coverage for the RTK system. The base is designated as Base 2005.6801. The actual base is marked with a short star picket driven flush with the natural surface. The base is witnessed by a 1m long star picket within 0.3m of the ground mark. Two aluminum tags are attached to the witnessed post. These tags are inscribed "Haines Surveys" and "Gravity 2005.6801".

A sub-base was located within 5 minutes drive of the main base to provide a backup base station to the main base in case loop ties to the main base were poor. It is not marked but the approximate coordinates (+/- 10m) listed in the table define it's location.

Horizontal and vertical control has been established using the AUSPOS online GPS processing service provided by Geoscience Australia. This method provides control within the GDA94 Datum to within +/- 5 cm. It largely replaces the need for finding local survey marks or allows accurate control to be established when local marks are not available.

A total of 16.6 hours (at 10 second intervals) of observations were logged over # days. The following outlines the Cartesian coordinate precision attained per day (or part thereof over midnight GMT).

1 Sigma	sX(m)	sY(m)	sZ(m)	yyyy/mm/dd
6801	0.016	0.016	0.008	2005/11/12
6801	0.023	0.015	0.008	2005/11/13

Since GDA94 and WGS84 (Global Positioning System Datum ) are virtually equivalent the GDA94 values can be directly input into the GPS processing software for all calculations.

Vertical control has been converted to an Australian Height Datum (AHD) height using the GDA94 height determined from AUSPOS and the AUSGEOID98 gravimetric geoid.

Gravity control for 2005.6801 base station was established on the Australian Fundamental Gravity Network (Isogal 1984 / IGSN 71) using classical A-B-A ties from gravity station 67930134. The values for 67930134 were attained from Geoscience Australia in Canberra. A-B-A ties were made over several days to within 0.01 milligals

Control information (**WGS84 heights have been derived using AusGeoid98**):

	WGS 84			MGA Zone 53		AHD	Isogal 84
Base Station	Latitude	Longitude	Height	Easting	Northing	height	Gravity mGal
HS2005.6801	17 20 40.15775 S	137 27 59.14800 E	243.707	762117.401	8080652.673	197.723	978424.833
67930134	19 23 09.6 S	134 06 36.0 E	409.000			375.000	978514.580

## **Point Numbering and Marking**

The line is South-North and the 8 digits are constructed from the planned GDA coordinates for each gravity station using

$$\text{Line No} = (\text{GDA E} - 700000) / 10 \qquad \text{Stn No} = (\text{GDA N} - 8000000) / 10$$

eg. Planned gravity station GDA coordinates

762350.000N

8075100.000E

Line No = 6235

Station No = 7510

ie, Pt No = 62357510

Station numbers have been partly expanded in the processed data to show metres, that is, the Line Numbers = GDA E – 700000 and Station Numbers = GDA N – 8000000.

The gravity stations have not been marked in the field.

## Gravity Processing

The gravity values for this survey are related to the *Australian Gravity Base Station Network* using the *Isogal84 (IGSN 71)* values at known Gravity Stations as provided by *DMR*.

***Note that all gravity values shown in these surveys are expressed in units of milligals.***

The field gravity observations have been processed using standard formulae and constants to produce a Bouguer Anomaly for each gravity station.

The meter reading as recorded in the raw Scintrex data file is corrected for instrument tilts, meter drift and Earth Tide. Post processing corrections are detailed below.

### Drift

The residual drift between base station readings is calculated for each station reading proportionately by time. This is the drift value shown in the processing output.

$$\text{Drift} = [ (t_1 - t_n) ((b_2 - b_1) / (t_2 - t_1)) ]$$

$t_n$  = time of meter reading at each station

$b_1$  = base meter reading prior to station reading

$t_1$  = time of base reading  $b_1$

$b_2$  = base meter reading after station reading

$t_2$  = time of base reading  $b_2$

### Obs mgal

This is the observed gravity value in milligals.

$$\text{Obs} = b_g + (r_n - \text{drift}) - b_1$$

$b_g$  = base stn gravity value (Isogal84)

$r_n$  = meter reading at each station as shown in the CG3 .dat file

drift = residual drift correction as shown above

$b_1$  = base meter reading prior to station reading

### Anom

This is the difference between the observed gravity and the theoretical gravity value at each station. The theoretical value is calculated using the *1967 International Gravity Formula*.

$$\text{Anom} = \text{Obs} - g_{\text{th}}$$

Obs = observed gravity as explained above

$$g_{\text{th}} = 978031.8 (1 + 0.0053024 \sin^2 \phi - 0.0000059 \sin^2 2\phi)$$

$\phi$  = WGS84 Latitude

#### Freeair corrn

The freeair correction is calculated using

$$\text{Freeair corrn} = 0.3086 H$$

H = height above sea level (AHD height)

#### Bouguer corrn

$$\text{Bouguer corrn} = -0.04191 \rho H$$

$\rho$  = density (2.67 g/cc used for this survey)

H = height above sea level (AHD height)

#### Bouguer Anom

$$\text{Bouguer Anom} = \text{Anom} + \text{Freeair corrn} + \text{Bouguer corrn}$$

## **Results Formats**

Printed results of the gravity processing (with Bouguer corrections at density 2.67 g/cc) are included in the Appendix of this report (on the digital copy of the report on Compact Disc only, i. e., not printed). The results are also supplied in digital form on Compact Disc with the following files:

ALLCSV.CSV (survey data)  
REPEATS.REP (repeat observations)

A digital copy of this report is also on the Compact Disc in the root Directory.

ALLCOR.XYZ format (in digital hard copy, on Compact Disc – not printed)

This is a *GEOSOFT* compatible XYZ (space delimited columns) file. The data is sorted by Day then Line and Stn number. The column order is as follows:

/	MGA94 ZONE 53	GRID	drift	corr'd	obs	anom	freeair	bouguer	bouguer	height
/	E N	Line Stn		meter	mgal		corr	corr	anom	(AHD)
/										( 2.67)

### ALLCSV.CSV Format

This is a Comma Separated Variable format file. This format facilitates data import into spreadsheet and database software. Each record (line) contains the following data fields:

Pt Number, Line No, Station No, Date, Day Number, Local Time, WGS Latitude, WGS Longitude, WGS Height, MGA94 East, MGA94 North, AHD Height, Meter reading, Meter reading standard deviation, Earth Tide Correction, drift correction, corrected meter reading, gravity difference (mgal) from base, observed gravity (mgals), gravity anomaly, free-air correction, Bouguer correction (2.67), Bouguer anomaly

### \*.DAT (supplied upon request)

These are the raw data files from the *Scintrex CG3* gravimeter. There is a separate file for each day's data for each field party. The files are identified by the Julian day number (001 = Jan 1st) with the prefix G. eg. G142 = day 142 (22<sup>nd</sup> May or 21<sup>st</sup> May in a leap year).

**PRODUCTION LOG**

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Date	GPS Day	Observed	Repeats	Comments
12-Nov-05	316	78	1	mobilise to Calvert Hills, setup base, commence survey
13-Nov	317	90	3	complete Calvert gravity survey
14-Nov	318	0	0	depart Calvert Hills for next job
	Total	168	4	

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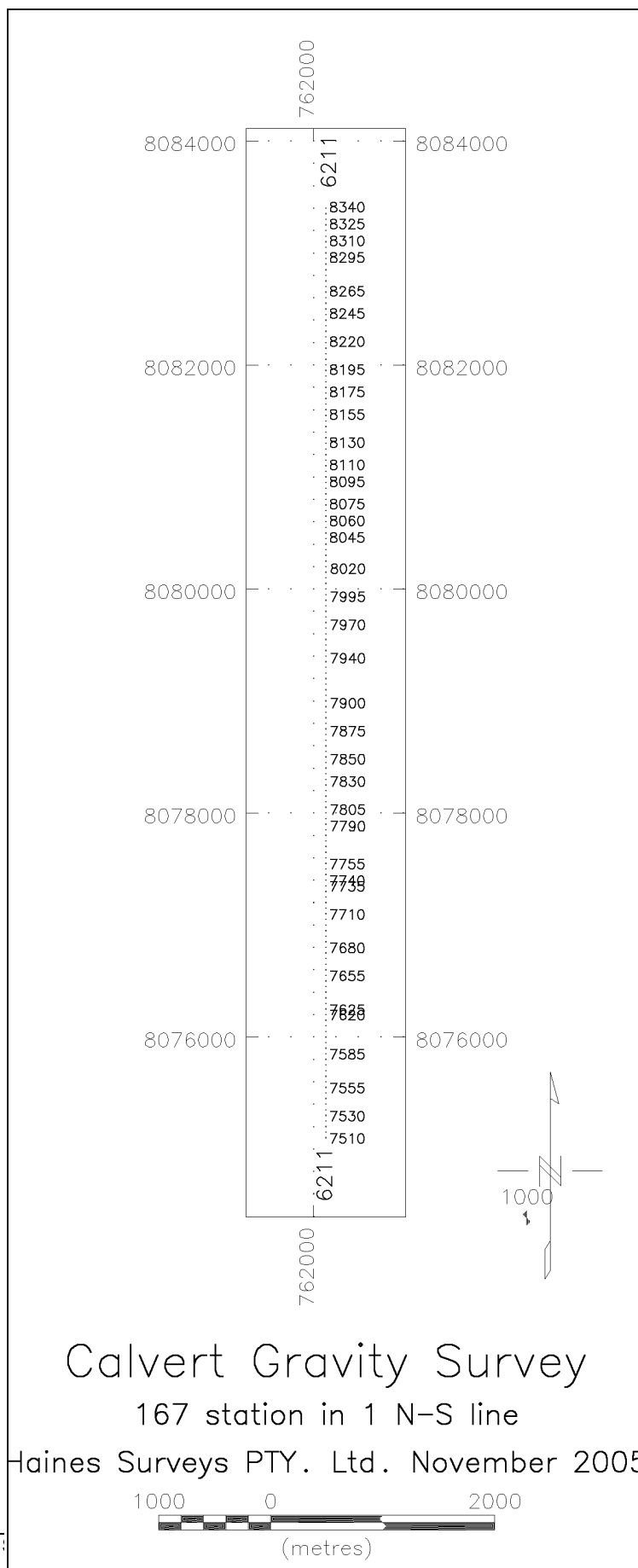
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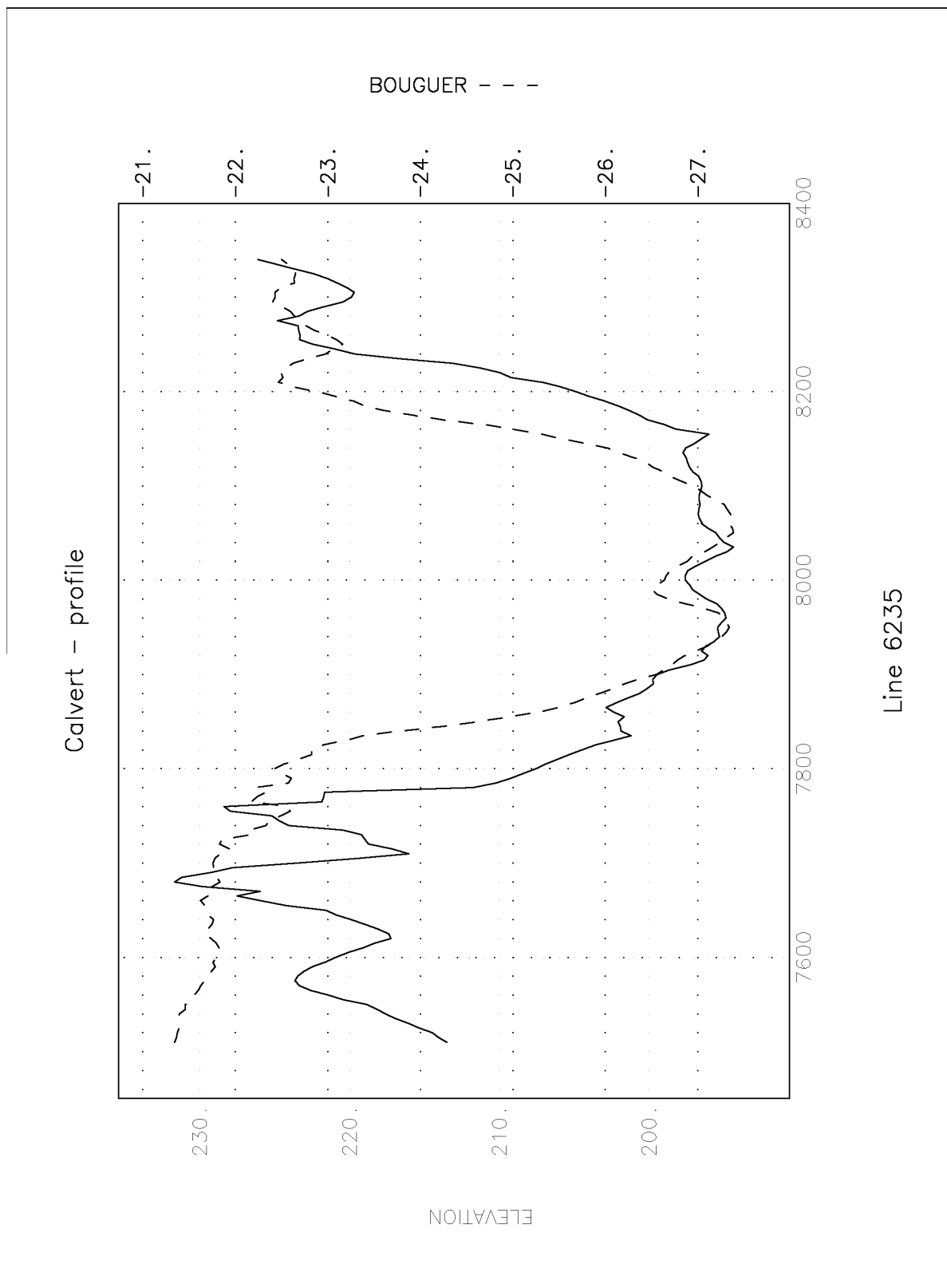


**Repeat Observation Results**

## CALVERT HILLS GRAVITY SURVEY

Pt #	Day	E	N	H	G	Bouguer
62358060	D316	762,349.502	8,080,606.991	196.479	978,424.857	-27.335
62358060	D316	762,349.817	8,080,606.311	196.471	978,424.839	-27.355
		-0.315	+0.680	+0.008	+0.018	+0.020
62358145	D316	762,340.780	8,081,453.727	196.956	978,425.911	-25.795
62358145	D317	762,340.420	8,081,453.338	196.945	978,425.957	-25.752
		+0.360	+0.389	+0.011	-0.046	-0.043
62358150	D316	762,351.429	8,081,504.695	196.498	978,426.228	-25.545
62358150	D317	762,352.106	8,081,504.033	196.488	978,426.267	-25.508
		-0.677	+0.662	+0.010	-0.039	-0.037





## PROCESSED RESULTS

/	MGA94	ZONE 53	GRID	drift	corr'd	obs	anom	freeair	bouguer	bouguer	height
/	E	N	Line	Stn	meter	mgal		corr'n	corr'n	anom	(AHD)
/										( 2.67)	
/D316											
/762117.5	8080652.7	0	6801	+0.000	3133.232	978424.833	-65.987	61.017	-22.125	-27.095	197.723
/762117.5	8080652.7	0	6801	-0.012	3133.232	978424.833	-65.987	61.017	-22.125	-27.095	197.723
/762117.5	8080652.7	0	6801	+0.429	3133.244	978424.833	-65.987	61.017	-22.125	-27.095	197.723
/762117.5	8080652.7	0	6801	+0.005	3132.815	978424.833	-65.987	61.017	-22.125	-27.095	197.723
/762117.5	8080652.7	0	6801	-0.004	3132.810	978424.833	-65.987	61.017	-22.125	-27.095	197.723
/762280.3	8080560.9	0	6899	+0.025	3133.266	978424.855	-66.007	60.664	-21.997	-27.339	196.579
/762280.3	8080560.9	0	6899	+0.027	3133.267	978424.856	-66.006	60.664	-21.997	-27.338	196.579
/762280.3	8080560.9	0	6899	+0.423	3133.314	978424.903	-65.959	60.664	-21.997	-27.291	196.579
/762280.3	8080560.9	0	6899	+0.425	3133.305	978424.894	-65.968	60.664	-21.997	-27.300	196.579
762351.2	8077651.9	6235	7765	+0.277	3134.813	978426.402	-65.808	68.461	-24.824	-22.171	221.845
762357.1	8077690.8	6235	7770	+0.273	3134.760	978426.349	-65.843	68.419	-24.809	-22.233	221.709
762353.5	8077735.5	6235	7775	+0.268	3134.662	978426.251	-65.921	68.406	-24.804	-22.319	221.664
762345.9	8077792.1	6235	7780	+0.258	3136.684	978428.273	-63.872	65.345	-23.695	-22.222	211.748
762351.1	8077844.0	6235	7785	+0.255	3136.610	978428.199	-63.922	64.866	-23.521	-22.577	210.193
762345.0	8077898.6	6235	7790	+0.252	3136.747	978428.336	-63.760	64.567	-23.412	-22.606	209.224
762347.7	8077947.0	6235	7795	+0.248	3136.990	978428.579	-63.495	64.325	-23.324	-22.494	208.440
762347.4	8077999.6	6235	7800	+0.244	3137.213	978428.802	-63.247	64.047	-23.224	-22.424	207.540
762350.9	8078047.9	6235	7805	+0.241	3137.213	978428.802	-63.225	63.843	-23.150	-22.532	206.879
762354.6	8078102.3	6235	7810	+0.237	3137.198	978428.787	-63.214	63.604	-23.063	-22.674	206.105
762353.4	8078150.8	6235	7815	+0.234	3137.176	978428.765	-63.214	63.365	-22.977	-22.825	205.332
762353.5	8078199.5	6235	7820	+0.230	3137.317	978428.906	-63.050	63.110	-22.884	-22.824	204.505
762351.0	8078245.2	6235	7825	+0.227	3137.357	978428.946	-62.989	62.824	-22.780	-22.945	203.577
762353.9	8078301.5	6235	7830	+0.222	3137.327	978428.916	-62.993	62.447	-22.644	-23.189	202.357
762341.8	8078348.2	6235	7835	+0.219	3137.342	978428.931	-62.956	62.087	-22.513	-23.382	201.190
762356.9	8078399.0	6235	7840	+0.215	3136.788	978428.377	-63.487	62.295	-22.589	-23.780	201.864
762348.9	8078450.9	6235	7845	+0.212	3136.293	978427.882	-63.958	62.305	-22.592	-24.245	201.897
762354.8	8078497.0	6235	7850	+0.209	3135.857	978427.446	-64.372	62.357	-22.611	-24.626	202.065
762345.4	8078546.5	6235	7855	+0.206	3135.573	978427.162	-64.633	62.236	-22.567	-24.964	201.672
762352.0	8078597.6	6235	7860	+0.203	3135.107	978426.696	-65.076	62.447	-22.644	-25.272	202.356
762351.5	8078648.7	6235	7865	+0.199	3134.769	978426.358	-65.390	62.600	-22.699	-25.489	202.850
762353.4	8078698.5	6235	7870	+0.195	3134.700	978426.289	-65.436	62.397	-22.626	-25.664	202.195
762353.8	8078748.1	6235	7875	+0.190	3134.705	978426.294	-65.408	62.165	-22.541	-25.784	201.441
762346.7	8078799.4	6235	7880	+0.187	3134.691	978426.280	-65.398	61.916	-22.451	-25.933	200.636
762352.6	8078850.0	6235	7885	+0.184	3134.617	978426.206	-65.449	61.757	-22.393	-26.085	200.121
762345.7	8078899.9	6235	7890	+0.179	3134.549	978426.138	-65.493	61.631	-22.348	-26.210	199.713
762354.2	8078944.3	6235	7895	+0.174	3134.376	978425.965	-65.646	61.644	-22.352	-26.354	199.754
762355.5	8078997.8	6235	7900	+0.170	3134.206	978425.795	-65.791	61.555	-22.320	-26.556	199.466
762356.1	8079053.4	6235	7905	+0.166	3134.269	978425.858	-65.702	61.297	-22.227	-26.632	198.630
762345.7	8079094.8	6235	7910	+0.161	3134.440	978426.029	-65.512	60.865	-22.070	-26.717	197.228
762361.0	8079139.2	6235	7915	+0.156	3134.531	978426.120	-65.400	60.591	-21.971	-26.780	196.342
762366.1	8079195.8	6235	7920	+0.152	3134.486	978426.075	-65.419	60.499	-21.937	-26.857	196.045
762344.8	8079252.3	6235	7925	+0.143	3134.244	978425.833	-65.635	60.638	-21.988	-26.985	196.494
762358.6	8079298.9	6235	7930	+0.139	3134.164	978425.753	-65.693	60.552	-21.957	-27.097	196.216
762346.6	8079351.3	6235	7935	+0.134	3134.171	978425.760	-65.662	60.383	-21.895	-27.174	195.667
762341.2	8079403.4	6235	7940	+0.131	3134.140	978425.729	-65.669	60.262	-21.851	-27.258	195.275
762352.2	8079440.6	6235	7945	+0.126	3134.054	978425.643	-65.738	60.291	-21.862	-27.308	195.371
762349.5	8079496.0	6235	7950	+0.123	3133.993	978425.582	-65.773	60.300	-21.865	-27.338	195.399
762347.6	8079540.6	6235	7955	+0.117	3134.056	978425.645	-65.689	60.224	-21.838	-27.303	195.153
762348.2	8079595.7	6235	7960	+0.114	3134.113	978425.702	-65.607	60.129	-21.803	-27.280	194.846
762353.6	8079647.1	6235	7965	+0.109	3134.125	978425.714	-65.571	60.158	-21.814	-27.226	194.938
762343.4	8079696.9	6235	7970	+0.105	3134.208	978425.797	-65.465	60.226	-21.838	-27.077	195.158
762350.3	8079749.0	6235	7975	+0.102	3134.338	978425.927	-65.311	60.322	-21.873	-26.861	195.471
762350.6	8079804.1	6235	7980	+0.096	3134.363	978425.952	-65.260	60.532	-21.949	-26.677	196.149
762354.7	8079849.9	6235	7985	+0.092	3134.368	978425.957	-65.234	60.678	-22.002	-26.558	196.622
762354.6	8079900.1	6235	7990	+0.088	3134.313	978425.902	-65.266	60.816	-22.052	-26.502	197.071
762353.6	8079950.4	6235	7995	+0.085	3134.197	978425.786	-65.358	60.888	-22.078	-26.549	197.303
762341.3	8079999.5	6235	8000	+0.081	3134.028	978425.617	-65.505	60.974	-22.109	-26.640	197.582
762345.5	8080053.8	6235	8005	+0.077	3133.981	978425.570	-65.526	60.975	-22.110	-26.661	197.587
762354.5	8080104.4	6235	8010	+0.074	3133.947	978425.536	-65.537	60.928	-22.093	-26.702	197.433

762355.3	8080152.9	6235	8015	+0.071	3133.946	978425.535	-65.515	60.761	-22.032	-26.787	196.892
762342.7	8080200.0	6235	8020	+0.067	3133.956	978425.545	-65.484	60.562	-21.960	-26.882	196.246
762345.6	8080250.9	6235	8025	+0.062	3134.003	978425.592	-65.413	60.359	-21.886	-26.940	195.590
762353.6	8080301.8	6235	8030	+0.059	3134.002	978425.591	-65.390	60.111	-21.796	-27.076	194.785
762345.3	8080343.3	6235	8035	+0.055	3133.984	978425.573	-65.389	59.979	-21.748	-27.159	194.357
762356.5	8080399.2	6235	8040	+0.049	3133.757	978425.346	-65.590	60.171	-21.818	-27.238	194.979
762349.8	8080447.9	6235	8045	+0.046	3133.611	978425.200	-65.714	60.265	-21.852	-27.301	195.285
762348.0	8080503.6	6235	8050	+0.043	3133.454	978425.043	-65.845	60.339	-21.879	-27.385	195.526
762348.1	8080548.3	6235	8055	+0.039	3133.339	978424.928	-65.939	60.502	-21.938	-27.375	196.053
762349.5	8080607.0	6235	8060	+0.035	3133.268	978424.857	-65.983	60.633	-21.986	-27.335	196.479
/D316											
/ 762117.5	8080652.7	0	6801	+0.000	4093.125	978424.833	-65.987	61.017	-22.125	-27.095	197.723
/ 762117.5	8080652.7	0	6801	+0.000	4093.125	978424.833	-65.987	61.017	-22.125	-27.095	197.723
/ 762117.5	8080652.7	0	6801	+0.275	4093.125	978424.833	-65.987	61.017	-22.125	-27.095	197.723
/ 762117.5	8080652.7	0	6801	+0.010	4092.850	978424.833	-65.987	61.017	-22.125	-27.095	197.723
/ 762280.3	8080560.9	0	6899	+0.228	4093.123	978424.831	-66.031	60.664	-21.997	-27.363	196.579
/ 762280.3	8080560.9	0	6899	+0.229	4093.124	978424.832	-66.030	60.664	-21.997	-27.362	196.579
/ 762280.3	8080560.9	0	6899	+0.271	4093.206	978424.914	-65.948	60.664	-21.997	-27.280	196.579
/ 762280.3	8080560.9	0	6899	+0.272	4093.197	978424.905	-65.957	60.664	-21.997	-27.289	196.579
762349.8	8080606.3	6235	8060	+0.231	4093.131	978424.839	-66.001	60.631	-21.985	-27.355	196.471
762351.6	8080652.9	6235	8065	+0.233	4093.063	978424.771	-66.048	60.678	-22.002	-27.372	196.623
762345.4	8080703.6	6235	8070	+0.235	4093.040	978424.748	-66.047	60.704	-22.012	-27.354	196.709
762352.1	8080759.9	6235	8075	+0.237	4093.052	978424.760	-66.009	60.698	-22.009	-27.320	196.689
762361.0	8080809.3	6235	8080	+0.238	4093.083	978424.791	-65.955	60.669	-21.999	-27.285	196.594
762341.3	8080852.3	6235	8085	+0.240	4093.140	978424.848	-65.878	60.681	-22.003	-27.200	196.634
762339.7	8080909.0	6235	8090	+0.242	4093.212	978424.920	-65.780	60.689	-22.006	-27.097	196.658
762348.7	8080952.3	6235	8095	+0.244	4093.279	978424.987	-65.693	60.657	-21.994	-27.030	196.555
762346.3	8080997.4	6235	8100	+0.246	4093.356	978425.064	-65.595	60.630	-21.985	-26.949	196.469
762347.5	8081057.0	6235	8105	+0.248	4093.453	978425.161	-65.470	60.646	-21.990	-26.815	196.519
762348.9	8081105.6	6235	8110	+0.250	4093.510	978425.218	-65.391	60.695	-22.008	-26.704	196.677
762344.5	8081154.6	6235	8115	+0.252	4093.492	978425.200	-65.386	60.815	-22.052	-26.623	197.068
762347.5	8081202.7	6235	8120	+0.254	4093.539	978425.247	-65.317	60.889	-22.079	-26.507	197.307
762347.2	8081250.6	6235	8125	+0.256	4093.556	978425.264	-65.278	60.927	-22.092	-26.443	197.429
762349.4	8081302.3	6235	8130	+0.258	4093.648	978425.356	-65.162	60.955	-22.103	-26.309	197.522
762341.8	8081351.1	6235	8135	+0.259	4093.739	978425.447	-65.048	61.016	-22.125	-26.157	197.719
762344.7	8081404.4	6235	8140	+0.261	4093.881	978425.589	-64.881	60.961	-22.105	-26.025	197.542
762340.8	8081453.7	6235	8145	+0.263	4094.203	978425.911	-64.537	60.781	-22.039	-25.795	196.956
762351.4	8081504.7	6235	8150	+0.265	4094.520	978426.228	-64.196	60.639	-21.988	-25.545	196.498
/D317											
/ 762117.5	8080652.7	0	6801	+0.000	4092.680	978424.833	-65.987	61.017	-22.125	-27.095	197.723
/ 762117.5	8080652.7	0	6801	+0.005	4092.680	978424.833	-65.987	61.017	-22.125	-27.095	197.723
/ 762117.5	8080652.7	0	6801	-0.020	4092.675	978424.833	-65.987	61.017	-22.125	-27.095	197.723
/ 762117.5	8080652.7	0	6801	+0.005	4092.695	978424.833	-65.987	61.017	-22.125	-27.095	197.723
/ 762280.3	8080560.9	0	6899	+0.000	4092.750	978424.908	-65.954	60.664	-21.997	-27.286	196.579
/ 762280.3	8080560.9	0	6899	+0.000	4092.745	978424.903	-65.959	60.664	-21.997	-27.291	196.579
/ 762280.3	8080560.9	0	6899	-0.020	4092.775	978424.933	-65.929	60.664	-21.997	-27.261	196.579
/ 762280.3	8080560.9	0	6899	-0.020	4092.760	978424.918	-65.944	60.664	-21.997	-27.276	196.579
762343.4	8075092.2	6235	7510	-0.019	4097.901	978430.059	-63.340	65.888	-23.891	-21.344	213.506
762346.2	8075146.9	6235	7515	-0.019	4097.751	978429.909	-63.465	66.049	-23.950	-21.366	214.027
762341.9	8075198.1	6235	7520	-0.019	4097.626	978429.784	-63.566	66.192	-24.001	-21.376	214.490
762348.8	8075246.1	6235	7525	-0.019	4097.416	978429.574	-63.754	66.460	-24.099	-21.392	215.361
762340.5	8075288.6	6235	7530	-0.018	4097.257	978429.415	-63.893	66.676	-24.177	-21.394	216.060
762350.0	8075342.6	6235	7535	-0.018	4097.072	978429.230	-64.053	66.933	-24.270	-21.390	216.892
762346.1	8075399.4	6235	7540	-0.018	4096.907	978429.065	-64.191	67.141	-24.346	-21.396	217.567
762335.9	8075442.5	6235	7545	-0.018	4096.712	978428.870	-64.367	67.319	-24.410	-21.458	218.142
762319.9	8075498.2	6235	7550	-0.018	4096.537	978428.695	-64.516	67.549	-24.493	-21.461	218.887
762344.7	8075555.5	6235	7555	-0.018	4096.132	978428.290	-64.894	68.027	-24.667	-21.534	220.437
762353.4	8075589.4	6235	7560	-0.018	4095.902	978428.060	-65.108	68.325	-24.775	-21.558	221.402
762374.2	8075633.4	6235	7565	-0.018	4095.607	978427.765	-65.383	68.694	-24.909	-21.597	222.600
762370.7	8075679.3	6235	7570	-0.017	4095.413	978427.571	-65.555	68.920	-24.991	-21.626	223.330
762353.9	8075746.2	6235	7575	-0.017	4095.278	978427.436	-65.659	69.019	-25.026	-21.667	223.651
762350.2	8075800.9	6235	7580	-0.017	4095.228	978427.386	-65.684	68.960	-25.005	-21.729	223.460
762350.2	8075845.9	6235	7585	-0.017	4095.278	978427.436	-65.613	68.831	-24.958	-21.740	223.043
762350.1	8075899.4	6235	7590	-0.017	4095.318	978427.476	-65.548	68.660	-24.897	-21.784	222.490
762349.7	8075951.7	6235	7595	-0.017	4095.488	978427.646	-65.354	68.393	-24.799	-21.761	221.622
762350.2	8075998.4	6235	7600	-0.017	4095.568	978427.726	-65.252	68.189	-24.726	-21.789	220.964
762344.4	8076051.5	6235	7605	-0.017	4095.683	978427.841	-65.113	67.915	-24.626	-21.824	220.074
762346.9	8076099.6	6235	7610	-0.016	4095.854	978428.012	-64.919	67.608	-24.515	-21.826	219.081
762337.7	8076141.3	6235	7615	-0.016	4096.019	978428.177	-64.735	67.373	-24.430	-21.792	218.317
762356.5	8076190.1	6235	7620	-0.016	4096.259	978428.417	-64.472	67.044	-24.310	-21.739	217.252

762344.3	8076252.0	6235	7625	-0.016	4096.279	978428.437	-64.423	67.082	-24.324	-21.666	217.374
762350.0	8076295.8	6235	7630	-0.016	4096.074	978428.232	-64.608	67.313	-24.408	-21.703	218.125
762351.6	8076347.2	6235	7635	-0.016	4095.834	978427.992	-64.824	67.581	-24.505	-21.749	218.991
762351.9	8076399.7	6235	7640	-0.016	4095.614	978427.772	-65.020	67.862	-24.607	-21.765	219.903
762348.8	8076449.8	6235	7645	-0.004	4095.461	978427.619	-65.150	68.171	-24.719	-21.698	220.903
762349.4	8076495.8	6235	7650	-0.004	4095.326	978427.484	-65.263	68.373	-24.792	-21.683	221.558
762351.5	8076549.8	6235	7655	-0.004	4094.796	978426.954	-65.768	69.183	-25.086	-21.671	224.183
762351.7	8076600.8	6235	7660	-0.004	4094.466	978426.624	-66.074	69.734	-25.286	-21.626	225.970
762346.6	8076649.5	6235	7665	-0.004	4094.066	978426.224	-66.452	70.205	-25.457	-21.704	227.494
762346.9	8076700.3	6235	7670	-0.004	4094.381	978426.539	-66.113	69.735	-25.286	-21.664	225.973
762351.3	8076745.3	6235	7675	-0.003	4093.532	978425.690	-66.941	70.905	-25.711	-21.747	229.764
762347.3	8076797.7	6235	7680	-0.003	4093.042	978425.200	-67.407	71.496	-25.925	-21.836	231.677
762353.2	8076847.9	6235	7685	-0.003	4093.157	978425.315	-67.269	71.349	-25.871	-21.791	231.202
762345.4	8076898.5	6235	7690	-0.003	4093.562	978425.720	-66.840	70.734	-25.648	-21.755	229.208
762347.4	8076950.6	6235	7695	-0.003	4093.802	978425.960	-66.576	70.305	-25.493	-21.764	227.819
762352.4	8076996.2	6235	7700	-0.003	4094.637	978426.795	-65.720	68.967	-25.008	-21.761	223.483
762349.1	8077050.8	6235	7705	-0.003	4095.382	978427.540	-64.950	67.726	-24.558	-21.781	219.461
762352.3	8077100.1	6235	7710	-0.003	4095.977	978428.135	-64.332	66.670	-24.175	-21.837	216.039
762349.6	8077146.6	6235	7715	-0.014	4095.621	978427.779	-64.666	67.030	-24.306	-21.941	217.208
762355.5	8077199.6	6235	7720	-0.014	4095.411	978427.569	-64.851	67.498	-24.475	-21.828	218.724
762352.1	8077246.9	6235	7725	-0.014	4095.311	978427.469	-64.929	67.578	-24.504	-21.855	218.983
762348.5	8077300.7	6235	7730	-0.014	4094.931	978427.089	-65.285	67.638	-24.526	-22.172	219.177
762351.8	8077354.2	6235	7735	-0.015	4094.685	978426.843	-65.506	68.016	-24.663	-22.152	220.402
762351.0	8077398.5	6235	7740	-0.015	4093.765	978425.923	-66.405	69.152	-25.075	-22.328	224.082
762351.3	8077448.7	6235	7745	-0.015	4093.565	978425.723	-66.582	69.352	-25.147	-22.377	224.732
762344.9	8077503.5	6235	7750	-0.015	4093.335	978425.493	-66.786	69.496	-25.200	-22.490	225.198
762346.6	8077547.3	6235	7755	-0.015	4092.665	978424.823	-67.436	70.351	-25.509	-22.595	227.967
762349.0	8077601.8	6235	7760	-0.015	4092.600	978424.758	-67.476	70.479	-25.556	-22.553	228.383
762340.4	8081453.3	6235	8145	-0.001	4093.799	978425.957	-64.491	60.777	-22.038	-25.752	196.945
762352.1	8081504.0	6235	8150	-0.001	4094.109	978426.267	-64.157	60.636	-21.987	-25.508	196.488
762355.0	8081550.3	6235	8155	-0.009	4094.396	978426.554	-63.849	60.482	-21.931	-25.298	195.988
762349.1	8081603.3	6235	8160	-0.009	4094.226	978426.384	-63.994	61.172	-22.181	-25.003	198.224
762347.6	8081647.8	6235	8165	-0.010	4094.375	978426.533	-63.825	61.414	-22.269	-24.680	199.007
762350.7	8081703.0	6235	8170	-0.010	4094.575	978426.733	-63.599	61.755	-22.392	-24.237	200.112
762343.2	8081752.9	6235	8175	-0.010	4094.765	978426.923	-63.386	61.919	-22.452	-23.919	200.645
762346.6	8081800.9	6235	8180	-0.010	4094.915	978427.073	-63.214	62.130	-22.529	-23.612	201.329
762346.0	8081848.2	6235	8185	-0.010	4094.965	978427.123	-63.142	62.357	-22.611	-23.396	202.063
762343.2	8081900.7	6235	8190	-0.010	4094.880	978427.038	-63.202	62.650	-22.717	-23.269	203.015
762351.8	8081956.9	6235	8195	-0.010	4094.855	978427.013	-63.201	62.965	-22.831	-23.068	204.034
762354.3	8082001.6	6235	8200	-0.010	4094.835	978426.993	-63.201	63.231	-22.928	-22.898	204.895
762347.8	8082049.6	6235	8205	-0.010	4094.910	978427.068	-63.103	63.538	-23.039	-22.605	205.890
762346.5	8082102.1	6235	8210	-0.010	4094.780	978426.938	-63.209	63.922	-23.178	-22.466	207.135
762350.0	8082151.0	6235	8215	-0.010	4094.300	978426.458	-63.667	64.559	-23.409	-22.517	209.198
762349.5	8082202.2	6235	8220	-0.010	4094.150	978426.308	-63.793	64.794	-23.495	-22.493	209.962
762351.0	8082254.2	6235	8225	-0.010	4093.825	978425.983	-64.094	65.204	-23.643	-22.533	211.290
762352.1	8082306.5	6235	8230	-0.011	4093.354	978425.512	-64.540	65.759	-23.844	-22.626	213.087
762348.5	8082356.7	6235	8235	-0.011	4092.459	978424.617	-65.412	66.865	-24.245	-22.793	216.671
762353.4	8082404.5	6235	8240	-0.011	4091.669	978423.827	-66.180	67.782	-24.578	-22.976	219.644
762345.6	8082449.3	6235	8245	-0.011	4091.304	978423.462	-66.524	68.199	-24.729	-23.055	220.994
762345.6	8082500.1	6235	8250	-0.011	4090.894	978423.052	-66.911	68.641	-24.890	-23.159	222.427
762349.1	8082554.1	6235	8255	-0.011	4090.754	978422.912	-67.026	68.921	-24.991	-23.095	223.336
762350.0	8082602.1	6235	8260	-0.011	4090.849	978423.007	-66.909	68.906	-24.986	-22.988	223.286
762349.2	8082655.2	6235	8265	-0.011	4090.939	978423.097	-66.794	68.938	-24.997	-22.853	223.390
762344.1	8082703.0	6235	8270	-0.011	4091.004	978423.162	-66.707	68.948	-25.001	-22.760	223.423
762350.1	8082750.1	6235	8275	-0.011	4090.749	978422.907	-66.940	69.377	-25.157	-22.719	224.813
762349.0	8082800.3	6235	8280	-0.011	4091.089	978423.247	-66.577	68.933	-24.995	-22.639	223.372
762348.7	8082849.0	6235	8285	-0.012	4091.223	978423.381	-66.420	68.757	-24.932	-22.595	222.804
762347.2	8082901.1	6235	8290	-0.012	4091.503	978423.661	-66.116	68.423	-24.810	-22.504	221.720
762352.2	8082955.3	6235	8295	-0.012	4091.823	978423.981	-65.771	68.037	-24.671	-22.404	220.470
762348.9	8083001.5	6235	8300	-0.012	4091.893	978424.051	-65.680	67.854	-24.604	-22.430	219.877
762344.5	8083051.0	6235	8305	-0.012	4091.908	978424.066	-65.642	67.793	-24.582	-22.431	219.680
762350.4	8083099.7	6235	8310	-0.012	4091.743	978423.901	-65.784	67.935	-24.633	-22.483	220.138
762348.8	8083156.8	6235	8315	-0.012	4091.433	978423.591	-66.068	68.133	-24.705	-22.640	220.782
762347.6	8083201.8	6235	8320	-0.012	4091.278	978423.436	-66.202	68.349	-24.784	-22.637	221.480
762347.9	8083248.4	6235	8325	-0.012	4091.068	978423.226	-66.390	68.622	-24.882	-22.651	222.364
762345.0	8083307.8	6235	8330	-0.012	4090.783	978422.941	-66.648	69.041	-25.035	-22.641	223.723
762348.6	8083354.8	6235	8335	-0.012	4090.603	978422.761	-66.806	69.403	-25.166	-22.569	224.897
762347.4	8083404.4	6235	8340	-0.012	4090.408	978422.566	-66.978	69.778	-25.302	-22.502	226.112

