

- The northern lines range from 5357500N to 5358800N with easterly positions within the map boundary.
- Thick gorse dense tree cover and blackberry bush limited access on western grid areas near Austral Creek.
- North western area had dense gorse bush and limited access.
- Austral Creek was not negotiable in periods of heavy rains.
- Steep slopes in the southern area were difficult to negotiate on wet days.
- A grid map shows extent of the proposed survey.
- The Zeehan to Strahan highway traversed the western grid.

### Gravity Survey:

- Gravity stations were located by RTK GPS in real time in the appropriate datum 25m station intervals along lines.
- All stations were given a unique six figure ID
- Austral Grid had prefix of 1, eg 100001 as starting number
- Additional survey points were taken to map significant terrain and not used by gravity readings.
- Readings were taken in loops from a control station, the loop duration dependent on access and terrain elevation.
- Steep slopes required some agility to read the meter without incident.



- Swampy areas required full water proof waders to negotiate.

#### **GPS Data Processing:**

- RTK GPS positioning at each gravity station was recorded in the GPS memory in GDA94 datum as raw data in addition to real time display in AMG66 zone55.
- This data was then transformed again to the required datum and transferred to a memory card for computer access.
- Format was Easting Northing Elevation and satellite elevation position error 0.00 to 0.05m
- No post processing was required with this data set.

#### **Gravity Data Processing:**

- All gravity stations were given a unique six digit ID
- Gravity data was recorded in loops from a control station, the field measurement being a relative gravity measurement referenced to the base station control.
- Gravity data was recorded at each station in instrument divisions.
- The time of measurement was recorded in EST daylight saving or UTM plus 11 hours.
- A Solo program combined the common GPS point ID to the gravity station point ID as these were stored in two separate instruments.
- This data set was then processed to produce a tidal corrected data set of instrument readings to check repeatability of stations before further processing.
- Longmans' formulae was used for the calculation of tidal changes at the local time and location.

CLIENT: Zeehan Zinc  
 AREA: Zeehan Tasmania  
 GRID: Austral  
 ROTATION= 0.0000 MERCZONE=55 CALIB.FACTOR = 1.01390  
 MKPEAST =xxxxxx.xx MKPNORTH=xxxxxx.xx  
 BASE # 01;GRAVITY:9803101.400;EAST=xxxxxx ;NORTH=xxxxxx :motel  
 BASE # 02;GRAVITY:9802980.000;EAST=xxxxxx ;NORTH=xxxxxx :highway  
 LAST BASE  
 LOOP:01;METER:556;DATE:170306;OPERATOR:B.RAU  
 LINE Line  
 LINE Line  
 000000.00 0000000001. 3825.24 924 000.00 76 -.073 01 3825.17  
 363050.87 5358329.86 3820.88 952 195.77 76 -.069 777777 3820.81  
 363050.87 5358329.86 3820.82 1216 195.77 76 0.000 777777 3820.82  
 363075.52 5358350.11 3820.74 1220 195.75 76 0.000 100001 3820.74  
 363100.25 5358350.61 3820.88 1224 195.28 76 0.007 100002 3820.89  
 363125.09 5358349.86 3821.19 1227 193.57 76 0.007 100003 3821.20

#### Format:

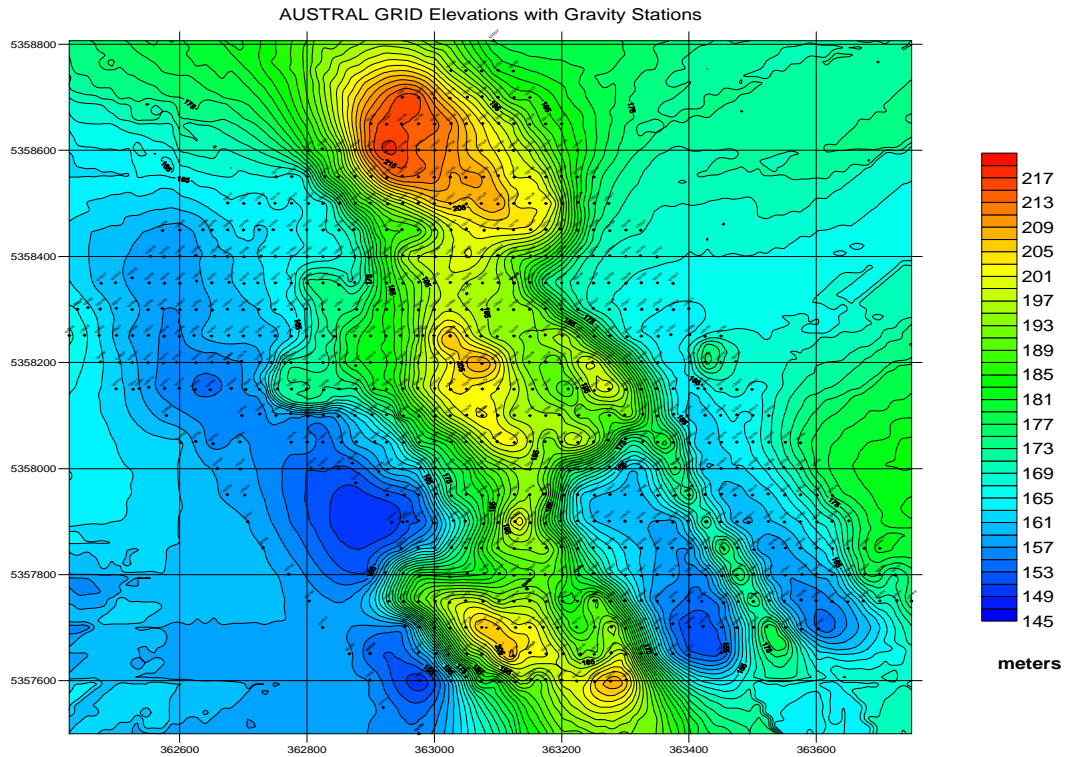
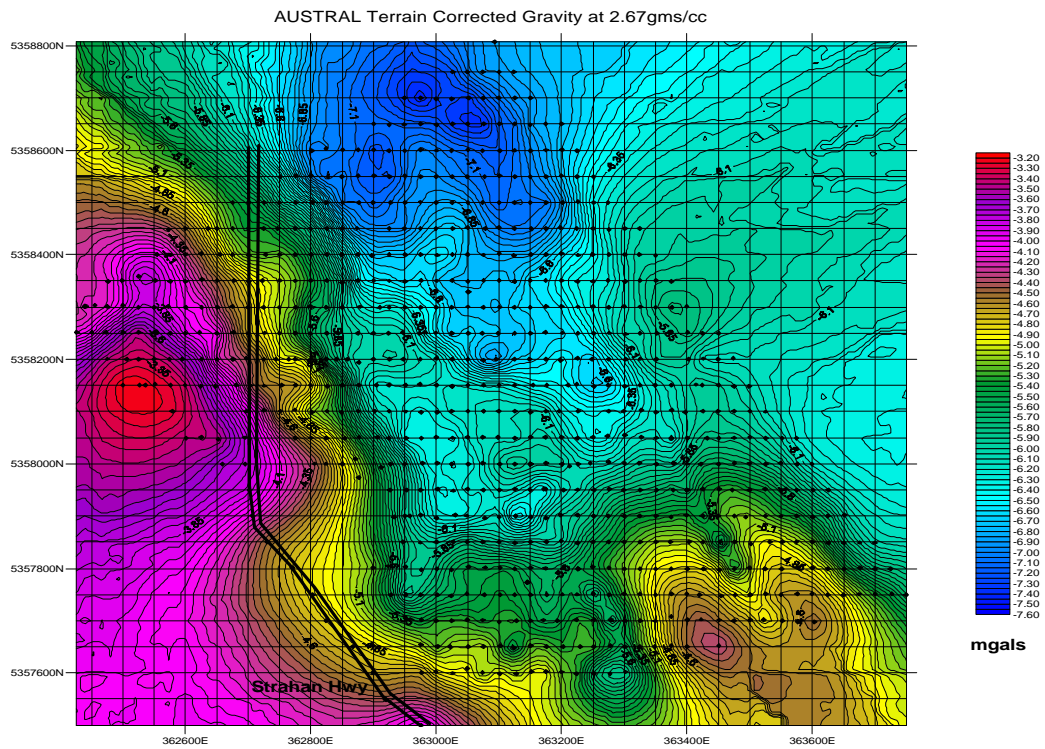
east, north, meter value, time, elevation, julian date, tidal correction, station ID, tidal corrected meter value.

- This final data set was processed to produce the following example result.
- This includes instrument drift at base, daily drift, latitude and Bouguer calculation.
- The Observed 65 value is a drift corrected tie to a base station with a recorded AGSO Isogal65 value.
- The final calculations are derived by the standard AGSO Isogal65 formulae.
- Only a single Bouguer density of 2.67 gms/cc was required to be calculated and terrain corrections for this survey are by consultant Dr. David Leahman.

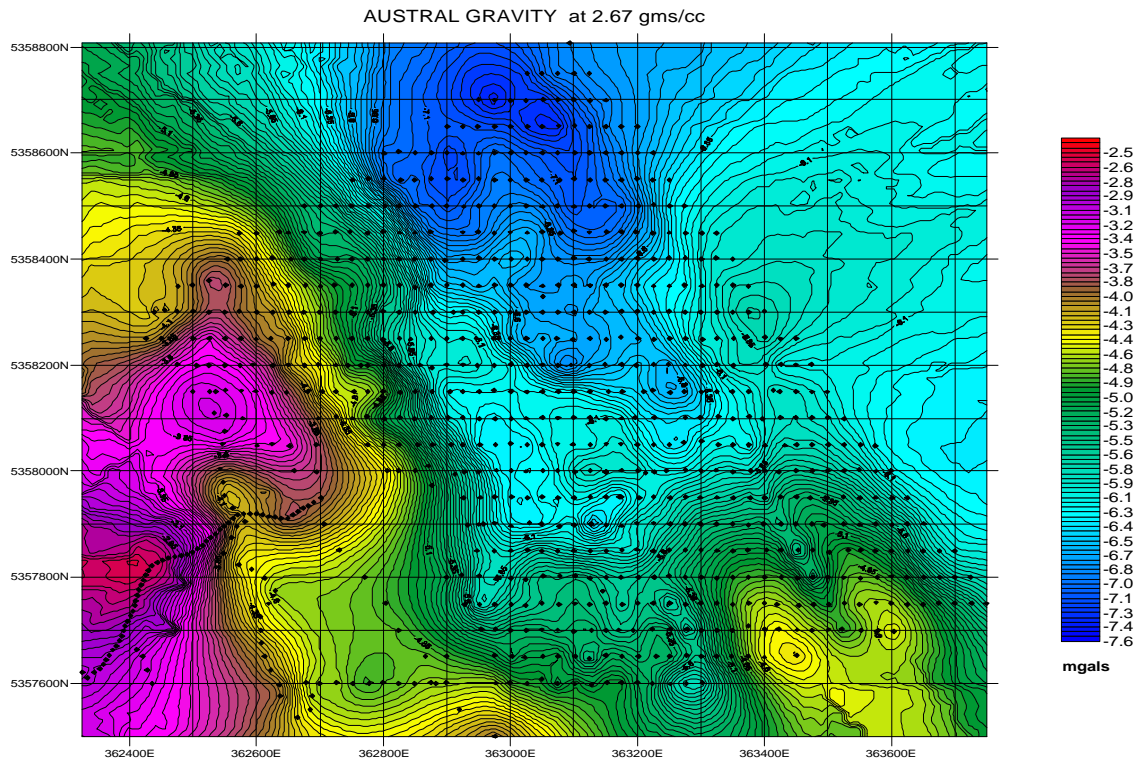
pegID	Observed65	Elevn	Lat66	Long66	AMG_Est66	AMG-Nth66	F/air	2.67	Zone
777777	980305.72	195.77	-41.914969	145.348605	363050.87	5358329.86	14.64	-7.26	55
100001	980305.64	195.75	-41.914791	145.348907	363075.52	5358350.11	14.57	-7.33	55
100002	980305.79	195.28	-41.914791	145.349205	363100.25	5358350.61	14.58	-7.27	55
100003	980306.11	193.57	-41.914802	145.349504	363125.09	5358349.86	14.37	-7.29	55
100004	980305.51	196.73	-41.914790	145.348607	363050.64	5358349.69	14.74	-7.27	55
100005	980305.10	198.94	-41.914775	145.348298	363025.06	5358350.83	15.02	-7.24	55
100006	980305.67	196.63	-41.914778	145.347998	363000.18	5358350.04	14.88	-7.13	55

- Final archive data format is then

pegID	AMG_Est66	AMG-Nth66	Elevn	Observed65	TerrC	D2.67	tGrav	Lat66	Long66	F/air	Zone
100001	363075.52	5358350.11	195.75	980305.64	0.57	-7.33	-6.76	-41.914791	145.348907	14.57	55
100002	363100.25	5358350.61	195.28	980305.79	0.59	-7.27	-6.68	-41.914791	145.349205	14.58	55
100003	363125.09	5358349.86	193.57	980306.07	0.55	-7.34	-6.79	-41.914802	145.349504	14.32	55
100003	363125.09	5358349.86	193.57	980306.11	0.55	-7.29	-6.74	-41.914802	145.349504	14.37	55







Austral with western extensions from Oceana, see combined maps in Oceana for regional view.

- **OCEANA**



A view of area from Austral Smelter with Mt. Zeehan under cloud.

## **THE SURVEY:**

### **Control Data:**

- All raw GPS survey controls are acquired in GDA94 datum (WGS84) and transformed in real time to survey grid references in AGD66 and AMG66 Zone 55 using the Tasmanian AGD66 transformation.
- All map presentation is AMG66 zone 55 datum.
- All time references for gravity are EST daylight saving UTM plus 11 hours.
- All height references are AHD

### **GPS Base station:**

- See base locations

### **Gravity sub base:**

- A gravity sub base #444444 was located on a raised area in central Oceana grid near to the GPS station high point. This was used as a local control to monitor of drifts with intermediate tie controls also used due to difficult nature of this area.
- Location: 444444 362234.86E 5357417.69N 196.49m
- Observed gravity: 980309.66 milligals

### **Survey Lines:**

- Lines were surveyed at 25m station intervals on the western grid and 25m line intervals north south.
- The grid is in a valley where Mt Zeehan forms the western slopes, a sandstone and quartz ridges the eastern slopes.
- Steep slopes were not negotiable and avoided.

- Numerous old mine workings frequented the valley in addition to the main mining complex long since abandoned, the Oceana mine.
- Several deep shafts to 186m are still open, but water filled.
- Surveying found sink holes in the limestone and they were very deep and not easy to see until nearby in tall bush.
- Old mine pits? deep and water filled, predominated in the NE area surveyed and after circling this area through tall dense bush no access point was found. This area was declared out of bounds for more surveying due to the extreme danger of falling into a deep, steep sided water filled hole with no escape.
- Due to difficulty of access in thick bush, flooded creeks and numerous deep sink holes the survey was limited in coverage in proposed mining area.
- Old grid pegs were relocated by GPS for reference
- A grid map shows extent of the proposed survey and area completed.
- Old mine shafts were located by GPS
- Old and current drill holes were located by GPS.

#### **Gravity Survey:**

- Gravity stations were located by RTK GPS in real time in the appropriate datum at 25m and detail 10m station intervals along lines, and random stations along tracks and cleared bush areas open to GPS surveying
- Difficult areas requiring gravity coverage were optically levelled from GPS control points.
- All stations were given a unique six figure ID
- Oceana Grid had prefix of 4, eg 400001 as starting number
- Readings were taken in loops from a control station, the loop duration dependent on access.
- Steep slopes required some agility to read the meter without incident and were avoided. This area was more difficult to negotiate than Austral grid slopes. A water race on the northern side was traversed to measure data north of the Oceana fault.
- 

#### **GPS Data Processing:**

- RTK GPS positioning at each gravity station was recorded in the GPS memory in GDA94 datum as raw data in addition to real time display in AMG66 zone55.
- This data was then transformed again to the required datum and transferred to a memory card for computer access.
- Format was Easting Northing Elevation and satellite elevation position error 0.00 to 0.05m
- No post processing was required with this data set.

#### **Gravity Data Processing:**

- All gravity stations were given a unique six digit ID

- Gravity data was recorded in loops from a control station, the field measurement being a relative gravity measurement referenced to the base station control.
- Gravity data was recorded at each station in instrument divisions.
- The time of measurement was recorded in EST daylight saving or UTM plus 11 hours.
- A Solo program combined the common GPS point ID to the gravity station point ID as these were stored in two separate instruments.
- This data set was then processed to produce a tidal corrected data set of instrument readings to check repeatability of stations before further processing.
- Longmans' formulae was used for the calculation of tidal changes at the local time and location.

CLIENT: Zeehan Zinc  
 AREA: Zeehan Tasmania  
 GRID: Oceana  
 ROTATION= 0.0000 MERCZONE=55 CALIB.FACTOR = 1.01390  
 MKPEAST =xxxxxx.xx MKPNORTH=xxxxxx.xx  
 BASE # 01;GRAVITY:9803101.400;EAST=xxxxxx ;NORTH=xxxxxx :motel  
 BASE # 02;GRAVITY:9802980.000;EAST=xxxxxx ;NORTH=xxxxxx :highway  
 LAST BASE  
 LOOP:15;METER:556;DATE:270506;OPERATOR:B.RAU  
 LINE Line  
 LINE Line  
 000000.00 000000001. 3824.93 945 000.00 147 -.092 01 3824.84  
 362234.86 5357417.69 3824.46 1000 196.49 147 -.088 444444 3824.37  
 362388.01 5357364.66 3827.53 1204 184.19 147 -.059 400693 3827.47  
 362400.17 5357357.22 3827.87 1208 182.86 147 -.056 400692 3827.81  
 362415.59 5357356.27 3828.37 1213 180.53 147 -.056 400682 3828.31  
 362438.71 5357352.77 3828.40 1217 179.77 147 -.056 400680 3828.34

Format:  
 east, north, meter value, time, elevation, julian date, tidal correction, station ID, tidal corrected meter value.

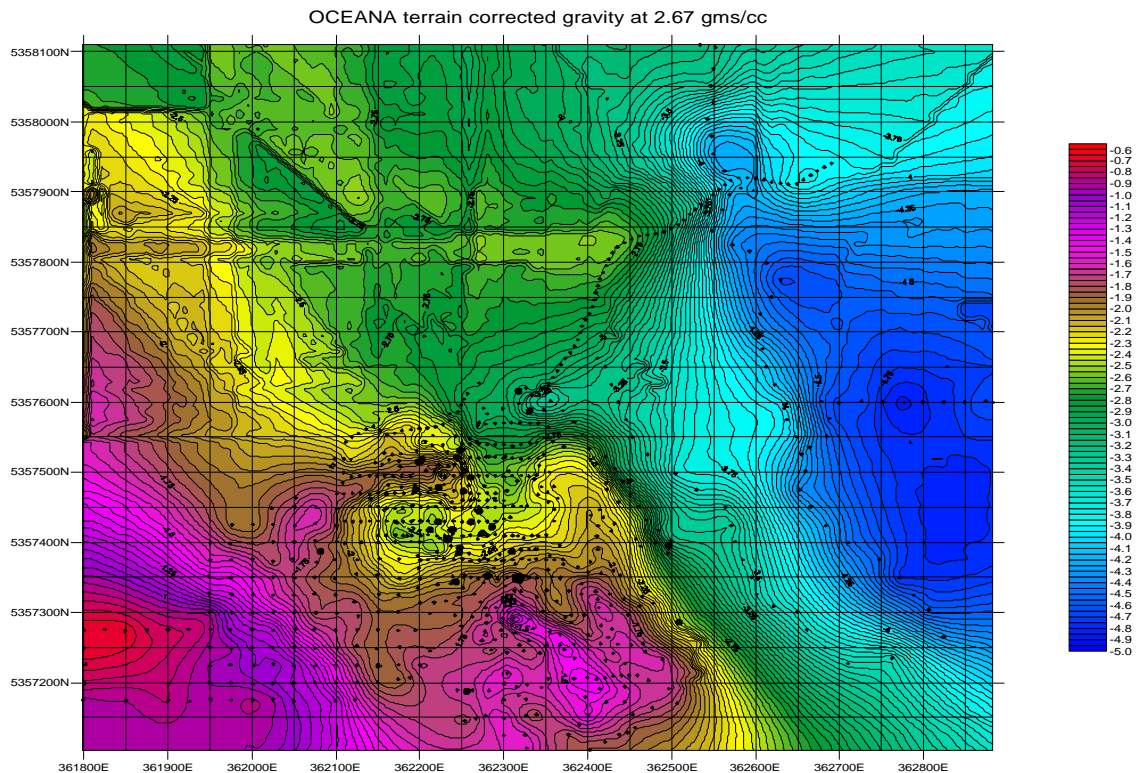
- This final data set was processed to produce the following example result.
- This includes instrument drift at base, daily drift, latitude and Bouguer calculation.
- The Observed 65 value is a drift corrected tie to a base station with a recorded AGSO Isogal65 value.
- The final calculations are derived by the standard AGSO Isogal65 formulae.
- Only a single Bouguer density of 2.67 gms/cc was required to be calculated and terrain corrections for this survey are by consultant Dr. David Leahman.

pegID	AMGEst	AMG-Nth	Latitude	Longitude	Elvn	Observed	Theoretical	D2.67
444444	362234.86	5357417.69	-41.923039	145.338556	196.49	980309.66	980352.22	-3.90
400693	362388.01	5357364.66	-41.923543	145.340390	184.19	980312.81	980352.26	-3.23
400692	362400.17	5357357.22	-41.923612	145.340535	182.86	980313.15	980352.27	-3.15
400682	362415.59	5357356.27	-41.923624	145.340720	180.53	980313.66	980352.27	-3.10
400680	362438.71	5357352.77	-41.923659	145.340998	179.77	980313.69	980352.27	-3.22

- Final archive data format is then



pegID	AMGEst	AMG-Nth	Elvn	Observed65	TrnC	D2.67	TD2.67	Latitude66	Longitude66
444444	362234.86	5357417.69	196.49	980309.66	1.62	-3.90	-2.28	-41.923039	145.338556
400693	362388.01	5357364.66	184.19	980312.81	1.19	-3.23	-2.04	-41.923543	145.340390
400692	362400.17	5357357.22	182.86	980313.15	1.20	-3.15	-1.95	-41.923612	145.340535
400682	362415.59	5357356.27	180.53	980313.66	1.20	-3.10	-1.90	-41.923624	145.340720
400680	362438.71	5357352.77	179.77	980313.69	1.21	-3.22	-2.01	-41.923659	145.340998
400681	362430.88	5357359.79	179.94	980313.73	1.18	-3.14	-1.96	-41.923595	145.340905



- Drill holes located at a round dot
- Shafts located as a group of squares at each corner of the shaft.
- Areas of low data in central area are sink holes and deep water filled holes.

## Combined Oceana Austral Gravity:

