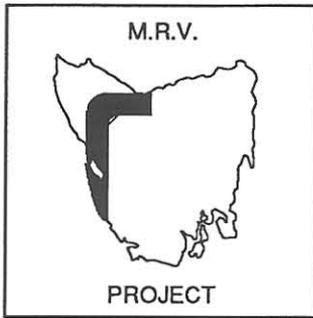


MRVGP8

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Mt Read Volcanics Project Geophysical Report 8

1988

MANTLE88

Regional Gravity Field Tasmania

by D. E. LEAMAN



TASMANIA DEPARTMENT OF RESOURCES & ENERGY
DIVISION OF MINES & MINERAL RESOURCES

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032002

MANTLE88
REGIONAL GRAVITY FIELD
TASMANIA

for
MT READ VOLCANICS PROJECT
by
DR. D.E. LEAMAN

April 1988

MANTLE88

SUMMARY

This report presents a regional formulation for the gravity field across NW Tasmania which may be used to generate residuals. The formulation is based on consideration of many geological factors and was not derived from any filtering or averaging process.

The formulation is presently considered reliable only for NW Tasmania but the model which generates it can be used across the island. It is expected that application of the model, or the accretion of new data, and especially more extensive evaluation of the available data in eastern and southern Tasmania will lead to substantial revisions.

The reference MANTLE88 should thus be considered analogous to the IGRF function which is used to generate regional magnetic fields and which is updated every few years. In the gravity case such an update is intended after any major regional analysis.

INTRODUCTION

Many early gravity interpretations derived from the TASGRAV data base were based on residual anomalies derived from a regional-residual separation. Profile smoothing, filter or grid average methods have been used. All mathematical methods generate numbers for the residual field which average zero but the truth of the valuation cannot be assessed where there are variations in field character or survey coverage. Such methods by their nature preclude evaluation of crustal structure or structures which generate complex or long wavelength characteristics. No major errors are introduced in the treatment of high contrast, shallow sources or structures such as Tertiary basins although understanding of the deeper section may be obscured.

In Western Tasmania recent work for the Mt Read Volcanics Project has shown that thick trough sections intruded by large plutons occur. These features cannot be reliably assessed by simple regional separations due to the interaction of anomaly wavelengths. Extended analysis of the gravity field in W and NW Tasmania has, however, allowed separation of several of the components generating the gravity field. The most critical of these relates to the Mantle.

The methodology was described by Leaman (1988a) and the basic control sections are included in Leaman (1988a, b). An extract of the basic mantle concept was given by Leaman (1988c). This basic extraction utilised simple, approximate methods and some refinement was recommended.

Subsequent 3D refinement has been undertaken of the primary components of the analysis; namely the mantle, the effect of water, and the granites. The review has not sought to provide additional detail on the form of the granites, although some has been obtained, but to confirm the mantle component. Some revision has been made of the model presented by Leaman (1988c).

The revised model has been used to calculate the effect of the mantle on the observed gravity field. When coupled with the effect of the surrounding water the resultant provides a regional field which can be used to generate residuals.

NOTES ON MANTLE88 AND ITS USE

The model used to generate the basic field values is presented in Figure 1 and Table 1. Results of the attraction of the model are provided in Table 3. Listings of the model or output are also available in computer readable form. This first attempt at provision of a regional model function has been termed MANTLE88. The coordinates listed in the table are a shortened version (northing) of the AMG. It will be noted that relatively few positions have been used to define the structure for any given depth. This reflects present knowledge and the fact that detail is not justified anywhere. Considerable revision is to be anticipated in the eastern half of the island.

There are also severe limitations offshore. Most of the offshore gravity data has not been fully corrected or assessed for reliability and the definition may be suspect. Table 3 excludes estimates more than a few kilometres from the coast.

Although the model used is primary and relatively crude it is believed to have a precision of less than ± 250 m in NW Tasmania. Precision is defined with present analysis and understanding within 2 mGal across NW Tasmania but the precise location, or scale, of any deviations is not known. The limits of perceived reliability are indicated in Figure 1.

The model (Table 1) is an inverse mould calculated using a contrast of -0.6 t/cu m. This form was chosen to simplify long term accretion of the model, especially offshore. Since all values are referred to the Bouguer density assumption of 2.67 t/cu m a density of 3.27 t/cu m is implied for the mantle. This function appears to satisfy the long wavelength aspects of the gravity field in Tasmania.

In order to provide values of absolute value, and which may be employed directly for residual separation, a scalar has been applied. The magnitude of this scalar was derived by refinement of arbitrary assumptions. An initial shift of 420 mGal was applied to the results of the model, in order to obtain positive

values, and these values coupled with the effect of major crustal masses were contrasted with the observed field. The precise form of upper crustal features is not critical to this assessment. When this was done a shift differential between the observed field and the resultant model field was found to be 30 to 32 mGal. The difference reflects the current precision of the model but the higher value is preferred. This assessment yields a total differential of 388 mGal. This value has been added to the model values as calculated to yield the values presented in Table 3. The compensated values can be compared directly with the observed field.

Application of these values should, however, also consider the effect the surrounding oceans. Bathymetry is reasonably well defined and the calculation has been undertaken on the same basis as the mantle model. The high contrast of the water (-1.64 t/cu m) does introduce problems near the coast. The model for the water volume (WATER - Table 2) offers the minimum detail for both distribution of water and definition of the model in order to ensure a stable integration.

The water function (Table 4) is smooth across mainland Tasmania but slightly stepped near the coast, across smaller islands or offshore. Stepping reflects inadequate or inaccurate definition of the water depth and is critical for depths less than 200 m. The definition for water depths less than 50 m is very crude beyond NW Tasmania and future versions of the regional field may also be super detailed for the water content.

Table 4 provides a listing of the effect of water across NW Tasmania.

The present water function is consistent with the supplied mantle function; both will need revisions and detail beyond the limits of high reliability shown in Figure 1.

Tables 3 and 4 present results on a 5 km grid across NW Tasmania. This grid is sufficient to define most gradients generated by mantle or water sources.

In order to generate a residual Bouguer anomaly map the values from each table should be summed, the sum used to generate a regional trend and this trend subtracted from the observed values. It will be found that this yields a bias of positive values and not a mean of zero. This reflects the relationships between large crustal masses close to the Bouguer density assumption and substantial upper crustal masses of the order of 0.1 t/cu m denser. Negative features may be related to post Cretaceous sedimentation or granites although some near zero values may involve these materials. Refer to the 2D guide sections of Leaman (1988b).

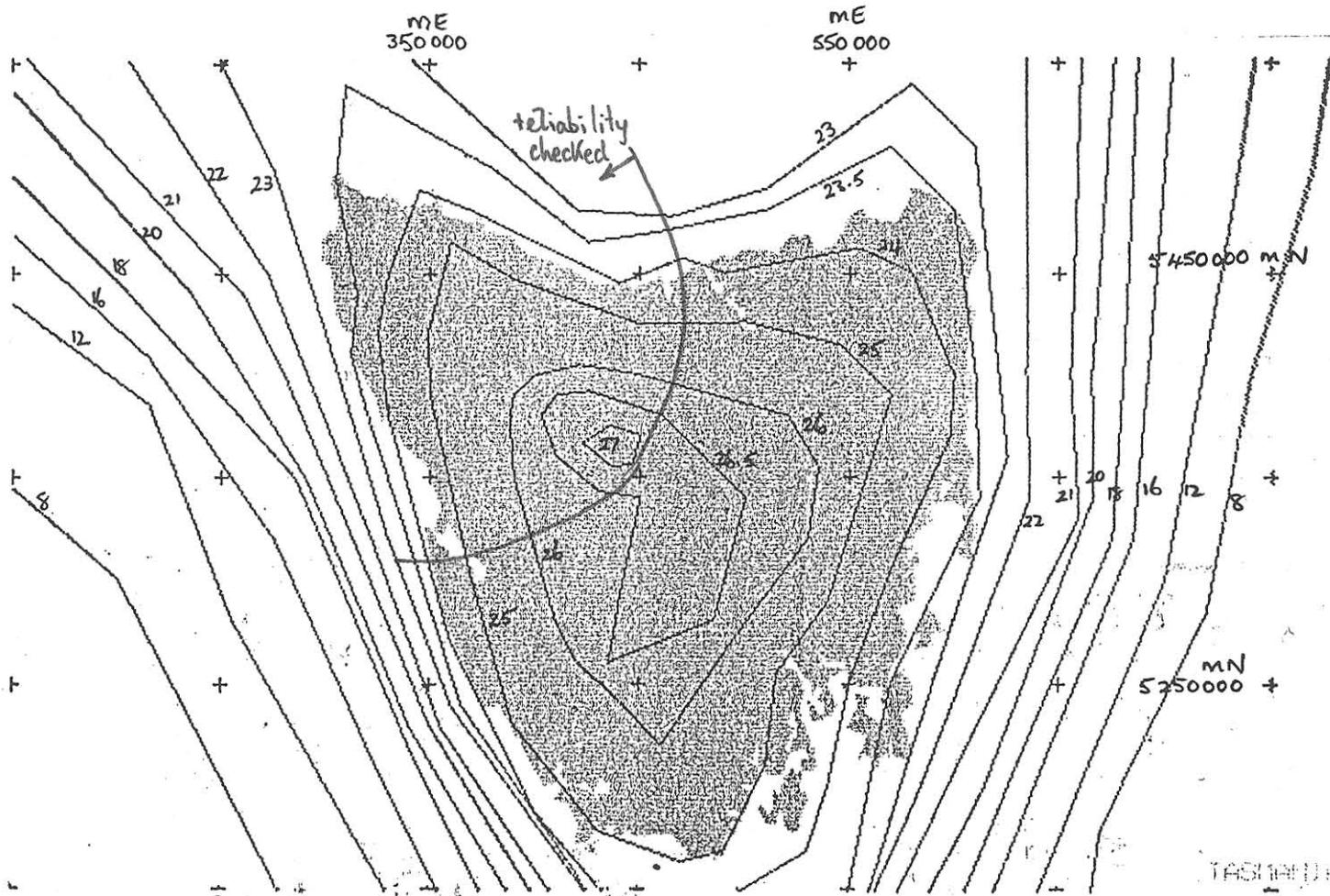
MANTLESS8 offers a more reliable way of interpreting sources of shallow or moderate depth without need to consider the entire

crust, survey coverage or the filter procedure used. It is suggested at this stage that it be used for detailed analysis of the larger basins or troughs and the granites pending necessary refinement within the 2 mGal precision. More detailed residual studies will need to consider these distorting features and the basic forms described by Leaman (1988b).

Caution is advised where either water or mantle function is used beyond the inferred limit of checked reliability and precision as marked in Figure 1. Considerable basic analysis is still required for much of Tasmania and it is intended to revise the regional model as this work is completed.

REFERENCES

- Leaman, D.E., 1988 a. Granites of W and NW Tasmania. Summation Report. Mines Department Tasmania, Mt Read Volcanics Project.
- Leaman, D.E., 1988 b. Regional evaluation W and NW Tasmania. Precambrian and Lower Palaeozoic structural relationships. Mines Department Tasmania, Mt Read Volcanics Project.
- Leaman, D.E., 1988 c. Gravity interpretation. Revised Mantle model. Mines Department Tasmania, Mt Read Volcanics Project.



SCALE 3333333
GRID 100000
ORIGIN 150000
MANTLE2

150000

contours in Km below surface

FIGURE 1: PLOT OF MANTLE88
Limit of tested reliability shown.

TABLE 1

MANTLE88

MODEL OF MANTLE

Revised from Leaman (1988c) after 3D check modelling.

Coordinates are shortened from AMG.

Each data block lists the block number, contrast and depth below sea level in metres (e.g., 1, -.60, 8000).

TABLE 2

WATER

Model used to calculate the effect of water. Based on bathymetry proved by National Mapping.

Format as for Table 1.

Note that considerable fine detailing is desirable for parts of this model. These do not affect its use for onshore regional estimates but may be critical at the coast or offshore where the water depth is less than 200 m.

GRAV3D
LEAMAN GEOPHYSICS

WATER

BODY CONTRAST DEPTH

1	1.64	1							
375000	476000	379000	470000	393000	466000	400000	460000	414000	454000
430000	445000	450000	443000	461000	446000	462000	444000	475000	455000
483000	450000	481500	455000	500000	462000	515000	460000	523000	468000
529000	467000	534000	460000	545000	464000	550000	478000	556000	481000
570000	474000	580000	482000	579500	490000	581000	490500	600000	506000
585000	525000	565000	585000	582000	603000	612000	576000	624000	522000
600000	506000	581000	490500	600000	480000	613000	460000	607000	445000
613000	430000	606000	410000	610000	395000	608500	376000	611000	335000
611500	324000	611000	310000	602000	313000	603000	336000	595000	340000
583000	320000	582000	293000	575000	283000	578000	275000	583000	276000
588000	287000	595000	277000	590000	270000	583300	268000	583000	276000
578000	275000	571000	255000	581000	250000	581200	240000	576000	236000
583000	213000	565000	213200	551000	231000	555000	246000	545000	240000
529000	233000	535000	210000	531000	196000	525000	182000	511000	185000
505000	200000	494000	169000	476000	169500	466000	180000	422000	176000
420000	190000	406000	204000	386000	241000	378000	239000	366000	277000
358000	280000	349000	327000	355000	326000	357000	336000	350000	356000
340000	363000	330000	380000	327000	379000	325000	396000	312000	413000
310000	422000	307000	430000	304000	453000	299000	457000	299500	466000
306000	472000	304500	490000	304000	496000	308000	498000	310000	504000
306000	516000	312500	526000	316000	520000	320000	527000	327000	525000
310000	504000	308000	498000	317000	490000	325000	506000	345000	482000
354000	483000	355000	490000	356000	482500	370000	474000	375000	476000
2000	826000	1000	%-350000	990000	%-352000	999000	825000	2000	826000

0

2	1.64	3							
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483000	450000	481500	455000	500000	462000	515000	460000	523000	468000
529000	467000	534000	460000	545000	464000	550000	478000	556000	481000
570000	474000	580000	482000	579500	490000	581000	490500	600000	506000
585000	525000	565000	585000	582000	603000	612000	576000	624000	522000
600000	506000	581000	490500	600000	480000	613000	460000	607000	445000
613000	430000	606000	410000	610000	395000	608500	376000	611000	335000
611500	324000	611000	310000	602000	313000	603000	336000	595000	340000
583000	320000	582000	293000	575000	283000	578000	275000	583000	276000
588000	287000	595000	277000	590000	270000	583300	268000	583000	276000
578000	275000	571000	255000	581000	250000	581200	240000	576000	236000
583000	213000	565000	213200	551000	231000	555000	246000	545000	240000
529000	233000	535000	210000	531000	196000	525000	182000	511000	185000
505000	200000	494000	169000	476000	169500	466000	180000	422000	176000
420000	190000	406000	204000	386000	241000	378000	239000	366000	277000
358000	280000	349000	327000	355000	326000	357000	336000	350000	356000
340000	363000	330000	380000	327000	379000	325000	396000	312000	413000
310000	422000	307000	430000	304000	453000	299000	457000	299500	466000
306000	472000	304500	490000	304000	496000	308000	498000	310000	504000
306000	516000	312500	526000	316000	520000	320000	527000	327000	525000
310000	504000	308000	498000	317000	490000	325000	506000	345000	482000
354000	483000	355000	490000	356000	482500	370000	474000	375000	476000
2000	826000	1000	%-350000	990000	%-352000	999000	825000	2000	826000

0

3	1.64	7							
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430000	445000	450000	443000	461000	446000	462000	444000	475000	455000
483000	450000	481500	455000	500000	462000	515000	460000	523000	468000
529000	467000	534000	460000	545000	464000	550000	478000	556000	481000
570000	474000	580000	482000	579500	490000	581000	490500	600000	506000
585000	525000	565000	585000	582000	603000	612000	576000	624000	522000
600000	506000	581000	490500	600000	480000	613000	460000	607000	445000
613000	430000	606000	410000	610000	395000	608500	376000	611000	335000
611500	324000	611000	310000	602000	313000	603000	336000	595000	340000
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529000	233000	535000	210000	531000	196000	525000	182000	511000	185000
505000	200000	494000	169000	476000	169500	466000	180000	422000	176000
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310000	422000	307000	430000	304000	453000	299000	457000	299500	466000
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310000	504000	308000	498000	317000	490000	325000	506000	345000	482000
354000	483000	355000	490000	356000	482500	370000	474000	375000	476000
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0

4	1.64	15							
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483000	450000	481500	455000	500000	462000	515000	460000	523000	468000
529000	467000	534000	460000	545000	464000	550000	478000	556000	481000
570000	474000	580000	482000	579500	490000	581000	490500	600000	506000
585000	525000	565000	585000	582000	603000	612000	576000	624000	522000
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613000	430000	606000	410000	610000	395000	608500	376000	611000	335000
611500	324000	611000	310000	602000	313000	603000	336000	595000	340000
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306000	472000	304500	490000	304000	496000	308000	498000	310000	504000
306000	516000	312500	526000	316000	520000	320000	527000	327000	525000
310000	504000	308000	498000	317000	490000	325000	506000	345000	482000
354000	483000	355000	490000	356000	482500	370000	474000	375000	476000
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0

5	1.64	25							
375000	500000	450000	478000	550000	530000	525000	603000	600000	630000
650000	600000	655000	520000	620000	460000	611000	335000	611500	324000
611000	310000	602000	313000	590000	300000	600000	280000	590000	260000
581000	250000	581200	240000	576000	236000	583000	213000	570000	216000
565000	213000	551000	231000	548000	210000	531000	196000	525000	182000
511000	185000	505000	200000	494000	169000	476000	169500	466000	175000
420000	173000	420500	190000	406000	204000	386000	240000	377000	238000
366000	277000	356000	280000	350000	350000	339000	363000	329000	300000
326000	379000	324000	396000	311000	413000	309000	422000	306000	430000
303000	453000	298000	457000	297000	466000	302000	496000	304000	516000
311500	529000	340000	530000	375000	500000	2000	826000	1000	%-350000

990000 %-352000 999000 825000 2000 826000

TABLE 3

ATTRACTION OF MANTLE MODEL MANTLE88

Values for positions offshore should be used with caution.

Subject to revision.

GRAVITY ANOMALY IN MGAL			<i>mantle</i>					
X COORD	Y COORD							
300000	320000	121.50	300000	330000	110.44	300000	340000	99.73
305000	320000	108.70	305000	330000	98.24	305000	340000	88.46
310000	320000	96.38	310000	330000	86.63	310000	340000	77.78
315000	320000	84.80	315000	330000	75.92	315000	340000	67.98
320000	320000	73.85	320000	330000	66.02	320000	340000	58.80
325000	320000	63.96	325000	330000	56.76	325000	340000	50.14
330000	320000	54.54	330000	330000	48.05	330000	340000	42.35
335000	320000	46.14	335000	330000	40.24	335000	340000	35.02
340000	320000	38.11	340000	330000	32.92	340000	340000	28.17
345000	320000	30.87	345000	330000	26.16	345000	340000	21.96
350000	320000	24.17	350000	330000	19.94	350000	340000	16.18
355000	320000	18.03	355000	330000	14.24	355000	340000	10.88
360000	320000	12.42	360000	330000	8.95	360000	340000	6.01
365000	320000	7.22	365000	330000	4.22	365000	340000	1.52
370000	320000	2.53	370000	330000	-0.18	370000	340000	-2.61
375000	320000	-1.69	375000	330000	-4.23	375000	340000	-6.46
380000	320000	-5.64	380000	330000	-8.00	380000	340000	-10.18
385000	320000	-9.32	385000	330000	-11.62	385000	340000	-13.49
390000	320000	-12.88	390000	330000	-14.95	390000	340000	-16.78
395000	320000	-16.14	395000	330000	-18.17	395000	340000	-19.90
400000	320000	-19.27	400000	330000	-21.18	400000	340000	-22.78
405000	320000	-22.15	405000	330000	-23.90	405000	340000	-25.35
410000	320000	-24.75	410000	330000	-26.30	410000	340000	-27.61
415000	320000	-26.94	415000	330000	-28.37	415000	340000	-29.55
420000	320000	-28.84	420000	330000	-30.12	420000	340000	-31.20
425000	320000	-30.44	425000	330000	-31.60	425000	340000	-32.59
430000	320000	-31.79	430000	330000	-32.84	430000	340000	-33.75
435000	320000	-32.92	435000	330000	-33.87	435000	340000	-34.70
440000	320000	-33.85	440000	330000	-34.72	440000	340000	-35.45
445000	320000	-34.62	445000	330000	-35.39	445000	340000	-36.02
300000	325000	115.94	300000	335000	105.06	300000	345000	94.68
305000	325000	103.50	305000	335000	93.26	305000	345000	83.83
310000	325000	91.47	310000	335000	82.20	310000	345000	73.70
315000	325000	80.30	315000	335000	71.89	315000	345000	64.25
320000	325000	69.87	320000	335000	62.32	320000	345000	55.46
325000	325000	60.20	325000	335000	53.43	325000	345000	47.28
330000	325000	51.33	330000	335000	45.19	330000	345000	39.67
335000	325000	43.08	335000	335000	37.50	335000	345000	32.58
340000	325000	35.47	340000	335000	30.51	340000	345000	26.08
345000	325000	0.35	345000	335000	24.00	345000	345000	19.97
350000	325000	21.99	350000	335000	18.01	350000	345000	14.47
355000	325000	16.08	355000	335000	12.51	355000	345000	9.36
360000	325000	10.66	360000	335000	7.42	360000	345000	4.57
365000	325000	5.71	365000	335000	2.82	365000	345000	0.31
370000	325000	1.17	370000	335000	-1.44	370000	345000	-3.69
375000	325000	-3.00	375000	335000	-5.38	375000	345000	-7.42
380000	325000	-6.85	380000	335000	-9.07	380000	345000	-10.95
385000	325000	-10.47	385000	335000	-12.56	385000	345000	-14.33
390000	325000	-13.91	390000	335000	-15.91	390000	345000	-17.57
395000	325000	-17.19	395000	335000	-19.08	395000	345000	-20.63
400000	325000	-20.26	400000	335000	-22.02	400000	345000	-23.44
405000	325000	-23.02	405000	335000	-24.67	405000	345000	-25.95
410000	325000	-25.54	410000	335000	-26.99	410000	345000	-28.15
415000	325000	-27.68	415000	335000	-28.99	415000	345000	-30.04
420000	325000	-29.51	420000	335000	-30.69	420000	345000	-31.65
425000	325000	-31.05	425000	335000	-32.12	425000	345000	-33.01
430000	325000	-32.34	430000	335000	-33.32	430000	345000	-34.14
435000	325000	-33.41	435000	335000	-34.30	435000	345000	-35.05
440000	325000	-34.30	440000	335000	-35.14	440000	345000	-35.75
445000	325000	-35.02	445000	335000	-35.72	445000	345000	-36.25

			X COORD	Y COORD	GRAVITY ANOMALY IN MGAL			mantle
300000	350000	89.74	300000	360000	80.41	300000	370000	72.18
305000	350000	79.33	305000	360000	71.11	305000	370000	63.84
310000	350000	69.73	310000	360000	62.41	310000	370000	55.83
315000	350000	60.71	315000	360000	53.99	315000	370000	48.31
320000	350000	52.16	320000	360000	46.46	320000	370000	41.29
325000	350000	44.44	325000	360000	39.24	325000	370000	34.64
330000	350000	37.14	330000	360000	32.49	330000	370000	28.39
335000	350000	30.35	335000	360000	26.20	335000	370000	22.56
340000	350000	24.05	340000	360000	20.35	340000	370000	17.02
345000	350000	18.23	345000	360000	14.96	345000	370000	12.15
350000	350000	12.74	350000	360000	9.99	350000	370000	7.50
355000	350000	7.94	355000	360000	5.41	355000	370000	3.30
360000	350000	3.39	360000	360000	1.12	360000	370000	-0.61
365000	350000	-0.80	365000	360000	-2.72	365000	370000	-4.28
370000	350000	-4.68	370000	360000	-6.40	370000	370000	-7.62
375000	350000	-8.37	375000	360000	-9.79	375000	370000	-10.71
380000	350000	-11.75	380000	360000	-13.01	380000	370000	-13.76
385000	350000	-15.10	385000	360000	-16.17	385000	370000	-16.73
390000	350000	-18.37	390000	360000	-19.22	390000	370000	-19.59
395000	350000	-21.24	395000	360000	-22.08	395000	370000	-22.29
400000	350000	-23.99	400000	360000	-24.70	400000	370000	-24.75
405000	350000	-26.44	405000	360000	-27.03	405000	370000	-26.93
410000	350000	-28.58	410000	360000	-29.09	410000	370000	-28.83
415000	350000	-30.43	415000	360000	-30.83	415000	370000	-30.46
420000	350000	-32.02	420000	360000	-32.34	420000	370000	-31.84
425000	350000	-33.35	425000	360000	-33.62	425000	370000	-32.98
430000	350000	-34.46	430000	360000	-34.65	430000	370000	-33.88
435000	350000	-35.33	435000	360000	-35.43	435000	370000	-34.53
440000	350000	-35.97	440000	360000	-35.96	440000	370000	-34.93
445000	350000	-36.40	445000	360000	-36.25	445000	370000	-35.10
300000	355000	85.00	300000	365000	76.23	300000	375000	68.46
305000	355000	75.18	305000	365000	67.39	305000	375000	60.53
310000	355000	65.97	310000	365000	59.05	310000	375000	52.94
315000	355000	57.35	315000	365000	51.19	315000	375000	45.75
320000	355000	49.29	320000	365000	43.79	320000	375000	38.96
325000	355000	41.76	325000	365000	36.86	325000	375000	32.57
330000	355000	34.74	330000	365000	30.37	330000	375000	26.56
335000	355000	28.21	335000	365000	24.25	335000	375000	20.94
340000	355000	22.14	340000	365000	18.69	340000	375000	15.73
345000	355000	16.54	345000	365000	13.50	345000	375000	10.92
350000	355000	11.37	350000	365000	8.71	350000	375000	6.49
355000	355000	6.56	355000	365000	4.30	355000	375000	2.41
360000	355000	2.24	360000	365000	0.23	360000	375000	-1.34
365000	355000	-1.81	365000	365000	-3.58	365000	375000	-4.79
370000	355000	-5.56	370000	365000	-6.97	370000	375000	-7.98
375000	355000	-9.08	375000	365000	-10.29	375000	375000	-11.07
380000	355000	-12.44	380000	365000	-13.46	380000	375000	-13.92
385000	355000	-15.68	385000	365000	-16.59	385000	375000	-16.77
390000	355000	-18.80	390000	365000	-19.49	390000	375000	-19.52
395000	355000	-21.73	395000	365000	-22.28	395000	375000	-22.11
400000	355000	-24.42	400000	365000	-24.82	400000	375000	-24.47
405000	355000	-26.81	405000	365000	-27.08	405000	375000	-26.55
410000	355000	-28.90	410000	365000	-29.05	410000	375000	-28.36
415000	355000	-30.71	415000	365000	-30.76	415000	375000	-29.90
420000	355000	-32.26	420000	365000	-32.21	420000	375000	-31.19
425000	355000	-33.57	425000	365000	-33.43	425000	375000	-32.24
430000	355000	-34.64	430000	365000	-34.41	430000	375000	-33.05
435000	355000	-35.47	435000	365000	-35.13	435000	375000	-33.66
440000	355000	-36.06	440000	365000	-35.60	440000	375000	-33.96
445000	355000	-36.42	445000	365000	-35.82	445000	375000	-34.07

300000	380000	65.05	300000	390000	58.75	300000	400000	53.40
305000	380000	57.43	305000	390000	51.86	305000	400000	47.05
310000	380000	50.18	310000	390000	45.23	310000	400000	40.99
315000	380000	43.16	315000	390000	38.93	315000	400000	35.23
320000	380000	36.73	320000	390000	32.89	320000	400000	29.76
325000	380000	30.65	325000	390000	27.29	325000	400000	24.47
330000	380000	24.74	330000	390000	21.88	330000	400000	19.59
335000	380000	19.38	335000	390000	16.93	335000	400000	14.95
340000	380000	14.45	340000	390000	12.28	340000	400000	10.60
345000	380000	9.82	345000	390000	7.99	345000	400000	6.66
350000	380000	5.55	350000	390000	3.99	350000	400000	2.95
355000	380000	1.63	355000	390000	0.42	355000	400000	-0.31
360000	380000	-2.02	360000	390000	-2.92	360000	400000	-3.34
365000	380000	-5.25	365000	390000	-5.82	365000	400000	-5.96
370000	380000	-8.29	370000	390000	-8.60	370000	400000	-8.35
375000	380000	-11.16	375000	390000	-11.07	375000	400000	-10.52
380000	380000	-13.99	380000	390000	-13.48	380000	400000	-12.54
385000	380000	-16.63	385000	390000	-15.82	385000	400000	-14.45
390000	380000	-19.24	390000	390000	-18.14	390000	400000	-16.25
395000	380000	-21.70	395000	390000	-20.21	395000	400000	-17.95
400000	380000	-23.95	400000	390000	-22.16	400000	400000	-19.63
405000	380000	-25.93	405000	390000	-23.89	405000	400000	-20.88
410000	380000	-27.64	410000	390000	-25.38	410000	400000	-22.06
415000	380000	-29.08	415000	390000	-26.58	415000	400000	-23.01
420000	380000	-30.27	420000	390000	-27.55	420000	400000	-23.75
425000	380000	-31.21	425000	390000	-28.28	425000	400000	-24.27
430000	380000	-31.93	430000	390000	-28.80	430000	400000	-24.60
435000	380000	-32.41	435000	390000	-29.11	435000	400000	-24.76
440000	380000	-32.67	440000	390000	-29.23	440000	400000	-24.77
445000	380000	-32.73	445000	390000	-29.19	445000	400000	-24.63
300000	385000	61.82	300000	395000	56.01	300000	405000	50.97
305000	385000	54.55	305000	395000	49.37	305000	405000	44.90
310000	385000	47.55	310000	395000	43.03	310000	405000	39.12
315000	385000	41.03	315000	395000	37.00	315000	405000	33.63
320000	385000	34.79	320000	395000	31.28	320000	405000	28.39
325000	385000	28.90	325000	395000	25.84	325000	405000	23.38
330000	385000	23.33	330000	395000	20.70	330000	405000	18.63
335000	385000	18.13	335000	395000	15.87	335000	405000	14.20
340000	385000	13.24	340000	395000	11.40	340000	405000	9.91
345000	385000	8.84	345000	395000	7.26	345000	405000	6.19
350000	385000	4.73	350000	395000	3.46	350000	405000	2.68
355000	385000	0.97	355000	395000	-0.00	355000	405000	-0.51
360000	385000	-2.46	360000	395000	-3.13	360000	405000	-3.35
365000	385000	-5.59	365000	395000	-5.94	365000	405000	-5.87
370000	385000	-8.47	370000	395000	-8.49	370000	405000	-8.11
375000	385000	-11.18	375000	395000	-10.89	375000	405000	-10.07
380000	385000	-13.84	380000	395000	-13.13	380000	405000	-11.94
385000	385000	-16.37	385000	395000	-15.19	385000	405000	-13.63
390000	385000	-18.76	390000	395000	-17.23	390000	405000	-15.20
395000	385000	-21.07	395000	395000	-19.22	395000	405000	-16.66
400000	385000	-23.18	400000	395000	-20.92	400000	405000	-17.99
405000	385000	-25.12	405000	395000	-22.48	405000	405000	-19.23
410000	385000	-26.64	410000	395000	-23.82	410000	405000	-20.16
415000	385000	-27.97	415000	395000	-24.91	415000	405000	-20.96
420000	385000	-29.05	420000	395000	-25.77	420000	405000	-21.57
425000	385000	-29.89	425000	395000	-26.40	425000	405000	-21.98
430000	385000	-30.51	430000	395000	-26.82	430000	405000	-22.23
435000	385000	-30.90	435000	395000	-27.05	435000	405000	-22.31
440000	385000	-31.09	440000	395000	-27.11	440000	405000	-22.27
445000	385000	-31.10	445000	395000	-27.03	445000	405000	-22.11

Mantle iv

300000	410000	48.71	300000	420000	44.47	300000	430000	41.23
305000	410000	42.92	305000	420000	39.44	305000	430000	36.55
310000	410000	37.42	310000	420000	34.46	310000	430000	32.08
315000	410000	32.17	315000	420000	29.81	315000	430000	27.94
320000	410000	27.11	320000	420000	25.21	320000	430000	23.86
325000	410000	22.37	325000	420000	20.69	325000	430000	19.88
330000	410000	17.76	330000	420000	16.55	330000	430000	16.03
335000	410000	13.51	335000	420000	12.65	335000	430000	12.31
340000	410000	9.53	340000	420000	8.90	340000	430000	8.96
345000	410000	5.72	345000	420000	5.55	345000	430000	5.75
350000	410000	2.47	350000	420000	2.43	350000	430000	2.94
355000	410000	-0.59	355000	420000	-0.38	355000	430000	0.35
360000	410000	-3.31	360000	420000	-2.86	360000	430000	-1.91
365000	410000	-5.69	365000	420000	-5.01	365000	430000	-3.82
370000	410000	-7.78	370000	420000	-6.89	370000	430000	-5.40
375000	410000	-9.62	375000	420000	-8.38	375000	430000	-6.68
380000	410000	-11.27	380000	420000	-9.76	380000	430000	-7.69
385000	410000	-12.75	385000	420000	-10.82	385000	430000	-8.47
390000	410000	-14.17	390000	420000	-11.78	390000	430000	-9.07
395000	410000	-15.34	395000	420000	-12.59	395000	430000	-9.50
400000	410000	-16.44	400000	420000	-13.27	400000	430000	-9.79
405000	410000	-17.40	405000	420000	-13.82	405000	430000	-9.95
410000	410000	-18.26	410000	420000	-14.24	410000	430000	-10.01
415000	410000	-18.90	415000	420000	-14.53	415000	430000	-9.94
420000	410000	-19.30	420000	420000	-14.77	420000	430000	-9.79
425000	410000	-19.61	425000	420000	-14.75	425000	430000	-9.56
430000	410000	-19.77	430000	420000	-14.70	430000	430000	-9.36
435000	410000	-19.78	435000	420000	-14.62	435000	430000	-9.00
440000	410000	-19.76	440000	420000	-14.39	440000	430000	-8.71
445000	410000	-19.52	445000	420000	-14.16	445000	430000	-8.45
300000	415000	46.68	300000	425000	42.82	300000	435000	39.73
305000	415000	41.10	305000	425000	37.93	305000	435000	35.32
310000	415000	35.87	310000	425000	33.24	310000	435000	31.18
315000	415000	30.88	315000	425000	28.77	315000	435000	27.18
320000	415000	26.11	320000	425000	24.46	320000	435000	23.34
325000	415000	21.52	325000	425000	20.28	325000	435000	19.63
330000	415000	17.13	330000	425000	16.25	330000	435000	15.95
335000	415000	13.01	335000	425000	12.44	335000	435000	12.45
340000	415000	9.17	340000	425000	8.89	340000	435000	9.17
345000	415000	5.64	345000	425000	5.61	345000	435000	6.15
350000	415000	2.38	350000	425000	2.61	350000	435000	3.40
355000	415000	-0.55	355000	425000	-0.09	355000	435000	0.93
360000	415000	-3.21	360000	425000	-2.46	360000	435000	-1.21
365000	415000	-5.47	365000	425000	-4.48	365000	435000	-3.01
370000	415000	-7.36	370000	425000	-6.19	370000	435000	-4.46
375000	415000	-9.05	375000	425000	-7.60	375000	435000	-5.59
380000	415000	-10.52	380000	425000	-8.76	380000	435000	-6.44
385000	415000	-11.82	385000	425000	-9.78	385000	435000	-7.05
390000	415000	-12.97	390000	425000	-10.50	390000	435000	-7.46
395000	415000	-14.05	395000	425000	-11.11	395000	435000	-7.71
400000	415000	-14.87	400000	425000	-11.60	400000	435000	-7.80
405000	415000	-15.62	405000	425000	-11.95	405000	435000	-7.79
410000	415000	-16.23	410000	425000	-12.18	410000	435000	-7.68
415000	415000	-16.76	415000	425000	-12.30	415000	435000	-7.47
420000	415000	-17.01	420000	425000	-12.30	420000	435000	-7.10
425000	415000	-17.20	425000	425000	-12.28	425000	435000	-6.75
430000	415000	-17.25	430000	425000	-12.06	430000	435000	-6.37
435000	415000	-17.20	435000	425000	-11.85	435000	435000	-6.07
440000	415000	-17.07	440000	425000	-11.61	440000	435000	-5.69
445000	415000	-16.87	445000	425000	-11.36	445000	435000	-5.42

Mantle v

300000	440000	38.34	300000	450000	35.86	300000	460000	33.95
305000	440000	34.17	305000	450000	32.35	305000	460000	30.89
310000	440000	30.29	310000	450000	29.02	310000	460000	28.07
315000	440000	26.67	315000	450000	25.84	315000	460000	25.38
320000	440000	23.07	320000	450000	22.76	320000	460000	22.68
325000	440000	19.51	325000	450000	19.60	325000	460000	20.09
330000	440000	15.90	330000	450000	16.43	330000	460000	17.40
335000	440000	12.66	335000	450000	13.46	335000	460000	14.75
340000	440000	9.52	340000	450000	10.61	340000	460000	12.22
345000	440000	6.63	345000	450000	7.99	345000	460000	9.91
350000	440000	4.00	350000	450000	5.65	350000	460000	7.90
355000	440000	1.66	355000	450000	3.61	355000	460000	6.21
360000	440000	-0.36	360000	450000	1.89	360000	460000	4.87
365000	440000	-2.02	365000	450000	0.54	365000	460000	3.90
370000	440000	-3.33	370000	450000	-0.44	370000	460000	3.29
375000	440000	-4.30	375000	450000	-1.07	375000	460000	3.01
380000	440000	-4.98	380000	450000	-1.39	380000	460000	3.03
385000	440000	-5.42	385000	450000	-20.19	385000	460000	3.30
390000	440000	-5.64	390000	450000	-1.33	390000	460000	3.74
395000	440000	-5.69	395000	450000	-1.03	395000	460000	4.33
400000	440000	-5.68	400000	450000	-0.60	400000	460000	5.02
405000	440000	-5.40	405000	450000	-0.07	405000	460000	5.80
410000	440000	-5.09	410000	450000	0.54	410000	460000	6.56
415000	440000	-4.70	415000	450000	1.20	415000	460000	7.46
420000	440000	-4.25	420000	450000	1.88	420000	460000	8.20
425000	440000	-3.78	425000	450000	2.54	425000	460000	9.00
430000	440000	-3.31	430000	450000	3.09	430000	460000	9.65
435000	440000	-2.88	435000	450000	3.66	435000	460000	10.17
440000	440000	-2.66	440000	450000	4.04	440000	460000	10.56
445000	440000	-2.28	445000	450000	4.22	445000	460000	10.82
300000	445000	37.07	300000	455000	34.89	300000	465000	33.11
305000	445000	33.23	305000	455000	31.57	305000	465000	30.30
310000	445000	29.62	310000	455000	28.50	310000	465000	27.71
315000	445000	26.20	315000	455000	25.57	315000	465000	25.26
320000	445000	22.84	320000	455000	22.69	320000	465000	22.86
325000	445000	19.50	325000	455000	19.80	325000	465000	20.44
330000	445000	16.19	330000	455000	16.90	330000	465000	17.99
335000	445000	13.00	335000	455000	14.05	335000	465000	15.54
340000	445000	10.00	340000	455000	11.35	340000	465000	13.15
345000	445000	7.24	345000	455000	8.88	345000	465000	11.06
350000	445000	4.75	350000	455000	6.70	350000	465000	9.23
355000	445000	2.55	355000	455000	4.83	355000	465000	7.74
360000	445000	0.68	360000	455000	3.23	360000	465000	6.60
365000	445000	-0.84	365000	455000	2.12	365000	465000	5.84
370000	445000	-1.99	370000	455000	1.33	370000	465000	5.42
375000	445000	-2.80	375000	455000	0.88	375000	465000	5.31
380000	445000	-3.30	380000	455000	0.74	380000	465000	5.50
385000	445000	-3.55	385000	455000	0.83	385000	465000	5.89
390000	445000	-3.59	390000	455000	1.13	390000	465000	6.46
395000	445000	-3.47	395000	455000	1.58	395000	465000	7.16
400000	445000	-3.20	400000	455000	2.15	400000	465000	7.90
405000	445000	-2.82	405000	455000	2.82	405000	465000	8.76
410000	445000	-2.35	410000	455000	3.55	410000	465000	9.71
415000	445000	-1.82	415000	455000	4.31	415000	465000	10.58
420000	445000	-1.24	420000	455000	5.00	420000	465000	11.41
425000	445000	-0.66	425000	455000	5.79	425000	465000	12.16
430000	445000	-0.11	430000	455000	6.43	430000	465000	12.80
435000	445000	0.36	435000	455000	6.95	435000	465000	13.32
440000	445000	0.73	440000	455000	7.34	440000	465000	13.72
445000	445000	0.92	445000	455000	7.58	445000	465000	13.99

Mantle vi

300000	470000	32.36	300000	480000	31.05	300000	490000	30.04
305000	470000	29.78	305000	480000	28.94	305000	490000	28.21
310000	470000	27.42	310000	480000	26.94	310000	490000	26.76
315000	470000	25.13	315000	480000	25.20	315000	490000	25.32
320000	470000	22.98	320000	480000	23.46	320000	490000	23.98
325000	470000	20.84	325000	480000	21.75	325000	490000	22.70
330000	470000	18.63	330000	480000	20.03	330000	490000	21.46
335000	470000	16.41	335000	480000	18.21	335000	490000	20.26
340000	470000	14.28	340000	480000	16.67	340000	490000	19.14
345000	470000	12.34	345000	480000	15.19	345000	490000	18.17
350000	470000	10.70	350000	480000	13.98	350000	490000	17.28
355000	470000	9.41	355000	480000	13.11	355000	490000	16.92
360000	470000	8.48	360000	480000	12.56	360000	490000	16.70
365000	470000	7.92	365000	480000	12.36	365000	490000	16.72
370000	470000	7.67	370000	480000	12.55	370000	490000	16.96
375000	470000	7.75	375000	480000	12.73	375000	490000	17.32
380000	470000	8.06	380000	480000	13.22	380000	490000	17.98
385000	470000	8.57	385000	480000	13.87	385000	490000	18.73
390000	470000	9.17	390000	480000	14.65	390000	490000	19.61
395000	470000	9.96	395000	480000	15.54	395000	490000	20.61
400000	470000	10.89	400000	480000	16.50	400000	490000	21.70
405000	470000	11.81	405000	480000	17.53	405000	490000	22.84
410000	470000	12.74	410000	480000	18.57	410000	490000	23.91
415000	470000	13.65	415000	480000	19.58	415000	490000	25.03
420000	470000	14.51	420000	480000	20.64	420000	490000	25.96
425000	470000	15.27	425000	480000	21.33	425000	490000	26.73
430000	470000	15.91	430000	480000	21.99	430000	490000	27.35
435000	470000	16.44	435000	480000	22.53	435000	490000	27.83
440000	470000	16.84	440000	480000	22.94	440000	490000	28.20
445000	470000	17.13	445000	480000	23.24	445000	490000	28.48
300000	475000	31.73	300000	485000	30.57	300000	495000	29.71
305000	475000	29.33	305000	485000	28.61	305000	495000	28.11
310000	475000	27.18	310000	485000	26.86	310000	495000	26.65
315000	475000	25.18	315000	485000	25.25	315000	495000	25.42
320000	475000	23.23	320000	485000	23.72	320000	495000	24.25
325000	475000	21.29	325000	485000	22.23	325000	495000	23.16
330000	475000	19.32	330000	485000	20.75	330000	495000	22.13
335000	475000	17.35	335000	485000	19.30	335000	495000	21.16
340000	475000	15.44	340000	485000	17.92	340000	495000	20.23
345000	475000	13.72	345000	485000	16.69	345000	495000	19.56
350000	475000	12.29	350000	485000	15.72	350000	495000	19.00
355000	475000	11.21	355000	485000	15.03	355000	495000	18.68
360000	475000	10.49	360000	485000	14.61	360000	495000	18.57
365000	475000	10.10	365000	485000	14.59	365000	495000	18.69
370000	475000	10.03	370000	485000	14.75	370000	495000	19.00
375000	475000	10.24	375000	485000	15.13	375000	495000	19.49
380000	475000	10.59	380000	485000	15.67	380000	495000	20.16
385000	475000	11.26	385000	485000	16.37	385000	495000	20.98
390000	475000	11.99	390000	485000	17.13	390000	495000	21.94
395000	475000	12.83	395000	485000	18.13	395000	495000	23.01
400000	475000	13.75	400000	485000	19.15	400000	495000	24.15
405000	475000	14.72	405000	485000	20.24	405000	495000	25.31
410000	475000	15.70	410000	485000	21.34	410000	495000	26.42
415000	475000	16.66	415000	485000	22.40	415000	495000	27.42
420000	475000	17.55	420000	485000	23.35	420000	495000	28.28
425000	475000	18.33	425000	485000	24.16	425000	495000	28.99
430000	475000	18.99	430000	485000	24.82	430000	495000	29.55
435000	475000	19.52	435000	485000	25.33	435000	495000	29.98
440000	475000	19.93	440000	485000	25.73	440000	495000	30.32
445000	475000	20.23	445000	485000	26.02	445000	495000	30.57

Mantle vii

300000	5000000	29.37
3050000	5000000	27.93
3100000	5000000	26.67
3150000	5000000	25.42
3200000	5000000	24.47
3250000	5000000	23.61
3300000	5000000	22.70
3350000	5000000	22.00
3400000	5000000	21.33
3450000	5000000	20.81
3500000	5000000	20.44
3550000	5000000	20.27
3600000	5000000	20.20
3650000	5000000	20.50
3700000	5000000	20.90
3750000	5000000	21.49
3800000	5000000	22.24
3850000	5000000	23.16
3900000	5000000	24.20
3950000	5000000	25.32
4000000	5000000	26.43
4050000	5000000	27.60
4100000	5000000	28.64
4150000	5000000	29.54
4200000	5000000	30.30
4250000	5000000	30.92
4300000	5000000	31.41
4350000	5000000	31.80
4400000	5000000	32.09
4450000	5000000	32.32
3000000	5050000	29.09

TABLE 4

ATTRACTION OF WATER MODEL

Values for positions offshore should be used with caution.

Subject to fine detailing and revision.

WATER

X COORD		Y COORD		GRAVITY ANOMALY IN MGAL				
300000	320000	-74.70	300000	360000	-16.33	300000	400000	-9.70
310000	320000	-19.64	310000	360000	-14.81	310000	400000	-5.34
320000	320000	-15.69	320000	360000	-14.02	320000	400000	-5.00
330000	320000	-14.55	330000	360000	-5.50	330000	400000	-1.80
340000	320000	-5.94	340000	360000	-5.09	340000	400000	-1.63
350000	320000	-5.35	350000	360000	-1.87	350000	400000	-1.49
360000	320000	-2.09	360000	360000	-1.68	360000	400000	-1.37
370000	320000	-1.88	370000	360000	-1.54	370000	400000	-1.28
380000	320000	-1.71	380000	360000	-1.43	380000	400000	-1.22
390000	320000	-1.59	390000	360000	-1.35	390000	400000	-1.15
400000	320000	-1.49	400000	360000	-1.28	400000	400000	-1.12
410000	320000	-1.41	410000	360000	-1.23	410000	400000	-1.08
420000	320000	-1.35	420000	360000	-1.19	420000	400000	-1.06
430000	320000	-1.31	430000	360000	-1.16	430000	400000	-1.04
440000	320000	-1.28	440000	360000	-1.14	440000	400000	-1.03
300000	330000	-62.19	300000	370000	-15.41	300000	410000	-5.50
310000	330000	-17.10	310000	370000	-14.36	310000	410000	-5.13
320000	330000	-15.15	320000	370000	-9.69	320000	410000	-1.89
330000	330000	-14.25	330000	370000	-5.25	330000	410000	-1.69
340000	330000	-5.92	340000	370000	-1.97	340000	410000	-1.53
350000	330000	-5.22	350000	370000	-1.76	350000	410000	-1.40
360000	330000	-1.98	360000	370000	-1.60	360000	410000	-1.31
370000	330000	-1.78	370000	370000	-1.47	370000	410000	-1.23
380000	330000	-1.64	380000	370000	-1.38	380000	410000	-1.17
390000	330000	-1.52	390000	370000	-1.30	390000	410000	-1.12
400000	330000	-1.43	400000	370000	-1.24	400000	410000	-1.08
410000	330000	-1.36	410000	370000	-1.19	410000	410000	-1.05
420000	330000	-1.31	420000	370000	-1.16	420000	410000	-1.03
430000	330000	-1.27	430000	370000	-1.14	430000	410000	-1.01
440000	330000	-1.24	440000	370000	-1.11	440000	410000	-1.01
300000	340000	-27.62	300000	380000	-14.77	300000	420000	-5.23
310000	340000	-16.07	310000	380000	-13.95	310000	420000	-3.37
320000	340000	-14.71	320000	380000	-5.43	320000	420000	-1.74
330000	340000	-13.98	330000	380000	-2.50	330000	420000	-1.57
340000	340000	-8.61	340000	380000	-1.85	340000	420000	-1.44
350000	340000	-5.08	350000	380000	-1.66	350000	420000	-1.34
360000	340000	-1.87	360000	380000	-1.52	360000	420000	-1.25
370000	340000	-1.70	370000	380000	-1.41	370000	420000	-1.18
380000	340000	-1.56	380000	380000	-1.32	380000	420000	-1.12
390000	340000	-1.46	390000	380000	-1.25	390000	420000	-1.08
400000	340000	-1.38	400000	380000	-1.21	400000	420000	-1.04
410000	340000	-1.32	410000	380000	-1.15	410000	420000	-1.02
420000	340000	-1.27	420000	380000	-1.12	420000	420000	-1.00
430000	340000	-1.23	430000	380000	-1.10	430000	420000	-0.99
440000	340000	-1.21	440000	380000	-1.08	440000	420000	-0.98
300000	350000	-17.90	300000	390000	-14.27	300000	430000	-5.02
310000	350000	-15.35	310000	390000	-5.65	310000	430000	-1.81
320000	350000	-14.35	320000	390000	-5.20	320000	430000	-1.62
330000	350000	-13.70	330000	390000	-1.94	330000	430000	-1.48
340000	350000	-5.27	340000	390000	-1.73	340000	430000	-1.36
350000	350000	-4.02	350000	390000	-1.57	350000	430000	-1.27
360000	350000	-1.78	360000	390000	-1.44	360000	430000	-1.19
370000	350000	-1.62	370000	390000	-1.36	370000	430000	-1.13
380000	350000	-1.50	380000	390000	-1.27	380000	430000	-1.08
390000	350000	-1.40	390000	390000	-1.20	390000	430000	-1.05
400000	350000	-1.33	400000	390000	-1.15	400000	430000	-1.01
410000	350000	-1.27	410000	390000	-1.20	410000	430000	-0.98
420000	350000	-1.23	420000	390000	-1.09	420000	430000	-0.97
430000	350000	-1.20	430000	390000	-1.07	430000	430000	-0.96
440000	350000	-1.18	440000	390000	-1.06	440000	430000	-0.96

X COORD	Y COORD	GRAVITY ANOMALY IN MGAL			
300000	440000	-4.84	300000	480000	-2.79
310000	440000	-1.67	310000	480000	-1.27
320000	440000	-1.52	320000	480000	-1.18
330000	440000	-1.39	330000	480000	-1.12
340000	440000	-1.29	340000	480000	-1.06
350000	440000	-1.31	350000	480000	-1.03
360000	440000	-1.14	360000	480000	-1.04
370000	440000	-1.09	370000	480000	-2.33
380000	440000	-1.04	380000	480000	-2.30
390000	440000	-1.00	390000	480000	-2.29
400000	440000	-0.97	400000	480000	-2.27
410000	440000	-0.95	410000	480000	-2.26
420000	440000	-0.95	420000	480000	-2.26
430000	440000	-0.94	430000	480000	-3.83
440000	440000	-0.93	440000	480000	-3.84
300000	450000	-4.69	300000	490000	-4.26
310000	450000	-1.54	310000	490000	-1.20
320000	450000	-1.42	320000	490000	-1.13
330000	450000	-1.31	330000	490000	-1.06
340000	450000	-1.22	340000	490000	-2.41
350000	450000	-1.15	350000	490000	-2.36
360000	450000	-1.09	360000	490000	-2.33
370000	450000	-1.04	370000	490000	-2.30
380000	450000	-0.99	380000	490000	-2.28
390000	450000	-0.97	390000	490000	-2.26
400000	450000	-0.95	400000	490000	-3.04
410000	450000	-0.73	410000	490000	-3.82
420000	450000	-0.93	420000	490000	-3.82
430000	450000	-2.31	430000	490000	-3.81
440000	450000	-2.32	440000	490000	-3.82
300000	460000	-1.59	300000	500000	-4.19
310000	460000	-1.44	310000	500000	-2.54
320000	460000	-1.33	320000	500000	-2.47
330000	460000	-1.24	330000	500000	-1.71
340000	460000	-1.16	340000	500000	-2.37
350000	460000	-1.10	350000	500000	-2.33
360000	460000	-1.05	360000	500000	-2.30
370000	460000	-1.01	370000	500000	-2.28
380000	460000	-0.97	380000	500000	-3.83
390000	460000	-0.94	390000	500000	-3.81
400000	460000	-1.56	400000	500000	-3.81
410000	460000	-2.31	410000	500000	-3.80
420000	460000	-2.30	420000	500000	-3.80
430000	460000	-2.30	430000	500000	-3.80
440000	460000	-2.30	440000	500000	-3.81
300000	470000	-2.87	300000	510000	-4.13
310000	470000	-1.36	310000	510000	-1.08
320000	470000	-1.25	320000	510000	-2.42
330000	470000	-1.18	330000	510000	-2.37
340000	470000	-1.10	340000	510000	-2.33
350000	470000	-1.05	350000	510000	-2.29
360000	470000	-1.00	360000	510000	-2.27
370000	470000	-0.97	370000	510000	-3.82
380000	470000	-2.32	380000	510000	-3.81
390000	470000	-2.31	390000	510000	-3.80
400000	470000	-2.30	400000	510000	-3.79
410000	470000	-2.28	410000	510000	-3.78
420000	470000	-2.28	420000	510000	-3.78
430000	470000	-2.27	430000	510000	-3.78
440000	470000	-2.27	440000	510000	-3.79

water ii