

Appendix A

Appendix A

EXPLORATION HISTORY

OCEANA/AUSTRAL/Nth AUSTRAL(MAXIM)/PYRAMID

- 1890 – 92** **Oceana Mining Company**
Shallow trenching at Oceana resulted in ~1000t @ 39%Pb & 14.5oz/t (411.1g/t) Ag
- 1896 – 99** **Oceana Pty. Ltd.**
Trenching and minor mining of 517t
- 1947 – 60** **Zeehan Mines Pty Ltd**
Exploration drilling, (39 surface – 58 underground), and reopening of workings, (Jack 1960).
- 1978 – 88** **Amoco/Cyprus+E.Z., EL 4/78**
1978 – 79 gridding; B+C horizon soil sampling; gradient array plus magnetic survey on Oceana, Nth Austral, Austral; grid mapping; field checking of 1970 Turair EM anomalies with mapping and soil sampling; (Jones 1979).
- 1979 – 80 grid extension at Oceana, Austral; Jackro power auger at Oceana; test of IP and pulse EM at Oceana; B horizon soil sampling at 50m intervals; heliborne DIGHEM at Oceana; drilling of ZT-79-2, ZT-80-3, ZT-80-5, ZT-79A-1, ZT80A-2, ZT80A-3; petrographic work on ZT-79-2; (Roxburgh & Jones 1980).
- 1980 – 81 compilation of 1947-60 data by Curtis & Assoc.; gridding at Austral, Nth Austral, Pyramid; mapping; 16 costeans dug, mapped and sampled; mapping of grids; Jackro power auger sampling, 25m intervals; gravity survey; drilling of ZT-80-6, ZT-80-7, ZT-80-8, ZT-80-9; DH pulse EM; core physical property tests; (Jones 1981).
- 1981 – 82 airphoto interpretation emphasising structure; Jackro power auger at Austral; rock chip sampling at Pyramid; core grinding; reprocessing of gravity; airborne magnetics at 250m spacing; 2 costeans dug at Austral; drilling of ZT-81A-4, ZT-81A-5, ZT-81A-6, ZT-81A-7, ZT-81A-8, ZT-81A-9, ZT-81A-10; (Jones 1983b).
- 1982 – 83 grid extension; 13 costeans dug at Oceana; core grinding; ground magnetics on Pyramid; EM-37 on Oceana, Austral, Nth Austral; DH SIROTEM, gamma, density; review of Mines Dpt. Collected aeromag.; drilling of ZT-82-10, ZT-82-10A, ZT-82-11, ZT-82-12, ZT-82-13; ground check of aeromag anomalies with soil sampling and ground mag; (Jones 1983a).
geological mapping at Pyramid; rock chip sampling at Pyramid; 3 costeans dug at Oceana; petrographic study on core; fluid inclusion and isotope study of core; Pyramid gravity contouring; review of Nth

- Austral geophysics; JRB compilation of pre-Amoco geophysics; drilling of ZT-82-13, ZT-82-14; (Jones 1983b).
- 1983 – 84 JV with EZ set up with EZ as managers; gridding, Jackro sampling at Pyramid; IP and drilling of ZMG249/249A at Nth Austral; (Mathison & Kay 1984).
3 costeans dug, sampled and in part mapped at Pyramid; lead isotope study on Oceana; petrographic work; (Mathison 1984). Review of mineralisation (Taylor 1983).
- 1984 – 85 No industry work (Mathison 1985), review of stratigraphy and mineralisation (Ellis 1984 BSc Hons).
- 1985 – 86 Wacker sampling at Pyramid; shallow winkle holes (ZWP 27-33); (Mathison 1986).
- 1986 – 87 No work; (Mathison & Taylor 1987).
- 1987 – 88 No work; RL established; (Jones 1988).
- 1988 – 95 Cyprus/Hudspeth/Arimco+EZ/Pasminco/Porthill Res Ltd, RL8809**
- 1991 – 92 review of geophysical data by Leaman; detailed mapping of the sequence; ground magnetics; processing of gravity; relogging of core; (Quayle 1992).
- 1992 – 93 drilling of OP1, OP2; minor rock chip sampling; magnetic and gravity interpretation; DHEM of holes drilled; (Quayle 1993).
- 1993 – 94 relogging of existing drill core; (Saxon 1994).
- 1994 – 95 ground magnetics; drilling of OP3, OP4, OP5; aircore drilling; resampling of Oceana core; mapping and rock chip sampling; gravity and magnetic interpretation; (Saxon 1995).
- 1996 – 98 Arimco/Mancala Pty Ltd (Hercules Resources Pty Ltd)**
- 1996 – 97 Review of stratigraphy and mineralisation (University of Melbourne, Peace 1996 BSc Hons).
- 1997 – 98 Annual Report for Hercules, (Cordery in Akerman 1998).
- 2002 – 03 ZZ Exploration EL 20/2002**
- Review of stratigraphy, XRF analysis of eastern lense (ZT-80-4), (University of Tasmania, McGilvray 2003, BSc Hons).

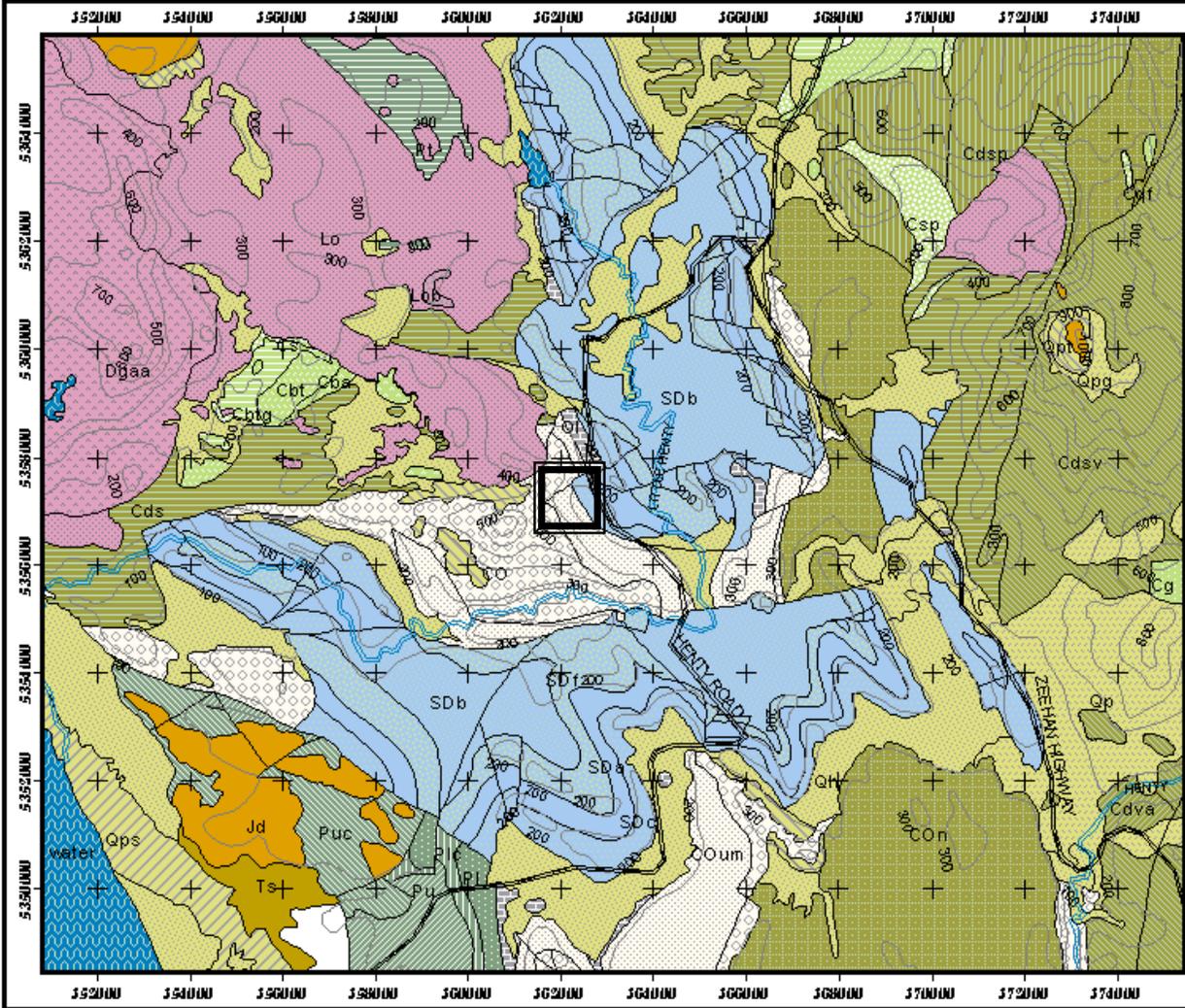
Appendix B

Appendix B – 1: 1:250,000 scale regional Geology of the Zeehan Mineral Field including the Heemskirk Granite (top left), and Trial Harbour (bottom left); Map features include regional-scale main roads, main rivers, large water bodies and 100 metre spaced contours.

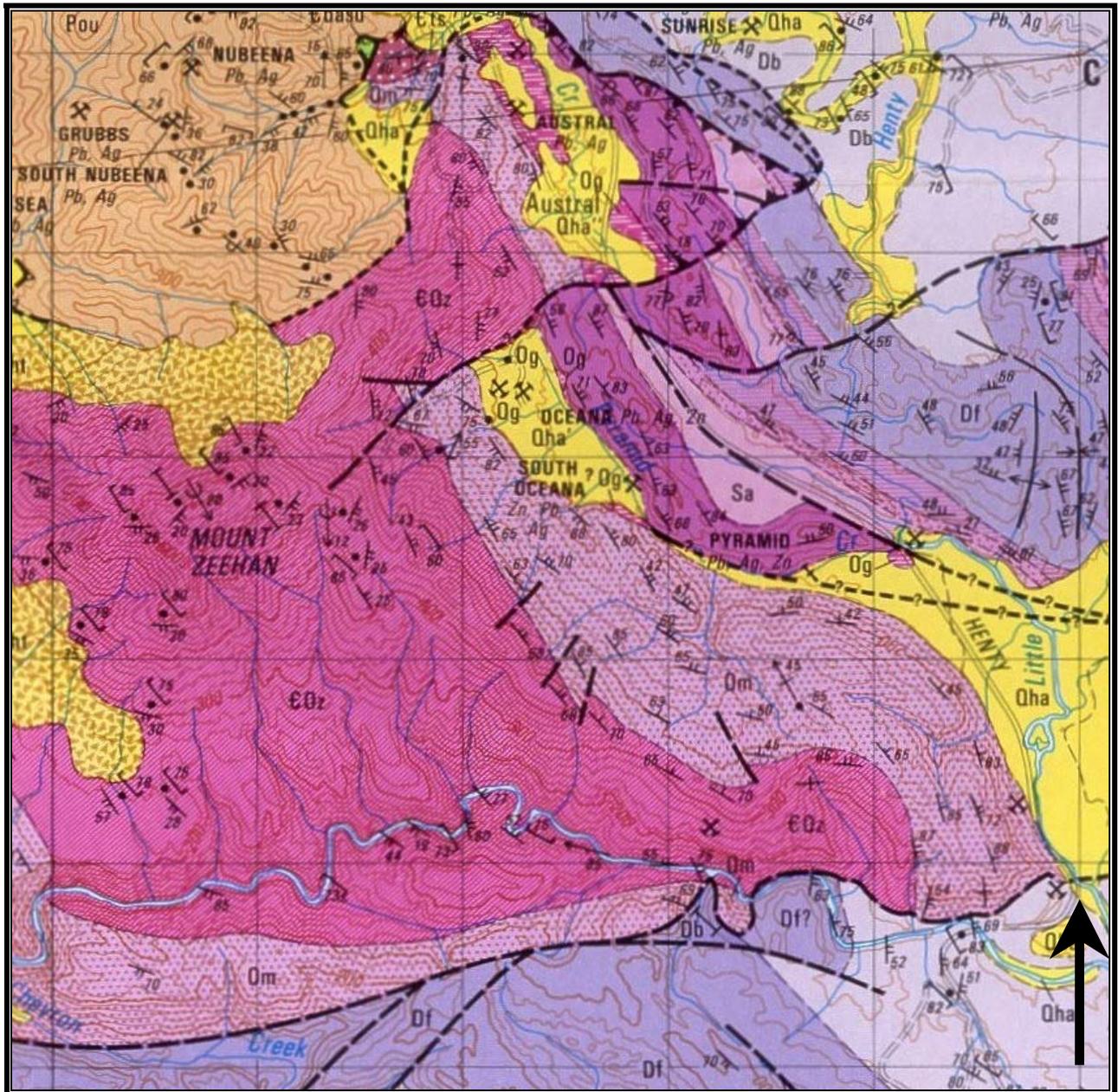
Regional Geology of Zeehan Mineral Field (1:250,000)

3 0 3 6 Kilometers

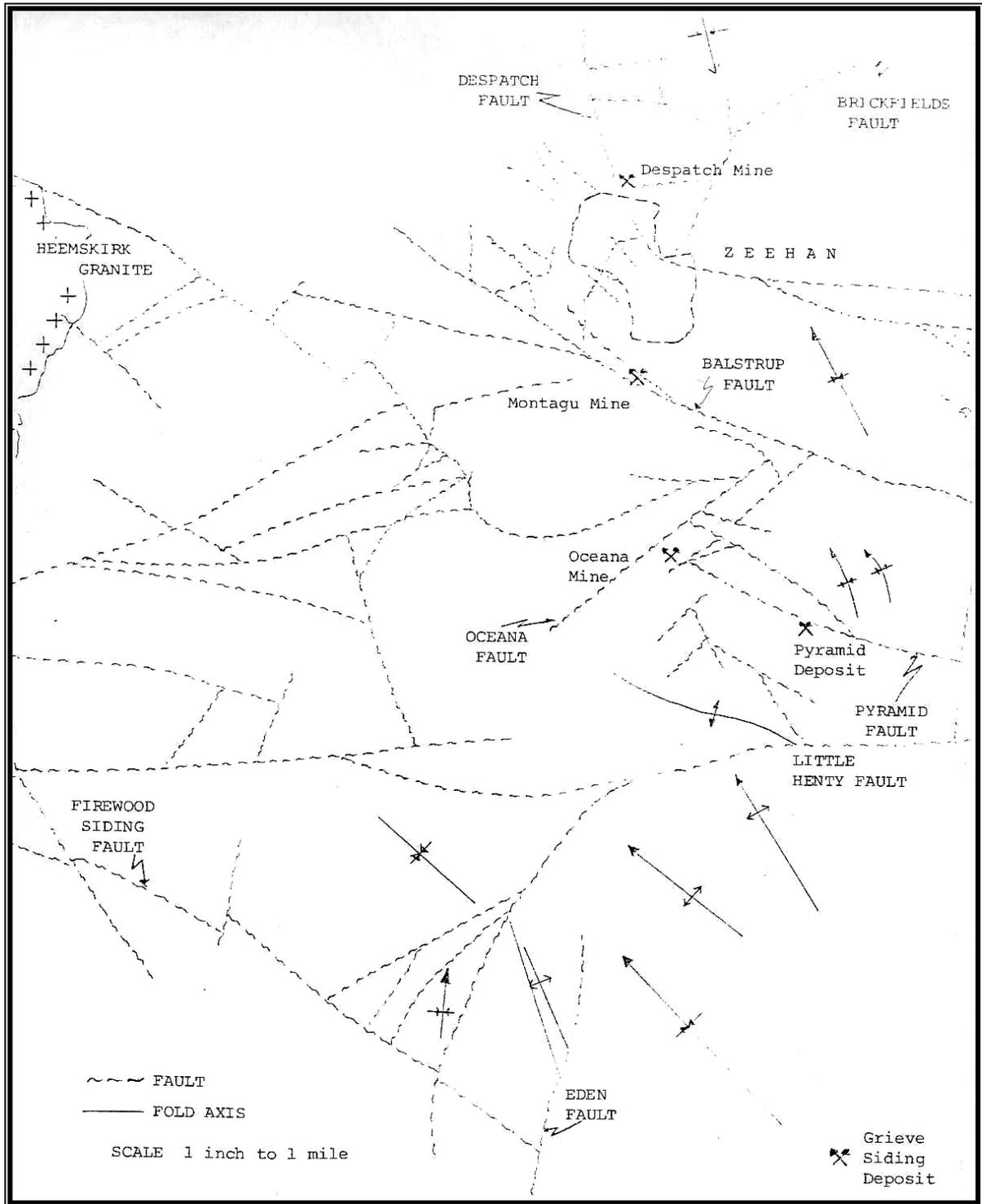
- Roads of Western Tasmania 1:500,000
- Contours 1:250,000
- Rivers of Western Tasmania 1:500,000
- Regional Geology of Zeehan Mineral Field (1:250,000)**



- Quaternary**
- Qha - Holocene alluvium
- Qht - Holocene talus
- Qhb - Holocene beach deposits
- Qpm - Pleistocene Moraine deposits
- Qpm
- Tertiary**
- Ts - sand, silt and clay
- Permian**
- Pu - Parmeener Sgp
- Pc - Upper Parmeener Sgp
- Pf - upper Lower Parmeener Sgp
- Pw - middle Lower Parmeener Sgp
- Pt - lower Lower Parmeener Sgp
- Devonian**
- Db - Bell Shale
- Df - Florence Quartzite
- Silurian**
- Sa - Amber Slate
- Sc - Crotty Quartzite
- Ordovician**
- Oi - Gordon Gp limestone
- Cambrrian**
- COum - Moira Fm
- CO Mt Zeehan Conglomerate
- Cdu - Upper Dundas Group
- Ctu - chert rich Conglomerate (Lower Dundas Gp)
- Cdmra - Razorback Conglomerate
- Cru - Rosebery Gp
- Crfb - Upper Rosebery Gp v'clastic breccia
- Cfu - Henty region lithicwacke
- Late Neoproterozoic**
- Lou - Oonah Fm siliciclastics
- IGNEOUS ROCKS**
- Jurassic**
- Jd - dolerite
- Devonian**
- Dgpu - Mt Heemskirk granite (Red series)
- Cambrrian**
- Cbb - MUC porphyritic basalt
- Cba - MUC massive pillowed basalt
- Cbag - MUC gabbro
- Cgm - MUC gabbro
- Csm - MUC massive serpentinite
- Csm - MUC massive serpentinite
- Late Neoproterozoic**
- Lov - Mafic lavas
- MAP FEATURES**
- water

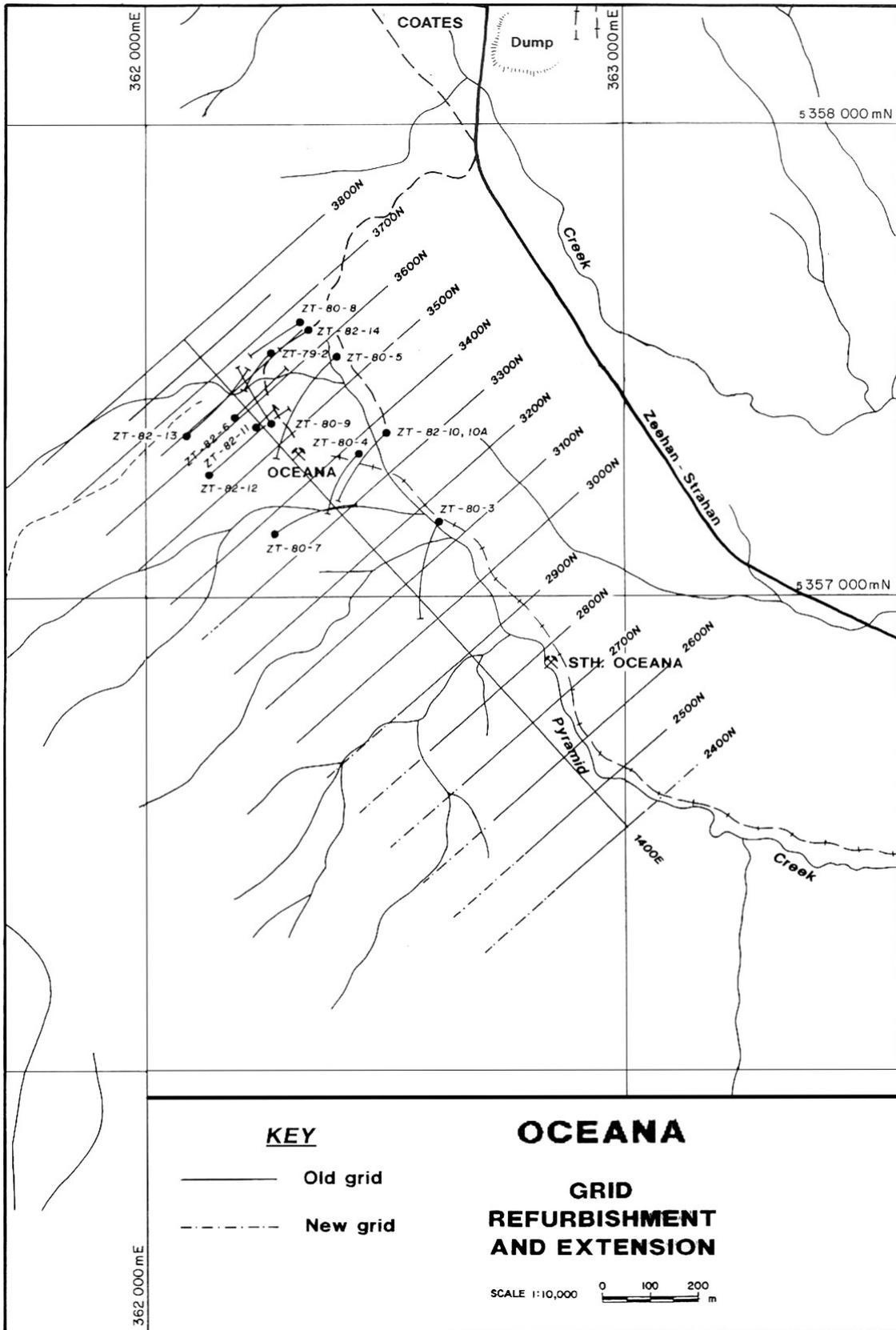


Appendix B – 2: Inset of 1:50,000 Geological Atlas Series of Zeehan, 1994 edition – sheet 7914S. Specified area is from 5353800mN to 5358300mN and 359800mE to 365200mE; Field of view = 5.4km (*Modified from Blissett 1962*).

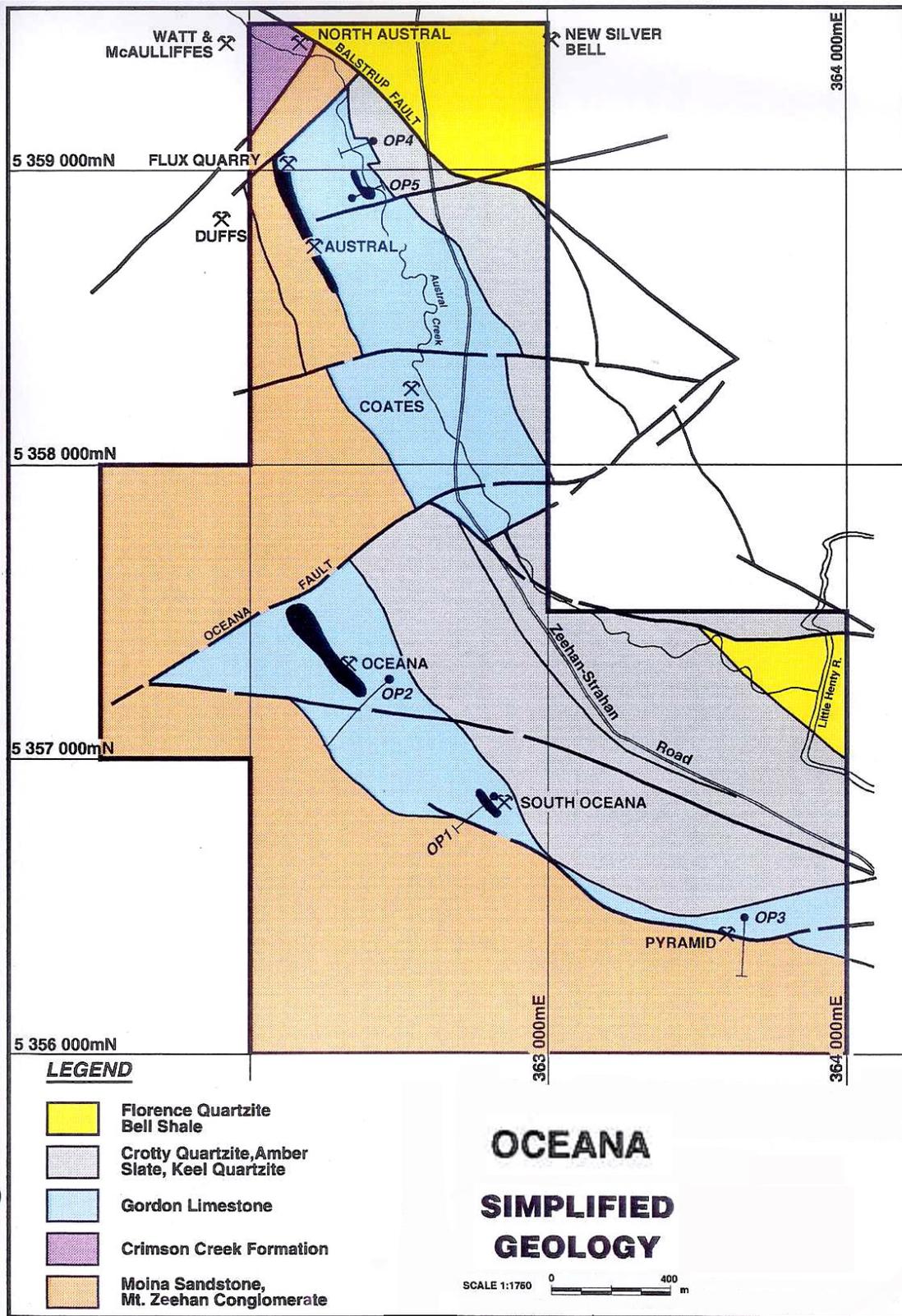


Appendix B – 3: Structural interpretation of the Zeehan area including main structural elements, main mines and dominant features (*Modified from Blissett 1962*).

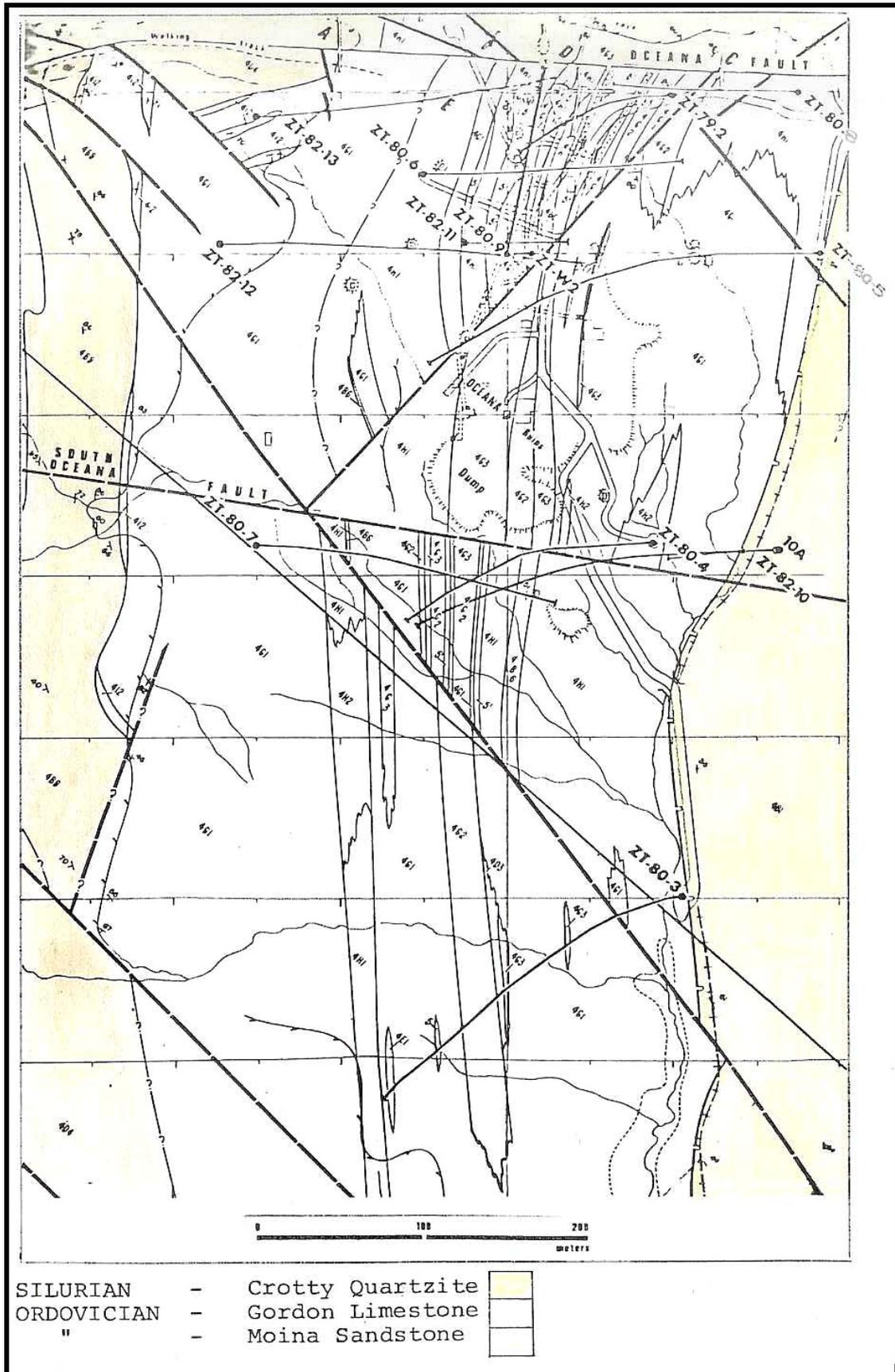
Appendix C



Appendix C-1: Local grid refurbishment and extension at Oceana including drill holes conducted by Amoco Minerals Australia Company (Modified from Cordery 1998).

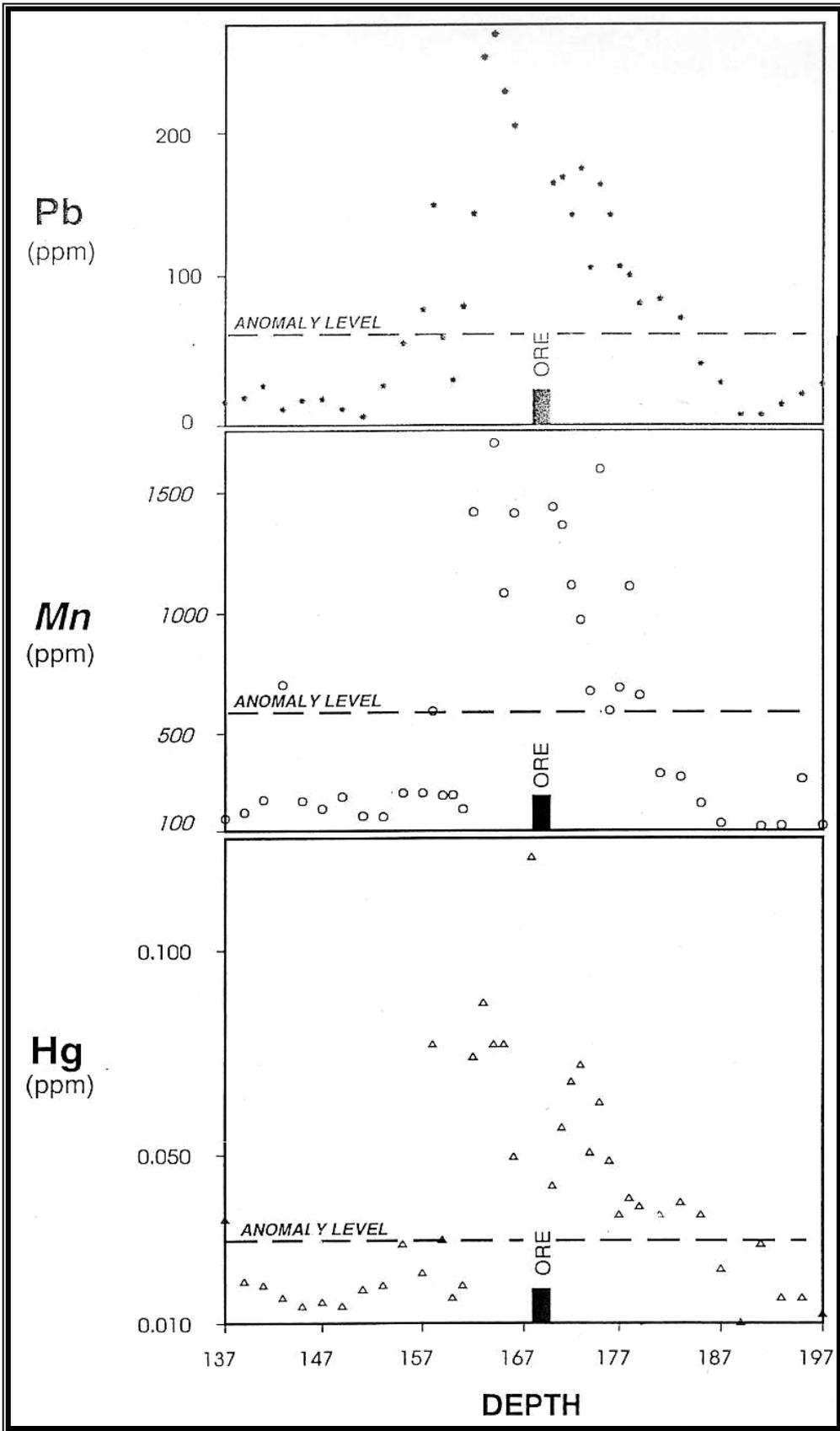


Appendix C-2: Simplified geology of Oceana including drill holes conducted by Pasminco Exploration on the Oceana Project (*Modified after Cordery 1998*).

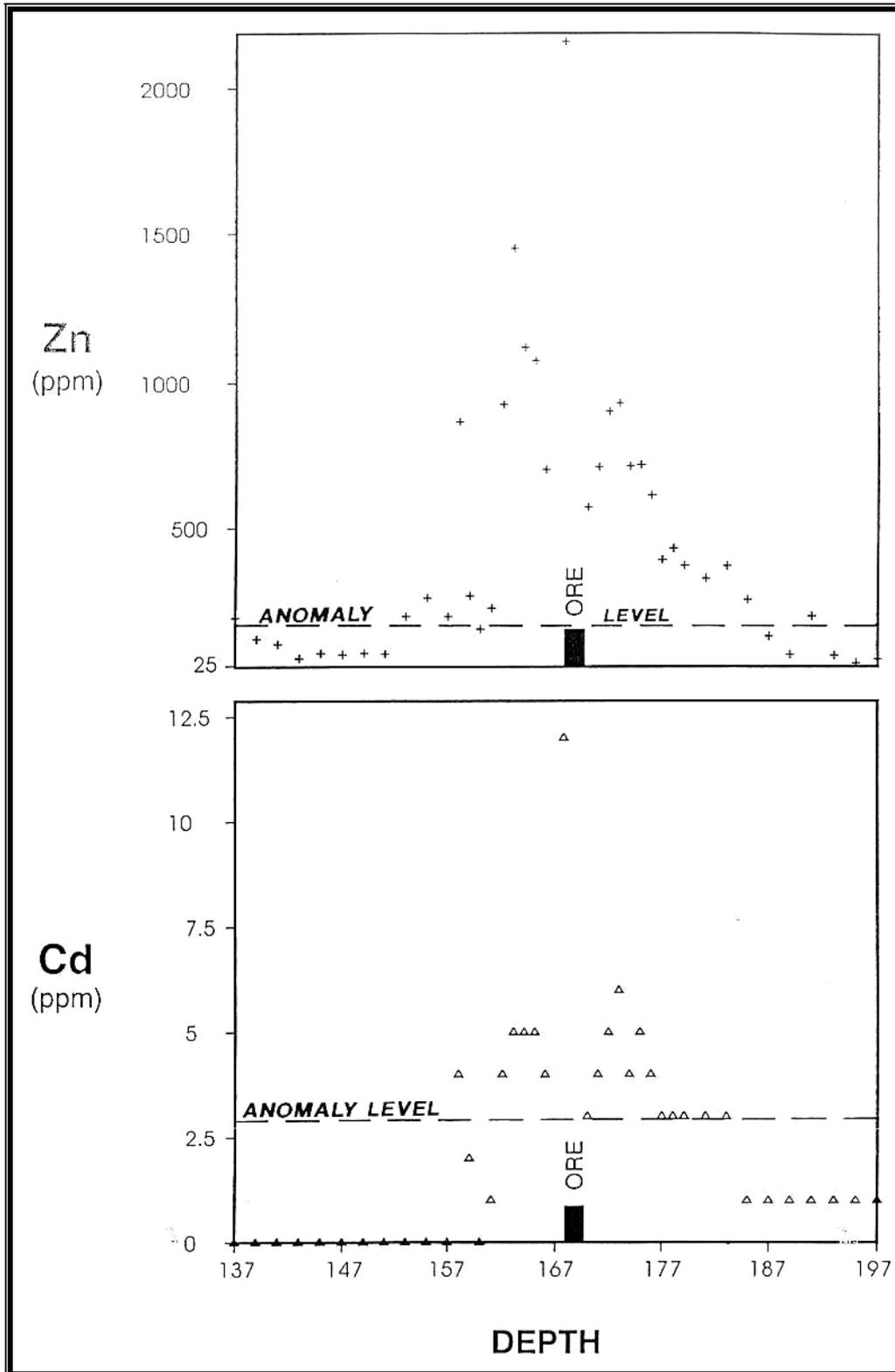


Appendix C-3: Simplified local geology with surface projection of ore lenses, known structures and drill holes conducted by Amoco Minerals Australia Company 1981 (Modified from Taylor 1983).

Appendix D



Appendix D – 1: Geochemical halo surrounding Southern Zone ore at Oceana (Pb, Mn, Hg); (from Saxon 1995).



Appendix D – 2: Geochemical halo surrounding Southern Zone ore at Oceana (Zn, Cd); (from Saxon 1995).

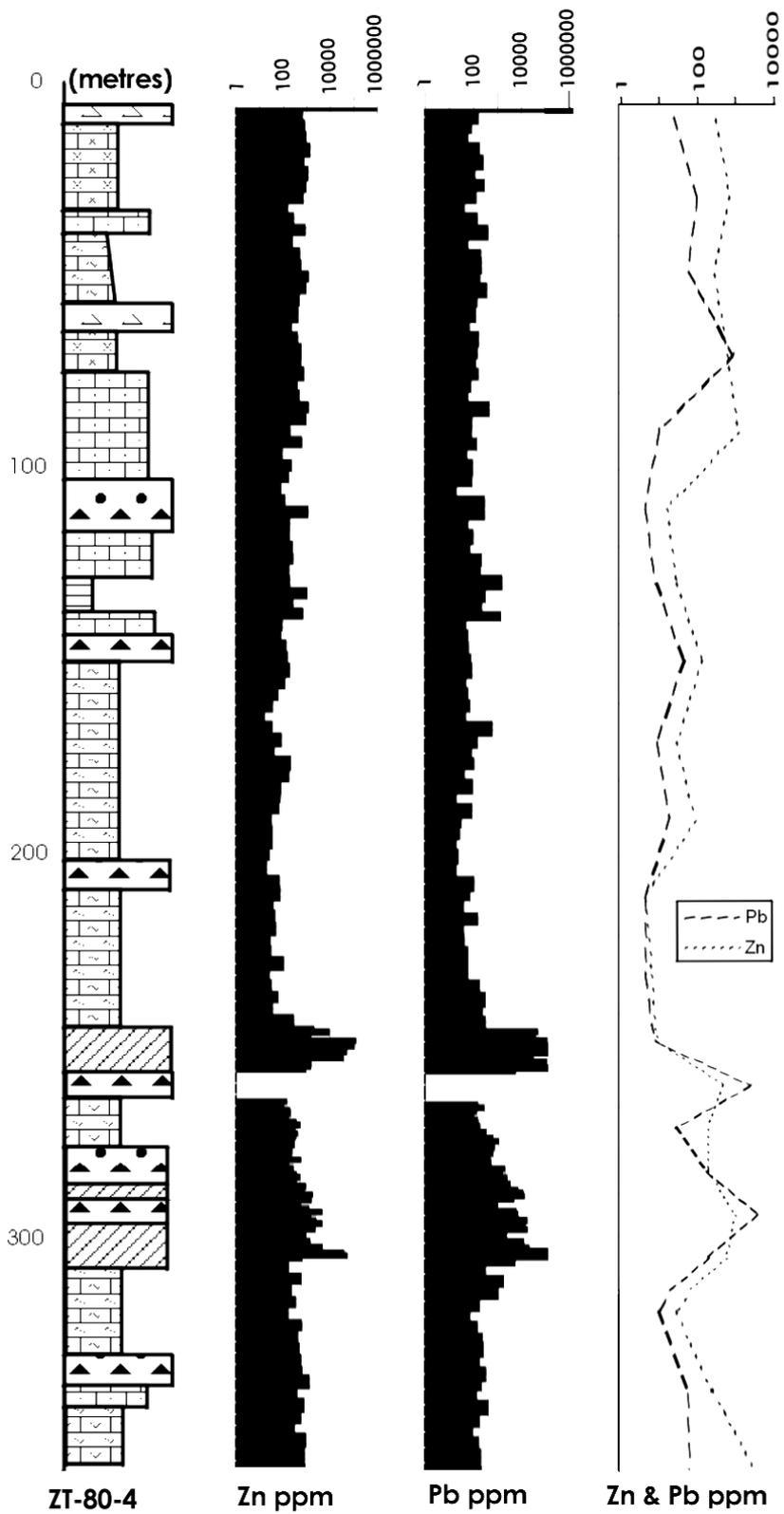
Appendix D – 3: X-ray Fluorescence results of ORECARB and MOCOMPSE programs with standards for trace elements graciously provided by Mr. Phil Robinson (M. Sc. Nottingham).

XRF ANALYSES, School of Earth Sciences-CODES, University of Tasmania										Phil Robinson, Analyst			22/05/2003			
mild steel mill used										Katie McGoldrick, XRF sample preparation.						
ORECARB program using fusion discs (ScMo X-ray tube)																
Ident	Depth	Sample No.	SiO2	TiO2	AL2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	P2O5	BaO	PbO		
TM1	11	7880401	0.99	0.02	0.49	7.31	1.19	13.29	32.79	0.09	0.16	0.01	0.02	0.00		
TM2	21	7880402	8.08	0.11	2.12	1.47	0.08	7.63	40.08	<0.05	0.68	0.03	0.03	0.01		
TM3	41	7880403	44.26	0.36	6.65	2.78	0.08	6.51	15.86	<0.05	2.22	0.25	0.02	0.01		
TM4	61	7880404	24.43	0.20	5.03	2.33	0.07	4.92	31.23	<0.05	1.66	0.07	0.03	0.08		
TM5	81	7880405	2.06	0.03	0.46	1.05	0.27	3.53	49.61	<0.05	0.15	0.01	0.03	0.00		
TM6	101	7880406	4.23	0.03	0.56	0.75	0.05	1.87	50.79	<0.05	0.19	0.05	0.03	0.00		
TM7	121	7880407	1.09	0.02	0.22	1.20	0.06	6.64	47.00	<0.05	0.08	0.00	0.02	0.00		
TM8	141	7880408	3.94	0.04	0.76	0.59	0.03	3.03	49.38	<0.05	0.25	0.03	0.03	0.01		
TM9	161	7880409	4.91	0.05	0.82	0.65	0.01	2.29	49.17	<0.05	0.27	0.01	0.03	0.00		
TM10	181	7880410	3.14	0.04	0.60	0.53	0.02	4.57	48.44	<0.05	0.21	0.00	0.02	0.00		
TM11	201	7880411	4.35	0.04	0.68	0.41	0.02	2.35	49.90	<0.05	0.24	0.01	0.03	0.00		
TM12	221	7880412	13.11	0.10	2.25	0.93	0.03	2.43	43.80	<0.05	0.74	0.06	0.02	0.00		
TM13	241	7880413	6.38	0.09	1.28	0.61	0.02	1.37	49.79	<0.05	0.43	0.01	0.03	0.00		
TM14	251	7880414	2.75	0.03	0.52	33.87	9.36	7.35	10.31	<0.05	0.15	0.03	0.01	0.23		
TM15	261	7880415	2.04	0.03	0.31	0.46	0.11	1.44	53.03	<0.05	0.11	0.01	0.03	0.00		
TM16	271	7880416	6.05	0.04	0.83	1.79	0.20	8.43	40.95	<0.05	0.26	0.03	0.02	0.02		
TM17	281	7880417	4.32	0.03	0.92	40.61	12.12	4.85	3.63	<0.05	0.3	0.05	0.01	0.32		
TM18	291	7880418	5.46	0.02	0.26	45.03	11.56	3.90	1.36	<0.05	0.08	0.01	0.01	0.02		
TM19	301	7880419	6.05	0.05	0.69	0.32	0.03	0.62	51.51	<0.05	0.25	0.00	0.03	0.00		
TM20	321	7880420	2.70	0.03	0.35	0.48	0.04	1.38	52.52	<0.05	0.13	0.04	0.03	0.01		
TM21	341	7880421	6.15	0.06	0.81	1.08	0.12	3.53	47.05	<0.05	0.27	0.01	0.03	0.01		
MOCOMPSE program using pressed powder pills (ScMo tube)																
Ident	Depth	Sample No.	Y	U	Rb	Th	Pb	As	Bi	Zn	Cu	Ni	W	Se		
TM01	11	7880401		3 <2		7 <2		25 <3	<2		295	5	35 <2	<1		
TM02	21	7880402		5 <2		27	3	103 <3	<2		642	7	10 <2	<1		
TM03	41	7880403		19 <2		90	10	61	6 <2		269	6	14 <2	<1		
TM04	61	7880404		13 <2		67	7	757	4 <2		588	5	15 <2	<1		
TM05	81	7880405		2 <2		6 <2		11 <3	<2		1009	3	7 <2	<1		
TM06	101	7880406		3 <2		8 <2		5 <3	<2		18	4	2 <2	<1		
TM07	121	7880407		1 <2		3 <2		9 <3	<2		31	2	4 <2	<1		
TM08	141	7880408		2 <2		9 <2		47 <3	<2		139	3	4 <2	<1		
TM09	161	7880409		2 <2		11 <2		10 <3	<2		31	6	4 <2	<1		
TM10	181	7880410		2 <2		8 <2		21 <3	<2		84	4	2 <2	<1		
TM11	201	7880411		2 <2		10 <2		5	5 <2		5	5	5 <2	<1		
TM12	221	7880412		6 <2		27	3	5	4 <2		7	6	8 <2	<1		
TM13	241	7880413		4 <2		16	3	9 <3	<2		10	7	8 <2	<1		
TM14	251	7880414		2 <2		6	4	2100 <3	<2		442 <2		10 <2	<1		
TM15	261	7880415		2 <2		4 <2		27 <3	<2		179	4	2 <2	<1		
TM16	271	7880416		2 <2		10 <2		169 <3	<2		185	3	3 <2	<1		
TM17	281	7880417		3 <2		13	4	3000 <3	<2		890	5	11 <2	<1		
TM18	291	7880418		2 <2		4 <2		179 <3	<2		523 <2		20 <2	<1		
TM19	301	7880419		2 <2		10 <2		10 <3	<2		28	5	5 <2	<1		
TM20	321	7880420		2 <2		5 <2		54 <3	<2		222	4	3 <2	<1		
TM21	341	7880421		6 <2		11	3	59 <3	<2		2700	5	5 <2	<1		
detection limits (ppm)				1	2	1	2	2	3	2	1	2	1	2	1	

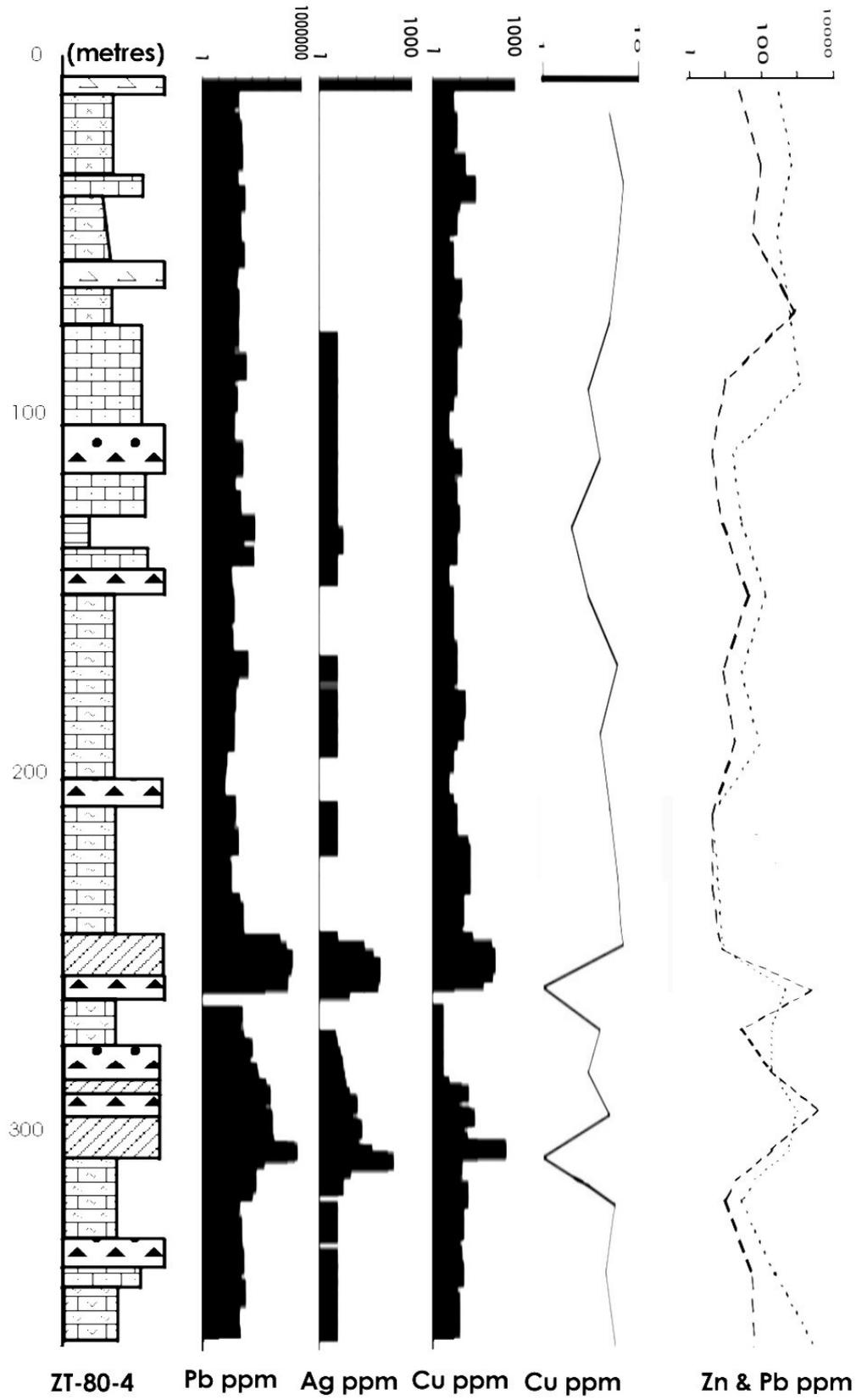
Antimony and Cadmium in high zinc samples						
AU1D program (Gold X-ray tube)						
Ident		Sb	Cd	Reference Rocks:-		
TM 1		<2	1	AW QUARTZ	<2	<1
TM 2		<2	3	AW QUARTZ expected	0	0
TM 3		4	<1	TASGRAN 1(10)	<2	<1
TM 4		2	3	TASGRAN 1(10) expected	0.1	0.1
TM 5		<2	6	TASBAS	<2	<1
				TASBAS expected	0.1	0.1
				GXR2/ 527	45.9	3.7
				GXR2/ 527 expected	43-49	4.1
				GXR4/ 542	4.4	<1
				GXR4/ 542 expected	4.6	0.86?
				CACO3(4.4g)	<2	<1
				CaCO3 expected	0	0
				GSR-6 limestone	<2	<1
TM 14	33.87% Fe2O3	7	4	GSR-6 expected	0.43	0.069
TM 15		<2	2	Fe2O3JM C 100% Fe2O3	6	<1
TM 16		2	<1	Fe2O3JM C 100% Fe2O3 (3	<1
TM 17	40.61% Fe2O3	10	3	Fe2O3JM C expected	5	0
TM 18	45.03% Fe2O3	5	4	IFG magnetite ri	2	<1
				IFG magnetite ri	<1	<1
				IFG expected	0.63	?
TM 21		<2	11	detection limit (ppm)	2	1
Gallium (ScM o tube)						
Gallium (ScM o Ga ppm)						
				Reference Rocks:-		
TM 1	<1.5		TM 01	Ga ppm	expected Ga	
TM 2		3	TM 02	AW QUARTZ	0.2 (<1.5)	0 SiO2
TM 3		9	TM 03	AW QUARTZ	1 (<1.5)	0
TM 4		8	TM 04	DTS-1	0.3 (<1.5)	0.5 dunite
TM 5 & repeat	<1.5 / <1.5		TM 05 & repe	GSR-6	8.2	7.1
TM 6	<1.5		TM 06	GSR-6	7.2	7.1 limestone
TM 7	<1.5		TM 07	GSR-6	7.6	7.1
TM 8		2	TM 08	mean	7.7	7.1
TM 9	<1.5		TM 09	TASBAS	25.2	25 basalt
TM 10		2	TM 10	TASBAS	24.9	25
TM 11		2	TM 11	detection limit (ppm)		1.5
TM 12		3	TM 12			
TM 13		2	TM 13	No germanium detected in any samples (high Zn ones only checked)		
TM 14		4	TM 14			
TM 15		2	TM 15			
TM 16		2	TM 16			
TM 17		7	TM 17			
TM 18	<1.5		TM 18			
TM 19	<1.5		TM 19			
TM 20	<1.5		TM 20			
TM 21		2	TM 21			

Appendix D – 4: (A) ZT-80-4 downhole plots of XRF results showing wall- to host-rock, and hanging- to foot-wall implications. Massive sulphides are coincident with Pb and Zn spikes. (B) Cu concentrations have a different trend to Pb and Zn generally, and negative opposing spikes at the Ore Zone (~300m).

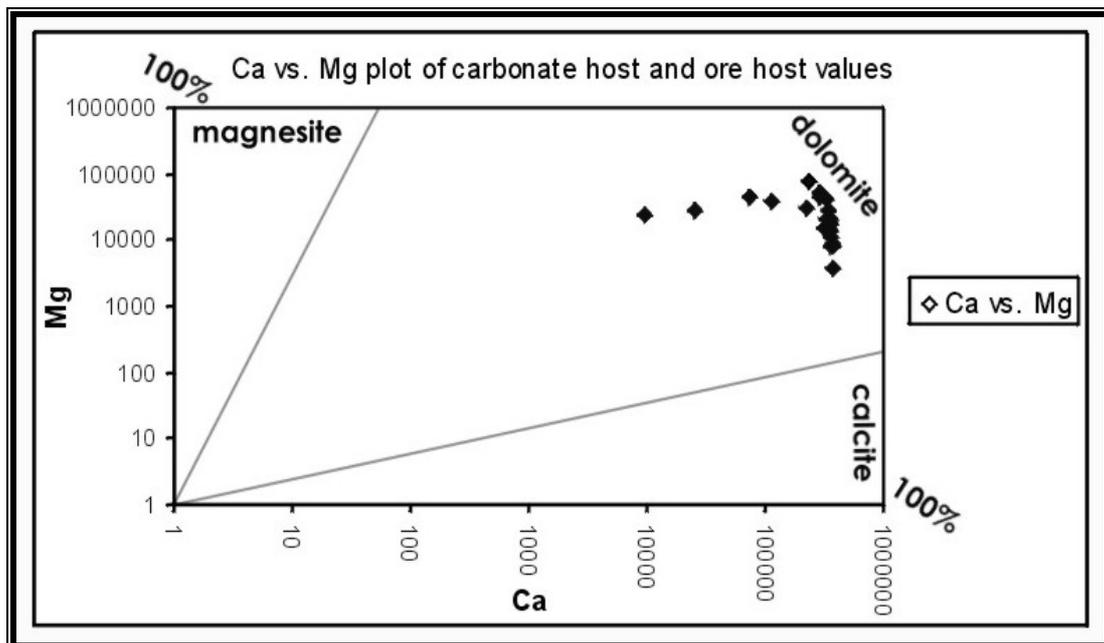
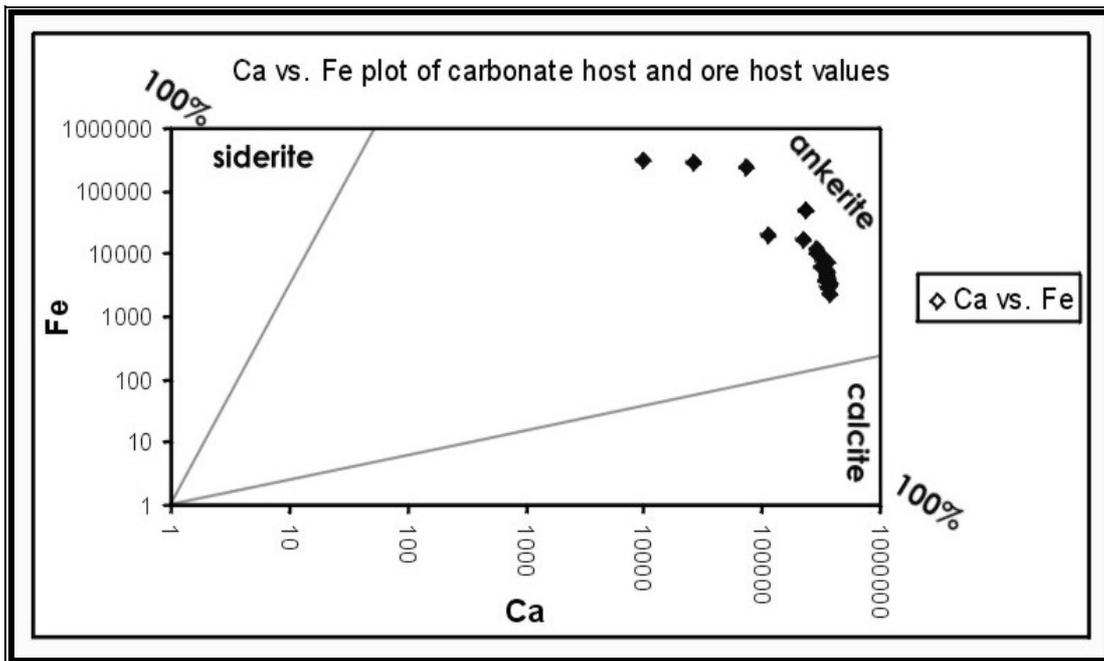
Downhole Pb/Zn assays of ZT-80-4 with fine and broad spacing



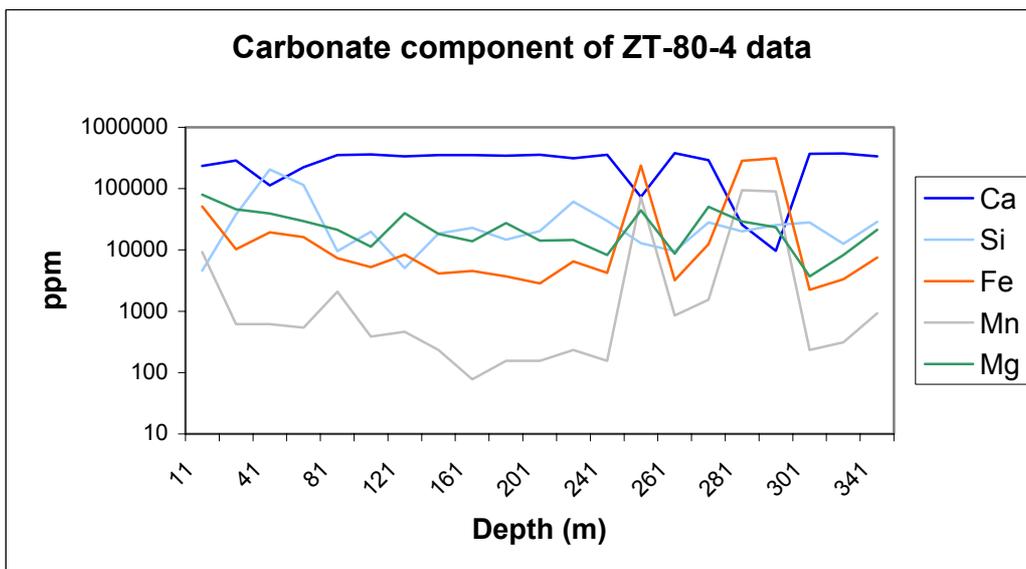
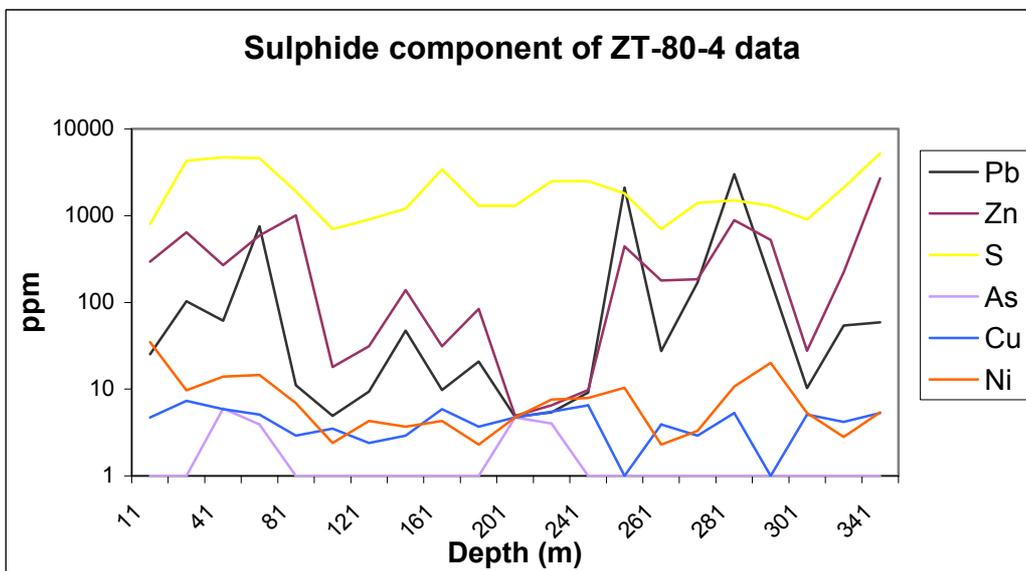
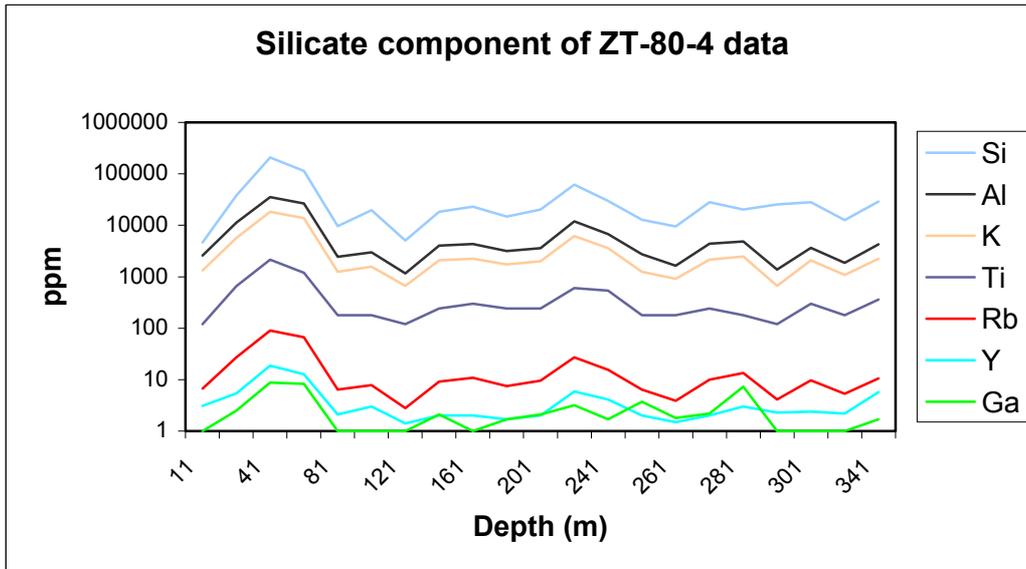
Downhole Cu and Pb/Zn assays of ZT-80-4 with fine and broad spacing



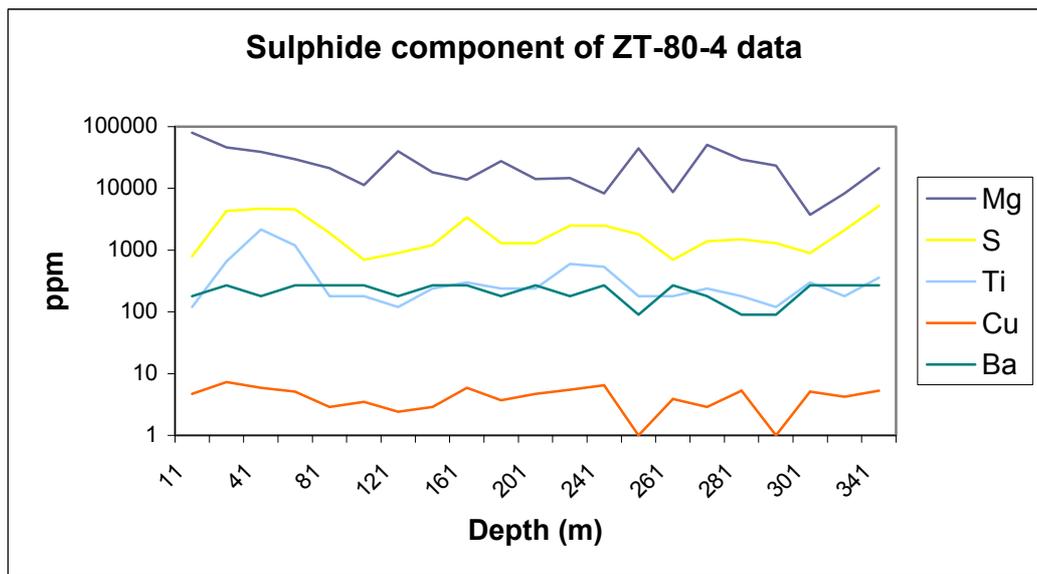
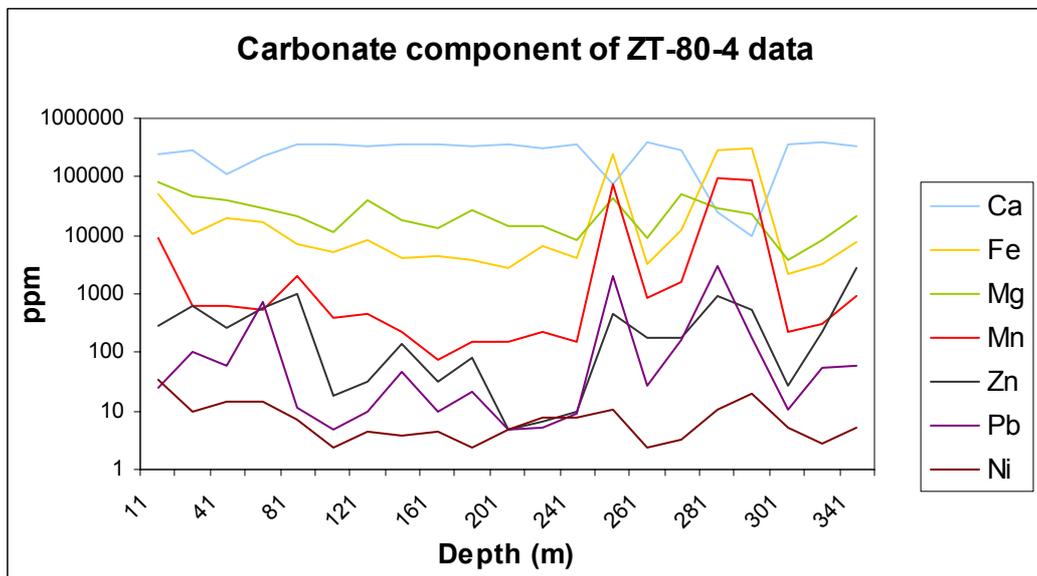
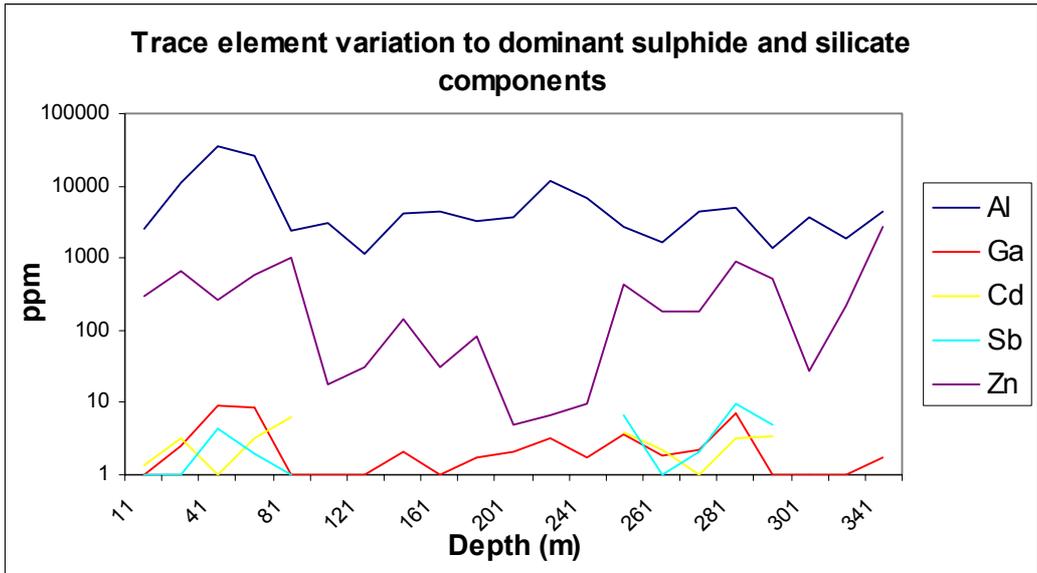
Appendix D – 5: Scatterplots host and ore minerals typically associated with carbonate hydrothermal phases. Data indicates Ca-rich dolomite and ankerite are the dominant carbonate phases in ore and the host rock at Oceana.



Appendix D – 6: Illustrations of silicate, carbonate and sulphide components of samples from ZT-80-4. Silicate components are relatively homogenous with the exception of elevated Ga in the ore zone at 300m, in contrast to mild enrichments of other elements. Sulphide components show Pb and Zn depletions are broadly consistent with sulphur depletions around 300m. Pb and Zn spikes are opposed by Cu spikes. Ni concentrations are proportionally homogenous with sulphur. Carbonate components show enrichment of Fe and Mn, and depletion of Ca with the ore zone. Slight enrichments of Mg are coincident with Fe and Mg spikes however both series are poorly homogenous.

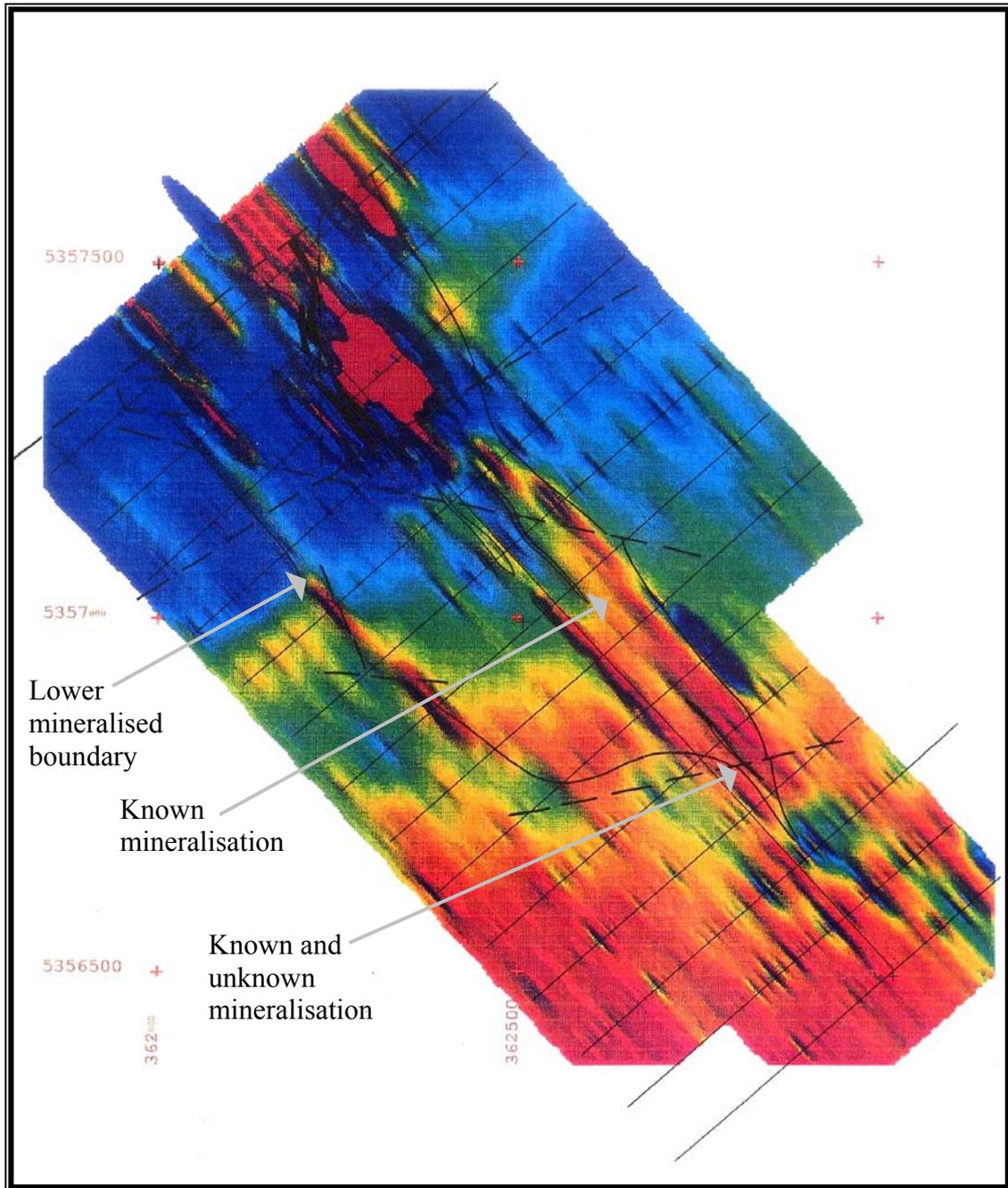


Appendix D – 7: (A) Trace element plot with a comparison of the dominant silicate and sulphide component element. Near surface plots indicate Cd is probably associated with sulphides and Ga and Sb are probably associated with silicates. (B) Carbonate plot including Zn, Pb and Ni. Concentrations are broadly homogenous or related to a response from fluid compositions. (C) Sulphide component plot including Ba and Ti. S shows a broad homogeneity with Ti, similar to homogeneity with Ni.

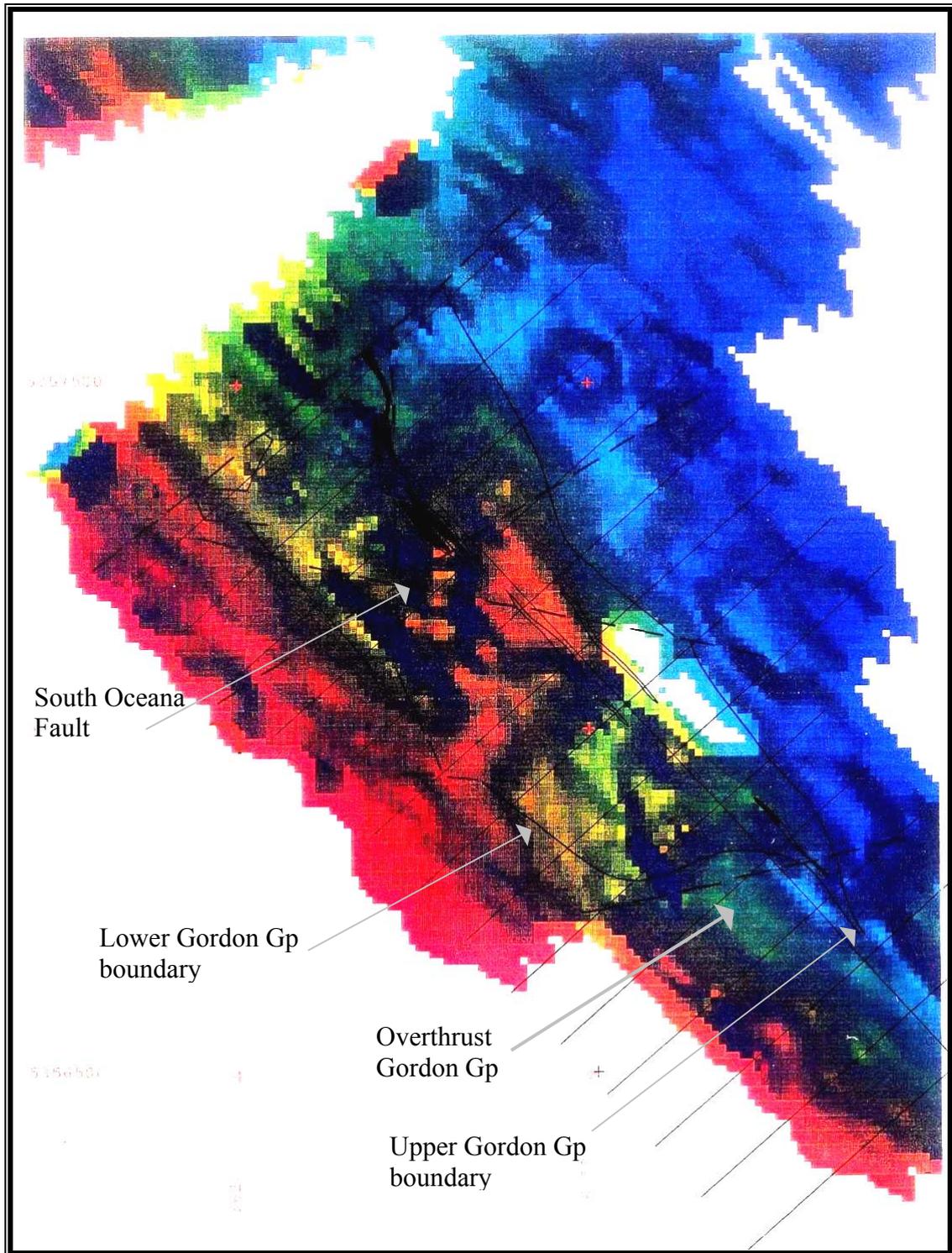


Appendix E

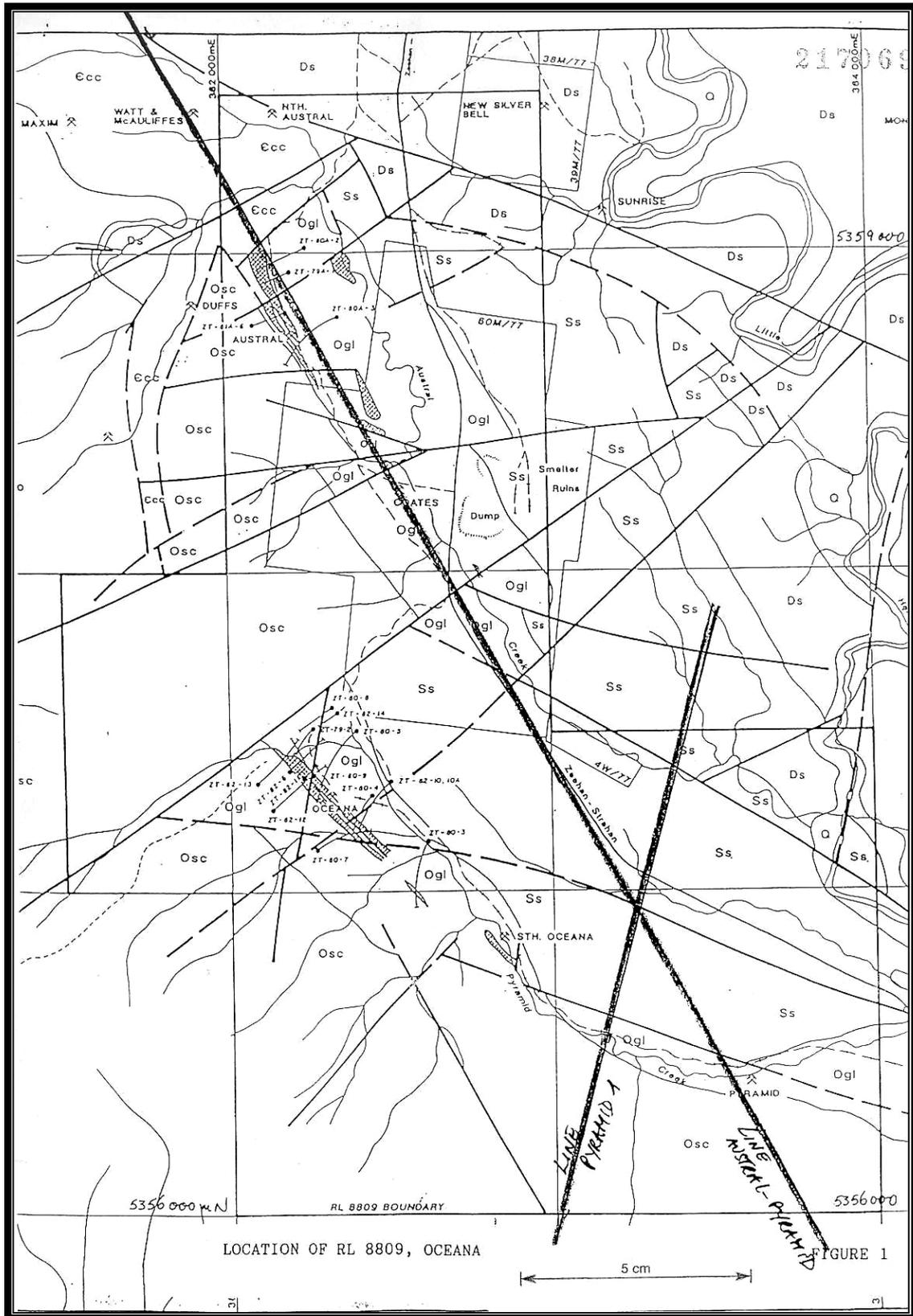
Appendix E – 1: Geo-instruments G – 856 magnetometer data taken with 5m station spacing and 100m line spacing from 2400N to 3700N and 1000E to 1800E, modelled in ER Mapper with northeast colour drape by Leaman, (1992), (*Modified from Quayle 1992*).



Appendix E – 2: Gravity data acquired by Amoco M.A.C., (Jones 1981), and tied to the state datum, corrected and modelled with ER Mapper using a north/south colour drape by Leaman Geophysics, (Leaman 1992). Grid spacing and location is similar to specifications used with magnetic surveys.

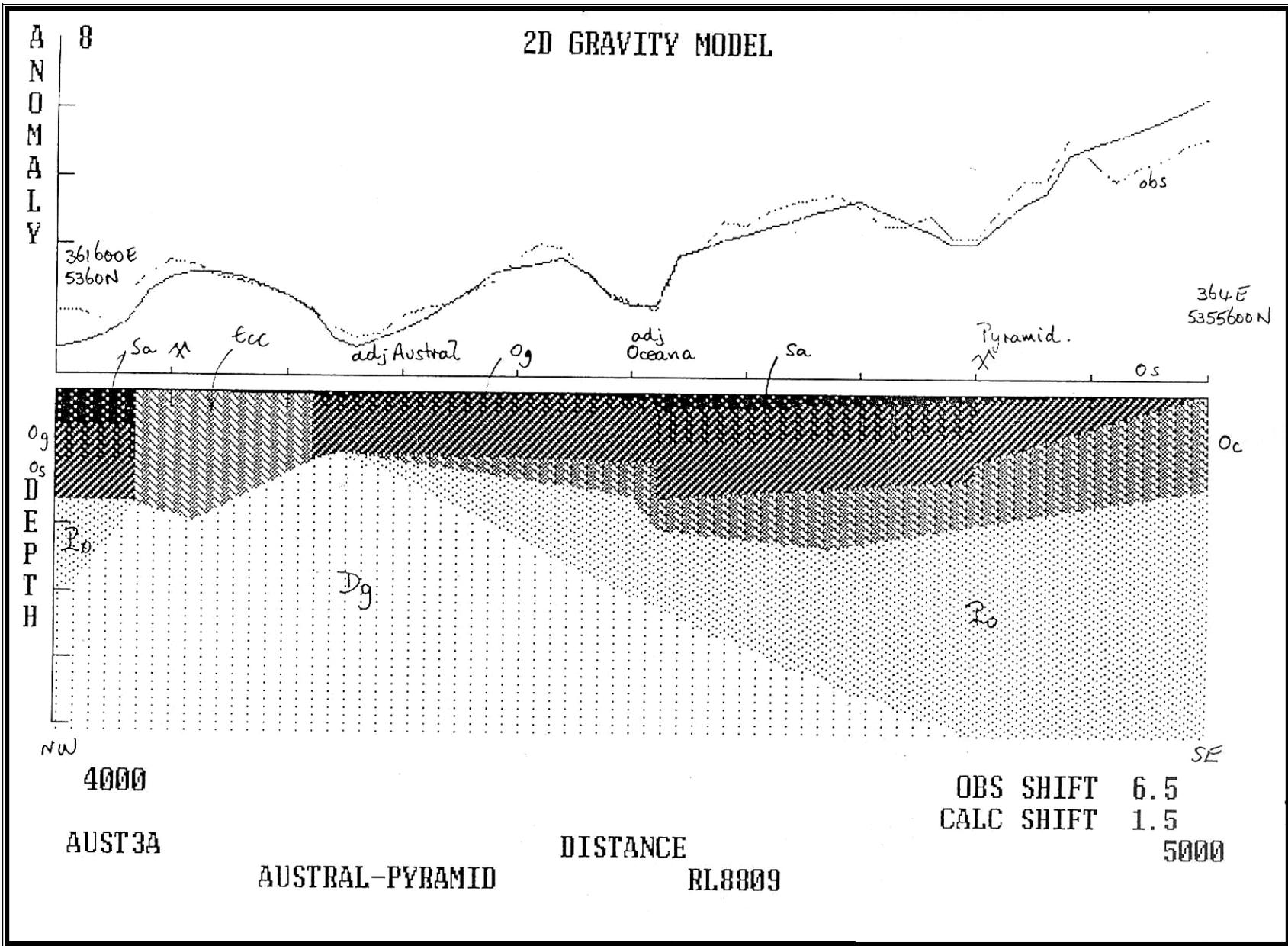


Appendix E – 3: Regional gravity interpretation using Amoco M.A.C. data (Jones 1981), modelled using Potent by Leaman Geophysics. Included images consist of the cross-section location map, and the 2D model of the Austral-Pyramid line (*Modified from Saxon 1995*).



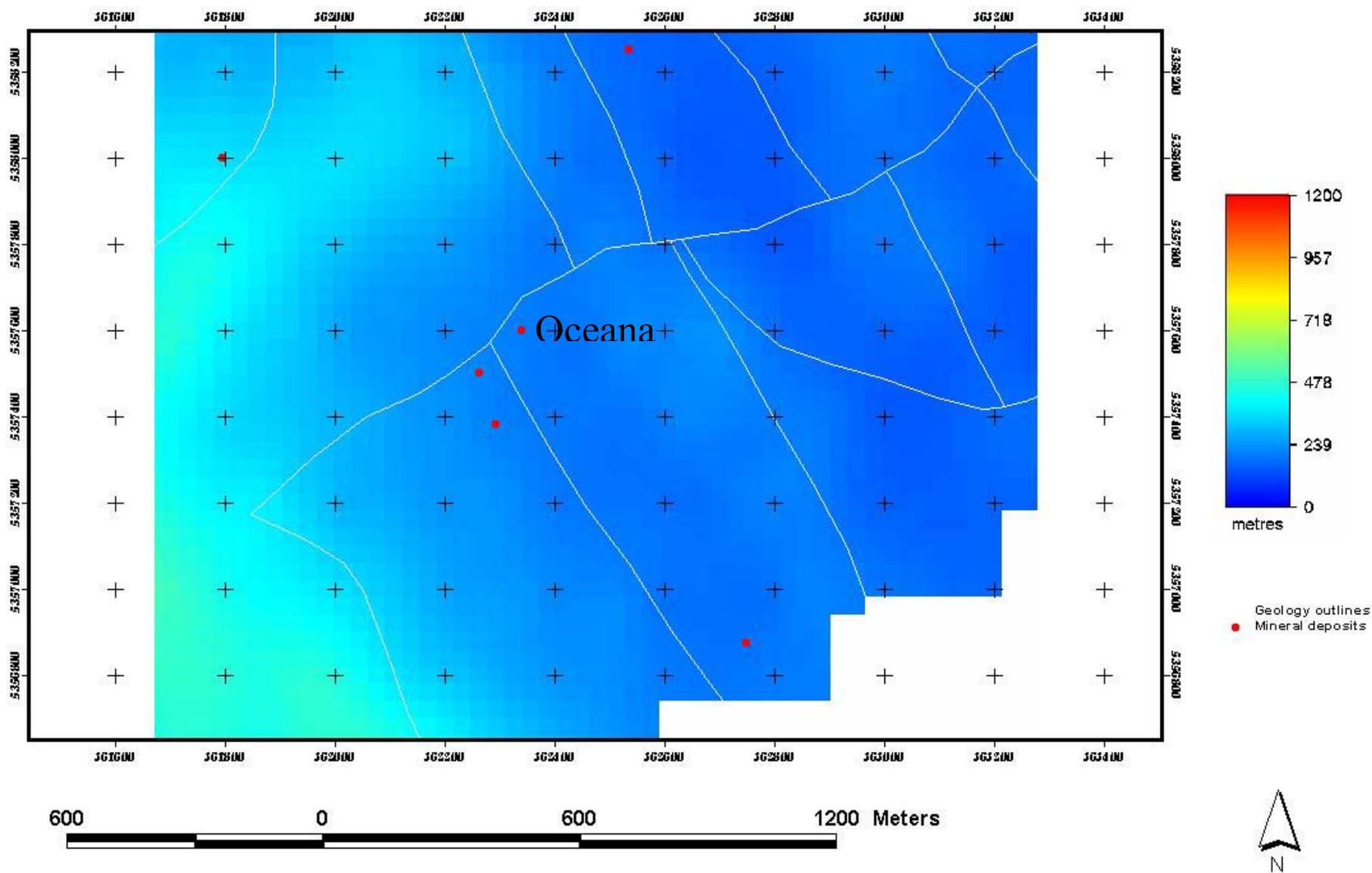
LOCATION OF RL 8809, OCEANIA

FIGURE 1

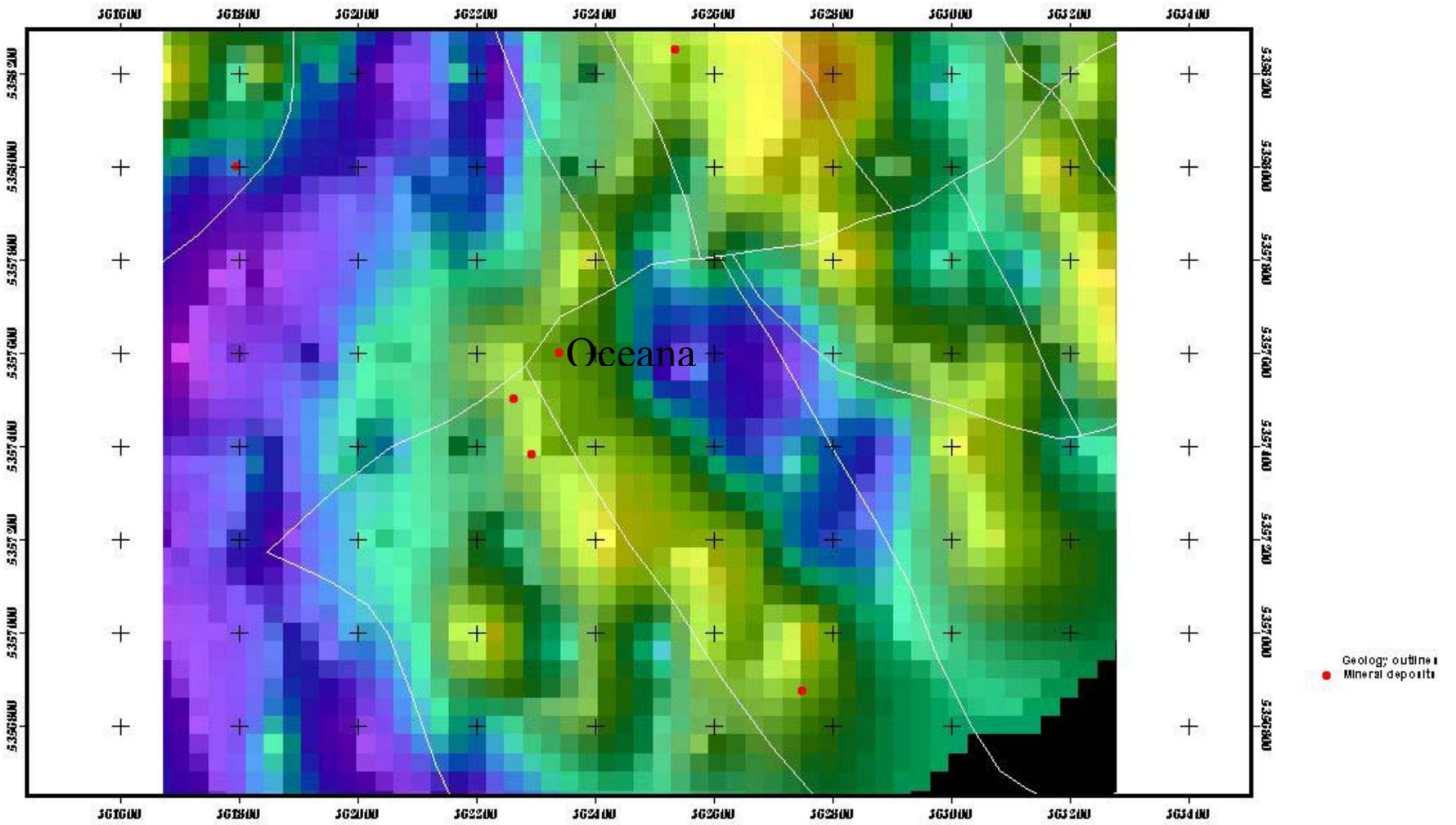


Appendix E - 4: Regional interpretive surveys from the Regional Minerals Program Western Tasmania supplied by Mineral Resources Tasmania. Surveys were carried out at 300m line spacings with local 200m spacings. Data is too broadly spaced to derive mineralisation features however regional structures and features can be identified. Surveys include digital elevation, 880Hz and 980Hz apparent resistivity, TMI and ternary radiometrics.

Oceana elevation



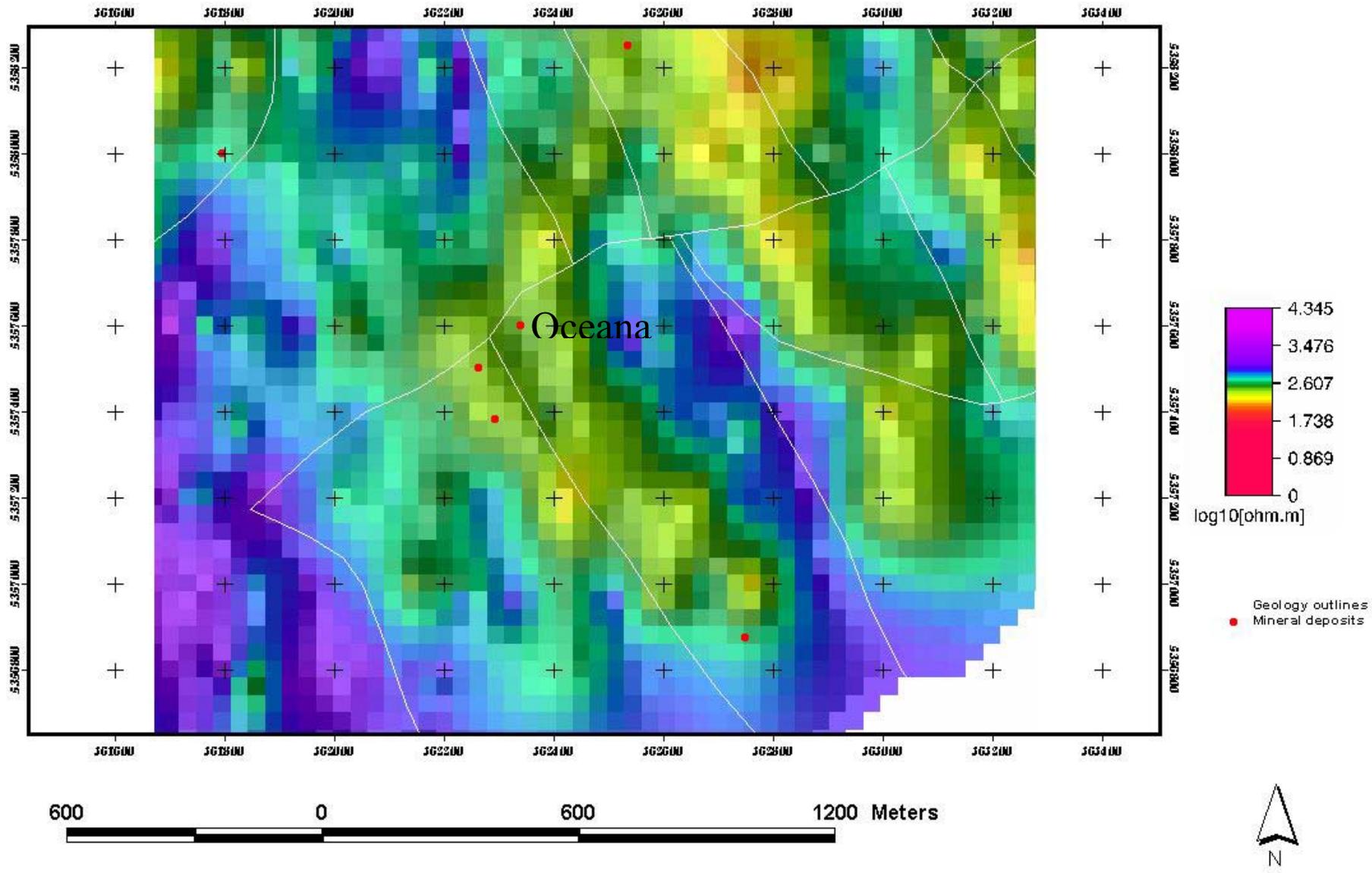
Oceana 880 Hz apparent resistivity



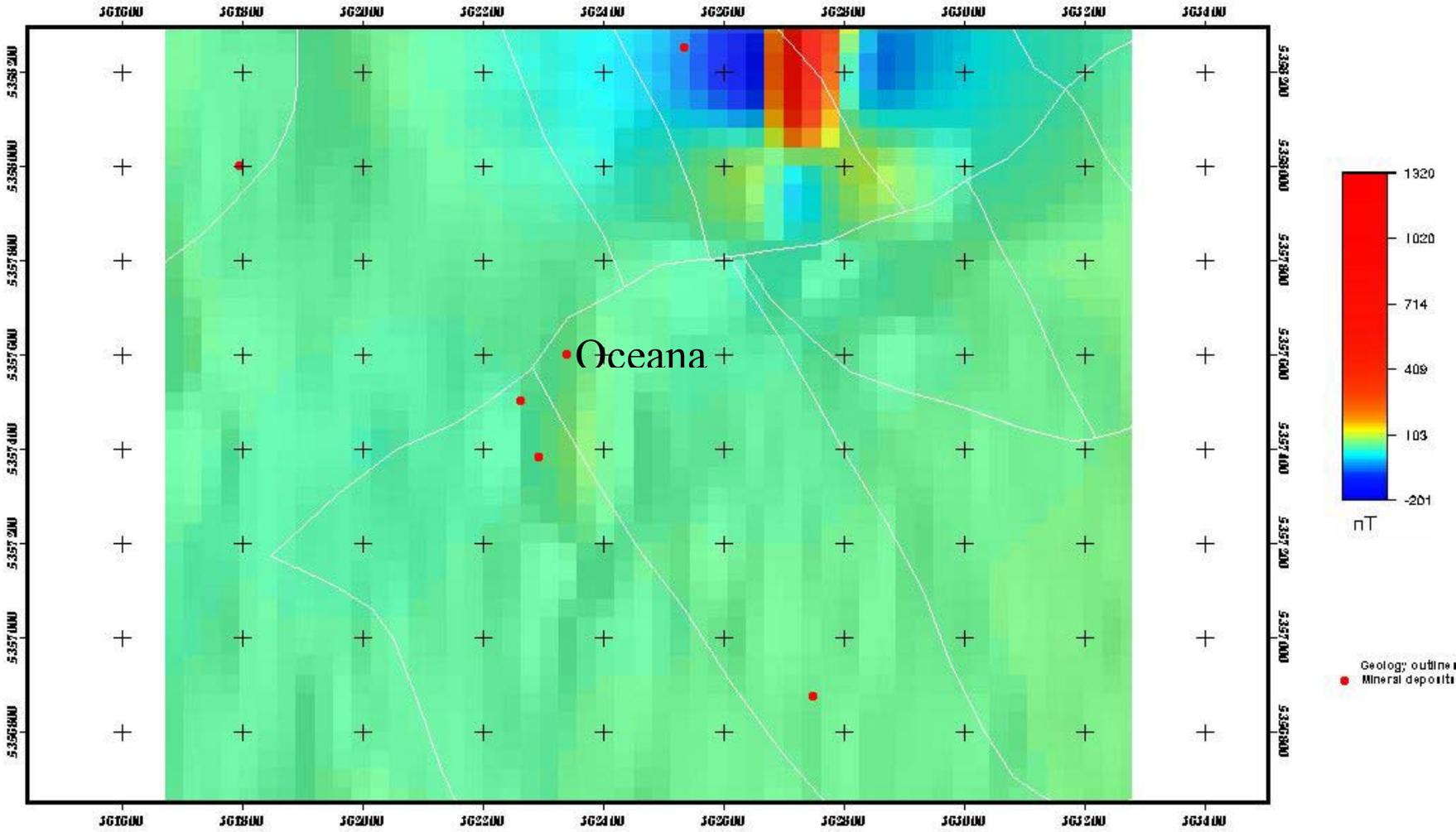
600 0 600 1200 Meters



Oceana 980 Hz apparent resistivity



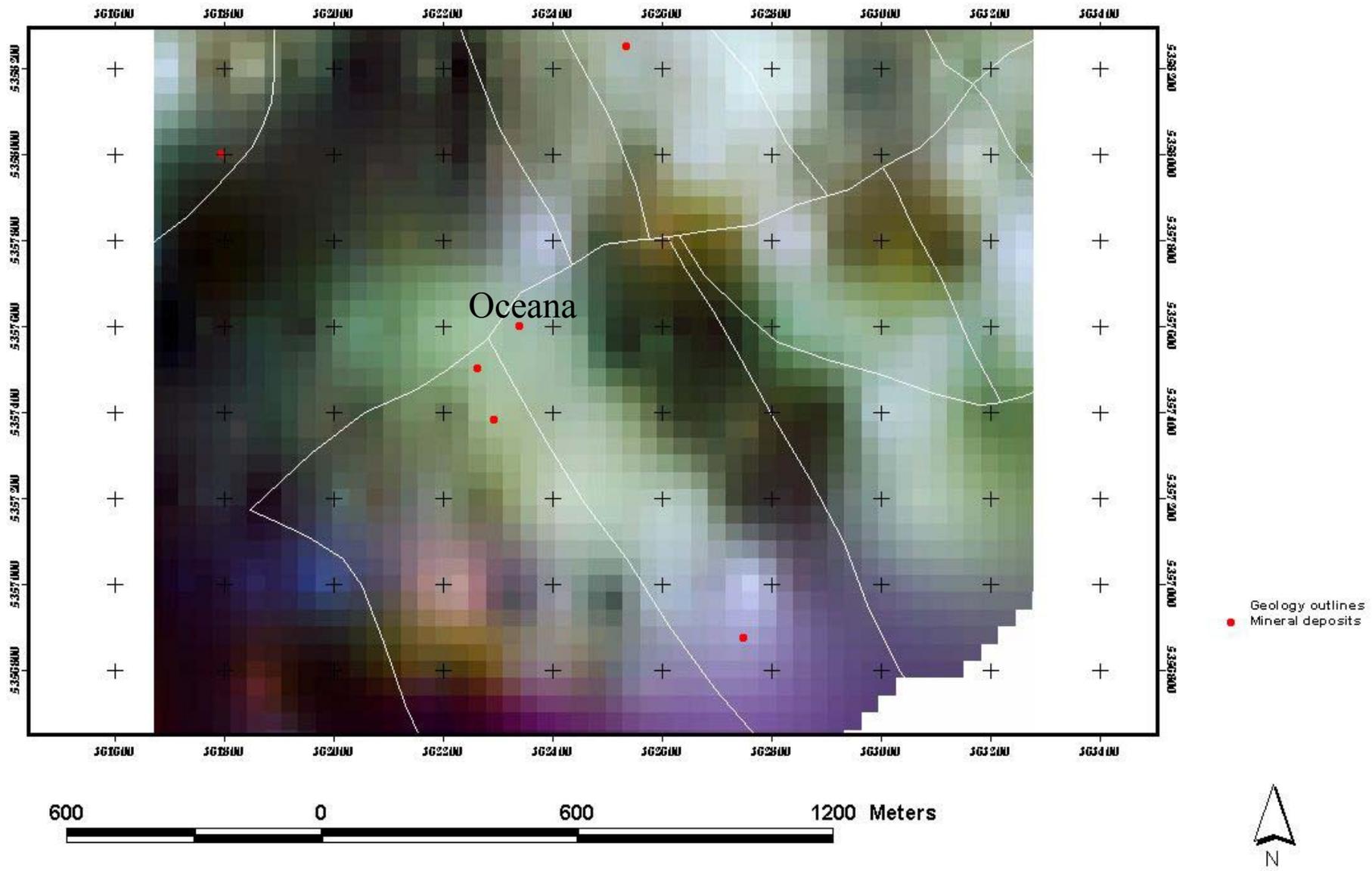
Oceana TMI with 1VD enhancement



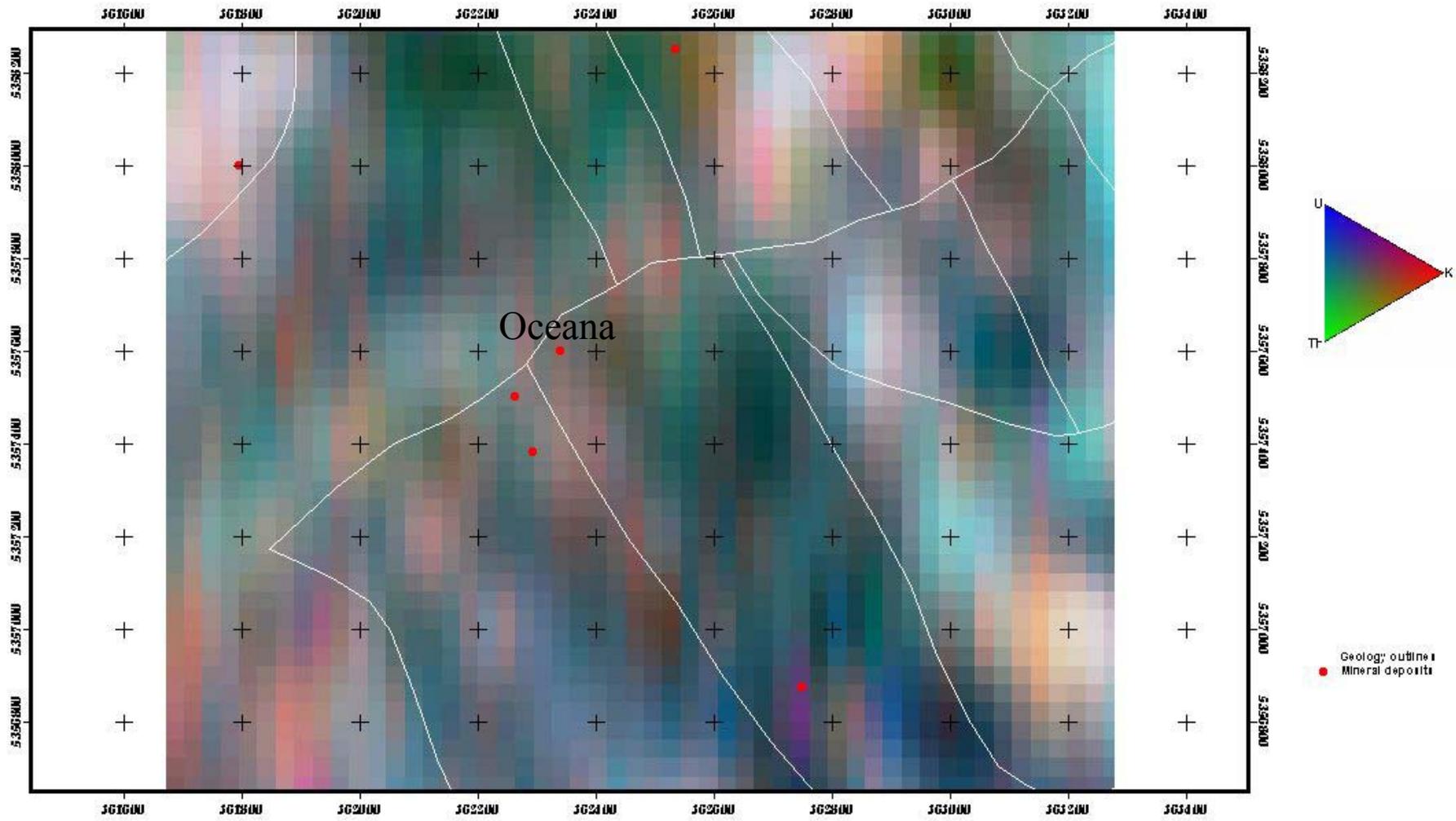
600 0 600 1200 Meters



Oceana ternary conductivity (R=880 Hz, G = 6600 Hz; B = 34 kHz)



Oceana ternary radiometrics



600 0 600 1200 Meters



Appendix F

Work Completed

Hole ID	Thin section	Type	Sample No.	Depth	Purpose
ZT-82-10A	Yes	PTS	788210A01	485.9m	Paragenesis
ZT-82-10A	Yes	DPTS	788210A03	76.3m	Ore textures
ZT-82-10A	Yes	PTS	788210A05	128.8m	Sedimentology
ZT-82-10A	Yes	PTS	788210A07	185.5m	Sedimentology
ZT-82-10A	Yes	PTS	788210A08	202.0m	Sedimentology
ZT-82-10A	Yes	PTS	788210A09	212.6m	Sedimentology
ZT-82-10A	Yes	PTS	788210A10	289.6m	Sedimentology
ZT-82-10A	Yes	PTS	788210A20	477.4m	Ore textures
OP2	Yes	PTS	95201	424.8m	Sedimentology
OP2	Yes	PTS	95202	409.3m	Paragenesis
ZT-82-10A	No	PB	788210A13	398.0m	Ore textures
ZT-82-10A	No	PB	788210A18	428.7m	Ore textures
ZT-80-7	Yes	FITS	7880712	166.2m	Fluid inclusions
ZT-80-7	Yes	PB	7880713	167.5m	Ore textures

Hole ID	Core condition	Logged
OP1 – South Oceana	Good	Yes
OP2 – South Zone	Good	Yes
OP3 – Pyramid	Good	Yes
ZT-80-3 – South Zone	Good	Yes
ZT-82-10A – South Zone	Good	Yes
ZT-80-4 – South Zone	Good	Yes
ZT-80-7 – South Zone	Good	Yes
ZT-80-5 – South Zone	Fair	Yes
ZT-82-12 – South Zone	Fair	Yes
ZT-80-8 – North Zone	Poor	Yes
ZT-82-13 – North Zone	Poor	Yes

