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Cooperative Research Centre for
Landscape Evolution & Mineral Exploration

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GEOCHEMICAL ORIENTATION SURVEYS AND REGOLITH GEOLOGY IN THE S.W. ARUNTA PROVINCE, NORTHERN TERRITORY (ARGOS PROJECT)

Volume 3 - Appendices 5-14

M.S. Skwarnecki, Li Shu, S.J. Fraser and I.D.M. Robertson

CRC LEME OPEN FILE REPORT 82

January 2002

(CSIRO Exploration and Mining Report 677R/CRC LEME Report 129R, 2000.
Second impression 2002)

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CRC LEME is an unincorporated joint venture between CSIRO-Exploration & Mining, and Land & Water, The Australian National University, Curtin University of Technology, University of Adelaide, University of Canberra, Geoscience Australia, Bureau of Rural Sciences, Primary Industries and Resources SA, NSW Department of Mineral Resources-Geological Survey and Minerals Council of Australia.
Headquarters: CRC LEME c/o CSIRO Exploration and Mining, PO Box 1130, Bentley WA 6102, Australia

Before commencing a geochemical survey over a large area of the SW Aruntas, The Northern Territory Geological survey contracted CRC LEME to establish optimum procedures for this survey. This report presents the outcomes of this Project, which commenced in September 1999, was completed in February 2000and was led by Dr I.D.M. Robertson.

The agreement between the parties allowed public release of these reports when the Northern Territory Geological Survey released the regional survey data. This was accomplished in October 2001 with release of Dunster J.N. and Mügge, A.E. Stream sediment survey of Western MacDonnell Ranges – statistical and GIS-based interpretation. Northern Territory Geological Survey, Digital Information on CD Package DIP 2001-002. It is intended that publication of the report will be an additional factor in transferring technology to aid the Australian mineral industry.

This report (CRC LEME Open File Report 82) is a second impression (second printing) of CSIRO Exploration and Mining Restricted Report 129R, first issued in 2000, which formed the output of the ARGOS Project.
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LIST OF APPENDICES

APPENDIX 5

CREEK PROFILES

Geochemistry plotted against distance down creek. Refer to Appendix 3A for locations of Winnecke samples and to Appendix 3B for Oonagalabi samples. Locations of mineralisation, either intersecting the creek or offset from it, are indicated by a horizontal bar on the x axis.

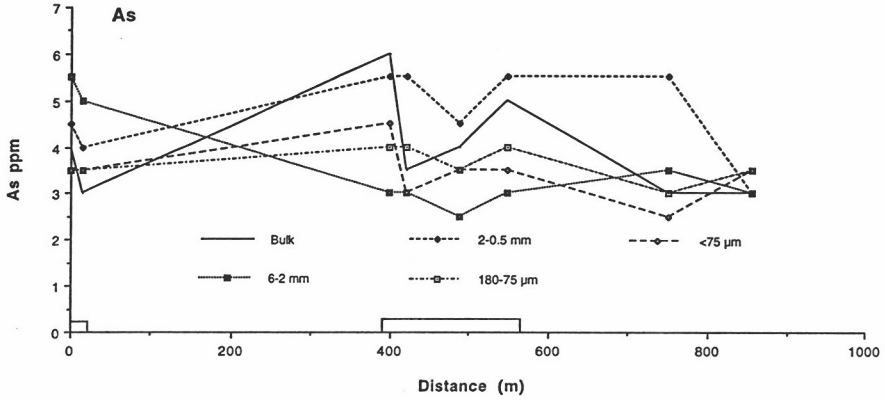
Appendix 5.A - Winnecke

Appendix 5.A.1 Creek A - Samples 251-256, 235-236
Mineralisation lies south of head of creek from Coronation workings and S of centre of creek from Golden Goose workings.

Appendix 5.A.2 Creek B - Samples 231-236
Top of creek contaminated by mine tailings.

Appendix 5B - Oonagalabi

Appendix 5.B1 Creek C - Samples 206-227, 289-290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2-0.5 mm
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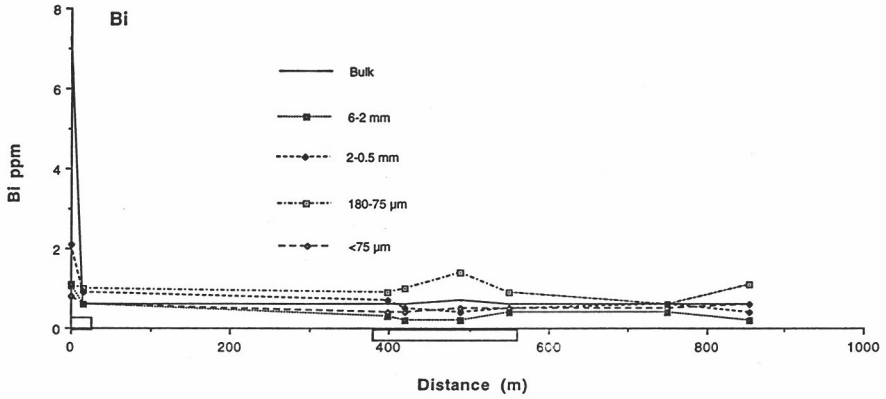
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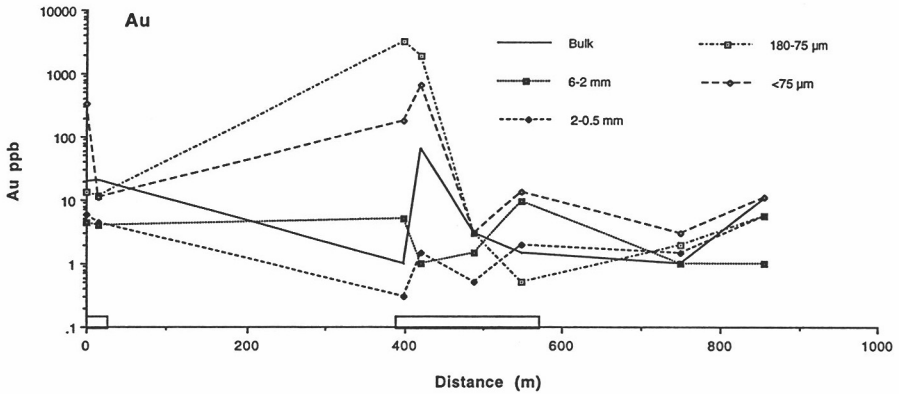
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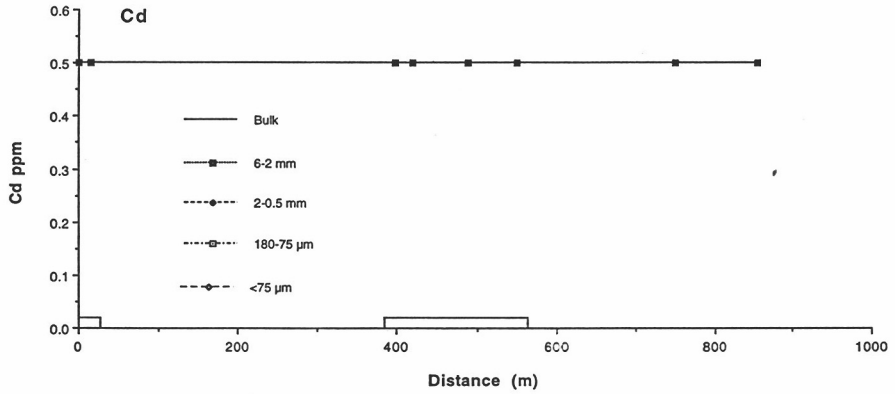
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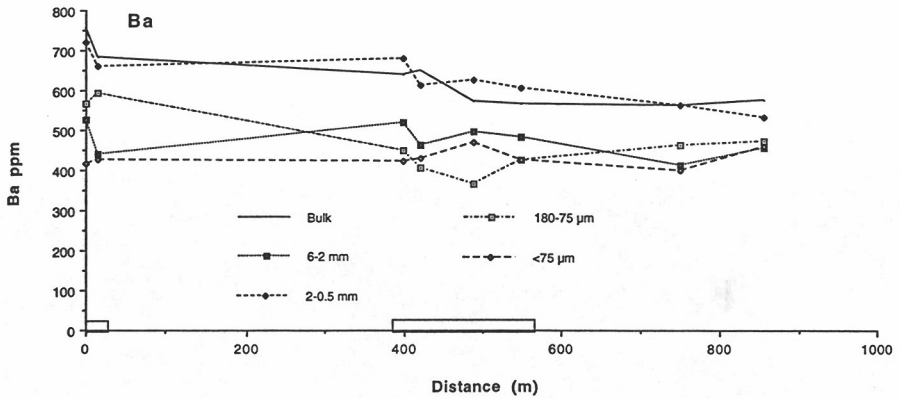
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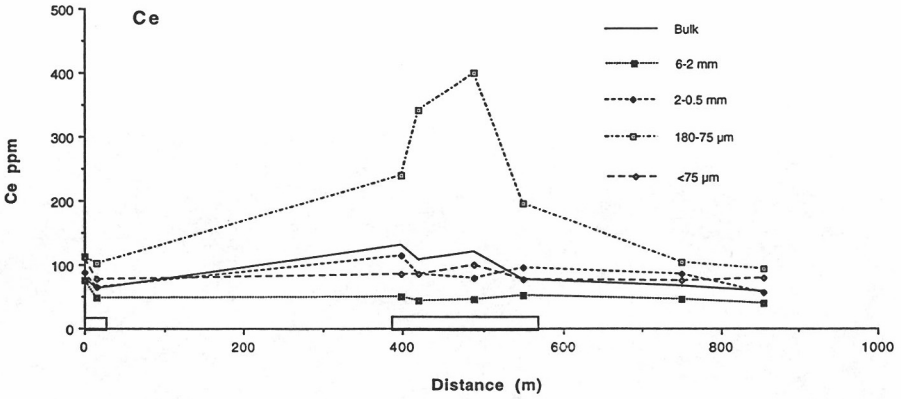
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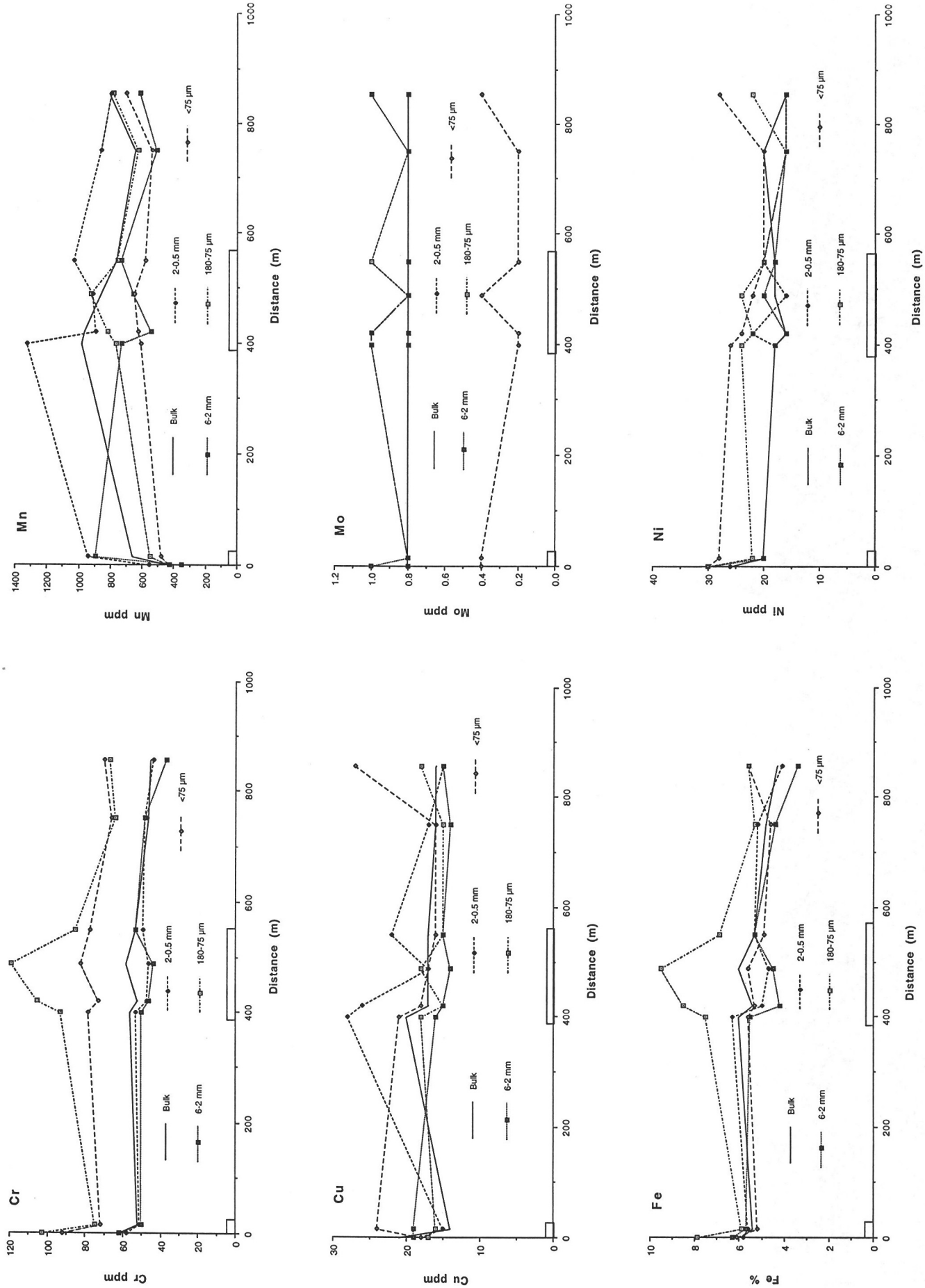
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Cu
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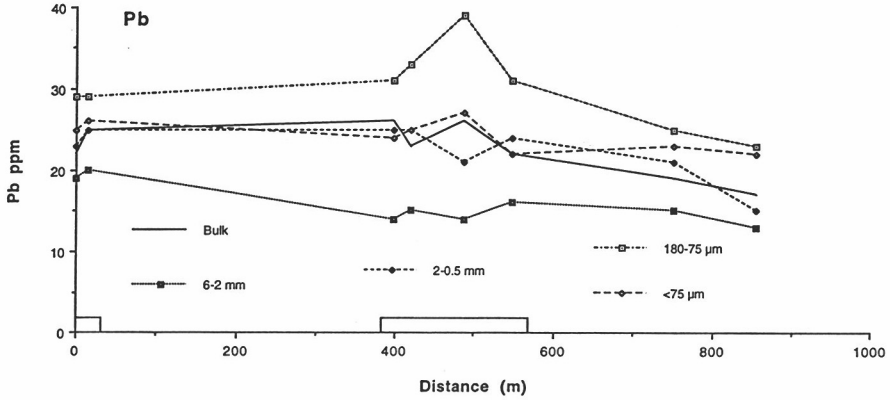
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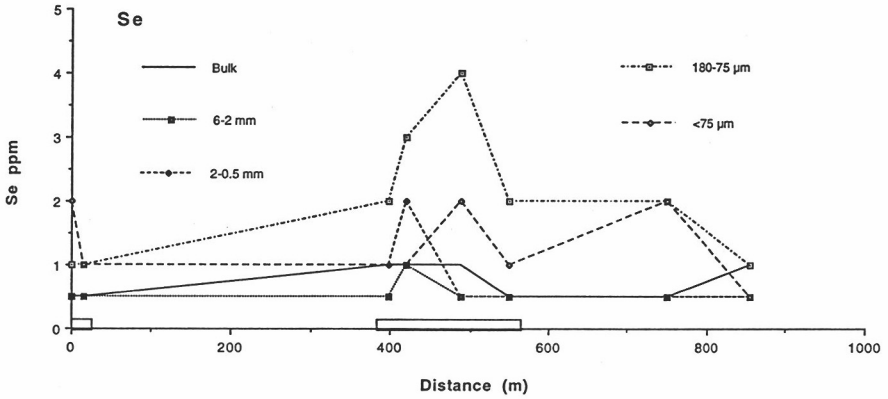
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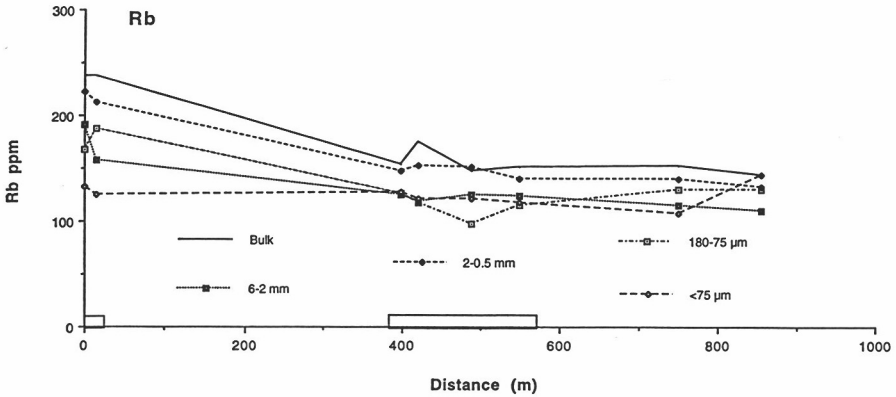
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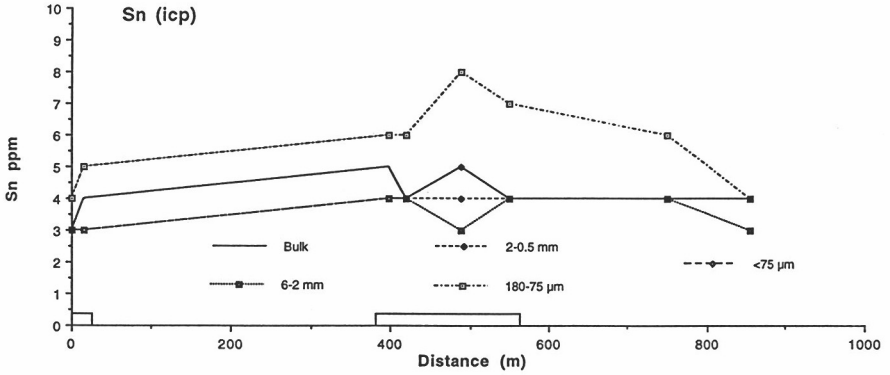
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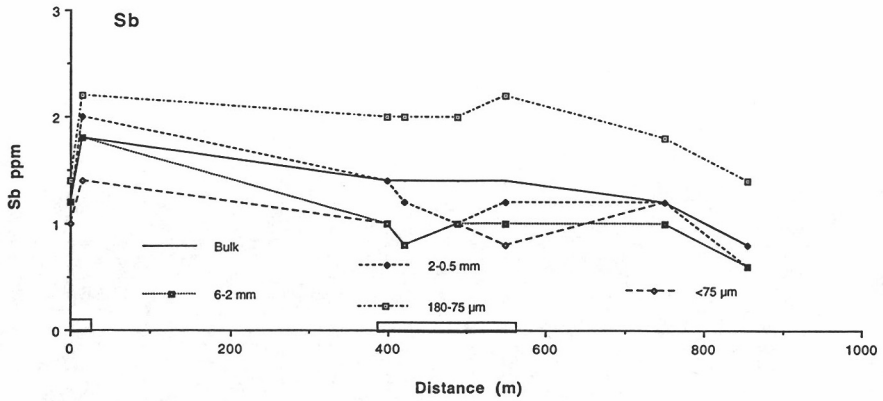
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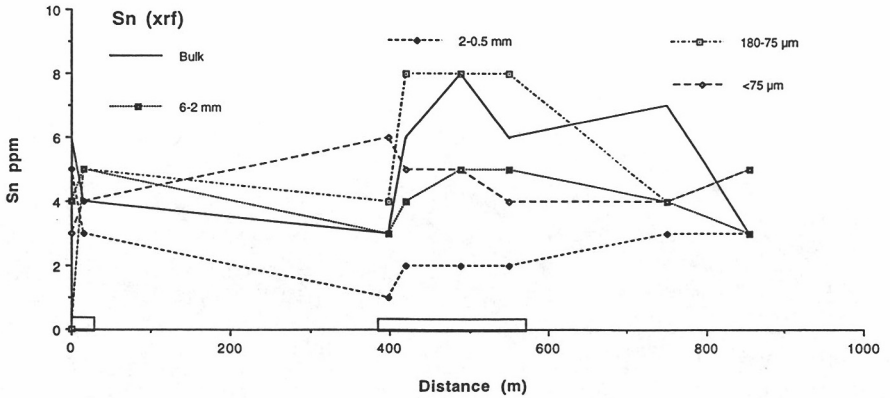
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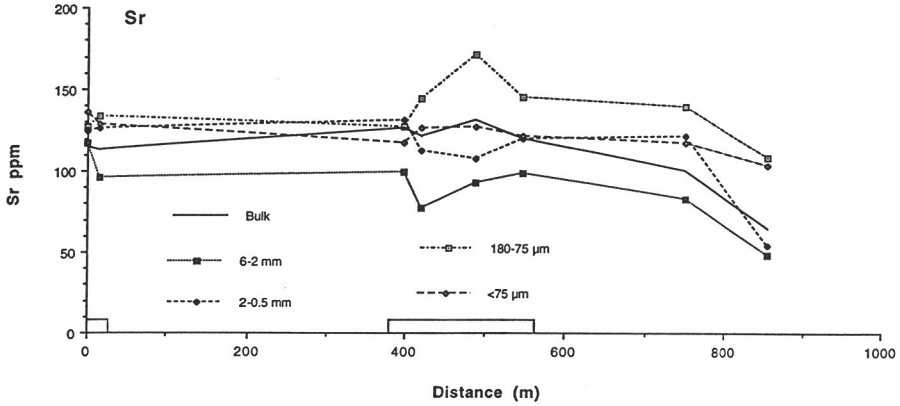
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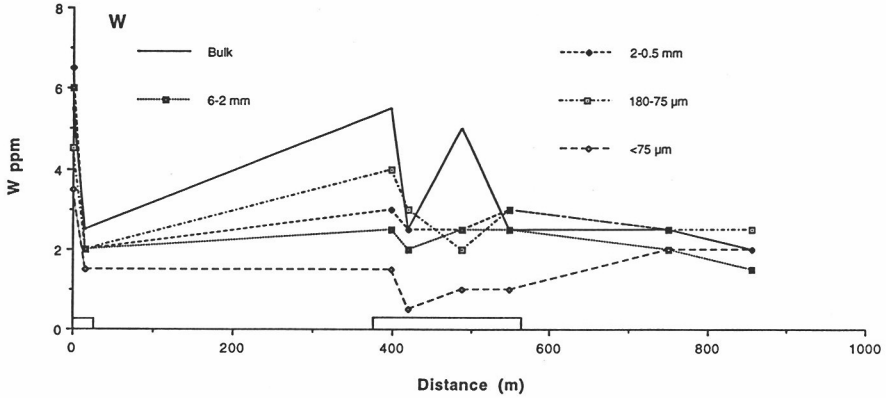
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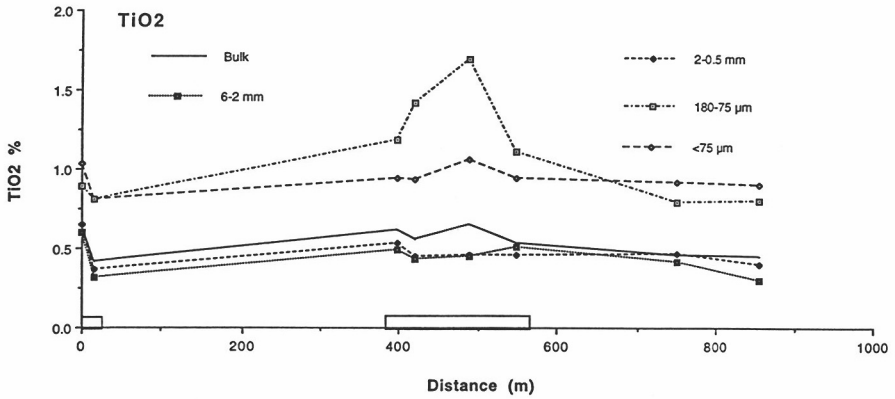
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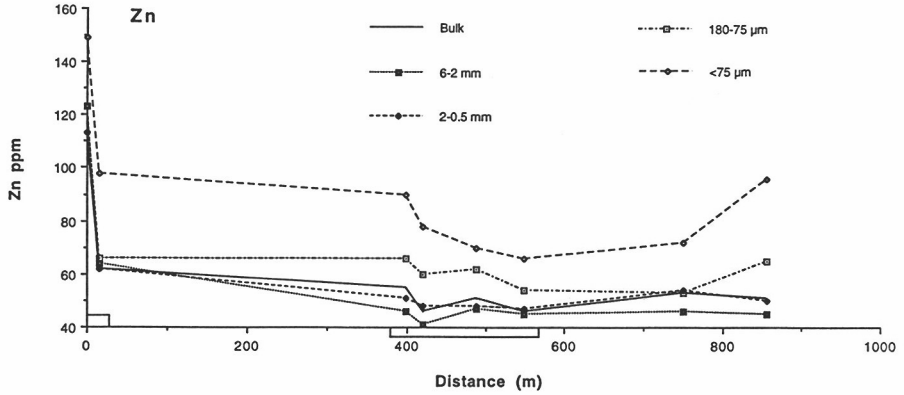
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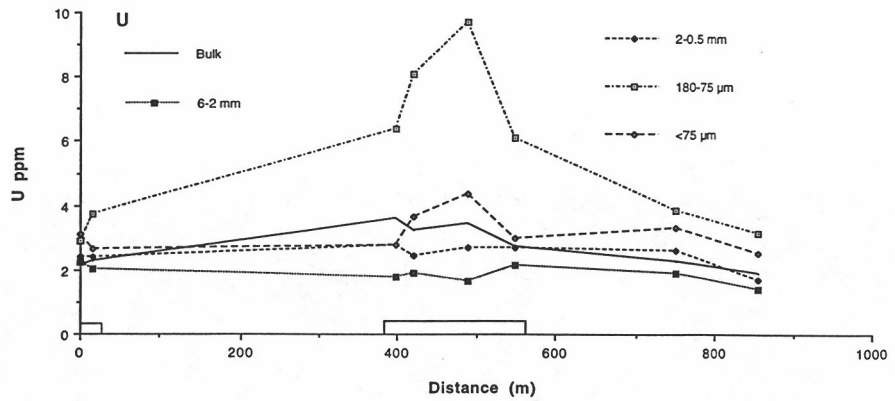
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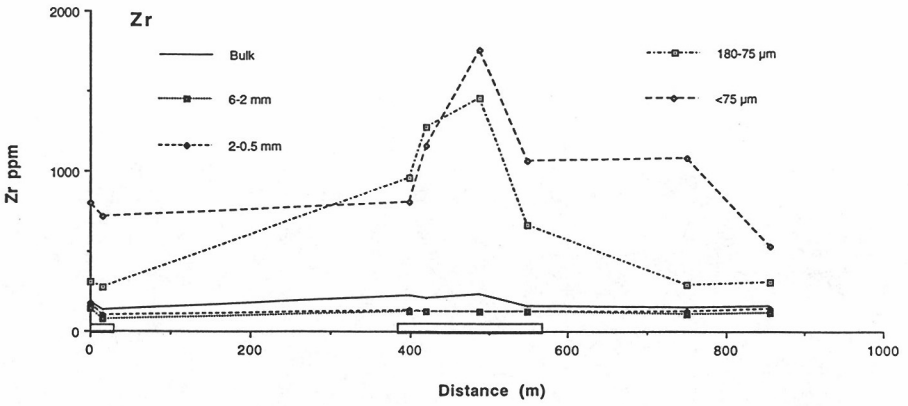
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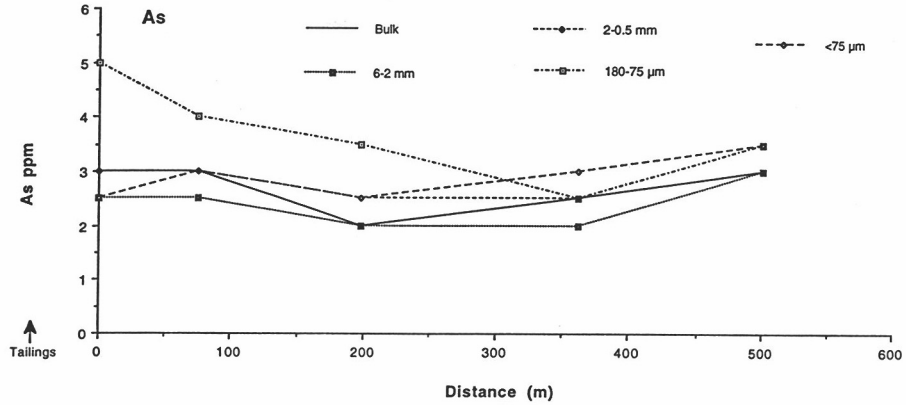
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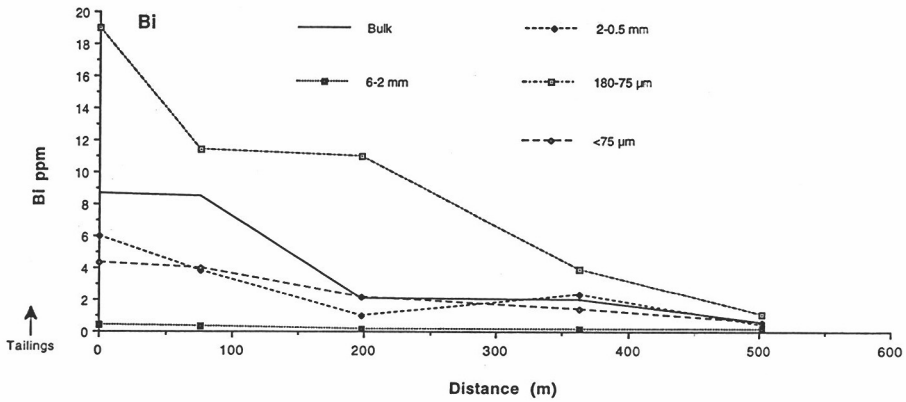
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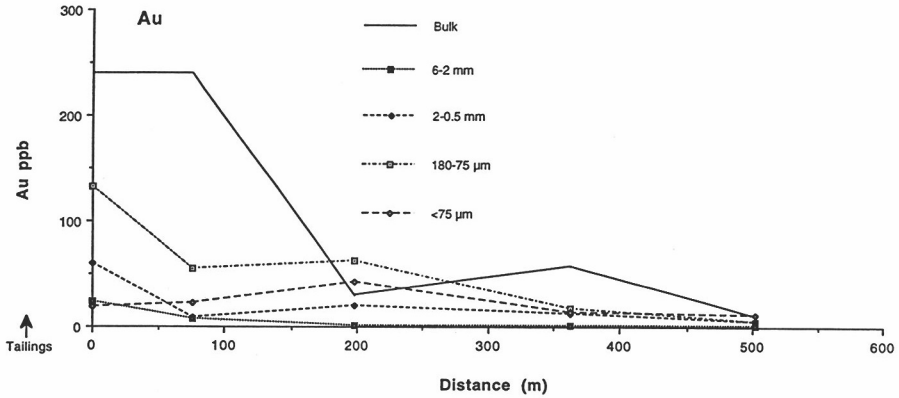
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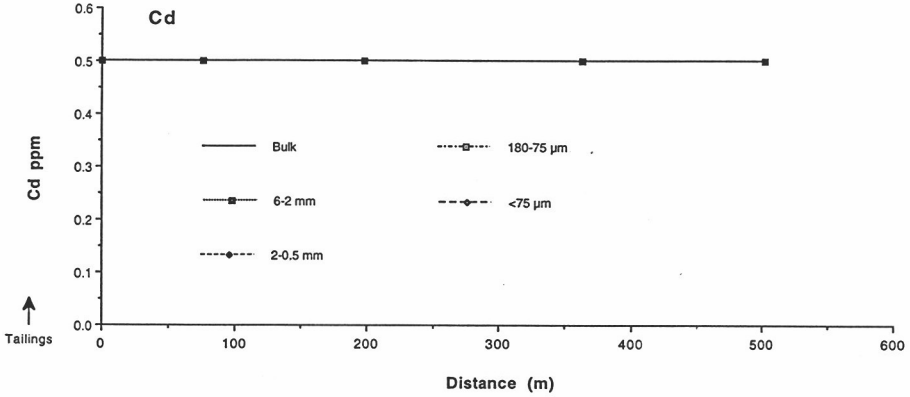
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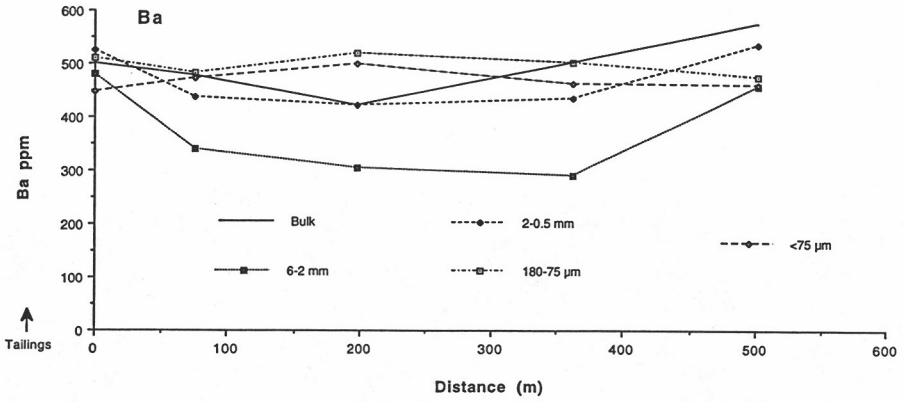
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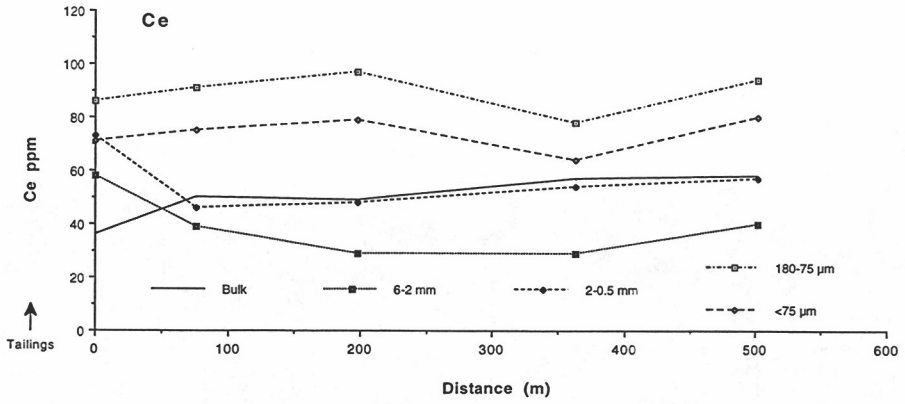
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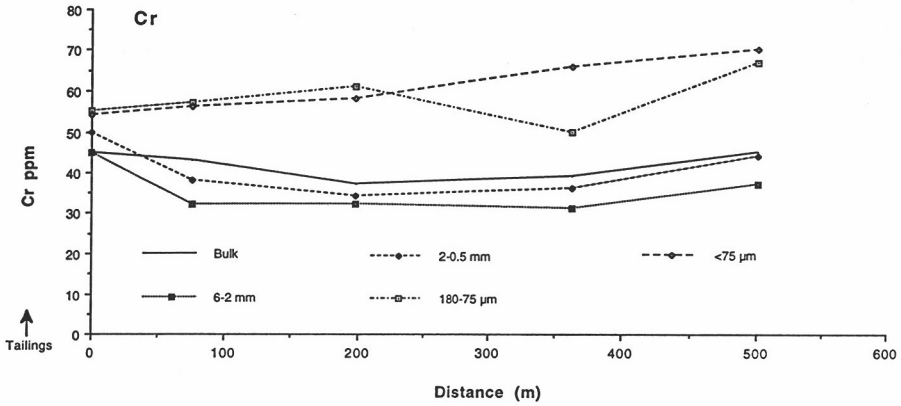
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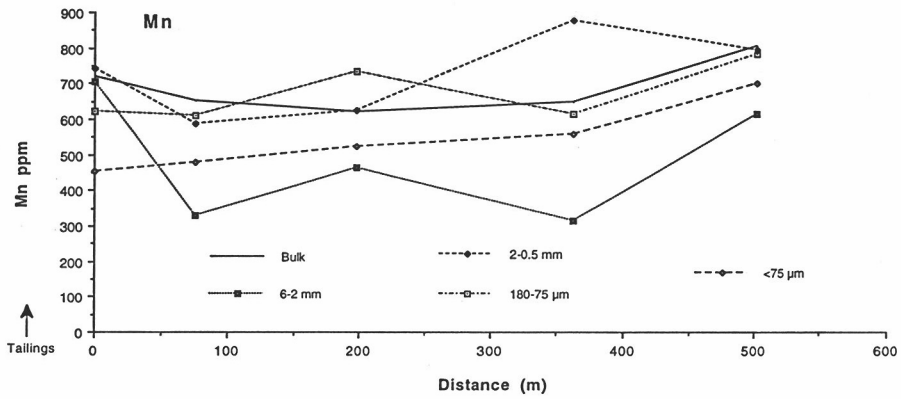
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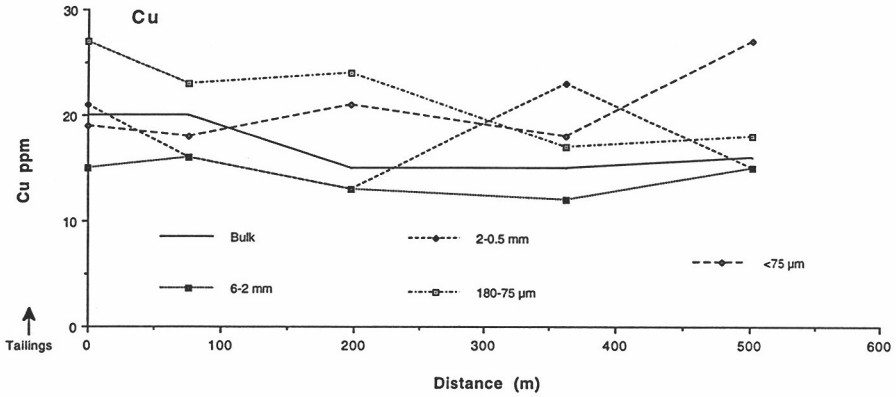
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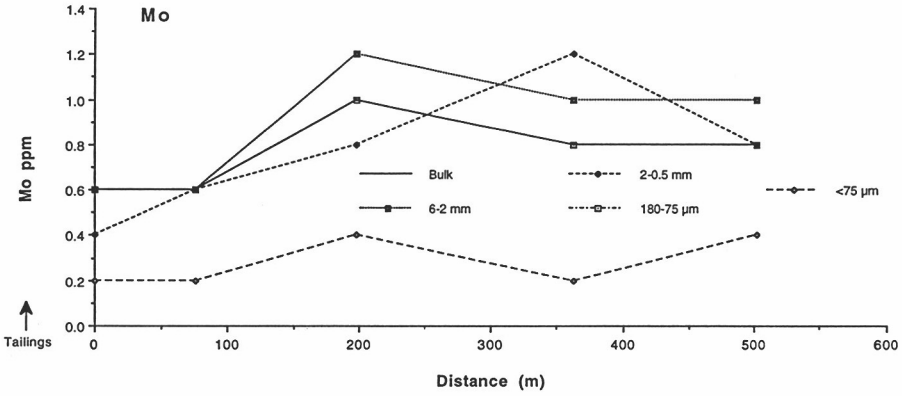
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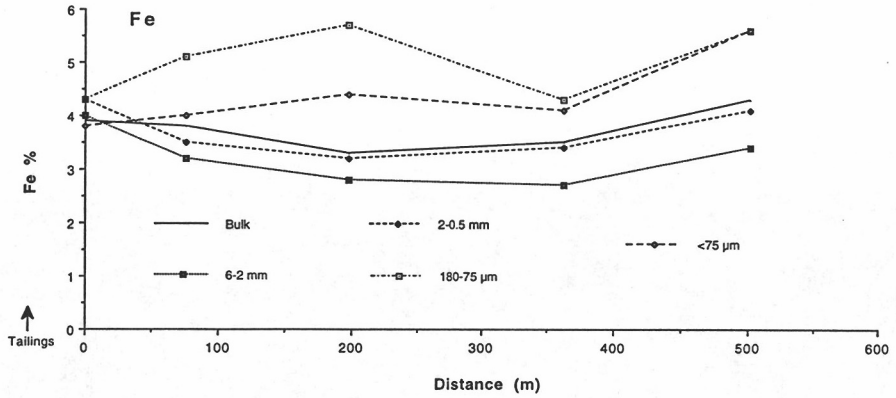
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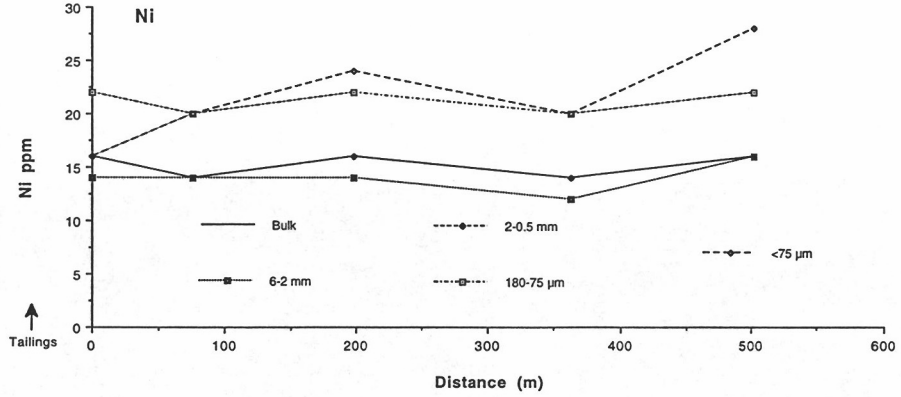
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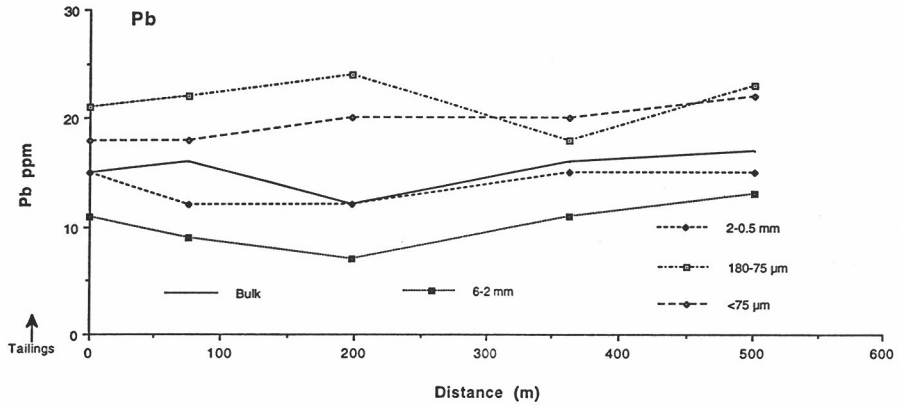
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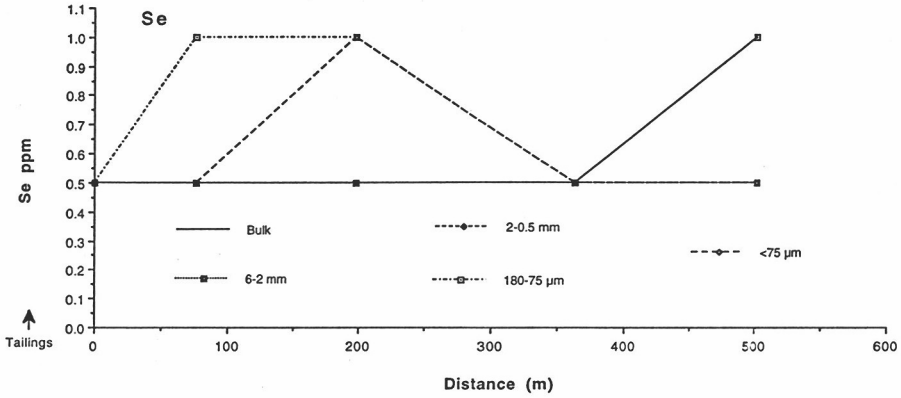
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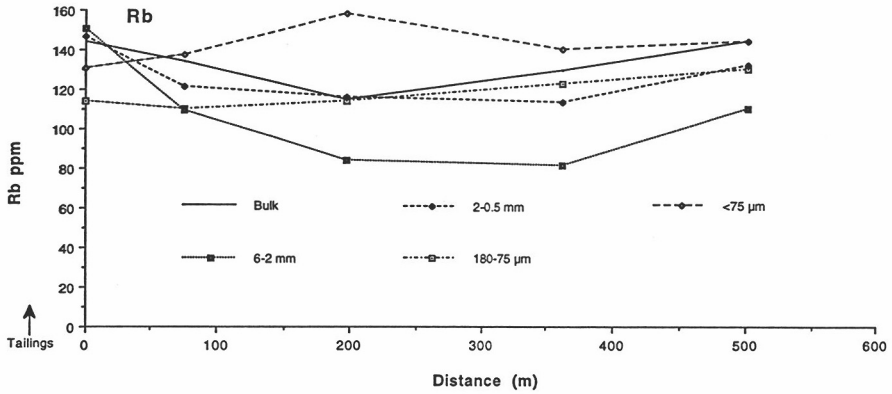
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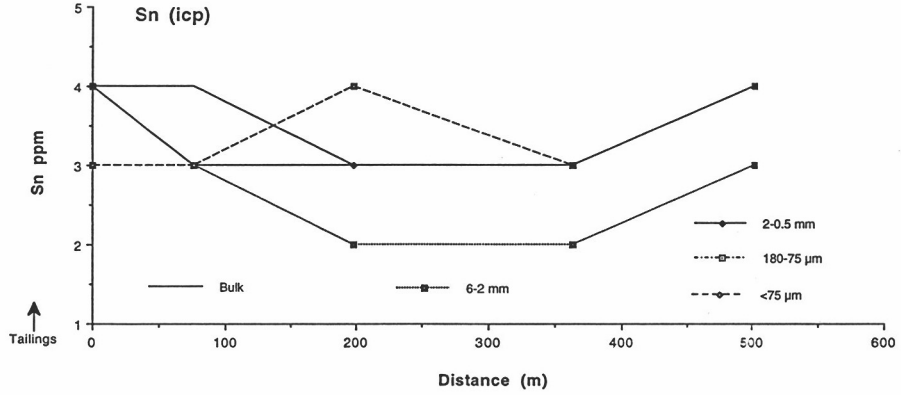
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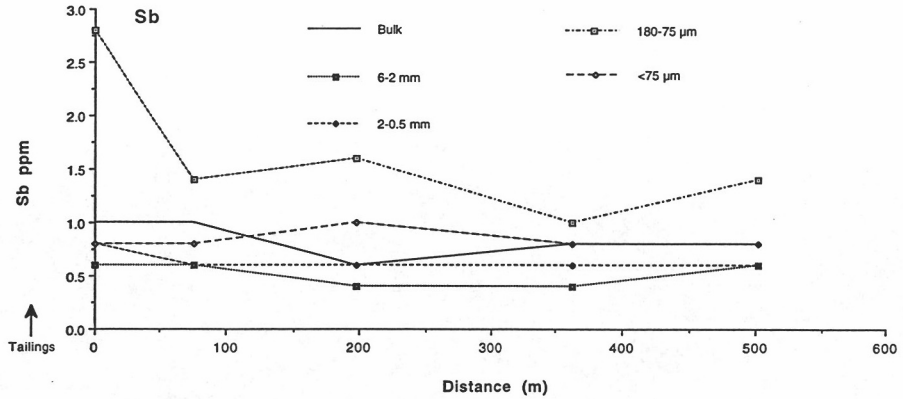
Tailings
Distance (m)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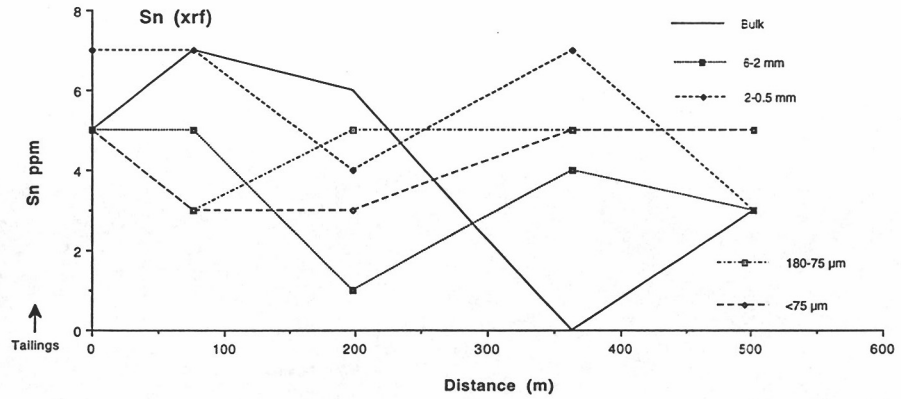
Distance (m)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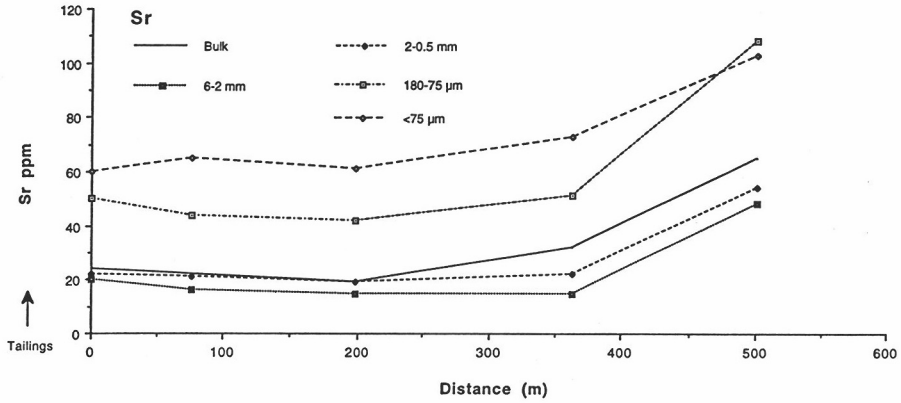
Tailings
Distance (m)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180-75 µm
<75 µm
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Tailings
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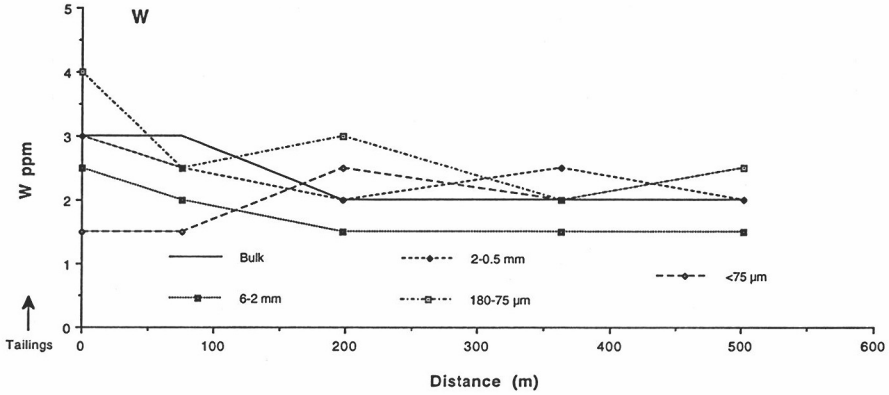
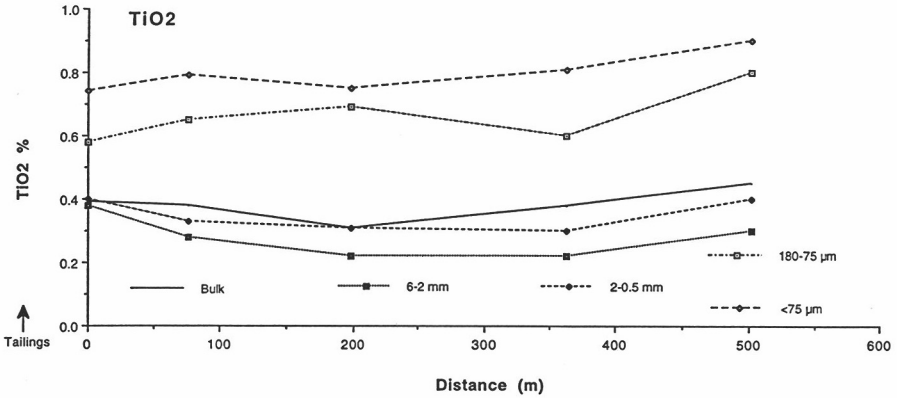
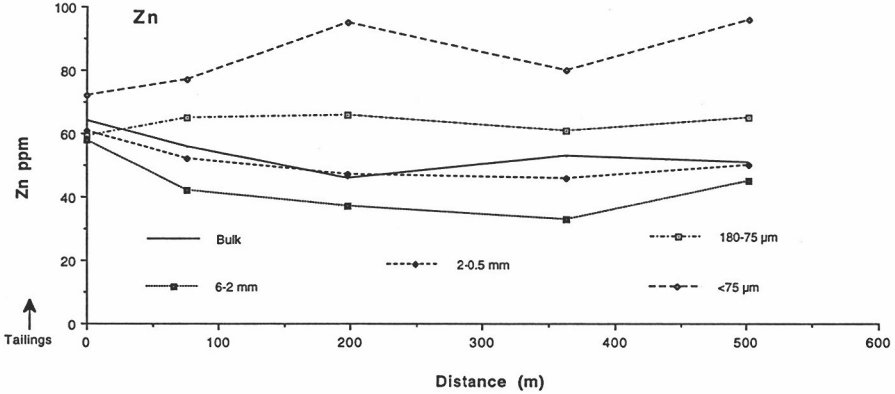
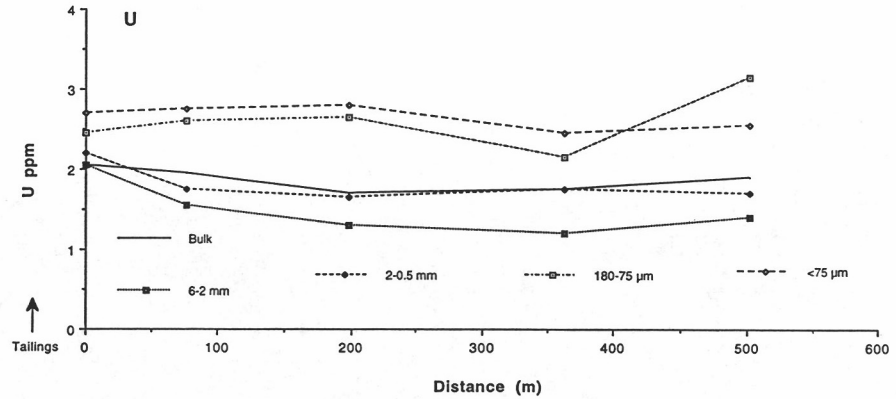
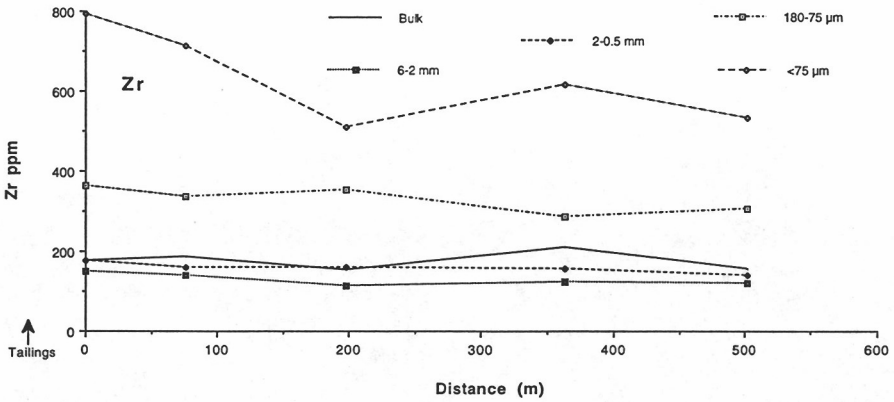
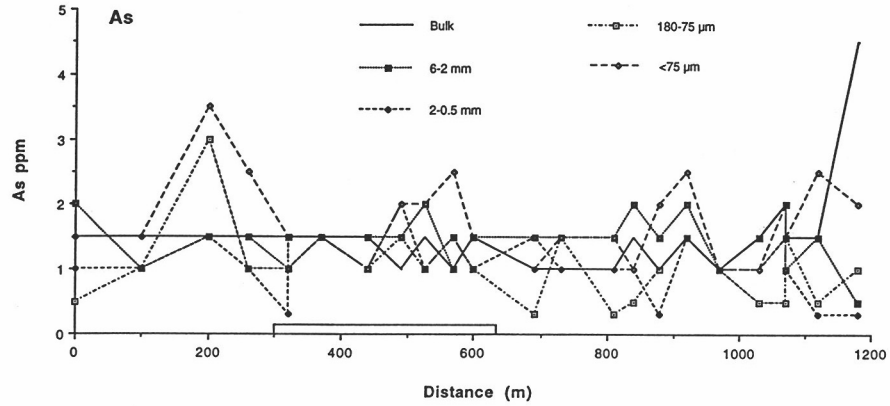

W
W ppm
Bulk
2-0.5 mm
<75 µm
6-2 mm
180-75 µm
Tailings
Distance (m)

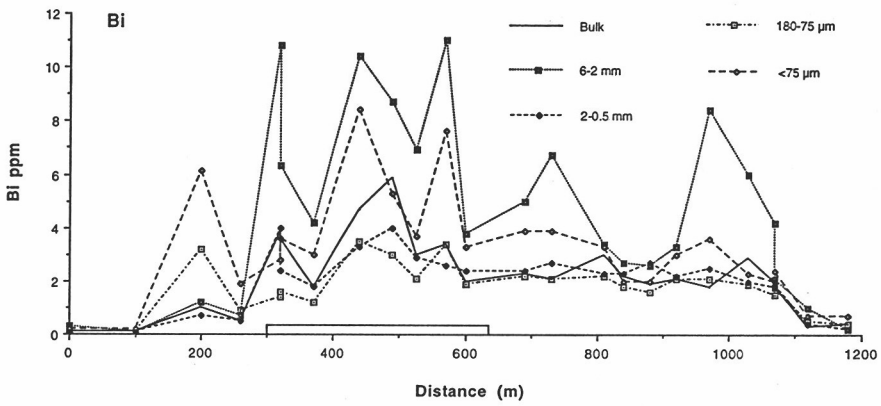

TiO2
TiO2 %
180-75 µm
Bulk
6-2 mm
2-0.5 mm
<75 µm
Tailings
Distance (m)

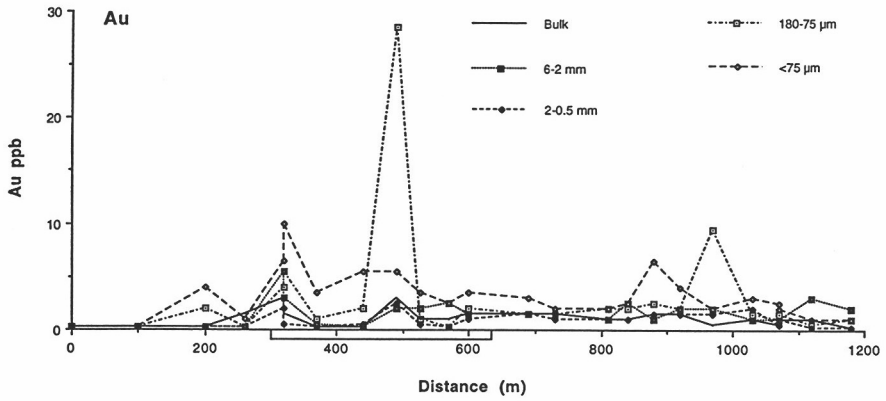

Zn
Zn ppm
Bulk
180-75 µm
2-0.5 mm
6-2 mm
<75 µm
Tailings
Distance (m)

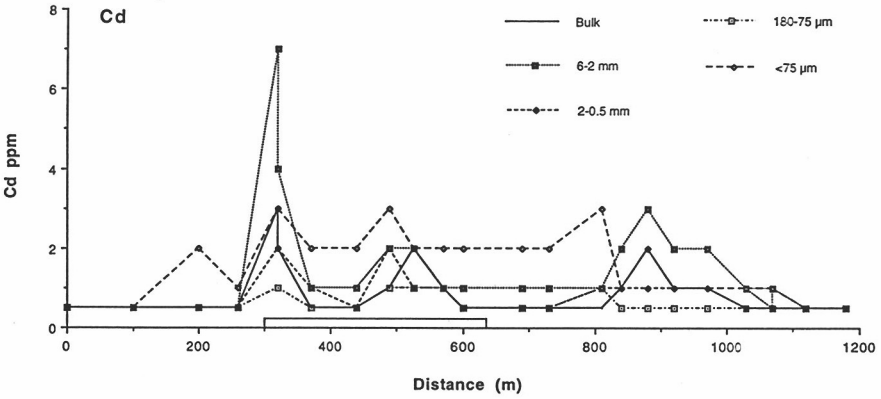

U
U ppm
Bulk
2-0.5 mm
180-75 µm
<75 µm
6-2 mm
Tailings
Distance (m)

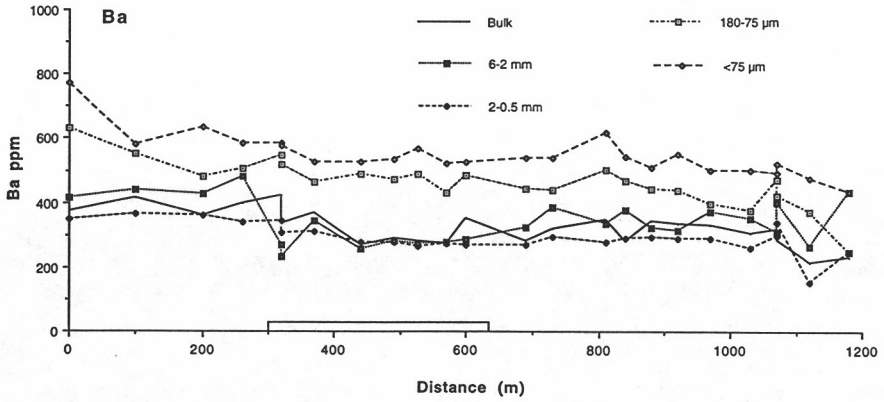

Zr
Bulk
180-75 µm
2-0.5 mm
6-2 mm
<75 µm
Zr ppm
Tailings
Distance (m)

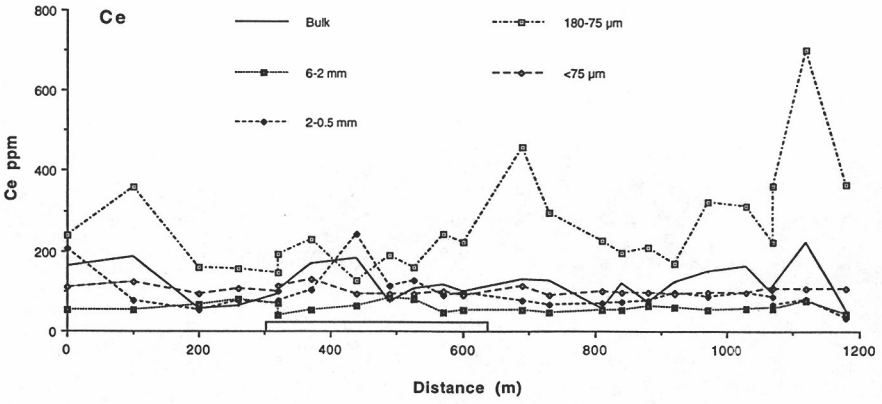

As
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm
As ppm
Distance (m)

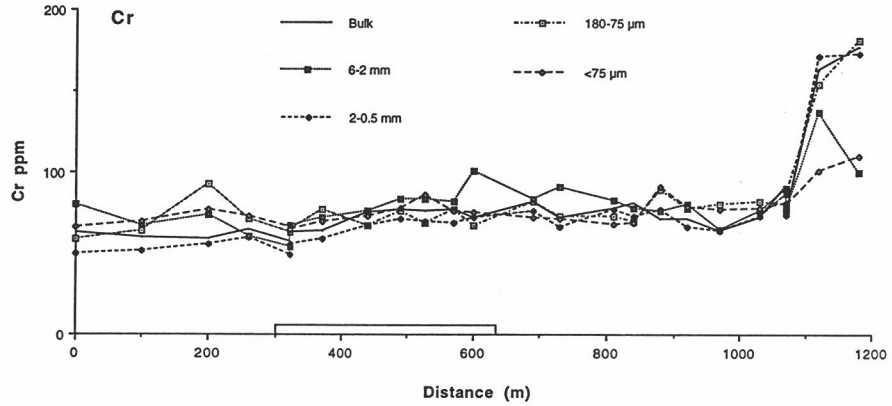

Bi
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm
Bi ppm
Distance (m)

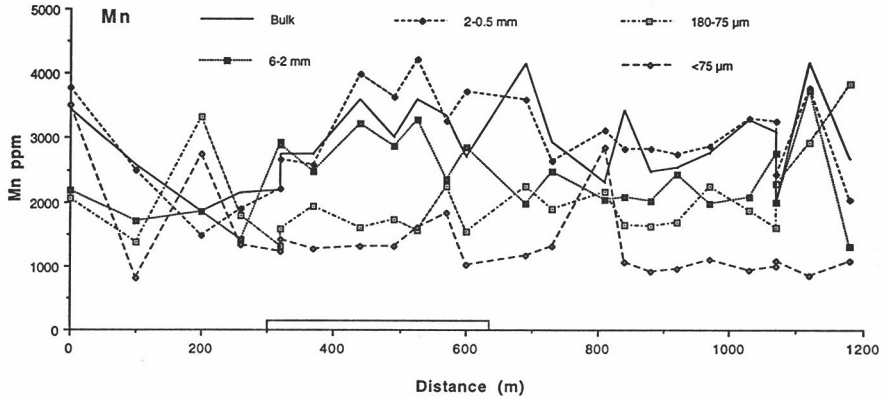

Au
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm
Au ppb
Distance (m)

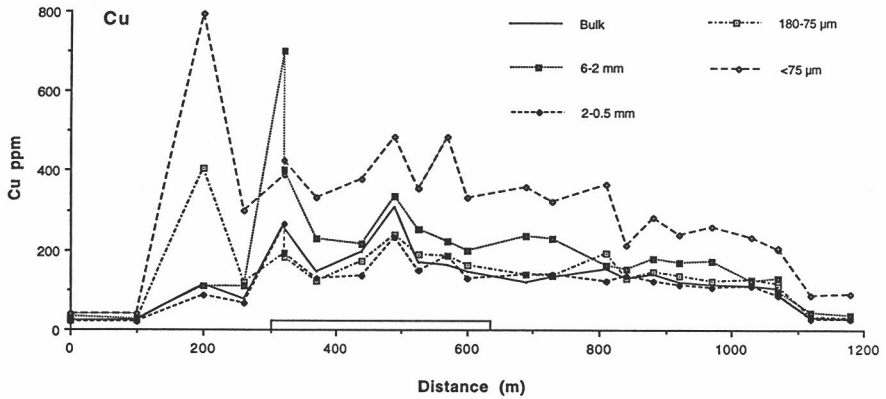

Cd
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm
Cd ppm
Distance (m)

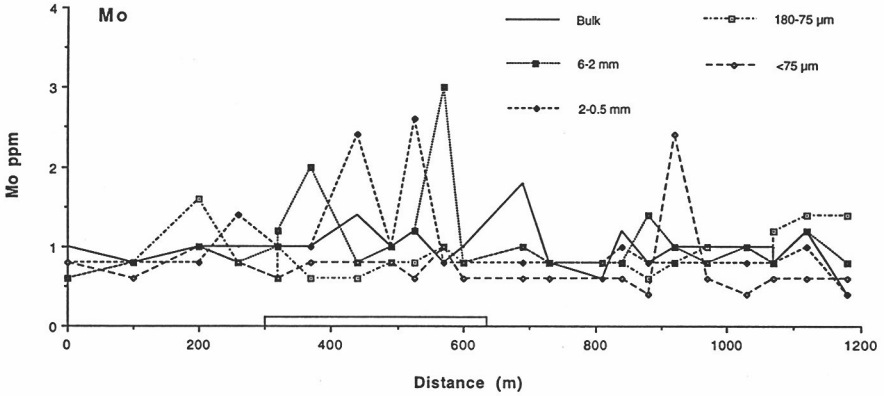

Ba
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm
Ba ppm
Distance (m)

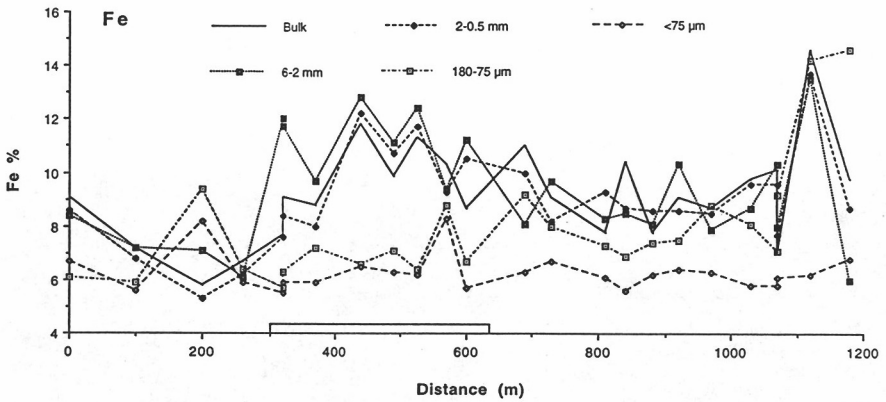

Ce
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm
Ce ppm
Distance (m)

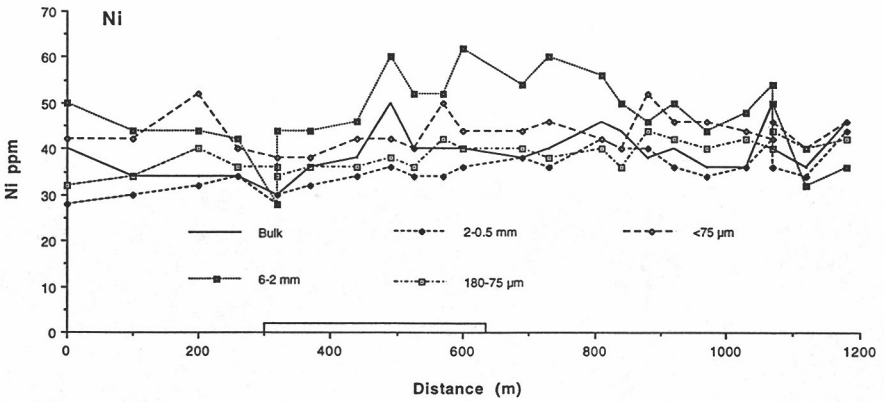

Cr
Bulk
6-2 mm
2-0.5 mm
180-75 µm
<75 µm
Cr ppm
Distance (m)

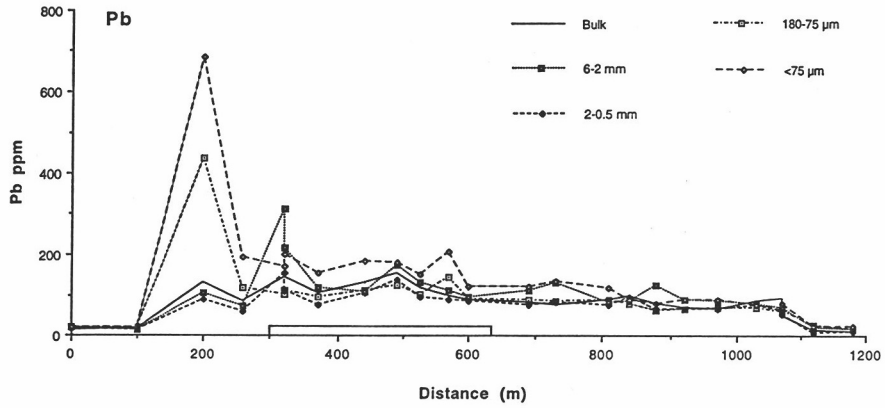

Mn
Bulk
6-2 mm
2-0.5 mm
180-75 µm
<75 µm
Mn ppm
Distance (m)

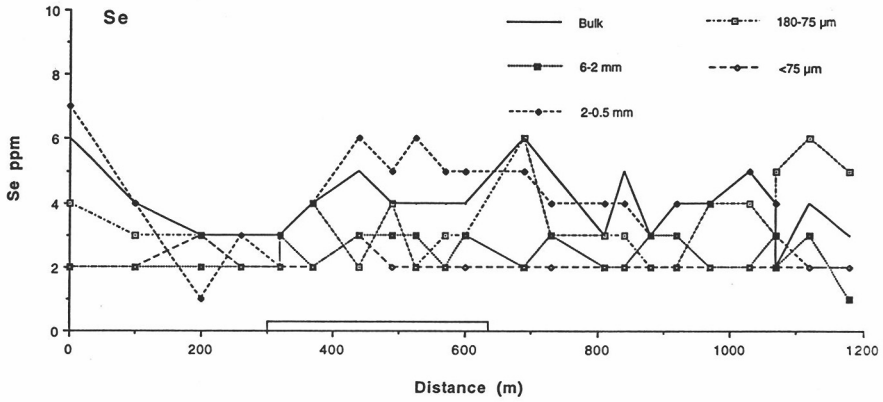

Cu
Bulk
6-2 mm
2-0.5 mm
180-75 µm
<75 µm
Cu ppm
Distance (m)

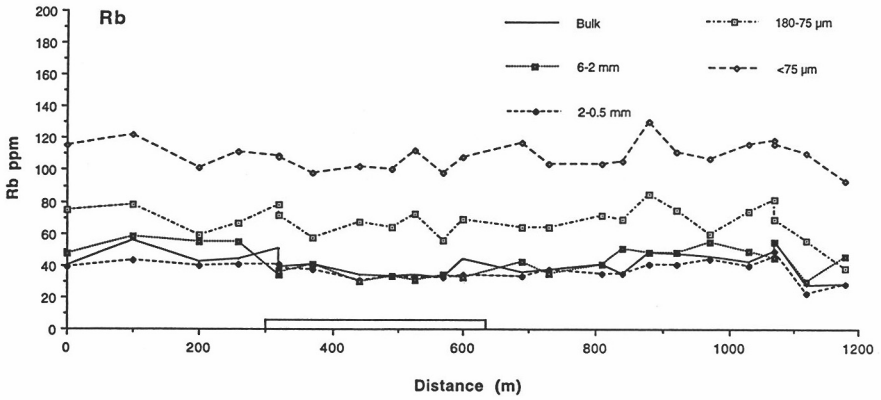

Mo
Bulk
6-2 mm
2-0.5 mm
180-75 µm
<75 µm
Mo ppm
Distance (m)

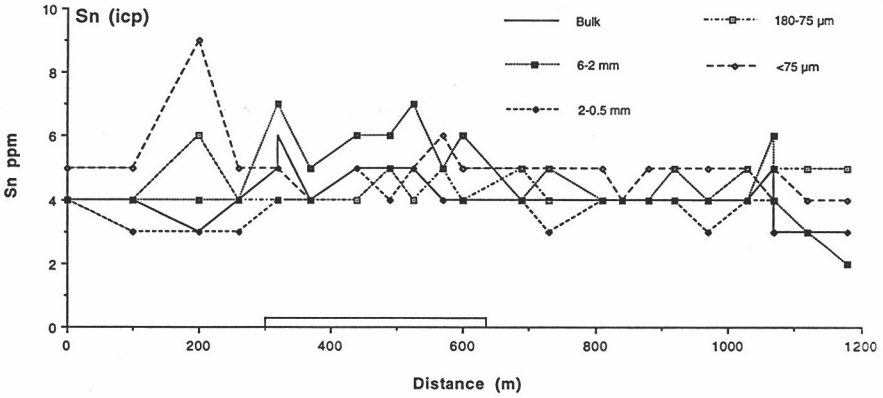

Fe
Bulk
6-2 mm
2-0.5 mm
180-75 µm
<75 µm
Fe %
Distance (m)

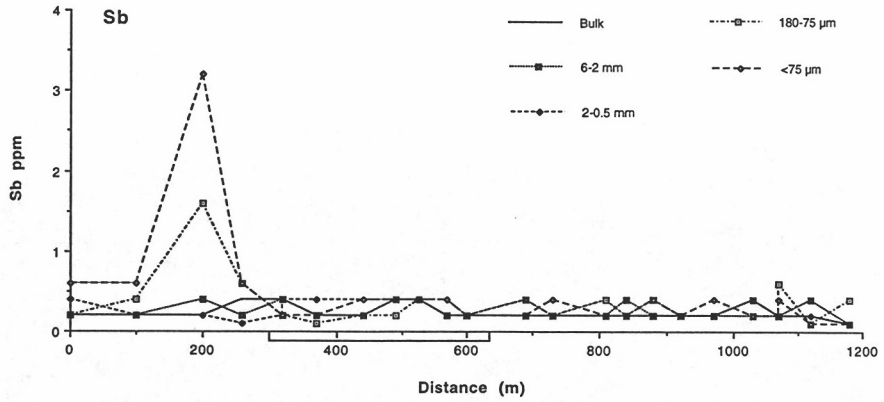

Ni
Bulk
6-2 mm
2-0.5 mm
180-75 µm
<75 µm
Ni ppm
Distance (m)

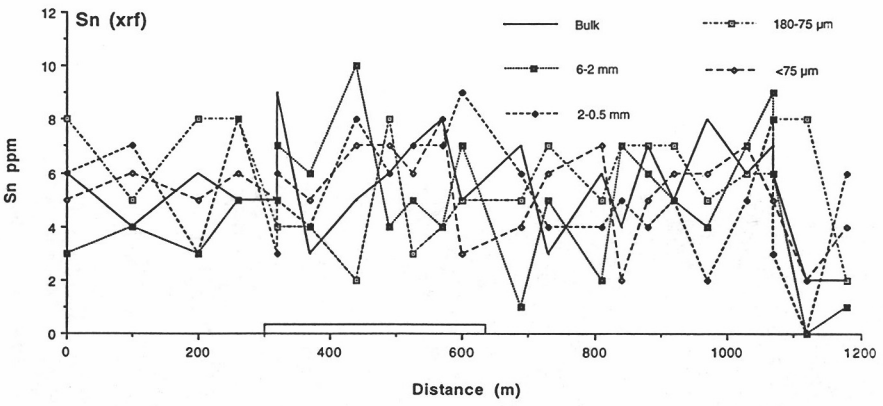

Pb
Pb ppm
Distance (m)
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm

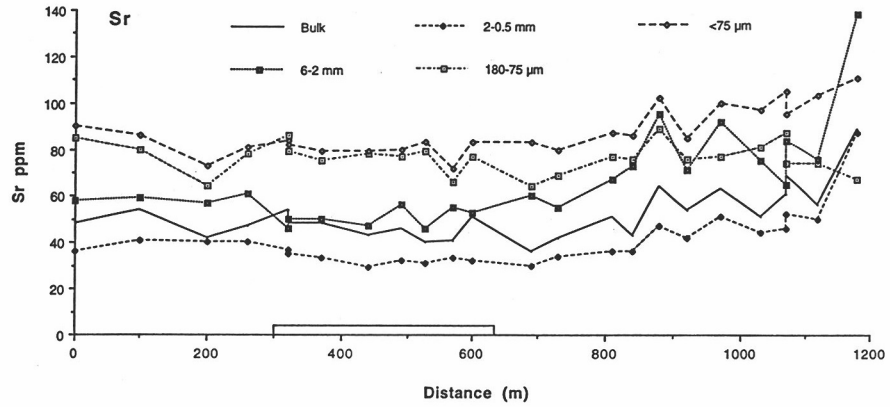

Se
Se ppm
Distance (m)
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm

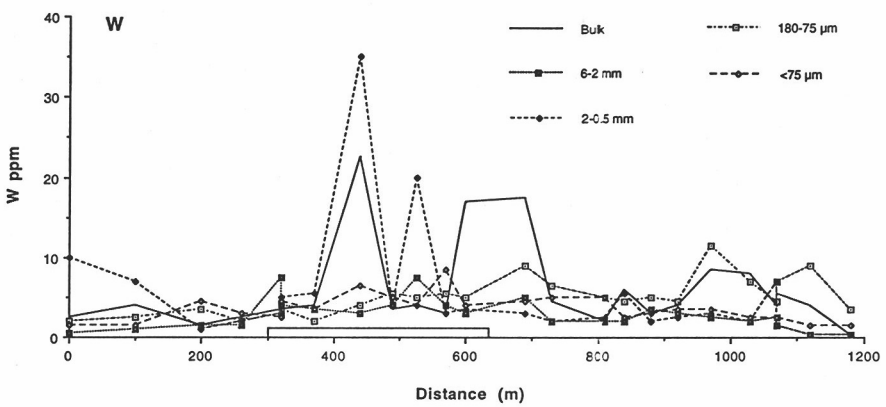

Rb
Rb ppm
Distance (m)
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm

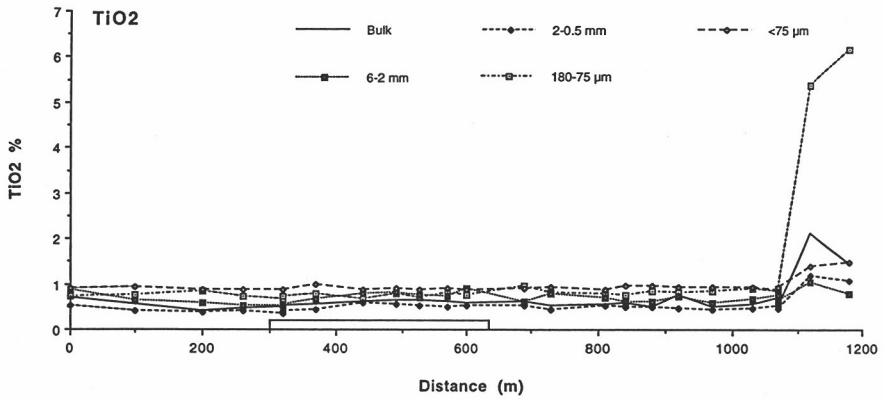

Sn (icp)
Sn ppm
Distance (m)
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm

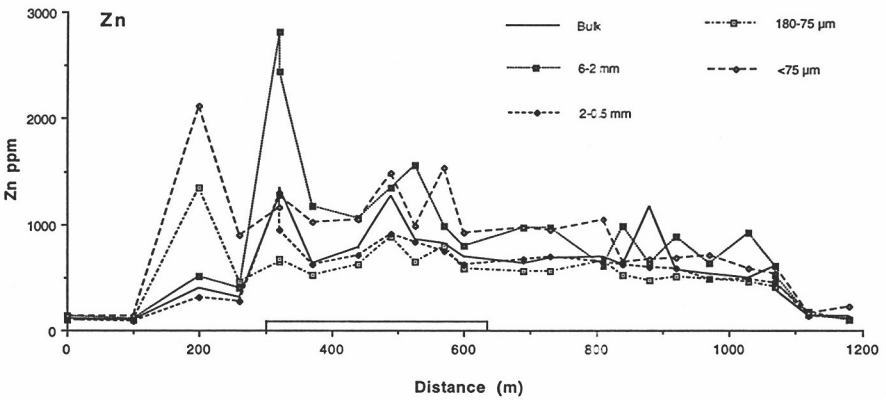

Sb
Sb ppm
Distance (m)
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm

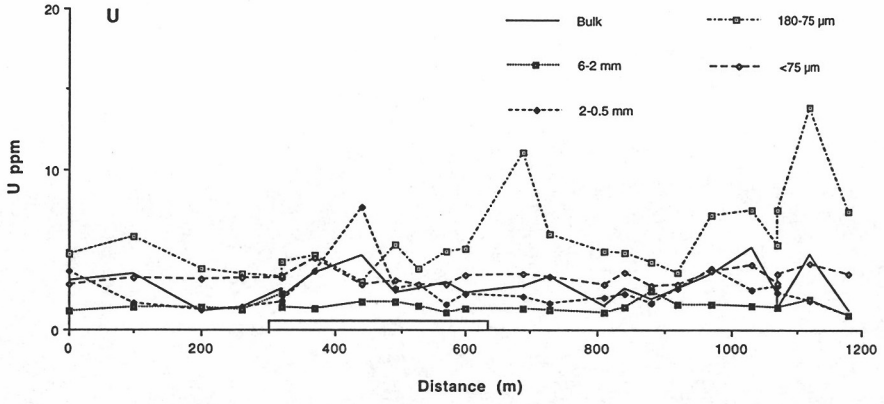

Sn (xrf)
Sn ppm
Distance (m)
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm

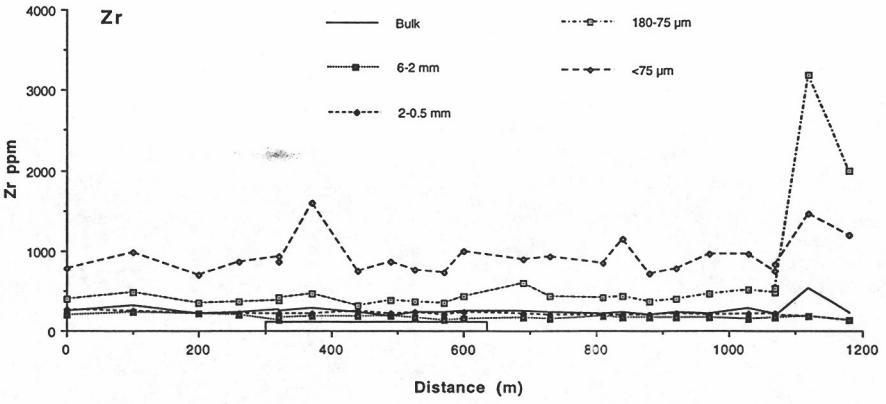

Sr
Bulk
2-0.5 mm
<75 µm
6-2 mm
180-75 µm
Sr ppm
Distance (m)


W
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm
W ppm
Distance (m)


TiO2
Bulk
2-0.5 mm
<75 µm
6-2 mm
180-75 µm
TiO2 %
Distance (m)


Zn
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm
Zn ppm
Distance (m)


U
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm
U ppm
Distance (m)


Zr
Bulk
180-75 µm
6-2 mm
<75 µm
2-0.5 mm
Zr ppm
Distance (m)

APPENDIX 6

CREEK LITHOLOGIES

Details of gravel- and boulder-sized clasts in creek bed at each sample site.

Appendix 6.A Winnecke

Appendix 6B Oonagalabi

WINNECKE CREEK LITHOLOGIES

Sample	Easting	Northing	Creek width (m)	Heavitree Quartzite	Quartz-veined Heavitree Quartzite	Muscovite-chlorite-bearing sandstone/flagstone	Chert	Ferruginized and silicifed Arunta metamorphic rock	Mafic amphibolite and chlorite-quartz-feldspar-amphibole schist	Quartz-muscovite schist	Quartz vein	Quartz vein with boxworks after pyrite and/or ferruginous quartz vein	Ironstone'	Chlorite-quartz schist	Chlorite-muscovite-quartz schist	Marble/calc-silicate rock	Quartz-tourmaline rock	Saprolite after mafic rock	Biotite schist
WO228	433455	7419243	10	••••	••				••		••		••						
WO229	433143	7419284	10	••••				••	•	•	••		••						
WO230	433580	7419416	10	••••						••	••		••	••					
WO231	433643	7419422	5	••••						••	••		•		••				
WO232	433631	7419466	10	••••							••		•	••	••				
WO233	433561	7419535	10	••••						••	•	•	•	••					
WO234	433552	7419636	10	••••						••	••		•	••					
WO235	433513	7419630	2.5	••••							••				••	••	•	••	
WO236	433590	7419684	20	••••							••			••	••				
WO237	433328	7419188	10	••••							••		••	••	••				••
WO238	433404	7419179	10	••••						••	••		•	••					
WO239	433272	7419207	5	••••			••				••		•	••					
WO240	433255	7419076	0.5	••••						••	••					•			
WO241	433245	7419089	1	••••	•		••			••	••								
WO242	433144	7419188	5	••••			••		••	••	••								
WO243	433098	7419148	4	••••			••				••			••					
WO244	433098	7419148	4	••••			••				••			••					
WO245	433120	7419094	5	••••			••		••		••	•	•	••					
WO246	433088	7419054	10	••••			••		••		••								
WO247	433009	7419026	25	••••	••		••				••								
WO248	432944	7418975	30	••••		••	••				••								
WO249	432943	7418839	7.5	••••			••				••								
WO250	432891	7418837	10	••••			•				••								
WO251	432933	7419201	0.5								••							••••	
WO252	432910	7419218	0.5								••		•			••••			
WO253	433247	7419459	2								••			••••		•••			
WO254	433296	7419534	2.5								••			••••		•••			•••
WO255	433328	7419584	2.5						•		••			••••		•••			•
WO256	433460	7419636	2.5						•		••			••••	•••				•
WO257	433486	7419068	7.5	••••	••		••	••			••	•	•		••				
WO258	433442	7419019	5	••••			••	••		••	••	•	•		••				
WO259	433420	7418925	5	••••			••				••	•	•		••				
WO260	433345	7418893	5	••••			••			••	••	•	•						
WO261	433342	7418776	5	••••			••				••	•	•						
WO262	433260	7418695	3	••••			••				••	•	•	•••					
WO263	433227	7418577	3	••••					••		••		•						
WO264	433227	7418577	3	••••					••		••		•						
WO265	433113	7418497	2.5	••••			••			••	••			••					
WO266	434058	7419067	10	••••			••			•	••			••					
WO267	434043	7419197	7.5	••••			••	•	•	••	••			••					
WO268	434043	7419197	7.5	••••			••	•	•	••	••			••					
WO269	434017	7419312	10	••••			••	•	•	••	••	•		••					
WO270	434074	7419453	15	••••			••	••		••	••								
WO271	433932	7419411	10	••••			•	•	••		••								
WO272	433828	7419475	7.5	••••			••		••	••	••								
WO273	433829	7419582	5	••••		•	••		••	••	••								
WO274	433690	7419641	5	••••	•			••						••					

Relative abundances

••••	abundant
•••	common
••	minor
•	rare

OONAGALABI
CREEK LITHOLOGIES

Sample	Easting	Northing	Creek width (m)	Quartz-feldspar-biotite gneiss	Garnet-quartz-feldspar-biotite gneiss	Mafic amphibolite and gneiss	Quartz vein	Magnesian-amphibole schist	Garnet quartzite	Magnetite pyroxenite	Magnesiohornblende rock or schist	Quartz-feldspar-muscovite pegmatite	Biotite-muscovite schist	Marble	Forsterite marble	Diopside calc-silicate or marble	Calc-silicate rock undiff.	Garnetiferous mafic gneiss	Garnet-biotite-quartz-feldspar schist	Malachite staining	Calcrete	Ironstone'	Iron oxide staining	Garnet sand
WO201	486077	7442612	2	++++	+	++++	+		++												+			
WO202	485895	7442381	7.5	++++		++++		++																
WO203	485791	7442487	2.5	++++		++++		++																
WO204	485695	7442530	2.5	++++		++++		++	+++															
WO205	485809	7442704	7.5	++++		++++		++		+														
WO206	484997	7441404	5	++++		++++						+												
WO207	485010	7441500	5	++++	+	++++																		
WO208	484950	7441744	5	++++		++++		+			+													
WO209	484891	7441767	5	++++		++++		++			+													
WO210	484887	7441788	5	++		++++		++																
WO211	484887	7441788	5	++		++++		++																
WO212	484886	7441848	10	+++		++++	+	++																
WO213	484891	7441903	3	+++		++++		++																
WO214	484877	7441944	2	+++		++++		++																
WO215	484820	7441970	5	++		++++	+	++																
WO216	484771	7441943	5	++		++++		++																
WO217	484781	7441996	10	+++		++++		++																
WO218	484775	7442056	12.5	++++		++++	+	++																
WO219	484778	7442086	15	++++		++++		++	+		++						+							
WO220	484778	7442135	20	++++	+	++++	+	++																
WO221	484748	7442153	10	++++		++++	+	++																
WO222	484741	7442167	5	++++	+	++++		++																
WO223	484758	7442209	5	++++	+	++++		++																
WO224	484727	7442287	10	++++	+	++++		++																
WO225	484664	7442273	10	++++		++++		++																
WO226	484689	7442323	10	++++		++++		++																
WO227	484689	7442323	10	++++	+	++++		++																
WO275	485287	7442123	0.5	++++		++++																		
WO276	485238	7442100	1	++++		++++		++																
WO277	485277	7442096	1.5	++++		++++		++																
WO278	485343	7442187	0.75	++++		++++		+++																
WO279	485242	7442128	1	++++		++++	+	+++																
WO280	485164	7442166	1	++		++++		+++																
WO281	485084	7442194	1	++++		++++		+++																
WO282	485084	7442194	1	++++		++++		+++																
WO283	485048	7442297	2.5	++		++++		++																
WO284	484941	7442504	10	++++		++++		++																
WO285	484969	7442519	5	++++		++++	+	++																
WO286	484940	7442420	2.5	++++		++++	+	++								+								
WO287	485751	7442748	10	++++		++++	+	++										+						
WO288	485296	7442665	10	++++		++++	+	++																
WO289	484624	7442391	15	++++	++	++++	+	++																++
WO290	484551	7442265	15	++++	+++	++++	+	++																+++

Relative abundances

++++ abundant
+++ common
++ minor
+ rare

APPENDIX 7

STATISTICAL SUMMARIES

Geochemical data for each fraction
C.V Coefficient of variation - Standard deviation / Mean

Appendix 7.A	Winnecke
Appendix 5B	Oonagalabi

STATISTICAL SUMMARY
WINNECKE ORIENTATION SURVEY

bulk -6mm fraction

Element	AU	AS	BA	BI	CD	CE	CR	CU	FE	MN	MO	NI	PB	RB	SB	SE	SN	SN_XRF	SR	TIO2	U	W	ZN	ZR
N of cases	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Minimum	-0.5	-0.5	323	0.2	-1	35	14	9	2.2	195	0.6	8	7	71	0.4	-1	2	-5	13	0.22	1.2	1	22	134
Maximum	1530	7.5	1650	8.7	1	132	69	29	8.8	14567	2	34	76	237	1.8	1	46	71	131	0.68	3.6	5.5	127	235
Range	1530.5	8	1327	8.5	2	97	55	20	6.6	14372	1.4	26	69	166	1.4	2	44	76	118	0.46	2.4	4.5	105	101
Median	1.25	3	455.5	0.4	-1	53.5	37	15	3.95	725	0.9	16	15	116	0.6	-1	3.5	-5	24	0.375	2.1	2	48	181.5
Mean	53.13	3.33	505.64	1.07	-0.96	59.89	37.30	15.32	4.15	1081.34	0.91	15.86	17.25	122.84	0.72	-0.59	4.41	1.07	41.66	0.39	2.10	2.27	49.16	183.80
Standard Dev	233.60	1.73	206.73	2.03	0.30	21.78	13.30	3.73	1.34	2120.85	0.23	4.96	10.56	36.36	0.36	0.82	6.47	12.13	35.85	0.12	0.58	1.03	19.33	22.90
Variance	54570.89	3.00	42738.84	4.10	0.09	474.15	176.86	13.94	1.79	4497995.30	0.05	24.63	111.40	1322.37	0.13	0.67	41.88	147.14	1285.11	0.02	0.34	1.05	373.81	524.54
C.V.	4.397	0.52	0.409	1.892	-0.316	0.364	0.357	0.244	0.323	1.961	0.255	0.313	0.612	0.296	0.493	-1.381	1.468	11.356	0.861	0.315	0.277	0.451	0.393	0.125

6-2 mm fraction

Element	AU	AS	BA	BI	CD	CE	CR	CU	FE	MN	MO	NI	PB	RB	SB	SE	SN	SN_XRF	SR	TIO2	U	W	ZN	ZR
N of cases	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Minimum	-0.5	-0.5	204	0.1	-1	23	11	8	1.6	82	0.6	6	4	49	0.4	-1	2	-5	10	0.14	0.85	1	13	75
Maximum	172	7	2429	1.1	2	75	62	32	6.3	32137	1.2	32	45	191	1.8	2	6	11	117	0.6	2.55	6	163	190
Range	172.5	7.5	2225	1	3	52	51	24	4.7	32055	0.6	26	41	142	1.4	3	4	16	107	0.46	1.7	5	150	115
Median	1	2.5	368.5	0.2	-1	39	30	13	3.4	613	1	14	11	93	0.4	-1	3	-5	16	0.25	1.625	2	39	126.5
Mean	5.97	2.85	421.46	0.25	-0.93	40.14	31.57	13.25	3.46	1429.61	0.91	14.18	12.11	97.02	0.57	-0.84	3.00	-0.66	32.39	0.28	1.62	1.98	42.18	130.48
Standard Dev	25.93	1.62	329.13	0.17	0.45	10.43	12.65	3.92	1.16	4804.36	0.19	5.23	7.11	34.58	0.29	0.61	0.94	5.65	32.51	0.11	0.46	1.00	25.94	19.14
Variance	672.51	2.64	108323.09	0.03	0.21	108.77	159.97	15.36	1.34	23081800.00	0.03	27.32	50.48	1195.70	0.09	0.37	0.88	31.95	1056.62	0.01	0.21	1.00	672.71	366.44
C.V.	4.347	0.569	0.781	0.671	-0.485	0.26	0.401	0.296	0.334	3.361	0.205	0.369	0.586	0.356	0.509	-0.723	0.313	-8.576	1.004	0.397	0.282	0.506	0.615	0.147

2-0.5 mm fraction

Element	AU	AS	BA	BI	CD	CE	CR	CU	FE	MN	MO	NI	PB	RB	SB	SE	SN	SN_XRF	SR	TIO2	U	W	ZN	ZR
N of cases	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Minimum	-0.5	-0.5	292	0.1	-1	34	13	8	2	188	0.4	8	7	68	0.4	-1	2	-5	14	0.21	1.05	1	19	97
Maximum	60	6.5	1404	6	-1	115	343	47	7.4	12077	1.2	30	50	223	2	2	6	7	131	0.65	2.8	7	113	208
Range	60.5	7	1112	5.9	0	81	330	39	5.4	11889	0.8	22	43	155	1.6	3	4	12	117	0.44	1.75	6	94	111
Median	1	4	453.5	0.3	-1	55	35	14	4	802.5	0.9	16	15	120.5	0.6	-1	3	-5	22	0.335	2.1	2	47	157
Mean	4.82	3.75	500.27	0.65	-1.00	58.32	42.50	15.96	3.98	1067.34	0.89	15.46	16.73	120.98	0.68	-0.84	3.23	-1.73	39.36	0.35	1.99	2.30	49.02	157.61
Standard Dev	10.85	1.48	180.00	1.06	0.00	17.86	47.81	6.67	1.22	1758.73	0.17	4.89	7.61	32.67	0.34	0.61	0.83	5.13	37.25	0.10	0.46	1.10	17.39	21.35
Variance	117.69	2.18	32399.65	1.12	0.00	318.83	2285.93	44.51	1.48	3093146.79	0.03	23.88	57.88	1067.51	0.11	0.37	0.69	26.30	1387.68	0.01	0.21	1.20	302.26	455.92
C.V.	2.252	0.394	0.36	1.635	0	0.306	1.125	0.418	0.306	1.648	0.191	0.316	0.455	0.27	0.491	-0.723	0.258	-2.969	0.946	0.287	0.232	0.477	0.355	0.135

180-75 µm fraction

Element	AU	AS	BA	BI	CD	CE	CR	CU	FE	MN	MO	NI	PB	RB	SB	SE	SN	SN_XRF	SR	TIO2	U	W	ZN	ZR
N of cases	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Minimum	-0.5	-0.5	366	0.2	-1	50	25	12	2.8	278	0.4	8	13	89	0.4	-1	2	-5	37	0.39	1.95	-0.5	40	230
Maximum	3190	5	595	19	-1	400	119	36	9.5	1999	1.2	38	39	187	2.8	4	8	9	171	1.69	9.7	4.5	138	1459
Range	3190.5	5.5	229	18.8	0	350	94	24	6.7	1721	0.8	30	26	98	2.4	5	6	14	134	1.3	7.75	5	98	1229
Median	3	3	485.5	0.4	-1	90	52.5	16	4.85	654	0.8	20	19	115.5	0.6	1	3.5	5	47.5	0.695	2.625	1.5	61	355
Mean	156.03	2.73	486.71	1.48	-1.00	108.02	56.21	17.50	5.19	785.18	0.83	19.14	21.14	117.09	0.90	0.39	3.80	1.61	63.77	0.77	3.15	1.88	63.55	424.41
Standard Dev	558.71	1.17	48.98	3.55	0.00	67.61	20.80	4.88	1.55	407.27	0.19	5.53	6.03	19.36	0.63	1.30	1.19	5.66	37.04	0.25	1.57	0.88	16.89	243.66
Variance	312157.11	1.37	2398.91	12.63	0.00	4570.58	432.73	23.79	2.39	165866.01	0.04	30.59	36.40	374.97	0.40	1.68	1.42	32.01	1371.95	0.06	2.48	0.78	285.18	59369.83
C.V.	3.581	0.429	0.101	2.395	0	0.626	0.37	0.279	0.298	0.519	0.232	0.289	0.285	0.165	0.699	3.359	0.314	3.506	0.581	0.329	0.499	0.471	0.266	0.574

<75 µm fraction

Element	AU	AS	BA	BI	CD	CE	CR	CU	FE	MN	MO	NI	PB	RB	SB	SE	SN	SN_XRF	SR	TIO2	U	W	ZN	ZR
N of cases	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Minimum	-0.5	-0.5	395	0.2	-1	40	28	11	2.9	294	0.2	8	15	101	0.2	-1	3	-5	48	0.52	2.4	-0.5	49	484
Maximum	655	17	530	4.3	-1	110	92	34	6.1	1439	0.6	44	27	162	1.4	2	5	11	136	1.1	4.35	3.5	182	1755
Range	655.5	17.5	135	4.1	0	70	64	23	3.2	1145	0.4	36	12	61	1.2	3	2	16	88	0.58	1.95	4	133	1271
Median	5.75	3	467	0.4	-1	79.5	54.5	17.5	4.2	567	0.4	20	20	137	0.6	1	4	-5	65	0.805	2.9	1.5	77.5	654
Mean	36.64	3.00	461.59	0.68	-1.00	79.27	55.18	17.82	4.32	569.07	0.31	19.36	20.77	133.82	0.61	0.52	3.64	-0.73	75.89	0.81	2.95	1.66	82.55	738.59
Standard Dev	112.93	2.43	37.71	0.83	0.00	10.51	14.69	4.36	0.75	180.14	0.11	6.47	2.86	15.45	0.28	1.11	0.57	5.53	24.44	0.11	0.39	0.59	22.24	246.88
Variance	12753.12	5.91	1422.29	0.69	0.00	110.39	215.73	19.04	0.56	32448.72	0.01	41.82	8.18	238.71	0.08	1.23	0.33	30.53	597.08	0.01	0.15	0.35	494.77	60948.76
C.V.	3.082	0.81	0.082	1.221	0	0.133	0.266	0.245	0.172	0.317	0.355	0.334	0.138	0.115	0.459	2.123	0.158	-7.597	0.322	0.141	0.132	0.355	0.269	0.334

STATISTICAL SUMMARY
OONAGALABI ORIENTATION SURVEY

bulk -6mm fraction

Element	AU	AS	BA	BI	CD	CE	CR	CU	FE	MN	MO	NI	PB	RB	SB	SE	SN	SN_XRF	SR	TIO2	U	W	ZN	ZR
N of cases	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Minimum	-0.5	-0.5	198	0.1	-1	37	44	22	5.6	1476	0.4	28	9	27	-0.2	2	3	-5	36	0.41	1.2	-0.5	87	163
Maximum	6	4.5	551	13.2	6	224	177	922	14.6	4171	2	56	241	67	0.4	6	8	13	89	2.11	6.9	22.5	2320	531
Range	6.5	5	353	13.1	7	187	133	900	9	2695	1.6	28	232	40	0.6	4	5	18	53	1.7	5.7	23	2233	368
Median	1	1.5	337.5	2	-1	99	74.5	116	9	2741	1	40	75.5	41.5	0.2	4	4	5	50.5	0.635	2.45	3.5	537	237
Mean	0.89	1.40	332.85	2.39	0.15	106.08	77.80	153.23	8.88	2810.73	1.08	41.15	72.15	42.68	0.18	3.58	4.25	2.33	51.75	0.69	2.65	4.51	581.28	248.18
Standard Dev	1.37	0.83	66.22	2.30	1.78	44.08	24.24	186.28	1.75	697.47	0.28	7.51	52.52	9.97	0.16	1.08	0.95	5.98	10.03	0.29	1.21	4.81	509.08	56.63
Variance	1.87	0.68	4384.64	5.29	3.16	1942.64	587.50	34701.00	3.07	486464.51	0.08	56.39	2758.64	99.30	0.03	1.17	0.91	35.76	100.50	0.08	1.47	23.11	259165.64	3206.40
C.V.	1.539	0.59	0.199	0.961	11.844	0.416	0.312	1.216	0.197	0.248	0.262	0.182	0.728	0.234	0.9	0.303	0.224	2.572	0.194	0.416	0.457	1.065	0.876	0.228

6-2 mm fraction

Element	AU	AS	BA	BI	CD	CE	CR	CU	FE	MN	MO	NI	PB	RB	SB	SE	SN	SN_XRF	SR	TIO2	U	W	ZN	ZR
N of cases	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Minimum	-0.5	-0.5	145	0.1	-1	38	44	25	4.5	946	0.6	28	12	22	-0.2	1	2	-5	44	0.37	0.9	-0.5	92	105
Maximum	5.5	3	510	16.8	7	114	137	1240	13.5	3818	3	74	310	78	0.4	4	8	10	138	1.04	2.4	7.5	2810	243
Range	6	3.5	365	16.7	8	76	93	1215	9	2872	2.4	46	298	56	0.6	3	6	15	94	0.67	1.5	8	2718	138
Median	1	1.5	322	4.2	1	54	83.5	156.5	9.35	2281	1	51	86	39.5	0.2	2	5	5	59.5	0.755	1.425	2	634	169
Mean	1.04	1.31	330.38	5.17	0.85	59.03	84.80	221.50	9.19	2345.85	1.05	51.95	85.18	41.93	0.20	2.43	4.85	1.25	65.43	0.74	1.45	2.34	761.70	172.18
Standard Dev	1.39	0.78	82.35	3.94	2.11	15.02	19.44	249.91	1.95	639.96	0.41	11.59	68.78	12.28	0.18	0.68	1.27	6.15	19.68	0.16	0.29	1.92	661.77	32.70
Variance	1.94	0.61	6781.27	15.52	4.44	225.67	378.06	62457.18	3.79	409550.70	0.17	134.25	4730.30	150.79	0.03	0.46	1.62	37.78	387.23	0.02	0.08	3.67	437936.93	1069.02
C.V.	1.343	0.596	0.249	0.763	2.479	0.255	0.229	1.128	0.212	0.273	0.396	0.223	0.807	0.293	0.877	0.278	0.262	4.917	0.301	0.21	0.197	0.82	0.869	0.19

2-0.5 mm fraction

Element	AU	AS	BA	BI	CD	CE	CR	CU	FE	MN	MO	NI	PB	RB	SB	SE	SN	SN_XRF	SR	TIO2	U	W	ZN	ZR
N of cases	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Minimum	-0.5	-0.5	135	-0.1	-1	32	49	20	5.2	1276	0.4	28	7	19	-0.2	1	3	-5	25	0.36	0.9	-0.5	81	131
Maximum	30.5	4.5	400	13	7	243	173	1020	13.7	4208	2.6	62	258	62	0.4	7	9	22	87	1.19	9.3	35	2380	260
Range	31	5	265	13.1	8	211	124	1000	8.5	2932	2.2	34	251	43	0.6	6	6	27	62	0.83	8.4	35.5	2299	129
Median	0.5	1	289.5	2.25	-1	78.5	71.5	111.5	8.85	2929.5	1	37	67	36.5	0.2	4	4	0	37	0.535	2.025	2.5	537.5	208.5
Mean	1.41	1.08	288.08	2.46	0.28	87.78	75.78	156.30	9.05	2909.40	1.11	39.60	69.40	37.10	0.15	3.73	4.10	1.13	39.83	0.60	2.48	4.96	554.73	205.85
Standard Dev	4.90	1.11	52.44	2.33	1.89	40.91	25.68	206.26	1.79	797.17	0.46	8.37	58.19	8.64	0.23	1.45	1.13	6.71	10.61	0.18	1.63	7.50	500.57	28.99
Variance	24.04	1.23	2749.92	5.41	3.59	1673.36	659.36	42544.47	3.22	635480.71	0.22	69.99	3385.99	74.71	0.05	2.10	1.27	45.04	112.51	0.03	2.64	56.18	250570.77	840.18
C.V.	3.471	1.03	0.182	0.946	6.889	0.466	0.339	1.32	0.198	0.274	0.42	0.211	0.838	0.233	1.592	0.389	0.275	5.965	0.266	0.306	0.656	1.51	0.902	0.141

180-75 µm fraction

Element	AU	AS	BA	BI	CD	CE	CR	CU	FE	MN	MO	NI	PB	RB	SB	SE	SN	SN_XRF	SR	TIO2	U	W	ZN	ZR
N of cases	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Minimum	-0.5	-0.5	250	0.1	-1	74	33	22	4.5	962	0.6	20	17	38	-0.2	2	3	-5	62	0.47	2.25	-0.5	95	208
Maximum	28.5	3	741	10.2	6	702	181	993	14.6	4272	2.2	52	435	90	1.6	6	7	26	89	6.17	13.9	11.5	2910	3180
Range	29	3.5	491	10.1	7	628	148	971	10.1	3310	1.6	32	418	52	1.8	4	4	31	27	5.7	11.65	12	2815	2972
Median	1	1	469	1.75	-1	211.5	76	128	7.3	1909	1	40	67	69	0.2	3	4	5	77	0.83	4.65	4.25	501.5	426
Mean	2.09	0.83	467.23	1.86	-0.13	227.93	79.38	165.40	7.92	2159.30	1.06	38.70	78.08	69.15	0.24	3.13	4.60	3.48	76.55	1.10	4.94	4.31	542.20	567.03
Standard Dev	4.75	0.95	81.61	1.64	1.60	111.85	24.28	186.78	2.22	846.41	0.39	4.97	75.05	10.72	0.33	1.02	0.81	6.50	6.99	1.11	2.23	2.40	526.45	520.24
Variance	22.51	0.90	6659.41	2.70	2.57	12509.40	589.32	34886.66	4.92	716406.68	0.15	24.73	5632.58	114.90	0.11	1.04	0.66	42.31	48.92	1.23	4.95	5.75	277143.96	270649.72
C.V.	2.273	1.153	0.175	0.886	-12.834	0.491	0.306	1.129	0.28	0.392	0.371	0.128	0.961	0.155	1.402	0.326	0.176	1.872	0.091	1.003	0.45	0.556	0.971	0.917

<75 µm fraction

Element	AU	AS	BA	BI	CD	CE	CR	CU	FE	MN	MO	NI	PB	RB	SB	SE	SN	SN_XRF	SR	TIO2	U	W	ZN	ZR
N of cases	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
Minimum	-1	-0.5	421	0.2	-1	58	43	40	5.1	745	0.4	24	19	86	-0.2	2	4	-5	71	0.75	2.05	1.5	133	459
Maximum	14.5	3.5	773	12.2	8	138	110	1540	8.3	3501	2.4	54	685	133	3.2	3	9	10	111	1.47	4.45	8.5	3800	1588
Range	15.5	4	352	12	9	80	67	1500	3.2	2756	2	30	666	47	3.4	1	5	15	40	0.72	2.4	7	3667	1129
Median	2.25	1.75	534	3	1	98	73.5	270	6.25	1186	0.6	43	84.5	109	0.2	2	5	5.5	86	0.92	3.175	3	693.5	766.5
Mean	2.99	1.71	545.30	3.21	1.18	100.50	75.55	329.88	6.26	1321.18	0.75	43.55	108.78	109.53	0.21	2.13	5.15	2.88	87.75	0.95	3.24	3.29	861.73	831.78
Standard Dev	3.03	0.94	67.81	2.36	2.23	16.43	10.88	306.91	0.68	570.98	0.31	5.67	114.56	11.53	0.56	0.34	1.08	5.32	8.79	0.13	0.58	1.53	825.61	229.62
Variance	9.17	0.88	4597.60	5.57	4.97	270.05	118.36	94191.86	0.46	326012.10	0.10	32.10	13124.85	132.92	0.31	0.11	1.16	28.32	77.32	0.02	0.33	2.35	681639.28	52724.59
C.V.	1.014	0.549	0.124	0.736	1.897	0.164	0.144	0.93	0.109	0.432	0.417	0.13	1.053	0.105	2.65	0.158	0.209	1.851	0.1	0.133	0.178	0.466	0.958	0.276

APPENDIX 8

CORRELATION MATRICES

Spearman Rank Correlation matrices for each fraction - numbers in bold have been shown, from inspection of scatter plots, to be significant. See also Appendix 9.

SPEARMAN RANK CORRELATION MATRICES
WINNECKE ORIENTATION AREA

Bulk

	As	Au	Ba	Bi	Cd	Ce	Cr	Cu	Fe	Mn	Mo	Ni	Pb	Rb	Sb	Se	Sni	Snx	Sr	Tl	U	W	Zn	Zr
As	1.00																							
Au	0.19	1.00																						
Ba	0.42	0.44	1.00																					
Bi	0.23	0.54	0.52	1.00																				
Cd	0.23	0.07	0.25	0.22	1.00																			
Ce	0.44	0.31	**0.81**	0.36	0.22	1.00																		
Cr	0.57	0.61	**0.76**	0.63	0.25	**0.65**	1.00																	
Cu	0.40	0.50	**0.61**	0.62	0.25	0.45	**0.70**	1.00																
Fe	0.55	0.42	**0.80**	0.51	0.25	**0.87**	**0.78**	**0.60**	1.00															
Mn	0.51	0.19	0.58	0.20	0.25	0.46	0.47	0.38	**0.59**	1.00														
Mo	-0.17	-0.47	-0.41	-0.15	-0.10	-0.14	-0.44	-0.29	-0.23	-0.30	1.00													
Ni	0.56	0.42	**0.68**	0.46	0.25	0.54	**0.79**	**0.76**	**0.68**	**0.50**	-0.28	1.00												
Pb	0.27	0.31	**0.77**	0.49	0.25	**0.82**	**0.52**	**0.43**	**0.82**	0.39	-0.10	**0.41**	1.00											
Rb	0.41	0.55	**0.92**	0.60	0.18	**0.81**	**0.82**	**0.63**	**0.80**	0.39	-0.41	**0.66**	**0.72**	1.00										
Sb	0.37	0.43	0.54	0.75	0.19	0.39	0.60	0.60	0.55	0.25	-0.20	0.47	0.56	0.56	1.00									
Se	0.18	0.23	0.26	0.17	-0.07	0.38	0.34	0.29	0.45	0.25	0.00	0.17	0.48	0.25	0.33	1.00								
Sni	0.38	0.33	0.72	0.33	0.27	0.61	0.52	0.63	0.64	0.51	-0.33	0.55	0.64	0.68	0.40	0.35	1.00							
Snx	0.12	0.24	0.45	0.19	0.25	0.39	0.32	0.44	0.37	0.34	-0.34	0.47	0.38	0.43	0.21	-0.01	0.43	1.00						
Sr	0.38	0.38	0.65	0.40	0.17	0.49	0.69	0.49	0.57	0.40	-0.47	0.51	**0.46**	0.60	0.63	0.37	0.32	0.14	1.00					
Tl	0.50	0.52	**0.88**	0.55	0.24	**0.87**	**0.86**	**0.63**	**0.95**	0.57	-0.37	**0.69**	**0.79**	**0.88**	0.54	0.40	0.64	0.39	0.67	1.00				
U	0.40	0.17	0.63	0.33	0.22	**0.82**	0.47	0.45	**0.81**	0.47	-0.03	0.44	**0.76**	**0.65**	0.37	0.28	0.65	0.40	0.28	**0.73**	1.00			
W	0.25	0.41	0.66	0.57	0.11	**0.63**	0.55	0.57	**0.66**	0.24	-0.17	0.44	0.60	**0.74**	0.50	0.07	0.60	0.41	0.29	**0.66**	**0.69**	1.00		
Zn	0.01	0.36	**0.68**	0.56	0.25	0.56	0.43	**0.46**	**0.67**	0.31	-0.23	**0.35**	**0.81**	**0.65**	0.45	0.25	0.59	0.34	0.33	**0.68**	0.52	0.60	1.00	
Zr	0.13	0.01	0.31	-0.05	0.13	**0.51**	0.12	0.17	0.29	0.12	0.03	0.04	0.42	0.29	-0.08	0.32	0.33	0.13	0.11	0.34	0.43	0.26	0.28	1.00

6-2 mm

	As	Au	Ba	Bi	Cd	Ce	Cr	Cu	Fe	Mn	Mo	Ni	Pb	Rb	Sb	Se	Sni	Snx	Sr	Tl	U	W	Zn	Zr
As	1.00																							
Au	0.19	1.00																						
Ba	0.24	0.33	1.00																					
Bi	0.36	0.60	0.24	1.00																				
Cd	0.06	0.03	0.25	-0.03	1.00																			
Ce	0.28	0.42	0.73	0.38	0.24	1.00																		
Cr	0.43	0.46	0.58	0.35	0.24	**0.53**	1.00																	
Cu	0.35	0.44	**0.69**	0.41	0.25	**0.62**	**0.79**	1.00																
Fe	0.40	0.48	0.81	0.38	0.23	**0.80**	**0.75**	**0.78**	1.00															
Mn	0.33	0.20	**0.66**	0.09	0.25	0.48	0.38	0.38	0.66	1.00														
Mo	-0.10	0.03	-0.45	-0.03	-0.23	-0.35	-0.22	-0.25	-0.27	-0.30	1.00													
Ni	0.45	0.33	0.62	0.24	0.25	**0.56**	**0.83**	**0.78**	**0.81**	0.43	-0.29	1.00												
Pb	0.17	0.32	0.82	0.32	0.25	**0.70**	0.46	**0.55**	**0.77**	**0.57**	-0.29	**0.52**	1.00											
Rb	0.19	0.41	**0.85**	0.27	0.23	**0.81**	**0.75**	**0.81**	**0.84**	0.48	-0.42	**0.73**	**0.69**	1.00										
Sb	0.32	0.50	0.61	0.59	0.24	0.56	0.62	0.68	0.73	0.36	-0.16	0.58	0.66	0.58	1.00									
Se	0.15	0.12	0.13	0.07	0.55	0.22	0.23	0.21	0.23	0.05	-0.26	0.30	0.22	0.17	0.18	1.00								
Sni	0.09	0.32	0.75	0.32	0.19	0.66	0.52	0.64	0.72	0.47	-0.26	0.59	0.70	0.76	0.54	0.23	1.00							
Snx	0.03	0.22	0.40	0.25	0.11	0.43	0.21	0.32	0.40	0.36	-0.30	0.32	0.40	0.45	0.26	0.18	0.55	1.00						
Sr	0.57	0.38	0.68	0.44	0.24	**0.62**	**0.72**	**0.64**	**0.76**	0.59	-0.39	**0.72**	0.62	0.63	0.66	0.23	0.54	0.25	1.00					
Tl	0.20	0.45	0.85	0.34	0.23	**0.84**	**0.75**	**0.77**	**0.91**	0.52	-0.36	**0.73**	**0.77**	**0.95**	0.67	0.22	0.80	0.39	**0.71**	1.00				
U	0.11	0.38	0.68	0.35	0.25	**0.76**	0.33	**0.58**	0.70	0.40	-0.27	0.43	**0.60**	**0.75**	0.43	0.27	0.74	0.51	0.44	**0.76**	1.00			
W	0.06	0.46	0.68	0.40	0.06	**0.61**	**0.38**	0.50	0.63	0.37	-0.25	0.41	0.49	**0.69**	0.53	0.02	0.60	0.51	0.40	**0.67**	**0.71**	1.00		
Zn	0.06	0.36	**0.86**	0.29	0.25	**0.69**	0.51	**0.62**	**0.79**	**0.61**	-0.35	**0.54**	**0.81**	**0.77**	0.64	0.11	0.65	0.37	0.57	**0.80**	**0.65**	0.60	1.00	
Zr	-0.27	-0.07	0.24	-0.15	0.17	0.37	-0.15	0.17	0.12	0.02	0.03	-0.10	0.19	0.31	-0.04	-0.03	0.33	0.14	-0.20	0.27	0.47	0.25	0.25	1.00

2-0.5 mm

	As	Au	Ba	Bi	Cd	Ce	Cr	Cu	Fe	Mn	Mo	Ni	Pb	Rb	Sb	Se	Sni	Snx	Sr	Tl	U	W	Zn	Zr
As	1.00																							
Au	0.20	1.00																						
Ba	0.31	0.31	1.00																					
Bi	0.27	0.50	0.42	1.00																				
Cd	•	•	•	•	•																			
Ce	0.41	0.31	**0.81**	0.40	•	1.00																		
Cr	0.57	0.46	**0.72**	0.49	•	0.62	1.00																	
Cu	0.48	0.30	**0.61**	0.51	•	**0.62**	0.75	1.00																
Fe	**0.54**	0.38	**0.85**	0.46	•	**0.88**	0.75	**0.67**	1.00															
Mn	0.31	0.24	**0.68**	0.16	•	0.52	0.56	0.47	**0.64**	1.00														
Mo	0.23	-0.09	-0.30	-0.05	•	-0.05	-0.20	-0.08	-0.02	-0.19	1.00													
Ni	**0.67**	0.39	**0.56**	0.39	•	**0.60**	0.81	**0.73**	**0.71**	**0.42**	-0.05	1.00												
Pb	0.21	0.17	**0.82**	0.34	•	**0.82**	0.44	0.53	**0.79**	**0.57**	-0.10	0.33	1.00											
Rb	0.35	0.37	**0.88**	0.43	•	**0.84**	0.73	**0.64**	**0.84**	0.48	-0.18	**0.69**	**0.68**	1.00										
Sb	0.23	0.30	0.59	0.58	•	0.60	0.48	0.46	0.57	0.34	-0.13	0.33	0.61	0.51	1.00									
Se	0.26	-0.01	0.23	0.18	•	0.29	0.20	0.26	0.22	0.19	0.21	0.24	0.18	0.25	0.18	1.00								
Sni	0.10	0.15	0.67	0.20	•	0.72	0.35	0.39	0.67	0.42	-0.01	0.25	**0.69**	0.72	0.39	0.16	1.00							
Snx	-0.24	0.41	-0.05	0.07	•	0.13	0.00	0.03	0.04	-0.03	-0.09	0.05	-0.01	0.16	-0.04	-0.23	0.17	1.00						
Sr	0.39	0.25	0.75	0.45	•	0.55	0.72	0.62	**0.69**	0.67	-0.20	0.52	0.57	0.60	0.64	0.20	0.35	-0.27	1.00					
Tl	0.48	0.37	**0.86**	0.47	•	**0.87**	0.75	**0.70**	**0.96**	0.58	-0.08	**0.70**	**0.74**	**0.89**	0.55	0.24	0.72	0.04	0.67	1.00				
U	0.35	0.23	**0.68**	0.35	•	**0.86**	0.42	0.48	**0.79**	0.46	0.03	0.43	**0.77**	**0.75**	0.53	0.26	0.73	0.21	0.40	**0.75**	1.00			
W	0.28	0.31	0.59	0.51	•	**0.70**	0.48	0.50	0.59	0.21	0.04	0.43	0.51	**0.72**	0.50	0.28	0.60	0.30	0.28	**0.63**	0.75	1.00		
Zn	0.08	0.36	**0.75**	0.39	•	**0.69**	0.43	0.50	**0.76**	**0.44**	-0.22	**0.34**	**0.80**	**0.70**	0.49	0.01	0.66	0.17	0.45	**0.78**	**0.64**	0.44	1.00	
Zr	-0.26	0.06	-0.08	-0.19	•	0.05	-0.37	-0.22	-0.01	-0.22	0.23	-0.25	0.08	0.04	-0.29	-0.20	0.29	0.49	-0.53	-0.01	0.18	0.25	0.25	1.00

SPEARMAN RANK CORRELATION MATRICES (CONTD)
WINNECKE ORIENTATION AREA

180-75 µm

	As	Au	Ba	Bi	Cd	Ce	Cr	Cu	Fe	Mn	Mo	Ni	Pb	Rb	Sb	Se	Sni	Snx	Sr	Tl	U	W	Zn	Zr
As	1.00																							
Au	0.37	1.00																						
Ba	-0.03	0.20	1.00																					
Bi	0.59	0.48	0.16	1.00																				
Cd	•	•	•	•	•																			
Ce	0.32	0.17	-0.13	0.46	•	1.00																		
Cr	0.59	0.42	0.16	0.70	•	**0.75**	1.00																	
Cu	0.29	0.35	0.01	0.39	•	0.22	0.49	1.00																
Fe	0.46	0.34	0.00	0.56	•	**0.77**	**0.81**	0.39	1.00															
Mn	0.18	0.16	0.06	0.28	•	0.49	0.43	0.23	**0.74**	1.00														
Mo	-0.20	-0.20	-0.26	-0.06	•	0.19	-0.05	-0.22	-0.03	-0.20	1.00													
Ni	0.55	0.49	0.26	0.63	•	0.42	**0.80**	0.63	**0.64**	0.37	-0.20	1.00												
Pb	0.50	0.37	-0.16	0.59	•	**0.59**	**0.62**	0.42	**0.72**	0.46	-0.03	0.47	1.00											
Rb	0.11	0.18	**0.72**	0.38	•	0.14	0.37	-0.05	0.17	0.08	-0.06	0.30	0.06	1.00										
Sb	0.68	0.47	0.03	0.80	•	0.41	0.72	0.43	0.54	0.11	-0.08	0.62	**0.54**	0.23	1.00									
Se	0.51	0.13	-0.33	0.37	•	0.56	**0.52**	0.00	**0.60**	0.34	0.07	0.34	**0.53**	-0.10	0.41	1.00								
Sni	0.24	0.06	-0.17	0.41	•	**0.79**	0.58	0.11	0.75	0.54	0.24	0.30	**0.65**	0.22	0.38	0.57	1.00							
Snx	-0.26	-0.09	-0.22	0.11	•	0.24	0.04	-0.07	0.19	0.29	0.17	0.01	0.21	-0.14	-0.05	0.16	0.37	1.00						
Sr	0.45	0.16	0.25	0.59	•	0.30	**0.66**	0.18	0.36	0.09	-0.19	0.55	**0.38**	0.62	0.55	0.32	0.34	-0.01	1.00					
Ti	0.36	0.28	-0.06	0.43	•	**0.84**	**0.80**	0.31	**0.90**	0.63	0.07	**0.54**	**0.63**	0.15	0.47	0.63	0.78	0.16	**0.42**	1.00				
U	0.40	0.24	-0.14	0.41	•	**0.89**	**0.71**	0.20	**0.77**	0.54	0.05	0.39	**0.65**	0.14	0.41	0.59	0.77	0.11	**0.37**	**0.86**	1.00			
W	0.39	0.28	0.05	**0.61**	•	0.46	0.50	0.22	0.40	0.11	0.19	0.33	0.43	0.36	0.57	0.22	0.52	0.15	0.32	0.29	0.33	1.00		
Zn	0.35	0.45	0.25	0.34	•	0.10	0.43	0.59	0.53	0.45	-0.38	**0.61**	0.43	0.13	0.33	0.13	0.09	-0.16	0.17	0.33	0.14	0.08	1.00	
Zr	0.20	-0.08	-0.27	0.08	•	**0.57**	**0.39**	0.04	0.24	0.05	0.47	0.10	0.14	-0.18	0.12	0.29	0.31	0.14	0.11	**0.45**	**0.42**	0.18	-0.26	1.00

<75 µm

	As	Au	Ba	Bi	Cd	Ce	Cr	Cu	Fe	Mn	Mo	Ni	Pb	Rb	Sb	Se	Sni	Snx	Sr	Tl	U	W	Zn	Zr
As	1.00																							
Au	0.12	1.00																						
Ba	-0.07	0.16	1.00																					
Bi	0.30	0.50	0.25	1.00																				
Cd	•	•	•	•	•																			
Ce	0.28	0.12	0.09	-0.01	•	1.00																		
Cr	0.51	0.34	0.05	0.55	•	0.17	1.00																	
Cu	0.52	0.46	0.22	0.56	•	0.14	**0.62**	1.00																
Fe	0.36	0.45	0.24	0.38	•	0.33	**0.61**	**0.61**	1.00															
Mn	0.11	0.25	0.61	0.16	•	0.23	0.20	0.37	**0.64**	1.00														
Mo	0.11	-0.18	-0.06	-0.19	•	0.22	-0.01	-0.07	-0.13	-0.41	1.00													
Ni	0.57	0.49	0.13	0.51	•	0.19	**0.80**	**0.81**	**0.62**	0.22	0.07	1.00												
Pb	0.49	0.29	-0.16	0.32	•	0.41	**0.46**	0.54	**0.60**	0.25	0.14	0.53	1.00											
Rb	0.03	0.35	**0.77**	0.19	•	0.28	-0.09	0.28	0.21	0.53	0.00	0.16	0.02	1.00										
Sb	0.50	0.50	-0.10	0.63	•	0.03	0.78	0.68	0.55	0.10	-0.06	0.83	0.55	-0.10	1.00									
Se	0.29	-0.11	0.09	0.13	•	0.49	0.19	-0.08	0.25	0.07	0.20	0.02	0.41	0.03	0.02	1.00								
Sni	0.19	0.01	0.30	-0.04	•	0.44	0.01	0.11	0.46	0.52	0.05	0.05	0.41	0.43	0.02	0.35	1.00							
Snx	0.19	0.11	-0.05	-0.10	•	0.09	-0.04	0.04	-0.01	0.10	-0.02	0.05	0.14	0.26	-0.05	0.03	0.25	1.00						
Sr	0.42	0.28	0.06	0.45	•	0.26	**0.84**	0.54	**0.58**	0.24	0.02	0.69	**0.60**	-0.04	0.63	0.29	0.06	-0.03	1.00					
Ti	0.51	0.16	-0.02	0.36	•	0.16	**0.87**	**0.60**	**0.57**	0.20	-0.02	**0.74**	**0.48**	-0.20	0.65	0.21	-0.01	-0.04	**0.83**	1.00				
U	0.18	-0.07	-0.01	0.05	•	**0.62**	0.21	-0.02	0.20	0.11	0.20	0.00	**0.43**	-0.03	-0.03	0.67	0.29	0.03	0.30	0.28	1.00			
W	-0.21	0.23	0.05	0.10	•	0.18	-0.17	-0.01	-0.06	-0.19	0.24	0.05	-0.01	0.30	-0.02	-0.07	-0.01	-0.07	-0.16	-0.24	-0.07	1.00		
Zn	0.31	0.56	0.31	0.47	•	0.16	0.40	**0.73**	0.53	0.31	0.05	**0.77**	0.42	0.49	0.57	-0.16	0.12	0.07	0.36	0.30	-0.15	0.35	1.00	
Zr	0.34	-0.09	-0.25	0.07	•	0.06	0.53	0.06	-0.02	-0.20	0.07	0.28	0.16	-0.50	0.38	0.26	-0.21	-0.02	0.51	**0.61**	0.34	-0.37	-0.21	1.00

SPEARMAN RANK CORRELATION MATRICES
OONAGALABI ORIENTATION AREA

Bulk

	As	Au	Ba	Bi	Cd	Ce	Cr	Cu	Fe	Mn	Mo	Ni	Pb	Rb	Sb	Se	Sni	Snx	Sr	Tl	U	W	Zn	Zr
As	1.00																							
Au	-0.24	1.00																						
Ba	-0.16	-0.11	1.00																					
Bi	-0.13	**0.53**	-0.42	1.00																				
Cd	-0.11	**0.54**	-0.26	**0.67**	1.00																			
Ce	0.12	-0.08	-0.14	-0.08	-0.21	1.00																		
Cr	0.33	0.10	**-0.70**	0.22	0.07	0.03	1.00																	
Cu	-0.11	**0.57**	-0.35	**0.88**	**0.78**	-0.16	0.16	1.00																
Fe	0.29	0.09	**-0.73**	0.34	0.11	**0.49**	**0.69**	0.22	1.00															
Mn	0.19	0.03	-0.46	0.03	-0.02	**0.62**	0.34	0.03	**0.77**	1.00														
Mo	0.06	0.19	-0.27	0.31	0.17	0.12	0.26	0.17	0.31	0.24	1.00													
Ni	0.42	-0.10	**-0.46**	0.25	0.09	-0.15	**0.72**	0.19	0.43	0.13	0.11	1.00												
Pb	-0.14	**0.48**	-0.23	**0.77**	0.62	-0.16	-0.04	**0.89**	0.14	0.00	0.13	-0.04	1.00											
Rb	-0.12	0.06	**0.71**	-0.26	-0.19	0.01	-0.34	-0.27	**-0.57**	-0.52	-0.22	-0.29	-0.23	1.00										
Sb	0.22	0.33	-0.05	0.35	0.31	0.08	-0.13	0.42	0.19	0.16	0.07	-0.04	0.53	-0.17	1.00									
Se	0.13	0.08	-0.30	0.09	-0.15	0.72	0.28	0.02	0.70	0.69	0.12	0.07	0.04	-0.19	0.17	1.00								
Sni	0.02	**0.48**	-0.20	**0.70**	**0.69**	0.05	0.20	**0.74**	0.32	0.25	0.35	0.20	**0.64**	-0.14	0.38	0.12	1.00							
Snx	0.08	0.27	-0.21	0.41	0.45	-0.09	0.13	0.49	0.16	0.07	0.02	0.18	0.45	-0.04	0.48	0.10	0.42	1.00						
Sr	0.02	-0.06	0.38	-0.35	-0.14	-0.08	-0.05	-0.38	-0.33	-0.37	-0.22	-0.17	-0.46	0.58	-0.34	-0.33	-0.24	-0.12	1.00					
Tl	0.39	-0.14	-0.39	0.05	0.05	0.13	**0.65**	-0.07	**0.54**	0.34	0.37	**0.62**	-0.30	-0.35	-0.24	0.12	0.22	-0.11	0.10	1.00				
U	0.03	0.10	-0.13	0.14	-0.04	**0.89**	0.12	0.03	**0.55**	0.62	0.24	-0.11	-0.02	-0.01	0.11	0.79	0.23	-0.05	-0.11	0.20	1.00			
W	-0.02	0.38	-0.19	0.20	0.07	0.58	0.01	0.23	0.34	0.56	0.25	-0.24	0.31	-0.05	0.30	0.50	0.28	0.14	-0.08	-0.17	0.52	1.00		
Zn	-0.18	**0.61**	-0.34	**0.83**	**0.74**	-0.12	0.12	**0.95**	0.24	0.06	0.06	0.10	**0.91**	-0.25	0.47	0.08	**0.68**	0.49	-0.37	-0.18	0.04	0.31	1.00	
Zr	0.09	-0.26	0.35	-0.35	-0.40	**0.44**	-0.19	-0.44	-0.03	0.07	0.12	-0.30	-0.39	0.25	-0.04	0.11	-0.18	-0.47	0.11	0.13	0.44	-0.02	-0.42	1.00

6-2 mm

	As	Au	Ba	Bi	Cd	Ce	Cr	Cu	Fe	Mn	Mo	Ni	Pb	Rb	Sb	Se	Sni	Snx	Sr	Tl	U	W	Zn	Zr
As	1.00																							
Au	-0.08	1.00																						
Ba	0.11	-0.38	1.00																					
Bi	-0.09	**0.46**	**-0.70**	1.00																				
Cd	-0.17	**0.72**	-0.52	**0.59**	1.00																			
Ce	0.20	-0.26	0.28	-0.36	-0.21	1.00																		
Cr	0.04	0.14	**-0.59**	0.27	0.04	-0.23	1.00																	
Cu	-0.14	**0.64**	**-0.61**	**0.72**	**0.90**	-0.21	0.13	1.00																
Fe	0.23	0.37	**-0.73**	0.51	0.39	0.05	**0.45**	0.45	1.00															
Mn	0.23	0.41	**-0.49**	0.34	0.38	0.20	0.24	0.40	**0.80**	1.00														
Mo	-0.07	0.38	-0.51	0.48	0.44	-0.20	0.09	0.47	0.34	0.23	1.00													
Ni	0.12	-0.04	**-0.55**	0.40	0.13	-0.16	**0.74**	0.25	0.40	0.25	0.07	1.00												
Pb	-0.09	**0.64**	-0.54	**0.65**	**0.87**	-0.16	0.02	**0.94**	0.45	0.40	0.49	0.13	1.00											
Rb	0.03	-0.34	**0.84**	-0.56	-0.41	0.22	**-0.55**	-0.52	**-0.75**	**-0.59**	-0.44	**-0.50**	-0.49	1.00										
Sb	0.01	0.54	-0.43	0.34	0.53	-0.02	0.04	0.54	0.46	0.42	0.46	0.06	0.63	-0.40	1.00									
Se	0.06	0.18	-0.59	0.39	0.34	0.18	0.52	0.40	0.69	0.62	0.21	0.57	0.39	**-0.52**	0.30	1.00								
Sni	0.09	0.41	-0.57	**0.65**	**0.63**	-0.09	0.13	**0.74**	**0.68**	0.66	0.35	0.32	**0.67**	**-0.61**	0.34	0.54	1.00							
Snx	-0.07	-0.06	-0.25	0.23	0.21	-0.15	-0.16	0.22	0.23	0.22	0.07	0.06	0.23	-0.21	0.04	0.24	0.39	1.00						
Sr	0.02	-0.13	**0.64**	-0.54	-0.34	0.18	-0.14	-0.52	**-0.56**	-0.48	-0.34	-0.33	-0.53	**0.65**	-0.47	-0.38	-0.63	-0.36	1.00					
Tl	0.19	0.00	**-0.49**	0.16	-0.06	-0.08	**0.80**	-0.02	**0.57**	**0.44**	0.10	**0.71**	-0.10	**-0.64**	-0.02	0.52	0.22	-0.10	-0.19	1.00				
U	0.12	0.16	-0.11	0.11	0.25	**0.51**	-0.13	0.17	0.28	0.28	0.07	-0.14	0.16	0.04	0.19	0.28	0.14	-0.02	0.10	-0.07	1.00			
W	0.07	**0.48**	-0.19	0.45	**0.62**	0.02	-0.29	0.66	0.27	0.38	0.23	-0.12	**0.69**	-0.13	0.36	0.18	**0.58**	0.22	-0.33	-0.36	0.26	1.00		
Zn	-0.08	**0.64**	**-0.62**	**0.70**	**0.88**	-0.18	0.08	**0.93**	0.54	0.47	0.43	0.21	**0.94**	-0.52	0.61	0.40	**0.73**	0.33	-0.58	-0.04	0.15	**0.69**	1.00	
Zr	0.20	**-0.71**	0.41	**-0.56**	**-0.67**	0.47	-0.32	**-0.67**	-0.29	-0.22	-0.32	-0.20	**-0.57**	0.39	-0.23	-0.22	-0.49	-0.05	0.09	-0.18	0.03	-0.32	-0.58	1.00

2-0.5 mm

	As	Au	Ba	Bi	Cd	Ce	Cr	Cu	Fe	Mn	Mo	Ni	Pb	Rb	Sb	Se	Sni	Snx	Sr	Tl	U	W	Zn	Zr
As	1.00																							
Au	0.14	1.00																						
Ba	-0.04	-0.19	1.00																					
Bi	0.17	**0.62**	-0.46	1.00																				
Cd	0.28	**0.49**	-0.29	**0.71**	1.00																			
Ce	0.00	0.11	-0.12	0.04	-0.10	1.00																		
Cr	-0.03	0.06	**-0.76**	0.14	0.03	0.04	1.00																	
Cu	0.32	**0.58**	-0.42	**0.87**	**0.83**	-0.05	0.13	1.00																
Fe	0.12	0.23	**-0.76**	0.39	0.13	**0.52**	**0.62**	0.30	1.00															
Mn	0.13	0.18	-0.30	0.18	0.03	**0.66**	0.14	0.12	**0.75**	1.00														
Mo	-0.03	0.16	-0.27	**0.42**	0.35	0.11	0.06	0.38	0.25	-0.02	1.00													
Ni	0.10	-0.01	**-0.61**	0.25	0.15	-0.12	0.77	0.22	0.43	0.09	0.12	1.00												
Pb	0.36	**0.53**	-0.29	**0.81**	**0.76**	-0.03	-0.08	**0.93**	0.21	0.10	0.34	0.02	1.00											
Rb	-0.04	0.09	**0.78**	**-0.42**	-0.32	-0.02	**-0.46**	-0.39	**-0.60**	-0.25	-0.37	-0.44	-0.36	1.00										
Sb	0.35	0.42	-0.21	0.42	0.43	0.30	-0.10	0.55	0.39	0.44	0.08	-0.22	0.60	-0.18	1.00									
Se	0.13	0.30	-0.31	0.24	-0.03	**0.82**	0.16	0.15	**0.60**	**0.65**	0.07	0.02	0.16	-0.11	0.46	1.00								
Sni	0.13	**0.43**	-0.44	**0.67**	**0.60**	0.23	0.20	**0.67**	0.52	0.37	0.59	0.37	**0.59**	-0.46	0.48	0.35	1.00							
Snx	0.19	-0.04	-0.06	0.09	-0.04	0.17	-0.10	0.11	0.26	0.37	0.00	-0.03	0.20	-0.20	0.33	0.35	0.23	1.00						
Sr	-0.36	-0.12	0.43	-0.57	-0.36	-0.26	-0.06	-0.59	-0.51	-0.45	-0.32	-0.22	-0.63	0.52	-0.53	-0.49	-0.53	-0.44	1.00					
Tl	-0.13	-0.12	**-0.59**	0.05	-0.03	0.14	**0.68**	-0.07	**0.61**	0.31	0.30	**0.72**	-0.25	**-0.56**	-0.21	0.09	0.38	-0.11	-0.07	1.00				
U	0.07	0.35	-0.22	0.18	0.01	**0.78**	0.21	0.08	**0.54**	0.53	0.21	0.00	0.08	-0.02	0.35	**0.78**	0.31	0.13	-0.24	0.13	1.00			
W	0.07	0.36	0.11	0.27	0.26	**0.51**	-0.31	0.29	0.20	0.48	0.26	-0.34	0.37	0.00	0.50	0.54	0.46	0.47	-0.31	-0.21	**0.52**	1.00		
Zn	0.30	**0.56**	-0.41	**0.86**	**0.80**	0.00	0.08	**0.98**	0.32	0.18	0.34	0.15	**0.95**	-0.41	0.60	0.20	**0.64**	0.19	**-0.64**	-0.12	0.11	0.33	1.00	
Zr	-0.02	-0.24	0.43	**-0.38**	**-0.46**	**0.57**	-0.45	**-0.43**	-0.07	0.30	-0.22	-0.40	-0.25	0.31	0.03	0.40	-0.17	0.27	-0.10	-0.27	0.28	0.36	-0.33	1.00

SPEARMAN RANK CORRELATION MATRICES (CONTD)
OONAGALABI ORIENTATION AREA

180-75 µm

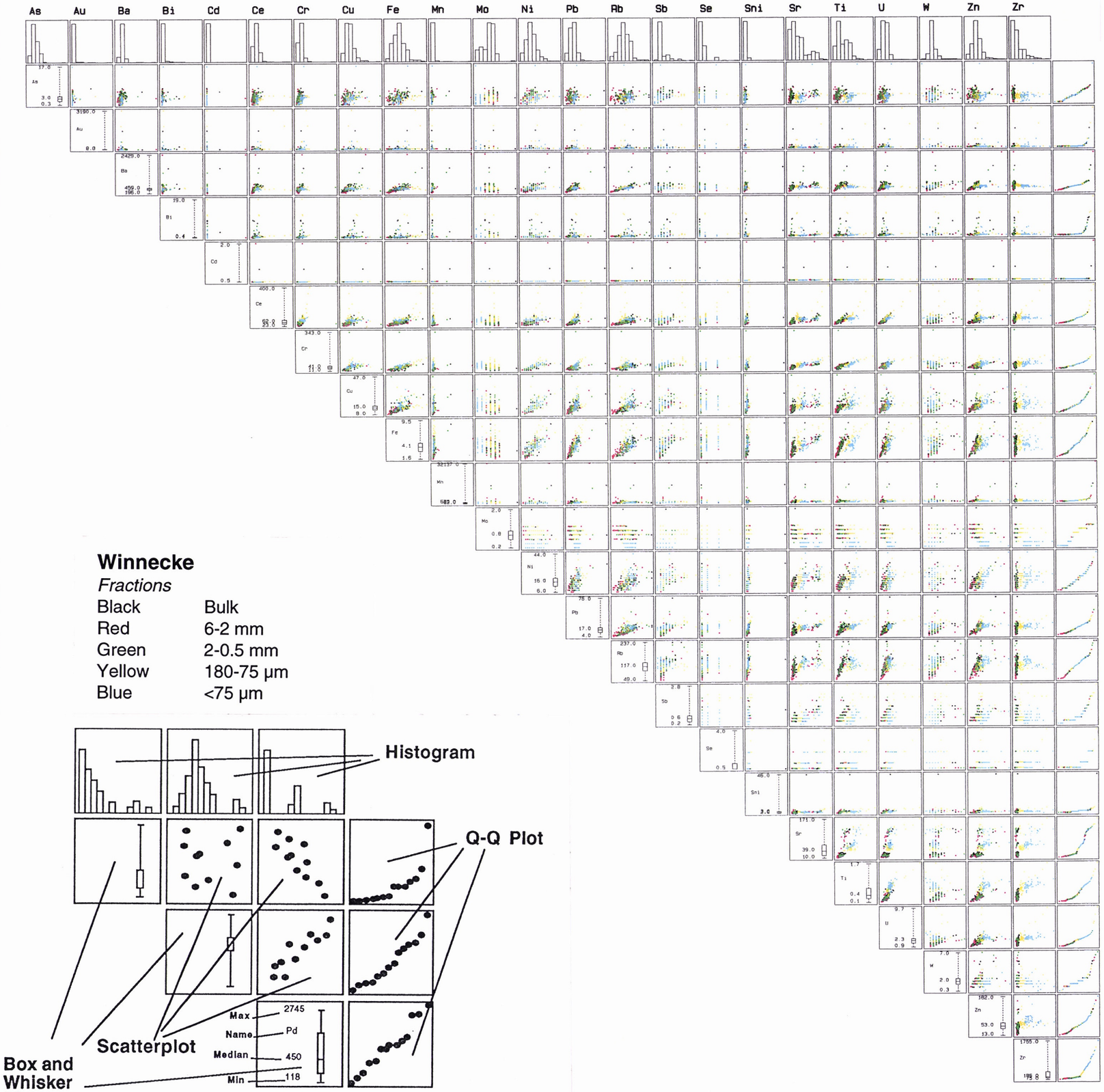
	As	Au	Ba	Bi	Cd	Ce	Cr	Cu	Fe	Mn	Mo	Ni	Pb	Rb	Sb	Se	Sni	Snx	Sr	Ti	U	W	Zn	Zr
As	1.00																							
Au	0.00	1.00																						
Ba	0.15	-0.15	1.00																					
Bi	-0.17	0.43	-0.22	1.00																				
Cd	-0.39	0.17	-0.06	**0.60**	1.00																			
Ce	0.10	-0.14	-0.33	-0.35	-0.45	1.00																		
Cr	0.05	0.09	**-0.83**	0.12	-0.12	**0.32**	1.00																	
Cu	-0.28	0.48	-0.09	**0.88**	**0.78**	**-0.50**	-0.01	1.00																
Fe	0.25	-0.07	**-0.64**	0.02	-0.25	**0.57**	**0.70**	-0.18	1.00															
Mn	0.20	-0.17	-0.39	-0.11	-0.21	0.58	0.43	-0.24	**0.85**	1.00														
Mo	0.08	-0.25	-0.42	0.02	0.07	0.12	0.39	-0.06	**0.63**	0.58	1.00													
Ni	-0.08	0.25	**-0.56**	0.18	0.05	0.03	0.51	0.17	0.38	0.09	0.28	1.00												
Pb	-0.09	0.41	0.04	**0.77**	0.51	-0.43	-0.08	**0.82**	-0.20	-0.27	-0.21	0.00	1.00											
Rb	-0.11	0.11	**0.38**	-0.08	0.05	-0.25	-0.23	-0.01	**-0.60**	**-0.57**	-0.42	-0.26	-0.16	1.00										
Sb	0.21	-0.05	0.05	0.13	-0.01	0.07	0.14	0.10	0.31	0.30	0.22	0.14	0.13	-0.18	1.00									
Se	0.12	-0.07	-0.44	-0.24	-0.33	**0.79**	0.46	-0.38	**0.62**	0.57	0.31	0.17	-0.30	**-0.43**	0.04	1.00								
Sni	0.19	-0.12	-0.43	0.19	0.15	0.21	0.50	0.10	0.70	0.65	0.79	0.22	-0.02	-0.35	0.36	0.42	1.00							
Snx	0.13	0.07	-0.20	-0.03	-0.22	0.09	0.28	-0.06	0.25	0.24	0.16	0.13	-0.03	-0.07	0.27	0.18	0.28	1.00						
Sr	0.07	0.13	0.37	-0.32	-0.09	-0.11	-0.28	-0.18	-0.41	-0.38	-0.45	-0.17	-0.27	**0.59**	-0.12	-0.25	-0.35	-0.05	1.00					
Ti	0.02	-0.20	**-0.65**	-0.23	-0.24	**0.51**	**0.67**	-0.34	**0.83**	0.67	0.68	0.42	-0.51	**-0.38**	0.07	0.61	0.63	0.20	-0.18	1.00				
U	0.06	-0.01	-0.40	-0.23	-0.37	**0.93**	**0.41**	-0.37	**0.50**	0.44	0.05	0.02	-0.30	-0.14	0.02	0.80	0.19	0.14	-0.12	**0.45**	1.00			
W	-0.01	0.33	-0.29	0.38	0.06	0.43	0.20	0.24	0.46	0.38	0.14	0.18	0.26	-0.22	0.30	0.31	0.37	0.28	-0.22	0.18	0.46	1.00		
Zn	-0.23	0.44	-0.06	**0.88**	**0.75**	-0.48	-0.05	**0.97**	-0.19	-0.26	-0.10	0.11	**0.91**	-0.10	0.06	-0.34	0.04	-0.08	-0.29	-0.42	-0.36	0.23	1.00	
Zr	-0.03	-0.24	-0.33	-0.55	-0.53	**0.74**	**0.36**	-0.66	**0.41**	0.39	0.18	-0.08	-0.63	-0.05	-0.18	0.65	0.06	0.04	-0.04	**0.61**	0.75	0.04	-0.66	1.00

<75 µm

	As	Au	Ba	Bi	Cd	Ce	Cr	Cu	Fe	Mn	Mo	Ni	Pb	Rb	Sb	Se	Sni	Snx	Sr	Ti	U	W	Zn	Zr
As	1.00																							
Au	0.00	1.00																						
Ba	-0.13	-0.10	1.00																					
Bi	0.12	**0.63**	-0.11	1.00																				
Cd	-0.10	**0.71**	-0.06	**0.71**	1.00																			
Ce	0.15	-0.22	0.26	-0.28	-0.43	1.00																		
Cr	0.38	0.12	**-0.50**	0.02	-0.19	-0.01	1.00																	
Cu	0.03	**0.73**	-0.08	**0.86**	**0.92**	-0.43	-0.05	1.00																
Fe	0.39	0.07	-0.06	0.36	0.04	0.12	0.37	0.17	1.00															
Mn	0.11	0.13	**0.44**	0.43	0.41	-0.07	-0.34	0.42	**0.49**	1.00														
Mo	0.40	0.07	0.32	0.28	0.09	0.02	-0.22	0.20	0.42	0.51	1.00													
Ni	0.24	-0.06	-0.14	0.09	0.06	-0.30	0.36	0.14	**0.46**	0.11	0.12	1.00												
Pb	-0.01	**0.66**	0.08	**0.76**	**0.84**	-0.40	-0.18	**0.86**	0.07	**0.48**	0.25	-0.01	1.00											
Rb	0.06	0.07	0.01	-0.21	-0.23	0.25	0.32	-0.19	-0.29	-0.58	-0.37	-0.12	-0.32	1.00										
Sb	0.04	0.07	0.50	0.08	0.08	0.17	-0.17	0.00	0.17	0.37	0.19	0.00	**0.30**	-0.10	1.00									
Se	0.04	0.26	0.08	0.33	0.16	0.02	0.03	0.25	0.21	0.11	0.25	-0.04	0.19	0.05	0.04	1.00								
Sni	0.26	**0.39**	0.29	0.56	0.36	-0.03	0.04	**0.51**	**0.42**	0.43	0.40	0.33	**0.33**	0.09	0.22	0.38	1.00							
Snx	-0.23	0.02	0.27	0.17	0.20	-0.22	-0.43	0.14	-0.11	0.34	0.28	-0.07	0.32	-0.40	0.38	-0.03	0.04	1.00						
Sr	0.17	-0.32	-0.47	**-0.49**	-0.48	0.23	**0.45**	**-0.51**	0.02	-0.44	-0.44	0.17	**-0.72**	0.34	-0.35	-0.24	-0.28	-0.42	1.00					
Ti	0.13	-0.30	-0.36	-0.37	-0.46	0.20	**0.45**	**-0.40**	0.25	-0.30	-0.11	0.36	-0.55	-0.02	-0.46	-0.13	-0.25	-0.39	**0.54**	1.00				
U	-0.32	0.15	-0.10	0.00	0.07	0.22	0.09	0.05	-0.10	-0.10	-0.21	-0.14	0.02	0.02	-0.19	0.20	-0.09	-0.19	0.06	0.33	1.00			
W	0.12	**0.66**	0.10	**0.87**	**0.66**	-0.13	-0.04	**0.75**	0.32	0.45	0.27	0.01	**0.75**	-0.18	0.32	0.23	0.56	0.29	**-0.57**	**-0.49**	-0.10	1.00		
Zn	-0.06	**0.71**	-0.01	**0.81**	**0.93**	-0.45	-0.13	**0.96**	0.12	0.47	0.22	0.08	**0.95**	-0.32	0.14	0.19	**0.40**	0.27	**-0.63**	-0.47	0.03	**0.75**	1.00	
Zr	-0.23	-0.12	0.09	-0.36	-0.24	**0.39**	0.06	-0.39	-0.10	-0.19	-0.28	-0.25	-0.14	-0.05	0.21	-0.16	-0.50	-0.06	0.05	0.23	**0.57**	-0.22	-0.27	1.00

APPENDIX 9

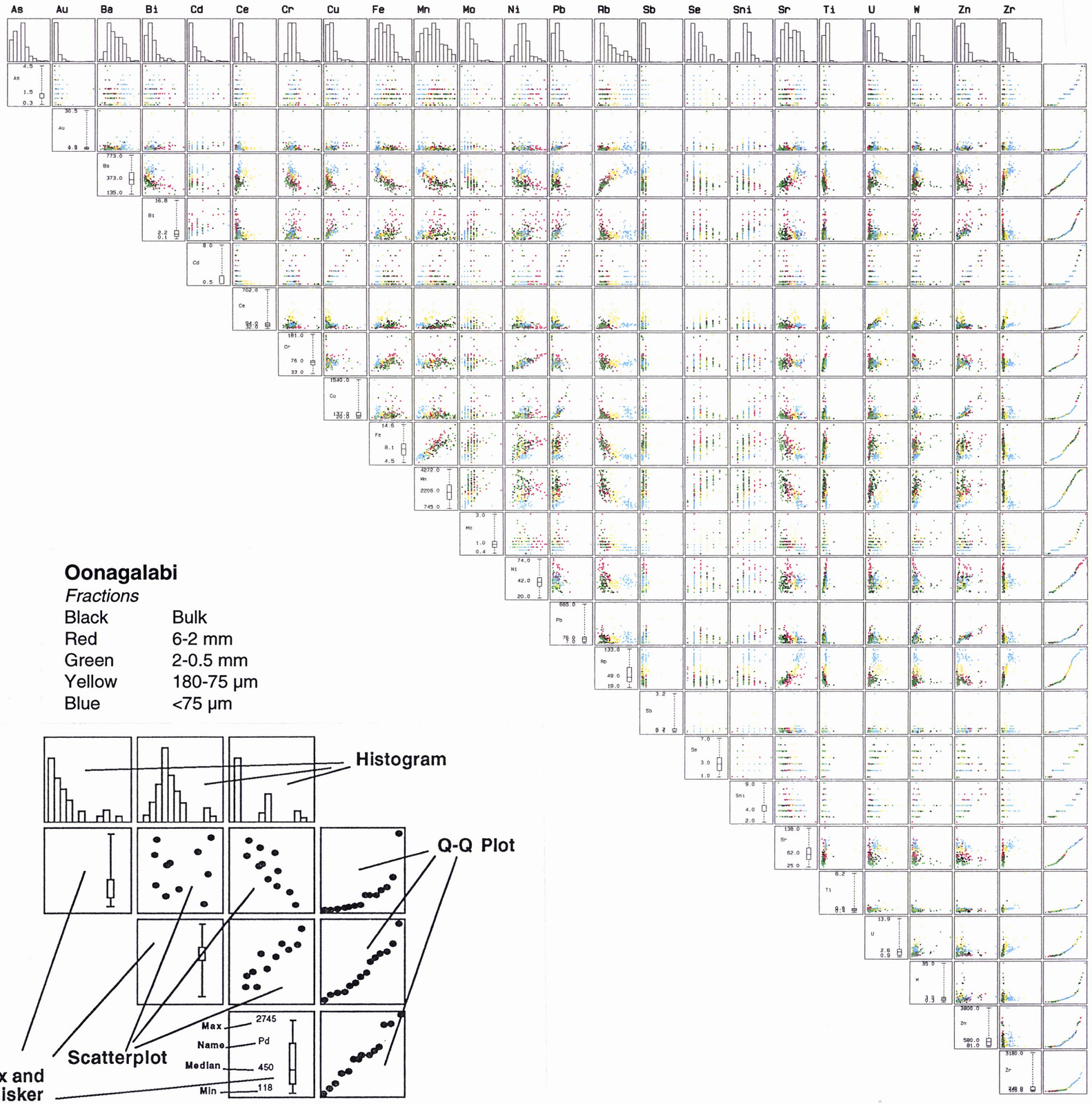
SCATTERPLOT MATRICES



Winnecke

Fractions

Black	Bulk
Red	6-2 mm
Green	2-0.5 mm
Yellow	180-75 µm
Blue	<75 µm



Oonagalabi

Fractions

Black	Bulk
Red	6-2 mm
Green	2-0.5 mm
Yellow	180-75 µm
Blue	<75 µm

APPENDIX 10

PRINCIPAL COMPONENT ANALYSES

Principal component analysis of each size fraction

Appendix 10.A Winnecke

Appendix 10.B Oonagalabi

Principal component analysis, rotated loading matrix (VARIMAX, Gamma = 1.0000)
Bulk <6mm fraction, Winnecke

	1	2	3	4	5
AU	0.346	-0.089	0.187	**0.781**	-0.095
AS	-0.031	0.213	-0.138	**0.719**	0.391
BA	0.065	**0.861**	0.142	0.080	0.433
BI	-0.003	0.122	**0.886**	0.100	0.075
CD	-0.018	0.982	0.008	0.036	0.015
CE	**0.550**	0.234	-0.082	0.133	**0.750**
CR	-0.017	0.339	0.190	0.394	**0.749**
CU	0.136	**0.568**	0.414	0.426	0.326
FE	0.288	**0.556**	0.058	0.236	**0.667**
MN	-0.024	**0.985**	-0.021	0.075	0.052
MO	0.102	-0.063	-0.479	0.008	-0.226
NI	-0.133	**0.592**	0.183	0.413	0.499
PB	0.223	**0.863**	0.032	0.035	0.385
RB	0.052	0.120	0.407	0.150	**0.791**
SB	-0.039	0.149	0.219	0.045	0.823
SE	0.486	-0.086	-0.351	0.287	0.385
SN	0.030	0.981	0.026	0.069	0.078
SN_XRF	0.058	0.915	0.192	-0.055	0.123
SR	0.034	0.090	0.042	-0.049	**0.939**
TIO2	0.330	0.366	0.119	0.203	**0.778**
U	**0.530**	0.254	-0.029	-0.015	**0.660**
W	0.449	0.015	0.436	-0.004	**0.627**
ZN	0.191	**0.657**	0.454	-0.020	0.367
ZR	**0.885**	0.087	-0.029	0.121	0.065

Significant values in bold

"Variance" Explained by Rotated Components

1	2	3	4	5
2.267	7.132	2.129	1.906	6.408

Percent of Total Variance Explained

1	2	3	4	5
9.444	29.717	8.871	7.942	26.698

Principal component analysis, rotated loading matrix (VARIMAX, Gamma = 1.0000)
6-2 mm fraction, Winnecke

	1	2	3	4	5
AU	-0.032	-0.025	0.017	-0.046	-0.049
AS	0.276	0.054	-0.593	-0.032	-0.201
BA	0.329	**0.915**	0.108	0.028	0.135
BI	0.703	-0.094	-0.277	0.085	-0.421
CD	0.092	0.978	0.027	0.006	0.054
CE	**0.842**	0.217	0.144	0.118	-0.055
CR	**0.844**	0.198	-0.268	-0.002	0.205
CU	**0.623**	**0.690**	-0.004	0.125	0.057
FE	**0.896**	0.239	-0.037	0.163	0.033
MN	0.094	**0.981**	-0.009	0.023	0.050
MO	-0.248	-0.176	0.002	-0.044	**-0.746**
NI	**0.750**	0.479	-0.162	0.050	0.068
PB	0.472	**0.715**	0.091	0.274	0.027
RB	**0.897**	0.189	0.190	0.098	0.133
SB	0.784	0.157	-0.368	0.129	0.014
SE	0.029	0.495	-0.111	0.290	0.283
SN	0.508	0.115	0.344	0.594	0.057
SN_XRF	0.084	0.128	-0.027	**0.914**	-0.020
SR	**0.808**	0.313	-0.277	-0.061	0.177
TIO2	**0.921**	0.207	0.127	0.048	0.151
U	**0.637**	0.257	0.410	0.344	-0.078
W	**0.654**	-0.066	0.180	0.239	-0.486
ZN	**0.644**	**0.691**	0.112	0.008	-0.083
ZR	0.033	0.095	**0.921**	0.036	-0.131

	6
AU	**-0.941**
AS	0.324
BA	0.026
BI	-0.069
CD	-0.022
CE	0.156
CR	-0.002
CU	0.052
FE	0.109
MN	0.006
MO	-0.023
NI	0.061
PB	0.058
RB	0.034
SB	-0.057
SE	0.026
SN	0.093
SN_XRF	0.008
SR	-0.045
TIO2	0.004
U	0.113
W	-0.022
ZN	0.044
ZR	0.098

Significant values in bold

"Variance" Explained by Rotated Components

1	2	3	4	5	6
8.593	5.193	2.027	1.629	1.277	1.084

Percent of Total Variance Explained

1	2	3	4	5	6
35.805	21.637	8.444	6.789	5.319	4.518

Principal component analysis, rotated loading matrix (VARIMAX, Gamma = 1.0000)
2-0.5 mm fraction, Winnecke

	1	2	3	4	5
AU	0.087	**0.879**	-0.138	-0.022	0.119
AS	0.169	-0.011	0.181	0.089	**0.818**
BA	0.409	-0.008	0.188	**0.861**	-0.007
BI	0.160	**0.901**	0.046	0.014	-0.100
CD	0.044	0.905	-0.043	-0.009	-0.025
CE	**0.711**	0.092	0.348	0.349	0.332
CR	0.011	0.049	0.115	0.139	0.104
CU	0.010	0.221	0.205	0.472	0.426
FE	**0.682**	0.024	0.215	**0.572**	0.277
MN	-0.021	-0.086	-0.033	**0.919**	-0.024
MO	0.100	**-0.532**	-0.373	-0.234	0.485
NI	0.274	0.127	0.290	**0.650**	0.360
PB	**0.524**	-0.118	0.118	**0.757**	-0.010
RB	**0.772**	0.186	0.356	0.260	0.032
SB	0.527	0.045	**0.710**	0.178	0.070
SE	0.175	-0.064	0.269	-0.012	0.512
SN	**0.816**	0.046	-0.104	0.067	0.003
SN_XRF	0.348	0.337	-0.374	-0.098	-0.427
SR	0.492	-0.062	**0.783**	0.233	0.168
TIO2	**0.706**	0.103	0.251	0.510	0.200
U	**0.850**	-0.021	0.079	0.190	0.167
W	**0.778**	0.122	-0.092	0.082	-0.057
ZN	**0.577**	0.162	0.000	**0.683**	-0.115
ZR	0.188	0.090	**-0.901**	-0.051	-0.214

	6
AU	-0.103
AS	-0.277
BA	-0.083
BI	0.055
CD	0.006
CE	0.081
CR	**-0.800**
CU	0.319
FE	-0.127
MN	-0.121
MO	0.104
NI	-0.021
PB	-0.028
RB	-0.044
SB	-0.004
SE	0.394
SN	0.020
SN_XRF	0.195
SR	0.039
TIO2	-0.025
U	0.064
W	0.018
ZN	-0.040
ZR	0.095

Significant values in bold

"Variance" Explained by Rotated Components

1	2	3	4	5	6
5.689	3.004	2.907	4.277	2.047	1.101

Percent of Total Variance Explained

1	2	3	4	5	6
23.706	12.519	12.111	17.821	8.529	4.589

Principal component analysis, rotated loading matrix (VARIMAX, Gamma = 1.0000)
180-75 µm fraction, Winnecke

	1	2	3	4	5
AU	**0.545**	-0.161	0.102	0.056	-0.369
AS	0.423	0.312	0.455	-0.018	-0.292
BA	-0.416	0.264	0.028	**-0.789**	0.017
BI	-0.079	0.122	**0.918**	0.039	0.047
CD	-0.123	0.070	**0.864**	0.056	0.109
CE	**0.948**	-0.067	0.025	0.146	0.059
CR	**0.889**	0.303	0.114	-0.201	-0.044
CU	-0.020	**0.577**	0.410	0.339	-0.121
FE	**0.856**	0.400	-0.035	-0.056	0.136
MN	0.226	**0.625**	-0.235	0.133	0.446
MO	0.159	**-0.546**	-0.124	0.011	0.014
NI	0.379	**0.758**	0.124	-0.249	-0.078
PB	**0.800**	0.174	0.158	-0.047	0.010
RB	0.077	0.054	0.025	**-0.961**	-0.078
SB	**0.632**	0.018	**0.674**	-0.241	-0.061
SE	**0.780**	0.150	-0.064	0.061	0.075
SN	**0.904**	-0.153	0.017	-0.048	0.178
SN_XRF	0.153	-0.166	0.126	0.056	**0.856**
SR	**0.858**	-0.025	0.078	-0.290	-0.107
TIO2	**0.930**	0.253	-0.087	0.108	0.092
U	**0.965**	-0.037	0.012	0.117	0.022
W	0.387	-0.173	**0.608**	-0.408	-0.079
ZN	0.133	**0.824**	-0.054	-0.280	-0.139
ZR	**0.862**	-0.174	0.035	0.267	-0.065

Significant values in bold

"Variance" Explained by Rotated Components

1	2	3	4	5
9.249	2.976	2.963	2.309	1.310

Percent of Total Variance Explained

1	2	3	4	5
38.537	12.400	12.348	9.622	5.459

Principal component analysis, rotated loading matrix (VARIMAX, Gamma = 1.0000)
<75 µm fraction, Winnecke

	1	2	3	4	5
AU	-0.187	0.223	0.313	-0.157	0.069
AS	0.099	0.363	0.294	**0.636**	-0.023
BA	**0.859**	-0.009	0.047	0.143	-0.035
BI	0.110	0.081	-0.134	0.014	0.053
CD	-0.017	0.067	-0.244	-0.015	0.612
CE	0.155	0.278	**0.675**	-0.317	-0.219
CR	-0.123	**0.807**	0.356	0.132	0.128
CU	0.312	**0.842**	-0.165	0.152	0.008
FE	0.160	**0.730**	0.356	0.170	0.016
MN	**0.558**	0.500	-0.143	0.412	-0.123
MO	-0.062	0.011	0.398	-0.435	-0.004
NI	0.118	**0.950**	-0.064	-0.036	-0.010
PB	-0.115	**0.625**	**0.506**	0.046	0.127
RB	**0.908**	0.075	0.009	-0.299	0.150
SB	-0.232	0.830	0.083	-0.034	0.049
SE	0.005	-0.035	0.806	0.047	-0.064
SN	0.465	0.059	0.461	0.119	0.066
SN_XRF	0.078	0.003	0.086	0.029	**0.852**
SR	-0.367	**0.657**	0.481	0.125	0.056
TIO2	-0.125	**0.753**	0.388	0.371	0.030
U	0.004	0.078	**0.833**	0.345	-0.021
W	0.088	0.028	-0.074	**-0.904**	-0.031
ZN	0.296	**0.785**	-0.205	-0.310	-0.152
ZR	-0.469	0.228	**0.562**	0.394	0.067

	6	7
AU	**0.755**	0.006
AS	-0.124	0.063
BA	-0.140	0.160
BI	0.062	**0.858**
CD	0.018	0.241
CE	0.142	-0.110
CR	0.109	0.239
CU	-0.071	-0.058
FE	0.323	-0.105
MN	0.193	-0.300
MO	-0.670	-0.141
NI	-0.010	0.001
PB	0.033	-0.264
RB	-0.011	0.035
SB	0.029	0.254
SE	-0.075	-0.081
SN	0.009	-0.418
SN_XRF	0.035	-0.138
SR	0.238	0.018
TIO2	0.027	0.056
U	0.123	-0.061
W	-0.094	0.066
ZN	0.095	-0.136
ZR	-0.042	0.124

Significant values in bold

"Variance" Explained by Rotated Components

1	2	3	4	5	6	7
2.867	6.081	3.757	2.429	1.271	1.337	1.398

Percent of Total Variance Explained

1	2	3	4	5	6	7
11.944	25.338	15.652	10.120	5.298	5.570	5.826

Principal component analysis, rotated loading matrix (VARIMAX, Gamma = 1.0000)
<6mm bulk fraction, Oonagalabi

	1	2	3	4	5
AU	**0.810**	0.069	-0.273	0.066	0.010
AS	-0.165	-0.022	0.325	0.472	**0.627**
BA	-0.104	-0.185	**-0.908**	-0.091	0.093
BI	**0.866**	-0.018	0.278	-0.169	0.036
CD	**0.899**	-0.170	0.006	0.025	0.062
CE	-0.175	**0.908**	-0.047	0.120	-0.092
CR	-0.059	0.101	**0.581**	**0.756**	-0.060
CU	**0.956**	-0.103	-0.030	-0.042	0.030
FE	0.109	**0.671**	**0.625**	0.269	-0.004
MN	0.002	**0.752**	0.399	0.016	0.030
MO	0.451	0.303	0.244	-0.324	-0.259
NI	-0.025	-0.166	**0.705**	0.049	0.265
PB	**0.843**	0.003	0.064	-0.281	0.227
RB	-0.038	-0.175	**-0.851**	0.045	-0.081
SB	0.286	0.298	0.041	-0.250	**0.636**
SE	-0.094	**0.789**	0.203	-0.153	0.234
SN	**0.856**	0.086	0.123	-0.134	0.126
SN_XRF	0.398	0.011	0.009	-0.156	**0.695**
SR	-0.222	-0.307	-0.253	**0.722**	0.032
TIO2	-0.089	0.243	0.416	**0.797**	-0.216
U	0.001	**0.825**	-0.069	0.131	0.013
W	0.126	**0.616**	0.015	-0.321	0.062
ZN	**0.948**	-0.045	-0.019	-0.102	0.142
ZR	-0.262	**0.497**	-0.163	**0.520**	-0.350

Significant values in bold

"Variance" Explained by Rotated Components

1	2	3	4	5
6.149	4.263	3.585	2.799	1.770

Percent of Total Variance Explained

1	2	3	4	5
25.621	17.762	14.939	11.661	7.376

Principal component analysis, rotated loading matrix (VARIMAX, Gamma = 1.0000)
6-2 mm fraction, Oonagalabi

	1	2	3	4	5
AU	**0.840**	0.066	0.086	-0.328	-0.228
AS	-0.257	-0.045	0.126	0.064	0.014
BA	-0.474	**-0.750**	0.024	-0.247	0.014
BI	**0.629**	0.303	-0.160	0.303	-0.161
CD	**0.934**	0.092	0.102	0.039	0.046
CE	-0.160	0.056	**0.853**	0.115	-0.048
CR	-0.058	**0.903**	-0.091	-0.194	-0.123
CU	**0.870**	0.142	-0.089	0.132	0.125
FE	0.379	**0.736**	0.245	0.141	0.025
MN	0.341	**0.589**	0.280	0.109	0.114
MO	0.346	0.054	-0.294	0.245	**-0.594**
NI	-0.127	**0.720**	-0.137	0.392	0.019
PB	**0.936**	0.006	0.139	0.176	0.025
RB	-0.388	**-0.785**	0.059	-0.263	0.010
SB	0.504	0.195	0.170	0.365	-0.310
SE	0.193	**0.740**	0.401	0.264	0.101
SN	**0.664**	0.344	0.120	0.379	0.231
SN_XRF	0.288	0.033	-0.184	0.228	**0.752**
SR	-0.263	-0.337	-0.060	**-0.830**	-0.063
TIO2	-0.139	**0.938**	-0.048	-0.057	-0.018
U	0.308	-0.036	**0.786**	-0.075	0.017
W	**0.759**	-0.196	0.124	0.212	0.028
ZN	**0.950**	0.096	0.034	0.183	0.092
ZR	**-0.725**	-0.286	0.242	0.366	0.075

	6
AU	0.125
AS	**0.824**
BA	0.125
BI	-0.155
CD	-0.165
CE	0.123
CR	-0.146
CU	-0.189
FE	0.367
MN	0.505
MO	0.091
NI	-0.204
PB	-0.025
RB	-0.052
SB	0.130
SE	-0.032
SN	0.107
SN_XRF	0.125
SR	-0.138
TIO2	0.125
U	0.089
W	0.328
ZN	-0.029
ZR	0.118

Significant values in bold

"Variance" Explained by Rotated Components

1	2	3	4	5	6
7.474	5.364	2.008	1.988	1.226	1.485

Percent of Total Variance Explained

1	2	3	4	5	6
31.140	22.350	8.366	8.283	5.110	6.188

Principal component analysis, rotated loading matrix (VARIMAX, Gamma = 1.0000)
2-0.5 mm fraction, Oonagalabi

	1	2	3	4	5
AU	**0.786**	0.122	0.109	-0.203	0.013
AS	0.381	-0.112	-0.154	**0.634**	0.231
BA	-0.395	-0.064	**-0.823**	-0.039	-0.205
BI	**0.907**	0.128	0.156	0.125	0.048
CD	**0.910**	-0.043	0.012	0.171	0.000
CE	-0.267	**0.610**	-0.049	0.019	**0.620**
CR	-0.135	-0.149	**0.896**	-0.213	-0.100
CU	**0.954**	-0.042	0.039	0.162	0.039
FE	0.122	0.311	**0.719**	0.070	**0.540**
MN	0.064	0.237	0.290	0.149	**0.787**
MO	0.430	**0.776**	0.083	0.010	0.014
NI	0.032	-0.010	**0.610**	**0.646**	-0.171
PB	**0.936**	-0.001	-0.103	0.093	0.168
RB	-0.359	-0.032	**-0.683**	-0.047	-0.310
SB	0.423	0.039	-0.077	-0.055	**0.670**
SE	-0.047	0.426	0.047	0.080	**0.774**
SN	**0.868**	0.307	0.158	0.054	0.137
SN_XRF	0.443	0.043	0.006	-0.414	0.436
SR	-0.312	-0.206	0.177	**-0.571**	-0.511
TIO2	-0.146	0.069	**0.901**	-0.012	-0.143
U	-0.022	**0.837**	0.095	0.061	0.226
W	0.043	**0.842**	-0.077	-0.128	0.309
ZN	**0.943**	-0.007	-0.021	0.128	0.161
ZR	**-0.648**	0.246	-0.433	0.028	0.434

Significant values in bold

"Variance" Explained by Rotated Components

1	2	3	4	5
7.340	2.998	4.080	1.565	3.456

Percent of Total Variance Explained

1	2	3	4	5
30.585	12.490	17.001	6.519	14.400

Principal component analysis, rotated loading matrix (VARIMAX, Gamma = 1.0000)
180-75 µm fraction, Oonagalabi

	1	2	3	4	5	6
AU	0.061	-0.182	0.217	0.215	-0.426	0.400
AS	-0.108	0.416	**0.662**	0.017	0.180	0.038
BA	-0.385	0.032	0.033	**-0.834**	-0.169	-0.088
BI	-0.162	**-0.894**	0.063	0.119	0.006	0.261
CD	-0.209	**-0.868**	-0.262	-0.013	0.070	0.007
CE	**0.917**	0.269	-0.064	0.002	0.046	0.123
CR	**0.643**	0.058	0.010	**0.570**	0.294	-0.191
CU	-0.178	**-0.952**	0.013	-0.138	0.055	0.107
FE	**0.677**	0.116	0.177	0.389	**0.554**	-0.058
MN	0.336	0.138	0.346	0.128	**0.738**	0.049
MO	0.164	-0.089	0.175	0.130	**0.888**	0.027
NI	-0.005	0.066	0.023	**0.866**	-0.002	0.186
PB	-0.138	**-0.668**	**0.596**	0.019	-0.068	0.065
RB	-0.436	0.042	-0.461	-0.487	-0.208	0.175
SB	-0.125	-0.191	**0.725**	-0.026	0.321	0.100
SE	**0.852**	0.162	0.056	0.164	0.100	0.103
SN	0.162	-0.437	0.221	0.140	**0.713**	0.257
SN_XRF	-0.030	-0.230	-0.024	0.164	0.250	**0.753**
SR	-0.382	0.470	-0.393	-0.064	-0.232	0.288
TIO2	**0.724**	0.072	-0.092	0.345	0.274	-0.305
U	**0.945**	0.172	-0.066	0.011	-0.013	0.156
W	**0.594**	-0.261	0.137	-0.059	-0.110	**0.565**
ZN	-0.158	**-0.961**	0.095	-0.072	-0.017	0.132
ZR	**0.808**	0.155	-0.176	0.177	0.279	-0.202

Significant values in bold

"Variance" Explained by Rotated Components

1	2	3	4	5	6
5.688	4.813	2.117	2.509	2.931	1.608

Percent of Total Variance Explained

1	2	3	4	5	6
23.700	20.055	8.820	10.456	12.211	6.702

Principal component analysis, rotated loading matrix (VARIMAX, Gamma = 1.0000)
<75 µm fraction, Oonagalabi

	1	2	3	4	5
AU	**0.857**	-0.076	0.116	-0.105	-0.213
AS	-0.068	0.277	-0.481	0.209	-0.176
BA	-0.321	**0.555**	**0.666**	-0.091	-0.100
BI	**0.853**	0.145	-0.008	0.177	0.116
CD	**0.906**	0.017	0.174	0.088	0.101
CE	**-0.483**	0.123	0.053	**-0.633**	-0.264
CR	-0.194	-0.044	**-0.910**	-0.018	-0.025
CU	**0.933**	0.140	0.179	0.029	-0.045
FE	0.060	**0.695**	-0.374	0.076	0.120
MN	0.020	**0.740**	0.236	0.142	0.206
MO	0.097	0.049	0.147	0.060	0.120
NI	-0.197	0.335	**-0.494**	0.476	0.107
PB	**0.606**	**0.660**	-0.001	0.057	0.145
RB	-0.153	-0.201	-0.054	0.026	**-0.839**
SB	0.135	**0.854**	0.107	-0.003	0.047
SE	0.410	0.373	0.049	-0.315	-0.407
SN	0.405	**0.663**	0.159	0.029	-0.374
SN_XRF	0.109	0.165	**0.562**	0.243	0.430
SR	-0.427	-0.307	**-0.603**	0.010	-0.176
TIO2	-0.332	-0.128	**-0.730**	-0.363	0.208
U	0.070	-0.059	-0.082	**-0.876**	-0.126
W	**0.626**	0.252	0.041	0.111	0.074
ZN	**0.932**	0.154	0.203	0.049	0.098
ZR	-0.258	-0.100	-0.179	**-0.770**	0.386

	6
AU	-0.030
AS	**0.495**
BA	0.042
BI	0.289
CD	-0.061
CE	0.236
CR	0.004
CU	-0.011
FE	**0.436**
MN	0.023
MO	**0.808**
NI	0.109
PB	0.036
RB	-0.126
SB	0.027
SE	0.032
SN	0.172
SN_XRF	0.097
SR	-0.236
TIO2	-0.053
U	-0.168
W	0.427
ZN	-0.004
ZR	-0.107

Significant values in bold

"Variance" Explained by Rotated Components

1	2	3	4	5	6
5.962	3.617	3.379	2.428	1.738	1.585

Percent of Total Variance Explained

1	2	3	4	5	6
24.840	15.072	14.079	10.119	7.243	6.605

APPENDIX 11

SAMPLE FRACTION WEIGHTS AND PERCENTAGES

Data gathered during size fractionation of stream sediment samples

SAMPLE FRACTION WEIGHTS AND PERCENTAGES

Fraction Units	bulk <6mm g	6-2 mm g	2-0.5 mm g	500-180 µm g	180-75 µm g	<75 µm g	6-2 mm %	2-0.5 mm %	500-180 µm %	180-75 µm %	<75 µm %
WO-201	1166.6	1008.9	1792.3	701.5	152.0	65.4	27.12	48.18	18.86	4.09	1.76
WO-202	1175.7	1008.9	1675.5	1038.4	164.1	35.8	25.72	42.71	26.47	4.18	0.91
WO-203	1210.9	1047.8	1473.4	958.7	257.5	120.4	27.16	38.19	24.85	6.67	3.12
WO-204	1155.6	1050.8	2422.1	483.2	29.5	12.3	26.28	60.58	12.09	0.74	0.31
WO-205	1200.8	1040.8	2212.8	583.8	39.6	12.4	26.76	56.89	15.01	1.02	0.32
WO-206	1122.6	1125.7	1724.1	805.4	167.8	72.0	28.90	44.26	20.68	4.31	1.85
WO-207	1086.6	952.8	1365.7	1140.6	219.9	88.7	25.29	36.25	30.27	5.84	2.35
WO-208	1059.1	2023.5	1881.4	723.6	24.9	9.0	43.40	40.35	15.52	0.53	0.19
WO-209	1129.9	948.1	1667.0	1003.9	157.0	53.3	24.76	43.53	26.22	4.10	1.39
WO-210	955.3	991.9	932.5	1166.6	444.8	158.9	26.85	25.24	31.57	12.04	4.30
WO-211	1037.6	942.1	1246.3	1101.4	279.7	101.8	25.66	33.95	30.00	7.62	2.77
WO-212	1144.2	918.3	1251.0	1368.2	273.9	64.9	23.69	32.27	35.30	7.07	1.67
WO-213	1185.9	1178.1	1729.6	961.8	261.2	97.7	27.86	40.90	22.75	6.18	2.31
WO-214	931.0	1129.1	1619.3	885.9	186.8	62.2	29.08	41.70	22.81	4.81	1.60
WO-215	1108.0	1119.0	1783.4	865.9	231.3	92.1	27.35	43.59	21.16	5.65	2.25
WO-216	1092.0	1029.7	1620.0	988.4	153.4	54.5	26.77	42.12	25.70	3.99	1.42
WO-217	1070.5	972.9	1165.4	1209.6	353.7	117.9	25.47	30.51	31.67	9.26	3.09
WO-218	1208.7	1030.6	1552.9	1183.8	154.5	54.4	25.92	39.05	29.77	3.89	1.37
WO-219	1104.6	1013.0	1592.4	1113.8	154.2	45.8	25.85	40.63	28.42	3.93	1.17
WO-220	1068.9	1121.9	1765.8	887.4	173.4	68.5	27.93	43.96	22.09	4.32	1.71
WO-221	1178.1	1023.7	1396.2	1015.3	225.0	66.0	27.47	37.47	27.25	6.04	1.77
WO-222	963.8	1058.7	1830.7	778.2	123.4	45.6	27.59	47.72	20.28	3.22	1.19
WO-223	923.4	920.5	1504.8	1051.0	226.6	76.1	24.36	39.82	27.81	6.00	2.01
WO-224	1063.0	957.5	1672.9	904.8	93.2	27.7	26.19	45.76	24.75	2.55	0.76
WO-225	992.5	1005.7	1497.8	1238.1	198.8	52.3	25.19	37.51	31.01	4.98	1.31
WO-226	1062.6	985.8	1643.5	859.0	174.7	65.0	26.44	44.09	23.04	4.69	1.74
WO-227	1036.6	996.2	2000.9	790.4	58.9	22.0	25.75	51.72	20.43	1.52	0.57
WO-228	966.0	1032.9	1936.2	754.5	252.0	141.6	25.09	47.03	18.33	6.12	3.44
WO-229	1123.8	999.3	2033.5	583.7	138.1	110.1	25.86	52.62	15.10	3.57	2.85
WO-230	1030.5	1072.6	1790.0	586.8	138.8	94.5	29.13	48.61	15.93	3.77	2.57
WO-231	991.8	959.7	1770.8	778.5	158.0	78.2	25.62	47.28	20.79	4.22	2.09
WO-232	1073.5	1034.2	1794.4	785.0	174.8	126.8	26.41	45.83	20.05	4.46	3.24
WO-233	952.7	984.5	1970.6	666.7	100.4	84.8	25.86	51.76	17.51	2.64	2.23
WO-234	1005.4	911.2	1622.2	865.8	274.5	197.6	23.54	41.90	22.36	7.09	5.10
WO-235	1079.0	997.6	1619.2	854.2	193.3	58.0	26.80	43.50	22.95	5.19	1.56
WO-236	1118.7	993.3	1924.0	724.5	145.1	96.5	25.58	49.54	18.66	3.74	2.48
WO-237	974.1	1005.0	1982.8	747.5	156.2	109.6	25.12	49.56	18.68	3.90	2.74
WO-238	1006.1	950.2	1935.5	527.8	125.8	108.9	26.05	53.05	14.47	3.45	2.99
WO-239	1144.8	1015.2	1918.4	762.7	157.3	158.2	25.31	47.82	19.01	3.92	3.94
WO-240	1013.2	1032.0	1737.9	995.4	295.8	186.5	24.30	40.91	23.43	6.96	4.39
WO-241	951.4	977.3	2047.1	647.7	206.0	101.6	24.56	51.44	16.28	5.18	2.55
WO-242	1175.9	994.3	2187.1	678.4	98.3	69.2	24.69	54.31	16.85	2.44	1.72
WO-243	1065.2	927.2	1918.6	1058.6	267.3	96.5	21.72	44.95	24.80	6.26	2.26
WO-244	1131.8	877.2	1800.5	904.7	153.4	56.9	23.13	47.47	23.85	4.04	1.50
WO-245	1143.9	975.5	1855.3	1043.7	191.7	108.8	23.37	44.44	25.00	4.59	2.61
WO-246	971.2	994.7	1941.1	681.7	128.5	48.1	26.22	51.16	17.97	3.39	1.27
WO-247	1040.5	926.8	2007.4	597.8	238.4	109.5	23.89	51.74	15.41	6.14	2.82
WO-248	1133.0	934.5	2215.2	745.9	138.9	63.5	22.80	54.06	18.20	3.39	1.55
WO-249	1086.8	975.6	2173.6	651.4	97.1	49.5	24.72	55.07	16.50	2.46	1.25
WO-250	1023.9	794.6	2136.2	886.2	138.5	75.0	19.71	53.00	21.99	3.44	1.86
WO-251	1093.3	907.1	1333.7	1262.7	252.5	107.5	23.48	34.52	32.68	6.54	2.78
WO-252	1005.5	837.1	1498.8	1117.8	234.1	91.4	22.15	39.66	29.58	6.19	2.42
WO-253	1074.1	872.2	1517.8	1331.8	267.8	111.2	21.27	37.01	32.48	6.53	2.71
WO-254	1098.0	802.6	1530.5	1401.9	240.2	66.4	19.86	37.87	34.69	5.94	1.64
WO-255	1107.2	940.3	1528.7	1287.9	195.9	41.3	23.54	38.27	32.25	4.90	1.03
WO-256	1123.6	887.9	1520.5	1136.7	171.3	54.7	23.54	40.32	30.14	4.54	1.45
WO-257	1105.1	987.8	2047.9	550.6	106.1	71.9	26.24	54.40	14.63	2.82	1.91

SAMPLE FRACTION WEIGHTS AND PERCENTAGES

Fraction	bulk <6mm	6-2 mm	2-0.5 mm	500-180 µm	180-75 µm	<75 µm	6-2 mm	2-0.5 mm	500-180 µm	180-75 µm	<75 µm
Units	g	g	g	g	g	g	%	%	%	%	%
WO-258	1174.1	891.8	2147.5	554.7	76.9	49.3	23.97	57.73	14.91	2.07	1.33
WO-259	1059.7	970.3	2297.3	586.4	81.1	64.3	24.26	57.44	14.66	2.03	1.61
WO-260	1060.6	1016.8	2322.6	562.2	172.8	97.5	24.37	55.67	13.48	4.14	2.34
WO-261	1130.5	959.0	2274.0	498.2	100.4	79.0	24.52	58.15	12.74	2.57	2.02
WO-262	1045.8	966.3	1871.6	928.6	189.8	134.1	23.62	45.76	22.70	4.64	3.28
WO-263	1018.0	825.5	1952.7	454.3	172.4	133.3	23.33	55.19	12.84	4.87	3.77
WO-264	993.2	858.0	1804.8	601.2	249.2	145.9	23.45	49.32	16.43	6.81	3.99
WO-265	956.6	863.7	2219.1	419.9	107.4	78.1	23.42	60.17	11.38	2.91	2.12
WO-266	965.6	875.4	2035.3	701.4	191.9	139.8	22.20	51.61	17.78	4.87	3.54
WO-267	953.1	921.3	2112.1	666.3	128.3	89.7	23.52	53.91	17.01	3.27	2.29
WO-268	1068.3	925.7	2052.3	676.3	138.9	111.5	23.71	52.56	17.32	3.56	2.86
WO-269	912.5	833.8	2245.6	684.9	183.5	169.6	20.25	54.54	16.63	4.46	4.12
WO-270	903.0	945.9	2027.3	603.7	236.4	203.7	23.55	50.47	15.03	5.88	5.07
WO-271	1238.5	831.7	2216.4	723.9	177.6	137.1	20.35	54.23	17.71	4.35	3.35
WO-272	1007.1	890.3	1807.2	845.1	165.0	118.0	23.27	47.24	22.09	4.31	3.08
WO-273	1106.8	833.4	2250.4	726.7	124.7	112.3	20.59	55.60	17.95	3.08	2.77
WO-274	1206.8	920.5	1762.0	1203.2	283.8	150.6	21.31	40.79	27.85	6.57	3.49
WO-275	681.1	567.0	1241.8	1244.7	313.5	97.3	16.37	35.85	35.93	9.05	2.81
WO-276	990.9	706.2	1318.2	888.1	275.9	118.0	21.36	39.87	26.86	8.34	3.57
WO-277	1028.4	415.3	760.2	998.3	601.6	230.3	13.82	25.29	33.21	20.02	7.66
WO-278	1059.6	609.9	1351.5	711.4	232.8	112.4	20.21	44.78	23.57	7.71	3.72
WO-279	1041.5	511.9	1068.9	945.1	389.9	183.9	16.51	34.48	30.49	12.58	5.93
WO-280	971.7	705.9	683.7	983.8	746.2	287.5	20.72	20.07	28.87	21.90	8.44
WO-281	1196.8	828.8	2160.0	758.4	67.8	55.0	21.42	55.81	19.60	1.75	1.42
WO-282	918.6	679.4	1430.4	1186.6	252.3	120.8	18.51	38.98	32.34	6.88	3.29
WO-283	1112.5	894.2	1734.0	931.6	105.9	50.9	24.06	46.66	25.07	2.85	1.37
WO-284	1231.6	884.7	1542.1	838.5	112.8	39.6	25.89	45.12	24.53	3.30	1.16
WO-285	1227.9	711.4	1800.9	986.7	235.4	93.9	18.58	47.04	25.77	6.15	2.45
WO-286	1222.2	761.7	1585.1	936.5	199.3	75.7	21.41	44.55	26.32	5.60	2.13
WO-287	1034.9	607.5	1549.7	1164.8	72.5	21.4	17.78	45.37	34.10	2.12	0.63
WO-288	971.1	590.0	1527.8	1333.6	41.3	11.9	16.84	43.59	38.05	1.18	0.34
WO-289	1160.2	780.5	2068.9	1209.6	160.4	37.3	18.34	48.60	28.42	3.77	0.88
WO-290	1064.5	538.9	2081.0	1223.6	64.3	5.5	13.77	53.18	31.27	1.64	0.14

Mean	23.95	45.64	22.99	5.03	2.39
Max	43.40	60.58	38.05	21.90	8.44
Min	13.77	20.07	11.38	0.53	0.14
StDev	3.83	8.06	6.58	3.25	1.44

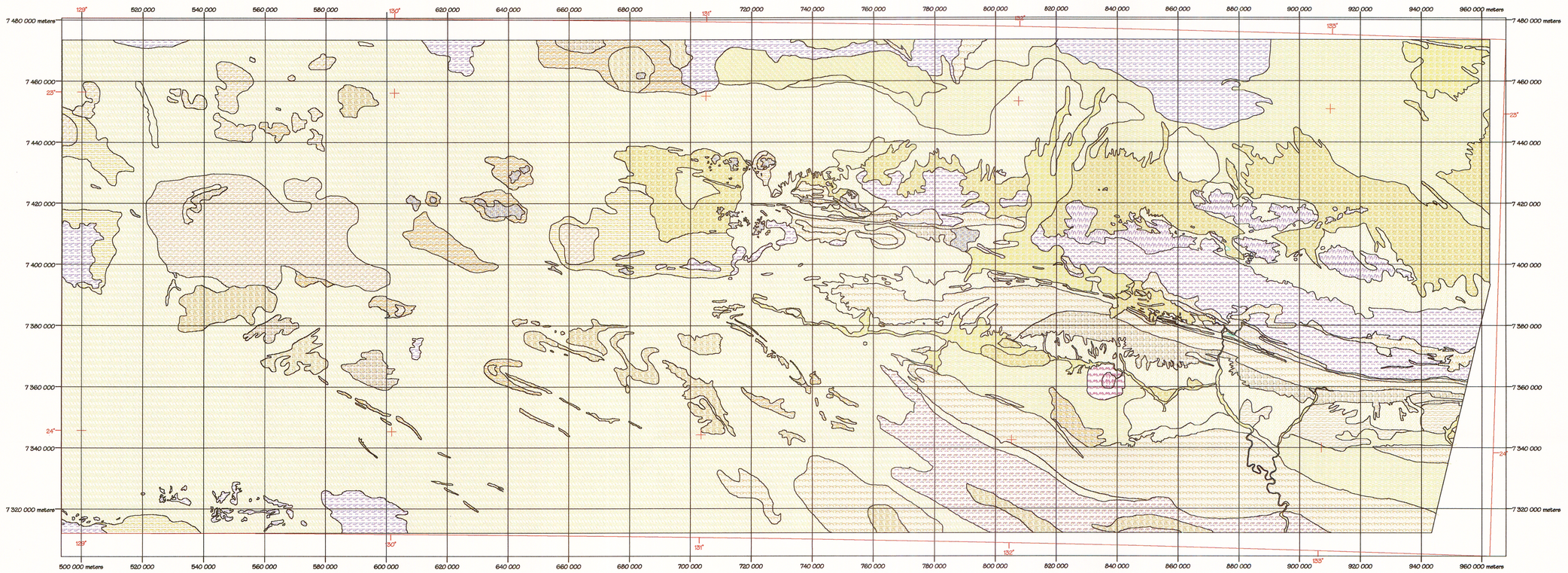
APPENDIX 12

REGIONAL MAPS

12.A Landform Interpretation

12.B 'RED' Status

Landform Interp ARGOS Project Area



CRCLEME
Cooperative Research Centre for Landscape Evolution & Mineral Exploration

CSIRO

Location Map

Black numbered grid lines are 20,000m intervals of the Australian Map Grid, Zone 52
Horizontal Datum: Australian Geodetic Datum 1966

Depositional Terrains

- af(1); active floodplains and flood-out basins
- al(1); piedmont gravel terraces; some fine-medium grained sandstones; appear as mesas
- ap(1); plains; alluvial stable
- dp(1); plains & rises; chalcedonic material, sand covered with calcareous earths
- fa(1); alluvial fans, floodplains, basins
- pp(1); playa plain; includes playa lakes
- u(1); dunefields; undulating plains, rises
- ul(1); parallel dunefield

Erosional (sedimentary) Terrains

- em(1); mountains & ridges; quartzites and sandstones
- eh(1); hills and ridges; quartzites and sandstones
- eh(2); hills, ridges and foothills; limestone
- el(1); low hills & ridges; quartzites, sandstones and conglomerates
- el(3); low hills, spurs, mesas; folded and flat-lying sedimentary rocks
- el(5); low hills on flat lying sedimentary rocks
- ep(3); plains and terraces; flat-lying and folded sedimentary rocks
- ep(4); plains; flat lying sedimentary rocks
- ep(5); plains and rises; partially stripped of aeolian sand cover
- eu(1); rises; unweathered ?, folded sedimentary rocks (incl carbonates)
- th(1); hills associated with a meteor crater
- tl(1); low hills associated with meteor crater

Erosional (metamorphic & igneous) Terrains

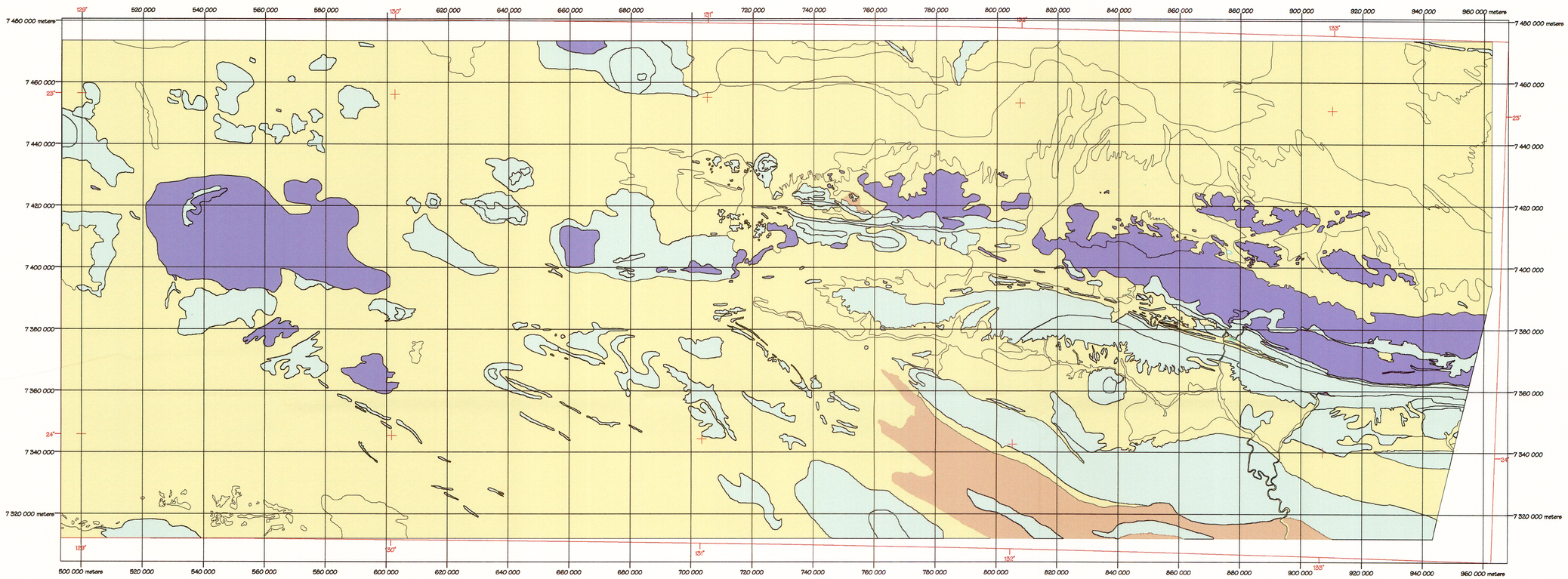
- rm(1); mountains; weathered granite, gneiss
- rh(1); hills(& plains); granite,gneiss,schist
- el(2); low hills; on folded sedimentary and igneous rocks
- ep(1); plains; stripped weathered granite, gneiss, schist
- ep(5.1); plains and rises on metamorphics; partially stripped of aeolian sand cover
- el(4); low hills & ridges; metamorhic rocks

Relict Terrain

- en(1); peneplains; dissected weathered granite, gneiss, schist with minor limestone cover
- rh(2); hills and ridges; quartzites and sandstones with ferruginous duricrust

APPENDIX 12.A

"RED" Status: ARGOS Project Area



CRCLEME
Cooperative Research Centre for Landscape Evolution & Mineral Exploration

CSIRO

Location Map

Black numbered grid lines are 20,000m intervals of the Australian Map Grid, Zone 52
Horizontal Datum: Australian Geodetic Datum 1966

"RED" Status

- Depositional Terrain; recent sediments
- Erosional Terrain; eroding sedimentary lithologies
- Erosional Terrain; eroding metamorphic and igneous lithologies
- Relict Terrain; areas with preserved or partially preserved weathering profiles

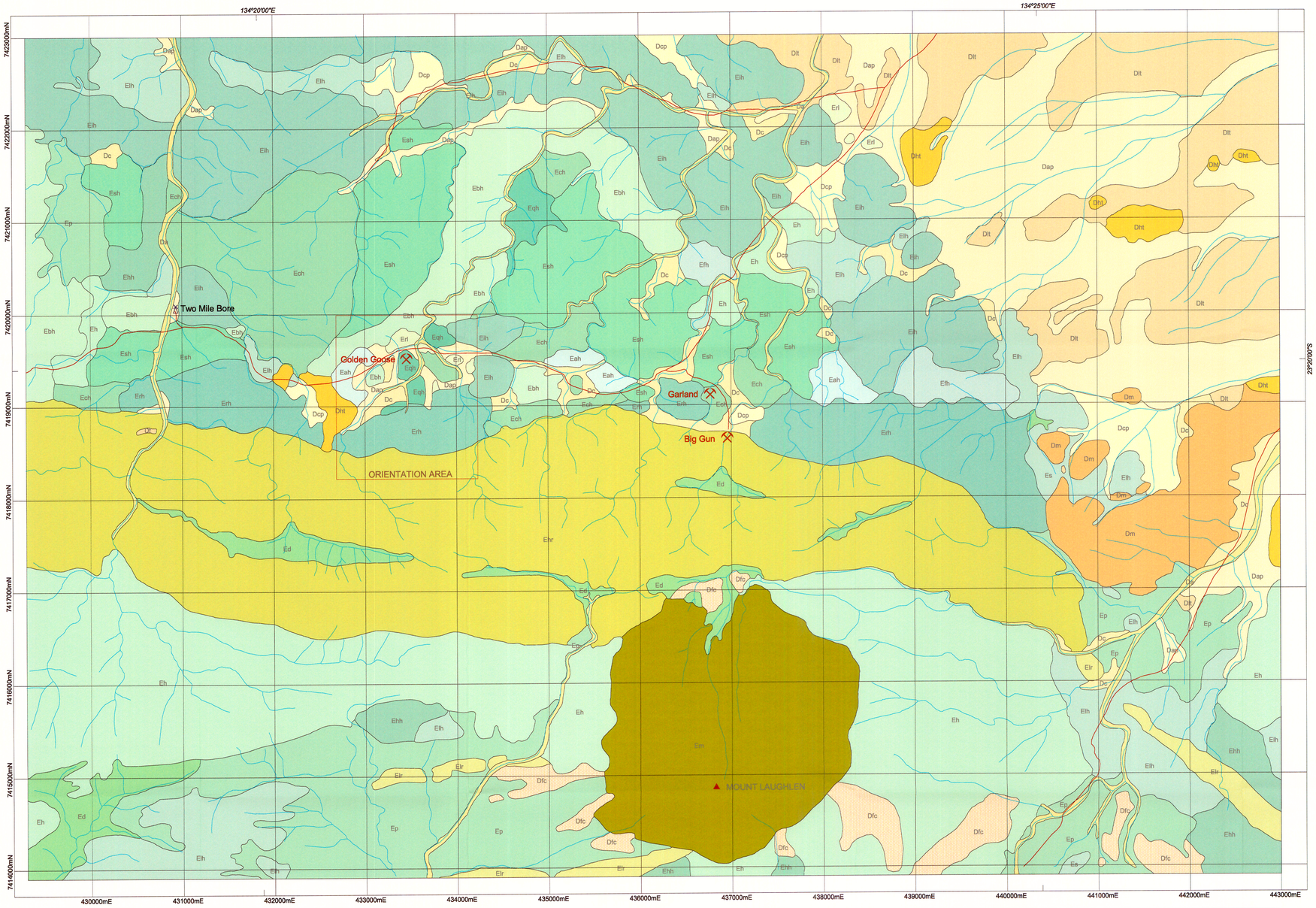
APPENDIX 12.B

APPENDIX 13

LOCAL REGOLITH-LANDFORM MAPS

13.A Winnecke
13.B Oonagalabi
13.C Mt Heughlin

REGOLITH-LANDFORM MAP OF WINNECKE GOLDFIELD, NORTHERN TERRITORY



EROSIONAL REGIME

Eah	Hills on slightly weathered amphibolite and associated metamorphic rocks (mainly gneiss and marble)
Ebh	Hills on slightly weathered biotitic schist
Ech	Hills on slightly weathered calc-silicate rock
Efh	Hills on slightly weathered quartzofeldspathic gneiss
Eih	Hills on slightly weathered cordierite, biotite and garnet gneiss and metamorphic rocks of greenschist facies
Eqh	Hills on slightly weathered gneiss with vein quartz
Erh	Hills on slightly weathered retrograde quartzofeld-pathic gneiss
Esh	Hills on slightly weathered muscovite-biotite schist, gneiss or quartzofeldspathic gneiss
Eh	Rugged terrains of low relief with outcrops or sub-crops of slightly weathered metamorphic rocks
Ed	Actively dissecting pediments with a veneer of lithic soil or lag of lithic fragments on saprock
Elh	Low hills on slightly weathered metamorphic rocks
Ehh	High hills on slightly weathered metamorphic rocks
Elr	Low ranges of saprock on quartzite and slightly metamorphosed sandstone
Ehr	High ranges of slightly weathered, thickly bedded quartzite and sandstone
Em	High mountains of slightly weathered, thickly bedded quartzite and sandstone
Erl	Low rises consisting of erosional remnants of highly weathered metamorphic rocks
Es	Low hills and gentle slopes of bleached saprolite on gneissic rocks
Ep	Undulating erosional plains with a veneer of lithic soil on saprock

DEPOSITIONAL REGIME

Da	River channels with quartz, mica and garnet sands and unconsolidated fluvial sediments
Dap	Gently undulating alluvial plains with sand- or clay-rich alluvium and colluvium, overbank sediments or slope-wash detritus
Dlt	Lower river terraces consisting of clay-rich soil on sand and gravel deposits
Dht	Higher river terraces with lag of river gravel and quartz fragments on saprolite and saprock of gneiss and schist
Dc	Pediments consisting of lithic fragments in colluvium and sheetwash detritus
Dcp	Colluvial plains and wash plains with sand- or clay-rich soil on colluvium and sheetwash detritus
Df	Hill cappings of massive ferricrete in fluvial sediments consisting of river sand, gravel and boulders
Dfc	Fluvial ridges on ferruginous colluvium and outwash detritus from high ranges and mountains
Dm	Mesas of massive silcrete on fluvial sediments and erosional remnants of silcrete, forming hard caps on saprolite on gneissic rocks

Mine (abandoned)

Drainage

Track

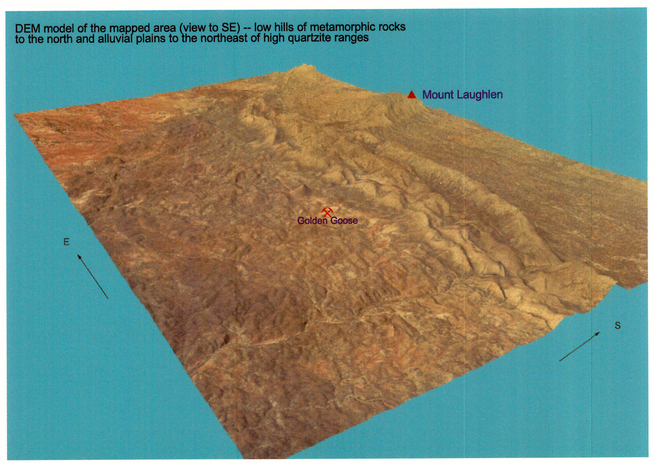
N

0 500 1000 1500 Meters

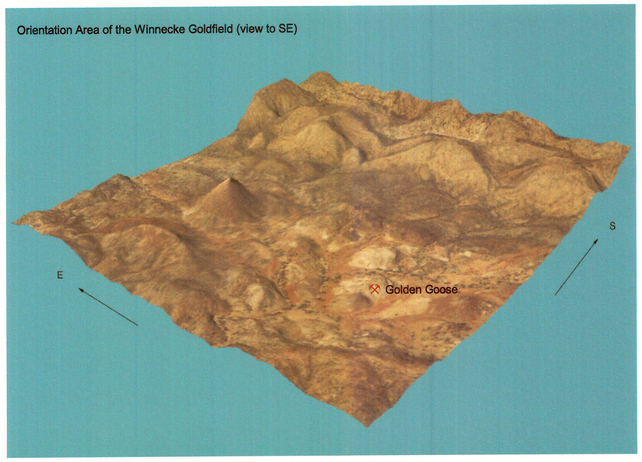
1:25 000

Projection: UTM Zone 53 Datum: AGD66

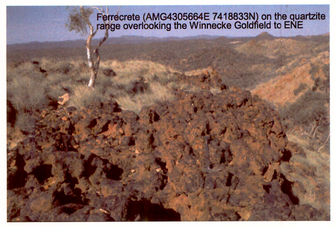
DEM model of the mapped area (view to SE) -- low hills of metamorphic rocks to the north and alluvial plains to the northeast of high quartzite ranges



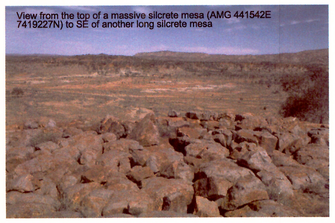
Orientation Area of the Winnecke Goldfield (view to SE)



Ferricrete (AMG4305664E 7418833N) on the quartzite range overlooking the Winnecke Goldfield to ENE



View from the top of a massive silcrete mesa (AMG 441542E 7419227N) to SE of another long silcrete mesa



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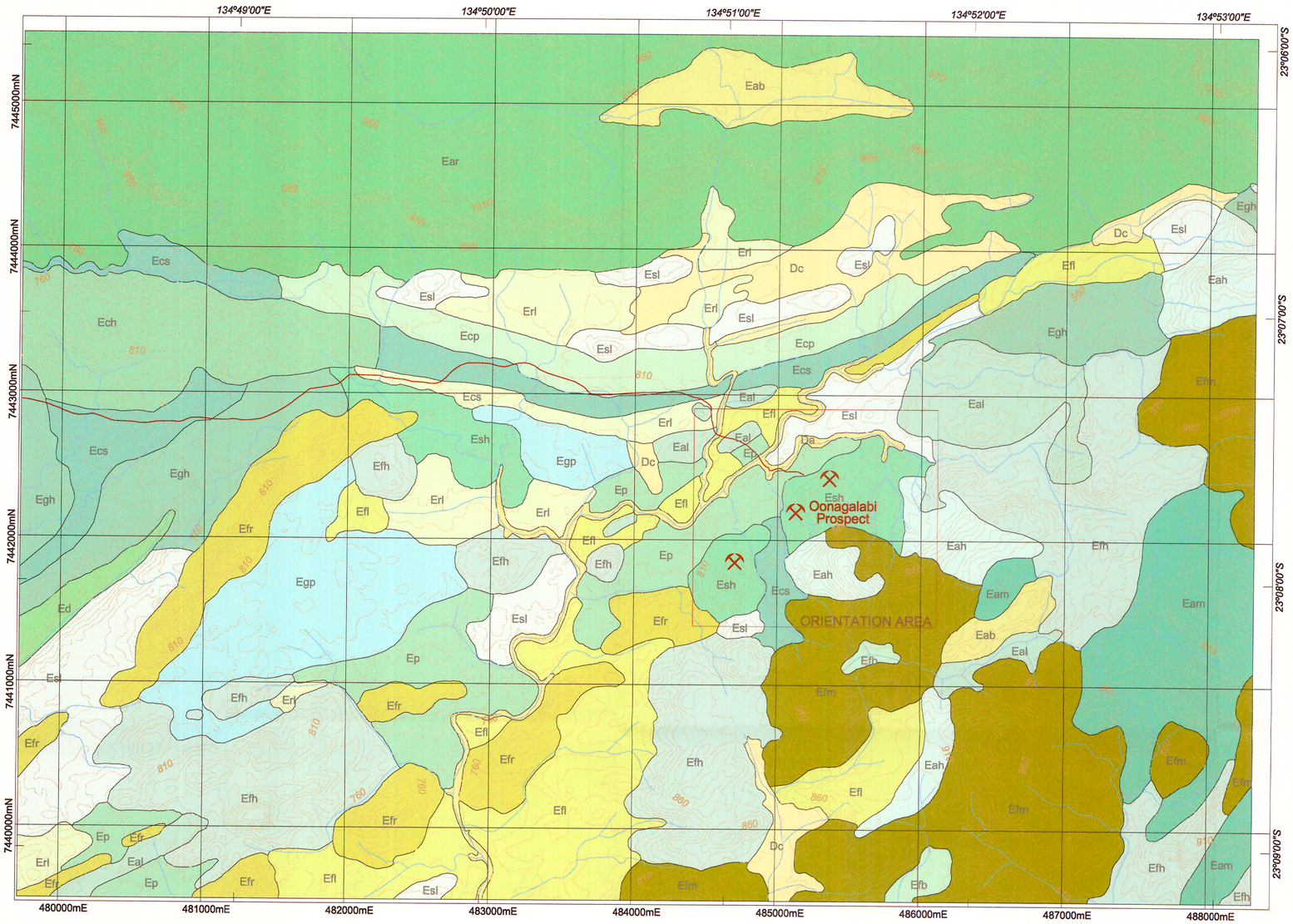
APPENDIX 13.A

REGOLITH-LANDFORM MAP OF OONAGALABI PROSPECT, NORTHERN TERRITORY



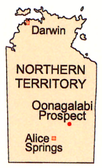
EROSIONAL REGIME

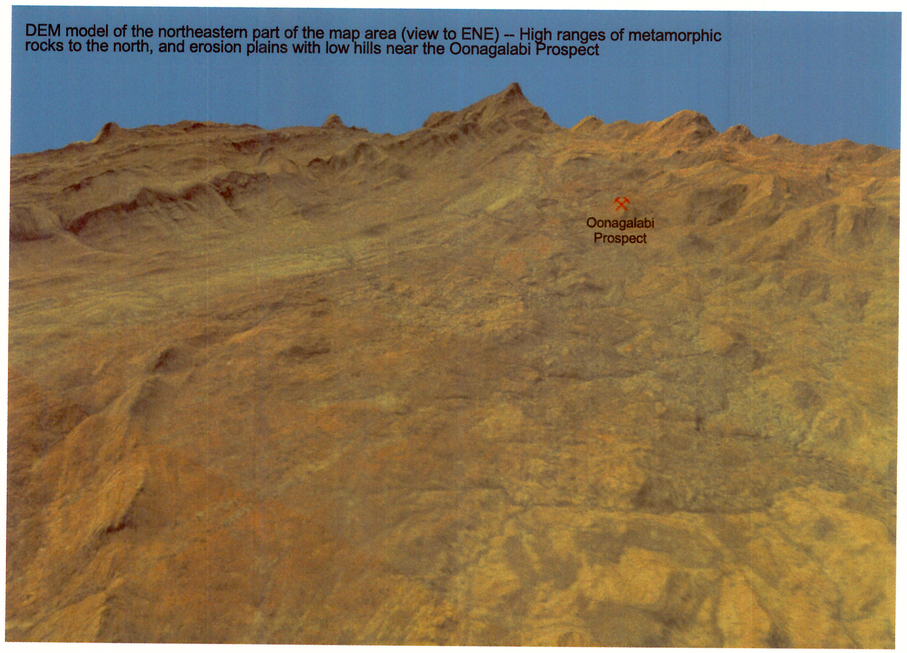
- **Eab** Small intermontane basin on slightly weathered amphibolite and associated metamorphic rocks
- **Eah** High hills on slightly weathered amphibolite and associated metamorphic rocks (various gneisses)
- **Eal** Low hills on slightly weathered amphibolite and associated metamorphic rocks (various gneisses)
- **Eam** Mountains of slightly weathered amphibolite and associated metamorphic rocks
- **Ear** High ranges of slightly weathered amphibolite and associated metamorphic rocks
- **Ech** High hills on slightly weathered calc-silicate rock and marble
- **Ecp** Erosion plains with thin lithic soil on saprock of calc-silicate rock and various gneisses
- **Ecs** Low hills with thin lithic soil on slightly weathered calc-silicate rock and marble
- **Ed** Actively dissecting pediments with a veneer of lithic soil or lag of lithic fragments on saprock
- **Efb** Small intermontane basin on slightly weathered quartzofeldspathic gneiss
- **Efl** Low hills on slightly weathered quartzofeldspathic gneiss
- **Efh** High hills on slightly weathered quartzofeldspathic gneiss
- **Efm** Mountains of slightly weathered quartzofeldspathic gneiss
- **Efr** Low ridges on slightly weathered quartzofeldspathic gneiss
- **Egh** Low hills on slightly weathered garnet-bearing gneiss or quartzofeldspathic gneiss
- **Egp** Erosion plains on slightly weathered garnet-bearing gneiss or quartzofeldspathic gneiss
- **Ep** Undulating erosion plains with a veneer of lithic soil on saprock
- **Erl** Low rises with lag of lithic fragments and erosional remnants of highly weathered metamorphic rocks
- **Esh** Hills on slightly weathered muscovite-biotite schist, gneiss or quartzofeldspathic gneiss
- **Esl** Low hills on slightly weathered muscovite-biotite schist, gneiss or quartzofeldspathic gneiss

DEPOSITIONAL REGIME

- **Da** River channels with quartz, mica and garnet sands and unconsolidated fluvial sediments
- **Dc** Pediments of lithic fragments in colluvium and sheetwash detritus

Prospect
Drainage
Track
800 contours



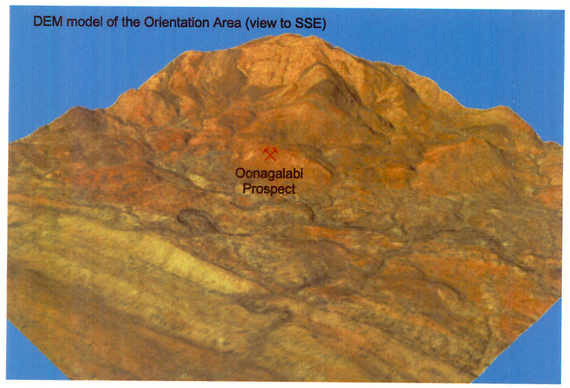


N

1:25 000

0 500 1000 1500 Meters

Projection: UTM Zone 53 Datum: AGD66
10 m contour interval



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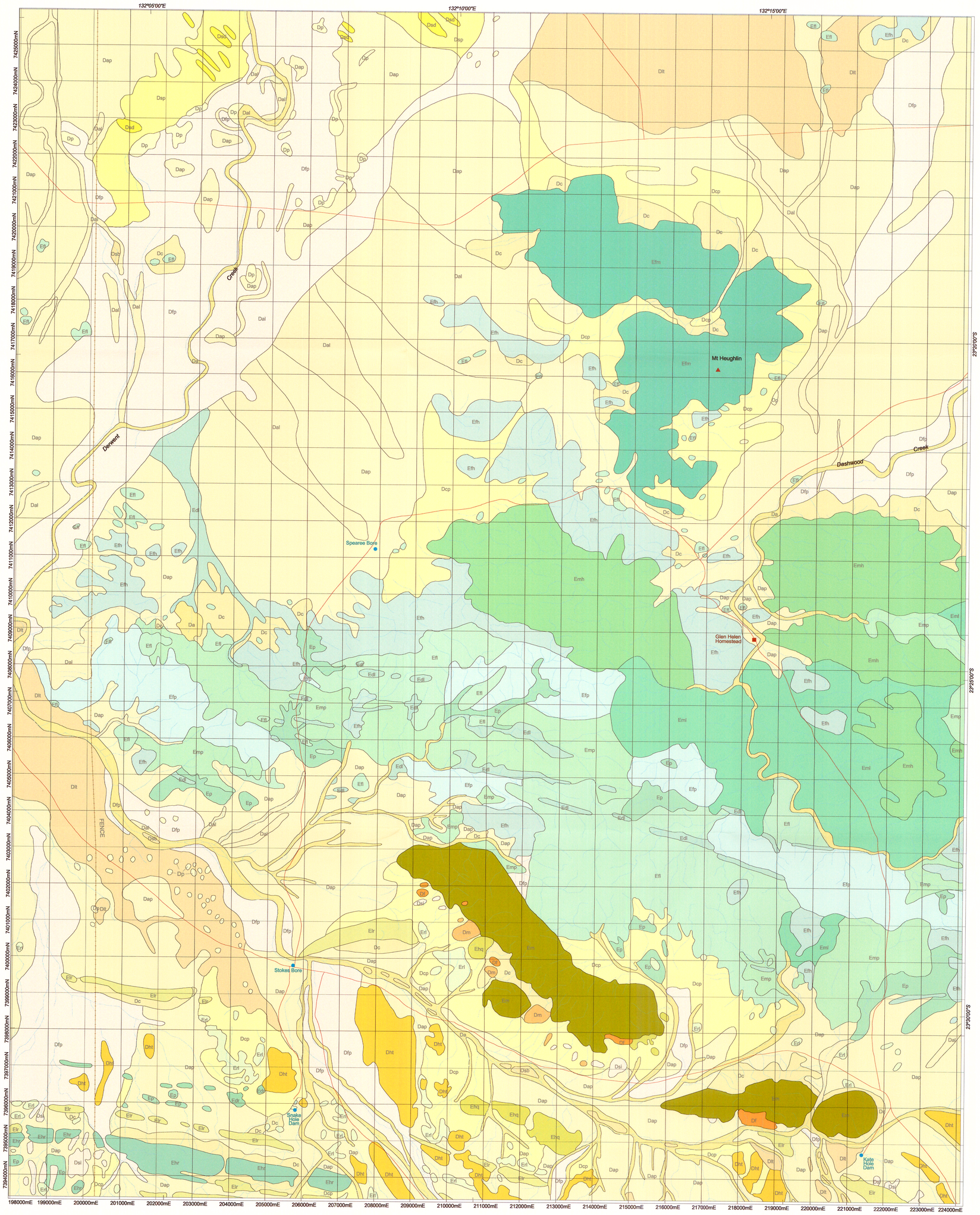
APPENDIX 13.B

REGOLITH-LANDFORM MAP OF MT HEUGHLIN AREA, NORTHERN TERRITORY

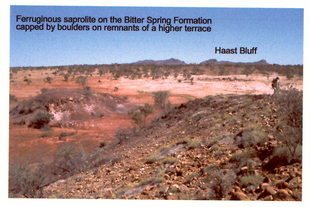


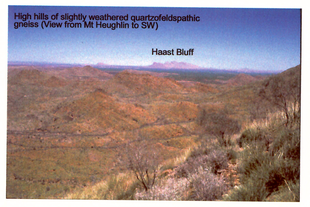
EROSIONAL REGIME

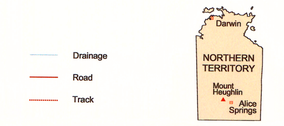
- **Elr** Low ranges of saprock on quartzite and slightly metamorphosed sandstone
- **Ehr** High ranges of slightly weathered, thickly bedded quartzite and sandstone
- **Ehq** High hills of slightly weathered quartzite and sandstone
- **Em** High mountains of slightly weathered, thickly bedded quartzite and sandstone
- **Edr** Low ridges on saprock of the Bitter Spring Formation (mainly mudstone and dolomite)
- **Erl** Low rises consisting of erosional remnants of highly weathered metamorphic rocks
- **Ep** Undulating erosion plains with a veneer of lithic soil on saprock
- **Efs** Low hills of ferruginous saprolite on siltstone and mudstone
- **Edl** Corestones and tors of weathered dolerite dykes in quartzofeldspathic gneiss
- **Efl** Low hills on slightly weathered quartzofeldspathic gneiss
- **Efh** High hills on slightly weathered quartzofeldspathic gneiss
- **Efm** Mountains on slightly weathered quartzofeldspathic gneiss
- **Efp** Erosion plains and rugged low hills with outcrops of slightly weathered metamorphic rocks
- **Eml** Low hills in rugged terrains on slightly weathered migmatite and banded gneiss
- **Emh** High hills in rugged terrains on slightly weathered migmatite and banded gneiss
- **Emp** Erosion plains with rock fragments, corestones and tors on migmatite and dolerite

DEPOSITIONAL REGIME

- **Da** Modern stream channels with unconsolidated fluvial sands and gravel
- **Dsb** Mid-channel sand bars of unconsolidated alluvial sediments
- **Dal** Undefined or abandoned stream channels with unconsolidated fluvial sediments
- **Dfp** Seasonally inundated floodplains with clay-rich alluvium, colluvium and overbank sediments
- **Dap** Gently undulating alluvial plains with clay-rich alluvium and colluvium, overbank sediments or slope-wash detritus
- **Dp** Claypans - shallow depressions of clayey and silty sediment on alluvial plains
- **Dsp** Aeolian sand plains with longitudinal sand dunes on alluvial sediments
- **Dsd** Large longitudinal dunes of well-sorted reddish sand
- **Dc** Pediments consisting of lithic fragments in colluvium and sheet-wash detritus
- **Dcp** Colluvial plains and wash plains with sand- or clay-rich soil on colluvium and sheetwash detritus
- **Dlt** Lower river terraces with lag of river gravel on clay-rich soil
- **Dht** Higher river terraces with lag of river gravel and quartz fragments on saprolite and saprock of gneiss and schist
- **Dm** Mesas of massive silcrete of fluvial sediments forming hard caps on sandstone and quartzite
- **Dsi** Low rises of erosional remnants of massive silcrete consisting of river sand and gravel
- **Df** Hill cappings of massive ferricrete in fluvial sediments consisting of river sand, gravel and boulders







N

1:50 000

0 1000 2000 3000 Meters

Projection: UTM Zone 53 Datum: AGD66

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APPENDIX 14

DIGITAL DATA DISC