Annual Report of Exploration Activities
May 1997 to May 1998

EL 11/96

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Introductory Comment

Exploration work was temporarily suspended during 1998, after the loss by fire (lit by an unknown arsonist) of the workshop used to store equipment and to process and store samples. All previous samples from EL 11/96 were lost, and all equipment was destroyed. Fortunately the data recorded on computer and most of the mounted grains were stored elsewhere at the time.

Most of the exploration programme planned for the summer months of 1997/1998 was not able to be completed.

Location of Tenement and Summary of Geology

Location of tenement and access

EL 11/96, comprising an area of 6 square kilometers, is located approximately 3 km NE of Pioneer, as illustrated in figure 1.

Access is provided by 4-wheel-drive track from Tebrakunna Rd., approximately 1.5 km W of the junction with the Gladstone main road.

Summary of the geology of the area

All the outcropping rocks in the area are Devonian coarse-grained granite/adamellites, with some small fine-grained granite/adamellite areas. In the western half of the lease the areas of exposed granite are separated by deeply greisenised (mostly kaolinised) regions. Most of these greisenised areas show lines of surface quartz fragments with a trend of 340^0 (T). In at least three cases these lines of surface quartz fragments indicate quartz veins still in place within the greisenised granite. Silcrete is usually encountered near the indicated quartz veins.

Figure 2 shows the area of the lease and the exposed granites. Also shown are the five sample lines and other spot sample locations. The areas where native metals were found are marked, and are each assigned a number to enable the native metals and alloys listed below Table 1 to be corellated with sites.

Previous Exploration of the Area

Except for the old tin-mining excavations in the SW corner of the lease (Nolan's old mine), and Mr. McCormack's mining lease adjoining the N end of the lease, there are no records of any previous exploration activity in the area. Nevertheless some limited activity has occurred, and is evidenced by some surface clearing and test pits, but this activity is very old. One of the old test pits occurs approximately 300 m to the SW of location 6 on Figure 2, and others occur to the NE of this point, close to the track. About 50 m to the S of location 11 on Figure 2, some of the loose surface granite rocks have been pushed up into quite a large mound, although no other evidence of excavation (e.g. a pit) is obvious.

Interest in the area, which led to the present exploration lease, commenced with the discovery of native metal particles in the ground immediately to the S of the lagoon on Mr. McCormack's mining lease. This was followed by the marking-out of two prospecting claims in 1995, which contained the two most obvious quartz veins in the hills immediately to the S of Mr. Mcormack's mining lease. The continuing discovery of native metals and alloys on these claims, and the apparent association of these native metals with the indicated quartz veins, led to an application for the present exploration lease.

During 1996/1997 geochemical sampling was carried out along the indicated lines in Figure 2. Each sample location was also examined for the presence of native metals and for chromites and Mg-ilmenites. This allowed mapping of occurrences for these particles, and showed that they were spatially associated with the quartz veins. At the same time the geochemical sampling and analysis did not indicate the presence of significant mineralisation, but did produce a corellation between quartz veins, native metals, chromite and Mg-ilmenite, and small geochemical "highs".

The results obtained during the 1996/1997 year were not encouraging for the discovery of an economic mineral deposit, but were geologically and geochemically puzzling.

Exploration Philosophy

While one of the main reasons for exploring the area is simply to shed light on the geological and geochemical puzzle posed by the presence of the native metals, chromites and Mg-ilmenites, and their association with the quartz veins, there is also the consideration that the presence of the native metals may be indicating some hidden deposit of economic value. The nature (or existence) of any such deposit can not be determined by the presence of the native metals alone, and it has not been possible to state the type of deposit being sought.

Exploration so far has involved the correlation of native metal occurrences, minerals which would not normally be found within a granite environment (chromite and Mg-ilmenite), geochemical results, and geophysical measurements such as magnetic, self-potential, electro-magnetic and radiation measurements.

Summary of Exploration Work Carried Out from May 1996 to May 1997

Details of this work are given in the 1996/1997 report on exploration activities. A brief summary is given below.

Five separate lines, totalling approximately 1.5 km in length were pegged out and sampled at 25 m intervals. Approximately 2 kg samples were taken at each site. About a quarter of each sample was reserved for chemical analysis by neutron activation and AAS or by PIXE/PIGME. The remainder of each sample was panned to a heavy mineral concentrate and examined for native metals, chromites and Mg-ilmenites. These were then subjected to electron microprobe analysis, and many of the native metals were later photographed.

Magnetic field measurements and radiation measurements were made at 5 m intervals along each pegged line. Self-potential and electromagnetic measurements were also made, and were given in the previous report.

Exploration Work Carried Out from May 1997 to May 1998

Samples from line 5 (containing locations 11 to 14 on Figure 2) were re-analysed using the method developed by Dr. Jan van Moort. In this method acid-*insoluble residues* are analysed. After preparation the samples consist mainly of quartz with minor feldspar and sericite. Most of the secondary mineralisation is removed, leaving only that mineralisation which occurred with the formation of the quartz. Samples were analysed at Lucas Heights in Sydney, by PIXE/PIGME (Proton Induced X-ray Emission, and Proton Induced GaMma ray Emission). The aim of this analysis was to look for evidence of any mineralisation associated with the emplacement of the quartz veins themselves.

It had been intended to analyse the acid insoluble residues also by EPR at the Central Science Laboratory, university of Tasmania, but the samples were destroyed by fire before this could be done. Some previous PIXE/PIGME analysis had been carried out on samples from line 1 (containing locations 4 to 6 on Figure 2), but this did not use acid insoluble residues. The planned re-analysis of line 1, using neutron activation rather than PIXE/PIGME, was not carried out because all the samples were destroyed by fire before being sent for analysis.

Vegetation samples have been taken along line 5, and have been prepared for AA analysis. These were to have been analysed using the Techtron-Varian AAS at the geology dept. of the university of Tasmania, However this machine was disposed of by the university during the recent building modifications, and is now being set up at our new workshop at Exton. It is not yet operational, but will be operating before the end of 1998.

Underground water flow in the lease area is quite high, and it was thought that this may be decreasing the signal obtained by conventional geochemical analysis. The vegetation analysis is to examine the possibility that at least some part of the signal may be amplified by concentration in the vegetation. The results of this analysis will be reported on later.

Line 2 (which includes location 7 and 8 on Figure 2) has been examined further for chromites and Mg-ilmenites, and some more of these have been added to the database.

Measurements of electromagnetic dip angle were made along line 1 (including locations 4, 5, and 6 on Figure 2), and along an EW line about 300 m N of line 1.

Results

Geochemical

The results of previous geochemical analysis were given in appendix A for the 1996/1997 report. This did reveal some geochemical "highs", often associated with the known quartz vein locations, but did not, by itself, indicate any mineralisation of economic interest.

A comparison between the neutron activation and acid-insoluble residue analyses is given in Table 1. Table 1 lists only those neutron activation elements which were also analysed by PIXE/PIGME. The PIXE/PIGME analyses of the acid-insoluble residues was carried out in the same batch as many other quartz analyses from other areas, and it was not possible to choose the same elements that were used for the neutron activation.

Figures 3 to 8 compare the two sets of line 5 results for Th, Fe, Cr, As, Cu and Zn.

Analysis of the acid-insoluble residues suggests that most of the geochemical "highs" shown by the neutron activation analysis, are not present in the quartz, and are therefore most probably secondary, and later than the quartz formation. The results suggest that the quartz vein through 100W (location 14 on Figure 2) contains no mineralisation, but that some quartz further to the east does contain some mineralisation. Except for the vein at location 14 on Figure 2, no other quartz veins were found on line 5, but isolated pieces of vein quartz were found on the surface at a number of places along the line, and in the creek bed 75 m north of 200W.

Figures 9 to 11 compare the line 5 results for K, Na and Rb. These elements gave geochemical "highs" at the same position for each method (35W to 50W), and also at the same position as indicated in the neutron activation results for Cu and Zn. This suggests that the Cu and Zn mineralisation is secondary and did not occur at the same time as that associated with the K, Na and Rb.

Electro-magnetic

Measurements of EM dip angle made along line 1, with the transmitter at the W end of the line, did not give any signal above measurement error. Dip measurements along an E-W line from the road through location 2 on Figure 2, with the transmitter located at the road, also gave no recogniseable signal.

Chromites

Most of the locations where chromites have been found were shown in figure 4 and 7 of the 1996/1997 report.

Table 2 gives the chromite compositions according to the location numbers shown on Figure 2. Note that chromites have now been found at the E end of line 2 (to the E of location 8 on Figure 2). No native metals were found at this position, but it was impossible to penetrate the silcrete here, and the lack of native metals (and the lack of geochemical signal) may have been due to the very shallow sample (30 cm).

Table 2 also gives the compositions for some chromites from Hogans Road, west of St Helens and well to the south of the lease area. These analyses were provided by Russel Fulton, university of Tasmania, for comparison with the EL 11/96 chromites. The last 4 of these chromites were reported as inclusions in orthopyroxene. Figure 12 shows the EL 11/96 chromite compositions compared to the Hogans Road chromites, illustrating that the two series are from different source material.

Mg-ilmenites

There has been little change to the Mg-ilmenite map (Figure 5) given in the 1996/1997 report, with only one further Mg-ilmenite being found at location 7 on Figure 2.

Figure 13 shows the EL 11/96 ilmenite compositions in comparison to ilmenites from other locations in Australia. The EL 11/96 Mg-ilmenites form an Fe^{2+}/Mg substitution series continuous with the diamond indicator picro-ilmenites, but are at the lower-Mg end of this series (except for one particle). The Mg-ilmenites in this series are both magnetically and chemically different from the other Mg-ilmenites shown in Figure 13 (the NSW Mg-ilmenites), which have higher Fe^{3+} and are some of the most magnetic ilmenites.
The EL 11/96 Mg-ilmenites also contain less Cr than most of the diamond indicator picro ilmenites.

Discussion

It is unfortunate that samples were destroyed before the remainder of line 5 samples (from 300W to 400W) could be analysed by neutron activation.

Figures 14 to 17, from the neutron activation analysis results, combine elements together which show "highs" at similar locations. To avoid swamping the lower concentration elements, the analysis figures for each element have been standardised by dividing each location result by the element mean. The concentration figures shown on the graphs therefore have no absolute meaning.

The element concentrations for line 5 form three fairly distinct patterns, with peak values as indicated.

(1) Rb, Na and K, at 25W (also shown by the PIXE/PIGME analysis) (Figure 14).
Cu, Mn, Zn and Ba, also at 25W (Figure 15).

(2) As, Cr and Fe, at 150W and 275W. Tungsten *could* also fit in this group (Figure 16).

(3) U, Pb, Ce, Sm and La, at 25W, 100W, 200W and 275W. Ni spans the first two and last two peaks in this group (Figure 17).

The known quartz vein (through location 14 on Figure 2) is associated with group (3), but this vein gives no significant "highs" in the PIXE/PIGME (acid residue) analyses, and was probably in place before the group (3) elements were added.

The identified native metals are associated with groups (1) and (3). No native metals have yet been associated with any of the peaks in group (2).

The above suggests several periods of activity. Perhaps the following can be suggested (very tentatively, and not necessarily in order).

- (a) Formation of the known quartz vein.
- (b) The quartz mineralisation (K, Na and Rb) at 25 to 50W.
- (c) Rare-earth and U/Pb secondary mineralisation, mainly at 100W and 200W.
- (d) Cu, Zn, Ni, As, Cr, and Fe secondary mineralisation at 50W, 150W and 275W.
- (e) Placement of the chromites and Mg-ilmenites.

Similar element groupings can be made for the other lines, but not with the same certainty. For line 1, whole sample PIXE/PIGME analysis was used (not neutron activation), and only some of the elements used in line 5 neutron activation analysis are available. Line 2 samples were analysed together with a larger group of samples from another area, and once again only some of the line 5 elements are available. Lines 3 and 4 are too short to give a good picture.

The occurrence of the chromites and Mg-ilmenites remains a problem. Spatially they appear to be associated with the known quartz veins or with occurrences of native metals, but no intrusion which could have carried them is visibly obvious in the vicinity of the quartz veins. Although the upper 1 m depth of the quartz veins may have been slightly disturbed, greisenised granite can be seen immediately to either side of the quartz veins below depths of about 1 m. Dr. Van Moort considers that the chromites and Mg-ilmenites are residual particles from material which was once in ancient drainage channels above the granite, and Dr. Ang Pwa considers that they may have originally been present on the eroded surface of the granite, and have fallen down fracture zones during some tectonic activity.

The native metal origins are also still not satisfactorily explained. Dr. Van Moort sees them being formed at high pressures associated with the granite formation, and being preserved by suitable conditions until the present. This does not really fit with their initial discovery in tertiary gravels on Mr. McCormack's mineral lease, which points to a much later formation near to the surface.

Conclusions

Several periods of 'geological activity' are suggested by the the geochemical data, but the nature and sequence of these events is not yet very clear.

The origins of the chromites and Mg-ilmenites is an important problem to solve. If they are residual particles, their occurrence is not very interesting, but if they came up through the granite the possibilities for mineralisation are greater. There is a need to determine if the chromites and Mg-ilmenites are related to the Tertiary basalts (as is also suggested by Prof. Wys Yim,- pers. Com.).

There is a need to determine if the native metals show any depth profile. This will involve sampling at deeper levels than has been done so far.

The possible existence of economic minerals has not yet been established, or ruled out; but perhaps it is unlikely.

Future Exploration

Much of the exploration planned for the past year was not able to be completed, and therefore still remains to be done. It had been planned to re-analyse line 1 samples by neutron activation, but all samples were lost in the fire. This line is quite interesting, and will need to be re-sampled, but sample preparation equipment (e.g. sample grinder) was also lost in the fire, and still awaits replacement.

The geochemical sampling and the mineralogy will be expanded as soon as preparation equipment can be replaced.

One particular aim will be to compare the compositional and magnetic properties of chromite and Mg-ilmenite from the lease area with chromite and Mg-ilmenite found elsewhere in the NE (e.g. near Moorinna).

No further geophysical measurements are planned.

Line 5, at about 25W and 275W, will be examined in more detail for the presence of buried quartz veins.

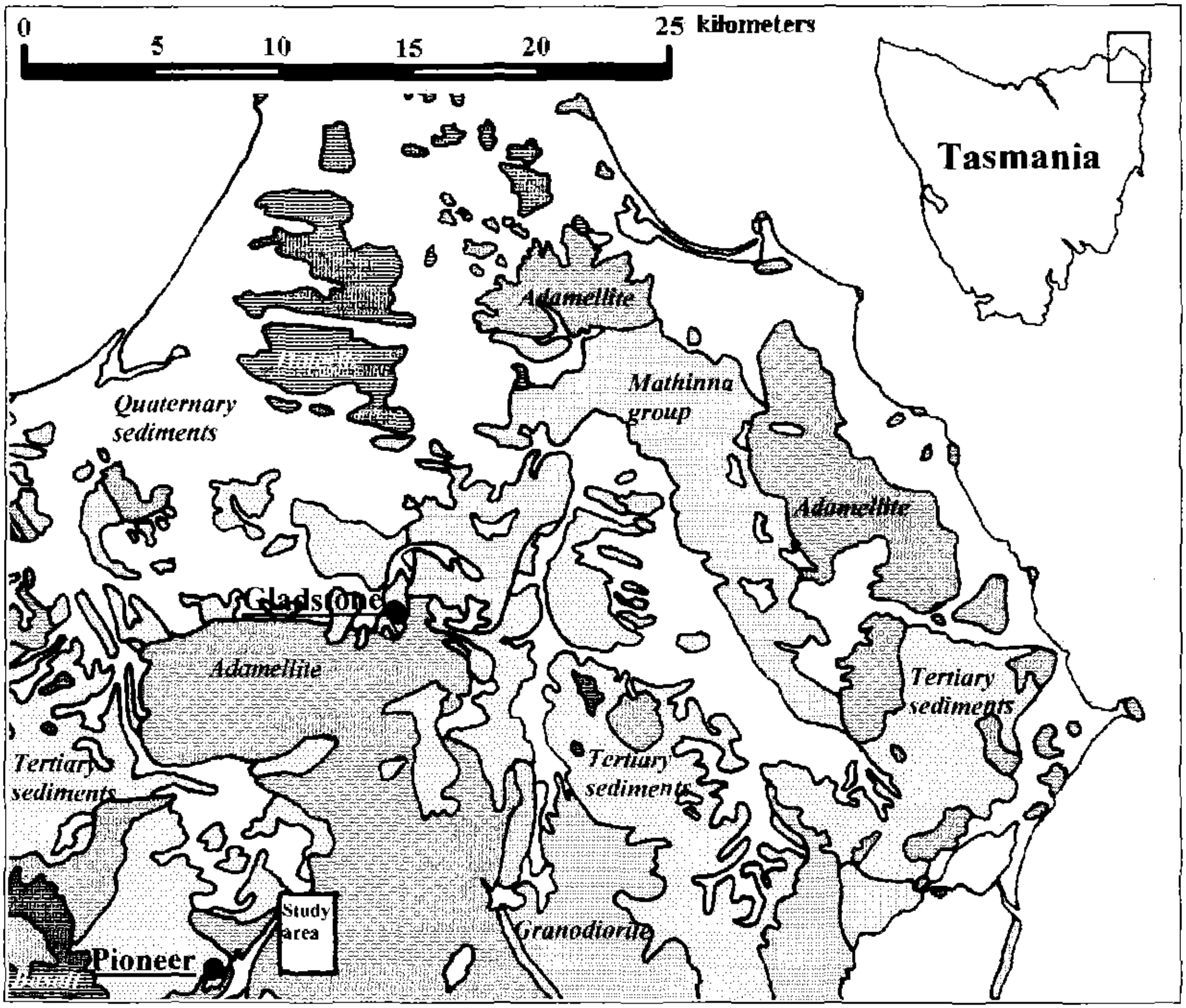
It is planned to use an auger drill to examine the deeply weathered areas under the native metal locations and the geochemical "highs". The drill has been obtained, and is currently being re-built.

References

Allen, N. R. (1998): *The rotating magnetic field separation of minerals.* Unpublished PhD thesis, University of Tasmania. 320 pages.

Figure 1

Location of EL 11/96



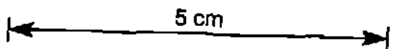
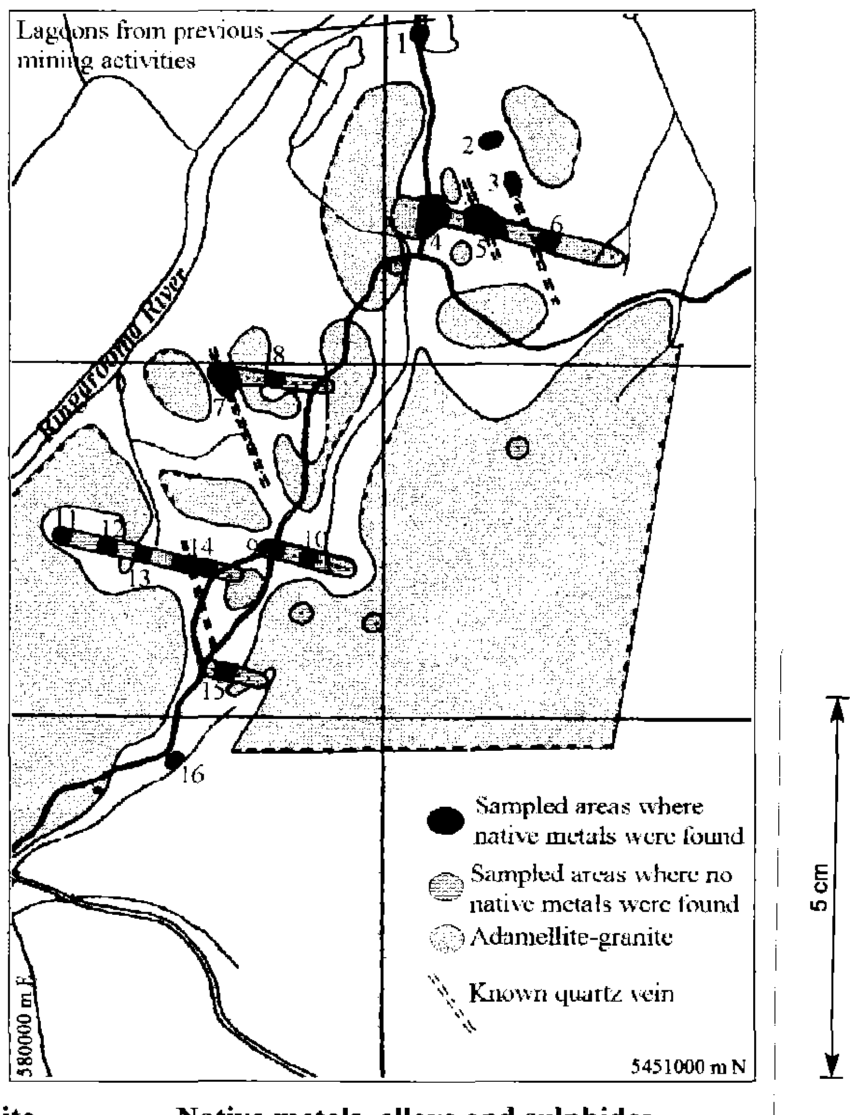


Figure 2

The lease area, showing sample lines and native metal occurrences

Note: grid spacing is 1 km



Site	Native metals, alloys and sulphides
1	Cu+Zn+Ni, Cu+Zn+Fe
2	Sn, Zn, Zn+Fe, Cu+Zn+Sn, Cu+Sn+Zn, Sn+Cu+Zn
3	Cu, Cu+Zn, pyrite
4	Cu, Sn, Fe+Zn, chalcopyrite
5	Pb, Sn, Fe+Zn, Pb+Sn+Zn, Sn+Pb+Cu+Zn, pyrite
6	Pyrite,arsenopyrite
7	Cu, Sn+Pb, Sn+Pb+Cu, pyrite, chalcopyrite, bornite, chalcocite, sphalerite
8	Sn+Pb, Sn+Pb+Cu
9	Chalcopyrite, pyrite
10	Sn+Pb, Cu+Zn, chalcopyrite, tetrahedrite
11	Fe+Cr
12	Fe+Cr, pyrite
13	Cu, Pb, Sn+Pb
14	Ni, Cu, Ni+Cu, Cu+Ni, Fe+Cr, Fe+Ni, Sn+Pb, Fe+Cr+Ni, Cu+Fe+Ni, pyrite
15	Fe+Cr+Ni
16	Zn, Zn+Fe, Cu+Zn, pyrite

Figure 3

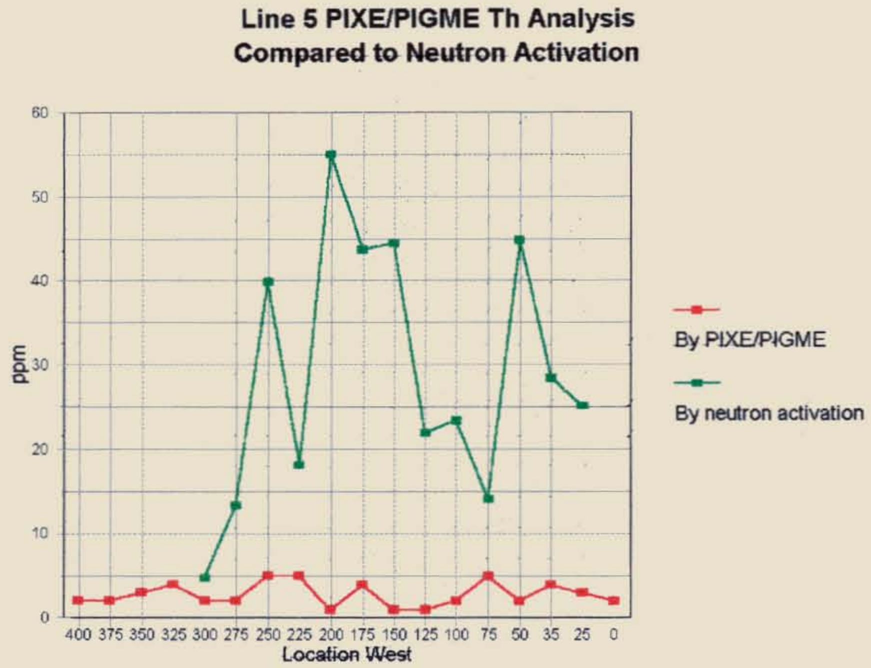


Figure 4

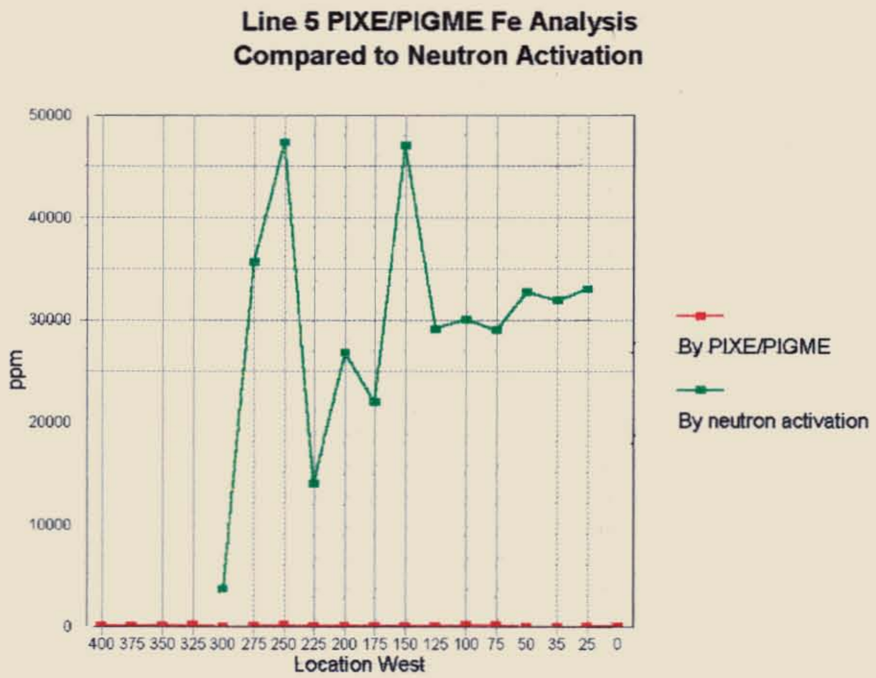


Figure 5

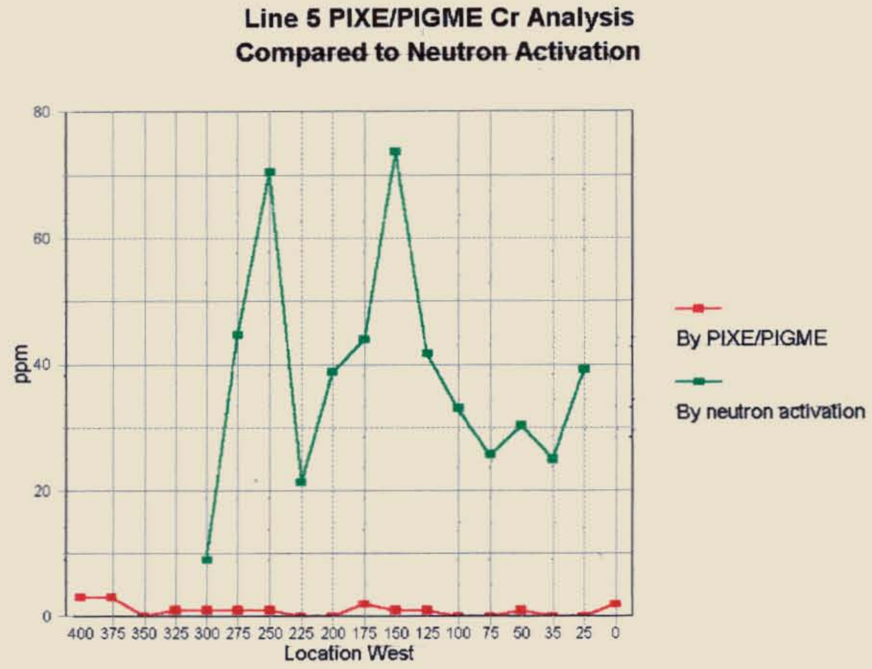


Figure 6

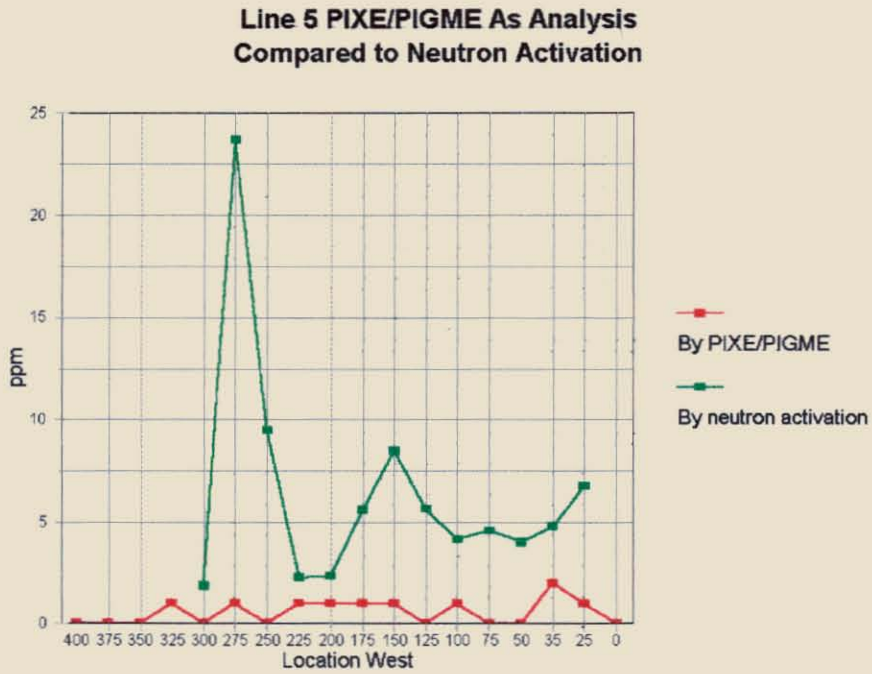


Figure 7

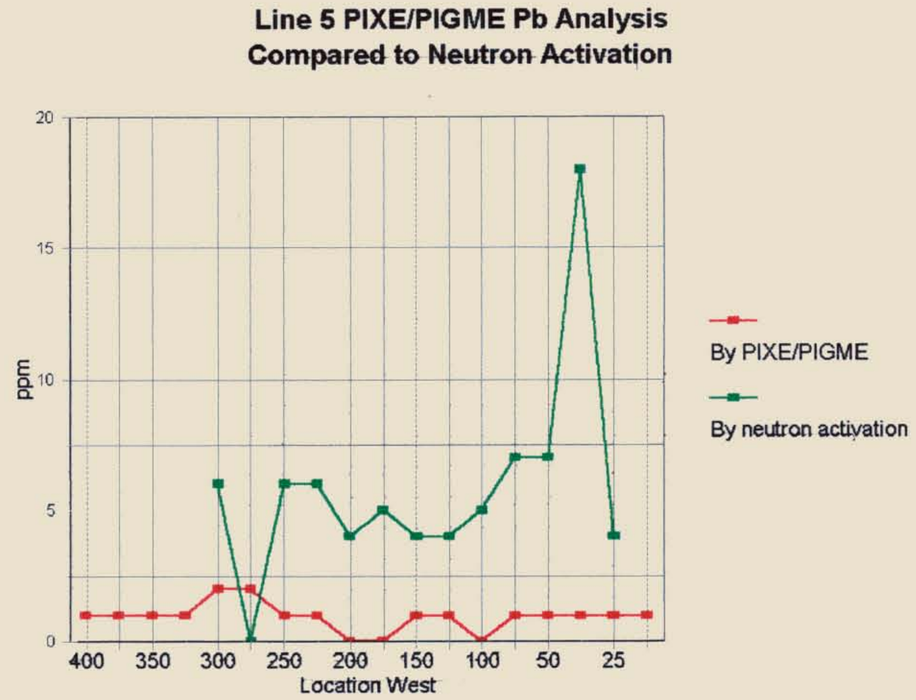


Figure 8

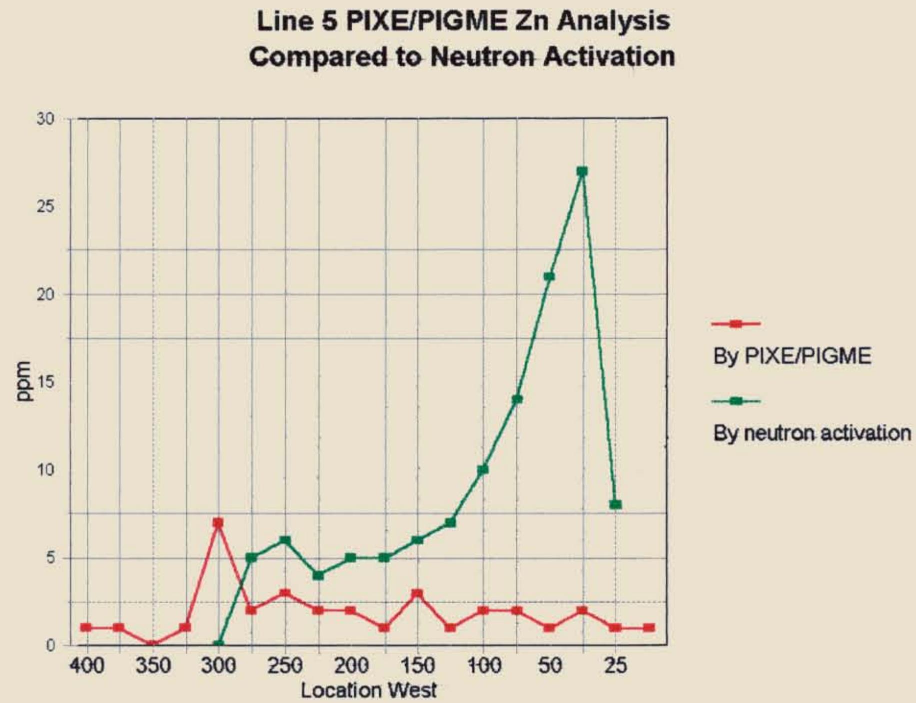


Figure 9

Line 5 PIXE/PIGME K Analysis
Compared to Neutron Activation

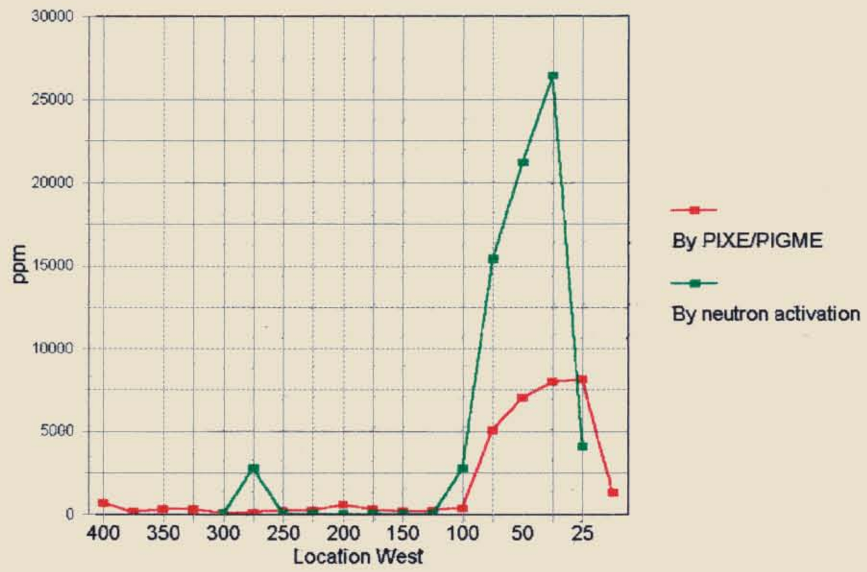


Figure 10

Line 5 PIXE/PIGME Na Analysis
Compared to Neutron Activation

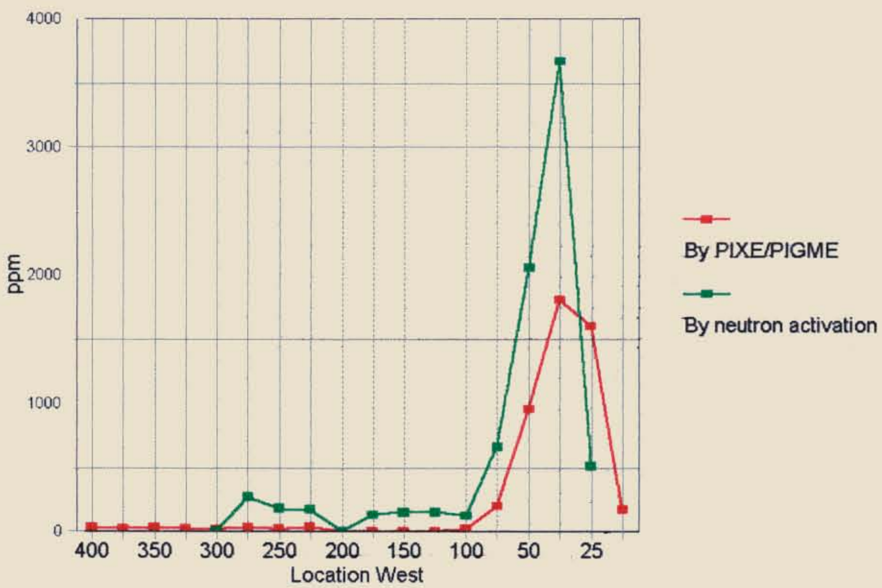


Figure 11

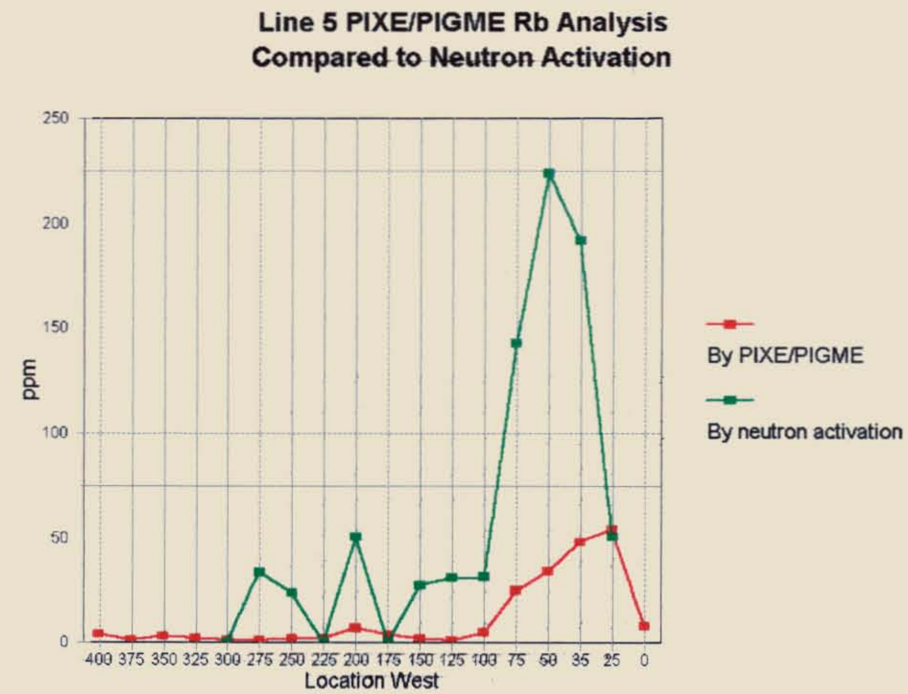


Figure 12

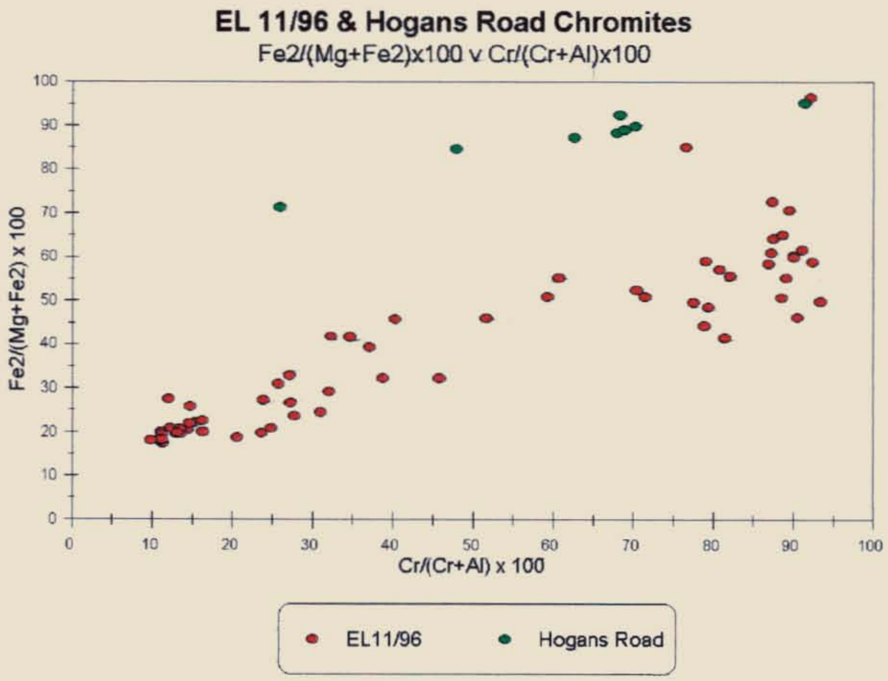
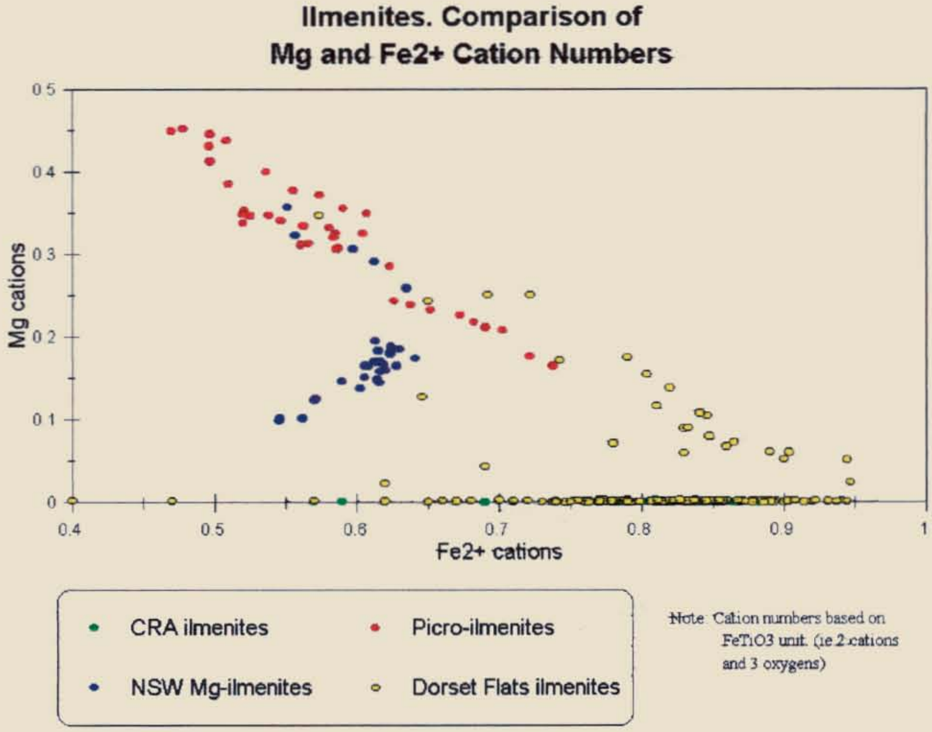


Figure 13



(From Allen, 1998)

Figure 14

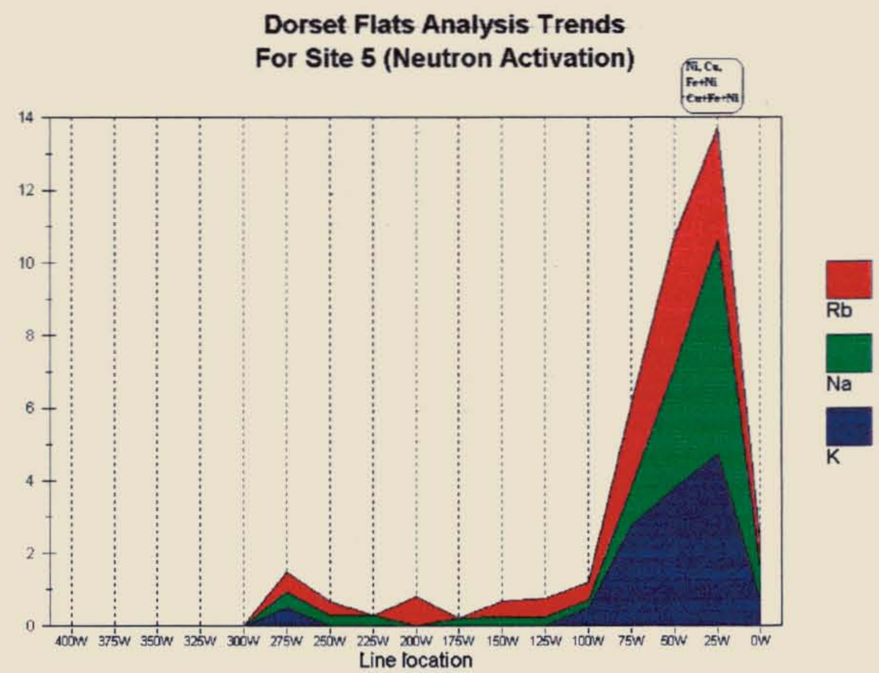


Figure 15

Dorset Flats Analysis Trends
For Site 5 (Neutron Activation)

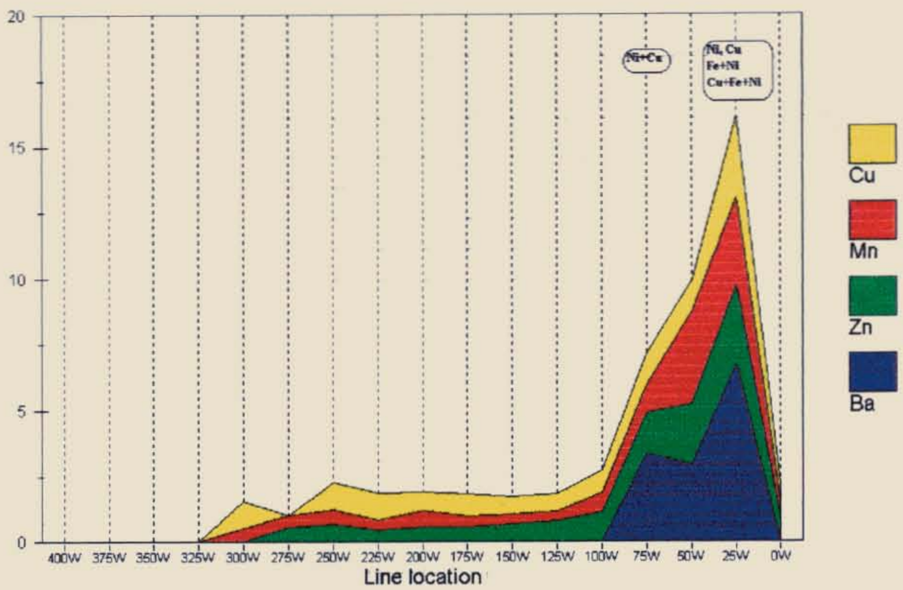


Figure 16

Dorset Flats Analysis Trends
For Site 5 (Neutron Activation)

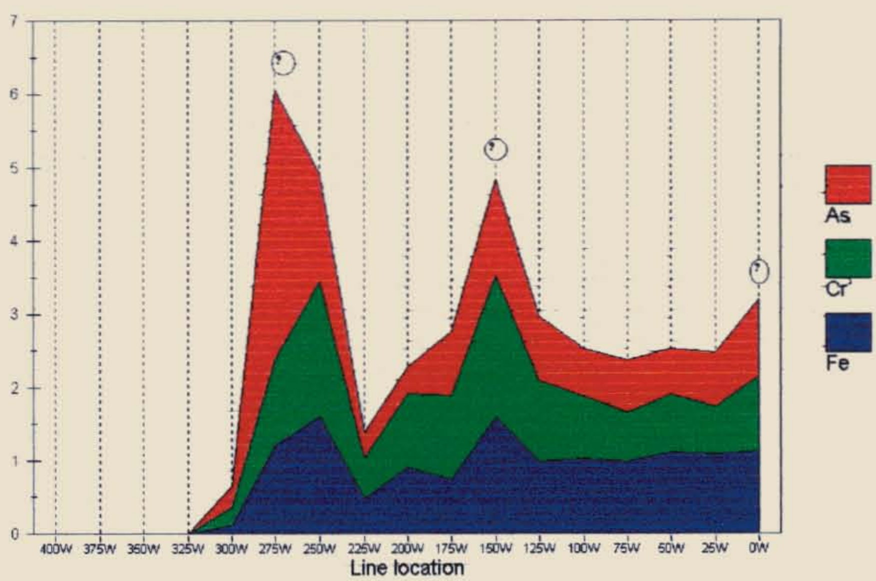


Figure 17

Dorset Flats Analysis Trends
For Site 5 (Neutron Activation)

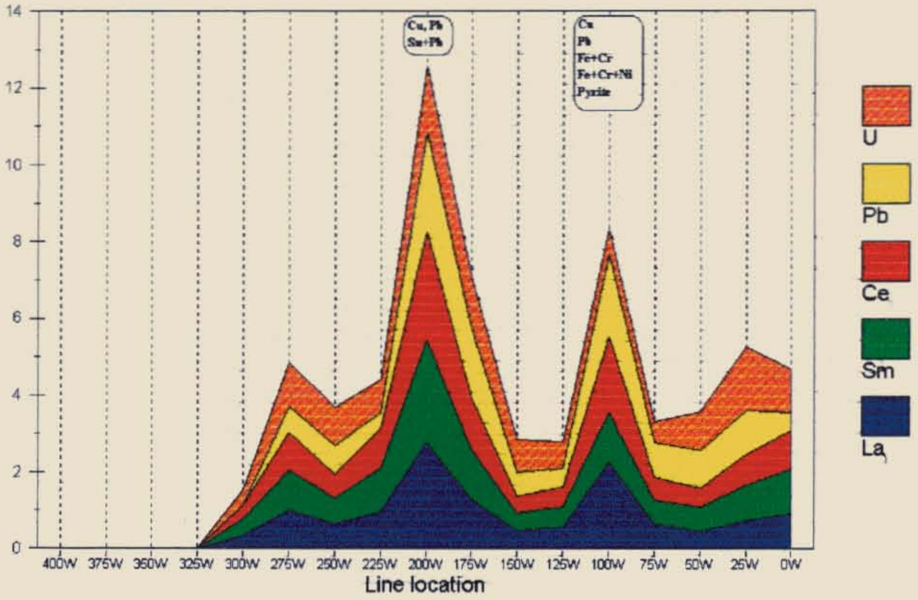


Table 1

PIXE/PIGME results

Line	Sample	F	NA	AL	LI	MG	SI	S	CL	K	CA	TI	V	CR	MN	FE	NI	CU
5	400W	27	28	1916	2	0	122812	2485	64	681	8	940	1	3	0	185	2	1
5	375W	26	24	575	0	0	131429	1406	59	138	15	1367	0	3	4	94	0	1
5	350W	21	30	991	2	0	132046	1725	54	304	9	1246	2	0	3	125	2	1
5	325W	15	24	1804	0	0	98114	302	189	288	2	2194	0	1	4	224	1	1
5	300W	7	15	122	2	0	96364	1286	57	60	20	384	0	1	1	51	2	2
5	275aW	11	29	257	0	0	102397	188	61	118	71	820	0	1	1	98	3	2
5	250W	24	19	2512	0	0	122071	1815	111	210	15	481	0	1	2	209	0	1
5	225W	12	34	1078	0	0	111488	528	46	250	10	490	0	0	3	96	2	1
5	200W	24	0	1942	0	0	111841	1801	43	586	2	160	0	0	2	93	1	0
5	175W	20	0	3048	0	0	117968	996	67	286	0	540	0	2	3	177	2	0
5	150W	35	0	3697	0	0	132391	1352	110	178	0	1027	1	1	1	190	1	1
5	125W	40	0	4208	0	0	111639	1795	147	247	12	677	3	1	2	178	2	1
5	100W	40	19	3251	0	0	108459	2063	71	398	11	886	0	0	4	239	1	0
5	75W	60	195	5243	1	0	102018	2197	46	5061	29	939	0	0	2	197	1	1
5	50W	27	959	6008	1	0	97957	1237	26	7026	109	228	0	1	4	83	2	1
5	35W	25	1809	7671	0	0	83905	1238	51	7996	290	79	0	0	4	89	0	1
5	25W	16	1606	7818	2	0	87142	1214	21	8170	268	290	0	0	3	109	1	1
5	0W	31	169	2300	0	0	98074	1242	64	-1342	20	604	1	2	3	151	3	1
	MDL	7.9	17.6	232	2.5		723	74	38	17	23	7	8	4	4	4	2	1.5

Line	Sample	ZN	GA	GE	AS	BR	RB	SR	Y	ZR	NB	MO	BAL	WL	PBL	AUL	THL	UL
5	400W	1	1	1	0	1	4	1	3	61	4	3	0	1	2	0	2	1
5	375W	1	1	1	0	1	1	2	4	92	2	5	0	0	1	2	2	2
5	350W	0	1	0	0	1	3	1	5	138	3	1	0	0	2	0	3	4
5	325W	1	1	1	1	1	2	3	9	251	3	11	0	0	0	2	4	5
5	300W	7	1	0	0	0	1	1	2	67	0	2	0	1	2	0	2	0
5	275aW	2	1	0	1	0	1	1	7	264	4	6	0	2	2	0	2	3
5	250W	3	1	1	0	1	2	1	3	39	1	1	0	3	2	0	5	0
5	225W	2	0	0	1	0	2	0	6	110	0	0	0	2	0	0	5	1
5	200W	2	0	0	1	1	7	0	4	144	0	0	0	1	1	0	1	1
5	175W	1	2	1	1	1	4	1	9	210	3	4	0	0	1	0	4	0
5	150W	3	2	2	1	0	2	2	2	55	3	0	0	0	0	2	1	0
5	125W	1	2	0	0	1	1	0	0	25	1	2	0	0	1	1	1	0
5	100W	2	1	1	1	1	5	3	1	98	4	7	0	1	3	1	2	2
5	75W	2	2	1	0	1	25	6	2	32	4	1	0	0	3	1	5	2
5	50W	1	2	1	0	1	34	10	2	101	3	0	11	0	7	2	2	1
5	35W	2	2	1	2	1	48	10	9	19	3	3	18	0	5	0	4	0
5	25W	1	1	1	1	0	54	8	4	43	3	2	25	0	4	0	3	0
5	0W	1	1	1	0	1	8	3	3	79	4	1	0	0	3	1	2	1
	MDL	1.5	1.3	1.5	1.7	1.3	2	2.5	7	5	5	8	32	4	3	4	8	4

Neutron activation results

Line	Sample	F	NA	AL	LI	MG	SI	S	CL	K	CA	TI	V	CR	MN	FE	NI	CU
5	400W																	
5	375W																	
5	350W																	
5	325W																	
5	300W		0							0				9.0		3700.0	0.0	6.0
5	275aW		270							2800				44.7		35600.0	8.0	0.0
5	250W		180							0				70.4		47400.0	7.0	6.0
5	225W		170							0				21.3		14000.0	5.0	6.0
5	200W		0							0				38.7		26800.0	5.0	4.0
5	175W		130							0				43.9		22000.0	0.0	5.0
5	150W		150							0				73.7		47100.0	3.0	4.0
5	125W		150							0				41.7		29200.0	5.0	4.0
5	100W		120							2800				33.0		30100.0	7.0	5.0
5	75W		660							15400				25.7		29100.0	7.0	7.0
5	50W		2060							21200				30.3		32800.0	7.0	7.0
5	35W		3670							26400				25.0		31900.0	9.0	18.0
5	25W		510							4100				39.2		33100.0	5.0	4.0

Line	Sample	ZN	GA	GE	AS	BR	RB	SR	Y	ZR	NB	MO	BAL	WL	PBL	AUL	THL	UL
5	400W																	
5	375W																	
5	350W																	
5	325W																	
5	300W	0.0			1.9		0.0							0.0	0.0	0.0	4.7	2.2
5	275aW	5.0			23.7		33.6							6.9	22.0	0.0	13.3	6.6
5	250W	6.0			9.5		23.8							0.0	24.0	0.0	39.9	5.6
5	225W	4.0			2.3		0.0							0.0	14.0	0.0	18.1	4.9
5	200W	5.0			2.3		50.3							0.0	85.0	0.0	55.0	10.1
5	175W	5.0			5.6		0.0							2.4	60.0	0.0	43.7	7.7
5	150W	6.0			8.5		27.4							0.0	20.0	0.0	44.4	4.9
5	125W	7.0			5.7		31.0							0.0	16.0	0.0	21.9	4.0
5	100W	10.0			4.2		31.6							0.0	70.0	0.0	23.4	4.0
5	75W	14.0			4.6		143.0							0.0	29.0	0.0	14.1	3.3
5	50W	21.0			4.0		224.0							0.0	33.0	0.0	44.8	5.9
5	35W	27.0			4.8		192.0							0.0	37.0	0.0	28.4	9.7
5	25W	8.0			6.8		50.3							2.9	15.0	0.0	25.1	6.5

535022

Table 2

EL 11/96 & Hogans Road Chromites

Location Number	Oxide weight % MgO	Al2O3	SiO2	TiO2	Cr2O3	MnO	FeO tot.	NiO	ZnO	Calculated FeO	Fe2O3
3	9.55	5.37	0.02	0.04	61.84	0.35	21.23	0.11	0.06	17.49	4.15
3	10.30	4.51	0.00	0.03	64.29	0.43	18.05	0.07	0.11	15.80	2.49
4	19.24	51.04	0.00	0.23	13.77	0.10	12.66	0.25	0.06	9.78	3.20
4	13.66	34.51	0.00	0.22	30.39	0.21	18.81	0.17	0.35	15.70	3.46
4	17.92	53.74	0.04	0.05	10.99	0.22	14.88	0.32	0.24	12.10	3.09
4	13.23	34.51	0.09	0.93	27.26	0.29	20.63	0.21	0.22	16.84	4.21
4	21.24	56.24	0.08	0.07	10.70	0.22	10.44	0.33	0.05	7.95	2.77
4	9.89	13.57	0.00	0.17	50.88	0.23	22.90	0.13	0.07	18.23	5.18
4	15.64	31.75	0.14	0.78	29.97	0.14	19.37	0.24	0.00	13.19	6.86
4	11.50	25.23	0.01	0.11	40.27	0.23	20.07	0.08	0.12	17.48	2.88
5	4.98	5.36	0.00	0.04	55.38	0.33	28.60	0.09	0.01	23.38	5.80
5	16.73	36.69	0.12	0.82	25.81	0.18	17.75	0.23	0.08	12.34	6.02
5	21.06	56.42	0.02	0.06	10.31	0.18	10.67	0.34	0.05	8.12	2.84
5	19.92	53.42	0.02	0.04	13.36	0.09	11.11	0.38	0.12	9.14	2.19
5	19.98	54.11	0.04	0.12	11.26	0.20	12.67	0.45	0.06	9.31	3.73
5	20.16	53.61	0.05	0.09	9.99	0.21	13.86	0.32	0.00	8.93	5.47
5	20.95	56.53	0.07	0.16	10.29	0.08	10.19	0.30	0.12	8.38	2.01
6	20.34	54.39	0.03	0.06	12.71	0.13	10.96	0.41	0.24	8.78	2.42
6	16.64	41.01	0.11	0.80	21.21	0.21	18.73	0.21	0.17	13.26	6.07
6	8.57	5.12	0.02	0.01	62.78	0.44	21.47	0.00	0.07	18.88	2.87
6	18.13	38.60	0.14	0.51	25.89	0.36	15.71	0.14	0.06	10.53	5.76
100 m E of 6	9.94	10.65	0.00	0.07	54.79	0.48	21.84	0.00	0.02	17.51	4.82
100 m E of 6	20.09	54.31	0.00	0.05	12.56	0.08	11.56	0.34	0.00	9.35	2.46
100 m E of 6	19.69	53.26	0.00	0.07	13.64	0.14	12.38	0.43	0.06	9.84	2.83
7	6.87	5.90	0.00	0.05	61.53	0.49	24.86	0.00	0.13	21.95	3.24
7	7.24	4.14	0.00	0.02	63.35	0.33	23.14	0.02	0.25	20.67	2.75
7	8.64	7.45	0.00	0.39	50.83	0.65	30.52	0.04	0.05	19.42	12.34
7	11.71	7.93	0.04	0.41	52.09	0.56	25.50	0.08	0.08	14.82	11.86
7	7.90	6.38	0.03	0.06	63.51	0.30	18.81	0.06	0.12	19.72	-1.02
7	6.74	5.28	0.00	0.07	61.69	0.38	26.54	0.03	0.19	22.46	4.53
7	2.90	11.24	0.07	0.10	55.00	0.44	32.67	0.12	0.30	29.76	3.24
7	7.73	4.65	0.00	0.00	63.14	0.37	25.19	0.13	0.07	20.93	4.74
7	10.76	10.54	0.03	0.08	60.72	0.18	20.41	0.01	0.03	18.12	2.54
7	5.61	5.09	0.02	0.04	64.70	0.22	24.75	0.06	0.30	24.09	0.74
7	10.00	14.82	0.00	0.05	52.60	0.30	25.20	0.05	0.29	19.74	6.07
7	7.71	6.10	0.01	0.05	62.17	0.51	26.01	0.16	0.17	21.51	5.01
7	11.61	10.82	0.02	0.05	60.28	0.28	19.30	0.08	0.23	16.45	3.16
7	15.68	30.12	0.00	0.45	38.04	0.21	16.70	0.19	0.08	13.36	3.71
7	8.66	9.20	0.04	0.00	57.91	0.35	25.85	0.00	0.10	20.68	5.74
7	7.97	4.98	0.03	0.08	67.55	0.27	21.80	0.06	0.14	21.27	0.59
7	13.68	36.36	0.08	0.67	25.85	0.22	23.59	0.21	0.06	17.52	6.74
7	8.33	10.13	0.01	0.06	57.06	0.31	26.58	0.13	0.16	21.42	5.73
7	10.38	20.28	0.00	0.10	44.12	0.36	24.95	0.00	0.30	19.15	6.44
100 m E of 8	20.40	53.00	0.00	0.10	15.40	0.10	11.10	0.30	0.20	9.06	2.28
75 m E of 8	19.80	46.50	0.00	0.10	21.50	0.00	11.00	0.40	0.10	8.65	2.61
75 m E of 8	20.30	48.30	0.00	0.20	18.70	0.10	11.40	0.30	0.00	8.33	3.41
75 m E of 8	19.50	45.80	0.00	0.10	22.60	0.10	11.30	0.20	0.10	9.18	2.35
75 m E of 8	19.40	50.30	0.00	0.30	14.60	0.10	14.30	0.40	0.10	10.02	4.76
75 m E of 8	18.30	42.20	0.00	0.20	24.20	0.10	12.90	0.20	0.00	10.13	3.08
75 m E of 8	20.70	56.40	0.00	0.10	9.20	0.10	10.40	0.50	0.00	8.10	2.56
75 m E of 8	18.80	46.40	1.50	0.20	21.70	0.00	11.40	0.30	0.20	12.51	-1.23
75 m E of 8	17.90	43.40	0.00	0.10	24.30	0.00	14.00	0.10	0.00	11.58	2.69
75 m E of 8	0.60	3.90	0.00	0.00	68.30	0.50	25.30	0.00	1.40	29.92	-5.13
75 m E of 8	8.10	3.70	0.00	0.00	67.10	0.20	22.60	0.00	0.00	20.66	2.15
11	9.21	18.86	0.01	0.19	43.46	0.38	26.26	0.13	0.14	20.22	6.72
11	20.09	54.10	0.00	0.04	12.17	0.08	10.84	0.34	0.20	8.76	2.32
12	20.04	53.60	0.01	0.03	11.90	0.10	11.06	0.32	0.06	8.65	2.68
12	20.62	54.56	0.08	0.18	10.22	0.10	10.98	0.36	0.03	8.14	3.15
12	15.71	39.70	0.08	0.70	22.11	0.13	18.02	0.23	0.05	13.74	4.76
25 m W of 12	20.66	55.26	0.07	0.15	10.40	0.12	10.66	0.35	0.12	8.24	2.68
50 m W of 12	9.57	3.17	0.05	0.00	67.52	0.34	17.36	0.03	0.12	16.95	0.46
14	18.25	51.67	0.05	0.05	13.38	0.07	13.92	0.36	0.10	11.35	2.86
14	20.23	55.83	0.03	0.10	10.52	0.12	10.19	0.35	0.15	8.77	1.58
15	12.04	31.79	0.02	0.17	32.05	0.32	22.14	0.09	0.17	18.04	4.56
Hogans Rd	1.92	8.82	0.02	0.26	31.19	0.63	57.47	0	0.41	30.54	29.93
Hogans Rd	2.22	9.89	0.05	0.17	31.33	0.57	55.76	0.09	0.52	30.02	28.60
Hogans Rd	2.11	9.72	0.01	0.19	32.18	0.43	54.97	0.08	0.48	30.16	27.57
Hogans Rd	0.9	1.69	0.02	0.78	26.92	0.48	68.15	0	0.4	31.34	40.90
Hogans Rd	6.3	36.22	0.02	0.06	18.91	0.22	39.31	0.05	0.86	28.07	12.49
Hogans Rd	3.1	15.93	0.05	1.55	21.82	0.56	56.22	0.14	0.49	30.64	28.42
Hogans Rd	2.72	6.15	0.07	5.34	15.41	0.43	67.92	0.07	0.11	33.33	38.43
Hogans Rd	1.62	6.22	0.03	5.12	20.05	0.46	65.67	0.04	0.19	35.01	34.07