THE ABUNDANCES AND DISTRIBUTION OF SOME TRACE ELEMENTS IN SOME SELECTED SOUTH AFRICAN SHALES

VOLUME II

P.K. HOFMEYR

V O L U M E II

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APPENDIX I

TABLE 1A: Sample localities, sample collectors, hand specimen descriptions and sample mineralogy as determined by X-ray diffraction

KEY

Ch	-	Chlorite	Mt	-	Magnetite
I	-	Illite	C	-	Calcite
K	-	Kaolinite	D	-	Dolomite
M	-	Montmorillonite	S	-	Siderite
P	-	Pyrite	VA	-	Very abundant
G	-	Goethite	*	-	Present in moderate amount
H	-	Hematite	Tr	-	Present in trace amount

Minerals listed under OTHERS are present in trace amounts unless otherwise specified.
Samples are arranged in order of decreasing geological age.

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
Fg 17	As for Fg 16	As for Fg 12	Dark grey well laminated shale	I	Ch (Tr)	*			
SF 2	Collected from a cutting on the mountain road west of the Sheba Mine, at a point slightly east of the 5/9 milestone, northern limb of Ulundi syncline	Dr H Allsopp, Bernard Price Institute, Johannesburg	Fresh, medium to fine grained greywacke	Ch	I (Tr)	*	*		
SF 3	As for SF 2	As for SF 2	Fresh grey greywacke, composed of about equal amounts of clayey material and angular mineral fragments 0.6 mm	Ch-I		*	*		C
SF 4A	As for SF 2	As for SF 2	Dark grey, finely laminated shale	Ch-I		*	Tr	Tr	
SF 4B	As for SF 2	As for SF 2	Fresh, grey, medium to fine grained greywacke	Ch-I		*	*	Tr	
SF 5	As for SF 2	As for SF 2	Dark grey, finely laminated shale	Ch-I	K (Tr)	*	*	Tr	
SF 6	As for SF 2	As for SF 2	Dark grey, finely laminated shale	Ch	I	*	*		
SH 2	Borehole core ZK 40, which penetrates the core of the Zwartkoppie anticline close to the Sheba Mine	As for SF 2	Extremely fine grained, grey shale	Ch-I		*	*	*	D
SH 3	As for SH 2	As for SF 2	Fresh grey, finely laminated shale	Ch-I		*	*		
SH 6	As for SH 2	As for SF 2	Fresh grey, finely laminated shale	Ch	I (Tr)	*			
SH 7	As for SH 2	As for SF 2	Medium grained greywacke	Ch	I (Tr)	*	*		D

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
Fg comp.	As for SF 2	As for SF 2	Composite shale, not to be confused with Allsopp et al (1968) sample No.C which is a composite Fig Tree Greywacke from the New Consort Mine	Ch	I	*	*	Tr	
			KHEIS SYSTEM						
KH 1	Sample taken below base of the Kuibis series in the Fish River Canyon, from strata dipping at an angle of 50° compared to the horizontal overlying Nama sediments	R Danchin	Rather altered rock			*			C, S, H
			WITWATERSRAND SYSTEM						
			GOVERNMENT REEF SERIES						
JP 10	Anglo American Corporation borehole JY8, near Klerksdorp, Viljoenskroon District, farm Jersey 145. 9301-9303'	Dr E Antrobus, Anglo American Corporation	Finely banded grey-green shale with occasional visible quartz	Ch	I	*	*		
JP 9	As for JP 10, 9229-9331'	As for JP 10	Dark grey-green, finely banded shale, shows cross bedding and a little visible pyrite	Ch	I	*	*		Mt
JP 8	As for JP 10, 7972-7974'	As for JP 10	Light coloured shale, considerable small scale cross bedding, variations in grain size over distances of a few inches	Ch	I	*	*		P
JP 7	As for JP 10, 7701-7699'	As for JP 10	Light coloured, fine grained shale, with occasional quartz rich lenses	Ch-I		*	*		

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
JP 6	As for JP 10, 7410-7414'	As for JP 10	Light coloured, finely banded, grey-green core. Fairly coarse grained in parts	Ch-I		*	*		
			JEPPESTOWN SERIES						
JP 5	As for JP 10, 6801-6803'	As for JP 10	Dark, finely banded, fine grained shale	Ch		*			Mt
JP 4	As for JP 10, 5550-5552'	As for JP 10	Finely banded core, light bands predominate, visible quartz	Ch	I (Tr)	VA	*		
JP 3	As for JP 10, 5450-5452'	As for JP 10	Finely banded core, light grey-green bands predominate	Ch	I (Tr)	VA			
JP 2	As for JP 10, 4200-4202'	As for JP 10	Finely banded light grey-green core. Quartz rich	Ch	I (Tr)	*	*		
JP 1	As for JP 10, 4000-4002'	As for JP 10	Finely banded light grey-green core. Quartz rich	Ch	I (Tr)	*	*		
			SINCLAIR GROUP						
			KUNJAS SERIES						
KUN 1	Taken on the road from Helmeringhausen to Gamochas house, about midway from Helmeringhausen	R Danchin & V von Brunn, Precambrian Research Unit, UCT	White, bedded, indurated shale, the shale band is underlain by arkose and conglomerate	I	M (Tr)	VA			
KUN 2	As for KUN 1, 10 feet higher in succession	As for KUN 1	As for KUN 1	I	M (Tr)	VA	*		

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
KUN 3	Sample taken on farm Lovedale, on the road from Helmeringhausen to Sinclair and Walvis Bay	As for KUN 1	Dark, finely layered, indurated sediment, sampled from a band about 30 feet thick	I	M (Tr)	VA			C
KUN 4A	As for KUN 3	As for KUN 1	Dark shale with white laminations	I	M (Tr)	VA	Tr	Tr	
KUN 4B	As for KUN 3	As for KUN 1	As for KUN 4A	I		VA	Tr	Tr	S
			DAMARA SYSTEM						
Dm 1	Sample taken near Dardabis on the Windhoek road, overlying Nossib (Kämtsas) quartzites. Situated on the east fringe of the Damara syncline	H W Fesq, Department of Geochemistry, UCT	Phyllitic shale	I-Ch	M (Tr)	*	*		D
			MALMESBURY FORMATION						
Mm 2	Main road north of Van Rhyn's Dorp, in the vicinity of the gneiss contact at the Sout River	A J Erlank, Department of Geochemistry, UCT	Slightly metamorphosed greyish arenite, with poorly developed laminations	I	Ch-M (Tr)	*	*		
Mm3	Ciolli's quarry near new national road from Cape Town to Malmesbury	A T Lloyd and A J Erlank	The sample was taken from very near a mineralized zone characterized by abundant chalcopyrite and calcite. The sample taken however, a medium grey shale, appears in hand specimen to be completely unaffected by the nearby mineralization	I		*			
Mm 4	As for Mm3	As for Mm 3	A sample of the more arenaceous Malmesbury sediment	I	M (Tr)	*	*		

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
Mm 5	A quarry near Bellville on top of a hill on the national (N2) road from Cape Town to Paarl	As for Mm 3	A sample of more argillaceous Malmesbury sediment	I	M (Tr)	*	*		
Mm 7	Table View Quarry, 5½ miles past Milnerton on the Malmesbury road	R Danchin	Dark grey indurated argillaceous shale, extremely fresh sample	I	K-M(Tr)	*			
			CANGO FORMATION						
Cg 1	From a cutting near the entrance to the Cango Caves, 35 ft towards the caves from conspicuous fault line	A T Lloyd	A light grey, finely laminated, micaceous shale	I	Ch	*			
Cg 2	From a road cutting ¾ mile below the caves on the Oudtshoorn road	A T Lloyd	A greyish-white, well laminated, highly micaceous shale	I		*			
Cg 3	Six miles outside Calitzdorp on the Ladismith-Calitzdorp road. Huis River Pass	A J Erlank	Fine grained, dark grey, well laminated shale	I	Ch	*	Tr		
Cg 4	As for Cg 1	A J Erlank	Light grey, finely laminated, micaceous shale	I	Ch	*			
			NAMA SYSTEM						
			KUIBIS SERIES						
Kui 1	Bedded shale, 900' from the top of the Fish River Canyon, taken from a 2 foot band over and underlain by coarser members	R Danchin	Red, horizontally disposed shale with well developed laminations	I	M (Tr)	Tr			D (**)
Kui 2	The sample was taken 4.5 miles from the Fish River Canyon on the road connecting the Canyon with the national Windhoek road	R Danchin	A thin band of extremely well laminated white shale, could also possibly be from the Schwarzkalk	I	M (Tr)	VA		Tr	D

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
Kui 3	Sample taken 200' below Schwarz-kalk limestone in the Fish River Canyon from a 2 foot band intercalated with weathered Kuibis arkose	R Danchin	Yellowish-white somewhat silty sample, very well indurated and probably more metamorphosed than Kui 2	I	M (Tr)	VA		*	
Kui 4	Fish River Canyon area. Exact locality unknown	G Germs, Precambrian Research Unit, UCT	Light coloured, fissile shale	I	M (Tr)	*			
			SCHWARZRAND SERIES						
Schr 1	Sample taken 4 miles from Maltahöhe on the road to Helmeringhausen, just below the base of the Fish River Series	R Danchin	A green non-laminated silty rock	I-Ch		*	*	*	
Schr 2	Sample taken 14 miles from Konkiep on the Seeheim road, on the farm after Farm Simplon	As for Schr 1	A well-bedded, flaky green rock, which has been fairly extensively weathered	I-Ch-M		VA	*		C
Schr 3	Fish River Canyon area. Exact locality unknown	G J Germs	Light coloured, finely bedded shale	I	Ch	*			
Schr 4	As for Schr 3	As for Schr 3	As for Schr 3	I	Ch	*			
			FISH RIVER SERIES						
FR 1	Luderitz-Seeheim main road, on Farm Chaub, 10 miles from Seeheim	H W Fesq	Red, silty shale interbedded with flagstones and overlain by Fish River quartzites		I (Tr)	VA			
FR 2	Sample taken 28 miles from Mariental on the Maltahöhe road, at a point where two prominent koppies stand on the side of the road	R Danchin & H Fesq	Basal, reddish coloured Fish River mudstone. Poorly laminated, and occurs finely interbedded with a dirty red sandstone	I	MOK (Tr)	*	*	*	C, H

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
FR 3	Sample taken in the river bed adjacent to the turnoff to the farm Voigtsgrund from the main Mariental-Maltahöhe road	As for FR 2	Extremely hard massive rock occurring inter-bedded with coarser members which show well developed cross bedding	I	M (Tr) K (Tr)	VA	*	*	C, H
FR 4	Sample taken 60.4 miles from Mariental on the Maltahöhe road, in a road cutting next to a river bed	As for FR 2	The sample was taken from a 1 foot thick argillaceous band, from a well exposed horizontally disposed sandstone sequence which shows cross bedding	I	M (Tr)	*	*	Tr	
FR 5	Sample taken 37 miles from Konkiep on the Seeheim road	As for FR 2	A moderately well laminated shale with a brownish red colour	I	M (Tr)	VA	*	Tr	C (*), H
FR 6	As for FR 5, ½ mile further from Seeheim	As for FR 2	Very similar in appearance to FR 5, but probably more weathered	I	M (Tr) K (Tr)	VA	*	*	C
FR 7	Sample taken in a deep road cut 7 miles from Seeheim in one of the tributaries of the Fish River	As for FR 2	A greyish red, finely laminated rock	I	M (Tr) K (Tr)	VA	*	*	G
FR 8	As for FR 7, ½ mile nearer to Seeheim	As for FR 2	Well laminated indurated shale with a reddish purple colour	I	M (Tr) K (Tr)	*	*	*	C
FR 9	Sample taken just on Seeheim side of the Fish River bridge	As for FR 2	Massive silty rock with minor shaley intercalations		I-K-M	*	*	*	
AEc 8	Borehole No.1, Artnell Exploration Co., on the farm Vreda 281, Gibeon District 3931'	SWA Geological Survey	Fine grained, reddish brown micaceous shale	Ch-I	K (Tr)	*	*	*	C (*)
AEc 9	As for AEc 8 4209'	As for AEc 8	Fine, indurated, reddish grey, micaceous shale	I	Ch	*	*	*	C (*)

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
AEc 10	As for AEc 8 4253'	As for AEc 8	As for AEc 9	I	Ch	*	*	*	C (*)
AEc 11	As for AEc 8 4324'	As for AEc 8	As for AEc 9	I-Ch		*	*	Tr	C (*)
AEc 12	As for AEc 8 4422'	As for AEc 8	As for AEc 9	I-Ch		*	*	*	C
			CAPE SYSTEM						
			BOKKEVELD SERIES						
Bk 1	Western bank of the Gamka River, in close proximity to the Table Mountain Sandstone Bokkeveld contact. Second shale horizon in first shale band	A T Lloyd	Massive dark grey shale	I-Ch		*	*		
Bk 2	As for Bk 1, third shale horizon in first shale band	As for Bk 1	Medium-dark grey laminated shale	Ch	I	VA	*		C
Bk 3	As for Bk 1, seventh shale horizon in first shale band	As for Bk 1	Massive mudstone, medium to dark grey	I-Ch		*	*		
Bk 4A	As for Bk 1, shale horizon 10 feet below second sandstone in second shale band	As for Bk 1	Medium grey rock, slightly laminated	Ch-I	M (Tr)	*	*	Tr	
Bk 4B	As for Bk 4A, six feet higher in the succession	As for Bk 1	Well laminated inhomogeneous brown to greyish white shale	I	K (Tr) M (Tr)	*	*		
Bk 5	Near the confluence of the Dwyka and Gamka Rivers, between the rivers, sample taken from 4th shale band ten feet above the 3rd sandstone	As for Bk 1	A light greenish-grey slightly laminated rock		I (Tr) K (Tr)	VA	*		
Bk 6A	As for Bk 5, from 4th shale band just below the 4th sandstone band	As for Bk 1	A whitish-grey well laminated shale	I	Ch (Tr) M (Tr)	VA	*		
Bk 6B	As for Bk 6A, 2 feet higher in the succession	As for Bk 1	A medium grey, fairly massive mudstone	I-Ch	M (Tr)	*	*		

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
Bk 7	A quarry on the right hand side of the road between Prince Albert and the Swartberg Pass, about 1½ miles outside Prince Albert; from the fifth shale band and very near to the Bokkeveld-Witteberg contact	As for Bk 1	A light grey micaceous shale	I-Ch		*	*		
Bk 8	From a road quarry just before the entrance to the Swartberg Pass, from the second shale horizon, one hundred feet above the first sandstone	As for Bk 1	A medium greenish grey sample with ½ inch laminations	I	Ch-M	*	*		P
Bk 9	As for Bk 8, 12 feet higher in the succession	As for Bk 1	A white, slightly weathered shale	I		*	*		D, S
Bk 10	Taken in new road cutting in the Gamka Poort, on the south western side of the opening, first shale band just below first sandstone sand	As for Bk 1	A medium grey, slightly laminated shale, some laminations creamy-pink in colour	Ch-I		*	*		
Bk 11	As for Bk 10, near the middle of second shale band	As for Bk 1	A silty rock consisting of interbedded light grey and light brown laminations	Ch-I		*	*		
Bk 12	As for Bk 10, just below Bk 11 in the succession	As for Bk 1	A fine grained, white shale with well developed laminations	I	Ch	*	*		
Bk 13	As for Bk 10, from 10 feet below Bk 12	As for Bk 1	Light brown massive shale, containing several well preserved lamellibranchs	I-Ch		*	*		
Bk 14	As for Bk 10, from 10 feet below Bk 13	As for Bk 1	Very light grey, massive shale with lamellibranchs	I	M-Ch (Tr)	VA			
Bk 16	From a road cut at the top of a hill 15 miles from Ladismith on the Gamka Poort - Ladismith road	As for Bk 1	A medium to light grey shale with fine banding visible on fresh surfaces	I-Ch	M (Tr)	*			

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
Bk 25	Second shale band, Gydo Pass traverse	As for Bk 18	Dirty grey siltstone with a few clayey intercalated laminations. Occasional trilobites in the vicinity	I-Ch		*	Tr		
Bk 26	As for Bk 25, higher in second shale band	As for Bk 18	Light greyish-green rock with moderately well developed laminations. Quite weathered	I-Ch	M (Tr)	*	Tr		
Bk 27	As for Bk 26, higher in second shale band	As in Bk 18	Weathered yellowish-grey rock taken in the vicinity of sparse trilobite casts	I-Ch		*	Tr		
Bk 28	As for Bk 27, higher in second shale band	As for Bk 18	Poorly sorted grey rock, indurated and poorly laminated	I	Ch-M (Tr)	*	*		
Bk 29	As for Bk 28, higher in second shale band	As for Bk 18	Weathered cream-grey shale	I	Ch-M	*	Tr		
Bk 30	As for Bk 18, third shale band	As for Bk 18	Light green, poorly laminated claystone	I	M-Ch	*			
Bk 34	As for Bk 18, fifth shale band	As for Bk 18	Light brownish green silty rock	I	M-Ch (Tr)	VA	*		
Bk 302	Sample taken about 25 miles south-east of Grahamstown, near Martindale	Dr D A M Smith, Anglo American Corporation	Dark grey massive rock	I	M-Ch	*	Tr		
Bk 318	Sample taken about 4miles south-west of Prince Albert	As for Bk 302	Dark, greyish green weathered shale	I	M-Ch	VA	*		
Bk 321	Bokkeveld outcrops near Ladismith	As for Bk 302	Dark grey massive fresh mudstone	I-Ch	M	*	Tr		Tr
Bk 361	Sample taken in Bokkeveld exposures at Prince Alfred Hamlet	As for Bk 302	Very dark blue-grey massive rock, very fresh	I-Ch	M (Tr)	*	Tr		

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
Bk 373	About 20 miles east of Worcester	As for Bk 302	Pale blue-grey massive rock	I	Ch	VA	*	Tr	
Bk 389	Bokkeveld exposures south of Villiers-dorp	As for Bk 302	Red-yellow-buff coloured shale	I-K		*	Tr	Tr	
			WITTEBERG SERIES						
Wb 1	Taken from a quarry $\frac{3}{4}$ mile from Prince Albert on the road to the Swartberg Pass near the top of the upper Witteberg	A T Lloyd	A very fine grained, massive reddish-grey sample	I	M-Ch (Tr)	*			S
Wb 2	From the same quarry as Wb 1, 35 ft lower in the succession	As for Wb 1	A greenish-grey slightly laminated sample	I	Ch-M (Tr)	*			
Wb 3	From a quarry about $\frac{1}{2}$ mile beyond the Voortrekker Park Rest Camp, outside Prince Albert, from the Lower Witte-berg shales	As for Wb 1	A medium, light grey sample, with well developed laminations	I-Ch	M (Tr)	VA			
Wb 4	Near the Witteberg-Dwyka contact in the Floriskraal Dam area south of Laings-burg. Sample taken about 50 ft before the first tillite 33° 6' E, 20° 55' S	As for Wb 1	A rather coarse grained non-fissile silt-stone	I-Ch		VA	*		
Wb 5	This sample was collected by the late A T Lloyd and no record was kept of its exact locality, but it is believed to be the same as Wb 4	As for Wb 1	A brownish black quite well laminated rock	I	M (Tr)	*			
Wb 6	As for Wb 5	As for Wb 1	A black coloured fresh well laminated shale	I	Ch (Tr) M (Tr)	*			
Wb 7	As for Wb 5	As for Wb 1	A silty rock with thin dark bands	I	M (Tr)	*			

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
			KARROO SYSTEM						
			DWYKA SERIES						
Dw 1	Florriskraaldam area, south of Laingsburg	A T Lloyd	A silty well laminated rock	Ch	I (Tr) M (Tr)	VA			
Dw 4	Sample taken 42 miles from Grunau on the main road to Vioolsdrift	R Danchin	A dark fine grained mudstone devoid of laminations	I	M (Tr)	VA	Tr		C
Dw 5	As for Dw 4	As for Dw 4	A lighter, greyish mudstone with very fine laminations		I (Tr) M (Tr)	VA	Tr	Tr	
CV 86	Borehole SS 1, farm Klipdrift, Sutherland District. Sample taken from Upper Dwyka Shales. 4904'	S A Geological Survey	A dark grey mudstone	I-K	M (Tr)	VA	Tr	Tr	
LDw3/ WB	Sample taken from the white band one mile north of Floriskraaldam in Laingsburg District	K Perry	Very black, well laminated, carbonaceous shale	I	K (Tr)	*			
LDw4/ WB	As for LDw3/WB	As for LDw3/WB	As for LDw3/WB	I	K (Tr)	*			
			ECCA SERIES						
			NORTHERN ECCA FACIES						
BEc 4265	Borehole VB/85/65 Bothaville District. Upper Ecca shales from Vierfontein Shale and Crinkly Shale zones	J S McKinney, Anglo American Corporation	Black, carbonaceous well laminated shale	K	I-M (Tr)	*	Tr	Tr	C
BEc 4266	As for BEc 4265	McKinney	Dark grey-black shale, slightly carbonaceous and finely laminated	K-I-M		*	*	*	P
BEc 4267	As for BEc 4265	McKinney	Dark grey-black slightly carbonaceous shale	K-M	I	*	*	Tr	

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
BEc 4268	As for BEc 4265	McKinney	As for BEc 4267	M-K	I	*	Tr	Tr	S
BEc 4269	As for BEc 4265	McKinney	As for BEc 4267	M-K	I (Tr)	*	Tr	Tr	S (*)
BEc 4270	As for BEc 4265	McKinney	As for BEc 4267	M	K-I (Tr)	*	Tr	Tr	S
BEc 4286	Borehole VB/79/65 Bothaville District Middle Ecca shale from Foss Sandstone Zone	McKinney	Greyish black, well laminated, carbonaceous shale	K	I (Tr)	*	*	*	
BEc 4287	As for BEc 4286	McKinney	As for BEc 4286	K	I-Ch (Tr)	*	*	*	
BEc 4288	As for BEc 4286	McKinney	As for BEc 4286	K	I-Ch-M (Tr)	VA	*	*	
BEc 4292	As for BEc 4286, from Lazy Shale Zone	McKinney	As for BEc 4286	K-I	M (Tr)	*	*	*	
GB45/ 64/1	Borehole GB45/64, Glenfillian Block, Wakkerstroom District, E. Transvaal. Middle Ecca Shale. Farm Beelzebub 0-89	N J Reid, Anglo American Corporation	Argillaceous sample from sub-carbonaceous "Crinkly Sandstone Zone"	K	I	Tr	*	Tr	C (*)
GB45/ 64/2	As for No.1 89-123'	Reid	Carbonaceous shale	I-K	M	*	*	*	C
GB45/ 64/3	As for No.1 123-135'	Reid	Argillaceous sample from zone of alternating fine-grained and coarse grained sediments displaying cross bedding	I-K	M (Tr)	*	*		
GB45/ 64/4	As for No.1 135-190'	Reid	Argillaceous sample from silty, well bedded zone	I-K	M (Tr)	Tr	*	*	
GB45/ 64/5	As for No.1 190-496'	Reid	Dark shale, possibly metamorphosed by nearby dolerite dyke	I-K	M (Tr)	*	*		

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
GB47/64/3	As for No.1 410-425'	Reid	Carbonaceous shale from the base of a zone of well bedded "crinkly" grey sandstone	K-I	M (Tr)	*	*	*	C
GB47/64/4	As for No.1 425-466'	Reid	Fine grained brown well bedded, siltstone	I-K	M (Tr)	VA	*	*	C
GB47/64/5	As for No.1 466-487'	Reid	Carbonaceous shale from zone of brown and grey, cross bedded sandstone containing garnets	K-I	M (Tr)	*	*	*	C
GB47/64/6	As for No.1 487-530'	Reid	Argillaceous member from a zone of white to brown, micaceous, well bedded sandstone & siltstones	K-I	M (Tr)	*	*	*	C
GB47/64/7	As for No.1 530-608'	Reid	Carbonaceous shale from sandstones zone containing Fritz Coal seam	K-I	M (Tr)	*	*	*	C
GB47/64/8	As for No.1 608-657'	Reid	Argillaceous member from well bedded sandstone zone	K-I	M (Tr)	*	*	*	C
GB47/64/9	As for No.1 657-752'	Reid	Black shale from zone containing Alfred, Gus and Dundas coal seams	I-K	M (Tr)	*	*	*	
GB47/64/10	As for No.1 752-799'	Reid	Carbonaceous shale from zone of grey and brown micaceous cross bedded sandstones	I-K	M (Tr)	*	Tr	*	
GB47/64/11	As for No.1 779-828'	Reid	Carbonaceous shale from zone of medium grained sandstones and Coking coal seam	I	K	*	*	*	

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
GB48/65/1	Borehole GB48/65, Glenfillian Block, Wakkerstroom District, E. Transvaal. Prospect Farm 36-IT. 225-247'	Reid	Carbonaceous shale from base of "crinkly" sandstone zone	I-K	M (Tr)	*	*	*	
GB48/65/2	As for No.1 247-286'	Reid	Carbonaceous shale from zone of predominantly white to grey faintly "crinkly" sandstones	I-K	M (Tr)	*	*	*	C
GB48/65/3	As for No.1 286-311'	Reid	Carbonaceous shale from a zone of cross-bedded medium to coarse grained sandstones	I-K	M (Tr)	*	*	*	
GB48/65/4	As for No.1 311-366'	Reid	Argillaceous sample from well-bedded sandstone zone	K-I	M (Tr)	*	*	*	
GB48/65/5	As for No.1 366-389'	Reid	Carbonaceous, micaceous shale from zone of alternating shales and "crinkly sandstones"	K-I	M (Tr)	*	*	*	C, S
GB48/65/6	As for No.1 389-451'	Reid	Sub-carbonaceous shale from a zone predominantly comprised of sandstones	K-I	M (Tr)	*	*	*	
GB48/65/7	As for No.1 451-493'	Reid	Carbonaceous shale from zone of alternating shales and sandstones	K-I	M (Tr)	*	*	*	
GB48/65/8	As for No.1 493-612'	Reid	Argillaceous sample from sand-stone zone containing abundant garnets	K	I (Tr) M (Tr)	*	*	*	
GB48/65/9	As for No.1 612-649'	Reid	Carbonaceous shale from zone of alternating shales and sandstones and containing Alfred seam	K-I	M (Tr)	*	*	*	S, P
GB48/65/10	As for No.1 649-702'	Reid	Carbonaceous shale from zone of alternating shales and sand-stones containing globular pyrite	K-I	M (Tr)	*	*	*	S, P

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
GB48/65/11	As for No.1 702-758'	Reid	Carbonaceous shale from zone of medium to coarse grained sandstones with irregular coal and shale partings	K-I	M (Tr)	*	*	*	
GB48/65/12	As for No.1 758-796'	Reid	Carbonaceous shale from zone of alternating shales and sandstones as well as Gus and Dundas coal seams	K-I	M (Tr)	*	*	*	
GB48/65/13	As for No.1 796-828'	Reid	Sub-carbonaceous shale from zone of cross bedded sandstones	K-I	M (Tr)	*	Tr	*	C
A62/1	Borehole A62, Farm Klippan just south of Wonderfontein in the Hendrina-Middelburg District, E. Transvaal. 91-97'	R Whittaker, Anglo American Corporation	Extremely carbonaceous, finely laminated black shlae, with very little visible arenaceous material present	K	I (Tr) M (Tr)	*		Tr	S
A62/2	As for No.1 131-139'	Whittaker	As for A62/1	K	I (Tr) M (Tr)	*		Tr	S
A62/3	As for No.1 158-161'	Whittaker	As for A62/1	K	M (Tr)	*		*	S
A62/4	As for No.1 163-164'	Whittaker	As for A62/1	K	M (Tr) I (Tr)	*		*	
A62/5	As for No.1 172-174'	Whittaker	As for A62/1	K	M (Tr) I (Tr)	*		Tr	
A62/6	As for No.1 191-195'	Whittaker	As for A62/1	K	I (Tr) M (Tr)	*		*	
A76/1	Borehole A76, Farm Klippan just south of Wonderfontein in the Hendrina-Middelburg District, E. Transvaal 32-43'	Whittaker	Extremely carbonaceous, fresh, finely laminated black shale with very little arenaceous component present	K	I (Tr) M (Tr)	*		Tr	
A76/2	As for No.1 97-103'	Whittaker	As for A76/1	K	M (Tr) I (Tr)	VA		*	

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
A76/3	As for No.1 103-106'	Whittaker	As for A76/1	K	M (Tr) I (Tr)	*		Tr	
A76/4	As for No.1 106-112'	Whittaker	As for A76/1	K	M (Tr) I (Tr)	*		Tr	
A76/5	As for No.1 121-131'	Whittaker	As for A76/1	K	M (Tr) I (Tr)	*		*	S
A76/6	As for No.1 135-139'	Whittaker	As for A76/1	K	I (Tr) M (Tr)	*		Tr	S, P
A78/1	Borehole A78, Farm Nooitgedacht, south of Farm Klippan in the Hendrina-Middelburg District. E. Transvaal. 68-69'	Whittaker	Extremely carbonaceous, fresh, finely laminated, black shale with very little arenaceous component present	K	M (Tr) I (Tr)	*		*	
A78/2	As for No.1 72-74'	Whittaker	As for A78/1	K	I (Tr) M (Tr)	*		*	
A78/3	As for No.1 81-84'	Whittaker	As for A78/1	K	M (Tr)	*		*	
A78/4	As for No.1 88-92'	Whittaker	As for A78/1	K-I	M (Tr)	*		*	
A78/5	As for No.1 109-110'	Whittaker	As for A78/1	K	I-M (Tr)	*		Tr	
A78/6	As for No.1 119-133'	Whittaker	As for A78/1	K	I-M (Tr)	*	Tr	*	S
A78/7	As for No.1 133-136'	Whittaker	As for A78/1	K	I-M (Tr)	*		*	S
A78/8	As for No.1 137-144'	Whittaker	As for A78/1	K	I-M (Tr)	*	Tr	*	S
A78/9	As for No.1 165-169'	Whittaker	As for A78/1	K	I-M (Tr)	*		*	
A78/10	As for No.1 182-192'	Whittaker	As for A78/1	K-I	M (Tr)	*		Tr	
A78/11	As for No.1 197-198'	Whittaker	As for A78/1	K	I-M (Tr)	*			P, C,
A78/12	As for No.1 201-202'	Whittaker	As for A78/1	K	I-M (Tr)	*		Tr	D
A78/13	As for No.1 205-211'	Whittaker	As for A78/1	K	I-M (Tr)	*		*	D

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
SEc 1	Borehole Somkele N1, Mtubatuba, North Zululand 1050'. (The Ecca Beaufort boundary in this area is not well defined, and it is probable that the first few samples are Lower Beaufort shales	G Morano, Geological Survey, Mtubatuba	Black highly carbonaceous shale	I-K	M (Tr)	VA	*		C
SEc 2	As for SEc 1 1085'	Morano	Black highly carbonaceous shale with plant fossils	K	I-M (Tr)	VA			C, P
SEc 3	As for SEc 1 1375'	Morano	Black massive shale	K-I	M (Tr) Ch (Tr)	VA	*	Tr	C
SEc 4	As for SEc 1 1440'	Morano	Black massive shale	I-K	M (Tr)	*	*		C
SEc 5	As for SEc 1 1480'	Morano	Black highly carbonaceous shale	I-K	M (Tr)	*	*		
SEc 6	As for SEc 1 1640'	Morano	Black massive carbonaceous shale	I-K	M (Tr)	VA	*		
SEc 7	As for SEc 1 1675'	Morano	Black massive shale	I-K	M (Tr)	VA	*		
SEc 8	As for SEc 1 1750'	Morano	Black massive shale	I	M (Tr)	VA	*		
SEc 9	As for SEc 1 1800'	Morano	Black massive carbonaceous shale	I	K (Tr)	*	*		
SEc 10	As for SEc 1 2234'	Morano	Black massive carbonaceous shale	I-K		*	*		
SEc 11	As for SEc 1 2262'	Morano	Black highly carbonaceous shale	I	K (Tr)	VA	Tr		
SEc 12	As for SEc 1 2350'	Morano	Black massive carbonaceous shale	I	K	*	*		
SEc 13	As for SEc 1 2420'	Morano	Black highly carbonaceous shale	I-K		VA	Tr		
SEc 14	As for SEc 1 2490'	Morano	Black carbonaceous shale	K-I	M (Tr)	*	Tr		
SEc 15	As for SEc 1 2745'	Morano	Black carbonaceous shale	I-K	M (Tr)	*	Tr		
SEc 16	As for SEc 1 2837'	Morano	Black massive shale	K-I	M (Tr)	*	*		
SEc 17	As for SEc 1 3055'	Morano	Black massive shale	I-K	M (Tr)	*	*	*	
SEc 18	As for SEc 1 3205'	Morano	Black massive shale	I-K	M (Tr)	VA	*		P
SEc 19	As for SEc 1 3414'	Morano	Black massive shale	I-K	M (Tr)	*	*	Tr	P

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
SEc 20	As for SEc 1 3498'	Morano	Black carbonaceous massive shale	I-K	M (Tr)	VA	*	Tr	P
SEc 21	As for SEc 1 3525'	Morano	Black massive carbonaceous shale	K-I	M (Tr)	*	*		
SEc 22	As for SEc 1 3575'	Morano	Black massive carbonaceous shale	K-I	M	*	*		
SEc 23	As for SEc 1 3684'	Morano	Black massive carbonaceous shale	I-K	M (Tr)	*	*	*	
SEc 24	As for SEc 1 3730'	Morano	As for SEc 23	I-K	M (Tr)	*	*		
SEc 25	As for SEc 1 3893'	Morano	Black massive carbonaceous shale	K	M (Tr) I (Tr)	Tr			P
SEc 26	As for SEc 1 4160'	Morano	As for SEc 23	K-I	M (Tr)	*	*		
Ec Dan 1	Middle Ecca Shales from Dannhauser Borehole G.S.0.9. 421'	Geological Survey, Pretoria	Black carbonaceous shale with fine, well developed laminations	K-I	M (Tr)	VA	*		
Ec Dan 2	As for Ec Dan 1 473'	As for No.1	As for Ec Dan 1	K-I	M (Tr)	*	*		
Ec Dan 3	As for Ec Dan 1 603'	As for No.1	As for Ec Dan 1	K-I	M (Tr)	*	*	*	
Ec Dan 4	As for Ec Dan 1 615'	As for No.1	As for Ec Dan 1	K-I	M (Tr)	*	Tr	Tr	
Ec Dan 5	As for Ec Dan 1 638'	As for No.1	As for Ec Dan 1	K-I	M (Tr)	Tr			P
Ec Dan 6	As for Ec Dan 1 875'	As for No.1	As for Ec Dan 1	K-I	M (Tr)	*	*	*	
Ec Dan 7	979' Borehole G.S.0.10.	As for No.1	Dark grey well laminated silty specimen	I	M (Tr) K (Tr)	VA	*	*	
Ec Dan 8	986' Borehole G.S.0.10.	As for No.1	As for Ec Dan 7	K-I	M (Tr)	VA	*	*	S (*)
Ec Dan 9	As for Ec Dan 1 1188'	As for No.1	Black carbonaceous shale, quite well indurated, and finely laminated	K-I		*	*	*	

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
SEc 20	As for SEc 1 3498'	Morano	Black carbonaceous massive shale	I-K	M (Tr)	VA	*	Tr	P
SEc 21	As for SEc 1 3525'	Morano	Black massive carbonaceous shale	K-I	M (Tr)	*	*		
SEc 22	As for SEc 1 3575'	Morano	Black massive carbonaceous shale	K-I	M	*	*		
SEc 23	As for SEc 1 3684'	Morano	Black massive carbonaceous shale	I-K	M (Tr)	*	*	*	
SEc 24	As for SEc 1 3730'	Morano	As for SEc 23	I-K	M (Tr)	*	*		
SEc 25	As for SEc 1 3893'	Morano	Black massive carbonaceous shale	K	M (Tr) I (Tr)	Tr			P
SEc 26	As for SEc 1 4160'	Morano	As for SEc 23	K-I	M (Tr)	*	*		
Ec Dan 1	Middle Ecca Shales from Dannhauser Borehole G.S.0.9. 421'	Geological Survey, Pretoria	Black carbonaceous shale with fine, well developed laminations	K-I	M (Tr)	VA	*		
Ec Dan 2	As for Ec Dan 1 473'	As for No.1	As for Ec Dan 1	K-I	M (Tr)	*	*		
Ec Dan 3	As for Ec Dan 1 603'	As for No.1	As for Ec Dan 1	K-I	M (Tr)	*	*	*	
Ec Dan 4	As for Ec Dan 1 615'	As for No.1	As for Ec Dan 1	K-I	M (Tr)	*	Tr	Tr	
Ec Dan 5	As for Ec Dan 1 638'	As for No.1	As for Ec Dan 1	K-I	M (Tr)	Tr			P
Ec Dan 6	As for Ec Dan 1 875'	As for No.1	As for Ec Dan 1	K-I	M (Tr)	*	*	*	
Ec Dan 7	979' Borehole G.S.0.10.	As for No.1	Dark grey well laminated silty specimen	I	M (Tr) K (Tr)	VA	*	*	
Ec Dan 8	986' Borehole G.S.0.10.	As for No.1	As for Ec Dan 7	K-I	M (Tr)	VA	*	*	S (*)
Ec Dan 9	As for Ec Dan 1 1188'	As for No.1	Black carbonaceous shale, quite well indurated, and finely laminated	K-I		*	*	*	

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
Ec Dan 10	As for Ec Dan 1 1318'	As for Ec Dan 1	As for Ec Dan 9	I-K	M (Tr)	*	*		
Ec 4	Springbok Colliery Ltd Borehole Bh 134. Middle Ecca Shale. 26° 05' E, 29° 21' S. 16 miles south east of Witbank. 117'	Danchin	Black well laminated shale, notably fine grained	K	M (Tr) I (Tr)	*			
Ec 5	As for Ec 4 154'	Danchin	Black shale with minor white quartzose bands	K	I	*	Tr		S
Ec 6	As for Ec 4 221'	Danchin	Black fine grained, well laminated shale	K	I	*			
Ec 7	As for Ec 4 255'	Danchin	Indurated black shale	K	I	*		*	S (*)
Ec 8	As for Ec 4 380'	Danchin	Indurated, black, slightly sandy shale	K	M (Tr) I (Tr)	VA		Tr	
Ec 9	As for Ec 4 270'	Danchin	An indurated black shale	K	I-M (Tr)	*		Tr	S
Ec 10	As for Ec 4 277'	Danchin	As for Ec 9	K	I-M (Tr)	*		Tr	
Ec 11	Vierfontein Collieries, near Orkney. 27° 05' E, 26° 48' S. Borehole VG 520 Middle Ecca Shale from 132 feet, 20 feet above top coal seam	Danchin	Laminated black shale	K	I-M	*	Tr		
Ec 12	As for Ec 11, Borehole VG 523, depth 166 feet	Danchin	Silty black shale, well developed laminations	I-K	M	*	*	*	
Ec 13	As for Ec 12, depth 196 feet. 120 feet above bottom coal seam	Danchin	Poorly laminated black shale	K	M I (Tr)	*			
Ec 14	As for Ec 11, hand specimen from 1 foot above bottom coal seam	Danchin	Poorly laminated, very carbonaceous black shale	K	M (Tr)	Tr			
Ec 15	As for Ec 14, sample from hanging of bottom seam	Danchin	Black shale, extremely carbonaceous, coaly in parts	K	M (Tr)	*			
Ec 16	As for Ec 14	Danchin	Non-laminated black shale	K		*			

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
Ec Dan 10	As for Ec Dan 1 1318'	As for Ec Dan 1	As for Ec Dan 9	I-K	M (Tr)	*	*		
Ec 4	Springbok Colliery Ltd Borehole Bh 134. Middle Ecca Shale. 26° 05' E, 29° 21' S. 16 miles south east of Witbank. 117'	Danchin	Black well laminated shale, notably fine grained	K	M (Tr) I (Tr)	*			
Ec 5	As for Ec 4 154'	Danchin	Black shale with minor white quartzose bands	K	I	*	Tr		S
Ec 6	As for Ec 4 221'	Danchin	Black fine grained, well laminated shale	K	I	*			
Ec 7	As for Ec 4 255'	Danchin	Indurated black shale	K	I	*		*	S (*)
Ec 8	As for Ec 4 380'	Danchin	Indurated, black, slightly sandy shale	K	M (Tr) I (Tr)	VA		Tr	
Ec 9	As for Ec 4 270'	Danchin	An indurated black shale	K	I-M (Tr)	*		Tr	S
Ec 10	As for Ec 4 277'	Danchin	As for Ec 9	K	I-M (Tr)	*		Tr	
Ec 11	Vierfontein Collieries, near Orkney. 27° 05' E, 26° 48' S. Borehole VG 520 Middle Ecca Shale from 132 feet, 20 feet above top coal seam	Danchin	Laminated black shale	K	I-M	*	Tr		
Ec 12	As for Ec 11, Borehole VG 523, depth 166 feet	Danchin	Silty black shale, well developed laminations	I-K	M	*	*	*	
Ec 13	As for Ec 12, depth 196 feet. 120 feet above bottom coal seam	Danchin	Poorly laminated black shale	K	M I (Tr)	*			
Ec 14	As for Ec 11, hand specimen from 1 foot above bottom coal seam	Danchin	Poorly laminated, very carbonaceous black shale	K	M (Tr)	Tr			
Ec 15	As for Ec 14, sample from hanging of bottom seam	Danchin	Black shale, extremely carbonaceous, coaly in parts	K	M (Tr)	*			
Ec 16	As for Ec 14	Danchin	Non-laminated black shale	K		*			

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Other
				Dominant	Subordinate		Plagioclase	K-Feldspar	
Ec 17	Roadcut on the Volksrust-Newcastle Road, 25 miles from Newcastle	Danchin	Dark grey poorly laminated shale, rather weathered	I	K-M	VA			
Ec 18	Lower Ecca shale 5 miles west of Vryheid, on Vryheid-Dundee road	Danchin	Brownish grey, massive shale, laminated in rather broad bands	I	M-K (Tr)	VA	Tr	Tr	
Ec 19	Smallish quarry 2 miles south of Vryheid (Mahlabatini) Lower Ecca shale	Danchin	Dark grey, reasonably fresh well laminated shale	I	M (Tr) K (Tr)	*	Tr		
Ec 21	Unvoti River, north of New Hanover, south of Greytown 29° 09' E, 30° 38' S. Lower Ecca shale	R Danchin & G Hart from Standard Vacuum Oil co.	Dark greenish-grey fissile shale	I	M (Tr)	*			
Ec 22	As for Ec 21, Lower Ecca shale	As for Ec 21	Dark greenish grey, fissile shale		M (Tr) I (Tr)	*			
Ec 23	As for Ec 21, Lower Ecca shale	As for Ec 21	As for Ec 22	I	M (Tr) Ch (Tr)	VA	Tr	Tr	
Ec 24	As for Ec 21, Lower Ecca shale	As for Ec 21	As for Ec 22	M-I	K (Tr)	*			
Ec 25	As for Ec 21, Lower Ecca shale	As for Ec 21	Dark grey, silty indurated sediment		I (Tr) M (Tr) K (Tr)	*			
Ec 27	As for Ec 21, Lower Ecca shale	As for Ec 21	Dense, dark, bluish grey, well laminated shale	I	M (Tr)	*			
Ec 30	As for Ec 21, Upper Ecca shale	As for Ec 21	Dark black shale with occasional thin sandy bands; quite fresh	I	M (Tr)	*	Tr	Tr	
			CENTRAL ECCA FACIES						
R 1	Port St John's, Transkei	P J Ryan, Anglo American Corp.	Carbonaceous, moderately well laminated shale	I	Ch	*	Tr		S, D
AB 1	Borehole No. AB1/65, Abrahamskraal, Victoria West, 31° 48' E, 22° 37' S, Upper Ecca shale - depth 4311'. Very close to the border between the Southern and Central Ecca Facies	Geological Survey, Pretoria	Dark, grey, well laminated shale	I-Ch		*	*		

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
AB 4	As for AB1, top of Middle Ecca shale, depth 4718'	As for AB1	Dark grey, poorly laminated mudstone	I		*	*		
AB 7	As for AB1, Middle Ecca shale, depth 5673'	As for AB1	Dark grey, well laminated shale	I-Ch		*	*		
PR 40	Borehole SS3, Abrahamskraal, Victoria West, depth 4393', Upper Ecca shale	M J Leith, Geological Survey, Beaufort West	Greyish-brown, poorly laminated silty rock	I-K		VA			
PR 41	As for PR 40, Middle Ecca shale - depth 5772'	As for PR 40	Light grey mudstone with moderate laminations	I	M (Tr) K (Tr)	VA	*		
WEc 1	5 miles from Britstown on Prieska road. New road cut	R Danchin & P Hofmeyr	Very fresh grey-green shale, fairly well developed laminations	I	Ch (Tr)	*	*		S
WEc 3	About 1 mile outside Britstown, at the Vosburg turnoff from the Prieska road	As for WEc 1	Moderately well bedded greenish-grey shale with dark streaks	I	Ch	*	*		
WEc 4	As for WEc 3	As for WEc 1	As for WEc 3	I-K	Ch (Tr)	*	*	Tr	
WEc 5	Jacob's Farm, Soutpan, 35 miles north west of Vosburg. Sample taken from deep, recent trenches, Middle Ecca shale	As for WEc 1	Well bedded greenish-grey fresh shale	I	Ch (Tr)	VA	Tr		
WEc 5B	As for WEc 5	As for WEc 1	Black shale finely laminated with alternate light and dark bands	I		*			C (*)
WEc 5C	As for WEc 5	As for WEc 1	Pure black well laminated carbonaceous shale	I		VA			
WEc 5D	As for WEc 5	As for WEc 1	Light coloured extremely finely laminated shale	I		VA			
WEc 5P	As for WEc 5	As for WEc 1	Carbonaceous shale with plentiful visible pyrite		K	Tr			C (**) P
WEc 7	Kareekop, 31 miles from Williston on the Brandvlei road	As for WEc 1	Greenish-grey, poorly bedded, silty shale	I	Ch	*	*		

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Others
				Dominant	Subordinate		Plagioclase	K-Feldspar	
SA 27	Borehole SA1/66. Saambokkraal, Laingsburg. 32° 40' E, 21° 20' S. Upper Ecca shale 4829'	As for QU 19	Fine grained, fresh, dark grey shale	I-Ch	K	*	*		
SA 31	As for SA 27, Middle Ecca shale, 7054'	As for QU 19	As for SA 27	Ch-I		*	*		
SA 34	As for SA 27, Lower Ecca shale, 8889'	As for QU 19	As for SA 27	I-K		*	*		
R 2	Top of Ecca Pass north of Grahamstown	P J Ryan, Anglo American Corp.	Very fine grained, finely laminated shale	I		Tr			
			WESTERN ECCA FACIES						
Ec 1	Floriskraaldam area, south of Laingsburg, sample taken ½ mile north-west of the dam about 500 feet above white band. Lower Ecca shale	A T Lloyd	A medium grey, rather coarse grained well laminated shale	I-Ch	M (Tr)	*	*		
Ec 2	From a road cut 2½ miles south of Laingsburg on the road to Floriskraaldam, 750 feet above white band. Lower Ecca shale	A T Lloyd	Similar in appearance to Ec 1, but colour variations somewhat more marked and cross bedding visible	I	M (Tr)	*	*		
Ec 3	As for Ec 2, one foot higher in the succession	A T Lloyd	Homogeneous medium grey laminated shale	I-Ch	M (Tr)	*	*		C (*)
WEc 13	Road cut on Calvinia-Williston road, 10 miles from Calvinia	R Danchin P Hofmeyr	Light blue, massive mudstone	K-I	Ch (Tr)	*	*	*	
WEc 14	Sutherland-Matjiesfontein road, 28 miles from Sutherland. (Possibly a Lower Beaufort shale)	As for WEc13	Fresh, well-bedded, dark blue shale	I-Ch		*	*	*	
WEc 15	Ceres-Sutherland road, 22 miles from Ceres turnoff. (Possibly a Lower Beaufort shale)	As for WEc 13	Dark, greyish blue, rather weathered siltstone	I-Ch		*	*	*	
KL 14	Borehole KL1/65, NE of Sutherland, Middle Ecca shale, depth 1495' very close to junction between Western, Southern & Central Ecca Facies	Geological Survey, Pretoria	Light grey well laminated siltstone	I-Ch		*	*		

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Other
				Dominant	Subordinate		Plagioclase	K-Feldspar	
KL 17	As for KL 14, Lower Ecca shale, depth 2272'	As for KL 14	Light grey, weathered shale	Ch-I		*	*		
CV 66	Borehole SS1, Farm Klip Drift, Sutherland District. Lower Ecca shale, depth 1555', very close to junction between Western, Southern & Central Ecca Facies	Geological Survey, Sutherland	Dark grey mudstone	I-K	M (Tr)	*	*		
CV 71	As for CV 66, Lower Ecca shale, depth 2360'	As for CV 66	Dark grey mudstone	K	M (Tr) I (Tr)	VA	*		
CV 75	As for CV 66, Lower Ecca shale, depth 3493'	As for CV 66	Dark grey mudstone		M (Tr) I (Tr) K (Tr)	*	*		S
			BEAUFORT SERIES						
Bf 1	Five miles outside Bloemfontein in a new road cut on the Brandfort road	R Danchin	Argillaceous green sediment, interbedded with green Beaufort siltstones showing prominent cross bedding	I	K (Tr) M (Tr)		*	Tr	
Bf 2	Road cut 1 mile outside Richmond, on the Richmond-Hanover road	Danchin	Moderately well bedded reddish argillite. Interbedded with coarser green siltstones	I	K (Tr) M (Tr)		*		
Bf 3	Road cut on Laingsburg-Beaufort West road, 13 miles from Laingsburg	Danchin	As for Bf 2	I	K-M		*		
Bf 4	As for Bf 3, 34 miles from Laingsburg	Danchin	Green, silty, poorly bedded rock	I	Ch M (Tr)		*		
Bf 5	Coffee Bay, Transkei, east of Elliotdale, 31° 59' E, 29° 09' S. Base of Beaufort	R Danchin & G Hart from Standard Vacuum Oil Co.	Hard, fissile, thinly bedded shale	I	K (Tr)		*		
Bf 6	As for Bf 5, but higher in the succession	As for Bf 5	As for Bf 5, but a fresher sample	I-Ch			*		

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Other
				Dominant	Subordinate		Plagioclase	K-Feldspar	
Bf 7	As for Bf 5, but several hundred feet higher in the succession	As for Bf 5	Dark grey, hard, fissile, well bedded, silty shale	I	K		Tr		
Bf 8	As for Bf 5, but several hundred feet higher in the succession	As for Bf 5	As for Bf 7	I	M		*		
WBf 6	Carnarvon-Williston road, 7 miles from Carnarvon	R Danchin & P Hofmeyr	Greenish-brown, well bedded siltstone	I-M	Ch (Tr)	VA	*	Tr	
PR 38	Borehole SS3, Abrahamskraal, Victoria West, depth 1196'		Well bedded, fine grained light grey shale	I	K (Tr) M (Tr)	VA	*		
PR 39	As for PR 38, depth 2721'		Rather poorly bedded, fresh silty sediment		I (Tr) K (Tr)	VA			
			DREDGED AGULHAS BANK SAMPLES						
DR 21	Sample dredged from the Agulhas Bank. 34° 39' S, 20° 21' E	R Gentle, Dept. of Oceanography, UCT	Light green, gritty, weathered shale, with prolific $CaCO_3$ coating (removed)	I-Ch		*	*	Tr	C
DR 50	34° 24' S 21° 06' E	As for DR 21	Dark grey, finely laminated, fresh shale	I-Ch		*	Tr	Tr	
DR 127	34° 37' S 20° 29' E	As for DR 21	Dark grey shale, somewhat coarser and more weathered than DR 140, with prolific $CaCO_3$ coating (removed)	I-Ch		*	*		
DR 140	34° 28' S 19° 09'E	As for DR 21	Dark grey, fresh, well bedded shale	I-Ch		*	*	Tr	
DR 142	34° 30' S 19° 02' E	As for DR 21	Brownish-green laminated rock with alternating fine and coarser bands	I	Ch	*	*		
DR 143	34° 26' S 18° 58' E	As for DR 21	Greenish-grey, finely laminated, fresh shale	I-Ch	M (Tr)	*	*		
LS 3	34° 25' S 20° 50' E	As for DR 21	Dark grey silty shale	I-Ch	M (Tr)	*	Tr	Tr	

Sample number	Locality	Collector	Remarks	Clay minerals		Quartz	Feldspars		Othe
				Dominant	Subordinate		Plagioclase	K-Feldspar	
Bf 7	As for Bf 5, but several hundred feet higher in the succession	As for Bf 5	Dark grey, hard, fissile, well bedded, silty shale	I	K		Tr		
Bf 8	As for Bf 5, but several hundred feet higher in the succession	As for Bf 5	As for Bf 7	I	M		*		
WBf 6	Carnarvon-Williston road, 7 miles from Carnarvon	R Danchin & P Hofmeyr	Greenish-brown, well bedded siltstone	I-M	Ch (Tr)	VA	*	Tr	
PR 38	Borehole SS3, Abrahamskraal, Victoria West, depth 1196'		Well bedded, fine grained light grey shale	I	K (Tr) M (Tr)	VA	*		
PR 39	As for PR 38, depth 2721'		Rather poorly bedded, fresh silty sediment		I (Tr) K (Tr)	VA			
			DREDGED AGULHAS BANK SAMPLES						
DR 21	Sample dredged from the Agulhas Bank. 34° 39' S, 20° 21' E	R Gentle, Dept. of Oceanography, UCT	Light green, gritty, weathered shale, with prolific $CaCO_3$ coating (removed)	I-Ch		*	*	Tr	C
DR 50	34° 24' S 21° 06' E	As for DR 21	Dark grey, finely laminated, fresh shale	I-Ch		*	Tr	Tr	
DR 127	34° 37' S 20° 29' E	As for DR 21	Dark grey shale, somewhat coarser and more weathered than DR 140, with prolific $CaCO_3$ coating (removed)	I-Ch		*	*		
DR 140	34° 28' S 19° 09'E	As for DR 21	Dark grey, fresh, well bedded shale	I-Ch		*	*	Tr	
DR 142	34° 30' S 19° 02' E	As for DR 21	Brownish-green laminated rock with alternating fine and coarser bands	I	Ch	*	*		
DR 143	34° 26' S 18° 58' E	As for DR 21	Greenish-grey, finely laminated, fresh shale	I-Ch	M (Tr)	*	*		
LS 3	34° 25' S 20° 50' E	As for DR 21	Dark grey silty shale	I-Ch	M (Tr)	*	Tr	Tr	

A P P E N D I X 2

TABLES 2A to 22A

Element concentrations and some inter-element ratios

TABLE 2A

SWAZILAND SYSTEM

FIG TREE SERIES SHALES

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
Fg 12	1.6	18	62	156	61	658	179	1147	26	29	1.6	88	2	9	15	5.9	2.04	10.8	0.16
Fg 13	1.5	19	74	164	87	737	169	1059	26	27	1.6	90	5	5	8	5.9	2.14	8.5	0.16
Fg 14	1.8	19	60	102	38	451	220	1245	26	32	1.5	130	10	3	7	5.4	2.05	11.9	0.18
Fg 16	1.3	15	71	132	32	475	117	946	21	24	1.3	102	7	10	14	5.2	2.16	14.8	0.12
Fg 17	2.8	19	56	173	36	430	127	879	21	29	1.9	83	4	7	43	5.5	2.52	11.9	0.14
SF 4A	2.1	20	54	116	39	600	194	1070	28	35	1.7	99	8	7	8	6.6	2.08	15.4	0.18
SF 5	1.6	18	46	103	25	526	148	1090	23	25	1.4	120	5	11	9	4.7	2.07	21.0	0.14
SF 6	1.0	16	48	122	32	496	105	945	20	25	1.4	77	8	10	12	5.8	2.14	15.5	0.11
SH 2	1.3	12	44	138	32	420	85	775	16	26	1.1	114	8	5	12	5.4	2.06	13.1	0.11
SH 3	1.3	16	18	114	46	463	136	903	23	19	1.3	85	<2	5	2	6.2	2.21	10.1	0.15
SH 6	0.9	17	77	282	47	520	125	850	22	19	1.3	95	4	7	7	5.3	2.09	11.1	0.15
Fg. Comp	1.1	13	46	90	33	526	94	763	17	19	1.3	96	8	14	17	3.6	2.03	15.9	0.12

TABLE 3A

FIG TREE SERIES GREYWACKES AND IRONSTONES

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
Fg 1	1.5	11	33	70	24	414	122	977	20	20	1.5	51	<2	<2	6	3.5	1.92	17.3	0.12
Fg 2	1.8	8	41	65	22	341	83	573	18	26	1.9	40	4	3	8	6.1	2.08	15.5	0.14
Fg 8	1.1	5	76	52	44	338	73	811	16	11	1.2	37	<2	6	10	3.0	1.85	7.7	0.09
Fg 9	1.3	9	19	82	22	207	57	346	15	80	2.5	60	2	<2	11	3.0	2.28	9.4	0.16
Fg 10	1.8	15	94	190	74	1200	182	1590	28	28	1.5	78	3	8	9	6.7	2.16	16.2	0.11
Fg 11	1.0	8	36	53	29	339	50	524	15	75	1.4	59	6	<2	6	4.9	2.14	11.7	0.10
Fg 15	1.3	10	58	69	36	277	86	706	15	12	1.6	89	<2	3	5	2.2	1.84	7.7	0.12
SF 2	1.0	12	45	89	36	443	74	824	15	15	1.1	105	4	5	7	4.3	2.01	12.3	0.09
SF 3	0.9	12	44	90	22	444	70	820	12	46	1.0	112	19	9	7	6.3	2.44	20.2	0.09
SF 4B	1.3	13	40	89	32	570	89	768	15	18	1.2	91	3	6	6	4.6	2.04	17.8	0.12
SH 7	1.4	10	30	70	34	666	68	694	21	17	1.0	111	4	9	5	6.2	1.95	19.6	0.10
KHEIS SYSTEM																			
Kh 1	4.3	13	17	18	4.7	12	35	57	11	38	2.1	338	11	17	11	1.9	2.22	2.55	0.61

TABLE 4A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
WITWATERSRAND SYSTEM																			
GOVERNMENT REEF SERIES																			
JP 10	1.3	17	85	90	32	232	123	710	17	24	1.6	188	6	12	12	3.9	2.13	7.25	0.17
JP 9	1.0	13	41	55	20	186	67	478	14	15	1.2	111	12	2	<2	1.8	2.15	9.30	0.14
JP 8	1.2	16	42	77	32	316	100	1125	15	16	1.2	107	5	7	13	3.8	2.10	9.88	0.09
JP 7	1.3	19	46	98	36	258	135	935	18	16	1.1	130	<2	<2	11	3.5	2.24	7.17	0.14
JP 6	1.3	21	60	97	40	252	187	900	21	28	1.3	158	4	4	2	4.0	1.97	6.30	0.21
JEPPESTOWN SERIES																			
JP 5	0.8	11	32	63	21	215	67	530	16	6	1.6	137	<2	17	21	5.4	2.12	10.2	0.13
JP 4	1.1	11	44	61	30	205	89	780	12	10	1.0	99	<2	7	13	1.9	1.79	6.83	0.11
JP 3	4.3	21	10	104	6.4	20	19	56	6.6	69	4.0	506	17	22	24	2.8	2.68	3.13	0.34
JP 2	1.2	14	64	88	43	352	123	1290	16	18	1.3	130	<2	3	9	3.2	2.05	8.19	0.10
JP 1	1.2	14	61	88	45	298	143	876	16	16	1.3	136	3	10	14	2.6	2.05	6.62	0.16
SINCLAIR GROUP																			
KUNJAS SERIES																			
KUN 1	1.6	24	2	9	<1.0	2	172	132	16	29	2.0	252	10	18	24	3.3	2.37	>2.0	1.30
KUN 2	1.7	24	2	9	<1.0	2	174	132	18	31	2.3	261	9	21	15	2.1	2.49	>2.0	1.32
KUN 3	2.0	14	26	4	<1.0	12	151	92	14	43	2.5	168	8	14	38	6.0	2.47	>12.0	1.64
KUN 4A	2.0	17	9	4	<1.0	11	153	104	17	38	2.1	216	14	13	28	3.6	2.63	>11.0	1.47
KUN 4B	2.2	19	11	2	<1.0	3	187	107	16	40	2.2	228	11	15	24	2.9	2.46	>3.0	1.75

TABLE 5A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
									DAMARA SYSTEM										
Dm 1	3.0	23	3	105	19	51	111	103	18	43	2.2	246	15	14	13	3.3	2.65	2.68	1.08
									MALMESBURY FORMATION										
Mm 2	3.8	17	7	48	7.6	14	29	26	6.0	31	2.3	175	10	31	33	2.1	2.22	1.84	1.12
Mm 3	3.4	20	27	113	14	37	112	88	16	43	2.3	193	13	17	24	2.0	2.43	2.64	1.27
Mm 4	2.3	11	12	49	11	24	59	61	9.4	33	1.9	271	6	10	12	0.4	1.88	2.18	0.97
Mm 5	3.1	22	10	117	14	40	142	112	18	35	2.4	188	11	16	23	2.4	2.35	2.86	1.27
Mm 7	3.3	23	27	125	18	48	116	107	17	42	2.1	178	16	16	18	2.6	2.47	2.67	1.08
									CANGO FORMATION										
Cg 1	3.4	25	23	115	8.8	32	63	71	17	64	3.3	200	19	20	27	5.0	2.55	3.64	0.89
Cg 2	3.1	28	13	119	10.0	18	53	57	17	76	3.1	204	24	27	23	4.0	2.83	1.80	0.93
Cg 3	3.4	27	32	144	23	56	106	106	18	43	1.9	146	15	17	12	3.8	2.60	2.43	1.00
Cg 4	3.1	22	31	112	18	53	103	98	18	36	1.9	151	12	16	8	4.7	2.50	2.94	1.05

TABLE 6A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
									NAMA SYSTEM										
									KUIBIS SERIES										
KUI 1	1.3	8	8	38	2.3	6	44	33	6.2	21	1.0	31	4	13	17	3.7	2.63	2.61	1.33
KUI 2	2.2	23	3	13	2.9	9	129	123	14	53	3.4	464	24	25	11	3.7	2.22	3.10	1.05
KUI 3	1.1	8	5	6	<1.0	4	30	40	4.7	47	2.0	405	6	15	31	2.0	2.40	>4.0	0.75
KUI 4	11.0	30	14	28	3.2	18	169	70	26	69	3.5	446	21	18	12	3.7	2.50	5.63	2.41
									SCHWARZRAND SERIES										
Schr 1	2.8	14	47	84	12	32	62	68	10.0	41	1.7	198	13	18	18	3.3	2.22	2.67	0.91
Schr 2	2.1	13	59	71	11	50	54	63	9.5	42	1.7	218	15	14	12	3.9	2.01	4.55	0.86
Schr 3	2.9	16	26	100	16	40	90	76	12	40	2.1	199	14	16	7	2.4	1.01	2.50	1.18
Schr 4	1.9	16	28	78	34	35	270	88	27	45	2.9	230	8	8	19	1.1	2.10	1.03	3.07
									FISH RIVER SERIES										
FR 1	1.5	4	13	19	4.1	9	26	26	3.1	27	1.3	203	5	12	15	0.5	1.24	2.20	1.00
FR 2	2.5	15	7	86	15	34	76	69	12	36	1.9	153	11	7	29	3.6	2.14	2.27	1.10
FR 3	2.1	12	6	55	10.0	25	51	67	9.2	51	2.3	352	17	19	29	1.6	2.05	2.50	0.76
FR 4	3.1	17	6	76	11	33	78	87	13	89	4.5	838	24	24	16	4.3	2.24	3.00	0.90
FR 5	2.5	13	16	67	13	28	62	63	10	44	2.3	227	10	17	21	3.4	2.13	2.15	0.98
FR 6	1.6	11	32	48	11	21	55	50	7.4	50	1.9	225	7	13	18	2.0	2.06	1.91	1.10
FR 7	2.8	15	7	69	13	31	60	65	11	28	2.3	315	13	17	21	3.0	2.17	2.38	0.92
FR 8	2.9	17	7	99	20	42	81	74	14	35	1.9	140	9	15	26	3.7	2.34	2.10	1.09
FR 9	3.1	14	5	51	11	21	65	55	9.5	35	3.3	315	13	17	22	1.8	2.08	1.91	1.18

TABLE 6A (cont.)

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
AEc 8	3.4	16	24	76	14	29	84	83	12	53	2.7	361	14	18	22	1.4	2.29	2.07	1.01
AEc 9	3.9	20	22	108	20	40	101	98	14	39	2.4	174	13	12	22	2.8	2.54	2.00	1.03
AEc 10	3.3	19	25	106	20	40	88	97	13	34	2.1	144	10	12	26	2.2	2.31	2.00	0.91
AEc 11	3.2	19	36	95	20	38	79	97	12	34	2.1	188	12	9	28	1.5	2.51	1.90	0.81
AEc 12	4.1	22	23	117	21	42	103	98	14	39	2.3	193	13	17	35	3.2	2.48	2.00	1.05

TABLE 7A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
									CAPE SYSTEM										
									BOKKEVELD SERIES										
Bk 1	4.2	22	30	110	17	45	147	105	20	45	2.6	220	20	24	34	3.6	2.26	2.65	1.40
Bk 2	2.1	10	9	63	12	28	78	68	12	35	1.7	233	8	15	30	1.2	1.80	2.33	1.15
Bk 3	3.0	21	16	116	21	43	160	106	18	33	2.0	159	16	14	21	3.2	2.18	2.05	1.51
Bk 4A	2.6	17	14	92	17	38	106	91	16	61	2.5	242	17	10	27	3.2	2.31	2.24	1.16
Bk 4B	3.1	14	13	57	11	26	99	89	16	51	2.5	349	14	10	23	3.6	1.93	2.36	1.11
Bk 5	1.6	9	11	63	8.3	24	48	40	8.7	35	1.6	164	2	8	24	4.0	1.65	2.89	1.20
Bk 6A	2.3	14	25	7	<1.0	3	72	74	9.0	56	1.9	340	9	15	31	3.6	1.92	>3.00	0.97
Bk 6B	2.5	17	21	133	18	47	94	88	15	59	2.5	197	17	11	19	4.2	2.03	2.61	1.07
Bk 7	3.0	24	18	68	11	36	103	97	17	68	2.8	478	30	21	23	5.5	2.35	3.27	1.06
Bk 8	2.8	21	20	79	10	35	104	83	15	54	2.2	198	14	18	25	5.7	2.29	3.50	1.25
Bk 9	2.6	21	4	9	<1.0	3	126	80	12	75	2.1	334	26	21	101	3.4	2.40	>3.00	1.58
Bk 10	3.0	20	21	102	20	47	139	104	18	52	2.3	219	14	13	26	3.8	2.25	2.35	1.34
Bk 11	4.3	17	12	59	7.9	37	82	83	12	58	2.7	277	17	7	14	3.9	2.24	4.68	0.99
Bk 12	2.9	22	18	62	11	44	145	114	17	49	2.3	252	17	17	20	4.8	2.24	4.00	1.27
Bk 13	2.6	17	15	96	19	53	108	105	13	74	2.5	233	15	17	28	4.3	2.71	2.79	1.03
Bk 14	2.7	18	17	36	<1.0	21	137	115	15	67	2.9	357	58	22	31	4.4	2.21	> 21	1.19
Bk 16	2.5	17	19	101	15	42	69	99	12	56	1.9	277	13	16	23	3.6	2.25	2.80	0.70
Bk 17	2.9	17	24	82	14	44	77	98	13	47	1.9	183	7	21	28	3.7	2.08	3.14	0.79
Bk 18	2.6	19	21	90	5.3	32	112	99	16	68	2.4	245	19	16	28	4.4	2.17	6.04	1.13
Bk 19	3.2	24	26	159	16	60	205	125	19	58	2.5	149	10	12	19	5.9	2.38	3.75	1.64

TABLE 7A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
									CAPE SYSTEM										
									BOKKEVELD SERIES										
Bk 1	4.2	22	30	110	17	45	147	105	20	45	2.6	220	20	24	34	3.6	2.26	2.65	1.40
Bk 2	2.1	10	9	63	12	28	78	68	12	35	1.7	233	8	15	30	1.2	1.80	2.33	1.15
Bk 3	3.0	21	16	116	21	43	160	106	18	33	2.0	159	16	14	21	3.2	2.18	2.05	1.51
Bk 4A	2.6	17	14	92	17	38	106	91	16	61	2.5	242	17	10	27	3.2	2.31	2.24	1.16
Bk 4B	3.1	14	13	57	11	26	99	89	16	51	2.5	349	14	10	23	3.6	1.93	2.36	1.11
Bk 5	1.6	9	11	63	8.3	24	48	40	8.7	35	1.6	164	2	8	24	4.0	1.65	2.89	1.20
Bk 6A	2.3	14	25	7	<1.0	3	72	74	9.0	56	1.9	340	9	15	31	3.6	1.92	>3.00	0.97
Bk 6B	2.5	17	21	133	18	47	94	88	15	59	2.5	197	17	11	19	4.2	2.03	2.61	1.07
Bk 7	3.0	24	18	68	11	36	103	97	17	68	2.8	478	30	21	23	5.5	2.35	3.27	1.06
Bk 8	2.8	21	20	79	10	35	104	83	15	54	2.2	198	14	18	25	5.7	2.29	3.50	1.25
Bk 9	2.6	21	4	9	<1.0	3	126	80	12	75	2.1	334	26	21	101	3.4	2.40	>3.00	1.58
Bk 10	3.0	20	21	102	20	47	139	104	18	52	2.3	219	14	13	26	3.8	2.25	2.35	1.34
Bk 11	4.3	17	12	59	7.9	37	82	83	12	58	2.7	277	17	7	14	3.9	2.24	4.68	0.99
Bk 12	2.9	22	18	62	11	44	145	114	17	49	2.3	252	17	17	20	4.8	2.24	4.00	1.27
Bk 13	2.6	17	15	96	19	53	108	105	13	74	2.5	233	15	17	28	4.3	2.71	2.79	1.03
Bk 14	2.7	18	17	36	<1.0	21	137	115	15	67	2.9	357	58	22	31	4.4	2.21	> 21	1.19
Bk 16	2.5	17	19	101	15	42	69	99	12	56	1.9	277	13	16	23	3.6	2.25	2.80	0.70
Bk 17	2.9	17	24	82	14	44	77	98	13	47	1.9	183	7	21	28	3.7	2.08	3.14	0.79
Bk 18	2.6	19	21	90	5.3	32	112	99	16	68	2.4	245	19	16	28	4.4	2.17	6.04	1.13
Bk 19	3.2	24	26	159	16	60	205	125	19	58	2.5	149	10	12	19	5.9	2.38	3.75	1.64

TABLE 7A (cont.)

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
Bk 20	2.5	23	18	68	8.8	40	145	120	19	45	2.3	186	20	18	29	5.7	2.32	4.55	1.21
Bk 21	2.4	24	27	79	13	49	163	124	18	48	2.1	177	18	13	23	5.4	2.30	3.77	1.31
Bk 22	2.5	26	16	64	9.9	48	179	122	17	50	1.9	171	22	20	31	5.6	2.46	4.85	1.47
Bk 23	2.9	25	16	121	7.2	59	180	129	19	54	2.4	183	17	15	23	6.3	2.31	8.19	1.40
Bk 24	2.9	23	9	117	5.4	63	142	122	19	76	3.1	194	19	19	28	6.2	2.30	11.67	1.16
Bk 25	2.9	17	13	50	8.2	31	116	109	15	89	3.5	329	13	19	28	4.1	2.14	3.78	1.06
Bk 26	2.7	21	15	58	6.4	40	134	118	19	53	2.4	219	22	18	38	5.1	2.33	6.25	1.14
Bk 27	3.0	22	31	120	17	50	312	146	23	82	3.9	251	16	33	52	6.4	2.35	2.94	2.14
Bk 28	2.7	17	15	71	11	32	104	97	15	55	2.6	262	16	15	29	4.3	2.07	2.91	1.07
Bk 29	2.5	25	29	64	8.2	42	158	126	20	44	2.2	147	16	17	27	5.7	2.37	5.12	1.25
Bk 30	2.7	20	17	37	11	37	136	98	17	55	2.4	251	19	20	23	5.6	2.14	3.36	1.39
Bk 34	2.2	14	11	58	8.0	25	51	86	8.8	41	1.7	360	11	13	17	3.6	2.05	3.13	0.59
Bk 302	3.6	22	35	115	15	46	107	137	12	52	3.1	238	15	18	20	5.2	2.39	3.07	0.78
Bk 318	2.8	15	28	50	8.9	24	58	84	12	37	2.2	219	7	12	60	4.0	2.17	2.70	0.69
Bk 321	3.3	23	30	128	18	52	119	124	11	43	2.5	141	17	18	36	5.1	2.30	2.89	0.96
Bk 361	3.1	28	20	65	4.9	35	150	132	17	31	2.2	132	17	22	49	6.7	2.46	7.14	1.14
Bk 373	3.6	23	7	8	< 1.0	4	167	150	16	38	2.2	190	19	23	27	5.7	2.11	> 4.00	1.11
Bk 389	3.7	24	18	24	< 1.0	18	176	143	17	21	2.1	185	19	18	33	6.4	2.20	> 18.0	1.23

TABLE 8A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
									WITTEBERG SERIES										
Wb 1	3.1	27	43	108	14	53	130	120	21	65	2.6	135	15	22	36	7.7	2.36	3.79	1.08
Wb 2	2.8	26	42	97	21	50	123	114	22	65	2.5	126	17	24	31	7.9	2.40	2.38	1.08
Wb 3	1.4	8	6	52	14	21	34	44	6.6	39	1.3	310	9	8	14	2.9	1.80	1.50	0.77
Wb 4	2.6	17	12	94	15	27	65	72	11	75	2.2	252	16	11	33	3.9	2.26	1.80	0.90
Wb 5	3.5	25	19	27	4.5	13	104	107	19	54	2.3	394	18	19	26	5.3	2.39	2.89	0.97
Wb 6	3.2	25	41	58	9.7	38	118	101	20	58	2.6	290	27	15	23	7.3	2.32	3.92	1.17
Wb 7	3.4	22	37	84	13	54	89	97	18	69	2.5	219	21	20	33	6.7	2.29	4.15	0.92
									KARROO SYSTEM										
									DWYKA SERIES										
Dw 1	1.7	13	22	66	21	21	30	22	7.9	18	1.3	111	9	14	27	2.8	2.78	1.00	1.36
Dw 4	1.8	22	10	4	<1.0	3	112	65	9.8	35	1.5	168	17	21	55	5.8	2.99	>3.0	1.72
Dw 5	1.9	23	21	8	<1.0	3	158	61	12	58	2.3	192	16	19	71	7.1	3.50	>3.0	2.59
CV 86	2.7	20	42	97	18	49	104	73	16	28	2.3	111	11	19	37	5.4	2.35	2.72	1.42
LDW 3/WB	3.0	20	40	13	<1.0	16	112	100	11	35	1.9	141	11	15	60	10.2	2.46	>16.0	1.12
LDW 4/WB	3.5	21	39	34	16	12	112	68	15	37	2.2	149	12	18	39	8.9	2.41	0.75	1.65

TABLE 9A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
ECCA SERIES - NORTHERN ECCA FACIES																			
BOTHAVILLE BOREHOLE																			
BEc4265	2.8	16	31	41	18	58	133	93	18	28	2.1	173	13	15	23	27.5	1.80	3.22	1.43
BEc4266	3.5	20	25	87	20	34	82	150	12	32	2.1	323	17	17	29	8.6	2.27	1.70	0.55
BEc4267	3.4	19	25	87	14	35	72	136	11	36	1.9	337	18	20	26	9.0	2.31	2.50	0.53
BEc4268	3.3	24	33	67	<1.0	48	100	118	12	33	2.0	165	17	21	26	12.0	2.33	>48.0	0.85
BEc4269	3.3	23	31	66	21	46	83	113	16	38	2.1	145	18	23	29	13.5	3.02	2.19	0.73
BEc4270	3.4	22	34	59	15	58	83	190	16	33	2.0	160	17	19	29	17.2	2.16	3.87	0.44
BEc4286	2.9	14	10	56	11	18	48	83	7.6	21	1.3	249	14	13	27	3.7	1.84	1.64	0.58
BEc4287	3.3	19	12	71	34	60	62	83	9.0	20	1.4	168	15	10	28	5.2	2.08	1.76	0.75
BEc4288	5.7	15	7	41	28	23	125	59	16	30	2.4	171	12	8	26	3.0	1.83	0.82	2.12
BEc4292	5.1	28	28	135	27	55	115	108	16	39	2.3	218	14	17	24	9.6	2.55	2.04	1.06
BOREHOLE GB47/64																			
GB47/64/1	3.4	23	19	108	14	44	86	100	13	34	1.7	279	17	18	31	3.7	2.43	3.14	0.86
GB47/64/2	3.2	20	4	83	10	24	66	71	12	31	1.9	158	23	20	29	2.7	2.34	2.14	0.93
GB47/64/3	4.7	24	19	125	19	44	111	109	16	45	2.8	284	17	21	30	6.9	2.50	2.32	1.02
GB47/64/4	4.2	22	10	111	15	32	79	86	11	32	1.9	275	17	10	27	4.2	2.51	2.13	0.92
GB47/64/5	4.4	24	23	124	13	32	95	104	17	50	2.3	362	17	27	34	9.6	2.55	2.46	0.91
GB47/64/6	4.7	21	9	108	14	27	73	88	16	33	2.1	246	16	15	32	5.0	2.53	1.93	0.83
GB47/64/7	4.4	23	10	120	17	38	80	111	16	37	2.9	231	16	23	31	7.2	2.58	2.24	0.72

TABLE 9A (cont.)

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
GB47/64/8	4.9	25	26	110	14	35	104	119	16	48	3.0	316	16	22	29	11.5	2.57	2.50	0.87
GB47/64/9	5.4	29	22	136	14	33	110	143	14	38	2.2	371	23	20	34	11.1	2.65	2.36	0.77
GB47/64/10	3.6	25	27	89	15	56	97	186	15	29	2.1	273	16	16	28	13.0	2.18	3.73	0.52
GB47/64/11	3.4	16	9	60	13	25	53	66	10	32	1.7	347	15	18	35	6.1	2.14	1.92	0.80

TABLE 10A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
									BOREHOLE GB45/64										
GB45/64/1	4.9	18	14	94	17	34	68	68	16	55	2.4	236	16	14	44	3.7	2.56	2.00	1.00
GB45/64/2	4.9	23	24	68	15	35	87	99	13	37	2.2	485	20	28	26	4.1	2.54	2.33	0.88
GB45/64/3	4.0	24	11	106	18	40	87	104	14	45	2.1	357	34	19	28	4.4	2.50	2.22	0.84
GB45/64/4	3.3	18	7	58	12	27	61	69	9.7	40	1.6	136	8	14	33	2.3	2.31	2.25	0.88
GB45/64/5	3.5	27	8	83	15	32	92	83	16	59	2.4	363	20	19	37	2.4	3.17	2.13	1.11
GB45/64/6	3.2	22	8	107	15	34	80	86	13	42	1.8	348	19	21	28	4.5	2.51	2.27	0.93
GB45/64/7	4.4	23	25	116	18	43	101	117	16	55	2.9	299	17	25	42	12.8	2.38	2.39	0.86
GB45/64/8	4.3	21	16	109	12	29	102	97	18	43	2.5	188	12	14	32	9.1	2.73	2.42	1.05
GB45/64/9	3.7	19	5	95	11	21	75	75	11	35	1.9	428	21	22	40	5.0	2.42	1.91	1.00
GB45/64/10	4.4	25	28	98	16	39	104	113	16	48	2.6	293	18	22	37	11.4	2.51	2.44	0.92
GB45/64/11	4.6	23	11	103	20	35	99	100	15	35	2.2	267	19	14	38	7.5	2.62	1.75	0.99
GB45/64/12	3.1	27	19	95	13	34	126	157	9.8	24	1.1	272	20	14	29	11.1	2.27	2.62	0.80
GB45/64/13	2.0	16	5	48	6.2	10	38	38	4.8	12	0.4	182	11	10	33	3.7	2.06	1.61	1.00

TABLE 11A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
									BOREHOLE GB48/65										
GB48/65/1	4.0	22	20	103	24	53	95	97	16	34	2.2	281	17	19	27	7.2	2.40	2.21	0.98
GB48/65/2	4.0	17	9	61	13	27	71	68	10	24	1.3	245	15	14	24	4.2	2.25	2.08	1.04
GB48/65/3	4.4	25	22	98	19	44	102	106	16	35	2.1	336	16	18	32	11.8	2.59	2.32	0.96
GB48/65/4	3.7	23	7	103	12	29	74	76	12	23	1.5	123	14	8	31	6.7	2.40	2.42	0.97
GB48/65/5	5.2	22	17	121	33	63	98	111	17	43	2.7	266	16	14	29	13.3	2.44	1.91	0.88
GB48/65/6	4.4	17	8	89	13	25	84	91	12	33	1.8	279	14	16	37	7.0	2.32	1.92	0.92
GB48/65/7	6.3	26	18	127	18	43	99	118	17	47	3.2	427	19	24	34	10.6	2.51	2.39	0.84
GB48/65/8	4.6	18	6	71	10	18	64	79	10	26	1.8	274	15	15	37	5.0	2.18	1.80	0.81
GB48/65/9	5.2	24	28	117	33	60	100	125	15	33	2.1	284	20	22	41	16.7	2.51	1.82	0.80
GB48/65/10	4.7	26	28	101	16	43	106	127	16	35	2.3	278	16	25	36	13.6	2.48	2.69	0.83
GB48/65/11	2.7	15	4	81	6.1	11	46	66	7.0	29	1.6	448	18	16	36	4.8	1.96	1.80	0.70
GB48/65/12	1.1	27	14	73	9.7	37	68	119	6.6	16	0.7	221	17	10	27	27.9	2.71	3.81	0.57
GB48/65/13	3.9	24	20	118	11	28	94	91	10	42	2.1	338	21	22	33	10.8	2.24	2.55	1.03

TABLE 12A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
									BOREHOLE A78										
A78/1	3.2	27	39	127	53	113	175	266	12	57	1.9	391	24	21	32	24.8	2.35	2.13	0.66
A78/2	2.5	34	51	114	16	69	307	390	12	31	1.9	430	24	13	30	20.7	2.96	4.31	0.79
A78/3	5.3	23	36	69	11	53	308	418	12	78	2.9	372	30	16	25	39.9	2.56	4.82	0.74
A78/4	3.9	29	41	123	55	80	296	230	14	79	2.9	197	23	22	37	20.3	2.43	1.45	1.29
A78/5	3.3	20	22	70	14	40	93	201	10	63	2.1	349	32	25	38	32.1	2.16	2.86	0.46
A78/6	3.4	25	25	114	15	43	75	103	14	43	1.8	210	19	39	39	12.3	2.35	2.87	0.73
A78/7	3.7	26	32	112	16	44	95	171	15	77	2.8	418	33	44	44	17.1	2.28	2.75	0.56
A78/8	3.5	26	49	112	32	71	120	123	18	81	2.6	197	21	37	35	15.9	2.35	2.22	0.98
A78/9	7.3	28	40	84	11	31	98	135	13	72	2.1	274	31	37	37	24.1	2.51	2.82	0.73
A78/10	4.3	26	40	126	7.5	32	133	118	12	63	1.5	181	28	29	40	25.0	2.06	4.27	1.13
A78/11	2.1	13	21	36	8.6	36	32	187	8.6	50	1.3	349	29	17	35	45.2	2.01	4.19	0.17
A78/12	6.2	19	23	46	8.9	35	70	164	12	74	2.0	203	89	15	23	38.2	2.22	3.93	0.43
A78/13	6.7	28	35	106	11	33	116	116	15	71	2.7	196	21	34	33	18.1	2.37	3.00	1.00
									BOREHOLE A76										
A76/1	4.2	25	42	88	26	79	206	263	11	52	1.5	229	24	25	34	28.7	2.11	3.04	0.78
A76/2	3.0	23	25	104	17	37	110	175	11	65	2.1	427	50	18	30	15.9	2.18	2.18	0.65
A76/3	2.9	20	22	51	27	68	73	162	12	74	2.0	418	35	36	48	38.6	2.25	2.52	0.45
A76/4	4.3	26	34	129	43	75	118	151	16	87	2.6	276	29	21	33	17.2	2.24	1.74	0.78
A76/5	3.2	27	27	101	20	116	92	225	15	47	1.8	294	12	21	23	18.2	2.28	5.80	0.41
A76/6	3.1	19	24	52	8.2	22	68	120	12	77	2.1	234	35	26	33	36.7	2.14	2.68	0.57

TABLE 13A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
									BOREHOLE A62										
A62/1	4.8	28	39	127	53	113	175	144	12	78	1.9	177	22	29	33	20.6	2.27	2.13	1.22
A62/2	4.3	21	51	114	16	69	307	137	12	177	1.9	291	23	27	34	33.1	2.29	4.31	2.24
A62/3	3.0	20	36	69	11	53	308	266	12	53	2.9	341	26	10	22	30.7	2.21	4.82	1.16
A62/4	3.7	29	41	123	55	80	296	220	14	32	2.9	215	30	20	29	33.2	2.33	1.45	1.35
A62/5	5.5	28	22	70	14	40	93	294	10	98	2.1	250	32	24	30	21.3	2.05	2.86	0.32
A62/6	3.3	26	25	114	15	43	75	297	14	60	1.8	305	42	21	37	17.3	2.33	2.87	0.25
									DANNHAUSER BOREHOLE										
Ec Dan 1	3.1	20	24	87	16	34	76	87	13	33	2.3	328	16	26	26	6.1	2.23	2.13	0.87
Ec Dan 2	3.4	21	35	103	19	40	91	92	15	45	2.7	227	17	25	33	9.2	2.28	2.11	0.99
Ec Dan 3	3.6	24	27	94	13	38	89	99	15	42	2.4	191	15	26	29	13.8	2.43	2.92	0.90
Ec Dan 4	2.8	21	22	68	17	48	64	129	12	27	1.2	193	17	21	23	14.8	2.22	2.87	0.50
Ec Dan 5	2.9	22	35	68	18	49	74	113	13	26	1.4	151	17	27	29	18.1	2.39	2.72	0.65
Ec Dan 6	7.0	29	37	121	9.7	30	127	128	18	63	3.3	308	17	33	36	15.4	2.57	3.09	0.99
Ec Dan 7	2.0	11	2	38	6.9	15	38	58	8.3	23	2.9	293	15	9	27	2.2	1.97	2.17	0.66
Ec Dan 8	2.0	13	4	63	8.7	17	37	56	6.6	18	1.3	199	10	8	28	2.3	2.24	1.95	0.66
Ec Dan 9	4.3	23	31	107	13	34	77	91	14	45	2.6	297	18	27	33	9.5	2.39	2.62	0.85
Ec Dan 10	5.0	25	19	106	14	33	95	99	15	41	2.5	354	18	23	38	6.4	2.42	2.36	0.96

TABLE 14A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
									SOMKELE BOREHOLE										
SEc 1	5.7	16	13	41	5.6	11	52	48	8.4	25	1.6	139	7	18	32	15.5	2.06	1.96	1.08
SEc 2	2.3	16	20	61	9.8	18	67	43	14	34	2.1	154	7	14	29	7.5	2.59	1.84	1.56
SEc 3	2.9	18	20	77	11	18	72	58	13	39	2.6	224	11	13	26	5.3	2.22	1.64	1.24
SEc 4	3.1	18	17	77	9.4	18	64	55	9.3	36	2.0	254	11	17	26	5.0	2.18	1.91	1.16
SEc 5	3.6	19	22	80	13	22	76	57	12	34	2.0	149	11	18	31	7.9	2.15	1.69	1.33
SEc 6	4.0	19	24	85	14	31	81	57	12	34	2.1	156	11	18	36	7.0	2.20	2.21	1.42
SEc 7	2.8	19	20	83	8.2	15	68	56	12	37	2.3	211	14	17	30	5.0	2.19	1.83	1.21
SEc 8	3.0	16	12	66	6.5	12	56	45	9.0	34	1.9	196	10	13	25	3.5	2.07	1.85	1.24
SEc 9	3.5	18	27	67	11	22	65	57	10	30	1.7	174	15	15	24	14.4	2.25	2.00	1.14
SEc 10	3.4	21	28	118	22	37	111	66	13	38	2.3	173	15	23	37	7.3	2.34	1.68	1.68
SEc 11	3.3	21	22	49	4.0	9	90	49	10	28	1.7	198	22	23	36	4.7	2.23	2.25	1.84
SEc 12	3.4	23	26	84	29	66	94	64	13	36	2.2	219	15	19	35	5.3	2.37	2.28	1.47
SEc 13	4.6	15	12	43	5.6	7	52	39	7.7	24	1.3	137	11	15	26	25.6	2.08	1.25	1.33
SEc 14	3.1	21	27	90	10	22	66	58	15	50	2.6	200	13	18	32	9.0	2.38	2.20	1.14
SEc 15	3.7	26	30	110	17	26	128	61	18	37	2.5	167	15	24	46	5.8	2.55	1.53	2.10
SEc 16	3.0	23	24	94	13	30	95	64	15	28	1.6	129	13	14	34	4.4	2.61	2.31	1.48
SEc 17	2.8	19	22	75	11	23	60	49	11	37	1.9	206	14	19	26	4.7	2.23	2.09	1.22
SEc 18	3.4	17	15	64	10	20	51	44	11	32	2.1	184	13	20	26	3.0	2.24	2.00	1.16
SEc 19	4.1	22	45	97	15	32	80	62	14	40	2.6	196	14	20	25	5.7	2.42	2.13	1.29
SEc 20	3.6	19	40	77	10	21	61	45	11	30	2.0	177	13	19	32	4.6	2.36	2.10	1.36
SEc 21	3.4	20	47	84	14	33	83	66	13	43	2.3	198	12	21	28	5.3	2.39	2.36	1.26
SEc 22	3.6	22	36	96	22	36	116	71	15	40	2.9	194	17	20	28	6.2	2.37	1.64	1.63
SEc 23	2.6	20	25	88	14	29	90	73	13	49	2.7	311	15	19	29	5.3	2.31	2.07	1.23
SEc 24	5.1	24	28	99	18	44	104	85	17	46	2.7	294	18	23	31	7.2	2.27	2.44	1.22
SEc 25	1.6	33	440	138	19	29	66	57	14	55	2.9	167	11	18	221	7.5	4.17	1.53	1.16
SEc 26	5.8	29	17	104	19	49	93	104	16	42	2.5	307	15	25	37	9.7	2.79	2.58	0.89

TABLE 15A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
									SPRINGBOK COLLIERY										
Ec 4	6.4	28	27	66	16	58	53	160	15	68	2.8	230	22	25	23	20.4	2.27	3.63	0.33
Ec 5	3.2	26	34	105	15	35	79	94	16	69	2.3	208	13	27	34	12.3	2.42	2.33	0.84
Ec 6	3.9	30	28	142	23	42	122	133	12	66	2.3	249	33	34	38	16.2	2.17	1.83	0.92
Ec 7	3.7	26	38	119	23	58	86	103	16	69	2.5	199	25	16	26	18.3	2.53	2.52	0.84
Ec 8	6.6	18	45	212	65	109	189	213	18	157	4.4	311	19	14	21	13.1	1.68	1.68	0.89
Ec 9	4.3	27	49	119	12	33	176	145	20	48	3.5	208	21	22	32	20.4	2.21	2.75	1.21
Ec 10	4.1	28	28	120	22	46	131	155	14	63	2.5	208	23	32	42	20.1	2.13	2.09	0.85
									VIERFONTEIN COLLIERY										
Ec 11	2.2	22	19	54	14	71	55	290	14	36	1.3	254	18	26	26	16.6	2.12	5.07	0.19
Ec 12	3.2	20	17	89	16	35	72	122	14	32	1.7	237	10	12	15	9.2	2.26	2.19	0.59
Ec 13	2.3	20	18	45	15	70	59	276	13	40	1.3	215	9	19	23	18.9	2.13	4.67	0.21
Ec 14	2.6	37	8	20	3.6	8	46	85	6.6	14	0.4	116	27	45	64	17.7	2.04	2.22	0.54
Ec 15	2.1	45	11	3	<1.0	14	57	185	10	56	1.2	600	82	45	58	37.3	4.32	>14.0	0.31
Ec 16	5.0	58	10	9	<1.0	12	127	255	20	94	2.3	888	105	64	51	30.2	4.79	>12.0	0.50
									REMAINING NORTHERN ECCA SHALES										
Ec 17	2.8	16	13	63	8.5	20	47	44	9.1	44	1.9	184	16	18	24	3.3	2.14	2.35	1.07
Ec 18	3.6	24	51	134	13	65	127	96	19	62	3.1	200	14	21	33	5.1	2.10	5.00	1.32
Ec 19	4.2	26	47	78	14	58	145	122	22	100	4.2	236	31	28	44	8.0	2.18	4.14	1.19
Ec 21	3.5	23	44	89	10	43	107	94	18	51	2.6	168	6	32	43	12.3	2.34	4.30	1.14
Ec 22	3.5	23	55	86	13	43	108	99	17	52	2.3	175	8	21	50	9.2	2.38	3.31	1.09
Ec 23	3.9	21	40	71	5.8	40	103	105	16	49	2.5	179	16	18	33	9.8	2.28	6.90	0.98
Ec 24	3.9	22	39	95	5.0	38	112	99	16	87	3.5	173	12	23	23	9.1	2.15	7.60	1.13
Ec 25	3.2	21	75	89	10	41	75	82	15	71	2.1	182	12	18	45	8.3	2.34	4.10	0.91
Ec 27	3.5	25	56	75	9.7	40	98	97	16	52	2.5	185	19	24	8	7.1	2.19	4.12	1.01
Ec 30	3.3	23	26	76	16	40	84	78	17	55	2.3	196	16	27	35	11.4	2.27	2.50	1.08

TABLE 16A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
										CENTRAL ECCA FACIES									
R 1	4.2	26	62	92	18	48	122	92	18	49	2.6	181	20	27	34	8.4	2.37	2.67	1.33
AB 1	3.3	19	30	84	11	28	94	51	13	39	2.3	174	16	12	14	3.0	2.25	2.55	1.84
AB 4	3.6	23	29	107	13	32	110	49	15	39	2.2	138	16	18	34	2.6	2.45	2.46	2.24
AB 7	3.8	26	24	108	18	33	128	70	16	29	2.2	140	14	19	15	3.8	2.55	1.83	1.83
PR 40	3.0	22	29	103	19	29	104	59	18	34	2.1	152	14	16	37	5.0	2.40	1.53	1.76
PR 41	3.3	23	35	99	20	25	116	54	15	22	1.9	142	8	21	37	4.9	2.35	1.25	2.15
WEc 1	3.0	24	24	88	6.8	33	99	67	13	76	1.7	105	11	17	17	5.0	2.37	4.85	1.48
WEc 3	3.6	26	40	129	14	37	129	88	16	33	2.2	125	13	19	42	4.2	2.37	2.64	1.47
WEc 4	3.6	23	19	117	13	28	113	73	15	34	2.2	138	11	14	36	3.3	2.40	2.15	1.55
WEc 5	3.5	27	28	88	11	31	136	67	16	45	2.7	103	8	17	11	4.0	3.64	2.82	2.03
WEc 5B	2.8	24	17	16	<1.0	11	108	48	20	61	3.4	321	16	23	42	3.7	2.74	>11.0	2.25
WEc 5C	2.3	22	16	17	<1.0	7	121	83	13	27	1.6	176	16	16	52	5.4	3.16	>7.0	1.46
WEc 5D	2.5	24	16	23	<1.0	8	129	97	14	23	1.5	162	15	16	53	3.4	3.03	>8.0	1.33
WEc 5P	2.0	7	27	42	9.6	14	55	18	11	67	2.8	102	2	20	21	4.7	2.43	1.46	3.06
WEc 7	3.5	22	30	103	13	28	103	73	13	39	2.3	176	15	21	47	4.0	2.41	2.15	1.41
WEc 8	3.6	24	40	120	15	35	129	87	17	30	2.3	128	15	10	34	4.8	2.48	2.33	1.48
WEc 9	3.2	21	46	74	12	33	92	73	13	29	1.9	139	14	20	29	3.7	2.39	2.75	1.26
WEc 10	3.3	17	57	36	11	23	95	65	9.1	26	2.2	125	11	13	7	3.8	2.55	2.09	1.46
WEc 11	3.3	22	36	103	13	32	108	73	14	47	2.3	120	12	25	37	3.8	2.39	2.46	1.48

TABLE 17A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
								CENTRAL ECCA FACIES - ARDNELL BOREHOLE											
AEc 1	4.7	20	29	15	7.7	19	120	88	16	51	2.8	190	17	15	24	23.2	2.22	2.47	1.36
AEc 2	4.9	15	22	62	5.4	13	67	67	9.8	35	1.9	237	11	16	20	8.3	2.06	2.41	1.00
AEc 3	2.8	18	29	70	16	42	74	65	18	72	2.8	166	13	18	20	17.3	2.39	2.63	1.14
AEc 4	3.4	18	22	83	8.4	17	80	73	13	34	2.2	197	13	18	28	7.9	2.16	2.02	1.10
AEc 5	3.3	19	26	79	12	27	95	91	12	32	2.1	198	15	20	30	7.1	2.23	2.25	1.04
AEc 6	3.3	19	28	78	12	30	106	97	13	30	2.1	203	14	16	24	6.0	2.28	2.50	1.09
AEc 7	3.4	21	37	104	17	44	119	112	15	39	2.2	154	11	20	29	5.0	2.37	2.59	1.06
								SOUTHERN ECCA FACIES											
QU 19	3.7	21	24	101	13	29	96	60	14	40	2.3	155	13	16	30	3.7	2.36	2.23	1.60
QU 23	4.1	21	22	76	14	31	102	63	14	42	2.4	185	14	19	19	2.0	2.36	2.21	1.62
SA 27	3.5	25	29	114	18	29	119	58	11	38	2.5	149	12	18	46	4.6	2.45	1.61	2.05
SA 31	3.2	23	28	99	4.9	25	150	60	17	33	2.2	145	12	20	30	4.6	2.37	5.10	2.50
SA 34	3.9	19	35	73	<1.0	21	167	46	16	38	2.2	172	14	18	29	4.1	2.28	>21.0	3.63
R 2	3.4	29	9	45	<1.0	16	31	34	8.7	37	2.1	307	27	55	16	8.3	1.97	>16.0	0.91

TABLE 18A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
									WESTERN ECCA FACIES										
Ec 1	2.5	13	16	59	9.1	20	51	42	8.5	39	1.8	214	7	13	28	2.3	1.92	2.20	1.21
Ec 2	1.9	13	22	71	10	22	55	52	8.9	44	1.6	176	4	13	41	2.6	1.86	2.20	1.06
Ec 3	2.4	15	27	68	13	25	60	60	11	56	2.1	211	14	11	30	2.6	2.06	1.92	1.00
WEc 13	3.4	23	36	113	14	30	117	75	15	37	2.4	149	16	20	44	3.4	2.41	2.14	1.56
WEc 14	4.6	23	22	80	15	30	107	77	13	42	2.3	160	14	21	40	4.6	2.59	2.00	1.39
WEc 15	2.9	14	16	56	6.8	17	63	60	8.2	33	1.9	191	11	18	87	2.2	2.02	2.50	1.05
WEc 17	2.9	6	11	143	<1.0	5	37	50	8.6	70	3.6	71	5	3	24	4.0	2.27	>5.0	0.74
KL 14	3.7	20	30	85	14	30	97	63	13	45	2.3	216	15	17	24	3.2	2.31	2.14	1.54
KL 17	3.5	22	26	97	16	28	117	58	15	34	2.3	137	12	19	35	4.3	2.35	1.75	2.02
CV 66	3.2	24	28	101	18	47	108	64	16	25	1.9	126	13	21	38	5.8	2.61	2.61	1.69
CV 71	3.2	21	26	91	20	22	91	46	16	31	2.3	147	13	20	36	6.1	2.33	1.10	1.98
CV 75	1.0	19	28	89	39	20	65	46	13	43	1.3	158	9	19	32	6.8	2.24	0.51	1.41
									BEAUFORT SERIES										
Bf 1	2.8	19	20	81	14	23	62	57	11	38	1.8	232	15	15	27	4.5	2.38	1.64	1.09
Bf 2	2.8	19	14	92	8.7	28	60	69	13	33	1.8	159	11	13	28	3.5	2.29	3.22	0.87
Bf 3	2.7	22	15	111	12	29	106	76	14	20	1.5	103	9	10	30	4.2	2.42	2.42	1.39
Bf 4	3.8	20	15	92	16	30	71	64	14	39	2.3	170	12	14	27	3.8	2.45	1.88	1.11
Bf 5	3.1	19	27	73	7.6	21	61	59	12	35	1.7	159	15	18	12	3.1	2.43	2.76	1.03
Bf 6	3.5	24	40	97	9.4	25	96	68	16	33	2.1	126	14	26	37	4.4	2.52	2.66	1.41
Bf 7	2.9	23	35	106	11	32	98	73	15	30	1.9	153	13	24	41	3.8	2.38	2.91	1.34
Bf 8	3.7	23	28	109	9.4	30	89	69	15	26	1.7	153	13	22	36	6.3	2.56	3.19	1.29
WBf 6	3.0	20	25	90	6.1	26	92	63	11	34	2.0	180	14	14	23	5.1	2.49	4.26	1.46
PR 38	3.0	21	11	100	18	31	101	72	16	36	2.4	159	15	22	23	3.9	2.40	1.72	1.40
PR 39	4.0	18	21	77	18	17	66	33	12	32	2.1	214	14	19	32	3.9	2.29	0.94	2.00

TABLE 19A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
								DREDGED AGULHAS BANK SEDIMENTS											
DR 21	3.2	18	23	65	10.0	30	99	100	13	42	2.3	247	19	2	10	3.1	2.14	3.00	0.99
DR 50	3.3	24	7	101	7.9	41	151	113	17	34	2.0	104	16	15	30	5.9	2.31	5.19	1.34
DR 127	2.5	15	15	66	12	35	91	122	10.0	34	1.9	186	12	19	19	3.2	2.09	2.92	0.75
DR 140	3.3	23	18	75	9.0	38	130	113	16	47	2.6	247	19	19	13	5.0	2.25	4.22	1.15
DR 142	3.3	20	16	78	9.7	34	108	105	13	47	2.1	207	18	15	12	3.8	2.20	3.51	1.03
DR 143	2.9	20	11	86	5.2	38	109	100	13	45	2.2	219	16	19	29	4.8	2.22	7.31	1.09
LS 3	2.0	11	99	46	4.9	16	45	132	6.0	54	2.4	260	10	15	28	6.7	1.71	3.27	0.34

TABLE 20A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb	LOI	Ga/Al	Ni/Co	V/Cr
								SEPARATED LESS THAN TWO MICRON FRACTIONS											
Fg 1	1.9	19	60	183	32	679	233	1098	38	22	3.3	66	2	5	13	8.5	1.82	21.22	0.21
Fg 14	3.2	24	86	273	52	618	172	1119	28	18	2.3	83	6	3	41	9.3	2.36	11.88	0.15
Fg 17	2.3	24	112	176	63	689	230	1806	33	24	2.3	104	4	7	15	9.3	2.05	10.94	0.13
JP 7	2.1	28	68	226	43	319	221	1206	23	8	2.0	44	3	4	17	8.7	2.32	7.42	0.18
Mm 7	4.5	25	50	159	28	69	150	122	19	46	2.5	174	17	19	37	8.6	2.39	2.46	1.23
Kui 2	3.2	38	16	66	<1.0	21	200	170	21	41	2.3	189	16	27	20	6.9	2.33	>21.0	1.18
Kui 4	17	40	300	146	6.6	46	231	205	33	69	3.8	149	23	23	15	6.0	2.71	6.97	1.13
Cg 1	3.5	28	48	184	16	47	98	82	19	60	4.2	175	15	18	30	6.9	2.39	2.94	1.20
Bk 7	3.7	37	32	115	15	58	166	123	21	19	1.9	89	11	21	40	8.4	2.22	3.87	1.35
Bk 14	4.0	32	42	86	4.0	43	252	154	23	37	2.3	116	15	30	31	8.0	2.42	10.75	1.64
Bk 18	3.8	33	63	169	5.1	52	246	186	22	36	2.5	108	14	36	30	10.4	2.40	10.20	1.32
Bk 21	4.6	32	63	112	15	58	305	175	28	20	2.4	115	18	24	44	9.3	2.09	3.87	1.74
Schr 3	4.4	31	68	355	33	74	190	126	22	38	2.9	108	8	19	17	8.4	2.65	2.24	1.51
Wb 6	3.7	34	82	154	16	63	164	109	22	22	2.3	88	8	15	37	12.3	2.27	3.94	1.50
GB45/64/3	5.0	39	7	117	19	45	162	134	21	31	2.3	75	11	9	26	7.9	3.04	2.37	1.21
GB47/64/7	5.2	39	18	189	16	46	153	130	19	35	2.3	76	17	14	17	13.1	2.80	2.88	1.18
GB47/64/11	5.6	37	18	135	16	42	131	114	18	27	1.8	70	22	20	34	9.7	2.37	2.63	1.15
GB48/65/11	6.5	46	24	237	16	37	171	140	16	33	1.7	127	43	31	42	15.1	2.78	2.31	1.22

TABLE 21A

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb
			SEPARATED	LESS	THAN	TWO	MICRON	FRACTION	ON	A	VOLATILE	FREE	BASIS		
Fg 1	2.1	21	66	200	35	742	255	1200	41	24	3.6	72	2	6	14
Fg 14	3.5	26	94	298	57	674	190	1220	31	20	2.5	90	7	3	45
Fg 17	2.6	27	122	192	69	752	254	1970	37	26	2.5	113	4	8	16
JP 7	2.3	31	74	247	47	349	242	1320	26	9	2.2	48	3	4	19
Mm 7	5.0	27	55	174	31	75	164	133	20	50	2.8	190	19	21	41
Kui 2	3.5	40	17	71	<1.0	23	215	183	23	44	2.5	203	17	29	22
Kui 4	18	42	319	155	7.0	49	246	218	36	73	4.1	159	25	24	16
Cg 1	3.8	31	52	198	17	50	105	88	21	64	4.2	188	16	19	32
Bk 7	4.1	41	35	125	16	63	181	134	23	21	2.1	97	12	23	44
Bk 14	4.4	35	46	94	4.4	47	275	167	25	40	2.5	126	18	32	34
Bk 18	4.2	37	70	189	5.7	58	275	208	24	40	2.8	120	16	40	33
Bk 21	5.1	36	69	123	17	64	336	193	31	22	2.7	127	20	26	48
Schr 3	4.9	34	74	387	39	81	208	138	25	42	3.2	118	9	21	19
Wb 6	4.2	39	94	176	18	72	187	124	25	25	2.6	100	9	17	42
GB45/64/3	5.5	42	8	127	20	49	176	146	22	34	2.5	82	12	10	28
GB47/64/7	6.0	42	21	218	18	53	176	150	22	40	2.7	88	20	16	19
GB47/64/11	6.3	41	20	149	18	46	146	126	20	30	2.0	77	24	22	38
GB48/65/11	7.7	54	28	279	18	44	201	165	19	39	7.7	149	51	36	49

TABLE 21A continued

	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb
SEc 2	3.2	26	45	245	20	44	131	61	23	56	3.5	233	9	20	41
SEc 3	4.6	38	32	146	18	47	173	106	19	45	3.1	156	14	15	40
SEc 22	6.2	61	62	270	24	54	190	105	26	56	3.6	155	16	19	40
SEc 23	4.6	39	52	228	15	47	183	115	24	50	3.4	136	17	22	41
Ec Dan 9	6.7	43	47	171	18	56	190	137	28	52	2.8	110	18	25	35
Ec 14	4.3	48	12	82	<1.0	10	87	153	18	9	0.8	106	27	59	76
Ec 18	4.9	38	76	192	18	102	202	125	18	64	3.1	165	9	21	44
WEc 1	3.7	34	38	189	18	83	202	91	22	90	2.9	123	7	10	24
WEc 4	4.9	45	51	248	22	114	203	105	23	33	2.5	179	6	22	52
AB 4	3.6	38	25	181	20	47	167	102	21	34	2.2	116	20	20	41
QU 23	3.9	37	18	120	16	47	154	102	20	53	2.6	130	18	31	23
AEC 4	4.1	27	12	96	8.9	26	99	83	15	35	2.0	178	14	21	22
R 1	5.2	38	116	172	18	78	165	128	19	62	3.1	168	13	30	49
Bf 7	3.7	30	60	151	14	42	153	93	19	37	2.6	166	11	22	38
PR 38	3.8	33	14	241	19	47	156	100	24	42	3.0	128	21	23	32

TABLE 22A

Th and U concentrations in ppm and Th/U ratios in some selected South African shales

Results determined by gamma-spectroscopy

Sample groups arranged in order of decreasing geological age

	Th	U	Th/U
FIG TREE SHALES			
Fg 14	6.3	0.6	10.5
Fg 16	5.6	0.8	7.0
KHEIS AND DAMARA SEDIMENTS			
Kh 1	14	4.4	3.2
Dm 1	19	1.3	14.6
WITWATERSRAND SEDIMENTS			
JP 3	18	4.3	4.2
KUNJAS FORMATION			
KUN 1	16	2.4	6.7
KUN 2	17	2.3	7.4
KUIBIS SERIES			
KUI 2	23	3.9	5.9
FISH RIVER SERIES			
FR 3	16	2.9	5.5
FR 4	25	4.4	5.7
AEc 9	14	2.6	5.4
AEc 10	10	2.4	4.2
AEc 11	10	2.4	4.2
MALMESBURY FORMATION			
Mm	17	2.5	6.8
BOKKEVELD SERIES			
Bk 13	15	2.8	5.4
Bk 14	18	3.4	5.3
Bk 17	17	2.1	8.1
Bk 22	17	2.7	6.3
Bk 25	17	2.4	7.1
Bk 27	27	2.8	9.6

TABLE 22A continued

	Th	U	Th/U
DWYKA SERIES			
Dw 4	21	3.5	6.0
NORTHERN ECCA FACIES			
BEc 4270	19	2.0	19.5
GB45/64/7	22	6.6	3.3
A78/9	29	8.0	3.6
A76/3	24	9.0	2.7
A76/6	28	9.5	3.0
SEc 1	19	4.0	4.9
SEc 23	21	4.7	4.5
SEc 25	13	4.1	3.2
Ec Dan 3	26	4.5	5.8
Ec 4	28	3.3	8.5
Ec 5	27	6.5	4.2
Ec 14	43	3.2	13.4
Ec 15	45	3.7	12.1
Ec 16	56	5.1	11.0
CENTRAL ECCA FACIES			
AB 1	16	3.4	4.7
AB 4	19	3.0	6.3
AB 7	18	3.4	5.3
WEc 1	18	3.4	5.3
AEC 1	20	25	0.8
AEC 2	16	2.6	6.2
WESTERN ECCA FACIES			
WEc 15	12	3.0	4.0
KL 14	18	3.7	4.9
BEAUFORT SERIES			
WBF 6	16	2.9	5.5

A P P E N D I X 3

TABLES 23A to 42A

Tables as referred to in Volume I

TABLE 23A

AVERAGE TRACE ELEMENT ABUNDANCES (IN PPM) IN SOUTH AFRICAN ARGILLACEOUS ROCKS

		Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	
Swaziland System															
Fig Tree Series	(23)	1.4 (0.3)	13.7 (4.2)	51.0 (18.9)	114 (53)	38.4 (16.3)	502 (197)	115 (48)	883 (258)	20.0 (4.7)	28.7 (17.3)	1.4 (0.3)	87.5 (24.7)	5.3 (3.9)	6 (3
Kheis System	+(1)	4.3	13	17	18	4.7	12	35	57	11	38	2.1	338	11	17
Witwatersrand System	(10)	1.2* (0.2)	15.7 (3.7)	48.5 (20.4)	82.1 (17.2)	30.5 (11.9)	257* (57)	105 (47)	847* (147)	15.2 (3.8)	16.6* (6.7)	1.3* (0.3)	133* (27)	5.5 (5.1)	8 (6
Kunjas Series	+(5)	1.9	19.6	10.0	5.6	1.0	6.0	167	113	16.2	36.2	2.2	225	10.4	16
Damara System	+(1)	3.0	23	3	105	19	51	111	103	18	43	2.2	246	15	14
Malmesbury Formation	+(5)	3.2	18.6	16.6	90.4	12.9	32.6	91.6	78.8	13.3	36.8	2.2	201	11.2	18
Cango Formation	+(4)	3.3	25.5	24.8	123	15.0	40.0	81.3	83.0	17.5	54.8	2.6	175	17.5	20
Nama System															
Kuibis Series	+(4)	1.5*	17.3	7.5	21.3	2.4	9.3	93.0	66.5	12.7	47.5	2.5	337	13.8	17
Schwarzrand Series	+(4)	2.4	14.8	40.0	83.3	18.3	39.3	119	73.8	14.6	42.0	2.1	211	12.5	14
Fish River Series	(14)	2.9 (0.6)	15.3 (4.5)	16.4 (10.6)	75.7 (27.5)	14.5 (5.1)	30.9 (9.6)	72.1 (20.6)	73.5 (21.4)	11.0 (3.0)	42.4 (15.6)	2.4 (0.8)	230 (85)	12.2 (4.5)	14 (4
Cape System															
Bokkeveld Series	(38)	2.9 (0.6)	19.8 (4.3)	18.7 (7.2)	75.8 (36.2)	10.5 (5.7)	36.9 (14.7)	127 (49)	106 (23)	15.5 (3.4)	53.0 (14.7)	2.4 (0.5)	235 (75)	17.0 (8.6)	16 (5
Witteberg Series	(7)	2.9 (0.5)	21.4 (6.8)	28.6 (15.8)	74.2 (29.3)	13.0 (5.1)	36.6 (16.6)	94.7 (34.8)	93.6 (26.7)	16.8 (5.8)	60.7 (11.8)	2.3 (0.5)	247 (96)	17.6 (5.5)	17 (5
Karroo System															
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
		(1.1)	(5.7)	(38.5)	(30.1)	(10.5)	(21.0)	(54.1)	(69)	(3.1)	(23.8)	(0.6)	(102)	(13.3)	(8
Central Facies	(26)	3.4 (0.6)	21.2 (4.2)	30.7 (11.4)	78.5 (34.1)	11.5 (5.3)	27.2 (10.7)	106 (20)	72.3 (19.6)	14.5 (2.6)	40.1 (14.7)	2.3 (0.4)	161 (47)	13.1 (3.5)	18 (3
Southern Facies	+(6)	3.6	23.0	24.5	84.7	8.7	25.2	111	53.5	13.5	38.0	2.3	186	15.3	24
Western Facies	(12)	2.9 (0.7)	17.8 (5.5)	24.0 (7.0)	87.8 (24.4)	14.7 (9.2)	24.7 (10.0)	80.7 (28.4)	57.8 (11.1)	12.2 (3.0)	41.6 (12.0)	2.2 (0.6)	163 (42)	11.1 (4.0)	16 (5
All Ecca Rocks	(176)	3.7	22.2	28.2	87.1	15.1	36.3	99.0	105	13.5	45.6	2.2	232	18.1	20
Beaufort Series	(11)	3.2 (0.4)	20.7 (2.0)	22.8 (9.2)	93.5 (12.7)	11.8 (4.1)	26.5 (4.7)	82.0 (18.0)	63.9 (11.8)	13.5 (1.9)	32.4 (5.5)	1.9 (0.3)	164 (36)	13.2 (1.9)	17 (5
Dredged Agulhas Bank Shales	(7)	2.9 (0.4)	18.7 (4.5)	16.7* (3.5)	73.9 (17.4)	8.4 (2.6)	33.1 (8.3)	105 (33)	112 (11.8)	12.6 (3.7)	43.3 (7.3)	2.2 (0.2)	210 (53)	15.7 (3.5)	14 (6
Separated less than 2μ Fraction	(33)	4.0* (1.5)	33.8 (7.6)	53.2 (51.8)	169 (62)	18.9 (13.2)	50.7* (15.1)	173 (49)	118*	21.6 (5.3)	37.5 (16.6)	2.5 (0.6)	121 (38)	13.6 (7.7)	19 (9
Non-Carbonaceous South African Argillaceous Rocks	(184)	2.7	18.6	27.3	80.4	15.7	29.7$^{\phi}$	106	82.7$^{\phi}$	14.9	40.9	2.1	186	12.6	15
Carbonaceous South African Argillaceous Rocks	(132)	3.8	22.8	28.2	88.8	16.1	39.7	98.7	118	13.4	47.4	2.2	255	19.9	21
All South African Argillaceous Rocks	(316)	3.2	20.4	27.7	83.9	15.9	34.4$^{\phi}$	103	99.2$^{\phi}$	14.3	43.6	2.2	215	15.7	17

* Not all data included in averages

Figures in brackets beneath averages denote standard deviations

\+ Standard deviations not given for groups of less than seven samples

ϕ Fig Tree and Witwatersrand data excluded

A P P E N D I X 3

TABLES 23A to 42A

Tables as referred to in Volume I

TABLE 23A

AVERAGE TRACE ELEMENT ABUNDANCES (IN PPM) IN SOUTH AFRICAN ARGILLACEOUS ROCKS

		Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb
Swaziland System																
Fig Tree Series	(23)	1.4	13.7	51.0	114	38.4	502	115	883	20.0	28.7	1.4	87.5	5.3	6.4	10.2
		(0.3)	(4.2)	(18.9)	(53)	(16.3)	(197)	(48)	(258)	(4.7)	(17.3)	(0.3)	(24.7)	(3.9)	(3.2)	(8.0)
Kheis System	+(1)	4.3	13	17	18	4.7	12	35	57	11	38	2.1	338	11	17	11
Witwatersrand System	(10)	1.2*	15.7	48.5	82.1	30.5	257*	105	847*	15.2	16.6*	1.3*	133*	5.5	8.6	12.1
		(0.2)	(3.7)	(20.4)	(17.2)	(11.9)	(57)	(47)	(147)	(3.8)	(6.7)	(0.3)	(27)	(5.1)	(6.7)	(7.0)
Kunjas Series	+(5)	1.9	19.6	10.0	5.6	1.0	6.0	167	113	16.2	36.2	2.2	225	10.4	16.2	25.8
Damara System	+(1)	3.0	23	3	105	19	51	111	103	18	43	2.2	246	15	14	13
Malmesbury Formation	+(5)	3.2	18.6	16.6	90.4	12.9	32.6	91.6	78.8	13.3	36.8	2.2	201	11.2	18.0	22.0
Cango Formation	+(4)	3.3	25.5	24.8	123	15.0	40.0	81.3	83.0	17.5	54.8	2.6	175	17.5	20.0	17.5
Nama System																
Kuibis Series	+(4)	1.5*	17.3	7.5	21.3	2.4	9.3	93.0	66.5	12.7	47.5	2.5	337	13.8	17.8	17.8
Schwarzrand Series	+(4)	2.4	14.8	40.0	83.3	18.3	39.3	119	73.8	14.6	42.0	2.1	211	12.5	14.0	14.0
Fish River Series	(14)	2.9	15.3	16.4	75.7	14.5	30.9	72.1	73.5	11.0	42.4	2.4	230	12.2	14.9	23.6
		(0.6)	(4.5)	(10.6)	(27.5)	(5.1)	(9.6)	(20.6)	(21.4)	(3.0)	(15.6)	(0.8)	(85)	(4.5)	(4.4)	(5.6)
Cape System																
Bokkeveld Series	(38)	2.9	19.8	18.7	75.8	10.5	36.9	127	106	15.5	53.0	2.4	235	17.0	16.8	30.2
		(0.6)	(4.3)	(7.2)	(36.2)	(5.7)	(14.7)	(49)	(23)	(3.4)	(14.7)	(0.5)	(75)	(8.6)	(5.0)	(15.0)
Witteberg Series	(7)	2.9	21.4	28.6	74.2	13.0	36.6	94.7	93.6	16.8	60.7	2.3	247	17.6	17.0	28.0
		(0.5)	(6.8)	(15.8)	(29.3)	(5.1)	(16.6)	(34.8)	(26.7)	(5.8)	(11.8)	(0.5)	(96)	(5.5)	(5.9)	(7.6)
Karroo System																

		(0.6)	(4.3)	(7.2)	(36.2)	(5.7)	(14.7)	(49)	(23)	(3.4)	(14.7)	(0.5)	(75)	(6.6)	(5.0)	(15.0)
Witteberg Series	(7)	2.9	21.4	28.6	74.2	13.0	36.6	94.7	93.6	16.8	60.7	2.3	247	17.6	17.0	28.0
		(0.5)	(6.8)	(15.8)	(29.3)	(5.1)	(16.6)	(34.8)	(26.7)	(5.8)	(11.8)	(0.5)	(96)	(5.5)	(5.9)	(7.6)
Karroo System																
Ecca Series																
Northern Facies	(132)	3.8	22.8	28.2	88.8	16.1	39.7	98.7	118	13.4	47.4	2.2	255	19.9	21.2	33.5
		(1.1)	(5.7)	(38.5)	(30.1)	(10.5)	(21.0)	(54.1)	(69)	(3.1)	(23.8)	(0.6)	(102)	(13.3)	(8.2)	(18.1)
Central Facies	(26)	3.4	21.2	30.7	78.5	11.5	27.2	106	72.3	14.5	40.1	2.3	161	13.1	18.0	29.8
		(0.6)	(4.2)	(11.4)	(34.1)	(5.3)	(10.7)	(20)	(19.6)	(2.6)	(14.7)	(0.4)	(47)	(3.5)	(3.8)	(12.2)
Southern Facies	+(6)	3.6	23.0	24.5	84.7	8.7	25.2	111	53.5	13.5	38.0	2.3	186	15.3	24.3	28.3
Western Facies	(12)	2.9	17.8	24.0	87.8	14.7	24.7	80.7	57.8	12.2	41.6	2.2	163	11.1	16.3	33.8*
		(0.7)	(5.5)	(7.0)	(24.4)	(9.2)	(10.0)	(28.4)	(11.1)	(3.0)	(12.0)	(0.6)	(42)	(4.0)	(5.4)	(7.1)
All Ecca Rocks	(176)	3.7	22.2	28.2	87.1	15.1	36.3	99.0	105	13.5	45.6	2.2	232	18.1	20.5	32.8
Beaufort Series	(11)	3.2	20.7	22.8	93.5	11.8	26.5	82.0	63.9	13.5	32.4	1.9	164	13.2	17.9	28.7
		(0.4)	(2.0)	(9.2)	(12.7)	(4.1)	(4.7)	(18.0)	(11.8)	(1.9)	(5.5)	(0.3)	(36)	(1.9)	(5.1)	(8.0)
Dredged Agulhas Bank Shales	(7)	2.9	18.7	16.7*	73.9	8.4	33.1	105	112	12.6	43.3	2.2	210	15.7	14.9	20.1
		(0.4)	(4.5)	(3.5)	(17.4)	(2.6)	(8.3)	(33)	(11.8)	(3.7)	(7.3)	(0.2)	(53)	(3.5)	(6.0)	(8.7)
Separated less than 2μ Fraction	(33)	4.0*	33.8	53.2	169	18.9	50.7*	173	118*	21.6	37.5	2.5	121	13.6	19.6	31.6
		(1.5)	(7.6)	(51.8)	(62)	(13.2)	(15.1)	(49)		(5.3)	(16.6)	(0.6)	(38)	(7.7)	(9.3)	(11.3)
Non-Carbonaceous South African Argillaceous Rocks	(184)	2.7	18.6	27.3	80.4	15.7	29.7ø	106	82.7ø	14.9	40.9	2.1	186	12.6	15.4	24.9
Carbonaceous South African Argillaceous Rocks	(132)	3.8	22.8	28.2	88.8	16.1	39.7	98.7	118	13.4	47.4	2.2	255	19.9	21.2	33.5
All South African Argillaceous Rocks	(316)	3.2	20.4	27.7	83.9	15.9	34.4ø	103	99.2ø	14.3	43.6	2.2	215	15.7	17.8	28.5

* Not all data included in averages

Figures in brackets beneath averages denote standard deviations

\+ Standard deviations not given for groups of less than seven samples

ø Fig Tree and Witwatersrand data excluded

TABLE 24A

AVERAGE TRACE ELEMENT ABUNDANCES (IN PPM) OF FIG TREE SERIES AND ECCA SERIES ROCKS

DATA SEPARATED INTO GROUPS

		Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb
Fig Tree Series																
Shales	(12)	1.5	16.8	54.7	141	42.3	525	142	973	22.4	25.8	1.5	98.3	5.9	7.8	10.1*
		(0.5)	(2.5)	(16.2)	(51)	(16.9)	(96)	(42)	(150)	(3.7)	(5.1)	(0.2)	(15.9)	(2.6)	(3.1)	(5.2)
Greywackes and Ironstones	(11)	1.3	10.3	46.9	83.5	34.1	476	86.7	785	17.3	31.6	1.4	75.7	3.0*	5.0	7.3
		(0.4)	(2.8)	(21.6)	(37.8)	(15.1)	(273)	(36.8)	(318)	(4.4)	(24.7)	(0.4)	(27.8)	(1.5)	(2.8)	(2.0)
Ecca Series - Northern Facies																
Borehole GB45/64	(13)	3.9	22.0	13.9	90.8	14.5	31.8	86.2	92.8	13.3	40.8	2.0	296	18.1	18.2	34.4
		(0.8)	(3.5)	(7.9)	(20.8)	(3.7)	(8.7)	(22.4)	(28.9)	(3.6)	(12.9)	(0.7)	(100)	(6.3)	(5.3)	(5.8)
Borehole GB47/64	(11)	4.2	22.9	16.2	107	14.4	35.5	86.7	108	14.2	37.2	2.2	286	17.5	19.1	30.9
		(0.8)	(3.3)	(8.0)	(22)	(2.3)	(9.6)	(18.6)	(34)	(2.4)	(7.3)	(0.5)	(62)	(2.8)	(4.5)	(2.6)
Borehole GB48/65	(13)	4.2	22.0	15.5	97.2	16.8	37.0	84.7	98.0	12.7	32.3	2.0	292	16.8	17.2	32.6
		(1.3)	(4.0)	(8.2)	(21.0)	(8.6)	(15.8)	(18.4)	(21.4)	(3.7)	(8.7)	(0.6)	(84)	(2.2)	(5.2)	(4.9)
Borehole A62	+(6)	4.1	25.3	35.7	103	27.3	66.3	209	226	12.3	83.0	2.3	263	29.2	21.8	30.8
Borehole A76	+(6)	3.5	23.3	29.0	87.5	23.5	66.2	111	182	12.8	67.0	2.0	313	30.8	24.5	33.5
Borehole A78	(13)	4.3	24.9	34.9	95.3	19.9	52.3	148	202	12.9	64.5	2.2	290	31.1	26.8	34.5
		(1.8)	(5.3)	(9.9)	(30.9)	(16.3)	(24.5)	(95)	(102)	(2.4)	(15.5)	(0.5)	(97)	(18.0)	(10.5)	(5.9)
Somkele Borehole	(26)	3.5	20.5	24.8*	82.6	13.1	26.2	78.5	59.0	12.6	36.8	2.2	197	13.1	18.6	30.7*
		(0.7)	(4.1)	(6.1)	(22.2)	(5.9)	(13.1)	(20.9)	(13.9)	(2.6)	(7.6)	(0.4)	(49)	(3.2)	(3.3)	(5.1)
Dannhauser Borehole	(10)	3.6	20.9	23.6	85.5	13.5	33.8	76.8	95.2	13.0	36.3	2.3	254	16.0	22.5	30.2
		(1.3)	(5.4)	(12.4)	(25.6)	(4.1)	(11.3)	(26.8)	(24.9)	(3.4)	(13.5)	(0.7)	(70)	(2.4)	(8.0)	(4.7)
Bothaville Borehole	(10)	3.7	20.0	23.6	63.9*	20.9*	43.5	90.3	113	13.4	31.0	2.0	211	15.5	16.3	26.7
		(0.9)	(4.4)	(10.1)	(15.9)	(6.8)	(15.2)	(27.6)	(38)	(3.5)	(6.5)	(0.4)	(79)	(2.2)	(4.8)	(2.1)
Borehole Bh134	(7)	5.3	26.1	35.6	124	18.5*	54.4	119	143	15.9	77.1	2.9	230	22.3	24.3	30.9
Ecca Series - Central Facies																
Ardnell Borehole	(7)	3.7	18.6	27.6	70.1	11.2	27.4	94.4	84.7	13.8	41.9	2.3	192	13.4	17.6	25.0
		(0.8)	(1.9)	(5.1)	(27.6)	(4.3)	(12.1)	(21.5)	(17.3)	(2.7)	(15.0)	(0.4)	(27)	(2.1)	(2.0)	(4.1)
Average GB Boreholes	(37)	4.1	22.3	15.1	97.8	15.2	34.7	85.8	99.0	13.3	36.7	2.1	292	17.5	18.1	32.7
		(0.9)	(3.5)	(7.8)	(21.6)	(5.6)	(11.8)	(19.4)	(28.1)	(3.3)	(10.4)	(0.6)	(82.2)	(4.1)	(5.0)	(4.8)
Average A Boreholes	(25)	4.0	24.6	33.7	95.2	22.6	59.0	154	203	12.7	69.6	2.2	289	30.6	25.1	33.4
		(1.1)	(4.4)	(9.6)	(29.2)	(16.2)	(27.2)	(94)	(84)	(2.1)	(27.8)	(0.5)	(86)	(14.4)	(8.8)	(6.3)

* Not all data included in averages

Figures in brackets denote standard deviations

\+ Standard deviations not given for groups of less than seven samples

TABLE 24A

AVERAGE TRACE ELEMENT ABUNDANCES (IN PPM) OF FIG TREE SERIES AND ECCA SERIES ROCKS

DATA SEPARATED INTO GROUPS

		Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb
Fig Tree Series																
Shales	(12)	1.5	16.8	54.7	141	42.3	525	142	973	22.4	25.8	1.5	98.3	5.9	7.8	10.1*
		(0.5)	(2.5)	(16.2)	(51)	(16.9)	(96)	(42)	(150)	(3.7)	(5.1)	(0.2)	(15.9)	(2.6)	(3.1)	(5.2)
Greywackes and Ironstones	(11)	1.3	10.3	46.9	83.5	34.1	476	86.7	785	17.3	31.6	1.4	75.7	3.0*	5.0	7.3
		(0.4)	(2.8)	(21.6)	(37.8)	(15.1)	(273)	(36.8)	(318)	(4.4)	(24.7)	(0.4)	(27.8)	(1.5)	(2.8)	(2.0)
Ecca Series - Northern Facies																
Borehole GB45/64	(13)	3.9	22.0	13.9	90.8	14.5	31.8	86.2	92.8	13.3	40.8	2.0	296	18.1	18.2	34.4
		(0.8)	(3.5)	(7.9)	(20.8)	(3.7)	(8.7)	(22.4)	(28.9)	(3.6)	(12.9)	(0.7)	(100)	(6.3)	(5.3)	(5.8)
Borehole GB47/64	(11)	4.2	22.9	16.2	107	14.4	35.5	86.7	108	14.2	37.2	2.2	286	17.5	19.1	30.9
		(0.8)	(3.3)	(8.0)	(22)	(2.3)	(9.6)	(18.6)	(34)	(2.4)	(7.3)	(0.5)	(62)	(2.8)	(4.5)	(2.6)
Borehole GB48/65	(13)	4.2	22.0	15.5	97.2	16.8	37.0	84.7	98.0	12.7	32.3	2.0	292	16.8	17.2	32.6
		(1.3)	(4.0)	(8.2)	(21.0)	(8.6)	(15.8)	(18.4)	(21.4)	(3.7)	(8.7)	(0.6)	(84)	(2.2)	(5.2)	(4.9)
Borehole A62	+(6)	4.1	25.3	35.7	103	27.3	66.3	209	226	12.3	83.0	2.3	263	29.2	21.8	30.8
Borehole A76	+(6)	3.5	23.3	29.0	87.5	23.5	66.2	111	182	12.8	67.0	2.0	313	30.8	24.5	33.5
Borehole A78	(13)	4.3	24.9	34.9	95.3	19.9	52.3	148	202	12.9	64.5	2.2	290	31.1	26.8	34.5
		(1.8)	(5.3)	(9.9)	(30.9)	(16.3)	(24.5)	(95)	(102)	(2.4)	(15.5)	(0.5)	(97)	(18.0)	(10.5)	(5.9)
Somkele Borehole	(26)	3.5	20.5	24.8*	82.6	13.1	26.2	78.5	59.0	12.6	36.8	2.2	197	13.1	18.6	30.7*
		(0.7)	(4.1)	(6.1)	(22.2)	(5.9)	(13.1)	(20.9)	(13.9)	(2.6)	(7.6)	(0.4)	(49)	(3.2)	(3.3)	(5.1)
Dannhauser Borehole	(10)	3.6	20.9	23.6	85.5	13.5	33.8	76.8	95.2	13.0	36.3	2.3	254	16.0	22.5	30.2
		(1.3)	(5.4)	(12.4)	(25.6)	(4.1)	(11.3)	(26.8)	(24.9)	(3.4)	(13.5)	(0.7)	(70)	(2.4)	(8.0)	(4.7)
Bothaville Borehole	(10)	3.7	20.0	23.6	63.9*	20.9*	43.5	90.3	113	13.4	31.0	2.0	211	15.5	16.3	26.7
		(0.9)	(4.4)	(10.1)	(15.9)	(6.8)	(15.2)	(27.6)	(38)	(3.5)	(6.5)	(0.4)	(70)	(2.2)	(4.8)	(2.1)
Borehole Bh134	(7)	5.3	26.1	35.6	124	18.5*	54.4	119	143	15.9	77.1	2.9	230	22.3	24.3	30.9
Ecca Series - Central Facies																
Ardnell Borehole	(7)	3.7	18.6	27.6	70.1	11.2	27.4	94.4	84.7	13.8	41.9	2.3	192	13.4	17.6	25.0
		(0.8)	(1.9)	(5.1)	(27.6)	(4.3)	(12.1)	(21.5)	(17.3)	(2.7)	(15.0)	(0.4)	(27)	(2.1)	(2.0)	(4.1)
Average GB Boreholes	(37)	4.1	22.3	15.1	97.8	15.2	34.7	85.8	99.0	13.3	36.7	2.1	292	17.5	18.1	32.7
		(0.9)	(3.5)	(7.8)	(21.6)	(5.6)	(11.8)	(19.4)	(28.1)	(3.3)	(10.4)	(0.6)	(82.2)	(4.1)	(5.0)	(4.8)
Average A Boreholes	(25)	4.0	24.6	33.7	95.2	22.6	59.0	154	203	12.7	69.6	2.2	289	30.6	25.1	33.4
		(1.1)	(4.4)	(9.6)	(29.2)	(16.2)	(27.2)	(94)	(84)	(2.1)	(27.8)	(0.5)	(86)	(14.4)	(8.8)	(6.3)

* Not all data included in averages

Figures in brackets denote standard deviations

\+ Standard deviations not given for groups of less than seven samples

TABLE 25A

Averages of inter-element ratios for groups of South African argillaceous rocks

	Ga/Al x 10^4	Ni/Co	V/Cr
Fig Tree Series	2.10	17.90	0.13
Witwatersrand System	2.13	7.49	0.16
Kunjas Series	2.47	-	1.50
Malmesbury Formation	2.27	2.44	1.14
Cango Formation	2.62	2.70	0.97
Nama System: Fish River Series	2.18	2.17	0.99
Kuibis Series	2.44	3.78*	1.39
Schwarzrand Series	2.14*	2.69	1.51
Cape System: Bokkeveld Series	2.22	3.88*	1.17
Witteberg Series	2.26	2.92	0.98
Karroo System: Dwyka Series	2.75	-	1.64
Ecca Series:			
Northern Facies	2.32	2.27*	0.85
Central Facies	2.47	2.38*	1.56
Southern Facies	2.30	2.79*	2.05
Western Facies	2.25	1.92*	1.39
Beaufort Series	2.69	2.51	1.31
Dredged Agulhas Bank shales	2.13	4.20	0.96
Separated less than two micron fraction	2.62	3.86*	1.28*
All South African argillaceous rocks	2.31	2.55+	1.01+

* Not all samples included

+ Fig Tree and Witwatersrand samples excluded

TABLE 26A

Averages of inter-element ratios for the Ecca Series, Karroo System

	$Ga/Al \times 10^4$	Ni/Co	V/Cr
Northern Ecca Facies:			
Bothaville borehole	2.22	2.19*	0.90
Borehole GB 45/64	2.51	2.18	0.94
Borehole GB 47/64	2.45	2.44	0.83
Borehole GB 48/65	2.38	2.29	0.87
Borehole A 62	2.25	3.07	1.09
Borehole A 76	2.20	2.99	0.61
Borehole A 78	2.35	3.20	0.74
GB Boreholes average	2.45	2.30	0.88
A Boreholes average	2.29	3.12	0.79
Somkele borehole	2.39	1.98	1.34
Dannhauser borehole	2.31	2.49	0.80
Springbok Colliery	2.20	2.40	0.84
Vierfontein Colliery	2.14	3.54*	0.39
Central Ecca Facies:			
Ardnell borehole	2.24	2.41	1.11
Remaining shales	2.56	2.37*	1.73
Northern Ecca	2.32	2.27*	0.85
Central Ecca	2.47	2.38*	1.56
Southern Ecca	2.30	2.79*	2.05
Western Ecca	2.25	1.92*	1.39
Total Ecca	2.34	2.28*	1.03

* Not all samples included

TABLE 27A

Average trace element abundances (ppm) in argillaceous rocks and the continental crust

	Pelitic rocks Wedepohl (1971)	Continental crust Taylor(1964)	Separated clay fraction	S.A. shale	Carbonaceous shale	Non-carbonaceous shale
Be	3	2.8	4.0+	3.2	3.8	2.7
Sc	13	22	21.6	14.3	13.4	14.9
V	130	135	173	103	98.7	106
Cr	90	100	118+	99.2+	118	82.7+
Co	19	25	18.9	15.9	16.1	15.7
Ni	68	75	50.7+	34.4+	39.7	29.7+
Cu	45	55	53.2	27.7	28.2	27.3
Zn	95	70	169	83.9	88.8	80.4
Ga	19	15	33.8	20.4	22.8	18.6
Y	41	33	37.5	43.6	47.4	40.9
Zr	160	165	121	215	255	186
Nb	18	20	13.6	15.7	19.9	12.6
Yb	3.7	3.0	2.5	2.2	2.2	2.1
Pb	20	12.5	31.6	28.5	33.5	24.9
Th	12	9.6	19.6	17.8	21.2	15.4

+ Not all samples included

Table 28A

Correlation coefficients for elements in the FIG TREE SERIES samples

Be	1.00														
Ga	.46	1.00													
Cu	.15	.31	1.00												
Zn	.17	.65	.57	1.00											
Co	.15	.43	.65	.55	1.00										
Ni	.22	.45	.54	.49	.71	1.00									
V	.54	.83	.48	.48	.57	.55	1.00								
Cr	.36	.66	.63	.47	.61	.77	.85	1.00							
Sc	.54	.75	.44	.52	.63	.66	.91	.78	1.00						
Y	-.03	-.14	-.32	-.15	-.22	-.24	-.19	-.36	-.18	1.00					
Yb	.50	.08	-.10	.03	-.01	-.20	.16	-.17	.18	.50	1.00				
Zr	.01	.57	.06	.26	.04	.23	.34	.33	.22	-.18	-.42	1.00			
Nb	-.18	.17	.00	-.04	-.26	-.04	.00	.06	-.17	.23	-.34	.49	1.00		
Th	-.07	.35	.25	.26	.08	.42	.13	.31	.19	-.32	-.39	.41	.31	1.00	
Pb	.60	.29	.18	.29	-.01	-.04	.07	.03	.06	.03	.32	-.03	-.01	.28	1.00
LOI	.41	.28	-.09	-.14	.18	.43	.31	.37	.36	.10	-.07	.19	.32	.17	.08
Al	.52	.68	.05	-.01	.29	.37	.68	.59	.58	-.11	.09	.45	.14	.25	.19
Fe	.08	-.51	-.33	-.44	-.26	-.33	-.33	-.49	-.23	.52	.63	-.77	-.27	-.47	.02
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 29A

Correlation coefficients for elements in the WITWATERSRAND SYSTEM samples

Be	1.00														
Ga	.60	1.00													
Cu	-.58	-.05	1.00												
Zn	.56	.86	.12	1.00											
Co	-.62	-.07	.77	.19	1.00										
Ni	-.77	-.29	.67	-.08	.89	1.00									
V	-.53	.23	.76	.33	.90	.71	1.00								
Cr	-.64	-.15	.61	.05	.88	.95	.72	1.00							
Sc	-.73	.07	.70	.09	.75	.72	.88	.64	1.00						
Y	.97	.72	-.42	.64	-.54	-.72	-.38	-.59	-.58	1.00					
Yb	.96	.48	-.59	.46	-.72	-.81	-.63	-.74	-.72	.92	1.00				
Zr	.98	.58	-.53	.55	-.66	-.80	-.54	-.71	-.68	.96	.99	1.00			
Nb	.77	.39	-.53	.14	-.78	-.80	-.65	-.77	-.69	.79	.78	.77	1.00		
Th	.64	.10	-.46	.18	-.64	-.65	-.61	-.70	-.59	.56	.80	.74	.44	1.00	
Pb	.54	-.05	-.53	.15	-.50	-.46	-.62	-.46	-.62	.37	.64	.58	.19	.88	1.00
LOI	-.18	.13	.09	.18	.06	.20	.19	.12	.46	-.14	.00	-.05	-.36	.30	.27
Al	.23	.88	.26	.74	.29	.04	.60	.18	.42	.40	.09	.20	.05	-.22	-.37
Fe	-.40	-.47	-.09	-.61	-.35	-.04	-.32	-.27	.15	-.41	-.16	-.26	.01	.15	.05
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 30A

Correlation coefficients for elements in the MALMESBURY FORMATION samples

Be	1.00														
Ga	.59	1.00													
Cu	.10	.47	1.00												
Zn	.20	.88	.68	1.00											
Co	-.10	.68	.78	.89	1.00										
Ni	-.06	.74	.72	.95	.98	1.00									
V	-.07	.73	.50	.94	.83	.91	1.00								
Cr	-.18	.68	.55	.92	.91	.96	.98	1.00							
Sc	-.04	.76	.61	.97	.89	.96	.99	.98	1.00						
Y	.16	.61	.98	.81	.83	.80	.65	.67	.74	1.00					
Yb	.72	.65	-.11	.40	-.05	.10	.36	.17	.30	.07	1.00				
Zr	-.92	-.84	-.20	-.51	-.22	-.28	-.28	-.18	-.30	-.03	-.78	1.00			
Nb	.59	.90	.74	.82	.74	.74	.57	.57	.65	.79	.37	-.77	1.00		
Th	.86	.15	-.35	-.30	-.56	-.53	-.50	-.61	-.51	-.34	.55	-.66	.13	1.00	
Pb	.90	.31	-.29	-.10	-.47	-.39	-.26	-.42	-.28	-.21	.79	-.74	.20	.94	1.00
LOI	.78	.95	.30	.70	.44	.51	.50	.43	.52	.42	.73	-.96	.85	.45	.56
Al	.55	.99	.36	.86	.64	.72	.74	.68	.75	.51	.67	-.83	.84	.16	.32
Fe	.09	.78	.74	.98	.88	.93	.94	.92	.97	.86	.34	-.37	.73	-.42	-.19
	Be	**Ga**	**Cu**	**Zn**	**Co**	**Ni**	**V**	**Cr**	**Sc**	**Y**	**Yb**	**Zr**	**Nb**	**Th**	**Pb**

Table 31A

Correlation coefficients for elements in the FISH RIVER SERIES Samples

Be	1.00														
Ga	.91	1.00													
Cu	.19	.28	1.00												
Zn	.83	.95	.29	1.00											
Co	.77	.90	.41	.96	1.00										
Ni	.77	.93	.20	.98	.94	1.00									
V	.91	.96	.30	.94	.89	.89	1.00								
Cr	.86	.95	.37	.92	.85	.90	.91	1.00							
Sc	.84	.95	.07	.93	.86	.95	.93	.90	1.00						
Y	.05	.11	-.12	-.02	-.20	.03	.13	.21	.19	1.00					
Yb	.39	.32	-.30	.08	-.07	.12	.28	.31	.36	.78	1.00				
Zr	.03	-.02	-.36	-.21	-.39	-.14	-.07	.06	.05	.87	.87	1.00			
Nb	.41	.41	-.32	.22	.02	.28	.33	.47	.46	.77	.87	.84	1.00		
Th	.13	.03	-.41	-.15	-.29	-.09	-.02	.03	.10	.68	.73	.78	.68	1.00	
Pb	.47	.60	.13	.65	.67	.62	.54	.54	.54	-.29	-.23	-.43	.04	-.24	1.00
LOI	.34	.50	-.36	.52	.38	.60	.48	.38	.65	.37	.41	.28	.41	.26	.15
Al	.91	.99	.19	.92	.86	.91	.94	.93	.95	.14	.40	.05	.46	.12	.58
Fe	.77	.93	.25	.93	.89	.96	.88	.94	.94	.15	.25	-.01	.39	.00	.55
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 32A

Correlation coefficients for elements in the BOKKEVELD SERIES samples

Be	1.00														
Ga	.43	1.00													
Cu	.24	.30	1.00												
Zn	.14	.21	.44	1.00											
Co	.07	-.05	.41	.75	1.00										
Ni	.13	.39	.38	.86	.66	1.00									
V	.30	.69	.25	.26	.08	.35	1.00								
Cr	.47	.81	.33	.20	-.02	.35	.76	1.00							
Sc	.28	.67	.21	.31	.15	.48	.81	.64	1.00						
Y	-.05	-.02	-.09	.15	.04	.18	.16	.00	.14	1.00					
Yb	.42	.25	.24	.30	.14	.32	.46	.43	.44	.69	1.00				
Zr	-.06	-.35	-.27	-.39	-.23	-.42	-.31	-.33	-.27	.48	.24	1.00			
Nb	.16	.34	-.11	-.19	-.31	-.10	.26	.31	.27	.29	.32	.35	1.00		
Th	.22	.48	.20	-.08	-.13	.01	.58	.55	.42	.26	.43	.06	.38	1.00	
Pb	-.05	.11	-.08	-.32	-.30	-.38	.15	-.02	-.03	.15	.03	.06	.14	.40	1.00
LOI	.24	.79	.27	.12	-.23	.32	.62	.72	.55	.03	.34	-.33	.20	.42	-.02
Al	.44	.98	.27	.16	-.08	.33	.69	.82	.68	-.09	.20	-.37	.32	.47	.03
Fe	.18	.18	.32	.71	.60	.75	.31	.16	.43	.01	.33	-.42	-.23	-.07	-.34
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 32A

Correlation coefficients for elements in the BOKKEVELD SERIES samples

Be	1.00														
Ga	.43	1.00													
Cu	.24	.30	1.00												
Zn	.14	.21	.44	1.00											
Co	.07	-.05	.41	.75	1.00										
Ni	.13	.39	.38	.86	.66	1.00									
V	.30	.69	.25	.26	.08	.35	1.00								
Cr	.47	.81	.33	.20	-.02	.35	.76	1.00							
Sc	.28	.67	.21	.31	.15	.48	.81	.64	1.00						
Y	-.05	-.02	-.09	.15	.04	.18	.16	.00	.14	1.00					
Yb	.42	.25	.24	.30	.14	.32	.46	.43	.44	.69	1.00				
Zr	-.06	-.35	-.27	-.39	-.23	-.42	-.31	-.33	-.27	.48	.24	1,00			
Nb	.16	.34	-.11	-.19	-.31	-.10	.26	.31	.27	.29	.32	.35	1.00		
Th	.22	.48	.20	-.08	-.13	.01	.58	.55	.42	.26	.43	.06	.38	1.00	
Pb	-.05	.11	-.08	-.32	-.30	-.38	.15	-.02	-.03	.15	.03	.06	.14	.40	1.00
LOI	.24	.79	.27	.12	-.23	.32	.62	.72	.55	.03	.34	-.33	.20	.42	-.02
Al	.44	.98	.27	.16	-.08	.33	.69	.82	.68	-.09	.20	-.37	.32	.47	.03
Fe	.18	.18	.32	.71	.60	.75	.31	.16	.43	.01	.33	-.42	-.23	-.07	-.34
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 33A

Correlation coefficients for elements in the WITTEBERG SERIES samples

Be	1.00														
Ga	.88	1.00													
Cu	.63	.83	1.00												
Zn	.03	.24	.47	1.00											
Co	-.40	-.11	.22	.78	1.00										
Ni	.33	.50	.84	.78	.57	1.00									
V	.76	.98	.88	.28	-.01	.55	1.00								
Cr	.84	.99	.84	.28	-.05	.54	.97	1.00							
Sc	.82	.98	.89	.23	-.03	.57	.98	.98	1.00						
Y	.55	.50	.42	.70	.31	.54	.40	.47	.41	1.00					
Yb	.89	.94	.84	.40	-.02	.61	.89	.90	.90	.72	1.00				
Zr	-.05	-.35	-.64	-.93	-.82	-.88	-.44	-.42	-.40	-.53	-.43	1.00			
Nb	.74	.63	.61	-.08	-.32	.29	.57	.53	.62	.38	.74	.06	1.00		
Th	.70	.87	.81	.36	.17	.64	.86	.92	.91	.43	.77	-.56	.32	1.00	
Pb	.63	.65	.54	.73	.27	.62	.57	.66	.56	.91	.76	-.63	.23	.66	1.00
LOI	.68	.89	.99	.42	.19	.78	.94	.91	.95	.43	.87	-.61	.59	.87	.56
Al	.88	1.00	.85	.23	-.12	.52	.98	.99	.98	.49	.94	-.35	.65	.86	.64
Fe	.32	.61	.87	.81	.65	.93	.69	.64	.67	.57	.68	-.93	.29	.70	.64
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 34A

Correlation coefficients for elements in the A SERIES BOREHOLE samples

Be	1.00														
Ga	.24	1.00													
Cu	.12	.54	1.00												
Zn	-.01	.74	.59	1.00											
Co	-.13	.42	.34	.56	1.00										
Ni	-.22	.39	.40	.48	.76	1.00									
V	-.03	.34	.72	.33	.34	.38	1.00								
Cr	-.16	.25	.12	-.08	.01	.21	.51	1.00							
Sc	.12	.46	.34	.56	.31	.25	.01	-.27	1.00						
Y	.32	-.19	.20	.02	-.06	-.05	.11	-.26	.01	1.00					
Yb	.21	.23	.22	.16	.27	.01	.43	.13	.50	.08	1.00				
Zr	-.46	-.17	-.16	-.21	-.19	-.01	.05	.45	-.30	-.11	.00	1.00			
Nb	.23	-.37	-.42	-.43	-.27	-.44	-.29	-.04	-.24	.04	-.05	.05	1.00		
Th	.24	.15	.03	.20	-.01	-.13	-.41	-.62	.41	.21	.01	-.21	-.26	1.00	
Pb	-.14	-.01	-.07	.13	.05	-.19	-.36	-.42	.08	.12	-.18	.08	-.18	.74	1.00
LOI	-.06	-.70	-.19	-.73	-.21	-.19	.11	.15	-.59	.09	-.12	.16	.31	-.35	-.13
Al	.27	.86	.37	.71	.42	.35	.15	.06	.37	-.09	.12	-.35	-.35	.22	.04
Fe	-.08	.16	.10	.32	.15	.26	-.27	-.41	.60	.06	.02	-.26	-.40	.54	.17
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 35A

Correlation coefficients for elements in the GB SERIES BOREHOLE samples

Be	1.00														
Ga	.25	1.00													
Cu	.44	.65	1.00												
Zn	.60	.58	.46	1.00											
Co	.56	.31	.46	.49	1.00										
Ni	.41	.58	.69	.52	.85	1.00									
V	.53	.78	.75	.68	.51	.65	1.00								
Cr	.29	.76	.74	.50	.37	.68	.78	1.00							
Sc	.73	.46	.54	.68	.61	.64	.67	.43	1.00						
Y	.54	.28	.33	.50	.34	.30	.43	.12	.72	1.00					
Yb	.79	.35	.46	.67	.50	.48	.56	.34	.86	.81	1.00				
Zr	.28	.17	.23	.19	.05	.03	.19	.15	.11	.33	.30	1.00			
Nb	.12	.40	.09	.34	.16	.17	.28	.25	.12	.23	.17	.49	1.00		
Th	.45	.33	.52	.38	.21	.26	.41	.28	.47	.56	.61	.61	.36	1.00	
Pb	.25	-.16	.03	.09	.08	-.13	-.03	-.14	.15	.36	.23	.11	-.07	.18	1.00
LOI	-.03	.55	.57	.27	.28	.49	.41	.63	.10	-.12	.04	-.02	.01	.05	.00
Al	.14	.84	.69	.47	.21	.54	.71	.84	.23	.03	.19	.14	.37	.30	-.24
Fe	.44	.15	.24	.47	.38	.31	.33	.06	.78	.66	.62	-.08	-.01	.25	.25
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 36A

Correlation coefficients for elements in the SOMKELE BOREHOLE samples

Be	1.00													
Ga	-.02	1.00												
Cu	-.42	.65	1.00											
Zn	-.21	.83	.55	1.00										
Co	.02	.63	.25	.73	1.00									
Ni	.18	.58	.09	.60	.93	1.00								
V	.12	.53	-.07	.58	.68	.59	1.00							
Cr	.39	.63	-.00	.59	.63	.73	.64	1.00						
Sc	.00	.69	.16	.74	.63	.60	.73	.67	1.00					
Y	-.30	.62	.52	.74	.48	.43	.27	.53	.60	1.00				
Yb	-.18	.60	.38	.75	.59	.49	.47	.57	.73	.88	1.00			
Zr	.14	.27	-.12	.23	.25	.41	.23	.67	.29	.55	.51	1.00		
Nb	.09	.38	-.10	.23	.29	.33	.59	.43	.31	.15	.24	.42	1.00	
Th	.42	.53	.00	.40	.43	.46	.60	.56	.45	.29	.38	.38	.62	1.00
Pb	-.38	.68	.99	.56	.25	.09	-.03	.02	.18	.49	.35	-.13	-.10	.04	1.00
LOI	.47	-.21	-.03	-.36	-.23	-.25	-.28	-.14	-.35	-.33	-.42	-.29	-.25	-.17	-.01
Al	.40	.58	-.13	.47	.43	.63	.75	.74	.58	.28	.38	.49	.73	.71	-.09
Fe	-.42	.71	.96	.61	.70	.13	-.04	.13	.30	.60	.46	-.00	-.14	-.00	.96
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 37A

Correlation coefficients for elements in the NORTHERN ECCA FACIES samples

Be	1.00														
Ga	.17	1.00													
Cu	-.13	.22	1.00												
Zn	.30	.16	.26	1.00											
Co	.18	.10	.12	.56	1.00										
Ni	.10	.21	.13	.46	.77	1.00									
V	.20	.31	.13	.39	.46	.54	1.00								
Cr	.08	.42	.03	.09	.28	.57	.59	1.00							
Sc	.41	.36	.17	.43	.25	.34	.26	.10	1.00						
Y	.38	.27	.19	.31	.28	.39	.43	.35	.37	1.00					
Yb	.42	.13	.25	.52	.30	.26	.38	.08	.71	.48	1.00				
Zr	.10	.46	-.12	-.01	-.02	.04	.16	.42	.06	.21	.09	1.00			
Nb	.11	.58	-.06	-.20	-.03	.03	.16	.45	.03	.36	-.01	.61	1.00		
Th	.18	.68	.05	-.03	-.04	.07	-.07	.21	.28	.38	.12	.40	.52	1.00	
Pb	-.15	.33	.85	.12	-.01	-.09	-.05	-.07	.05	.08	.07	.04	.08	.21	1.00
LOI	.06	.33	.05	-.16	.13	.35	.42	.66	-.05	.40	-.06	.26	.57	.35	.03
Al	.18	.70	.07	.32	.29	.44	.39	.46	.25	.28	.15	.11	.33	.56	.05
Fe	.01	-.01	.55	.13	-.05	-.06	-.22	-.26	.35	.02	.15	-.24	-.33	-.10	.50
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 38A

Correlation coefficients for elements in the CENTRAL ECCA FACIES samples

Be	1.00														
Ga	.21	1.00													
Cu	.27	.08	1.00												
Zn	,28	.38	.26	1.00											
Co	.25	.17	.54	.76	1.00										
Ni	.27	.36	.61	.73	.79	1.00									
V	.17	.87	.10	.23	.13	.23	1.00								
Cr	.31	.42	.16	.12	.05	.29	.53	1.00							
Sc	.04	.60	.00	.20	.28	.36	.50	.09	1.00						
Y	-.17	-.21	-.10	-.16	-.13	.16	-.38	-.38	.25	1.00					
Yb	.07	-.11	.10	-.15	.07	.12	-.11	-.34	.50	.57	1.00				
Zr	.17	-.06	-.31	-.44	-.42	-.39	-.15	.08	.19	.02	.31	1.00			
Nb	.31	.48	.12	-.05	-.08	.14	.39	.48	.38	-.19	-.02	.47	1.00		
Th	-.04	.14	.22	.08	.18	.23	-.02	-.02	.24	.27	.27	.17	.04	1.00	
Pb	-.25	.33	-.23	-.02	-.20	-.24	.35	.27	.29	-.28	-.23	.23	.35	.28	1.00
LOI	.36	-.21	.00	-.34	-.02	.03	-.16	.19	.19	.36	.33	.23	.21	-.05	-.18
Al	.48	.81	.21	.57	.39	.53	.61	.44	.52	-.19	-.15	.04	.59	.16	.26
Fe	-.21	-.21	.26	.52	.67	.63	-.32	-.28	.13	.39	.20	-.52	-.40	.11	-.30
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 39A

Correlation coefficients for elements in the SOUTHERN ECCA FACIES samples

Be	1.00														
Ga	-.64	1.00													
Cu	.21	-.76	1.00												
Zn	-.17	-.33	.62	1.00											
Co	.24	-.12	.16	.70	1.00										
Ni	.37	-.49	.39	.75	.89	1.00									
V	.13	-.75	.96	.53	.00	.30	1.00								
Cr	.21	-.55	.48	.79	.74	.95	.46	1.00							
Sc	.17	-.82	.73	.37	-.12	.32	.85	.54	1.00						
Y	.87	-.33	-.10	-.09	.51	.47	-.25	.22	-.21	1.00					
Yb	.34	-.23	.36	.69	.95	.86	.20	.71	-.04	.49	1.00				
Zr	-.12	.70	-.85	-.89	-.51	-.74	-.81	-.84	-.72	.02	-.58	1.00			
Nb	-.20	.73	-.85	-.86	-.55	-.78	-.81	-.87	-.72	-.06	-.63	.99	1.00		
Th	-.37	.83	-.85	-.79	-.53	-.79	-.79	-.84	-.72	-.21	-.62	.97	.98	1.00	
Pb	-.24	-.14	.66	.86	.53	.43	.51	.42	.11	-.19	.62	-.70	-.66	-.58	1.00
LOI	-.66	.84	-.61	-.51	-.56	-.85	-.58	-.85	-.64	-.51	-.63	.76	.82	.88	-.21
Al	-.53	.94	-.84	-.60	-.40	-.71	-.81	-.77	-.79	-.29	-.50	.88	.92	.97	-.39
Fe	-.06	-.54	.77	.87	.59	.78	.76	.87	.61	-.07	.69	-.94	-.95	-.89	.70
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 40A

Correlation coefficients for elements in the WESTERN ECCA FACIES samples

Be	1.00														
Ga	.44	1.00													
Cu	.09	.79	1.00												
Zn	.18	-.03	.07	1.00											
Co	-.38	.56	.57	-.06	1.00										
Ni	.37	.83	.68	-.10	.31	1.00									
V	.65	.93	.71	.16	.29	.77	1.00								
Cr	.69	.55	.45	.10	-.12	.55	.67	1.00							
Sc	.36	.89	.77	.32	.56	.69	.86	.35	1.00						
Y	-.19	-.72	-.41	.35	-.35	-.65	-.62	-.16	-.54	1.00					
Yb	.50	-.31	-.31	.73	-.59	-.35	-.02	.17	-.04	.56	1.00				
Zr	-.11	.07	.18	-.87	.05	.15	-.08	.00	-.25	-.19	-.59	1.00			
Nb	.58	.77	.71	-.03	.24	.62	.78	.69	.69	-.40	.01	.22	1.00		
Th	.31	.92	.63	-.26	.58	.70	.80	.42	.71	-.87	-.52	.18	.64	1.00	
Pb	.05	.02	-.16	-.40	-.17	-.04	.03	.25	-.22	-.43	-.25	.14	.09	.33	1.00
LOI	-.07	.49	.30	.42	.75	.25	.34	-.11	.69	-.26	-.08	-.52	.15	.42	.24
Al	.27	.96	.81	-.22	.61	.78	.85	.40	.80	-.78	-.51	.27	.70	.93	.04
Fe	.02	-.41	-.34	.90	-.22	-.43	-.24	-.15	-.06	.62	.78	-.84	-.34	-.58	-.15
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 41A

Correlation coefficients for elements in the BEAUFORT SERIES samples

Be	1.00														
Ga	-.02	1.00													
Cu	.19	.57	1.00												
Zn	-.18	.81	.06	1.00											
Co	.34	-.24	-.50	-.07	1.00										
Ni	-.31	.60	-.12	.84	-.06	1.00									
V	-.19	.80	.22	.81	-.04	.59	1.00								
Cr	-.55	.68	.02	.77	-.35	.87	.61	1.00							
Sc	.15	.79	.20	.72	.18	.64	.64	.58	1.00						
Y	.15	-.48	-.11	-.65	.23	-.23	-.54	-.33	-.27	1.00					
Yb	.43	-.07	-.13	-.14	.56	.08	.06	-.19	.29	.65	1.00				
Zr	.20	-.70	-.18	-.69	.35	-.53	-.65	-.74	-.66	.62	.26	1.00			
Nb	.19	-.20	.31	-.56	.10	-.42	-.23	-.42	-.17	.65	.43	.58	1.00		
Th	.35	.55	.68	.15	.05	.06	.30	.02	.60	.09	.36	-.09	.55	1.00	
Pb	.23	.63	.44	.60	.10	.32	.42	.15	.50	-.42	-.01	-.19	-.30	.43	1.00
LOI	.23	.43	.24	.44	-.23	.21	.36	.13	.09	-.34	-.17	.00	.02	.15	.39
Al	-.18	.92	.47	.80	-.12	.60	.73	.67	.82	-.52	-.12	-.69	-.28	.55	.70
Fe	-.29	.72	.07	.88	-.21	.81	.65	.81	.74	-.48	-.05	-.73	-.55	.18	.54
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

Table 42A

Correlation coefficients for elements in the DREDGED AGULHAS BANK samples

Be	1.00														
Ga	.91	1.00													
Cu	-.79	-.79	1.00												
Zn	.73	.89	-.79	1.00											
Co	.35	.14	-.52	.03	1.00										
Ni	.76	.87	-.95	.89	.36	1.00									
V	.87	.97	-.84	.91	.26	.92	1.00								
Cr	-.77	-.61	.70	-.55	-.13	-.57	-.54	1.00							
Sc	.93	.99	-.81	.86	.23	.87	.98	-.62	1.00						
Y	-.32	-.37	.69	-.56	-.59	-.66	-.57	.16	-.45	1.00					
Yb	.01	.00	.41	-.38	-.38	-.33	-.16	.04	-.01	.74	1.00				
Zr	-.33	-.49	.52	-.76	-.19	-.61	-.64	.04	-.50	.79	.74	1.00			
Nb	.94	.78	-.66	.50	.29	.58	.69	-.83	.80	-.08	.25	.01	1.00		
Th	-.21	.10	-.08	.22	-.18	.29	.12	.36	.00	.00	-.10	-.20	-.34	1.00	
Pb	-.45	-.11	.26	.23	-.71	-.06	-.06	.36	-.17	-.07	-.25	-.41	-.60	.43	1.00
LOI	-.35	-.06	.57	.00	-.80	-.31	-.11	.53	-.13	.41	.34	-.08	-.41	.33	.72
Al	-.28	-.12	.70	-.19	-.71	-.49	-.21	.51	-.18	.61	.53	.14	-.28	.11	.44
Fe	.31	.65	-.22	.68	-.43	.49	.65	.02	.60	-.15	.12	-.52	.13	.46	.57
	Be	Ga	Cu	Zn	Co	Ni	V	Cr	Sc	Y	Yb	Zr	Nb	Th	Pb

TABLE 43A

Cu/Al, V/Al and Cr/Al ratios in illitic-rich South African shales

		Cu/Al	V/Al	Cr/Al
Bokkeveld Series				
Bk	1	3.09	15.1	10.8
	2	1.62	14.0	12.2
	3	1.66	16.6	11.0
	4A	1.90	14.4	12.4
	4B	1.80	13.7	12.3
	5	2.33	10.2	8.5
	6A	3.44	9.9	10.2
	6B	2.50	11.2	10.5
	7	1.76	10.1	9.5
	8	2.18	11.3	9.0
	9	0.46	14.4	9.2
	10	2.36	15.6	11.7
	11	1.58	10.8	10.9
	12	1.83	14.7	11.6
	13	1.91	13.8	13.4
	14	2.08	16.8	14.1
	16	2.52	9.2	13.1
	17	2.93	9.4	12.0
	18	2.39	12.8	12.9
	19	2.55	20.1	12.3
	20	1.81	14.6	12.1
	21	2.59	15.6	11.9
	22	1.52	17.0	11.6
	23	1.48	16.7	11.9
	24	0.90	11.6	10.9
	25	1.64	14.6	13.7
	26	1.67	14.9	13.1
	27	3.31	33.4	15.6
	28	1.82	12.6	11.8
	29	2.74	14.9	11.9
	30	1.82	14.5	10.5
	34	1.61	7.5	12.6

TABLE 43A cont.

		Cu/Al	V/Al	Cr/Al
Witteberg Series				
Wb	1	3.77	11.4	10.5
	2	3.88	11.4	10.5
	3	1.35	7.6	9.9
	4	1.60	8.6	9.6
	5	1.81	9.9	10.2
	6	3.81	11.0	9.4
	7	3.85	9.3	10.1
Ecca Series				
Somkele Borehole - Northern Ecca Facies				
SEc	1	1.67	6.7	6.2
	2	3.23	10.8	6.9
	3	2.44	8.8	7.1
	4	2.01	7.6	6.5
	5	2.50	8.6	6.5
	6	2.84	9.2	6.5
	7	2.37	8.1	6.6
	8	1.53	7.1	5.7
	9	3.32	8.0	7.0
	10	3.17	12.6	7.5
	11	2.30	9.4	5.1
	12	2.67	9.6	6.6
	13	1.66	7.2	5.4
	14	3.09	7.5	6.6
	15	2.98	12.7	6.1
	16	2.67	10.6	7.1
	17	2.63	7.2	5.9
	18	1.92	6.5	5.6
	19	5.00	8.9	6.9
	20	4.92	7.5	5.5
	21	5.48	9.7	7.7
	22	3.90	12.6	7.7
	23	2.91	10.5	8.5
	24	2.65	9.8	8.0
	26	1.66	9.1	10.1

TABLE 43A cont

		Cu/Al	V/Al	Cr/Al
Central Ecca Facies				
R	1	5.75	11.3	8.5
AB	1	3.51	11.0	6.0
AB	4	3.05	11.6	5.1
AB	7	2.37	12.6	6.9
PR	40	3.16	11.3	6.4
PR	41	3.58	11.8	5.5
WEc	1	2.37	9.8	6.6
	3	3.71	12.0	8.2
	4	2.00	11.9	7.7
	5	3.78	18.4	9.0
	5b	1.95	12.4	5.5
	5c	2.29	17.3	11.9
	5d	2.01	16.2	12.2
	5p	9.89	20.1	6.6
	7	3.31	11.4	8.0
	8	4.11	13.2	8.9
	9	5.23	10.5	8.3
	10	8.72	14.5	9.9
	11	3.97	11.9	8.0

APPENDIX 4

FIGURES AS REFERRED TO IN VOLUME I

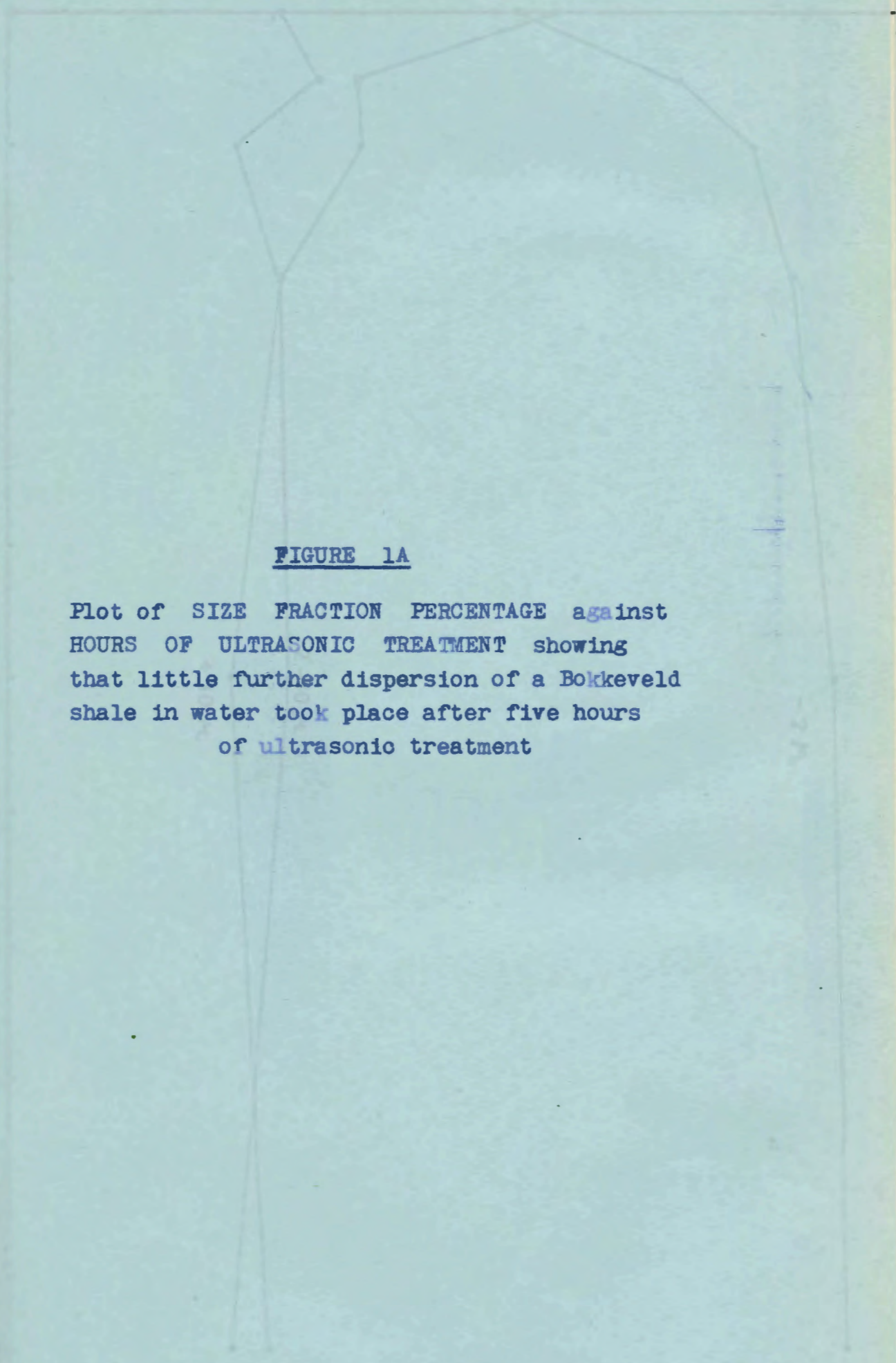
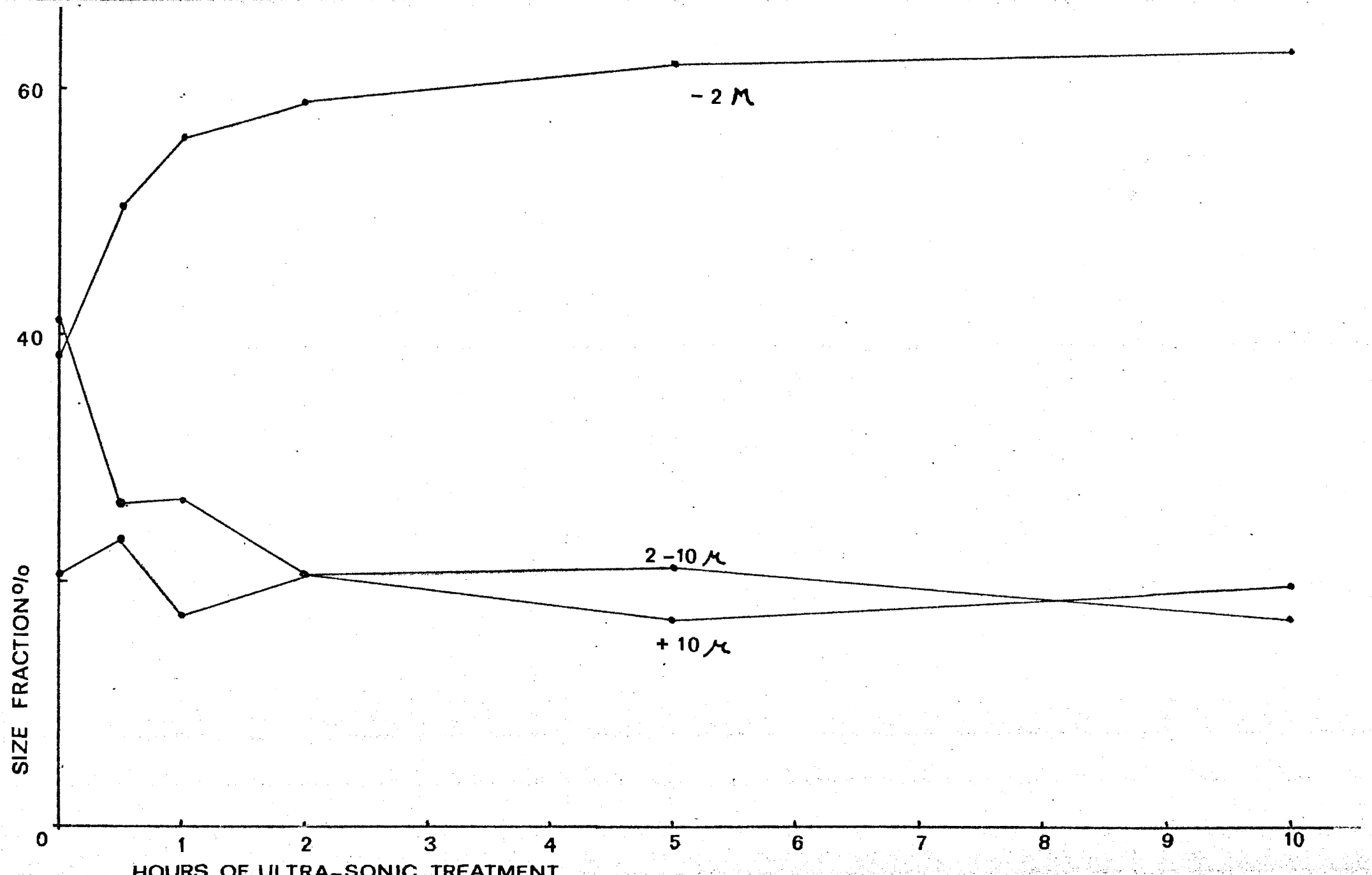


FIGURE 1A

Plot of SIZE FRACTION PERCENTAGE against HOURS OF ULTRASONIC TREATMENT showing that little further dispersion of a Bokkeveld shale in water took place after five hours of ultrasonic treatment


60
40
0
SIZE FRACTION %
- 2 μ
2 -10 μ
+ 10 μ
1
2
3
4
5
6
7
8
9
10
HOURS OF ULTRA-SONIC TREATMENT

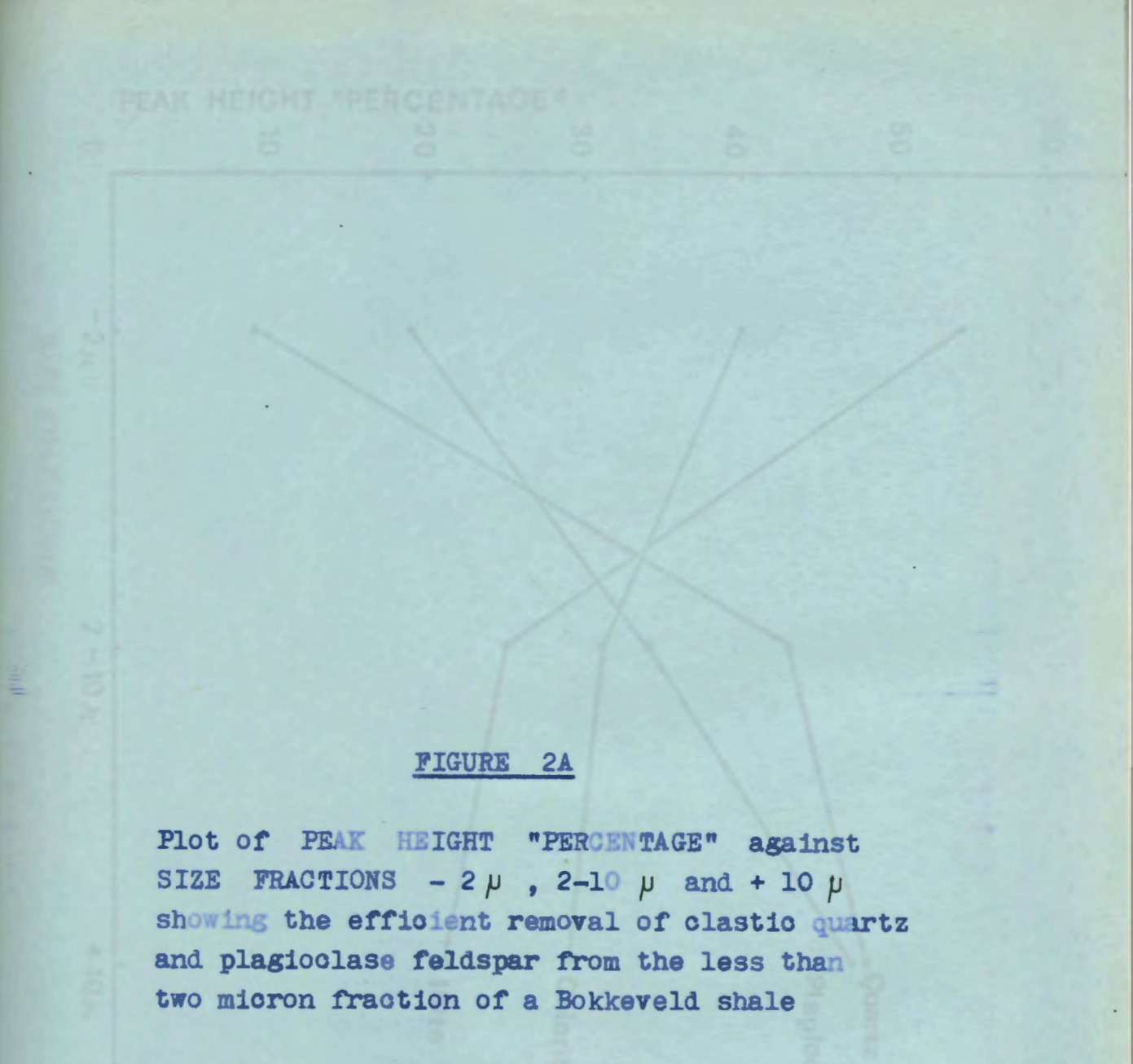
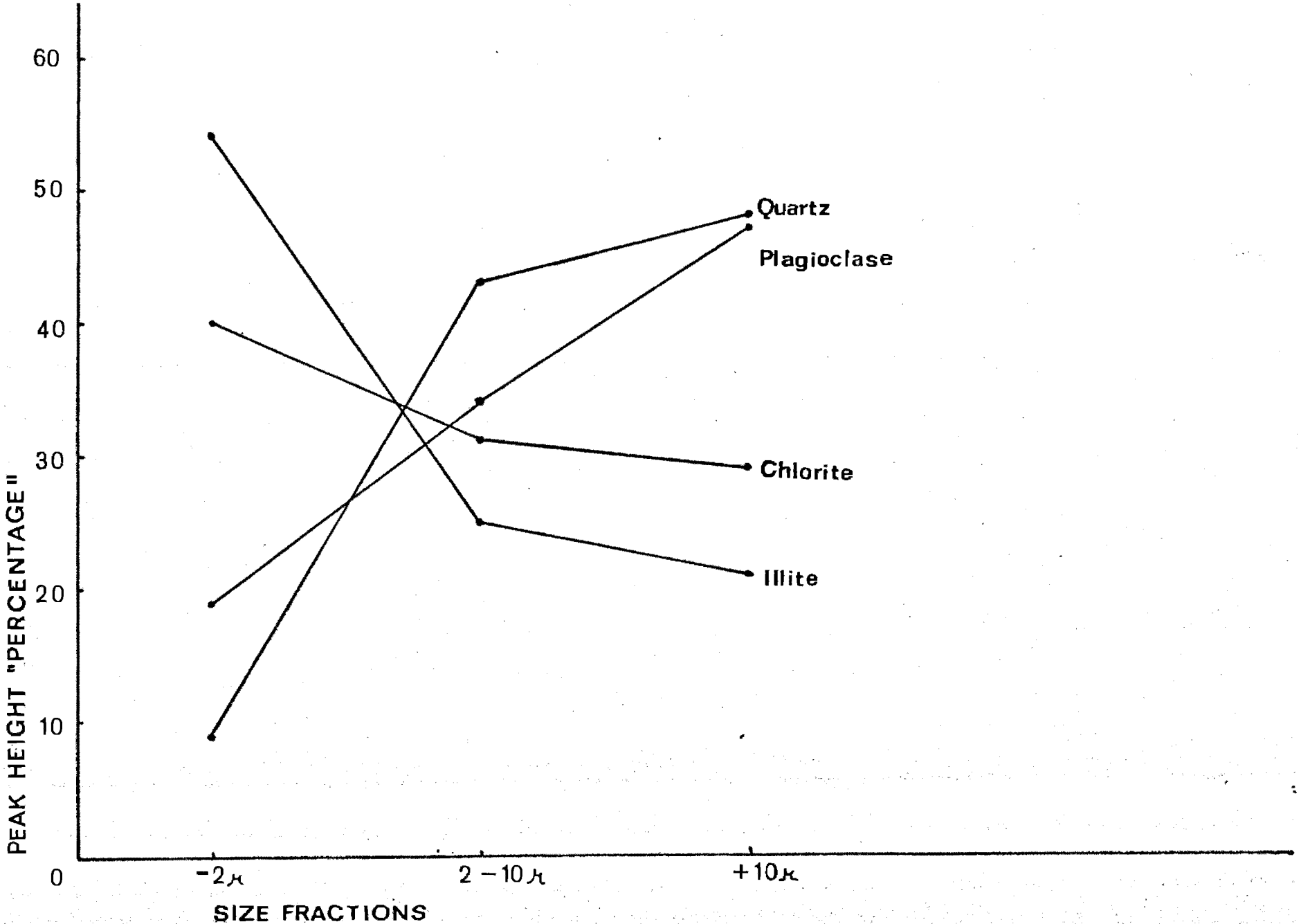


FIGURE 2A

Plot of PEAK HEIGHT "PERCENTAGE" against SIZE FRACTIONS - 2 μ , 2-10 μ and + 10 μ showing the efficient removal of clastic quartz and plagioclase feldspar from the less than two micron fraction of a Bokkeveld shale


60
50
40
30
20
10
0
PEAK HEIGHT "PERCENTAGE"
Quartz
Plagioclase
Chlorite
Illite
-2μ
2 -10μ
+10μ
SIZE FRACTIONS

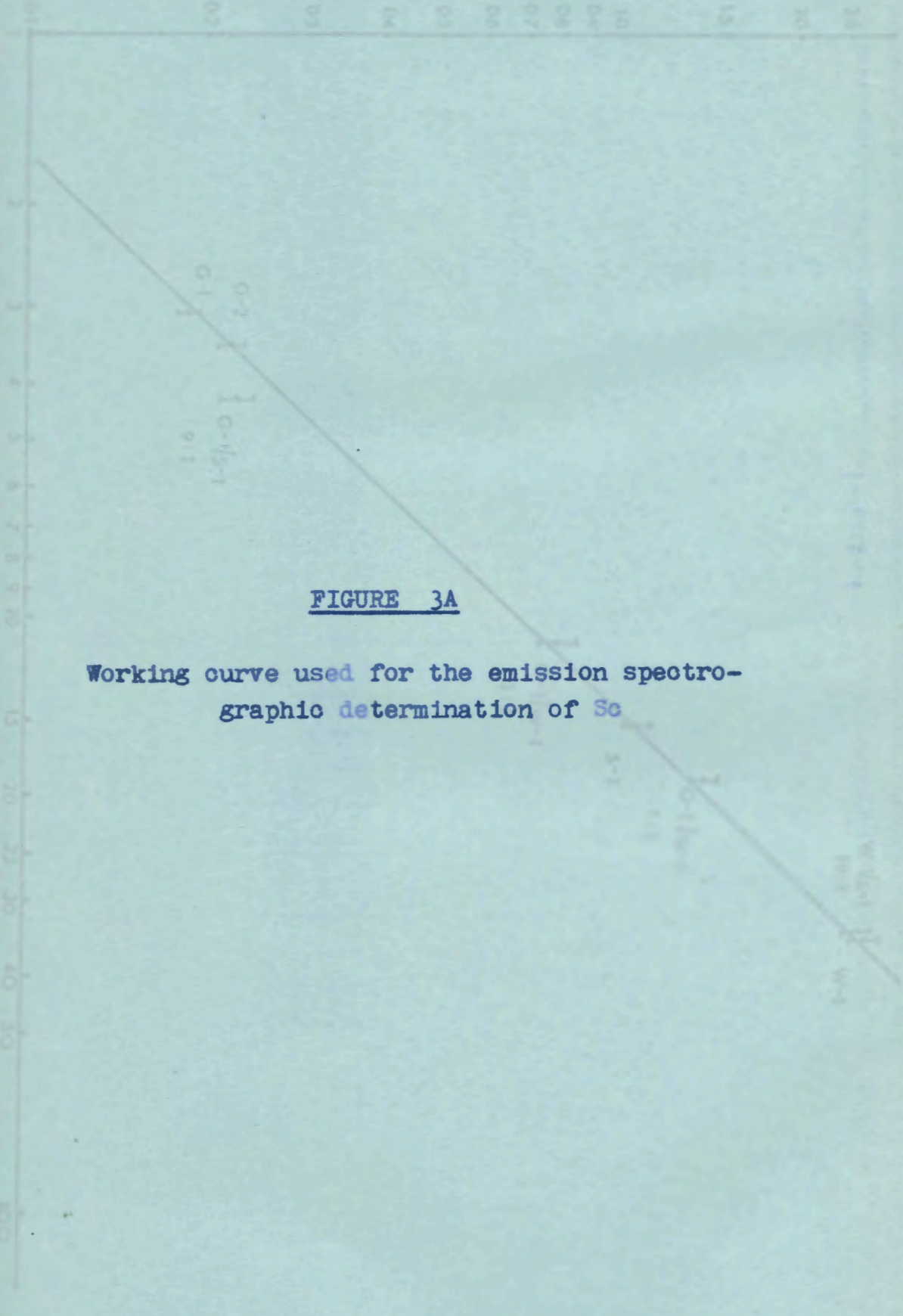
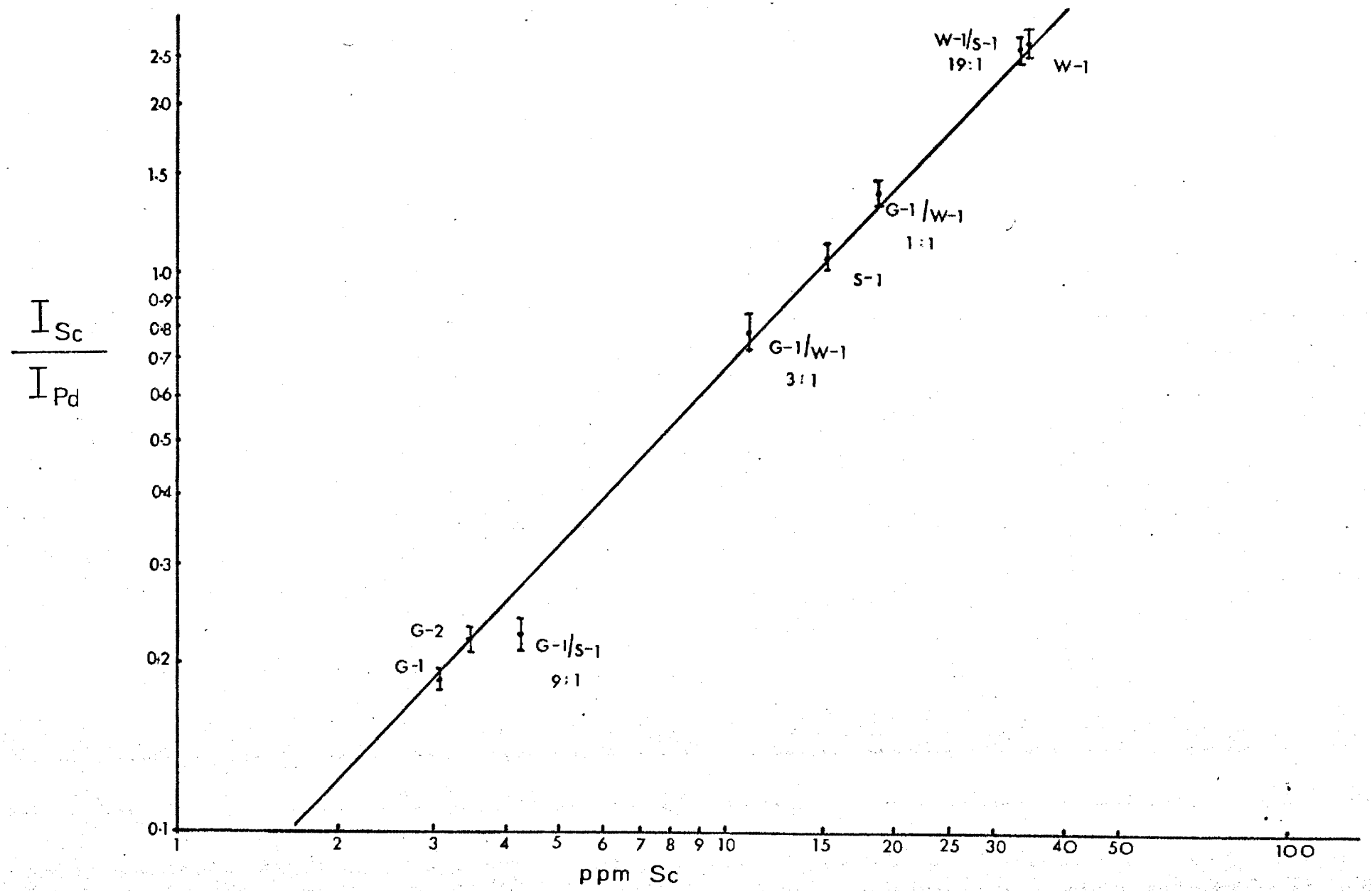


FIGURE 3A

Working curve used for the emission spectrographic determination of Sc


$\frac{I_{Sc}}{I_{Pd}}$
2·5
2·0
1·5
1·0
0·9
0·8
0·7
0·6
0·5
0·4
0·3
0·2
0·1
W-1/S-1
19:1
W-1
G-1/W-1
1:1
S-1
G-1/W-1
3:1
G-2
G-1
G-1/S-1
9:1
1
2
3
4
5
6
7
8
9
10
15
20
25
30
40
50
100
ppm Sc

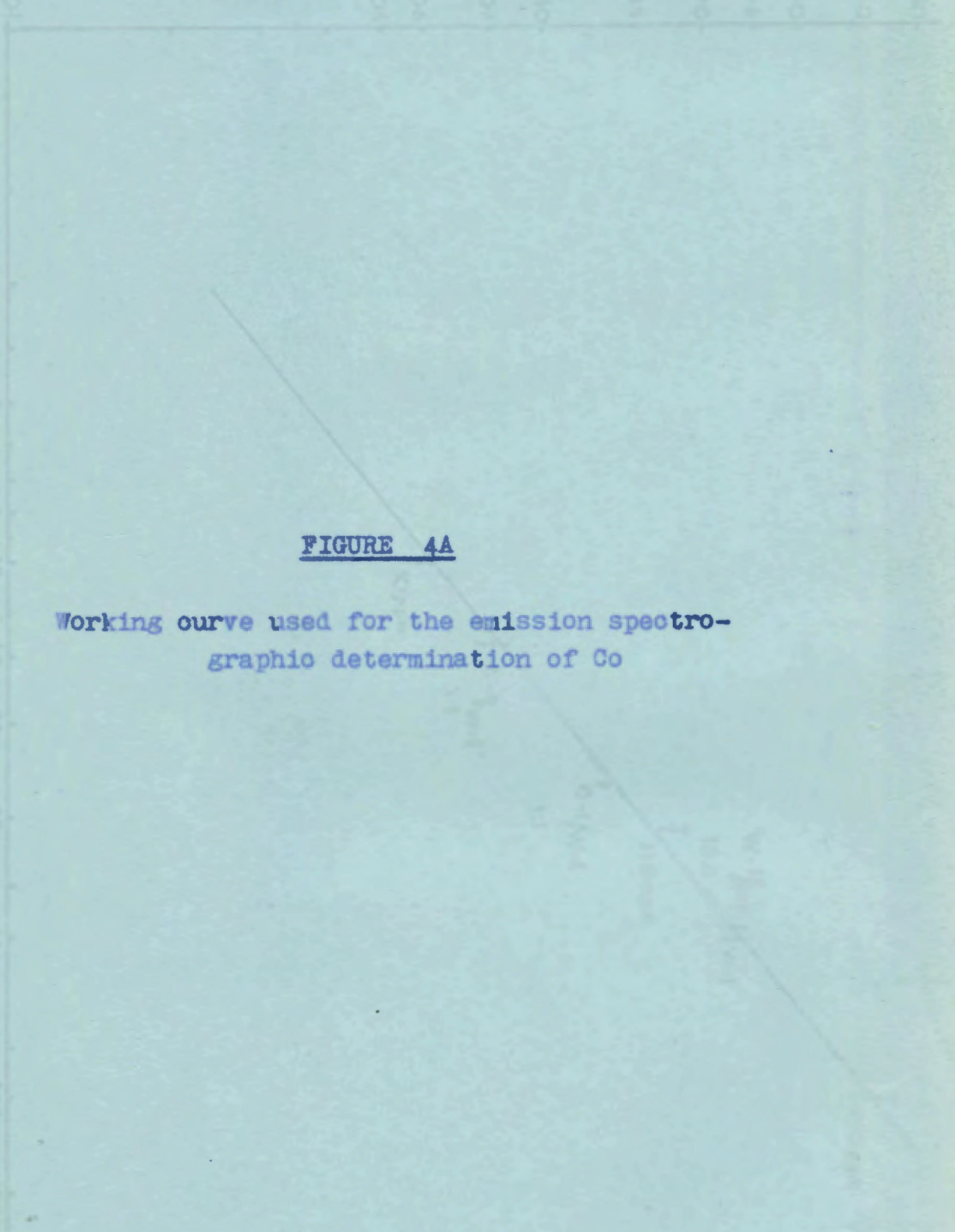
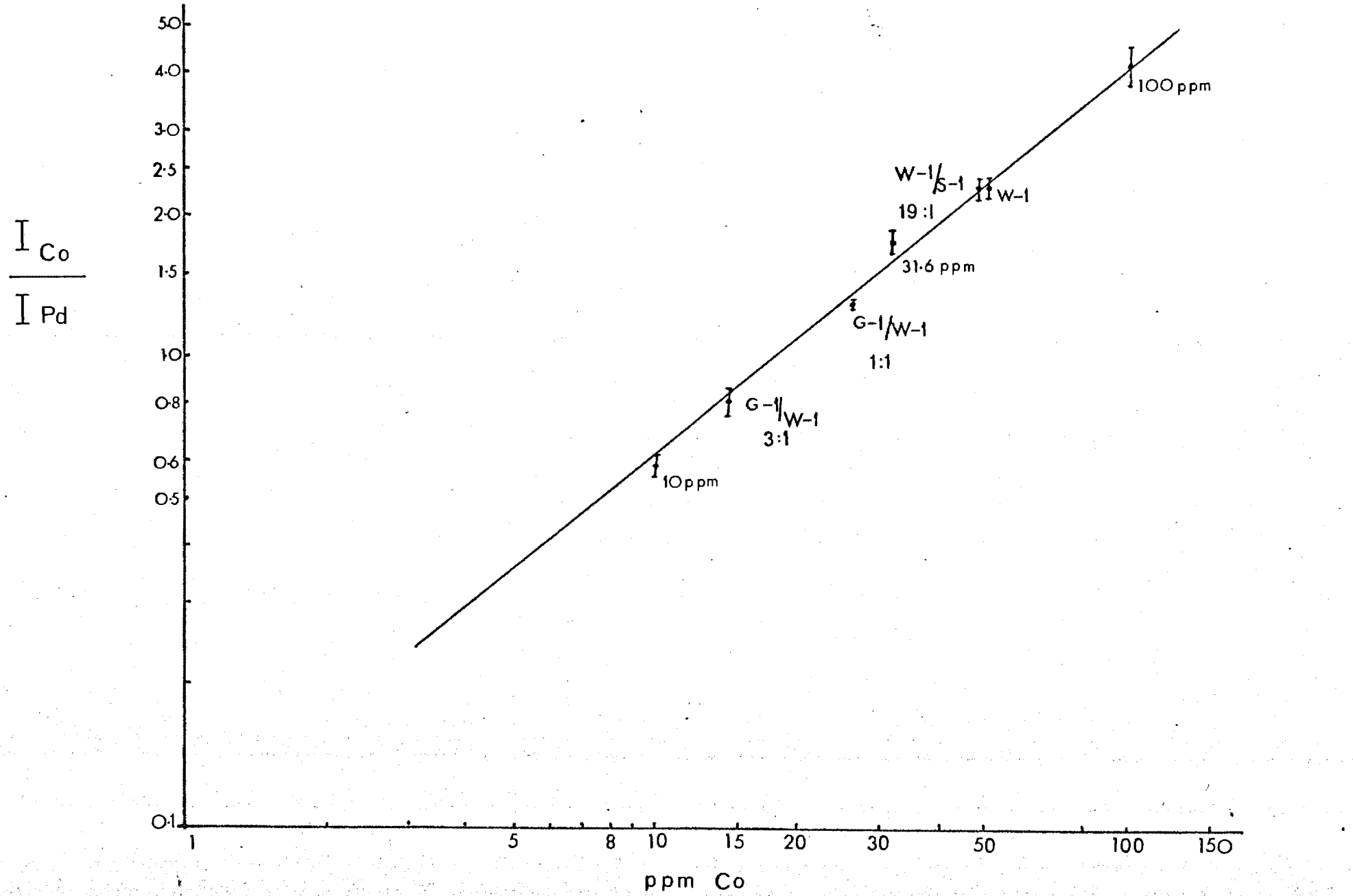


FIGURE 4A

Working curve used for the emission spectrographic determination of Co


I Co / I Pd
5·0
4·0
3·0
2·5
2·0
1·5
1·0
0·8
0·6
0·5
0·1
1
5
8
10
15
20
30
50
100
150
ppm Co
100 ppm
W-1/S-1
19 : 1
W-1
31·6 ppm
G-1/W-1
1:1
G-1/W-1
3:1
10 ppm

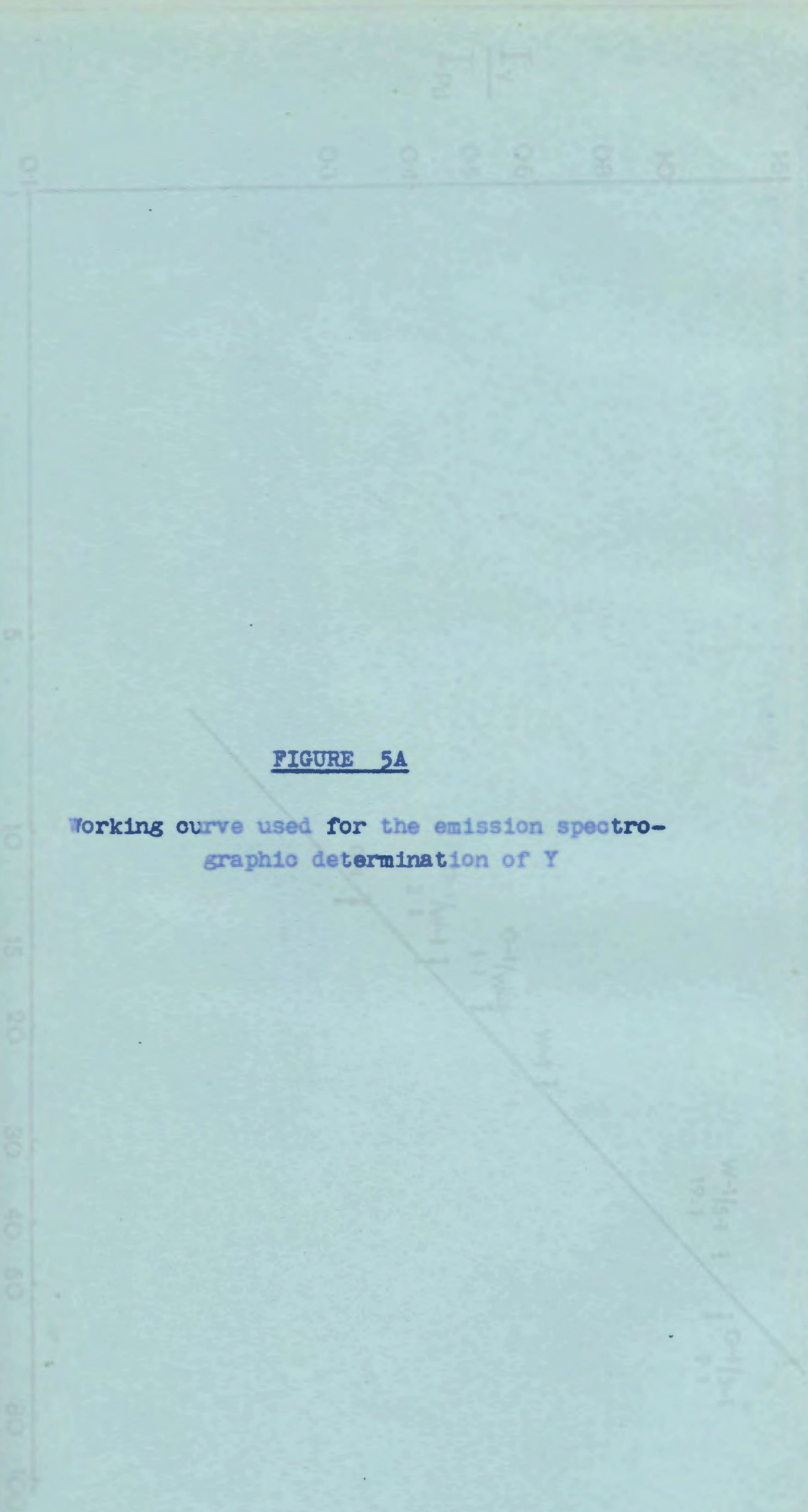
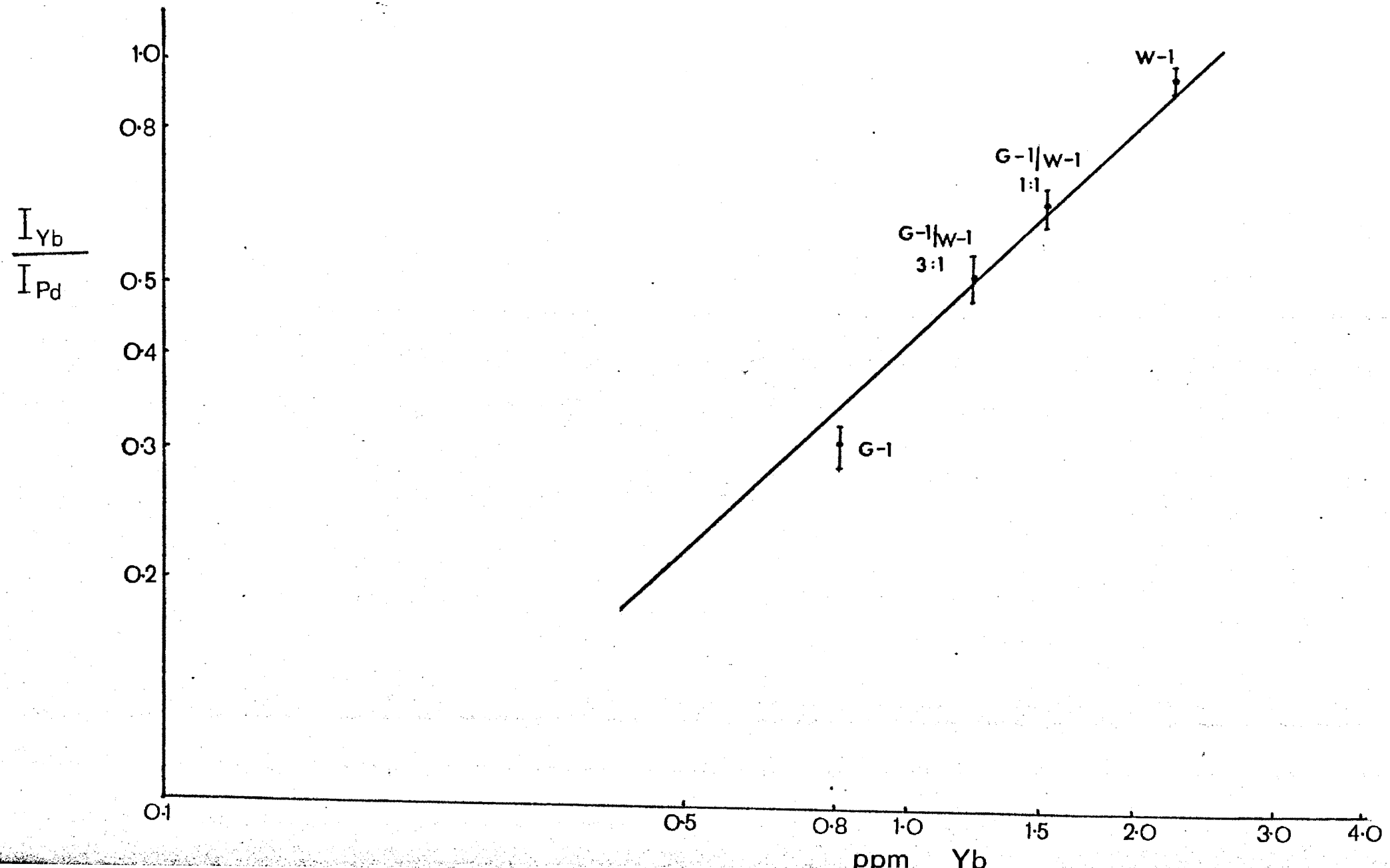


FIGURE 5A

Working curve used for the emission spectrographic determination of Y


$\frac{I_{Yb}}{I_{Pd}}$
1·0
0·8
0·5
0·4
0·3
0·2
0·1
W-1
G-1/W-1
1:1
G-1/W-1
3:1
G-1
0·5
0·8
1·0
1·5
2·0
3·0
4·0
ppm Yb

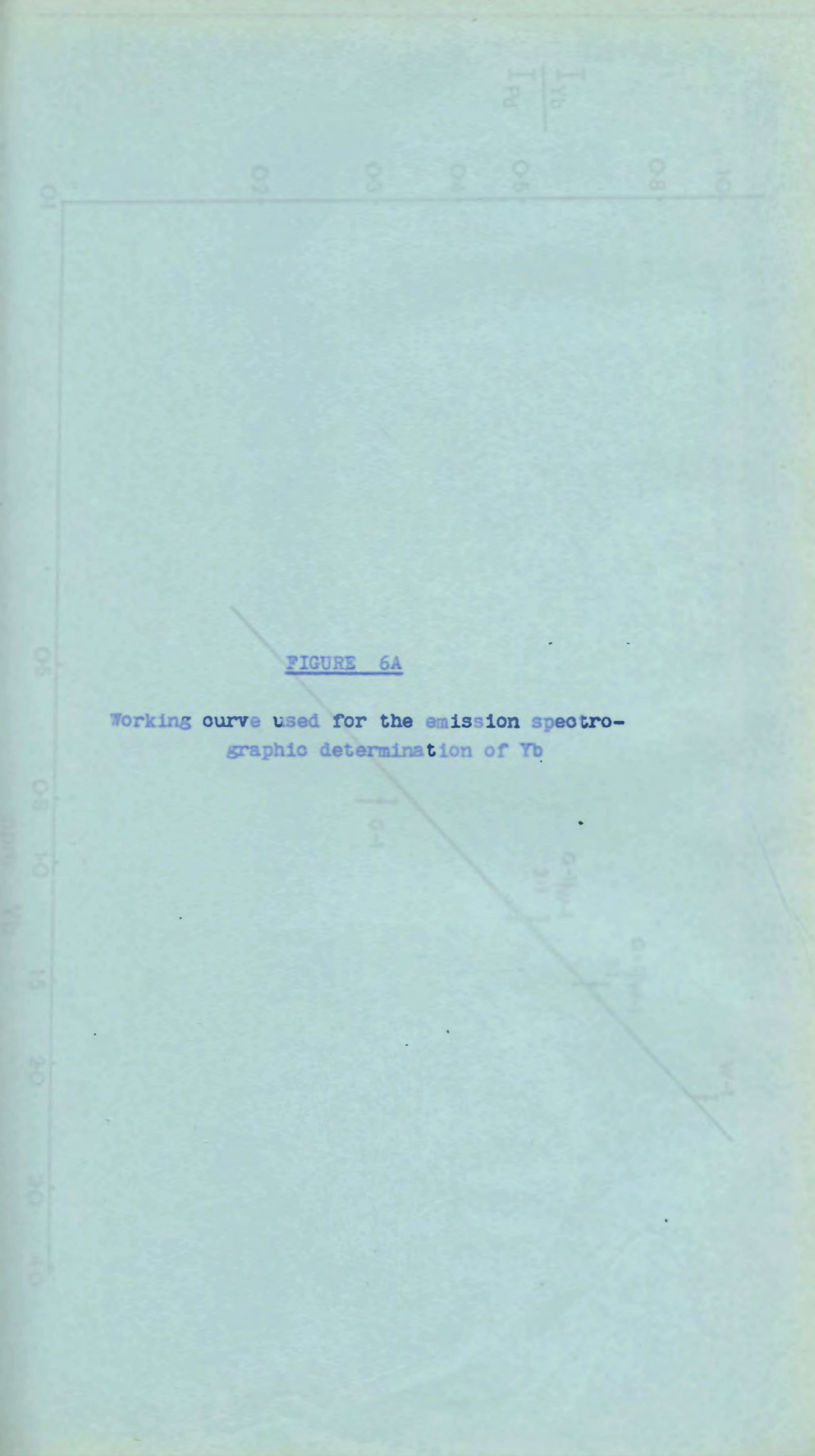


FIGURE 6A

Working curve used for the emission spectrographic determination of Yb

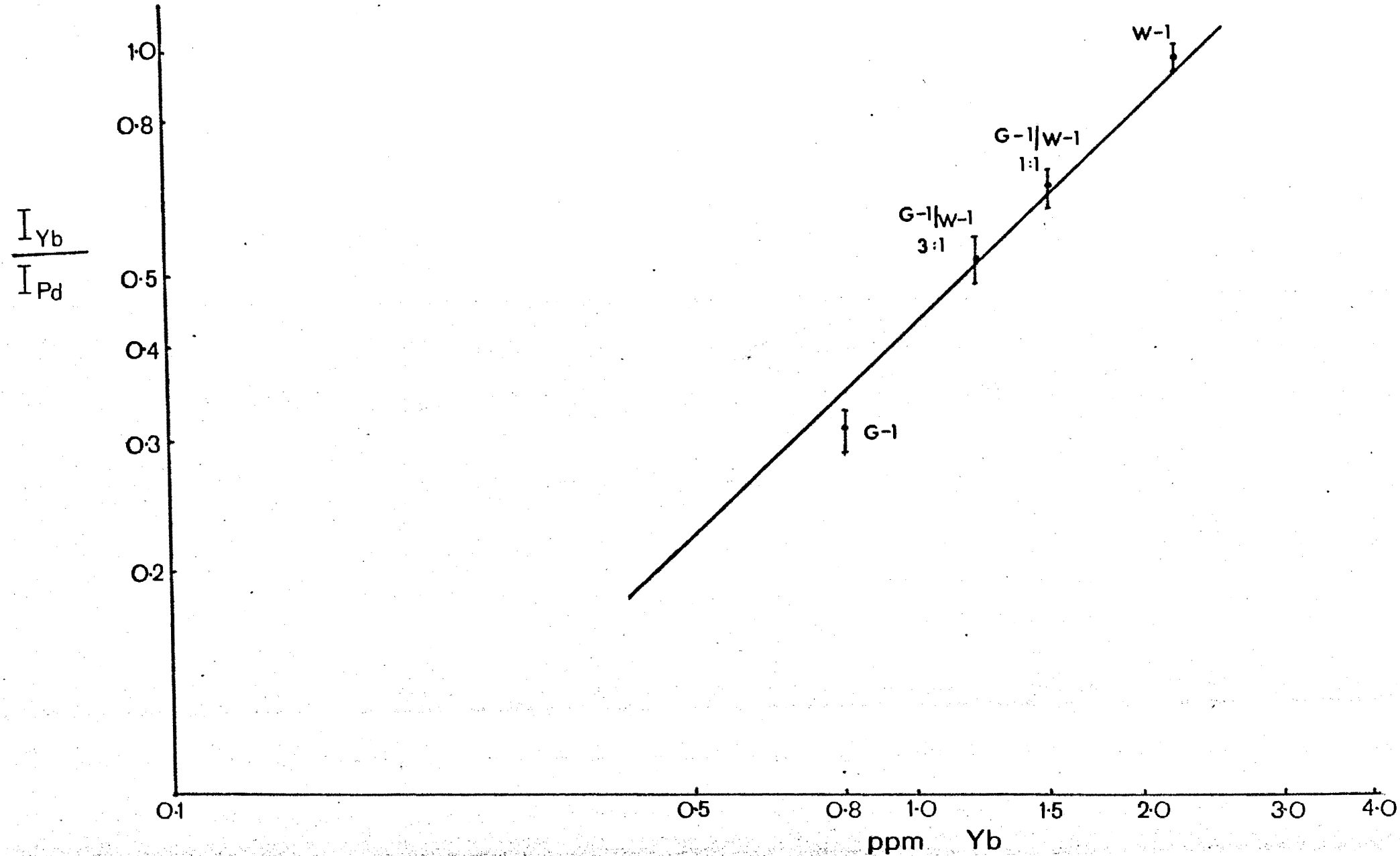
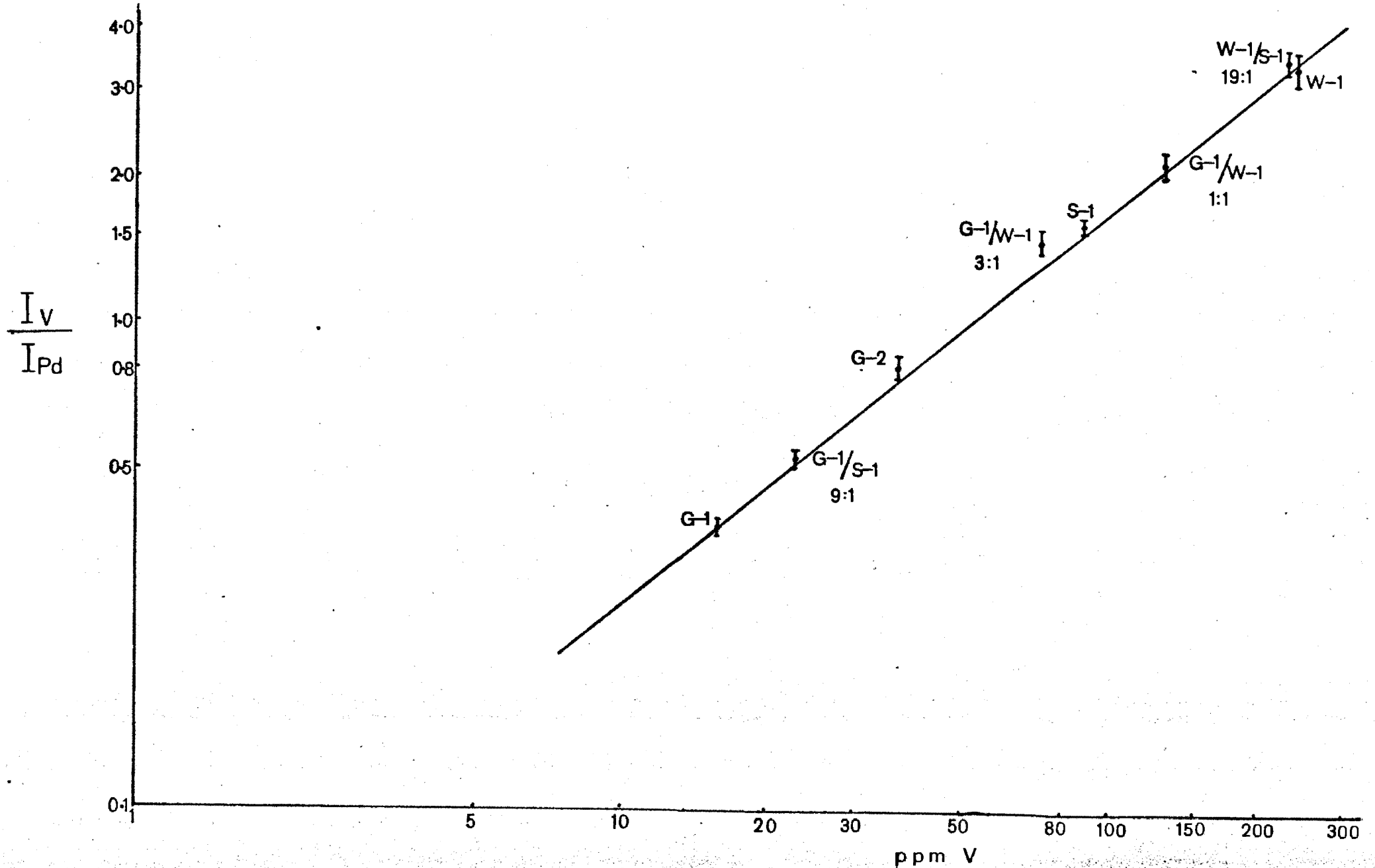
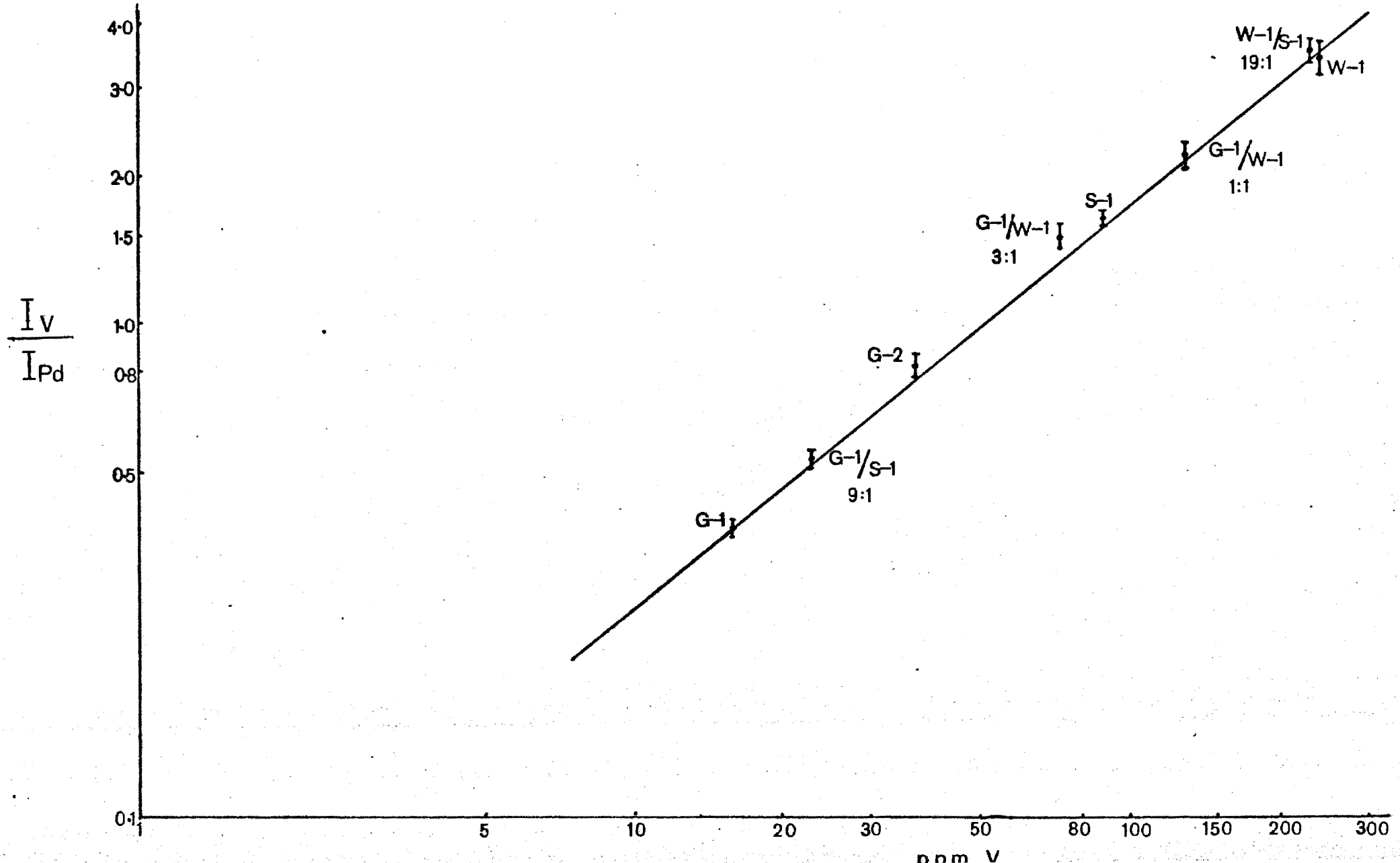

$\frac{I_{Yb}}{I_{Pd}}$
1·0
0·8
0·5
0·4
0·3
0·2
W-1
G-1|W-1
1:1
G-1|W-1
3:1
G-1
0·1
0·5
0·8
1·0
1·5
2·0
3·0
4·0
ppm Yb

FIGURE 7A

Working curve used for the emission spectrographic determination of V


$\frac{I_V}{I_{Pd}}$
4·0
3·0
2·0
1·5
1·0
0·8
0·5
0·1
1
5
10
20
30
50
80
100
150
200
300
ppm V
G–1
G–1/S–1
9:1
G–2
G–1/W–1
3:1
S–1
G–1/W–1
1:1
W–1/S–1
19:1
W–1


$\frac{I_V}{I_{Pd}}$
4·0
3·0
2·0
1·5
1·0
0·8
0·5
0·1
1
5
10
20
30
50
80
100
150
200
300
ppm V
G–1
G–1/S–1
9:1
G–2
G–1/W–1
3:1
S–1
G–1/W–1
1:1
W–1/S–1
19:1
W–1

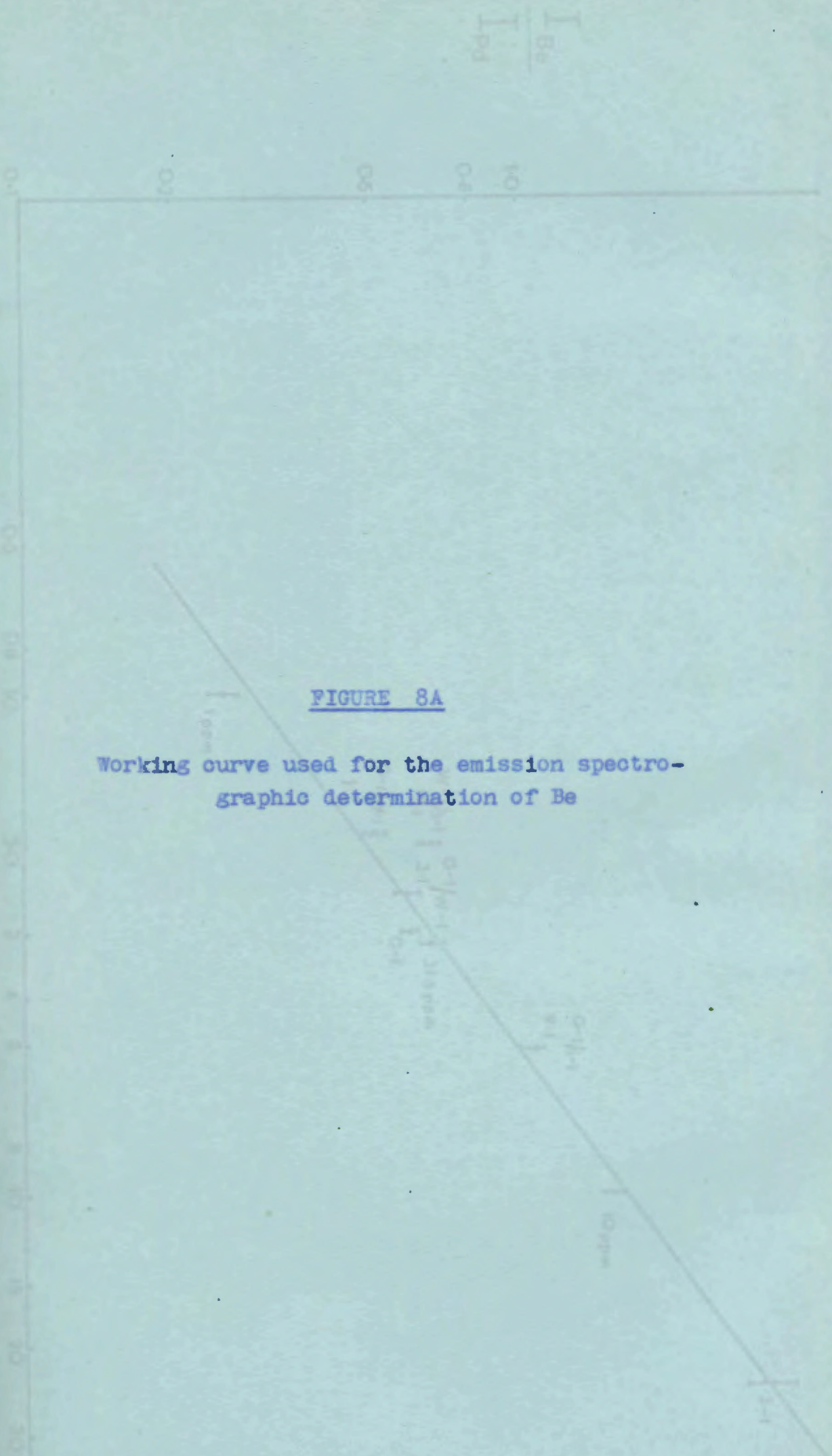
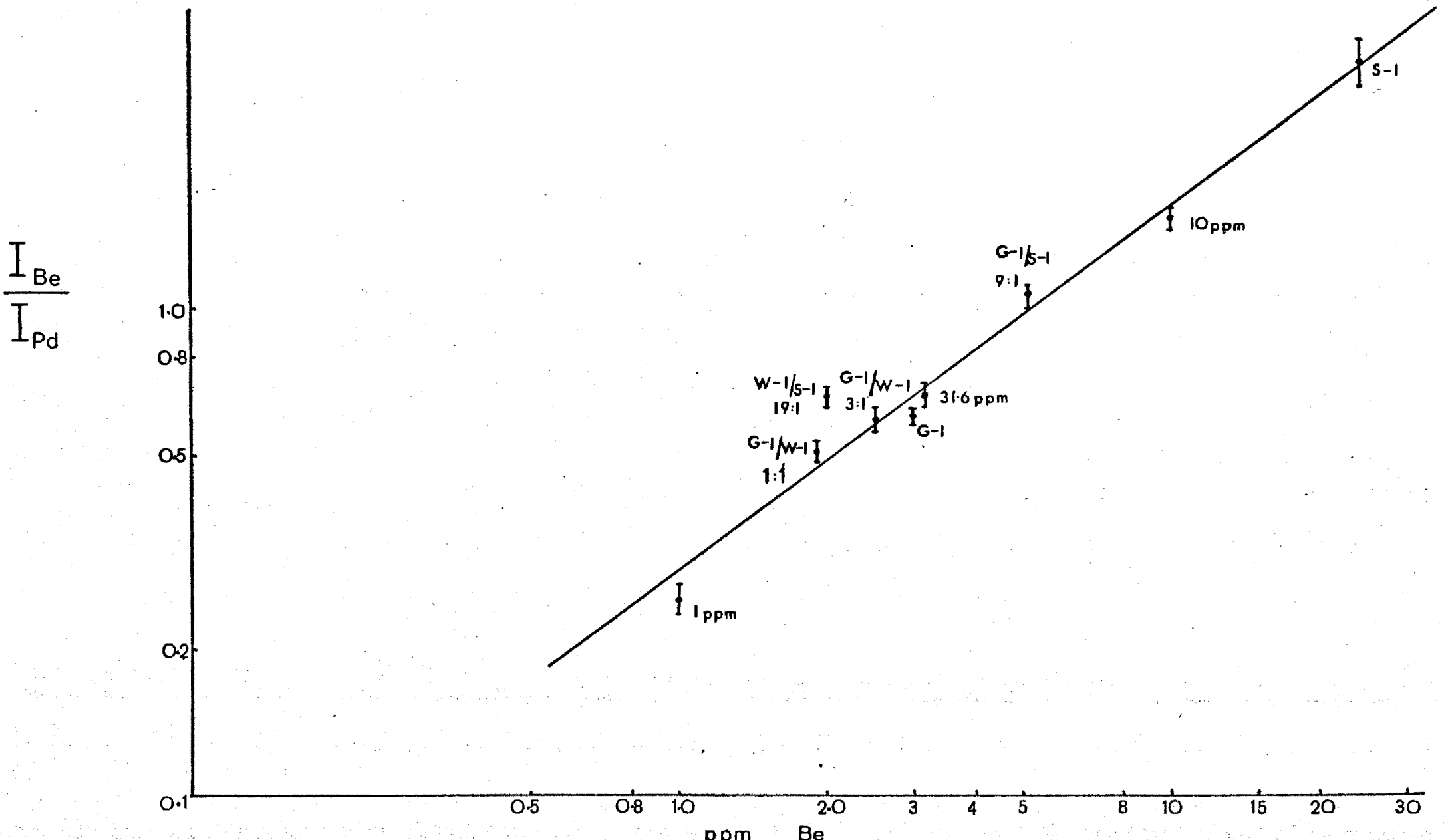


FIGURE 8A

Working curve used for the emission spectrographic determination of Be


I Be / I Pd
1·0
0·8
0·5
0·2
0·1
0·5
0·8
1·0
2·0
3
4
5
8
10
15
20
30
ppm Be
S-1
10ppm
G-1/S-1
9:1
W-1/S-1
19:1
G-1/W-1
3:1
31·6 ppm
G-1
G-1/W-1
1:1
1ppm

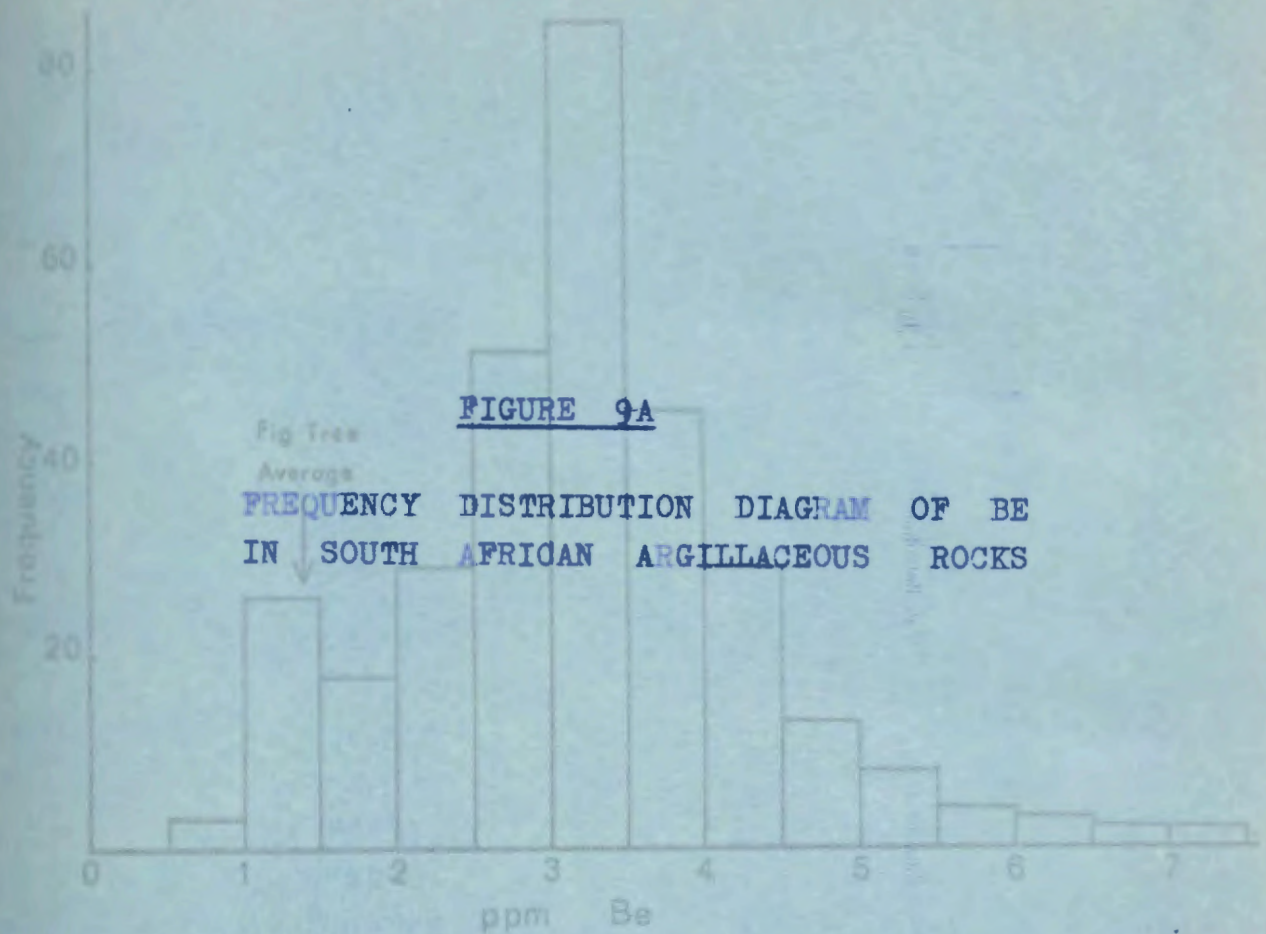


FIGURE 9A

FREQUENCY DISTRIBUTION DIAGRAM OF BE
IN SOUTH AFRICAN ARGILLACEOUS ROCKS

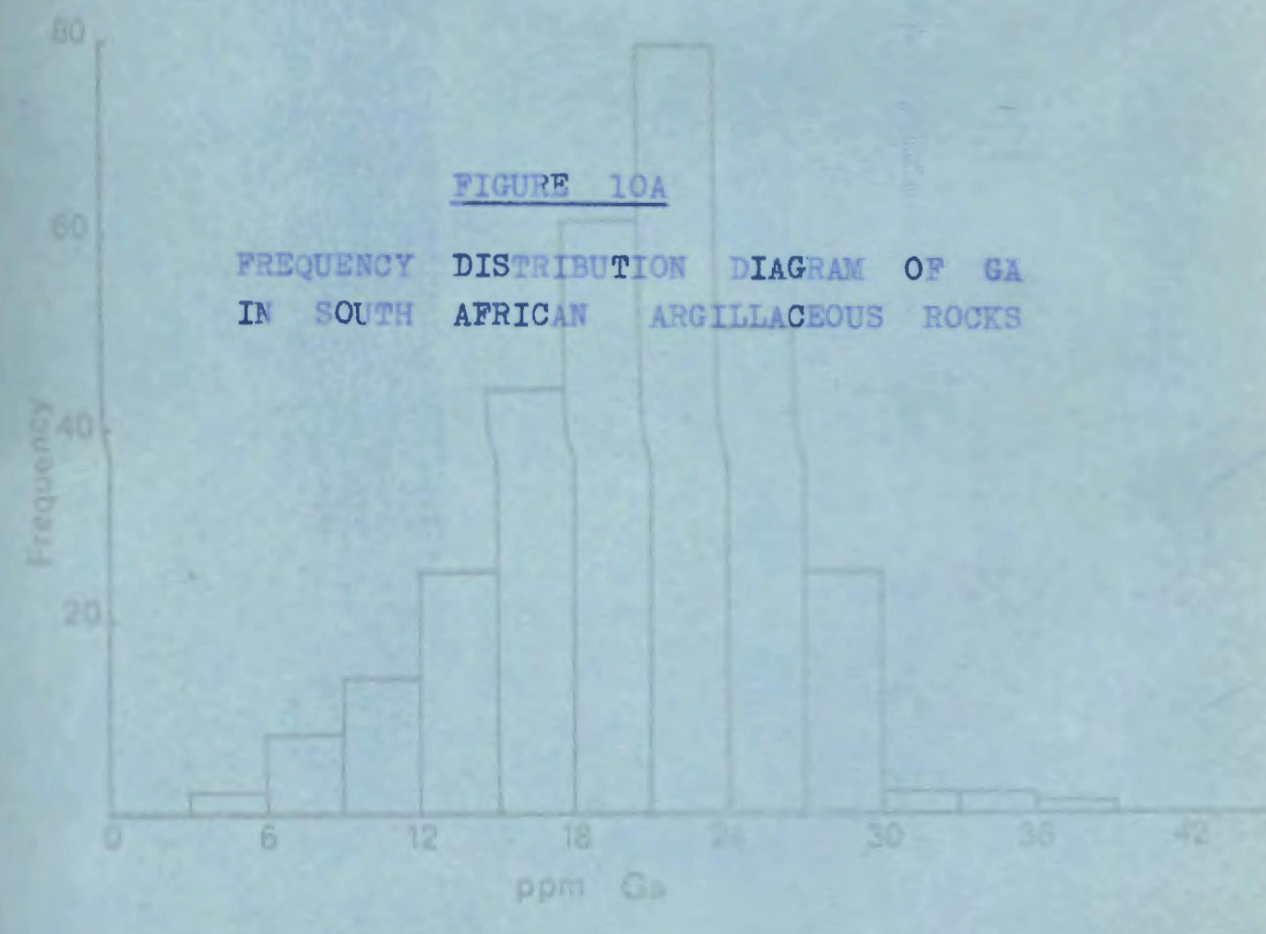
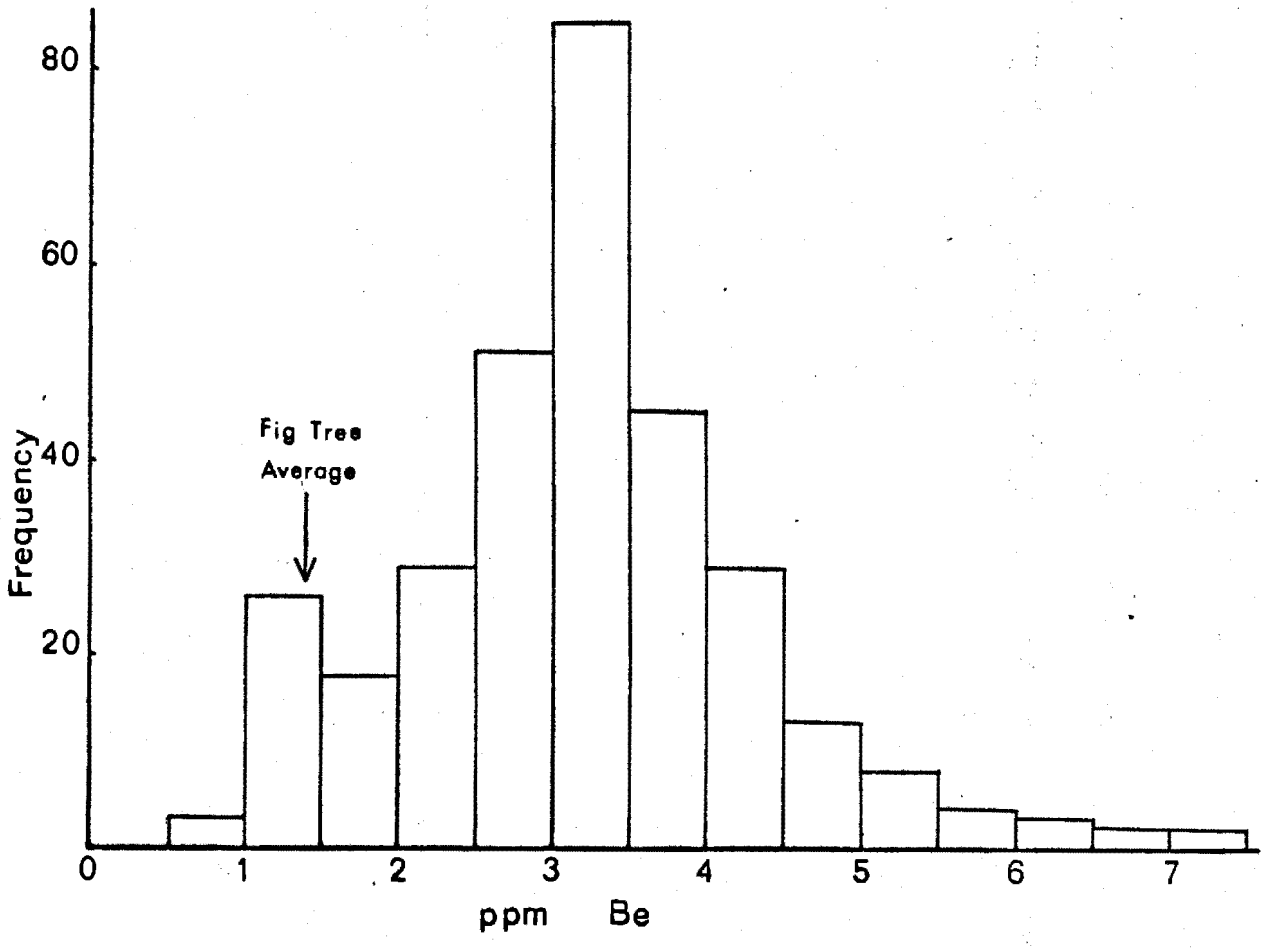


FIGURE 10A

FREQUENCY DISTRIBUTION DIAGRAM OF GA
IN SOUTH AFRICAN ARGILLACEOUS ROCKS


80
60
40
20
Frequency
Fig Tree
Average
0
1
2
3
4
5
6
7
ppm Be

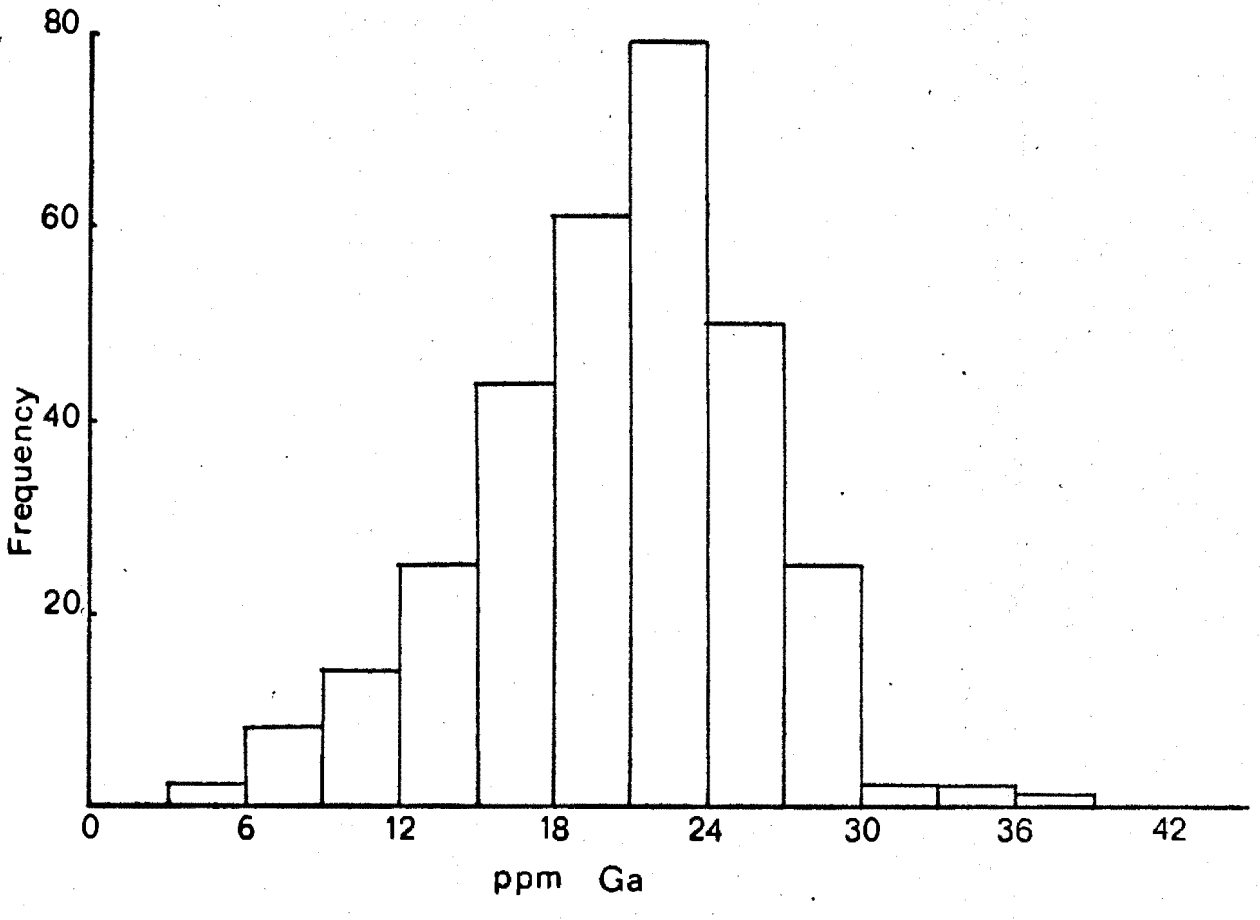

80
60
40
20
Frequency
0
6
12
18
24
30
36
42
ppm Ga

FIGURE 11A

FREQUENCY DISTRIBUTION DIAGRAM OF CU
IN SOUTH AFRICAN AGRILLACEOUS ROCKS

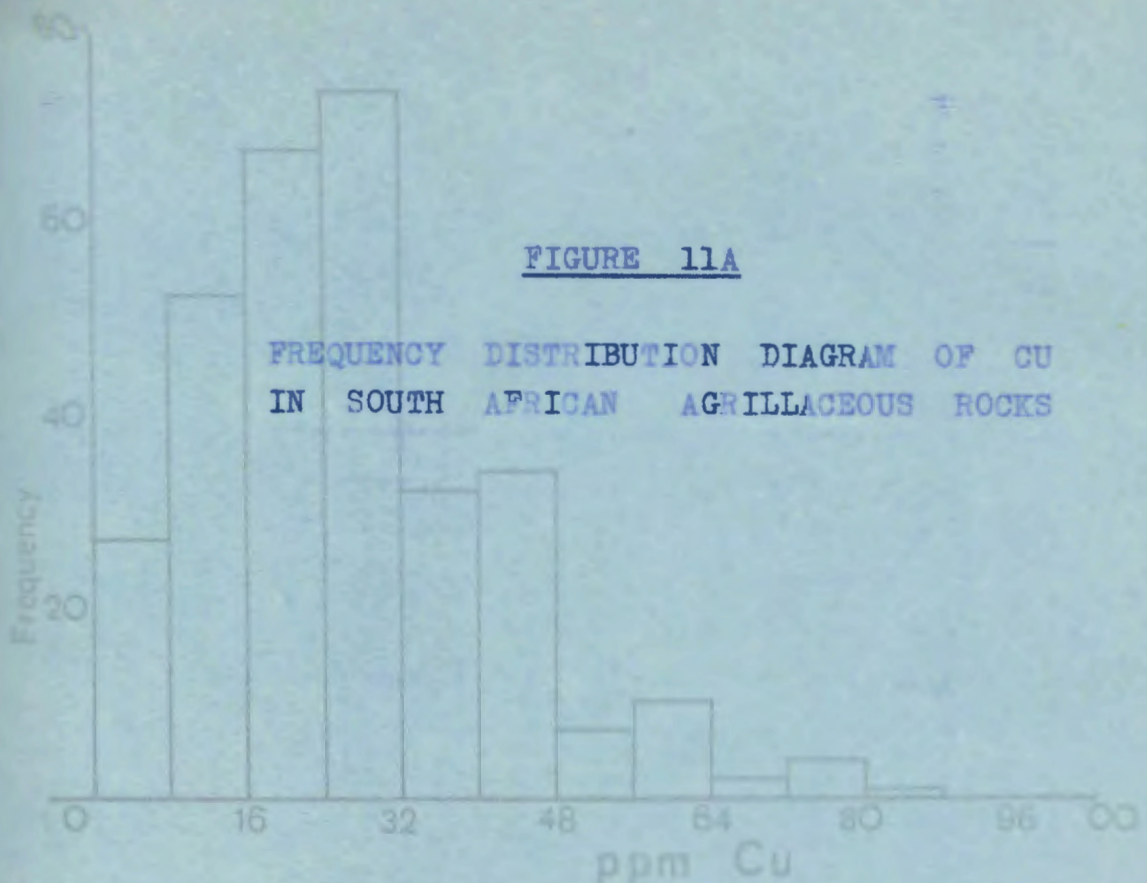
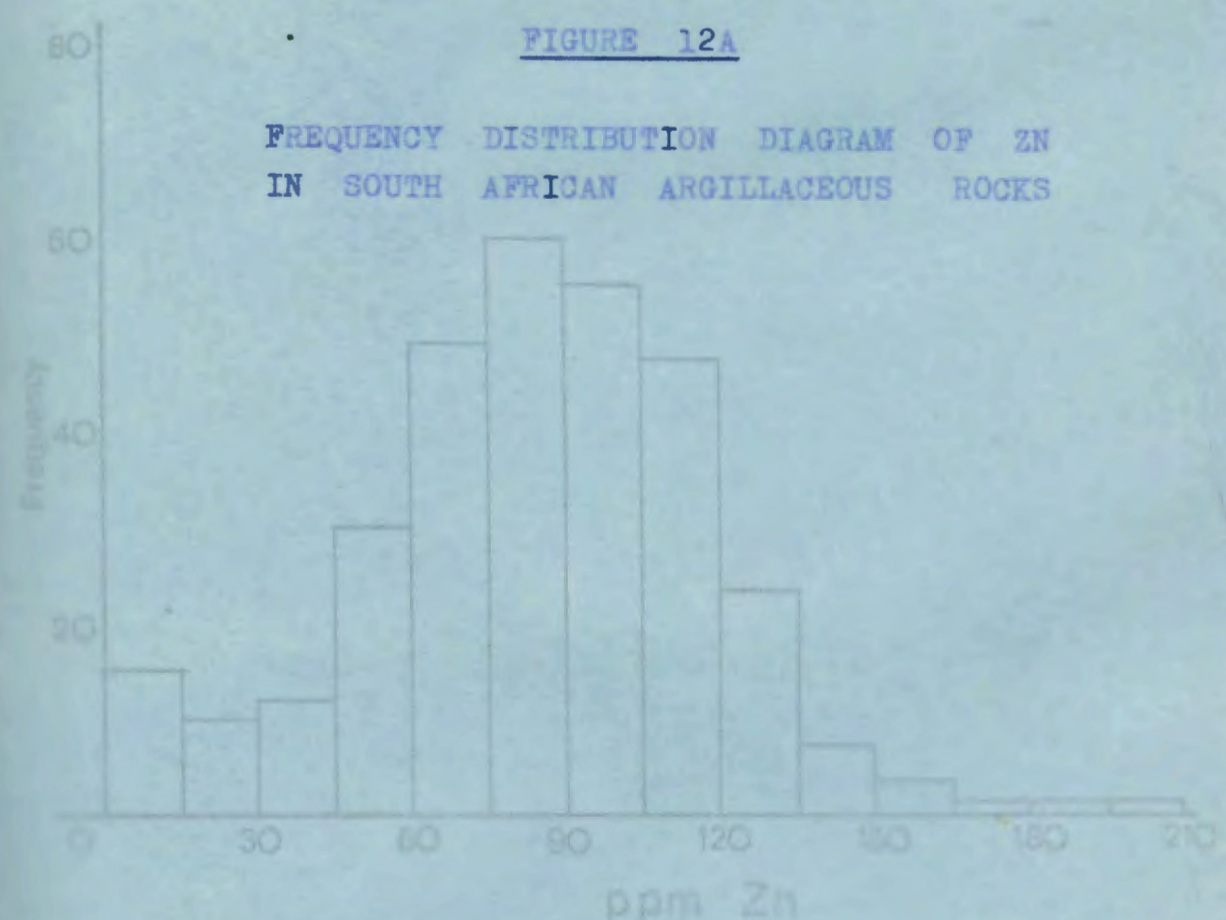
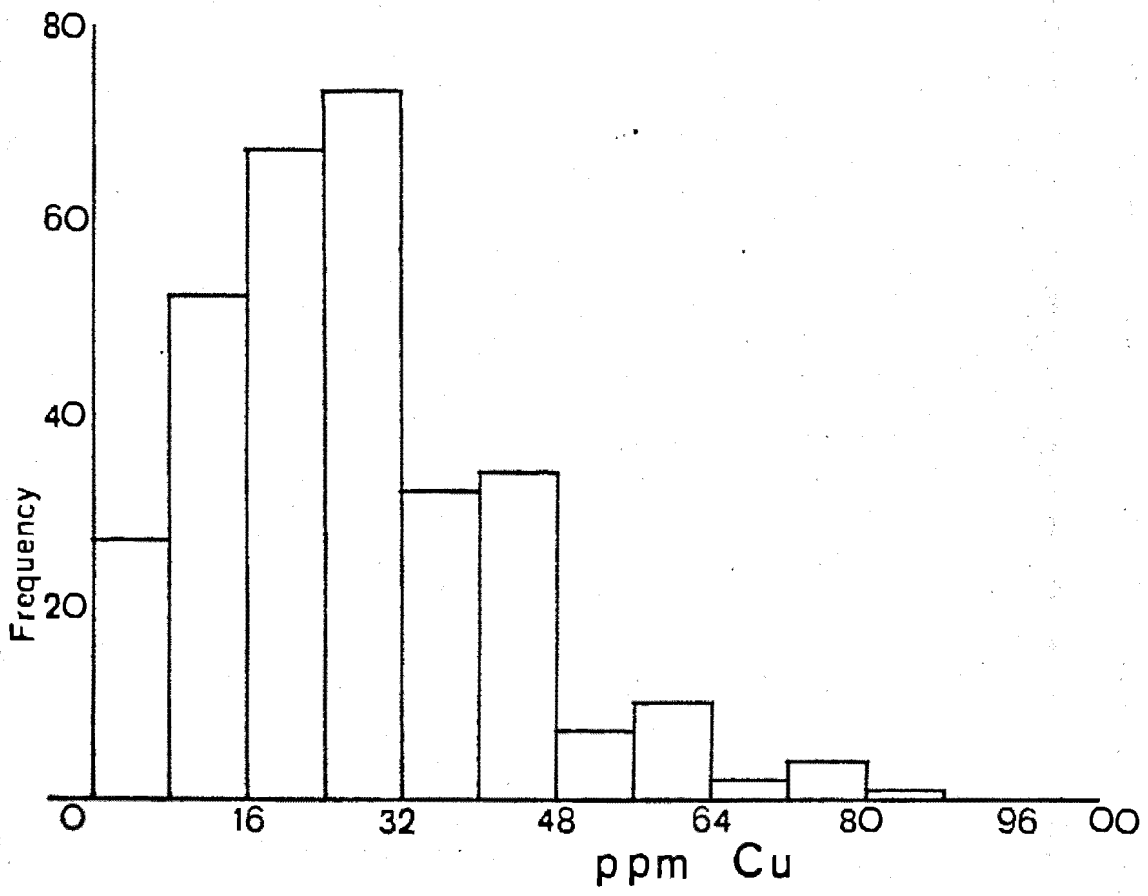
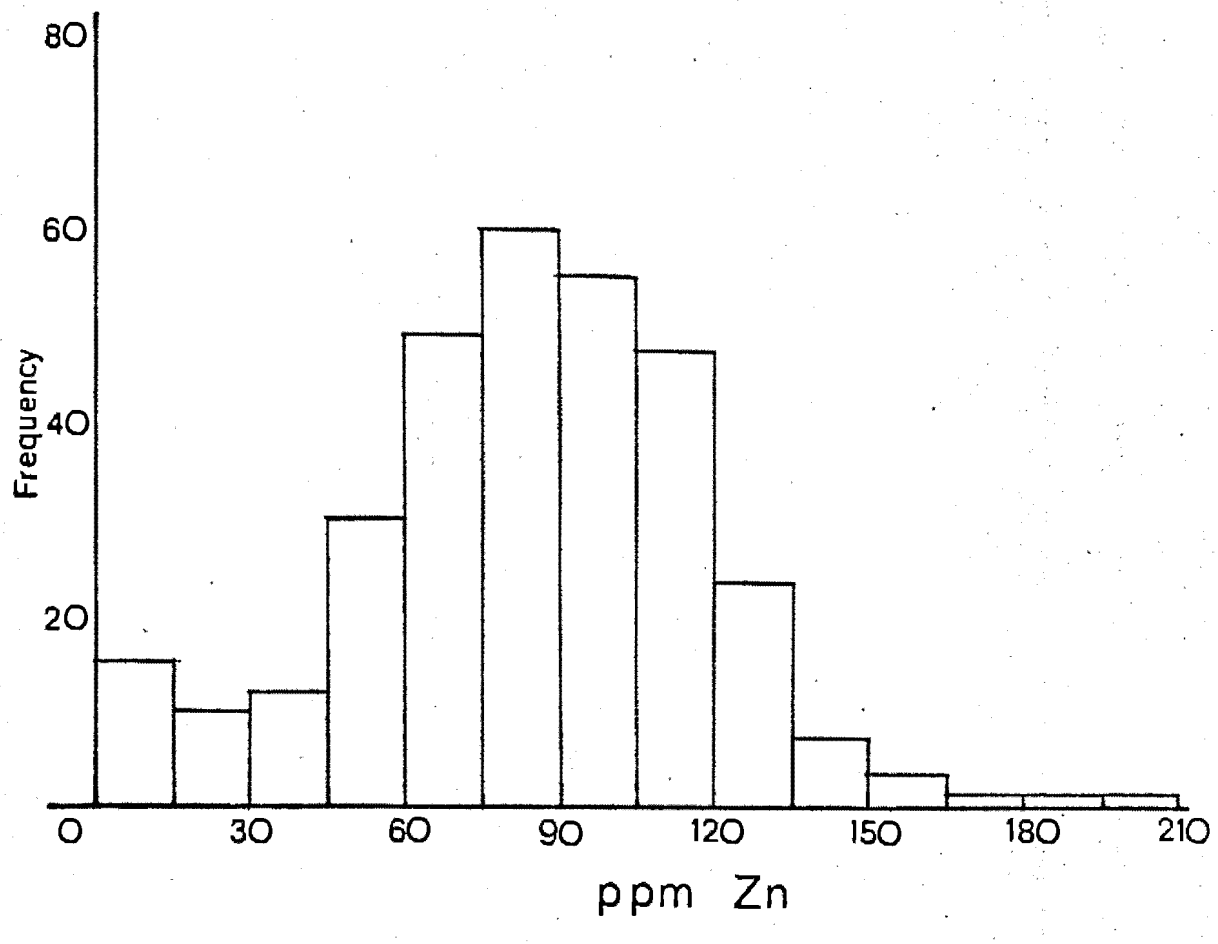


FIGURE 12A

FREQUENCY DISTRIBUTION DIAGRAM OF ZN
IN SOUTH AFRICAN ARGILLACEOUS ROCKS




80
60
40
20
Frequency
0
16
32
48
64
80
96
00
ppm Cu


80
60
40
20
Frequency
0
30
60
90
120
150
180
210
ppm Zn

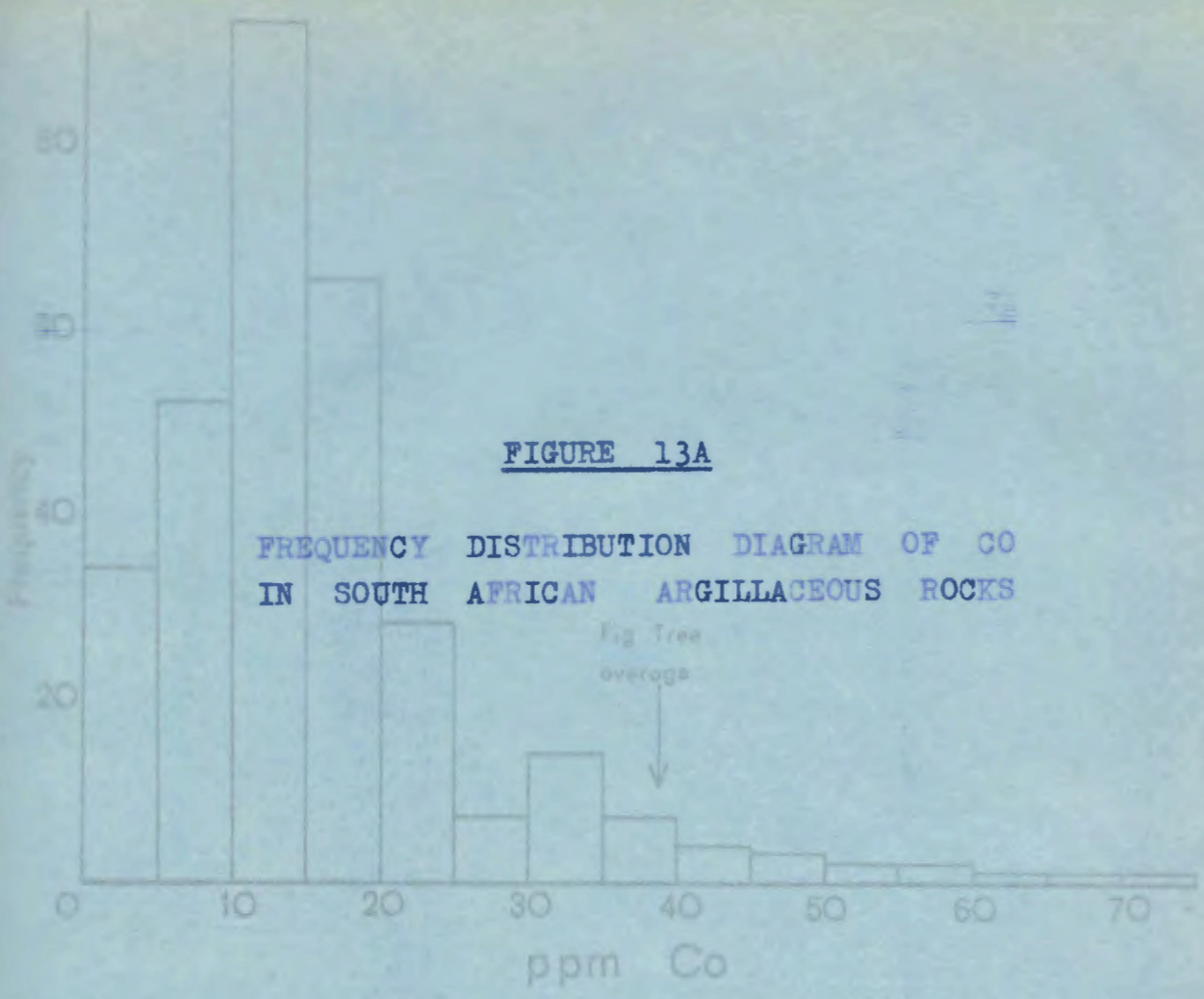


FIGURE 13A

FREQUENCY DISTRIBUTION DIAGRAM OF CO
IN SOUTH AFRICAN ARGILLACEOUS ROCKS

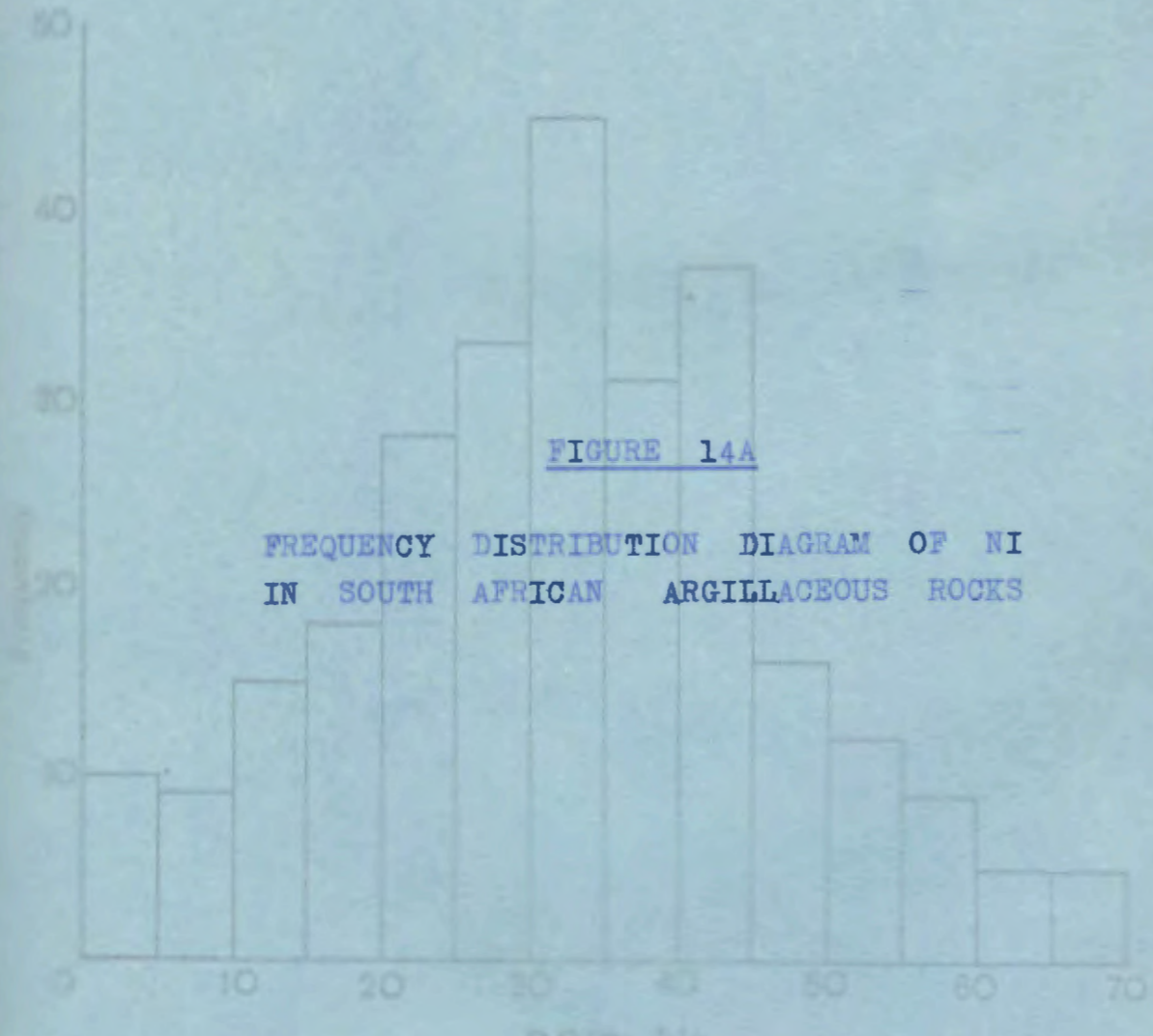
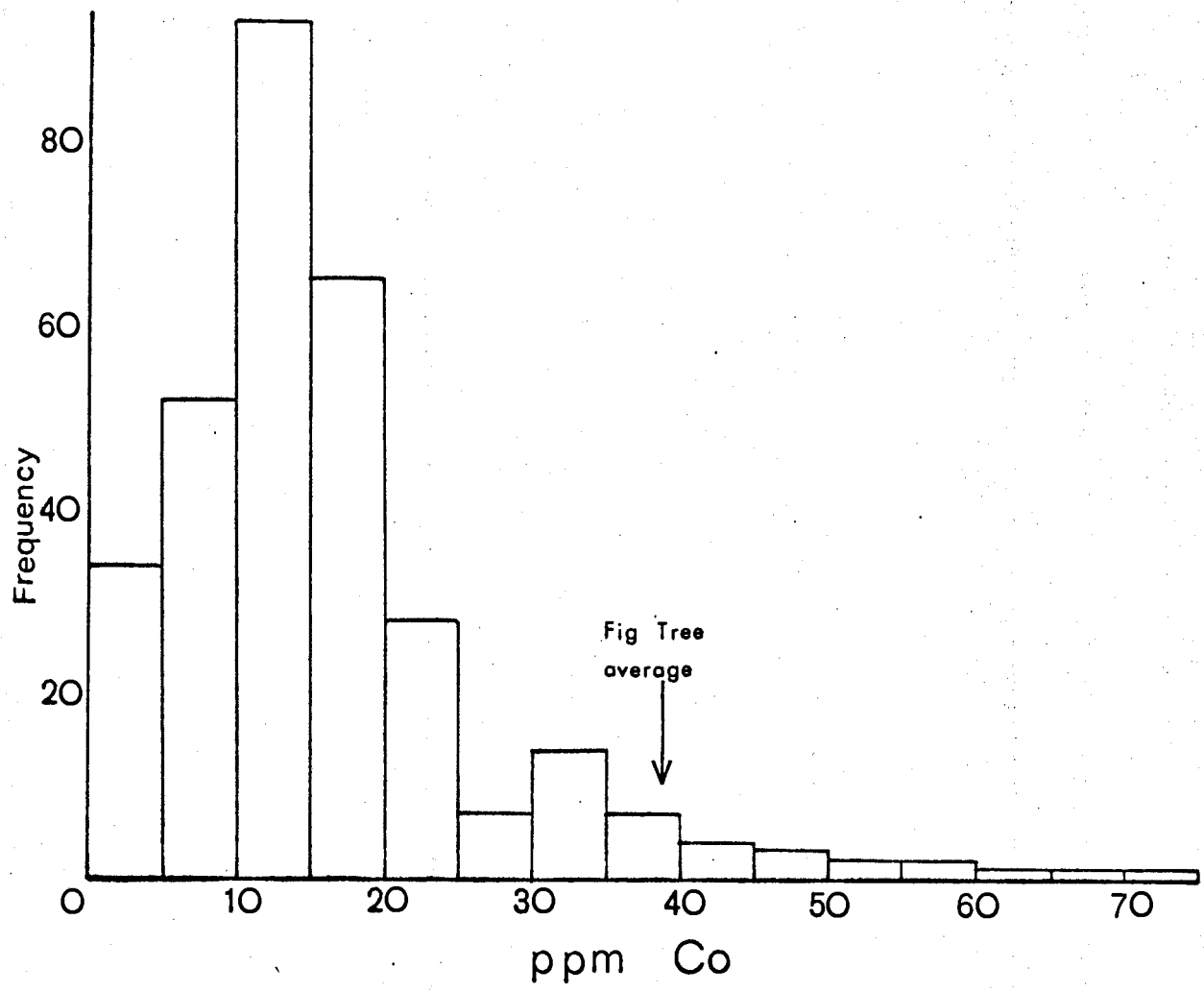
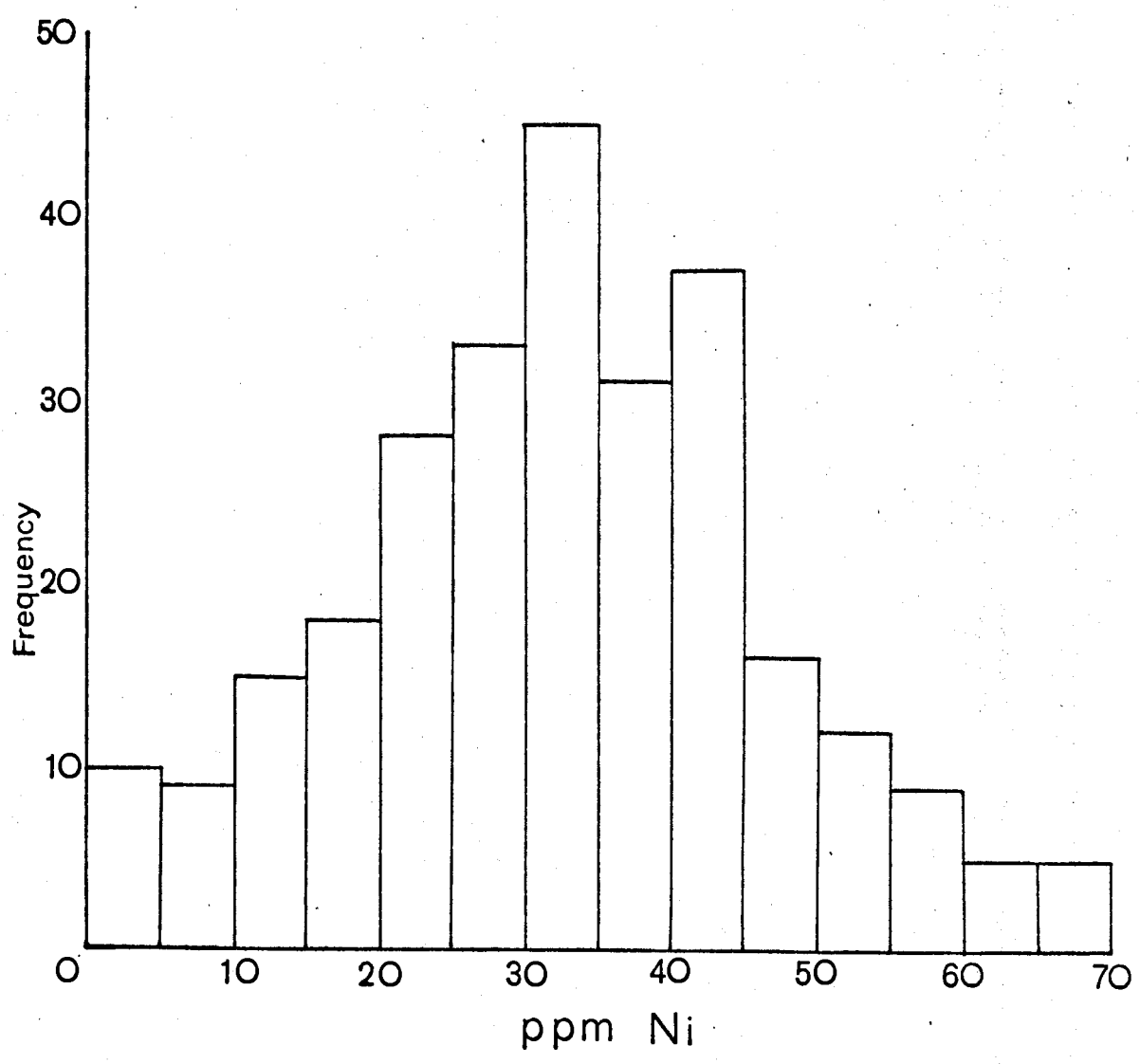


FIGURE 14A

FREQUENCY DISTRIBUTION DIAGRAM OF NI
IN SOUTH AFRICAN ARGILLACEOUS ROCKS


80
60
40
20
Frequency
Fig Tree
average
0
10
20
30
40
50
60
70
ppm Co


50
40
30
20
10
Frequency
0
10
20
30
40
50
60
70
ppm Ni

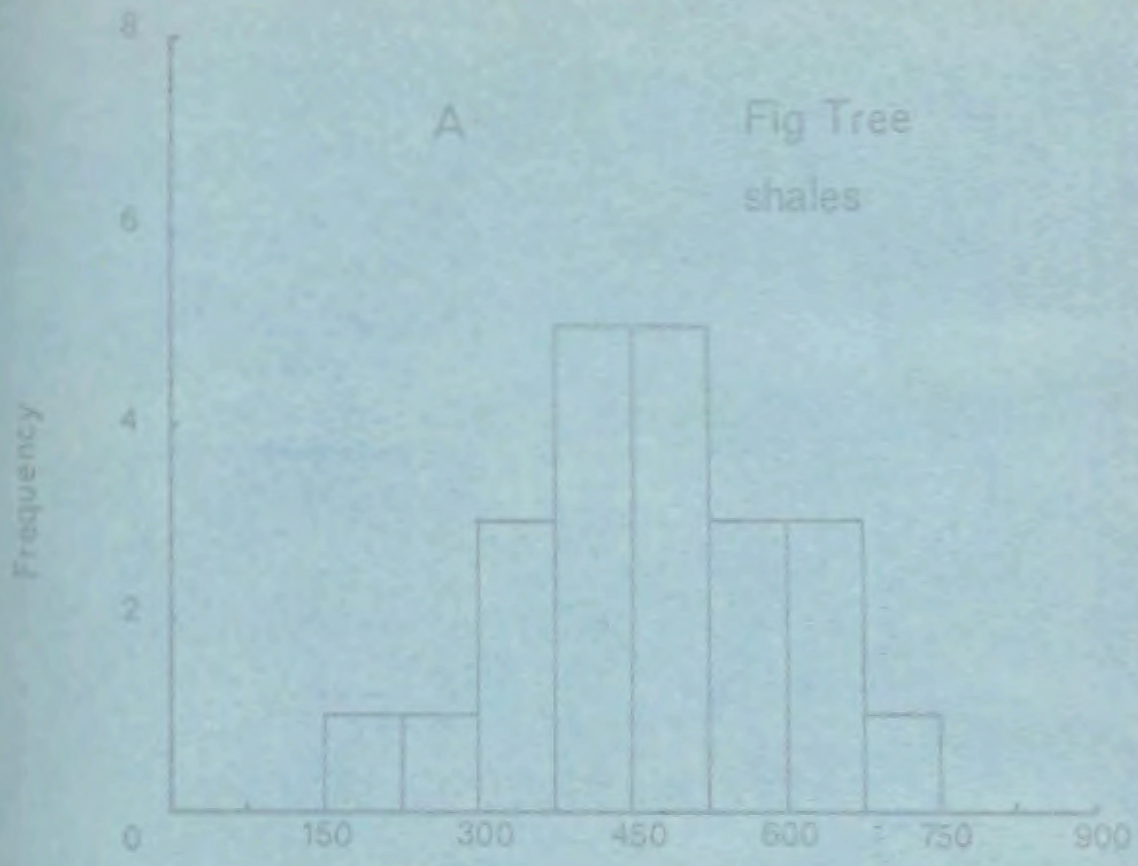
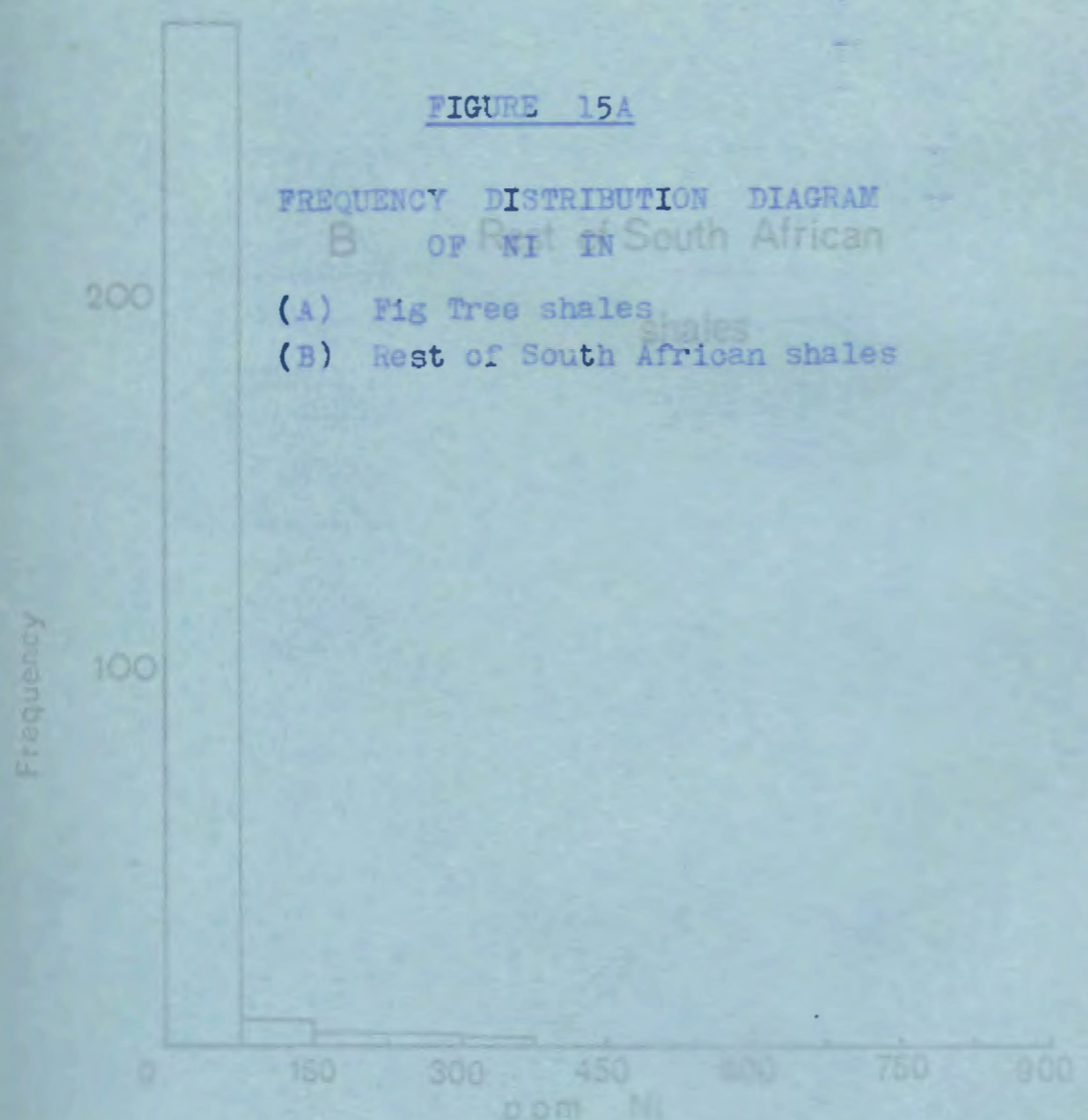


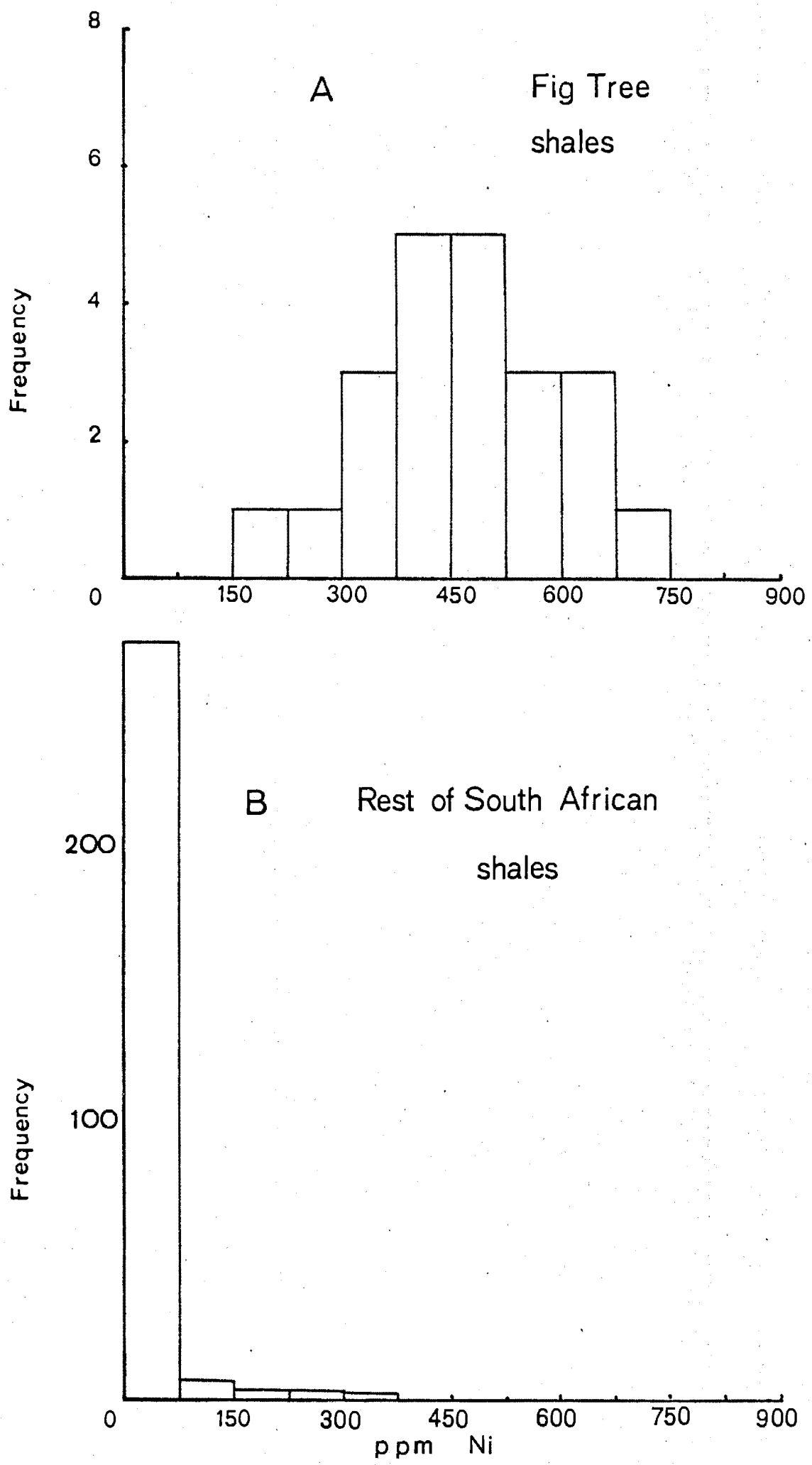
FIGURE 15A

FREQUENCY DISTRIBUTION DIAGRAM OF Ni IN

(A) Fig Tree shales

(B) Rest of South African shales




A
Fig Tree
shales
Frequency
8
6
4
2
0
150
300
450
600
750
900
B
Rest of South African
shales
200
100
Frequency
0
150
300
450
600
750
900
ppm Ni

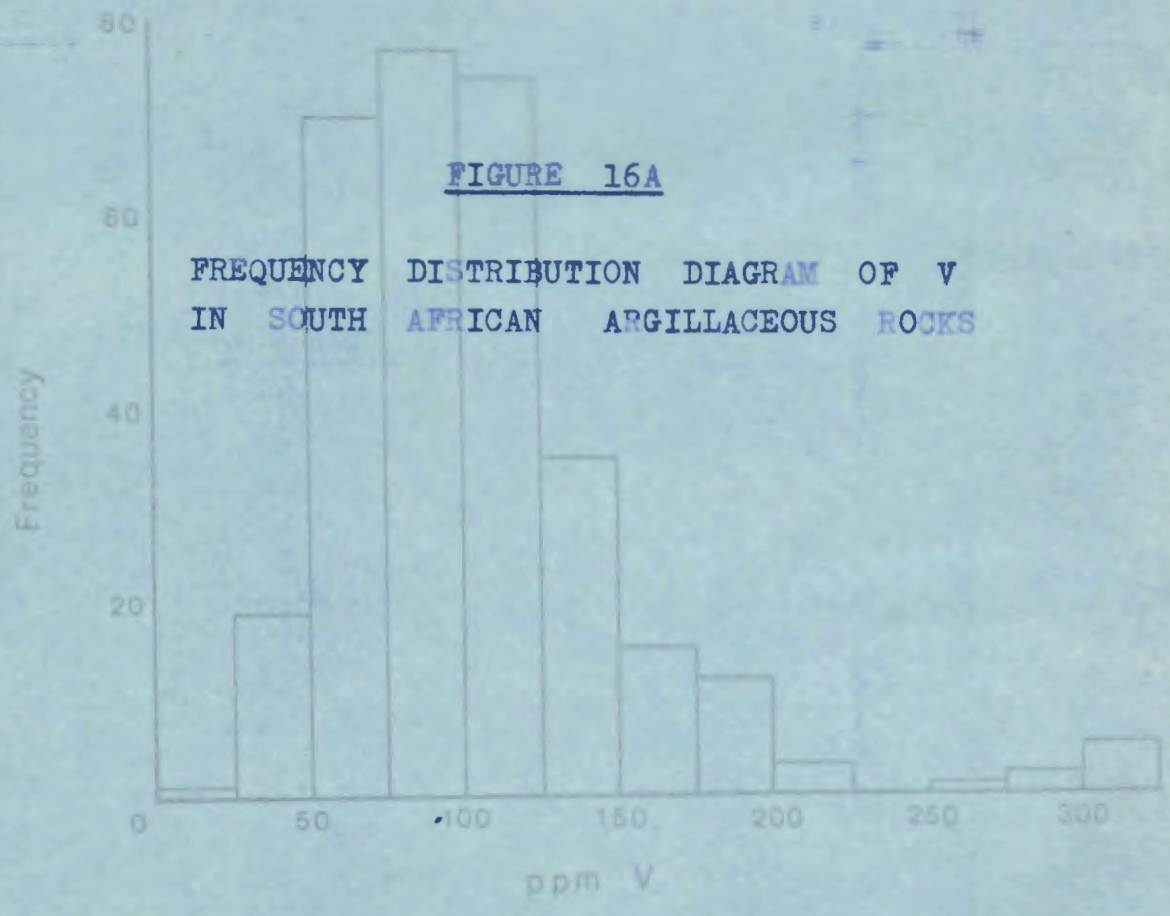


FIGURE 16A

FREQUENCY DISTRIBUTION DIAGRAM OF V
IN SOUTH AFRICAN ARGILLACEOUS ROCKS

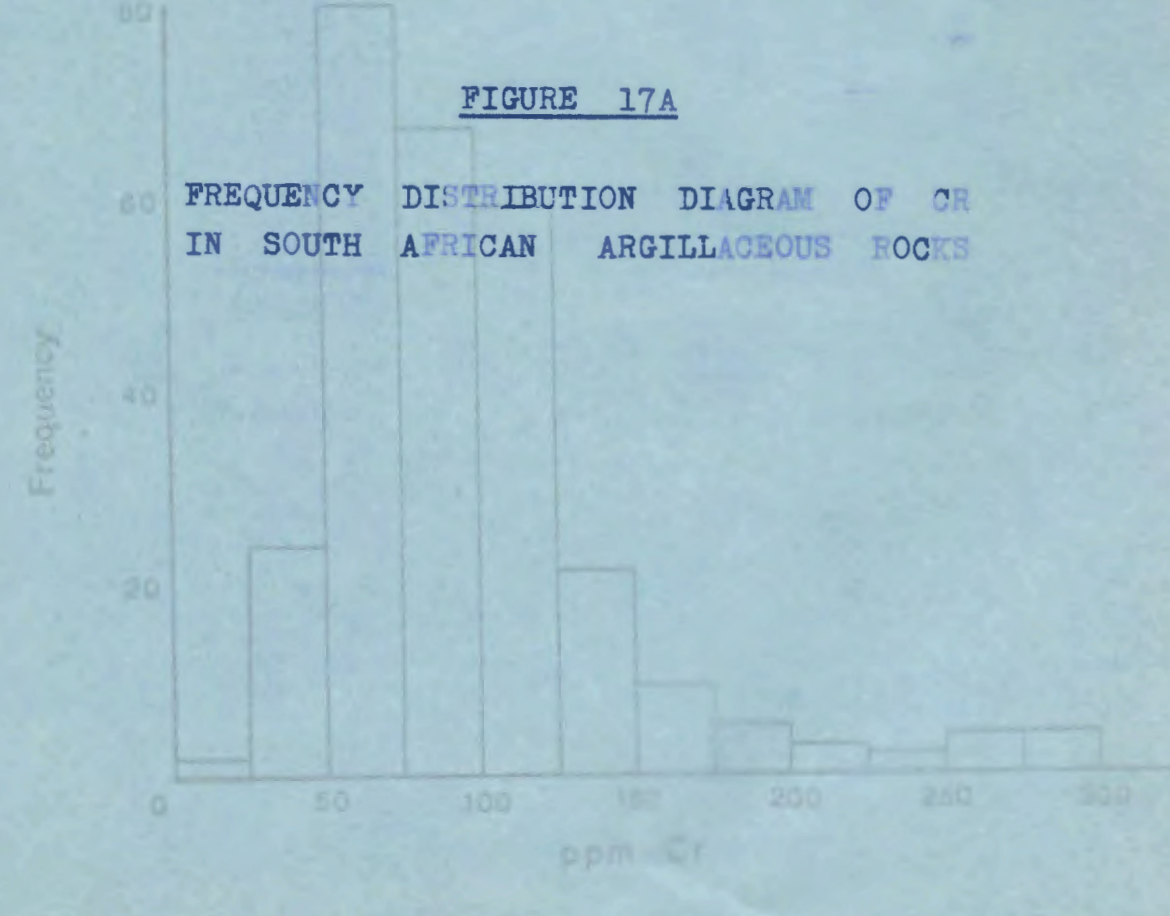
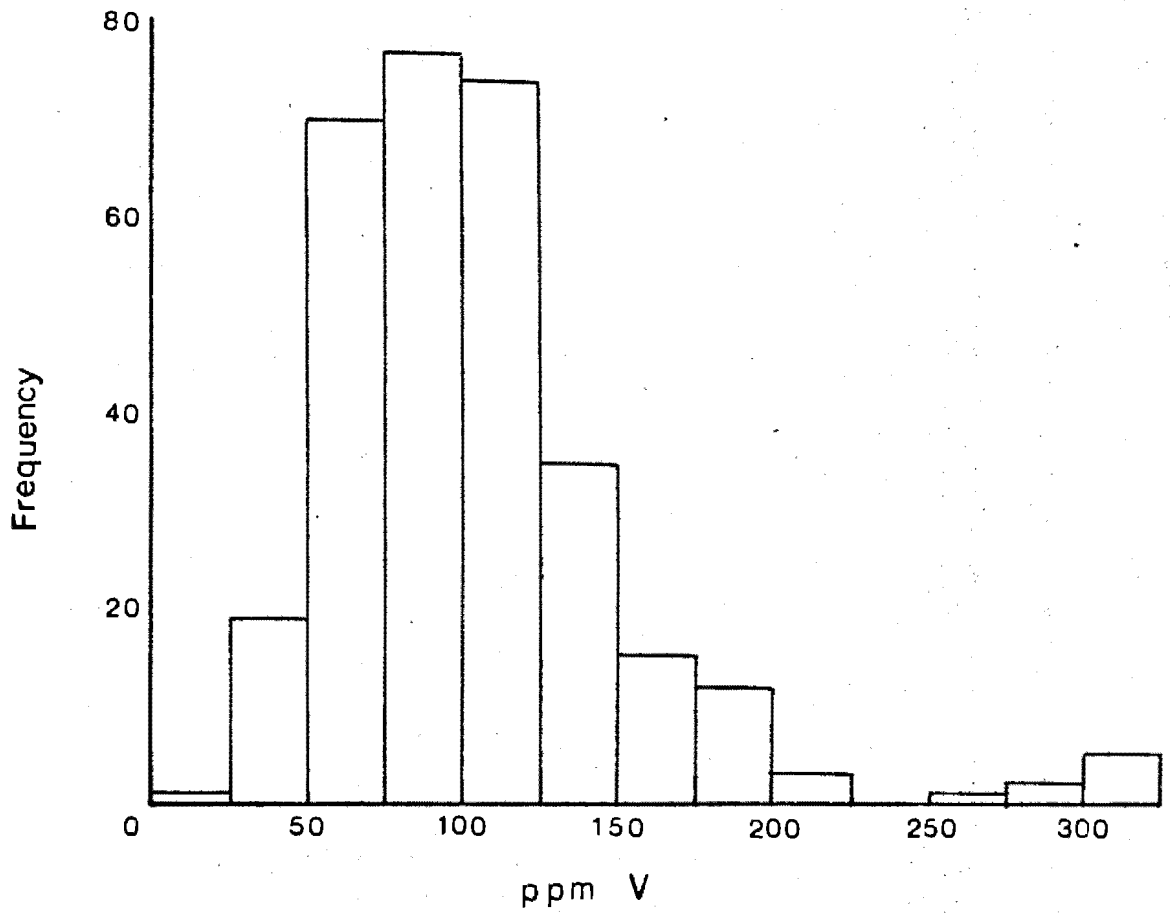
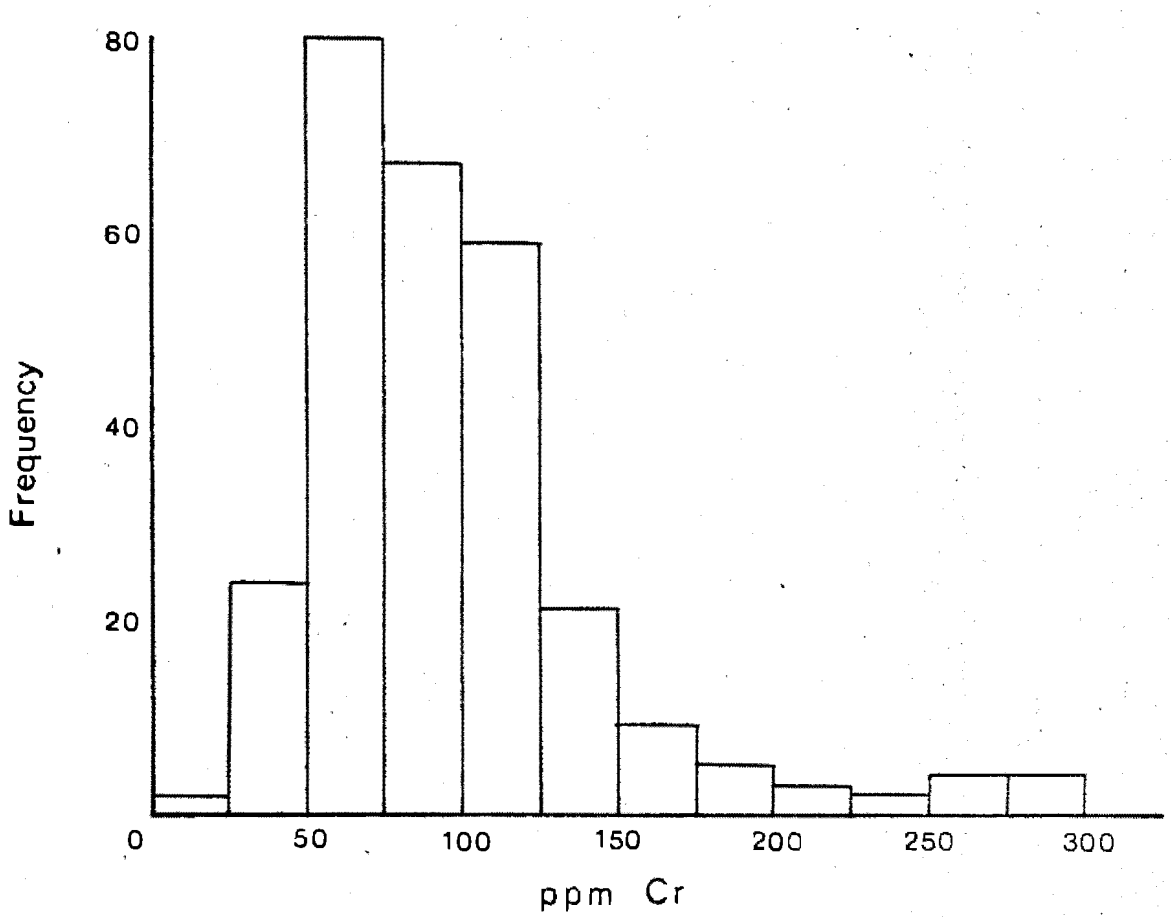


FIGURE 17A

FREQUENCY DISTRIBUTION DIAGRAM OF CR
IN SOUTH AFRICAN ARGILLACEOUS ROCKS


80
60
40
20
0
Frequency
50
100
150
200
250
300
ppm V


80
60
40
20
0
Frequency
50
100
150
200
250
300
ppm Cr

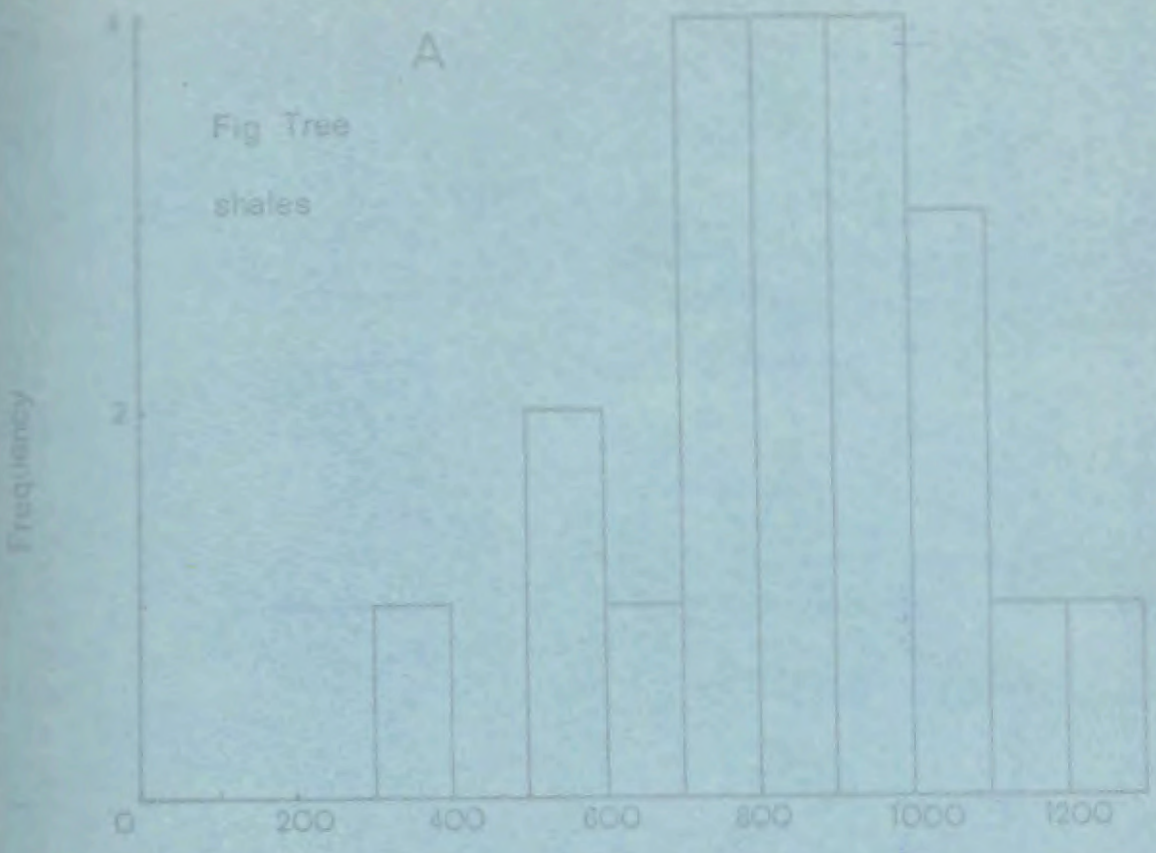
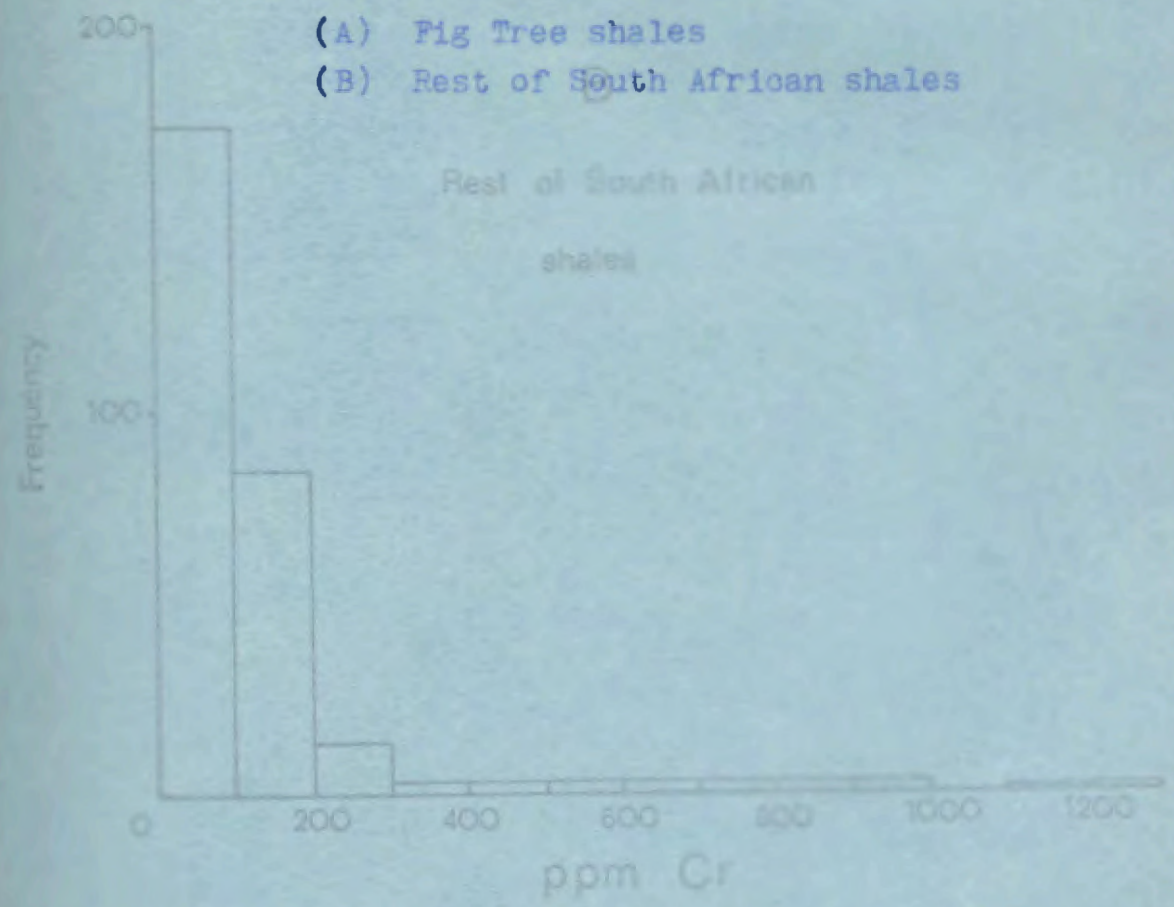
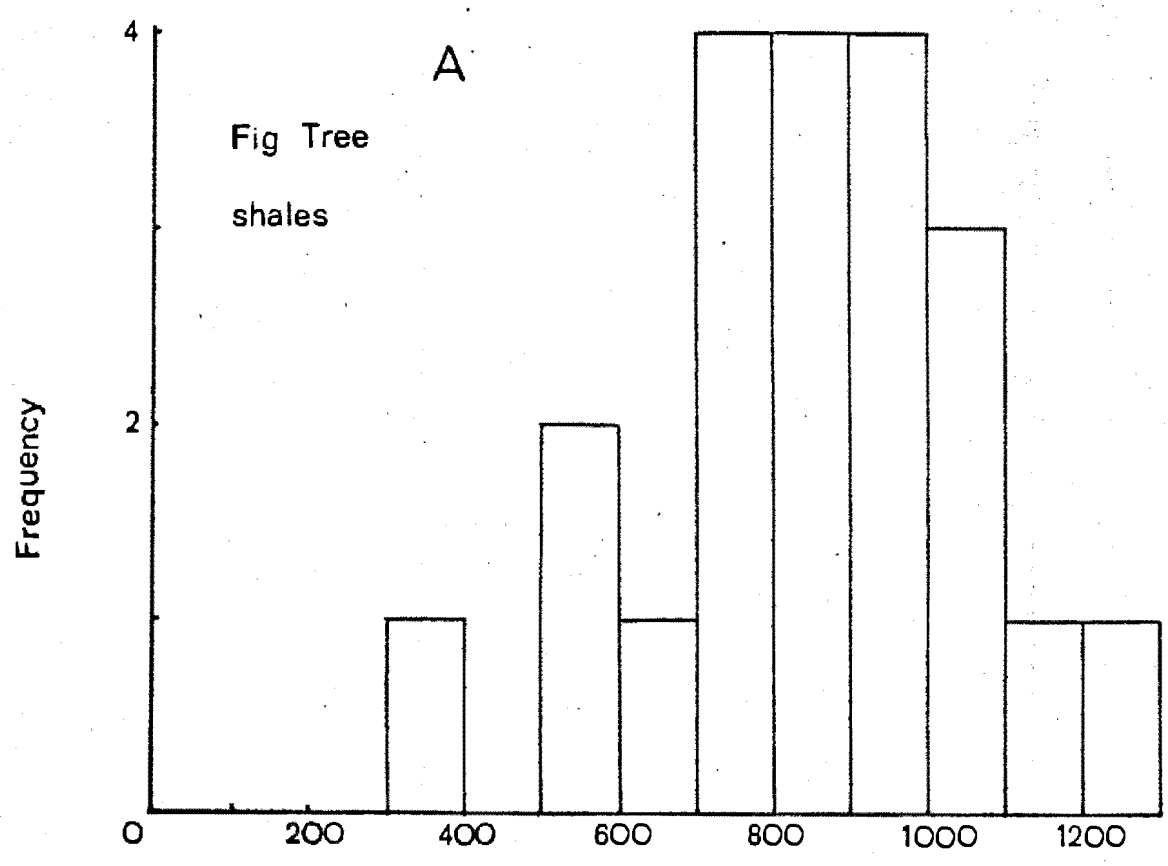


FIGURE 18A

FREQUENCY DISTRIBUTION DIAGRAM
OF CR IN

(A) Fig Tree shales
(B) Rest of South African shales




A
Fig Tree
shales
Frequency
4
2
0
200
400
600
800
1000
1200

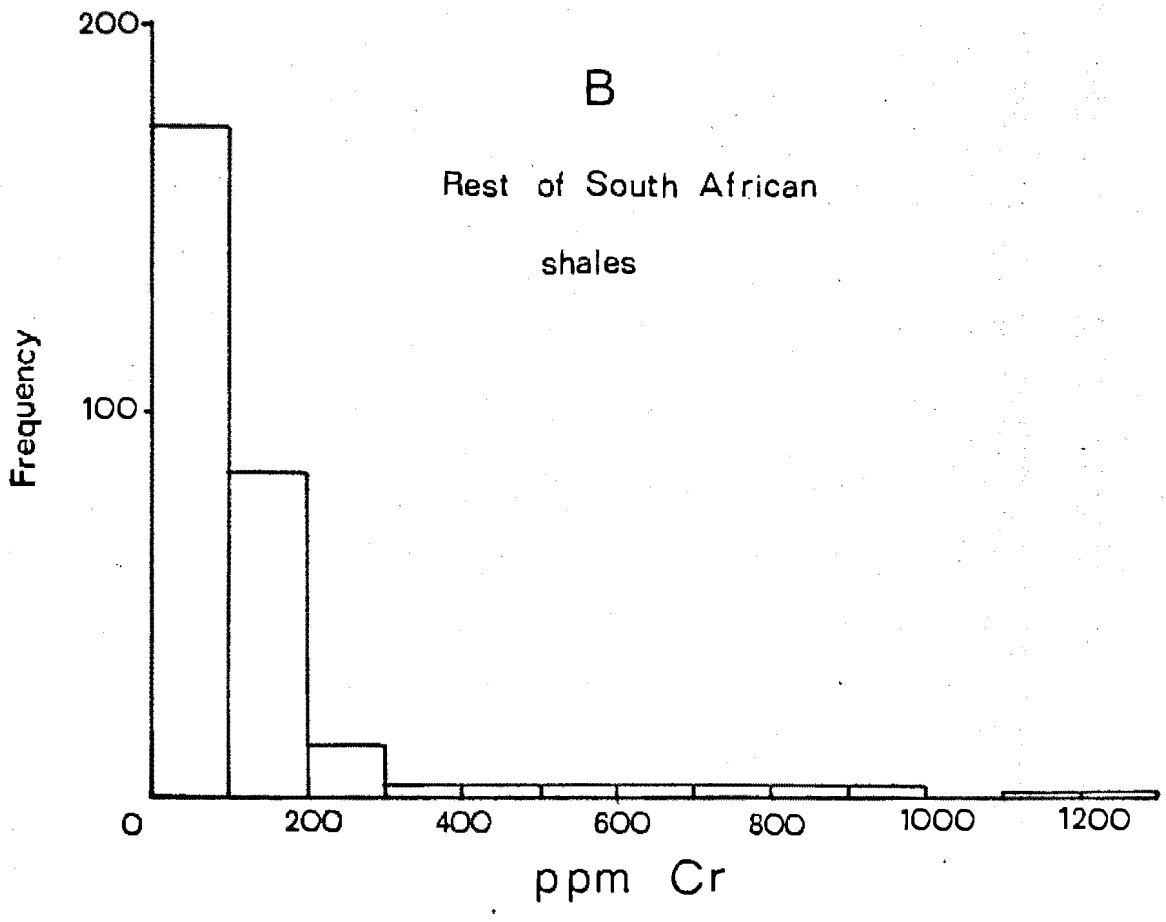

B
Rest of South African
shales
Frequency
200
100
0
200
400
600
800
1000
1200
ppm Cr

FIGURE 19A

FREQUENCY DISTRIBUTION DIAGRAM OF SC
IN SOUTH AFRICAN ARGILLACEOUS ROCKS

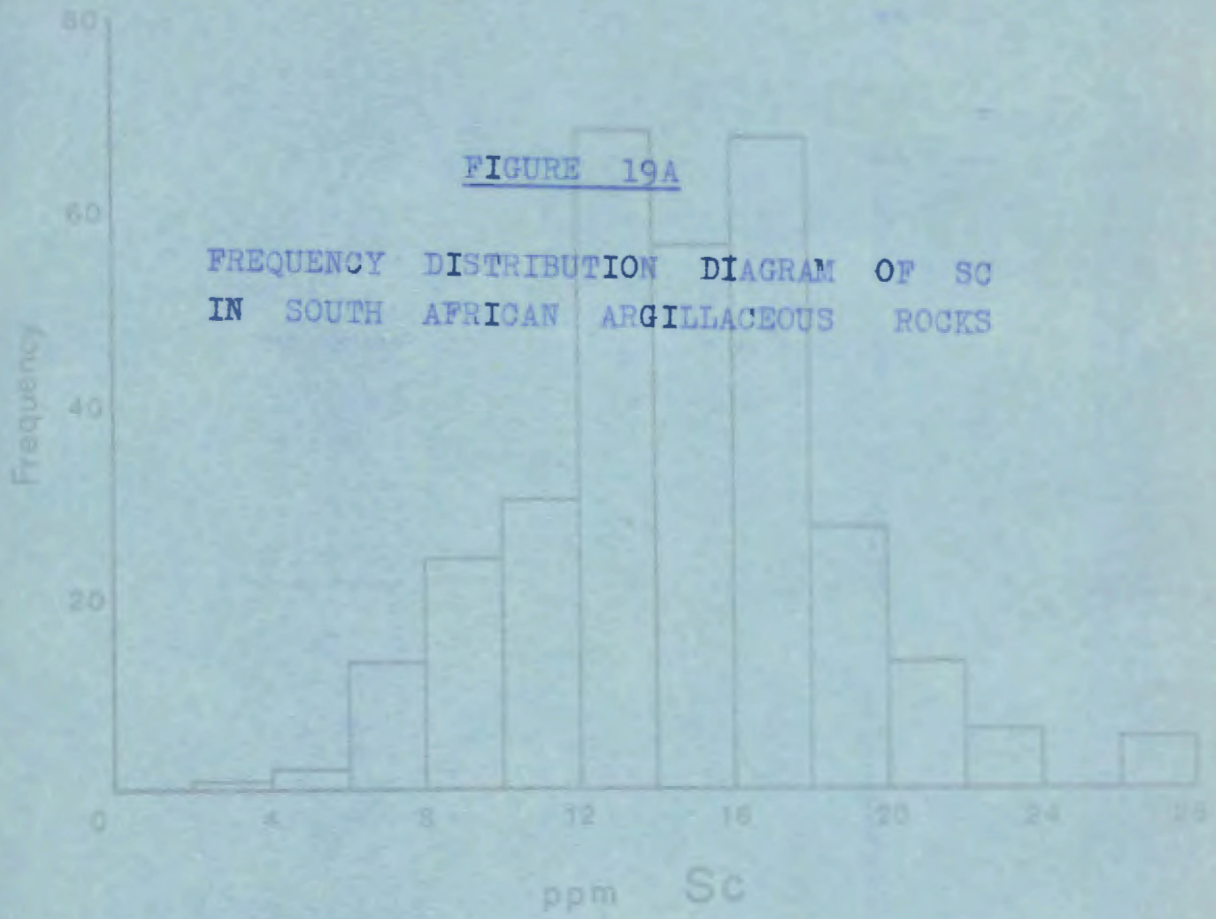
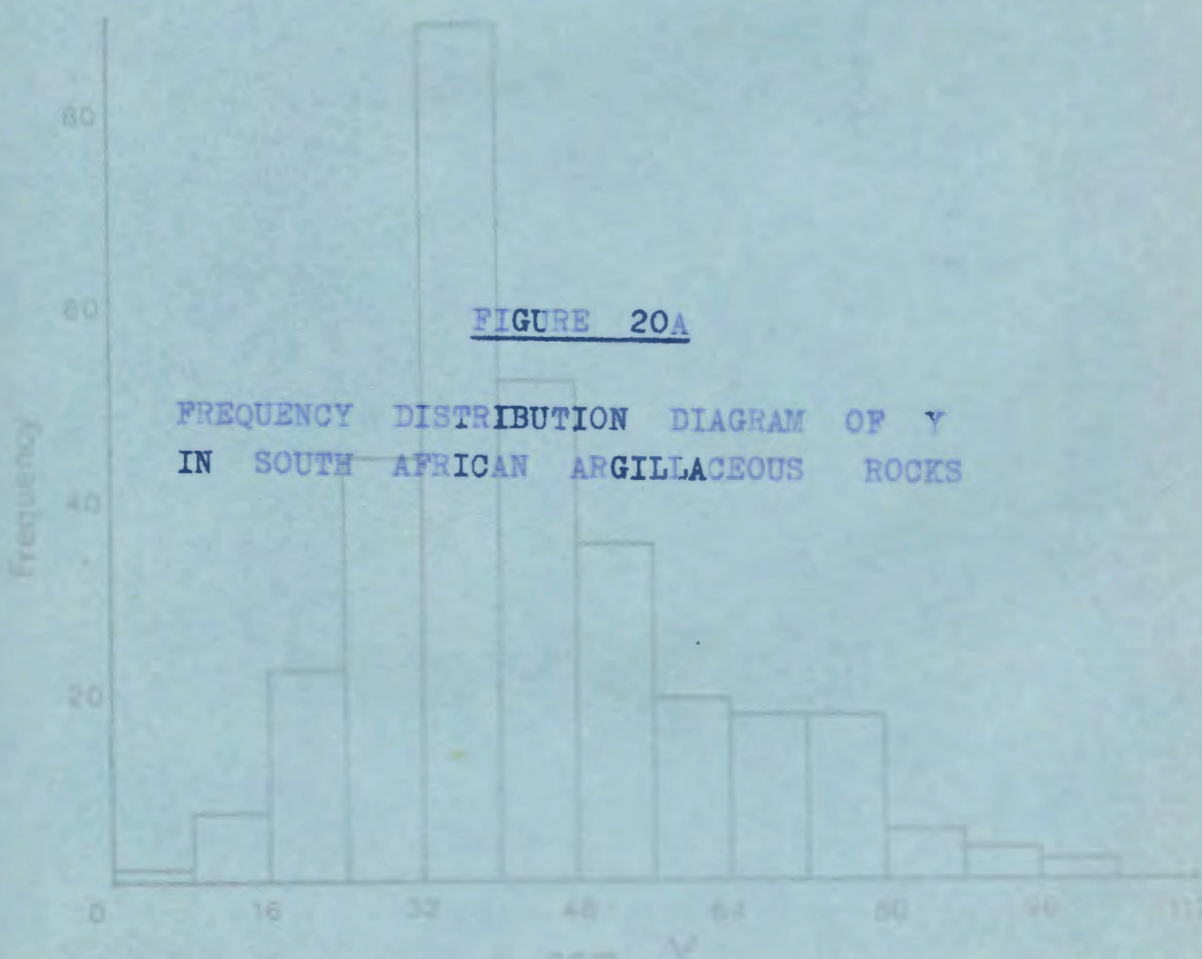
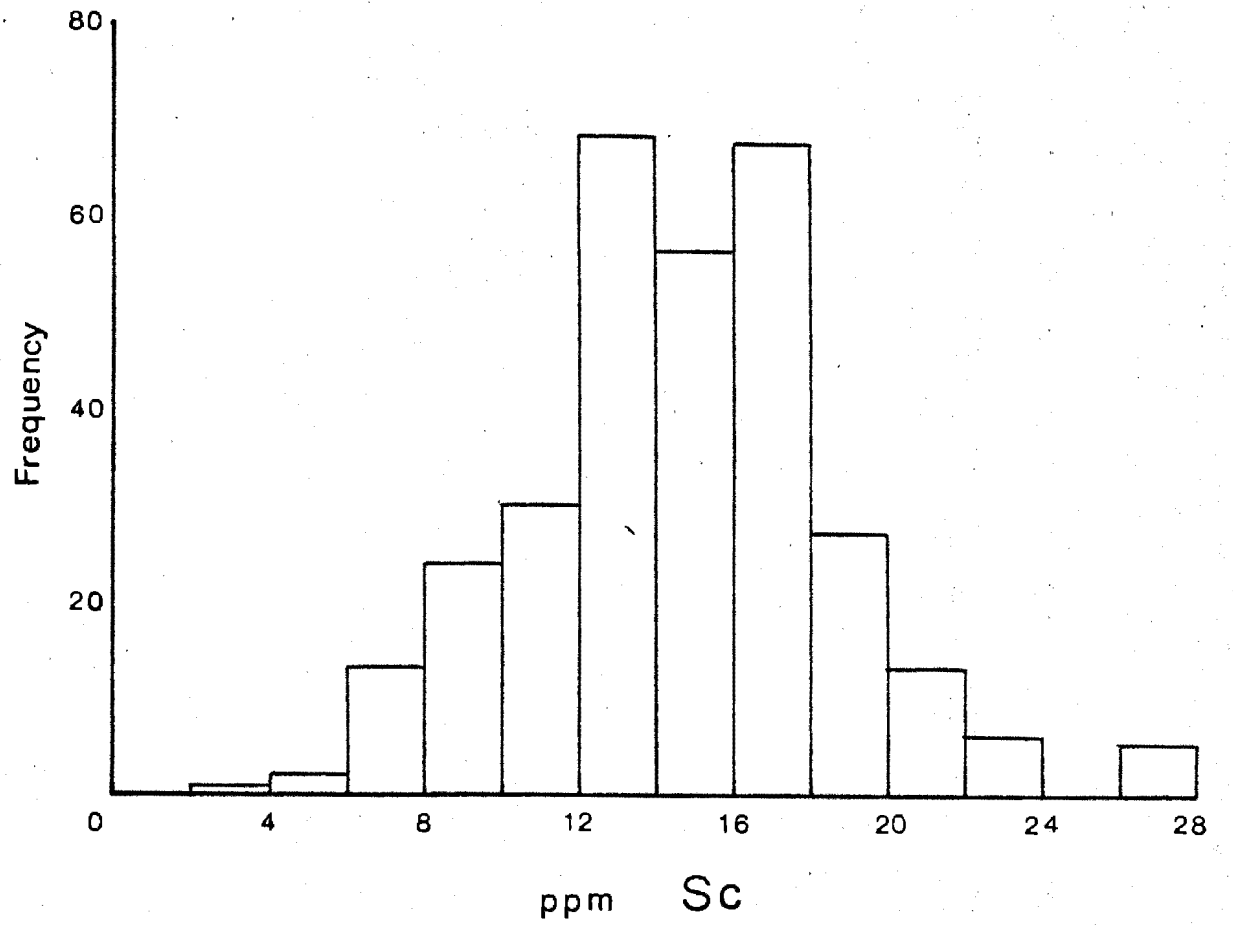


FIGURE 20A

FREQUENCY DISTRIBUTION DIAGRAM OF Y
IN SOUTH AFRICAN ARGILLACEOUS ROCKS




80
60
40
20
Frequency
0
4
8
12
16
20
24
28
ppm Sc

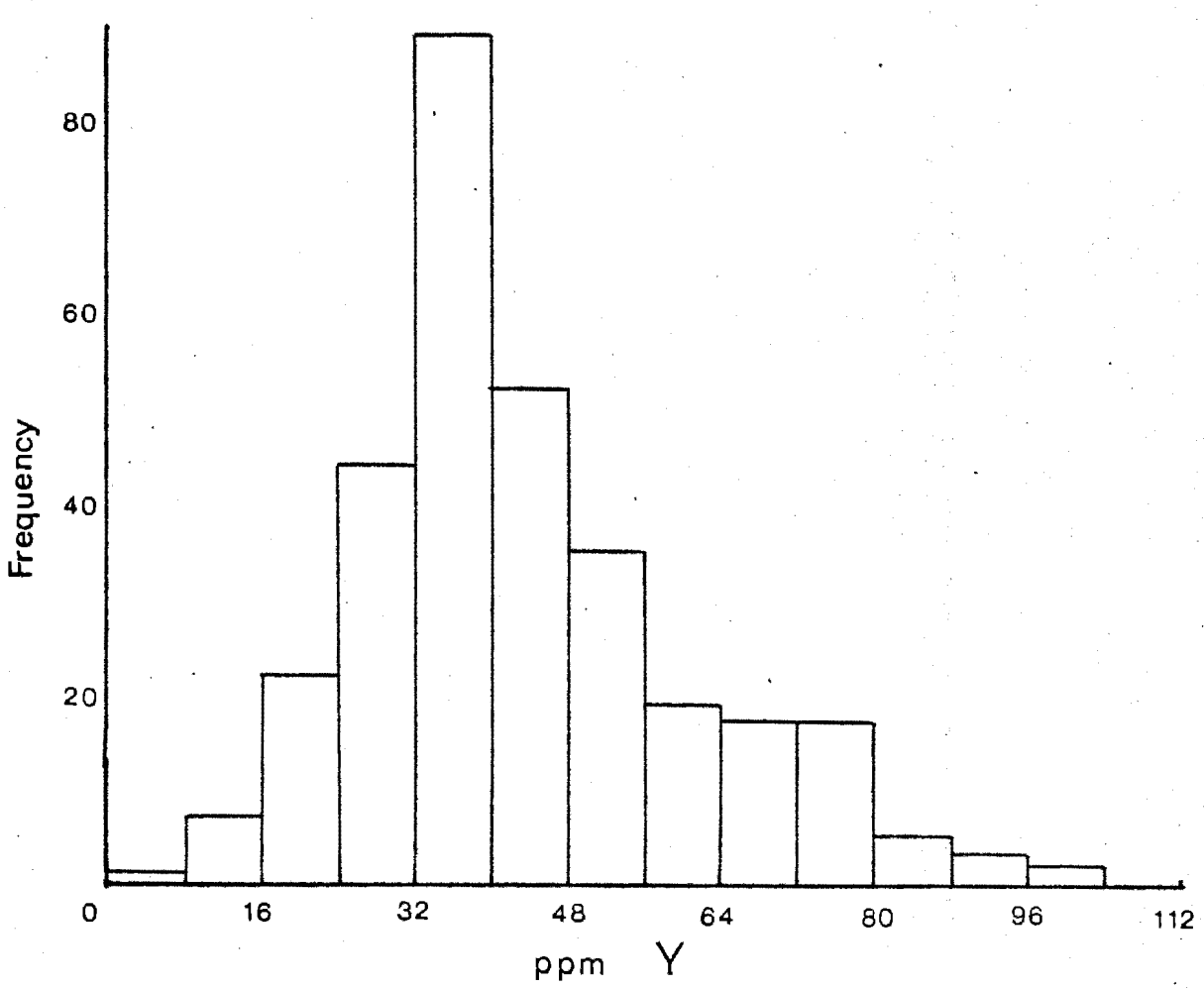

80
60
40
20
Frequency
0
16
32
48
64
80
96
112
ppm Y

FIGURE 21A

FREQUENCY DISTRIBUTION DIAGRAM OF YB
IN SOUTH AFRICAN ARGILLACEOUS ROCKS

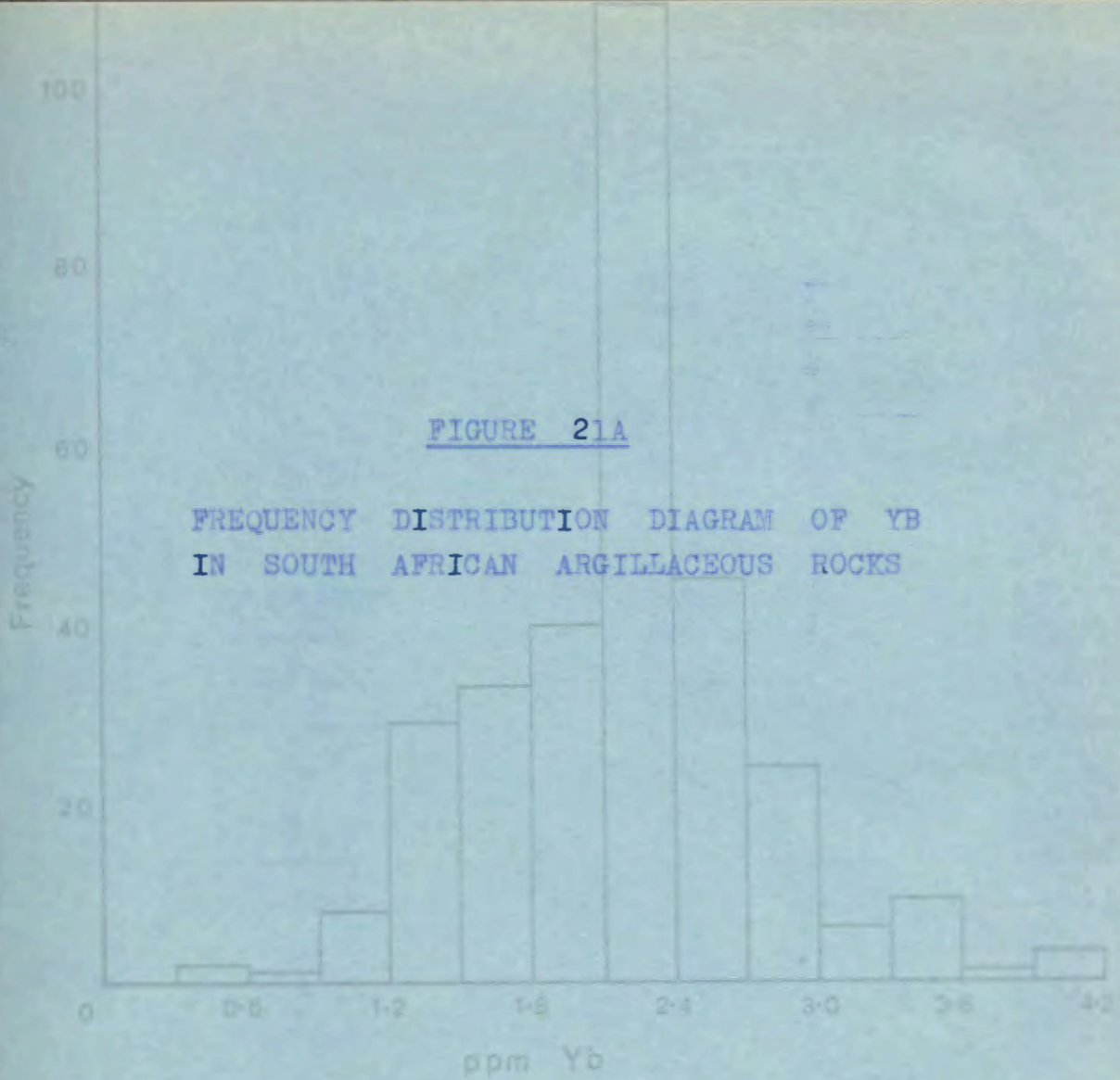
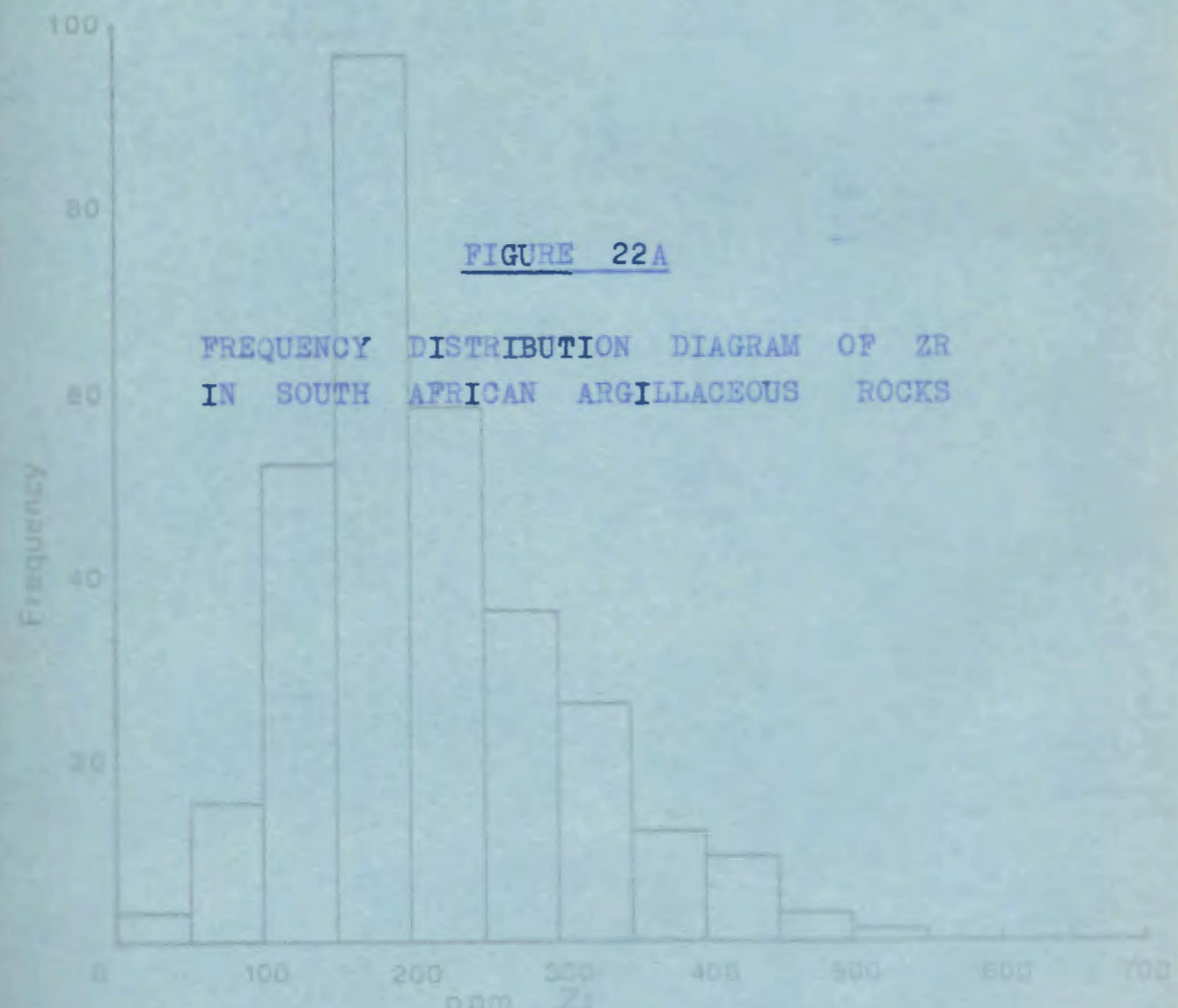
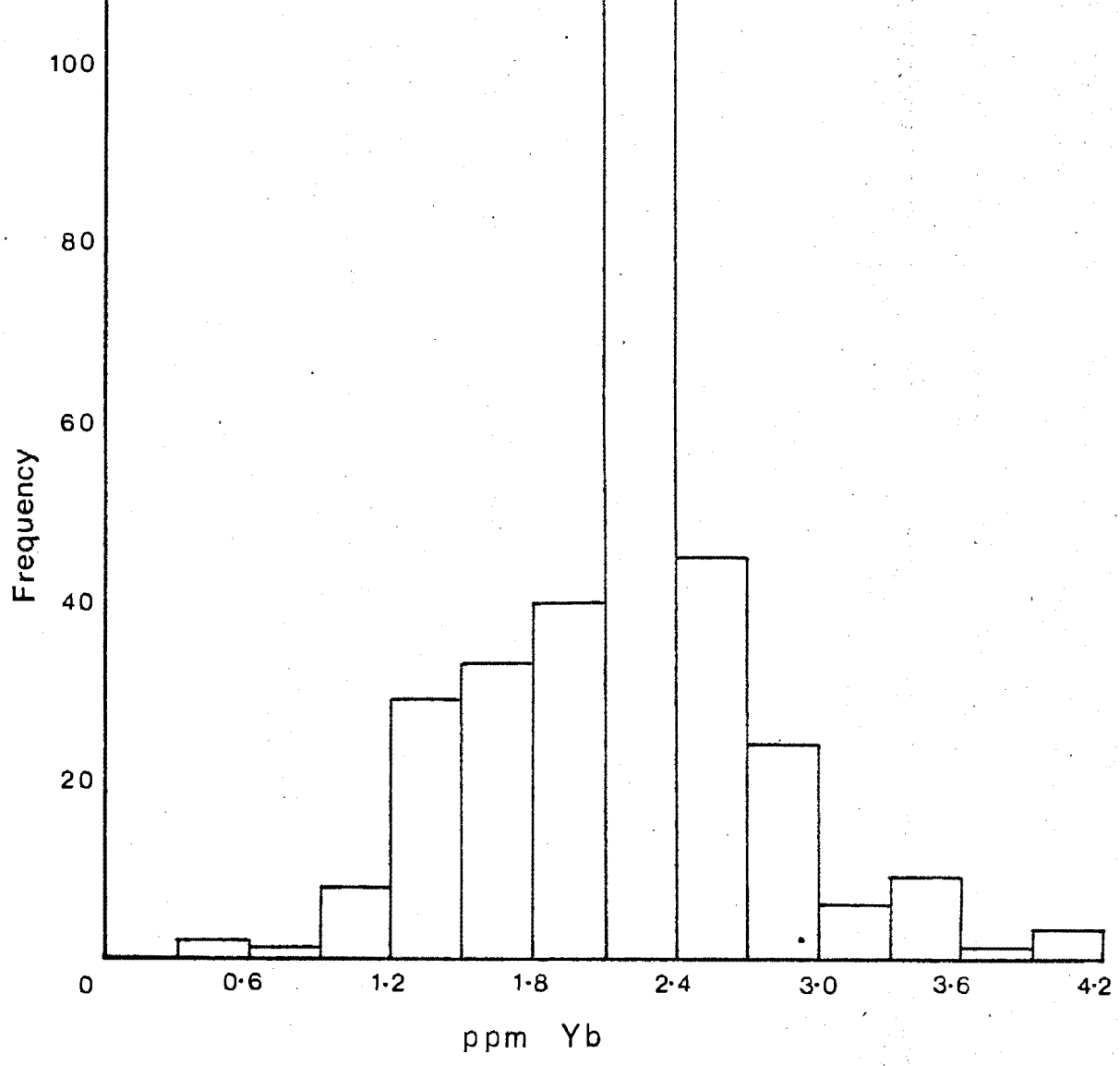


FIGURE 22A

FREQUENCY DISTRIBUTION DIAGRAM OF ZR
IN SOUTH AFRICAN ARGILLACEOUS ROCKS




100
80
60
40
20
0
Frequency
0·6
1·2
1·8
2·4
3·0
3·6
4·2
ppm Yb

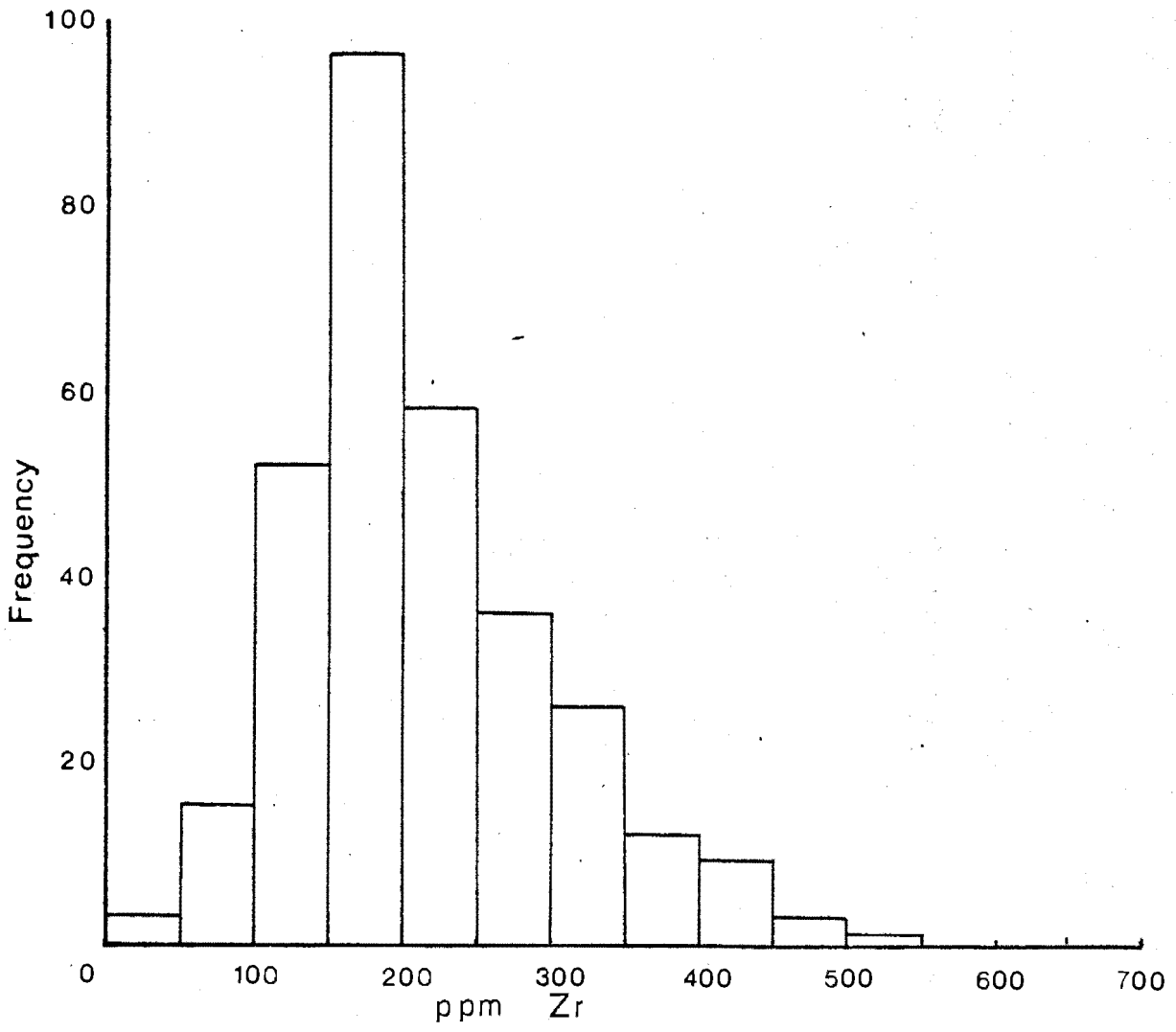
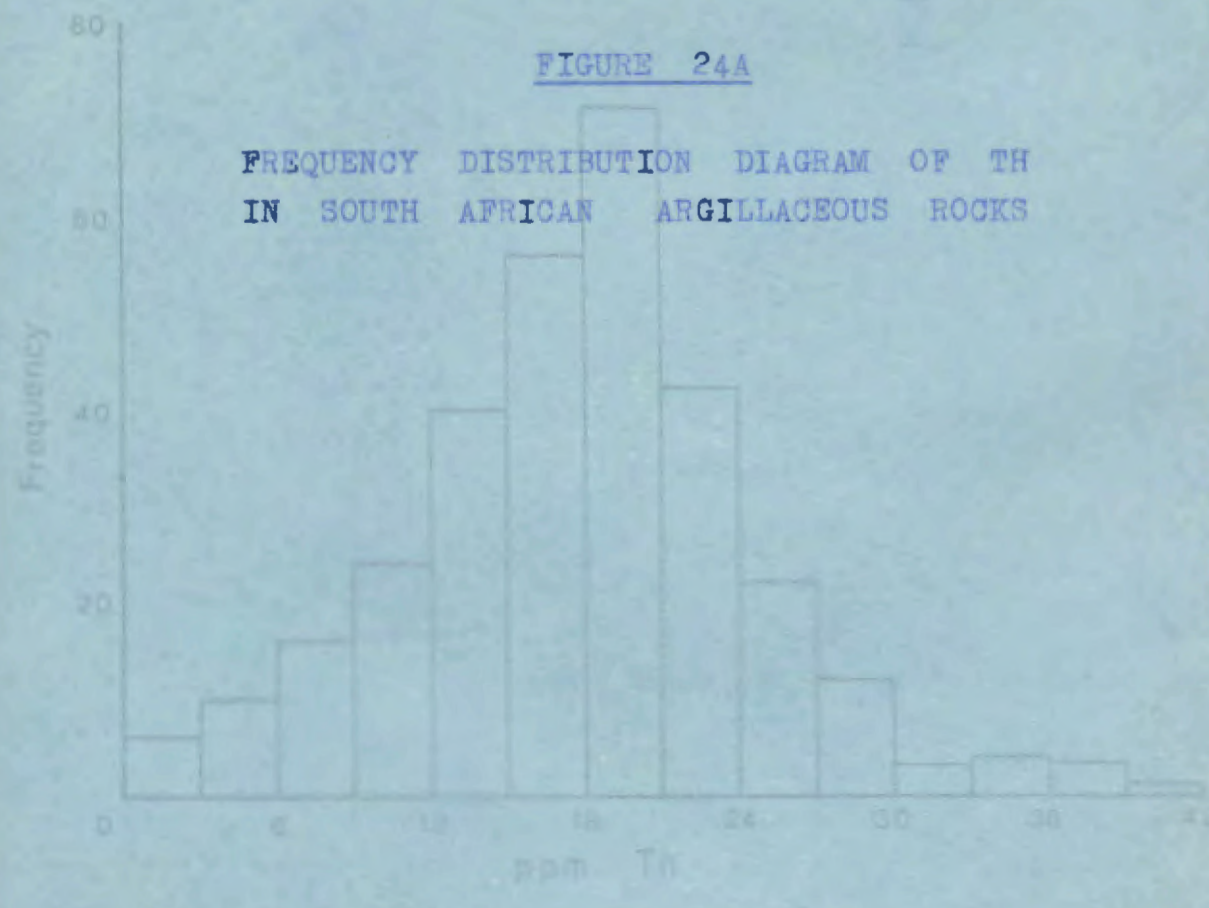

100
80
60
40
20
0
Frequency
100
200
300
400
500
600
700
ppm Zr

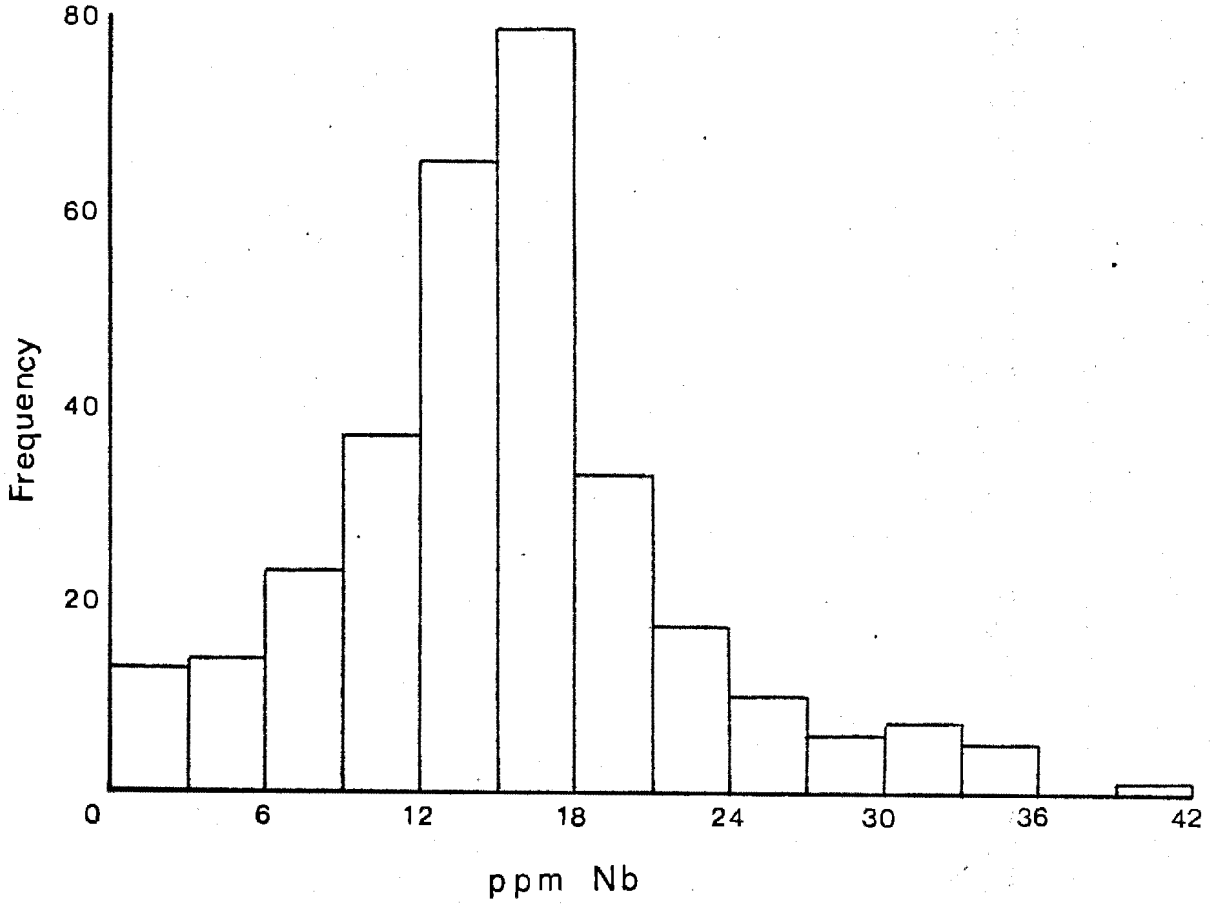
FIGURE 23A

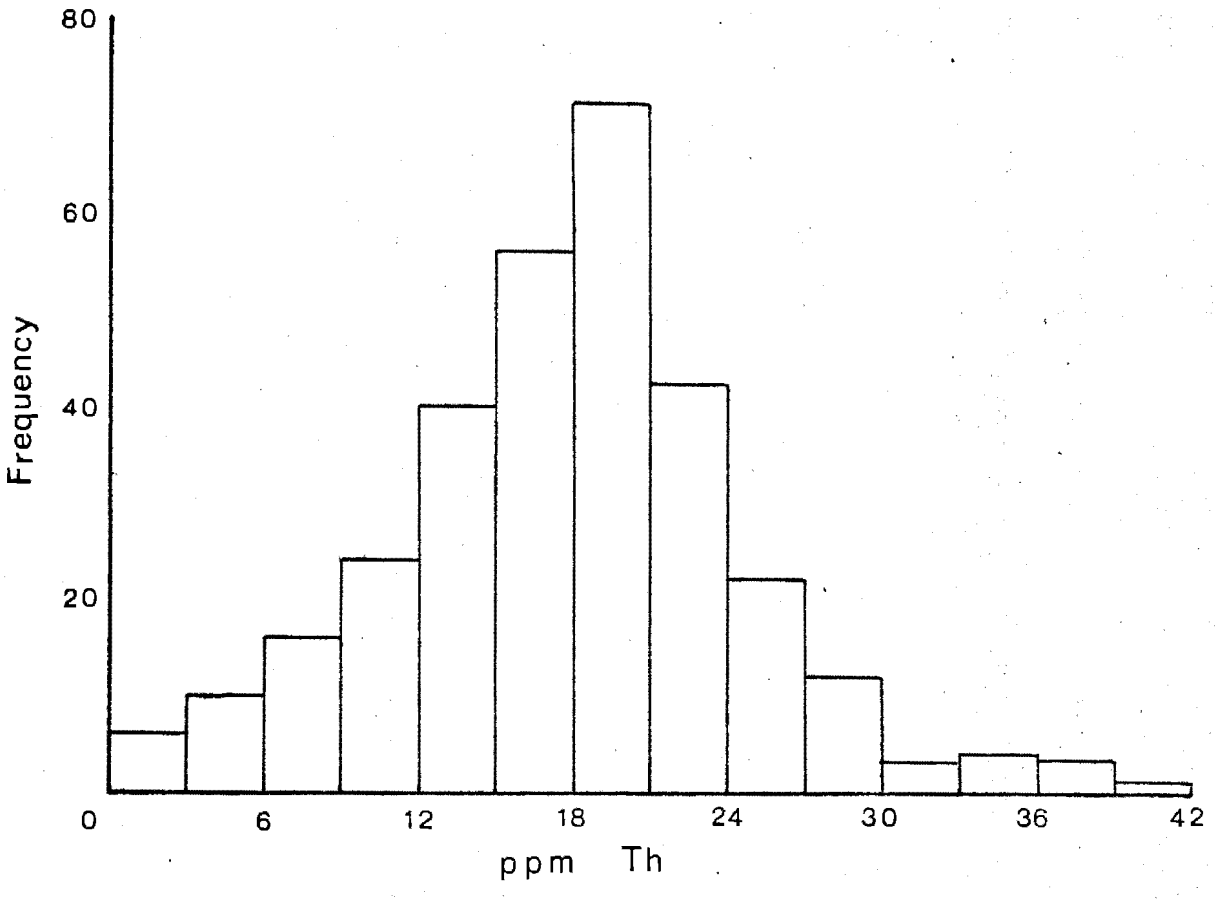
FREQUENCY DISTRIBUTION DIAGRAM OF NB
IN SOUTH AFRICAN ARGILLACEOUS ROCKS

FIGURE 24A

FREQUENCY DISTRIBUTION DIAGRAM OF TH
IN SOUTH AFRICAN ARGILLACEOUS ROCKS




80
60
40
20
0
Frequency
6
12
18
24
30
36
42
ppm Nb


80
60
40
20
0
Frequency
6
12
18
24
30
36
42
ppm Th

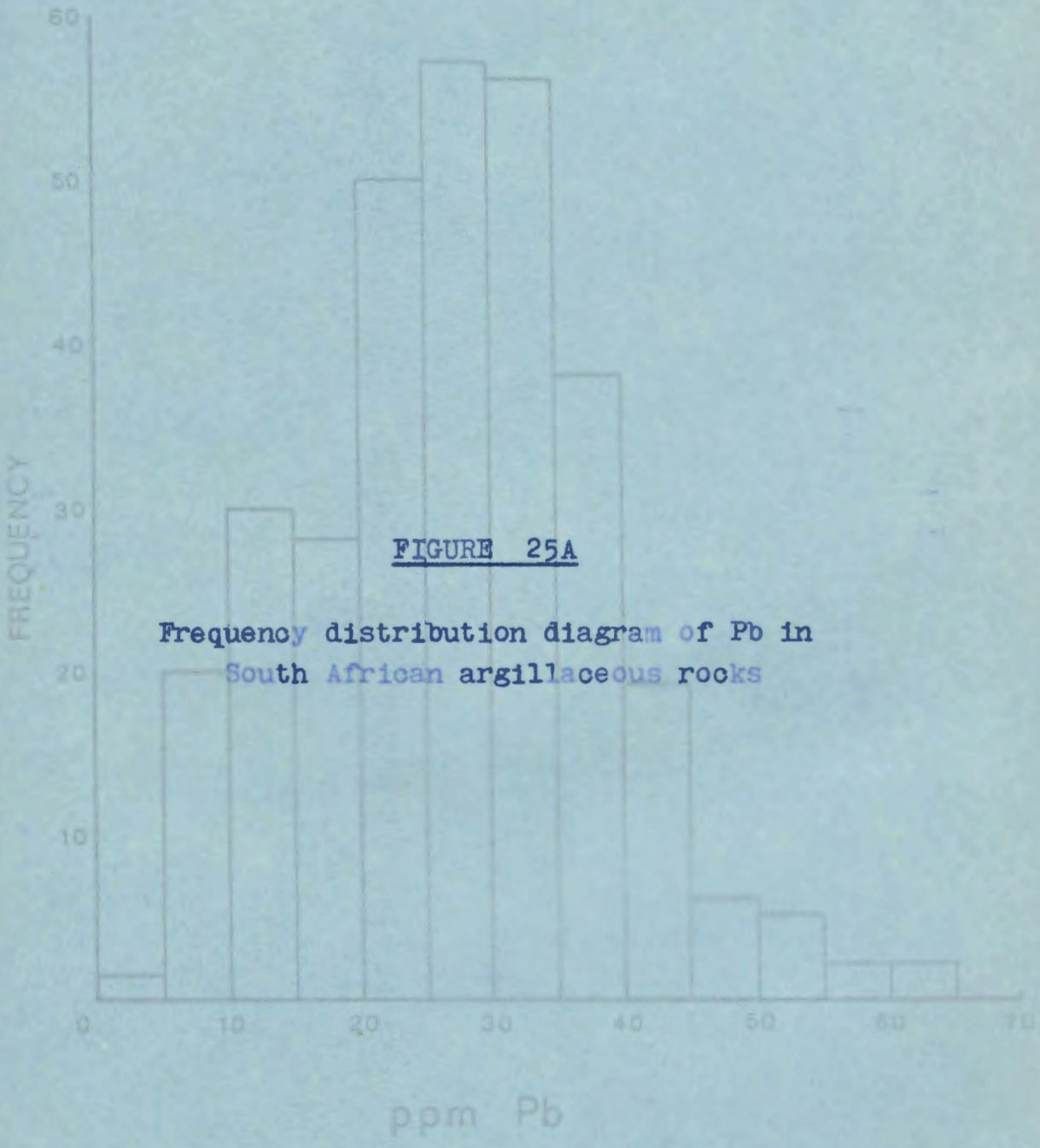


FIGURE 25A

Frequency distribution diagram of Pb in South African argillaceous rocks

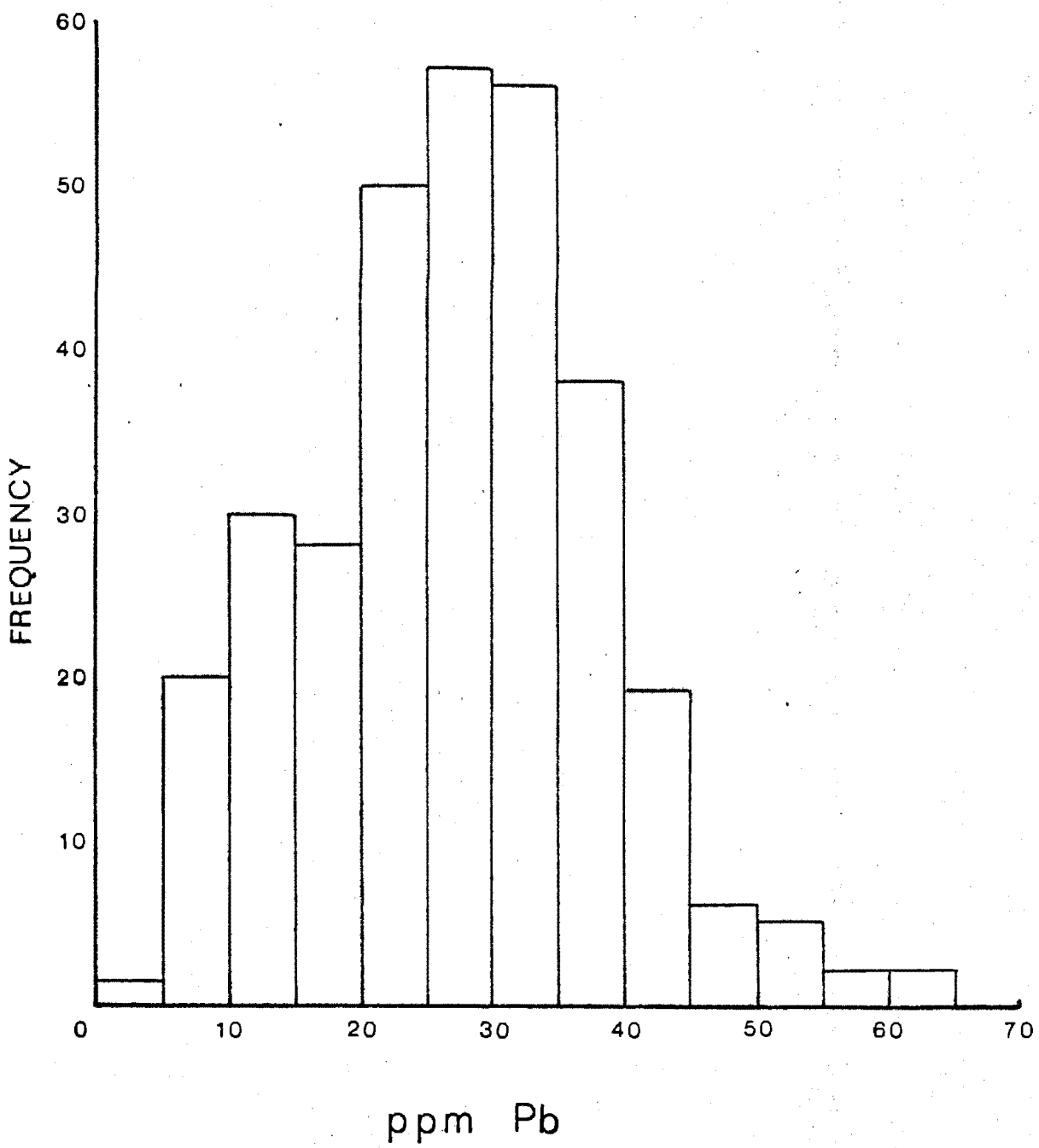
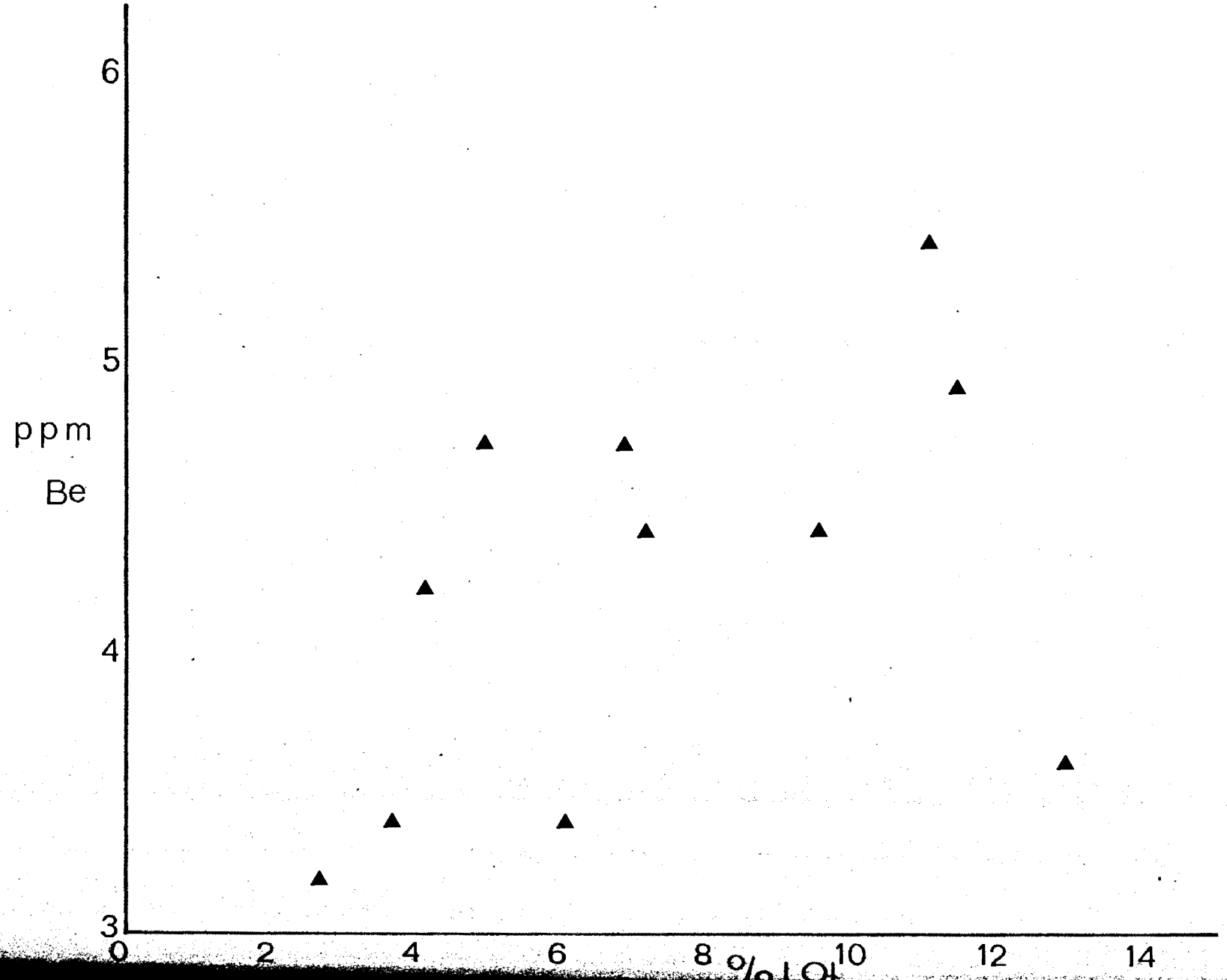

60
50
40
30
20
10
0
FREQUENCY
10
20
30
40
50
60
70
ppm Pb

FIGURE 26A

The relationship of Be with LOI (loss on ignition) in shales from Borehole GB 47/64, Northern Ecca Facies, Karroo System


6
5
ppm
Be
4
3
0
2
4
6
8
10
12
14
% LOI

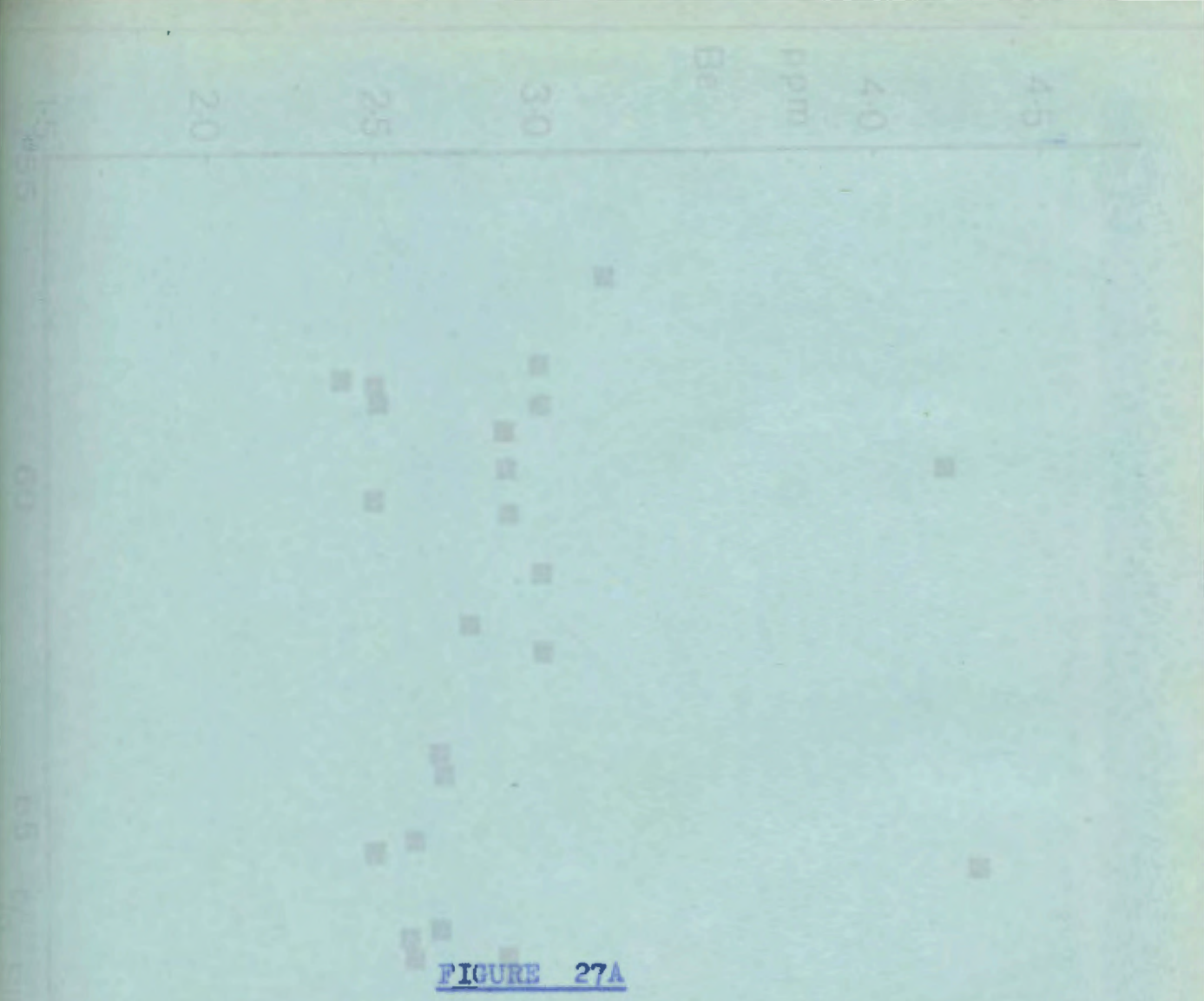
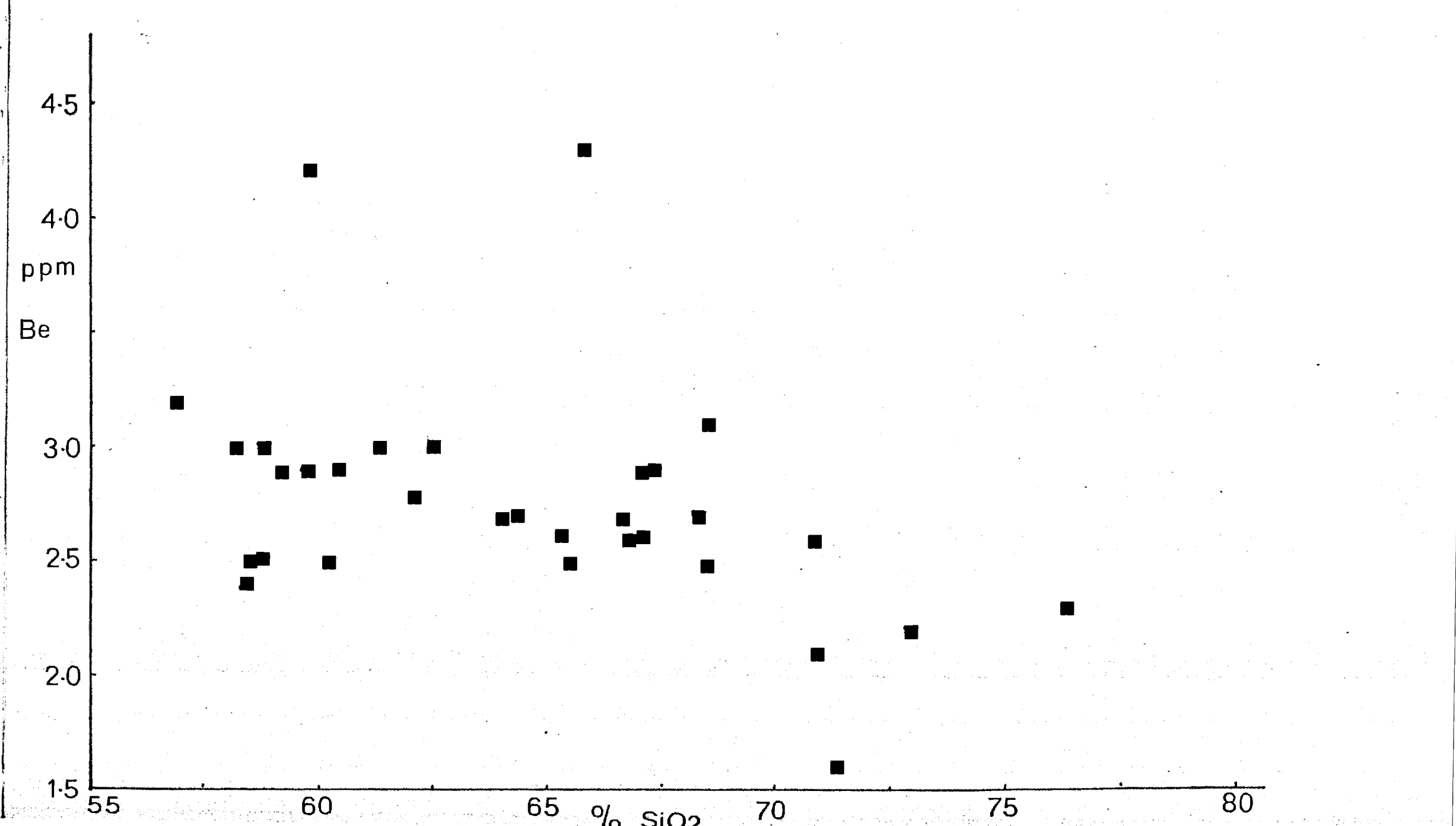


FIGURE 27A

The relationship of Be with SiO_2 in shales from the Bokkeveld Series, Cape System


4·5
4·0
ppm
Be
3·0
2·5
2·0
1·5
55
60
65
% SiO2
70
75
80

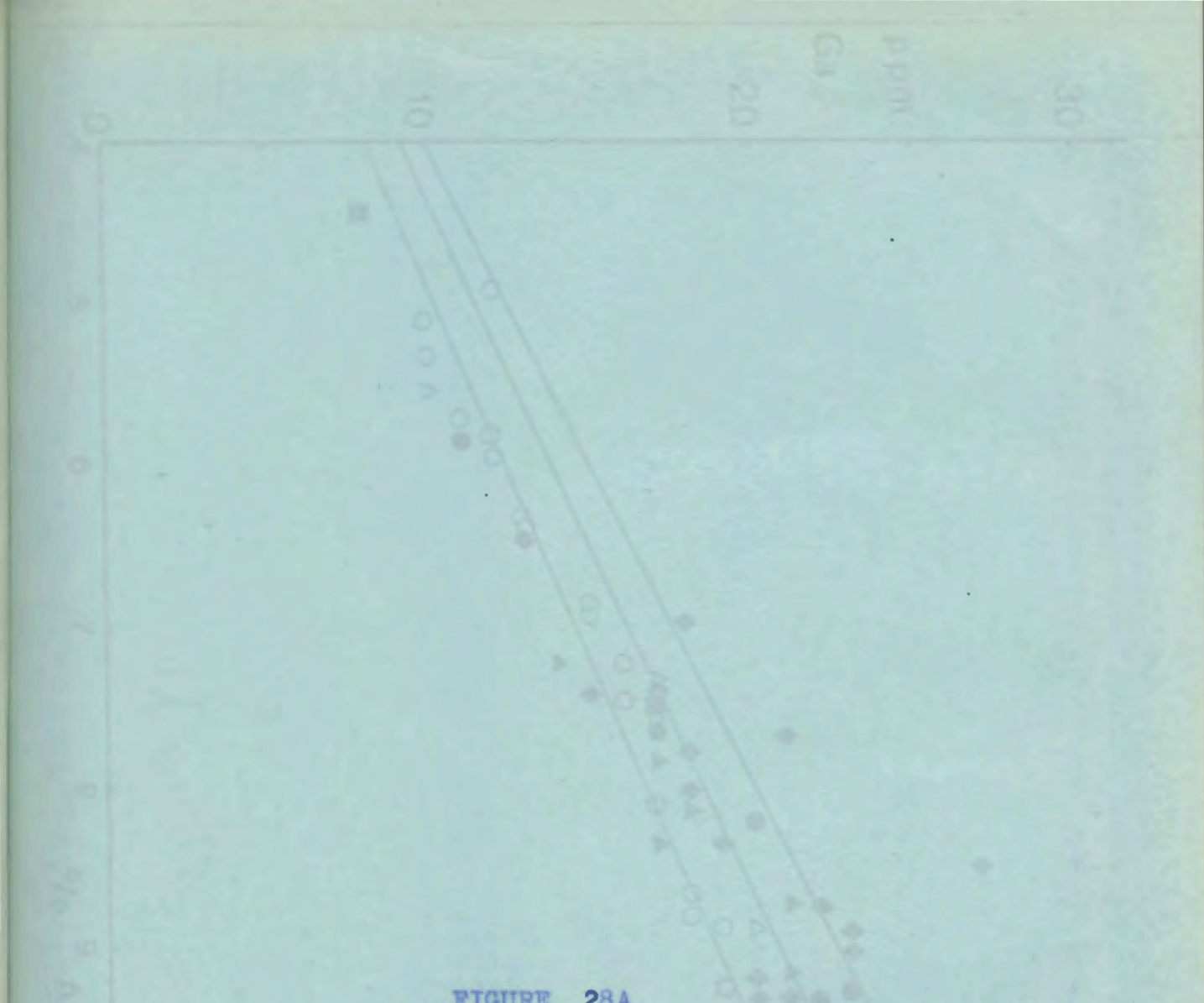
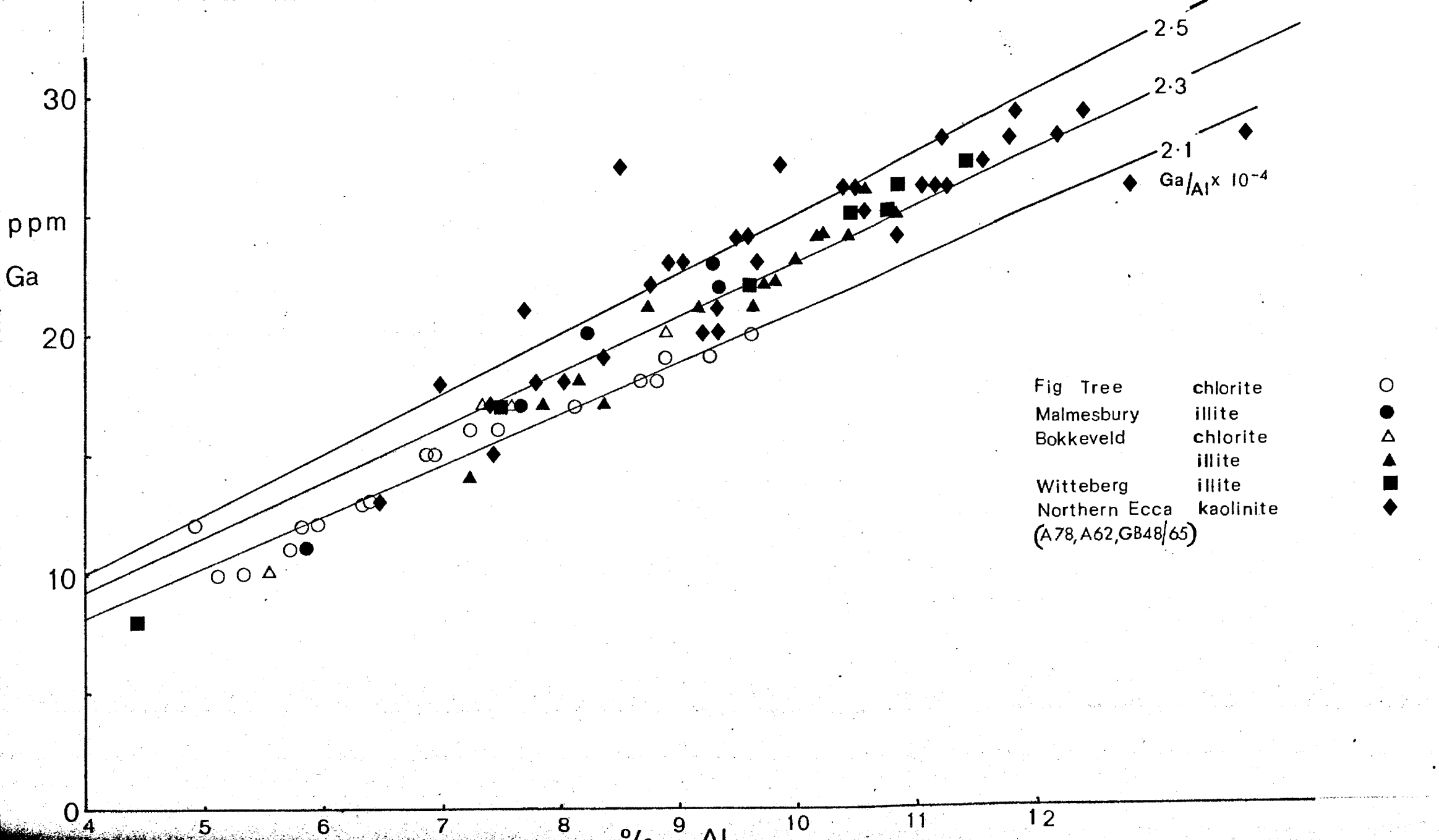


FIGURE 28A

The Ga - Al relationship in Fig Tree, Malmesbury, Bokkeveld, Witteberg and Northern Ecca Facies shales


2·5
2·3
2·1
Ga/Al x 10⁻⁴
ppm
Ga
30
20
10
0
4
5
6
7
8
9
10
11
12
% Al
Fig Tree chlorite
Malmesbury illite
Bokkeveld chlorite
illite
Witteberg illite
Northern Ecca kaolinite
(A78, A62, GB48/65)

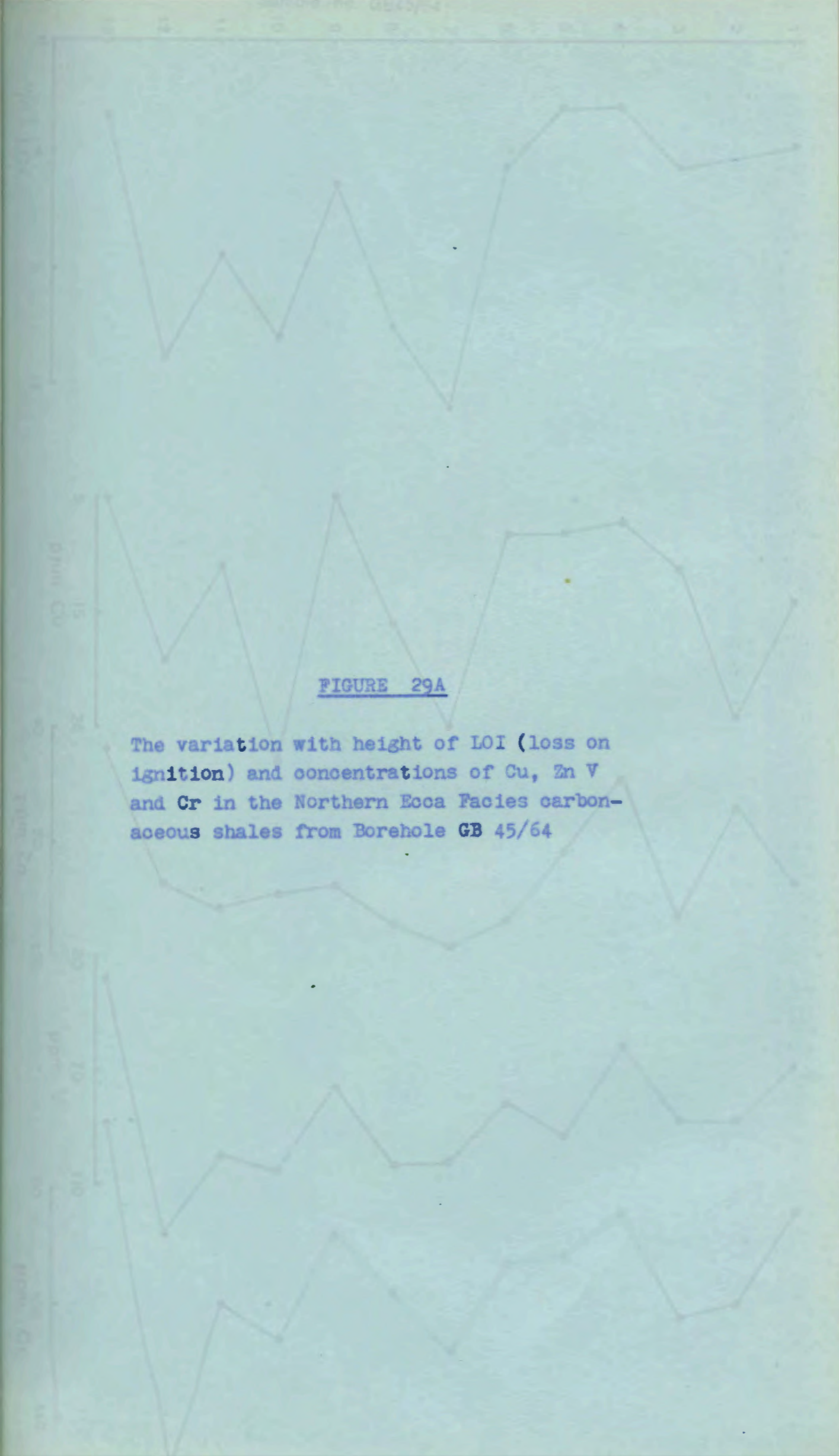


FIGURE 29A

The variation with height of LOI (loss on ignition) and concentrations of Cu, Zn V and Cr in the Northern Ecca Facies carbonaceous shales from Borehole GB 45/64

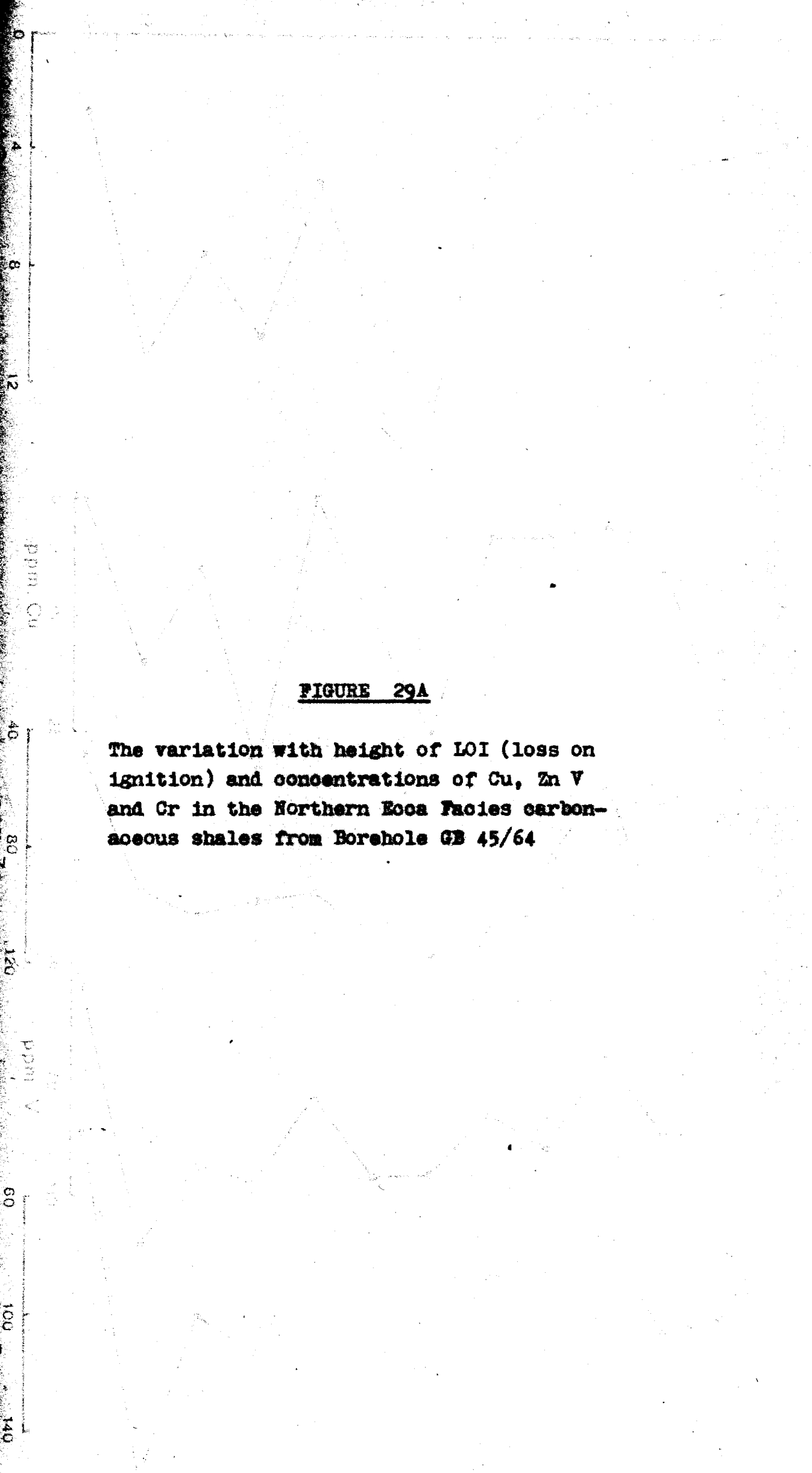


FIGURE 29A

The variation with height of LOI (loss on ignition) and concentrations of Cu, Zn V and Cr in the Northern Eocs Facies carbonaceous shales from Borehole GB 45/64

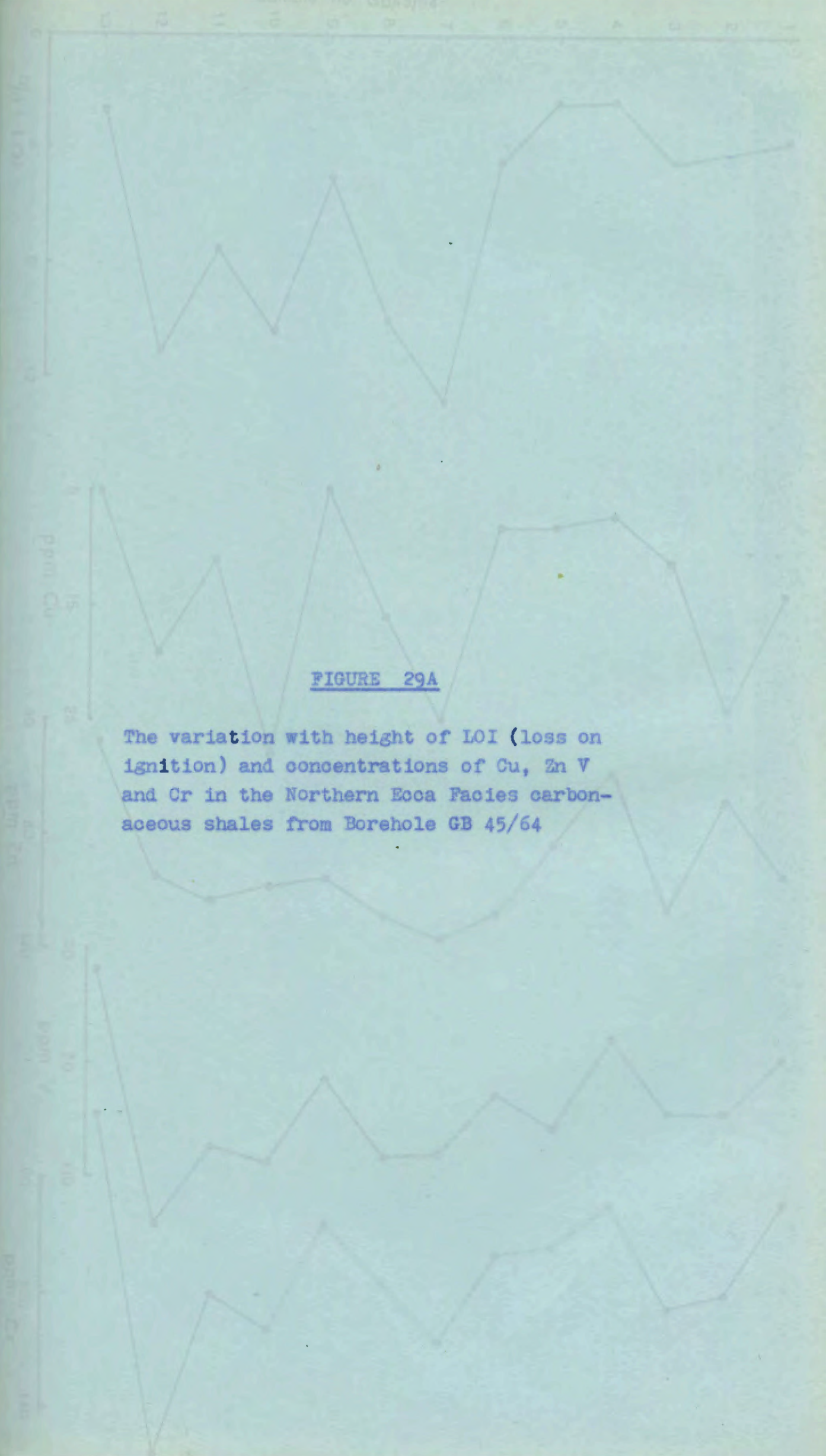
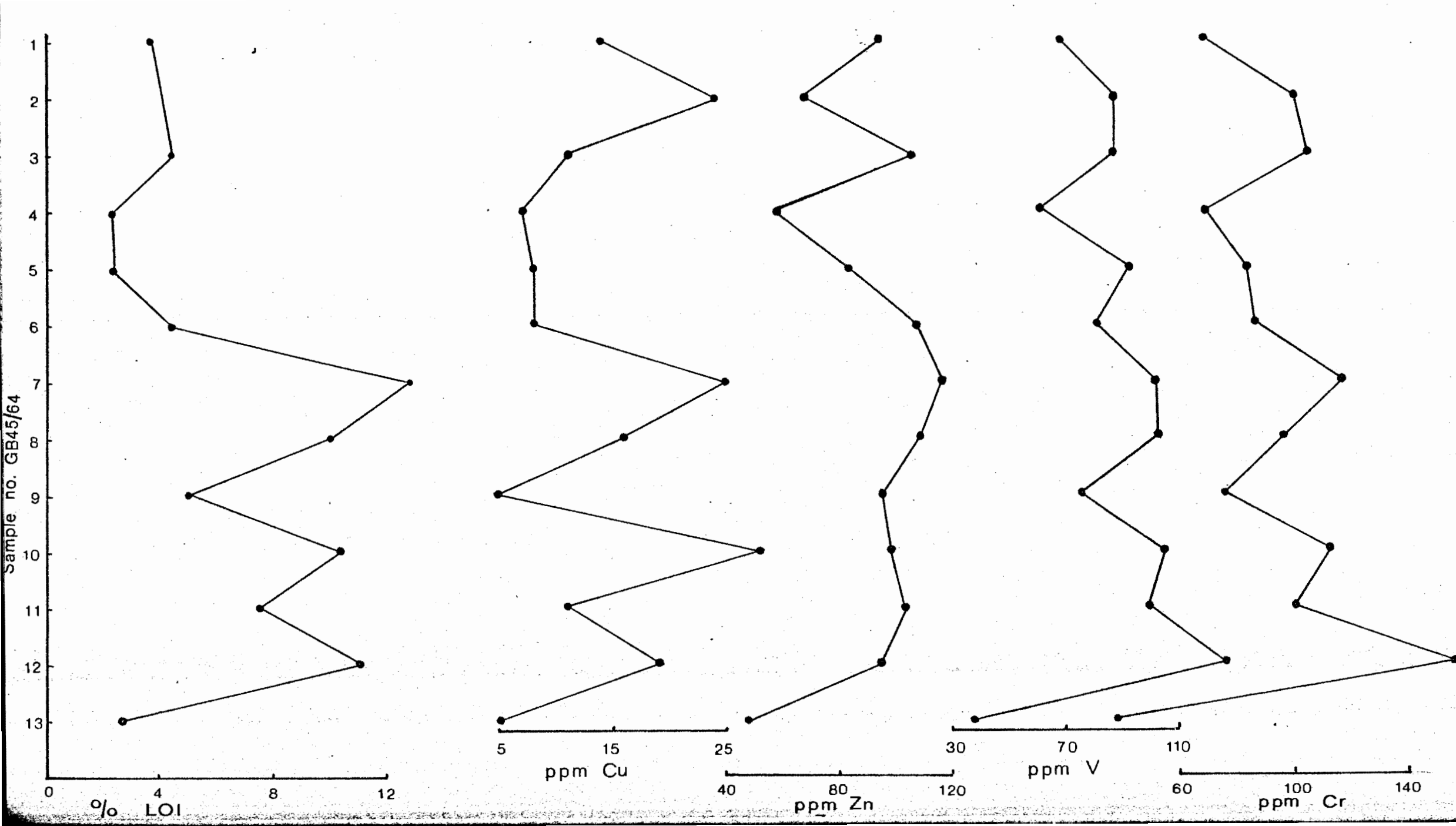


FIGURE 29A

The variation with height of LOI (loss on ignition) and concentrations of Cu, Zn V and Cr in the Northern Ecca Facies carbonaceous shales from Borehole GB 45/64


Sample no. GB45/64
1
2
3
4
5
6
7
8
9
10
11
12
13
0
4
8
12
% LOI
5
15
25
ppm Cu
40
80
120
ppm Zn
30
70
110
ppm V
60
100
140
ppm Cr

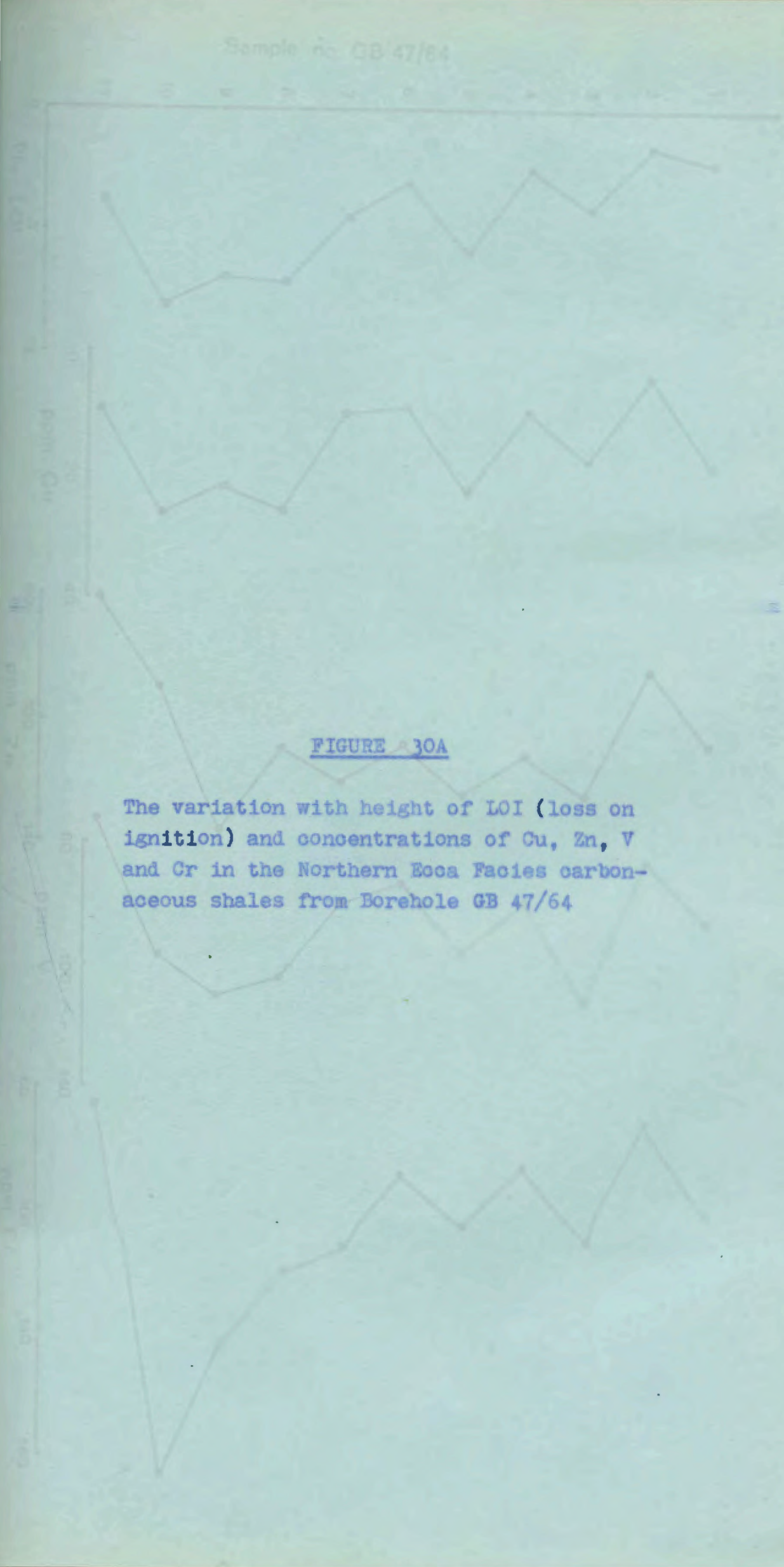


FIGURE 30A

The variation with height of LOI (loss on ignition) and concentrations of Cu, Zn, V and Cr in the Northern Ecca Facies carbonaceous shales from Borehole GB 47/64

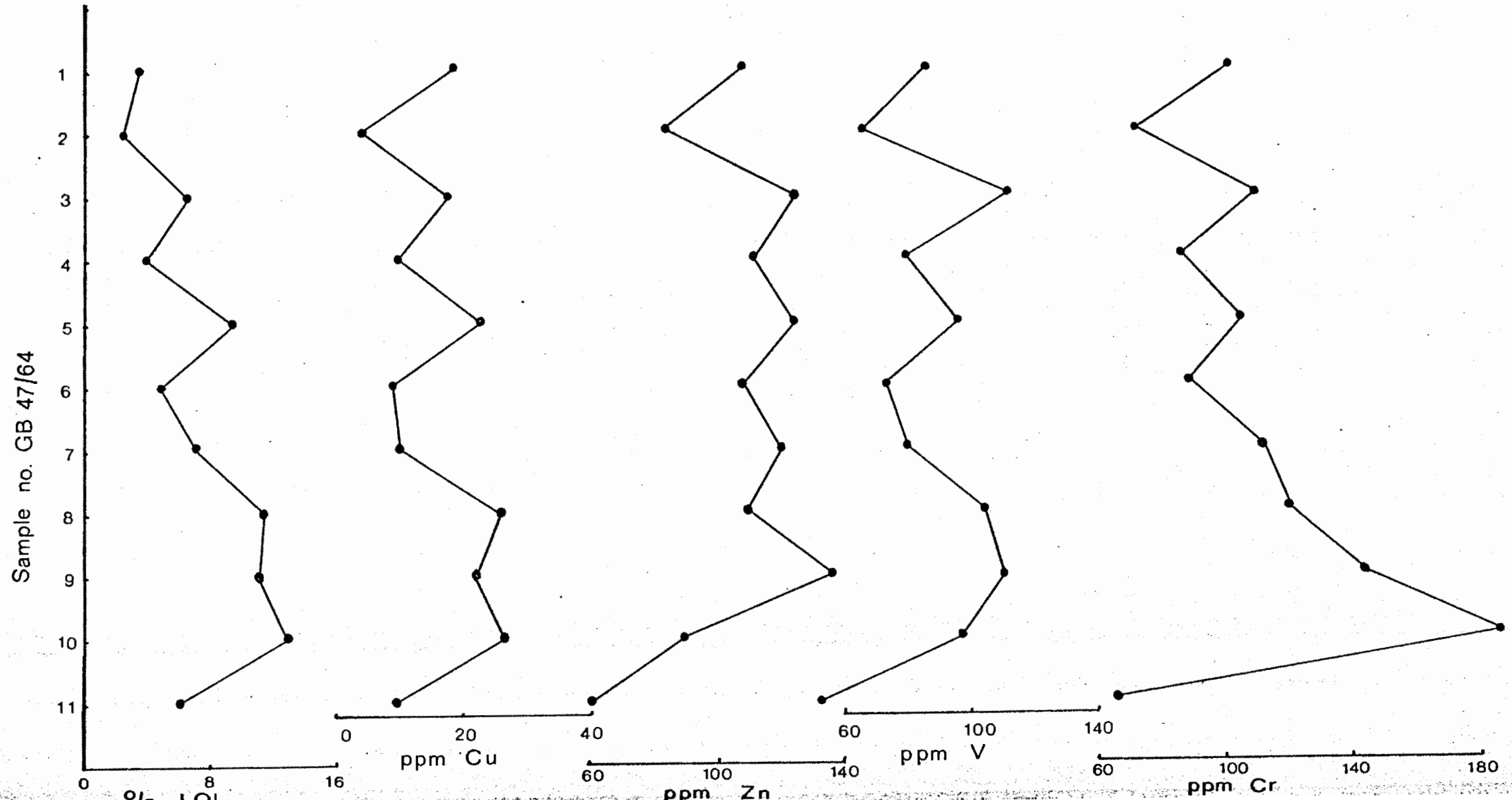

Sample no. GB 47/64
1
2
3
4
5
6
7
8
9
10
11
0
8
16
% LOI
0
20
40
ppm Cu
60
100
140
ppm Zn
60
100
140
ppm V
60
100
140
180
ppm Cr

FIGURE 31A

The relationship of the Ni/Co ratio with Eh in the interstitial waters of eastern Pacific sediments. Data adapted from Brooks et al. (1968)

FIGURE 31A

The relationship of the Ni/Co ratio with Eh in the interstitial waters of eastern Pacific sediments. Data adapted from Brooks et al. (1968)

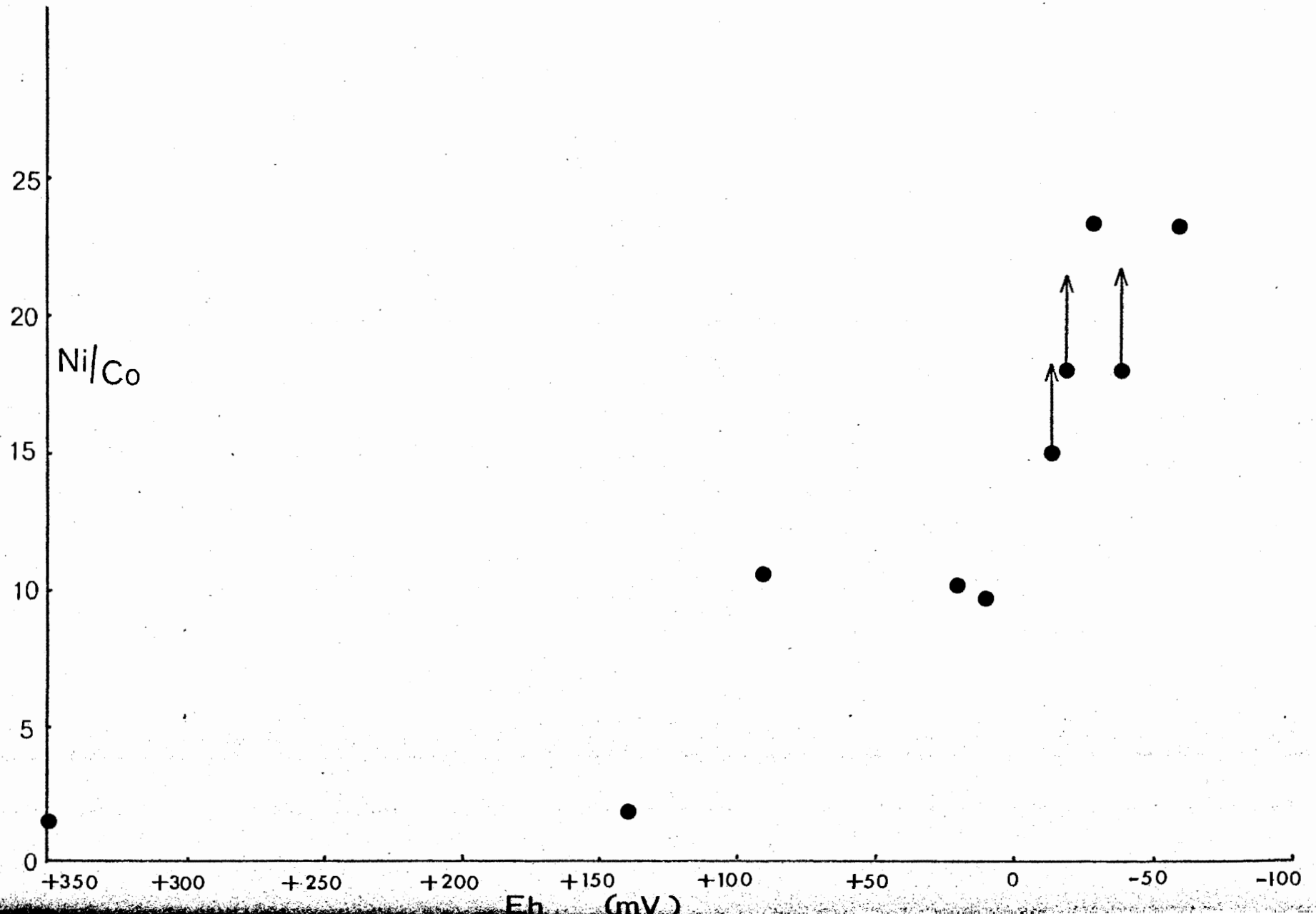
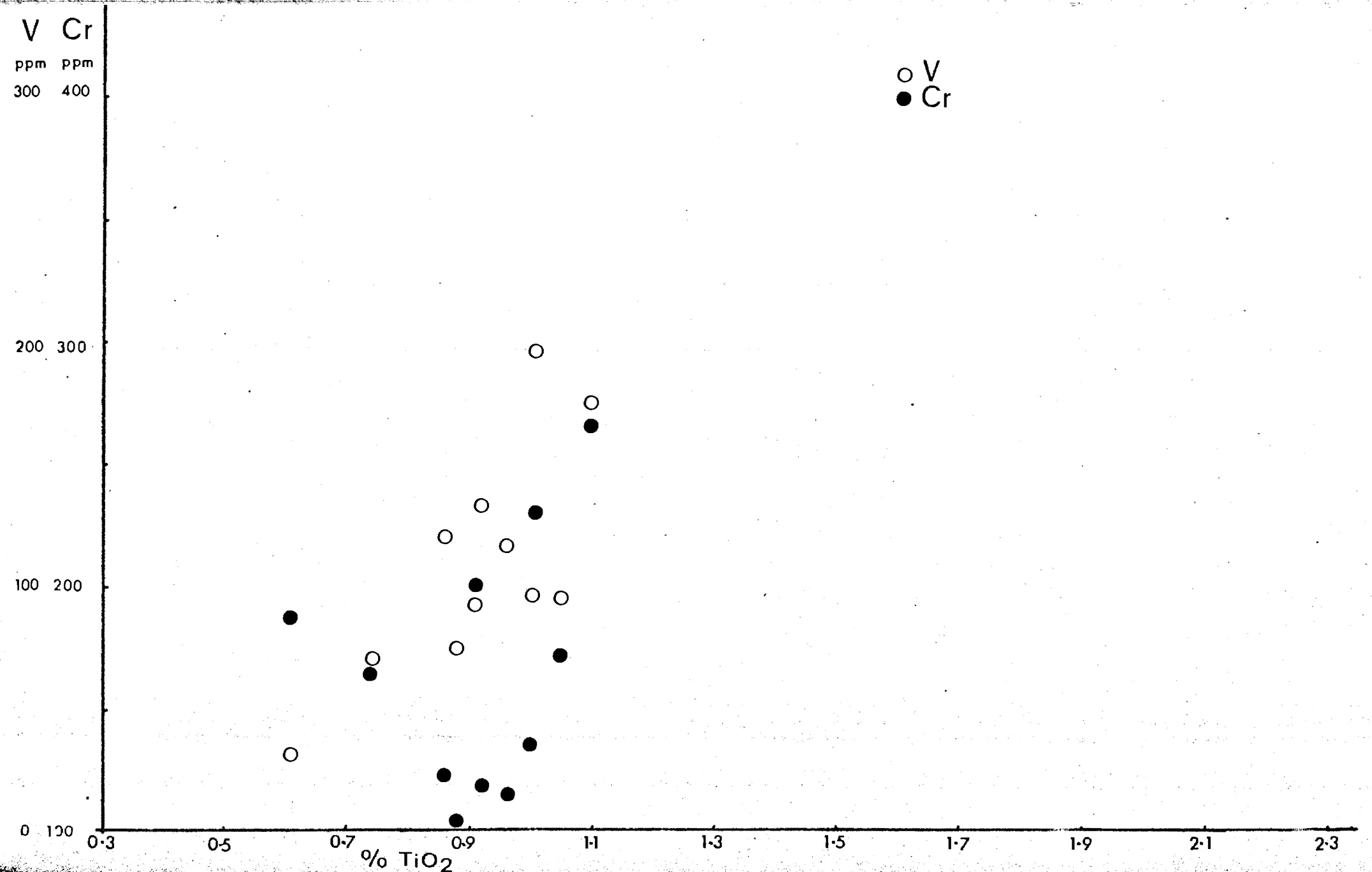

25
20
Ni/Co
15
10
5
0
+350
+300
+250
+200
+150
+100
+50
0
-50
-100
Eh (mV)

FIGURE 32A

The relationship of V and Cr with TiO_2 concentrations in the Northern Ecca Facies carbonaceous shales from Borehole A 78


V Cr
ppm ppm
300 400
200 300
100 200
0 100
V
Cr
0·3
0·5
0·7
0·9
1·1
1·3
1·5
1·7
1·9
2·1
2·3
% TiO2

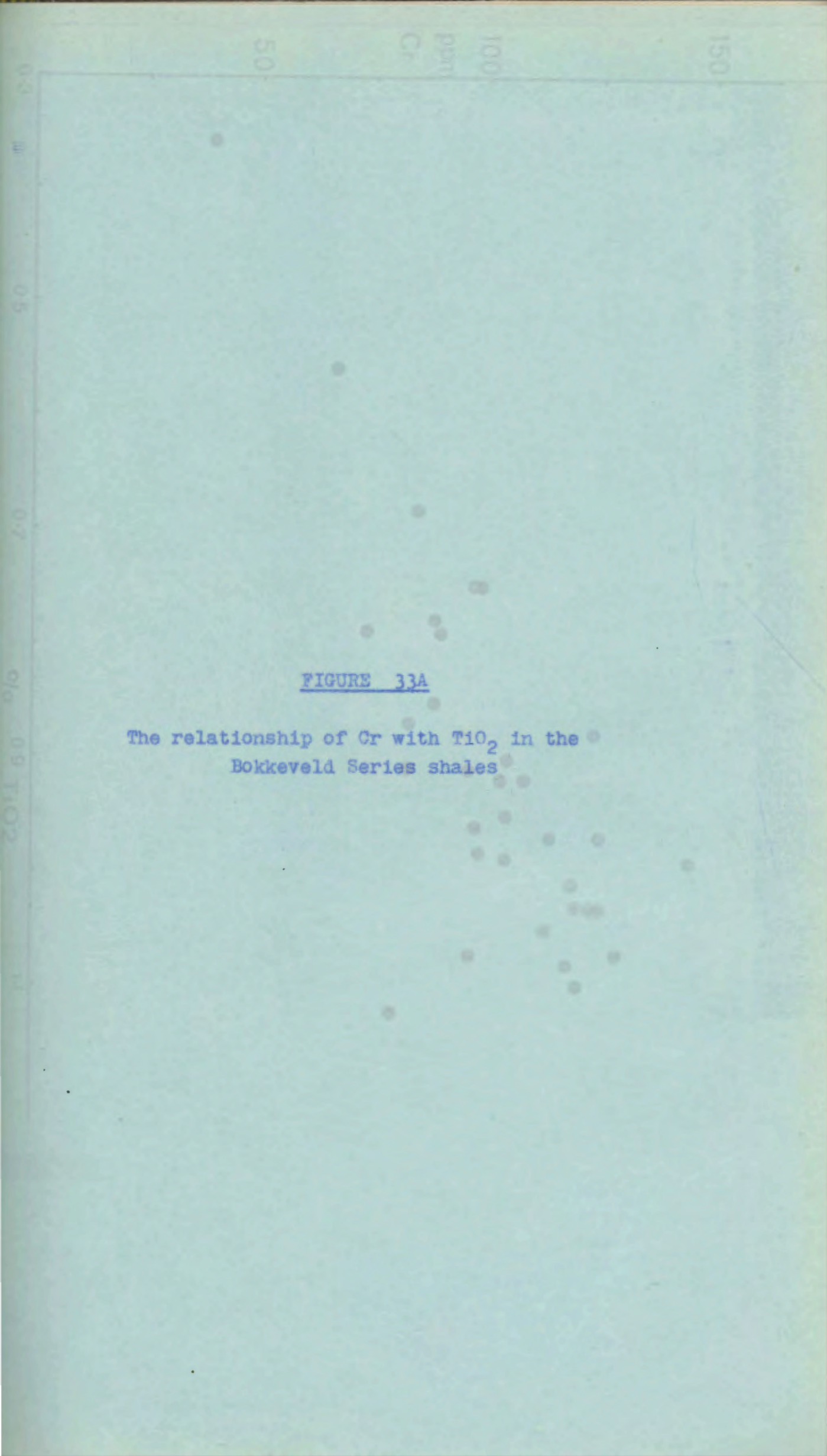
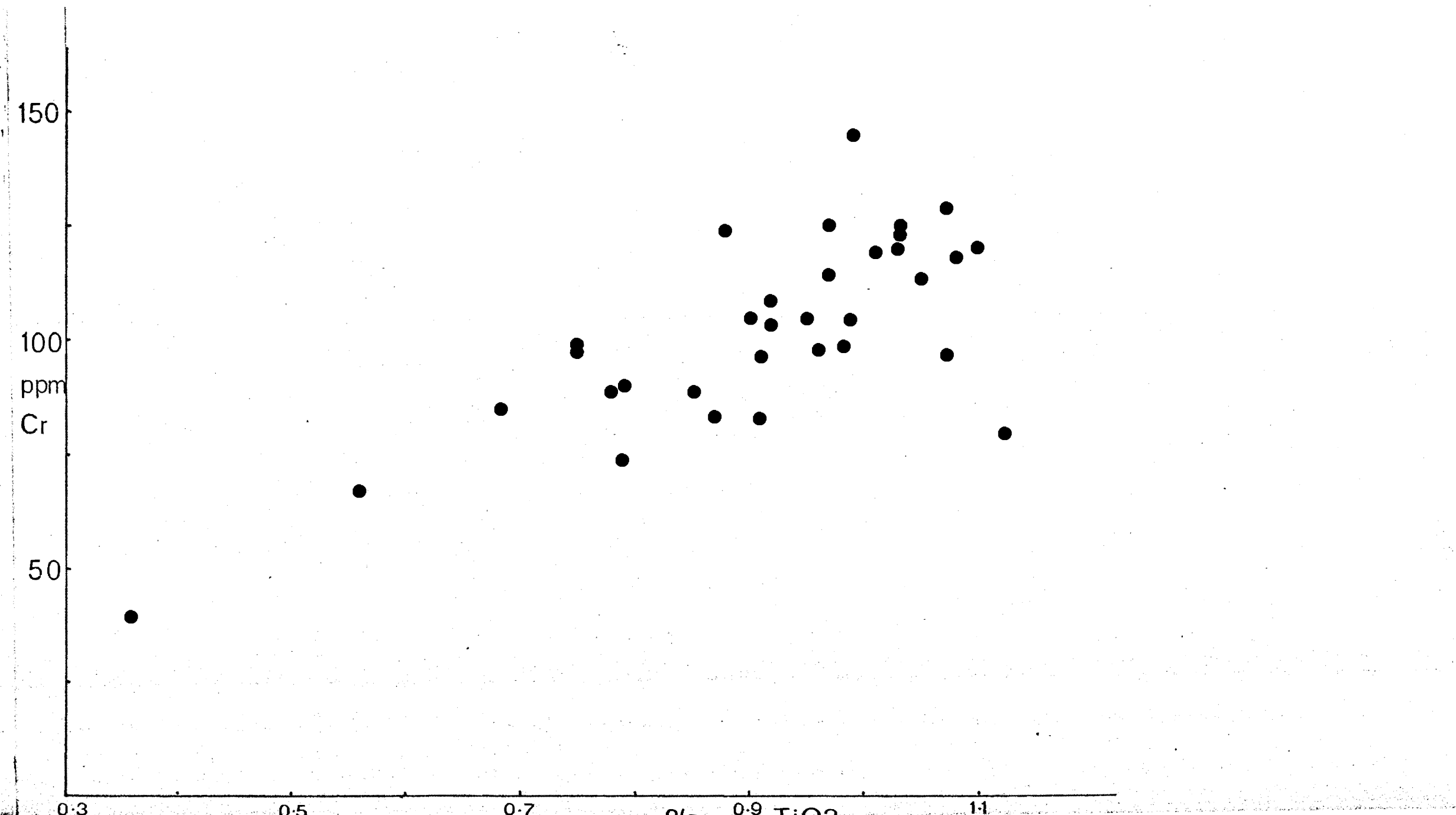


FIGURE 33A

The relationship of Cr with TiO_2 in the Bokkeveld Series shales


150
100
ppm
Cr
50
0·3
0·5
0·7
0·9
1·1

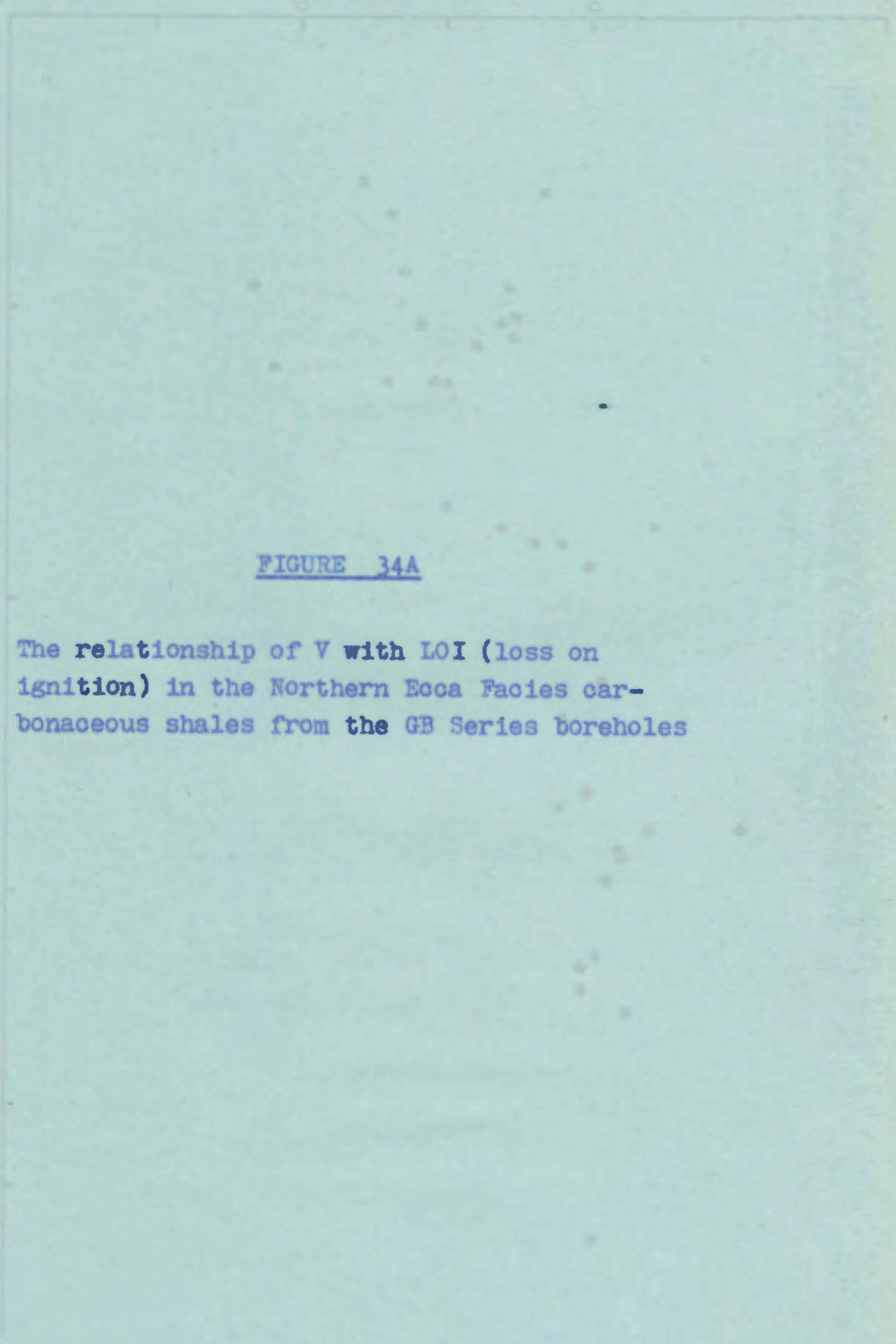
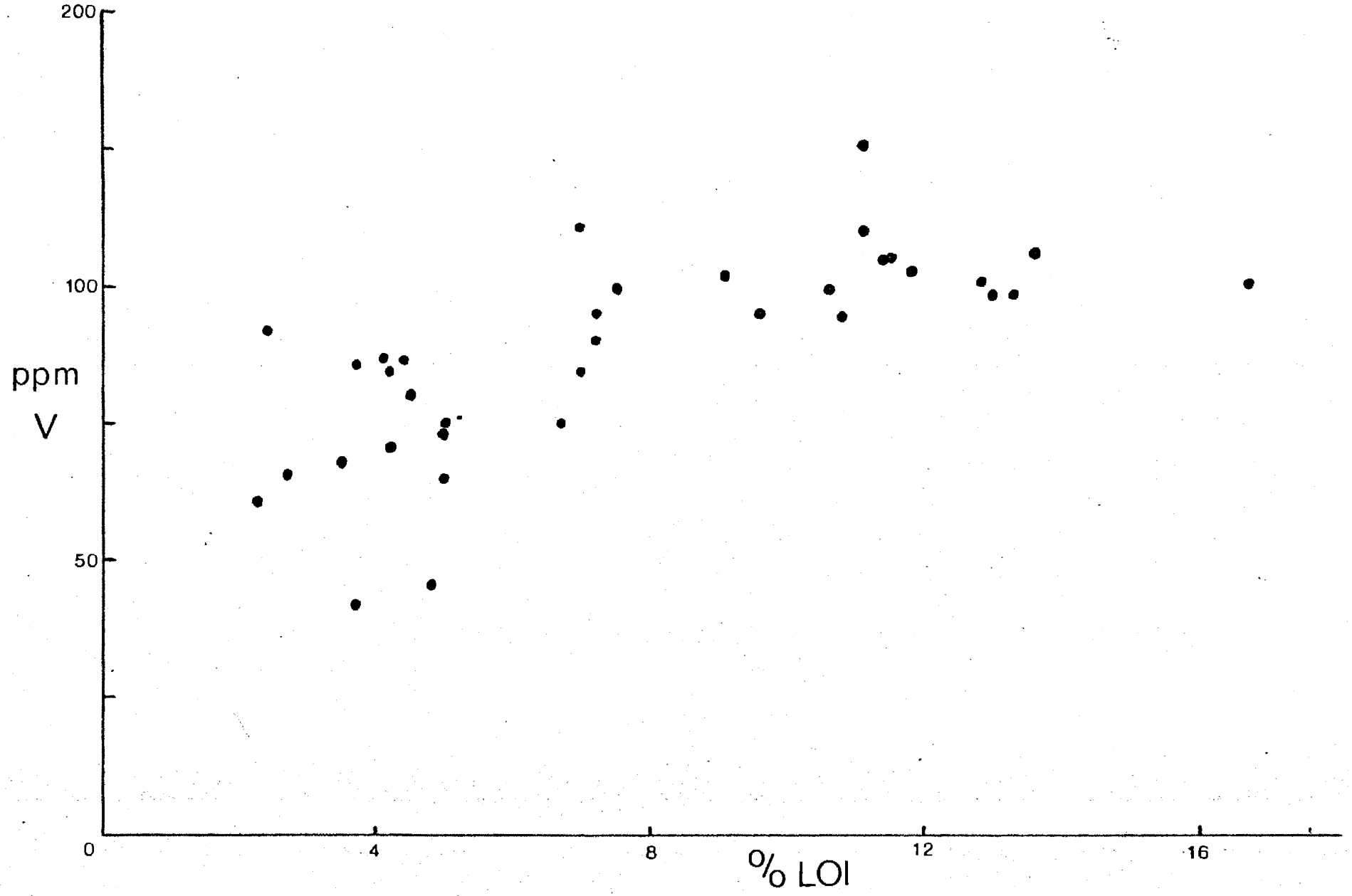


FIGURE 34A

The relationship of V with LOI (loss on ignition) in the Northern Ecca Facies carbonaceous shales from the GB Series boreholes


200
100
50
0
ppm
V
4
8
12
16
% LOI

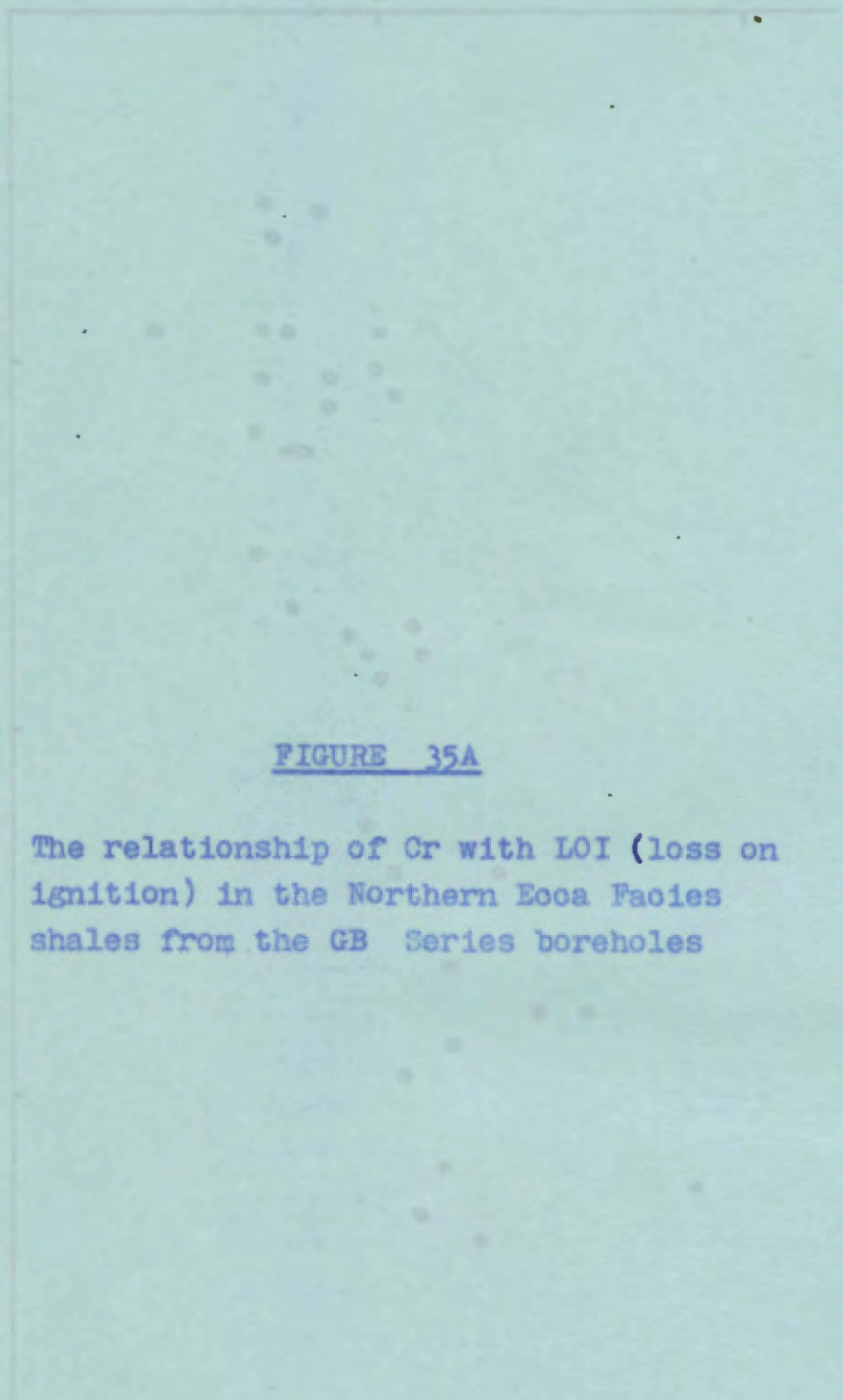
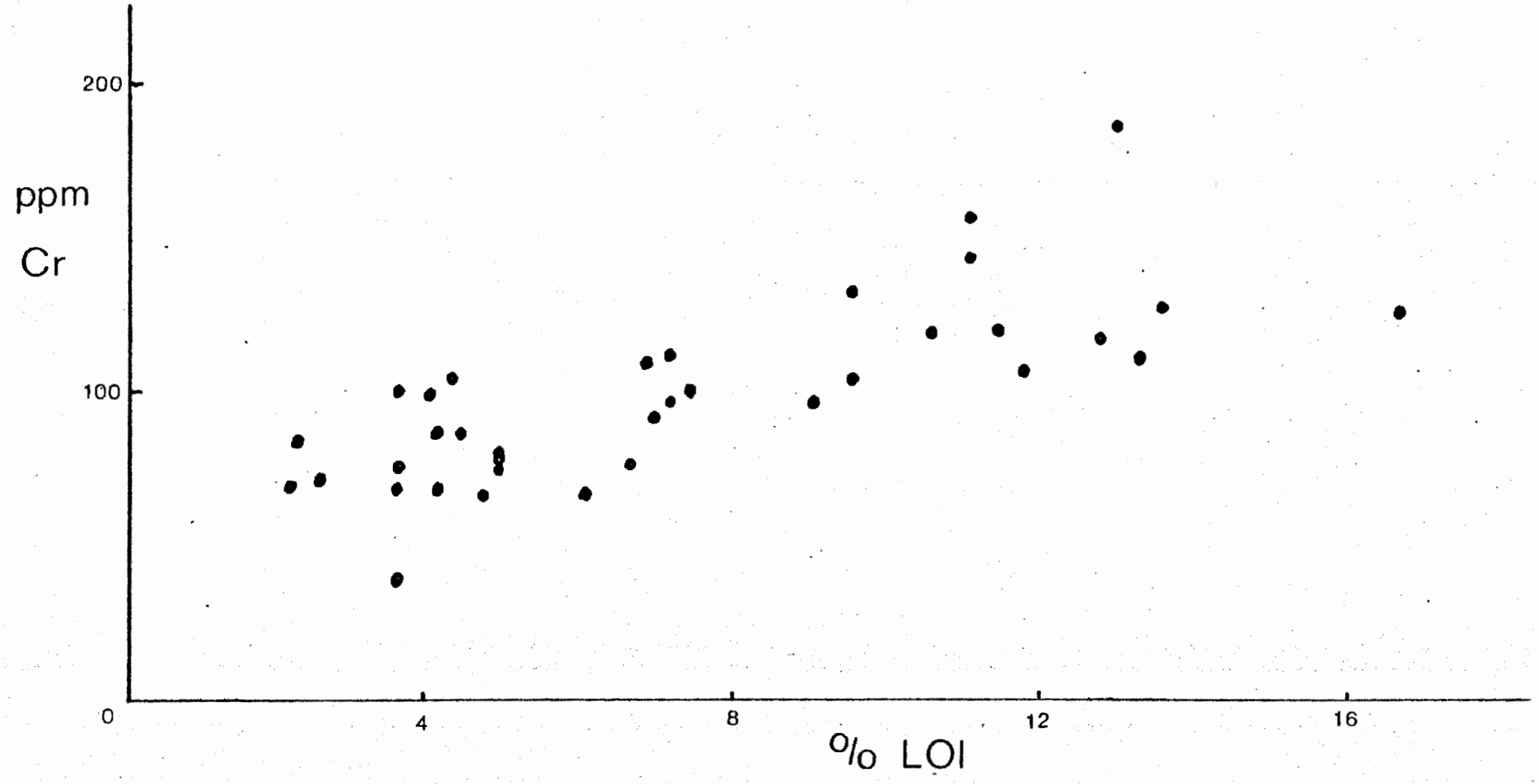


FIGURE 35A

The relationship of Cr with LOI (loss on ignition) in the Northern Ecca Facies shales from the GB Series boreholes


200
100
0
ppm
Cr
4
8
12
16
% LOI

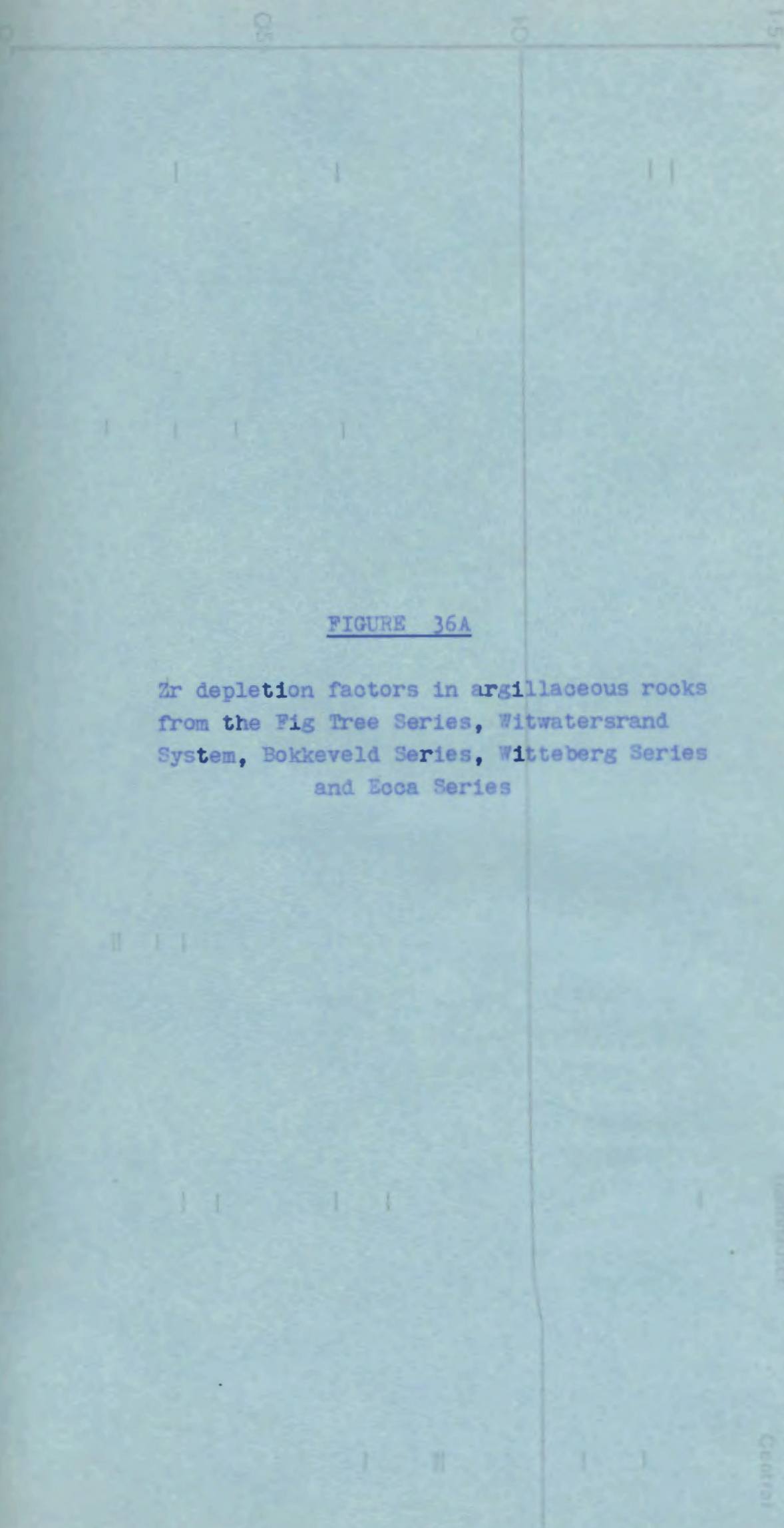


FIGURE 36A

Zr depletion factors in argillaceous rocks from the Fig Tree Series, Witwatersrand System, Bokkeveld Series, Witteberg Series and Ecca Series

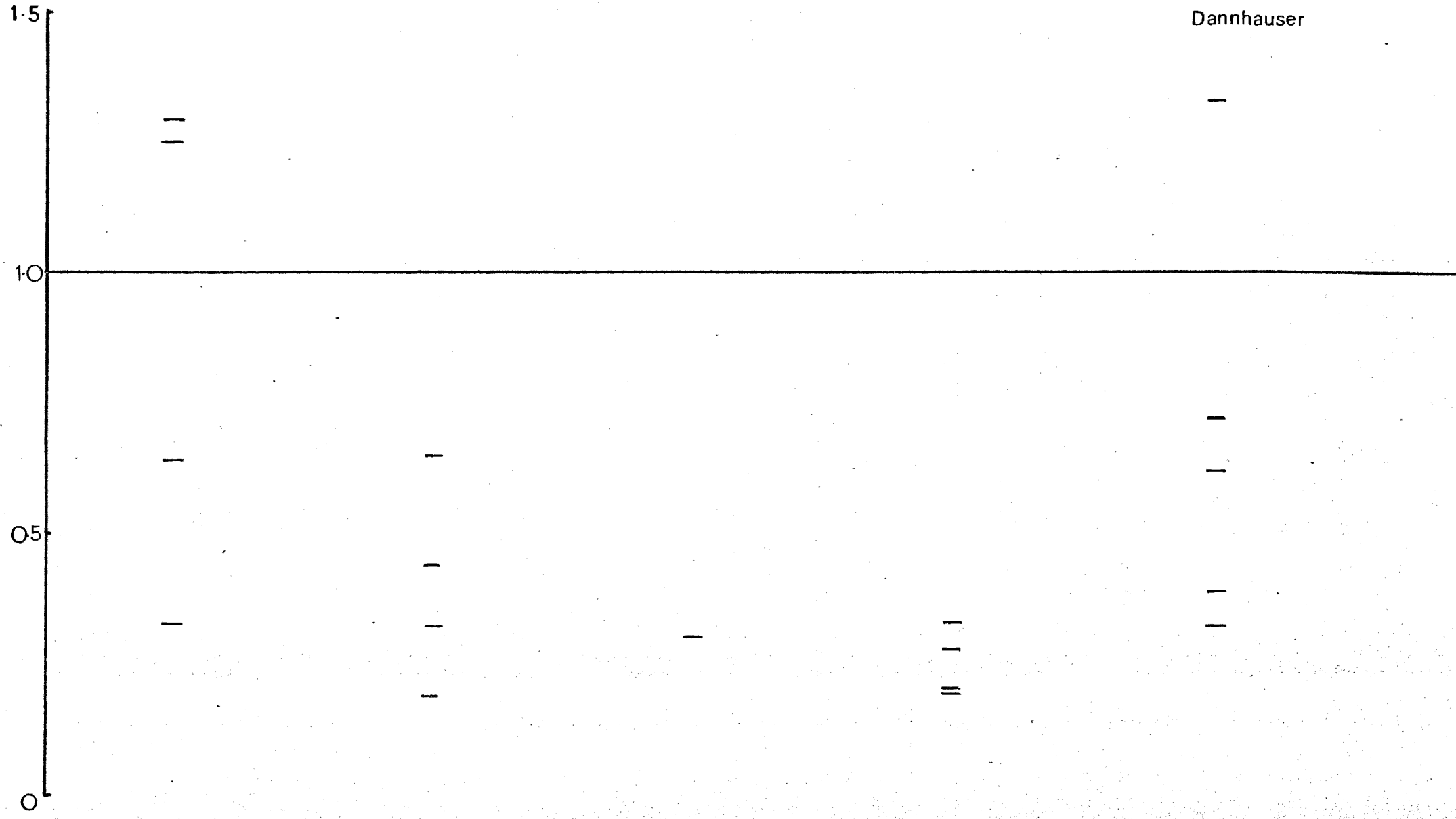


Fig Tree
Witwatersrand
Bokkeveld
Witteberg
GB Boreholes
Boreholes :
Somkele
Dannhauser
Ecc
1·5
1·0
0·5
0

FIGURE 37A

The relationship of Nb with TiO_2 in Bokkeveld Series shales

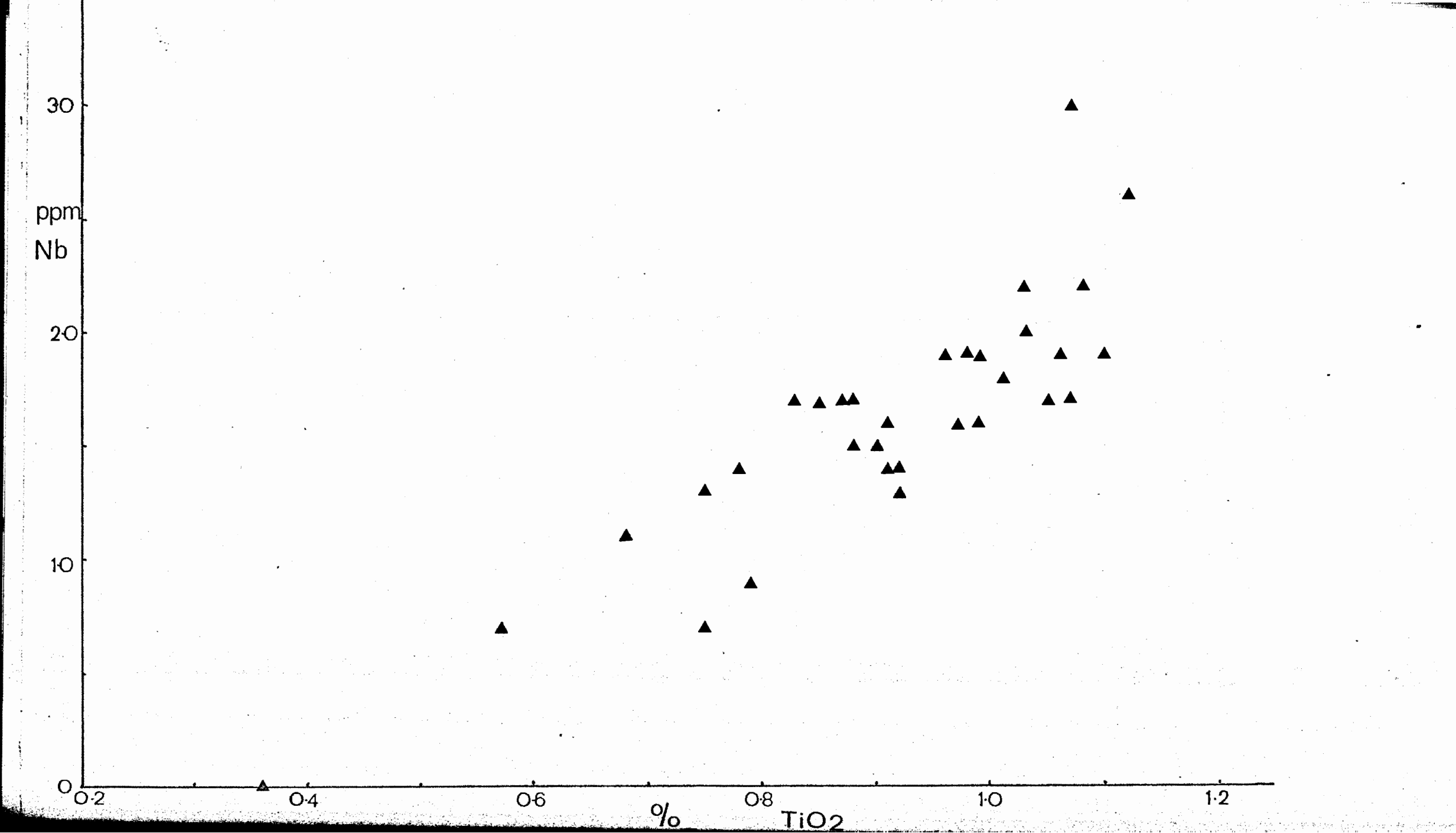

30
ppm
Nb
20
10
0
0·2
0·4
0·6
0·8
1·0
1·2
%
TiO2

FIGURE 38A

The relationship of the average Nb and average TiO_2 contents of various groups of South African argillaceous rocks

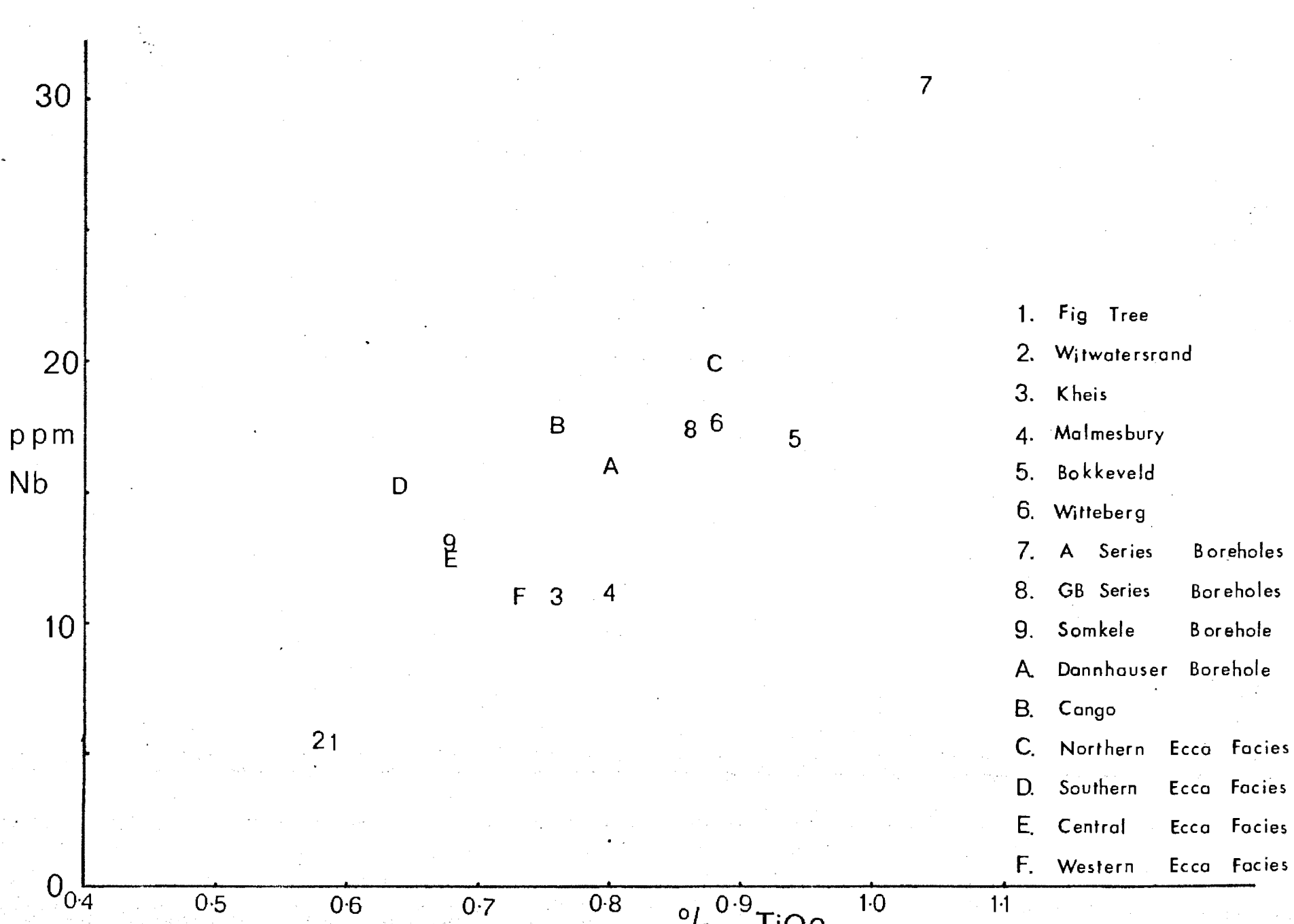
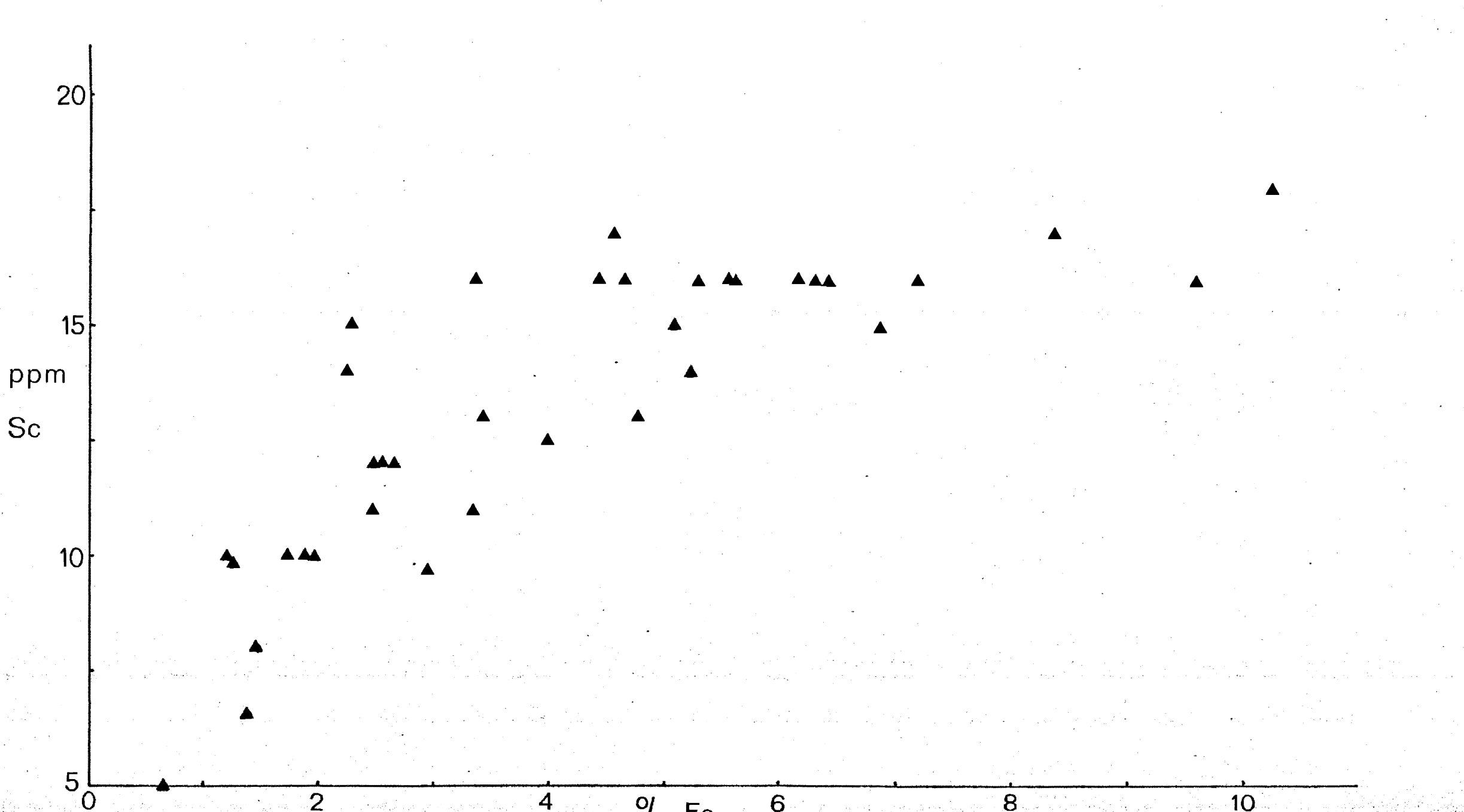

30
20
10
0
ppm
Nb
0·4
0·5
0·6
0·7
0·8
0·9
1·0
1·1
% TiO2
7
C
B
8
6
5
A
D
9
E
F
3
4
21
1. Fig Tree
2. Witwatersrand
3. Kheis
4. Malmesbury
5. Bokkeveld
6. Witteberg
7. A Series Boreholes
8. GB Series Boreholes
9. Somkele Borehole
A. Dannhauser Borehole
B. Cango
C. Northern Ecca Facies
D. Southern Ecca Facies
E. Central Ecca Facies
F. Western Ecca Facies

FIGURE 39A

The relationship of Sc with total Fe in the Northern Ecca Facies carbonaceous shales from the GB Series boreholes


20
15
10
5
ppm
Sc
0
2
4
6
8
10

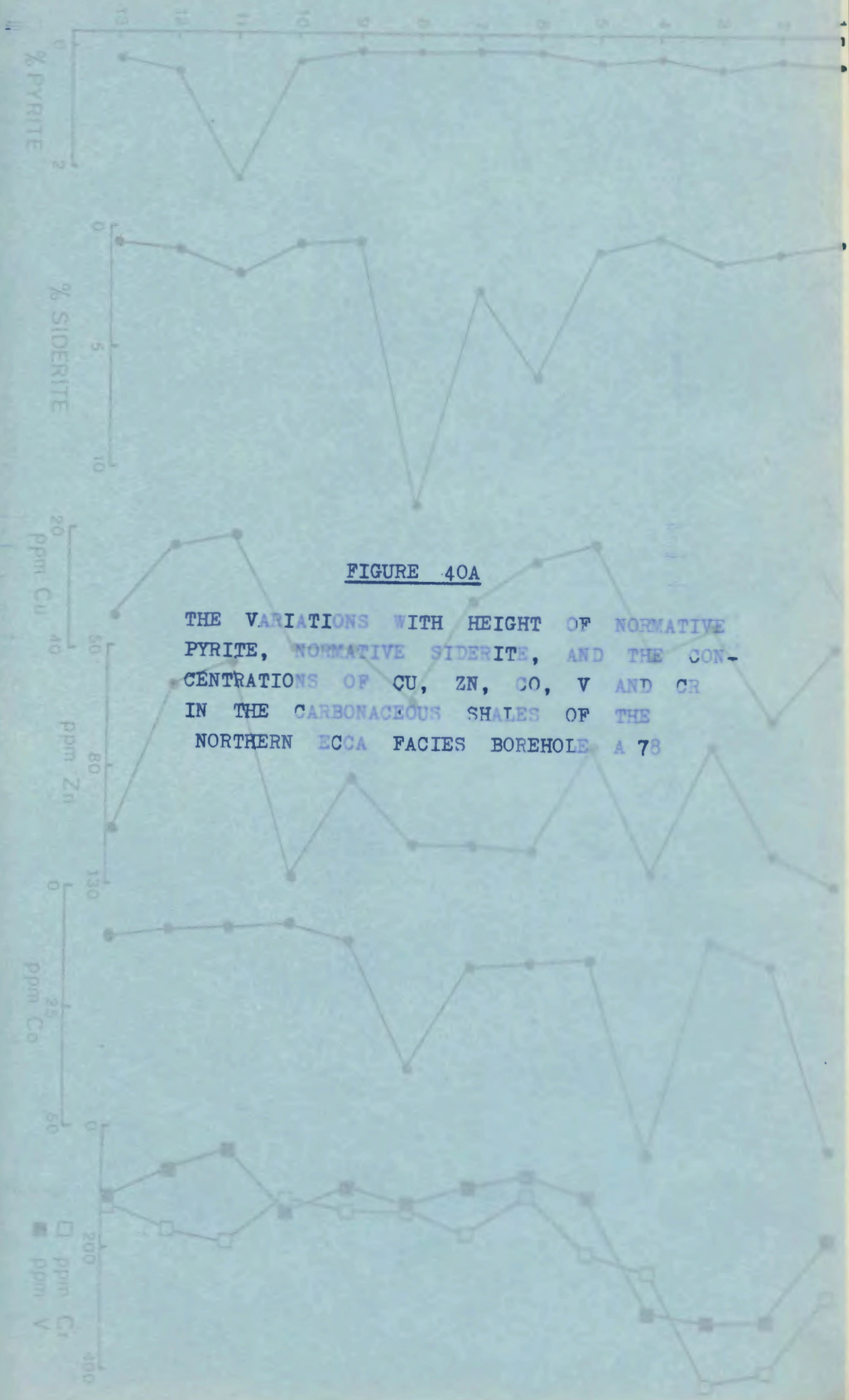
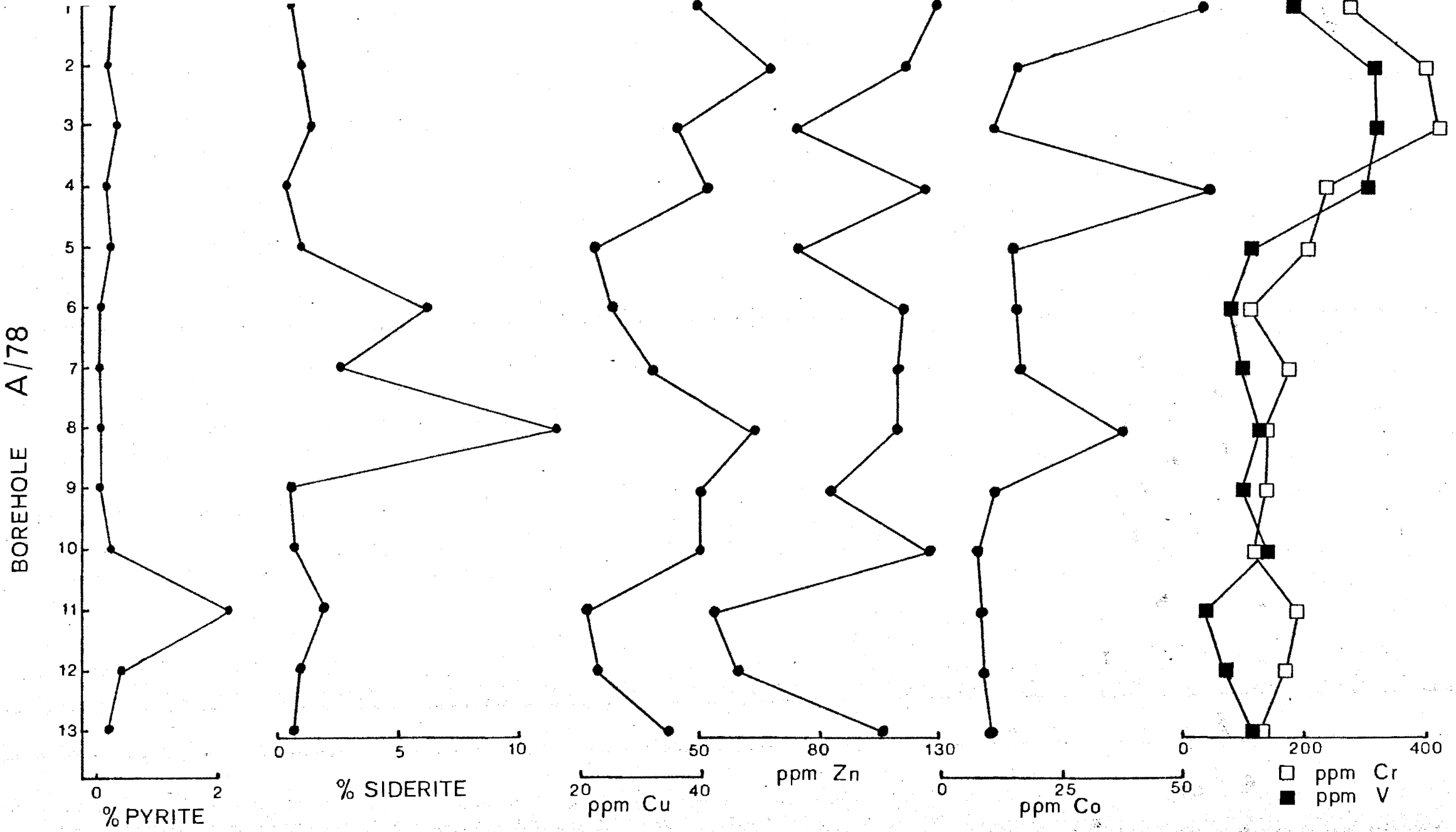


FIGURE 40A

THE VARIATIONS WITH HEIGHT OF NORMATIVE PYRITE, NORMATIVE SIDERITE, AND THE CONCENTRATIONS OF CU, ZN, CO, V AND CR IN THE CARBONACEOUS SHALES OF THE NORTHERN ECCA FACIES BOREHOLE A 78


BOREHOLE A/78
1
2
3
4
5
6
7
8
9
10
11
12
13
0
2
% PYRITE
0
5
10
% SIDERITE
20
40
ppm Cu
50
80
130
ppm Zn
0
25
50
ppm Co
0
200
400
ppm Cr
ppm V

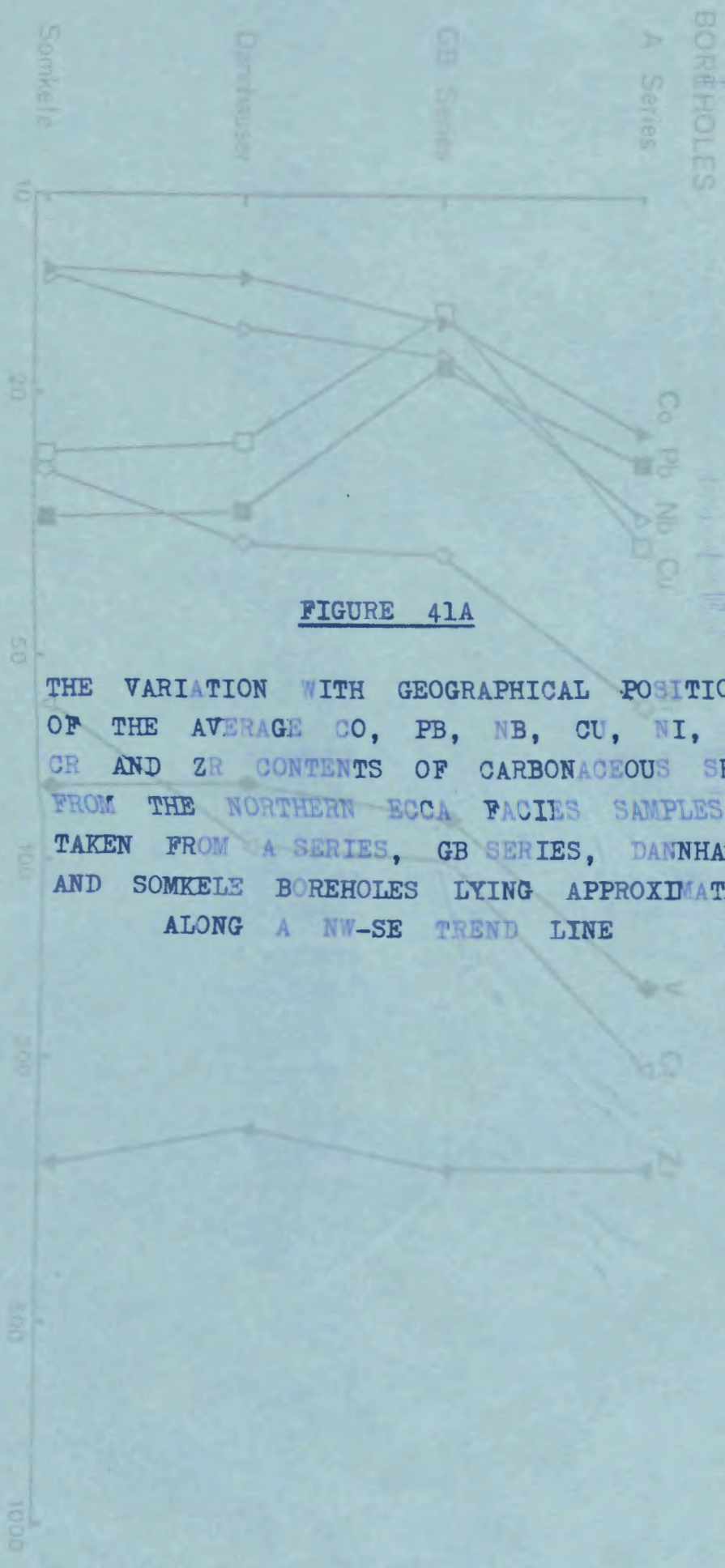
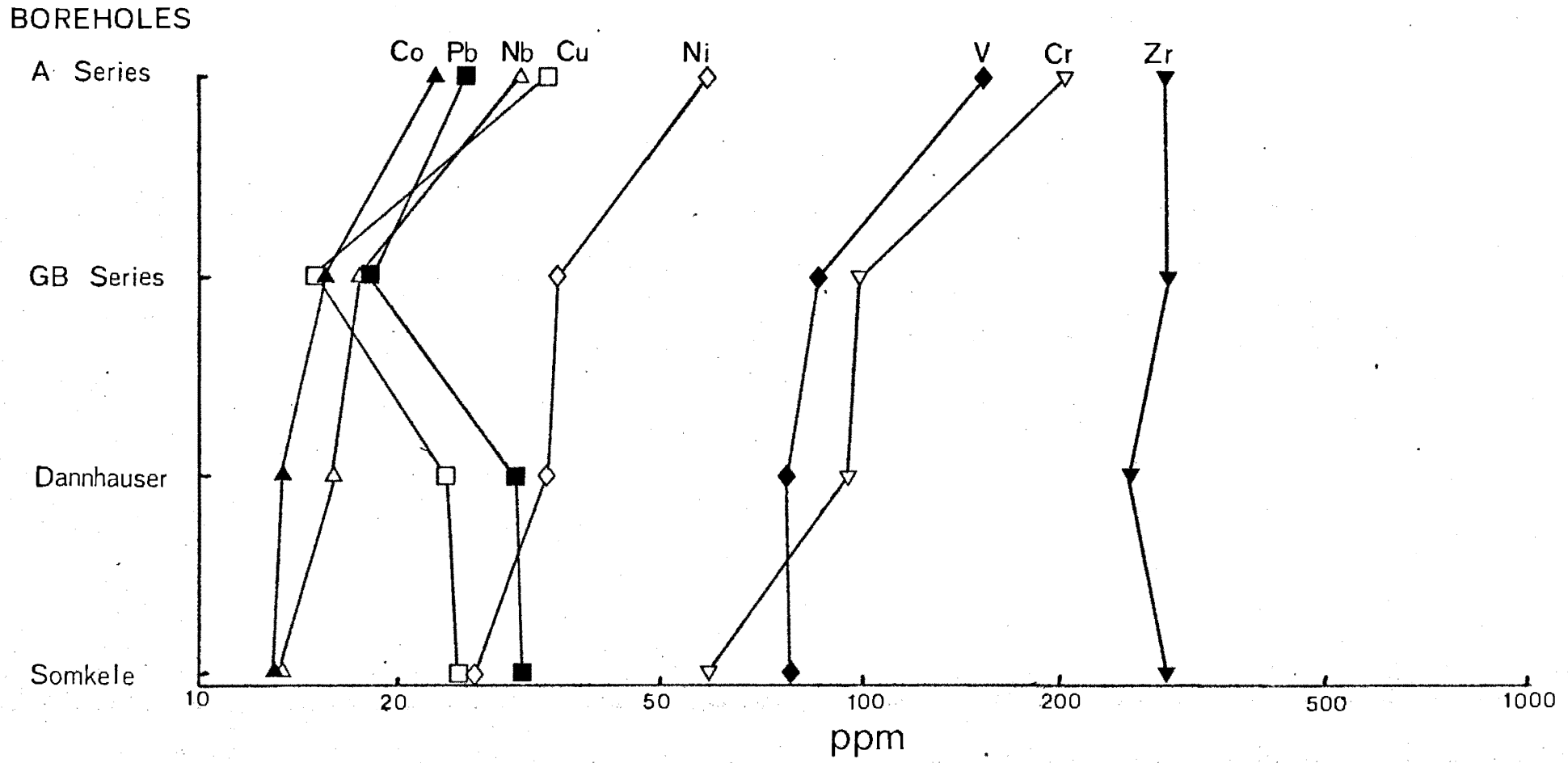


FIGURE 41A

THE VARIATION WITH GEOGRAPHICAL POSITION OF THE AVERAGE CO, PB, NB, CU, NI, V, CR AND ZR CONTENTS OF CARBONACEOUS SHALES FROM THE NORTHERN ECCA FACIES SAMPLES TAKEN FROM A SERIES, GB SERIES, DANNHAUSER AND SOMKELE BOREHOLES LYING APPROXIMATELY ALONG A NW-SE TREND LINE


BOREHOLES
A Series
GB Series
Dannhauser
Somkele
Co
Pb
Nb
Cu
Ni
V
Cr
Zr
10
20
50
100
200
500
1000
ppm

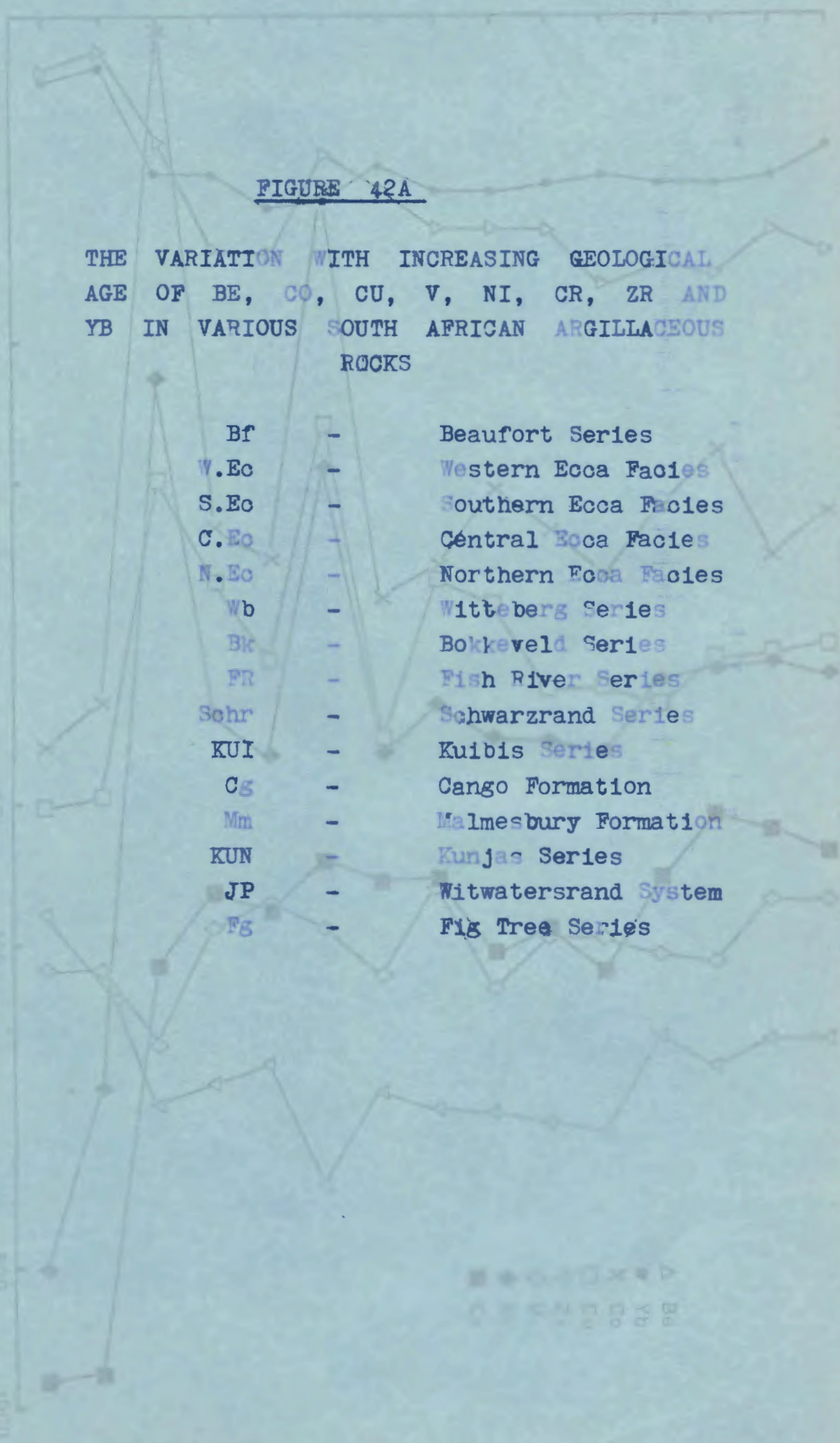
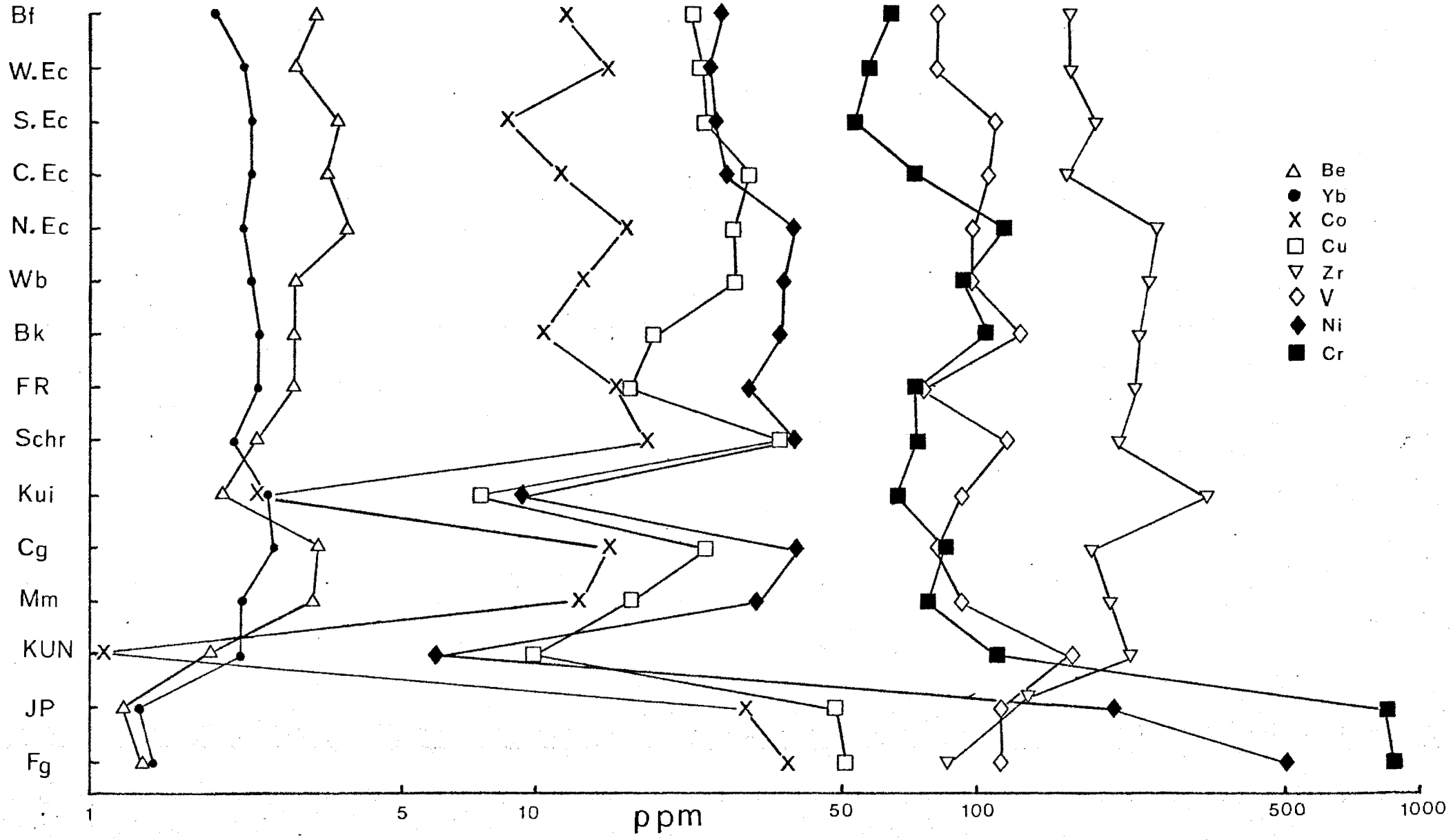


FIGURE 42A

THE VARIATION WITH INCREASING GEOLOGICAL AGE OF BE, CO, CU, V, NI, CR, ZR AND YB IN VARIOUS SOUTH AFRICAN ARGILLACEOUS ROCKS

Bf	-	Beaufort Series
W.Ec	-	Western Ecca Facies
S.Ec	-	Southern Ecca Facies
C.Ec	-	Central Ecca Facies
N.Ec	-	Northern Ecca Facies
Wb	-	Witteberg Series
Bk	-	Bokkeveld Series
FR	-	Fish River Series
Schr	-	Schwarzrand Series
KUI	-	Kuibis Series
Cg	-	Cango Formation
Mm	-	Malmesbury Formation
KUN	-	Kunjas Series
JP	-	Witwatersrand System
Fg	-	Fig Tree Series


Bf
W.Ec
S.Ec
C.Ec
N.Ec
Wb
Bk
FR
Schr
Kui
Cg
Mm
KUN
JP
Fg
Be
Yb
Co
Cu
Zr
V
Ni
Cr
1
5
10
50
100
500
1000
ppm

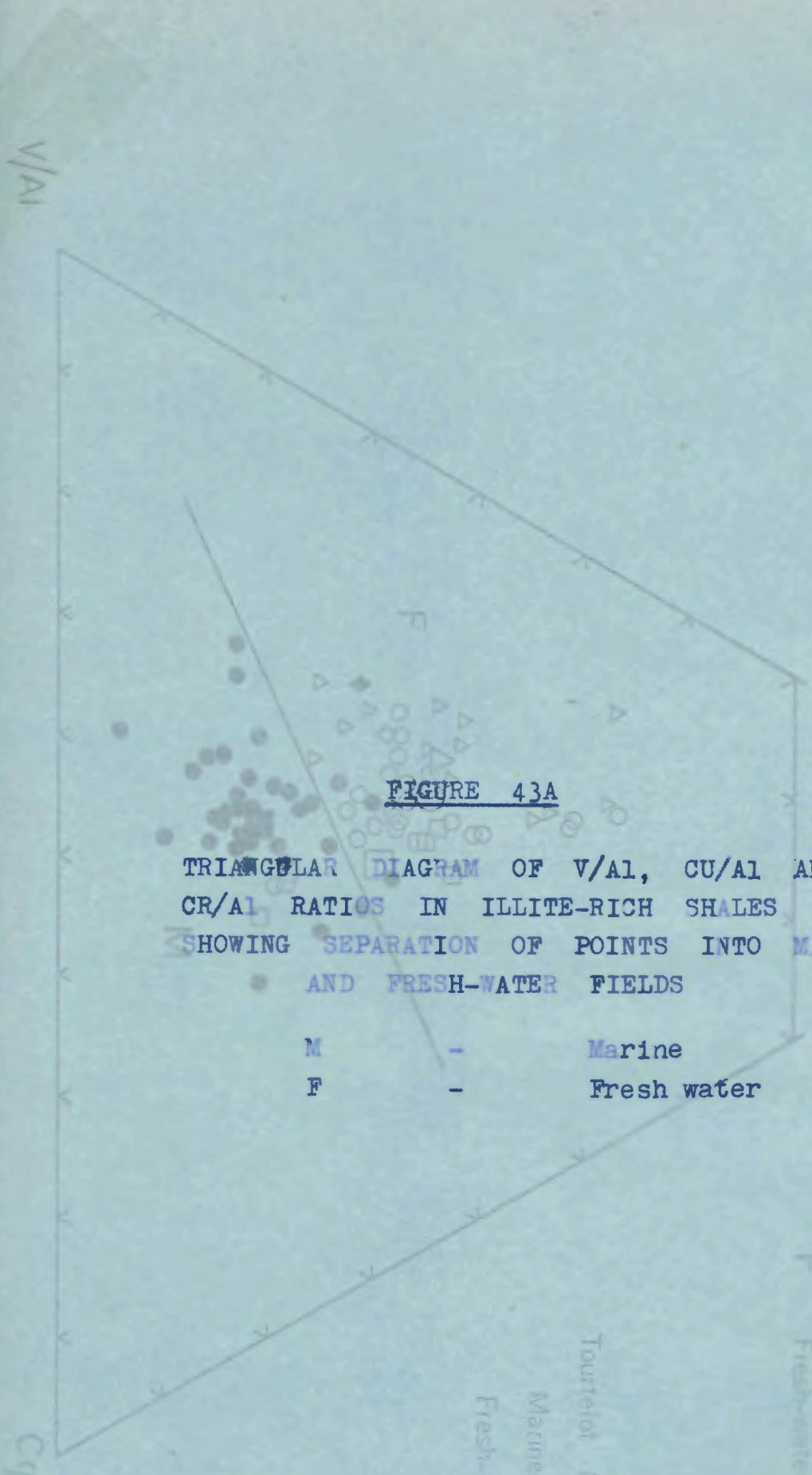
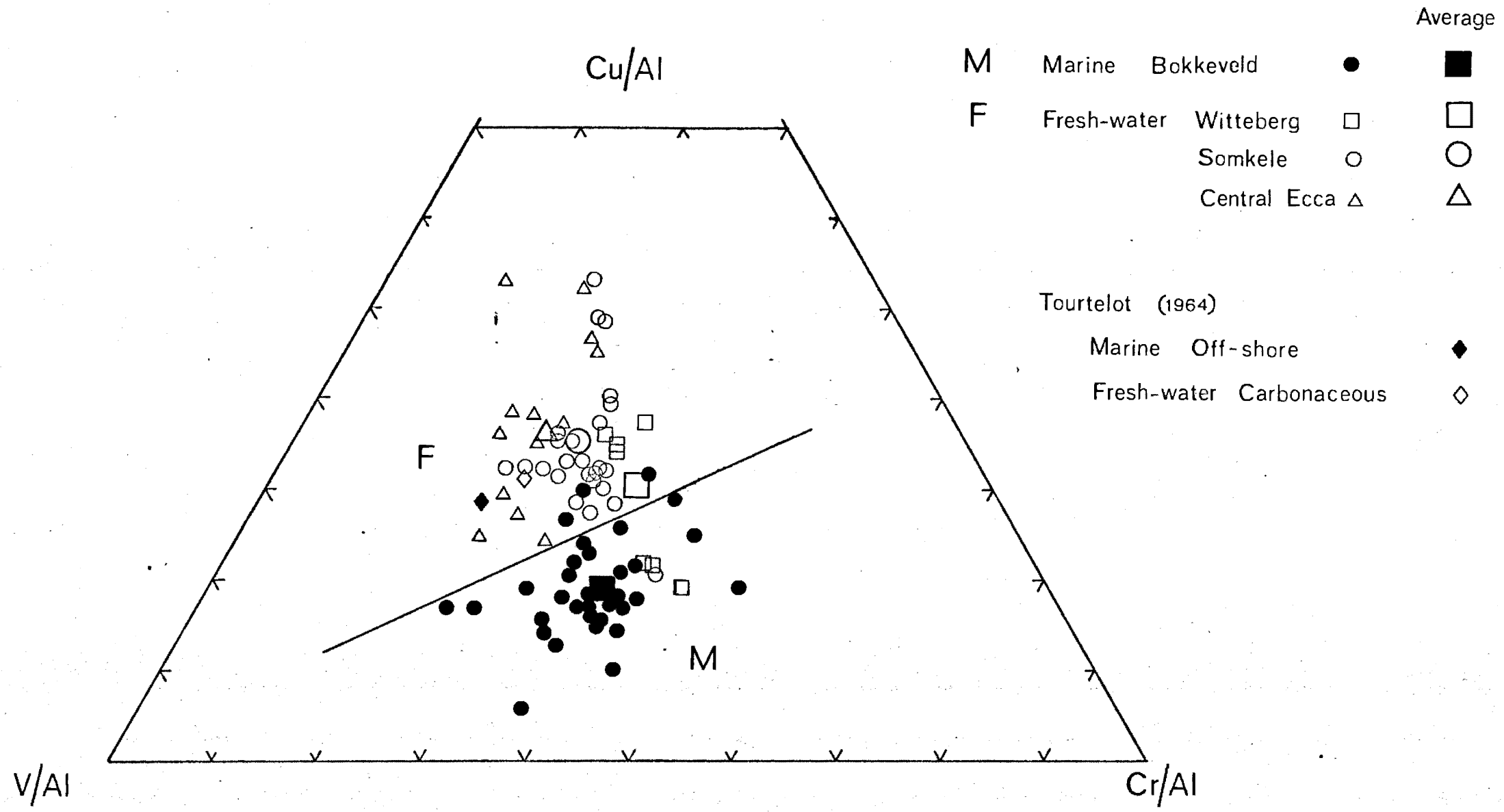


FIGURE 43A

TRIANGULAR DIAGRAM OF V/Al, CU/Al AND CR/Al RATIOS IN ILLITE-RICH SHALES SHOWING SEPARATION OF POINTS INTO MARINE AND FRESH-WATER FIELDS

M - Marine

F - Fresh water


Cu/Al
V/Al
Cr/Al
F
M
Average
M Marine Bokkeveld
F Fresh-water Witteberg
Somkele
Central Ecca
Tourtelot (1964)
Marine Off-shore
Fresh-water Carbonaceous

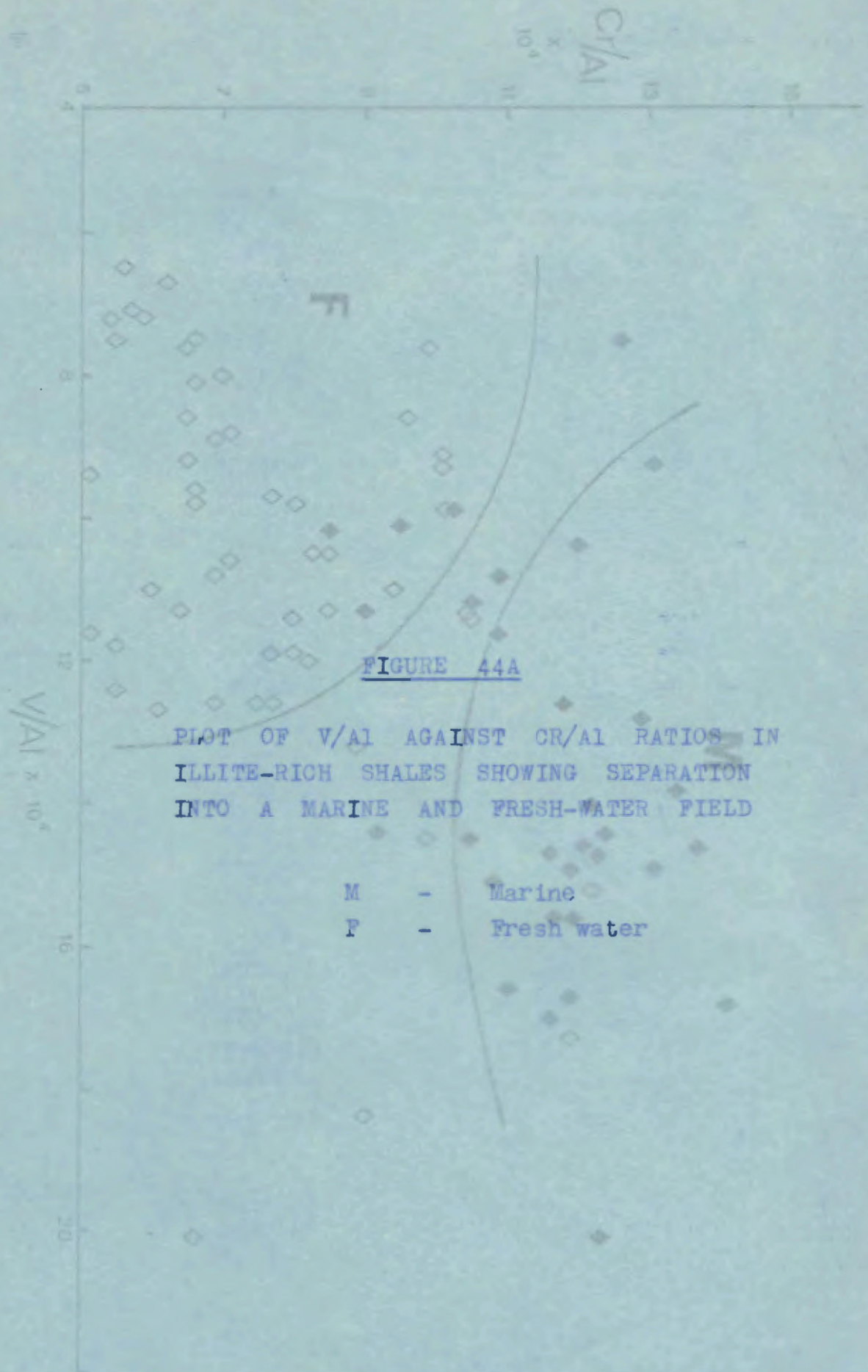
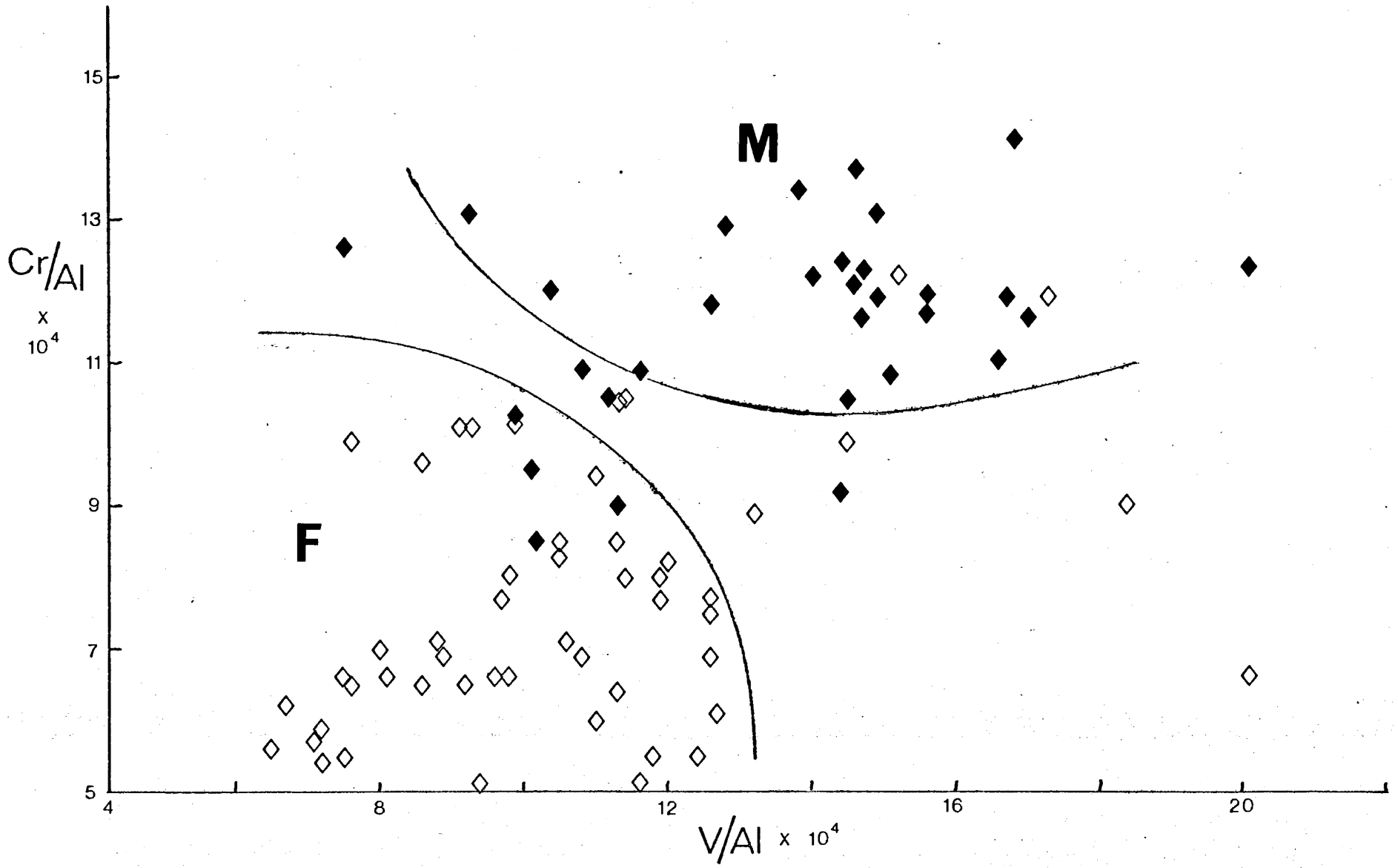


FIGURE 44A

PLOT OF V/Al AGAINST CR/Al RATIOS IN ILLITE-RICH SHALES SHOWING SEPARATION INTO A MARINE AND FRESH-WATER FIELD

M - Marine
F - Fresh water


M
F
15
13
11
9
7
5
Cr/Al
x
10^4
4
8
12
16
20
V/Al x 10^4

APPENDIX 5

COMPUTER PROGRAM FOR ZINC, COPPER AND NICKEL DETERMINATIONS

APPENDIX 5

```
C
C     PROGRAM TO DETERMINE COPPER, NICKEL AND ZINC BY X-RAY FLUORESCENCE
C     ANALYSIS USING THE REYNOLDS METHOD
C
C     ORDER OF FEEDING CARDS:- (1) POSITION CORRECTION FACTORS, (2) ZN,
C     CU AND NI BACKGROUND CORRECTION FACTORS, (3) CONCENTRATIONS OF ZN,
C     CU AND NI IN STANDARD, (4) COUNTING TIME FOR GOLD PEAK, (5) DATA
C     CARDS FOR TUBE CONTAMINATION, (6) DATA CARDS FOR STANDARD, (7)
C     DATA CARDS FOR TUBE CONTAMINATION AND STANDARD PUNCHED WITH SAMPLE
C     IDENTITY NUMBER, (8) SAMPLE DATA CARDS
C     ITYPE CODE  1=STD., 2=END OF STDS., 3=SAMPLE, 4=END OF SAMPLES AND
C     RUN, 5=SAMPLE FOR AU CORRECTION, 6=END OF AU CORRECTION SAMPLES
      DIMENSION COUNT(8),SAMPL(3)
      ITYPE = 1
      IREAD = 8
      IRITE = 5
C     POSITION CORRECTION FACTORS
      READ (IREAD,5)X,Y,Z
    5 FORMAT(3F6.5)
C     FACT4, FACT5 AND FACT6 ARE ZN, CU AND NI FACTORS FOR CALCULATION
```

```
C      OF BACKGROUNDS AT PEAK POSITIONS
       READ (IREAD,10)FACT4,FACT5,FACT6
   10  FORMAT (3F8.5)
C      CONCENTRATIONS OF ZN, CU AND NI IN STANDARD
       READ (IREAD,15) CONZN,CONCU,CONNI
   15  FORMAT(3F5.0)
C      COUNTING TIME FOR GOLD PEAK
       READ (IREAD,20) AUTM
   20  FORMAT(F4.0)
       STDZN = 0.0
       STDCU = 0.0
       STDNI = 0.0
       AVZN = 0.0
       AVCU =0.00
       AVNI =0.0
       CI = 0.0
   25  WRITE (IRITE,30)
   30  FORMAT (1H1,28X,'X-RAY   FLUORESCENCE   ANALYSIS   FOR   ZINC,  CO
     4PPER   AND   NICKEL'///)
       WRITE (IRITE,35)
```

```
      COUNT(8) = COUNT(8)/TIME1
      COUNT(3) = COUNT(3)/TIME2
      COUNT(5) = COUNT(5)/TIME2
      COUNT(7) = COUNT(7)/TIME2
C     COUNT RATES ARECORRECTED FOR DEAD TIME
      DO 70 I=1,8
   70 COUNT (1) = COUNT (1)/ (1-COUNT(1) * 0.0000027)
C     COUNT RATES ARE CORRECTED FOR POSITION
      GO TO (2,80,85,90),IPOSN
   80 DO 95 I=1,8
   95 COUNT(I) = COUNT(I)*X
      GO TO 2
   85 DO 100 I=1,8
  100 COUNT(I) = COUNT(I)* Y
      GO TO 2
   90 DO 105 I=1,8
  105 COUNT(I) = COUNT(I)* Z
    2 IF (5-ITYPE)76,76,75
   76 ZNBGD = (COUNT(2)+COUNT(6)+COUNT(8)) * FACT4
      ZN = COUNT(3) - ZNBGD
      CUBGD = (COUNT(2)+COUNT(6)+COUNT(8)) * FACT5
```

```
      CU = COUNT(5) - CUBGD
      BGDNI = (COUNT(2)+COUNT(6)+COUNT(8)) * FACT6
      ANI = COUNT(7) - BGDNI
      AVZN = AVZN + ZN
      AVCU = AVCU + CU
      AVNI = AVNI + ANI
      C1 = C1 + COUNT(1)
      IF (6-ITYPE)60,86,60
   86 FACT1 = AVZN/C1
      FACT2 = AVCU/C1
      FACT3 = AVNI/C1
      GO TO 60
   75 ZNBGD = (COUNT(2)+COUNT(4)+COUNT(6))** FACT4
      ZN = COUNT(3) - ZNBGD
      ZN = ZN - (COUNT(1)*FACT1)
      CUBGD = (COUNT(4)+COUNT(6)+COUNT(8) * FACT5
      CU = COUNT(5) - CUBGD
      CU = CU - (COUNT(1)*FACT2)
      BGDNI = (COUNT(4)+COUNT(6)+COUNT(8) * FACT6
      ANI = COUNT(7) - BGDNI
      ANI = ANI - (COUNT(1)*FACT3)
      GO TO (110,110,115,115),ITYPE
```

```
  110 STDZN = STDZN + ZN
      STDCU = STDCU + CU
      STDNI = STDNI + ANI
      K = K + 1
      IF (2-ITYPE)60,125,60
C     CALCULATION OF AVERAGE NET STANDARD ZN, CU AND NI COUNT RATES
  125 CK = K
      FACZN = STDZN/CK
      FACCU = STDCU/CK
      FACNI = STDNI/CK
      FDLZN = (CONZN * 3.0 * SQRT(2.0))/(FACZN * AMU)
      FDLCU = (CONCU * 3.0 * SQRT(2.0))/(FACCU * AMU)
      FDLNI = (CONNI * 3.0 * SQRT(2.0))/(FACNI * AMU)
C     CALCULATION OF FACTORS FOR SUBSTITUTION IN THE REYNOLDS EQUATION
C     FACTOR = PPMSTD/(MUSTD * P-BSTD)
      FACT7 = CONZN/AMU/FACZN
      FACT8 = CONCU/AMU/FACCU
      FACT9 = CONNI/AMU/FACNI
      GO TO 60
C     CALCULATION OF ZN, CU AND NI CONCENTRATIONS IN SAMPLES
  115 PPMZN = ZN * AMU* FACT7
      PPMCU = CU *AMU *FACT8
      PPMNI = ANI * AMU * FACT9
```

SAMPLE LOCALITY MAP

BOTSWANA

TRANSVAAL

SWAZILAND

SOUTH WEST AFRICA

ORANGE FREE STATE

NATAL

LESOTHO

CAPE PROVINCE

ATLANTIC OCEAN

INDIAN OCEAN

1 : 2,000,000

20 0 40 80 120 160 200 KM.

P. K. Hofmeyr
1971

LEGEND

- SWAZILAND SYSTEM — FIG TREE SERIES
- KHUIS SYSTEM
- WITWATERSRAND SYSTEM
- SINCLAIR GROUP — KUNJAS SERIES
- DAMARA SYSTEM
- MALMESBURY FORMATION
- CANGO FORMATION
- NAMA SYSTEM — KUBIS SERIES
  - SCHWARZRAND SERIES
  - FISH RIVER SERIES
- CAPE SYSTEM — BOKKEVELD SERIES
  - WITTEBERG SERIES
- KARROO SYSTEM — DWYKA SERIES
  - ECCA SERIES — NORTHERN FACIES
  - — CENTRAL FACIES
  - — SOUTHERN FACIES
  - — WESTERN FACIES
  - BEAUFORT SERIES

x Borehole samples

Capitalisation and Proletarianization on a Western Cape Farm: Klaver Valley 1812 - 1898

by Elizabeth Anne Host

Submitted to fulfil the requirements of
Master of Arts in History
University of Cape Town

August 1992.

ADONIS
(born 10 May 1896, died 5 June 1992)

a former farm worker in Malmesbury who introduced me to the realities of farm life and with whom I spent many fascinating and happy hours.

Acknowledgements

To my supervisor, Nigel Worden I give my grateful thanks and appreciation. He has, throughout the process of supervising this dissertation, always given thorough and incisive criticism and comment. He has also gone well beyond the bounds of a supervisor in providing wonderful support and encouragement.

Many friends and colleagues in Cape Town, Giyani and Johannesburg have made the completion of this dissertation, not only possible, but thoroughly enjoyable. To all of them, a warm thank you for their encouraging support, and to Julia for giving me accommodation in Cape Town, John and Peter for caring for my dog, Barry for looking after things in Giyani, and Siggi for all the delicious and much enjoyed pizzas, while I was in Cape Town.

Fred Duckitt of Darling has been a great and patient teacher of the workings of the agricultural world. Without him I would not have discovered and had such generous access to the Klaver Valley journals. I thank him for his time and warm hospitality.

I would like to thank the Human Sciences Research Council and the Centre for African Studies for financial assistance while doing research for this dissertation.

Contents

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Abstract

This thesis is the study of a single farm, Klaver Valley in the Darling district, 1812 - 1898.

Chapter One provides a physical view of Klaver Valley from 1812 to 1898 showing the changes in the landscape and production of grains, wine and wool over the period. It argues that these changes occurred as a direct result of external market forces.

Chapter Two focuses on the changes which occurred in the labour process from the early 1800s to 1898, arguing that the main impetus for change came from mechanisation of harvesting in the 1820s and 1850s.

Chapter Three explores the notion of a capitalist farmer and argues that Duckitt and later Ruperti can be categorised as capitalist farmers. The main thrust of their progressive capitalization occurred before the 1850s and it did so as a result of the system of informal credit which existed at farm level among farmers, allowing for re-investment and survival of cash flow.

Chapter Four studies the process of proletarianisation which accompanied the capitalist development of the farm and its farmers. While taking account of the existence of a small number (3) of sharecroppers on the farm in the 1840s, 1870s and 1890s, this chapter argues that by the early 1830s, the farm was operating on the back of fully proletarianised labour. Composition of the labour force, wages and tasks, the work of women and the change from resident and permanent to casual labour from the 1820s to the 1890s, form some of the main focuses of this chapter.

Chapter Five explores the nature of the relationship between the farmer and workers from 1829 - 1898, the two increasingly alienated from each other by the encroachment of the overseer. It argues that capitalist relations of production developed in the context of paternalism throughout although it was increasingly shaped by the cash-oriented relationship.

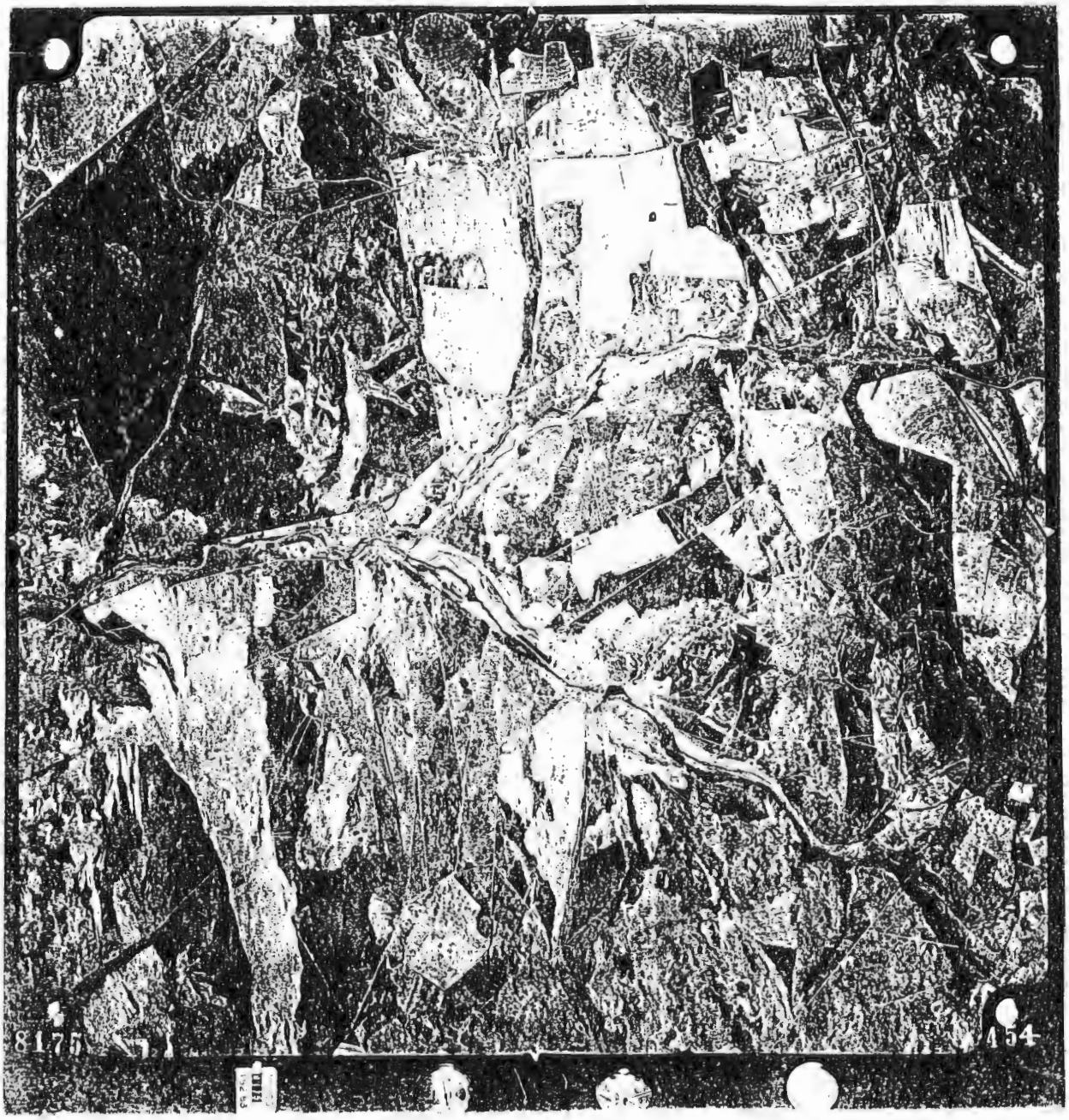

Figure 1: Aerial Photograph of Klaver Valley

Source: Suveyer General's Office, Mowbray, Cape Town

In a geographically wider study, Bradford looks at the nature of capitalization in the Transvaal, providing important considerations for understanding the transition to capitalist agriculture and giving us much needed insights into what constituted a capitalist farmer and what mechanisms for labour sale and usage existed.[12] This study has provided a much needed understanding of what constituted a capitalist farmer in the context of climate, cash and coercion. Her work further investigates the nature of "self-commoditisation" of labourers in the context of the patriarchal homesteads. Ultimately, if the wage was controlled by ... anyone other than the person who had earned it, for example, the headman, that individual's level of proletarianisation was as yet incomplete. Again, Bradford's work opened up further debates on the nature of proletarianisation and on the lack of clarity contained in the term "wage-labour".

In the South-western Cape since the majority of the labour force consisted of imported slaves and indigenous Khoisan whose social structures had already been dismantled by the early 1820s, these considerations do not impinge to the same degree on the Western Cape proletarianisation debate. However, as a trigger to more clarity of understanding of what constituted a "free wage labourer", the notions of either social or kinship/familial obligation must be explored. Can one say that a wage earner, for example a woman or a child, was not fully proletarianised until they controlled their own entry onto the labour market and the appropriation of their wage and subsequent expenditure?[13] While many rural studies have looked at the relations of production and the specificity of coercion and control by farmers over workers and while many have argued for a "tempering paternalism", few have looked at the nature of this on the ground.[14] With the exception of van Onselen, these have in the most part relied on Genovese's conceptualisation and formation of the concept of paternalism, seeing it as an almost ameliorating device oiling work and production relations. Van Onselen on the other hand argues that as an ethos which pervaded both pre-capitalist and capitalising relations of production, by its very nature it was capable of "generating violence at either the individual or collective level", at various stages and moments of recreation or demise.[15]

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[12] H. Bradford, A Taste of Freedom: the ICU in Rural South Africa, 1924 - 1930, (New Haven, 1980) and in *Highways, Byways and Culs-de Sacs*, pp. 69 - 70.

[13] H. Bradford, *Highways, Byways and Culs-de Sacs*, pp. 69 - 70.

[14] P. Scully, Bouquet of Freedom, (1990) T. Keegan Rural Transformations, (1986) and more recently, C. van Onselen, *The Social and Economic Underpinnings of Paternalism and Violence on Maize Farms of the South-western Transvaal, 1900 - 1950*, African Studies Seminar Paper, May 1991, University of the Witwatersrand.

[15] C. van Onselen, *Social and Economic Underpinnings of Paternalism*, p. 39.

This thesis, while attempting to clarify stages and features of capitalization and proletarianisation, also addresses concepts directly linked with labour, mechanisation and capitalization. Much of the most recent socio-historical conceptual developments on work, time and labour processes, has emanated from Britain and America, and these have helped provide new ways of looking at human beings who lived and laboured in industrialising Britain.[16] More broadly and in terms of conceptual foci, they have provided a context for the analysis of these processes on a single farm in the Malmesbury district.

While this study argues for capitalist relations of production early on in the nineteenth century, it does take into account that a capitalist economy was not fixed and static, but changed and was reshaped. Apparently pre-capitalist features continued to exist and in fact very often promoted further intensification of capitalist practices. While this thesis does not purport to speak for the general, it attempts to get behind that generality and assess the degree to which agricultural activity moved between pre-capitalist and increasingly capitalist and/or capitalising conditions and characteristics, from the perspective of production output and its interaction with market forces.

Where was the recipe for capitalist enterprise on the land formulated, by whom, and how was that recipe synchronised with local conditions over the period under review? In studying the impetus for change and development along the capitalist continuum, in terms of increased mechanisation of the labour process while the labour force was still predominantly "unfree", it is evident that variations existed on the characteristics and pace of that change. The farmer and workers alike, at various stages, capitalised often hesitatingly through periods of both material and mental adaptation, often displaying the ability to employ apparently pre-existent measures of control and compromise.

In the intensely capitalist context of the farm, which early on developed into a self-contained unit of production and manufacture, the relations of production were at once shaped by varying notions of time, work ethic capitalist and proletariat consciousness, often overseen by a paternalism which in itself adapted to the new mode of production. While this paternalism has often been seen as an antiquated mechanism for social relations, it could and did reform itself in a new context.

---

[16] P. Joyce, (ed.), The Historical Meaning of Work, New York, 1987, and E. and S. Yeo (eds), Popular Culture and Class Conflict 1590 - 1914 (Brighton, 1981) and articles on paternalism, social control, development of class, in Social History and History Workshop Journal

Focusing on one farm as a unit of production, has allowed for generally understood concepts and processes to be unpicked in fine detail. In this study we are able to meet the farmer and workers in their own context, on the Klaver Valley farm. This study has only been possible because of the discovery, while doing oral research for my Honours dissertation, of a set of farm journals dating from 1829 to 1898.[17] They are, as an archival resource, unique. No such similar set of farming accounts is known for the western Cape and so I completed as full an investigation of them as possible.

The farm journals contain day-to-day accounts of the activities on the farm (who worked, their labour and remuneration, with infrequent references to the specific labour process and relationship of labour output to wage earning). Particularly in the pre-emancipation period, there is detailed evidence of the farmer's financial activities, and although less detailed from the 1840s, nevertheless does provide us with insight into his financial activities. From the 1860s the records become much less detailed and by the early 1870s, provide very little information. From 1873 to 1893, there are no records available. They begin again in 1893 through to 1898. The four wage books which are still extant, do not constitute a full record of workers' wages and labour, are organised according to workers' names and so cover a wide period, although in limited detail, of 1820s to 1870s. Very often a worker remained on the farm beyond the date at which his wages are recorded. The periodisation for this thesis was largely determined by that of the journals, since it is based on this farm and is a study of the particularity of space, time and action, with as much of the minutae as is possible to retrieve.

The inhabitants of Klaver Valley and I have opened the door for scrutiny, analysis and categorisation which it is hoped, will contribute to the current debate on transitions to and processes of capitalization and proletarianisation in the south - western Cape countryside.

---

[17] For a full list of the journals and the period they cover, see the bibliography. These journals are in the possession of Mr F. Duckitt

Introduction

This study of the farm Klaver Valley in the south-western district of Darling, in the Cape is based on farm records and is an attempt to show the process of capitalization and concomitant proletarianisation from 1812 to 1897.[1] It addresses some of the important issues which have constituted much of the debate on agrarian change. It is a response to the need for an analysis on the ground of "process". Without such specificity, there are gaps in our understanding of the complexities of time, form and the nature of that process, hampering and narrowing the conceptual developments in South African agrarian history.

Since the 1970s, agrarian historical investigations of the South African hinterland and the south-western Cape have recently grown and a number of important studies have already contributed to our understanding of capitalist penetration of agriculture in the Cape, Transvaal and Orange Free State in the nineteenth and twentieth centuries. Although studies of rural and agrarian history are still far behind those of the United Kingdom and America, important steps have been taken, paths worn and new directions posited for the further development of rural South African historiography.[2]

Many of these revisionist studies have been primarily concerned with the process of agrarian capitalization and how it transmuted itself on the ground. They have also, increasingly, taken a regional or even smaller focus of investigation, in response to more general overviews such as Morris' study of capitalization in South African agriculture.[3] It was historians' dissatisfaction with the generality of these studies which prompted their moving towards more specifically focused areas of analysis. In traversing the entire South African countryside, general studies of economic change and capitalist development in the countryside often missed the niceties of process and

---

[1] 1812 is the year in which William Duckitt first occupied Klaver Valley and when it changed from a stock to an agricultural farm. 1898 is the last year which is covered in the journals.

[2] C. Bundy *Assessing the Harvest: Some Perspectives on South Africa's Rural History (19th and 20th Centuries)*, South African Historical Society National Conference Paper, Cape Town, 1985, T. Keegan, *The Overthrow of Cape Slavery* South African Review of Books, July/October 1991, H. Bradford, *Highways, Byways and Culs-de-Sacs: The Transition to Agrarian Capitalism in Revisionist South African History*, Radical History Review, 46/7, 1990, for overviews of past rural historiography and suggestions for future direction.

[3] M. Morris, *The State and development of Capitalist Social Relations in the South African Countryside: a process of class struggle*, Ph.D. dissertation, University of Sussex, 1981.

failed to highlight the uneven nature of such developments, which narrowly focused studies are able to bring out so clearly.[4]

The process of economic change in its general form and capitalization more specifically in the Cape has been dealt with by various historians and these studies have certainly developed our understanding of the wider economic changes in process in the nineteenth century and before.[5] In terms of the focus of this thesis, four important South African studies, highlighting aspects of and variations on themes and concepts explored here, are given more detailed reference, providing an historiographical context for this study.

Robert Ross' study of economy in the south-western Cape argued that capitalist penetration of the agro-economy and the entrenchment of a "landed gentry", had taken place by at least 1800. The necessary proletarianisation of the labour force was, in his view, firmly in place by the 1860s by which time production, long since contingent upon an interaction with the local and international markets, occurred on the back of a dispossessed and therefore proletarianised labour force.[6]

Ross has been criticised by Bradford and Krikler for confusing commercialisation and capitalization and for equating dispossession with proletarianisation.[7] Nevertheless his study has provided western Cape historians with important insights into the relationship of the farmer ruling class with

---

[4] S. Marks and A. Atmore (eds), Economy and Society in Pre-Industrial South Africa, (London, New York 1980), T.Keegan, Rural Transformations in Industrialising South Africa The Southern Highveld to 1914, (Johannesburg 1986), W. Beinart, P. Delius and S. Trapido (eds), Putting a Plough to the Ground Accumulation and Dispossession in Rural South Africa 1850 - 1930, (Johannesburg 1986), H. Bradford, *The Industrial and Commercial Workers Union of Africa in the South African Countryside 1924 - 1930*, Ph.D. dissertation, University of the Witwatersrand, 1985., R. Ross, *The First Two Centuries of Colonial Agriculture in the Cape Colony: A Historiographical Review*, Social Dynamics,9 (1), 1983., S. Dubow, *Land, Labour and Merchant Capital* (Cape Town 1982).

[5] J. Marincowitz, *Rural Production and Labour in the Western Cape 1835 - 1888 with Special Reference to the Wheat Growing districts*, Ph.D. dissertation, University of London, 1985; A. Mabin, *The Making of Colonial Capitalism. Intensification and Expansion in the Economic Geography of the Cape Colony, South Africa 1854 -1899*, Ph.D. dissertation, Simon Fraser University, 1984; R. Ross, *The First Two Centuries of Capitalist Agriculture*, in P. Delius, W. Beinart and S. Trapido, (eds), Putting a Plough to the Ground Accumulation and Dispossession in Rural South Africa 1850 - 1930, Johannesburg 1986.

[6] R. Ross, *The Origins of Capitalist Agriculture in the Cape Colony* in Putting a Plough to the Ground, pp. 56 - 101 and *Emancipations and the Economy of the Cape Colony*, unpubl. paper forthcoming in N. Worden and C. Crais (eds.), Breaking the Chains: Slavery and Emancipation in Nineteenth Century South Africa, p. 10.

[7] H. Bradford, *Highways, Byways and Culs-de-Sacs*, p. 82.

the vagaries of market place activity, a vital element of any analysis of agrarian capitalization. His apparent 'reduction of labour relations to insignificant details' does not deter from the notion upon which his thesis rests: that the dispossessed indigenous Khoisan together with a slave labour force, by virtue of the former's loss of access and the latter's lack of access to the means of production, particularly land, largely precluded them from taking directions other than wage labour.[8]

For this study, Ross' focus on production output both prior to and after emancipation, is important. He contends that production in fact increased in the immediate post-emancipation period. This would indicate that, in the context of an injection of capital for technological development, a free wage labour force was available in sufficient numbers for agricultural production to continue and even expand.

Production output increased as a result not only of increased productivity but because of international and local market forces as well as the farmer's access to capital and credit. Taking into account the variations pertaining to the markets of different crops such as the relative stability of the wheat and the fluctuating nature of the wine market, production, in Ross' view, carried on much the same as it had done under a system of slave labour. Ross is careful to state that "all round productivity" was not simply related to an emancipated labour force, but he does argue that production was not negatively affected by emancipation as farmers had feared. The reasons for this must be sought in more than the nature of the labour force. The markets and availability of capital resources were undoubtedly major contributory factors.[9]

While Ross has focused on the relationship of markets and production output, John Marincowitz, concentrating on the wheat districts of the south-western Cape, has shown the relationship of proletarianisation and resistance in these regions of the Cape between 1838 and 1888. In an earlier study Marincowitz explored the relationship of mission stations to the process of proletarianisation and how those enclaves of supposedly independent cultivation, provided an accessible labour pool for capitalising farmers in the surrounding countryside.[10] In this study of Klaver Valley, the mission station of Groenekloof/ Mamre, provided a vital source of labour for

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[8] J. Krikler in H. Bradford, *Highways and Byways*, p. 82.

[9] R. Ross, *Emancipations and the Economy of the Cape Colony*, forthcoming, pp. 10 - 14.

[10] J. Marincowitz, *Proletarians, Privatisers and Public Property Rights: Mission Land Regulations in the Western Cape between Emancipation and Industrialisation*, SOAS Seminar Paper, and *Rural Production and Labour in the Western Cape 1838 - 1888*

Klaver Valley and other surrounding farms, and retained its role as the main source of labour for the farm, throughout the nineteenth century.

No western Cape study has focused on the nature of labour tenancy and it is rather Timothy Keegan's study on the Southern Highveld that has illuminated this aspect of proletarianisation in his analysis of a transitional form of labour tenancy of the farm labour force.[11] In this study he argues that this type of "wage-in-kind" labour was especially prevalent on farms which were highly capitalised and was an option open to farmers with a negative cash flow. The specificity of this study is extremely helpful in terms of our understanding of the transitional nature of capitalist development and clearly shows that the albeit limited access to land did not give the open-sesame to "free" wage labour, but was in itself, a form of wage labour. Perhaps the term "wage labour" has to be explored in much more historically pertinent ways. Farmers' labour tenants were tied into a relationship of wage employment and their access to land, while it existed, was predicated upon a relationship with an employer.

In South Africa then, as Keegan has shown, the variety and degrees of transitional positioning of those workers on the continuum of "freedom from means of production" were many and varied and depended upon the local as well as the wider conditions of capital accumulation. These different stages were reached at various times and took different forms. A labour tenant's access to land did not free him from labour. The pressure put on him by the farmer, for use of his family as well as his own labour and the increasingly oppressive land and labour legislation which, while always unevenly operative on the ground, ultimately prevented any form of viable peasant production for any sufficient length of time.

Keegan's study indicates that to determine the proletarianisation of a labour force simply by looking at access to means of production, obfuscates the internal complexity and necessarily transitional nature of such a process. We need to investigate more clearly the "on-ground" complexities of factors such as access, wages and terms of employment, in the context of the wider economic pressures, the farmer's activities and the material conditions in which the labour is being procured and utilised and investigate the form and nature of wages and the regularity with which they were paid to workers.

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[11] Timothy Keegan, Rural Transformation in Industrialising South Africa The Southern Highveld to 1914, (Johannesburg, 1986.)

In a geographically wider study, Bradford looks at the nature of capitalization in the Transvaal, providing important considerations for understanding the transition to capitalist agriculture and giving us much needed insights into what constituted a capitalist farmer and what mechanisms for labour sale and usage existed.[12] This study has provided a much needed understanding of what constituted a capitalist farmer in the context of climate, cash and coercion. Her work further investigates the nature of "self-commoditisation" of labourers in the context of the patriarchal homesteads. Ultimately, if the wage was controlled by anyone other than the person who had earned it, for example, the headman, that individual's level of proletarianisation was as yet incomplete. Again, Bradford's work opened up further debates on the nature of proletarianisation and on the lack of clarity contained in the term "wage-labour".

In the South-western Cape since the majority of the labour force consisted of imported slaves and indigenous Khoisan whose social structures had already been dismantled by the early 1820s, these considerations do not impinge to the same degree on the Western Cape proletarianisation debate. However, as a trigger to more clarity of understanding of what constituted a "free wage labourer", the notions of either social or kinship/familial obligation must be explored. Can one say that a wage earner, for example a woman or a child, was not fully proletarianised until they controlled their own entry onto the labour market and the appropriation of their wage and subsequent expenditure?[13] While many rural studies have looked at the relations of production and the specificity of coercion and control by farmers over workers and while many have argued for a "tempering paternalism", few have looked at the nature of this on the ground.[14] With the exception of van Onselen, these have in the most part relied on Genovese's conceptualisation and formation of the concept of paternalism, seeing it as an almost ameliorating device oiling work and production relations. Van Onselen on the other hand argues that as an ethos which pervaded both pre-capitalist and capitalising relations of production, by its very nature it was capable of "generating violence at either the individual or collective level", at various stages and moments of recreation or demise.[15]

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[12] H. Bradford, A Taste of Freedom: the ICU in Rural South Africa, 1924 - 1930, (New Haven, 1980) and in *Highways, Byways and Culs-de Sacs*, pp. 69 - 70.

[13] H. Bradford, *Highways, Byways and Culs-de Sacs*, pp. 69 - 70.

[14] P. Scully, Bouquet of Freedom, (1990) T. Keegan Rural Transformations, (1986) and more recently, C. van Onselen, *The Social and Economic Underpinnings of Paternalism and Violence on Maize Farms of the South-western Transvaal, 1900 - 1950*, African Studies Seminar Paper, May 1991, University of the Witwatersrand.

[15] C. van Onselen, *Social and Economic Underpinnings of Paternalism*, p. 39.

This thesis, while attempting to clarify stages and features of capitalization and proletarianisation, also addresses concepts directly linked with labour, mechanisation and capitalization. Much of the most recent socio-historical conceptual developments on work, time and labour processes, has emanated from Britain and America, and these have helped provide new ways of looking at human beings who lived and laboured in industrialising Britain.[16] More broadly and in terms of conceptual foci, they have provided a context for the analysis of these processes on a single farm in the Malmesbury district.

While this study argues for capitalist relations of production early on in the nineteenth century, it does take into account that a capitalist economy was not fixed and static, but changed and was reshaped. Apparently pre-capitalist features continued to exist and in fact very often promoted further intensification of capitalist practices. While this thesis does not purport to speak for the general, it attempts to get behind that generality and assess the degree to which agricultural activity moved between pre-capitalist and increasingly capitalist and/or capitalising conditions and characteristics, from the perspective of production output and its interaction with market forces.

Where was the recipe for capitalist enterprise on the land formulated, by whom, and how was that recipe synchronised with local conditions over the period under review? In studying the impetus for change and development along the capitalist continuum, in terms of increased mechanisation of the labour process while the labour force was still predominantly "unfree", it is evident that variations existed on the characteristics and pace of that change. The farmer and workers alike, at various stages, capitalised often hesitatingly through periods of both material and mental adaptation, often displaying the ability to employ apparently pre-existent measures of control and compromise.

In the intensely capitalist context of the farm, which early on developed into a self-contained unit of production and manufacture, the relations of production were at once shaped by varying notions of time, work ethic capitalist and proletariat consciousness, often overseen by a paternalism which in itself adapted to the new mode of production. While this paternalism has often been seen as an antiquated mechanism for social relations, it could and did reform itself in a new context.

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[16] P. Joyce, (ed.), The Historical Meaning of Work, New York, 1987, and E. and S. Yeo (eds), Popular Culture and Class Conflict 1590 - 1914 (Brighton, 1981) and articles on paternalism, social control, development of class, in Social History and History Workshop Journal

Focusing on one farm as a unit of production, has allowed for generally understood concepts and processes to be unpicked in fine detail. In this study we are able to meet the farmer and workers in their own context, on the Klaver Valley farm. This study has only been possible because of the discovery, while doing oral research for my Honours dissertation, of a set of farm journals dating from 1829 to 1898.[17] They are, as an archival resource, unique. No such similar set of farming accounts is known for the western Cape and so I completed as full an investigation of them as possible.

The farm journals contain day-to-day accounts of the activities on the farm (who worked, their labour and remuneration, with infrequent references to the specific labour process and relationship of labour output to wage earning). Particularly in the pre-emancipation period, there is detailed evidence of the farmer's financial activities, and although less detailed from the 1840s, nevertheless does provide us with insight into his financial activities. From the 1860s the records become much less detailed and by the early 1870s, provide very little information. From 1873 to 1893, there are no records available. They begin again in 1893 through to 1898. The four wage books which are still extant, do not constitute a full record of workers' wages and labour, are organised according to workers' names and so cover a wide period, although in limited detail, of 1820s to 1870s. Very often a worker remained on the farm beyond the date at which his wages are recorded. The periodisation for this thesis was largely determined by that of the journals, since it is based on this farm and is a study of the particularity of space, time and action, with as much of the minutae as is possible to retrieve.

The inhabitants of Klaver Valley and I have opened the door for scrutiny, analysis and categorisation which it is hoped, will contribute to the current debate on transitions to and processes of capitalization and proletarianisation in the south - western Cape countryside.

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[17] For a full list of the journals and the period they cover, see the bibliography. These journals are in the possession of Mr F. Duckitt

CHAPTER ONE:
The Changing Face of Klaver Valley 1812 - 1898

If you take the N3 out of Cape Town and travel along the old West Coast road past the drifting white sand of Mamre, you will, soon after the rusted sign which reads *clieniek*, turn off along a winding sand road which forks to the left taking you to Klaver Valley.[1] The road onto the farm which is bordered by trees and bush is short and you soon reach the farm house of typical Cape Dutch architectural style standing solidly above the rest of the farm holding. Right in front of the house, reminiscent of the pictures one finds so frequently and always romantically referred to in popular books on slavery, is the slave bell firmly implanted in a massive granite rock. As you look out over the farm you are struck by the closeness of the buildings to the homestead. The forge,

Photograph 1: Klaver Valley Farm House, 1992

a small insignificant structure, is but a stone's throw away and the sheds are neatly placed across the road. There are small fields in between and on either side of both these buildings, which are

[1] Refer to District Map in back pocket cover to see Klaver Valley's situated in the District of Malmesbury. The aerial photograph on page vi, shows a modern view of the layout of the lands of Klaver Valley.

sowed with grain today. Klaver Valley's present owner is largely absent from the farm, and production is overseen by a manager, while the owner makes brief and frequent visits to monitor progress in production and the restoration of the original farm house.

This is a far cry from 1812 when William Duckitt, an agriculturist from England who "was engaged by the Government to proceed to the Cape for the purpose of improving the state of agriculture of that colony" in 1799 came to Klaver Valley.[2] He took up residence on the farm and began a process of landscape transformation and intensive agricultural and industrial production.[3] William Junior, his sons, Peter and Henry and his daughter, Anna Catherine continued farming until the 1890s when Edward Ranier Ruperti, her brother-in-law, took ownership of the farm. From then until 1898, the focus of production, while not changing completely, underwent a series of changes as a result of the introduction of technological innovation, interaction with market forces and financial booms and slumps. As a result of these agricultural developments, the landscape of the farm was completely transformed.

In 1812 Klaver Valley was a stock farm which supplied a thriving market in Cape Town. William Duckitt took occupation of Klaver Valley and continued to honour the meat contract he had obtained in 1801.[4] By the 1820s, the farm had undergone major changes in land usage with the development of cultivation. As a result of early mechanisation and innovative farming practices grain production steadily increased, to reach a peak in 1825 and 1835, and declining steadily throughout the nineteenth century, only showing signs of improvement in the 1890s. It did however remain one of the farm's major activities.[5]

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2 P. Philip, British Residents at the Cape Biographical Records of 4 800 Pioneers, (Cape Town, 1981), pp. 106 - 107.

3 *Opgaaf Returns*, 1812, C.A., J. 45, p.1. William Duckitt junior took over Klaver Valley from his father in 1825 and farmed it until 1871, when he sold all his stock and implements to his daughter Anna Catherine. She was married to Herman Ruperti, a German trader who had a store at Commercial Dale, close to Klaver Valley, and together with Henry and Peter Duckitt, she and her husband farmed until at least 1893, when Edward Ranier Ruperti, Herman's brother appears to have taken ownership of the farm.

4 D.J. van Zyl, *Die Geskiedenis van Graanbou aan die Kaap*, Archives Year Book, 31, Part 1, p. 237. The meat contract provided fresh meat to passing ships in Cape Town. Van Zyl dates William Duckitt's first year of occupation in 1810, but according to the *Opgaaf Returns* it was only in 1812 that the first grain was produced.

5 Correspondence of William Duckitt and Jacobus van Reenen, in which van Reenen refers to Duckitt's innovations with regard to his methods and new plough which "spared two-thirds the number of cattle and half the number of slaves" in A 1323, C.A., Correspondence, 22 March 1806.

The vineyards which were first introduced in 1815, disappeared from the face of the farm in the mid-1840s as a result of changing market determinants, and became the ground on which the seed of other agricultural produce, grain and vegetable crops were sown. It was only in the 1870s that the vineyard took on a new lease of life and resumed production until at least 1898. While the vineyards disappeared for a generation from the farm, stock production continued throughout the nineteenth century.

Sheep were present on the farm from at least the early 1800s when they were used to condition the land and provided income from the sale of their skins. It was only in the 1840s that the farmer's active interaction with the market, allowed for specialisation of breeds and the development of wool production on Klaver Valley, which continued to the end of the century.

Developments in transportation which arose out of rescheduling the use of stock, occurred throughout the nineteenth century, particularly with the infrastructural developments both on and off the farm. The growth of Malmesbury as a business and industrial centre and the spread of road and rail networks allowed for quicker and less arduous transportation of produce to the market. It also made possible the importation of a wider variety of household and farm commodities onto the farm. As the industrial developments proceeded, the farm and its population, initially almost totally self-reliant, became increasingly dependent upon outside sources to supply agricultural and general subsistence needs. Farm technology was, until the 1840s, largely manufactured on the farm both to serve the needs of production on Klaver Valley and also for sale to other farmers in the district.

From 1812 to the 1898 the farm changed its face and became an increasingly diversified and specialised unit of small, but important agricultural and industrial business. Through four generations of farmers, Klaver Valley maintained its productivity although experiencing major booms and weathering massive slumps, brought about by changing market forces, changes in the farmers' financial status and weather taking their toll on production output. The almost complete transformation of the farm landscape, beginning in 1810, had been brought about by the 1890s, with the development of arable fields and the addition of buildings.

The Landscape

From 1810 to 1898 the landscape changed its function and look, undergoing its most overt transformation during the first few decades of Duckitt's occupation. On one level the physical

appearance of the lands changed with the clearing of virgin bush and the development of cultivation. On another level it changed its function in as far as, through the nineteenth century it became the base upon which a varied assortment of structures was placed and additional "natural attractions" like trees were planted. All these changes came about as a direct result of agricultural enterprise and capitalization of the farming process.

The transformation began and was at its most intense during the first thirty years of farming when most of the virgin bush was cleared for cultivation and grazing. With every year which passed, seeds of various crops were rotated which changed the look of the fields on the farm. Dams were constructed, a blacksmith's forge was built in the 1820s, a mill in 1837, a dairy in the 1890s, and "*pondoks*" for herdsmen and labourers were implanted on the landscape.[6] Land which had once been open, was fenced in 1898 and had become private property. Although less permanent these changed the face of the farm forever, since later changes would come out of those already effected on Klaver Valley.

The 1860s through to the 1890s witnessed additional changes to the landscape with a dam being built in 1861 and other structures being added which would change the landscape.[7] By 1898, while the boundaries looked very much as they had done in the 1850s, the farm looked different. It no longer had a mill, a new dairy had been erected, Port Jackson seed had been planted on the Pampoenvlei boundary of the farm in an attempt to stop the drifting white sands blowing from the coast onto the fields, a horse course had been marked out on the farm and the entire farm had undergone a process of privatisation, evident in the form of fences.[8]

In 1897 a series of water pipes was laid to improve irrigation.[9] The transformation of the landscape, changing levels of production and the various directions the agricultural business took in the nineteenth century, occurred either directly or indirectly as a result of the Duckitt's and the Ruperti's responses to market forces.

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[6] References to a "the smithshop", K.V.J. 9 April 1833, to the repair of the mill, K.V.J. March 1843 which was still on the farm in 1871, K.V.J. 27 March 1871, to the wine cellar in March 1833. "*Pondoks*" was often used by Duckitt when referring to the homes of workers, e.g. references to April and Fortune's "*pondoks*" in March 1853. K.V.J. 29 March 1862, thatching of "*pondock*" at sheep's kraal.

[7] K.V.J. 1 - 31 January 1861. Further constructions are difficult to verify because of the paucity of information in the journals during the 1860s and early 1870s and the absence of any records for the 1880s.

[8] K.V.J. September and October 1895 reference to a new dairy being built, K.V.J. 29 June 1898 to the planting of Port Jackson seed, K.V.J. 24 August 1898 reference to horse course and K.V.J. 27 December 1897 and 10 - 16 June and 1898 reference to wire fencing.

[9] K.V.J. 19 May 1897. These would probably have been wooden pipes.

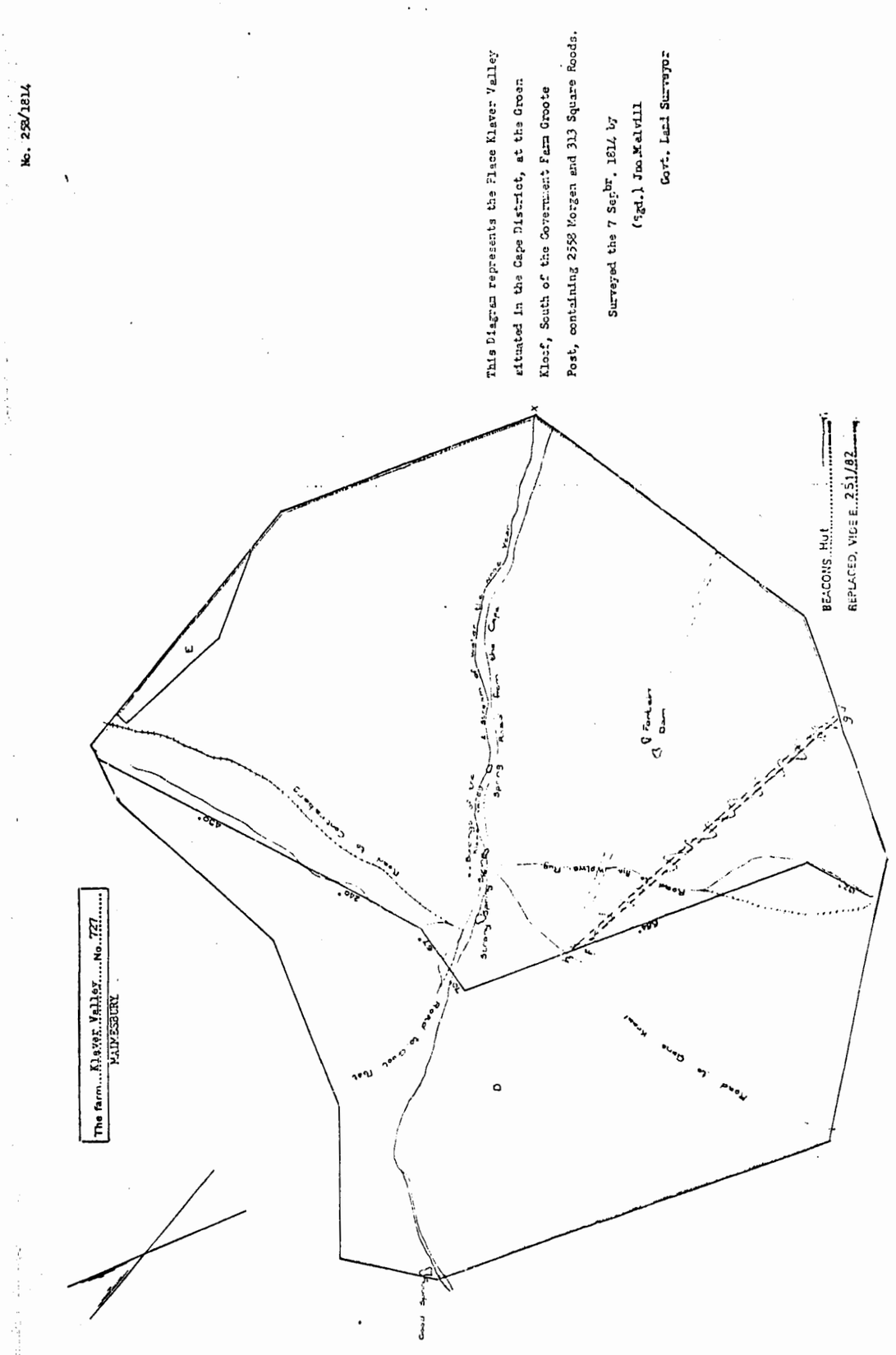

Figure 2: Klaver Valley in 1814

Source: Deeds Office , Cape Town, Farm No. 727.

This thesis argues that production on Klaver Valley had developed quite far along capitalist lines by the 1830s, and this chapter shows the market to have been a major factor influencing and determining production output and changes of focus. That the technological and methodological innovations particularly in the early years, were undoubtedly compatible with the farmers' English backgrounds and experience, should not detract from the very obvious capitalistic interaction of the farm with externally determined market forces, even after the ownership and management moved in the 1870s into the hands of Herman and Edward Ruperti, both of German/Portuguese origin.[10]

Grain, Wine and Wool Production

Klaver Valley was, by contemporary standards, an average sized farm, measuring 2 558 *morgen* 313 square *roods*.[11] When Duckitt began cultivating in 1812 he began on a small scale but the massive increase over the next seven years, would indicate that once the tenure of the farm had been secured, conditions were more favourable for production for the market and concomitant investment in the farm.

Prior to 1815 Duckitt held Klaver Valley on loan, which meant that he could have lost it after his term of tenure expired. In 1813 occupants of loan farms were given the right to apply for perpetual quit-rent tenure, which enabled him to hold the farm hereditarily and was free "to sell or alienate it, either partly or wholly, as free allodial property."[12] Duckitt took advantage of this change in the law, to secure his ownership. His annual rent of Rds 50, was considered low enough for him "to remunerate himself for such improvements in agriculture as he may have brought into the settlement."[13] Coinciding with the change in his tenure was an almost 600% increase in wheat output, from 60 *muids* in 1812 to 400 *muids* in 1815.[14]

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[10] Herman Ruperti had, prior to marrying Anna Catherine in 1864 (K.V.J. 3 February 1864), been a trader at Commercial Dale. Personal Communication, Mr F. Duckitt, Darling, December 1990.

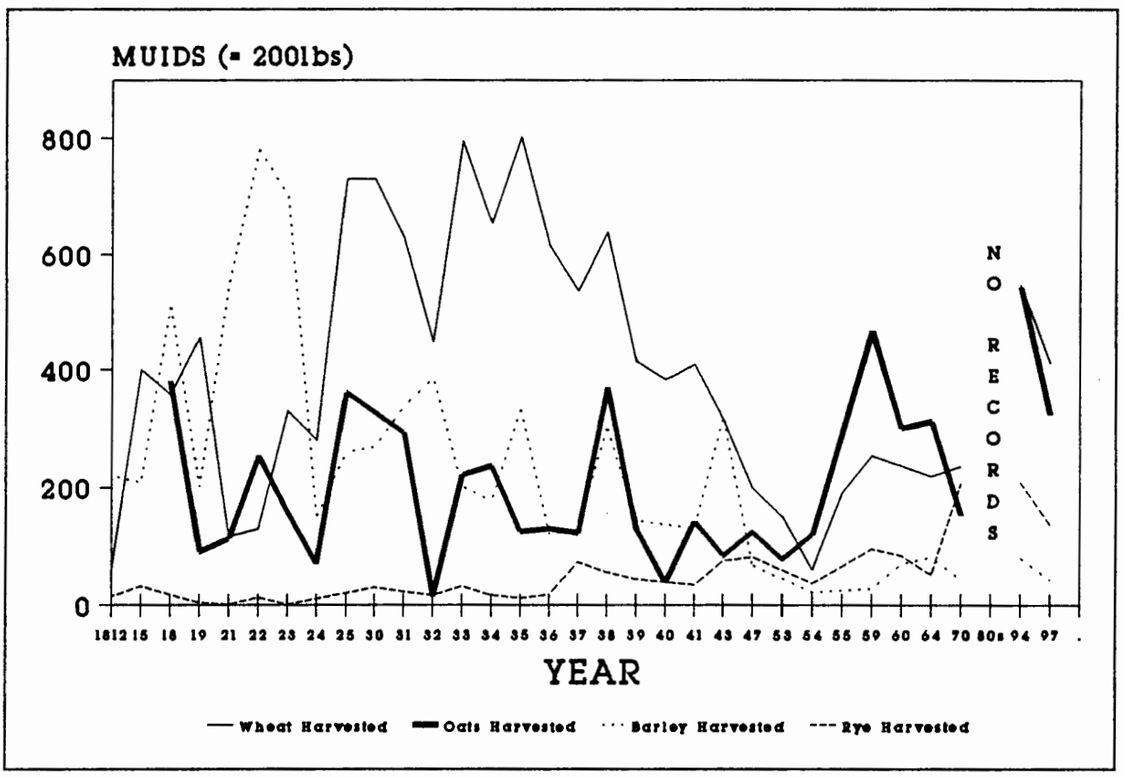
[11] Quit-Rent Journal, Cape Qts, vol. 2, 6/9/1814 to 2/6/1817, folio 505 - 506, New Farm registered, Malmesbury, Deeds Office, Cape Town. For average size of farms in the district and the South-western Cape Division, H. B. Thom, Die Geskiedenis van Skaapboerdery in Suid-Afrika, (Amsterdam, 1936), p. 42.

[12] C.G. Botha, Collected Works, vol. 2., p. 94., also L.C.Duly, British Land Policy at the Cape 17[illegible] 1844. A Study of Administrative Procedures in the Empire, (Durham, North Carolina, 1968)

[13] Quit-Rent Journal, Cape Qts, vol. 2, 6/9/1814 to 2/6/1817, folio, 505.

[14] See Table of Production Output on Klaver Valley 1812 - 1897, p.8 below.

In 1820 Duckitt Senior divided the farm roughly in half, giving the smaller portion of 1008 *morgen* 415 square *roods*, later called Pampoenvlei, to his first son, William Jnr. in 1820.[15] The remainder of 1549 *morgan* 498 square *roods* retained the name Klaver Valley. Duckitt, as any farmer desirous of making his farming a profitable business, watched these prices, feeding a developing local market, rise with eagerness.[16] That the price would drop to Rds 68 in 1816 might not have been foreseen, but the unprecedented harvest of 380 *muids* of oats and 511 *muids* of barley in 1818 strongly suggests that Duckitt was improving his other crop harvests in the event of wheat prices falling dramatically.[17]



It is important to note that it was in 1818 that Duckitt first began to produce wine and brandy on Klaver Valley. The all-round increase in farm output prior to 1820 must also be seen in the light of his interaction with and responses to the market. From 1806, the price of wheat had risen

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[15] Quit-Rent Journal, Cape Qts, vol. 2, 6/9/1814 to 2/6/1817, folio 505.

[16] R. Ross, *The Cape and the World Economy 1652 - 1835* in R. Elphick and H. Giliomee, (eds), The Shaping of South African Society 1652 - 1840, p. 254 - 255.

[17] D.J.van Zyl, *Die Geskiedenis van Graanbou*, pp. 222 - 226.

dramatically, reaching Rds 104 per 100 *muids* in 1813, and jumping to Rds 132 in 1814, which explains the dramatic rise in wheat production from 60 *muids* in 1812 to 400 *muids* in 1815.[18]

The increase in production prior to 1820 was clearly related to the fact that Duckitt was farming on a large area of land and responding to market forces. The sudden drop from 454.75 *muids* in 1819 to 116.25 *muids* of wheat in 1821 must be seen in the context of the division. Production of barley increased from 220 *muids* in 1812 to 551.5 *muids* in 1821, at variance with the general levels of colonial production output.[19]

Until Duckitt's death in 1825, production figures fluctuated, with an increase in 1822 and 1823 in harvested barley, reaching over 700 *muids*, oats wavering between 113 *muids* in 1821 and 70 *muids* in 1824 and rye maintaining its status as the least produced crop, only reaching 11 *muids* in 1824. Much of the explanation for the steady growth in levels of production, especially in the early years, can be found in Duckitt's use of new and more productive technology. He had come to the Cape at the beginning of the century to develop local farming techniques and had brought with him, breeding stock, skilled labourers and very importantly, newly developed implements and innovative farming techniques from England.[20] Early on then, he had developed the business of mixed farming, the practice of crop rotation, knowledge of the importance of fertilising the land and developing new agricultural techniques and innovations which proved to be successful.[21]

William Duckitt Senior had begun wine and brandy production in 1818 at a time when the wine market, both local and international was experiencing a boom.[22] This is a clear example of his active response to changing market trends. 1.5 *leggers* (873 litres) of wine had been produced in

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[18] D.J.van Zyl, *Die Geskiedenis van Graanbou*, p. 271.

[19] See Graph of Production on Klaver Valley 1812 - 1898, p. 7. R.Ross, *Emancipations and the Cape Colony*, University of Leiden, forthcoming, p. 22.

[20] A.C. Ruperti, A Short History of the Duckitt Family 1800 - 1954, C.A., Accessions Register, A 941, p. 1. and D.J. van Zyl, *Die Geskiedenis van Graanbou*, pp. 234 - 239. Between 1809 and 1825, output in the Cape increased by 83%, M. Rayner, *Wine and Slaves: The Failure of an Export Economy and the Ending of Slavery in the Cape Colony, South Africa, 1806 - 1834*, (Unpublished Ph.D. dissertation, Duke University, 1986), p. 16.

[21] Crop rotation meant that crops were rotated every two to four years. The English pattern was on a three to four year cycle. J. Weller, History of the Farmstead, (London, 1982), p. 215.

[22] R. Ross, *The Cape of Good Hope and the world Economy*, Shaping, pp. 249 and 254 - 255.

1818 and by 1825 his son's wine production had increased to 48 *leggers* (27 936 litres).[23] While the proportion of wine and brandy production in relation to grain and stock production on the farm is difficult to assess, it can be assumed that it constituted a major source of income, since besides selling on the local Cape Town market, Duckitt also had ready access to the local "farm market" and friends and relatives who did not themselves produce wine and brandy.[24]

William Duckitt Junior inherited Klaver Valley at his father's death in 1825 and continuing his father's mixed and innovative farming practices, produced a massive wheat harvest of 730 *muids*, oats of 360 *muids* and 260 *muids* of barley.[25] This came but a year after the wine slump and again, is evidence of the farmer's response to changing market conditions which precipitated a stronger emphasis on grain as opposed to wine.[26] A greater interest in wheat, a more stable crop in terms of its position and price on the market, was clearly evident here. More land had been cleared for grain cultivation and more wheat seed had been sown than in 1824, 22.5 *muids* more than that sown the previous year. Furthermore, with annual fertilisation using cattle dung produced on the farm and the practice of crop rotation, the yield too, was higher, being 1:12.7, as opposed to previous yields of 1:2.9 in 1821 and 1:9.2 in 1823.[27] In 1825 the tariff on French wines was changed which effectively made them less expensive and more accessible to European buyers and according to Governor Bourke in 1828, the "low prices of wines in the last years...(had) caused great discouragement".[28] Duckitt nevertheless continued to produce both wine and brandy, no doubt because of his access to the "farm market" and the need for wine and brandy on farms.

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[23] *Opgaaf Returns*, J. 48., 1818, p. 32 and J. 56., 1825, p. 13. C.A., for total amounts produced. A *legger* is equivalent to 582 litres.

[24] The "farm market" (my label) was one which operated between farmers in the district and Duckitt was able to sell grain, wine and farming technology on this market, with few if any overheads incurred by transport costs, etcetera. See Markets below.

[25] *Opgaaf Returns*, C.A., J. 56. p. 13.

[26] The *Opgaaf* figures for Klaver Valley's wine production in 1825 show an increase of six *leggers* compared with 1823 when 42 *leggers* of wine were produced. It seems that wine production decreased during the following decade with only 25 *leggers* being produced in 1837. See *Opgaaf Returns*, J. 53 and J. 56, ibid., for 1823 and 1825, respectively.

[27] Ratios for 1824, 1823 and 1821 calculated from figures obtained from *Opgaaf Returns*, ibid., for 1824, 1822 and 1821 respectively.

[28] M. Rayner, *Wine and Slaves*, p. 194 and Governor Bourke to Juskisson, 19 May 1828, in PRO C.O. 48/124, fol. 276, cited in M. Rayner, *Wine and Slaves*, p. 197.

Until 1835 grain production continued to progress steadily with a marked drop in wheat and oat harvests in 1832, but a return to previous figures occurred in 1833 with the highest harvest in the past and future history of the farm being recorded in 1835 when 802.25 *muids* of wheat, 124.5 *muids* of oats, 333.75 *muids* of barley and 12.5 *muids* of rye were harvested.[29] Coming as this harvest did, but four years after mechanical threshing machine had been introduced into the harvesting process in 1829, this increase is easily understood. That the positive effects on output as a result of mechanisation were only evident after a period of four years must be seen in the context of the adaptation to mechanisation which shows a staggered process of improvement as opposed to instant increases.

From 1835 to 1839, the harvest figures dropped, with only 414 *muids* wheat, 18.75 *muids* oats, 143.25 *muids* barley and 44.25 *muids* rye being harvested at the end of 1839, not to return to the high output of 1835 for the remainder of the century.[30] Emancipation and the introduction of complete wage labour cannot be seen as the only reason behind the reduced output. In fact they probably had less to do with it than the change in production focus. Ross correctly argues that production in the post-emancipation period was "scarcely affected even in the medium term by the emancipation of slaves," and that if anything, production levels rose during this period.[31]

1839 marked the onset of a decade of decreasing grain production but increasing sheep and wool production on Klaver Valley ,unlike the rest of the colony. Taking into account the underlying principles of Duckitt's farming practice, with no permanent emphasis on one crop or area of production and his constant interaction with market forces, the change in emphasis and much heavier emphasis on wool production was not surprising.

In some ways the 1840s and 1850s were years of inherent contradiction for Klaver Valley and mark a period of transformation of the farming enterprise. It was in the early years of the 1840s

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[29] Total harvest figures were obtained from the Klaver Valley Journals by totalling the figures of grain harvested on a daily basis. K.V.J., November and December 1834 and January through to March 1835.

[30] Graphs of Wheat, Oats, Barley and Rye Production Output on Klaver Valley 1812 - 1898, p. 8 above.

[31] R. Ross, *Emancipations and the Economy of the Cape Colony*, forthcoming in Breaking the Chains, p. 7. Refer also to his Table 1, Production of Agricultural Commodities, op. cit., p. 22.

that specialisation of the oat, barley and rye crop occurred on Klaver Valley.[32] This specialisation was closely linked to the fact that Duckitt, besides selling his produce on the "farm market", was also supplying the Commissioner of Police and Sinclair and Company in Cape Town with hay during this period. On the one hand the production of grain crops declined and on the other, he exited one area of agricultural activity, namely wine production, which had become economically unviable and entered wool production which had proven profitable to his close associate, Van Reenen and would prove financially profitable for him.[33] The change in focus of the farm during this period brought about further modifications of and additions to the landscape. Former vineyards now came under the plough for grain and former grain lands were set aside for grazing and the erection of shepherds' lodgings and kraals for the ever increasing flocks of sheep which came onto Klaver Valley.

Throughout the 1840s, especially in the latter half, and the early 1850s, grain production dropped drastically to figures lower than the early 1820s and reaching an all-time low in 1854 a consequence of the heavy rainfall experienced that year and the subsequent damage to the grain.[34] This was partly due to financial problems experienced by Duckitt in the early 1840s, mainly in terms of cash flow and a squeeze on access to credit.[35] As a result of stopping wine production in 1846 he was now forced to purchase the farm's wine and brandy. Thirdly, by the mid 1840s, he was intensively engaged in wool production which throughout the colony had been on the increase since the early 1830s.[36] This period, possibly more than any other during the nineteenth century provides evidence to the nature of 'progressive' development of the farm as a productive business unit interacting with market trends and forces. The nature of the development, unlike the changes effected on the natural landscape, and because they were not linear and constant, were often slow to develop.

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[32] K.V.J. January - March 1842 for references to oats which were sold on the market and that which was retained for seed; K.V.J. November 1844 - January 1845 for references to barley and rye being similarly divided.

[33] For Van Reenen's development of the wool, especially the Merino industry, H.B. Thom, Die Geskiedenis van Skaapboerdery in Suid Afrika, pp. 52 - 69, and J.C. Chase, The Cape of Good Hope and the Eastern Province of Algoa Bay, London, 1843, pp. 170 - 173, on origins of wool trade.

[34] K.V.J. January through to December 1854, especially during the harvest season when rainfall brought about the rotting of the harvested crop, especially oats.

[35] The economy of the Cape was in depression in the early 1840s and no doubt this exacerbated Duckitt's financial problems which will be discussed in Chapter Three below.

[36] M. Rayner, *Wine and Slaves*, p. 241.

Table 1: Wool Production on Klaver Valley 1841 - 1898*

YEAR		INCOME FROM SALE OF WOOL
1841	1114 lbs wool	
1842	1019 lbs woll (lamb & ewe)	
1843	-	
1844	837 lbs wool (incomplete)	3 separate payments Rd 660 Rd 74.1.4 Rd 647.1.4 £101. 2.8
1845	714 lbs wool (incomplete)	£114. 2.4
1846	1399 lbs (Dutch) 1/- per lb	
1847	1639 lbs 1/- per lb	
1850	501 lbs	
1854	685 lbs (Dutch)	
1855	764 lbs	
1856	513 lbs	
1859	500 lbs (incomplete?)	
1861	-	£16. 7.2
1862	1266 lbs	
1893	2758 lbs	£60.14.3
1894	2658 lbs	£48.11.3
1895	± 2800 lbs (8 bales, 2 bags)	£54.10.0
1895	2873 lbs	£52. 3.5
1897	2553 lbs	£55.17.4
1898	3908 lbs	£88.

* Amounts of wool produced from totals given in journals on day of transport of wool to market. Income recorded here when it was recorded in the journals

Duckitt's entry onto the wool market was slow. He first produced wool in the 1840s, apparently at the expense of other aspects of the farm's productive capacity. He had close alliances with the Van Reenens who initiated the development of wool production in the western and later eastern Cape and this gave him a distinct advantage over those farmers who did not have such elite and 'economically progressive' connections.

He had kept Cape sheep, those with very little wool on their bodies, on Klaver Valley as they were an important part of the farm cycle in providing a means of conditioning the land. He had also invested in Merino sheep and over the years, had perfected his stock. Clearly his contacts with the van Reenens alerted him to the profitability of wool production, and while he continued to hold a stock of Cape sheep and make money from the sale of their skins, he produced his first wool in 1841, 1114 lbs sold at 2 *skelling* 4 *stivers* per 100 lbs.[37] His production of wool continued throughout the 1840s with his highest output occurring in the late 1840s, producing 1399 lbs (Dutch) of wool sold at 1/- per lb in 1846 and 1639 lbs sold at 1/- per lb. in 1847.[38] His increased production and profit from wool sales in the late 1840s coincided with the wool boom in the Colony which continued into the 1850s.[39] In partnership with Mr Becker, Duckitt purchased 650 Merino sheep costing £1 each in 1846.[40]

This was a high investment into the farming business, indicative of Duckitt's increasing capitalization. Together with his 381 wool-producing sheep, he now had nearly 1 000 sheep grazing on the land.

The 1840s witnessed the beginning of a profitable line of business for Klaver Valley farmers, although it also marked the low point of his grain production and it was only in the 1850s that output of wheat and oats increased. After the disastrous harvest of 1854, the following year marked the first in the upswing of production, with 190.25 *muids* wheat being harvested.[41] Throughout the 1850s there was a definite increase in production output, peaking in 1859 at its highest since 1843, with 254 *muids* wheat, 467 *muids* oats, 28 *muids* barley and 95.5 *muids* rye being harvested for that year.[42] The increase in the mid 1850s can be attributed largely to the

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[37] The use of non-wooled variety of sheep for land conditioning was explained to me by Mr F. Duckitt, Darling. First wool sale recorded in the journals, K.V.J. 15 April 1841, although he had first sheared sheep in 1834, but apparently with no success, K.V.J. 9 March 1834.

[38] K.V.J. 18 November 1846 and 12 November 1847 respectively. See Table on Wool Production 1841 - 1896, p. 15 below.

[39] A. Mabin, *The Underdevelopment of the Western Cape, 1850 - 1900* in W.G. James & M. Simons (eds.), The Angry Divide, Cape Town and Johannesburg 1989, p. 83.

[40] Mr Becker had come onto Klaver Valley in partnership with Duckitt at the beginning of 1846 and made their first joint purchase, K.V.J. 20 November 1846.

[41] Totals for this and other years, do not appear as reliable as those in earlier decades. There are references to the harvesting and cleaning of oats, barley and rye but few figures. Wheat appeared to be the only crop on which a regular calculation was made.

[42] See graphs of production output on p.14 above.

introduction of a reaping machine in 1854.[43] From this year on, production output steadily increased.

Throughout the 1860s the journal entries are very scant and reliable evidence of activities on the farm are absent. It would appear that while production of both grain crops and wool, continued, it was not recorded as methodically as it had been in previous decades. In 1860 236,5 *muids* wheat, 300 *muids* oats, 70 *muids* barley and 84 *muids* rye had been harvested. In 1864 the grain production output, while slightly lower all round than that of 1860, no doubt as a result of the drought, showed neither a drastic reduction nor marked improvement which tends to suggest that production continued but without the earlier harvest successes of the years prior to 1840. Part of the 1864 wheat crop was an experimentation. In 1863 a new strain of wheat called *French Wheat* had been sown and this might have prevented the harvest from being totally disastrous.[44]

At the beginning of the 1870s, William Duckitt Jnr sold stock and grain to his daughter who, with her husband, Herman Ruperti, took control of farming operations.[45] It seems that while he continued to live on Klaver Valley until his death in 1884, William Duckitt ceased active participation in the farming business in this decade. While the management of the farm in this period is unclear, there were certain developments which did take place. The low harvests of wheat must be seen in the context of more emphasis being placed on specialisation than on quantities produced. While specialisation of the oat crop had occurred in the 1840s, specialisation of the wheat crop was only obvious in the 1870s. *Du Toit's*, *Boonsayer's* and *Hollow Straw Baard Wheat*, different strains of wheat were first recorded in 1870.[46]

Agricultural innovation and experimentation and market demands for differentiated classes of wheat in the 1870s, again created a response by Klaver Valley farmers. Duckitt, his sons and

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[43] K.V.J. 30 October 1854. A reaping machine cost approximately £35 and farmers in Malmesbury who did not own machinery paid on average £16 a year to have their grain crops reaped. J. Marincowitz, *Rural Production and Labour*, p. 109.

[44] K.V.J. 23 May 1864 for harvest of *French Wheat*.

[45] K.V.J. 30 December 1871, for entry of accounts of cattle, sheep, horses and grain sold to Mrs A. Ruperti from 1st October 1870 to 31 October 1871 which totalled £335.18.9.

[46] K.V.J. November and December 1870 and January 1871 for references to these strains.

Ruperti responded to these demands not necessarily in quantity, but quality.[47] The dearth of information contained in the journals for the rest of the decade, while being disappointing, is perhaps also an indication of the change in the interests of the farmer. Herman Ruperti, coming as he did from a different background, and only having taken up farming with his marriage to Anna Catherine, was no record-keeper. In the absence of any farm records in this decade, it is only possible to suggest the path of development taken by the farm.

With the discovery of minerals in 1868 and the population growth of the Cape Colony during this period, it would be safe to assume that Ruperti and the Duckitt brothers responded to the growing local market for grain produce and improved his production output, facilitated by the use of improved harvesting technology. Mechanised harvesting would have alleviated some of the stresses incurred by the expansion of the labour markets on railway and road developments in the 1870s. Increased mechanisation allowed for output to continue increasing, albeit it slowly, in terms of quantity and pace with less labour than required earlier.[48]

No records of production, financial transactions and general daily activities for the 1880s exist which strongly suggests that the practice of keeping records was not maintained during this decade. In the light of general trends in the Cape it is possible to deduce what Klaver Valley might have produced during the 1880s. For the most part it was a decade of economic recession, with a decline in the quantity and value of harvests as a result of drought and falling market prices.[49] This then would suggest that Klaver Valley, as with other farms in the district, experienced similar trends. Reading back from the figures for the early 1890s, it is safe to assume that production levels had begun to recover in the late 1880s.

In the 1890s Klaver Valley began to show signs not only of recovery, but greatly improved harvests when compared with those of the 1870s. 1894 production output was measured at 547 *muids*

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[47] Klaver Valley produced a higher quality crop rather than a larger harvest which was not the case generally in the district. J. Marincowitz, *Rural Production and Labour in the Western Cape, 1838 - 1888, with special reference to the Wheat Growing districts*, D. Phil. dissertation, University of London, 1985, p. 171. Malmesbury farmers almost doubled their output in 1873/4 harvest compared with that of a decade earlier.

[48] According to family mythology, the low levels of production of Klaver Valley during the 1870s, was to no small degree attributable to the poor farming abilities and general lack of interest in farming of Peter and Henry Duckitt, Personal Communication, Mr F. Duckitt, Darling, January 1990.

[49] J. Marincowitz, *Rural Production and Labour in the Western Cape*, pp. 235 - 236.

wheat, 543 *muids* oats, 80 *muids* barley and 209 *muids* rye.[50] By 1897 the harvest had dropped by about 20% and the reasons for this can be found in the new forms of land division. Although new land had been cleared and taken over by the plough, the use of machinery made larger fields a more viable norm.[51] Furthermore, with the introduction of imported guano in the early 1890s, land continued to be fertilised, maintaining viable yields.[52]

While grain production continued to generate income, and re-established itself after the 1880s as a major productive activity on Klaver Valley, wool production steadily increased its importance as a generator of income in the farming business. Throughout the 1890s wool maintained its viability, totalling 8 bales (approximately 2 553 lbs) of wool in 1897 and bringing in £55.17.4. in income from wool sales to H. Jones and 3 908 lbs with an income of £88 in 1898.[53] The size of Ruperti's troop also increased, numbering 685 in 1897 and 801 in 1898.[54]

Vegetable, Dairy and Technological Production

Vegetable, dairy and technological production, when compared with grain, wine and sheep, constituted a very important part of the farm's productive capacity and potential for profits. While each of these were sold on either the local and/or "farm" markets, they generally tended to constitute an important part of production providing the farm inhabitant's subsistence and access to technology by which the farming enterprise was able to develop. These areas of productivity also made their mark on the landscape, changing it in different ways from that of the larger scale and fully marketable grain, wool and wine production.

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[50] See Graphs on Wheat, Oats, Rye and Barley Output on Klaver Valley 1812 - 1897 on p. 14.

[51] K.V.J. March 1898 reference to Turk Fig Hill, a new name for an old field which had been incorporated with another and renamed.

[52] K.V.J. 4 January 1895. Guano was used in conjunction with dung produced by cattle on the farm. A clear example of the staggered nature of progress and the combination of new and old methods during a period of transitional change. Ross in *Emancipations and the Economy of the Cape Colony*, (forthcoming), p. 13 has argued that guano was being used by farmers in the Cape in the 1840s, but Klaver Valley farmers only began using it, and then in conjunction still with cow dung, in the 1890s.

[53] K.V.J. 27 September 1897 for transport of wool and K.V.J. 15 October 1897 for amount received from sale of wool, K.V.J. 15 October 1898 10 bales, 3 bags = 3 908 lbs receiving £88.

[54] K.V.J. 6 January 1897 and 17 September 1898.

Vegetables were cultivated throughout the period with the main emphasis being on providing for the subsistence of the farm population. However, there were occasional instances where they were sold on the local Malmesbury market. Vegetable fields were laid out in the early years of Duckitt's occupation of Klaver Valley.[55]

Vegetables which were easily stored for long periods of time were the first ones to be grown on the farm. Peas were first produced in 1832 and since there is no record of these being sold they would have been stored and eaten dry later in the year.[56] In 1838, potatoes, which had a similar capacity for long storage, were harvested for the first time.[57] By the 1840s, when vineyard production had ceased, old vineyard land was put under the garden trowel and planted with vegetables and fruit. *Caffre melons*, pumpkins, cabbages and onions, all very easily stored and able to be eaten when other Cape vegetables were unavailable during the winter months, were cultivated.[58]

By the 1850s Duckitt was producing more than was needed or able to be stored on the farm and he sold some of his vegetable crop on the market in the early 1850s.[59] Potatoes were only sent to the market in the mid 1860s and this would suggest that for the most part the farm population was able to absorb the normal potato harvest.[60] Vegetable production continued through to the 1890s with a decline in the light of an increasingly reduced resident labour force. Furthermore the market in Malmesbury and Darling had by the end of the period, expanded and vegetable market gardening would, in times of need, be used to supplement the farm's fruit and vegetable stores.

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[55] Prior to 1829 there is no verifiable evidence that vegetables were grown on the farm, but it can be assumed that this cultivation had, especially prior to the growth of Malmesbury as an urban centre, been vital for the reproduction of the farmer and his resident labour force.

[56] K.V.J. 11 May 1832 for reference to the sowing of peas.

[57] K.V.J. 8 August 1838.

[58] K.V.J. July, September and October 1845.

[59] K.V.J. 27 April 1852 when he sold pumpkins at 2/- per 100. It is clear that the trend was not to sell on the wider open market, but rather to individuals, as was the case in 1853, K.V.J. April 1853, when Duckitt sold Petrus Okkers 50 pumpkins on credit, James Laing 25 pumpkins and Edward Jones, 15 pumpkins. All three individuals were known to Duckitt, two of them wagon drivers who transported produce to the market. K.V.J. 27 March 1865 sold 200 pumpkins to Mr Van Breda.

[60] 2 July 1864, K.V.J. 16 September 1865 for sale of potatoes on the market. Reference to Duckitt calculating time and labour costs of planting potatoes K.V.J. 5 February 1864.

Oxen and cattle, originally there to fulfil the provisions of the meat contract, constituted a vital part of agricultural production in providing the draught power for ploughs during the sowing season and reaping machines in the harvesting season. They were equally importantly employed in drawing dung and later guano-laden wagons and carts for land fertilisation and used to transport crops to the market. While oxen maintained their hold on draught, cattle were channelled into dairy production as early as 1831.

Dairy production unlike vegetable cultivation, expanded during the latter half of the nineteenth century, to provide for a growing dairy market in the 1840s, apparently lapsing during the 1860s and only resuming, with greater intensity and investment in the 1890s. By the 1840s butter was being produced on the farm and sold on the market.[61] Butter production continued throughout the period with the rebuilding of the dairy under the almond trees in 1895.[62]

Horses, originally used to draw carts and wagons, had by the 1890s, become a commodity both in terms of income from horse-racing and a means whereby Edward Ranier Ruperti, brother to William Duckitt's son-in-law, would maintain his position among the elites of Cape Town.[63]

Prior to the 1850s, all the inhabitants had their basic subsistence and clothing needs met by production units on the farm.[64] Various productive activities, like tailoring moved off the farm in the mid-1840s and clothes were then purchased by the farmer on the urban market. Vegetable and fruit production continued throughout the period, and in the main, the farm continued to provide for the subsistence needs of the farmer's family and resident workers. The growing casual and itinerant labour force increasingly had to provide for its own subsistence. Furthermore luxuries and new commodities like tea and coffee introduced onto the farm in 1829 and 1833 respectively, changed the diet of the farming population. It is clear that farm inhabitants had full access to food

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[61] K.V.J. 26 January 1842.

[62] K.V.J. 13 March 1895 "commenced building the dairy" and 19 March 1895 for reference to the Almond trees. This represented a high level of capital investment in this area of production.

[63] K.V.J. 4 March 1895 Edward Ranier Ruperti went to the Hopefield Races, K.V.J. 9 May 1895 he received £50 from St Elmo's winnings which he shared with the Melck Brothers.

[64] K.V.J. February, March, May, July and November 1829 Edward the Tailor at work, K.V.J. 28 November 1837 Magdelena Hanecom paid for making peoples' clothes, K.V.J. 10 July 1844 Aurora Adams given 1 *skepel* wheat to the value of Rds 3.4. for making jackets for children.

and commodity markets, buying many of these items, especially prior to the 1840s, from the missionaries at Mamre.[65]

Duckitt's innovative approach to agriculture encouraged the production of implements and new technology on the farm. From at least 1829 until the 1840s the production of ploughs and other farming implements and hardware was carried out by the blacksmith, wheelwright, leatherwork and wood craftsmen. From then until the last decades of the nineteenth century, the focus of their work changed from producing new articles to repairing old ones. This, more than any other aspect of the business entity, was instrumental in developing Klaver Valley as a manufacturing unit. Prior to the 1830s, Duckitt supplied farmers in the vicinity with new technology. Prior to the 1830s, Duckitt had begun the manufacture of iron ploughs on Klaver Valley which he had sold to close associates such as the van Reenens as well as other farmers in the district. Having his own manufacturing unit on the farm allowed for Duckitt to innovate at his own pace and not be held back by high importation costs and delays. In 1830 Conjato, a slave blacksmith, was employed in the making of ploughs for Jacob van Reenen.[66]

The manufacture of implements continued, but with decreasing frequency. By the 1850s, while still present on the farm, there was more emphasis on the production and repair of parts, for example, the repair of a wagon wheel in 1852 and the production of plough parts in 1853.[67] Increasingly the repair of machines would fall into the hands of engineers who accompanied machines around the district. In the case of Duckitt who owned his mechanical threshers and reapers, engineers would be called onto the farm in the event of a break-down. This was especially evident in the 1890s when the skilled labour required to repair these machines was only available off the farm, and the parts required very often for repairs were no longer manufactured on the farm.[68]

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[65] It appears that Duckitt increasingly purchased these items from Malmesbury from the 1840s onwards. In addition to tea and coffee, items such as snuff and tobacco were purchased regularly throughout the period until the 1860s, e.g. K.V.J. 21 January 1839 "purchased tea from Revd Lehman" at Groenekloof, K.V.J. 12 December 1839 for purchases by Duckitt from the missionary.

[66] K.V.J. 21 March 1830, where he, Jack and Dalo were "making ironwork for a single plough for J. van Reenen".

[67] K.V.J. 11 December 1852 for reference to Jafta September "ringing fore-wheel of *middle-slag* waggon.", K.V.J. 12 and 16 April 1853 for reference to Conjato making "yoke keys" and being assisted by Cabanga in laying "on phins(sic) of single plough".

[68] In the late 1850s and early 1860s, a worker on the farm had sufficient skills to attempt the repair of the reaping and threshing machines K.V.J. 22 December 1859 and 24 January 1862. K.V.J. January 1894, for reference to fetching the engineer, K.V.J. 6 December 1895 for reference to Ruperti going to "town to get a new gauge for the threshing machine from Harcombe Brothers, which cost him £2.10.0.

Markets

Once the produce had been harvested it was packed into bags, loaded onto ox or horse wagons and transported to Buck Bay, about 12 miles from Klaver Valley, to be loaded onto a boat and shipped 23 miles across the water to Cape Town or else transported to Malmesbury.[69] Prior to the 1870s, the shipping of wheat from Buck Bay was the norm, with the occasional transportation of wheat to Jacob's Bay. By the 1890s, wheat and other produce was taken by ox wagon to the market in Malmesbury.[70]

The wheat market was unlike the wine market in that it did not experience such prominent surges of boom and slump, being mostly reliant on local markets and always having sufficient demand.[71] The fluctuations of the wine market were as, or more attributable to the product, than to the economy out of which it came, dependent so heavily upon exports, especially prior to the 1830s.[72] Wine was largely sold on an international market protected by tariffs, and once those tariffs were lifted, was open to fierce competition from French wines. The wine market's initial wide base for sale, was partly what caused it to crash so heavily, since so many farmers had been heavily reliant on wine's exportability. After emancipation, the market for Cape produced wines dropped dramatically, falling by 1844 to no more than 2 365 *leggers* a year, lower than it had been for two decades.[73]

Wheat on the other hand, suffered no such similar decline. It had always had a growing local market and not being an export crop was not as vulnerable as wine was to the vagaries of the

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[69] Two to four wagon drivers rode the ox wagons, down to Buck Bay which was "a better bay, further forward and nearer to Cape Town than Jacob's Bay" which was only used occasionally in 1870. Personal Communication, Mr F. Duckitt, Darling, April 1992.

[70] K.V.J. 21, 24 April 1842 for example of shipping from Jacob's Bay; K.V.J. 14 March 1871 when wheat was sent to Malmesbury and 18 March 1871 sent to Dan Mills at Maitland; K.V.J.; 22 January 1895, oats sent to station at Malmesbury.

[71] This characteristic of the market became clear in the analysis of journal evidence and is corroborated by R. Ross, *Origins of Capitalist Agriculture*, in W. Beinart, P. Delius, S. Trapido, (eds.), Putting a Plough to the Ground Accumulation and Dispossession in rural South Africa 1850 - 1930, (Johannesburg 1986), pp. 60 - 61.

[72] R.Ross, *Origins of Capitalist Agriculture*, p. 61, R. Ross, *The Cape and the World Economy 1652 - 1835*, p. 255., R. Ross, *Emancipations and the Economy*, p. 10.

[73] D.J. van Zyl, Kaapse Wyn en Brandewyn, 1795 - 1860, (Cape Town 1974), pp 169 -70, cited in R. Ross, *Emancipations and the Economy* pp. 10 - 11.

international market.[74] Prior to and during the 1830s, Duckitt's market for his grain (wheat and hay) remained in Cape Town. Throughout the 1830s he shipped his wheat to John Gie, his agent in Cape Town who sold it on the Cape Town market. The buyers included such noteworthy customers such as the Superintendent of Police in Cape Town. In 1831 Duckitt entered into a contract to supply 70 000 lbs of hay and 200 *muids* of barley during 1831 and completed his order with six deliveries to the Police Department made in January and February 1831.[75] From 1832 to 1841, Duckitt supplied Sinclair and Company with hay.[76] Sinclair was a merchant in Cape Town, and that Duckitt had a decade of guaranteed custom, certainly secured his agricultural interests. While he supplied them with hay, he was also able to buy necessary commodities like coal and hardware on credit and since he received his purchases by return of his own wagons which had delivered the hay, he avoided incurring transport costs.[77] In 1842 he ceased to supply Sinclair & Co., and took up a tender to deliver hay to the Commissioner General's stores. His contract was for 68 500 bales of hay and by the end of February he had fulfilled it, receiving Rds 3 per 100 lbs, amounting to Rds 2 055 the balance of which was paid to him in March 1842.[78] Deliveries to the Commissioner General, continued every year until 1847 when he made his last delivery.[79]

When the wine export market crashed, Duckitt did not immediately respond with closure of his vineyards because he still retained active and profitable access to the "farm market". In 1829 he

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[74] R. Ross, *Emancipations and the Economy*, p. 11. and M. Rayner, *Wine and Slaves*, pp. 236 - 237.

[75] K.V.J. 24 and 30 January, 4, 10, 16, 21, 22 23 February 1831 for hay and barley sent to the police department. This grain was shipped from Buck Bay in the "North Wester" boat.

[76] Particularly January, February and March and the occasional delivery of hay in August. See these months in K.V.J. 1832 - 1841.

[77] K.V.J. 18 March 1832, for example, "received by return of waggon from Sinclair, half a chauldron of coal."

[78] K.V.J. 22 January 1842 for the first delivery of hay to Commissioner General, K.V.J. 23 February and 9 March 1842 for amount paid to Duckitt.

[79] K.V.J. 20 December 1842 for reference to new contract with Commissioner General. References to Duckitt supplying the Commissioner General every year until 1847, appear in the respective years in the month of January and K.V.J. 26 February 1847 for the final delivery of hay.

sold 622 gallons of wine and 93 gallons of brandy in total. Three of these were sold to his brother Frederick, and the remainder to farmers in his immediate environment.[80]

While wine farmers might have been receiving poor prices for their wine, Duckitt was not suffering, and appears to have been making good profits on this small, but profitable market. In 1833 when wine was reportedly selling on the Cape Town market at Rds 25 per *legger*, Duckitt was selling 1829 Laurie Wine, for Rds 30 per *half aum*, roughly equivalent to one-eighth of a *legger* giving him approximately Rds 240 per *legger*.[81] Although the wine was four years old he was nevertheless, enjoying extremely good profits on this market. He continued through the 1830s, into the 1840s to enjoy access to this market. Mr van Reenen, his brothers Frederick and Charles, Mr Crowcher, were some of his customers in 1838.[82] By 1847 he had stopped any vineyard production and so this source of income would, over the following year, dry up. During the 1850s and 1860s he purchased wine, most frequently from Tokai.[83] By the 1870s he had re-established his vineyards, and this source of wine purchases had stopped.

During the 1850s and 1860s, Duckitt continued shipping his produce, via Buck Bay to Cape Town to individual customers or to John Gie who took delivery and organised for its sale.[84] By the 1870s, a mill had begun operations in Maitland and it appears that wheat was sent to Dan Mills mostly by wagon rather than by boat.[85] Taking into account the low level of grain production on Klaver Valley in the 1870s, and the transitionary effects of a change in ownership, it is not surprising that references to sending wheat to the market are absent. By the 1890s, wheat was

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[80] K.V.J. January to December 1829. These figures were calculated from figures given in the daily journals to wine and brandy sold to farmers throughout the year. See for example, K.V.J. 31 December 1829, when he sold 30 gallons (roughly equivalent to a quarter of a *legger* = 145 litres) of wine to Mr George Marsh for Rds 18.

[81] For reported price of wine in 1833, *De Zuid-Afrikaan*, 4 January 1833; For price of Duckitt's wine, K.V.J. 8 June 1833, when the sale of this wine to John Kotze was recorded.

[82] K.V.J. 20 February, 7 April, 21 April, 23 May 1838

[83] K.V.J. 8 October 1861 purchased wine from "Tockai"(sic) and K.V.J. 24 December 1862, had wine from "Eksteen (his brother-in-law) and Cloete at Alphen delivered by return wagon from Tockai".

[84] K.V.J. 8 February 1862 sent Mr Silberbauer wheat and K.V.J. 21 February 1862 sent oats and barley.

[85] K.V.J. 22 March 1871 for the only reference in that year to shipping wheat to Dan Mills via Jacob's Bay.

being sent to Malmesbury, either for sale to Smuts & Koch or Lombard & Van Aarde, agricultural dealers in the town, or for rail transportation to Cape Town.[86]

Although Duckitt produced wool in the 1830s there is only one reference in 1834 to his sending 288 lbs wool to the market.[87] There are no further references in the journals of his selling it at any other time in the 1830s. What he was trading was sheep skins and this trade was between him and various individual merchants.[88] In 1844 he sold wool to Mr Sivewright, in 1845 to Mr John Eaton and by 1847 he was selling his wool on the open market where he was charged market tolls. Wool was largely sold by Duckitt to local merchants.[89]

The dairy market was, from 1842 accessible to Duckitt and he was selling his butter on the market in Malmesbury.[90] In 1895 a new dairy had been built, production had become quite specialised and was linked with the government dairy production, in the making of butter and cheese.[91] In 1897 Ruperti was still sending his butter onto the market, although by now a dairy had been set up in Darling, a few kilometres from Klaver Valley and Miss Hewitt and Miss White were in partnership with him. What is interesting to note is that by this time, specialisation of butter production had occurred and on one occasion Ruperti took receipt of Hartford butter which in all likelihood he would use in the development of his own dairy production.[92]

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[86] The Malmesbury railway line was constructed in 1888 and was fully utilised by the early 1890s. K.V.J. 22 and 24 March 1894 wheat sent to Malmesbury, K.V.J. 27 and 29 January and 5 February 1895 wheat and oats to Malmesbury, K.V.J. 14 and 15 February 1894 oats to Smuts and Koch, K.V.J. 30 March 1894 rye to Lombard, K.V.J. 22 January 1895 oats sent for rail transportation.

[87] K.V.J. 17 March 1834.

[88] K.V.J. 11 November 1837 example of sale of sheep skins, occurring until the early 1860s.

[89] K.V.J. 1 November 1844 to Sivewright, K.V.J. 8 December 1845 to Eaton, K.V.J. 12 November 1847 to Mr Horne on the market. M. Rayner, *Wine and Slaves*, p. 242. Between 1839 and 1840 there was an increase in the amount of wool produced by the western province, being 377 639 lbs in 1839 and 509 597 lbs in 1840, J.C. Chase, The Cape of Good Hope, p. 173.

[90] K.V.J. 28 January 1842 reference to paying toll and market dues for transport of wheat, barley and butter to market.

[91] K.V.J. 12 September 1895 "government dairy waggon arrived" on Klaver Valley, K.V.J. 14 September 1895 "government dairy did some work in butter and cheese making", K.V.J. 16 September 1895 "sent government dairy waggon to Darling".

[92] K.V.J. 13 August 1897 for half share of Miss Hewitt's butter, 3 September 1897 for half share of Mrs White's butter, 20 January 1897 for receipt of Hartford butter.

Markets for Klaver Valley's produce were available throughout the period under review and it is clear that the Duckitts and later the Rupertis gained access to these markets, both on a rural and peri-urban level in Darling and Malmesbury and urban markets in Cape Town. What has also become clear is that prior to the period of a decline in grain output on Klaver Valley in the 1840s, Duckitt had established the connections and employed an agent to ensure his access to the markets in Cape Town. It would appear that with regard to other forms of produce, the immediate and village market was, at least until the 1890s, the most important one for Klaver Valley farmers.

Conclusion

An overview of Klaver Valley from 1810 to 1898 shows very clear patterns of continuity as well as significant changes. Production on the farm rose steadily until 1835 and then, through to the mid 1850s declined quite heavily, although still continuing as a major activity and source of income on the farm. The 1840s while marking the demise of wine also witnessed the heyday of wool and the growth of a farm dairy industry. For the entire duration of the nineteenth century, the farm's changing levels and directions of production were in direct response to market forces and conditions. The responses were not immediate, but occurred after a period of adjustment and adaptation, making the capitalization of the farm and production a gradual process of development.

The most marked changes which occurred were those on the landscape. Had William Duckitt seen his farm in 1898 with its new and different layout of fields, a modern dairy, its boundaries set out in barbed wire fences and the different fields connected by a new network of roads, he would perhaps have recognised the surrounding environment, but the farm itself would have been another place. Not only did the farm look, feel and operate differently in 1898, all the physical changes which had taken place had been accompanied by changes in production techniques and the process of labour.

CHAPTER TWO
Changes in the Labour Process from 1829 - 1898

While the environment was shaped and transformed by the capitalising farmers and market-orientated production on Klaver Valley so too was the labour of the worker moulded and determined, indirectly by these forces of change and directly by changes in hand technology and the introduction of machines into the production process. Only certain aspects of the labour process changed with the introduction of mechanical threshers in the 1820s, scythes in the 1830s and mechanised reaping in 1853.

Duckitt and later Ruperti were, in terms of their innovative farming practices, generally more advanced than the average farmer in the district. That they were ahead of others points to an essential characteristic of the process of capitalization and innovation. It was not a solid process through which all farmers proceeded at the same pace. That other farmers lagged behind them in mechanising their agricultural production merely indicates the unevenness of capitalist development in the nineteenth century even within as small a district as Malmesbury in the south-western Cape.[1] Sowing and many other tasks, such as wine making, sheep shearing and maintenance of the farm's productive infrastructure changed negligibly. While some important changes did occur, much of the old continued. The mechanisation of the labour process was not continuous. In the earlier period, machines did not necessarily make for more streamlined work nor did they always shorten tasks. If anything, the delays experienced during the initial period of adaptation, consumed more time than was saved.

At the same time, the labour process witnessed an expansion of task categories and skills, so while some tasks, such as manual reaping were curtailed, others, such as collecting wood for and repairing machines, were introduced into the working day of the labour force. A wide variety of professional services were employed by the farmer in developing his agri-business. Control over crop and animal diseases, precipitated the learning of new tasks related to the application of manufactured remedies, and workers had to adapt their skills to the instructions which

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[1] The general studies and contemporary reports suggest that mechanisation was only introduced into the agricultural production cycle in the late nineteenth century. G.46 - '85, C.A., Annexures to the Votes and Proceedings of the House of Assembly, Cape of Good Hope, 2nd Session, 1885, vol. 3., Prof. A Fisher's Report, pp. 4 - 5 for reference to poor agricultural development and low levels of technological development, with "only half a dozen reaping machines in a district like Malmesbury" and most farmers still reaping with sickles.

accompanied such technical improvements. New members of an *elite* and non-farm work force, like engineers, moved onto the farm and their presence and activities affected the nature and process of regular farm work. In the process this new class of skilled mechanics increasingly replaced the workers who had previously managed the repair of farm technology and by the 1870s, most of these tasks were performed by outsiders.

Table 2: COMPARISON OF ANNUAL WORK PATTERN 1829 AND 1897)

(The work pattern was extracted from the Klaver Valley Journals of 1829 and 1894)

	1829	1894
MAY	Fertilisation with dung. Sowing oats, barley & wheat.	Sowing of wheat, ploughing.
JUNE	Sowing oats, wheat, rye. Filling sacks with wheat.	Sowing and ploughing barley, oats, rye, chaff.
JULY	Cleared land. Sowed wheat. Sundry tasks.	Harrowing of braakland; Stuffing of chaff; breaking up of land.
AUGUST	Cleared & ploughed new land. Sowed wheat. Made wine, repaired kraals.	Riding straw into kraals; commenced digging and delving in vineyard.
SEPTEMBER	Vineyard work, dam repair, clearing land.	Carting straw into kraals; collection of firewood; cleaning of chaff house & stables; commenced shearing of lambs.
OCTOBER	Clearing & ploughing land in preparation for sowing. Weeding wheat. Repair of threshing floors. Reap & mowed oats.	Sorting of wool; repair of kraals, chopping of firewood; men working in their gardens.
NOVEMBER	Reap oats and barley. Maintain sheaves. Clean (thresh) oats with machine.	Cutting, binding and mowing oats; scuffling vineyards Cut wheat and barley with and barley.
DECEMBER	Reap wheat. Clean oats. Reap rye.	Cutting wheat and rye; completed harvesting in mid December. There-after carting of sheaves, commenced threshing 21st December; commenced shearing lambs.
JANUARY	Transport wheat to threshing machine. Cleaned wheat and oats.	Threshing of wheat and oats.
FEBRUARY	Threshed wheat with machine and animals.	Sorted rye to send to show; clearing of stables; chopping bushes. Sent wheat, oats and barley to Malmesbury.
MARCH	Threshed wheat and commenced wine making. Shipped wheat to Cape Town via Jacob's Bay.	Cleared braakland - odd jobs around the farm.
APRIL	Sundry work. Prepared land - fertilised with dung. Sowed oats.	Chaffing rye; repair kraals; fertilised land with dung and guano.

The seasonal patterns on the farm year stayed generally the same, with sowing and harvesting being carried out in winter and summer respectively. These continuities and changes in the labour process occurred in the context of climatic and weather conditions, wind, rain and heat, which were completely outside the control of the farmer, and continued throughout the century to shape and often determine the physical conditions in which the labourers worked.

The Sowing Season

Table 2 shows that the impact of mechanisation was felt in the changes which occurred in the commencement of ploughing. Because mechanisation speeded up the harvesting process, it had a ripple effect of giving workers a break between harvesting/threshing and the commencement of sowing. In 1829 almost immediately after the completion of threshing, the sowing began on the 5 May commencing with oats on Saul's Hill and Pampoen Valley, then barley at the bottom of the valley using two-furrowed and single-furrowed ploughs. The double and three-furrowed ploughs

Photograph 2: Designs of Early Wooden Plough *(Darling Museum)*

were iron ploughs introduced into the labour process during this decade and while they did not change the number of workers, they would have introduced more draught animals onto the land.

Each one was drawn by an average of eight to ten oxen.[2] The increased use of the iron plough, more efficient than the wooden ones, would have changed the labour process. While a leader had always been necessary, leading eight to ten oxen as opposed to half that number would make his task more onerous and necessarily more skilled.

Photograph 3: Seed-bag used for broadcast sowing. Earlier versions were made of leather. Canvas was introduced later in the century. (Darling Museum)

There would have been some early winter rain by this time, but it would not have been sufficient to soften the ground adequately, hence the need for so many oxen to break through the hard soil. In 1830, one of the ploughs was led by David Malagas' son, an itinerant wage worker.[3] The leader's task was most commonly done by the young son of a farm worker whose job entailed walking ahead of the oxen pulling the plough and ensuring that the animals did not go off course.

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[2] Anon, Guide to the Cape of Good Hope, (London, 1819), p. 44. Double and three-furrowed ploughs bore the name of "Duckitt's plough" and were superior to the single furrow. Ibid., p. 59. This re-investment into the farming process was high, with the cost being between Rds 200 and Rds 225 per plough, and is clearly evident of the degree to which Duckitt, in as far as re-investment goes, was well on the way to becoming a capitalist farmer.

[3] K.V.J. 20 May 1830. David Malagas was given a loan "on account of his son leading the plough.

Behind the plough walked the sowers, the older men, who carried a large leather bag over their left shoulder so that they could easily reach in for the seed and throw it into the furrows. This method of sowing was called "broadcast sowing" and it survived well into the twentieth century in the south-western Cape - a clear example of the continued existence of very labour intensive methods alongside more modern and sometimes more efficient agricultural practices. During the 1830s all the farmers in the region practised this method of sowing.[4]

In 1830 ploughing occupied all the workers, totalling approximately twenty-seven, since more than one field was ploughed at a time.[5] By 1839 approximately eight workers were labouring on a single field. Throughout the period, the number of workers involved in ploughing and sowing underwent very little change. With the increased capitalization of production by the early 1840s, however, the procedure of sowing had become more methodical and organised. Instead of the haphazard sowing of oats, wheat, barley and rye as was the case in the early 1830s, by 1840, the procedure had been streamlined and sowing began with oats, followed by rye in May and barley and finally wheat in June and July.[6] The increase in the organisation was more productive and went towards streamlining and co-ordinating the sowing and successful harvesting of crops since, for example, oats take longer to ripen than does wheat.[7]

The timing and production cycle of the 1840s changed, although this was more as a result of a decrease in the amount of seed sown than it was as a result of more efficient production methods.[8] By 1859 the sowing season only began towards the end of May and continued until the end of June.[9] While the evidence for the 1860s and 1870s is less detailed, it would appear that

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[4] "Broadcast sowing" was explained to me by Lukas Adonis, a farm worker in Malmesbury in the early 1900s. By this time, *saaisakke* (seed-bags) were made of canvas, but since seed-drills only came into general use in the 1920s, the methods of sowing had remained the same. Interview Liz Host with Lukas Adonis, Malmesbury October 1988.

[5] K.V.J. May and June 1830. The total number of workers was calculated adding twenty-one slaves to the total number of wage earners recorded in the journals.

[6] K.V.J. May, June and July 1840.

[7] Personal communication, Mr F.Duckitt, Darling, December 1990.

[8] Grain production levels in the 1840s were comparatively lower than the previous decades since Duckitt had gone more intensively into wool production and sowed less seed.

[9] K.V.J. 20 May 1859 "commenced ploughing for rye with one double plough" and finished sowing of wheat, K.V.J. 20 June 1859. Reference to figures on production output in Chapter One above shows the huge increase in grain production across the board, compared with 1855.

the duration of the sowing season changed very little.[10] While a more efficient approach to the sowing of particular crops was evident in the 1840s, it is clear that between then and the 1870s, there were years in which the sowing of crops reverted back to the haphazard procedures of the 1830s. This was no indication that the farming enterprise had entered a period of capitalist decline. Rather, the fact is that the development of a more precise sowing procedure took time and, like many other changes on the farm, was staggered and uneven. By 1870, the more organised procedure of sowing had become the norm. Oats, barley and rye were ploughed in first and wheat, taking less time to ripen, was sown last of all.[11]

By the 1890s, other general innovations on the farm had changed the duration of the sowing season. By 1895, sowing commenced a little earlier at the end of April and was completed by the end of May.[12] While there is no evidence in the journals suggesting the use of seed-drills, it would seem that they might have been introduced, having the effect of shortening the sowing season and, studying the production figures, increasing output. In 1897, sowing began in mid-April and was completed by the end of June.[13] While this appears to have been a much longer season, the number of days spent sowing was similar to that of two years earlier. In 1897 there were frequent references to the cessation of work because of rain. At the end of the 1890s, ploughing was still done using two and three-furrowed ploughs, although now mules as well as oxen were used in conjunction with three to four men per field.[14]

By the 1890s, seed was being sown on fewer, but larger divisions of land. Here too, is further evidence of a streamlining of the production process, a concomitant of capitalising agriculture. In 1832, the grain crop had been sown on no fewer than thirteen fields and in 1839 ten fields. By

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[10] K.V.J. 5 May and 30 June 1861, K.V.J. 9 May and 1 July 1870 for duration of sowing season in these respective years.

[11] K.V.J. May and June 1870 and 1871 for ploughing of oats, rye, barley and lastly wheat. That some of the crops were sown simultaneously, did not change the overall effects of greater methodical productivity evident by this time.

[12] K.V.J. 25 April and 30 May 1895.

[13] K.V.J. 17 April and 30 June 1897. Sowing was stopped soon after and only recommenced on 26 May 1897.

[14] K.V.J. 17 and 23 April 1897, three ploughs, two ox and one mule with 3 - 4 men sowed four muids of oats in a day. K.V.J. 12 August 1897 Ruperti tried a "new German braakplough". This is another instance of re-investment into the farm by the farmer.

1897 only five large and three smaller fields were being cultivated. Furthermore, new land was still in the 1890s, in the process of being cleared and coming under the plough.[15]

Capitalization of production for the market and its consequent effect on time and cash-oriented notions of productivity and cost-effectiveness, changed if not the methods, then the pace of ploughing and sowing on Klaver Valley. Until 1831, while Duckitt was conscious of time, he only broke the day into morning and afternoon and the divisions between them were clear, yet as blocks of time they themselves had no specific division.[16] In the ploughing season there appears to have been little reference to smaller divisions of time. This is not indicative of a lack of time-consciousness, but rather that the pressures on workers to complete the sowing of seed, were largely determined by the climate. May and June are cold and wet months of the Cape year and it was in the workers' interests to complete the sowing as soon as possible. Very often beginning in the early hours of the morning, it continued through the day, lasting for a maximum of two months of the year until the 1870s, after which the period of sowing shortened.

While there is ample evidence of Klaver Valley farmers becoming increasingly capitalist in their purchases of new and technologically advanced machinery, there is little comparable evidence of the effects of this capitalization on the labour process itself. That mechanisation affected the way work was done and particularly, the pace at which it was carried out is certain, but there is only one example in 1864 of the farmer's capitalist interests informing both production and the labour process. This was concerned with the planting of potatoes for the market in 1864.[17] It is clear that Duckitt had not employed 175 people but rather that he had added the number of workers who had prepared the ground and planted the potatoes, each day from 5 January until 30 January, being on average six people a day. It is noticeable too, that he has included the cost of the seed and food and wine for the labour.

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[15] K.V.J. May - August 1832 for reference to thirteen differently named fields. K.V.J. October to December 1839 for names of fields from which crops for that year were harvested. K.V.J. 17 April - 30 June for reference to eight different fields. K.V.J. March 1898, for new field, Turk Fig Hill, which was first cultivated that year.

[16] K.V.J. 7 May 1829, "Ploughing in oats in Pampoen Valley with 2 double and Single in the morning and three double and 1 Threefurrowed(sic) and 1 Single in the afternoon."

[17] K.V.J. 5 February 1864

"Expense of making the Bank and delving the Potatoe Ground	£12. 5. 3
Computed 50 loads dung at 1/- riding per load	£ 2.10. 0
9 *Muids* seed Potatoes at 12d per *muid*	£ 5. 8. 0
Victuals & Wine for 175 people at 1/3d per day for one day	£10.18. 9
	£31. 2. 0

Photograph 5: Scythe used to cut grain (Darling Museum)

of grain he succeeded in reaping.[18] At the rate of half an acre a day, prior to the 1840s, the harvesting of the grain crop took the best part of three months, using the labour of at least 35 workers, which included women and children. In November 1839 ten mowers were employed and by mid November, eighteen people were listed in the journals when the barley was being cut. By the end of December Klaver Valley had at least thirty-five workers listed as being present, which was slightly less than the thirty-eight in November of 1832.[19]

Reaping with a scythe allowed for "easily two acres" a day to be reaped, which would inevitably cut down on the need for harvesting labour.[20] Even prior to the introduction of mechanical

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[18] For amount per day, personal communication with Mr F. Duckitt, Darling, March 1992. F. Blersch, Handbook of Agriculture, Cape Town, 1906, p. 119., refers to three to five men cutting an acre a day using sickles.

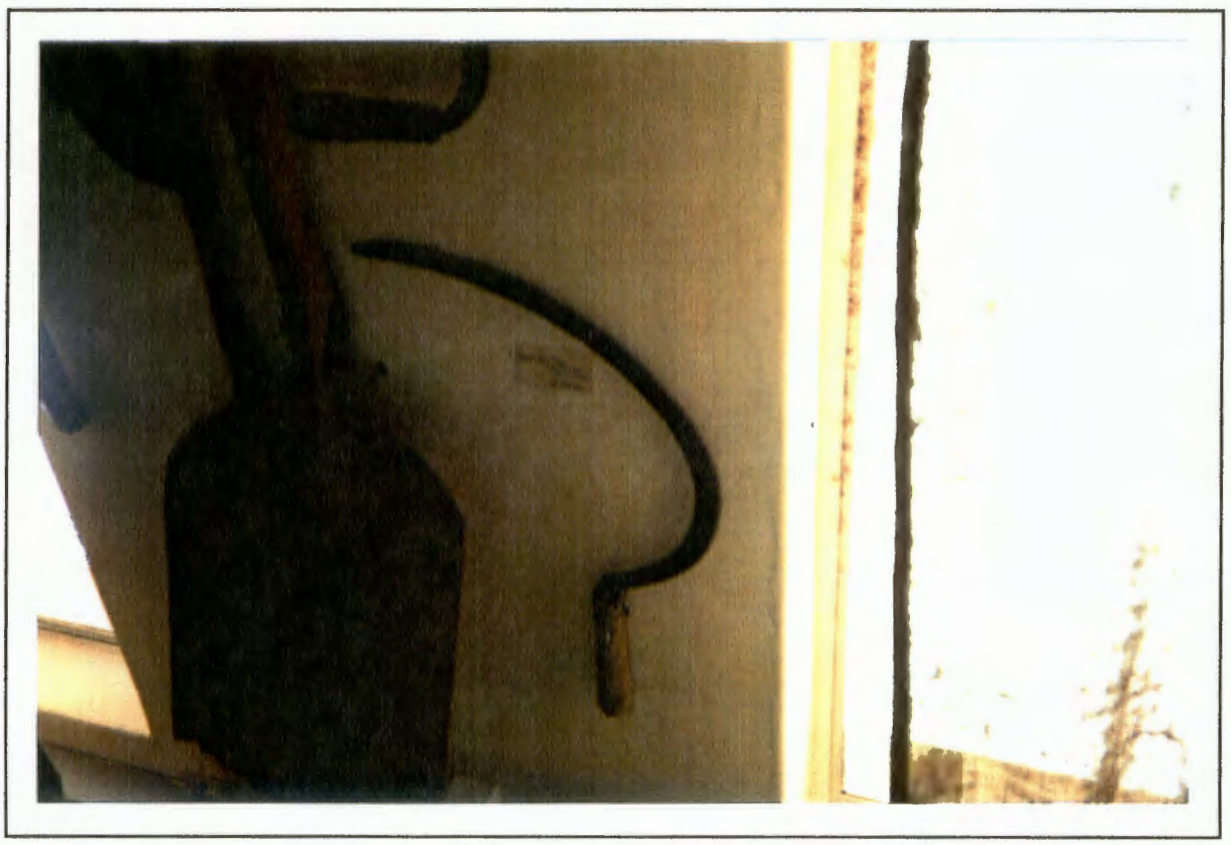
[19] The numbers of workers were obtained from the lists of names recorded each day in the journals, K.V.J. November and December 1832 and 1839.

[20] A scythe is bigger than a sickle, with a long handle which is on a hinge and able to swing easily across the ears of grain, cutting a half a sheaf at a time. Personal communication Mr F. Duckitt, Darling, December 1990. E.J.T. Collins, *Labour Supply and demand in European Agriculture 1800 - 1880*, in E.L. James and S.J. Woolf, (eds.), Agrarian Change and Economic Development, (London, 1969), pp. 79 - 85.

The Harvesting Season

It was in the area of harvesting that the most overt and the most significant changes occurred on Klaver Valley between 1829 and 1898. Changes in perceptions and use of time and in hand technology in the 1830s and the early introduction of mechanical threshing machines in or before 1829, and reaping machines in 1853, markedly changed the labour process on the farm. As a result of mechanisation, time was determined by the pace and efficiency of the machine, and although they often broke down, the time pressures placed on the harvesters were much greater than those placed on workers during the sowing season.

Prior to 1853, reaping was carried out by workers initially using only sickles, and a combination of sickles and scythes after the mid-1830s. This change in hand technology, while not as dramatic

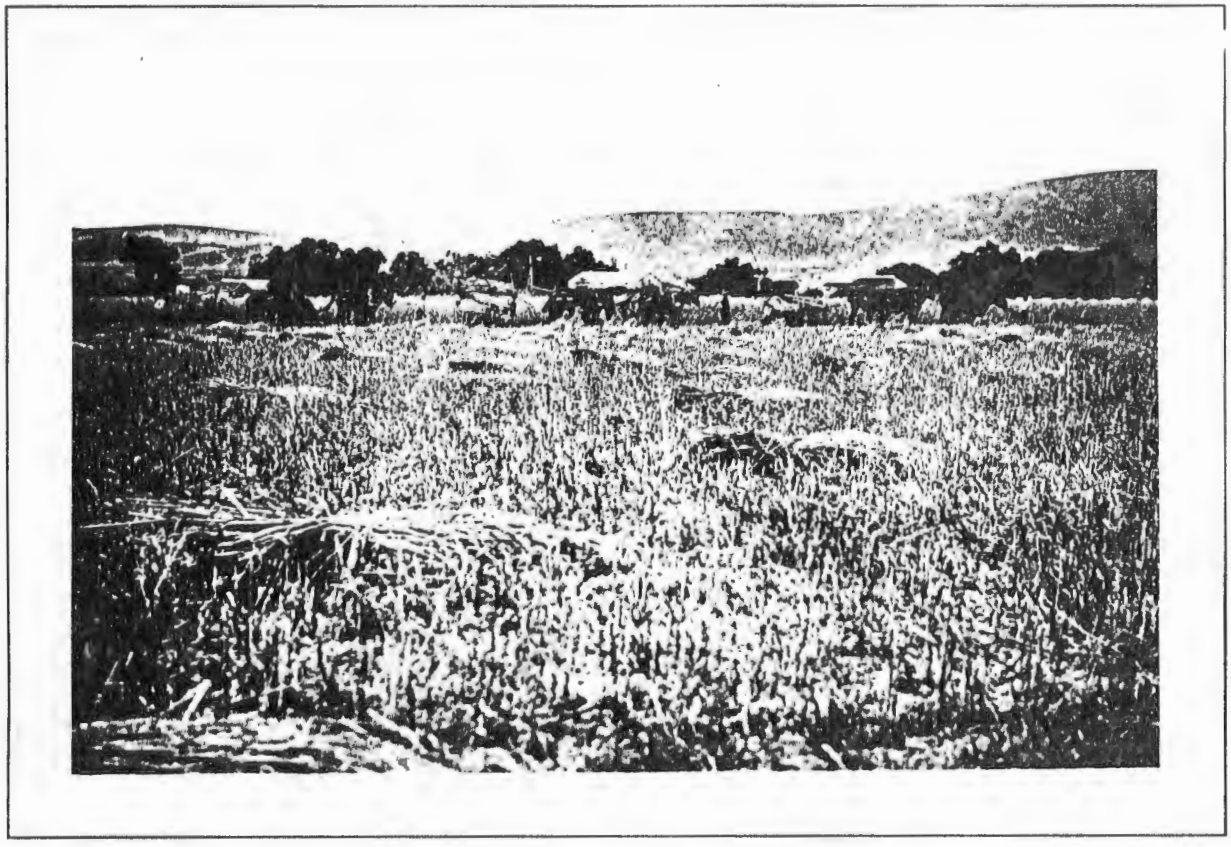


Photograph 4: Sickle used to cut grain (Darling Museum)

as the introduction of a mechanical reaper, nevertheless changed the labour process. When grain was reaped with a sickle, a worker typically covered a half an acre a day, in terms of the amount

reapers in 1853, time was of the essence during the harvesting season. If the crops were not harvested in time, they would over-ripen and if the ricks were not turned and opened to allow for ventilation, the harvested crop would, as a result of its freshness, dampen and begin to rot.

When Duckitt began in 1854 to calculate the number of hours spent on each task, it was to compare the process of reaping with a machine and with sickles and scythes. It is interesting that there are no corresponding references to time calculations after the introduction of scythes, which definitely hastened the reaping process, in 1837. In 1853 the type of mechanical reapers which



Photograph 6: Reaping on Karnemelksfontein, Darling c. 1920, using mechanical reaper. In the foreground are sheaves of grain which have been bound with *matjiesgoedbende*.
(F. Duckitt, Darling)

were introduced into the labour process were reaping machines which left the cut corn lying loose on the ground. This meant that although the reaper was able to cut three to four acres of grain

a day, the sheaves still had to be tied manually.[21] The reaping process changed significantly with the introduction of the reaping machine. Previously two to three *spans* of workers had been required on a field to reap grain.[22] By 1854, in conjunction with a reaping machine, "three people worked on Oliphants Klip Oatland with the machine, beginning at 9 o'clock and continued until a quarter six o'clock P.M. - lost 1½ hours work long bolt having brok(sic) 6¼ hours at work. Eight people binding behind machine from 10 o'clock."[23] This referred to one field and on the others, workers would be reaping with sickles and scythes. Throughout the period the manual expertise of the labour force was called into action as was the case in 1859 when grain was "cut with machine until evening, 6 people binding and 5 cutting with sickles... (the following day they cut) wheat on Wolverug with the machine. 6 people employed with machine. 4 people cut with sickles".[24]

Not only did Duckitt record the hours spent on a task, he was also meticulous in recording the number of hours lost, when a machine broke down. This was indicative of the initial stages of mechanisation in the reaping process. By the 1860s, once the farmer had adapted to the use of machines, there are no references to time spent or lost on a task. While reaping became mechanised it did not completely reduce the need for manual labour. Throughout the 1870s and 1880s, while a reduction in harvest labour would have occurred, manual skills continued to be utilised during the harvest in the late 1890s.

Working in the fields alongside the machine meant that workers no longer had as much control over the pace at which he worked. Although the use of sickles and scythes continued to be utilised in conjunction with the mechanical reapers, those workers reaping and cocking hay in the fields where the machine was being used, would certainly have had their work speeded up. Indirectly too, there was added pressure on those who reaped with sickles and scythes to finish a field. After mechanisation, much of the labour process was determined by the pace of the reaping and

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[21] This machine came to be called the *losgooier* (loose-thrower) in the twentieth century once the mechanical reaping - self-binding machine had been introduced onto farms in the 1920s and 1930s. The sheaves of grain were tied with *matjiesgoedbande*, cords made of bulrushes, obtained from the farm and made by workers in September or October, just prior to the harvesting season. The use of bulrush reeds points to another area in which the farmer utilised to the fullest extent, the natural resources of his farm environment.

[22] A *span* was a team of workers which could range from between six and twenty workers per *span*, which makes the calculation of a daily average very difficult.

[23] K.V.J. 15 November 1854.

[24] K.V.J. 15 and 16 December 1859.

threshing machines and so we find that it was in this season of the agricultural year, that the labour process came, quite early on, to reflect the continual, although uneven process of capitalist development.

Mechanisation's most direct impact in the long-term was to reduce the number of workers needed to successfully bring in the harvest. By the 1890s, the harvesting labour force was reduced to almost half, with eighteen men and two boys listed as Ruperti's harvest men for 1894 and seventeen men listed as his men for threshing in the same year.[25] This was the case even as late as 1896 when machines were still being used in conjunction with manual labour, and sickles and scythes continued to be utilised even when reaping machines dominated the cutting of grain. This was especially so when the machine broke down or more fields needed cutting than was possible with only two machines, as was the case in 1896, when the machine was used to cut the wheat and sickles employed to cut the rye.[26] Because machines were being used to cut the grain, this not only shortened the reaping period but also freed workers for other tasks, which is why, in 1897, there is evidence of men being employed in the vineyard while grain was still being reaped.[27] This was not a case of over-employment of farm labour, but rather was such, that while workers were effectively utilised in the seasonal task, other different, but equally important tasks were able to be carried out.[28] Again, the uneven process of capitalization of production and commoditisation of labour is shown in this example.

Capitalization and mechanisation added new time pressures to the labour process which meant that breaks from work no longer started when the workers needed to stop nor did they continue until workers had completed their eating, drinking and resting. Increasingly from the mid-1850s, these breaks became externally determined as the farm increasingly concerned itself with efficient production output in the process of consolidating itself as a business centre. Having gone through the process of mechanising the labour process, the farmer nevertheless, continued to depend on the ability of workers to perform manual reaping skills decades after reaping machines had been

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[25] K.V.J. Lists of men found on the last few pages of the 1893 - 1898 Journal. Only some men were involved in both reaping and threshing labour process, for example, George Prince, but most names on the two lists are different.

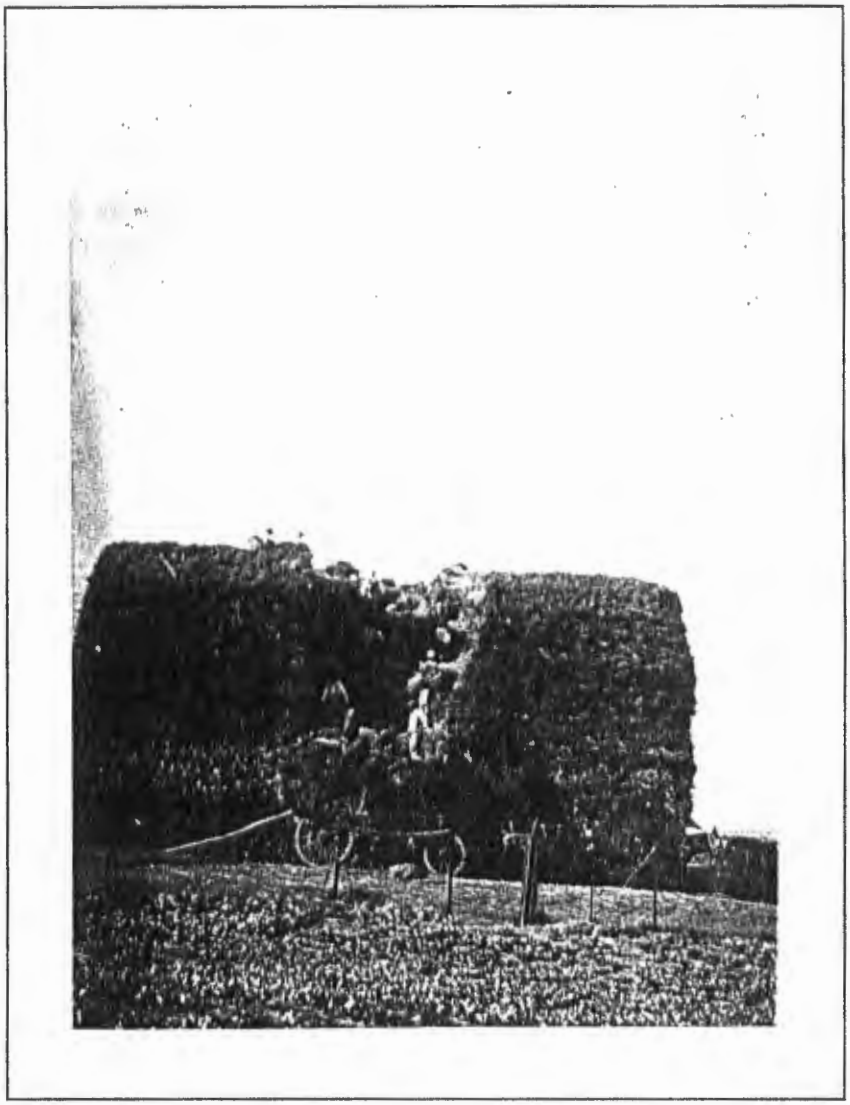
[26] K.V.J. 7 November 1896. This might have been a case of only specific crops being reaped with machines if it were not for references in later years to all crops being mechanically harvested, e.g. mid-October - end of November 1897, 1898.

[27] K.V.J. 2 and 10 November 1897, when three men were employed in the vineyard.

[28] Refer to Table on Seasonal Pattern of 1829 and 1897,No. 1 p. 6 above in November and December of 1894 other tasks, besides reaping and threshing were carried out.

introduced on the farm. The assumption that workers could still reap with a sickle in the 1890s, was testament to the fact that workers had continued to use these skills on Klaver Valley and had had to reap with sickles and scythes on other farms with lower levels and degrees of mechanisation.

Mechanisation of the second stage of the harvesting process, that of the cleaning or threshing of the grain, occurred very early on in the farm's history.[29] This early mechanisation can be seen as an indicator of capitalization of production on the farm and evidence of very early re-investment into the business of farming. The investment into the production process was a result of his innovation and his concern to maximise profits. Threshing machines like all other forms of mechanical devices introduced onto the farm did not immediately produce results.[30] If, for example, the output for 1833 is compared with that



Photograph 7: A rick being dismantled and grain being loaded onto a wagon for transportation to the trampling floor. Karnemelksfontein, Darling, c.1920.

(F. Duckitt, Darling)

[29] It is not clear when mechanical threshing machines were first imported onto Klaver Valley, but they are evident in 1829, K.V.J.4 - 9 February 1829. Threshing machines cost approximately £80 and were reported to have reduced labour by about half. Anon, Emigrants Guide to the Cape of Good Hope, (london, 1821), p. 60.

[30] Chapter One above and graph of production of grain crops 1812 - 1898, p. 14.

of 1832, it would appear that, as with the effects of reaping machines on output two decades later, output only changed approximately four years after the introduction of machines.[31]

Once the grain had been cut, it was bound into sheaves, using *matjiesgoedbande* and ricks were set up in the field.[32] They had to be covered with bushes to protect them from strong winds which blow at this time of the year. They were typically opened up in January in order to turn the sheaves and prevent the crop from rotting. Christmas came and went and by the beginning of the following year, enough grain had been harvested to begin the threshing process. The ricks were broken down and the crop was transported by ox-drawn wagons to the threshing floor and machines. As early as 1829, mechanical threshers were employed, requiring the labour of nine to ten men.

Even after mechanical threshers had been introduced into the labour process, grain continued to be threshed on an open circular floor, and trampled by oxen or horses, with a man standing in the centre of the floor with a whip to drive the animals round the floor.[33] Trampling the wheat would separate the chaff from the ear. That this practice was continued even after threshing machines had been introduced, was not as a result of "backwardness", but rather because the needs of the farm, especially that of providing the horses with fodder, were better and more cheaply served by the trampling of wheat by oxen or horses, since animals failed to remove all the wheat from the chaff and the farmer could then use that as horse fodder.[34]

Once cleaned and packed into bags, the grain was ready either for storage or for immediate transport to the market.[35] This required the labour of ten men, including riders and packers.

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[31] The exact date of the introduction of mechanical threshers is not known, but they were definitely operating on the farm in 1829 although they might have been introduced prior to this date.

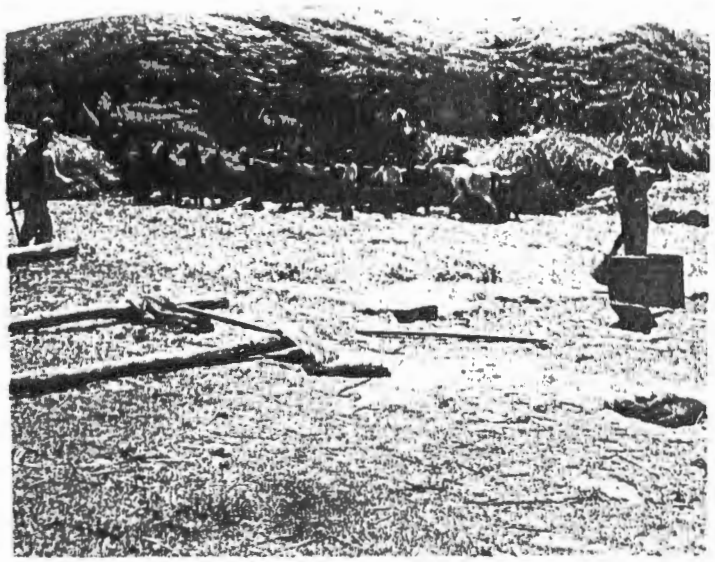
[32] K.V.J. 29 November 1833 for size of wheat rick which measured fifteen by eight and a half "measured yards".

[33] This was the same method used in the eighteenth and early nineteenth century. Anon, Emigrants' Guide to the Cape of Good Hope, p. 59.

[34] Personal communication Mr F. Duckitt, Darling, December 1990.

[35] Grain was transported to either Buck Bay and later to Malmesbury, in ox wagons, *middle-slag* wagons and mule wagons. The amount which could be carried in ox wagons was approximately 30 bags equalling per bag, 200 lbs wheat, 150 lbs oats and barley, *middleslag* wagons could carry approximately 25 bags and required 8 horses or mules, or 12 oxen to draw them. A *mule* wagon carried approximately 15 bags of oats and required 2 horses on hard road or 4 oxen or horses in the sand. Ox wagons were most frequently used to transport grain to Buck Bay.

When the produce was being transported to Cape Town by boat, from either Jacob's Bay or Buck Bay, the wagons were driven down to the coast. The oxen were outspanned and given time to drink and rest, and the workers then loaded the bags of wheat onto the boat. At Buck Bay, the oxen were able to walk a fair distance into the water to meet the boat, but this was not possible as Jacob's Bay because of the rocky undersurface. Having loaded the boat, the drivers and packers then spanned the oxen and returned to the farm, usually having spent the whole day travelling and unloading.

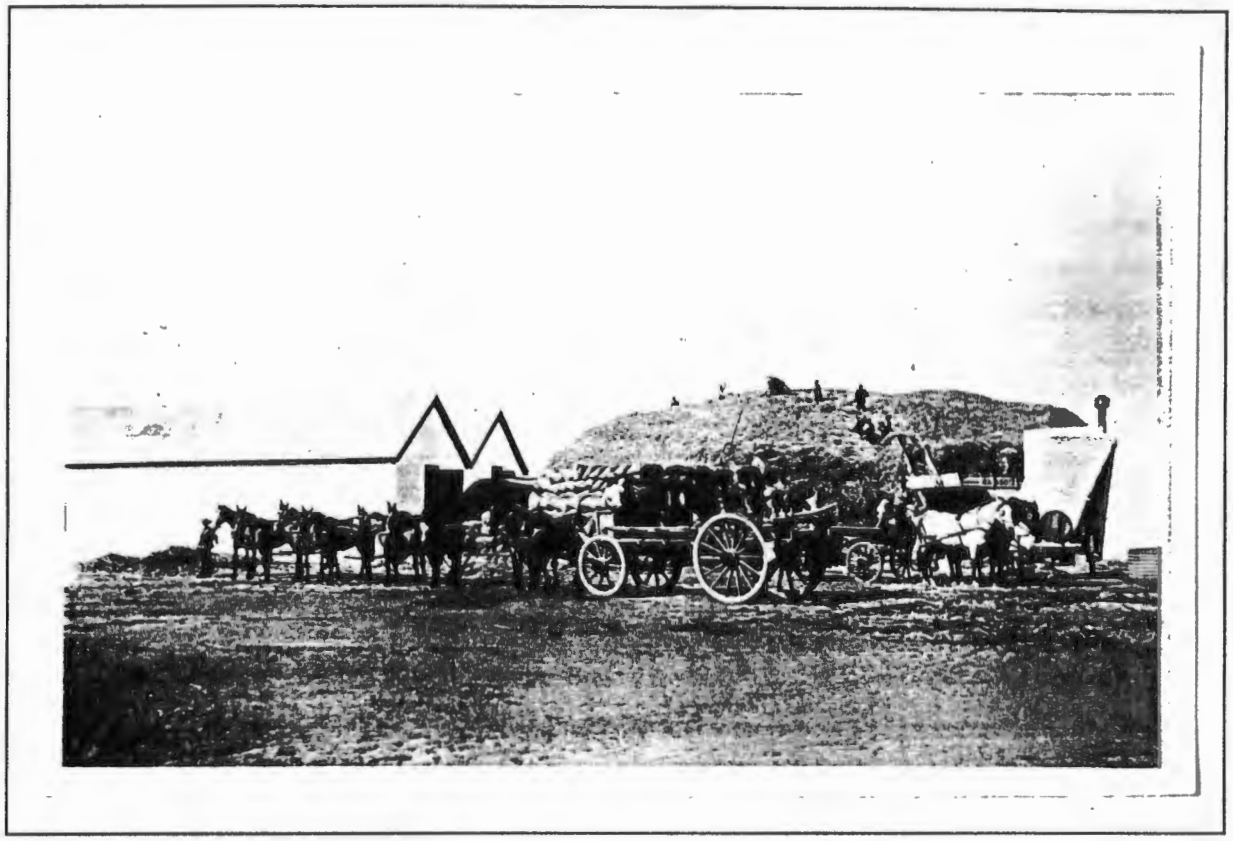


Photograph 8: Grain in the process of being trampled by horses. Karnemelksfontein, Darling, c.1920
(F. Duckitt, Darling)

By 1896 the entire harvesting process had been mechanised to a greater or lesser degree.[36] Reaping machines, chaff cutters and threshing machines, all went towards reducing the time spent on harvesting tasks and changing not only the farm's labour needs, but also the labour process. When machines broke down, particularly in the early years of use, the farmer was forced to rely on the manual labour and reaping and threshing skills of the workers. It is clear then, that mechanisation of harvesting did not completely reduce the dependence of the farmer upon the worker.

Mechanisation ultimately sped up the harvesting process, but it also served to bring about delays. An important factor in assessing the degrees and levels of change in the labour process as a result

[36] K.V.J. 12 December 1896 "finished thrashing altogether".



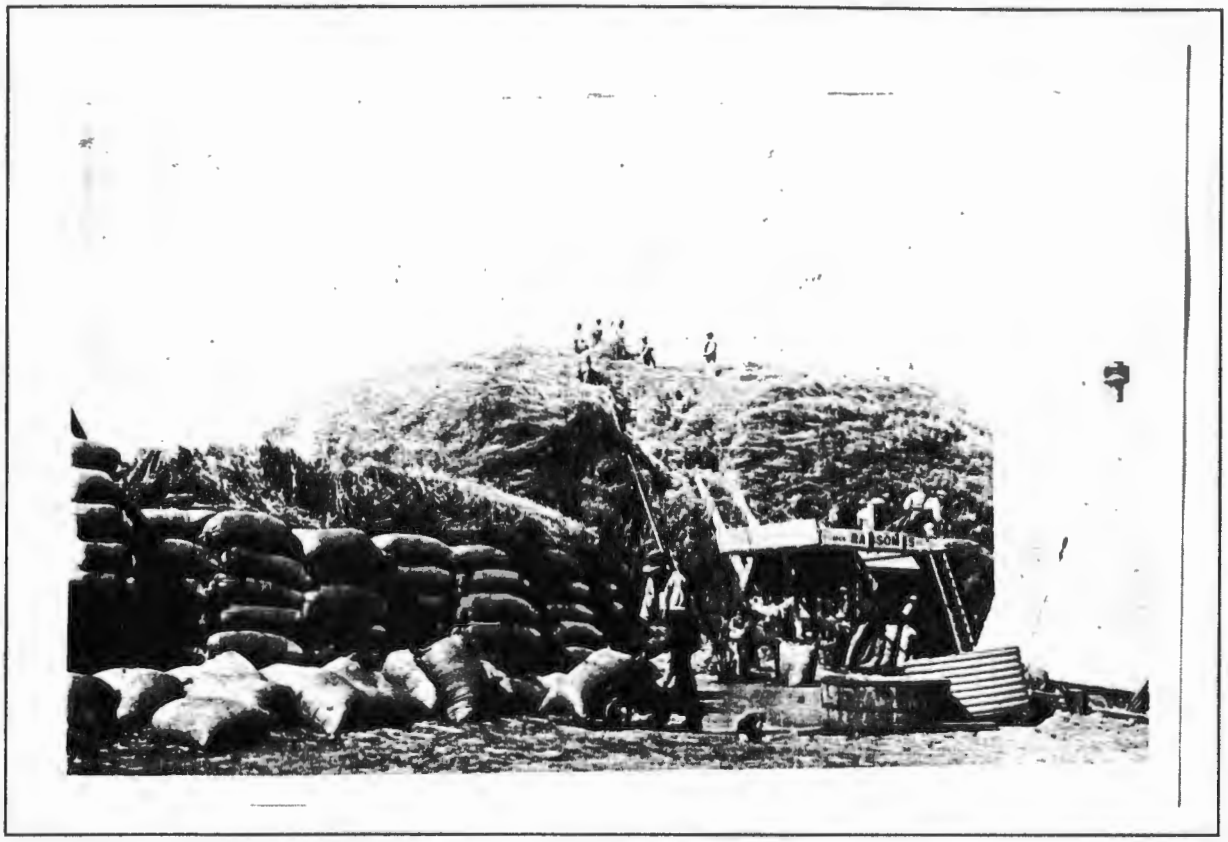
Photograph 9: Grain packed into bags and ready for transport to Buck Bay or Malmesbury. Karnemelksfontein, Darling, c.1920

(F. Duckitt, Darling)

of mechanisation, was that machines, both in early phases of introduction and later, frequently broke down and could not be absolutely relied upon. Human labour, while it tried, did not stop when a machine did.[37]

What it did do was change the degree to which the farmer had to rely upon manual labour. In the 1830s, the months of October through to January were fairly labour intensive, having on average thirty-five to forty labourers on the farm each day, more than half being resident, and having at least three to four women involved in reaping and binding. If this is compared with the 1890s, when in October on average only nine men were occupied with mowing and the workers were almost exclusively male, and predominantly casual and itinerant, the changes are quite marked. The reduction in labour needs occurred at particular points of the process, for example, when cutting with the machine, only four men would be working alongside each mechanical reaper, as opposed to the pre-1853 period when three or four teams of four to six, and possibly more men

[37] K.V.J. 15 January 1898 "Brought the machine home from Mud River had an accident with the engine - the Schammel bolt snapped."



Photograph 10: Threshing of grain, male labour used in conjunction with a Ransom Threshing Machine. Karnemelksfontein, Darling, c.1920

(F. Duckitt, Darling)

and women each, making a very conservative average of between sixteen and twenty-four men and women would be employed as reapers and mowers at this time.[38]

Low Seasons of the Agricultural Year

Besides harvesting and sowing, there were equally important tasks such as the shearing of sheep, vineyard work and the making of wine and brandy with which workers were employed generally in February and September/October of any one year. These tasks tended to be carried out before the ploughing/sowing season in March to April/May and in August and September of any one year. Table No. 2 shows that these months changed as the century progressed, a result of mechanisation having shortened the harvesting process.

[38] K.V.J. 10 November 1855 and K.V.J. 10 November 1835 for list of sixteen mowers. Again these figures must be treated with caution in light of the variance in size of a *span*.

The washing and shearing of sheep was a manual task, and remained so for the whole of the nineteenth century.[39] This task was performed mainly by resident but also by itinerant workers taking up three to four days of February and again in September/October which was also the month when sheep were washed, during the latter half of the 1800s.[40] In 1869, eight workers washed a total of 305 sheep over a period of three days, making the average number of sheep washed per worker, twelve per day. The following day shearing of Eksteen's and Peter Duckitt's sheep totalling 305, began and was completed by an average of seven workers in three days. On one day 150 sheep were shorn by nine people, making a daily average of 16 sheep shorn by each shearer.[41] Sheep increasingly came to be washed just prior to shearing so that the natural grease could be extracted thereby making the shearing easier. After shearing the wool would be washed and rolled so as to fetch higher prices thereby responding to market demands and profitably serving Duckitt's capitalising interests.

By 1897 the placing of this task in the agricultural calendar had not essentially changed, although in August 1897, sheep were "physiced with Coopers Dip".[42] The bringing forward of this task was in all likelihood a response to an epidemic of Scab or as a result of increased mechanisation in other aspects of the labour process and a period of time was then available. By 1897, shearing had changed insofar as only three workers were involved in this task, but they worked at it for five days, shearing the young sheep, the number of which is not known.[43] Since the labour of

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[39] K.V.J. 1 - 3 October 1844, first reference to washing sheep. Five people washed 264 sheep over three days, making an individual average of nineteen sheep on the first day, and thirty-three over the next two days. K.V.J. 5 - 10 January 1859 washed lambs for scab with *vitriol*, a solution manufactured on Klaver Valley. See recipe found in journal 1858 - 1866, Recipe for destroying caterpillars and for bathing sheep: "Take a tub which will hold 25/30 gallons of water. put into it 2 quarts of Tar 7 lbs of Common Soda pur a few gallons of boiling water on it, stir it until the Soda is dissolved then fill the Tub with Cold Water when it will be fit for use."

[40] K.V.J. February 1844 sheared lambs for three days, K.V.J. 4 October 1844, commenced shearing with five to seven people and continued for four days. K.V.J. 1 - 3 October 1844 washed sheep. K.V.J. 19 October 1855 four out of the five sheep shearers, were strangers.

[41] K.V.J. 12, 13, and 14 October 1869 for reference to nine workers shearing 150 sheep on that day. Shearing was carried out by male workers throughout the nineteenth century and continued to be a task reserved for male labourers.

[42] K.V.J. 5 August 1897 for reference to washing the sheep in Cooper's Dip. The use of this remedy which had been produced by manufacturers off the farm, is yet another example of how the needs of the farm had, from the 1890s onwards, been increasingly met by professional services and continuing a process of reducing its self-reliance.

[43] K.V.J. 12 - 20 September 1897. There were three days in which they did not shear sheep. K.V.J. 6 January 1897 for total number of sheep on Klaver Valley in 1897.

shearing had not been mechanised, it seems likely that the average number of sheep each worker sheared would have remained very similar to that of the earlier period.[44]

Any increase in the output per worker per day would have come about as a result of his increased efficiency and speed and not as a result of new machines. Shearing took place on a *misvloer* (dung floor) or the sheep was placed on a hide/skin. By at least the mid 1840s, the process of shearing would have been influenced by market standards and demands, although it is only in 1894 that reference is made to "sorting the wool".[45] First it would be "skirted which involved taking off the dirty pieces of wool. The shearer would then shear the back of the sheep, followed by the two sides. The wool on the belly of the sheep would be the last to be sheared. The wool would then be classed, before being "bagged", usually in a hemp bag, before being sent to market.[46]

Vineyard Work

Throughout the nineteenth century, harvesting grapes and wine making remained a manual labour task. This apparent lack of progressive and/or mechanised development in the vineyard had more to do with the nature of the grape than lack of innovation. Picking of grapes, by virtue of their size and tenderness, had to be done by hand.[47] Vineyard work entailing the cultivation of vines and the production of wine constituted two separate processes, carried out at different times of the year. The vine-stocks were planted in August/September and grapes were harvested in February, both prior to 1846 and after the 1870s, with marginal changes in times when vineyard maintenance work was carried out. The preparation of the vineyard was hard labour, which entailed "delving" (digging the holes to plant the vines) prior to planting new vine-stocks. While Klaver Valley farmers did fertilise their vineyards with dung, vineyard soil did not deplete at as rapid a pace as grain-producing soil. "Scuffling" (loosening the soil between the vines) was done

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[44] The shearing of sheep remained a non-mechanised task until fairly recently. Shearers used the manual clippers known as the "Drummerboy shears", personal communication Mr F. Duckitt, Darling, March 1992.

[45] K.V.J. 1 October 1894 "2 men sorting wool" for one day.

[46] This process of shearing a sheep was explained to me by Mr F. Duckitt, Darling, March 1992, who was sure that "this was the way it was always done." Again, this might be a case of tunnelling on the part of my informant and I am aware that while he might believe that, it might not necessarily have been so.

[47] Grape picking even in the late twentieth century is still predominantly, a manual task.

by men usually twice a year between one February and the next. Pruning, also a male-dominated task, was carried out in spring or early summer prior to the harvest in February.

The picking of grapes in February required dexterous finger work and prior to 1846 this task was a predominantly female task. Women, all of them related to male workers on the farm, came onto Klaver Valley for an average of 7 days to pick the grapes.[48] Women walked the paths between the vines, carrying heavy baskets on their backs, and spent from seven to twelve days harvesting the grapes. They were then transported by horse or mule wagon to the cellar to be pressed. The making of wine involved the work of men, being two carriers and two trappers. Pressing the grapes and making wine occupied their labour for about four days. In September the soil of the vineyard was "scuffled" and being heavy manual labour, was performed by men, usually either resident or regular casual day labourers. When Klaver Valley resumed wine production in the 1870s, while the labour process was still the same, it was now carried out solely by men. Women had moved out of the farm labour process by this time, only appearing, and in increasingly diminishing numbers, in November and December for the grain harvest.[49]

Maintenance of Productivity and Farm Infrastructure

Other tasks which were characteristically those of a maintenance type, consisted in the main of the repair of buildings, sheep and cattle kraals and implements, the making of cords used to bind the sheaves, the construction of dung-based floors used to trample the grain and the erection of new dwellings and buildings. These tasks formed a major part of the annual work pattern and labour process on the farm, although they were not directly linked to production and profits. As production mechanised, so were new tasks incorporated into the working year.

In September and October of 1830 approximately nine workers were marked as being present on the farm and they were employed in clearing dams, filling bags with chaff, harrowing in the dung which had been deposited by ox wagons on the lands and needed to be worked into the soil, painting the house and cleaning the stables. The repair of the trampling floor and weeding of land

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[48] K.V.J. 4 March 1829 for commencement of wine making and reference to twelve women cutting grapes.

[49] The changes in employment of women on the farm is discussed more fully in Chapter 4, pp. 81–91 below.

prior to the beginning of reaping in October was also completed at this time of the year.[50] The fertilisation of the soil, a task most directly a part of the major production on the farm, involved the loading of dung prior to the 1890s, and guano thereafter, onto ox wagons. This was then transported to fields, deposited in heaps around the field and later harrowed in. This task continued throughout the century, with the major difference being that by the 1890s, guano was first fetched from the station in Malmesbury, transported back on the ox wagon and then carted onto the land. It required the same manual labour of ploughing it into the soil. In the 1830s this had been done in the first few months of the calendar year and by the 1890s, little change in the timing of this task had occurred.[51] The number of loads carted per day varied from the 1830s to the 1890s. At the beginning of April 1833 two horse wagons and two carts rode twenty-four loads and towards the end of April an average of sixty loads of dung a day. In April 1897 between sixteen and thirty-five loads of dung were carted on average, making the carting of dung a less frequent and less intensive task.[52]

With the development of building early on in the century, lime was manufactured from shells collected at Buck Bay beach[53] which were then crushed and burnt, using the *suikerbos* wood which gave good heat and was in plentiful supply".[54] This would then be used to manufacture lime, which would be used in the manufacture of building mortar and plaster and white-wash for the walls of the buildings, and for making the solution which would be used for washing sheep until the introduction of Cooper's Dip in the 1890s.

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[50] K.V.J. September and October 1830 for reference to these tasks being completed on the farm.

[51] K.V.J. April - May 1829 "riding dung and manure" and K.V.J. April 1894 "carting manure".

[52] K.V.J. 19 April - 2 May 1833 and 2 April - 9 April 1897.

[53] K.V.J. 1 and 2 April 1838 wheat had been transported to Buck Bay by ox wagon and before returning to Klaver Valley, the workers had loaded the wagon with shells from the beach. Mr F. Duckitt explained that "lime burning was stopped at Buck Bay where the East India Company burnt lime until 1820 and had to give up through lack of wood for burning. Convicts and slaves were used for labour with ox drawn carts and the old tronk or servant's room as it is now had no door or window in but were let in through a hole in the roof, and climbed down by ladder, and when all were in the ladder was pulled up so no-one could escape or run away. A cutter used to come and fetch the lime when they had a load and it was taken out by dinghy to the cutter and off-loaded. From early 1700s to 1820 lime was burnt there, unlimited supply of shell." Personal communication, Mr F. Duckitt, Darling, December 1990.

[54] *Suikerbos* wood was obtained from the Sugarbush trees in the district.Personal communication, Mr F. Duckitt, Darling, May 1992.

The repair of fences and hedges and sheep kraals was also worked into the year's cycle. Prior to the advent of wire fences in the 1890s, the hedges and "fences" were typically made of the "suikerbos" plant and required annual or more regular repair. This task would be carried out in August to October of any year.[55] The development of hedges and other forms of boundary markers, was clearly a manifestation of the developing capitalization of the farming business. That the earlier "hedges" were generally constructed around animal *kraals* and only later around the perimeter of the lands, shows very obviously that in the process of capitalization, while production was the first area of farming enterprise to change its form and output, the commoditisation of land was only to occur, in its more permanent form in the 1890s with the construction of wire fences.

As late as the 1860s, most of the repair of farm machinery, buildings wagons and other tools and implements was carried out, at various times through the year by labour already present on the farm.[56] By the 1890s, mechanical repairs and the maintenance of wagons and carts had been transferred to mechanics and wheelwrights in the village centre of Darling, so that when Ruperti's Scotch cart needed repair it was taken by Willem to Darling. When reaping and threshing machines broke down, Ruperti "went to town to see about the man to work the machine" He returned with R.M. Ross Machine Oil.[57]

Animal diseases came to be treated in a more scientific way. In 1854 "breeding cattle were vaccinated" for the first time[58] and by the 1890s, while they had previously been washed in a concoction made up on the farm, sheep were now being dipped in Cooper's Dip. As remedies were developed to counter the spread of disease, activities on the farm became more diverse and required new and different skills which would have to be learnt by the farm workers. In 1843, workers washed "oxen for foot and mouth sickness" in August. In the 1850s, crops, specifically oats, were being *vitrioled*, using a farm-manufactured solution and by the 1890s, this solution, copper

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[55] K.V.J. August - October 1829 references to repairing *kraals* and "cutting and riding bushes for cow *kraal* and "repairing Wolverug *kraal*. K.V.J. August 1844 when a new sheep *kraal* was made. K.V.J. 11 - 16 May 1859 "people fixing cow's stable with *papekuil* (a type of reed) and fixing manger in mare's stable, making new posts and making a fixing a calf house gate". K.V.J. April 1895 "repaired sheep *kraal*, made cattle *kraal* and June 1895 "clearing bushes and chopping for hedges". K.V.J. 10 - 13 June for erection of wire fences and 13 - 14 August 1898 "repairing vineyard hedge".

[56] K.V.J. 24 January 1862 "Jafta repaired threshing machine".

[57] K.V.J. 20 April 1898 for repair of cart and 21 November 1898 for maintenance of machine.

[58] K.V.J. 23 August 1854 for vaccination of cattle and see Duckitt's recipe for washing sheep and destroying caterpillars in footnote no.42, Chapter Two above.

phosphate, was being purchased on the market and "applied to oats seed to prevent 'black smut'.[59]

Conclusion

As part of the farmer's innovative approach to farming and the early capitalization of the production, the labour process underwent marked changes early on in the nineteenth century. It was most certainly mechanisation which provided the main impetus for this change, occurring as it did first and foremost in the harvesting process. From 1829 to 1898, the harvesting labour process on Klaver Valley changed directly as a result of mechanisation, of threshing in the 1820s and reaping in 1853. These changes were not however, immediate, nor did they follow a linear progression. Manual reaping and threshing continued to exist alongside mechanised processes even as late as the end of the nineteenth century. This in no way detracts from the depth and intensity of the change which, had by 1898, affected the harvesting labour process in form and content and significantly reduced the number of workers required on the farm. While much of the labour process on Klaver Valley had changed in the nineteenth century, almost as much had remained the same. Ploughing and sowing, vineyard work, pastoral care and shearing, had remained visibly unaltered, except for the fact that the points at which these tasks were undertaken, changed occasionally throughout the period, and sometimes had their commencement, as with regard to sowing, brought forward.

The use of time and its demands on the labour process had changed during the nineteenth century. With the mechanisation of the harvesting process, time spent on tasks and the pace of work, became more pressured and although every activity generates its own time, machines brought pressure to bear on the pace and nature of activities.[60]

The development of external professional service off the farm especially noticeable in the 1890s, precipitated a devolution of the farm's manufacturing capacity and by the end of the period, the farm was much more heavily dependent upon industries and services in the village of Darling for

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[59] K.V.J. Ruperti "paid Steytlers bill for phosphate". For reason behind using phosphate, personal communication Mr F. Duckitt, Darling, March 1987.

[60] William Grossin cited in, R. Whipp, *Time and Work Discipline*, P.Joyce, (ed.), The Historical Meaning of Work, (New York, 1987), p. 214. More detailed discussion of the development of capitalist time and use of the clock and its effects on the relationship between the farmer and worker is in Chapter 5, below.

the productive and infrastructural maintenance and development of Klaver Valley. Its earlier home-based manufacture and repair of agricultural necessities and farming technology which had ensured its self-reliance, had gone. It was by the 1890s, operating in a heavily capitalised context and therefore fully locked into and dependent upon the immediate locality for its survival and progressive development.

Early on then, the farmer had not only interacted with the market, but had changed and developed the farm's productive capacity in direct response to market forces. He had ploughed back his profits from the sale of his produce into the farm and invested in machinery from as early as the 1820s. This meant that from the 1820s, the farm had become infused with and increasingly co-ordinated by the notions and ambitions of a progressive and capitalising farmer.

CHAPTER THREE
The Farmer's Use of Credit and Cash

The first Klaver Valley farmer, William Duckitt, came from England in 1799 and spent the next decade employed by the government developing innovative farming strategies. In 1808 he purchased a shop, in partnership with John Watney in Plein Street, Cape Town, at which he sold "embroidered sprig muslins, gold and silver lace and gunpowder". He also sold agricultural implements at the stores near the barracks.[1] He came to Klaver Valley in 1812 and by 1814 had obtained perpetual quit-rent tenure of the farm, more stable and secure than loan tenure, and therefore a more feasible enterprise in which to invest.[2] At least some of the capital used to invest in the farm would have come from profits made from the sale of goods and technology from the barracks and Plein Street in Cape Town.

His son, William, took ownership of the farm in 1820 and continued his father's innovative approach to farming, with increased mechanisation during the 1820s and 1850s, was able to continue the farm's interaction with markets, improving its viability as a production unit. When the farm was taken over by William's daughter, Anna Catherine, she did this together with her husband, Herman Ruperti, who was of German/Portuguese origin and whose father had had a general dealer store at Commercial Dale, almost adjacent to Klaver Valley. Even in the light of their different origins, both the Duckitt farmers and later the Rupertis all fitted onto the continuum of capitalist development, the Rupertis exhibiting much more solidly consolidated capitalist practices than the Duckitts of the first half of the nineteenth century.

The farmers on Klaver Valley can be seen to have moved through the various stages of capitalist development from 1814 to 1898. The previous chapters have shown that from the early 1800s, William Duckitt responded to changing market forces by reformulating and redirecting production on the farm, thereby not only participating on the market in a commercial sense, but responding to changing trends on the local and international markets. From 1825 his son not only continued

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[1] P. Philip, British Residents at the Cape Biographical Records of 4 800 Pioneers, p. 106.

[2] Chapter One above.

to interact with markets, but also re-invested in the farm developing its productivity with the early introduction of machines and technological production on the farm.[3]

Besides responding to markets, Chapter One has shown that capitalization was evident in the increased privatisation of property demarcated by wire fencing in the 1890s and the commoditisation of stock as farming activity became less personally orientated and increasingly more business-like. A further and vital aspect of capitalization was the use of credit. Duckitt had access to and utilised to its fullest extent, credit which was available at farm and country level and which existed outside the parameters of institutional banking. Prior to 1837 there were no banks in the south-western Cape and therefore no formal institutions which provided this important component of development. The absence of such services, however did not mean that credit was unavailable. The local farming community provided for its own needs by creating informal, but nevertheless, well organised structures in order to maintain their farms and ensure future success.

From at least the 1820s to the 1840s, family members and friends who were members of the Cape's elite class, provided William Duckitt with a basis for obtaining credit. By the late 1840s, banks had all but cornered the credit market and taken over from the informal arrangements which had dominated the rural economy in previous decades. During the 1850s, while farmers were still passing notes, these were no longer individually determined or processed, but lodged with a bank. Throughout the following three decades, Klaver Valley farmers came to rely more heavily on banks for the safe deposit of their money and for credit and loan facilities. By the 1890s, the Klaver Valley farmer, Ruperti, was in all senses a cheque book farmer.[4] While he still used local companies for short-term credit and loans of cash, was securely locked into a clientage relationship with the Standard Bank of South Africa. What occurred throughout the nineteenth century, especially by the 1850s, was that Klaver Valley farmers, in the process of capitalising their farming enterprise, moved inexorably from using sometimes makeshift financial and credit arrangements to a dependence upon the formal and impersonal structures provided by banks in the immediate and wider district.

This chapter seeks to trace the nature of the "intra-farmer" credit arrangements which facilitated the capitalization of the rural economy and attempts to show in terms of their financial know-how

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[3] See Chapter One above for response to markets and re-investment in the farming enterprise with the purchase of machinery

[4] W.M. Macmillan, Complex South Africa: An Economic Footnote to History, (London, 1930), pp. 76 - 77, cited in W. Beinart and P. Delius, *Introduction*, Putting a Plough to the Ground, pp. 4 - 5.

and activities how much more capitalist the Klaver Valley farmers in the 1890s when matched against that of their predecessors in earlier decades.

Capitalist agriculture on Klaver Valley developed most rapidly prior to the 1850s and it was largely due to the system of credit to which farmers had access which enabled them to capitalise their farming activities. Ross has pointed to this as an essential element of agri-business.[5] His example of credit was that provided by farmers to butchers in the eighteenth century. While this was so, there was also, by the nineteenth century, a very much broader network of credit operating among farmers and agriculturists in the south-western Cape. Even with the existence after 1837, of formal institutions of credit, farmers in the district kept their heads above water by developing their own private credit arrangements among themselves. Prior to 1829 and through to the 1840s, farmers maintained their livelihood and supported their progress on the back of this informal credit system. By the late 1840s, however, this network operated in conjunction with banks, with farmers giving each other credit via promissory notes lodged with the banks.

By the 1850s informal mechanisms of credit had been completely subsumed by the formal banking facilities, manipulated now by institutions as opposed to individuals. Agents played a large part in the payment and receipt of claims by their clients. By the mid 1850s, fewer inter-farmer transactions took place and now notes were directly linked to banks. The information for the 1860s and 1870s, while sparse, shows little reference to attendance at farm sales, more purchases at dealers, but when farm sales were attended, the length of credit period appears to have shortened. From this time on banks came to control agricultural credit and by the 1890s, Ruperti, the then owner of Klaver Valley, was completely locked into a clientage relationship with the Standard Bank which had begun operations in the Malmesbury district in 1879. By the 1890s, Ruperti was often in town on business but no information on that business is available. He was still "getting credit" on the local level, but now from companies such as Lombard and van Aarde in Malmesbury, as opposed to individual farmers.

The wide use of credit in the rural community points to two important issues. Firstly, the rural community had constructed its own form of credit very early on when the government banking system proved itself unable to meets the demands for credit.[6] The first steps taken by Duckitt towards a long-term relationship with the bank were tentative and show clearly that while the bank

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[5] R. Ross, *The Cape of Good Hope and the world economy 1652 - 1835*, Shaping, p. 262.

[6] W. Dooling, *Law and Community in a Slave Society: Stellenbosch District c. 1780 - 1820*, M.A. dissertation, U.C.T., 1991., p. 18 - 31, for reference to credit being controlled by individuals.

might have existed it did not mean that clients were availing themselves of all the facilities immediately. Initially Duckitt used the bank only to deposit money. It was only later that he made use of the other credit and loan facilities available.

The mechanisms to obtain credit had been created by the farmers to serve their purposes and ensure that they could expand and develop without making unnecessary inroads into their cash reserves. The average transaction usually involved payment for the purchase of stock, implements and grain, three to twelve months after the purchase. There was often interest charged on such a transaction, but this was not always the case.[7]

Prior to the 1840s, credit operated between Duckitt and members of his family. This credit system existed on a more tangible level with the borrowing and lending of goods, produce and stock. William and Frederick Duckitt, sons of the original Duckitt, kept each other in wine, brandy and meal, with the balance of risk falling mainly on William Duckitt, since he appears to have carried the burden of most of the lending. Throughout 1828 and no doubt prior to this, William lent Frederick wine, meal and brandy, and in January 1829, Frederick paid William Rds 286.0.0 for the "wine taken in 1828 and 1829".[8] It seems he had no available cash prior to this date.

In June of 1829 William had borrowed fifteen sheep from Frederick and had returned them at the end of July.[9] This intra-familial system of credit, borrowing and lending, although possibly no indication of anything more than fraternal brotherhood, could also have been the means whereby a farmer could "make do" without resorting to either indebting himself to a harsher creditor or having to declare himself unable to make a success of his farming venture. It seems that Frederick was involved in pastoral farming since he did not appear to produce any grain, and was apparently entitled to receive a certain amount of wheat once a year. In August 1829 he "took away 53 *muids* of wheat being all he has to receive of the 60 *muids* shipped by Jacob's Bay..."[10]

Whether it was simply his relationship with William which gave Frederick some share in Klaver Valley's harvest or whether it was an arrangement between the two brothers is difficult to tell.

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[7] K.V.J. 21 January 1836, Duckitt purchased 10 black oxen from Mr Chris. Johannes Rabe at Rds 30 each and passed a promissory note of Rds 300 payable 21 May 1836.

[8] K.V.J. 21 January 1829.

[9] K.V.J. 30 July 1829.

[10] K.V.J. 8 August 1829.

That William gave him a total of 53 *muids* of wheat suggests that it was for consumption as opposed to cultivation. No mention was made of it being seed wheat. What appears to have been happening here was an unequal relationship of exchange between the two brothers. Although very often it appeared that one or other member of the wider Duckitt family had not only his farming enterprise but his subsistence assured by William, it was not without a cost. There was no free generosity. Duckitt was in the business of farming and while he might have taken the risks and suffered short-term losses, he did not risk serious losses. Family members who proved their inability to get onto their feet did not simply continue to live off the rest of the family. Those who were unproductive had to pay their way as is evidenced by the payment of board and lodging charged to parents and children who did not contribute their time and effort to maintain the farm, as was the case in the 1860s when William charged his sons, Peter and Henry, board and lodging.[11]

Besides family members, Duckitt was able to exploit his relationship with friends and acquaintances who were members of the Cape elite, such as Jacob van Reenen. This relationship tended to work, both in the short and long-term, in Duckitt's favour. He most often lent to or borrowed from such notables as the Van Reenens, Cloetes, and Melcks.[12] This occurred between William and members of Cape Town's elite families, especially in the 1820s and up to the 1840s, accounted for much of William Duckitt's early success. His father's development and progression as a capitalist was very closely connected to the support and association established early on in his life at the Cape and his son was to benefit from these connections. Soon after his arrival in the Cape, the original William Duckitt had gone into joint farm ventures with the Van Reenens and the Cloetes

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[11] K.V.J. 18 February 1842 for an example of when William Duckitt "received of my mother an order on Mr J, Gie for Rds 348.0.6. cash due per lodging for 1841, payable 15 March 1842 " Personal communication Mr F. Duckitt, Darling, November 1987, the payment of board and lodging had been a practice in the family until the 1920s, when the family agreed not to charge board and lodging to either one or both parents who might still be living on the farm. This may very well have been the case in the Duckitt family, but there is no record that the Rupertis in the 1890s either ever charged their parents board and lodging, or if they did, that they were part of this agreement.

[12] three families have in earlier studies been recognised as those who had succeeded in acquiring great wealth by the nineteenth century. J.L.M. Francken, *Martin Melck*, Tijdscrift vir Wetenskap en Kuns, 18, 1938, and G. Wagenaar, *Johannes Gijsbertus van Reenen - sy aandeel in die Kaapse geskiedenis tot 1806*, (M.A. dissertation, U.C.T., 1976), both cited in R. Ross, *The First Two Centuries of Colonial Agriculture*, Social Dynamics, 9, 1, 1983, p. 43.

and the Melcks were to become members of his extended family once his children had married into them.[13]

In 1829 Duckitt's relationship with Jacob van Reenen was one which easily accommodated borrowing and lending. Throughout the year Jacob Van Reenen took wine on credit, paying for it in parts sometimes six months later.[14] While this was no more or less than the credit given to other farmers, it is noticeable that Duckitt refers to his family and members of these notable families "borrowing" from him, and not buying on extended credit. There were some occasions when Van Reenen was given wine, but most often he took it first and paid for it later. Duckitt's relationship was much closer than merely affording Van Reenen time to pay. They accompanied each other to farm sales and town, and Duckitt, no doubt fully aware of Van Reenen's status, never failed to make mention of his excursions.[15]

Duckitt also borrowed sheep from Van Reenen and returned them, most often a few weeks later.[16] This sharing guaranteed mutual benefit. There are frequent references to giving Van Reenen wine throughout 1829, paying much later. By 1831 it appears he was paying for the wine on a more regular basis which points to a tightening up of the relationship and a more immediate cash oriented exchange.[17] Van Reenen could buy his wine at lower prices and also delay

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[13] *Opgaaf Returns*, J.45, p.1, 1812 for reference to van Reenen holding Klaver Valley on loan prior to William Duckitt taking up occupation on and management of the stock farm. K.V.J. 16 January 1833 when W. Duckitt purchased Kruywagenskraal from the van Reenen family. Other examples exist in the family tree of members of the Duckitt family having married into these families, e.g. Mary, daughter of Frederick Duckitt of Karnemelksfontein married Henry Cloete of Groot Constantia, her sister married John Cloete and her brother married Hester Johanna. In the 1880s, Henry, son of William Duckitt, married Elizabeth van Reenen, at about the same time that his cousin, Annie married Jacob Pieter van Reenen and Hildagonda and Aletta Duckitt married Ryk and Gilbert Melck respectively. The family tree is in the possession of Mr P. Duckitt, Darling.

[14] K.V.J. 10 March 1829 for example of Van Reenen borrowing wine and K.V.J. 30 June 1829 for when he paid Rds 90 for the wine.

[15] K.V.J. 2 May 1829 Duckitt bought various household commodities "in the company of Dirk van Reenen."

[16] K.V.J. 15 May 1829 Duckitt returned fifteen sheep borrowed of Mr J. Van Reenen, after having purchased seventy Cape sheep at the auction of P. Heinnenberg Ltd on 11 May 1829, Farmers never borrowed blood stock, "farmers only ever borrowed stock for slaughter". Personal communication, March 1992, Mr F. Duckitt Darling.

[17] K.V.J. 21 June 1831, 25 June 1831, 4 July 1831, 20 July 1831, 28 July 1831, 27 August 1831, 6 October 1831, 14 November 1831, 28 November 1831, 6 December 1831, 21 December 1831, for the references to giving Van Reenen wine. All these entries have "Paid" recorded next to them.

payment. By 1835 however, the relationship had changed, no doubt as a result of Van Reenen now having his own vineyards. Instead of paying for the wine, he now returned it.[18]

Prices while they might not have always been lower than those obtainable on the market, nevertheless still worked in Van Reenen's favour, since payment was not always immediate.[19] Duckitt, on the other hand, could continue his daily slaughter of a sheep without interruption, until he had built up his stock of Cape sheep, which were primarily for the conditioning of land and consumption.[20] After Duckitt had built up his stock, he discontinued borrowing sheep from Van Reenen with the same frequency and by 1836 there was only one occasion of sheep borrowing and this time it was Van Reenen who had borrowed twelve sheep from Duckitt, which he returned the following month.[21] The mutual assistance between Duckitt and Van Reenen, can be seen as the means whereby the elite and wealthier stratum of society reproduced itself. The wealthier members of society used the smaller and less influential men like Duckitt to reinforce and maintain their status and the smaller men of Duckitt's ilk, allowed themselves to be so exploited in order to gain acceptance and finally entry into that upper stratum.[22]

By the 1840s, connections with the elite would prove to have outlasted their tangible and immediate benefits and member of the elite would not come to Duckitt's aid as, for example van Reenen's father had done for his father. He attempted to get Van Reenen's assistance when he found himself unable to pay his quit-rent, but either Van Reenen had lost his force in government circles or he did not try hard enough to accommodate Duckitt's needs. He had written to the Governor requesting a respite in the payment of his rent (quit-rent) arrears because of crop failure in the last year and promised to settle '..April next when all arrears will be paid...' His request was forwarded to the Civil Commissioner for the Cape Division who refused to accede. No reference exists in the journal in either 1841 or 1842 and he still retained ownership of Klaver Valley, so he was undoubtedly lent the money by a friend, or he called up a debt owing to him. Van Reenen

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[18] K.V.J. 6 January 1835, "J. Van Reenen returned wine borrowed from me".

[19] Wine prices on the Cape market rarely rose above Rds 50 per *legge*, in 1829 being Rds 57, 1830 - Rds 65 and 1834 - Rds 49 per *legger* in M. Rayner, *Wine and Slaves*, p. 198.

[20] K. V.J. 14 March 1831, 1 February 1832, 12 February 1833, 29 July 1834, 27 July 1835 as examples of the frequent references to Duckitt purchasing Cape sheep from farmers in the district.

[21] K.V.J. 15 September 1836 when Van Reenen borrowed twelve sheep and 21 October 1836 when Van Reenen returned the sheep.

[22] See footnote number 14 above for examples of Duckitt children marrying into families of the elite in the Cape.

wrote to the Governor on his behalf, but it appears that this path was no longer open to even the Van Reenens. The bureaucratic wheels had begun turning, governmental control had been decentralised with divisional representatives, being less susceptible to pleas from the wealthy of Cape Town and "favours" could no longer be easily extended, even to the wealthy and influential.[23]

Important credit transactions, with or without interest, also took place, between Duckitt and less noteworthy individuals. It was this mutual knowledge and mutual trust that allowed for notes promising payment to be passed and for this system to continue to work for all. Prior to the 1840s, the levying of interest on an amount to be paid in the future, was comparatively rare. By the early 1840s, however, this had crept into these inter-farmer transactions. In 1841 Duckitt purchased thirty sheep for Mr I.G. Muller at Rds 6 each, paying seven months interest at half a per cent.[24] Paying and charging interest on "post-dated" payments, had doubtless crept in as a result of the bank's influence on rural communities. What had also become the pattern in the early 1840s, was the quite marked decrease in the number of credit-purchases which took place.

Besides these very important credit arrangements, there were also those transactions which were more clearly bartered exchanges rather than the normal commodity exchange in which money passed hands either immediately or later. Although not occurring very often, when it did it was usually very small-scale. In 1834 Duckitt exchanged 4 *muids* of oats for 3 gallons of vinegar. In 1838 he exchanged wheat for a pony and in 1833 and 1841 he gave meal for 600 *haarders*.[25] The later payment for stock or grain purchased was the most common form of inter-farmer credit and exchange, which lasted longer than any other form of credit/exchange. Duckitt most often purchased sheep and "passed a note payable" three to twelve months later.[26] By the 1840s, it is noticeable that the period of credit had been drastically shortened, being reduced to an average

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[23] C.A. Colonial Office Records, (C.O.), Memorial Petitions, 4008, folio, 151, 19 February 1841 for Duckitt's request and ibid, for Van Reenen's letter dated 13 November 1843

[24] K.V.J. 24 April 1841.

[25] K.V.J. 16 March 1834, 22 October 1838, 25 January 1833 and 3 April 1841, respectively. *Haarders* were small fish purchased for workers' rations.

[26] K.V.J. 26 January 1832, 29 April 1834, 6 October 1834, 27 July 1835, 16 May 1836, 14 June 1836, 30 June 1838, 1 March 1839, for references to purchasing and passing a note which was payable between 3 to 12 months later.

of less than three months and often payable that same month, as was the case in 1846 when Duckitt purchased sheep on 8 June and paid on 27 June of the same year.[27]

The other form of credit was one which occurred, not between two but three individuals. Farmers, including Duckitt, purchased stock from another farmer, and passed a note in favour of yet another farmer or a merchant, to whom the seller was in debt. This was the case when Duckitt purchased sheep from van Reenen and paid the money, using a promissory note, to Mr Theunessin to whom van Reenen owed money.[28]

While this was never a predominant form of credit-cum-exchange, it certainly was practised, although with much less frequency than the individual credit. By the 1850s, evidence of these payments are extremely rare, with only one occurring in 1846 and in 1850. It is worth noting that these were both payments made to the farmers' creditors, one of whom was J. Moorrees, a general dealer in Malmesbury.[29]

Prior to the late 1840s, although most of Duckitt's large purchases of stock and farming implements were paid for on credit, the smaller purchases and commodity buying for the farm household and workers, tended to be paid for immediately and in cash. This was especially so when he bought from the missionaries and small entrepreneurs like the fishmonger. Cash payments, while continuing throughout the period, remained restricted to smaller transactions and those transactions which occurred between the farmer on Klaver Valley and small-scale entrepreneurs. Duckitt regularly purchased implements, hardware and household commodities from the missionaries at Groenekloof/Mamre for which he either paid immediately in cash, or when he had cash available usually very soon after the purchase.[30]

Cash payments which had been the least utilised means of exchange, it had become, across the board, the most common method of payment by the late 1840s.[31] The reason for this was that the banks had by this stage made deep inroads into the rural economy and less credit was

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[27] K.V.J. 8 June 1846 for purchase and 27 June 1846 for payment reference.

[28] K.V.J. 21 June 1834 and K.V.J. 15 December 1836 Duckitt purchased sheep from De Villiers and paid Rds 210 to Korsten on 31 March 1837.

[29] K.V.J. 30 June 1846 and 5 February 1850.

[30] K.V.J. 17 March 1836.

[31] K.V.J. 25 March 1852

therefore available for farmers. By the 1850s there were comparatively fewer instances of Duckitt attending farm sales, because dealers like Lombard and Van Aarde, Smuts and Koch, had commandeered much of the implement and grain market. Further, most of Duckitt's purchases were now paid either by promissory note, via the bank, or by means of "an order on Mr J. Gie", his agent who managed his finances, and who frequently paid Duckitt's accounts to merchants and other creditors in Cape Town.[32]

It had been during the 1830s that banks independent of government control, and subsequently more viable financial institutions, had opened in Cape Town. Duckitt's initially poor utilisation of the institution, was a measure of his low level of capitalist development and also indicative of his already established position in the network of credit operating between farmers. The Cape of Good Hope Bank, the first bank to open in the Cape, began business on 1 August 1837.[33] It is clear that initially Duckitt used the bank as a depositing facility only, continuing to obtain his credit via the informal network already in place.[34]

Duckitt's slow adaptation to the use of banks was mirrored in his even slower adaptation to changes in legal tender. In 1831 the replacement of rixdollars by sterling effectively meant that colonists' rixdollars, decreasing in value since the late 18th century, would now have to be exchanged at the fixed rate for sterling.[35] The structure of the coinage system changed in 1831 and rixdollars ceased to be regarded as legal tender in March 1841.[36] Duckitt however, continued to use this coinage and throughout the 1850s, equated the value of the exchanges in rixdollars in his journals, although he would have been tendering pound sterling, the first reference to which was made in 1841.[37] It is worth noting that this was a reference to money paid to him from his sale of wool. In 1842 he "engaged Mr Jackson at £20 per annum" but the remainder of the entries pertaining to local exchanges, purchases and wages, remained in rixdollars. Increasingly

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[32] K.V.J. 1 April 1842, "gave Mr Moorrees an order on sight on Mr Gie for Rds 20.4.4."

[33] E.H.D. Arndt, Banking and Currency Development in South Africa (1652 - 1927), (Cape Town 1928), p. 236.

[34] K.V.J. 14 November 1837 for first deposit of Rds 624.4.0. made by William Duckitt at the Cape of Good Hope Bank in Cape Town.

[35] E.H. D. Arndt, Banking and Currency Development in South Africa 1852 - 1927, (Cape Town, 1928), pp. 63 - 64. and for the implications of the change-over to pound sterling, R. Ross, *The Cape and the world economy 1652 - 1835*, Shaping, pp. 259 - 261.

[36] R. Ross, *The Cape and the world economy*, p. 260.

[37] K.V.J. 16 April 1841.

the rixdollar equation/value alongside the sterling disappeared and by 1861 money values were written solely in £.s.d. form, with the exception of wages which were still being recorded in rixdollars.[38] The discontinuation of the rixdollar as legal tender by law and its use in the wider society on the ground were not simultaneous. People did not change their understanding of currency and values as is evidenced by Duckitt's slow transition to use of pound sterling as a unit of currency in his journals.

That the use of promissory notes continued well into the 1850s, is a further indication of Duckitt's use of this method of payment in the context of cash flow shortages. Most of his business dealings were articulated by promissory notes and not hard money which accounts for his slow and staggered adaptation to the new coinage system. While Duckitt had made little active use of banks in the 1830s and early 1840s, by the beginning of the 1850s, many of the promissory notes he passed and which were passed to him, were payable at the bank, which is indicative of his increased and more active use of available banking facilities and services.[39]

Farmers like Duckitt, with access to banks, and the funds to deposit so that he would benefit by using the facilities of the institution, were able, by the 1840s, to extricate themselves from the web of informal credit arrangements, which had become risky when notes were unable to be met.[40] The early 1840s were a high-risk period during which many farmers drowned in a sea of debt which they were unable to meet.[41] A poignant note from the son of Duckitt's former partner in the Plein Street shop, who was also a farmer in the district, was a precursor to what many farmers would be experiencing by the mid 1840s. Necessity has compelled me to take the liberty of asking you the loan of two muids of Wheat until the next harvest, having had no crops last year and not being able to purchase, should it be in your power, I hope you will assist me, I should not trouble you, but have not a Muid to sow, by granting my request you would greatly relieve me and with our best respects to you and yours I remain sincerely Yours J. Watney.(sic)[42]

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[38] K.V.J. January - December 1861.

[39] 17 April 1852, a note payable to S.A. Bank on 15 February 1853 in favour of J. Steytler.

[40] While there are no references to Duckitt either being unable to pay or someone being unable to pay him, it would not be unrealistic to assume that once locked into institutional relationships, the less formal arrangements on the ground were more open to manipulation and farmers stood to lose out as a result of their debtors either going bankrupt or having to delay payment of bills.

[41] the 1840s depression, J,.Marincowitz, *Rural Production 1838 - 1888*, and R. Ross, 'Emancipations and the economy of the Cape Colony'.

[42] K.V.J. 6 July 1839 - note found loose in the journal, dated 6 July 1839.

What is telling about this letter, besides the fairly obsequious tone, is that produce and not a loan of money was being asked for. There is also a firm guarantee of repayment, once he had planted the seed and was able to harvest the following year. The perception that Duckitt had this to spare him is also worth noting. Obviously his plight as outlined in his letter to the Governor in 1843, was not yet evident either in real or perceived terms.

By the 1850s, although still operating, mutual credit facilities had thinned as a result of improved cash flow and the development of formal institutions of credit which progressive farmers like Duckitt had begun to use in the 1830s and had become more locked into by the 1850s.[43] This meant that inter-farmer credit increasingly became less necessary. There are certain interesting aspects to this. Duckitt, although continuing to make use of informal credit arrangements, initially only used the bank for deposits. Thereafter he was to authorise John Gie, his agent in Cape Town, to make his deposits in Cape Town.

By the 1850s not only had Duckitt capitalised and made more use of the credit and loan facilities of the formal institutions, but the entire rural economy had capitalised so that most transactions were now formally authorised and conducted in and with the bank, with little personal and less free means of credit on the local farm level. Very little evidence exists of the earlier relationship of mutual assistance and informal credit between him and other farmers, and him and members of the elite.

Klaver Valley farmers continued to make use of the bank through the next two decades and by the 1890s, Ruperti was able to conduct all his financial business at the Standard Bank in

[43] The Cape of Good Hope Bank, the first private bank in the Colony, had been founded in 1837 and by 1843 there were sufficient banks to cope with the colonists' needs. R. Ross, *The Cape and the world economy*, Shaping, p. 263. Duckitt recorded his first deposit of Rds 624.4.0. in the "New Bank". K.V.J. 14 November 1837 at the end of his account of cash expended.

Malmesbury which had opened there in 1879.[44] He conducted his financial transactions completely outside the earlier forms of money exchange among farmers, although he still borrowed money, not from individuals but companies. The references to Ruperti borrowing cash from companies are frequent in the 1890s. He usually borrowed small amounts and they were generally paid back within a month or two, or if he had an account there, it would be added to his debt and when he paid his monthly account, he would pay off the money borrowed.[45]

When we see Klaver Valley's farmers in the 1890s, it is clear that the major proportion of their financial activity was co-ordinated by cheques which had become a more common means of payment and both the business and the farmer were dealing with village and town industries, paying not irregularly and in cash as they had done in the earlier years, but much more regularly and usually by cheque. Ruperti appears too, to have had accounts at the major dealers, like Smuts & Koch, Lombaard & Van Aarde and John Moorrees, in Malmesbury. These accounts were used and paid up regularly, as was the case in his dealings with Moorrees in Malmesbury.[46] It is not clear if he settled his accounts every month or if, as in the above case, he paid them over a period of a few months, but the former would seem to have been the case, since there are often large amounts which are recorded in the journals alongside the companies' names.[47]

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[44] Standard Bank Inspection Report, SB INSP 1/1/105 442/MALMES for the first year of its operation in Malmesbury. The Inspection Reports of the Standard Bank were made available to me and they provide an interesting insight into the people who did business with the bank. Most of these reports were made on *discount liabilities* which were similar to modern post-dated cheques given to the bank and the bank gave a percentage of the value of the bill before it was due. Since the bank was carrying the risk of credit, character references and financial status/suitability or otherwise, were thoroughly investigated. These reports provide a myriad of fascinating detail about individuals, and one also sees at first hand, the operation of social and class-based belief on the ground. An example which was prolific in the reports was the statement - "a respectable man", when the person in question was either a man who owned property or connected to men of property. For example: "Hermanus John Duckitt, farmer at Klaver Valley, (a discount liability) by J.S. Van Reenen senior and junior, 28 February 1881 for £90. Recently bought a farm not yet transferred to his name. Particulars of purchase unknown to me". Farm valued at DC £2 000. A respectable man whose position is not known here." *Standard Bank Inspection Reports*, SB INSP 1/1/105 442/MALMES, 1881, pp. 136-137., Standard Bank Archives, Johannesburg.

[45] K.V.J. 8 August 1893 borrowed £5 from J.L. & Co., and paid it back that same month. K.V.J. 8 August 1893 Ruperti paid back the £5 he had borrowed from J.L. & Co. K.V.J. 2 and 3 October 1893 he borrowed £4.7.0. from the same company

[46] K.V.J. 17 June 1893 Ruperti paid J. Moorrees & Co £45.1.0., K.V.J. 19 February 1894 Ruperti paid J. Moorrees £50.

[47] 24 April and 14 May 1896 Smuts & Koch were paid a total of £51 on the two occasions; 20 March 1897 he paid £50 to Smuts & Koch on account; 29 January 1897 J. Moorrees was paid £41.10.6 on account;

By the 1890s, Ruperti was much more insurance-minded than Duckitt had been in the 1830s. Now, Ruperti paid a regular quarterly insurance premium to a life assurance company of £2.7.0.[48] Furthermore his dealings with outside industries were more overt in the 1890s than they had previously been. For example, he no longer milled his own grain but sent it to be milled at Dan Mills in Maitland. In 1896 he still milled Klaver Valley grain and by 1897 he and his sons owned what was now called S.A. Milling Co. Ruperti's milling bill also appears to have increased over the years, and not only had the farmer capitalised but he was increasingly using the service of capitalist industry outside of the farm.[49]

That the farmer by the 1890s was more capitalist than the Duckitt's of the 1840s, is further reinforced by Ruperti's utilisation of machinery as a means of enhancing the farm's income. Having mechanised a major part of his production, his seasonal activities, especially during harvesting, were radically shortened and instead of letting the machine stand idle, Ruperti hired it out to neighbouring farmers once he had completed his harvest. This additional exploitation of assets, although not bringing in large amounts, certainly gave him extra income. He hired out machinery to family members and also to long-standing family associations, such as the van Reenens and the Melcks, earning in excess of £38 in 1896.[50]

Conclusion

Prior to the growth and expansion of the banking industry, the main basis of their ability to develop the farm, came from their access to credit at farm level. After 1837, banking operations influenced and reshaped the older system of informal credit and finally broke it down, so that by the 1850s, Duckitt had come to rely more heavily on the bank than he did on his friends and neighbours.

Credit is a vital component of capitalist development and what this chapter has attempted to argue is that without the earlier structures of credit existing at farm level, controlled by the farmers themselves, capitalist development of agriculture in general, and Klaver Valley specifically, would

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[48] K.V.J. 6 July 1893 £2.7.0.; 1 March 1895 £2.6.10; 15 October 1897 £2.6.10 for examples of his paying insurance.

[49] K.V.J. 24 October 1896 Ruperti paid £4.15.0. to Dan Mills; K.V.J. 11 January 1897 he paid Dan Mills and Sons, £5.10.0.; 28 January 1897 he paid S.A. Milling the amount of £17.5.0.

[50] K.V.J. 2 February 1894 he received £6.10.0. from John Duckitt, 29 January 1896 J. van Reenen paid him £20 for the machine and 5 March 1896 he received £18.15.0. from J.A. Melck for the machine.

have been delayed. It was because they had had access to some form of credit that farmers had been able to develop their enterprises and, to a large degree, protect their cash flow, that enabled their active use of banking facilities once they had become available. Without money to deposit, or without some form of valuable collateral, farmers would not have been able to deposit money and earn interest, nor would they have been able to avail themselves of the loan facilities and enter into a clientage relationship with a bank. It was in the 1840s, a period of depression in the south-western Cape and an equally financially stringent time for Duckitt, that the change in financial activity occurred.

It was during this decade that the previously dominant means of payment on credit organised by individual farmers and merchants, was edged out by the incursion of banks. By the end of the 1840s, banks were responsible for the risk of the majority of promissory notes passed between Duckitt, his neighbours and merchants. Duckitt was able to withstand the stringent forties, because he had established his financial reputation and was able then to maintain his credit standing in local and wider financial circles.

William Duckitt, his son, Peter and Henry Duckitt, and the Rupertis, all farmers on Klaver Valley from 1812 to 1898, represent various stages of capitalist development. Their individual persona notwithstanding, they exhibited, to an ever-increasing degree throughout the nineteenth century, those characteristics which made them capitalist farmers. Besides their English background which contributed to their progressive economic behaviour, their political ideology played no small part in assisting their capitalist development. Their connections and association with individuals like Ebden and Versfelt, the former also one of the proponents of a free banking system, provided an encouraging context for their capitalization. It is clear that while these relationships assisted in promoting their economic advancement, they also provided a means of social aggrandizement.

Over the period of approximately eighty years, Klaver Valley farmers became more capitalist in outlook, behaviour and attitudes. The most obvious change was the increasing depersonalisation of financial transactions and the increased dependence on and interaction with externally created and developed industrial and mercantile interests in Darling village and the wider district. The 1850s mark the decade of transformation, when Duckitt consolidated his financial business with banks and throughout the following decades, reinforced this relationship.

By the 1890s, when Ruperti was on Klaver Valley, the farm was owned and managed as a highly developed capitalist enterprise heavily dependent upon the bank which was now very much more

locally situated. Ruperti represented the personification of agricultural capitalism in terms of his business dealings and his fully developed client relationship with the bank. Cheques were now regularly passed between him and his creditors and credit was now managed and co-ordinated by the institution.

Ruperti also managed his own financial affairs which was very different to his Duckitt predecessors. They, especially prior to the 1850s, had had less control over their own financial strategies and operations since an agent, from the 1820s to the 1840s, in the person of John Gie and his son, based in Cape Town, had in effect been the manager of Duckitt's affairs. The closer and tighter control over his finances which Ruperti was able to exercise, meant that there was a direct relationship between what occurred on the farm and how its income was disposed of. Furthermore, he was not only making money from crop and stock production, but also from the hiring out of machines which he already owned, thereby increasing his income.

This chapter has also highlighted, albeit briefly, the length of time it took the Klaver Valley farmers to adapt to wider economic changes. The very slow integration of the new currency into the economic activities of the farmer within the context of his own farm, probably as a result of the fact that his broader economic and financial dealings were being managed by a third party, point to his distance from externally determined changes. In all his dealings on the farm and in the farming locality, money was valued "the old way and in the old currency". This aspect of the farmer's development is important to note, because although it is not a major financial issue, it certainly gives us a deeper understanding of the process of capitalization. Had he not had an agent, he might very well have adapted with more alacrity, but with an agent who dealt with his finances at the coal face, he was able to adapt more slowly and still continue operating his farm successfully. This shows how the old could and did exist alongside the new, allowing for less disruption and alleviating the stress of rapid change, but also extending the period of adaptation.

From the 1820s to the 1890s then, the farmers on Klaver Valley can be seen to have slowly and often hesitatingly progressed towards a stronger and greater capitalization. Their ability to do so was rooted in their early access to credit and their beneficial association with members of the Cape elite. What is clear is that by the end of the nineteenth century, Klaver Valley farmers were businessmen whose attention was focused more intently upon exploiting banking mechanisms with all their contingent benefits and ensuring that every available strategy was employed to make bigger profits.

CHAPTER FOUR
Proletarianisation on Klaver Valley 1812 - 1898

What impact did changes in production, mechanisation and the farmers' changing financial behaviour have on the nature of proletarianisation on Klaver Valley? At the start, the farm had been a stock farm providing for the demanding meat market in Cape Town. In 1814 it was transformed into a mixed stock, grain and wine producing farm and continued as such until the 1840s, when its productive energies became heavily, although not totally focused on wool production, moving back again by the 1890s, into a period of greater balance between grain, wine, wool and dairy production. Klaver Valley lived through slavery, the boom in rail and road construction in the 1860s and 1870s, the mineral discoveries in Kimberley with their ripple effects on transport, markets, labour and changes in farm ownership and management. All these factors played a role in shaping the size, composition and utilisation of the labour force on the farm.

During the nineteenth century, the labour force on Klaver Valley changed in form and composition. Prior to 1838, it composed a combination of slaves, indentured and free labour. During the 1840s while some of the labour had already become fully proletarianised, there were those workers who hired their oxen to Duckitt during the ploughing season and who were therefore, not absolutely dependent upon their wages for their subsistence. By the 1850s, this practice had disappeared, but in the 1870s there had come into the farm's population a small number of sharecroppers who sowed on the half with the farmer. In the 1890s, two sharecroppers were evidently sowing on the half with Ruperti, although were not in his employ as wage labourers.

Throughout the century then, the labour force on the farm can be seen to have moved through a process of proletarianisation in which it became totally dependent upon the wage earned. The debates on proletarianisation are wide and varied, focusing on dispossession, lack of access to any means of production in the form of land or beast, dependence upon wages for the maintenance of the labourer's subsistence.[1] But the essential point of departure seems to be most accurately focused upon the stage at which workers were no longer in a position to reject or avoid wage labour. While Ross is correct in viewing dispossession of the Khoi, early on in the eighteenth

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[1] H. Bradford, *The Industrial and Commercial Workers' Union of Africa in the South African Countryside 1924 - 19300*, Ph.D. dissertation, Wits, 1985, T. Keegan, Rural Transformations, 1986, ch.5.

century, as a most important factor in proletarianisation, it was not the only factor.[2] Quite clearly dispossession laid the bedrock foundation for proletarianisation. However, having no access to land did not mean the loss of access to all means of production. As Klaver Valley shows, some labourers retained access to and a hold on draught animals until at least the 1840s, and although they were locked into wage labour employment, it can be easily argued that they were not totally reliant on their wage earning capacity. This chapter argues that by the 1850s, when all evidence of workers using their own oxen had gone, the labour force which motored the production of the farm, had, in all the important ways, become fully proletarianised, although the existence of two to three sharecroppers in the 1870s and 1890s provided a strong hiccup in this process.

From 1812 to 1898, the labour force on Klaver Valley decreased in size. In addition to this, labour also came to comprise of daily casual workers, as opposed to permanent and resident. These changes were part of the process of proletarianisation which accompanied and was a vital factor in the process of capitalization of the farmer and production on the farm. These two developments went hand in hand, the one rested on and grew out of the other. During this time, first Duckitt and later Ruperti employed a variety of workers on the farm. Besides slaves, indentured workers like "Prize Negroes" and white immigrant labourers, they also employed local Khoi and free blacks, many of these with their wives and children.

Composition of the Labour Force

In 1815 out of the total number of 33 black labourers and two *knechte* on Klaver Valley, thirteen were slave, three were indigenous Khoi and a massive twenty-two were "prize slaves".[3] The number of slaves had dropped from seventeen adult males and two adult females in 1812 to ten adult males, one female and two children.[4] This drop can be accounted for by the increase in the

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[2] R. Ross, *Origins of Capitalist Agriculture*, Putting a Plough to the Ground, pp. 56,73,79

[3] *Opgaaf Returns*, C.A., J. 46, p. 24. *Knechte* were usually poor whites who, unable to purchase their own land, usually sowed-on-the-half with a farmer and assisted in overseeing the labour force. "Prize slaves" was the label given to those people who had been captured as slaves, but had been 'rescued' from their captors and put into indentured service in the Cape colony.

[4] *Opgaaf Returns*, C.A., J. 45, p. 16.

having to lay out cash.[11] Secondly, the labour force was very nearly totally "foreign" and largely new in the colony which would have allowed Duckitt a stronger measure of control.[12]

By 1825, the labour force looked very different. There were now, for the first time, free blacks registered as being on the farm - four male and two female adults, as well as "prize slaves" numbering thirteen adult, seven minor males, four adult and five minor females.[13] That Duckitt was still utilising "prize slaves" on the farm was to be expected since their indentureships were of fourteen years duration.[14] The smaller number indicates that some had completed their indentures while on Klaver Valley and had left the farm, and others still worked on the farm and now constituted a percentage of the free black workforce, some of whom were still on Klaver Valley in the 1840s. The almost total reduction of slaves to one adult male in 1821 was due partly to the fact that William Duckitt had taken over control of Klaver Valley and his father's labour force together with implements and stock in 1820, making the senior Duckitt's return negligible.

In 1829, besides slaves, Duckitt employed approximately six free blacks and between 1831 and 1838, there was an annual average of seven workers listed as free blacks working on Klaver Valley. What percentage of the workforce this constituted is hard to calculate down to the last person but we do nevertheless have figures which show that most if not all the free blacks were resident on the farm.[15] Taken together with the slave population, which in 1834, stood at fifteen adult and six minor slaves, making a total of approximately twenty-one adults and six children resident on the farm, the percentage of resident free blacks would have been 28,5% with adult slaves at 71,4%.[16] The predominance of other forms of labour in a slaveholding economy is striking.

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[11] Prize slaves were distributed by the state without cost to the employer...(his obligation being) to provide training and instruction, although the reality was that very often the prize slaves only received food and shelter. Some recipients of prize slaves hired them out for profit but Duckitt appears to have used his as farm labourers. See C. Saunders, *"Prize Slaves in Pre-Emancipation Cape*, pp. 5 - 6.

[12] Workers, new in the colony, would have been at a disadvantage in terms of cultural and language differences, at variance with the Christian and, on Klaver Valley, English background of the farmer.

[13] *Opgaaf Returns*, C.A., J. 55, p. 25.

[14] C.Saunders, *"Prize Slaves" in Pre-Emancipation Cape*, p. 10.

[15] Neither the journals nor the wage books differentiate between resident and itinerant. These figures have been worked out from names and payments made in the daily journals and my own familiarity with the workers on the farm. While this is not absolutely accurate, a clearer idea of the farm's labour force was able to be reached.

[16] K.V.J. 9 December 1834 for the number of slaves on the farm in that year, for the purposes of valuation by Mr Gie and Mr Blanckenberg representing the Cape government.

There are important points to be made here. Firstly, long before the end of slavery, but also noticeably after the ending of the slave trade, Duckitt utilised free alongside slave and indentured labour on the farm and had done so since at least 1812.[17] Secondly, free blacks stayed on Klaver Valley for a long time, as is borne out by the example of Massourina who worked on the farm from at least 1829 to at least 1843.[18] Thirdly and very importantly, having shown that Duckitt was by the late 1830s at least, already fully on the road to capitalization, here is another factor which informs that conclusion. Prior to the end of 1838 he did not produce his harvest using only slave labour. That he utilised slaves is clear, but what is important to note is that he also made full use of free wage labour and his production output increased as a result of the combined labour of free and unfree workers.[19] In 1833 he brought in his harvest with a total of seven male slaves and five women, and an average of between thirteen to eighteen itinerant workers. On some days in November and December there were more than twenty itinerants on the farm so that the slaves were not the highest proportion of the labour force.[20] This points to a complexity which must be taken into account when studying slave economies. In relying heavily on American plantation slave studies as an important backdrop to Cape slavery, there has perhaps been too narrow a conceptualisation of what a Cape slave owner was. If Duckitt, albeit as an associate of the elite in the Cape, is anything to go by, farmers, especially those who had elite and government connections, owned slaves but throughout the period employed wage and other forms of labour. Their production and activities therefore, cannot be seen solely in the context of slave ownership.

Throughout the nineteenth century, the workforce on Klaver Valley was made up of a variety of workers, including white indentured immigrants, "prize negroes" and wage workers who were mostly male workers from Groenekloof/Mamre. From the early 1800s, although always apparently in small numbers, indigenous Khoi worked on Klaver Valley.[21] They are by nature of being

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[17] The evidence for this is in the records of wages paid to workers in 1829 where payments for "last year's harvest" are recorded. See for example, K.V.J. 26 January 1829, when Gotlieb Okkers, was paid Rds 11 and 4 skellings "for harvesting in 1828".

[18] K.V.J. 1829 to 1843, for example, 11 August 1829 when Massourina came to work at Rds 6 a month; 25 March 1832 when Massourina was given Rds 6 and leave of absence to search for Willem; 3 January 1843 when Massourina was paid his wine money.

[19] Chapter One above for production output 1814 - 1898.

[20] K.V.J. January to December 1833 and November and December 1833 for the average number of itinerants and the frequency of days where over twenty casual workers were employed on the farm.

[21] There are scattered references throughout the journals until the late 1840s, to "hottentots", but thereafter no references to a worker's origins or racial group are evident. By this stage a cultural label might have become unnecessary. Only in 1869, is there a reference to Zamze, caffer (sic) receiving soles valued at 9d, K.V.J. 31 August 1869.

labelled as such, evident in the journals up to the 1840s. It is apparent that some of them moved out of indentured labour into engagements as wage labourers, for example, Ceylon and Dalo who were engaged in October and December respectively.[22]

The apparently small number may be accounted for by the lack of labelling rather than their absence from the farm. When they were hired it was often as shepherds and ox-herds, or in the case of May, who was hired as a wagon driver in 1835.[23] Also, many of the workers on the mission station would have been Khoi, but were generically labelled, and especially by the 1870s, as the "Mamre men". Throughout the slave period, a number of "free blacks" were employed by Duckitt. Many of them came from Groenekloof/Mamre. Of course the label vanished after 1838.

Most workers in the 1820s were resident, numbering at least twenty-five, with casuals and itinerants numbering less than six through the year, but increasing to approximately thirty at peak stages of the harvesting season. The 1820s provide an important insight into not only the ratio of casual and resident labour, but rather the diversity of labour usage in a slave-holding economy. In 1829 Klaver Valley had five black indentured workers on the farm, some of whom, for example Massourina, stayed until the early 1860s. In 1835, Duckitt obtained two white juvenile immigrants from England on 8 year apprenticeships.[24] The following year, John Alfred Smith and William Wilson were indentured until their 21st birthdays. In 1837 Duckitt indentured two youth, Joseph Howard and James Geehan, an importation of white immigrants coming in September 1837 from St Helena Bay, including William Hillman who with James Geehan, was still resident on Klaver Valley in 1847. A final importation including Samuel Alley, occurred in August 1838.[25] These children would have been resident and involved in work on the land throughout the year as well as during the harvest. Duckitt did not import indentured servants again until 1840 when he brought from town, two "prize negroes" Zandona and Nahonzy in January; in March Andona (No.144), Catora (No.55) and Isaac (No. 21) were indentured to him, in June Louisse aged ten

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[22] K.V.J. 30 October and 21 December 1830.

[23] K.V.J. 3 October 1835.

[24] E. Bradlow, *The Children's Friend Society at the Cape of Good Hope*, Victorian Studies, 27, 2, Winter 1984, pp. 155 - 177. K.V.J. 19 May 1835.

[25] K.V.J. 1 - 31 March 1829 for names of black indentured workers, Harry ,Joe, Tom, Negroote, Massourina, the last of whom becomes in his time on the farm, labelled a free black in the records; 26 March 1836, 19 September 1837, 18 August 1838.

years (No.358); in March 1842 he received a man Mecapa (No. 99) and a woman Kebooka (No. 262) on an indenture of 3 years and eleven years respectively.[26]

In 1843, Katora, Zou and Andona were engaged by Duckitt for one year, although no wage is given.[27] This total of eight indentured workers ("prize negroes") within the space of two years is not necessarily accurate. There are references to other "prize negroes" in the 1840s, for example, Alexander, who was originally an "apprentice negro" dying in 1843, having apparently been on Klaver Valley since January 1829.[28] By the 1870s none of these people appears to be on the farm, so it can be assumed that once having completed their indentures they either engaged themselves for a year to the farmer or left the farm.[29]

That these workers were imported between 1840 and 1842, indicates that Duckitt, no longer having access to a resident and permanent slave labour force, numbering in 1834, fifteen adults and six children (potential workers), was investing in labour which would apparently be more stable than relying on finding workers at particular pressure points of the year. This was also in light of the fact that many slaves in the district had left their farms.[30] Many, although not all, had also left Duckitt's farm. Conjato, for example, stayed on the farm until 1853. The labour of seven resident men would certainly have made the difference to the pace at which the reaping and the threshing would have been completed.

If one compares the labour usage on Klaver Valley between 1846 and 1897 the numbers have essentially changed very little.[31] This was not because the farmer had not mechanised production

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[26] K.V.J. 1 January 1840, 11 March 1840, 27 June 1840, 30 March 1842. The spellings of their names is at best a guess because the names in the journal were not clear.

[27] K.V.J. 10 March 1843.

[28] K.V.J. 23 January 1843 for death of Alexander, where the cause of death was given as asthma; 15 January 1829 for his engagement as a worker on the farm. He was apparently an apprentice until 1829, at which stage he was engaged as a wage labourer.

[29] K.V.J. 8 October 1861 November appears to be one of the few who did not leave Klaver Valley and in October 1861 November, "a native of Mozambique" who "departed this life...constitution broken down" was originally an indentured worker. In 1838 he was referred to as the "horse boy" and one gathers that old age was the cause of his death in 1861. K.V.J. 29 November 1838, Klaver Valley Journals.

[30] J.C. Armstrong and N. Worden, *The Slaves 1652 - 1834* in Shaping, p. 167.

[31] The difference in the number of casual daily workers as opposed to resident workers on the farm was not always possible to see since their itinerant, casual or resident status was not recorded.

- we know that he had. The reason is that by 1897 more land was under cultivation than had been the case in the 1840s. The reasons for this can be seen in Duckitt's depressed financial situation in the 1840s accompanying lower levels of cultivation and the fact that a large proportion of his production was focused on sheep and wool production. Furthermore, in the 1840s, not all the available land had yet been cleared for cultivation.[32]

With regard to the numbers of workers in the 1840s, the number of resident workers appears to have been similar to the 1830s, with approximately twelve to eighteen on the farm for twelve months and at the end of the year, twenty itinerants coming onto the farm for work stints of three days and more. During the 1870s there were between four and seven workers on the farm for the duration of the year, with an average of approximately twelve itinerant workers coming onto the farm from October to December. These figures differ from earlier and later averages partly because production had not improved to any great degree and might possibly fail to reflect the trend of the decade because of the paucity of the records for this period.

The figures for the 1890s show some significant changes with the number of workers coming onto the farm during the harvesting season numbering between eighteen and thirty-seven in 1896 and seventeen and twenty in 1897. The lower average of the harvesting season in 1897 was as a result of fewer workers coming onto the farm, the itinerants working on the farm for longer periods of time, rather than previously when a greater number of workers had come onto the farm for very much shorter periods of time. The 1896 and 1897 figures also include resident workers which the earlier figures of the 1840s do not necessarily do because very often Duckitt did not record the payment of wages or make any reference to resident workers in the daily journals.

By the 1890s the balance between resident and itinerant had changed quite significantly. Resident workers now numbered between six to twelve, and the number of casual workers had increased, so that by 1896, the number of itinerants who came onto the farm for periods of less than two months, numbered thirty, and the number of workers on the farm for the full twelve months,

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[32] K.V.J. December 1832, December 1833 and December 1897 for the differences in land under cultivation and for names of land divisions under cultivation in 1830s, 1890s. Some names of course remained the same, but others were new. See Chapter One above for changes in names of land divisions on Klaver Valley.

numbered only nine.[33] By this time, it appears that casual and itinerant labour provided the backbone of production on the farm, with the daily casual workers coming almost exclusively from Mamre.

Hiring Patterns 1829 - 1898

Hiring patterns and the terms of employment changed over the period, initially being recorded formally, but after the early 1840s, markedly absent from the farmer's records. It seems then that the means and methods of hiring became more uniform and less individualised, that they required no special reference in the journals. As the labour force increasingly came from one central labour pool, the Groenkloof mission station, the terms and conditions of employment on Klaver Valley became common knowledge, and since mission inhabitants, later called Mamriers came to constitute the major component of the farm's labour force, details and explanations of conditions of employment, became unnecessary.

While many contracts of hire gave no specific detail, there were some which did, in outlining conditions of service, wages, and duration of contract. These tended most often to occur when casual workers were hired. The detail generally focused on the task/s of the job for which the worker was being employed. The non-specified nature of contracts of hire for resident workers was related to the fact that they were quite frequently occupied with more than one task. If they did have a job specification at the point of entry onto the farm, this did not ensure that they would be solely occupied with that one task, while they were employed on the farm.

Resident and permanently employed workers often did tasks which were not part of their original contract or were outside the parameters of the tasks with which they were normally occupied on the farm.[34] Also, some casual itinerants became permanent and resident after they had fulfilled the first contract. These differences were of course related as much to what was happening on the labour market and with legislation as they were to the process of the formalisation of labour on the farm by both the workers and the farmer. While the records do not always give us a clear picture of how workers were hired and from where, we do gain sufficient insight into the process

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[33] Figures obtained from K.V.J. 1896. All workers who came onto Klaver Valley were recorded with their wages and the time they spent on the farm. It was not always clear how many of the nine who spent twelve months on the farm, were daily casuals or residents, since no specification is given in the records and there is no reliable indicator by which to determine which workers were resident and which were casual.

[34] See for example Cabanga, a blacksmith, who also worked in the harvest in 1870, K.V.J. 31 January 1871 he was paid "the balance due him for harvest 1870"

to be able to draw some conclusions about how the labour market operated at farm level. While discussing the hiring of workers it is also important to look at the use of borrowed labour on the farm. The early 1830s, detailed as they were in the journals, show an array of hiring and borrowing which do not fit into the simple categories and show a complexity which is sometimes absent or over-simplified in general studies.

Throughout the nineteenth century, more than three-quarters of the casual and regular itinerants came from Groenekloof.[35] Since it was only two or three kilometres from Klaver Valley, it was an ideal labour pool for this and other surrounding farms. The Duckitts and later the Rupertis used Groenekloof/Mamre throughout the period, and while not using only those workers, nevertheless depended very heavily on that source. Duckitt did not always go to the station to hire workers. Many came to the farm, but that he did go directly to the station, often to purchase commodities from the missionary, would seem to indicate that he was well-known there, and would doubtless often let it be known that he needed labour.[36]

Workers whose indentureship came to an end often engaged themselves to work for Duckitt, as did Dalo, who was engaged on the same day as his indenture expired in 1830.[37] It is not clear how long he had been on Klaver Valley, but it could have been years. That he was hired at Rds 8 a month provides no detail as to the work he would do, but it would probably be in various tasks ranging from vineyard work to sowing and harvesting.[38]

Various workers were hired for a particular period often determined by the task. This was especially so with the ploughing and harvest work. These workers ranged from being specialist workers, those who reaped and worked the machines, to low-skilled workers, who were involved in carting and packing. In April of 1831, Jan Louis, a worker from a neighbouring farm, Groote

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[35] See the journals in the earlier decades for references to workers who were from Groenekloof and especially in 1893 -97, for references to "Mamre Men". The mission station changed its name to Mamre in 1854.

[36] See CA 1/MBY, 1/1/5. case 917, 6/12/48. Duckitt v. Nathan, Cupido and Andries, for reference to Duckitt having recruited labour from the station, and going there to find out why the men had deserted. See also Chapter Five, pp. 24 - 26 where the role and status of Duckitt in the wider context of the mission station is discussed.

[37] K.V.J. 21 December 1830.

[38] K.V.J. 9 March 1832 when he "left off work", 17 March 1832 Duckitt paid him, "on order of Mr Thomas Sinclair, being the balance of wages due him Rds 36.3.2. and on the same day he left my place with his family".

Post, "engaged himself for the ploughing season at Rds 8 a month". He worked for the duration of the ploughing season and then left Klaver Valley.[39] Tom and Edwyn who were two free blacks, were engaged in November 1831 for wheat cutting and quoted a handsome 12 rixdollars a month.[40] In January 1831 Titus Africa's wife was employed to make heaps and he was paid Rds 4 and 3 skellings for her labour.[41] In January 1832 Jafta and Pedro were paid Rds 2 for two days of cutting barley.[42] Telemachus who had been on Klaver Valley since at least 1829, was employed for making a "new span of waggon reims" in 1832, and was paid piece-rate at Rds 5 for that task.[43]

Some workers were hired for a pre-determined period of time, but not necessarily for specific tasks, and they were sometimes employed during the harvesting and sowing season which meant they were very often involved exclusively in that work. An example was Andries who was engaged to work for Duckitt for one year at Rds 6 a month. This meant that he would have been involved in the harvesting process.[44] Other contracts had no time specification but did specify the wage and whether the worker would get clothes or not as was the case with "Joe, free black, (who) commenced work at Rds 8 per month with no clothes." in 1834.[45] A few months later, Class Waterboer was engaged at Rds 3 per month with clothes as a herd.[46] This suggests that the actual wage was severely reduced when clothes were part of the deal. In 1835, Springvelt, son-in-law of Piet (who obviously worked on the farm), was engaged "per year at Rds 4 per month with clothes". A month later May, a Khoi labourer, was engaged to drive the wagon, at Rds 8 per month without clothes.[47]

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[39] K.V.J. 20 April 1831.

[40] K.V.J. 30 November 1831.

[41] K.V.J. 12 January 1831.

[42] K.V.J. 5 January 1832.

[43] K.V.J. 1 July 1832.

[44] K.V.J. 31 December 1834

[45] K.V.J. 28 February 1834.

[46] K.V.J. 9 July 1834.

[47] K.V.J. 22 September 1835 and 3 October 1835 respectively.

In 1837 it is noticeable that some workers were being hired at Rds 3 to Rds 4 a month with no clothes.[48] This appears to change in 1838 though when workers' wages included the provision of clothes, as was the case with Little July and Millacato respectively. It is worth noting that Little July was the son of July, a slave of Duckitt's. It seems that Little July had "returned from town" on 10 December and on that day he was hired.[49] This apparent change in the level of the wage and the addition of clothes can be seen as an attraction offered by the farmer to workers in 1838, the year that the farmer lost his source of bonded labour. That these workers were involved in different tasks is a consideration, but previously, workers had not been engaged at such low rates of pay. During the harvest season Duckitt hired groups or teams of workers usually for short-term contracts, mainly between 1834 and 1838. Workers from Genadendal came in January of 1834 for the purpose of reaping and again in December 1834 to January 1835 to reap the next harvest. It seems that the workers from Genadendal mission station toured the countryside during the harvest seasons employed themselves for short stints and then moved on.[50] The men from Tulbagh who were hired to work on the farm during the harvest season also only came onto the farm once. This suggests that hiring workers who were not resident in the vicinity of the farm was rare, and only occurred at times when local labour was not available. The men from Tulbagh came only for three days in December 1838.[51] They were different in that they only arrived towards the end of December 1838, long after the harvesting season had begun and at least three weeks after the 1st December, the final day of slavery. They appear to have left their farm/s in the Tulbagh district and sought work as wage labourers on farms, once slavery was finally over.[52]

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[48] K.V.J. 9 March 1837 when Johannes Magerman was hired at Rds 3 a month with no clothes, K.V.J. 20 September 1837 when Nathaniel Arnold was engaged at Rds 4 a month without clothes. This wage was unprecedented. Previously wages had averaged Rds 6 to Rds 8 a month, often with clothes.

[49] K.V.J. 19 November 1838 when Millacoto commenced work at Rds 6 a month with clothes and K.V.J. 10 December 1838 when Little July, the son of a former slave, was engaged at Rds 6 per month with clothes.

[50] K.V.J. 24 December 1834 and 9 January 1835.

[51] K.V.J. 26 December 1838.

[52] That many left their farms at the first opportunity seems to have been the case as documented by J. Armstrong and N. Worden, *The Slaves 1652 - 1834*, Shaping, p. 167.

In 1838 Duckitt also hired an itinerant team of sheep shearers indicating that either he had an unprecedented amount of wool to shear or he was short of labour.[53] Throughout the remainder of the century, he and later Ruperti do not appear to have hired any groups of itinerant workers on the farm, although taking into account the increasing absence of hiring contractual records, they might have been employed. The reasons for the absence of contracts hiring procedures might be found in the fact that the overseer, Robert Restall, appears to have taken over the role of employing and paying wages to the labour force on the farm in 1837. He had been on Klaver Valley since at least 1829, but had until this time, been more involved with his own cultivation and production than he had been a full-time overseer.[54] That Duckitt was no longer involved in paying workers, would seem that he had also delegated the responsibility of hiring workers largely to Restall.[55] The pattern of engagements also became more standardized after 1838, since all farmers would now be engaging workers at increasingly standard wages and with standard contracts and conditions.

While the hiring of individual workers remained the most common form of employment on the farm, brothers and uncles were often hired at the same time. This is shown in the cases of Solomon and David Bossman (sic) in 1832.[56] While the employment of family members continued throughout, there are no specific detailed hiring contracts evident in the records beyond this time. The next clear evidence of hiring family members was in 1863 when the de Lisle family - Gustav, Johannes, Willem, Johanna, Susan and Wilhel - was hired for the harvest season in 1863. The family came onto Klaver Valley every year in November to December until 1866.[57]

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[53] K.V.J. 28 February 1836 for reference to the sheep shearing team of whom the five strangers were, Lendon, Philander, Augustine and Jassamine. Jassamine would work as a mower on Klaver Valley again in 1838, K.V.J. 21 October 1838. K.V.J. 21 October 1838 ten Klaver Valley workers, including Jassamine one of the sheep shearers, and nine Ganzekraal people mowed oats on a Sunday and Duckitt paid out a total of Rds 31.4 in payment. Ganzekraal was a farm a short distance away from Klaver Valley.

[54] K.V.J. 8 September 1829 the first reference to Restall in the journals, which refers to Duckitt sending 10 muids of wheat to town for Mr Restall, and K.V.J. 20 February 1835 for receiving 23 muids of wheat being part of his share, K.V.J. 20 December 1835 for reference to Restall paying people for reaping the wheat on his land, K.V.J. 24 August 1837 for Restall taking 20 muids of wheat being a portion of his share.

[55] The increasing separation of the farmer and his workers and the role played by the overseer in this process is discussed in Chapter Five below, pp. 10 - 18.

[56] K.V.J. 5 January 1832.

[57] K.V.W.B. De Lisle family, folios 227, 228, 221, 156, 246, 201, 235, 253, 250 listed under "L" in index.

The different forms of hiring that can be seen to have taken place on the farm during a period when most farmers were apparently only using slave labour, points to an essential factor in the argument that while a capitalising and almost fully capitalised farmer could and did utilise slave labour he also employed local Khoi, immigrant workers from the East Coast, and both white and black indentured workers. Variety in the sources of labour was also a characteristic of the pre-1840s, with workers coming from far wider a context than the mission station. This diversity of labour usage occurred partly because Duckitt had connections with importers of labour and with the elite in Cape Town but also and mainly because he was intent on improving production, bringing new land under the plough and making a profit which needed more labour than perhaps his pocket could afford if he had had to buy slaves.

What is also clear is that prior to the 1840s, when capitalization of production entered a period of consolidation, hiring contracts and conditions of work varied much more than they did from the 1840s to the 1890s. As farm increasingly became a business and workers became increasingly and rapidly fully dependent upon wages for subsistence, hiring patterns, conditions of employment and wages paid, increasingly standardised.

Changes in utilisation of labour force 1829 - 1898

In Chapter Two the types of activities carried out by workers throughout the year's working cycle were studied, but here, very briefly I would like to point to changes in the numbers of workers on the farm with regard to changing production and mechanisation over the period. In the 1890s there was a daily average of six men coming to Klaver Valley from Mamre, in October and November making approximately ten to twelve resident workers, a smaller number than on the farm in the 1830s, when there were at least twenty resident workers. While average figures per month or per year may give us a small indicator of the numbers of workers employed, they tend to be skewed and therefore inaccurate, since at the beginning of January for example during the first seven or eight days, one would have found especially in the 1830s and 1840s, that the harvesting labourers, many itinerants, were still on the farm. By late January, they would have gone and the number of itinerants would have been reduced as it was in 1833, by almost half.[58] The average of just over seven itinerants on the farm in 1833 therefore masks, to a degree, the fact that in the first week or so, there were approximately eleven, and in the middle of the month there were approximately four, moving to approximately six by the end of the month.

[58] K.V.J. 1 - 31 January 1833.

On any one day in 1831, between 15 October and 11 November 1831, Klaver Valley had five to ten people mowing and from seven to seventeen people making heaps of the cut grain (mainly oats) giving us between twelve to twenty-seven people on the farm over this period of a month.[59] When the reaping of barley began on 11 November, fifteen reapers and five heap makers were recorded as carrying out the work. The fifteen reapers were broken up into groups *spans* of about five each and the heap makers, at this time mainly women, were dispersed in those barley fields to make heaps. In December, and the beginning of the wheat harvest, Duckitt borrowed twelve labourers, bringing the number of workers involved in the harvest, and on Klaver Valley at the end of December to approximately twenty-seven including the borrowed labour.[60] It is important to note that in 1831, the grain was still being cut manually. By 1854, most of the reaping was done with a machine.[61] Although there were approximately seventeen to nineteen workers still on the farm, the labour force was now involved in different tasks. Manual work, while still a major component, had been replaced, albeit only to a degree, by machines, in effect doing away with almost a third of the labour force.

By the 1890s, the reaping had been mechanised. In October 1897 the cutting of oats began with the use of a machine, although now, three men had to cut "roads through the grain", in preparation for the movement of the machine.[62] When, two days later, they began working with two machines, the labour usage at this stage of the harvesting process had increased by two or three, more were needed to carry water and labourers were needed to prepare the roads. The number of itinerants increased, as in earlier years, once the threshing began and on 17 December Ruperti paid eighteen workers with approximately twelve resident workers.[63] Some casual workers were paid off earlier in the month, once the reaping had been completed. Ruperti's list at the back of his journal of workers on the farm is divided into those who were harvesting men

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[59] The numbers of workers can only be given this way because they were not all hired/engaged to do a particular task prior to the commencement of that task. All major activities like this tended to start off with half or more than half the number they finished with. Duckitt used to employ people as the task progressed - he did not start with a full complement of labour. For example, K.V.J. 15 October to 11 November 1831, which shows this increase in number of workers over time.

[60] K.V.J. 5 December to 25 December 1831.

[61] K.V.J. 30 October 1854 which records Duckitt's purchase of a reaping machine, and subsequent entries, on 8 November, 13 to 16 November and 9 to 11 December 1854 which make reference to the use of a reaping machine.

[62] K.V.J. 18 October 1897. Also note K.V.J. 11 and 19 October 1895, only four to seven men mowing and three boys cutting the grain.

[63] K.V.J. 17 - 18 December 1897, for reference to wages given to eighteen workers, and September 1897 for the names of Ruperti's men.

and those who were thrashing men. Nine out of the fourteen harvesting men were also evidently involved in threshing, so that the remainder of the threshing men appear to have been resident on the farm.[64] Some workers were paid only at the end of December or in January of the following year.

The sowing and ploughing season only changed in terms of its labour input, with regard to the more extensive area under cultivation by the 1890s, therefore to a degree increasing the number of workers involved in the process. The methods of broadcast sowing and the use of ploughs continued. Perhaps the change to a "new German braakplough" in 1897[65] affected the labour usage, but it is unlikely since it operated on similar principles and was drawn by animals. The most pronounced difference was that the ploughs had, over the period, increasingly been drawn by horses as opposed to oxen.[66] In the early 1800s most of the ploughs had been drawn by oxen, making the labour of leading them extremely difficult. With the introduction by at least the 1830s, of the use of mule or horse-power in drawing ploughs, the labour exertion would have been slightly reduced. That the process of sowing in 1897 might have been any different is not shown by the notes in the journals. There is evidence even in 1897 attesting to the use of ox-drawn as well as mule-drawn ploughs.[67]

Sowing in 1897 began in April and continued right through to the end of June, and in those months, Ruperti paid eighteen people various amounts of money. In earlier years at this time, not as many workers had been involved in the process. Some of course would have only been on the farm for a short stint, as opposed to those who would have been there for the season. Although, and this was different to former years, the ploughing and sowing on Klaver Valley in this year, took place amidst a series of other tasks and occupations. Previously, in the 1830s and 1850s, these high points of the year had been of a longer duration and had been single-mindedly focused on either the sowing/ploughing or the reaping/harvesting. The labourers in 1897, therefore, were not simply occupied with a seasonal task, but in between doing that, carried out other tasks as well.[68]

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[64] K.V.J. 1893 to 1897 and list on the last two pages of the journal covering 1893 to 1897.

[65] K.V.J. 12 August for trial of new German plough.

[66] For the effect on cultivation of the use of horses, see, G.E. Evans, The Horse and the Furrow, (London, 1967) chapter 16.

[67] K.V.J. 17 April 1897.

[68] K.V.J. April, May, June, November and December 1897, where workers are occupied with tasks other than the main ones.

Comparing the 1820s with the 1890s, highlights the important changes which took place in the labour force over the period. Klaver Valley workers by the 1890s, were predominantly casual and itinerant as opposed to earlier years where they had been largely resident. Labour had operated on a farm in which mechanisation had been introduced as early as the 1820s, and the changes in the size and nature of the work force on the farm, were directly related to this factor. Over the period then, the farm had witnessed the breakdown of a previously compact and physically close labour force.

The variety of workers, so broad in the 1820s, with slave, indentured and free wage labourers employed together, narrowed significantly by the 1890s, when a characteristic of the workers on the farm could very clearly be called, a new uniformity. The point at which this shift occurred is unclear, but what is clear, is that the process towards the shift had its roots in the 1820s with the varied nature of employment on the farm. At least by the 1850s, an increase in the number of casual and more generally, Mamre workers, was evident.

The utilisation of labour on Klaver Valley from 1829 to 1898 clearly shows a pattern of change. While in the earlier years of the century, both the full-time resident, the itinerant and casual work force was much larger in size, it was also more fully occupied with manual labour. By the end of the century, machines had come to dominate especially the harvesting season and while this had served to reduce the number of workers required, it had also changed the nature of the labour process.

Having looked at the composition, size and nature of the labour force and having assessed the changes in patterns of hiring and utilisation of the labour force on the farm, it is appropriate now to attempt to understand how the process of proletarianisation manifested itself in the case of individual resident, casual and itinerant workers on the farm from the 1820s to the 1890s.

Tasks and Wages - Women

Women's experience of work was very different to men. Their ability to delay their own proletarianisation puts them into a different and separate category from their male counterparts. Prior to the 1850s, women had been overtly present on the farm during the grain and grape harvests, as itinerant workers. By the end of the nineteenth century, however, their absence was marked and they no longer constituted the same proportion of the labour force as they had done in the earlier period.

There was a marked change from the 1830s to the late 1840s was in women's participation in vineyard work. Up until 1843 women from Groenekloof/Mamre worked in the vineyard, especially in February or March during the grape harvest. The numbers of women employed in the vineyard changed from twelve in 1829, eight in 1833, to twelve again in 1841.[69] Wine was not made on Klaver Valley from 1845 until the 1870s. [70]By that stage, women had been completely replaced by men. Women were only employed in the vineyard during the picking season and they worked for eleven and a half days in 1832, seven and a half days in 1836, and three days in 1843.[71] Most noticeable was the reduction in the number of days worked, indicating the tailing off of vinestock numbers and generally winding down the production of wine on the farm.

The women who picked the grapes were most often married or otherwise related to men already employed by Duckitt. Examples are Magdelena Hanecom who was the wife or sister of Nathan Hanecom, owner of oxen which in 1844 damaged Duckitt's field of crops and worked for him in the forthcoming harvest to repay the damages. Victoria Dolph also worked in the vineyard in February/March and she too was related to a worker, Philip Dolph.[72] That these women were connected to men who were already in the farmer's employ or whom he knew, was for some of the women, their passport to labour on the farm. This vineyard activity, while important, was fairly marginal in comparison with the sowing and harvesting labour.

Besides vineyard work though, some women were able to earn money in other labour activities on the farm, especially in the production of clothes. Right up until 1844 some women were involved in making clothes for mainly workers, but also for members of the farmer's family - both Aurora Adams and Justina Roberts earned one *skep* of wheat, valued at Rds 3.0.4., Aurora for

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[69] The last reference to the vineyard and women working in it can be found in K.V.J. 14 March 1843; for references to numbers of women employed see entries on 4 March 1829, 9 March 1833 and 22 March 1841. See also figures cited by P.Scully in Bouquet of Freedom, p. 53, on numbers of workers required for a vineyard - it seems that Duckitt's labour usage of sometimes 12 men only in September/October, in vineyards that were not his main production area, were lower than is supposed.

[70] K.V.J. 10 March 1845 where "all hands cutting grapes" signalling the end of casual employment for women in the grape harvest.

[71] For number of days worked in vineyard picking grapes, K.V.J. 31 March 1832, 12 March 1836 and 14 March 1843, respectively.

[72] K.V.J. 25 March 1835 for reference to Magdelena Hanecom as vineyard worker, when she was also paid less than the others, possibly as a result of absenteeism; K.V.J. 30 August 1844 for reference to her husband or brother; K.V.J. 27 March 1840 for reference to Victoria Dolph ; K.V.W.B. 22 March 1838, for a list of other women who worked in the vineyard during the 1830s, where a list of "*Vineyard Girls*" is given.

making jackets and Justina for making three pairs of trousers for the children.[73] They were paid in 1844 in kind but this was only because during the 1840s, Duckitt was unable to pay in cash for labour services. Seamstresses, like Marianne Conrade earned Rd 1.5.2. in 1834 for making a pair of buckskin trousers for William Duckitt and Rds 12.1. in 1835 for making twenty-four pairs of leather trousers and five leather jackets.[74] She was also able to earn money as a midwife. In 1834 she "came to attend to Loressa" and for that midwifery task was paid Rds 5. She attended Loressa again in 1834 and was also paid Rds 5 for that.[75] By the 1840s the general trend of women moving out of farm labour is borne out by those who ceased to work after 1844, either in vineyard or in seamstress work. Women were, occasionally during this period, able to find employment in other activities on the farm, like heap making and reaping. Through the 1840s to the 1890s women featured less and less in these tasks, so that by 1859, only nine women were employed on Klaver Valley and that was during the harvest in December with the vineyard no longer on the farm. By the 1890s neither of these activities was being offered to them, having been taken over by children and adult males and reaping having become an exclusively male job.[76] Domestic labour hardly featured in the records with only a reference to Elsy, "the housemaid" in the 1840s and 1850s, which would suggest that the farmer's wife carried out most domestic duties in the farm household, with the more menial work probably being done by servants when it was required.[77]

Women tended by and large to be employed in land-based activities only when there was a need for their labour. It is interesting to note that women were paid out, if not for all, for a proportion of their wine ration. This raised the amount of money they took home. If they were able to reap wheat they earned Rds 2 as opposed to reaping barley, oats or rye, where they earned Rd 1. The money these women made on the farm, would have made a difference to their household income - all were married to casual and itinerant but regularly employed male workers from Groenekloof/ Mamre, so their independent household budgets would certainly have benefited. How, is very

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[73] K.V.J. 10 July 1844 and 12 August 1844, respectively.

[74] K.V.J. 8 February 1834 and 2 January 1835 respectively.

[75] For Marian Conrade's midwifery tasks in attending Loressa, K.V.J. 3 November 1831 and 23 January 1834.

[76] K.V.J. December 1844 for reference to women making heaps; K.V.J. January 1835 for reaping when five women reapers were employed in reaping, K.V.J. 17 December 1859, nine women paid for reaping and heapmaking, K.V.J. 18 November 1897 for references nine men and boys making heaps.

[77] K.V.J. 10 April 1843 and 17 July 1850 for reference to Elsy.

difficult to say, but it would seem that since they did not work regularly throughout the year, this income would have been a fillip to the family income.[78]

Tasks and Wages - Men

Men experienced a different process of proletarianisation compared with women. They entered into the wage labour sooner and more intensively than women, and became fully dependent upon those wages much earlier, being on the whole, in the last stages of proletarianisation by the late 1850s. Some workers only came onto Klaver Valley for short periods of time and very often their tasks were then clearly laid out as was the case with George Mozambique who was employed in the vineyard and no doubt also as a worker during the wine making season in 1831. This, and trapping and winemaking, paid a little better than herding or other field work in 1831. Judging by his name he was either a "prize negro/slave" or he was one of the "*Mozbiekers*" from Mozambique.[79] He engaged at Rds 8 per month, "to take care of the vineyard". He came onto Klaver Valley in January and this would have been in time for him to "watch" the vineyard, that is guard it against animals coming in and eating the grapes, and of course, people coming in and taking grapes, which by the end of January would be ready for picking. He would also become involved in the making of wine during February and March. He was paid Rds 17.5.0. in cash when he left in April. Duckitt had paid his *opgaaf* of Rds 3.0.0. Having worked from 22 January to 22 March he earned Rds 16. He stopped work on 9 April so only earned Rds 4.5.0. that month, giving a total of Rds 20.5.0.[80] There is no further record of him so it would appear that he did a few months labour before moving onto another farm and into other employ.

While George Mozambique was employed at a monthly wage, some workers, particularly those who were already on the farm, like Benjamin Prince and Kwivido Zyster, were often paid separately for each task carried out. They worked in the vineyard in 1831 and for this a separate remuneration was given them. This gave them the opportunity to earn money over and above their

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[78] H. Ludlow, *Missions and Emancipation in the South Western Cape: A Case Study of Groenekloof (Mamre) 1838 - 1852*, M.A. dissertation, U.C.T., 1992, Chapter Four, on the household budgets of Groenekloof/ Mamre residents.

[79] Patrick Harries has documented the importation of Mozambiquans between 1876 and 1882, in *"Mozbiekers": The immigration of an African Community to the Western Cape 1876 - 1882*, Cape Town History Conference, U.C.T., 1978. While this was a formal process of immigration there would also possibly have been informal migrations by small groups or individuals earlier.

[80] K.V.J. Wage Book, listed under "M' on contents page. of K.V.J. Wage Book.

monthly wage. Working in the vineyard earned these two men 4 *skellings* a day, giving them an extra Rds 6 at the end of twelve days' work.[81]

Massourina's work history encapsulates the transition to wage labour within a family and visibly shows the process of proletarianisation within one man's working life. Massourina was referred to as a "free black", and was on the farm from at least 1830 till at least 1850. His mother had been more independent of wage labour than he was, having owned cattle and possibly hired them to farmers, although there is no evidence of this. When Massourina was first on the farm he still had access to these cattle via his mother. In 1835 her cattle had obviously been impounded in the cattle pound and Duckitt gave Massourina Rds 4 to "release his mother's cattle".[82] Massourina's long term and permanent employment on the farm for at least twenty years is perhaps not as important as the fact that he came from a family which had access to stock and it is his generation which moved into permanent wage labour.

That workers were living through a process of proletarianisation which manifested itself in their increasing dependence upon wages earned in farm labour is clearly shown in the example of Alias Antony. Within a decade he had moved from a position of being able to survive on itinerant labour to one where he needed cash throughout the year. In this transition, he moved from being a reaper and wagon rider to carrying out tasks such as washing and shearing sheep and performing other general farm tasks as a full-time labourer. In 1858 he only worked on Klaver Valley from June to September, earning Rds 86.5.2. This five month work pattern continued until 1869 when he worked for a twelve month period on the farm, earning himself £12.14.9½.[83]

While workers moved increasingly into a position of wage dependency, they also moved towards greater dependency on the farmer. All workers had "accounts" with the farmer, but some accounts appear to have kept a hold on workers which prevented their leaving the farm. That Class (sic) Africander stayed on the farm for a period of no less than fourteen years, is evidence perhaps that he had carved himself a comfortable niche within the farm structure and so stayed on. However,

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[81] K.V.J. 22 January 1831, 23 June 1831 for engagement of Kwivido, Prince and Roberts, and K.V.J. 20 July 1831 for their payment.

[82] K.V.J. 15 March 1835.

[83] K.V.W.B. including 1858 and 1869, listed under "A" on contents page.

it seems more likely that debt, rather than comfort kept him there. Class Africander worked on Klaver Valley from 1838 to 1840 and again from 1851 to 1863.[84]

Table 3: Class Africander's Wages 1839 - 1862
(Figures taken from Klaver Valley Wage Books covering 1830s, 1860s)

1839	Rds	79.2.5. (included 10 - 31 December 1838)
1840		73.2.4.
1841 to 1850		no records available
1851	Rds	47.7.4.
1852		129.2.4.
1853		150.5.2.
1854		130.2.4.
1855		154.3.2.
1856		156.7.2.
1857		185.7.0. (includes son's wages of Rds 16.)
1858		169.2.4.
1859		152.2.4.
1860		185.0.4.
1861		203.5.3.
1862	£	17.13.½
1863	£	9.17.3½

Being a resident worker meant that he would have worked at the harvesting and sowing tasks, vineyard and other low season tasks.His wage records, like all other workers on the farm, contain the amount of money he earned and the length of time he worked in any one year. It is important to note that from 1852 to 1856 Duckitt was indebted to him for at least 18 rixdollars.[85] By the end of 1855 Duckitt had "overpaid" him 20 rixdollars and his debt to the worker was reduced. Again, Duckitt paid up the debt at the end of 1857 and this is shown in the apparent increase Africander got and the fact that for the first time since 1852, Africander had neither a debit nor a credit balance.

[84] The reason for the break might be that the records for wages 1841 to 1851 no longer exist, so Africander might very well have worked in that period. Information was obtained from the wage books which record a worker's earnings on the farm throughout the duration of his employ. Africander's will be found in the earlier as well as the later wage books.

[85] See Class Africander's wages for this period in the Klaver Valley Wage Book covering the 1850s and 1860s.

In 1853 the record states that the account was squared off and Duckitt gave him "a present" of Rd 5.2.4 in December which apparently effected the squaring off procedure.[86] However by the end of 1854 he had a debit balance of Rd 14.2.4. and the debit balances continued until 1857, the year his son worked and he earned an "extra" Rds 40. In 1858 there was a credit balance of Rds 12.0.2. and again in 1860 with Rds 2.4.0., increasing ten times to Rds 28.2.3. and a massive £4.13.½ in 1862. In 1863 he only worked one day in January and in March, April, May, July, August and September.

Thereafter it appears he left the farm. The most important process highlighted in this wage record, is that the "indebtedness" worked both ways, being binding on both the farmer and worker. That a worker owed the farmer could be a means whereby the farmer could keep him there, but conversely, the same can be said if the farmer owed the worker, the latter was hardly likely to leave, never to return, when he had the status of creditor. When the situation arose of the farmer owing the worker, it was because of wages having been unpaid to the worker the previous year. This often frequent delay in receiving wages did not alter the pace at which workers proletarianised nor did it alleviate their dependence upon their wage. If anything, money owed to them would have made their dependence that much greater.

The nature of the farmer-worker relationship played a role in the degree to which each party was able to use the "credit" of the other. How well the worker "knew" the farmer and vice versa and those relationships of longer duration, were more open to manipulation by both the farmer and the worker than the cases where neither party was familiar with the other. What is also worth noting here is that Class Africander was employed in December 1838 at Rds 6 per month. In 1852 he was earning Rds 10, an increase of Rds 4.

Another factor is that from 1852 to 1862, Class's monthly wage did not increase. That he was paid a monthly average of Rds 12 and sometimes slightly more in December months for the wheat harvest, did not effectively give him a lot of extra money in total every year. In terms of the development of debt-dependence, Class Africander's wage history shows a classic and very common growth of dependency. As with Alias Antony, he had slowly moved into full-time farm labour. In the 1830s he had not worked a full year and in 1851 he only worked for 86 days, but by 1852 he was employed for twelve months of the year. That in 1863 he only worked for six months of the year, suggests very strongly that in January, February, June, October through to

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[86] For all the references to Class Africander's Wages see the Klaver Valley Books, covering the 1830s, 1850s and 1860s, under his name.

December, he was either working on another farm, or the records of his wages for that period have been lost.

Casual and Itinerant Workers

Casual workers, those who came on to the farm on a regular and often daily basis and itinerants who came for short and specific periods of time, had a different work experience and earned wages on a different scale to those who were resident and permanent. These wages were generally paid per task and the level of these payments was higher than ordinary resident farm workers earned. Workers could therefore earn better wages by carrying out their skilled tasks on different farms and working for more than one employer. These workers can be categorised as specialists whose work had been learnt from their fathers and who could command a higher remuneration, than comparatively less skilled daily labourers. Tasks such as tailoring, thatching, carpentry and riding the wagons were performed by such workers. Prior to the 1850s, they were frequent visitors to the farm. However, once the manufacture and repair of farm technology had moved off the farm into local peri-urban industry, their presence on the farm decreased. Only the thatcher continued, although with decreasing regularity, after the 1850s.

The tailor, prior to and during the 1830s, was predominantly a man who came onto the farm for a few days or a few weeks, once and possibly twice a year to make clothes for the farmer's family and the workers. There were a few years in the early 1840s when women made clothes, but by the late 1840s, there was no evidence of a tailor either female or male working on the farm or even being employed by the farmer.

Edward the tailor's employment and remuneration was distinctly different to other workers. He worked on the farm till at least 1830, having been on the farm definitely in 1829 and probably before. He was paid for making certain articles of clothing and in 1832 he was also given as part of his remuneration, Rds 4 for coffee and sugar in 1832.[87] Since this was a more skilled task, he earned nearly twice as much as ordinary farm labour out in the field.

Another job which was also comparatively well-remunerated, was that of thatching. Pete Thatcher, a slave "belonging to Enslin, arrived at Klaver Valley" on 6 January 1831 and worked for eleven days earning Rds 22. That he was "borrowed" did not mean that Duckitt did not pay for his

[87] K.V.J. 6 May 1832 when Edward the Tailor came to work and on 1 July 1832 when he was paid, Rds 16 and 2 skellings and a quarter of a stuiver. Rds 16.2.¼.

services. Pete came to thatch again in April and earned Rds 42.[88] He was paid directly by Duckitt, so it seems that while he was perceived as being "Enslin's boy", he was nevertheless, not earning income for his owner, and more than likely did the rounds of farms in the district.

Other specialist tasks which were not part of regular farm work included thatching which was only necessary once a year or when a new building had been erected. Workers like Pete Thatcher and Hendrik Thatcher carried out these tasks in the 1830s and Johannes Thatcher in the 1840s.[89] These workers' tasks would not have been open to "variety" since they would come onto the farm to do a specific job and then leave the farm and that would prevent their labour being utilised in other areas. It was as a result of their short presence o the farm, as opposed to their inability to carry out other tasks, which prevented their wider involvement in farm work.

Other itinerant workers were those who came to the farm only at harvest time and such an example was Carel Ephraim and his wife, Martha who was also, although to a lesser degree employed on the farm as a heapmakerer. This case study highlights so many of the patterns of labour on Klaver Valley in the pre- and early post-emancipation period that it bears looking at in detail. Carel began work on the farm in February 1837, his wife Martha worked as a heap maker during the harvest of 1838.[90]

Carel Ephraim's Wages 1838 - 1840
(taken from the Klaver Valley Wage Book covering the 1830s)

1838	January to 31 May at Rds 8 per months earned	= Rds 40.0.0.
	June to October he is not on the farm 13 October did 3 weeks and 4½ days riding	
	29 October to 26 November riding at Rds 12 per month	= Rds 10.6.0.
	26 November through December - 20½ days reaping wheat at Rd 1.4.0. a day	= Rds 30.6.0.
	2¾ days doing odd jobs	= Rds 1.6.0.
	6½ days riding sheaves	= Rds 4.7.0.1
	December he got money for his house at Groenekloof	= Rds 25.0.0.
	Opgaaf	= Rds 4.0.0.
	Cash paid to Carol Paulus, Alexander for him	= Rds 2.1.2.
	TOTAL FOR 1838 = Rds 119.2.4.	
	Credit balance for 1838 = Rds 11.2.5.	
	Total for 1837 = Rds 133.6.0.	

[88] K.V.J. 6 January 1831, 21 April 1831. Again we see how Duckitt's relationship of credit extended also to the use of other farmers' labour as was the case with Enslin.

[89] K.V.J. 21 April 1831, for references to Pete Thatcher, K.V.J. 10 March 1836, for reference to Johannes Thatcher and K.V.J. 17 May 1844 for reference to Johannes Thatcher.

[90] For all references to Carel Ephraim's wages see the Klaver Valley wage book for the 1830s, Carel Ephraim. For Martha's earnings, see the list of "Vineyard girls" in the back of that same Wage Book and also refer to list of names at the front, and see her individual wage record.

Martha earned Rds 3 for eight days' work in vineyard and Rds 8.5.0 in December for working at harvesting. She also received a present in December 1838, of Rds 5. bringing the couple's total up by Rds 16.5.0, for the year.[91]

1839	3 days at sheep sale *	= Rds 1.4.0.
	18 January - 18 February driving to town	= Rds 10.0.0.
	7 February - 18 March earned Rds 12	= Rds 12.0.0.
	Present for his attention to oxen on the road	= Rds 10.0.0.
	End of April to end June Rds 8 per month riding stumps	= Rds 16.0.0.
	July to December worked 2 weeks and 8 days at Rds 12 per month	= Rds
	December he was occupied with reaping wheat	
	TOTAL FOR 1839 = Rds 126.5.4.	
	Credit balance for 1839 = Rds 23.6.0.	
	Total for 1838 = Rds 148.3.4.	
	* Bringing sheep from the sale at Stickland.[92]	

1840	January to end February driving wagon at Rds 12 per mth	= Rds 24.0.0.
	9 days driving grape wagon	= Rds
	3 weeks driving plough	= Rds
	(From October to December all accounts were in new book - not available)	
	TOTAL FOR 1840 = Rds 165.2.1.	
	No reference to credit balance	
	Total for 1840 = Rds 165.2.1.	

This was the last reference to her working on Klaver Valley. They had a house on the mission station at Groenekloof and in February 1840 he and Martha married. We are referred to "the new book" which no longer exists and so thereafter no record exists of Ephraim's work and earnings.

Carel's earnings together with Martha's gave this couple an average earning on Klaver Valley, over the three years, of Rds 128 a year, which would give them Rds 12 roughly, a month, a comparatively good income in the rural areas for a farm worker. Carel's work history highlights the fact that although in 1837 he was only employed as a driver, both on the farm and off, by 1838 he was also involved in the reaping of the annual crop, as a reaper, not a driver. He also did a few days odd jobs, no doubt in an attempt to earn extra money prior to marrying Martha and obtaining a house on the mission station. Since wages for riding the wagon only increased on Klaver Valley in the early 1850s, rising to 6 *skellings* a day as opposed to 4 *skellings* a day in 1837, Carel would not have had an increased wage in the time he worked on the farm.

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91 K.V.J. 22 March 1838, 27 December and 29 December 1838.

92 K.V.J. 9 January 1839.

While his stay on the farm was quite short, being as far as we know, four years, his employment during a period of slavery is an example of the many workers Duckitt employed and to whom he paid a wage when he also had a resident slave labour force. It is also worth noting that he was a wagon driver. When he transported sheaves on the farm he was paid at the rate of Rds 8 per month, but when he travelled to town, he was paid at the rate of Rds 12 per month. This points to the higher value placed on trips off the farm and would also indicate that the load being carried, being more susceptible to loss or damage, carried a higher risk and therefore the rider was paid more because he was doing a more responsible job and secondly, he was not being supervised along the way. There was probably nothing more guaranteed to give a worker a higher sense of his own importance and therefore, a stronger feeling of responsibility, than to be paid more for this than for work on the farm when he was directly under the supervision of the overseer and farmer. Carel left Duckitt's service at the end of 1840. His altercation with Robert Restall the overseer in 1839, probably did not endear him to the place and he stayed another year, working only in January and February as far as the wage records go.[93]

Lodewyk Roberts, an itinerant worker who became a regular casual employee of Duckitt in the 1830s provides another illustration of the experience of increased proletarianisation of workers in the district even before emancipation.

He was a mission inhabitant of Groenekloof who, prior to 1838, was fully dependent upon the wage earned on the farm having begun work there in the 1820s. His brother, John, also worked on the farm at that time at forge work, hay-making, barley and wheat reaping and riding the wheat on the farm.[94] Lodewyk's activities on the farm included vineyard work, harvesting and assisting the thatcher.

In the few years covered in the wage books, Lodewyk's work history shows painfully clearly how quickly an itinerant worker could and did become a regular casual worker,locked into wage labour. During the first two years Lodewyk was able to sustain himself on three or four months of work a year. In 1831 he worked in October and November reaping barley, hay-making and riding hay and cut barley. 1831 finished with his having a debit balance of Rds 5.2.4 and grain debit, and his earnings for the year totalling Rds 56.5.1.

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[93] The altercation with Restall will be dealt with in Chapter 5 below, pp. 115-17.

[94] For John Roberts' work history and wages, see the Klaver Valley Wage Books for 1831, 1832, 1833. He continued to work after this but there is no record of his activities and wages.

In 1832 he worked from 14 May to 6 June in the vineyard which he worked in again in July. In October, November and December he was employed hay-making, cutting barley, rye and wheat. His vineyard work earned him 4 skellings a day for 21 days, and for this he was paid in cash. During the harvest season he earned mainly food, and again at the end of the year he was indebted to Duckitt for grain received. By 1833, he was fully locked into full-time wage labour, working on Klaver Valley for nearly the entire duration of the year. A far cry from an initial three months.

During 1833 he undertook a wider variety of tasks, taking care of the oxen from 8 November to 14 December, 32 days when he earned 6 *skellings* a day. Until the end of December he was binding wheat and it appears he was remunerated in kind as well as cash. For eight days he was paid Rd1.4.0. and for the other 8 days binding, he was paid 1 *skepel* of wheat a day. His total income for 1833 was Rds 68.5.0. which was a good two-thirds higher than that of the previous year when he earned Rds 47.2.4. By 1834, Lodewyk was a fully proletarianised wage labourer, absolutely dependent for his subsistence, upon the wage he earned.

That he did not work prior to March 1834 says less than that he worked from March continuously through to December of that year. One can assume that this pattern of labour continued for the next four years, until 1838. In that year he was only recorded as having worked in the vineyard in August, earning 6 *skellings* for one and a half days' work. The explanation for the change in work pattern may lie in his having left Klaver Valley at the end of 1834 and returned for a short spell in 1838.[95]

Resident workers

Certain specialist tasks/skills carried out by resident workers also paid better wages than that received by ordinary labourers. The groom was one of the workers who was able to earn a higher wage than many of the workers on the farm. The specialised nature of this task is obvious, but what was also important was that this man was responsible for tending to the horses which were extremely valuable in money terms and in terms of their function as a necessary means of draught

[95] For Lodewyk Roberts' work and wage history see entries under his name for 1831, 1832, 1833, 1834 and 1838, Klaver Valley Wage Books.

and transport. Michael Geary, was engaged in March 1831, as a groom at Rds 10 a month, more than double the wage of many of the workers on the farm at the time.[96]

Two other important workers who occupied positions of skill and speciality on the farm over a long period of time were Conjato, the blacksmith and Anthony, the cook. These workers' case histories portray much of the complexity of work on the farm and the changing levels of wage and income for workers in this specialist category. Their income changed over the period and we gain more insight into the wage earning and the degree to which length of service gave them short-term and sometimes superficial advantage over other workers.

Conjato, a former slave, engaged himself to Duckitt in December 1838. Having been a blacksmith he continued this task, but was not restricted to forge work. His case study allows for insight into labour practices and procedures on the farm, and besides his length of service which might make him a rare rather than a common case, the combination and variety of different tasks that he undertook while he lived on Klaver Valley, highlight one of the most common features of labour on the farm.

Conjato was a blacksmith by occupation but he also "took care of the trap floor". Job descriptions for resident workers were not as initially formal as they were for itinerants, and the resident worker was frequently engaged in other tasks besides the one for which he had been employed, as Conjato's case shows. The fluidity of labour activities on the farm, was very much present on Klaver Valley, which makes labelling or categorising a worker as a blacksmith for example, often clouds our understanding of his wider use on the farm. Here again we are taken into a situation which runs far wider than the exclusive categorisations we often use.

On the 1st of December 1838, when slaves were finally emancipated, Conjato and Rose, who was later to become his wife, and their daughter, Andriesa, left Klaver Valley.[97] Where they went is not known, but they certainly left to taste their freedom. Having done that, they returned to Klaver Valley after ten days of absence. On returning Conjato, who had been one of the most

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[96] K.V.J. 28 March 1831, 6 January 1831 and 21 April 1831.

[97] K.V.J. 10 December 1838 for reference to his family, their return and his engagement on the farm. See names and values of slaves on Klaver Valley, K.V.J. 9 December 1834. Conjato heads the list as being the most valuable slave on the farm, valued at £185.

highly valued slaves at £185, engaged himself to Duckitt at Rds 12 per month.[98] In April he received "a present" of Rds 13.2.4. and at the end of November he received Rds 8 as "a present", as did some other slaves.[99]

Conjato's work activities were predominantly that of working in the forge and he was on a few occasions, prior to December 1838 paid for "working in the shop on Sunday".[100] This would have been the workshop he and the other blacksmiths, for example Negroote, a "free black" made and repaired ploughs and other farm technology. In 1832 he was paid Rds 10 for "taking care of the trap floor 10 Sundays".[101] What is noticeable here is that what he had done on a few occasions in the past had become a much more permanent task, from two Sundays to ten. In March of 1834 he was engaged for a day shearing sheep along with five other workers, one of whom appeared to be a stranger. He and the stranger, Jasamine, were paid Rd 1 for that day's work and the other three, were paid 5 *skellings* 2 *stivens*. He appears to have done work on the trap floor on Sundays, during the harvesting season, no doubt while the other workers were otherwise occupied.[102]

There is no specific reference to him again until 1838 when his return and engagement were noted. From then until 1853, Conjato worked as a blacksmith on the farm.[103] We do not know how or if his wage increased - there are no wage records per se, but we do have the odd reference in the diary for payments made to him for tasks which look to have been outside of his normal work duties, again following the pattern of earlier years when he was engaged in tasks other than the one for which he had been employed. In October 1838, he also assisted in mowing of oats on

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98 K.V.J. 9 December 1834 for reference to Conjato who was the most valuable slave Duckitt owned. K.V.J. 7 April 1838, 29 November 1838, for references to Conjato's presents, K.V.J. 30 November 1838, 1 - 2 December 1838 for references to other presents given to slaves.

99 K.V.J. 4 April 1830 when he was paid for working for three Sundays in the shop, K.V.J. 22 August and 30 November 1830 when he was paid Rd 1.2.4. for working in the "smith shop" on Sunday.

100 Footnote No. 30 above and K.V.J. 4 April 1832.

101 K.V.J. 16 March 1834 for reference to sheep shearing and payment, K.V.J. 3 June 1834 for reference to "mending trap floor Sundays during trapping season".

102 K.V.J. 14 February 1841.

103 Another blacksmith, Fritz with his assistant, came onto Klaver Valley in 1844 to work. Whether there was an added load of work and he came in a temporary and itinerant capacity is not known. There are, however, no further references to Fritz so it can be assumed that he came onto the farm only once. K.V.J. 19 March 1844.

a Sunday, and was undoubtedly used for this task because the farmer was short of labour.[104] By the early 1840s there are fewer references to his working outside of the forge, although one example was of his shearing sheep in 1841 for three days which earned him half a crown, and would have been a fillip to his income.[105]

While the majority of workers on Klaver Valley performed a task and earned a wage, albeit in some cases, pathetically small, there were workers whose wage remuneration formed only part of their total earnings. Such a case was Anthony who worked as a cook on Klaver Valley from 1828 until 1859.[106] An analysis of his income provides an interesting insight into a farmer/worker business relationship. He shared in the sheep-skin venture with Duckitt and once a year got "his share of skins" in cash. Throughout the journals there are annual references to this relationship. This further complicates our present notions of workers. They were not simply labourers. In this case what we have is a classic "shared business venture". Anthony's long residence on the farm, can be explained by the fact that besides his wage of Rds 5 per month, he also got a half share of the profits earned from the sale of sheep skins.[107] His most profitable period was in the late 1830s and it seems that while the sale of sheep skins continued throughout the period, Anthony does not appear to have benefitted from the increased number of sheep on the farm. As Duckitt had moved into more concentrated wool production, the focus had moved away from skin sales and it is clear that while the figures may not be accurate, Anthony's share decreased through the 1840s.

Anthony - Cook on Klaver Valley 1828 - 1859
(Wages and details prior to 1840 obtained from Wage Books and that pertaining to period 1841 - 1855 obtained from K.V.J.)

1828 Paid Rds 5 per month with clothes - employed as a cook.
Duckitt paid James Laing for shoes for Antonie - Rds 5.
Antonie received, via Joe (also a free black"), Rds 5 in cash from Duckitt.
At the end of the year he was paid cash (unclear amount) to balance his account of 1827.

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[104] K.V.J. 21 October 1838.

[105] K.V.J. 14 February 1841.

[106] He is recorded in the early years as Antonie but in the latter years he is referred to in the journals as Anthony. I have chosen the latter spelling. He was the cook on Klaver Valley from before 1828 to 1859. The only wage records exist from 1828, but he received money to balance his account of 1827 for which there are no records.

[107] K.V.W.B. covering 1828, 1830s and 1840s, Antonie (free black). His wage on commencement of duties as a cook, was Rds 5 a month with clothes. In 1840 he was still being paid Rds 5 a month.

to Duckitt during the ploughing and sowing season. One such worker in the 1830s was Christian Oppel who used his own oxen on Klaver Valley.[108] He, like other such workers usually worked for a certain number of days and so one can assume that they hired themselves and their oxen to other farmers, especially during the sowing season. By the 1850s the practice of hiring the oxen and the owner/ rider together appears to have died out, due to the farmer having acquired sufficient numbers of his own draught animals and also the mission residents having lost and been unable to replace their ox herds.[109]

While some of the workers used their own oxen, thereby practising a type of sharecropping arrangement, there were also sharecroppers on the farm who were both employees of Duckitt and, especially in the later decades of the century, those who were not apparently employed by the farmer either before or at the time of their sharecropping relationship. Sharecropping or sowing-on-the-half was practised on Klaver Valley, in apparently short bursts in the 1830s and 1840s. The farm population and more importantly, the farm's production therefore occurred as a result of varying degrees of labour, both free wage labourers and semi-independent producers. Sharecroppers were both black and white, one of the latter most certainly being the overseer, Robert Restall, in the 1820s to 1830s.[110]

By 1871, three men appear to have been sowing on the half with Duckitt and if the overseer was sowing on the half with the farmer, there is no record of his doing so.[111] In May 1894, Ruperti gave two men, Manuel Adams and Marthinus Visser wheat to "sow on the half with me."[112] The presence of this "transitory" relationship on Klaver Valley in the 1870s and 1890s, points to two aspects of labour status and usage on the farm. Firstly, the farm was not producing only using free wage labour. Part of its output, although very

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[108] K.V.J. 17 July to 28 July 1838.

[109] H. Ludlow. *Missions and Emancipation in the South Western Cape*, pp. 138 -139 on the loss and replacement of stock after the late 1830s.

[110] K.V.J. for example 20 February 1835, 12 October 1835 when Duckitt gave Restall twenty-three muids of wheat "being part of his share" and fourteen muids of wheat being the "remainder of his share of 82¼ muids sown in 1834", and on 24 August 1837 when Restall took "20 muids of wheat being a portion of his share."

[111] K.V.J. 19 May, 30 May, 1 June, 22 June, 28 June 1871, for amounts given to David Puma, Heim Johannus, Samuel Johannus to sow.

[112] K.V.J. 26 May and 29 May 1894.

small, was as a result of sharecropping arrangements with producers who did not otherwise work for Ruperti.[113]

In the 1870s, with the onset of the transport developments throughout the country, western Cape farmers suffered shortages of labour, when so many went to work on road developments and the Cape Town Harbour. That some were sowing on the half with Duckitt in 1871 perhaps points to the existence of a strategy to maintain production and to keep labour at a time of potential or real shortage.[114] That sharecroppers were on Klaver Valley also adds to our understanding of how the farm was working in the seventies and nineties. It was not only based on wage labour. Some of the farmer's income was derived from sale of crops sown on the half - it also allowed him to keep land worked when he perhaps did not have the labour to do so, nor the cash to pay them.[115]

In the 1890s there is still evidence of sharecroppers on Klaver Valley, with Ruperti sowing on the half with Adams and Visser in 1894.[116] By 1898 there was only one sharecropper who was sowing on the half with Ruperti.[117] This decrease through the century and reduction by the end of the 1890s, to one sharecropper, points to the nature of the process of proletarianisation on the farm. It did not occur in a solidly linear way, nor did mass proletarianisation indicate a total change in the labour which produced the farm's crops.

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[113] There are wage workers recorded in the journals who have the same surname as some of these sharecroppers, but it cannot be assumed that they were members of the same families of sharecroppers whose labour Ruperti had co-opted in exchange for sowing-on-the-half.

[114] Peter and Charles Duckitt were farming Klaver Valley in conjunction with Herman Ruperti at this time and the 1870s was not a decade in which the farm's productive output was at its highest. The discovery of mineral and concomitant rail and harbour developments put pressure on farmers' labour need. Reference to the increased need for labour and plans to import it, Labour Commission of Enquiry 1893, G.39, pp. 59 - 60, for reference to G. H. Stevens recruiting labour for farms in 1871/72. The records for the 1870s are very scant with 1871 being one of the fullest years so it can be assumed that this practice was not new to either the farmers or the producers. For names of people and amount of wheat, rye and oats sown on the half with Duckitt and Ruperti, K.V.J. 18 May 1871, 23, 26 and 30 May 1871, 13, 14, 17 and 28 June 1871, 12 July 1871. There was also a fairly marked reduction in the employment of wage labour on Klaver Valley in 1870, e.g. K.V.J. February 1870, on six people were working on the farm.

[115] T. Keegan, Rural Transformations, chapters 1 and 5., on the nature of and cash constraints often underlying the sharecropping relationship.

[116] K.V.J. 26 May and 29 May 1894 respectively.

[117] K.V.J. 3 January 1898 when Jonathan Visser was paid fifteen shillings for twenty *muids* of oats which he had sowed on the half with Ruperti.

Conclusion

An analysis of the labour force on Klaver Valley in the nineteenth century has allowed for a clearer understanding of the complexity which existed on the ground, in terms of composition, the procedures and processes of hiring and the work done on the farm. Changes took place in almost every aspect so that by the end of the nineteenth century, the labourers had changed, their tasks had changed and their conditions and terms of employment had changed.

The labour force of the 1820s and 1830s was more complex and varied in nature than simply a slave labour force. Furthermore, while it was largely residential it contained strong itinerant and casual components. These features would, in the following three decades, strengthen and expand, so that by at least the 1860s, Klaver Valley production was dependent upon a labour force which had increasingly come to depend on wages earned in itinerant and casual daily labour for its subsistence.

As the people had gone through a process of increasing reliance on wage employment and dependency on credit from the farmer, so too did the tasks change. in the earlier decades the farm had offered a much wider variety of tasks for both low-level and high-level skilled workers. By the 1860s, many of the specialist tasks which had previously been performed by resident or itinerant farm workers, had moved into the realm of peri-urban industry and skilled specialists of a different class, race and background. Over the period then, variety decreased and tasks narrowed to become less skilled and more uniform. Hiring patterns too became more standardized and less tailored to the individual situation or worker. By the 1840s, the overseer had become more overtly active in the management of labour, taking over the tasks of hiring and paying wages from the farmer. The process of capitalization on the farm and its inherent and almost inevitable depersonalisation of employment and work procedures, had, by the 1840s, become the norm matching the increasing business-like nature of farming.

By the 1850s, while female workers had moved out of farm labour, male workers can be seen to have tied themselves, very often in a complex relationship of indebtedness, to the farmer and the farm. It was at this stage that debt became a permanently structured feature of remuneration, only consolidating itself by the 1890s. Even when wages for casual and itinerant tasks increased in the 1860s, this did not change the pattern of permanent indebtedness into which workers had come

to bind themselves.[118] When many of the harvesting wages dropped slightly in the 1870s clearly a long-term result of increased mechanisation in reaping and threshing, their position of weakness had long been entrenched and their dependence upon earning in either cash or kind, simply tightened and secured the dependency.[119] While a proportion of the farm's production had been carried out by workers using their own cattle up to the 1840s and sharecroppers sowing-on-the-half with the farmer in the 1870s and 1890s, this semi-proletarianised labour had, with the exception of one man, disappeared from Klaver Valley by 1897. Even their presence on the farm in the 1840s, does not in any way detract from the conclusion, that in the main, labour on the farm was predominantly in the hands of fully proletarianised workers in the 1850s. The straggling few who had managed to retain some form of petty semi-independent production were never large in number, nor did they control a major proportion of the farm's productive output. This analysis of labour's experience of proletarianisation matches and was a necessary cause and effect of the capitalization of the farmer and his agri-business. Most of the labourers on the farm, both former slaves and free blacks never had a chance of access to sufficient land or livestock. This study shows that even those who previously hired out their stock to Duckitt, had by the 1850s, lost access to that livestock, making their future inevitably one of wage labour.

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[118] Prior to the 1860s, most wage levels remained the same, with only shepherds and wagon drivers having an increase of Rds 4 in their monthly wage and wagon drivers earning an extra 2 *skellings* a day in 1853. A broader increase in wages occurred in the 1860s, with for example the reaping and threshing tasks increasing

[119] Remuneration for threshing dropped from 1/- a day in 1863 to 9d a day in 1870, wheat reaping from 2/6d a day in 1867 to 2/- a day in 1870 and heapmaking from 1/- a day in 1863 to 9d a day in 1870. There was an increase however, in sowing and ploughing tasks, noticeably less mechanised than harvesting tasks, for example, leading a plough in 1864 had earned a worker 7/6d a month and by 1871 that same task earned 10/- a month. Ploughing in the 1830s earned Rds 8 a month and by 1871 it was paying 15/- a month. These wages were extracted from the journals for these years.

CHAPTER FIVE
Redefining Paternalism: The Relationship between the farmer and the workers on Klaver Valley 1820s - 1890s

The relationship between the farmer and workers on Klaver Valley was dominated by a paternalistic ethos. This ethos and its manifestation on the ground changed from the 1830s and by the 1890s had consolidated itself within capitalist relations of production on the farm. As paternalism changed from the "old" non-capitalist "Genovese-type" with its inherent familial and personal "acts of kindness and fatherly discipline" to the "new" paterna-capitalist form, it became stronger, not weaker, and it patterned the farmer-worker relationship as farming capitalised and workers proletarianised.[1]

The "old" paternalism was one in which control was maintained and force often exerted by the farmer on his workers, in the name of paternal caring. Frequently, this concept encompassed a strong familial attitude and not only did it allow for, but it encouraged, stronger personal involvement of the farmer in the workers' home and family concerns. The worker was perceived in a similar light to the way he perceived his children, interacting with the workforce with the superiority of the father-figure and the distance of one whose life experience has taught him all there is to know.

The "new" paternalism was characterised not necessarily by apparently familial and personal behaviour and attitudes, but was rather manifested in the way in which new capitalist entrepreneurs served their capitalist enterprises, by employing positive strategies, such as re-employing workers who had proved their reliability, giving work to members of a worker's family, apparently recognising workers' rights to vacation and holidays, not because this last necessarily benefitted the business in the short-term, but because it consolidated a pattern of worker loyalty to an employer who would then be able to call on this loyalty in time of need.

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[1] The labels "old" and "new" are derived from Price and Huberman debate on the active role of paternalism in relations of production in both urban and rural industry in Britain in the 19th century. While the context of Klaver Valley is very different, I have employed these terms because they accurately portray the processes of continuity and change which informed relations in the work place during the transition to capitalism. See M. Huberman,"The Economic Origins of Paternalism: Lancashire cotton spinning in the first half of the nineteenth century",*Social History*, 12, 2, 1987, pp. 177- 178; M. Huberman, "The economic origins of paternalism: reply to Rose, Taylor and Winstanley", *Social History*, 14, 1, 1989, pp.99 - 103.

The main differences between the "old" and the "new" forms of paternalism were that by at least the 1860s, the context in which these two parties operated, had become almost totally cash orientated. The familial and personal context had almost disappeared, since fewer individuals in the workforce were known to the employer and the nexus of their relationship had changed from one of personal contact to one of cash contact. Even although it changed, paternalism was evident in other ways, such as employment strategies which served both the worker in terms of his need for wage labour and the farmer in terms of his need for reliable and "loyal" workers, in the post 1850s. Throughout, it allowed for the marked changes in the labour force and economic structures to proceed without massive overt disruption or resistance. The main reason for this can be found in the continuation of paternalistic practices by the farmer and appropriate responses from the workers.

In the 1830s Klaver Valley had a predominantly residential and permanent labour force, a farmer whose interests were focused on the farm and a large measure of self-sufficiency with regard to providing for its production needs. By the 1890s less labour was required on the farm, the majority of it being casual and itinerant and the farmer although still getting his income from farming was more heavily involved in activities like horse-racing off the farm.[2] By 1854 production was more mechanised than it had been previously and this and other technological needs of the farm were increasingly provided by village and Cape Town industry.

Prior to and during the early 1830s the management of farm labour had largely been dominated by the farmer. By the late 1830s, especially after the emancipation of slaves in 1838, the farmer and the workers had been distanced from each other, and the vacuum was in the process of being filled by the overseer. By 1840 he had become more closely involved in the management and control of workers so that the distance between the farmer and workers had widened and their separation entrenched. The overseer's presence had increased and he had become the figure representative of discipline and power on the land. The farmer's presence and his role in the work relationship had changed. He appeared more and more, only in the last stages of conflict, after the overseer had played out his role as manager and wielder of power. Overseers had been on the

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[2] See Chapter One and Chapter Two above for discussion of the elitist connections and activities, such as horse-racing, of Ruperti in the 1890s.

farm since 1812, but it was only in the 1830s that they moved from being the *knegt*-cum-*bijwoner* to a fuller involvement in the management of workers.[3]

In the 1840s with a noticeable increase in the use of an external arbiter through the courts, the farmer-worker relationship changed and the old familial paternalism which had oiled their relationship began to show a less personal face, assisting in the alienation of workers and farmer.[4] Legislation, particularly the Masters and Servants Acts of 1841 and 1856, reinforced the separation. By the 1860s the workers' acts of theft in particular, were a clear manifestation of the inevitable breakdown of the farm "community" in light of the fact that many of these cases were now being taken to court. The 1870s and 1880s mark the period in which the workers gained some strength via the expanding nature of the rail and urban labour force and this is seen by the changing arrangements of labour on the farm. That the 1870s was also a period of decline in production, owing in part to poor farming practices, did not weaken the paternal authority sufficiently to give the workers a permanent victory.

By the 1890s the farmer and worker related in the context of a thinly negotiated relationship, which was no longer based on strong familial connections, personal and close cohabitation. Through the previous six decades, emancipation and mechanisation had served to depersonalise the activities of the workers. Overseers, although living and working on the farm from 1812, had actively created a divide in the workers' relationship with the farmer. The latter became, although not too distant, a figure on the hill as opposed to an almost omnipresent one beside the plough.

Paternalism in many ways shaped the development of capitalist relations of production among the farm inhabitants and itinerants. The "old" paternalistic ethos which dominated the landscape prior to the 1840s, 'grew out of the necessity to discipline and morally justify a system of exploitation...was accepted by both masters and slaves...encouraged by close living of masters and

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[3] C.A., *Opgaaf* Returns for 1812 to 1815, J.42 - J.46, for reference to the presence of a *knegt* on Klaver Valley. Note that Robert Restall (see Chapter 4) had been on the farm since 1828/9 and that his arrangement of sowing-on-the-half with Duckitt had decreased so that by 1838 he was more involved in overseeing production and labour than he was in his own farming.

[4] The court records as a source do have problems associated with the fact that they are records mainly of the farmer class and of a situation which was both false and in which the dominance of power largely precluded the worker, usually the defendant. They have been used with these disadvantages in mind. What they do help us with, is in giving historians some insight into the relationships and material conditions on farms and an idea of how these relationships played themselves out, with varying degrees of strength and weakness.

slaves...(and) undermined solidarity among the oppressed by linking them as individuals to their oppressors'.[5]

The Old Paternalism

The farmer and his workers were physically close and their mutual involvement in each other's lives was frequent and in some cases, bordered on quite strong personal links. Duckitt monitored and bore the cost of ensuring successful births, assisted in formalising marriages and in the case of a worker's death lent money to family members and sometimes organised for the burial of his workers, many of them slaves and apprentices. In 1831, Loressa, a slave, gave birth to a male child named July and on that day Duckitt paid Marian, the midwife, "Rds 5 for attending to Loressa".[6]

There are several indicators in the above example of strong paternalism operating in the relationship. That Duckitt paid Marian gives us an insight into his perception of his role as "*pater-familias*" and was a clear manifestation of the old paternalism which lubricated farm labour relations, especially when the labour was tied into the mechanism of bondage and personal ownership. It was a paternalism that rested on family concerns and participation in slave family events. It is worth noting that these were the births of male children. The amount of Rds 5, nearly the monthly wage of some of his workers, shows the extent to which this service was regarded as important. What is also very clear is that Duckitt took a personal interest in his slaves and "invested" in the reproduction of his labour force, although on the face of it, he would simply have been consolidating his role as a generous and interested "father".

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[5] E.Genovese, Roll, Jordan, Roll The World The Slaves Made, (Vintage Books, 1976., pp 3 - 7, and The World the Slaveholders made: Two essays in interpretation, (Middletown, 1988); H.Gutman, The Black Family in Slavery and Freedom, 1750-1925, (New York, 1977).

[6] K.V.J., 3 November 1831. Later references to "Little July" indicate that he continued to live and work on the farm as he grew up. For his engagement at Rds 6 per month, when he could only have been 7 years old, see K.V.J., 10 December 1838. In 1834 Loressa produced another male child and Marianne Coenraad was paid Rds 5 for attending to her during the birth, K.V.J., 11 January 1834 and 23 January 1834. The spelling of the midwife's name differed between the two instances, but this does not detract from the farmer's behaviour.

His "generosity" was evident elsewhere on the farm. Throughout the 1820s and until 1839, there are frequent references to giving his slaves "presents" of cash.[7] The monetary value of these presents was high and can be seen as sufficient to keep resistance at bay and "loyalty-cum-obedience" at the fore. That they were largely given to slaves reinforced the notions of paternalism. These fillips to the slaves' existence came directly from the man who owned them. That he cared for them could have been in no doubt in Duckitt's mind. After all, he was the one who provided them with these "luxuries". That these gifts were successful tools of manipulation and control, was intrinsic to the relationship of farmer-owner and bonded slave. It is not known how frequently this practice occurred prior to the 1830s, but it can be assumed that even if Duckitt had always given his slaves and apprentices "presents", those which were benignly distributed in the 1830s played an increasingly important role in manipulative placation and were attempts to intensify their appreciation of his goodness, so strategically displayed on the 1st of December 1838.

The day dawned dull and grey, with constant rain throughout and therefore "no work was done".[8] This was an important moment in the relationship, in which the transition to free labour could have occurred completely outside of the farmer's control and manipulation. Throughout the year Duckitt had given presents to his workers, particularly his apprentices, but in November and within the first week of December he gave free reign to his nervousness about their departure, and exhibited his "paternal gratitude" by giving fourteen people, apprentices, indentured immigrant, James Buchan and wage labourers, gifts of money.[9] Duckitt like any slave - owner, was not deterred by the real probability that his ex-slaves, being so subordinated and unequal, could not

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[7] "Present to servants of Rds 2.2.0.", K.V.J., 3 November 1831; "Present to Martha (a slave) Rds 4." K.V.J., 12 April 1832; "Present to Old July (a slave) Rds 5", K.V.J., 10 April 1833; "Jack, a present of Rds 10", K.V.J., 7 October 1833; "Old Dinah a present of Rds 8.2.4", K.V.J., 1 February 1834; "Armoet a present of Rds 3.2.4", K.V.J., 25 November 1836.

[8] For a wider picture of 1 December 1838, see John Mason, 'Emancipation Day 1st December 1838', draft chapter 7, *Slavery and Emancipation in South Africa 1806 - 1842*, Ph.D., Yale University, forthcoming 1992.

[9] K.V.J., 7 April 1838 Conjato received Rds 13.2.4 and Rds 8 on 29 November 1838; K.V.J., 21 June 1838 when "November was given Rd 1.2.4 for a straw hat" and Rds 2 on 30 November 1838. On 1 December Jack received Rds 4, and Adam received Rds 2. Old July who was leaving for Cape Town, received Rds 5 on 2 December 1838. For references to presents given to wage workers, see K.V.J., 3 December 1838, when 9 people received 4 *skellings* each, with one or two others receiving small amounts throughout the early days of December, example, K.V.J., 8 December 1838 when "Boys (sic) wife received a present of Rd 1.

generate gratitude in response to his "generosity".[10] He was after all, not ultimately wanting to do anything other than keep them on the farm and under his control for as long as possible. The gambit, sub-conscious though it might have been, paid off. Klaver Valley did not witness a total exodus of its former slave labour force. Rather, some left "for town" and returned through the month of December, engaging themselves as wage-earning workers with their former master.[11] This moment of transition, when workers might have been able to move into independent peasant production or off the farm into other forms of labour, was finely muffled by the giving of gifts.[12] While the workers were now legally free, they were still bound by the cords of the 'old' paternalism which consolidated their "familial dependency". Duckitt, continuing to play according to the old paternalistic and unwritten rules, re-employed his former slaves, who had returned to him, after their temporary departure.

Duckitt, although not losing all his workers, nevertheless suffered a shortage of labour during the harvest of 1838. He sent a *labour tout*, Class Kieviet to Tulbagh, about sixty miles from Klaver Valley, to fetch additional labour.[13] "Ten Tulbagh Hottentots" worked on the farm for three and a half days after which they were paid off. It seems that rather than being caused by the exodus from Klaver Valley, the need for labour was due to the non-arrival of itinerant workers from the surrounding district.[14]

Duckitt did not lose all his former slave labour and it was at this point that the parameters of his relationship with former slaves who were now wage earners, changed. They could no longer relate as owner and owned and at the point of reformulation, Duckitt employed the overtly paternalistic gesture of giving gifts. But he did not continue this practice. 1839 and all future years were totally devoid of any gift giving - all clothes, tobacco and other items given had a corresponding monetary

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[10] This is Genovese's argument in his seminal study of slave responses to "acts of kindness" by slaveholders, Roll, Jordan, Roll.

[11] See K.V.J., 9 December 1838 for example of Conjato, the blacksmith, his wife Rose, both former slaves, and their daughter, Andriesa, and Little July came back "from town" and engaged themselves as wage workers.

[12] N. Worden, *Adjusting to Emancipation: Freed Slaves and farmers in the mid-nineteenth century South-Western Cape*, Angry Divide, p.34 , J. Marincowitz, *Rural Production and Labour*, Chapter One, who argue that the exodus was a pre-emancipation fear, rather than a reality.

[13] K.V.J., 15 December 1838, Class Kieviet, a wage worker on Klaver Valley "was absent on leave to Tulbagh" returning with people on 21 December 1838.

[14] K.V.J. 26 December 1838, "10 Tulbagh Hottentots" paid Rds 3.4.0. for 3½ days' work.

value which was debited to the workers' account.[15] This shift was important in that while he was ostensibly still continuing the practice of "giving to workers", he was very clearly maintaining a strict record of his "generosity" and paternalism can be seen to have been successfully operating in the context of a cash oriented relationship.

With the marked increase in absenteeism and drunkenness after emancipation, Duckitt's strategy of control, in which the carrot and the whip held pride of place proved to be as, or even more effective. Now he not only offered or withdrew the "extras", but could extract a portion of the worker's wage, in cases where discipline and control were deemed to be slipping.[16] This new "tool of control" was more effective because the wage was the legitimate possession of the worker - he had earned it and it was his rightful due. No longer did Duckitt have to use gift-giving and fatherly cajolement as a strategy. He could now deduct time and money from a worker's wage when the latter had proven himself to be unproductive either by his absence or his drunkenness. This strategy which carried with it a sense of "capitalist legitimacy", would prove as, or possibly more, effective than earlier methods.

The ability to extract "fines" from the workers' wages, consolidated Duckitt's legal power. The effect of a deduction from his wage, put the worker into a similar position to the one in which he would have been had he been tried in court and fined. But that Duckitt was the one who imposed the deduction-cum-fine, gave him a stronger position of power in the relationship. He in fact gained by not incurring additional expense or disruption by having to attend court and losing the labour of a worker.

The methods of control changed but the principles underpinning the farmer-worker relationship did not. If anything they increased in strength in order for the farmer to continue exerting the same control he had done when at least part of his labour force had been enslaved. What had changed was the means by which he could exert this control. Withholding and deducting portions of the wage in the case of workers being unproductive on the job was more effective than giving a gift in the hope that the gesture would endear his labour to him and consolidate the worker's loyalty. Removing what was perceived by workers as theirs because they had not fulfilled their "contract of labour" rather than giving them additional rewards over and above what they could

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[15] K.V.J., 15 July 1839 "Singalo a pair of leather trousers Rds 4.2.0." and "To Name Springveldt a duffle jacket Rds 9" on 17 June 1839, as examples.

[16] See below for increase in absenteeism and drunkenness.

normally expect, would prove very successful in maintaining farmer control and developing a work ethic closer to the farmer's needs and ideas than the workers on the farm.

That, in the face of this coercion, they did not always leave his employ points to two issues. Firstly, and more strongly, their service on the farm was frequently long in duration and the relationship which had developed between the two parties, had served to keep the worker subservient and believing that the farmer, albeit very strangely, did care about his employees. This would be especially appropriate to those workers who had been on Klaver Valley for long periods of time. Secondly, had they left they would in all likelihood either have encountered a similar behavioural pattern in other farmers, or they would have spent more of their lives in court rooms and prisons.

In terms of response, the workers' options were increasingly limited to conflicts between workers and between individuals and the overseer. The farmer responded by extending his field of authority in employing the magistrate and courts - an outside arbiter who would ultimately act in his interest. His increased use of the courts coincided with the increased and very much more overt role played by the overseer in labour relations.

The Separation of the Farmer and Workers

Knegte and *Bijwoners* had been on the farm since the early 1800s, but had, by the late 1830s, encroached more visibly on the farmer-worker relationship. The presence of the overseer on the farm as a manager of labour created a wider physical and psychological divide between the farmer and the workers. This distance had, first and foremost, been created and widened by the working presence of the overseer on Klaver Valley. The relationship of the farmer and worker was changed permanently by the ever increasing presence of the overseer as a labour manager during the 1830s. His increase in power over the worker created a divide across which old forms of paternalism lost their potency and new forms were introduced and entrenched. The farmer's status as a parental father-figure in fact strengthened as he removed himself from day-to-day interaction with his workers on the land. The overseer, attempting to wield what was perceived by the workers as illegitimate authority, served indirectly to strengthen the farmer's control by increasing his distance and removing him from first-hand involvement in conflicts on the farm.

The following court case resulting from a conflict between Carel Ephraim, an itinerant worker from Groenekloof and Robert Restall, the overseer, highlights the process of separation between

the farmer and workers and shows very clearly the increasingly pervasive role which the overseer had come to play in labour relations on Klaver Valley by 1839.[17]

In this incident Duckitt can be seen to no longer be involved throughout the conflict. He came in at the end and, not making any attempt to settle the dispute between the workers and the overseer, simply, and apparently objectively, takes "declarations" from those involved and witnesses. Although he was now only an assistant justice of the peace, he still represented the law on the farm. However, this case shows that his use of the courts, now that he was no longer always as closely involved in the conflict and had removed himself from the land, is worth noting. The resort to the use of the courts in this case also undoubtedly characterised his position, in relation to both the workers and the overseer, as one of objectivity.

In August 1839, Carel Ephraim "clenched (his) fist and did strike and beat with many blows...(the) head and face and parts of (Restall's) body and did knock him to the ground." Restall stated that "at noon a difference arose between Carel and a fellow worker, Officer (over) an ox. I went up to them and desired them to leave the ox alone. I told them if they had any complaint **to make it to me**. I desired them to go to their ploughs which they did, Carel Ephraim drove his oxen the distance of about 200 yards and when opposite to Officer who was in the act of spanning in the defendant deliberately left his oxen and went over to Officer passing me. Officer was about 20 yards from defendant... defendant then took off his hat and swearing at Officer, said, 'What do you want of me?'. Officer pushed defendant away from him with his left hand. Defendant gave Officer a violent blow on the nose which in consequence bled profusely. I called to them to desist from fighting and I said that **I would not allow it.** I went up to them after finding I could not separate them if they did no desist I would beat them both. Officer left off and Carel Ephraim said,'Let me show this little Mosambique (sic) something' and made a violent plunge at Officer, when with a small quince stick with a whip attached to it I struck defendant, I believe over the arm.

The defendant then turned to me and collared me and asked me why I struck him." I replied "I have previously given you notice to that effect" and desired him to leave off and take his hands from me. Defendant then seized my stick and broke it, tore my jacket and knocked me down with his fist. On rising (he) aimed another blow at me which knocked my hat off. I had frequently during the period desired him not to molest me but to go home. Defendant then followed me about the land calling names. Defendant told me take off my jacket and to fight with him **evidently**

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[17] Carel Ephraim's work on the farm and his earnings and Robert Restall's movement from sharecropper to overseer have been discussed in Chapter 4 above.

provoking me to strike him. Defendant threw down his whip stick, told me I might drive the plough myself. I desired defendant to go home which he did and **I followed him.** Mr Duckitt came to the land and took the declaration of the witnesses.'[18] Restall's evidence clearly shows his struggle for dominance. The evidence suggests that had Restall left well alone, the conflict between Carel Ephraim and Officer would have taken its course. It is clear that Restall was only able to maintain his position by exacerbating a conflict between two workers, one of whom, Officer, had only worked on Klaver Valley since February 1839.[19]

This was obviously the major issue at hand, and whether personal animosity or a desire to protect one's job from "outsiders", since Officer might have moved into Ephraim's work territory, the conflict was nevertheless between these two workers. Restall's insistence for control changed the parameters of the conflict and almost inevitably, brought Ephraim to court where he was found guilty of assault and fined £3 or fourteen days' imprisonment. He was committed and discharged on 20 August "having paid the fine" having spent three days in jail.[20]

Restall's role in the above case can be attributed to his obvious lack of power and his determination to gain it, even at the risk of being "knocked down", losing his whip stick and having his hat knocked off. What Restall had not bargained for was to have Ephraim follow him, call him "names" and threaten a boycott of work. This seemed to be a decisive point in the battle for authority. Ephraim lost. It was only after this that Duckitt came onto the land and "took the declaration of the witnesses."

The complete absence of Duckitt until the stage when a case against Ephraim had obviously been made points to the separation of the farmer and worker on the land. Prior to the development of a full-time overseer Duckitt must have been more closely involved in such day-to-day interactions. However, with Restall permanently on the land with the workers, Duckitt was no longer that closely involved in conflicts and only came onto the scene when it was over. The "father" had been replaced by the "step-father", one who had no personal connection with the farm, and nothing which raised him above the work force which he was attempting to gain control

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[18] C.A. 1/MBY 1/1/1, Case No. 33, 17 August 1839. The emphases in the above extract are mine.

[19] K.V.J. 5 February 1839, Officer was engaged at Rds8 per month.

[20] C.A., 1/ MBY 1/3/1, Case No. 33 . Also see Huberman, "Economic Origins of Paternalism", ibid., p. 186-188 on the importance of age in the paternalistic relations of production in the early cotton industry.

over, and with whom he had no built-in "familial" authority.[21] Restall had been farming on-the-half with Duckitt on Klaver Valley since 1829 - his background was not removed from the workers' ken and he had no basis for demanding the authority that he did. He was, in the eyes of the workers and no doubt the farmer, no better than a labourer. By contrast Duckitt had the farm, elite connections, controlled production, and was of a different class to that of the workers on the land. These factors all went towards propping up his status and consolidating his paternalism, and the absence of them in Restall, brought him down to their level.

Lastly it is clear that Restall's evidence was much more detailed than that given by Officer and two other witnesses, William Wilson an indentured labourer and Boy Africander an itinerant reaper. Officer only saw Carel "pushing (Restall)" and Africander "...saw no more (and) went away."[22] That they did not speak at length in court is hardly surprising given the constraints of a court house, but the very clear refusal by Africander to give any detail and the denial of more than "a push" by Officer, who was at the heart of the original conflict, is worth noting. Rather than align themselves with Restall, they opted for the side of their co-worker.[23] This case shows very clearly the process of separation of farmer and workers which had taken place by 1840. It shows too, how in the process of maintaining and strengthening his control over the labour force, the overseer was strongly challenged by the workers. The separation of farmer and worker, was however aligned with the farmer's interests, and became a more overt characteristic of labour relations on Klaver Valley in the late 1830s.

A case of similar but more intense conflict took place on Klaver Valley early in 1840 between the overseer, Restall and a resident worker, Phillip Dolph. This case shows a greater battle for authority between the workers and the overseer, a testing of that authority by Dolph which was more courageous than Ephraim's the previous year, although the worker was again to lose not only the battle, but also the war. Hereafter there appear to be no cases of this particular type. This case clearly exhibits the language of power used by Restall and the almost silent but very overt action taken by Dolph.

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[21] C. Van Onselen, *The Social and Economic Underpinnings of Paternalism*, pp. 17 - 18.

[22] C.A. 1 MBY 1/1/1, ibid.

[23] See Chapter 4 above for growth of worker's consciousness. This example shows how this consciousness manifested itself in "non-action" as opposed to "action" where there was definitely a consciousness of their similar low status and lack of power.

Restall in giving his testimony, stated that "On the 2nd January 1840 while on the land at Klaver Valley, the defendant's brother came and asked whether he could be employed. I refused to take him. However he persisted in staying there. The Defendant (Phillip Dolph) gave his brother a sickle and he went to assist. I asked the Defendant's brother whose sickle he had got. He replied, 'Phillip's'. I then asked Phillip whose sickle he had. He replied his own. I replied, 'You cannot have two ', and addressing myself to the Defendant's brother, Hans, I said, ' Give me your sickle.' I then threw it over to a reaper who was without one upon which Phillip left his space and took it from him saying it was his sickle and would give it to no other person than **his master** when he should go home in the evening. I replied, 'You have no reason to wait so long **as I am master on this land**. You may give it to me.' The Defendant said he would not. I said to the Defendant, 'This is a piece of obstinacy. **I cannot allow those people to look on and you with a sickle in your hand.** I insist upon having it.' The Defendant still refusing, I took it from him...the Defendant then suddenly came behind me, seized me round the waist and endeavoured to throw me down. In the struggle to release myself the Defendant I believe fell, ...then got up and in a most violent way, came up to me with the sickle, evidently attempting to strike me with it. I warned (him) to keep off and if he should approach I would strike him. (He came up and Restall struck him) over the arm and (called) the rest of the people to take him away before any accident happened. The Defendant was then **persuaded by some of the other people to leave** - the Defendant afterwards came up to me again and held his fist under my nose. I then sent for **Mr Duckitt who ordered him from the land.** The sickle I took from the Defendant did not belong to him...(but) to another man who had lost it."[24] Phillip Dolph was found guilty and imprisoned for 3 weeks, with the first and third week on a "spare diet".[25]

Language used by Restall in the above case was obviously an attempt to behave as if he had the authority on the farm. That his language was overtly forceful is an indication of the tenuousness of his real authority.From the workers' point of view he had no real power - it was only when Duckitt came onto the farm that Dolph responded to the order to leave. Restall had not, this time, even given that order - for fear of yet another exhibition of "obstinacy"? It seems that, for Dolph at least, there was a clear differentiation between his master, the legitimate farmer and the overseer. Duckitt was no longer expected on the land during the day which is shown by Dolph's equating his return "home" in the evening with seeing his master. The struggle by Restall for overt signs of respect are classically illuminated by his anger and fear that the rest of the work force

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[24] C.A., 1/MBY 1/1/1, Case No. 76. Date of evidence 27 January 1840. The emphases are mine.

[25] C.A., 1/MBY 1/3/1, Case No. 76.

of his ilk from which to draw if need be.[27] There is no definite evidence of overseers who came onto the farm after Restall and Jackson and the next time an overseer was referred to on Klaver Valley, it was in the 1890s, with the arrival of Niekerk and in the late 1890s, Stoffberg. By this time, overseers had definitely ensconced themselves within the workforce, working alongside the workers in many cases, and considered, although part of management, nevertheless, one of the workforce.

Justice and Authority on the Farm and in the District

There were reasons that Duckitt came to use the courts more frequently from 1840 onwards.[28] Firstly, it was only in 1838 that a Resident Magistrate was ensconced in the Malmesbury district, bringing the workings of statutes more closely to the farms and their inhabitants. Secondly, the farmer no longer had a resident bonded labour force with which to exemplify and measure his control over other, free wage workers in the workplace. This can be seen as one of the most important factors effecting a change in his attitude and manifesting itself in a less personal implementation of control on the farm and the use of an external, although not more objective, body of arbitration and control. Thirdly, Duckitt was experiencing economic difficulties in the 1840s, owing to personal financial straits which were exacerbated by the falling wheat prices, and this constraint would have added to strains already present in the relationship, forcing them to the surface.[29]

The farmer-worker relationship was at times informed and influenced by such basic issues as money and its shortage. His financial difficulty during the 1840s might explain why he had not paid Singalo an indentured "Prize Negro" in 1845. Singalo duly laid a charge against Duckitt in order to obtain his wages. What Singalo's case does tell us though, is that workers on Klaver Valley used

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[27] Colin Bundy, *Vagabond Hollanders and Runaway Englishmen*, in W.Beinart, P. Delius and S. Trapido, Putting a Plough to the Ground, pp. 101 - 128, argues that poor whites were roaming the Cape countryside by the 1870s. The presence of *knegte*-cum-overseers on Klaver Valley by the late 1830s would seem to indicate, if not a proliferation, then the existence of marginalised whites earlier than that.

[28] In comparison with his brother, Frederick, William Duckitt certainly made less use of the courts. His brother frequently took workers to court for insolence, desertion etc., whereas William appears to have been able to maintain and entrench control over his labour force in more subtle ways, on Klaver Valley.

[29] Refer Chapter 3, above, for Duckitt's personal financial position. J. Marincowitz *Rural Production 1838 - 1888*, Chapter 1, where he argues that farmers were faced with falling wheat prices and labour scarcity in the first half of the 1840s.

the legal system to prevent losing what was rightfully theirs. In 1845 Singalo who had wages owing to him, was paid by Duckitt in the presence of the magistrate.[30] Singalo's charge against Duckitt is witness to the fact that workers did push against injustice and made use of the legal system where necessary. What is evident here is the movement by workers away from remaining totally subordinated by the farmer's "father" image and their active use of legal proceedings not used before.

Other instances recorded in the court records indicate that the Masters and Servants Acts of 1841 and 1856 served to map out the already diverging paths of the farmer and workers, by confirming, legalising and further enhancing farmers' already changed attitudes. In 1849 David Gousman, a harvest worker on Klaver Valley, had loaded bags of harvested grain unevenly onto a wagon. When Duckitt's insistence that he correct this was met by a defiant refusal, a struggle between Duckitt and Gousman followed. "I took Defendant **by the collar of the jacket and asked him in a civil manner** why he thus conducted himself...he came again to the land to bid the men good day **in my presence** and **without saluting me**, and left saying (he) was going away."[31]

The charges against David Gousman by Duckitt in 1849 show how the relationship between the farmer and worker, closer to the homestead exhibited similar struggles for dominance that were experienced by the overseer and worker in the fields. There were major differences but paternalism operated on different levels with different workers. This case exhibits how, when in close contact with workers, the farmer employed all the paternalistic ploys at his command and although finally winning the case, he too had to engage in the struggle for authority and respect with Gousman that the overseer had done with Dolph in 1840.

This case also shows that when Duckitt was in close contact with workers, it was not during the ordinary labour of a season, as the overseer was, but rather at important points in the labour cycle, for example in the loading of harvested grain. Being the more superior and of course being the one whose interests were most affected by the successful transportation of the harvest to the market, it was the farmer who took this task onto his personal portfolio. It was at times like these that Duckitt, in close contact with workers, was forced to engage in the struggle for the maintenance of authority and subordination of the worker.

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[30] K.V.J. 29 March 1845, Singalo was paid £3.1.6. = Rds 41.

[31] C.A. 1 MBY 1/1/6, Case No. 1065, 6 December 1849. The machines were transported to the fields/lands, and Duckitt would have gone onto the land to supervise the loading of bags of grain for the market. For the most part however, he was largely absent from the land.

The contradiction, inherent in a paternalism which easily accommodated violence and temperance, in Duckitt's action of taking Gousman by the collar and then speaking to him in "a civil manner" was not apparent to him. Duckitt was furious that Gousman returned to the fields, and greeted his fellow labourers without "saluting" him. The worker in refusing to follow the older mores of social behaviour, saluting his employer and thereby showing respect, had overstepped the limits of acceptable behaviour. In earlier periods, this insolence by a worker very often led to a beating.[32] It was probably this final display of insolence which precipitated his appearance in court on a charge of insubordination. Duckitt's authority was, by the late 1840s, sufficiently internalised to allow him to wait until the case appeared before a magistrate, when he would doubtless win and thereby re-inforce his authority. He no longer needed to act against the worker immediately in order to prevent the erosion of his authority. Unlike Restall, Duckitt's actions and perceptions of the incident are clearly that of a man whose "old" paternalistic ethos was having to adjust to changing circumstances. That again, the worker failed to uphold his defiance does not deter from the insight that is gained into the farmer-worker relationship. The workers did not completely and passively abandon themselves to unquestioning subordination, but continued, albeit only occasionally, to press against the barriers preventing free association and interaction. Workers were beginning to manifest the realisation of their rights. During the 1840s and 1850s there were only one or two incidences of workers either stealing or breaking the norms of employer-employee interaction, recorded in the journals every year.[33] These cases were most often of workers involved in theft which points to two main issues. Firstly, the dominance of the farmer, a Field Cornet/Justice of the Peace until the 1850s, appears to have been so solidly inculcated, that defiance was stamped out on the ground before it reached the courts.

That there were so few incidents of overt insubordination and/or incidents of workers breaking their contracts, was indicative of the fact that by the time the law was instituted, Duckitt, with the advantage of his active role as a Justice of the Peace, did not need the law, although it provided a strong support for him in his maintenance of power.[34] His authority was entrenched and the

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[32] N. Worden, Slavery in Dutch South Africa, Cambridge, 1985, p. 106 - 108.

[33] K.V.J. 12 February 1846 when Jack was detected stealing 6 lbs of wheat and on 16 February 1846 he stole and sold four yokes made of "my own brush-wood and iron and was paid Rds 11 for them."; 22 March 1847 Duckitt "attended at Malmesbury in the trial of Martinus Boyce and September Michael", the case of David Gousman 30 November 1849 which is not recorded in the journal; 15 July 1858 Gys and Class "detected stealing wheat out of seed sack" and 9 August 1858 a shirt and halter of Duckitt's was stolen by Jacob Tys and recovered the same day.

[34] See Chapter 3 above. Duckitt *Field-Cornet* until 1850, K.V.J. 1 June 1850 he received Rds 50 as his salary. This appears to be the last time.

Acts of 1841 and 1856 merely provided a backdrop against which he could more rigidly consolidate his control and reinforce his paternalistic status, rather than serving as a catalyst for the formation of new forums of dominance.

The law also undoubtedly gave workers a recognizably legitimate and wider berth in which to establish their rights within the relationship. That Klaver Valley workers did not apparently avail themselves of this space further indicates the degree to which Duckitt's paternal capitalist ethos had gained hegemony on the farm. The unequal balance of power between the two and the fact that even although workers had the law, they retained their subservient position in the relationship, can be seen as the main reason why they did not take any action against Duckitt, even before 1856 when it became more difficult to do so.

Secondly, while workers were unable to markedly change their subordinate position in the relationship, they were able and did make successful attempts at improving their standard of living. Again, though, this appears to have been less common on Klaver Valley than on other farms.[35] The reason for this apparently less conflict- -oriented relationship on Klaver Valley was that the law was not a distant factor which was called in at moments of crisis - it was, in the person of the Justice of the Peace, a permanent and visible feature of Klaver Valley life. There is little evidence in the journals of an increase in the use of courts after 1846. In 1848 Andries Platjie was "detected washing the head of a merino ewe and found whole of the meat, and a handkerchief containing Potato's(sic) which he stole on Tuesday night. Class Africander and Philip Dolph sent in charge of prisoner to Malmesbury." On Thursday Duckitt attended the court at Malmesbury and Platjie was condemned to 30 lashes and one month in irons for "sheep stealing".[36] The law informed everyday social relations very much more closely than it did on farms where the law was not embodied in the very character of the farm owner. It is not surprising then that workers on Klaver Valley, although only occasionally, attempted to improve their existence even if they did not attempt to constantly and overtly erode the less tangible, but stronger authority of the farmer. It is also worth noting that Philip Dolph who had ultimately succeeded in his resistance against Restall by being given the "stamp of Duckitt's approval" was one of the "guardians" of the prisoner. Rather than increasing, the theft of Duckitt's stock or produce and William Duckitt's use of the

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[35] Court cases heard in the Malmesbury Magistrate's Court from 1840s to 1860s attest to an increase in workers' attempts to fight for their legal rights by taking their employers to court for contraventions of the Masters and Servants Act of 1841 C.A., 1 MBY 1/1/4 1846-1848. An abundance of cases exists which show an increase in workers' attempts to erode the farmers' control by desertion and failure to honour contracts in the 1850s, C.A., 1 MBY 1/1/6 1850 - 1859.

[36] K.V.J. 20 and 21 December 1848.

courts to re-establish his position of authority on the farm, appears to have decreased during the 1860s with only three workers, employed for a long time on Klaver Valley, making inroads into the farmer's pocket.[37]

By the 1890s, the references to either theft or the farmer taking a worker to court has almost completely disappeared.[38] This did not mean that there existed on Klaver Valley conflict-free work relations. It seems more likely that the conflict had been built into the relationship and had become so much a part of everyday farmer-worker interaction that it no longer escalated into a public case, nor did it warrant recording with the same frequency as it had done prior to the 1850s.

Furthermore, even when labour did prove difficult, Duckitt had easy access to more labour. Groenekloof Institution, later Mamre, was barely six miles from his farm and he operated on and with the place and its inhabitants in ways similar to the way he did on the farm. After the 1840s most of his labour came from the mission station. It was to a large extent, his "private labour pool". That his interactions with the people and the place reinforced his paternalistic ethos is indicated in his business dealings with the missionaries. In the 1840s their business relationship was largely based on Duckitt's purchases of stock and farming implements, and his use of the mission station as a repair store.[39]

The missionary was also on occasion given money to pay workers, mainly women, who had worked on Klaver Valley. This no doubt reinforced the primacy of the farmer in the relationship but it also served to co-opt the missionary onto the farmer's side. He was not only financially in debt to Duckitt, but he was considered sufficiently "trustworthy" to pay workers for Duckitt.[40]

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[37] The journal entries for the 1860s are comparatively less detailed than those of earlier and later years. However, there are often no incidences of theft in any one year. For incidences of theft in the 1860s see K.V.J., 13 May 1862 for the case of Cabanga, K.V.J. 2 November 1862 for the theft of a sheep by Adam Cazar and John Faro, K.V.J. 4 July 1865 for Adam Cazar's theft of oxen and K.V.J. 27 October 1865 for reference to his trial.

[38] Only one incident of Ruperti taking a worker to court is recorded in the journals between 1893 and 1898. See K.V.J. 14 March 1895.

[39] K.V.J. 24 December 1841, Duckitt paid Revd. Janische Rds 100 for 25 sheep bought on 2nd August 1841; K.V.J. 12 August 1843 he purchased 5 spades from Revd Janische for Rds 9.3.0.; K.V.J. 18 March 1854 he paid for the repairs to a cart and a new "axletree"(sic) the amount of Rds 8.2.4.

[40] K.V.J. 14 March 1843 Duckitt paid Revd Lehman Rds 8.5.0. so that he could pay "the (seven) vineyard girls".

Duckitt's paternal control can be seen to have been clearly a part of mission life by the late 1840s. Duckitt who was by this time an assistant *field-cornet*, together with van Reenen, his superior, went to the mission station to collect statistics on the number of able-bodied men who would be able to join the military forces on the Eastern frontier in 1846. Barely three weeks later he returned to the station and "dispatched 60 unmarried men and 4 officers to town to proceed to the Seat of war."[41]

This incident again provides evidence of the relationship Duckitt had with those who lived and worked on the station. As a Justice of the Peace in former years and an assistant in the late 1840s, and a farmer, the inhabitants of the station consisted of those who provided him with labour or services. In the name of the law he could and successfully did move onto the mission station and co-opt people into taking up arms. His status and position of power and the way in which the prospect of war was perceived and no doubt explained, was believed by the mission inhabitants. That his understanding was firmly rooted in his class position and in his ideological perspective is clear.[42]

Was socio-political hegemony so entrenched by this stage that it alone made Duckitt's and van Reenen's appeals so successful? When they, together with the mission inhabitants, are placed in their more regular daily relationship of worker and farmer, child and parent, with all its attendant authority, and a relationship in which socio-political hegemony was a strong factor, the inhabitants' acquiesence is clearly understood. Perhaps this incident did not reinforce the paternalistic relationship as much as it was a manifestation of that inequality and the overriding dominance of the farmer.

By the early 1860s Duckitt's relationship with the mission station and its inhabitants had changed in its balance of power. With regard to the farmer and the missionaries, the missionary appears to have become the party which was not only subordinated to the farmer, but also increasingly in his debt. In the 1860s, the missionary paid Duckitt large amounts of money mostly for wheat purchased from him, and in the 1890s, from Ruperti.[43]

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[41] K.V.J. 4 and 6 May 1846 and 26 May 1846.

[42] H. Ludlow, H. Ludlow, *Missions and Emancipation in the South-Western Cape*, pp. 190 - 191.

[43] K.V.J. 26 February 1862 and K.V.J. 1 April 1896 when Revd. Schreve paid Ruperti £30 on account and on 21 April he paid "the balance of his account" of £32.6.1., H. Ludlow, *Missions and Emancipation in the South-Western Cape*, p. 127., for reference to the close association Duckitt had with the missionaries and also the ease with which he moved onto and around the mission station.

Between the 1840s and the late 1850s, the missionaries came to be in the farmer's debt more so than the Duckitts and later, the Rupertis were indebted to them. The farmer's paternalistic control, already internalised on Klaver Valley, had by this stage, been integrated into the life of the people at Groenekloof/Mamre - the mission station had become very much more closely entwined with the farmer and the farm - a satellite on which the farmer heavily depended for his labour and his position of power and control in the neighbouring district.

The scenario of the farm and its relations of production over the period, was one which included an almost adjunctive labour pool, over which the farmer's paternalism spread. The workers' homes were therefore not separate nor private. Duckitt had free access and he used it. While the farm community *per se* had by the 1870s disintegrated in many ways, with family structures of employment and residency, and the movement towards a more casual and itinerant labour force, it can also be seen to have been extended and consolidated.

Duckitt no longer needed a close resident labour force since he had one down the road. Being an itinerant worker on Klaver Valley did not mean or imply a similar itinerancy as experienced by other workers, especially those who did not come from the mission station. The farmer had as much access to mission inhabitants' home and leisure periods as he might have done if they had lived on the farm itself.[44] After emancipation, throughout the 1860s and 1870s, this "consolidation" of the farm population, both resident and itinerant, was determined and shaped by the farmer's paternalism and at the same time, served to reinforce and solidify those bonds of "familial interaction and dependency".

The New Paternalism

While dependency and paternalistic control had stretched its web far beyond the confines of the farm by the late 1840s, the process of its successful operation on the farm had also, by this time been potently assisted by two factors - indebtedness and the *dop*. Recent research in the role played by liquor in society has pointed to a variety of new questions which we should investigate if we are to understand the social reality of drinking.[45] Amongst others, Brennan argues that to focus on the amounts of alcohol consumed does not always give the historian any more clarity on

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[44] For the itinerant and resident divide see Chapter 4 above.

[45] T.Brennan, *Towards a Cultural History of Alcohol in France*,Social History, 23, 1989-90. These questions and some tentative answers have been discussed in Chapter 4 above, from the point of view of the workers and the labour process.

its place in social relationships. In terms of the role played by alcohol in the farmer-worker relationship we have yet to move beyond issues of blatant control and look into the cultural work ethic which firstly accommodated "drinking in the workplace" and secondly, allowed for this practice to be institutionalised on farms and in rural relations of production in the south-western Cape. In the 1830s the farm relationships could be said to have been dominated equally by the "old" paternalistic norms and liquor. By the 1890s while the social relations of production continued to be dominated by a paternalistic ethos, albeit of a newer and more distant formulation, they had also been substantially saturated in liquor. Paternalism even in its new form was very strongly supported and consolidated by the entrenchment of the "*dop*" system.

Until the early 1840s, workers on Klaver Valley had received brandy during the ploughing and sowing season, the coldest season of the year.[46] It was only after Emancipation that workers who did not want wine or brandy were given "*sopy*" money "in consideration of not drinking wine", which might have meant a conscious move away from giving wage workers brandy, while slaves had received it automatically. By the early 1840s, while there is still evidence of workers receiving "wine money", there is no longer any reference to giving people brandy during the sowing season.[47]

It seems clear that one cannot argue for a cessation of giving liquor to workers on Klaver Valley. The dependency created by alcohol and the very solid place it had come to take in punctuating the labour process, would make it unwise for the farmer to stop. It would seem more likely that while the references to this practice had stopped by 1841, the practice did not. Again, over time its "normality" might have precluded reference to it in the daily records. By the 1890s while some workers were still receiving "wine money" infrequently during the year, the remainder of the labour force was receiving a regular dose of liquor.[48] Duckitt can be seen to have very successfully used liquor as a manipulative tool, thereby entrenching his paternalism. It was not the liquor itself nor the quantities that counted, but the fact that it was distributed by the farmer to the workers that was important.

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[46] K.V.J. 22 May 1840 Duckitt "commenced giving people brandy"

[47] K.V.J. 16 May 1836 for reference to giving people who do not drink brancy 1 *skelling* per week. See K.V.J. May 1841 there was no reference to giving brandy, but workers were paid at the end of December, for example, K.V.J. 26 December 1841 Singalo received "*sopy*" money "up to this date" of Rds 3.4.0.

[48] K.V.J. 25 August 1894 Dial and August were paid 3/3d wine money; 11 November 1894 George Prince was paid 1/- in lieu of wine and 1 December 1894 three men received wine money.

That as late as 1894, workers were being paid money in place of wine, shows the perception of the *dop* in the farmer's view. He obviously saw it as part of the worker's wage and while the worker was prepared to exploit this notion, he received extra cash. In many cases the wine workers received was unsaleable on the open market so by distributing to his labour force the farmer was not losing profits. Giving his workers money was therefore in some form, an additional outlay for the farmer. By 1898 there are no further references to workers receiving wine money, which points to a consequence of its dependency-related effects - the workers were all drinking their regular *dop*.[49] It may also be indicative of a withdrawal by the farmer of the choice of a cash alternative. Studies of rural labour relations in the south-western Cape which have been conducted have generally given the impression that alcohol had always been given to workers on an average of six times a day.[50] What emerges from this study is that liquor had not always held the same coercive primacy in labour relations that it had come to hold by the 1840s.

From the 1830s to the late 1890s, liquor played an increasingly stronger role in reinforcing the farmer's paternalism and in consolidating the workers' subordination on Klaver Valley. In the 1830s liquor, albeit only when workers were receiving "brandy rations" during the ploughing season, informed and shaped labour relations on the farm even if only during that season. However, it did not affect every worker since those who were not receiving brandy were outside of the group of those who were. This however did not reduce the coercive subordinating process - the farmer was still reinforcing the paternalistic ethos by giving workers money in lieu of brandy. That their physical dependence on alcohol was not being supported by the farmer is not the issue. What is important is that they still experienced another form of "generosity" by the farmer, which although it was not serving a physical dependence in the same sense as the brandy would have been, it was still an "extra" fillip in the life of a worker who was not getting "soupjies".

In 1844 the practice of brandy rations during ploughing ceased and when wine production on the farm came to an end in 1845, Duckitt begins to purchase wine and brandy. In 1844 Duckitt recorded purchasing brandy to the value of Rds 25. It would seem that he was buying brandy for his own family's consumption. His purchases of brandy continue and his purchases of wine, beginning in 1846 increase and become more regular purchases.[51] Until the 1890s when there

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[49] K.V.J. January to July 1898 in which there are no references to giving workers wine money.

[50] P.Scully, A bouquet of Freedom, p.55.

[51] K.V.J. 20 July 1844. For purchases of wine see K.V.J. 28 July 1846 when he purchased 2½ *aums* wine, 29 July he purchased 1 *anker* of brandy and ½ *aum* wine, 8 October 1846 he purchased ½ cask of wine (176 gallons).

was once again a vineyard on Klaver Valley, Duckitt had to purchase wine and brandy, for farm consumption. Once the vineyard resumed production in the 1870s, he could use his own sour wine for distribution to workers.

The amount of wine that workers received did not increase over the years as much as it became institutionalised - from 1830 to 1898 liquor moved from being an "additional" fillip to the working day to an inherent part of the work programme where the day was punctuated by the *dop*. The luxury had become a working necessity which was built into the contract of work and had, by the turn of the century come to be an expected part of the wage packet. This development gave the farmer stronger control in that not only was he the source of the much needed wine, but he could and did discipline abuse of the system. Here his paternalistic control was very overt. The liquor was acceptable as long as his workers did not show any signs of over-indulgence. Once they did and once they punctured the facade of correctability and normality, by becoming obviously intoxicated, Duckitt did not hesitate to remove them from the land thereby preventing other workers from following similar patterns of behaviour.[52] That there were so few instances of this occurring points to the development of dependence and an awareness by workers of the limits to which they had to adhere. Furthermore, once a worker was dependant upon the ration of wine, he would be careful not to jeopardise his next "fix".

While there are only the roots of later worker influence on the drinking pattern of the work day which are evident by at least first decade of the twentieth century, workers, although under the farmer's control, did play an active role in using the *dop* to shape their days and lives as rural labourers.[53] It also gave them another means whereby they could influence their relationship with the farmer. While the overriding control over distribution and amounts rested with the

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[52] K.V.J. 21 November 1846 when Duckitt sent two workers home because they were drunk.

[53] Interview Liz Host with Lukas Adonis, former farm worker in Malmesbury district in the early 1900s, November 1986. When the "known" time for a *dop* was approaching, workers would call out to the farmer, "Die hondjie byt" (*The dog is biting*) which would be a signal to the farmer to distribute their drink. Lukas explained this by saying that **the workers knew** when their throats were dry and when they needed a drink and it was therefore quite acceptable, the farmer even relied upon it, for the workers to put down tools and have their *dop*. Liz host, *Die Hondjie Byt: Labour Relations in the Malmesbury District c1880 - c1920*, Hons. dissertation, U.C.T., 1987, Chapter 3.

farmer, the worker was still up until at least 1894, able to exercise a choice and receive either wine or money.[54]

Besides liquor, debt was another "dependency-related" factor which impinged upon and shaped the relationship between the farmer and the worker. This however, can be seen to have operated in both the farmer's and workers' advantage and disadvantage. Prior to the 1860s most of the labour force was resident and because of their long duration on the farm and the farmer's knowledge of them as a group and as individuals, they could benefit from small "extras" given to them by the farmer, even if only in the short-term.[55]

Workers could more easily work the system of indebtedness to the farmer to suit their own financial plans. During the late 1850s and early 1860s the incidence of advance payments to workers by the farmer markedly increased. When there were indentations into the labour force during the 1870s and 1880s, the farmer was again at some comparative disadvantage in that labour was increasingly scarcer and workers, albeit itinerant, could appeal to his pocket before they had laboured.[56]

By the 1890s, the system of accounting and the precision with which workers and farmers interacted via cash or kind transactions in the cash book, had become more systematically organised. That the farmer knew many of the workers in his labour force, meant that their mutual indebtedness very often became a permanent state of affairs. Ultimately the worker suffered and was disadvantaged in the long term, by the wall of debt which built up and served to solidify the barriers to his mobility and freedom.

Workers were by this stage mostly itinerant and moved off and onto Klaver Valley much more frequently than they had prior to the 1860s. This meant that the period of their indebtedness to Ruperti might have become shorter than it was in earlier decades. However, by moving off Klaver Valley onto another farm, often only meant a transferral of his previous debt, and not its

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[54] This changed on most farms by the end of the nineteenth century and became completely controlled by the farmer, with the worker having either to accept wine or nothing. Lukas Adonis Interview by Liz Host, September 1986, Liz Host, *Die Hondjie Byt*, p.55, footnote reference no. 41., P. Scully, A Bouquet of Freedom, pp. 55 - 56.

[55] Examples of workers receiving *skepples* of wheat below the current market price, for example, K.V.J. 3 August 1842 John Taylor was paid in kind 1 *skep* meal at Rds180 (less than market price).

[56] CCP A12-'90, Report on Labour Question, Appendix B, p. iii.

cancellation, although some workers managed to evade the farmers to whom they owed service in lieu of an advanced payment.[57]

In terms of the relationship between the farmer and the worker, the payment of advance wages could superficially point to workers gaining the upper hand. That this was true for many is not disputed, but there are no references to workers being given advance wages by Duckitt and not keeping to the agreement. The fact that some workers, evident in the 1860s, returned to fulfil their obligation, must be seen in the context of the period and the hegemonic paternalism which still operated.[58] The "old" paternalism was in its final stages, but was still able to manipulate the relationship between even a potential worker and the farmer.

The question historians need to ask is why the labourers kept their side of the arrangement. What was it that determined their honouring the agreement to pay back? The answer lies in the degree to which they had internalised the paternalistic notions of the farmer and had literally bought into a relationship of indebtedness. Also, and this would certainly be applicable to the period prior to the 1860s, there was little alternative. If they did not work for Duckitt, they would have to work for another farmer.

This indebtedness was not always and only between the farmer and worker. In 1860 one of the workers on Klaver Valley, Jacobus Dolph, was owed money by a man called Hendrick Cordom. He arranged with Duckitt to pay him in advance of labouring so that he could immediately settle with Jacobus. In July 1860, "Hendrick Cordom engaged himself to me, to take care of Horses(sic) at Rds 10 per month and harvest wages during harvest and to work in floor when not required with horses. To commence on the 1st of August. To Hendrick Cordom to pay Jacobus Dolph for a **debt owing him, a check on Commercial Bank £4.".13. = Rds 62 and cash of Rds 4.**[59] Hendrick Cordom duly commenced work, his labours having been spelled out in clear detail. This precise description points clearly to the fact that the farmer was ensuring that he did not lose and "got his money 's worth". Cordom was paid Rds 4 and a *skep* of meal valued at Rds 4.2.0.[60]

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[57] G3-'94, Labour Commission, p.298

[58] A good example was of Leafra Frans, a shepherd, who not only fulfilled his obligation, but stayed on the farm longer than originally specified. See below, p. 133.

[59] K.V.J. 24 July 1860. The emphases are mine.

[60] K.V.J. 24 August 1860.

This example, though not occurring frequently on the farm, does point towards the role paternalism played in the relationship between the farmer and the worker. Jacobus Dolph was able to obtain his money indirectly from Duckitt because he and members of his family were known to him. Philip Dolph, either a brother, father or uncle of Jacobus, had just three months previously died and been buried on Klaver Valley. This was a classic case of paternalism working temporarily in some workers' favour and forcing others into wage labour.[61]

It would seem then that debt was incurred by workers and was alleviated for them by the farmer, all in the context of familial connections and a paternalistic ethos of caring and inculcating an overt or more subtle dependency in the case of both parties of workers. Leafra Frans was initially paid £6 in advance for herding Messrs, P. & H. Duckitt's sheep **for two years** commencing from 1st April next until April 1864."[62] Leafra Frans did arrive to fulfil his contract and stayed on Klaver Valley as Peter and Henry's shepherd until at least 1865, staying longer than his contract of two years.[63]

Most advance payments were made to people either known to the farmer or known to one of his workers and so indebtedness more often devolved upon the mutual knowledge which existed between the worker and the farmer.[64] It was a double-edged tool which worked for both sides of the relationship at various moments of interaction and need. When the farmer was strapped for cash during the 1840s he could call on "the loyalty" of workers he had known for a long time, the Anthony's and Philip Dolphs of Klaver Valley and pay them "by notes of hand".[65]

The financial stringency of such an arrangement which was placed on workers' shoulders, served to entrench their dependence upon Duckitt since he became the source of their survival until their wages were paid. That he precipitated the situation and did not suffer from a major revolt by the workers is indicative of their almost complete absorption in a paternalistic relationship. They also,

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[61] K.V.J. 5 September 1860 refers to Johannes Cordom transporting wheat to town for Duckitt, and being paid Rds 20 in advance.

[62] K.V.J. 22 February 1862. The emphasis is mine.

[63] K.V.J. 1 April 1864 when he got a *skep* of meal valued at 6/- and 12 April 1865 when he was paid £4. Journal entries for the period June 1866 to June 1869 do not exist, so I was not able to verify his date of departure.

[64] See Chapter Three above for reference to the system of credit which contextualised mutual indebtedness between Duckitt and other farmers in the district.

[65] K.V.J. 30 September 1848, "settled with people by notes of hand payable on 28 July 1849. "

during this period, were able to get more out of the farmer since he had placed them in a position of immobility and very overt dependence. Having got over the hurdle of appealing to their willingness to wait for their money, he strengthened the mutual although unequal dependence. Naturally their dependence on the farmer for food and their basic subsistence was intensified, since without a wage, he was their only means of survival. The workers in turn were able to appeal to this self-same "concern" in the farmer, when they were in a situation of perceived or real need.[66]

Furthermore, this instance would not be forgotten once they received their wages. While the workers remained on Klaver Valley either in an itinerant or resident capacity, they would be able to recall the favour done for the farmer and call up his dependence upon them. That this occurred with at least some of these workers is evident in their long duration of labour on the farm.[67]

That indebtedness was internalised in the relationship between the farmer and worker, was almost necessary, in a relationship which was overseen by paternalism. Indebtedness had become more formalised. In the 1840s, when Duckitt was without sufficient cash to pay the workers he was in a position of power and authority and status - the workers were forced to accept the fact. However, beyond the 1840s there are no references to delay in the payment of wages. In a more formalised and capitalist context, his workers could not get away with such "promises" based on trust. By the 1860s the "old" non-capitalist paternalism had changed and was now mediated, by much stricter capitalistic conditions and contracts. By the end of the 1860s, there is only one reference to paying a worker in advance and that was again a case of paying Jonathon Visser, a worker known to the farmer, in advance **for his son leading the plough.**[68]

What we gather from the above examples of wage advancements is that the farmer in some instances created additional labour tasks for the worker receiving the advance payment. This would ensure that he did not lose on the agreement. By the 1830s, when the overseer had moved between the two parties, the relationship of the farmer with his workers, especially those on the

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[66] For an example of this, K.V.J. 28 January 1850 when Duckitt gave Andries, one of the workers who had to wait for his wage in 1848, Rds 8 to bury his wife, Katjie.

[67] K.V.J. 3 April 1860. Philip Dolph had remained on Klaver Valley until he died on the above date, having been in Duckitt's service for "upwards of 30 years"; K.V.J. 15 August 1851 Hermanus Magerman, having left Klaver Valley in January for Caffraria, returned as did Class Africander from the same "expedition" on 22 August 1851.

[68] K.V.J. 13 March 1866. The emphasis is mine. See Chapter 4 above regarding the payment of wages to parents or spouses when the labour had been performed by mostly wives and/or children.

land, was increasingly contextualised in the context of debt. By the 1860s this appears to have reached a high point. Although the farmer had delayed paying wages at least once in the 1840s and given the extent to which workers had been paid in advance especially prior to the 1860s, thereafter the farmer attempted to remove himself as the worker's creditor. Duckitt and later Ruperti did not have the same extreme labour shortages over long periods of time as other farmers did because their labour pool was so accessible and so much an adjunct of the farm. The odd moments of labour shortage, really only in January 1838, were not sufficiently dire to pressure the farmer into making unprofitable money advances to potential labour.

Another manifestation of paternalism was to be found in the naming practices on Klaver Valley. Throughout the period the daily records referred to workers by first names in the earlier decades of the nineteenth century and first and last names by the 1860s, by which time workers themselves had developed individual identities strong enough to require their own first and surnames. Duckitt's use of paternalistic labels included the use of diminutives, the use of the word "little" and "old" almost as prefixes to some workers' names. In the 1830s the reference to "Little July" was necessary for the farmer to distinguish between "Old July" and his son.[69]

Duckitt very often used the prefix "old" before a worker's name, not necessarily to distinguish the worker's age or seniority, but rather to differentiate him/her from another with the same name. In 1858 he "interred the body of Old Jacobus Dolph".[70] That Jacobus Dolph was undoubtedly quite old in chronological terms by the time he died might have been the reason, but it is more likely that there was a younger Jacobus on the farm and this was a distinguishing adjective as opposed to a descriptive one. Although this practice was not overtly paternalistic, its subtle paternalism is clear. While the older worker was distinguished from the younger, he was still treated as a junior member of the farmer's "family of workers".

By the 1860s, the two brothers farming Klaver Valley had grown up with some of the older workers on the farm, and this appellation, would have been used by them when they had been young boys. That it did not change once they were grown men, is an indication of the inherent respect-cum-condescension in using "Old" before such workers' names. Such naming practices reinforced the "structured inequality" within which paternalism on the farm continued to thrive.[71]

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[69] K.V.J. 10 December 1838.

[70] K.V.J. 22 September 1858

[71] C.Van Onselen, *Social and Economic Underpinnings of Paternalism*, March 1991, pp. 19-20.

There is a noticeable individualisation of worker persona after their emancipation, often evident in the increase in their adoption and use of less derogatory first names and new surnames, and the related adoption by the farmer of recording these changes, an example of which was "Lodewyk Adams who was formerly January Adams".[72] This served in some way to personalise the alienation and/or distancing of the farmer from the worker. While it might have caused further separation, it was also a manifestation of the separation which was already developing between them.

Throughout the nineteenth century the relationship between the farmer and his workers on the farm changed. From the 1830s through to the 1890s events both on the farm and off the farm served to reshape, consolidate and strengthen paternalistic social relations and in some case, weaken them.[73]

The emancipation of slaves, *de jure* in 1834 and *de facto* in 1838 definitely affected the relationship between Duckitt and Klaver Valley workers. While Duckitt was never solely a slave owner, he did own twenty-one slaves in 1834 and the fact that their bonded status was changed, certainly affected their future relationship with Duckitt both on an individual and group level. Those workers who remained on the farm and contracted to work for Duckitt once they had been emancipated, would provide the means whereby old social relations, particularly in the context of strong paternalism, could, and would be reproduced.

Emancipation served as a new context in which a stronger cash-oriented paternalism could grow out of the old patterns and modes of interaction, not to act as a catalyst for changing the relationship. The changed status of the workers was, basically, a distantly esoteric notion, which while it entitled labourers to a wage, certainly did not entitle them to increased social equality in their work and living relationship with the farmer. In attempting to assess the impact of such a change in legal status, certain assumptions have to be questioned. Particularly, the assumption that once the law spoke everything changed. This does not accord with the daily reality of living.

Stronger and more inculcated was the "agreed" form of interaction and since that had developed on the ground it would hold, as a familiar and understood factor in daily life as a farm worker and

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[72] K.V.J. 17 July 1839. Some workers would also have changed their names as a result of being baptised on admission to the Groenekloof Mission Station, personal communication Kerry Ward, 29 June 1992.

[73] Only events and processes which can be seen in journal entries to have directly impinged on farm life have been used in this analysis.

farmer. The process of adaptation to their new status, from both sides, was only possible without massive and overt conflict, if they maintained what they both knew. In this way emancipation more than likely provided an extra surge of energy into the paternalistic norms which had been operating very strongly on the farm prior to slaves being freed.

The Eighth Frontier War which broke out in 1850 shows more clearly how external forces could serve so subtly to reinforce the paternalistic relationship at farm level. Four workers left "for Caffraria" in January 1851. This would have affected Duckitt's labour force to perhaps too small a degree to quantify, or for that matter to have any serious impact.The only noticeable change was that "the children" assisted with the shearing of sheep in February.[74] What is worth noting is that three out of the four returned after their stint of duty, not only to their homes, but to Klaver Valley, six to eight months later.[75]

There are two issues here which are important. Firstly three out of four workers returned **home** to the farm and secondly, their jobs were still available to them. Why? They returned to Klaver Valley for reasons which are to be found in their relationship with Duckitt. He had been their "employer, in the case of Philip Dolph since the 1830s, and he "valued" them as workers. The farm was a sufficiently familiar place to which to return after participating in a war. Furthermore, by keeping their jobs open for them, Duckitt was displaying a new form of paternalism - they would have a job and he would be assured of the return of his reliable workers.[76] It is clear then, that by keeping Dolph's, Magerman's and Africander's jobs open for them, Duckitt was serving the interests of the farm business unit very well indeed.

While it is not possible to verify the impact of the mineral revolution which began in the 1870s, on the relationship of the farmer and worker, it could be expected that with the expansion of the labour market, district and country-wide, the relationship between the farmer and his workers might have undergone moments of severe stress and tension.[77]

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[74] K.V.J. 5 - 8 February 1851 for references to children assisting with the shearing of sheep.

[75] K.V.J. 6 January 1851 Hermanus Magerman, Philip Dolph, France Skipper and Class Africander left for Caffraria. Dolph returned on 5 June 1851, Hermanus Magerman on 15 August 1851 and Class Africander on 22 August 1851. France Skipper did not return.

[76] M. Huberman, *The Economic Origins of Paternalism*, Social History, 12, 2, 1987., pp 180 - 181 where he argues that employers needed and attempted to maintain reliable employers in the workplace.

[77] Journal entries for the 1870s are generally very scant and are totally absent for the 1880s.

On the face of it production and labour output was being pressured from expanding local markets and labourers were increasingly able to gain access to new opportunities. However the farmer, who had mechanised at least one aspect of his production by the 1830s, and who by the 1870s, was already developing new and technologically advanced and increasingly mechanised agri-production, would not feel the effects of less available labour.[78] Peter and Henry Duckitt, and later Herman Ruperti, had sufficient land to be able to enter into sharecropping arrangements with three tenants and so, in the likely event that they were suffering from the expanded labour markets, they were still able to utilise their land and make a profit, albeit a smaller one, on the grain produced by the tenants.[79]

By the 1890s, Klaver Valley's farmer, Edward Ranier Ruperti and his workers were relating in a much more commoditised and cash-oriented context. The overseer, Stoffberg, was now, as a fixture on the farm and in farm relations of production, firmly in place. Ruperti was more absent than any of his predecessors had been and his relationship with his workers was consequently, at its most distant. Although workers were known by name, a necessity for paying wages, they were now mostly itinerant workers emerging from the same source, Mamre, and were collectively referred to as the "Mamre men".[80]

That they experienced less familial and personal contact is evident in the absence of references to personal data of workers. There was only one reference to the death and burial of a worker in 1894 and even in this the distancing and commoditisation of the relationship is overt. "Old Willem Willemse died and was buried this afternoon. 1 coffin debited to his account £1.5.0.[81] While recognising that earlier deaths had ultimately cost the family of the worker, what is noticeable here, is the reference to "debiting" his account. In the 1860s, such cold calculations had no doubt been considered but they were not mentioned in the same breath as the death of the worker. Furthermore, Willem Willemse was old and the absence of reference to him prior to his death, suggests that he was unproductive and living on the farm. He had an account with Ruperti which presupposes that he was engaged in some labour tasks in return for his keep.

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[78] See Chapters 1 and 2 above.

[79] See Chapter 4 above for discussion of sharecropping arrangements in the 1890s.

[80] K.V.J. Although the majority of itinerant workers had, since the 1840s, come from Groenekloof/Mamre, their absence from the farm in previous decades had not determined the absence of labour. By the 1890s, when they were not on the farm, little or no work was done.

[81] K.V.J. 21 May 1894.

The contract of work had by the late 1890s become more formal. Three workers appear to have established their rights to an annual holiday, pointing to the developing formalisation of the work relationship between farmer and worker.[82] While one recognizes that the workers might have gained "a right", it is important to note that the timing of the leave fitted in very neatly with the production cycle on the farm and was certainly not arbitrary, nor chosen by the workers. Here again, traces of the old and evidence of the "new" paternalism was operative in their relationship. The farmer granted the workers' leave for a week, **at his convenience**.

The development of Easter holidays was one which accorded both with the workers' desires and the farmer's religious ideology. His inability to stop workers absenting themselves over the Easter period cannot only be seen in that light.[83] He might very well not have desired to do so. The issue of Easter holidays provides us with a classic example of the congruence of worker "resistance" and farmer's deeply ingrained religious and social beliefs. In the meeting of these two, paternalism, albeit increasingly one with a cash facade, had been reinforced. The farmer turned a blind eye to the marked absence of workers over the Easter period for years on end and only formally acknowledged it in the farm records, years later. This was not indicative of the farmer's helplessness, as much as it shows how "the father" while aware that his "child" might have thought he was getting away with his defiance, was also only too well aware that what the child was delighting in, was in fact ultimately going to benefit him. The father was the victor. He gained power by allowing his workers time off when the holiday was illegitimate, in that he would be perceived as being "kind".[84]

Conclusion

The relationship between the farmer and workers on Klaver Valley retained the cord of paternalism, although it changed from 1829 to 1898. While the dependence changed and became less concerned with subsistence and more concentrated on alcohol, and while the farmer and workers became increasingly alienated from each other, overall paternalism nevertheless continued to dominate the relationship. Obviously as the farm labour force took on a less known and

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[82] K.V.J. 28 September 1896. K.V.J. 3 - 9 April 1865 being the first time no Mamre men were in work. K.V.J. 23 March 1894 being the first reference in the journals to Good Friday.

[83] For importance of Easter to mission inhabitants, K. Ward, *The Road to Mamre: migration, memory and the meaning of community*, M.A. dissertation, U.C.T., 1992., pp. 68 - 70.

[84] There are no references to Duckitt taking any action against workers who stayed away from Klaver Valley during the Easter period.

personal face, the interaction exhibited this distancing, but even while they moved to such opposite ends of the farm, they still continued to be dominated by the ethos of the farmer's paternalism.

The overt forms of the "old" paternalism appear to have died out by the early 1860s. This was not necessarily from any conscious attempt by the farmer to relate on less personal levels with his workers, but rather because by that stage, many of the workers who had been part of the farm community for a length of time had either left or died. It was probably at this time that a point of transformation in the paternalistic ethic can be seen to have taken place. The "new" paternalism which had slowly been developing became more prominent at this time.

The paternalistic relationship began to operate on a less familial and familiar basis, with the ethos manifesting itself in the work context alone, although those workers who came back to the farm regularly every year would experience a more personal form of the fatherly guidance and control. However workers who were less known and who did not return to Klaver Valley on a regular basis, while still subject to the farmer's notions of superiority and subordination, would have a less personal relationship with their employer.

The main reason for the continuation of paternalism, albeit in a changed form, can be found in the nature of work and life on the land in a rural context. The rural world, even today, remains remote and distanced from the hubbub of the urban complexity. The changes which occurred and which reshaped the paternalism came largely from the capitalization of this slow moving rural world. As the economy of the farm had capitalised and cash had come to form the nexus of their relationship, the farmer and workers moved out of each other's spheres of activity and influence.

The early "farm community" had consisted largely of residential labour which existed in a fairly tight-knit community, all more or less dependent upon each other. The spatial lay-out of the farm in the early period facilitated this close interaction. Workers and the farmer laboured together on the land and lived, although separately, not so far apart as to be removed from each other's life and daily cycles. By the 1890s, while most of Klaver Valley's labour was itinerant and coming from Mamre, the physical and psychological distance was very much greater than it had been prior to the 1850s. For those workers who lived on Mamre, the paternalistic control of the farmer over their lives had been significantly reduced.

Prior to the 1850s, the farmer's accessibility to Mamre and the ease with which he had moved into and operated on the mission station, the regularity with which itinerants had returned to the farm

every season, served to reinforce the notions of paternalism. By the 1890s, paternalism on the mission station had been severely retarded, although because the farm bordered on the mission station, there is little doubt that the farmer still perceived it as an adjunct to the farm, especially in terms of its role as a labour resource.

The variety of tasks on the farm, although lessening with the devolution of technological and manufacturing tasks to industries outside of the farm boundaries, throughout the period nevertheless continued to influence the type of relationship particular workers had with the farmer. Each worker, especially those who occupied positions of status on the farm, felt the paternalistic presence in different ways. The duration of their mutual knowledge also had an effect on their relationship. This meant that in the earlier decades of the nineteenth century, when the labour force was more permanent and closer to hand, most of them resident on the farm, paternalism in its older and less money orientated form, flourished. By the latter half of the century when fewer workers came into contact with the farmer, and then largely only at times of conflict, their relationship had depersonalised and was almost totally articulated by cash.

It must be concluded then, that throughout the nineteenth century, with fewer opportunities providing a suitable context for paternalism that throughout the nineteenth century, the farm relations were oiled by a mode of behaviour, not only compatible with, but entirely supportive of the promotion of capitalization and proletarianisation. Paternalism played an important role in blurring the processes of change and allowed these processes to continue while on the surface maintaining the equilibrium of "respectful authority" and decorum.

Conclusion

This study has attempted to investigate and highlight the complexity of process of capitalization and proletarianisation as it unfolded on the ground. In looking at a single farm, it has been possible to study these processes using the detail provided in the daily farm journals, thereby affording a more precise understanding of the complexity of development. What has become clear is that continuities were important in that they forced most changes to develop gradually and in an uneven and staggered rather than a linear way.

During the nineteenth century, the farm underwent a process of physical transformation, production focus and output changed, the farmer increasingly capitalised and the labour process, the status of labour and the labour force's relationship with the farmer all underwent significant, all be they uneven, changes.

The physical transformation of Klaver Valley, largely coming out of the farm's changes in production, was manifested predominantly in the addition to the landscape of buildings and man-made structures such as sheep kraals and changes in land usage. The buildings which came to decorate the farm landscape, arose out of specific production needs, with some, such as the forge evident very early on in the century and continuing, albeit in an increasingly marginal way, to operate within the farm's productive structures. Other structures, such as the mill, while an integral part of the farm's productivity, had disappeared by the 1870s, directly as a result of the development of the industrial mill outside of the farm in the urban environs. A building, like the dairy, on the farm in the 1840s, was still evident in the 1890s, although by this time, it had already been rebuilt and modernised.

Changes in land usage occurred on an annual cyclical basis with the practice of crop rotation occurring from the beginning of the farm's history. There were also more permanent changes which occurred, especially in the late 1830s and early 1840s, when the emphasis on wool production intensified and wine production ceased. Land which had previously supported vinestocks was rescheduled for grain production and fields for the increasing numbers of sheep were created from old crop lands. The look of the crop lands changed, especially beyond the 1850s, when machines were used more frequently and paths, especially for reaping machines, had to be made on an annual basis, so that machines could move through the fields. These paths while

in different places every year, nevertheless changed the look of a field of ripened grain making it very different to one three or four decades earlier.

The above transformations of the landscape were directly related to changes in production and farm output. These changes came about as a direct result of the farm's interaction with markets. Although production for the market is not necessarily an indicator of capitalist production, when the farm's focus of production and output levels are directly linked to market forces, as they were on Klaver Valley, there is a strong basis for arguing that the farm was operating according to capitalist principles and in the context of improving profits. This was especially clear when wine production was stopped in 1845, quite long after the slump in the international market was experienced in the 1820s, although the "farm market" had continued to provide a viable outlet for Duckitt's wine and it was when this market ceased to provide a profitable outlet for his wine in the early 1840s, that production on the farm stopped.

While some of the changes in production were as a result of downward turns in the market, others, such as wool, occurred in response to upward trends. The development of wool production on Klaver Valley can be seen to have taken the farm's profit potential away from wine into a different arena, where the risks were fewer and the market more assured. It was not coincidental that vineyards were replaced by sheep kraals in the 1840s and stayed like this until the 1870s when the vineyards returned to the farm. Wool was able to produce for an expanding and profitable market, both locally and internationally.

A strong feature of capitalising agriculture was the decreasing self-sufficiency of the farm, in terms of its own productive needs and the needs of those who worked the land. Prior to the 1850s farming technology was produced on the farm. The maintenance and repair of tools and machines, while continuing for longer than the production of these items, also came to an end by the mid 1860s, with workers on the farm still, but less frequently occupied with the repair of machines and maintenance of tools. By the 1890s it is clear that the machines on the farm were purchased and fully maintained by itinerant engineers who only came onto Klaver Valley in the event of a break-down and need for service of machines, particularly those concerned with harvesting. What had happened by this stage was that industry and professional services outside the periphery of the farm, had expanded and the productive resources of the farm had become increasingly dependent upon them.

The reasons for this were two-fold. As the farm capitalised it became less profitable to maintain resident and full-time blacksmiths and carpenters to produce implements and technology which had become cheaper to purchase. Furthermore, from the 1850s, the process of mechanisation increasingly determined the necessity of using professionally trained mechanical engineers to maintain machines which had become too complex for the farm's blacksmith to cope with. Furthermore parts, no longer able to be manufactured on the farm, had to be purchased on the market as a result of the development of an industrial manufacturing infrastructure which had come out of the technological developments and capitalization of the wider economy.

Related to the farmer's English background and access to technological innovations and the increasingly mechanised nature of the farming process, the re-investment of profits into the farming enterprise occurred very early on in the nineteenth century on Klaver Valley. This is evident in the introduction of harvesting machines in the 1820s, the increased purchase of sheep in the 1840s and the further mechanisation of production in the 1850s. One of the most important facilitating conditions allowing for this re-investment was the accessibility of credit.

The farmer had access to his profits because he had access to credit from family, friends and neighbouring farmers. Although banks began in the late 1830s, Duckitt really only began to utilise their credit facilities in the late 1840s, since the "farm network" of credit still operated although increasingly in alliance with banks, served his needs sufficiently. It was only in the 1840s, once this source and mechanism ceased to operate as a result of increasing bank dominance in the rural economy and in the facilitation of credit, that Duckitt increasingly turned to the formal institution to serve these needs. What has become clear is that the absence of banks did not imply an absence of credit. Prior to the 1840s, credit was easily available via his family members and very importantly, via his elite connections.

Adaptation was also staggered in terms of the farmer's use of changes in currency. The Cape rixdollar currency was replaced by pound sterling in the early 1840s but it was only in 1863 that Duckitt first recorded his transactions, both wage and other business, in pounds only. From the 1840s he had frequently given the pound equivalent but had still been working and thinking in the context of rixdollars. It is clear from this, that while currency changes, occurred, the farmer took much longer to adapt, continuing to use the old form of currency, for at least a decade after legal sanction. This suggests that transactions on the farm and between Klaver Valley and other farms continued to be valued in rixdollars even if pound sterling was being used.

Every capitalising enterprise needs access to cash. Klaver Valley was no exception. The informal credit network provided the means whereby the farmer could retain a hold on his cash and this was used for commodity purchases from small entrepreneurs such as the fish monger and particularly the missionaries at Groenekloof/Mamre where he regularly purchased small household commodities such as tea, and where he sometimes had repairs to tools and implements done. Besides the need for cash in terms of small-scale purchases and payments, cash was also needed to pay wages. Long before 1838 and emancipation of slaves, the Klaver Valley farmer employed wage earners, who were paid in cash.

From at least 1829, the labour force on Klaver Valley was a mixture of free and unfree labour. Duckitt's need for cash to pay those and others who hired out their oxen to him, was a vital and an important corollary of his early capitalization. In the process of developing his agricultural enterprise, he exploited a variety of sources of labour, making 1838 a mere formality, rather than a completely new means of employment procedure as he had, since at least the 1820s, employed wage labourers on the farm. What happened during the 1840s was that the labour force, on the verge of full proletarianisation at the beginning of the decade, had almost completed this process by the end of the decade.

By the 1850s the resident labour force on Klaver Valley was predominantly proletarianised, with only one or two sharecroppers on the farm in the 1870s and one in the 1890s. The first workers to proletarianise were those who had had either tenuous access or no access at all to plots or livestock. The workers who continued through the 1840s to maintain some, albeit very precarious independence and a small income from hiring out their stock were the next to follow. Those who were able to avoid proletarianisation longer than any others, were small producers who had avoided any form of wage labour and had managed to retain their semi-independence by sharecropping. This last category, unlike sharecroppers elsewhere in the Transvaal and Orange Free State, appear to have maintained their independence even in as far as their control over the use and distribution of their family labour. While it is not absolutely certain, it would appear that they neither worked for the farmer themselves, nor did they supply him with the labour of members of their families. It would seem then, that sharecropping, while often combined with wage labour, was not the case on Klaver Valley. Changes occurred throughout the century in relation to the use of casual labour on Klaver Valley. Prior to the 1850s most of the labourers were resident on the farm, with casual daily labourers and itinerant workers forming a small part of the Klaver Valley labour force. From the beginning of the 1840s, the number of workers coming onto the farm on a daily or short-term itinerant basis began to increase, so that by the

1870s, the ratio of resident to casual had changed, with the latter comprising the greater proportion of the labour force. Some workers, who had initially worked on the farm on an itinerant basis because they had had access to livestock and/or sufficient land to provide for the reproduction of their own and their family's subsistence, were increasingly forced into more regular casual wage labour as they lost access to those other channels of income.

While very few workers were able to remain outside the clutches of wage employment throughout the nineteenth century, the female sector of the farm wage labour force, was able to retain a position of fluid independence in terms of farm labour. Having constituted a proportion of the labour force as slaves they continued, in small numbers, to work on the farm in a part-time capacity as vineyard and harvest labourers until the 1850s, after which they disappeared almost completely, with the exception of two women working in the harvest in the 1890s, and this, only occasionally. Vineyard work, especially the harvesting of grapes in February, had until the vineyard closed in 1845 been the domain of female labour. When vineyards resumed in the 1870s, women were by that stage completely absent from this task.

It would seem then that unlike their male counterparts, women were able to survive and maintain their households without having to sell their labour on the farm market. That their entry onto the farm was facilitated by their connection to men already in the farmer's employ, shows more about their ability to utilise that channel of access to wage labour when necessary than their inability to gain access to wage employment. Many women were able to contribute to their household economies and their own and family's reproduction, by gleaning pickings from the farm and involving themselves in tasks which provided an income and or contributed to the family's subsistence. What is clear is that they did not need to enter and tie themselves into a dependence upon wage labour as early as men did.

In terms of the hiring and contractual agreements into which workers entered, there is a definite watershed in the late 1840s and early 1850s, the most overt change occurring in the reduction of variety in the wake of standardisation of contracts and conditions of employment. Prior to the 1850s and the consolidation of capitalization of agriculture, the hiring processes, contracts and wages for individual workers varied tremendously, with specific contracts and arrangements operating according to particular circumstances. Workers who wished only to enter wage labour for short and specified periods in order to extract themselves from debt were able to do so much more easily before the end of the 1840s, than they were able to do so afterwards. Once the farming population had entered the 1850s, it is apparent that all these mechanisms had become

This study has attempted to show how the process of capitalization and proletarianisation worked itself out on the ground. The evidence points to the 1850s as the decade of transformation from pre-capitalist to capitalist farming practices and as the decade in which labourers consolidated themselves as proletarianised wage earners, dependent upon their wage earning capacity in order to subsist and who by the 1870s had become predominantly casual daily labourers, living on the Mamre mission station, the major labour pool for the surrounding farms, and commuting on foot to the farm on a daily basis. Generations of Klaver Valley labourers would wear tracks into the ground which would come to permanently mark the landscape and provide testament to their daily struggle for survival.

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5. Maps

Maps obtained from the Surveyor General's Office, Mowbray, Cape Town in 1986 from Mr P. Coombes. Please note it is no longer possible to obtain copies of district maps from the Surveyor General's Office.

6. Oral Sources

Lukas Adonis Interview November 1986. Fred Duckitt Interviews - December 1986, July 1988, December 1990, March, May, June 1992.

(Recorded interviews in my possession)

District Map

Source: *Surveyor General's Office, Mowbray, Cape Town*