Sample	Sill No.	Crushing	Description
BC1/0,05	3	JC, S, A)	Chemical traverse through the sill. All samples are between 300 - 400 grams with no noticeable feature differing from the normal sill sections
BC1/0,20	3	JC, S, A)	
BC1/0,50	3	JC, S, A)	
BC1/1,20	3	JC, S, A)	
BC1/2,10	3	JC, S, A)	
BC1/2,70	3	JC, S, A)	
BC1/0,80A	3	WC	30 grams of a quartz from a joint filling
BC1/0,80B	3	WC	40 grams of th- adjacent altered aplite
BC3/1,0	3	JC, S, A)	Chemical traverse, samples between 300 - 400 grams
BC3/2,6	3	JC, S, A)	
BC3/2,8	3	JC, S, A)	
BC5/-0,21		JC, WC	Approximately 300 grams of chloritic quartzite
BC5/-0,17		JC, WC	Approximately 300 grams of chloritic quartzite
BC5/-0,12		JC, WC	Approximately 300 grams of chloritic quartzite
BC5/-0,04		JC, A	250 grams of chloritic quartzite adjacent to upper contact
BC5/0,01	3	JC, A	20 - 30 grams of aplite adjacent to contact
BC5/0,02	3	JC, A	20 - 30 grams adjacent to BC5/0,01
BC5/0,03	3	JC, A	20 - 30 grams adjacent to BC5/0,02
BC5/0,07	3	JC, WC	70 - 80 grams adjacent to BC5/0,03
BC5/0,73	3	JC, WC	200 - 25o grams
BC5/0,88	3	JC, WC	200 - 250 grams
BC5/0,97	3	JC, WC	200 - 250 grams
BC5/1,80	3	JC, WC	200 - 250 grams
BC5/3,00	3	JC, WC	200 - 250 grams
BC5/3,68	3	WC	Approximately 100 grams, 9 centimetres from bottom of contact

Sample	Sill No.	Crushing	Description
BC7/-0,04		JC, WC	200 grams of chloritic quartzite adjacent to upper contact
BC7/0,01	1	WC	20 - 30 grams of aplite adjacent to contact
BC7/0,02	1	WC	20 - 30 grams adjacent to BC7/0,01
BC7/0,04	1	WC	67 grams adjacent to BC7/0,02
BC7/0,05	1	WC	20 - 30 grams adjacent to BC7/0,04
BC7/0,06	1	WC	20 - 30 grams adjacent to BC7/0,05
BC7/0,07	1	WC	20 - 30 grams adjacent to BC7/0,06
BC7/0,08	1	WC	20 - 30 grams adjacent to BC7/0,07
BC7/0,10	1	WC	70 - 80 grams adjacent to BC7/0,08
BC7/0,13	1	JC, WC	100 - 150 grams adjacent to BC7/0,10
BC7/3,20	1	WC	70 - 80 grams, 15 centimetres from bottom contact
BC7/3,22	1	WC	70 - 80 grams adjacent to BC7/3,20
BC7/3,24	1	WC	70 - 80 grams adjacent to BC7/3,22
BC7/3,26	1	WC	70 - 80 grams adjacent to BC7/3,24
BC7/3,27	1	WC	20 - 30 grams adjacent to BC7/3,26
BC7/3,28	1	WC	20 - 30 grams adjacent to BC7/3,27
BC7/3,29	1	WC	20 - 30 grams adjacent to BC7/3,28
BC7/3,30	1	WC	20 - 30 grams adjacent to BC7/3,29
BC7/3,31	1	WC	20 - 30 grams adjacent to BC7/3,30
BC7/3,32	1	WC	20 - 30 grams adjacent to BC7/3,31
BC7/3,33	1	WC	20 - 30 grams adjacent to BC7/3,32
BC7/3,34	1	WC	20 - 30 grams adjacent to BC7/3,33 and the bottom contact
BC7/3,39		JC, WC	200 grams of chloritic quartzite adjacent to the bottom contact
BC7/3,45		JC, WC	200 grams of chloritic quartzite adjacent to BC7/3,39

Sample	Sill No.	Crushing	Description
G -0,02	6	WC	Start of a traverse through a quartz filled joint and associated altered aplite. 20 grams of altered aplite 2 centimetres from a quartz filled joint
G -0,01	6	WC	20 grams adjacent to joint and G -0,02
G 0,01	6	WC	20 grams on the other side of the joint
G 0,02	6	WC	20 grams adjacent to G 0,01 altered
G 0,03	6	WC	20 grams adjacent to G 0,02 altered
G 0,04	6	WC	20 grams adjacent to G 0,03 slightly altered
G 0,05	6	WC	20 grams adjacent to G 0,04 no apparent alteration

APPENDIX B

Procedures used in chemical analysis

The initial samples of crushed powder analysed by General Superintendence Co. Ltd. of the BC1 series were done in the following manner:-

(1) X-Ray fluorescence

SiO_2, Al_2O_3, Fe_2O_3, MgO, CaO, Na_2O, K_2O, TiO_2, P_2O_5 and MnO

(2) Volumetric

FeO

(3) Gravimetric

H_2O^-, H_2O^+ and $CO_2^=$

(4) Colormetric

F

(5) Atomic absorption spectroscopy

Zn

The other samples were analysed for major elements by the author using the following procedures:-

Approximately 5 grams of crushed powder was heated in an oven at 120^o C for 24 hours, in a silica, crucible, to determine H_2O^-. After weighing the samples were heated in a furnace at 1000^o C for 12 hours and reweighed to determine total volatiles.

Duplicate fusion discs were made from the fired sample, using the procedure of Norrish and Hutton (1969).

Single pressed pellets of fresh powder were made using the procedure of Norrish and Chappel (1967).

TABLE I

X-ray fluorescence spectrometer operating conditions

Element	Analysing Crystals	2 θ Angle	Filter[1]	Collimator[2]	Counting Time (sec)	Analysed Target[3]	Counter	X-ray tube Target[1]	X-ray tube Kv	X-ray tube mA
Fe	LIF220	85,90	In	Coarse	40	FD	Flow Prop	Cr	50	50
Mn	LIF220	95,35	In	Fine	200	FD	Flow Prop	Cr	50	50
Ti	LIF200	86,22	Out	Fine	20	FD	Flow Prop	Cr	50	50
Ca	LIF200	113,20	Out	Fine	20	FD	Flow Prop	Cr	50	50
K	PE	50,77	Out	Fine	20	FD	Flow Prop	Cr	50	50
P	PE	89,69	Out	Coarse	80	FD	Flow Prop	Cr	50	50
Si	PE	109,32	Out	Coarse	20	FD	Flow Prop	Cr	50	50
Al	PE	144,92	Out	Coarse	80	FD	Flow Prop	Cr	50	50
Mg	ADP	136,92	Out	Coarse	200	FD	Flow Prop	Cr	50	50
Na[4](Pk)	GYPSUM	103,35	Out	Coarse	200	PP	Flow Prop	Cr	50	50
Na[4](Bg)	GYPSUM	97,00	Out	Coarse	200	PP	Flow Prop	Cr	50	50

1. The use of a Cr tube for all elements differ from Norrish and Hutton (1969) who used a W tube for Mn and Fe, but the use of a Cr filter on the Phillips machine permits Mn and Fe to be determined with a Cr tube.

2. Collimator sizes are fine: 150 microns, coarse: 550 microns.

3. FD = Fusion Disc, PP = Pressed Pellet.

4. The net peak of the sodium, i.e. Na(Pk) - Na(Bg) was used for the calculations.

These prepared samples were analysed in a Phillips PW 1410 X-Ray fluorescence spectrometer, and the machine conditions are listed in Table I. The counts for the duplicate samples were converted into percentage content using a computer programme written by J.P. Willis and modified by Mr. T.S. McCarthy.

The procedures used for the elements not included in the 'Norrish Fusion Technique' are:-

(1)	FeO	Determined volumetrically using the method described in Schafer (1966). If only one iron oxide is listed it is expressed as ferric oxide.
(2)	$CO_2^{=}$	Gravimetric by combustion in nitrogen atmosphere. Determined by General Superintendence Co. Ltd.
(3)	F	Ion selective electrode after fusion decomposion. Determined by General Superintendence Co. Ltd.
(4)	S, Cl	X-Ray fluoresence of pressed pellet. Determined by General Superintendence Co. Ltd.
(5)	H_2O^+	Subtraction of CO_2, F, Cl, S from the loss on ignition at 1000^{o} C.
(6)	Rb, Sr	X-Ray fluorescence of pressed powder using the Mo Crompton peak for the mass absorption correction method.
(7)	Au	Fire assay. Determined by the Assay Department of E.R.P.M.

Symbols used in appendix figures

Chemical traverse	Symbol	
BC1	⌽	(sieved)
BC3	⍋	(sieved)
BC5	⋇	
BC7	×	
G76D	◊	

If the symbol is enclosed within a circle it implies that, that particular sample in the traverse is from the adjacent quartzite.

Figure I

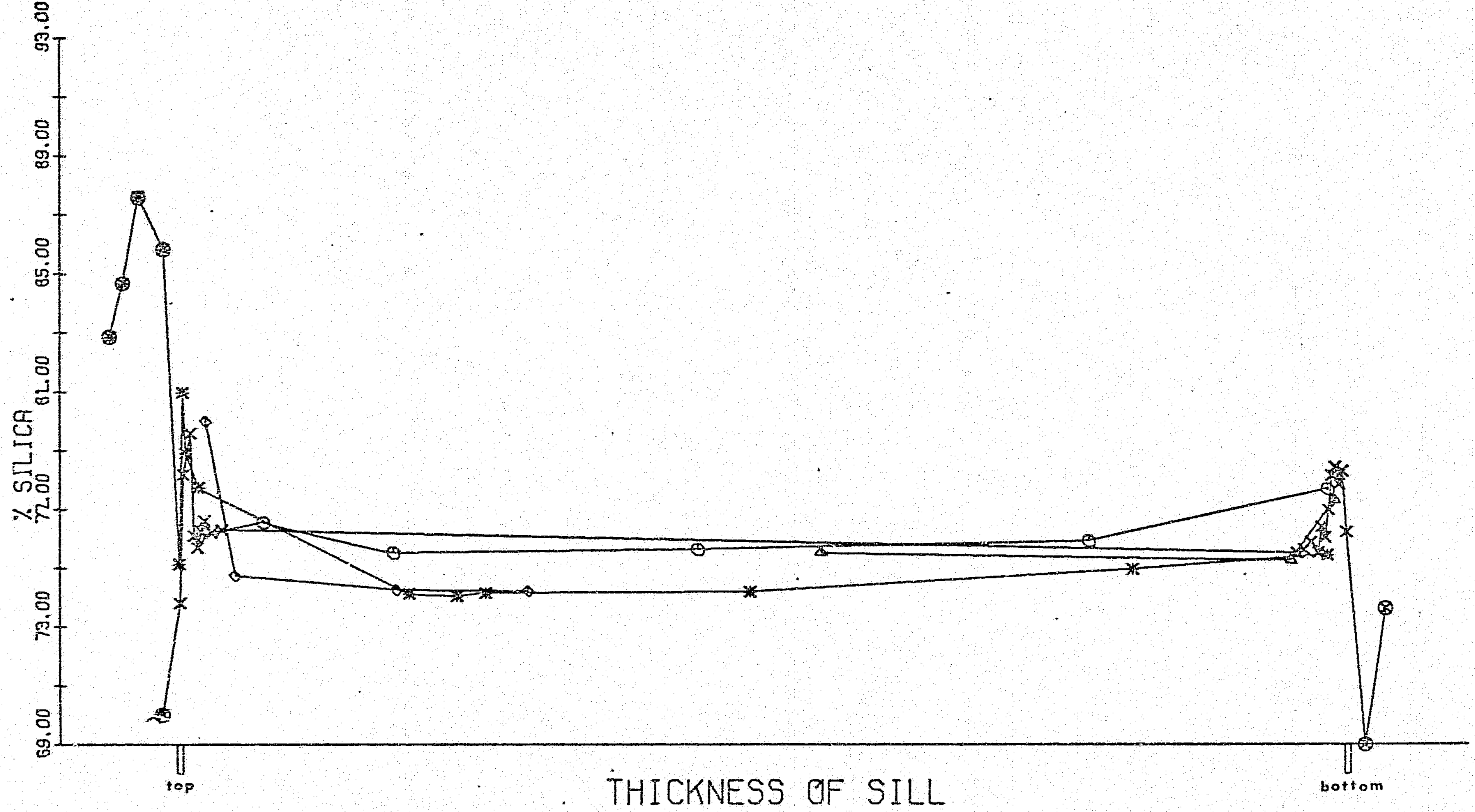

% SILICA
93.00
89.00
85.00
81.00
77.00
73.00
69.00
top
bottom
THICKNESS OF SILL

Figure II

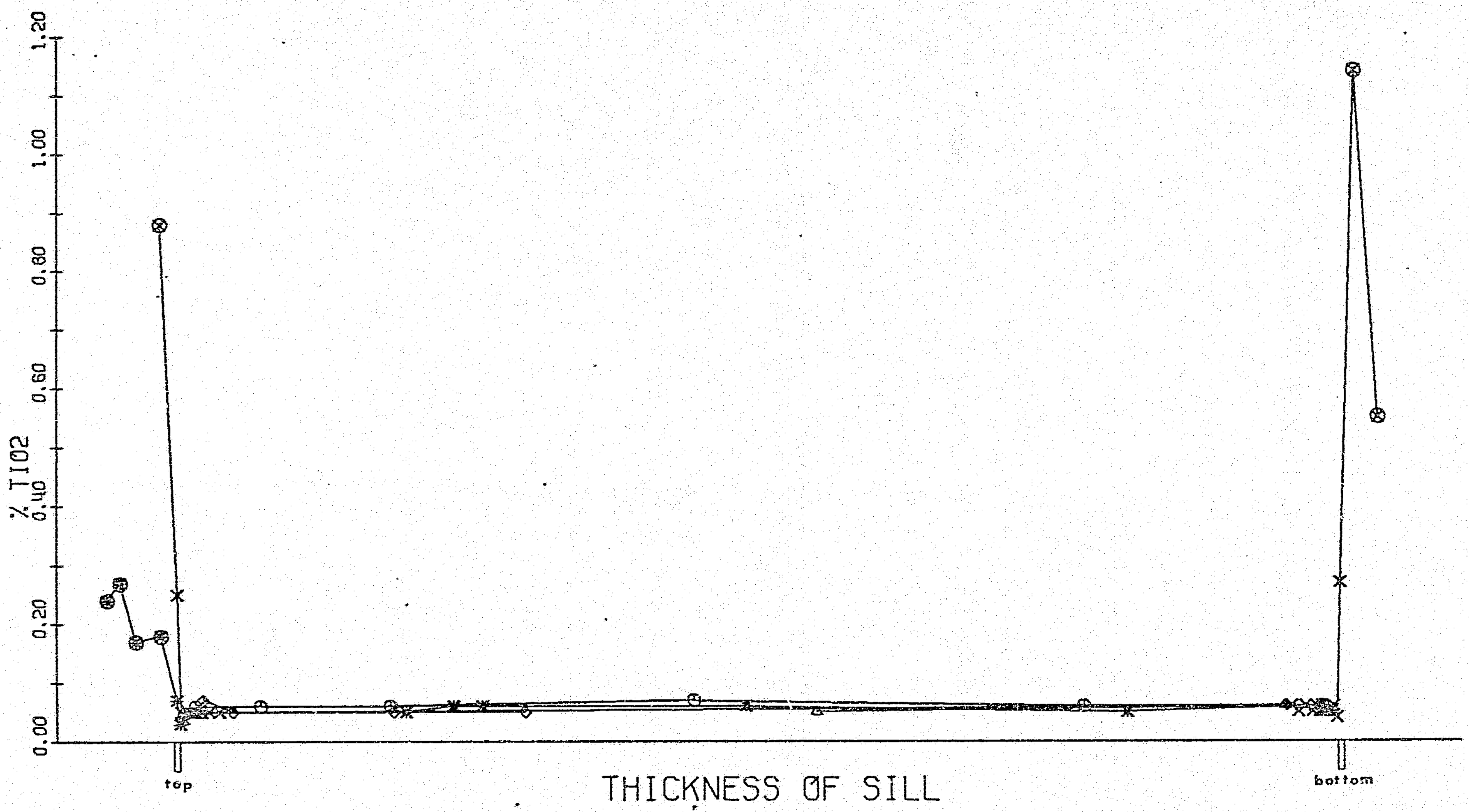
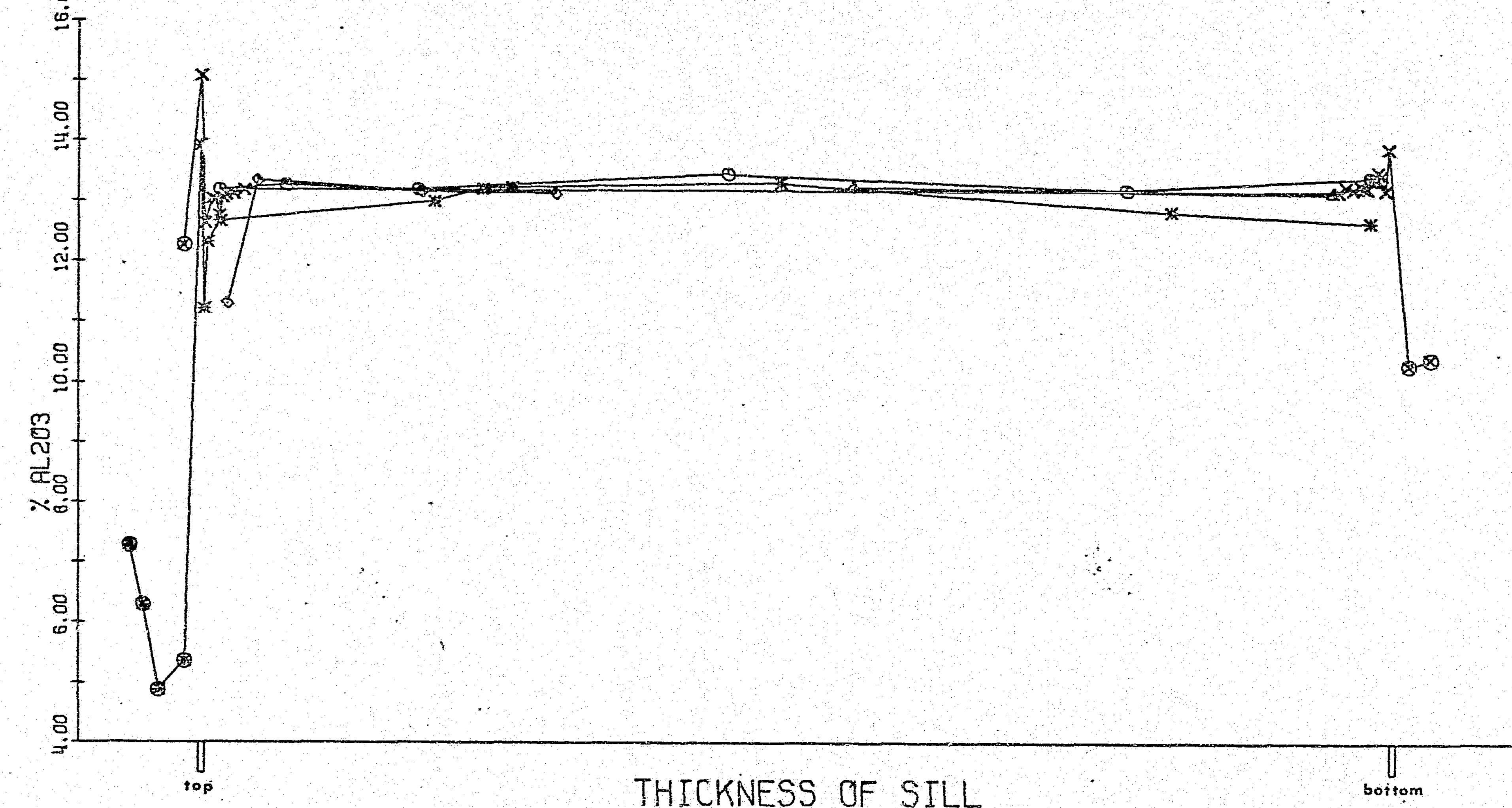
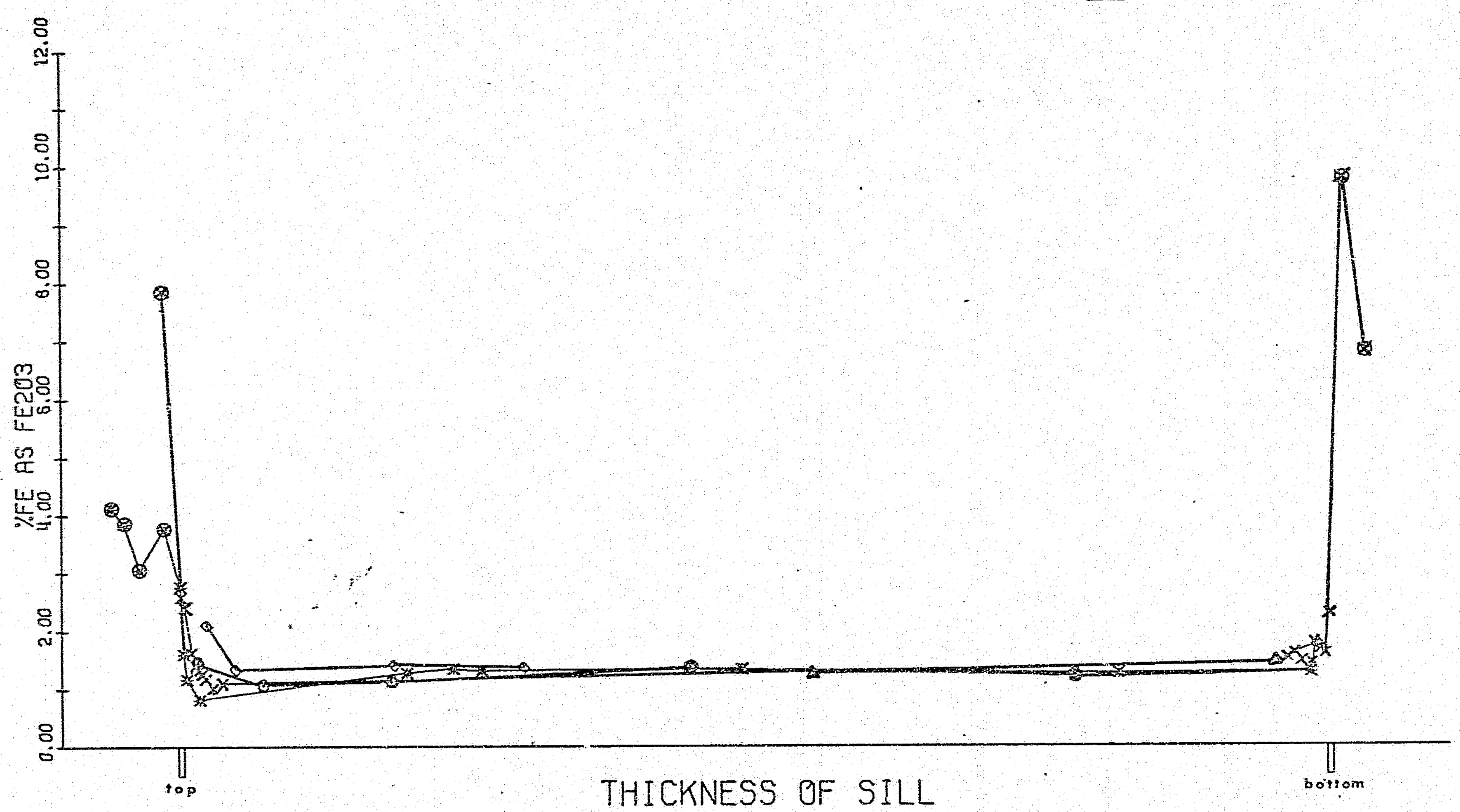


Figure III



16.00
14.00
12.00
10.00
8.00
6.00
4.00
% AL2O3
top
bottom
THICKNESS OF SILL

Figure IV



%FE AS FE2O3
12.00
10.00
8.00
6.00
4.00
2.00
0.00
top
bottom
THICKNESS OF SILL

Figure V

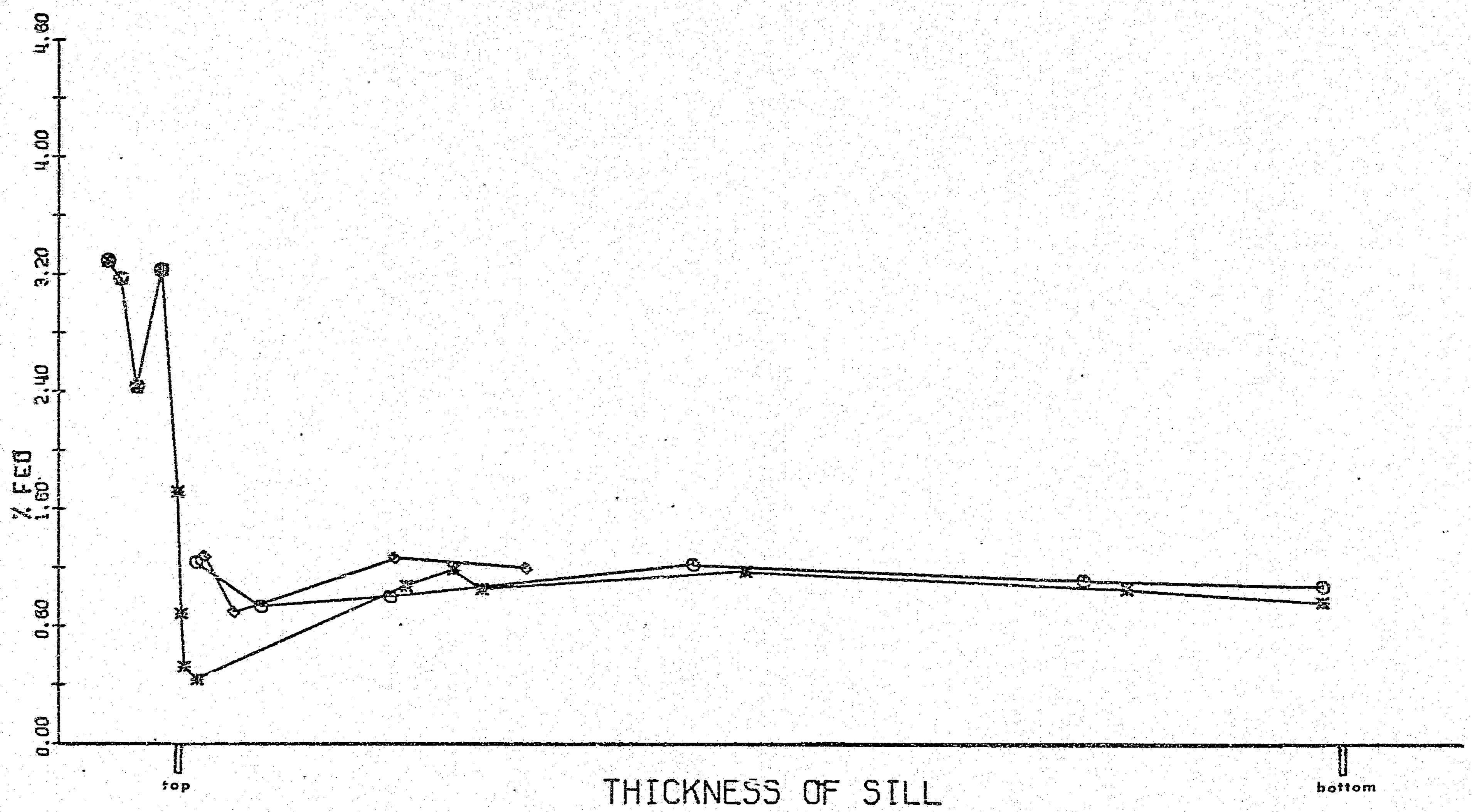


Figure VI

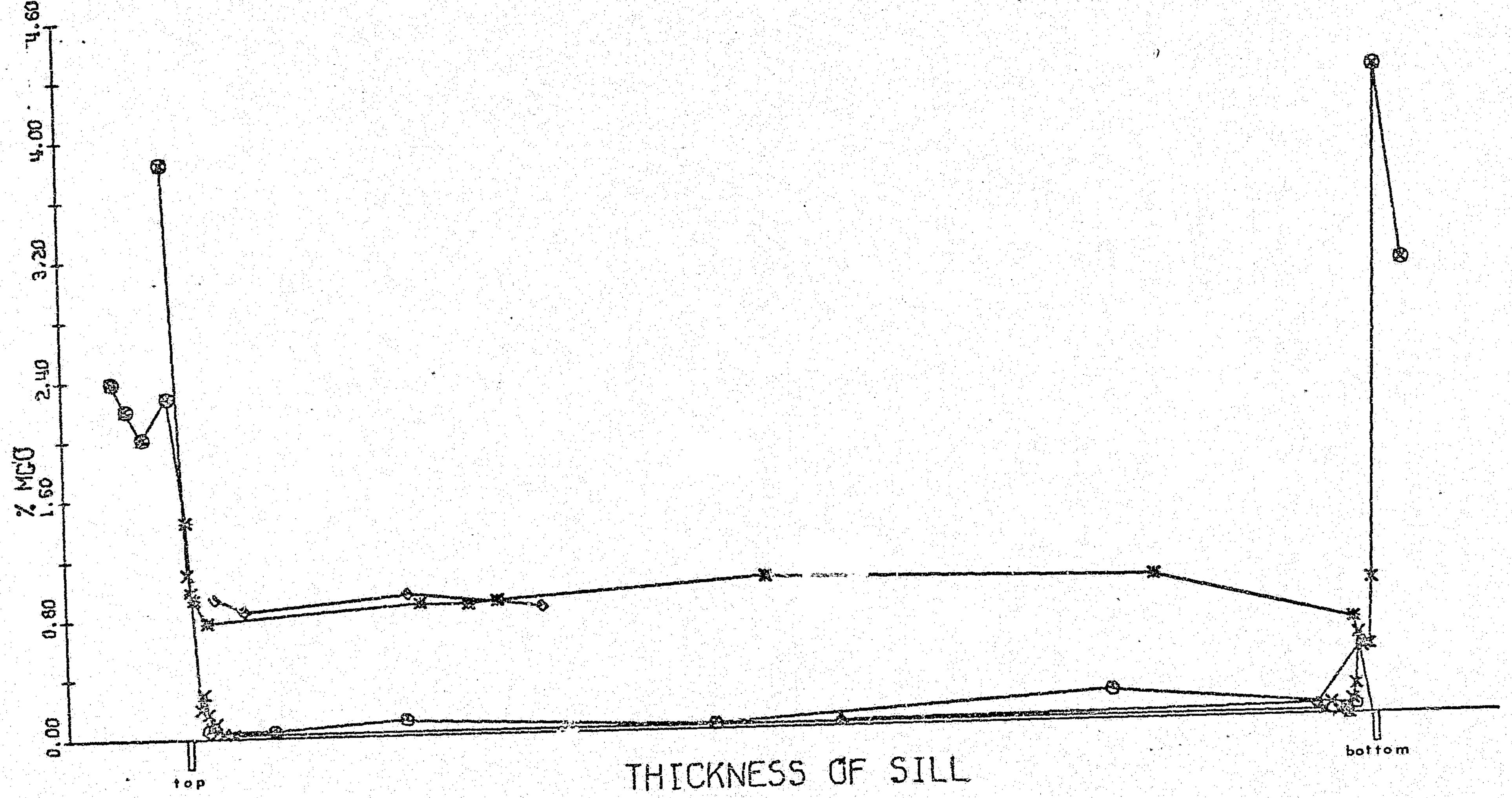


Figure VII

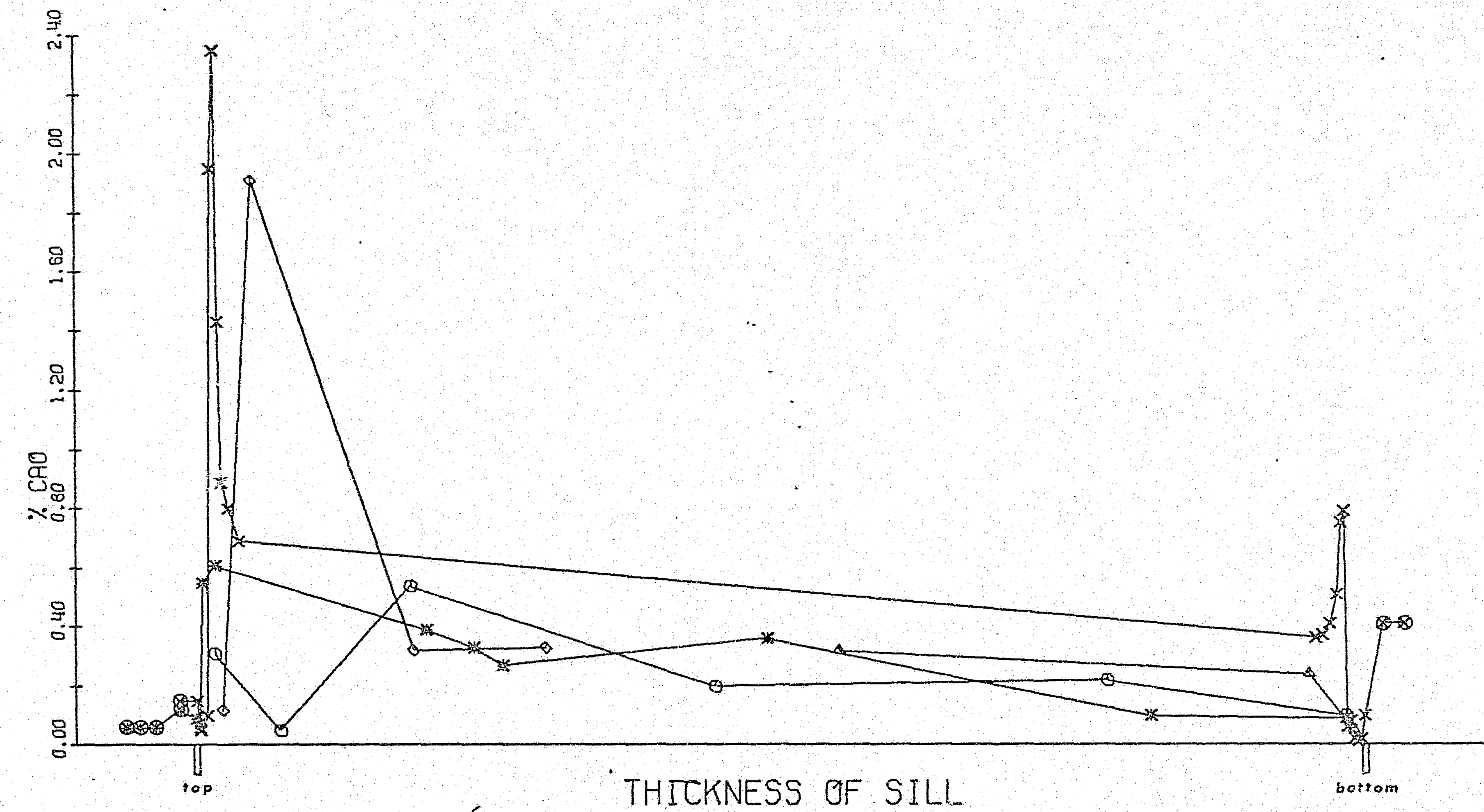


Figure VIII

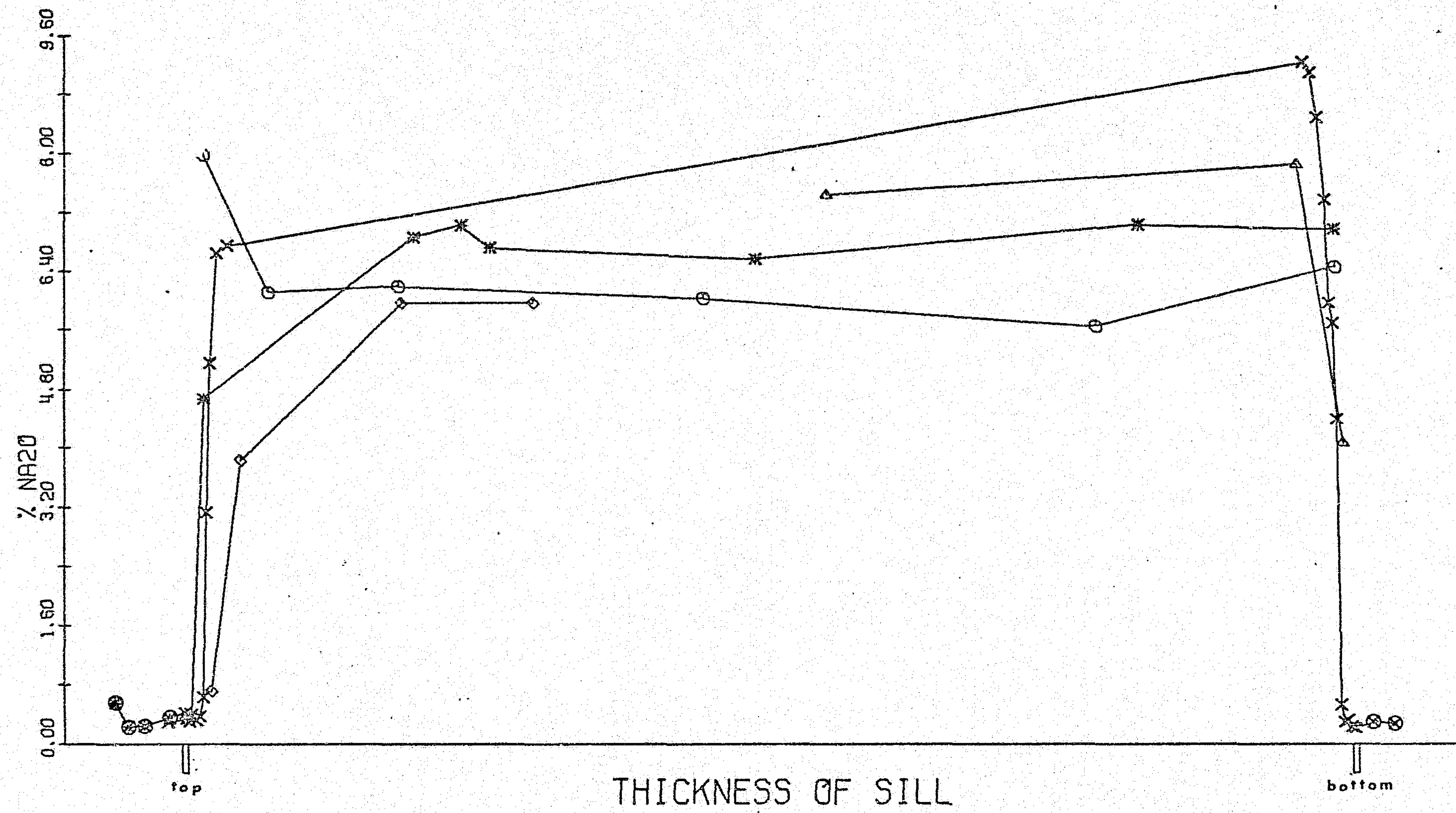


Figure IX

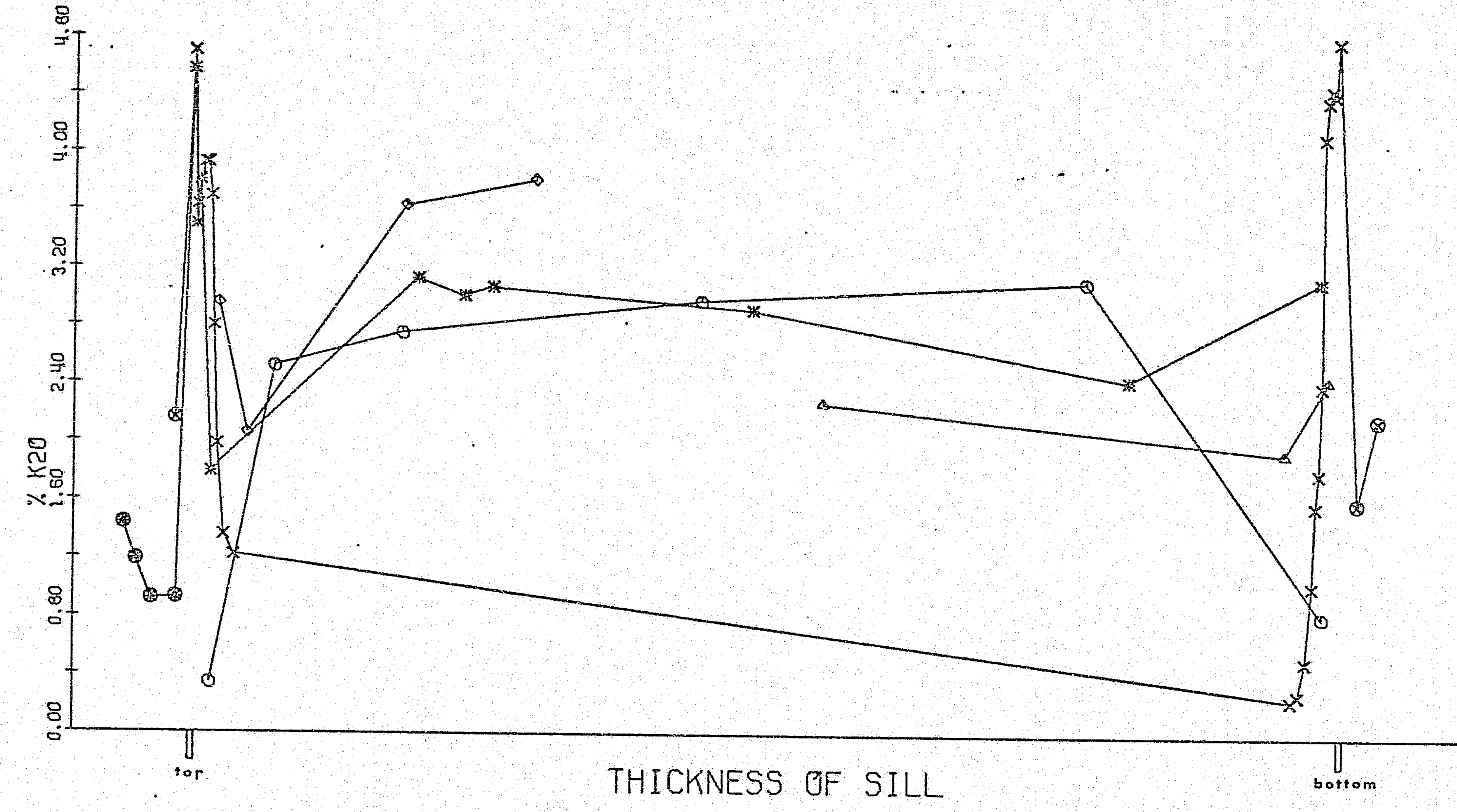


Figure X

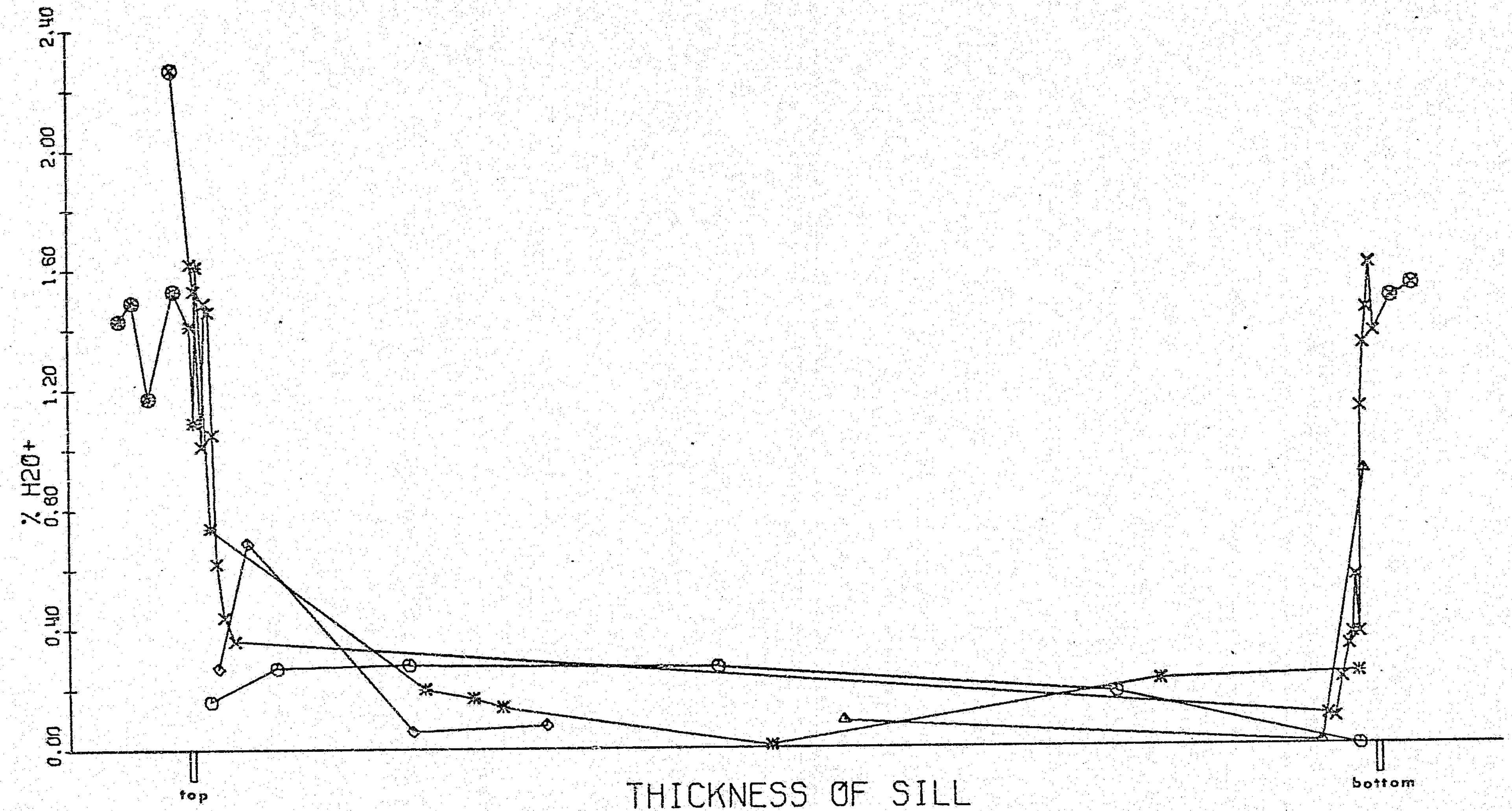


Figure XI

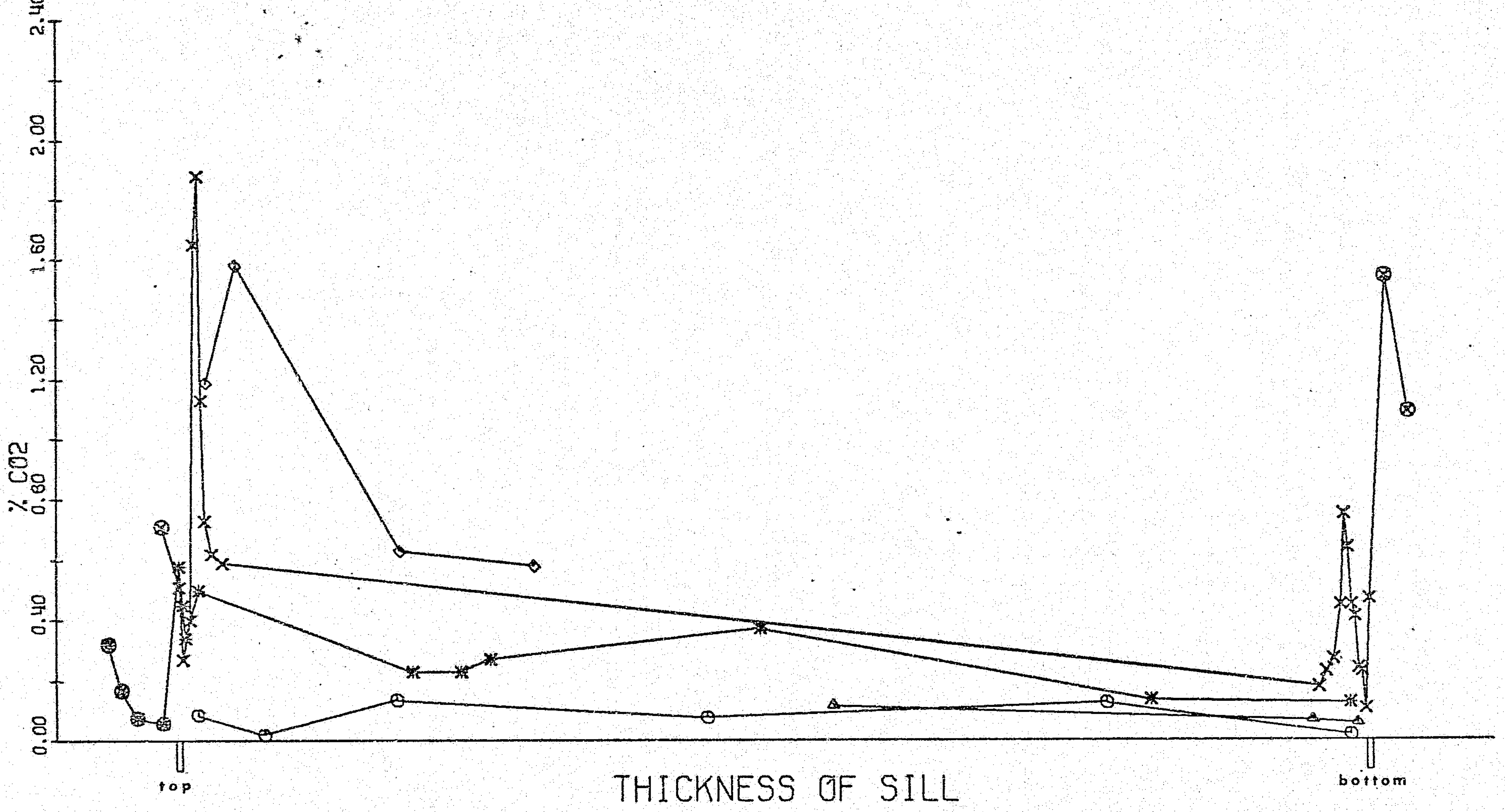
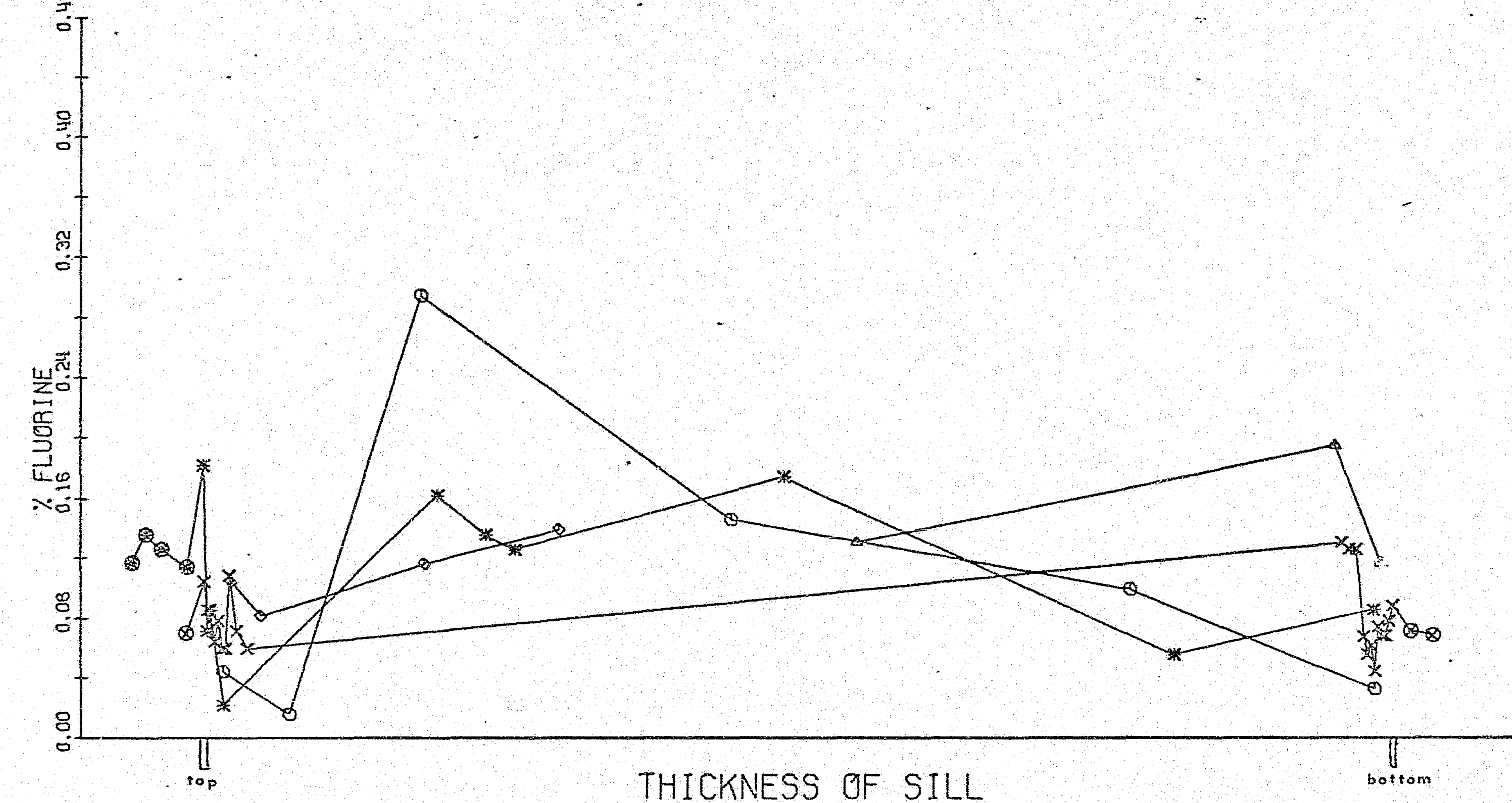


Figure XII



% FLUORINE
0.48
0.40
0.32
0.24
0.16
0.08
0.00
top
bottom
THICKNESS OF SILL

Figure XIII

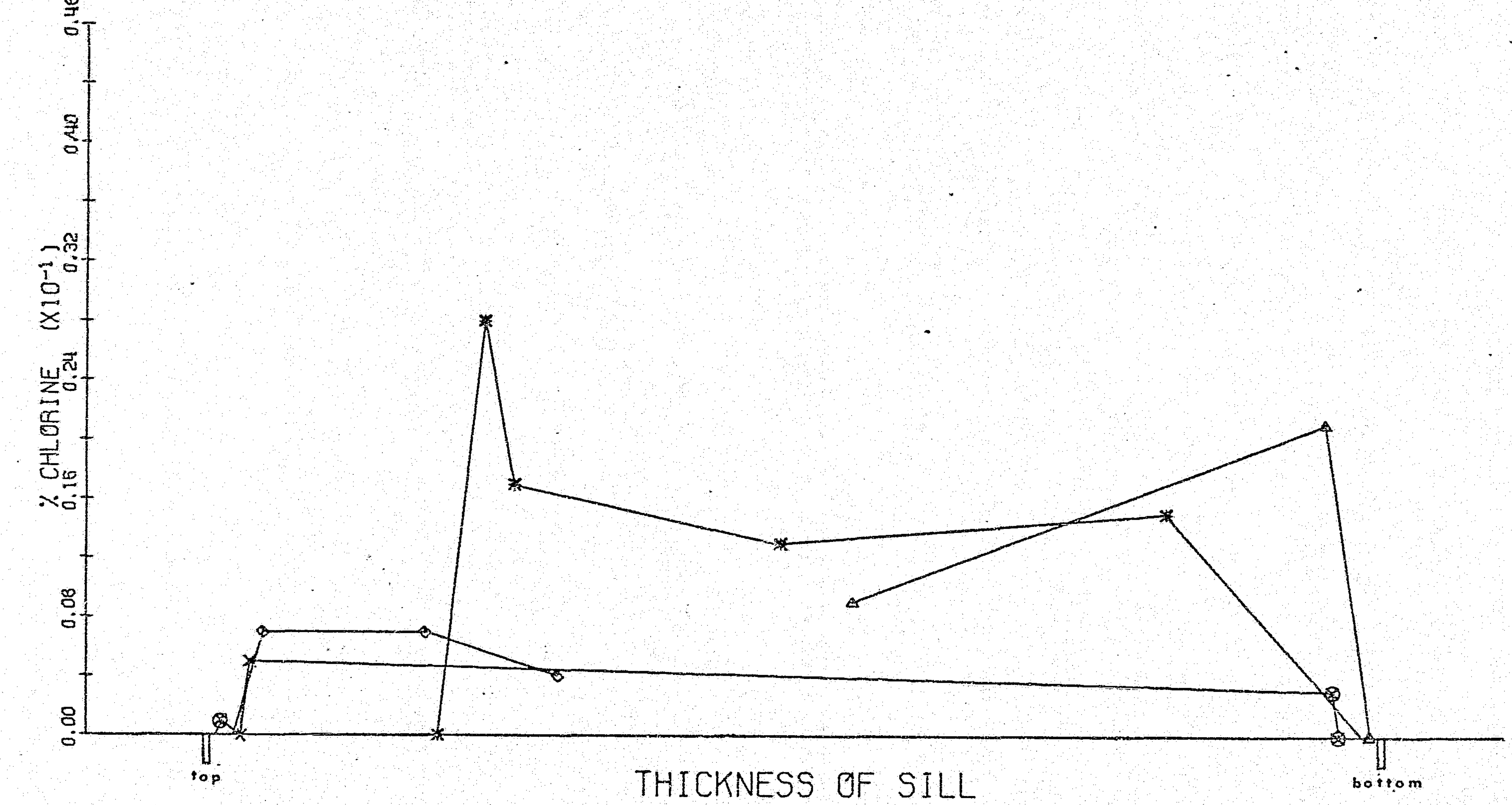
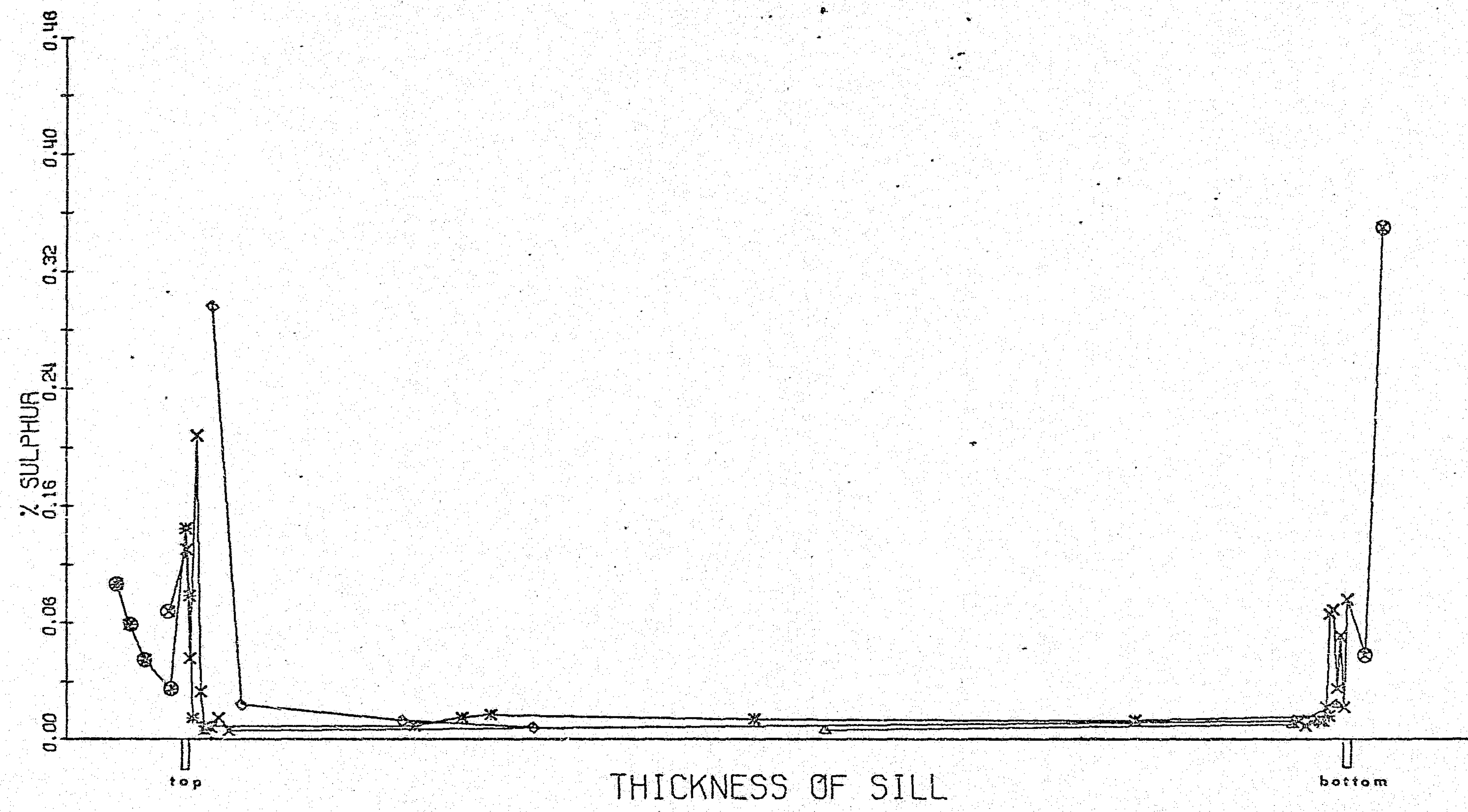
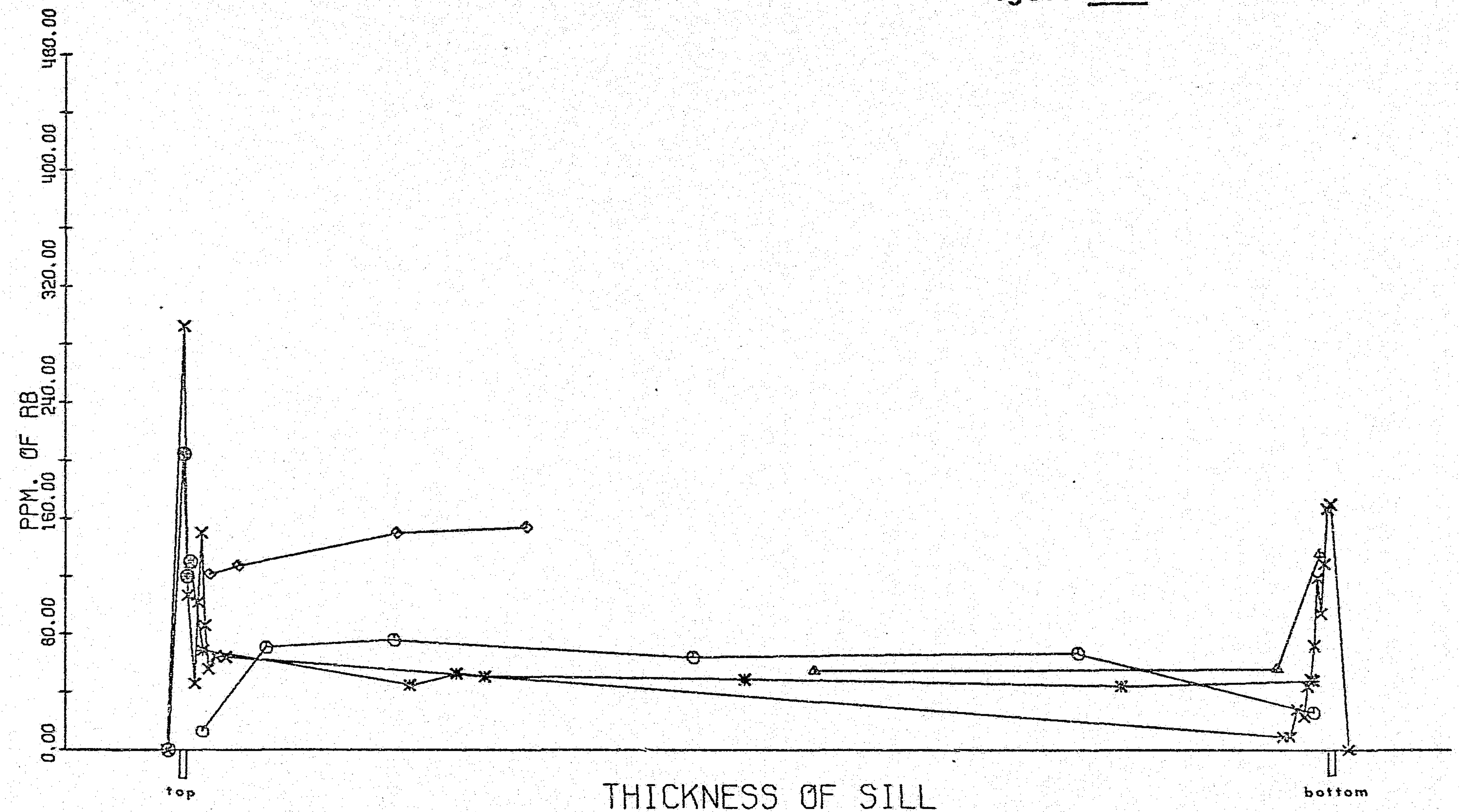

% CHLORINE (X10-1)
0.00
0.08
0.16
0.24
0.32
0.40
0.48
top
bottom
THICKNESS OF SILL

Figure XIV



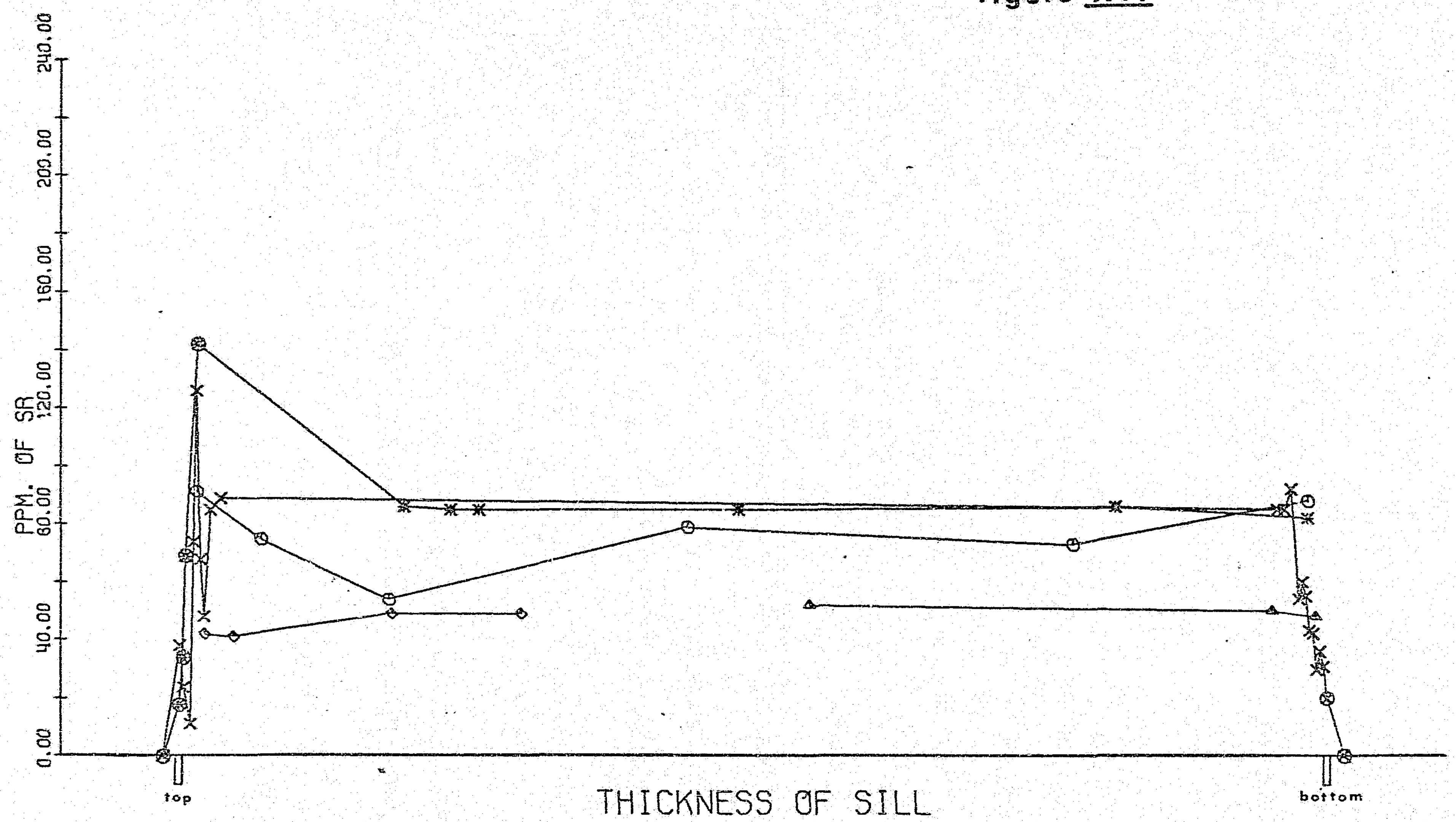
0.48
0.40
0.32
0.24
0.16
0.08
0.00
% SULPHUR
top
bottom
THICKNESS OF SILL

Figure XV



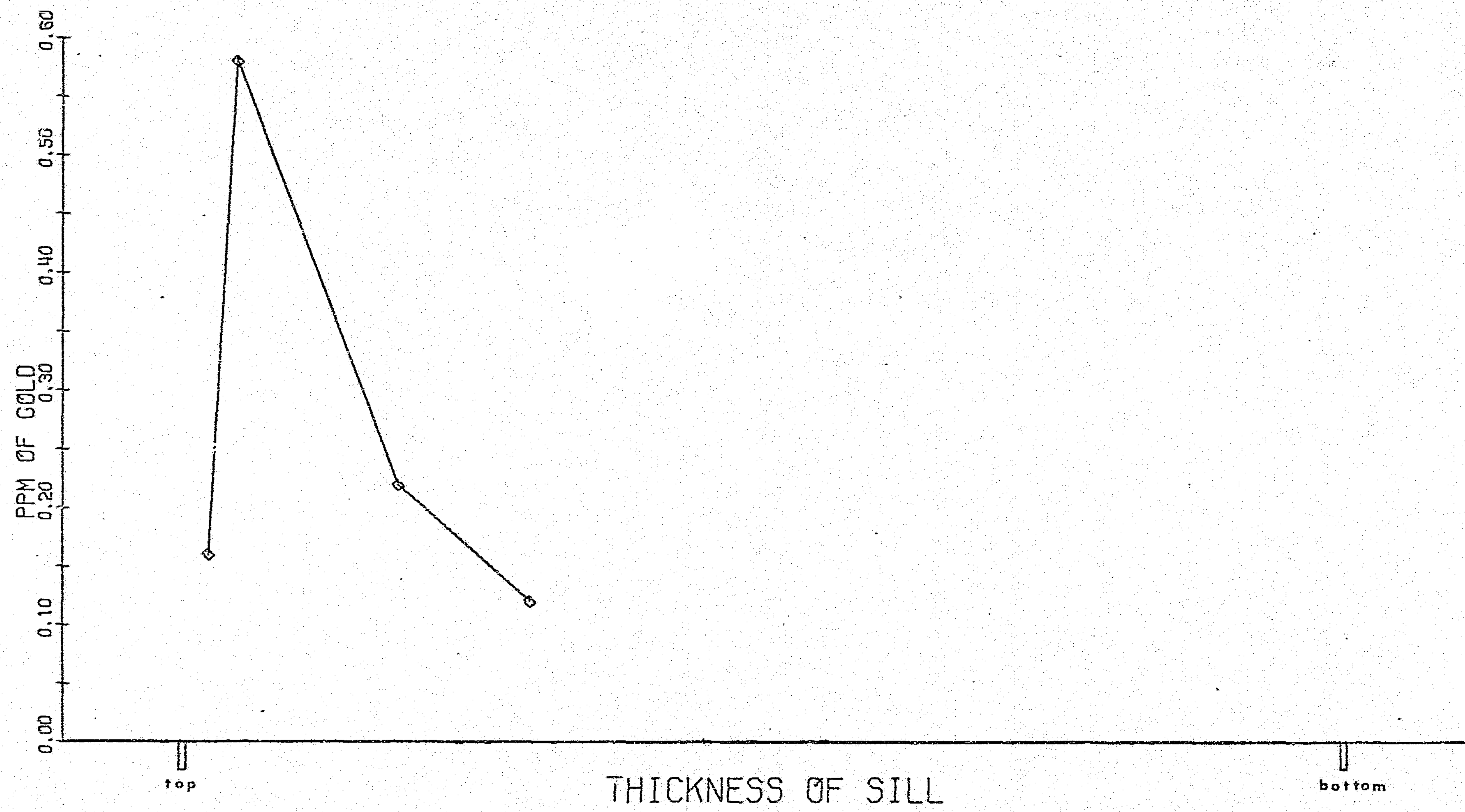
PPM. OF RB
0.00
80.00
160.00
240.00
320.00
400.00
480.00
top
bottom
THICKNESS OF SILL

Figure XVI



PPM. OF SR
0.00
40.00
60.00
120.00
160.00
200.00
240.00
top
bottom
THICKNESS OF SILL

Figure XVII



0.60
0.50
0.40
0.30
0.20
0.10
0.00
PPM ØF GØLD
top
bottom
THICKNESS ØF SILL

REFERENCES

Alling, H.L. (1932) Perthites. Amer. Min., 17, 43-65.

Allsopp, H.L. (1961) Rb-Sr age measurements on total rock and separated mineral fractions from the old granite of the Central Transvaal. J. geophys. Res., 66, 1499-1508.

Allsopp, H.L. and Kolbe, P. (1965) Isotopic age determinations on the Cape Granite and intruded Malmesbury sediments, Cape Peninsula, South Africa. Geochim. et. cosmoch. Acta, 29, 1115-1130.

Allsopp, H.L., Ulrych, T.J. and Nicolaysen, L.O. (1968) Dating some significant events in the history of the Swaziland System by the Rb-Sr isochron method. Can. J. Earth Sci., 5, 605-618.

Anderson, E.M. (1938) The dynamics of sheet intrusion. Proc. Roy. Soc. Edin., B58, 242-251.

Anhaeusser, C. (1973) The geology and geochemistry of the Johannesburg-Pretoria Dome, 361-386 in Lister, L.A., ed., 'Symposium on granites, gneisses and related rocks'. Spec. Publ. geol. Soc. S. Afr., 3.

Arriens, P.A., Brooks, C., Bofinger, V.M. and Compston, W. (1966) The discordance of mineral ages in granitic rocks resulting from the redistribution of rubidium and strontium. J. geophys. Res., 71, 4981-4994.

Bailey, D.K. and Schairer, J.F. (1966) The System Na_2O-Al_2O_3-Fe_2O_3-SiO_2 at 1 atmosphere, and the petrogenesis of alkaline rocks. J. Pet., 7, 114-170.

Bailey, D.K. and MacDonald, R. (1970) Petrochemical variations among midly peralkaline (comendite) obsidians from the oceans and continents. Contr. Min. Pet., 28, 340-351.

Balk, R. (1937) Structural behaviour of igneous rocks. Mem. geol. Soc. Amer., 5.

Barker, D.S. (1970) Composition of granophyre, myrmekite, and graphic granite. Bull. geol. Soc. Amer., 81, 3339-3350.

Birch, F. (1966) Compressibility; elastic constants. 97-174 in Clark, S.P., ed., 'Handbook of physical constants'. Mem. geol. Soc. Amer., 97.

Bottinga, Y. and Weill, A.F. (1972) The viscosity of magmatic silicate liquids: a model for calculation. Amer. J. Sci., 272, 438-475.

Brace, W.F. and Bombolakis, E.G. (1966) A note in brittle crack growth in compression. J. geophys. Res., 68, 3709-3713.

Brace, W.F., Paulding, B.W. and Scholz, C. (1966) Dilatancy in the fracture of crystalline rocks. J. geophys. Res., 71, 3939-3952.

Brown, G.C. (1970) A comment on the role of water in the partial fusion of crustal rocks. Earth & Plan. Sci. Lett., 9, 355-358.

Button, A. (1973) A regional study of the stratification and development of the Transvaal Basin in the Eastern and North-eastern Transvaal. Ph.D. thesis, University of the Witwatersrand.

Carmichael, I.S.E. and MacKenzie, W.S. (1973) Feldspar-liquid equilibria in panellerites: an experimental study. Amer. J. Sci., 261, 382-396.

Clark, S.P. (1966) Viscosity. 291-300 in Clark, S.P., ed., 'Handbook of physical constants', Mem. geol. Soc. Amer., 97.

Cook, N.G.W. (1962) A study of failure in the rock surrounding underground excavations. Ph.D. thesis, University of the Witwatersrand.

Crampton, D.G.V. (1973) The geochronology of the acid igneous rocks of the Derdepoort area, N.W. Transvaal. Honour project, University of the Witwatersrand.

Curle, J.H. (1899) The gold mines of the world. Waterloo & Sons, London.

Currie, K.L. and Ferguson, J. (1970) The mechanism of intrusion of lamprophyre dykes, indicated by 'offsetting' of dykes. Tectonophysics, 9, 525-535.

Davies, R.D., Allsopp, H.L., Erlank, A.J. and Manton, W.I. (1970) Sr isotopic studies on various layered intrusions in Southern Africa. 576-593 in Visser, D.T.L. and von Gruenewaldt, G., eds., 'Symposium on the Bushveld Igneous Complex and other layered intrusions'. Spec. Publ. geol. Soc. S. Afr., 1.

Davies, R.D. and Allsopp, H.L. (1975) Strontium isotopic evolution of the early Precambrian granitic rocks. In preparation.

Deer, W.A., Howie, R.A. and Zussman, J. (1962) Rock forming minerals. Vol. 1-5, Longman, London.

de Gasparis, A.A.A. (1967) Rubidium-strontium studies relating to problems of geochronology on the Nelspruit and Mpangeni granites. M.Sc. thesis, University of the Witwatersrand.

Durney, D.W. and Ramsay, J.G. (1973) Incremental strains measured by syntectonic crystal growths, 67-96 in de Jong, K.L. and Scholten, R., ed., 'Gravity and tectonics'. John Wiley & Sons, New York.

du Toit, A.L. (1954) Geology of South Africa, 3rd edition. Oliver & Boyd, Edinburgh.

Edgar, A.D. (1974) On the use of the term 'agpaitic'. Miner. Mag., 39, 729-730.

Emeleus, C.H. and Smith, J.V. (1959) Alkali feldspars VI, sanadine and orthoclase perthite from N. Ireland. Amer. Min., 44, 1187-1210.

Faure, G. and Powell, J.L. (1972) Strontium isotope geology. Springer-Verlag, Berlin.

Fockema, R.A.P. (1949) An occurrence of alkaline and acid lavas and breccias on the farm Kruidfontein 147, Rustenburg District. Trans. geol. Soc. S. Afr., 52, 205-223.

Friedman, M. and Logan, J.M. (1973) Lüder's bands in experimentally deformed sandstone and limestone. Bull. geol. Soc. Amer., 84, 1465-1476.

Gretner, P.E. (1969) On the mechanics of the intrusion of sills. Can. J. Earth Sci., 6, 1415-1419.

Griggs, D.T., Turner, F.J. and Heard, H.C. (1960) Deformation of rocks at 500^{o} to 800^{o} C. Mem. geol. Soc. Amer., 79, 39-104.

Harris, P.G., Kennedy, W.Q. and Scarfe, C.M. (1970) Volcanism versus plutonism - the effect of chemical composition. 187-200 in Newall, G. and Rast, N., 'Mechanism of igneous intrusion, Gallery Press, Liverpool.

Hart, S.R., Davies, G.L., Steiger, R.H. and Tilton, G.R. (1966) A comparison of the isotopic mineral age variation and petrologic changes induced by contact metamorphism. 73-110 in Hamilton, E.I. and Farquhar, R.M., ed., 'Radiometric dating for geologists'. John Wiley & Son, New York.

Heard, H.C. (1960) Transition from brittle fracture to ductile flow in Solenhofen limestone as a function of temperature, confining pressure and interstitial fluid pressure. Mem. geol Soc. Amer., 79, 193-226.

Heier, K.S. (1970) Rubidium, Vol. 2, 37, E, F in Wedepohl, K.H. 'Handbook of geochemistry'. Stringer-Verlag, Berlin.

Hoek, E. (1964) Rock fracture around mining excavations. CSIR Spec. Rep., 58, unpublished.

Hoek, E. (1965) Rock fracture under static stress conditions. CSIR Spec. Rep., Meg. 383, unpublished.

Hyndman, P.W. (1972) Petrology of igneous and metamorphic rocks. McGraw-Hill, New York.

Irwin, G.R. (1953) Angle and strain relations in flat plate Lüder's bands. Trans. Amer. Soc. Mech. Eng. J. appl. Mech., 75, 449-450.

Jaeger, J.C. (1958) Temperature outside a cooling intrusive sheet. Amer. J. Sci., 257, 44-54.

Jaeger, J.C. (1961) The cooling of irregularly shaped igneous bodies. Amer. J. Sci., 259, 721-734.

Jaeger, J.C. (1968) Cooling and solidification of igneous rocks. 503-536 in Hess, H.H. and Poldervaart, A. "Basalts vol. 2'. Interscience publishers, New York.

Jaeger, J.C. and Cook, N.G.W. (1969) Fundamentals of rock mechanics. Methuen & Co., London.

James, R.S. and Hamilton, D.L. (1969) Phase relations in the system $NaAlSi_3O_8$-$KAlSi_3O_8$-$CaAl_2Si_2O_8$ at 1 kilobar water vapour pressure. Contr. Min. Pet., 21, 111-141.

Jeffery, D.G. (1975) Structural discontinuities in the Witwatersrand Group on E.R.P.M.: their geology, geochemistry and rock mechanical behaviour. M.Sc. dissertation, University of the Witwatersrand.

Johannesen, A. (1932) A descriptive petrography of the igneous rocks. Vol. 2, The University of Chicago Press, Chicago.

Johnson, A.M. and Pollard, D.D. (1973) Mechanics of growth of some laccolith intrusions in the Henry mountains, Utah, part I, Tectonophysics, 18, 261-309.

Knopf, A. (1936) Igneous geology of the Spanish Peaks region, Colorado, Bull. geol. Soc. Amer., 47, 1747-1784.

Kogarko, L.N. (1974) Role of volatiles, 474-487 in Sorensen, H, ed., 'Alkaline rocks'. John Wiley & Sons, London.

Lee, W.H.K. and Clark, S.P. (1966) Heat flow and volcanic temperature. 483-512 in Clark, S.P. 'Handbook of physical constants'. Mem. geol. Soc. Amer., 97.

Lenthall, D.H. (1972) The application of discriminatory and cluster analysis as an acid to the understanding of the acid phase of the Bushveld Complex. Inform. Circ. Econ. geol. Res. Unit, 72.

Lovering, J.F. (1966) Electron microprobe analyses of chlorine in two pantellerites. J. Pet., 7, 65-67.

Lussiaa-Berdou-Polve, M. and Vidal, P. (1973) Initial strontium isotopic composition of volcanic rocks from Jan Mayen and Spitsbergen. Earth & Plan. Sci. Lett., 18, No. 2, 333-338.

Luth, W.C. (1969) The system $NaAlSi_2O_8$-SiO_2 and $KAlSi_2O_8$ to 20 kb and the relationship between H_2O content, P_{H_2O} and P_{total} in granitic magmas. Amer. J. Sci., 267-A, 325-341.

Luth, W.C., Jahns, R.H. and Tuttle, O.F. (1964) The granite system at pressures of 4 to 10 kilobars. J. geophys. Res., 69, No. 4, 759-773.

Mehnart, K.R. (1968) Migmatites and the origin of granitic rocks. Elsevier, Amsterdam.

Moorbath, S. and Bell, J.D. (1965) Strontium isotope abundance studies and rubidium-strontium age determinations of tertiary igneous rocks from the Isle of Skye, north-west Scotland. J. Pet., 6, 37-66.

Mudge, M.B. (1968) Depth control of some concordant intrusions. Bull. geol. Soc. Amer., 79, 315-332.

McCarthy, T.S. (1975) In preparation.

McDonald, D.P. (1911) The intrusive rocks of the Witwatersrand. Trans. geol. Soc. S. Afr., 14, 89-97.

MacDonald, R., Upton, R.G.J. and Thomas, J.E. (1973) Potassium and fluorine rich hydrous phase co-existing with peralkaline granite in south Greenland. Earth & Plan. Sci. Lett., 18, 217-222.

McGarr, A. (1971a) Stable deformation of rock near deep-level tabular excavations. J. geophys. Res., 76, 7088-7106.

McGarr, A. (1971b) Violent deformation of rock near deep-level tabular excavations - seismic events. Bull. Seism. Soc. Amer., 61, 1453-1466.

McGarr, A., Spottiswoode, S.M. and Gay, N.C. (1975) Relationship of tremors in a deep-level mine to induced stresses and to mechanical properties of a rock in the focal region. In preparation.

Nadai, A. (1950) Theory of flow and fracture of solids, Volume 1, 2nd edition. Engineering Societies Monographs. McGraw-Hill, New York.

Nagasawa, A. and Schnetzler, C.C. (1971) Partitioning of rare earth, alkali earth elements between phenocrysts and acidic igneous magma. Geochim. et cosmoch. Acta, 35, 953-968.

Nicolaysen, L.O., de Villiers, J.W.L., Burger, A.J. and Strelow, F.W.E. (1958) New measurements relating to the absolute age of the Transvaal System and of the Bushveld Igneous Complex. Trans. geol. Soc. S. Afr., 61, 137-163.

N.M.E.R.I. (1959) Some properties of hard rock from the East Rand Proprietary Mines. CSIR Spec. Rep., 28.

Noble, D.C. (1968) Systematic variation of major elements in comendite and pantellerite glasses. Earth & Plan. Sci. Lett., 4, 167-172.

Noble, D.C., Smith, V.C. and Peck, L.C. (1967) Loss of halogens from crystallized and glassy silicic volcanic rocks. Geochim. et Cosmoch. Acta, 31, 215-224.

Nockolds, S.R. (1954) Average chemical compositions of some igneous rocks. Bull. geol. Soc. Amer., 65, 1007-1024.

Norrish, K.G. and Chappel, B. (1967) X-Ray fluorescence spectrography, 161-213 in Zussman, S., ed., 'Physical methods in determinative Mineralogy'. Academic Press, London.

Norrish, K.G. and Hutton, J.T. (1969) An accurate X-Ray spectrographic method for analysis of a wide range of geological samples. Geochim. et Cosmoch. Acta, 33, 431-453.

Odé, H. (1957) Mechanical analysis of the dyke pattern of the Spanish Peaks area, Colorado. Bull. geol. Soc. Amer., 68, 567-576.

Pallister, G.F., Gay, N.C. and Cook, N.G.W. (1971) Measurements of the virgin state of stress in rock at depth. 2nd. int. Soc. Rock Mech. Congr., 1, 1-5.

Phillips, W.J. (1974) The dynamic emplacement of cone sheets. Tectonophysics, 24, 69-84.

Philpots, A.R. (1967) Origin of certain iron-titanium oxide and apatite rock. Econ. Geol., 62, 303-315.

Pollard, A.O. (1974) Derivation and evaluation of a mechanical model for sheet intrusions. Tectonophysics, 19, 233-270.

Prandtl, L. and Rinne, F. (1907) Vergleichende untersuchungen über die methoden zur bestimmung der druckfestigreit von Gesteinen. Neues Jb. Miner. Geol. Paläont., 1, 45-61.

Prandtl, L. and Tetjiens, O.G. (1957) Applied hydro- and aeromechanics. Dover Publication Edition, New York.

Presnall, D.C. and Bateman, P.C. (1973) Fusion relations in the system $NaAlSi_3O_8$-$CaAl_2Si_2O_8$-$KAlSiO_8$-SiO_2-H_2O and generation of granitic magmas in the Sierra Nevada batholith. Bull. geol. Soc. Amer., 84, 3181-3202.

Pretorius, D.A. (1964) The geology of the Central Rand goldfield. 63-108 in Haughton, S.H., ed., 'The geology of some ore deposits in Southern Africa', 1, Geol. Soc. S. Afr.

Price, N.J. (1966) Fault and joint development in brittle and semi-brittle rock. Pergamon Press, Oxford.

Reid, C.N. (1973) Deformation geometry for materials scientists. Pergamon Press, Oxford.

Roering, C. (1968) The geometrical significance of natural en-echelon crack arrays. Tectonophysics, 5, 107-123.

Roberts, J.L. (1970) The intrusion of magma into brittle rocks. 287-338 in Newall, G., and Rast, N. 'Mechanisms of igneous intrusions'. Gallery Press, Liverpool.

Sanford, P.R. (1959) Analytical and experimental study of simple geological structures. Bull. geol. Soc. Amer., 70, 19-51.

Schafter, H.A.S. (1966) The determination of iron (II) oxide in silicate, and refractory materials. The Analyst, 91, 755-790.

Schloemer, H. (1964) Synthetic hydrothermal cocrystallization of orthoclase and quartz. Geochim. Int., 1, 578-613.

Schreiner, G.D.L. and van Niekerk, G.R. (1958) The age of a Pilansberg dyke from the Central Witwatersrand. Trans. geol. Soc. S. Afr., 61, 197-203.

Secor, D.T. (1965) Role of fluid pressure in jointing. Amer. J. Sci., 263, 633-646.

Shand, S.T. (1927) Eruptive rocks. Thomas Murby & Co., London.

Shanin, V.E. (1950) Conjugate sets of en-echelon tension fractures in Athens limestone at Riverton, Virginia. Bull. geol. Soc. Amer., 61, 509-517.

Shaw, H.R. (1972) Viscosities of magmatic silicate liquids: an empirical method of prediction. Amer. J. Sci., 272, 870-893.

Shipway, A.M. (1972) Some aspects of Witwatersrand geology with special reference to the Central Rand area and E.R.P.M. Ltd. M.Sc. thesis, University of Leicester.

Skinner, B.J. (1966) Thermal expansion. 75-96 in Clark, S.P., ed., 'Handbook of physical constants'. Mem. geol. Soc. Amer., 97.

Snelling, N.S. and Rex, D.C. (1967) African geochronology 1966. Inst. geol. Sci. Isotope Geol. Unit Rep., 67/1.

Strickeisen, A.L. (Chairman), (1973) Plutonic rocks classification and nomenclature recommended by the I.U.G.S. Sub-Commission of the systematics of igneous rocks. Geotimes, Oct., 26-30.

Thompson, R.N. and MacKenzie, W.S. (1967) Feldspar-liquid equilibria in peralkaline acid liquids: an experimental study. Amer. J. Sci., 265, 714-734.

Tuttle, O.F. and Bowen, N.L. (1958) Origin of granite in the light of experimental studies in the system $NaAlSi_3O_8$-$KAlSi_3O_8$-SiO_2-H_2O. Mem. geol. Soc. Amer., 74.

Ussing, N.V. (1912) Geology of the country around Julianehaab, Greenland. Medor. Grnland, 38, 376-431.

van Niekerk, C.B. (1962) The age of the Gempost dyke from the Venterspost Gold Mine. Trans. geol. Soc. S. Afr., 65, 105-111.

van Niekerk, C.B. (1968) The suitability of acid extrusive rocks for U-Pb radiometric dating. Ph.D. thesis, University of Cape Town.

van Niekerk, C.B. and Burger, A.J. (1964) The age of the Ventersdorp System. Ann. geol. Surv. S. Afr., 3, 75-86.

von Kármin, T.A. (1911) Festigkeitsversuche unter allseitigem druck. Z. Ver. Dtsch. Ing., 55, 1749-1757.

Wager, P.A. (1907) Petrographical notes on the rocks in the vicinity of Craighall. Trans. geol. Soc. S. Afr., 10, 6-9.

Wager, L.R. and Brown, G.M. (1960) Collection and preparation of material for analysis. 4-32 in Smale , A.A. and Wager, L.R., 'Methods in geochemistry'. Interscience Publishers, New York.

Weber, M. (1909) Notes on acid intrusives in the Witwatersrand system. Trans. geol. Soc. S. Afr., 12, 67-77.

Whiteside, H.C.M. (1950) The geology of a part of the Far East Rand Basin, with special reference to the economic horizons and the footwall beds. Ph.D. thesis, London University.

Willemse, J. (1933) The petrography and tectonics of the Pretoria-Johannesburg granite. Trans. geol. Soc. S. Afr., 36, 1-28.

York, D. (1966) Least-squares fitting of a straight line. Can. J. Phys., 44, 1079-1086.

Zies, E.G. (1960) Chemical analysis of two pantellerites. J. Pet., 1, 304-306.

Table III

	Associated Intrusives		Analyses of samples from the upper contact of No. 6 sill from G76W stope				Analyses of samples on the lower contact of No. 3 sill		
Sill No.			6	6	6	6	3	3	3
Sample No.	F69C	G77A	G76D 0,1	G76D 0,2	G76D 0,75	G76D 1,2	BC3 1,0	BC3 2,6	BC3 2,8
% SiO_2	70,61	41,43	80,00	74,74	74,26	74,23	75,55	75,27	77,33
% TiO_2	0,08	0,95	0,07	0,05	0,05	0,05	0,05	0,06	0,05
% Al_2O_3	16,74	12,53	11,30	13,34	13,15	13,12	13,24	13,11	13,31
% Fe_2O_3	0,40	0,78	0,69	0,34	0,00	0,04	1,25	1,45	1,76
% FeO	0,48	9,90	1,28	0,90	1,27	1,20			
% MnO	0,03	0,33	0,03	0,06	0,05	0,05	0,04	0,03	0,03
% MgO	0,32	12,53	0,94	0,85	0,95	0,85	0,04	0,07	0,47
% CaO	0,41	10,02	0,12	1,91	0,32	0,33	0,32	0,24	0,05
% Na_2O	8,75	0,25	0,72	3,83	5,96	5,96	7,43	7,83	4,05
% K_2O	1,60	0,04	2,96	2,06	3,64	3,82	2,28	1,94	2,45
% H_2O^+	0,60	1,99	0,27	0,69	0,06	0,08	0,09	0,01	0,91
% H_2O^-	0,04	0,02	0,09	0,04	0,03	0,02	0,11	0,09	0,04
% P_2O_5	0.05	0,13	0,05	0,05	0,05	0,05	0,04	0,04	0,04
% CO_2*	0,33	15,28	1.19	1,58	0,63	0,58	0,12	0,07	0,06
% F *	0,065	0,136	0,105	0,082	0,117	0,140	0,131	0,195	0,117
% Cl *	<0,001	0,006	<0,001	0,007	0,007	0,004	0,010	0,021	<0,001
% S *	0,0117	<0,001	0,2962	0,0241	0,0126	0,0076	0,0056	0,0103	0,0241
Total	100,50	100,80	100,12	100,55	100,54	100,51	100,71	100,45	100,69
ppm Rb	78		122	128	151	155	55	56	136
ppm Sr	67		42	41	49	49	52	50	48
Rb/Sr	1,2		2,9	3,1	3,1	3,1	1,06	1,11	2,85
ppm Au †			0,16	0,58	0,22	0,12			
Na_2O/K_2O	5,47	6,25	0,24	1,86	1,64	1,56	3,26	4,04	1,65
Peralkaline index	0,96	0,04	0,39	0,64	1,05	1,06	1,11	1,14	0,70

Average Au stope walues at time of sampling were 12,2 and 9,6 in the previous month. Adjacent reef 0,14ppm

† Analysed by Assay Dept, E.R.P.M.

* Analysed by General Superintendence Co. Ltd.

Analyses of samples across borehole BC1

Sill No.	3	3	3	3	3	3	3	3	3	3	3	3
Sample No.	BC1 0,05*	BC1 0,20*	BC1 0,50*	BC1 1,20*	BC1 2,10*	BC1 2,70*	BC1 0,05	BC1 0,20	BC1 0,50	BC1 1,20	BC1 2,10	BC1 2,70
% SiO_2	76,10	76,57	75,53	75,64	75,93	77,71	75,76	76,04	75,10	74,79	75,64	
% TiO_2	0,06	0,06	0,06	0,07	0,06	0,06	0,09	0,14	0,09	0,06	0,06	
% Al_2O_3	13,18	13,27	13,19	13,45	13,18	13,38	13,43	13,20	13,07	13,26	13,04	
% Fe_2O_3	0,05	0,02	0,02	0,00	0,00	0,12						
% FeO	1,24	0,94	1,01	1,23	1,12	1,08	1,48	1,16	1,16	1,47	1,30	
% MnO	0,01	0,01	0,02	0,02	0,02	0,02	0,02	0,02	0,03	0,03	0,03	
% MgO	0,06	0,05	0,11	0,04	0,20	0,07	0,03	0,01	0,01	0,04	0,00	
% CaO	0,31	0,05	0,54	0,20	0,22	0,10	0,15	0,13	0,57	0,31	0,22	
% Na_2O	7,98	6,11	6,19	6,02	5,63	6,44	8,75	6,83	7,01	6,82	6,35	
% K_2O	0,34	2,52	2,75	2,98	3,12	0,83	0,42	2,58	2,79	3,63	3,21	
% H_2O^+	0,16	0,27	0,28	0,27	0,18							
% H_2O^-	0,11	0,07	0,10	0,07	0,11	0,07	0,02	0,03	0,03	0,03	0,02	
% P_2O_5	0,01	<0,01	<0,01	<0,01	<0,01	<0,01	0,04	0,04	0,04	0,04	0,04	
% CO_2	0,09	<0,05	0,14	0,08	0,13	<0,05						
% F	0,045	0,017	0,295	0,147	0,100	0,033						
% Loss on ignition							0,29	0,28	0,46	0,36	0,33	
Total	99,75	100,02	100,25	100,23	100,02	99,98	100,53	100,47	100,38	100,23	100,24	
ppm Rb							13	70	76	64	67	26
ppm Sr							91	75	54	79	73	88
Rb/Sr							0,14	0,93	0,71	0,82	0,92	0,29
Na_2O/K_2O	23,47	2,42	2,25	2,02	1,80	7,76						
Peralkaline index	1,02	0,96	1,00	0,98	0,96	0,86						

* Analysed by General Superintendence Co. Ltd.

Table V

Analyses of samples across borehole BC5

Sill No. / Sample No.	BC5 -0,21	BC5 -0,17	BC5 -0,12	BC5 -0,04	BC5 0,01	BC5 0,02	BC5 0,03	BC5 0,07	BC5 0,73	BC5 0,88	BC5 0,97	BC5 1,80	BC5 3,00	BC5 3,68
% SiO_2	82,86	84,69	87,62	85,85	75,14	80,98	78,93	77,77	74,15	74,07	74,16	74,21	74,96	75,44
% TiO_2	0,24	0,27	0,17	0,18	0,07	0,03	0,04	0,05	0,05	0,06	0,06	0,06	0,05	0,06
% Al_2O_3	7,28	6,29	4,89	5,37	13,92	11,21	12,32	12,66	12,99	13,20	13,22	13,30	12,82	12,64
% Fe_2O_3	0,47	0,34	0,36	0,17	0,86	0,62	0,51	0,34	0,08	0,03	0,14	0,03	0,08	0,19
% FeO	3,29	3,17	2,43	3,23	1,72	0,89	0,53	0,44	1,08	1.19	1,06	1,18	1,06	0,97
% MnO	0,08	0,08	0,07	0,08	0,04	0,04	0,06	0,05	0,04	0,03	0,03	0,03	0,03	0,03
% MgO	2,39	2,21	2,01	2,29	1,45	0,99	0,94	0,78	0,89	0,88	0,90	1,02	0,97	0,65
% CaO	0,06	0,06	0,06	0,12	0,09	0,06	0,55	0,61	0,39	0,33	0,27	0,36	0,10	0,09
% Na_2O	0,56	0,25	0,25	0,35	0,42	0,35	0,41	4,67	6,86	7,02	6,72	6,56	7,02	6,96
% K_2O	1,44	1,19	0,92	0,93	4,57	3,50	3,81	1,79	3,13	3,01	3,07	2,92	2,44	3,18
% H_2O^+	1,43	1,49	1,17	1,53	1,41	1,09	1,61	0,74	0,20	0,17	0,14	0,01	0,22	0,24
% H_2O^-	0,04	0,01	0,01	0,10	0,08	0,07	0,07	0,01	0,01	0,01	0,03	0,01	0,01	0,03
% P_2O_5	0,07	0,06	0,06	0,06	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,06	0,05	0,05
% CO_2*	0,32	0,17	0,08	0,06	0,58	0,45	0,34	0,50	0,23	0,23	0,27	0,37	0,14	0,13
% F *	0,117	0,136	0,126	0,114	0,182	0,072	0,086	0,022	0,163	0,136	0,126	0,175	0,056	0,086
% Cl *	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	0,028	0,017	0,013	0,015	<0,001
% S *	0,1065	0,0786	0,0552	0,0350	0,1446	0,0985	0,0148	0,0091	0,0089	0,0151	0,0173	0,0138	0,0130	0,0164
Total	100,77	100,51	100,28	100,48	100,73	100,52	100,27	100,49	100,32	100,45	100,28	100,31	100,04	100,76
ppm Rb					205	120	130	69	45	53	51	49	44	48
ppm Sr					18	34	69	142	86	85	85	85	86	82
Rb/Sr					11,3	3,5	1,9	0,5	0,5	0,6	0,6	0,6	0,5	0,6
Na_2O/K_2O					0,09	0,10	0,11	2,61	2,19	2,33	2,19	2,25	2,88	2.19
Peralkaline index					0,40	0,39	0,39	0,76	1,13	1,12	1,09	1,05	1,11	1,17

* Analysed by General Superintendence Co. Ltd

Analyses of samples across borehole BC7

Sill No.	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Sample No.	BC7 −0,04	BC7 0,01	BC7 0,03	BC7 0,04	BC7 0,05	BC7 0,06	BC7 0,07	BC7 0,08	BC7 0,10	BC7 0,13	BC7 3,20	BC7 3,22	BC7 3,24	BC7 3,26
% SiO_2	70,02	73,83	78,20	79,61	76,10	75,70	76,29	76,62	76,21	76,31	75,51	75,62	75,88	75,52
% TiO_2	0,88	0,25	0,05	0,05	0,05	0,05	0,06	0,05	0,05	0,05	0,06	0,05	0,06	0,05
% Al_2O_3	12,27	15,08	12,63	13,03	13,01	12,75	13,05	13,10	13,12	13,18	13,15	13,23	13.19	13,25
% Fe_2O_3] % FeO	7,87	2,60	2,43	1,63	1,42	1,35	1,27	1,19	1,03	1,11	1,46	1,52	1,61	1,47
% MnO	0,09	0,03	0,04	0,02	0,05	0,06	0,06	0,04	0,04	0,03	0,02	0,02	0,02	0,03
% MgO	3,85	1,11	0,99	0,20	0,30	0,17	0,08	0,11	0,04	0,03	0,03	0,08	0,02	0,04
% CaO	0,15	0,15	0,05	0,10	1,95	2,35	1,43	0,89	0,80	0,69	0,36	0,37	0,41	0,51
% Na_2O	0,30	0,34	0,31	0,33	0,38	0,64	3,14	5,16	6,65	6,75	9,22	9,08	8,46	7,36
% K_2O	2,16	4,70	3,64	3,93	3,93	3,70	2,80	1,98	1,36	1,22	0,25	0,29	0,52	1,04
% H_2O^+	2,27	1,62	1,53	1,01	1,49	1,46	1,05	0,62	0,44	0,36	0,10	0,09	0.22	0,33
% H_2O^-	0,06	0,04	0,05	0,13	0,07	0,03	0,03	0,03	0,02	0,03	0,03	0,03	0,05	0,07
% P_2O_5	0,12	0,07	0,05	0,05	0,04	0,05	0,04	0,04	0,04	0,04	0,04	0,04	0,02	0,04
% CO_2*	0,71	0,51	0,27	0,40	1,65	1,88	1,13	0,73	0,62	0,[illegible]	0,18	0,23	0,27	0,45
% F *	0,075	0,105	0,086	0,065	0,079	0,060	0,060	0,109	0,072	0,060	0,131	0,126	0,126	0,068
% Cl *	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	0,005	0,003	<0,001	<0,001	<0,001
% S *	0,0882	0,1311	0,0569	0,2080	0,0332	0,0060	0,0087	0,0079	0,0148	0,0061	0,0126	0,0087	0,0122	0,0129
Total	100,91	100,57	100,39	100,77	100,55	100,25	100,50	100,69	100,52	100,46	100,55	100,80	100,86	100,25
ppm Rb		293	107	46	102	151	86	56	65	64	9	9	28	23
ppm Sr		38	24	11	74	126	68	48	85	89	85	85	92	54
Rb/Sr		7,8	4,5	4,3	1,4	1,2	1,3	1,2	0,8	0,7	0,1	0,1	0,3	0,4
Na_2O/K_2O		0,07	0,09	0,08	0,10	0,17	1,12	2,61	4,89	5,53	36.88	31,31	16,27	7,08
Peralkaline index		0,37	0,35	0,37	0,38	0,40	0,63	0,81	0,95	0,94	1,17	1,15	1.10	1,00

* Analysed by General Superintendence Co. Ltd.

<u>Table VI</u> Cont:-

Sill No.	3	3	3	3	3	3	3	3	3	3
Sample No.	BC5 3,27	BC7 3,28	BC7 3,29	BC7 3,30	BC7 3,31	BC7 3,32	BC7 3,33	BC7 3,34	BC7 3,39	BC7 3,45
% SiO2	76,41	76,[illegible]	76,98	78,16	78,45	77,86	78,31	76,22	69,00	73,64
% TiO_2	0,06	0,05	0,05	0,05	0,05	0,06	0,04	0,27	1,14	0,55
% Al_2O_3	13,22	13,20	13,34	13,36	13,48	13,43	13,17	13,86	10,29	10,40
% Fe_2O_3 / % FeO	1,35	1,32	1,42	1,81	1,66	1,80	1,60	2,32	9,81	6,80
% MnO	0,04	0,03	0,02	0,02	0,02	0,02	0,02	0,02	0,10	0,07
% MgO	0,00	0,10	0,20	0,54	0,44	0,46	0,46	0,91	4,33	3,04
% CaO	0,75	0,79	0,06	0,08	0,02	0,01	0,02	0,10	0,41	0,41
% Na_2O	5,95	5,67	4,38	0,53	0,30	0,33	0,24	0,22	0,30	0,28
% K_2O	1,59	1,81	2,41	4,13	4,38	4,46	4,42	4,79	1,61	2,18
% H_2O^+	0,37	0,56	0,37	1,12	1,33	1,45	1,60	1,37	1,49	1,53
% H_2O^-	0,03	0,03	0,05	0,03	0,04	0,07	0,05	0,05	0,05	0,04
% P_2O_5	0,04	0,04	0,04	0,05	0,04	0,04	0,04	0,05	0,10	0,08
% CO_2*	0,75	0,64	0,45	0,41	0,24	0,23	0,11	0,47	1,54	1,09
% F *	0,056	0,062	0,045	0,075	0,069	0,069	0,079	0,089	0,072	0,069
% Cl *	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001
% S *	0,0127	0,0223	0,0862	0,0887	0,0349	0,0708	0,0218	0,0955	0,0577	0,3512
Total	100,64	100,37	99,91	100,49	100,56	100,36	100,21	100,85	100,30	100,53
ppm Rb	44	49	72	119	94	129	167	170		
ppm Sr	60	55	43	42	30	36	31	20		
Rb/Sr	7	0,9	1,7	2,8	3,2	3,6	5,5	8,5		
Na_2O/K_2O	3,74	3,13	1,82	0,13	0,07	0,07	0,05	0,05		
Peralkaline index	0,87	0,86	0,74	0,40	0,39	0,40	0,39	0,40		

* Analysed by General Superintendence Co. Ltd.

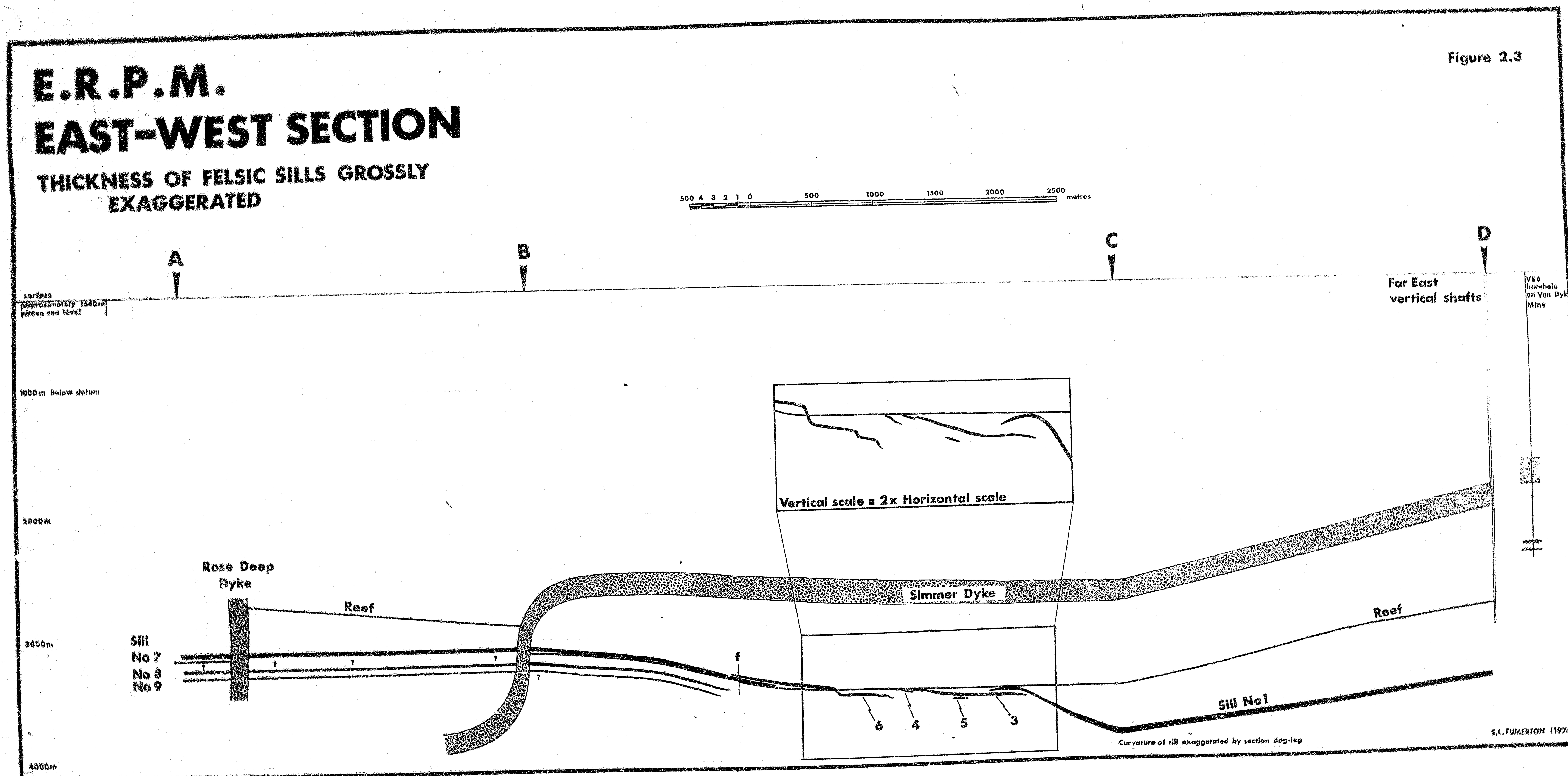
Analyses of samples adjacent to quartz veins

Sill No.	6	6	6	6	6	6	6	3	3
Sample No.	G -0,02	G -0,01	G 0,01	G 0,02	G 0,03	G 0,04	G 0,05	BC1 20A	BC1 20B
% SiO_2	72,50	73,28	75,13	74,75	75,62	74,77	74,66	98,41	74,60
% TiO_2	0,04	0,03	0,05	0,05	0,05	0,05	0,06	0,02	0,03
% Al_2O_3	14,96	14,98	13,46	13,00	12,99	13,10	13,30	0,47	13,29
% Fe_2O_3	0.06	0.11	0,06	0,08	0,10	0,18	0,09	0,08	0,02
% FeO	0,08	0,04	0,24	0,37	0,75	0,80	1,08	0,04	0,26
% MnO	0,02	0,02	0,03	0,04	0,03	0,04	0,02	0,02	0,03
% MgO	0,94	0,75	0,78	0,74	0,77	0,80	0,88	0,64	0,84
% CaO	0,14	0,12	0,38	1,22	0,25	0,17	0,21	0,05	0,58
% Na_2O	8,60	8,60	6,39	6,37	6,56	6,44	6,34	0,52	7,64
% K_2O	2,55	2,27	3,48	3,04	3,02	3,46	3,39	0,04	2,55
% H_2O^-	0,02	0,02	0,02	0,04	0,02	0,11	0,05	0,07	0,04
% P_2O_5	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05	0,05
% Loss on ignition	0,21	0,18	0,40	0,88	0,46	0,37	0,44	0,10	0,65
Total	100,18	100,46	100,48	100,64	100,67	100,34	100,58	100,53	100,60


E.R.P.M.
DISTRIBUTION
OF FELSIC SILLS
Projected onto surface
Figure 2.1
N
1
2
3
4
5
6
7
8
9
10
A
SECTION LINE A-B-C-D
B
C
D
Possible reef-sill trace extending to City Deep Mine
Aerial extent of felsic sill with reef-sill trace, numbered as in the text,
Solid border marks known termination
Dashed border marks infered termination
Infered suboutcrop
Vertical, subvertical & inclined shafts
Mined out areas as of 30/9/74
Mine boundary
500 4 3 2 1 0 500 1000 1500 2000 2500 metres
SCALE 1:20 000
S.L. FUMERTON (1974)


E.R.P.M.
UNDERGROUND
WORKINGS
Projected onto surface
Figure 1.2
T N
WESTERN SECTION
CENTRAL SECTION
EASTERN SECTION
DRIEFONTEIN
ANGELO
HERCULES
80 level
3428m below surface
77 level
east stope
VENTILATION
SOUTH WEST VERTICAL
SOUTH WEST SUBVERTICAL
WEST 1
WEST 2
WIT DEEP EAST
ANGELO WEST
COMET
HERCULES
CINDERELLA
CINDERELLA EAST
CENTRAL VERTICAL
CENTRAL SUBVERTICAL
SOUTH EAST VERTICAL
SOUTH EAST SUBVERTICAL
FAR EAST SUBVERTICAL
FAR EAST VERTICAL
3 NORTH
1 NORTH
2 NORTH
DRIEFONTEIN
2 SOUTH
1 SOUTH
ANGELO
MAIN
AGNES MUNRO
CASON
BLUE SKY
SECONDARY
TERTIARY
QUATERNARY
34 M.H.
41 M.H.
45 M.H.
49 M.H.
49 Main haulage
58 M.H.
57 M.H.
42 M.H.
37 M.H.
27 M.H.
21 M.H.
68 M.H.
(22) 3000 M.H.
22 Station cross cut
58 Main haulage
'D' pilot winze
'E' pilot winze
'F' pilot winze
'H' pilot winze
'M' pilot winze
'N' pilot winze
'O' pilot winze
L74 Expl. Cross Cut
C
D
F
G
H
H1
K
K1
L
Vertical shafts
500 4 3 2 1 0 500 1000 1500 2000 2500 metres
Main Reef Road
Germiston
Boksburg
Heidelberg

Figure 2.3



E.R.P.M.
EAST-WEST SECTION
THICKNESS OF FELSIC SILLS GROSSLY EXAGGERATED
500 4 3 2 1 0
500
1000
1500
2000
2500
metres
A
B
C
D
surface
approximately 1640m
above sea level
Far East
vertical shafts
VS6
borehole
on Van Dyk
Mine
1000m below datum
2000m
3000m
4000m
Vertical scale = 2x Horizontal scale
Rose Deep
Dyke
Reef
Simmer Dyke
Reef
Sill
No 7
No 8
No 9
f
6
4
5
3
Sill No1
Curvature of sill exaggerated by section dog-leg
S.L. FUMERTON (1974)

E.R.P.M.
STRUCTURAL
GEOLOGY
Figure 2.4
T N
PHOENIX FAULT
SHEASBY FAULT
STRUTHERS FAULT
HERCULES FAULT
SIMMER DYKE
ROSE DEEP DYKE
C
D
F
G
H
K
L
Fault-reef trace with symbol on downthrown side
Reef-dyke or reef-sill trace
Vertical, subvertical & inclined shafts
Mine boundary
5 4 3 2 1 0 500 1000 1500 2000 2500 metres
SCALE 1:20 000
(BASED ON PLANS MADE AVAILABLE BY ERPM)
S.L. FUMERTON & D.G. JEFFERY (1974)

ERPM

'H' SECTION

Figure 2.2

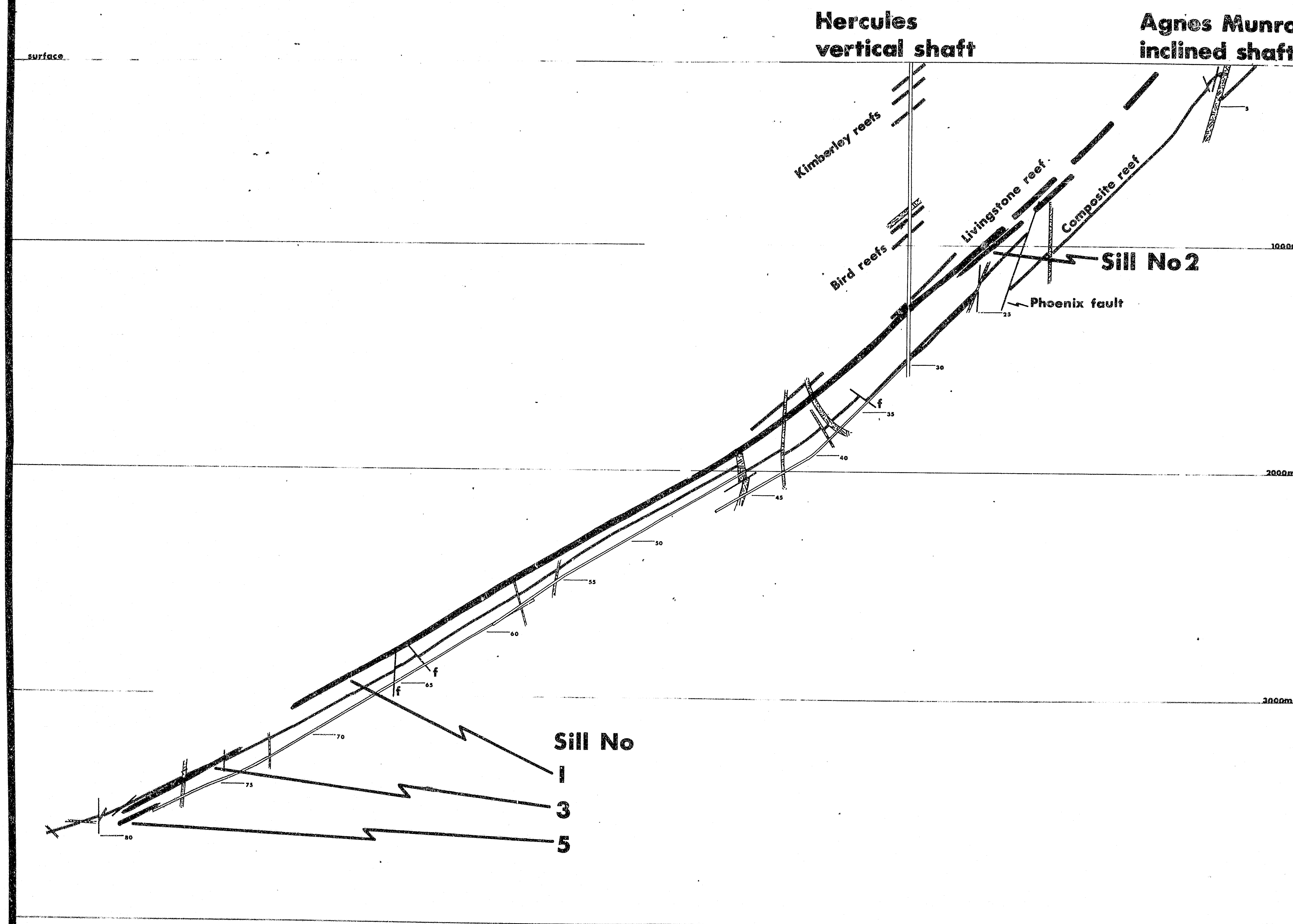


Table II

Analyses of samples from the central zone of the sills except the last two which are contact zone samples.

Sill No.	1	1	1	3	3	3	4	4	6	6	8	8	9	10	3	6
Sample No.	G41	H70A	H75II	H73A	H75F 2,6	H75Z	H76T	H77D	G75B	G76B	F70E	F67B	F64G	F64F	G74A	G74B
% SiO_2	73,69	73,87	74,49	73,65	73,53	74,01	71,52	75,94	73,69	73,81	74,68	74,70	75,04	70,28	78,15	79,79
% TiO_2	0,05	0,06	0,06	0,05	0,05	0,06	0,06	0,05	0,05	0,06	0,06	0,06	0,27	0,31	0,05	0,04
% Al_2O_3	13,21	13,28	13,06	13,16	13,13	13,05	16,14	12,77	13,15	13,13	13,24	13,21	14,12	13,50	13,46	11,62
% Fe_2O_3	0,11	0,08	1,41	0,49	0,74	0,16	0,18	0,33	0,14	0,11	0,12	0,13	1,39	0,23	0,88	0,57
% FeO	1,25	1,16		0,75	0,57	1,15	0,74	0,98	1,11	1,14	1,23	1,16	1,65	2,94	0,43	0,13
% MnO	0,05	0,04	0,03	0,06	0,06	0,05	0,03	0,02	0,04	0,04	0,03	0,04	0,04	0,08	0,02	0,02
% MgO	1,07	1,00	0,17	1,07	1,00	1,14	0,96	0,75	0,98	0,92	0,84	0,87	1,07	1,57	0,92	0,75
% CaO	0,41	0,28	0,27	0,58	0,32	0,44	0,82	0,14	0,28	0,27	0,49	0,34	0,13	3,09	0,11	0,08
% Na_2O	6,04	6,43	6,52	6,70	6,71	6,05	8,76	8,96	6,53	6,37	6,49	6,75	0,73	5,97	0,62	6,13
% K_2O	3,54	3,77	3,75	3,51	3,61	3,50	0,29	0,22	3,52	3,74	2,70	2,74	3,88	0,06	3,88	0,68
% H_2O^+	0,40	0,15	0,01	0,16	0,10	0,08	0,25	0,10	0,07	0,06	0,36	0,24	1,61	0,82	1,48	0,00
% H_2O^-	0,03	0,02	0,04	0,00	0,00	0,10	0,00	0,00	0,00	0,05	0,04	0,05	0,02	0,05	0,06	0,07
% P_2O_5	0,05	0,05	0,04	0,05	0,05	0,05	0,06	0,06	0,05	0,05	0,05	0,04	0,09	0,10	0,05	0,05
% CO_2 *	0,12	0,27	0,13	0,27	0,14	0,35	0,49	0,18	0,64	0,64	0,10	0,14	0,25	1,42	0,28	0,67
% F *	0,136	0,131	0,117	0,151	0,122	0,146	0,105	0,032	0,131	0,122	0,136	0,126	0,089	0,029	0,089	0,029
% Cl *	<0,001	0,039	0,003	0,004	0,018	<0,001	0,003	0,004	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001	<0,001
% S *	0,0085	0,0163	0,0075	0,0065	0,0117	0,0049	0,0087	0,0426	0,1470	0,0977	0,0099	0,0063	0,0422	0,0173	0,0507	0,1619
Total	100,16	100,63	100,09	100,65	100,17	100,34	100,42	100,59	100,49	100,60	100,57	100,60	100,15	100,72	100,50	100,80
ppm Rb			178													
ppm Sr			25													
Rb/Sr			7,12													
ppm Au †										0,20						
Na_2O/K_2O	1,71	1,71	1,74	1,91	1,86	1,73	30,21	40,73	1,86	1,70	2,40	2,46	0,19	99,50	0,16	0,01
Peralkaline index	1,04	1,10	1,13	1,13	1,14	1,05	0,91	1,17	1,11	1,11	1,03	1,07	0,38	0,73	0,39	0,93

† Analysed by Assay Dept, E.R.P.M.

* Analysed by General Superintendence Co. Ltd.

Author Fumerton S L
Name of thesis The Felsic intrusives in E.R.P.M. Boksburg 1975

PUBLISHER:
University of the Witwatersrand, Johannesburg
©2013

LEGAL NOTICES:

Copyright Notice: All materials on the University of the Witwatersrand, Johannesburg Library website are protected by South African copyright law and may not be distributed, transmitted, displayed, or otherwise published in any format, without the prior written permission of the copyright owner.

Disclaimer and Terms of Use: Provided that you maintain all copyright and other notices contained therein, you may download material (one machine readable copy and one print copy per page) for your personal and/or educational non-commercial use only.

The University of the Witwatersrand, Johannesburg, is not responsible for any errors or omissions and excludes any and all liability for any errors in or omissions from the information on the Library website.