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OPEN FILE REPORT SERIES

GEOCHEMICAL BACKGROUND, MT PERCY, KALGOORLIE, WESTERN AUSTRALIA

C.R.M. Butt

CRC LEME OPEN FILE REPORT 54

October 1998

(CSIRO Division of Exploration Geoscience Report 389R, 1993.
Second impression 1998)

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CRC LEME is an unincorporated joint venture between The Australian National University, University of Canberra, Australian Geological Survey Organisation and CSIRO Exploration and Mining
Headquarters: CRC LEME c/o CSIRO Exploration and Mining, Private Bag, PO Wembley, Western Australia, 6014

RESEARCH ARISING FROM CSIRO/AMIRA REGOLITH GEOCHEMISTRY PROJECTS 1987-1993

In 1987, CSIRO commenced a series of multi-client research projects in regolith geology and geochemistry which were sponsored by companies in the Australian mining industry, through the Australian Mineral Industries Research Association Limited (AMIRA). The initial research program, "Exploration for concealed gold deposits, Yilgarn Block, Western Australia" (1987-1993) had the aim of developing improved geological, geochemical and geophysical methods for mineral exploration that would facilitate the location of blind, buried or deeply weathered gold deposits. The program included the following projects:

P240: Laterite geochemistry for detecting concealed mineral deposits (1987-1991). Leader: Dr R.E. Smith.
Its scope was development of methods for sampling and interpretation of multi-element laterite geochemistry data and application of multi-element techniques to gold and polymetallic mineral exploration in weathered terrain. The project emphasised viewing laterite geochemical dispersion patterns in their regolith-landform context at local and district scales. It was supported by 30 companies.

P241: Gold and associated elements in the regolith - dispersion processes and implications for exploration (1987-1991). Leader: Dr C.R.M. Butt.
The project investigated the distribution of ore and indicator elements in the regolith. It included studies of the mineralogical and geochemical characteristics of weathered ore deposits and wall rocks, and the chemical controls on element dispersion and concentration during regolith evolution. This was to increase the effectiveness of geochemical exploration in weathered terrain through improved understanding of weathering processes. It was supported by 26 companies.

These projects represented "an opportunity for the mineral industry to participate in a multi-disciplinary program of geoscience research aimed at developing new geological, geochemical and geophysical methods for exploration in deeply weathered Archaean terrains". This initiative recognised the unique opportunities, created by exploration and open-cut mining, to conduct detailed studies of the weathered zone, with particular emphasis on the near-surface expression of gold mineralisation. The skills of existing and specially recruited research staff from the Floreat Park and North Ryde laboratories (of the then Divisions of Minerals and Geochemistry, and Mineral Physics and Mineralogy, subsequently Exploration Geoscience and later Exploration and Mining) were integrated to form a task force with expertise in geology, mineralogy, geochemistry and geophysics. Several staff participated in more than one project. Following completion of the original projects, two continuation projects were developed.

P240A: Geochemical exploration in complex lateritic environments of the Yilgarn Craton, Western Australia (1991-1993). Leaders: Drs R.E. Smith and R.R. Anand.
The approach of viewing geochemical dispersion within a well-controlled and well-understood regolith-landform and bedrock framework at detailed and district scales continued. In this extension, focus was particularly on areas of transported cover and on more complex lateritic environments typified by the Kalgoorlie regional study. This was supported by 17 companies.

P241A: Gold and associated elements in the regolith - dispersion processes and implications for exploration. Leader: Dr. C.R.M. Butt.
The significance of gold mobilisation under present-day conditions, particularly the important relationship with pedogenic carbonate, was investigated further. In addition, attention was focussed on the recognition of primary lithologies from their weathered equivalents. This project was supported by 14 companies.

Although the confidentiality periods of the research reports have expired, the last in December 1994, they have not been made public until now. Publishing the reports through the CRC LEME Report Series is seen as an appropriate means of doing this. By making available the results of the research and the authors' interpretations, it is hoped that the reports will provide source data for future research and be useful for teaching. CRC LEME acknowledges the Australian Mineral Industries Research Association and CSIRO Division of Exploration and Mining for authorisation to publish these reports. It is intended that publication of the reports will be a substantial additional factor in transferring technology to aid the Australian Mineral Industry.

This report (CRC LEME Open File Report 54) is a Second impression (second printing) of CSIRO, Division of Exploration Geoscience Restricted Report 389R, first issued in 1993, which formed part of the CSIRO/AMIRA Project P241A.

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PREFACE

Correct assessment of the significance of geochemical exploration data requires, *inter alia,* an appreciation of the background concentrations of the elements associated with mineralization in all possible sample media, on both local and regional scales. In many of the detailed dispersion studies undertaken in the Project, it has not been possible to obtain an adequate estimation of background, either laterally or, more significantly, along strike, because of the non-availability of suitable samples. However, at Mt. Percy diamond drilling showed that a site approximately 1 km along strike from the Mystery Zone deposit has an apparently similar geological setting, except for the absence of mineralization and the alteration associated with it. This provided the opportunity to investigate the geochemical and mineralogical effects of mineralization and to estimate relevant background values. The site is not ideal, because the only available samples of the regolith were 150 m to the south, and these are evidently derived from weakly altered and mineralized rocks. The data from the regolith, therefore, give an estimate for local background within the mineralized system itself. The information also supplements the multi-element and mineralogical database of weathering and dispersion in a range of geological settings in the Yilgan Block and provides further evidence that even minor mineralization may have a surface expression in areas of transported cover.

C.R.M. Butt
Project Leader

May 1993.

GEOCHEMICAL BACKGROUND, MT. PERCY, KALGOORLIE, WESTERN AUSTRALIA

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SUMMARY

In an earlier study the distribution of gold and over 40 other elements in the regolith was determined over the mineralized Mystery Zone at Mt. Percy. The site is typical of supergene Au deposits in the Kalgoorlie area. However, most of the samples were from the pit, so that only those from the western margin, including some drill cuttings, were in unaltered and unmineralized rocks or their weathered equivalent. None were distant from mineralization and could provide an adequate measure of the background. A further study has been undertaken to determine the geochemical background, using samples from diamond and percussion drilling approximately 1000 m N of the Mystery pit, across the same stratigraphy. The site was not ideal because, unlike the Mystery Zone, the regolith has been partly eroded and there is no lateritic duricrust or gravel horizon. Nevertheless, it provides useful comparative data for much of the regolith over barren or weakly mineralized equivalents of the rocks of the Mystery Zone.

The unweathered rocks in the background site consist of talc-chlorite-carbonate rocks of the Hannan's Lake Serpentinite, intruded by felsic porphyries. Unlike the Mystery Zone, there is no fuchsite-quartz-carbonate alteration and the rocks are essentially barren, with a maximum Au content of 8 ppb. The weathering front is at about 60 m but the full regolith profile could not be sampled as all percussion holes were terminated in saprolite at about 34 m vertical depth. The regolith consists of strongly leached saprolite that becomes softer and increasingly clay-rich towards the surface, merging with plasmic and mottled clays at about 10 m depth. These form a transitional zone, up to 4 m thick, between the saprolite and an almost uniform cover of non-calcareous and calcareous red clay soils. The regolith samples are from a traverse about 150 m south of the barren unweathered rocks of the diamond drill section and contain minor Au mineralization, associated with now-weathered fuchsite-altered ultramafic rocks.

For the *unweathered rocks* and *saprolites*, comparisons between the background site and mineralization in Mystery Zone indicate:

1. In both fresh and weathered ultramafic rocks, alteration is indicated by fuchsite (chromian muscovite) and by elevated concentrations of K, Ba and V. Altered porphyries can possibly be distinguished by their higher K contents.
2. Unmineralized talc chlorite ultramafic rocks in the Mystery Zone are relatively enriched in As and Sb compared to their equivalents in the background area. This may indicate widespread weak primary dispersion from mineralization into apparently barren wallrocks. The enrichment continues into the saprolite.
3. Unweathered mineralized porphyries have enhanced K, V, Au, As, W and Sb contents relative to unaltered background porphyries. However, although Au, As and W abundances are greater in the saprolite in the Mystery Zone, there appears to be no significant difference in Sb content compared to the minor background mineralization.
4. Weathered fuchsitic ultramafic rocks of the Mystery Zone are enriched in Au, As, W and Sb relative to background.

5. Overall, in addition to Au, mineralized saprolite is indicated by As (contrast x10 compared to barren talc-chlorite ultramafic rocks), Sb and W (contrasts x2, but x6 in porphyries). Regional scale thresholds are 20 ppb Au, 10 ppm As, 4 ppm Sb and 3 ppm W; local thresholds are rather greater, *i.e.*, 90 ppb Au, 35 ppm As, 8 ppm Sb, 6 ppm W.

In the *clay-saprolite* and *mottled clay* horizons broadly similar conclusions apply, except that Au may be leached and that W and, particularly, Sb tend to be more strongly concentrated than in the saprolite, particularly over the porphyries. However, data from these horizons are too few to provide an adequate comparison. The *red clay soils* at the background site do not retain a clear indication of their parent lithologies, unlike immediately underlying horizons, and are, therefore, probably transported. The data indicate that Au becomes concentrated in the calcareous surface horizons, although it is not certain whether the anomaly represents a widespread enrichment (local threshold about 30 ppb) or is related directly to the concealed minor mineralization deeper in the regolith. The occurrence of Au anomaly in calcareous soils overlying buried mineralization is consistent with the findings of several other investigations in the southern Yilgarn Block.

GEOCHEMICAL BACKGROUND, MT. PERCY, KALGOORLIE, WESTERN AUSTRALIA

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1 INTRODUCTION

The Mystery Zone of the Mt. Percy Mine was selected for a substantial study within the CSIRO/AMIRA Research Project because it offered the opportunity to investigate geochemical dispersion from gold mineralization at a site with a largely complete lateritic regolith. The distribution of gold and over 40 other elements was determined to exemplified the characteristics of many similar sites in the Kalgoorlie area (Gedeon and Butt, 1990; Butt, 1991). Primary Au mineralization in the Mystery Zone occurs in fuchsite-carbonate alteration zones at the contact with porphyries that intrude the Hannan's Lake serpentinite. The mineralized sequence has been deeply weathered and is concealed beneath a regolith over 60 m thick that consists of saprolite (50 m), which is clay-rich in the top 10 m, plasmic and mottled clays, and surficial horizons of lateritic gravels, lateritic duricrusts and pisolitic soils. These surficial horizons contain pedogenic carbonates in the top one to two metres.

The elements associated with primary Au mineralization appear to be S, Ag, W, As, Sb, Te and, possibly, Ba, K and Pb but, except for Ag and Te, none has a very direct relationship to Au. The Au distribution in the regolith is typical for the region, with minor enrichment and wide lateral dispersion in surficial gravels and duricrust (particularly associated with the presence of pedogenic carbonates), leaching and depletion in the underlying clay-rich horizons and some secondary concentration and minor dispersion in the saprolite. Primary and saprolitic Au mineralization is indicated by a broad superjacent Au anomaly (100- >1000 ppb) in the soils and lateritic horizons, and by high concentrations of W (5- >40 ppm), Sb (7- >16 ppm) and As (10-200 ppm). High K contents, due to resistant muscovite, give surface expression to the alteration zone. Although Au contents are <100 ppb in the underlying clay-rich horizons, Sb, W and, to a lesser extent, As remain anomalous; similarly, Ba and K contents remain high, indicating the porphyries and alteration zones respectively.

Sampling for the dispersion study was on two sections, 50 m apart, and based predominantly on duplicates of material collected for grade control. Except for a few samples of cuttings from the percussion pre-collar of a diamond drill hole passing beneath one of the sections, all samples were confined to the pit. Only samples from the western margin of the pit, including the drill cuttings, were in unaltered and unmineralized rocks or their weathered equivalents. None, therefore, were distant from mineralization or could provide an adequate measure of the geochemical background. Accordingly, a further study has been undertaken to attempt to determine the background, utilizing samples from drill traverses approximately 1000 m N of the Mystery pit, across the same stratigraphic sequence (Figure 1). The site was not ideal, because, *firstly*, the regolith has been partly eroded, so that there is no lateritic duricrust or gravel horizon and, *secondly*, the unweathered background samples are from a diamond drill hole on a section 150 m N of the nearest fence of reverse circulation percussion drilling. Nevertheless, the data provide useful comparison for much of the regolith over barren or weakly mineralized equivalents of the rocks of the Mystery Zone.

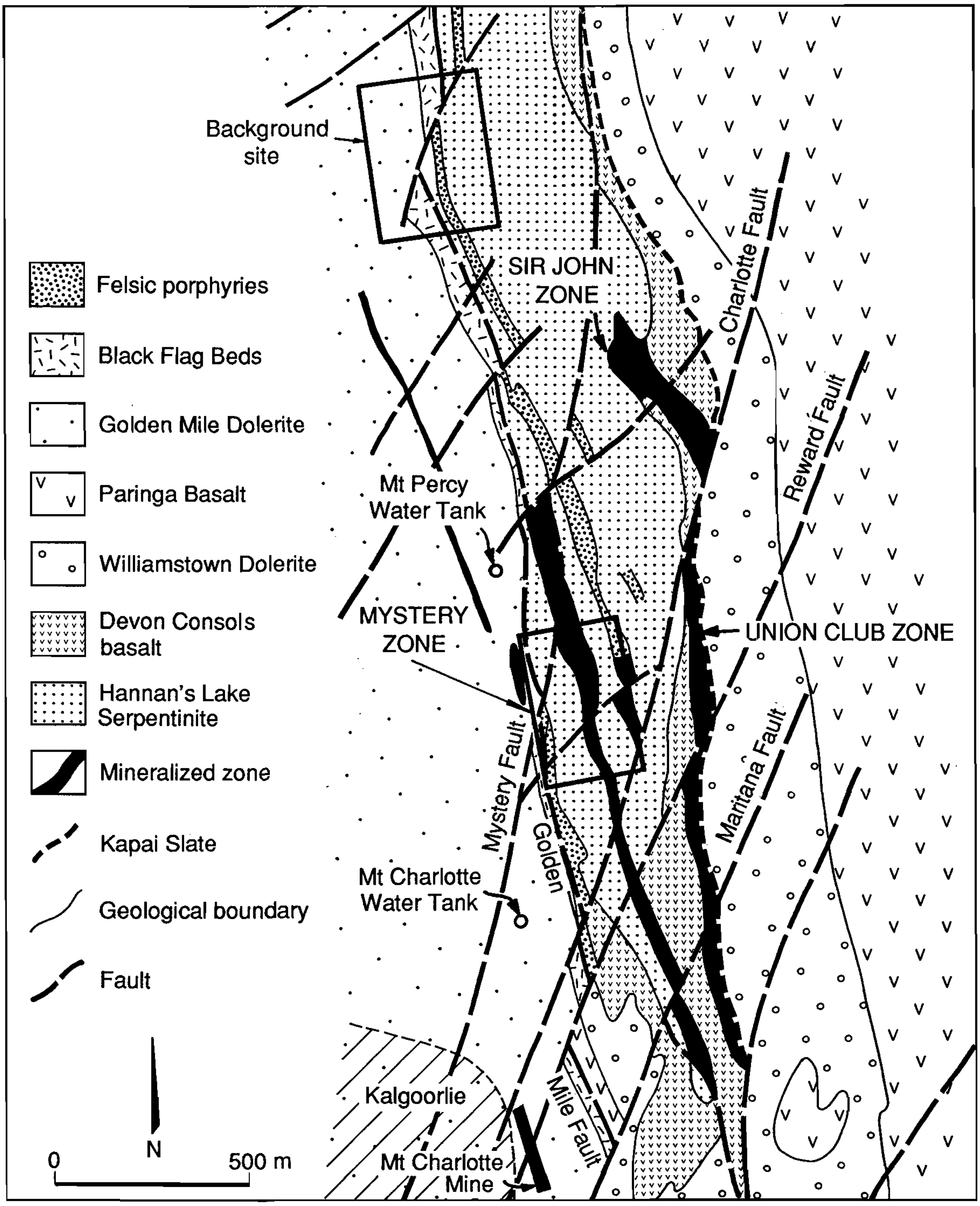


Figure 1. Regional geological setting of gold mineralization at Mt. Percy, Kalgoorlie, modified from Sauter et al., (1988). Box outlines location of background site shown on Figure 2.

2 GEOLOGICAL AND GEOMORPHOLOGICAL SETTING

Mt. Percy is about 2 km NE of the centre of Kalgoorlie. It lies at the northern end of the Kalgoorlie-Kambalda greenstone sequence, about 8 km N. of the Golden Mile and 1.5 km N. of Mt. Charlotte (Figure 1). At Mt. Percy, the Hannan's Lake Serpentinite, Devon Consols Basalt, Kapai Slate and Williamstown Dolerite form part of the hinge zone and steeply east-dipping limb of the Kalgoorlie Anticline (Travis *et al.*, 1971). The sequence is cut by a series of north-trending, west-dipping dextral faults, including the Maritana, Reward, Charlotte and Mystery Faults. Mineralization at Mt. Percy is located in the Hannan's Lake Serpentinite in the Mystery Zone and the Devon Consols Basalt in the Union Club and Sir John Zones (Sauter *et al.*, 1988). In the Mystery Zone, the talc-chlorite-carbonate rocks of the Hannan's Lake Serpentinite are intruded by porphyries, with strong fuchsite-carbonate alteration occurring at their contacts. Primary gold mineralization is largely confined to a series of irregular, mostly steeply-dipping lenses within the porphyries and adjacent alteration zones. To the north, the Mystery Zone sequence is cross-cut by NE-trending splays from the Golden Mile fault and is only weakly altered and mineralized.

Mt. Percy is situated in a relatively high part of the landscape, in a region that has a total relief of only a few tens of metres. The background site has been eroded to a few metres below the high points of lateritic duricrust formed locally over the Golden Mile Dolerite and the talc-chlorite-carbonate rocks of the Hannan's Lake Serpentinite. Nevertheless, the regolith is approximately 60 m thick, much the same as exposed in the Mystery pit.

3 SAMPLING AND ANALYSIS

3.1 Sampling

The objective of the sampling programme was to obtain a suite of samples to illustrate the vertical and lateral distribution of elements developed in the regolith over barren or poorly mineralized rocks similar to those in the mineralized Mystery Zone. The area fitting this requirement most closely is situated about 1000 m N along strike from the northern wall of the Mystery pit. The area had been drilled in 1986 and cuttings left unprotected, so that many were lost or unsuitable. It was not possible to sample the regolith (from percussion drilling) directly above the unweathered rock intersected by diamond drilling. The following samples were collected:

1. Reverse circulation percussion drill cuttings. A total of 79 regolith samples, each composited over 2 m, were taken from holes RCH 2140, 2142, 2143 and 2144, which were drilled to 40 m down-hole depth on line 17350 N at an inclination of 60° and bearing of 90°. Cuttings from other holes on the line were lost or unsuitable.

2. Diamond drill core. Diamond drill hole KND 134 was drilled on line 17500 N at an inclination of 50° and a bearing of 270°. Representative samples (22) of unweathered Hannan's Lake serpentinite and intrusive porphyries were collected as 1 m sections of quarter core. Each core sample included heterogeneities due to veining but was otherwise lithologically homogeneous.

3.2 Analysis

All samples selected for analysis were dried (40°C), a sub-sample taken for reference and the remainder jaw-crushed to 4 mm or smaller. The material was then riffle split and a minimum of 100 g extracted for grinding to less than 75 μm in a Mn steel mill.

Samples were analysed as follows:

A. Neutron activation analysis (INAA), 30 g sample (Becquerel Laboratories Pty. Ltd.):

Sb, As, Ba, Br, Ce, Cs, Cr, Co, Eu, Au, Hf, Ir, Fe, La, Lu, Mo, Rb, Sm, Sc, Se, Ag, Ta, Th, W, U, Yb, Zn.

B. X-Ray fluorescence (XRF) on pressed powders using a Philips PW1220C instrument by the methods of Norrish and Chappell (1977) and Hart (1989), with Fe determined for matrix correction (CSIRO):

Ba, Ce, Cu, Ga, Ge, Fe, Pb, Mn, Ni, Na_2O, Nb, Rb, Sr, S, TiO_2, V, Y, Zn, Zr.

C. Inductively-coupled plasma emission spectrometry (ICP-ES) on a Hilger E-1000 following fusion of 0.25 g samples with Li metaborate and solution in dilute HNO_3 (CSIRO):

Al_2O_3, SiO_2, Fe_2O_3, TiO_2, CaO, MgO, Ba, Be, Cr, Cu, Mn, Ni, V, Zr.

D. Atomic absorption spectrometry (AAS) using solutions prepared for ICP-ES:(CSIRO):

K_2O, Na_2O.

The detection limits are listed in Table II/1, Appendix II. A number of elements were analysed by more than one technique (*e.g.*, Ba, Cr, Ce, Fe, Rb, Zr) and others were at concentrations below detection limit in most, if not all, samples (*e.g.*, Ag, Be Ir, Se, U). Data from the method offering the greatest sensitivity and least scatter were selected for the earlier study and the same selection has been used in this report. These are listed in Appendix X. The suffixes ".x" and ".n" to the element symbols in Figures and Tables (*e.g.*, Ba.x, Au.n) indicate analysis by XRF and INAA respectively. Where concentrations are below the detection limit, a value of half the detection limit was used for statistical purposes. The precision of the data was monitored by replicate analyses of in-house control samples introduced at a rate of about one control per 10 unknowns.

The mineralogy of selected samples was determined by X-ray diffractometry, using CuKα radiation and a graphite-crystal monochromator.

4 UNWEATHERED ROCKS

4.1 Geology

The geology of the site, determined by KCGM geologists from the percussion and diamond drilling, is shown in Figure 2. The logged and interpreted geology through the regolith is shown in section in Figure 3. The unweathered rocks, intersected by diamond drill hole KND 134 at 17500N, have been projected on to the regolith section at 17350N, offset 46 m east to allow for the NNW strike. The sequence is similar to that of the Mystery Zone, with talc-chlorite-carbonate ultramafic rocks of the Hannan's Lake serpentinite intruded by felsic porphyries, bounded to the west by the Golden Mile fault and mafic and felsic units of the Black Flag Beds. The rocks have a steep westerly dip. There appears to be little correlation between the fresh and weathered sequences, but one contact is tentatively shown in Figure 3. Fuchsite carbonate alteration of the ultramafic rocks is very minor in the core, although it appears to be more abundant in the regolith, an observation supported by the geochemical data, particularly Au and K. This difference is probably a consequence of the 150 m strike separation between the sections and the lenticular nature of the alteration.

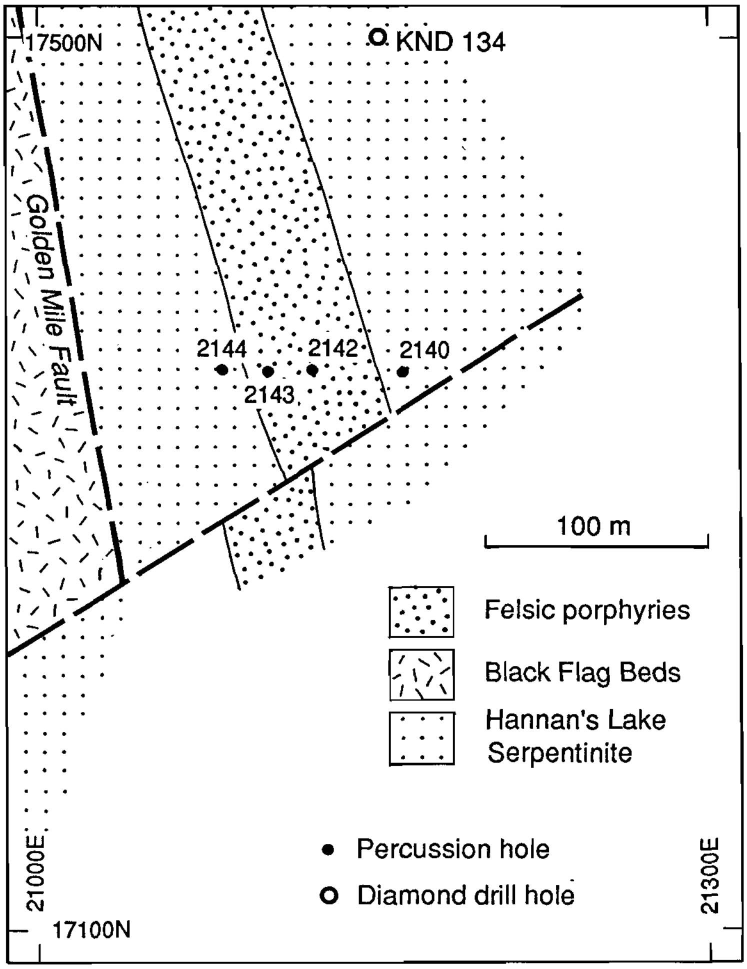


Figure 2. Geology of the background site, Mt. Percy, interpreted by KCGM geologists from exploration drilling. Location of site shown in Figure 1.

4.2 Principal lithologies

The principal lithological units have been given informal codes, defined in the text and in Appendix X, for identification in some Figures, Tables and the data listings.

Hannan's Lake serpentinite (code As). This consists of medium to pale green talc-chlorite-carbonate rocks, cross-cut by irregular carbonate-quartz veins and locally sheared and bleached. X-ray diffraction analysis shows that they consist of talc, chlorite, albite, calcite, dolomite and some magnesite, with minor quartz in some samples, probably in veins. Relict spinifex textures are preserved in places and, by analogy with the same unit in the Mystery Zone to the south, these rocks are assumed to be komatiites whose fabrics have been largely destroyed by hydrothermal alteration and metamorphism. Very minor fuchsite alteration was tentatively logged in the core from KND 134, but was not confirmed by subsequent mineralogical or geochemical analysis. However, such alteration seems to be more abundant in the weathered material intersected by the percussion drilling 150 m to the south. By analogy with their fresh equivalents in the Mystery Zone, these fuchsite altered rocks *(code Asf)* are moderately to strongly recrystallized komatiites, now composed predominantly of carbonate (dolomite and magnesite), quartz and fuchsite (chromian muscovite), with some chlorite, albite, accessory rutile and, where mineralized, pyrite.

Porphyries (code Af). The ultramafic rocks in the core are intruded by numerous porphyries, <1.0-4.5 m thick. These are mostly medium to dark grey rocks containing angular ultramafic xenoliths up to 1 cm in diameter, with minor quartz-carbonate veins and associated bleaching, and some minor silicification. Phenocrysts of quartz, feldspar and acicular mafic minerals are present in a fine grained matrix. X-ray diffraction shows the porphyries to consist of quartz, albite, chlorite, muscovite and carbonates (dolomite and minor magnesite). Disseminated fine-grained pyrite is patchily distributed as an accessory mineral. Weathered porphyries are recognized in the percussion drill cuttings although, because some may be narrower than the compositing interval of 2 m, their precise distribution is uncertain.

Black Flag Beds (code Ab). Mafic and felsic units of the Black Flag Beds occur below 195 m in KND 134, separated from the Hannan's Lake serpentinite by the Golden Mile fault. Possible equivalents occur in the regolith in RCH 2144, but their identification is uncertain.

4.3 Geochemistry

Statistical data for the talc-chlorite ultramafic rocks and the porphyries are summarized in Appendix III and the mean compositions compared with those of the equivalent lithologies in the Mystery Zone in Table 1. Only one ultramafic sample was logged as having fuchsite-carbonate alteration, but this is not confirmed by the geochemical and mineralogical data (*e.g.*, see K_2O concentrations, Table 1). As in the Mystery Zone, the principal lithologies are geochemically distinct. The porphyries are expectedly richer in Si, Al, Ti, Na, K, Ba, REE, Ga, Zr, Hf, Ta and Th and poorer in Mg, Ca, Cr, Co, Fe, Ni, Sc and V than the ultramafic rocks.

The principal differences between the two areas relate to elements associated with mineralization. The maximum Au contents in the background site are 6 ppb in the ultramafic rocks and 8 ppb in the porphyries; the concentrations of Sb, W and K are also very low. The mean Ba content is greater at the background site, in both lithologies, confirming that its abundance is related to the primary or metamorphic mineralogy of the host rocks rather than to alteration and the presence of mineralization. Because of the close association of mineralization with the porphyries in the Mystery Zone, particularly in section 15850N, it was possible that Ba was indicating the location of weathered primary mineralization even where the Au was leached from the upper saprolite and mottled zones (see Butt 1991; Section 5.2.2, page 27). The background ultramafic rocks are less magnesian (and richer in Si and Al) than those in the Mystery Zone, but greatly enriched in Sr. This may be related to the greater abundance of calcite and relative paucity of magnesite and dolomite in these rocks. The high Rb and Cs contents of the talc chlorite ultramafic rocks in the Mystery Zone is due to the presence of biotite in some units; biotite is not found in the background rocks. The cause of the minor differences in Cu and Zn contents is not known.

5 MINERALOGY AND GEOCHEMISTRY OF THE REGOLITH

5.1 Regolith profile and mineralogy

The full regolith profile could not be sampled. All percussion holes terminated in saprolite at 34 m, but the depth of weathering, as logged in the precollar of hole KND 134, is at about 60 m. The principal regolith units are shown on Figure 3 and on the element distribution plots. The regolith units have been given informal codes, defined in the text and Appendix, for identification in some Figures, Tables and the data listings. The mineralogical changes within the profiles over the principal lithologies are shown on Figure 4.

Table 1. Comparison of the mean (arithmetic) compositions of the unweathered major lithologies in the Mystery Zone and background area, Mt. Percy.

Code	Location	N	Fe.n %	SiO_2 %	Al_2O_3 %	MgO %	CaO %	Sr.x ppm	Ba.x ppm
As	Mystery Zone	19	6.56	37.58	5.79	20.80	6.14	97	13
	Background	*16*	*6.58*	*41.94*	*7.41*	*16.43*	*6.08*	*589*	*34*
Asf	Mystery Zone	29	5.91	36.60	5.34	15.85	6.33	181	223
	Background	*1*	*6.93*	*44.64*	*7.50*	*18.33*	*3.88*	*210*	*17*
Af	Mystery Zone	23	2.52	60.57	12.68	4.13	3.59	340	630
		12	*2.89*	*61.38*	*14.06*	*3.19*	*3.28*	*341*	*788*

Code	Location	N	Au.n ppb	S.x %	Sb.n ppm	As.n ppm	W.n ppm
As	Mystery Zone	19	5.3	0.03	3.3	52	1.1
	Background	*16*	*2.7*	*0.03*	*1.3*	*2*	*1.0*
Asf	Mystery Zone	29	1065.0	0.49	5.8	190	6.6
	Background	*1*	*2.5*	*0.02*	*1.1*	*3*	*1.0*
Af	Mystery Zone	23	1040.0	0.70	6.0	30	22.0
		12	*3.0*	*0.07*	*3.0*	*2*	*5.0*

Code	Location	N	Na_2O ppm	K_2O ppm	Rb.x ppm	Cs.n ppm
As	Mystery Zone	19	3353	5473	42	27.0
	Background	*16*	*6300*	*2900*	*7*	*1.7*
Asf	Mystery Zone	29	3615	15107	46	2.5
	Background	*1*	*6700*	*1700*	*12*	*5.8*
Af	Mystery Zone	23	52086	12658	37	1.9
	Background	*12*	*63200*	*7100*	*23*	*1.3*

Code	Location	N	Pb.x ppm	Zn.x ppm	Cu.x ppm	Mn.x ppm	Co.n ppm	Ni.x ppm
As	Mystery Zone	19	1	63	37	1142	89	1160
	Background	*16*	*3*	*134*	*34*	*1226*	*86*	*987*
Asf	Mystery Zone	29	7	66	49	1027	87	992
	Background	*1*	*3*	*104*	*20*	*1071*	*94*	*1095*
Af	Mystery Zone	23	12	48	39	449	15	63
	Background	*12*	*7*	*68*	*22*	*547*	*16*	*55*

Code	Location	N	Sc.n ppm	TiO_2%	V.x ppm	Cr.n ppm
As	Mystery Zone	19	22	0.26	135	2122
	Background	*16*	*25*	*0.30*	*158*	*2294*
Asf	Mystery Zone	29	20	0.24	298	1951
	Background	*1*	*27*	*0.27*	*176*	*2510*
Af	Mystery Zone	23	8	0.46	140	147
	Background	*12*	*10*	*0.52*	*81*	*141*

Table 1 continued. Comparison of the mean (arithmetic) compositions of the unweathered major lithologies in the Mystery Zone and background area, Mt. Percy.

Code	Location	N	Zr.x ppm	Hf.n ppm	Th.n ppm	Nb.x ppm	Ta.n ppm	Ga.x ppm	Ge.x ppm
As	Mystery Zone	19	15	0.5	0.25	1	0.3	6	1
	Background	*16*	*19*	*0.5*	*0.30*	*3*	*0.5*	*9*	*3*
Asf	Mystery Zone	29	13	0.5	0.25	1	0.3	7	2
	Background	*1*	*22*	*0.5*	*0.25*	*3*	*0.5*	*9*	*3*
Af	Mystery Zone	23	132	2.9	4.75	3	0.7	17	2
	Background	*12*	*153*	*3.8*	*5.95*	*4*	*1.1*	*19*	*3*

Code	Location	N	Y.x ppm	La.n ppm	Ce.n ppm	Sm.n ppm	Eu.n ppm	Yb.n ppm
As	Mystery Zone	19	6	0.6	1.3	0.66	0.25	0.6
	Background	*16*	*8*	*1.3*	*1.7*	*0.89*	*0.25*	*0.9*
Asf	Mystery Zone	29	5	0.5	1.6	0.53	0.25	0.4
	Background	*1*	*8*	*0.8*	*1.0*	*0.83*	*0.25*	*0.8*
Af	Mystery Zone	23	8	30.8	48.9	4.69	1.14	0.4
	Background	*12*	*13*	*32.2*	*64.8*	*6.42*	*1.39*	*0.9*

As: talc-chlorite carbonate ultramafic rocks; Asf: fuchsite carbonate ultramafic rocks;
Af: porphyries.

Saprolite (Codes S, Sc). The saprolite forms a broad zone about 50 m thick and has been identified as such by the presence of primary fabrics in fragments in the cuttings. The transition from unweathered to weathered rock (the weathering front) occurs beneath the deepest level sampled by the percussion drilling on line 17350N. All but three saprolite samples contain <0.1% CaO, indicating strong leaching. The saprolite becomes softer and increasingly clay-rich towards the surface (code Sc) and, as a result of settling, consolidation and the development of Fe oxide segregations, the rock fabrics are destroyed and it merges with the plasmic and mottled clays at about 10 m depth. Identification of the parent rock, at least into the three major lithological units, is possible throughout most of the saprolite and these are shown on Figure 3 and the element distribution plots. The porphyries and fuchsitic ultramafic rocks tend to be micaceous and bleached in the mid-saprolite (below 20 m), whereas the talc-carbonates are commonly weathered to ochre to red non-micaceous clays.

Mottled clay zone (Code Mc). This is a transitional zone, up to 4 m thick, between the saprolite and the red clays and soils. It occurs principally above the talc-carbonate rocks and consists of pale green-grey clays, strongly coloured by red and yellow secondary Fe oxides.

Calcareous (code Ak) and non-calcareous (code A) red clay soils. An almost uniform cover of dark red clays, 4-6 m thick, is present across the section. The clays contain numerous ooliths and nodules of Fe oxides (<0.5-5 mm in diameter), which also occur as a surface lag. The clays are calcareous in the top 2 m composite, due to the presence of pedogenic carbonates, although it is probable that these are, in reality, confined to the top metre. This profile of calcareous and non-calcareous red clays is widespread and typical of soils in the region, except where lateritic duricrusts and gravels are preserved.

5.2 Regolith geochemistry

5.2.1 Data display.

The element distributions are shown as symbol plots in Appendix I. The plotting intervals are the same as those used for the equivalent plots for the Mystery Zone, which were selected on the basis of the principal populations evident in histograms and cumulative frequency graphs (Butt, 1991: Volume II, Appendix IV). The distributions of Au, Fe and Ca are also plotted with different intervals because of the different abundances in the background area. Elements having similar geochemical affinities are described together. Comparative statistical data for each group of elements in the main regolith horizons over the principal lithological units are given in Tables II/2 to II/8, Appendix II, and may be compared with similar data for the Mystery Zone tabulated in Report 156R (Butt, 1991: Volume II, Appendix IV). The statistics were derived from samples that appeared to be lithologically homogeneous; mixtures, *e.g.*, of ultramafic rocks and porphyry within a two-metre interval, were excluded. The data for the soils are considered separately in Section 5.3.

5.2.2 Major elements: Fe, Si, Al

These elements commonly form the principal residual products of deep chemical weathering, occurring as oxides and oxyhydroxides (*e.g.*, goethite, hematite, gibbsite, quartz, hyalite) or as aluminosilicates (kaolinite, halloysite, allophane). Each is strongly enriched in the lower to mid saprolite, commonly by factors of two or more, due to residual concentration following the leaching of other components, particularly Mg and Ca. Due to closure, their abundances and distributions are generally inter-dependent. Comparative statistical data for these elements are given in Table II/2, Appendix II.

Iron is present predominantly in ferromagnesian minerals (principally chlorite) in the unweathered rocks; only a minimal amount occurs in sulphides. The lower Fe content of the porphyries (mean 2.9%) compared to that of the ultramafic rocks (6.6%) is discernible throughout the saprolite (means 4.3% and 10% Fe, respectively) and clay saprolite (6.8% and 15.9% Fe), but appears to be lost in the red clay soils. The strong enrichments towards the top of the saprolite are indicated by the presence of diffuse stains and discrete nodules and pellets of Fe oxides (goethite and hematite) and lead to the development of the mottled clay horizon over the more Fe-rich ultramafic rocks. Maximum Fe contents in the regolith of the background area are, however, much lower than in the Mystery Zone, due to the absence of lateritic duricrust and gravels.

Silica occurs principally as ferromagnesian and alumino-silicate minerals such as chlorite and albite in the unweathered rocks. Quartz is an important component of the porphyries, and minor quartz-carbonate veins are present in both porphyries and talc-chlorite ultramafic rocks. There is much less quartz in the fresh ultramafic rocks of the background area than in the Mystery Zone, where quartz occurs as an alteration product associated with mineralization. However, the weathered fuchsitic rocks in the background area have Si contents similar to those of the Mystery Zone, indicating the probable presence of quartz in the fresh equivalent. Thus, although the higher primary silica content of the porphyries relative to the talc-chlorite rocks is evident in the saprolite, there is little distinction between the porphyries and the fuchsitic rocks. There is no evidence for silicification of the ultramafic rocks in the regolith and the higher silica contents in the saprolite (*e.g* 72-86% SiO2 in hole RCH 2142) are due to quartz veining. The Si content of the red clay soils is lower and more homogeneous than much of the underlying regolith.

Aluminium is present in alumino-silicate minerals (e.g., feldspars, mica) and chlorite in the unweathered rocks, with higher concentrations in the porphyries (14.1% Al_2O_3) than the ultramafic rocks (7.4% Al_2O_3). These concentrations are both rather greater than those of the equivalent units in the Mystery Zone. Aluminium is enriched throughout the regolith compared to the bedrock, particularly in the clay saprolite and mottled clay on the ultramafic rocks. The higher Al content of the porphyries is reflected by strong kaolinization in the saprolite but the distinction between the lithologies is weak in the clay saprolite, mottled clay and red clay soils. These horizons are clay-rich, although less so than in the Mystery Zone, despite the higher initial Al contents, and probably represent largely residual enrichment by loss of other components, and settling and compaction of the clays.

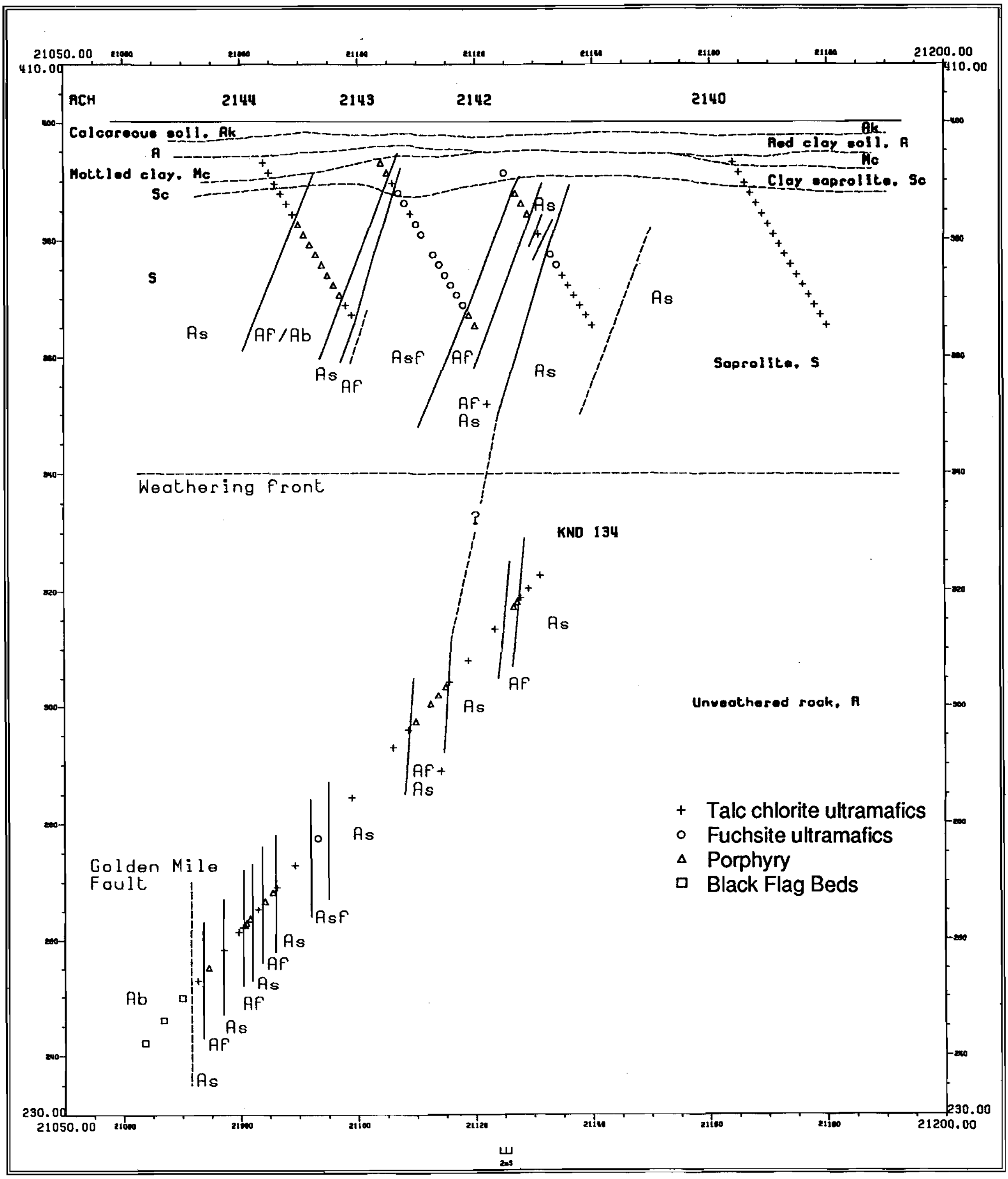


Figure 3. Section showing logged an interpreted geology and regolith units at the background site, Mt. Percy. Percussion drill section is 17350N; diamond drill section is 17500N.

5.2.3 Alkaline earth elements: Mg, Ca, Sr, Ba

Comparative statistical data for these elements are given in Table II/2, Appendix II. Magnesium, Ca and Sr have a number of similarities in their weathering behaviour, namely that they are strongly leached at the onset of weathering and almost totally depleted from some horizons of the regolith, but are re-concentrated at or close to the surface as pedogenic calcrete. Barium behaves somewhat differently, being relatively enriched through most of the regolith, and leached only very close the surface. As at the Mystery Zone, the distribution of the alkaline earth elements, especially Ca, in the regolith is characteristic of the region and has particular significance given the association between carbonate alteration and mineralization in many Archaean Au deposits and the enrichment of gold in horizons containing pedogenic carbonate.

Magnesium occurs predominantly in dolomite and ferromagnesian silicates (*e.g.*, chlorite, talc) in the fresh rocks. The abundance of the carbonates, particularly magnesite, is much less than in the Mystery Zone and this is reflected by lower Mg concentrations in the porphyries and talc-chlorite ultramafic rocks (means 3.2 and 16.4% MgO, respectively, compared to 4.1% and 20.8% MgO). The carbonate minerals are the most susceptible to weathering, so that there is a marked reduction in Mg content in the saprolite. However, concentrations above 5% MgO are present throughout the saprolite over the talc-chlorite ultramafic rocks *(e.g.* hole RCH 2140) due to the stability of chlorite and, especially, talc. Magnesium is further leached from the mottled clay and red clay soil as these ferromagnesian minerals ultimately are weathered, with concentrations declining to <1.0% MgO. This leaching is, however, less severe than at the Mystery Zone. Minor dolomite is present in the pedogenic carbonates precipitated in the soil.

Calcium is hosted predominantly by calcite and dolomite in the fresh ultramafic rocks (mean 6.1% CaO) and by dolomite in the porphyries (3.3% CaO); abundances are similar to those in the Mystery Zone. In consequence, Ca is leached more strongly than Mg, which is also present in more resistant ferromagnesian minerals and is at concentrations below 0.1% CaO throughout much of the regolith to within 5 m of the surface. Near the surface, however, Ca is precipitated in pedogenic carbonates as calcite and minor dolomite in the red clay soils, at concentrations of up to 2.6% CaO (4.7% $CaCO_3$). These concentrations are far lower than in the Mystery Zone (18-34% $CaCO_3$); the difference is probably due in part to the samples being 2 m composites and the proportionately greater loss during drilling of the top metre, which is commonly the site of maximum carbonate precipitation. Gypsum is present as a trace constituent in the soils.

Strontium. The host minerals for Sr in the unweathered rocks have not been determined, but the associations with Ca and Ba suggest that Sr is present in calcite, dolomite and, in the porphyries, in feldspar. The mean Sr content of the porphyries (340 ppm) is similar to that in the Mystery Zone, whereas that of the talc-chlorite ultramafic rocks (590 ppm) is far greater and corresponds to the presence of calcite in these rocks. Strontium is moderately to strongly leached in the regolith particularly on the talc-chlorite rocks (mean 28 ppm Sr in the saprolite). The persistance of Sr in saprolite, mainly over porphyry, corresponds to the presence of albite, which is more resistant to weathering than dolomite. The upper, clay-rich horizons, are less strongly leached of Sr than their equivalents in the Mystery Zone, but Sr is similarly strongly enriched, with Ca, in the pedogenic carbonates precipitated in the soils (maximum concentrations of 815 ppm Sr).

Barium. The Ba content in the porphyries (mean 790 ppm) is similar to that of the A type porphyries (mean 630 ppm) in the Mystery Zone, although the maximum (1470 ppm) is close to that of the B type. Barium is only a trace constituent of the talc-chlorite ultramafic rocks (mean 34 ppm). The probable host minerals are feldspar (albite) and barite. In the saprolite, weathered fuchsitic rocks contain 365 ppm Ba, rather greater than the equivalents in the Mystery Zone, but this may include contributions from minor porphyries. The association of high Ba contents with unmineralized porphyries and (weathered) fuchsitic rocks indicates that Ba cannot be considered as a pathfinder for Au

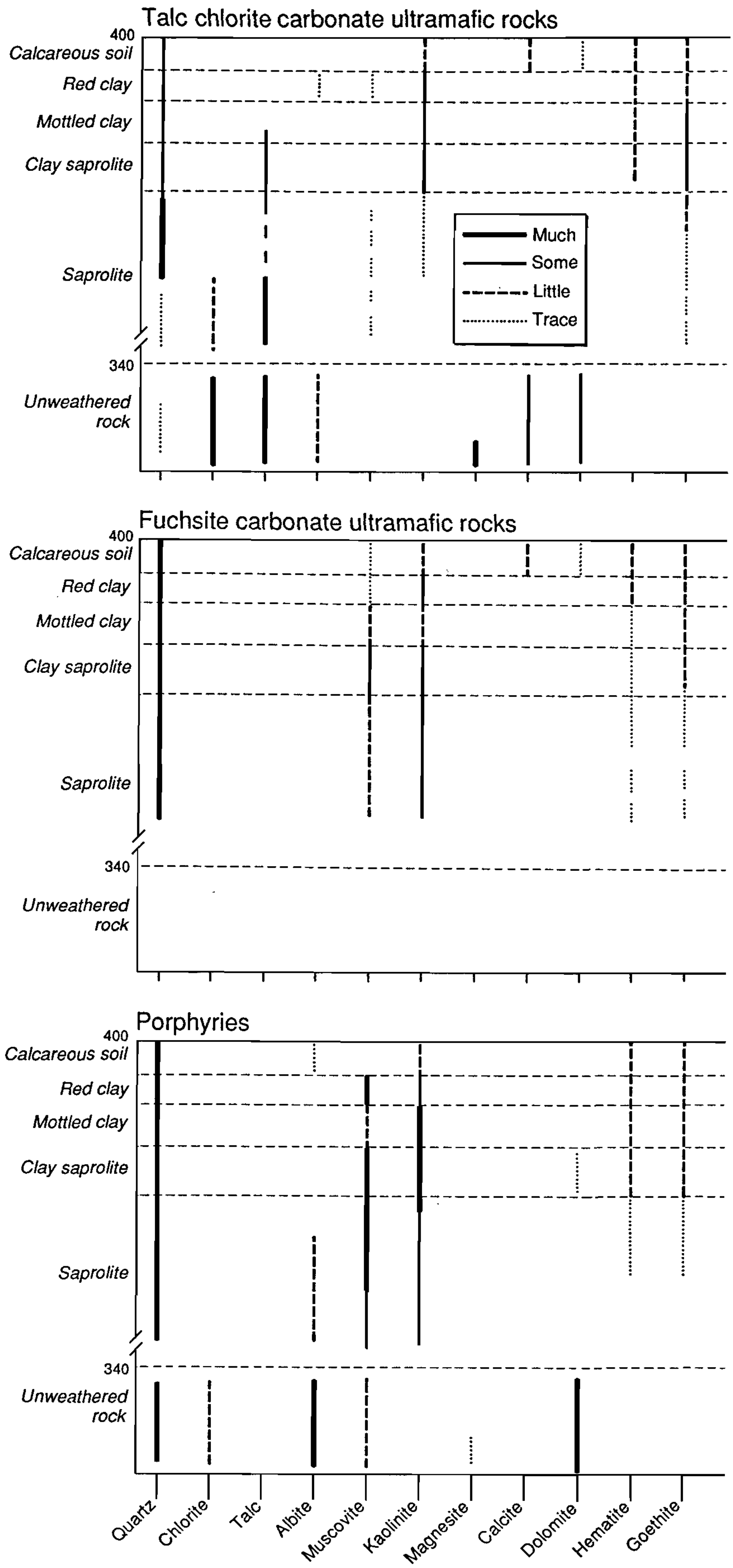


Figure 4. Mineralogy of the main regolith horizons over the three principal lithological units, Mt. Percy background site. No unweathered fuchsite carbonate ultramafic rocks are present in the drill core. Regolith data from percussion drilling on 17350N; fresh rocks from diamond drilling on 17500N.

mineralization in this system, although it evidently indicates the presence of fuchsite-carbonate alteration. Compared to the primary abundance, there is a marked enrichment in the saprolite derived from talc-chlorite rocks (140 ppm) but little over the porphyries. Nevertheless, the principal lithologies can be distinguished almost throughout the saprolite to mottled clay, but not in the red clay soils. There is no increase in Ba content associated with the pedogenic carbonate. As at the Mystery Zone, there is no noticeable change in the Ba abundance where albite is replaced by kaolinite in the saprolite, implying that, as Ba is released from albite, it is immediately reprecipitated as barite.

5.2.4 Elements associated with mineralization: Au, S, Sb, As, W

Comparative statistical data for these elements are given in Table II/3, Appendix II. In the Mystery Zone, primary gold mineralization is associated with the fuchsite-carbonate alteration of the ultramafic rocks and the porphyries which intrude them. The alteration zone is typically pyritic and, in addition to Au, is characterized by high abundances of S, Sb, As, Ag, Te and W. There is, however, no close correlation between Au and these elements within the alteration zone itself and, furthermore, each element behaves differently during weathering, resulting in distinctive dispersion patterns. In the background area, however, alteration is minimal and the abundances of these potential pathfinder elements are mostly very low, particularly in the unweathered rocks sampled by DDH KND134. However, weathered fuchsite-altered ultramafic rocks are present in the regolith and several associated samples are enriched in Au, Sb and W. The incompatibility between the fresh and weathered rocks is probably because the diamond and percussion drill sections are separated by 150 m.

Gold. Only three samples of unweathered rock have detectable Au (detection limit 5 ppb, maximum 8 ppb), of which one is in the Black Flag Beds. In the regolith, however, there is minor Au enrichment (55-605 ppb Au) over 4-6 m associated with a contact between a porphyry and fuchsite-altered ultramafic rocks. The contact is intersected by holes RCH 2142 and 2143 at 10 and 32 m depth in the clay saprolite and saprolite, respectively (Figure 5). Minor Au enrichment at about 32 m depth is present in each of the other three percussion holes; although it is possible that these represent a sub-horizontal zone of supergene enrichment, it is more probable that they are intersections of minor mineralized units. The distribution of Au in the regolith is typically patchy, even at the close intervals used in the study of the Mystery Zone, so that at the wider interval of the exploration sampling used here, a more precise interpretation is not possible.

An important feature of the data is the general minor enrichment of Au (30-52 ppb) in the calcareous soil in the top 2 m of the profile, with the maximum value close to the subcrop of the mineralized contact. This enrichment is consistent with the generally observed association between Au and pedogenic carbonate in this region.

Sulphur. The S content of the unweathered rocks is mostly below 0.05%; trace pyrite was seen in some porphyries, yielding a maximum of 0.19% S. In contrast, the S contents in the regolith are generally greater than in the unweathered rocks and are broadly similar to the upper regolith at the Mystery Zone. Sulphur maxima (0.2-0.95%) in the saprolite at about 32 m depth correspond to the Au maxima noted above; they may be due to remnant sulphides in quartz veins, or secondary sulphates such as alunite, as present at the Mystery Zone. High S concentrations in the soils correspond to the occurrence of trace gypsum detected by XRD.

Antimony. The mean Sb content of the unmineralized fresh porphyries and talc-chlorite ultramafic rocks are 3 ppm and 1.3 ppm, respectively, compared to 6 ppm in mineralized porphyries and the fuchsitic ultramafic rocks and to 3 ppm in the talc-chlorite ultramafic rocks at the Mystery Zone. The Sb content of regolith materials is generally greater (5-16 ppm Sb) than that of the unweathered rocks, particularly over the porphyries and fuchsitic ultramafic rocks. This increase is coincident with the occurrence of minor Au enrichment, but is more pervasive and not all Sb maxima are coincident with those of Au. As over the Mystery Zone, the Sb content of the soils (1-2 ppm) is similar to that of the unweathered rocks.

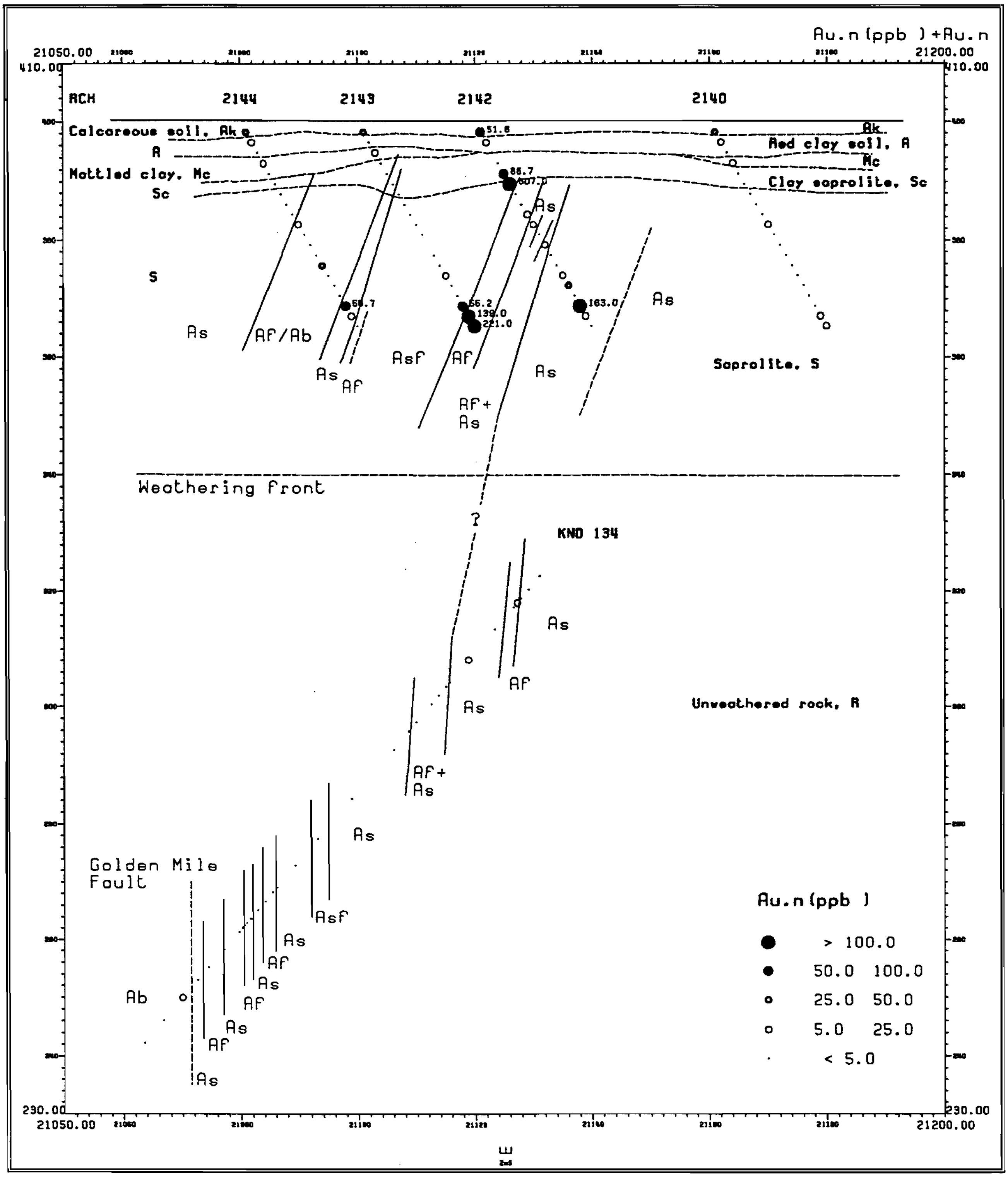


Figure 5. Gold distribution in the regolith and unweathered rocks at the background site, Mt Percy. Percussion drill section is 17350N; diamond drill section is 17500N.

Arsenic. The As content of the fresh rocks is 1-6 ppm, similar to that of the talc-chlorite ultramafic wallrocks in the Mystery Zone, where mineralized porphyries and fuchsitic ultramafic rocks have mean contents of 30 ppm and 185 ppm, respectively. The As distribution in the regolith appears to be unrelated to the presence of weathered fuchsitic rocks or to Au enrichment. The As content mostly increases upwards, broadly corresponding to the increasing Fe content

Tungsten. The unmineralized porphyries have a mean W content of 5 ppm, compared to 18-28 ppm in mineralized porphyries in the Mystery Zone. The unmineralized talc-chlorite ultramafic rocks contain <2 ppm at both sites. The abundance of W is slightly greater in the regolith, particularly in the upper saprolite and clay saprolite of the porphyries and fuchsite ultramafic rocks. However, there is no clear relationship with the distributions of Au or other pathfinder elements.

5.2.5 Alkali metals: Na, K, Rb, Cs

Comparative statistical data for these elements are given in Table II/4, Appendix II.

Potassium, rubidium and caesium. One of the most important features of the distribution patterns in the Mystery Zone is the association between K, Rb and Cs and the alteration zone. This association of alkali metals represents the occurrence of muscovite in the alteration assemblage and is retained throughout much of the regolith. A similar association in some unmineralized and unaltered talc-carbonate rocks at the Mystery Zone is related to the occurrence of biotite. However, biotite does not persist in the regolith and the alkali metals fron it have been leached. In the background site, the K, Rb and Cs distributions also largely indicate the distribution of muscovite. Thus, the higher values are associated with the porphyries in the unweathered rocks although they are significantly lower than in the equivalent altered and mineralized rocks at the Mystery Zone. The K, Rb and Cs concentrations are all much greater in the regolith, with the higher values indicating the porphyries and fuchsitic ultramafic rocks, but there is no specific association with the minor Au enrichments. Abundances are less in weathered ultramafic rocks but, unexpectedly, greater in the weathered porphyries than at the Mystery Zone. The relatively high K, Rb and Cs contents of the saprolite do not persist into the overlying red clay soils.

Sodium. Unlike the other alkali metals, there is no obvious Na enrichment associated with the alteration or mineralization in the Mystery Zone and Na has been leached from much of the regolith. Sodium is present in albite of the unweathered rocks and the highest concentrations are accordingly found in the porphyries. In the background site, these greater Na contents are retained in the lower saprolite but decrease upwards through the regolith. The lowest concentrations (<0.2% Na_2O) in the regolith are in the fuchsite ultramafic rocks. As at the Mystery Zone, some aspects of the Na distribution resemble those of Sr and Ba, which are also hosted in part by albite. Some Na in the regolith is probably contained in halite.

5.2.6 Halogens: Br

Bromine was the only halogen determined. Comparative statistical data for Br are given in Table II/4, Appendix II. The Br content is below detection limit (2 ppm) in the unweathered rocks, but the abundance increases steadily through the regolith to 20-30 ppm (maximum 62 ppm) in the clay-rich upper horizons, diminishing in the soil. This distribution is similar to that over the Mystery Zone, where Br is thought to provide a measure of either the clay content or the moisture content - the latter itself reflecting the clay content of water-unsaturated regolith materials. There is no obvious relationship with the Au distribution but, at the Mystery Zone, the Br enrichment is in the zones most leached or depleted in Au. However, it is unclear whether there is a causal link or whether the Br enrichment simply reflects a suitable host environment for accumulation during prolonged periods of aridity.

5.2.7 Base and transition metals: Pb, Cu, Zn, Co, Ni, Mn

Comparative statistical data for these elements are given in Table II/5, Appendix II. They are considered together because the base metals (Pb, Zn, Cu) are associated with some primary Au mineralization and because the transition metals (Mn, Co, Ni, Cu and Zn) have many similarities in chemical behaviour in the weathering environment. Nevertheless, there is no obvious enrichment of base metals with the primary Au mineralization in the Mystery Zone. Pyrite is the most abundant sulphide and only a few grains of other sulphides (*e.g.*, galena, chalcopyrite, sphalerite, arsenopyrite, millerite) were recovered in the heavy mineral concentrates or seen in polished section. The distribution patterns of Mn, Co, Ni, Cu and Zn have a number of similarities and are consistent with the gradual weathering of host primary ferromagnesian minerals, being leached from the upper horizons of the regolith and patchily enriched, together or separately, deeper in the regolith, particularly at 26-32 m depth.

Lead. The Pb abundance is very low, both in the unweathered rocks and the regolith. Fresh and weathered porphyry samples mostly contain 9-16 ppm Pb, whereas equivalent ultramafic rocks contain <9 ppm Pb. Two relatively greater values (19 and 32 ppm Pb) seem to be associated with minor Au mineralization in the regolith, similar to the isolated higher values in mineralization of the Mystery Zone.

Copper and zinc. Copper contents are lower than at the Mystery Zone, but show similar trends, with weak concentration in the saprolite but decreasing again closer to the surface. There is a general increase in abundance associated with the weathered fuchsite ultramafic rocks in the saprolite (100-155 ppm Cu), but no obvious relationship with the Au distribution. High concentrations (150-160 ppm Cu) also occur in some clay saprolite derived from talc-chlorite rocks. In comparison, Zn contents of the unweathered rocks, particularly the talc-chlorite ultramafic rocks, are greater than those at Mystery, but similar or rather less in the regolith. The fresh ultramafic rocks have a mean content of 135 ppm Zn (maximum 345 ppm) compared to 65 ppm (maximum 95 ppm) at the Mystery Zone. In the regolith, Zn contents decline towards the surface, being least (<40 ppm) in the clay saprolite and/or the mottled clay. There is possibly some minor secondary Zn enrichment, with Co and Mn, at 26-32 m depth. Similar enrichment was noted at the Mystery Zone at 40-45 m depth.

Cobalt and *nickel* contents of the fresh talc-chlorite ultramafic rocks (means 85 ppm Co, 985 ppm Ni) are greater than those of the porphyries (means 16 ppm Co, 55 ppm Ni) and these differences are maintained through the saprolite, although abundances decrease progessively upwards. There is possibly some minor secondary enrichment, with Mn and Zn, at 26-32 m depth, with maximum concentration of 540 ppm Co, 3520 ppm Ni. Equivalent enrichment is only minor over the porphyries, the metals being derived by lateral dispersion from the ultramafic wallrocks. The lowest concentrations occur in the red clay soils, in the top 5 m of the profile.

Manganese. The Mn content of the regolith is much lower than that of the parent material. The distribution probably reflects that Mn is hosted in the fresh rock by ferromagnesian minerals and dolomite, and that much of the Mn leached deep in the profile was derived from the latter. Within the regolith, the distribution is similar to that of the other transition metals, particularly Co. It has been strongly leached from the upper saprolite and clay-rich horizons of the regolith, with some patchy reprecipitation lower in the profile, at 26-32 m depth, with Co, Ni and Zn. Unlike the other metals, however, Mn contents increase in the soil, with Mn oxides visible on some partings.

5.2.8 Lithophile transition elements: Cr, Sc, Ti, V

Comparative statistical data for these elements are given in Table II/6, Appendix II. These elements are commonly residually enriched in lateritic regoliths, particularly in the ferruginous horizons, due to the loss of other components. At the Mystery Zone, this is true of Ti and V, but the distribution of Cr is unusual in that it is concentrated in the upper, clay-rich saprolite, the plasmic horizon and mottled clay zone and is at anomalously low concentrations in the lateritic duricrust and gravels. The Sc distribution is similar to that of Cr. Each of these elements has been concentrated two- to four-fold in the saprolite and clay-rich horizons but, whereas Fe, Ti and V are further concentrated in the lateritic duricrust, the abundances of Cr and Sc, particularly over the ultramafic rocks, are similar to or less than those in the unweathered rocks. In the background area, element abundances are broadly similar for both lithologies in the unweathered rocks, although the mean V content of the porphyries is less (80 ppm) than at the Mystery Zone (140 ppm). In the regolith, the distributions are similar to those at the Mystery Zone in equivalent horizons over each lithology, with concentrations increasing upwards through the profile by factors of up to fourfold, with maxima in the clay saprolite and mottled clay zone. The abundances of V and Cr in saprolite of all lithologies are lower than at the Mystery Zone, although the difference in the V content of the porphyries is less marked than in the fresh rock. It is possible that the lower abundances, particularly of V, reflect the absence of fuchsite alteration in the fresh rocks or less intense alteration in the weathered rocks, with fewer xenoliths in the porphyries. An association between V, particulary as the vanadian mica roscoelite, and Au mineralization has long been postulated Nickel, 1977), although in the Mystery Zone, it was identified in only one sample. There is no lateritic horizon in the background area, so that the contrasting behaviour of these elements cannot be checked. However, in the red clay soils, the Cr content declines sharply, whereas those of Ti and, in part, V, are similar or increase. The Sc distribution is similar to Cr, but the variations are less marked.

In the unweathered rocks, the ultramafics are relatively enriched in Cr, V and Sc, and the porphyries in Ti, clearly distinguishing these lithologies. This distinction holds in the regolith to the clay saprolite and mottled clay, but is lost in the surface red clays, as indicated in the Ti/Zr binary plot (compare Figures 6 and 7).

5.2.9 *Immobile elements: Zr, Hf, Th, Nb, Ta*

Comparative statistical data for these elements are given in Table II/7, Appendix II. These elements generally exhibit little chemical mobility in the weathering environment and follow this behaviour both in the Mystery Zone and in the background area. Zirconium, Hf, Nb and Ta are all members of the second and third transition series and have very similar chemical characteristics. In particular, the chemical behaviours of Zr and Hf are almost identical, and Nb and Ta almost invariably occur together. Thorium is an actinide element but it has chemical characteristics similar to those of Hf. Zircon is probably the principal host mineral for each of these elements and hence the stability of zircon determines their distribution and dispersion in the regolith. Some Th may be present as monazite but, if so, it is present at very low abundances and was not been detected in heavy mineral concentrates from the Mystery Zone.

With the exception of Zr, the abundance of each of these elements is below analytical detection limits in the ultramafic rocks and is present at very low concentrations. (N.B. Higher detection limits were applied in the background site, so that the mean contents appear slightly greater in Tables and distribution plots). The Zr, Hf and Th contents increase upwards through the regolith, even over ultramafic rocks. The greater abundances of Zr, Hf and Th in the porphyries compared to the ultramafic rocks discriminates the porphyries quite clearly in the unweathered rocks and throughout the regolith except for the surface red clay soils (see distribution plots and Figures 6 and 7). A similar discrimination is shown by Nb, but its concentrations are close to the detection limit and the contrast is weak. Tantalum concentrations are generally too low in the fresh rocks, saprolite and clay-rich horizons to show a significant distribution pattern.

5.2.10 *Rare earth elements: Y, La, Ce, Sm, Eu, Yb, Lu*

Comparative statistical data for these elements are given in Table II/8, Appendix II. Yttrium is considered with the rare earth elements (REE) because of its similar chemical behaviour, particularly to the "heavier" REE. The distributions of these elements tend to be similar, with some differences corresponding to whether they are "light" or "heavy". Except for Yb, the REE concentrations in the unweathered rocks are highest in the porphyries, with several REE being below detection limit in the

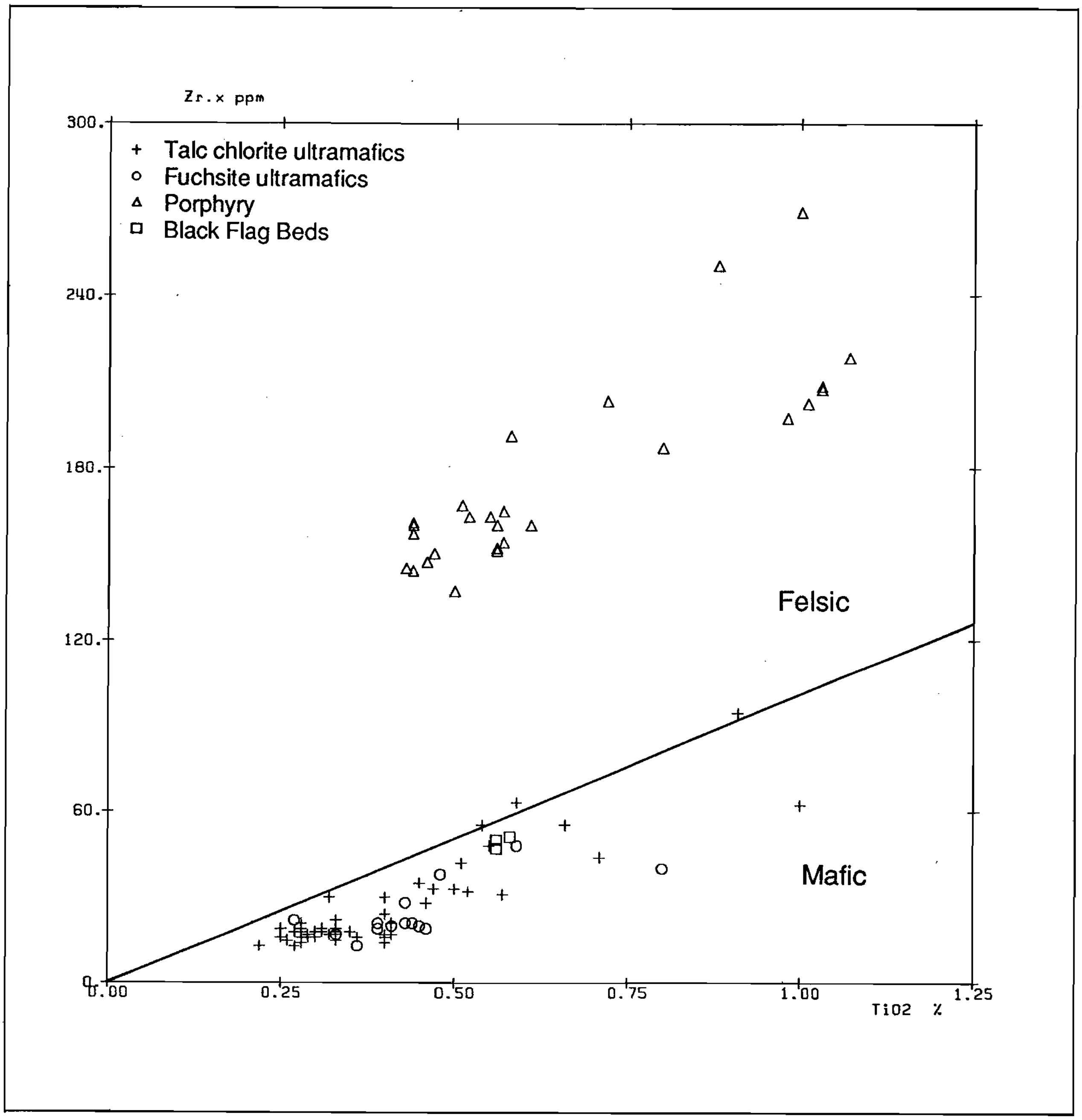


Figure 6. Binary plot of Zr and TiO_2 illustrating discrimination of mafic/ultramafic rocks and porphyries (all samples except soil). Lithological fields from Hallberg (1984).

ultramafic rocks. The relative enrichment in the porphyries is greatest for the lighter REE (La, x24; Ce, x38; Sm, x7). This contrast is similar to that at the Mystery Zone, although rather higher La contents in the background area have halved the factor. Unlike the Mystery Zone, the mean Yb content of the porphyries (0.92 ppm) is greater than that of the talc-chlorite ultramafic rocks (0.85 ppm). In contrast to the Mystery Zone, the REE distributions in the regolith are very similar to those of Zr and other "immobile" elements discussed above. Their abundances increase in the regolith, even over ultramafic rocks, but the distinction between ultramafic and felsic rocks is retained, except in the surface red clays. There is no evidence for leaching of the light REE or concentration of Y, Lu and Yb high in the saprolite. The REE appear to be weakly enriched in the red clay soils relative to the immediately underlying horizons, but the maxima generally occur deeper in the profile. Whether these maxima are related to intersections of specific units or reflect minor absolute enrichment in the saprolite is unclear.

5.2.11 Other elements: Ga, Ge

Comparative statistical data for these elements are given in Table II/7, Appendix II.

Gallium. The occurrence and distribution of Ga generally follow those of Al. Gallium contents are greater in the more aluminous porphyritic rocks (mean 19 ppm) than the ultramafic rocks (9 ppm). The distribution through much of the regolith is also similar to that of Al, with a close correlation between these two elements. Concentrations gradually increase upwards, with an enrichment in the clay-rich horizons that largely eliminates the differences in abundance between the main lithologies. Concentrations are lower in the red clay soils, particularly in the calcareous surface horizon.

Germanium The Ge contents in the unweathered rocks and the regolith are mostly below detection limit. A few samples in the saprolite of the ultramafic rocks have detectable Ge (5-8 ppm) close to the minor mineralization. A weak, probably residual, concentration in the regolith derived from the fuchsitic ultramafic rocks was noted at the Mystery Zone.

5.3 Soils

Comparative geochemical data for the calcareous and non-calcareous red clay soils are summarized on Table 2. Inspection of the distribution plots in Appendix I indicates that even for those elements that most clearly discriminate between the principal lithologies in the saprolite, *e.g.*, generally immobile elements such as Zr, TiO_2, V, REE, soil compositions give no indication of underlying lithology. The data suggest that the soils represent a mixture of materials. For example:

1. In a Ti/Zr binary plot, the soils (and one mottled clay sample) lie between the porphyry and ultramafic fields (Figure 7).

2. Although the total number of samples is low, the compositions are very homogeneous, as indicated by the low coefficients of variation (<0.15) of most elements (Table 2).

These results suggest that the soils are developed in transported material of local derivation, *i.e.*, colluvium.

For several elements, however, the soils are very heterogeneous, as shown by high coefficients of variation (>0.50): Au, Br, Ca, S, Sr S, Ta, W and, in calcareous soils, Na, Cs. Apart from W and Ta, for which the variability is due to poor analytical precision at very low abundances, these are all late-stage additions that accumulate patchily in soils as absolute enrichments. They occur principally as evaporites, such as pedogenic carbonate, gypsum and halite, that have precipitated during and after the deposition of the colluvium, under present climatic conditions. Gold is a similar late addition, associated with the pedogenic carbonate, and gives surface expression to the underlying mineralization through the transported cover.

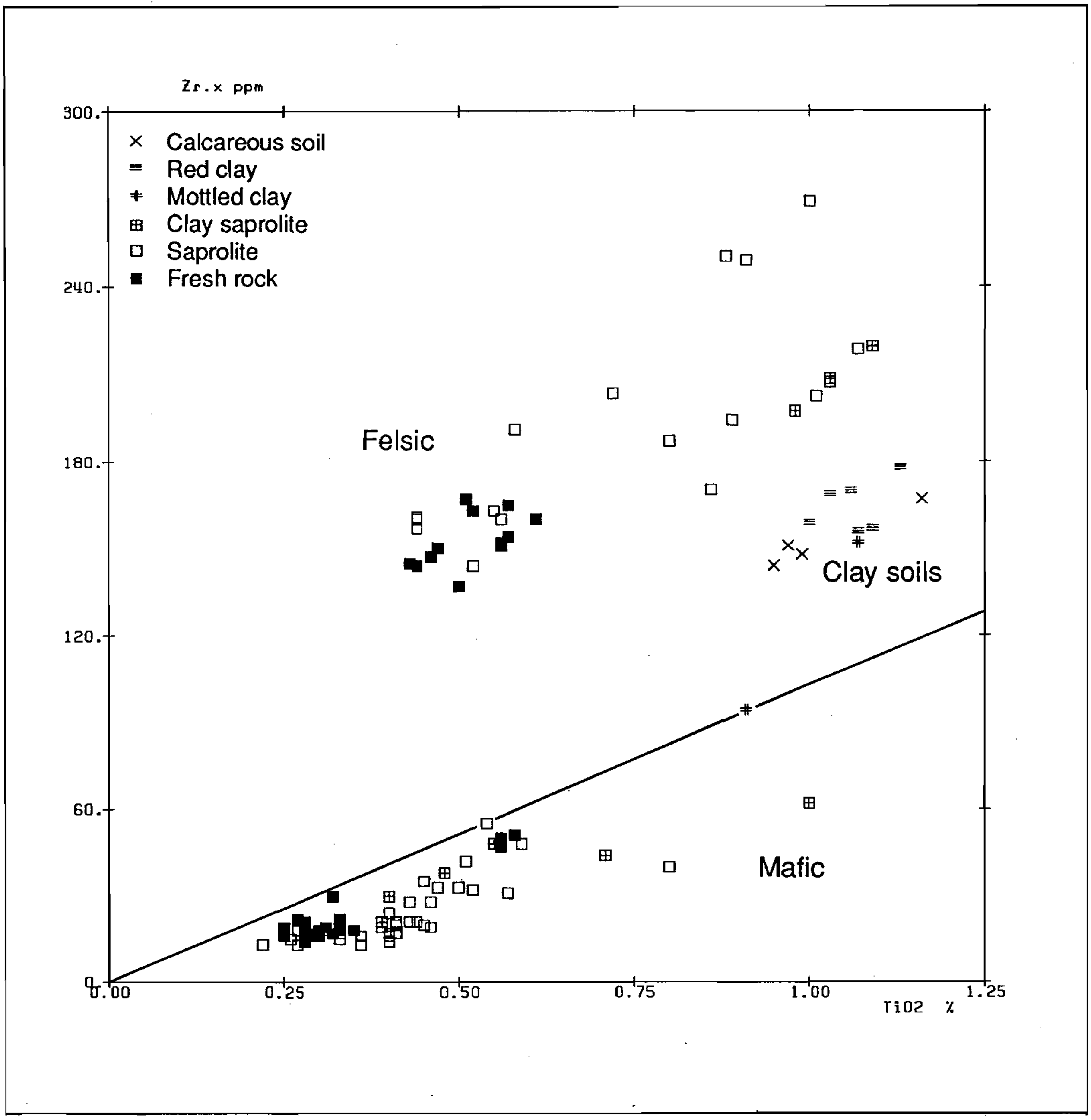


Figure 7. Binary plot of Zr and TiO_2 illustrating loss of discrimination between mafic/ultramafic rocks and porphyries in red clay soils (compare with Figure 6.)

TABLE 2. Comparison of arithmetic means and coefficients of variation in red clay soils

Horizon		Fe.n %	SiO_2 %	Al_2O_3 %	MgO %	CaO %	Sr.x ppm	Ba.x ppm
Ak Calcareous soil	M	11.16	54.27	13.48	0.96	2.07	365	234
	CV	*0.14*	*0.08*	*0.09*	*0.12*	*0.65*	*0.94*	*0.04*
A Red clay soil	M	10.27	59.29	16.21	0.94	0.28	34	238
	CV	*0.08*	*0.08*	*0.16*	*0.11*	*0.85*	*0.48*	*0.08*

Horizon		Au.n ppb	S.x %	Sb.n ppm	As.n ppm	W.n ppm
Ak Calcareous soil	M	40.5	1.08	1.4	16.6	1.0
	CV	*0.26*	*0.67*	*0.07*	*0.14*	*0.00*
A Red clay soil	M	8.3	0.49	1.7	16.8	1.2
	CV	*0.85*	*0.61*	*0.24*	*0.09*	*0.47*

Horizon		Na_2O %	K_2O %	Rb.x ppm	Cs.n ppm	Br.n ppm
Ak Calcareous soil	M	0.29	0.64	34	3.0	15.9
	CV	*0.57*	*0.03*	*0.04*	*0.31*	*0.31*
A Red clay soil	M	0.61	0.66	35	2.8	41.8
	CV	*0.14*	*0.07*	*0.09*	*0.18*	*0.30*

Horizon		Pb.x ppm	Zn.x ppm	Cu.x ppm	Mn.x ppm	Co.n ppm	Ni.x ppm
Ak Calcareous soil	M	15	50	59	477	23	170
	CV	*0.09*	*0.16*	*0.08*	*0.13*	*0.15*	*0.19*
A Red clay soil	M	10	41	52	215	16	164
	CV	*0.24*	*0.09*	*0.07*	*0.17*	*0.23*	*0.21*

Horizon		Sc.n ppm	TiO_2 %	V.x ppm	Cr.n ppm
Ak Calcareous soil	M	30.3	1.02	310	555
	CV	*0.07*	*0.09*	*0.12*	*0.18*
A Red clay soil	M	31.6	1.06	289	847
	CV	*0.05*	*0.04*	*0.09*	*0.33*

Horizon		Zr.x ppm	Hf.n ppm	Th.n ppm	Nb.x ppm	Ta.n ppm	Ga.x ppm	Ge.x ppm
Ak Calcareous soil	M	153	4.3	10	8	0.7	19	bld
	CV	*0.07*	*0.12*	*0.06*	*0.10*	*0.65*	*0.07*	-
A Red clay soil	M	165	4.9	10	9	0.8	24	bld
	CV	*0.05*	*0.04*	*0.09*	*0.08*	*0.60*	*0.07*	-

Horizon		Y.x ppm	La.n ppm	Ce.n ppm	Sm.n ppm	Eu.n ppm	Yb.n ppm	Lu.n ppm
Ak Calcareous soil	M	16	17	31	3.5	0.83	1.67	0.32
	CV	*0.10*	*0.10*	*0.11*	*0.12*	*0.09*	*0.10*	*0.05*
A Red clay soil	M	10	9	12	1.6	bld	1.29	0.23
	CV	*0.12*	*0.13*	*0.20*	*0.12*	-	*0.08*	*0.06*

Calcareous soils, N=4; Red clay soils, N=6.
M=Arithmetic mean; *CV=coefficient of variation*

6 DISCUSSION AND CONCLUSIONS

6.1 Element distributions and regolith evolution

The results from the background site are consistent with the earlier findings from the Mystery Zone, except for those referring to the lateritic gravels and duricrusts, which are not present. Thus, the regolith has properties related to at least two major stages of weathering: *firstly*, under humid, warm to tropical climates of the Cretaceous to mid-Miocene and, *secondly*, under drier climates since the Miocene. The former humid climates were probably equivalent to those prevailing in the present wetter savannas and gave rise to extensive, deep lateritic weathering under conditions of high water-tables. The later arid to semi-arid climates, which still prevail, have resulted in a general lowering of water-tables and changes to, and slowing of, chemical weathering. The distribution of each element in the regolith is the product of the effects of each of these stages. Many of the dominant geochemical (and mineralogical) characteristics can be related to the development of the lateritic profile under humid conditions. Other features, particularly reflected by the minor components of the regolith, are due to later, possibly still active, events related to more arid environments and appear as modifications of the pre-existing lateritic profile.

Features related to initial lateritic weathering include the gross structure of the profile, in which most major primary rock-forming minerals have been replaced by kaolinite and Fe oxides in a deep, leached saprolite that is overlain by increasingly ferruginous horizons in which initial rock fabrics are progressively destroyed. The later, arid, stage is represented by erosion or modification of any lateritic duricust and gravels, formation and/or deposition of red clays and precipitation of pedogenic carbonates

The principal stages in the evolution of the regolith can be summarized as follows:

1. *Lateritic weathering under warm humid conditions.*
a. progressive weathering of sulphides, carbonates, feldspars and ferromagnesian minerals and the leaching of their mobile constituents (S, Na, Cs, Ca, Mg, Sr, Mn, Co, Ni, Cu, Zn).
b. retention of less mobile constituents in secondary minerals, principally kaolinite and Fe oxides (Si, Al, Fe, Ba, Cr, Ti, V, As, Sb, Sc, Ga, Mn, Cu, Ni).
c. accumulation of immobilized elements in resistant primary minerals (*e.g.*, Zr, Hf in zircon; K, Rb in muscovite; Ti in rutile; REE, Ta, Nb, Th, W) or in stable secondary minerals (Ti in anatase; V in Fe oxides).

Unlike the Mystery Zone, there is no evidence for the dissolution or replacement of stable primary and secondary minerals *(e.g.*, muscovite, kaolinite, barite) and strong Fe oxide accumulation to form a ferruginous horizon, nor for the redistribution of Au and other elements in this horizon. However, by analogy, such processes probably occurred.

2. *Weathering under warm, semi-arid conditions.*
a. decline of the water-table, with arid conditions leading to vegetation changes which in turn induced instability of the land surface and possibly initiated erosion that removed the presumed ferruginous horizon. The retention of the dissolved products of continued slow weathering, together with the accession of marine salts associated with rainfall, resulted in progressive salinization of the groundwater.
b. deposition and reworking of colluvial erosion products, possibly with some reworking and homogenization with underlying residuum, to form the red clay soils.
c. mobilization of Au, probably as halide complexes, continuing to the present day, with the possible formation of a zone of weak Au enrichment deep in the saprolite.
e. release of soluble alkaline earth metals at the weathering front and their transport to the surface, probably by evaporation and/or evapotranspiration; vegetative cycling of these elements and Au has led to their gradual accumulation in the near-surface horizons.
f. continued leaching of base and transition metals (Cu, Co, Pb, Mn, Ni) with minor precipitation in the mid to lower saprolite.

Although there is some S accumulation deep in the saprolite, it is not known whether this corresponds to the precipitation of alunite, as at the Mystery Zone. The drilling is too shallow to determine if there is a zone of REE enrichment.

6.2 Comparison between background and mineralization

The objective of this study has been to provide some appropriate values for background abundances of elements associated with Au mineralization in the Mystery Zone, in order to assess their usefulness as geochemical pathfinders. The unweathered rocks sampled by diamond drilling represent almost completely barren host rocks, *i.e.*, talc-chlorite-carbonate rocks of the Hannan's Lake serpentinite and intrusive felsic porphyries, both unaffected by the fuchsite-carbonate alteration associated with Au mineralization. The samples from the regolith have some fuchsite-alteration and minor patchy mineralization, but the mean concentrations of Au and pathfinders (As, Sb, W) are very low, so that the samples appear to represent a site where alteration has minimal mineralization associated with it. Lateritic duricrust and gravels are absent, so that it was not possible to obtain background data for these materials; they are, however, of restricted distribution and the red clay soils are far more representative of the surface horizons of the regolith of the region.

In the Mystery Zone, the porphyries and, by definition, the fuchsitic rocks are altered and can be considered as mineralized. The results from the Mystery Zone show that, in addition to Au itself, primary and secondary mineralization are indicated by increased abundances of W, Sb and As. Silver and Te are also present in the lower saprolite and fresh rocks. Although there is, apparently, some primary dispersion into the talc-chlorite rocks, this extends for less than 1 m (Au, W, Sb; about 2.5 m for As), so the wallrocks are essentially unmineralized. In the regolith, W, Sb, K, Ba and, to a lesser extent, As all persist through the "depleted zone" within which Au contents are generally <100 ppb. However, only Au becomes secondarily enriched in the pedogenic carbonates.

The data for Au, the principal pathfinder elements (As, Sb, W) and the relatively immobile elements that possibly indicate alteration (K, Ba, V) from the Mystery Zone and the background site in fresh rocks and saprolite are compared in Figures 8 to 11. The ranges in element concentrations in the saprolite are generally wider and mean (geometric) abundances are greater than in the unweathered rocks. The increased ranges reflect variations in the degree of weathering through the saprolite and the increased abundances reflect both *relative* enrichment due to the loss of more soluble constituents such as Mg and Ca, and *absolute* enrichment due to lateral dispersion. The latter appears mostly to affect the ore-related elements (Au, As, Sb, W).

The unweathered talc-chlorite ultramafic rocks in the Mystery Zone are enriched in As and Sb, suggesting that primary dispersion of these elements is greater than previously inferred (Figure 8). Barium and, perhaps, Si and V are slightly depleted; the wide range in K content in the Mystery Zone reflects the presence of biotitic rocks (K_2O: >1.0%) compared to low abundances in the other talc-chlorite rocks (K_2O: <100 ppm). These differences remain in the saprolite, perhaps supplemented by lateral dispersion of Ba, Au, As, Sb and W from the adjacent alteration and mineralization, except that weathered talc-chlorite rocks are all K-poor, due to the instability of biotite. The greater abundances of the ore-elements in saprolite at the background site probably reflect the proximity of minor mineralization and could be primary or secondary in origin.

A comparison between the background talc-chlorite ultramafic rocks and their fuchsitic altered equivalents at the Mystery Zone (Figure 9) shows that the alteration is indicated by K and Ba. The wide range and very minor enhancement of V in the fresh altered rocks are largely related to the local presence of roscoelite (vanadian muscovite) in the Mystery Zone. These differences remain in the saprolite, with further enhancement of V but some loss of Ba; the wider range in Si contents probably reflects secondary silicification of dunitic zones rather than alteration. The altered rocks appear to be slightly depleted in Y and the heavier rare earths; La is depleted in the fresh rock but relatively enriched in the saprolite. The mineralization is clearly indicated by marked increases in the ore-related elements: Au>>As>W, Sb.

The unweathered altered porphyries in the Mystery Zone are enriched in V by a factor of nearly two compared to the unaltered background, although it is unclear whether this represents metasomatic enrichment during alteration or merely a greater volume of ultramafic xenoliths (Figure 10). The mineralization is clearly indicated by marked increases in the ore-related elements: Au>>As>W>Sb. The higher K, Au, As, Sb and W abundances in the porphyry saprolite compared to the fresh equivalents at the background site can be attributed to the weathered primary alteration and mineralization in the former. There is a minor enrichment in V, but Ba and Si contents are similar.

Comparison of the porphyries (Figure 10) and fuchsite ultramafic rocks (Figure 11) in the saprolite is between minor (background) and significant (Mystery Zone) alteration and mineralization. Inspection of the distribution plots (Appendix I) shows that there are small increases Si, V, K and Ba associated with the alteration and minor mineralization in the background regolith, relative to the unaltered talc-chlorite wallrocks. However, there seems to be little difference in the abundances of these elements between the background site and the Mystery Zone, although there is less Ba in the latter. The greater mineralization in the Mystery Zone, however, is indicated by higher mean contents of the ore-related elements, Au>>As>W in the porphyries and Au>>As>W, Sb in the fuchsitic ultramafic rocks.

6.3 Implications for exploration

For the *unweathered rocks* and *saprolites*, the element distribution plots and the comparisons between the background site and mineralization at the Mystery Zone indicate the following:

1. In both fresh and weathered ultramafic rocks, alteration is indicated not only by the presence of fuchsite (chromian muscovite), but also by elevated concentrations of K, Ba and V. Altered porphyries can possibly be distinguished by higher K contents.
2. The unmineralized talc-chlorite ultramafic rocks of the Mystery Zone are relatively enriched in As and Sb compared to their equivalents in the background area. This may indicate rather widespread, weak, primary dispersion from mineralization into apparently barren wallrocks. This enrichment is maintained in the saprolite.
3. Unweathered mineralized porphyries have enhanced K, V, Au, As, W and Sb contents relative to the unaltered background porphyries. However, although Au, As and W abundances are greater in the saprolite in the Mystery Zone mineralization, there appears to be no significant difference in Sb content compared to the minor background mineralization.
4. Weathered fuchsite ultramafic rocks at the Mystery Zone are enriched in Au, As, W and Sb relative to background.
5. Overall, in addition to Au, mineralized saprolite is indicated by As (contrast x10 compared to barren talc-chlorite ultramafic rocks), Sb and W (contrasts x2, but x6 in porphyries). Regional scale thresholds, based on populations evident in the combined data set (Mystery Zone and background), are 20 ppb Au, 10 ppm As, 4 ppm Sb and 3 ppm W. Local thresholds are rather greater, *i.e.*, 90 ppb Au, 35 ppm As, 8 ppm Sb, 6 ppm W (Table 3). Arsenic concentrations are partly dependent on those of Fe, hence thresholds tend to be higher over ultramafic rocks; data should, ideally, be normalized with respect to Fe content.

In the *clay-saprolite* and *mottled clay* horizons, broadly similar conclusions apply, except that Au may be leached and that W and, particularly, Sb tend to be more strongly concentrated than in the saprolite, particularly over the porphyries (Table 3). However, data from these horizons are too few to provide an adequate comparison. A threshold as low as 10 ppb Au may apply at sites more strongly leached than Mt Percy.

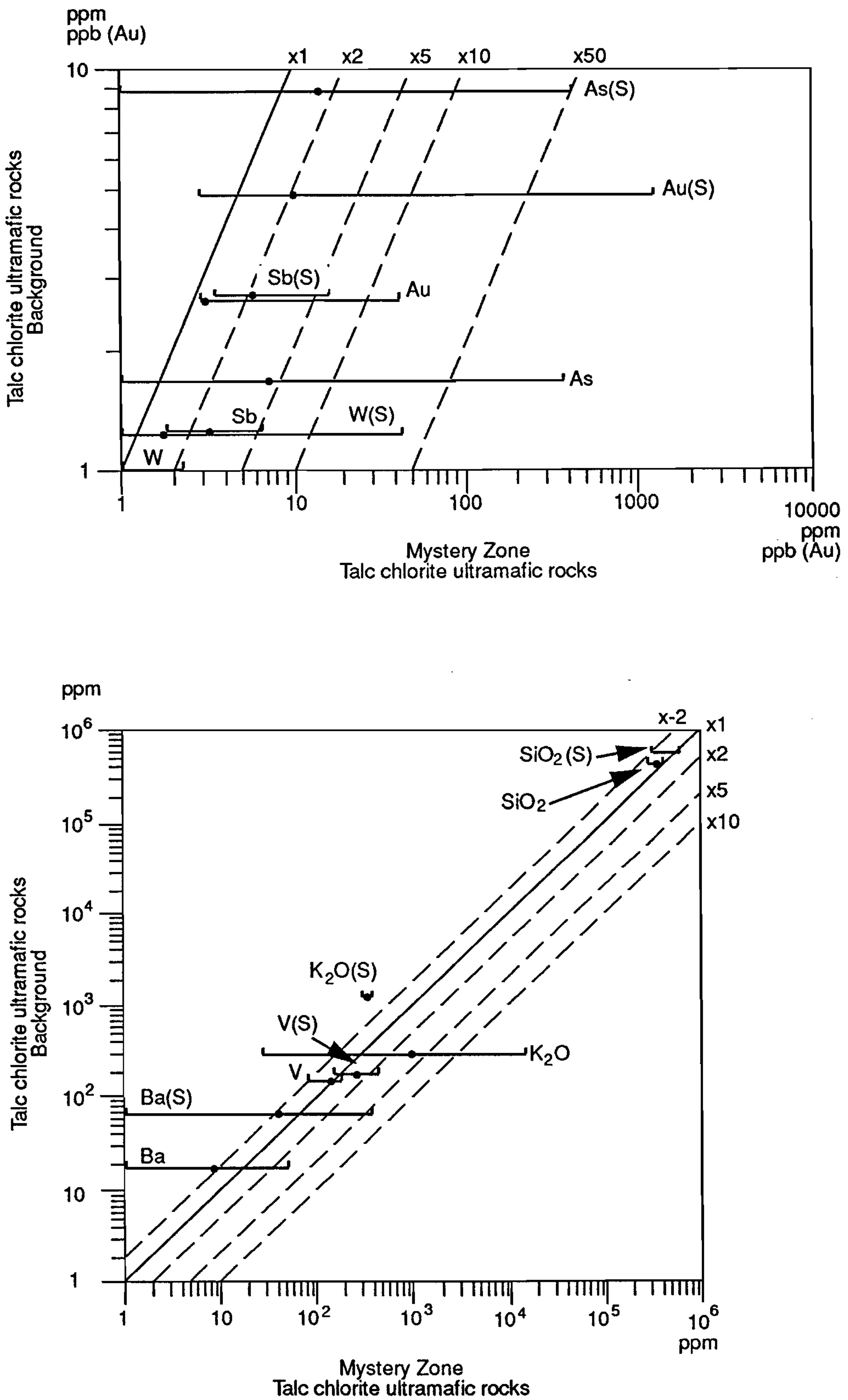


Figure 8. Comparison in element abundances in talc-chlorite ultramafic rocks from the background site and the Mystery Zone, expressed as ranges and geometric means in fresh rock and saprolite (S). Where the means are the same, the symbol plots on the line of equal abundance. Relative enrichments and depletions in the Mystery Zone are indicated by shifts to the right or left of this line, respectively.

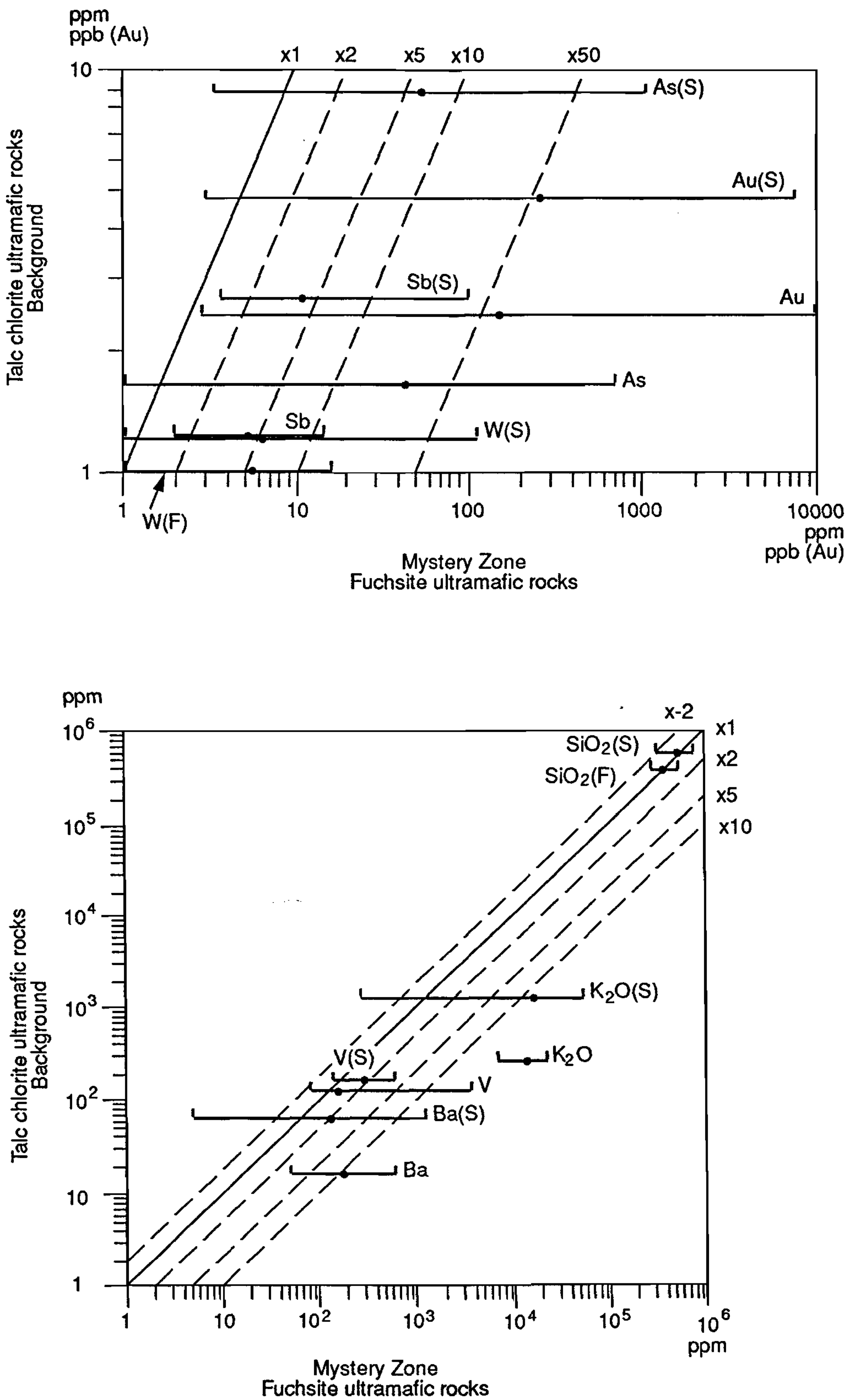


Figure 9. Comparison in element abundances in background talc-chlorite ultramafic rocks and fuchsite ultramafic rocks from the Mystery Zone, expressed as ranges and geometric means in fresh rock and saprolite (S). Where the means are the same, the symbol plots on the line of equal abundance. Relative enrichments and depletions in the Mystery Zone are indicated by shifts to the right or left of this line, respectively.

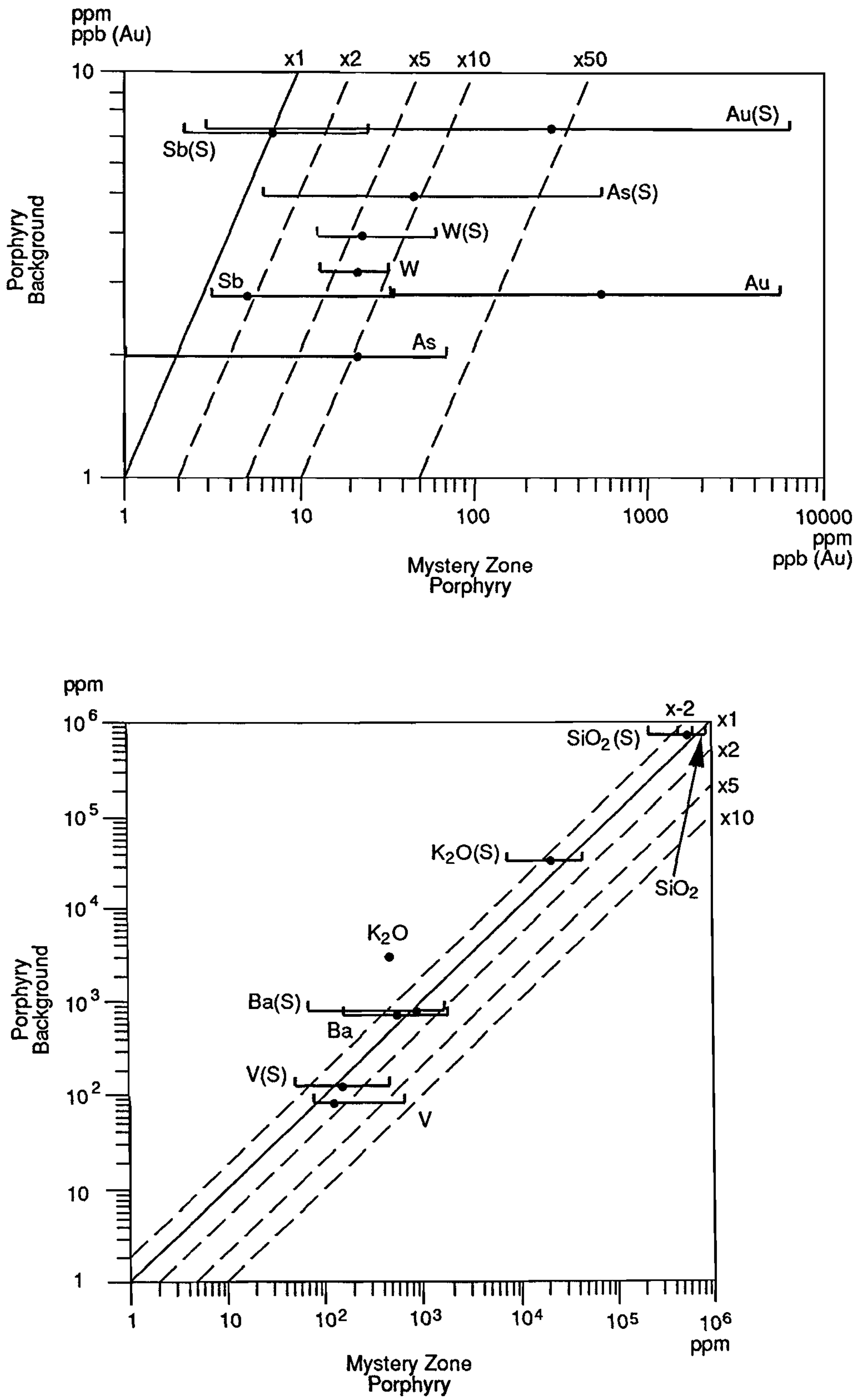
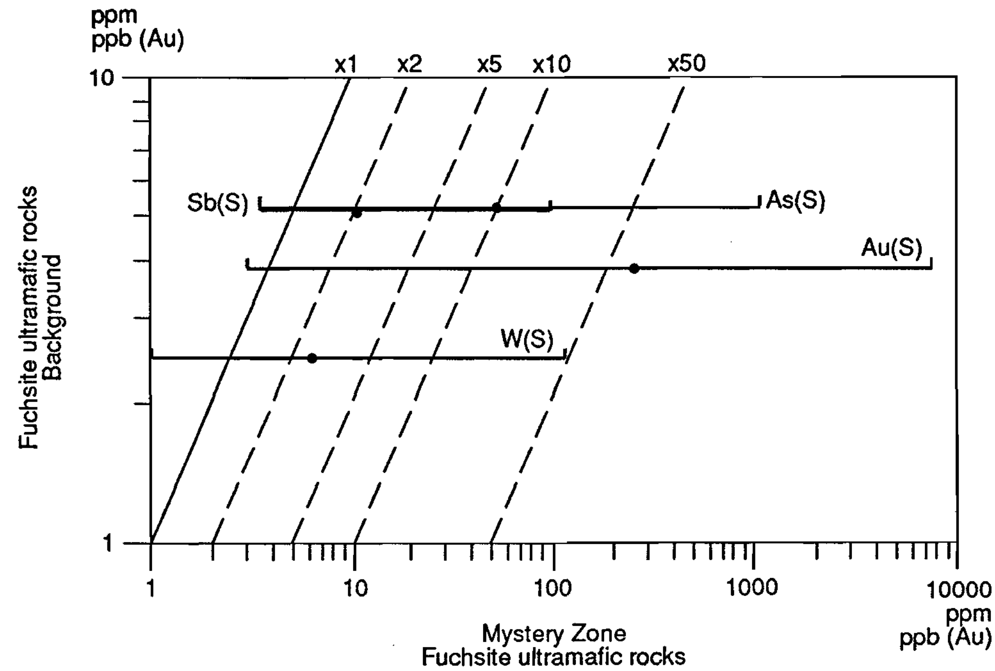


Figure 10. Comparison in element abundances in porphyries from the background site and the Mystery Zone, expressed as ranges and geometric means in fresh rock and saprolite (S). Where the means are the same, the symbol plots on the line of equal abundance. Relative enrichments and depletions in the Mystery Zone are indicated by shifts to the right or left of this line, respectively.



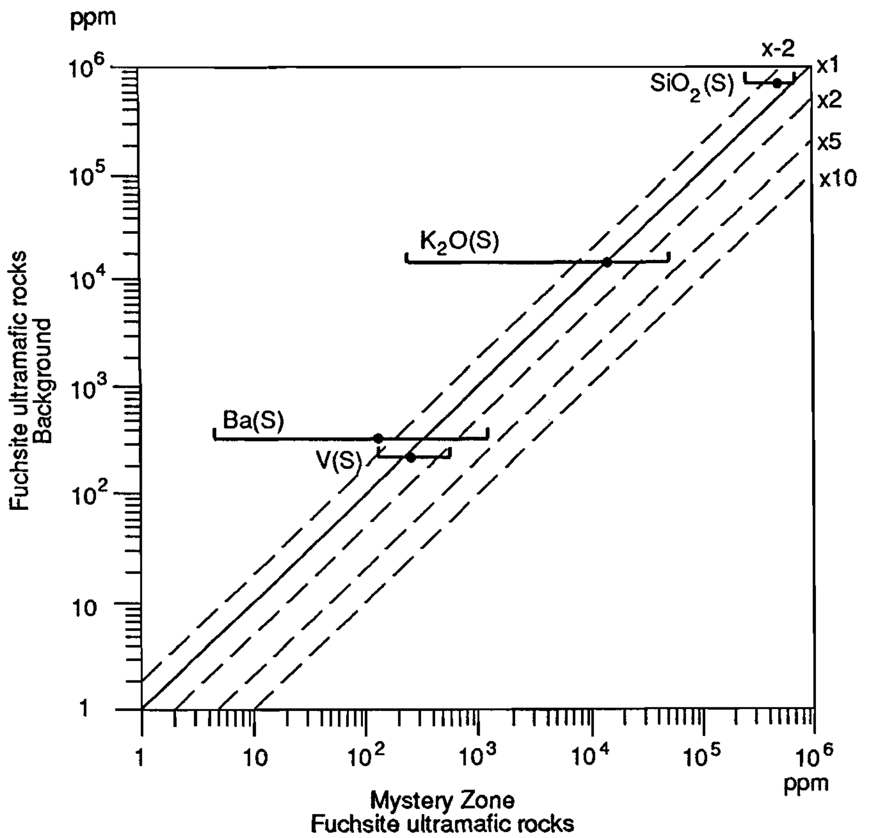


Figure 11 Comparison in element abundances in fuchsite ultramafic rocks from the background site and the Mystery Zone, expressed as ranges and geometric means in the saprolite (S). Where the means are the same, the symbol plots on the line of equal abundance. Relative enrichments and depletions in the Mystery Zone are indicated by shifts to the right or left of this line, respectively.

Table 3. Approximate threshold values for different regolith horizons, Mt. Percy

	Au ppb	As ppm	Sb ppm	W ppm
Saprolite				
Regional	20	10	4	3
Local	90	35	8	6
Clay horizons				
Regional	10	10	4	3
Local	30	25	10	8
Calcareous soil				
Non-lateritic	30	15	4	3
Lateritic	50	30	4	3

The *red clay soils* at the background site do not retain a clear indication of the parent lithology, unlike immediately underlying horizons and are, therefore, probably transported, at least in part. The data are very few but indicate that Au becomes concentrated in the calcareous surface horizons and thereby give surface expression to otherwise concealed mineralization. Whether this represents a more widespread anomaly or is related to the immediately underlying mineralization is not certain. A local threshold of about 30 ppb Au probably applies. The presence of a superjacent Au anomaly in calcareous soils on collovium overlying buried mineralization is consistent with the findings of several other investigations in the southern Yilgarn Block (Butt *et al.*, 1991). Concentrations of other elements are very low and regional thresholds are similar to the regional values for saprolite. Much greater values, of course, apply to soils derived from lateritic gravels.

7 ACKNOWLEDGEMENTS

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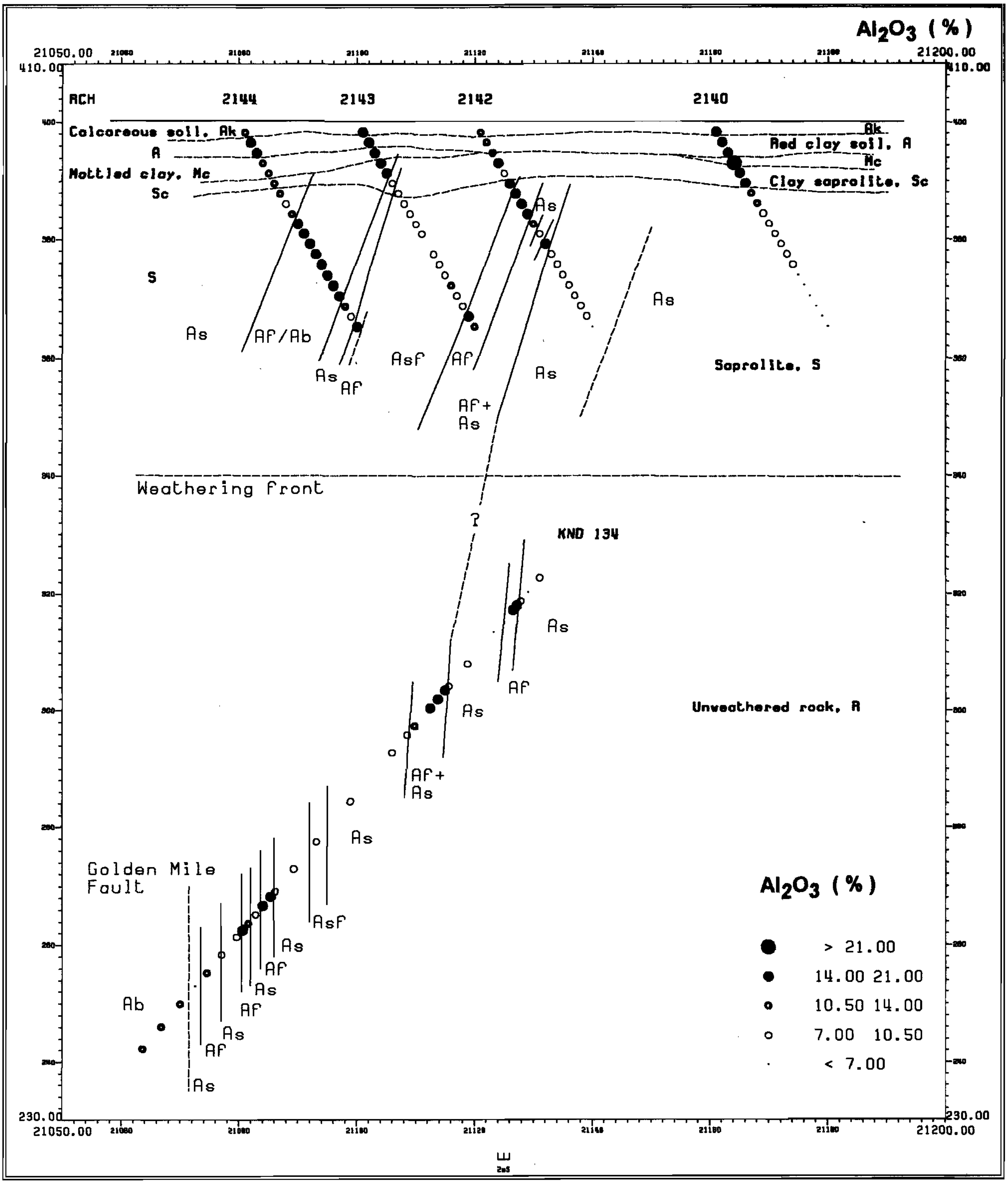
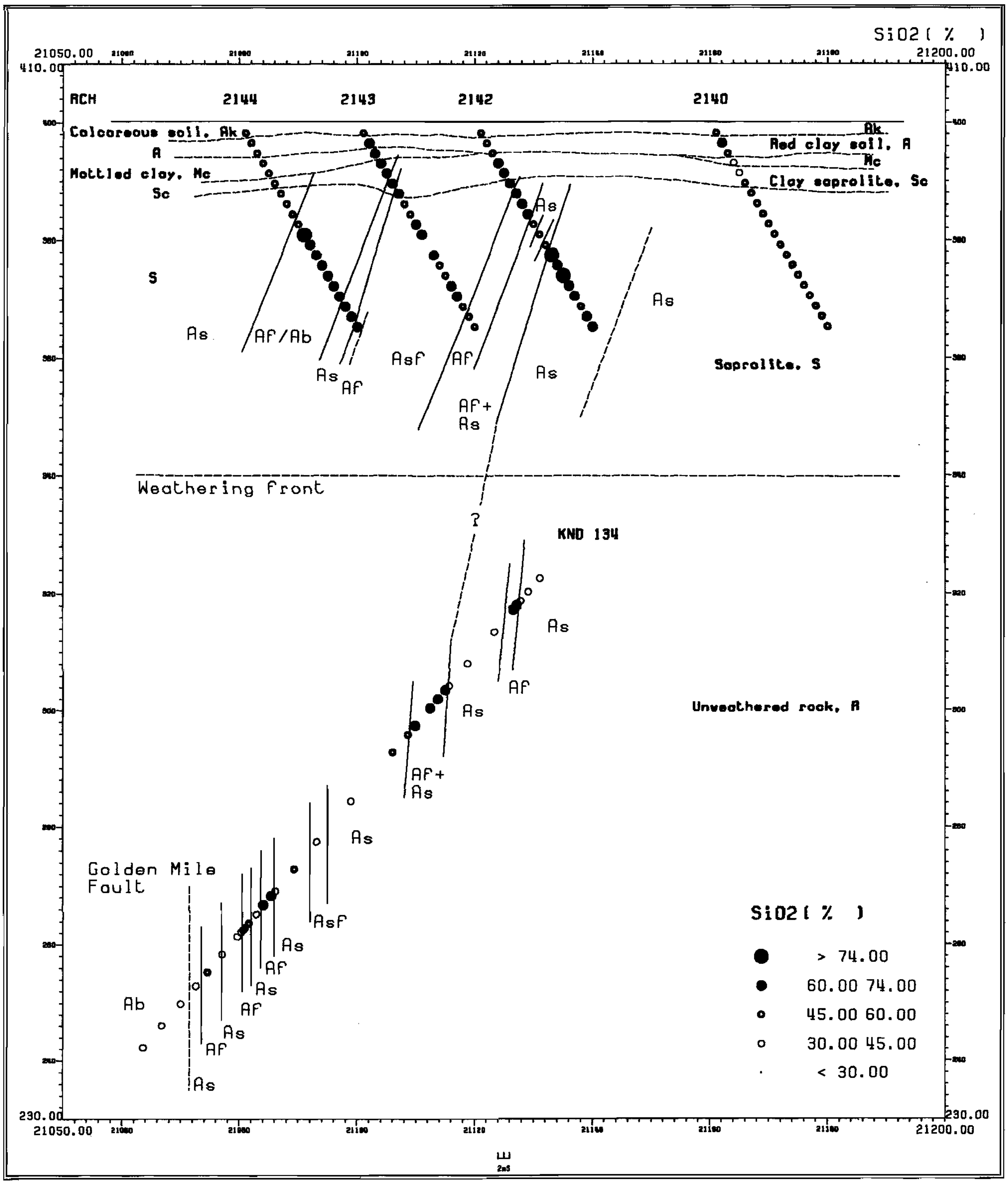
APPENDIX I

ELEMENT DISTRIBUTION PLOTS, SECTION 17350 N



Al2O3 (%)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Af+
As
Unweathered rock, R
As
Golden Mile
Fault
AsF
As
Af
As
Af
Ab
As
Af
As
Al2O3 (%)
> 21.00
14.00 21.00
10.50 14.00
7.00 10.50
< 7.00
E


SiO2 (%)
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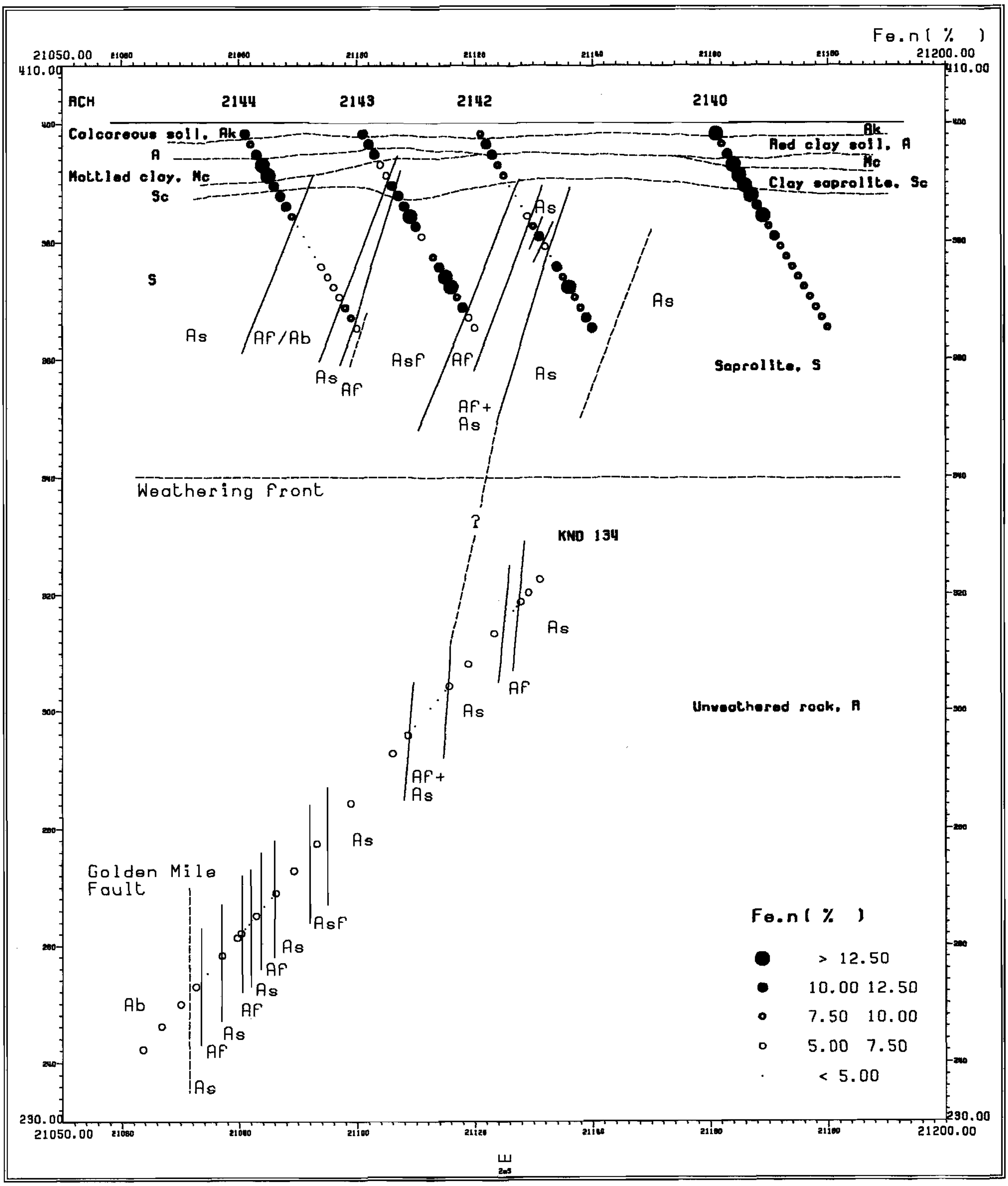
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Af+
As
Unweathered rock, R
As
Golden Mile
Fault
AsF
As
Af
As
Af
Ab
As
Af
As
SiO2 (%)
> 74.00
60.00 74.00
45.00 60.00
30.00 45.00
< 30.00
E


Fe.n(%)
21050.00
21200.00
410.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Af+
As
Unweathered rock, R
As
Golden Mile
Fault
Asf
As
Af
As
Af
As
Af
Ab
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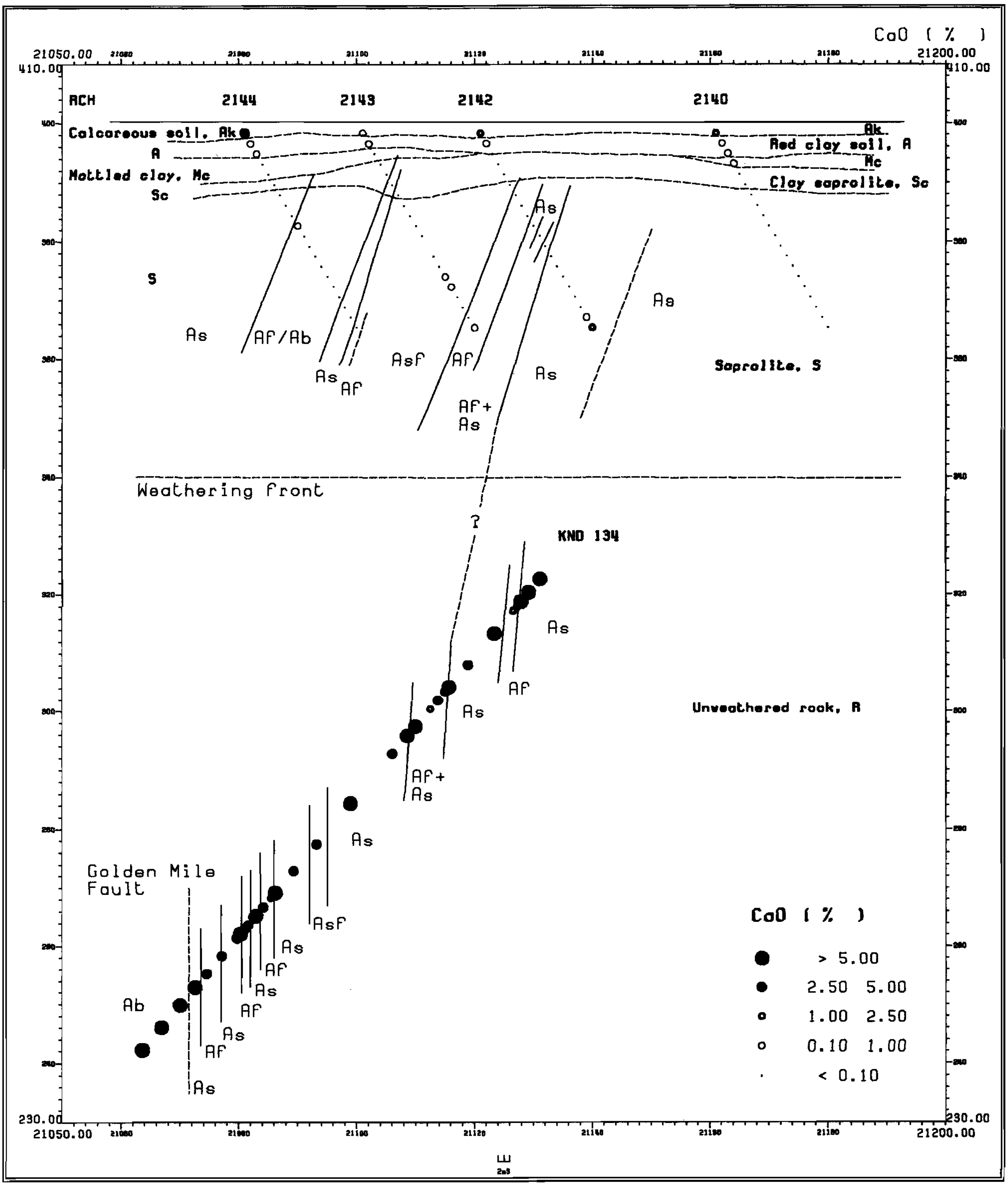
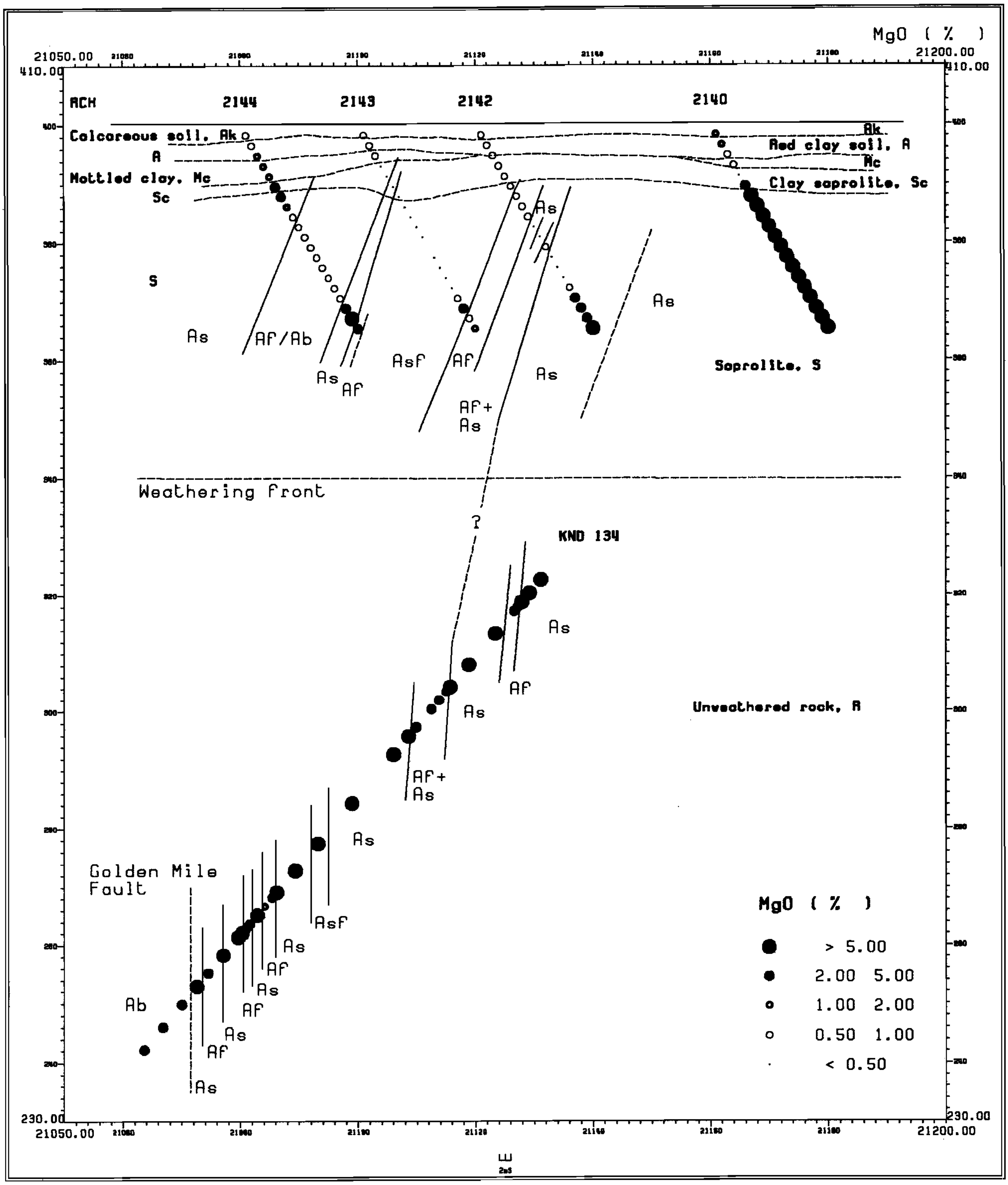
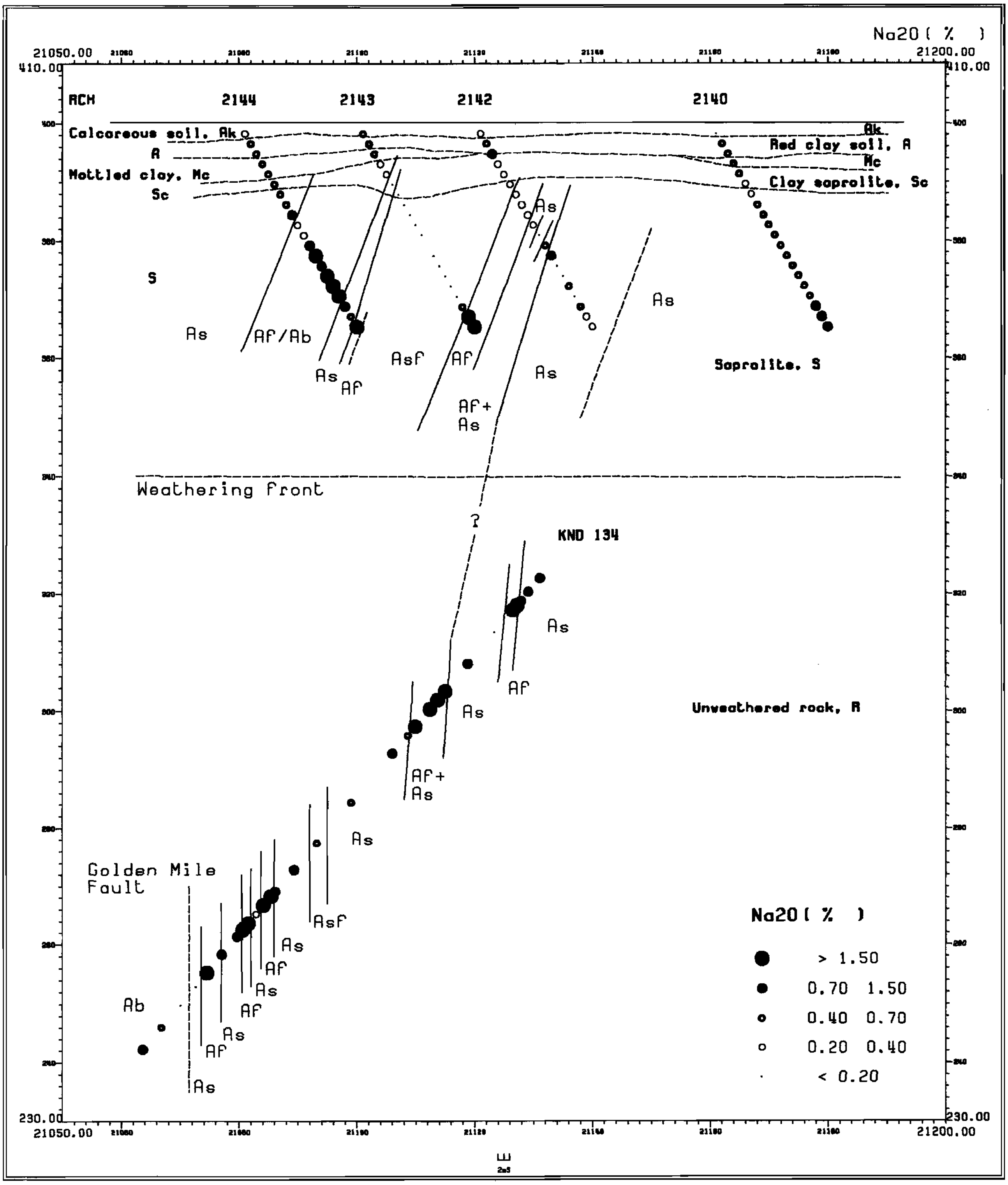
< 5.00
230.00
E

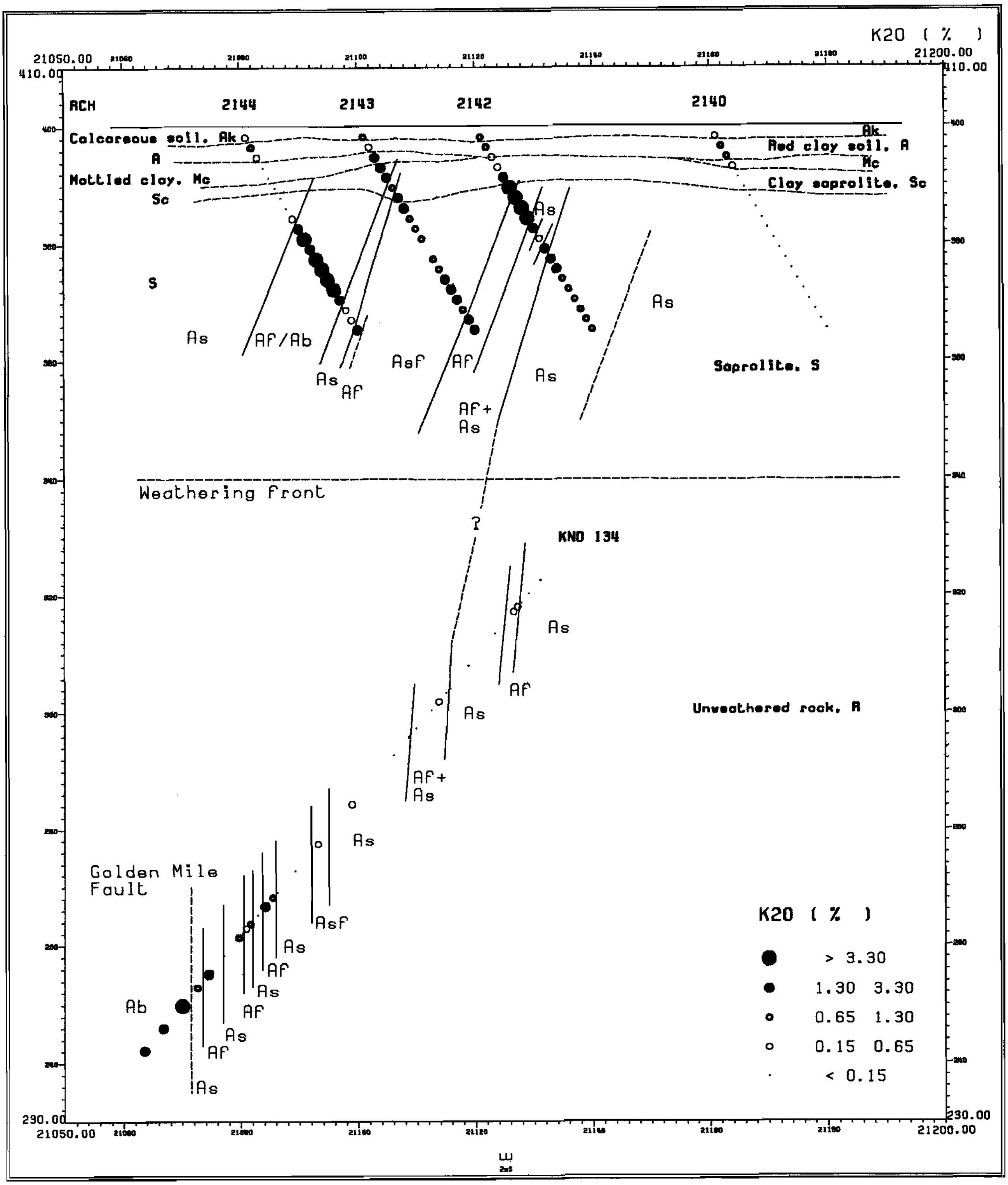

CaO (%)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
Asf
As
Af
As
Af
Ab
As
Af
As
CaO (%)
> 5.00
2.50 5.00
1.00 2.50
0.10 1.00
< 0.10
E

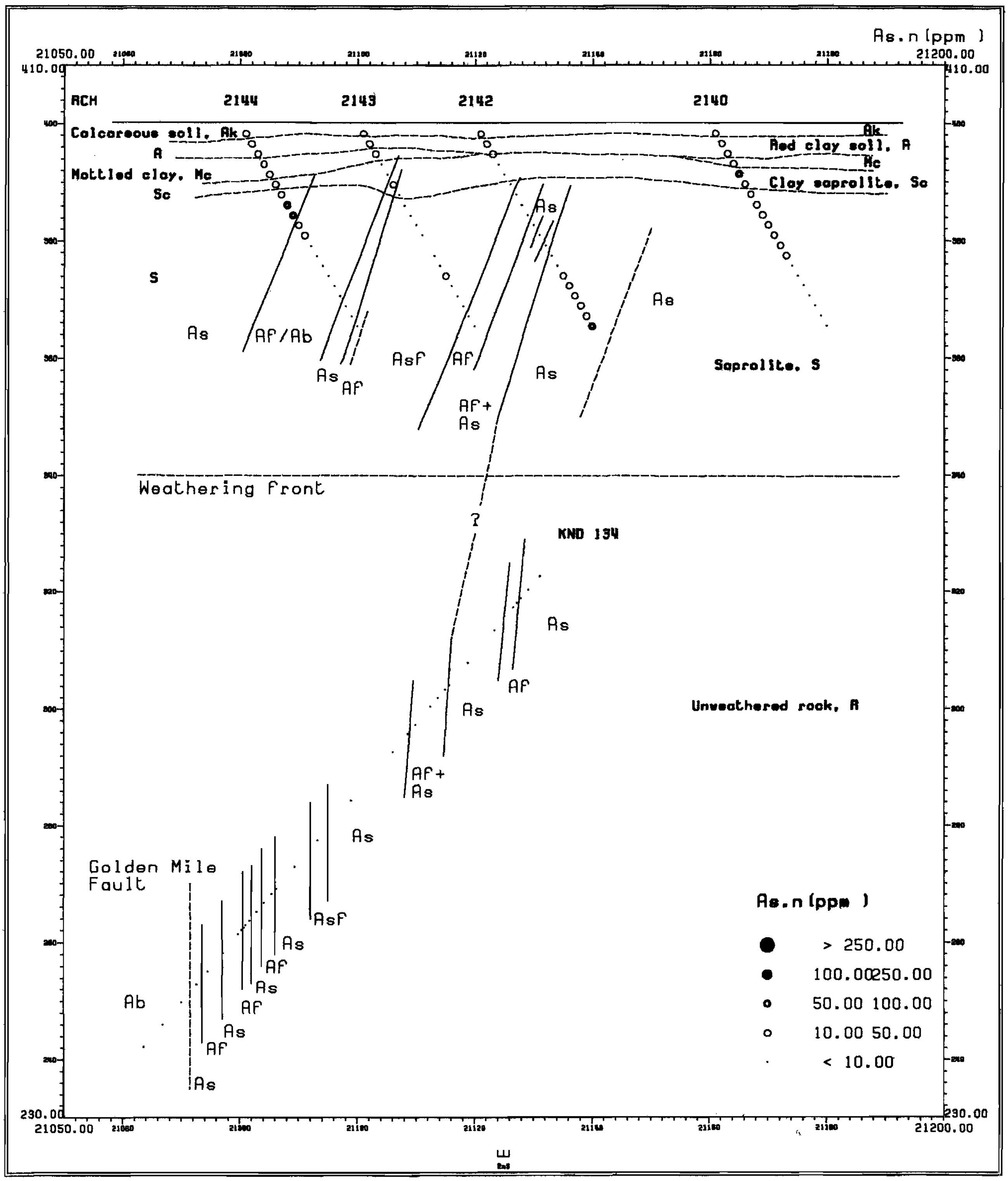


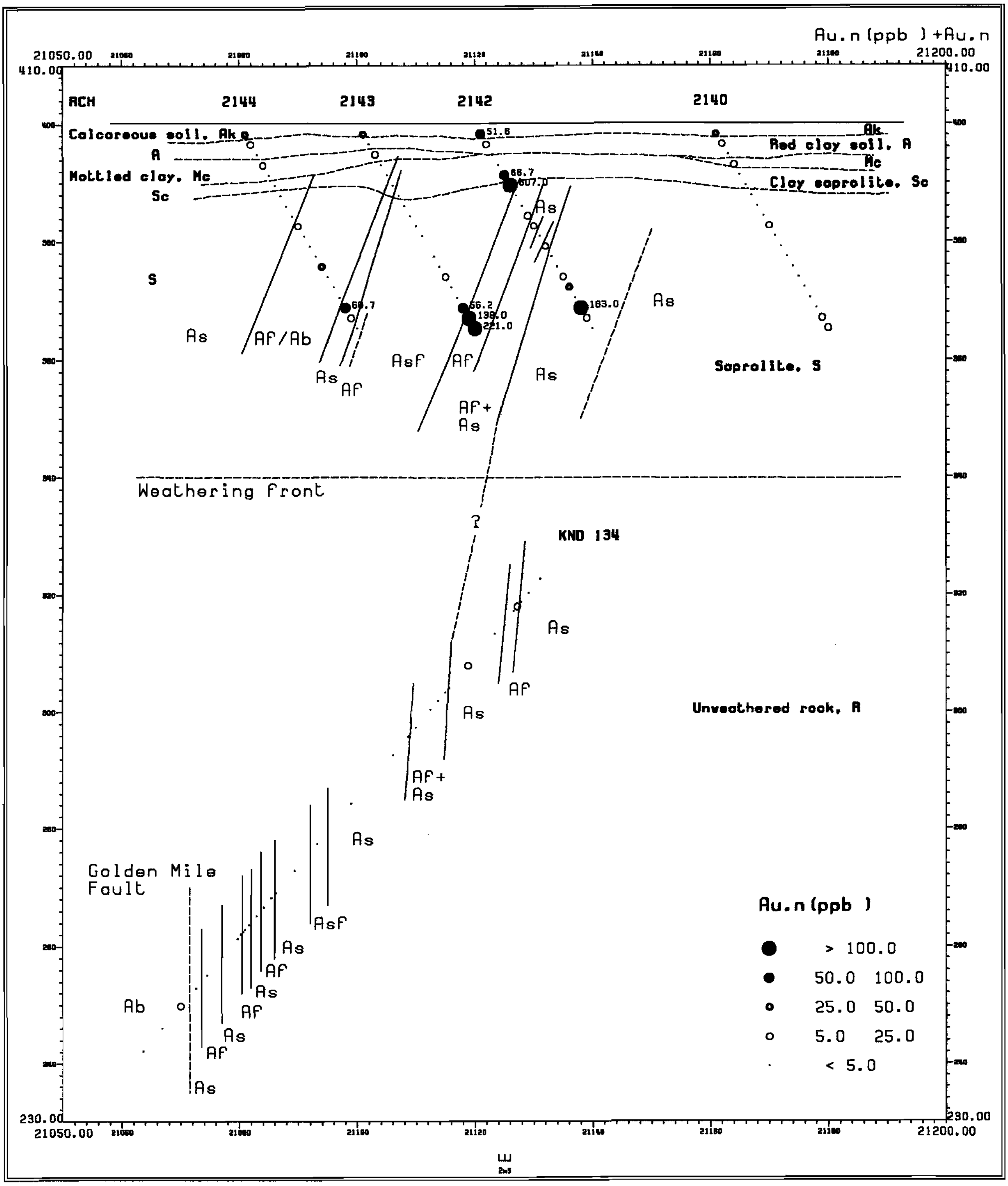
MgO (%)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Af+
As
Unweathered rock, R
As
Golden Mile
Fault
Asf
As
Af
As
Ab
Af
As
Af
As
MgO (%)
> 5.00
2.00 5.00
1.00 2.00
0.50 1.00
< 0.50



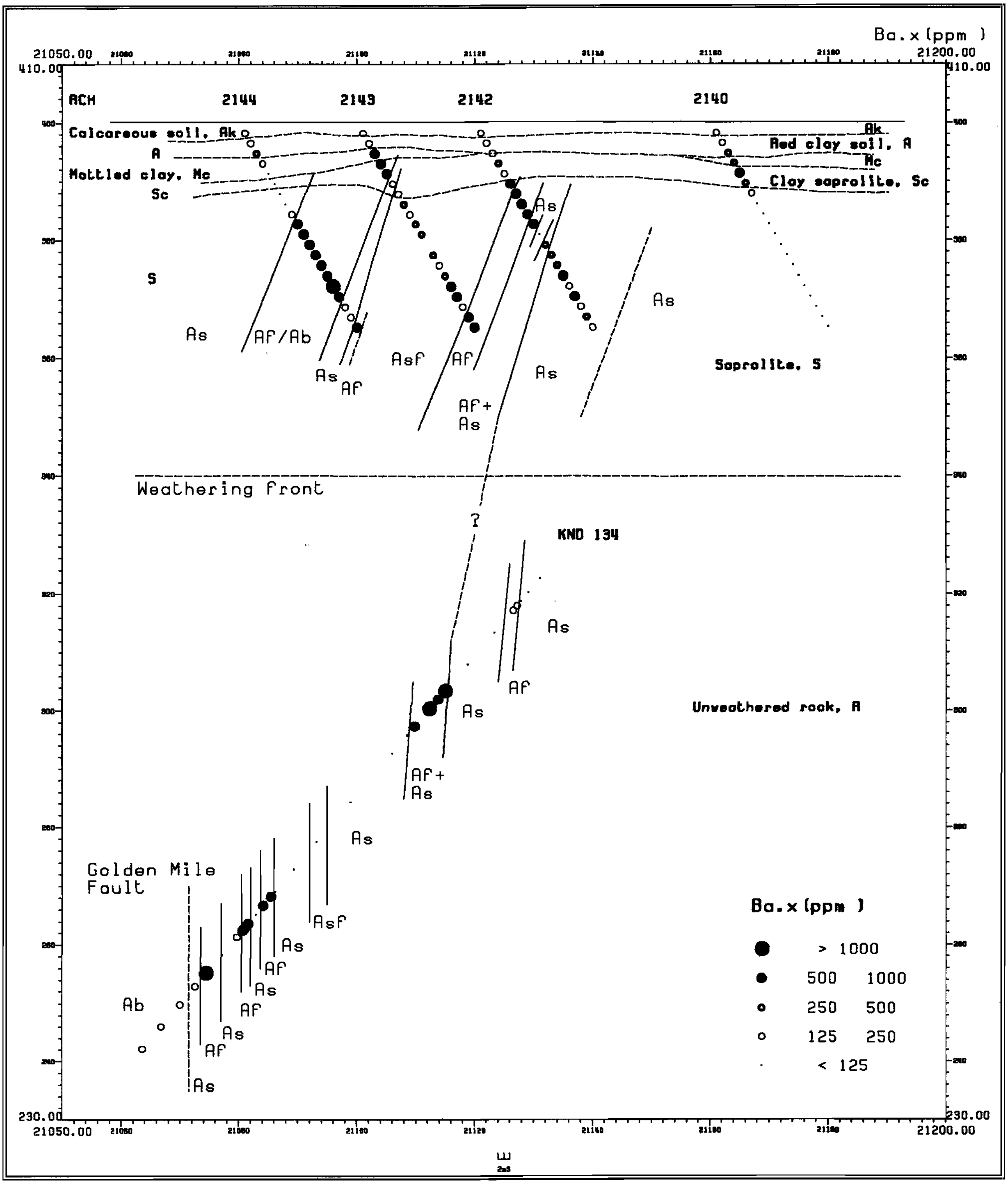
Na2O (%)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Red clay soil, A
Ak
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
Asf
As
Af
As
Af
As
Af
As
Ab
Na2O (%)
> 1.50
0.70 1.50
0.40 0.70
0.20 0.40
< 0.20
E

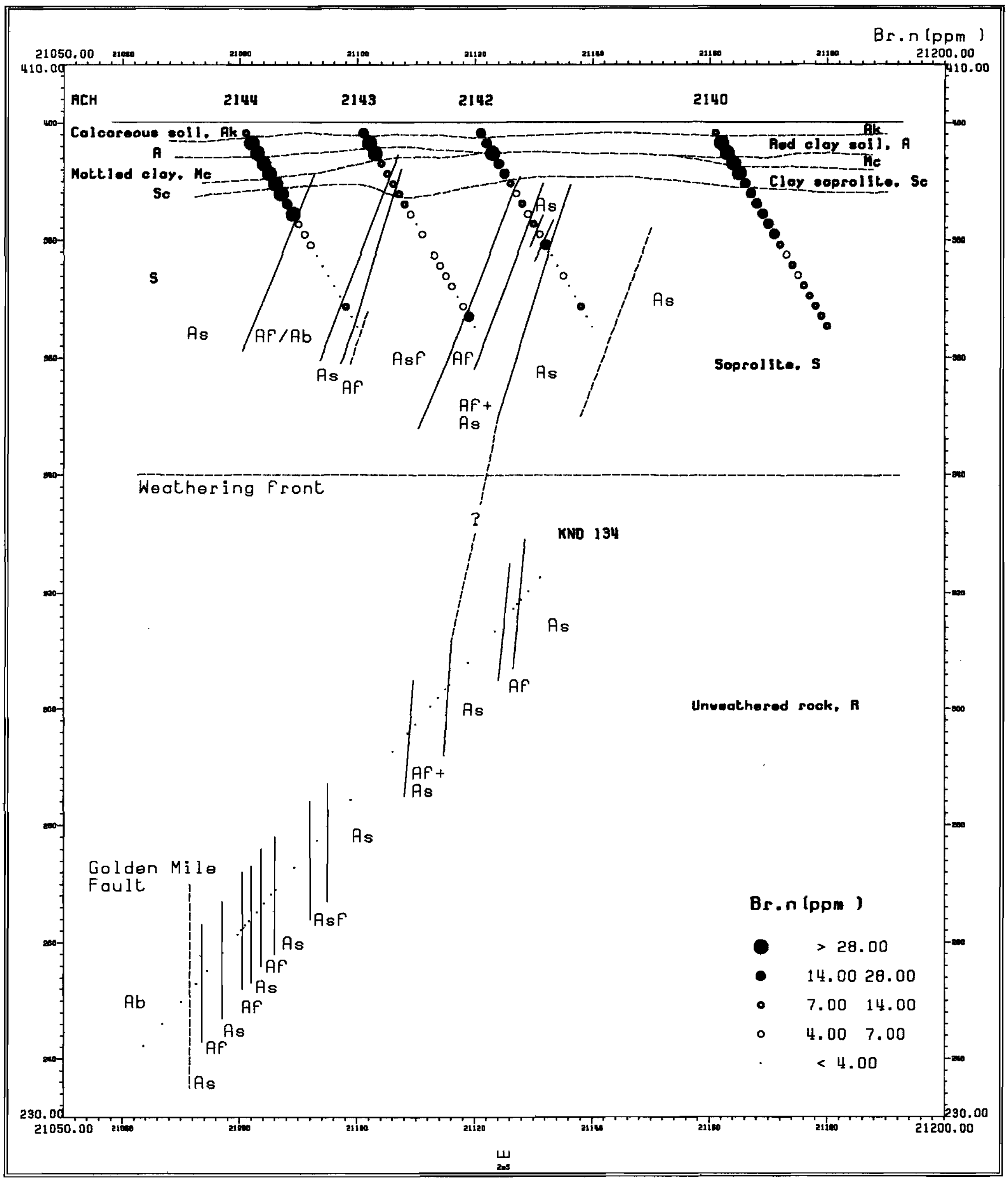

K20 (%)
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, A
Af+
As
As
Asf
Golden Mile
Fault
As
Af
As
Af
Ab
As
Af
As
K20 (%)
> 3.30
1.30 3.30
0.65 1.30
0.15 0.65
< 0.15
21050.00
21200.00
410.00
230.00

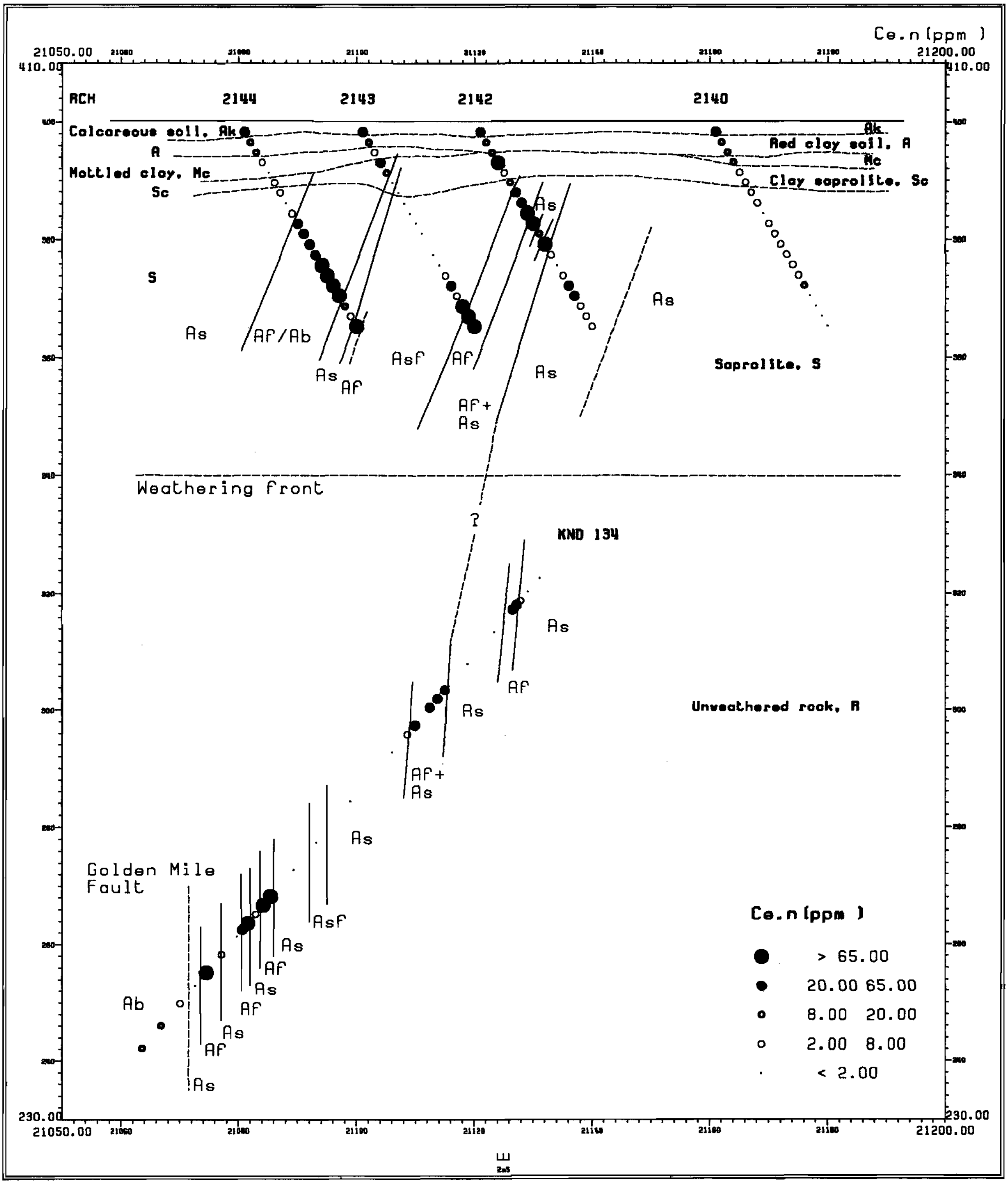

As.n (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
Ak
Red clay soil, R
R
Mottled clay, Mc
Mc
Sc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Af+
As
Unweathered rock, R
As
AsF
Golden Mile
Fault
As
Af
As
Af
As
Ab
As
Af
As
As.n (ppm)
> 250.00
100.00 250.00
50.00 100.00
10.00 50.00
< 10.00
E

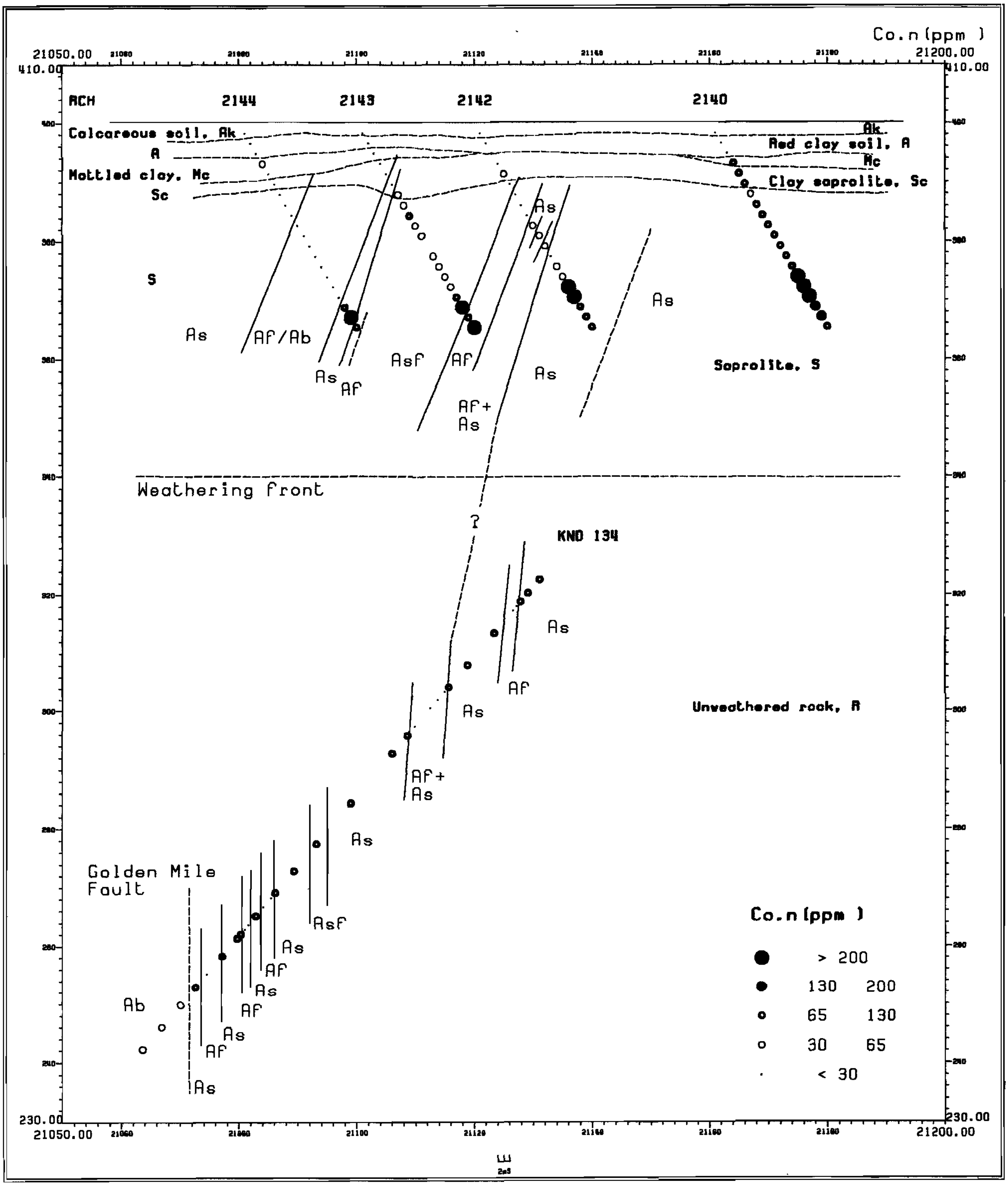


Au.n (ppb) +Au.n
21050.00
21200.00
410.00
230.00
RCH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
51.6
66.7
607.0
56.2
138.0
221.0
69.7
183.0
S
As
Af/Ab
As
Af
Asf
Af
Af +
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af +
As
As
AsF
Golden Mile
Fault
As
Af
As
Af
As
Ab
As
Af
As
Au.n (ppb)
> 100.0
50.0 100.0
25.0 50.0
5.0 25.0
< 5.0

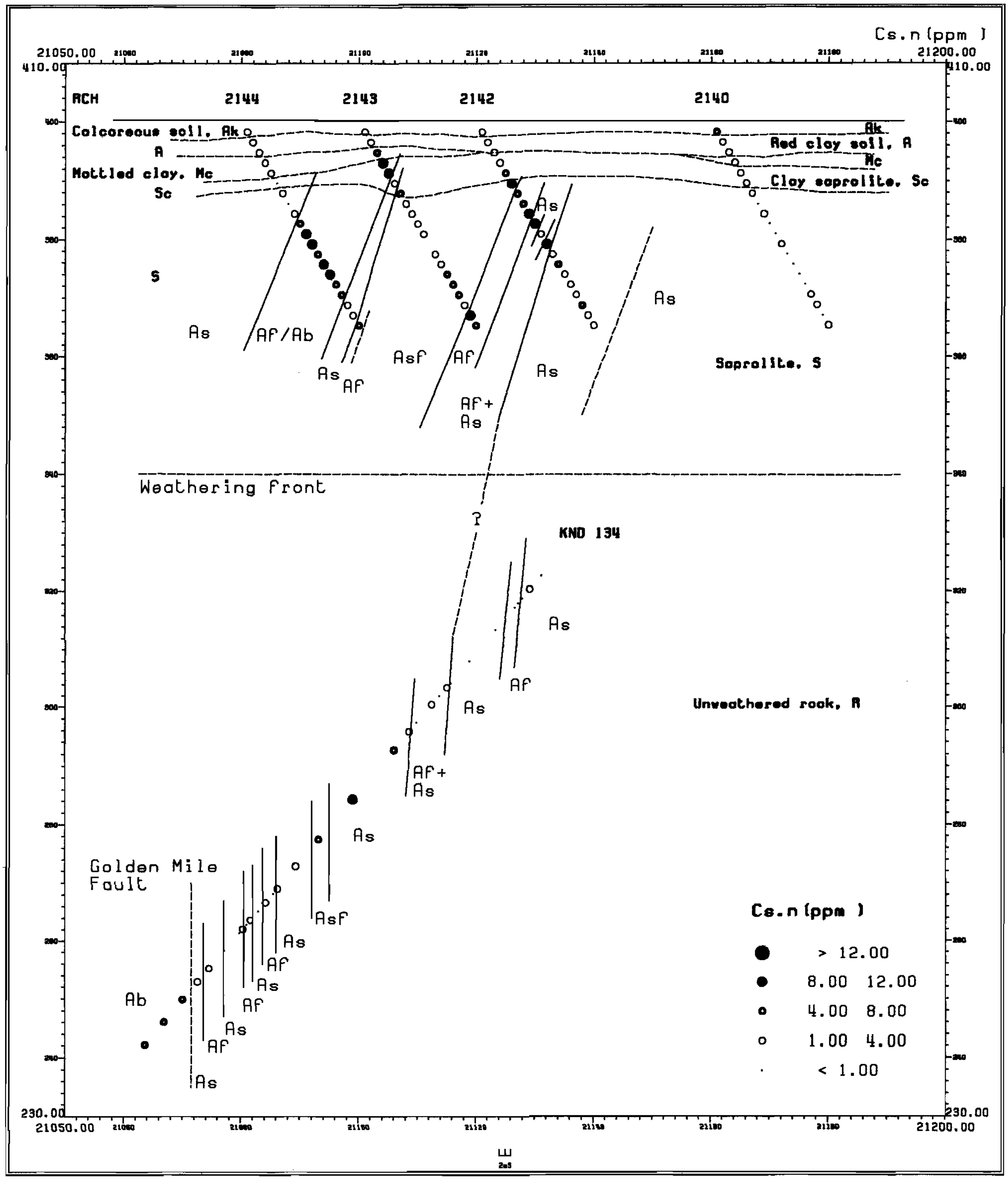

Ba.x (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
Asf
As
Af
As
Af
As
Af
Ab
As
Ba.x (ppm)
> 1000
500 1000
250 500
125 250
< 125
E

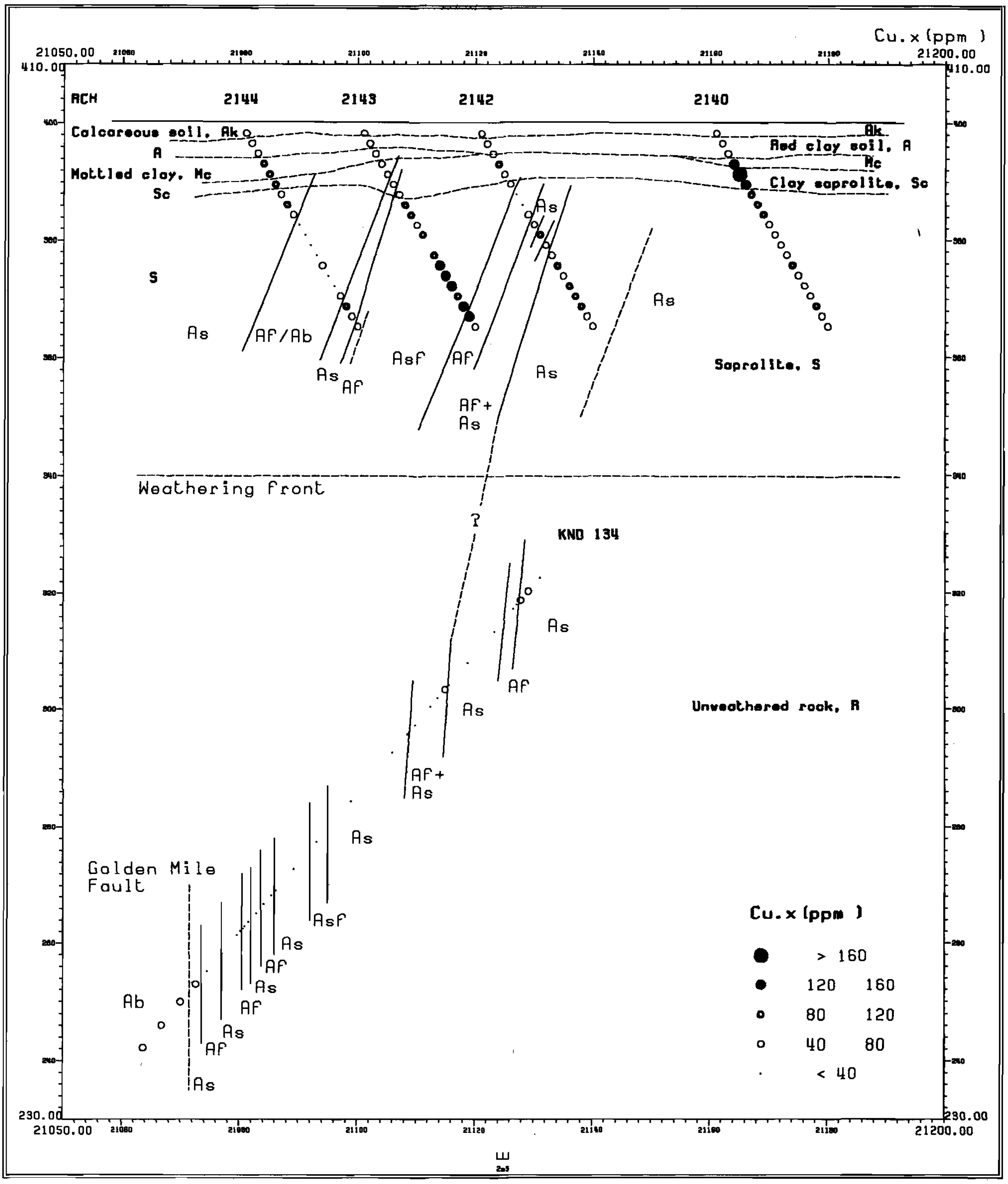

Br.n (ppm)
21050.00
21200.00
410.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
Ab
As
Br.n (ppm)
> 28.00
14.00 28.00
7.00 14.00
4.00 7.00
< 4.00
230.00
E

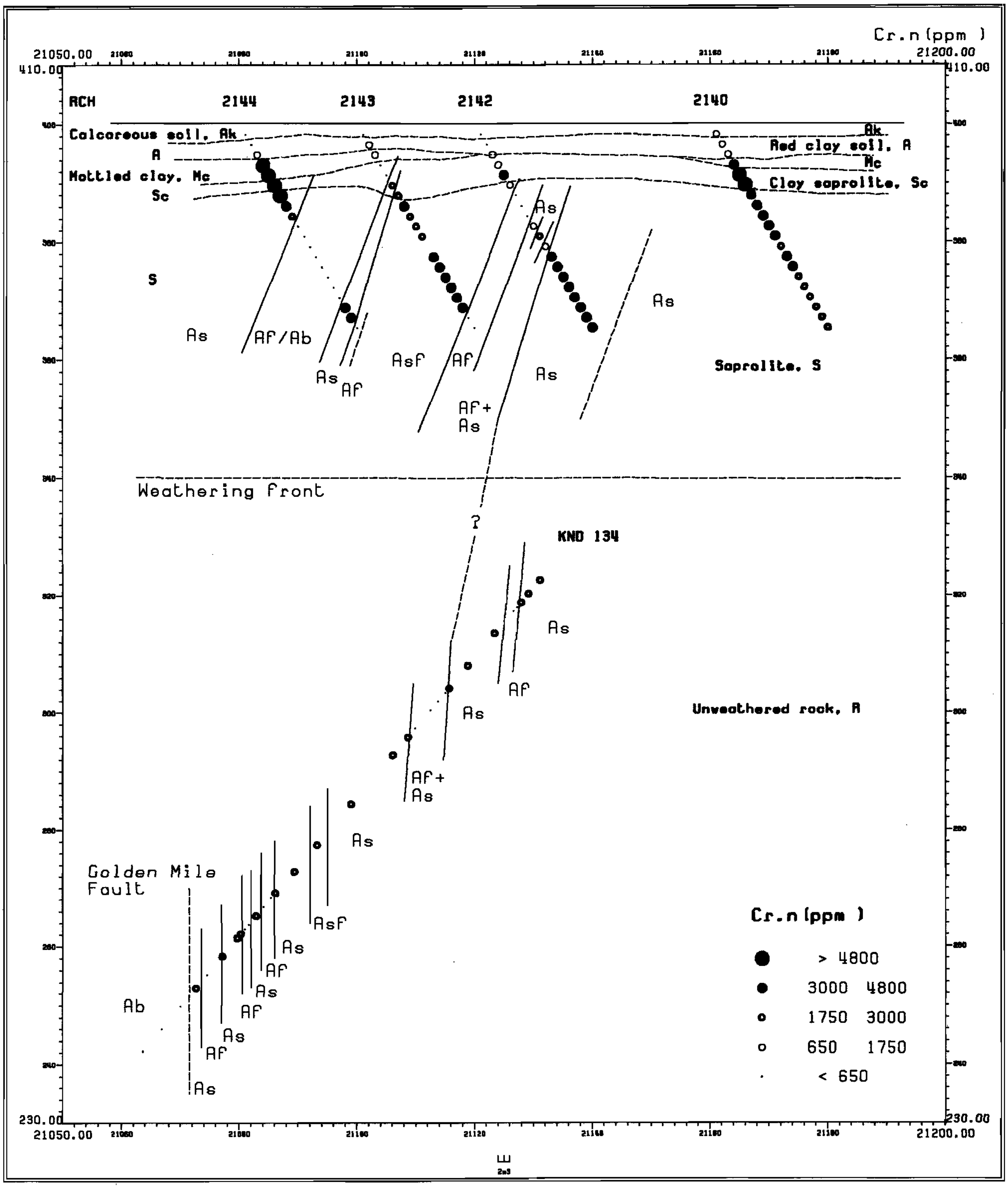

Ce.n (ppm)
21050.00
21200.00
410.00
230.00
RCH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
Asf
As
Af
As
Af
As
Af
As
Ab
Ce.n (ppm)
> 65.00
20.00 65.00
8.00 20.00
2.00 8.00
< 2.00
E



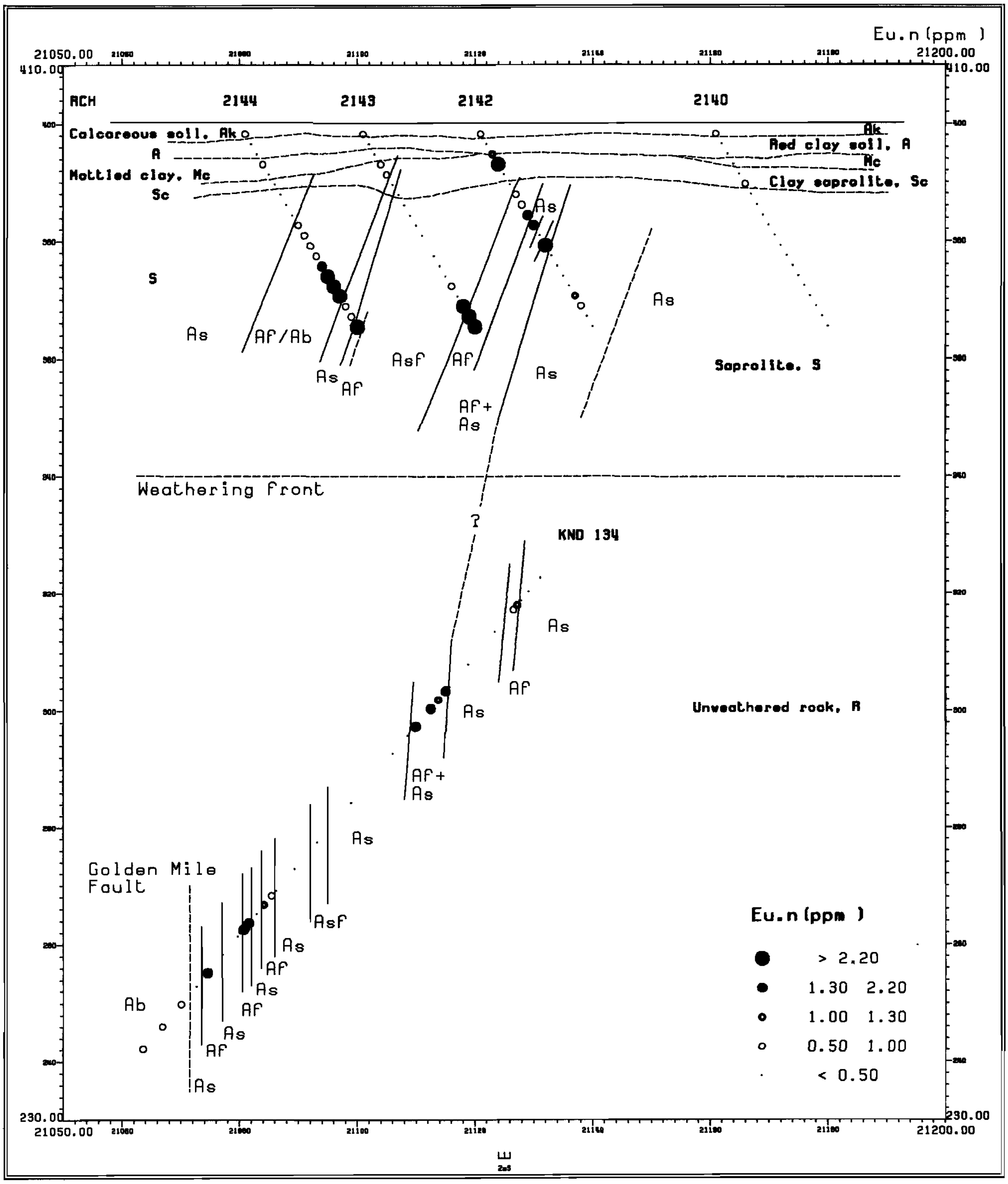
Co.n (ppm)
21050.00
21200.00
410.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
As
Ab
Co.n (ppm)
> 200
130 200
65 130
30 65
< 30
230.00
21050.00
21200.00
230.00
E

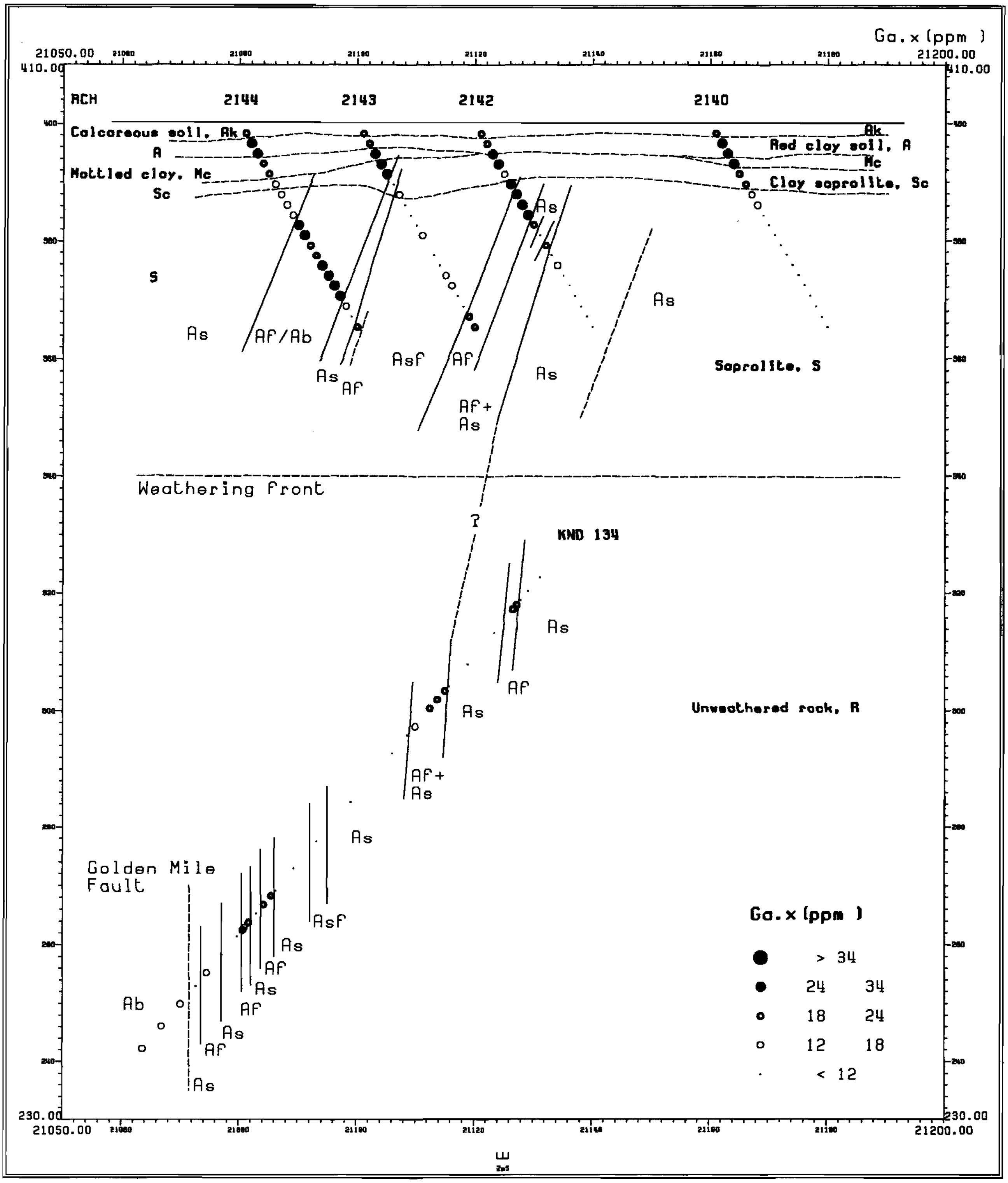

Cs.n (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
Ab
As
Cs.n (ppm)
> 12.00
8.00 12.00
4.00 8.00
1.00 4.00
< 1.00
E

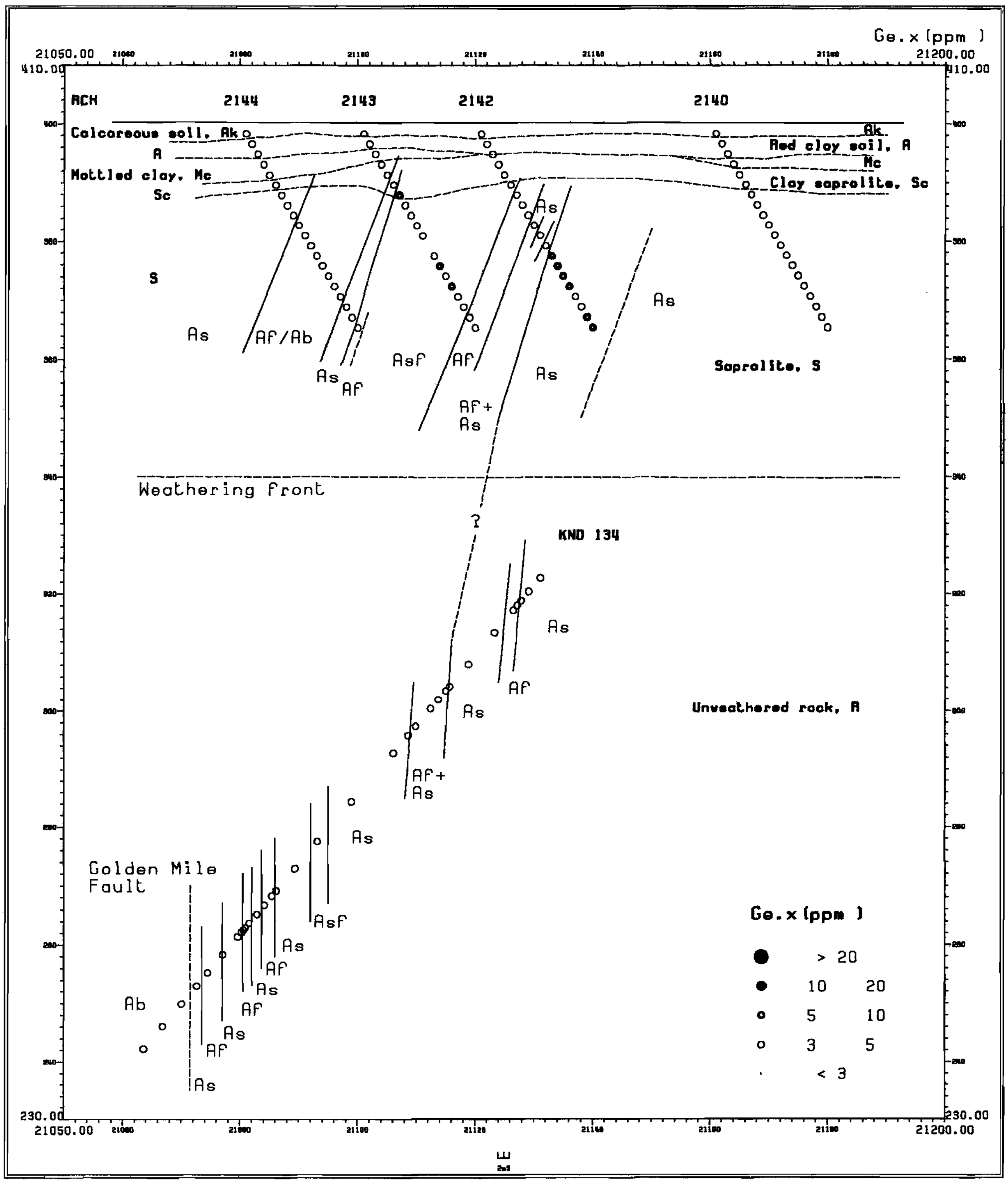

Cu.x (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
Asf
As
Af
As
Af
As
Af
Ab
As
Cu.x (ppm)
> 160
120 160
80 120
40 80
< 40
E

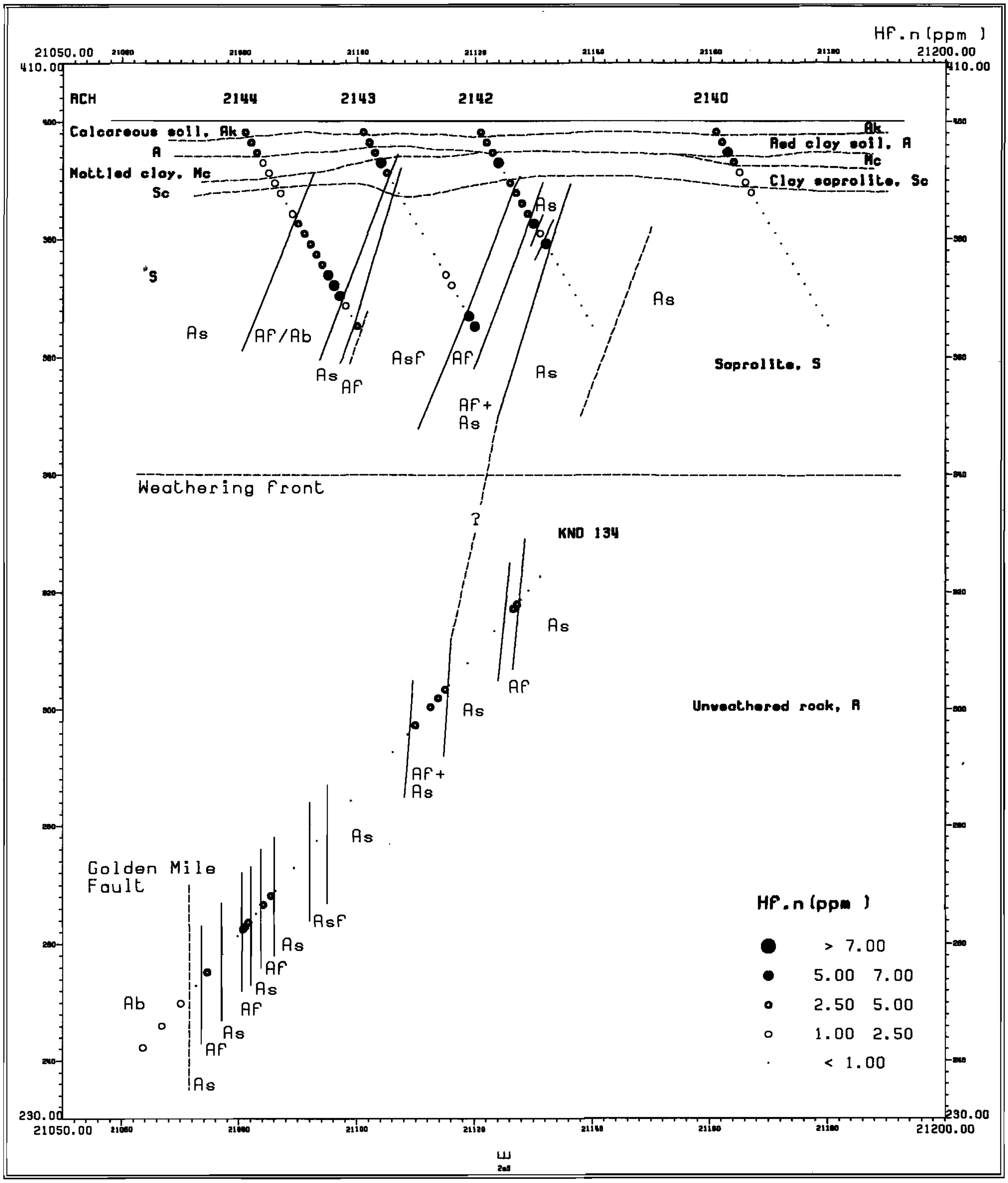


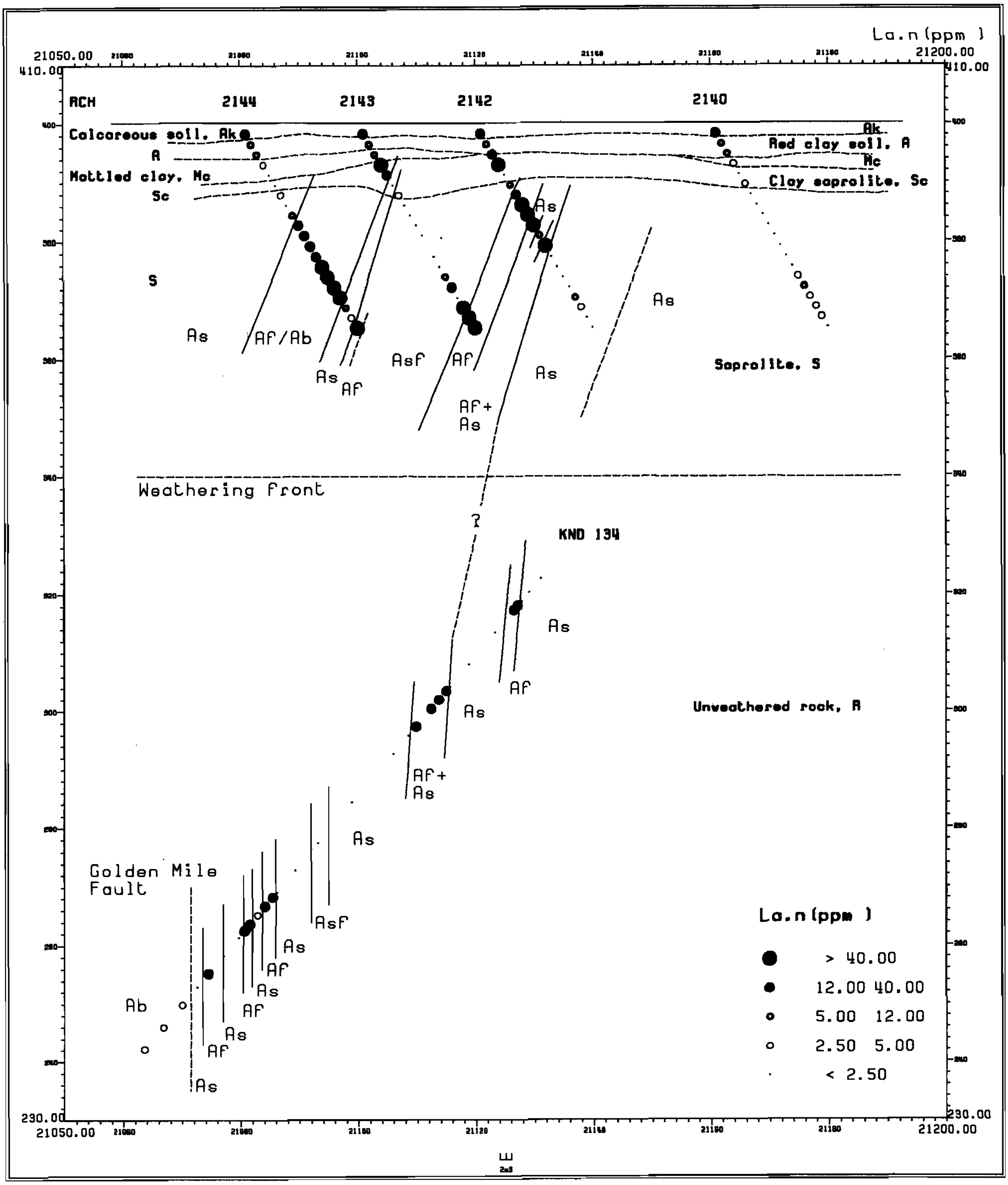
Cr.n (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
Af
AsF
Af+
As
Saprolite, S
Weathering front
?
KND 134
Unweathered rock, A
Golden Mile
Fault
Ab
Cr.n (ppm)
> 4800
3000 4800
1750 3000
650 1750
< 650

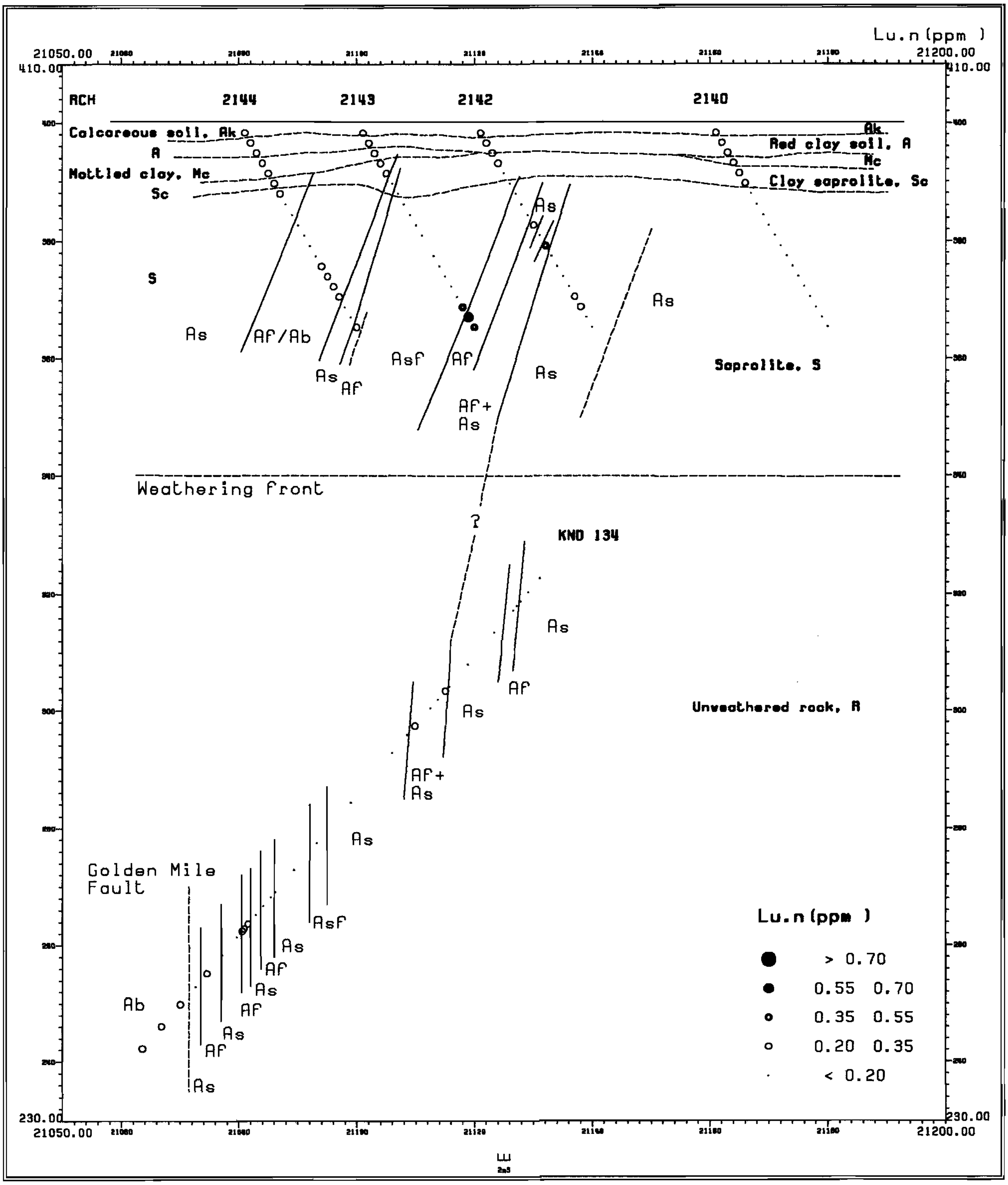

Eu.n (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Af+
As
Unweathered rock, R
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
Ab
As
Eu.n (ppm)
> 2.20
1.30 2.20
1.00 1.30
0.50 1.00
< 0.50
E


Ga.x (ppm)
21050.00
21200.00
410.00
230.00
RCH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Af+
As
Unweathered rock, R
As
Golden Mile
Fault
Asf
As
Af
As
Af
As
Af
Ab
As
Ga.x (ppm)
> 34
24 34
18 24
12 18
< 12
E

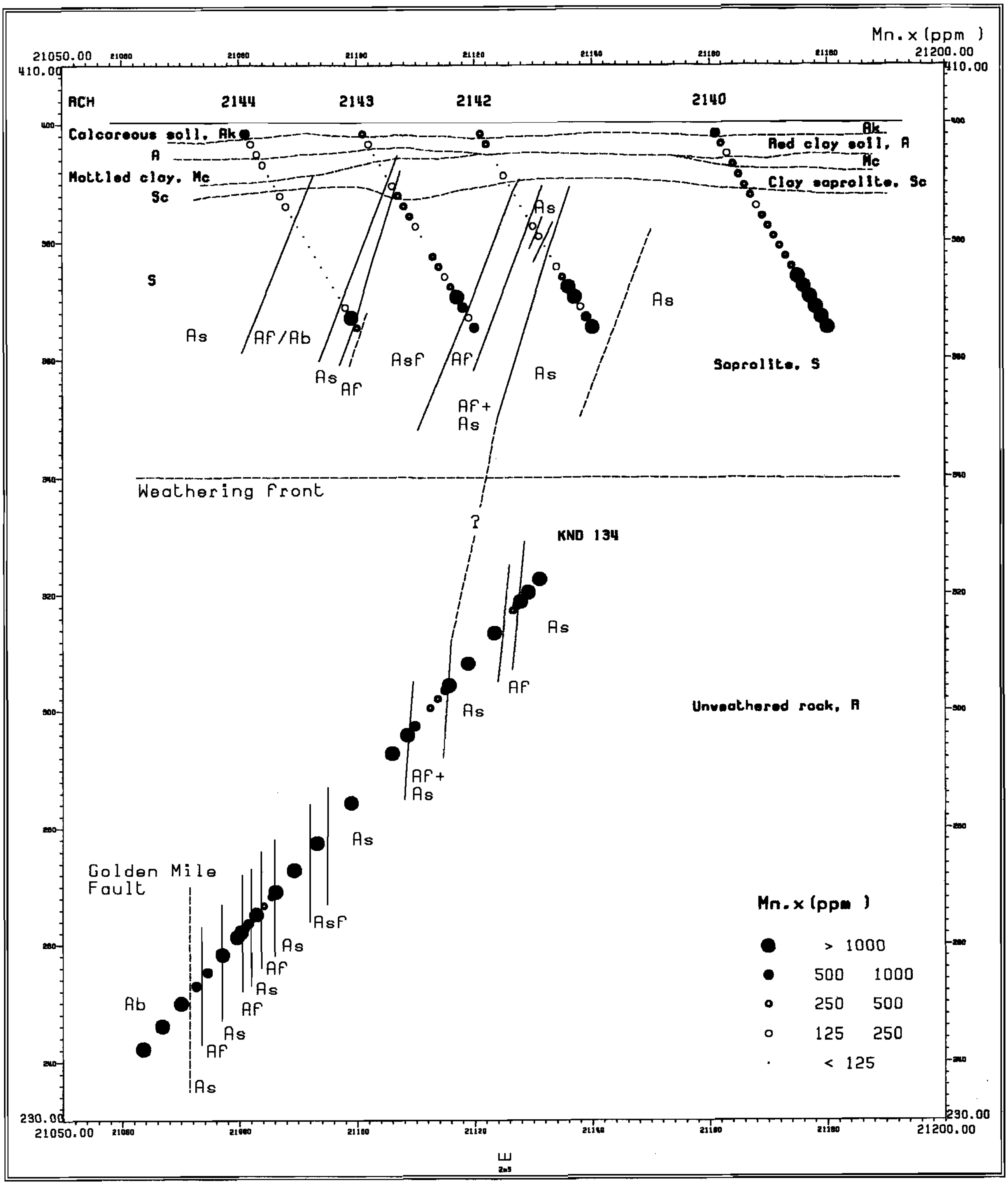

Ge.x (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
AsF
Golden Mile
Fault
As
Af
As
Af
As
Af
Ab
As
Ge.x (ppm)
> 20
10 20
5 10
3 5
< 3

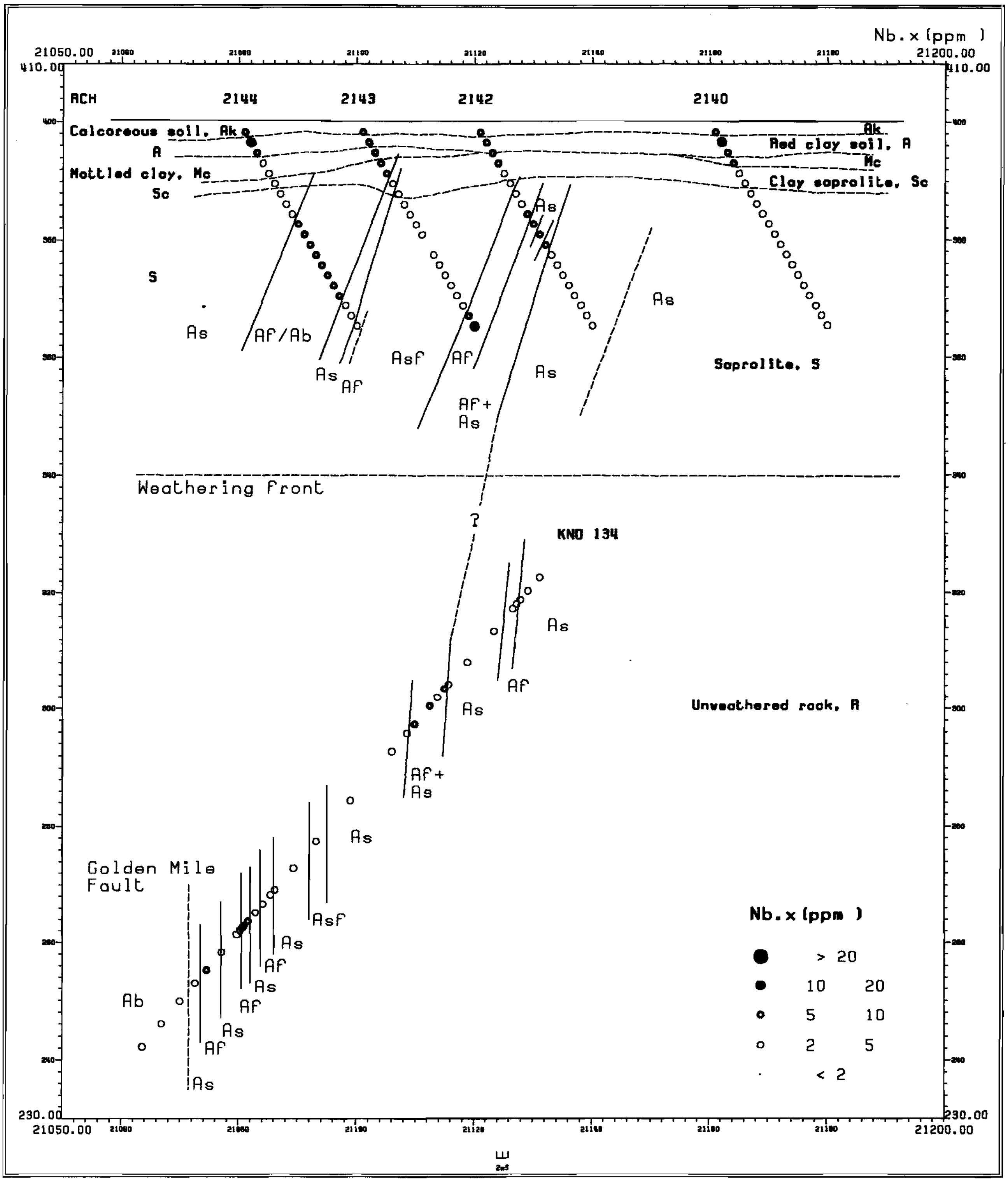

Hf.n (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
As
Ab
Hf.n (ppm)
> 7.00
5.00 7.00
2.50 5.00
1.00 2.50
< 1.00
E

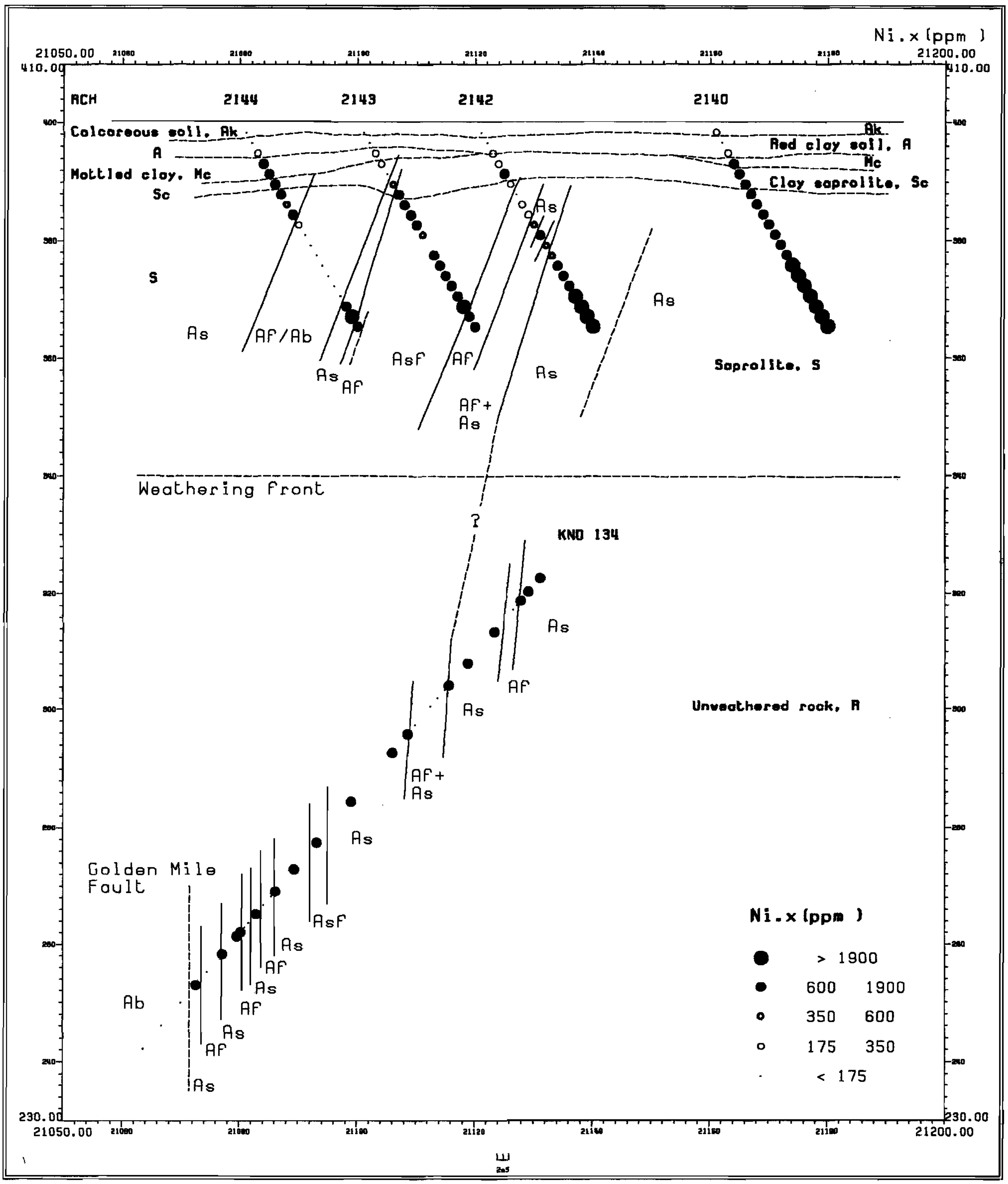

La.n (ppm)
21050.00
21200.00
410.00
230.00
RCH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
As
Ab
La.n (ppm)
> 40.00
12.00 40.00
5.00 12.00
2.50 5.00
< 2.50
E

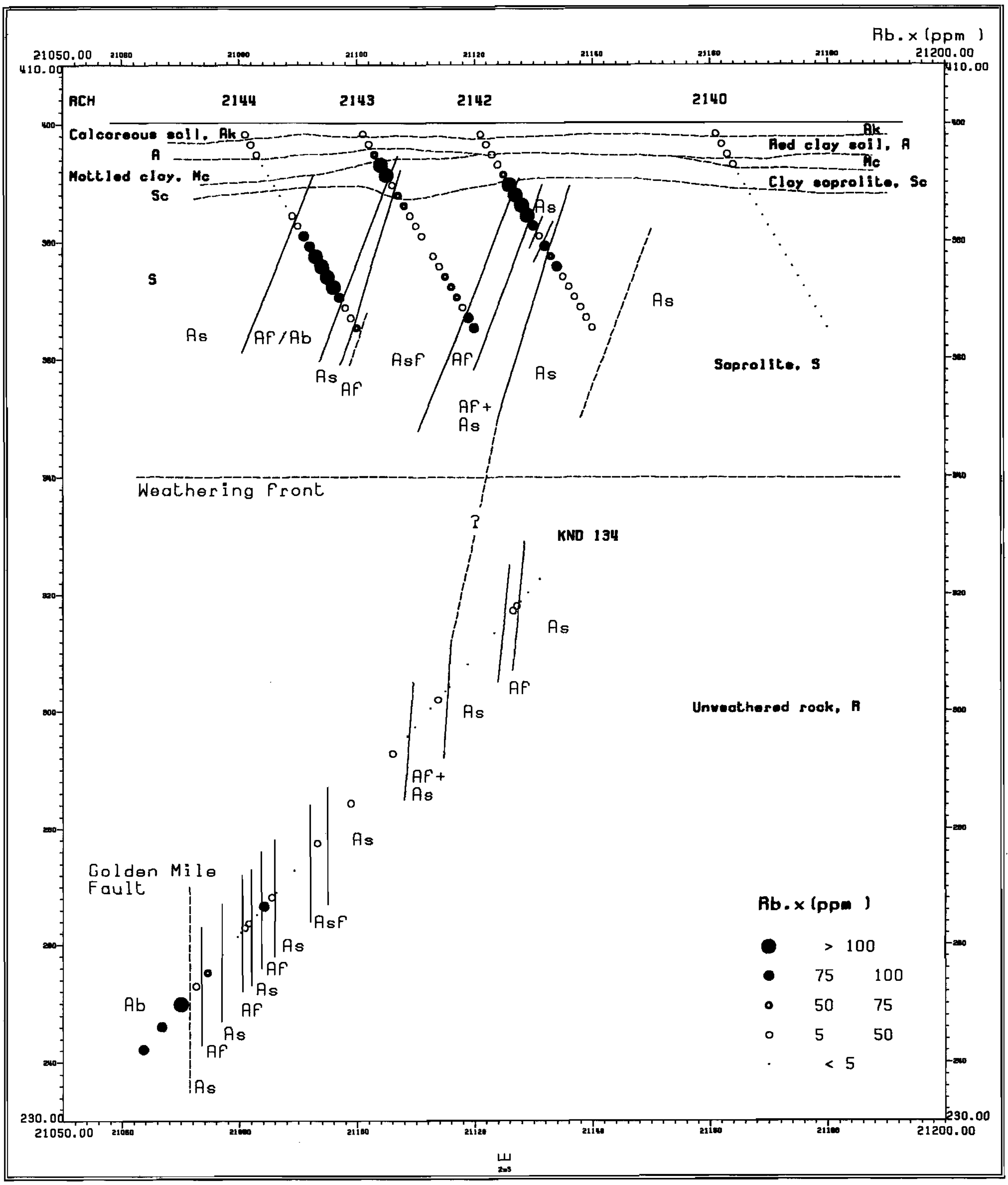


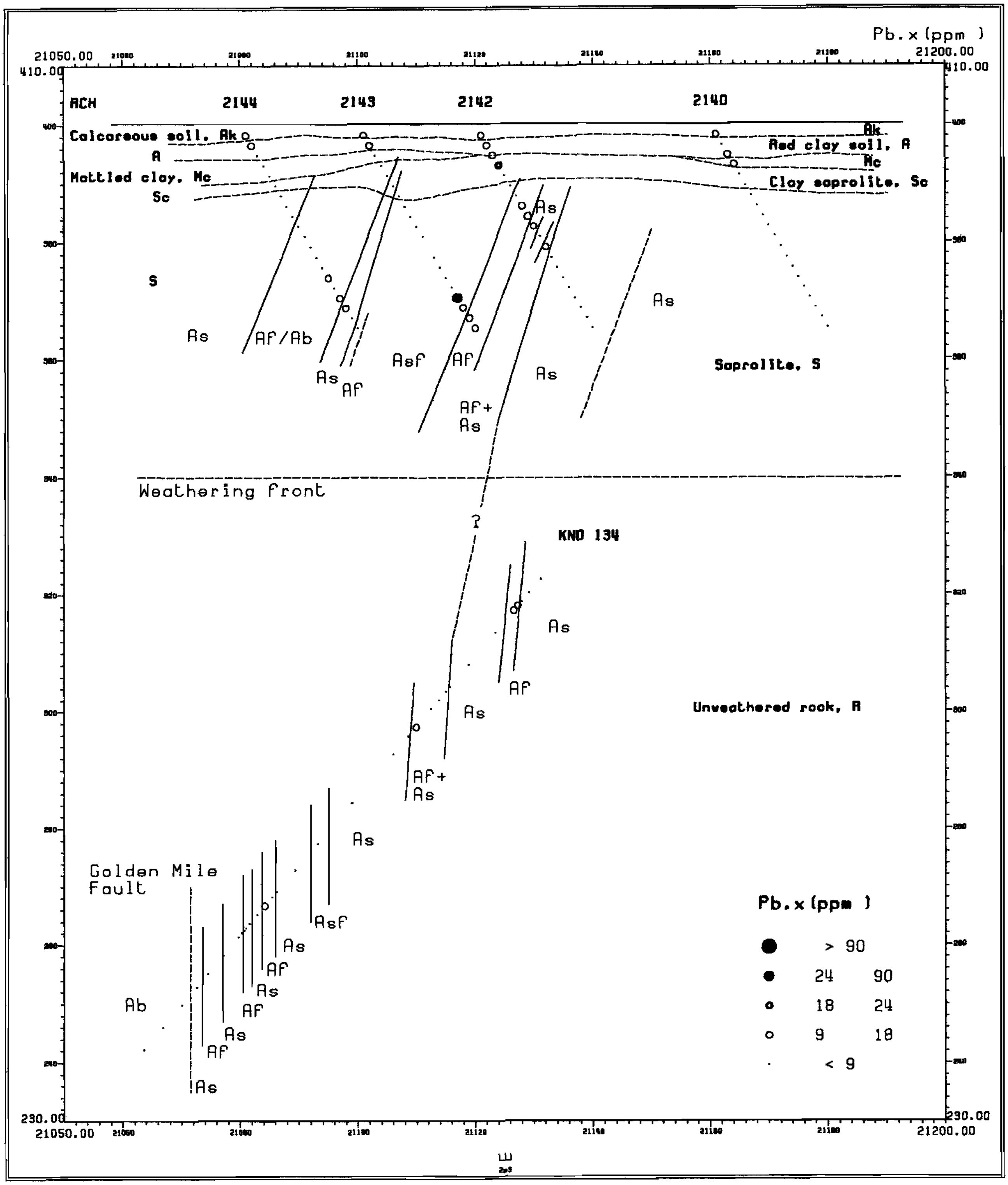
Lu.n (ppm)
21050.00
21200.00
410.00
230.00
RCH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
As
Ab
Lu.n (ppm)
> 0.70
0.55 0.70
0.35 0.55
0.20 0.35
< 0.20
E

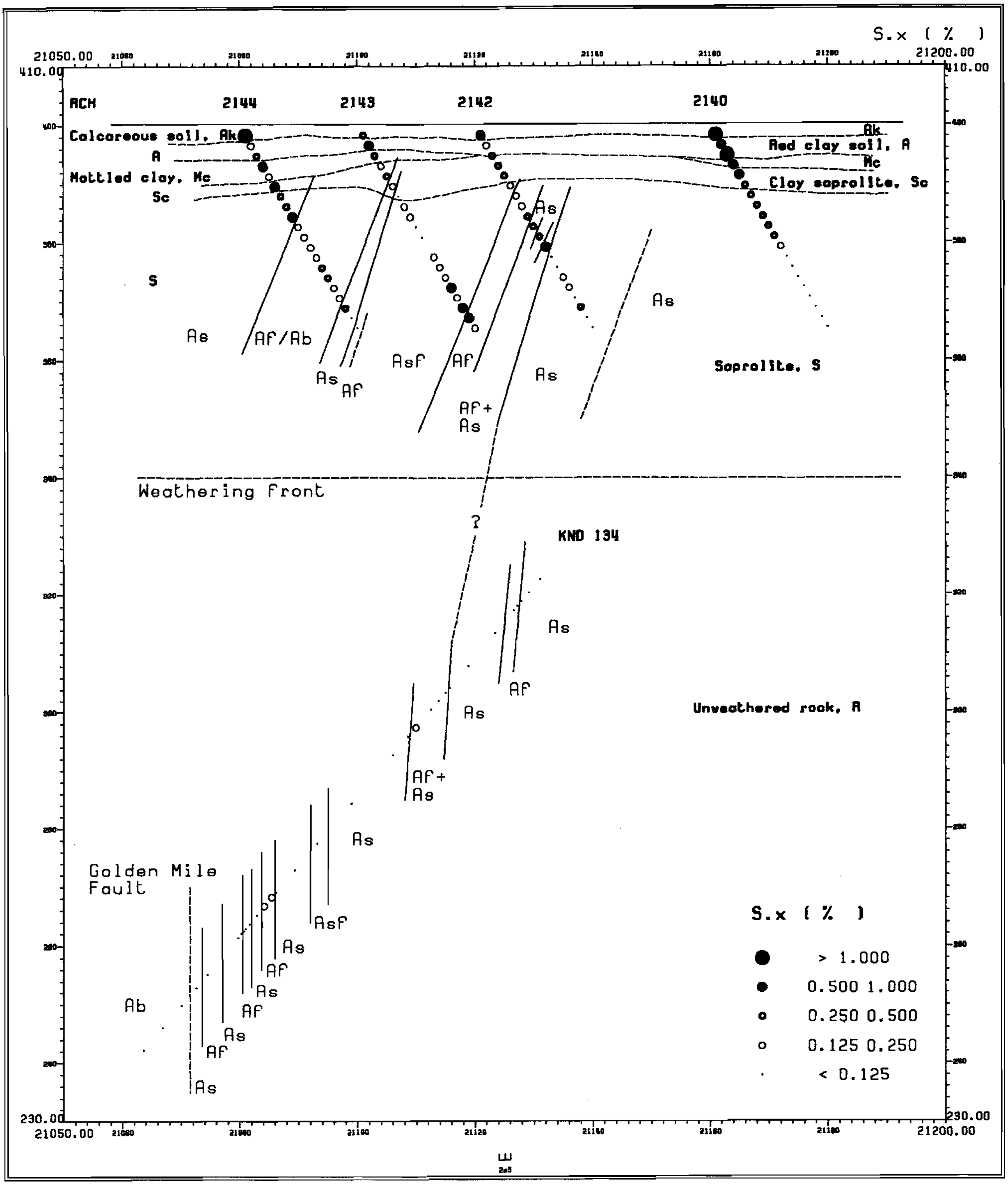

Mn.x (ppm)
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
Asf
Af
Af+
As
Saprolite, S
Weathering front
?
KND 134
Unweathered rock, R
Golden Mile
Fault
Ab
Mn.x (ppm)
> 1000
500 1000
250 500
125 250
< 125

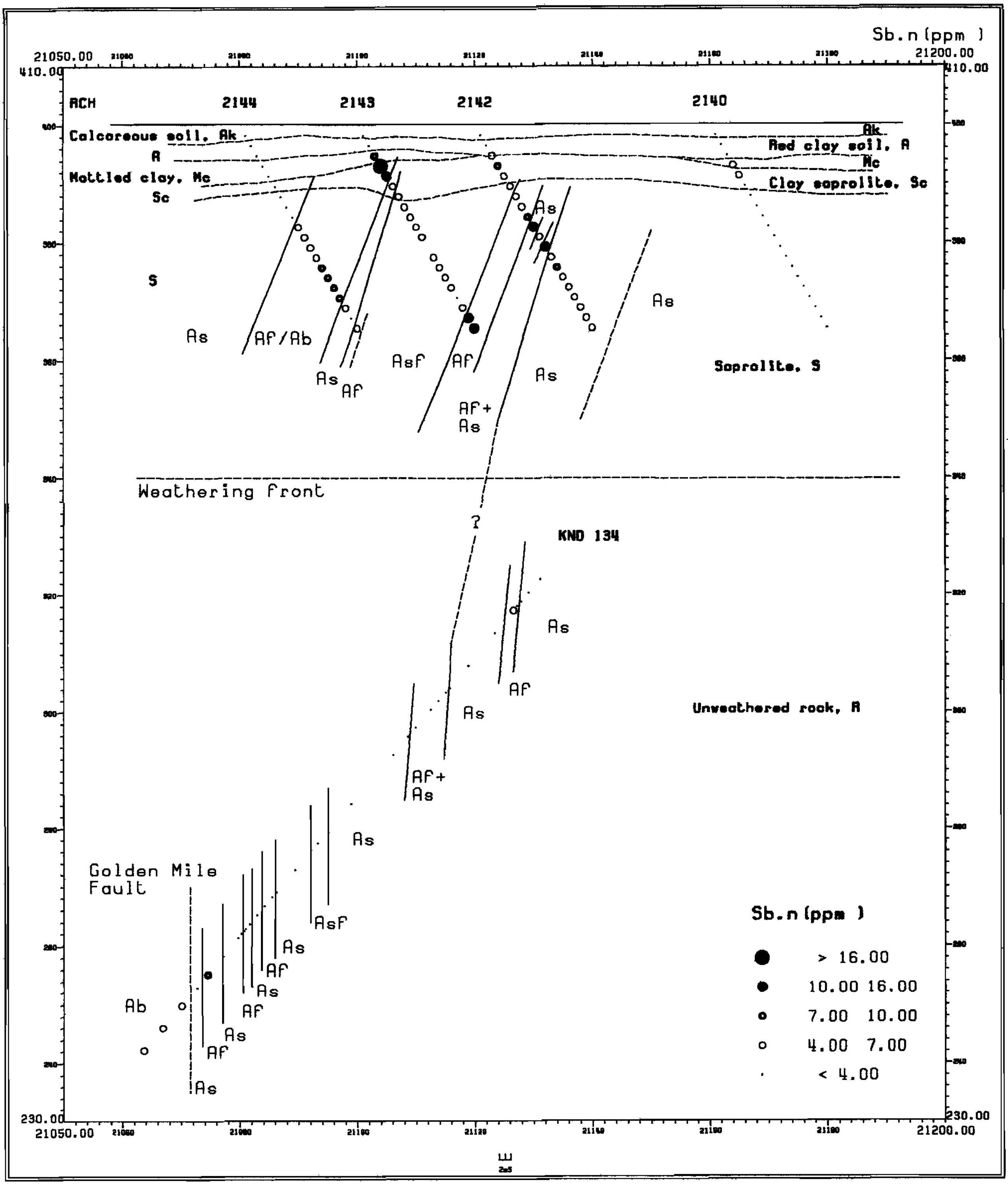

Nb.x (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
Saprolite, S
Weathering front
?
KNO 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
Asf
As
Af
As
Af
As
Ab
Af
As
Nb.x (ppm)
> 20
10 20
5 10
2 5
< 2
E

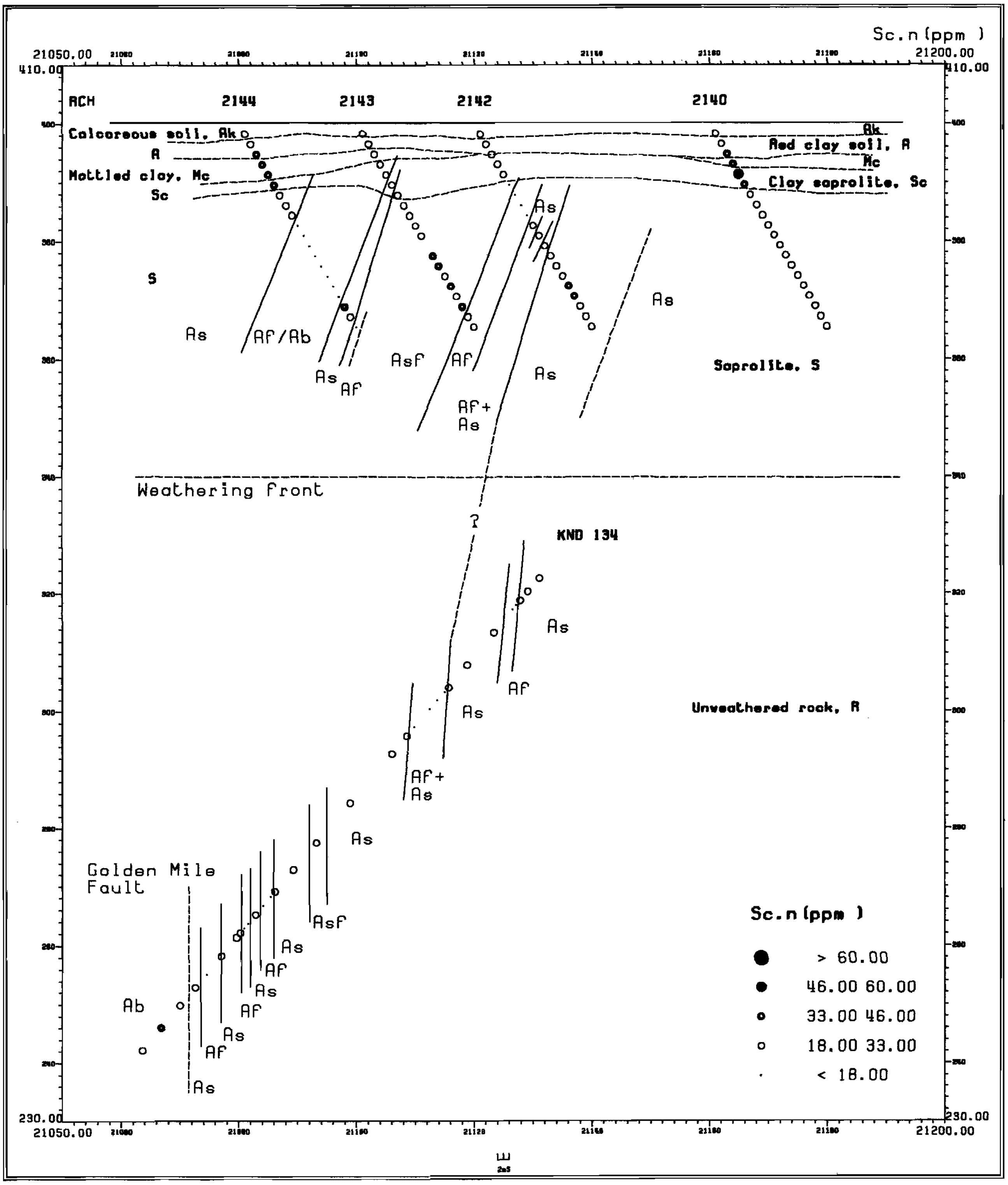

Ni.x (ppm)
21050.00
21200.00
410.00
230.00
RCH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
Ab
As
Ni.x (ppm)
> 1900
600 1900
350 600
175 350
< 175
E


Rb.x (ppm)
21050.00
21200.00
410.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
Unweathered rock, R
As
Af+
As
As
Golden Mile
Fault
Asf
As
Af
As
Af
Ab
As
Af
As
Rb.x (ppm)
> 100
75 100
50 75
5 50
< 5
230.00
21050.00
21200.00
E

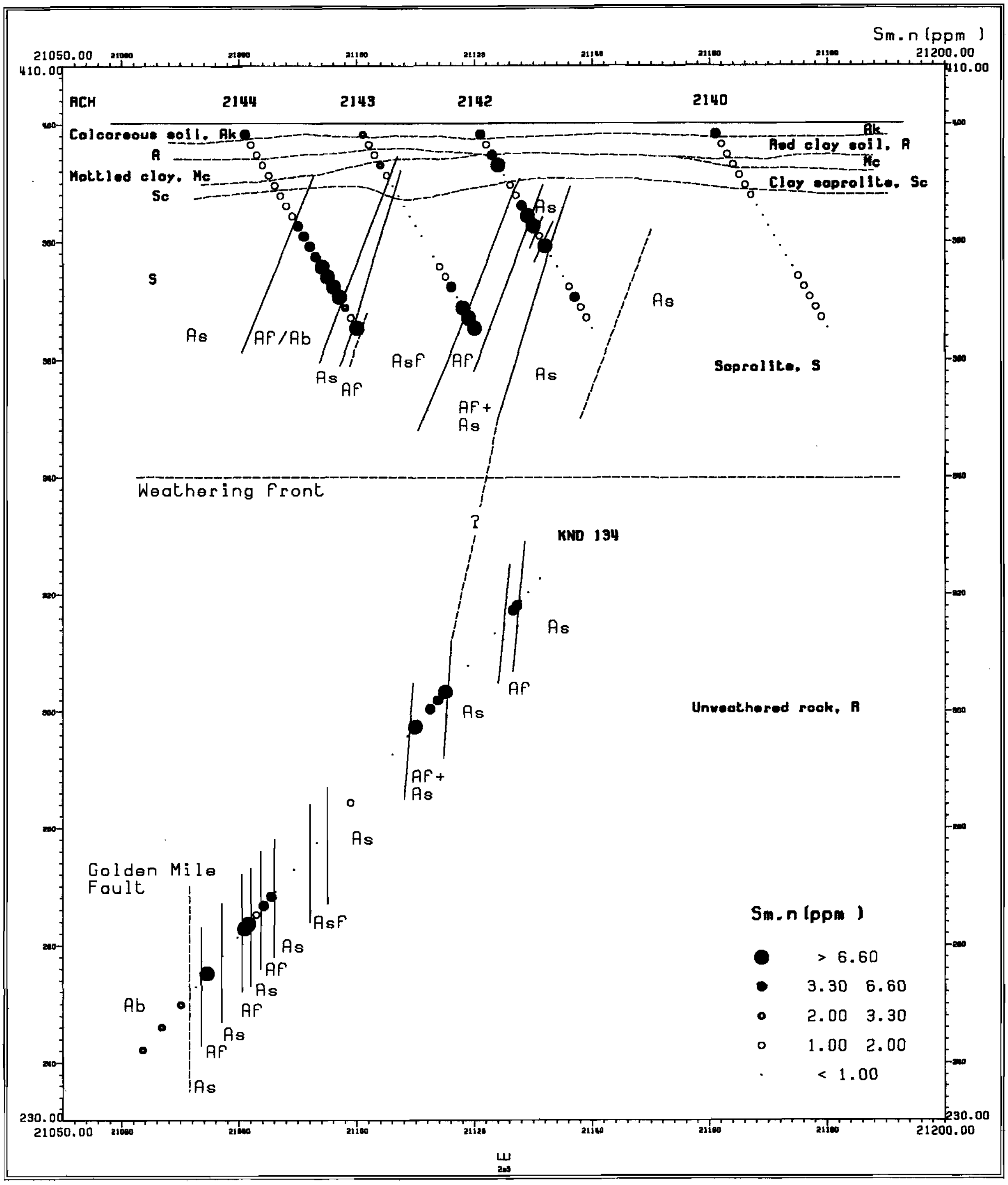

Pb.x (ppm)
21050.00
21200.00
410.00
410.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
Asf
As
Af
As
Af
As
Af
Ab
As
Pb.x (ppm)
> 90
24 90
18 24
9 18
< 9
230.00
230.00
21050.00
21200.00


S.x (%)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
Ab
As
S.x (%)
> 1.000
0.500 1.000
0.250 0.500
0.125 0.250
< 0.125
E

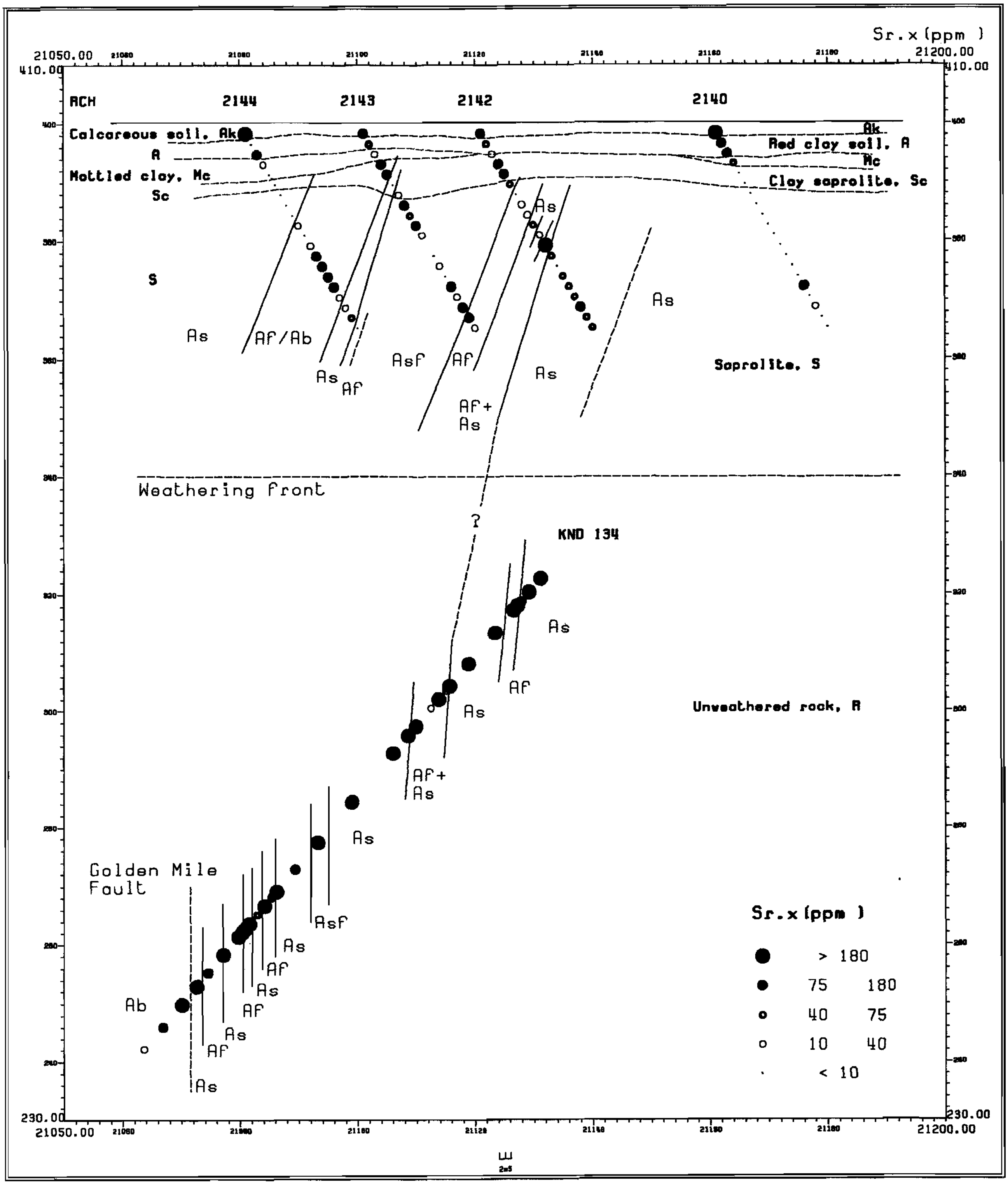

Sb.n (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
Red clay soil, A
A
Ak
Mottled clay, Mc
Mc
Sc
Clay saprolite, Sc
S
Saprolite, S
Weathering front
KND 134
Unweathered rock, R
Golden Mile
Fault
As
Af/Ab
Asf
Af
Af+
As
Ab
Sb.n (ppm)
> 16.00
10.00 16.00
7.00 10.00
4.00 7.00
< 4.00

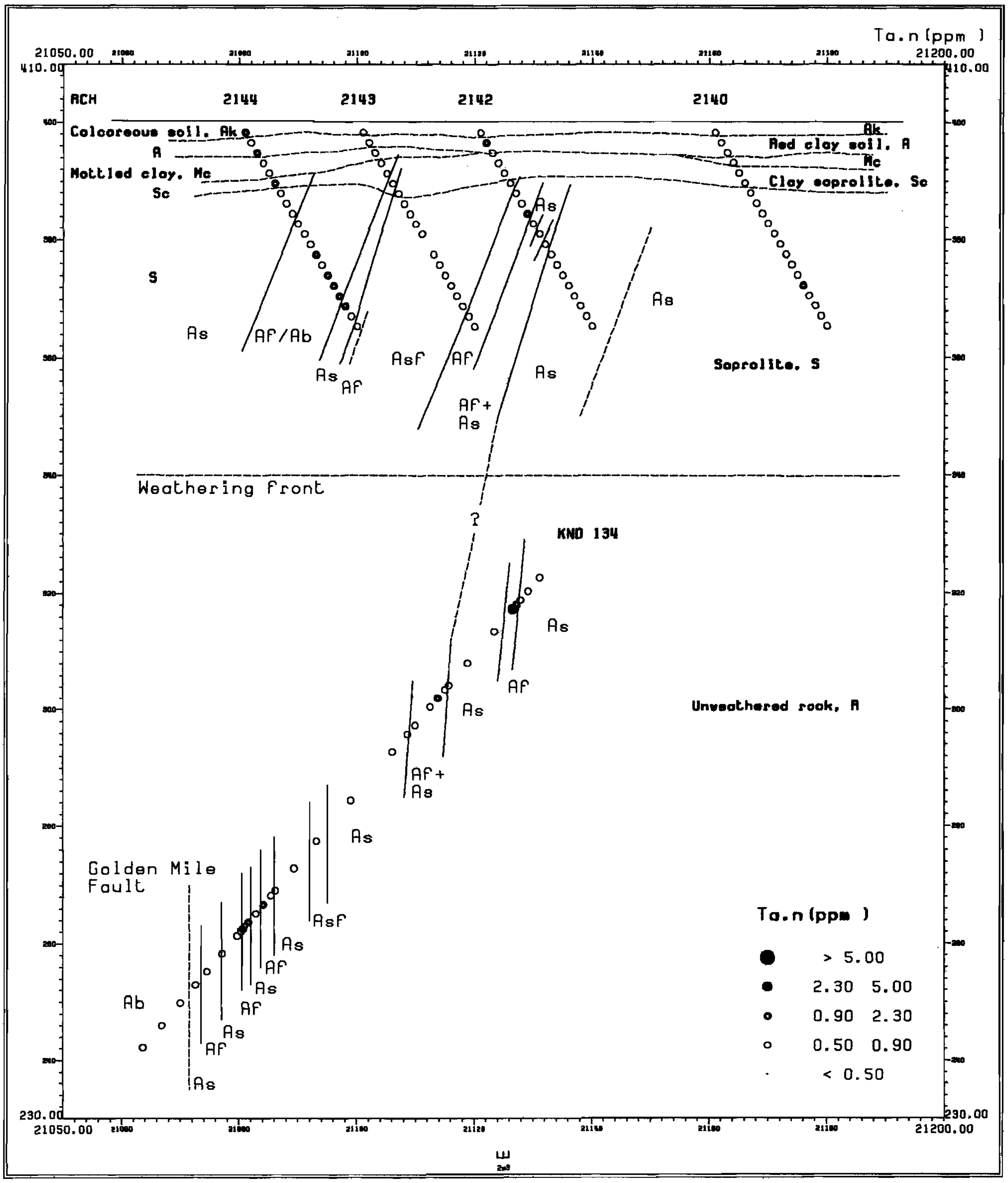


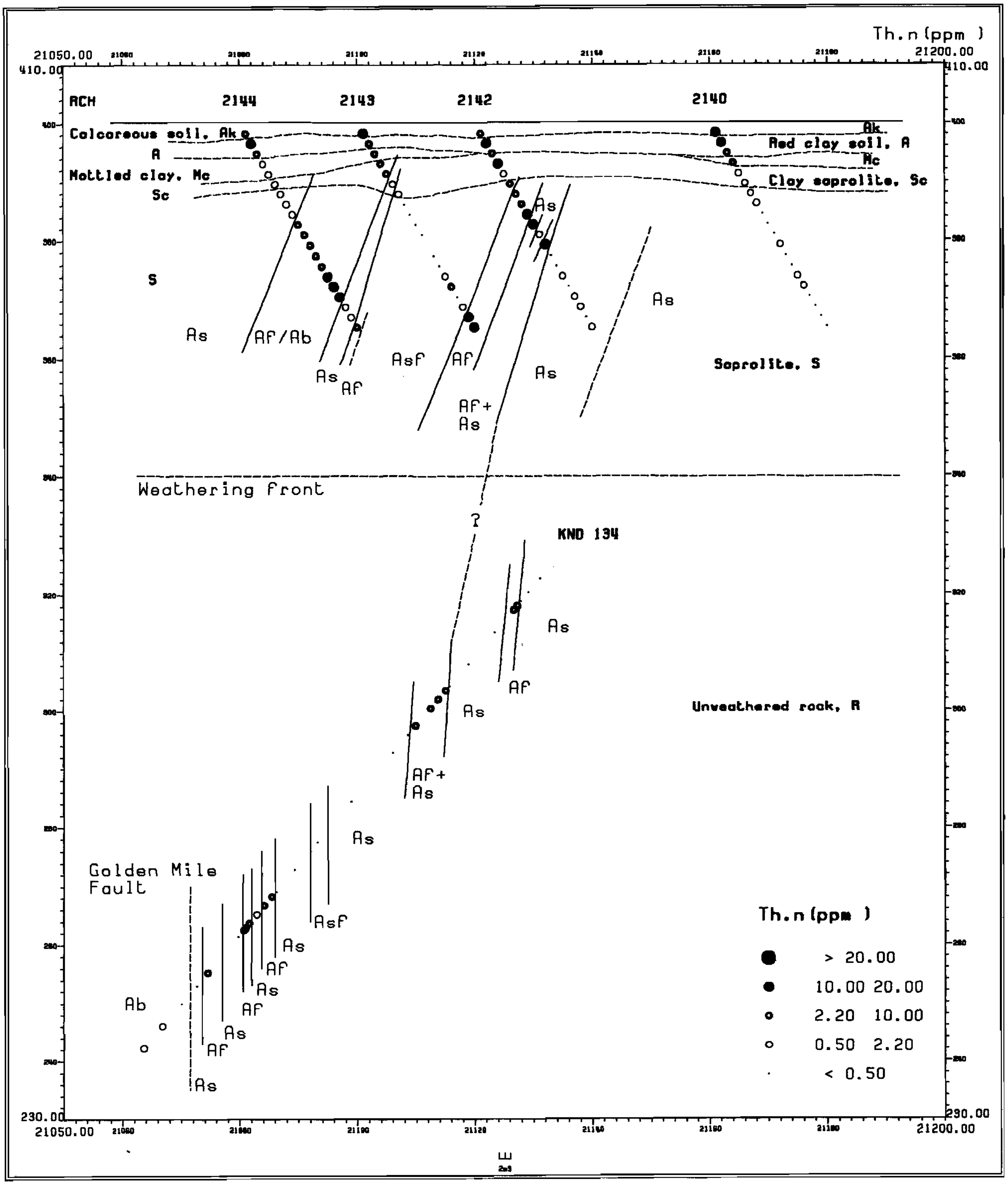
Sc.n (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Red clay soil, A
Mc
Clay saprolite, Sc
S
Saprolite, S
Weathering front
KND 134
Unweathered rock, R
Golden Mile Fault
As
Af/Ab
Af
Asf
Af+ As
Ab
?
Sc.n (ppm)
> 60.00
46.00 60.00
33.00 46.00
18.00 33.00
< 18.00



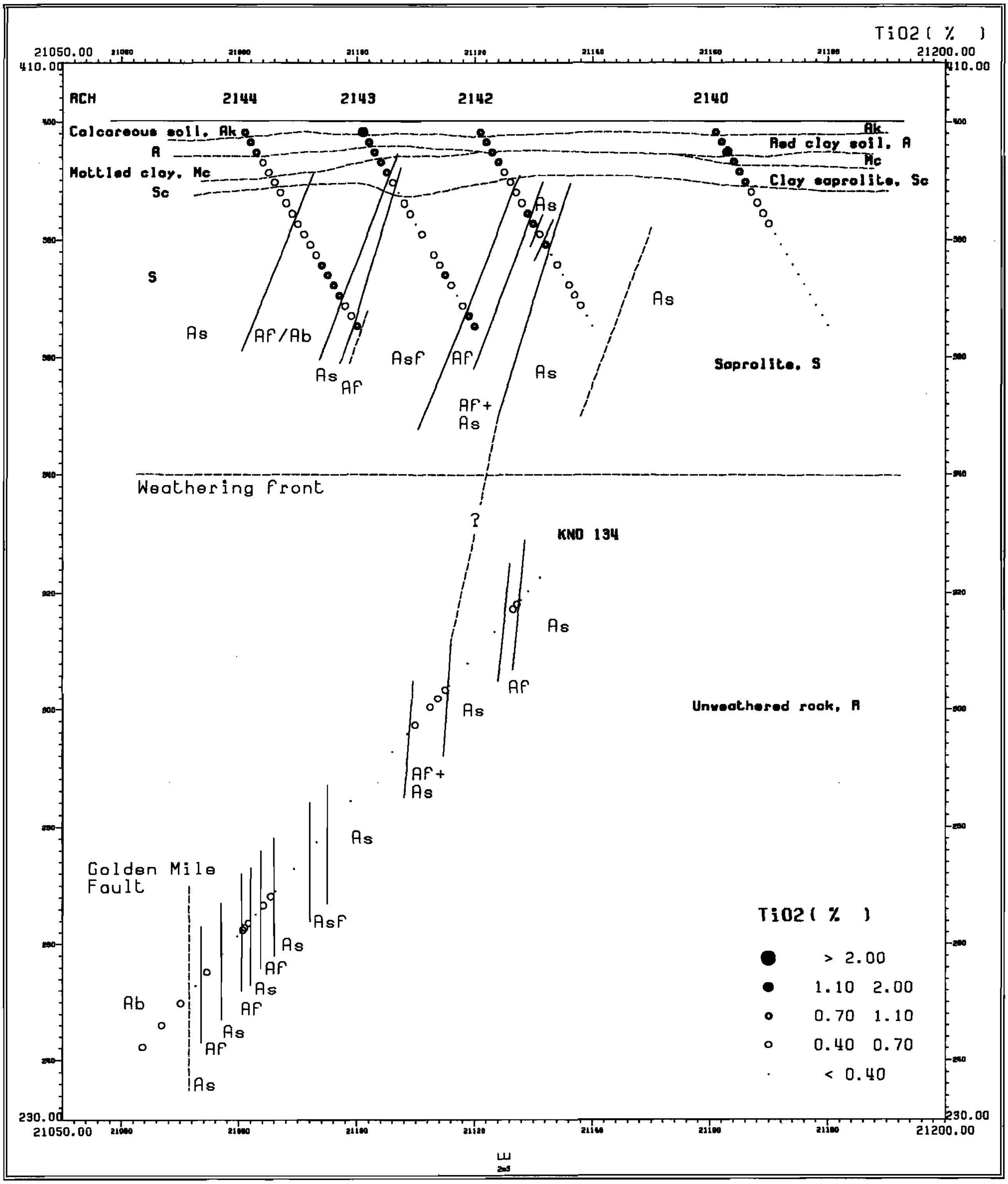
Sm.n (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
Ab
As
Sm.n (ppm)
> 6.60
3.30 6.60
2.00 3.30
1.00 2.00
< 1.00

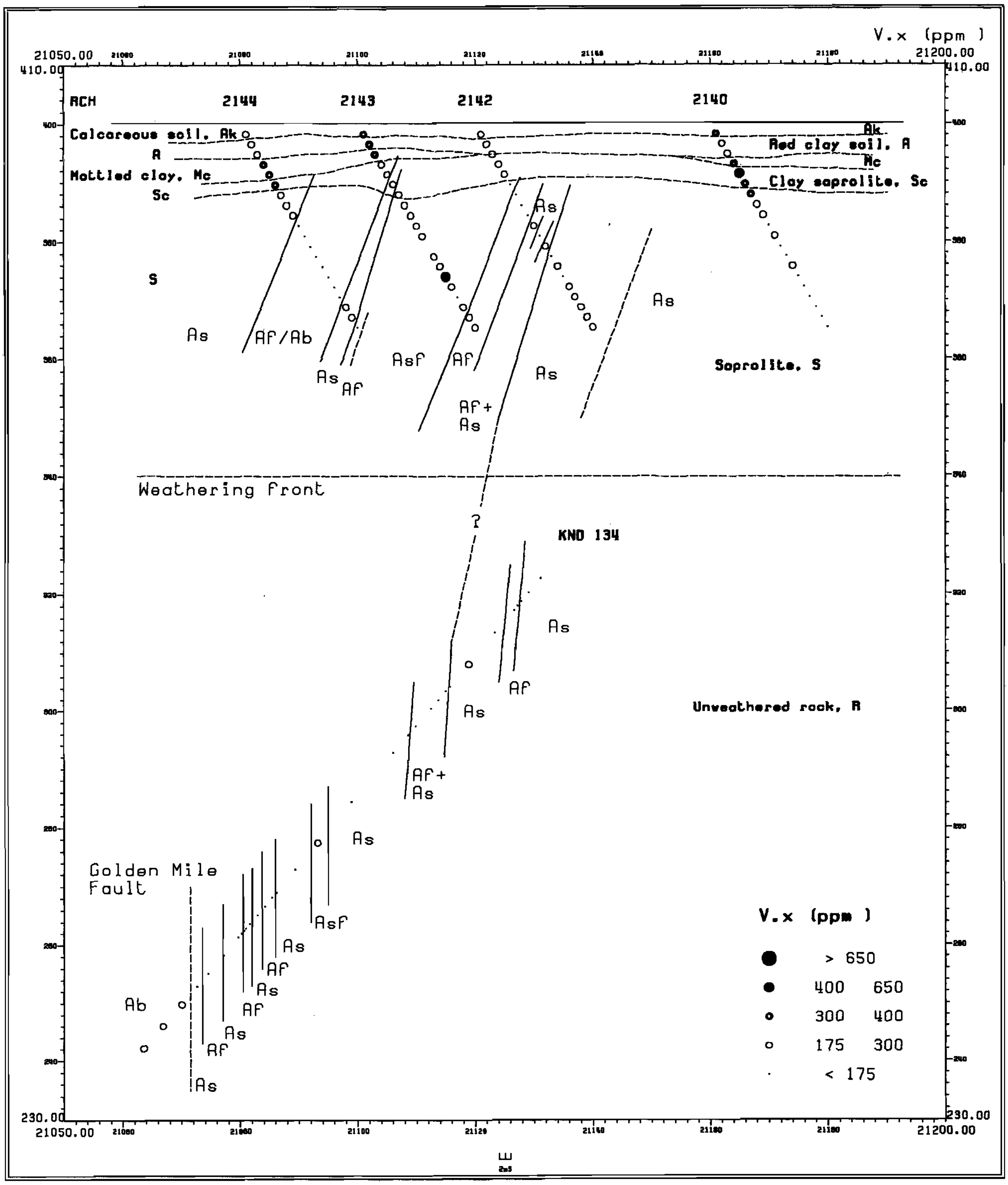

Sr.x (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Af+
As
Unweathered rock, R
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
Ab
As
Sr.x (ppm)
> 180
75 180
40 75
10 40
< 10
E

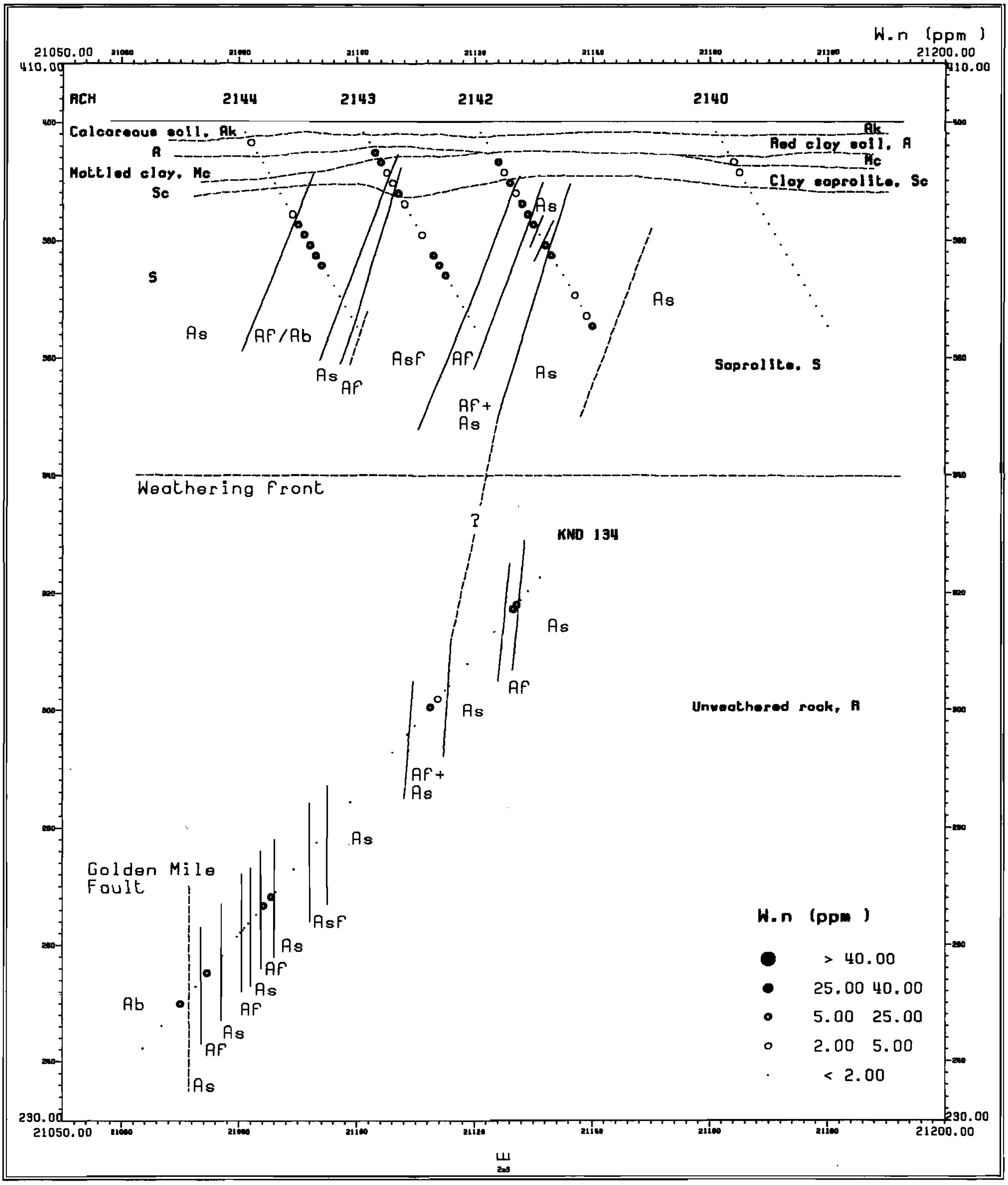

Ta.n (ppm)
21050.00
21200.00
410.00
230.00
RCH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
Ab
As
Ta.n (ppm)
> 5.00
2.30 5.00
0.90 2.30
0.50 0.90
< 0.50
E



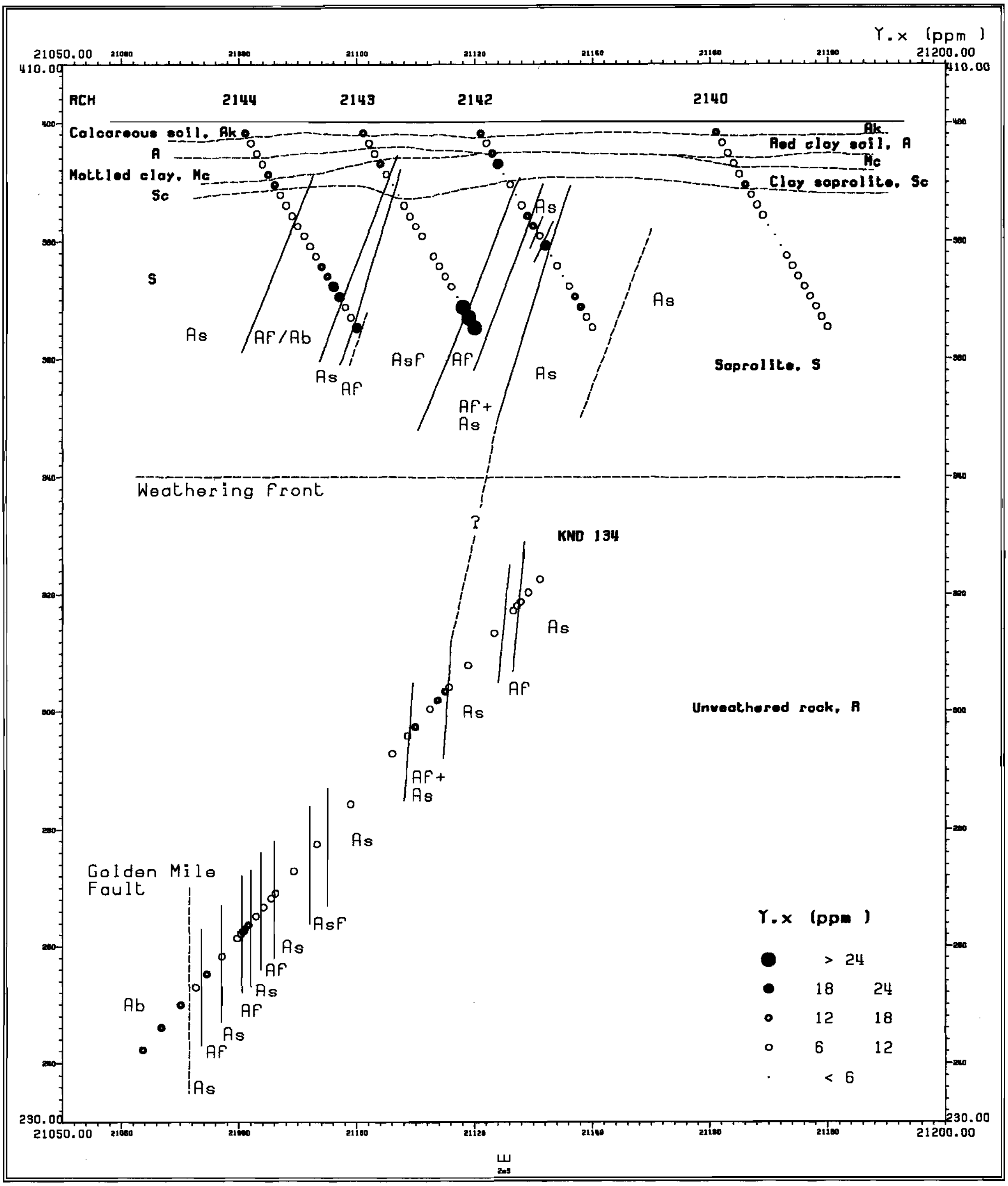
Th.n (ppm)
21050.00
21200.00
410.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
Asf
As
Af
As
Af
As
Af
Ab
As
Th.n (ppm)
> 20.00
10.00 20.00
2.20 10.00
0.50 2.20
< 0.50
230.00
21050.00
21200.00
230.00


TiO2 (%)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
Ab
As
TiO2 (%)
> 2.00
1.10 2.00
0.70 1.10
0.40 0.70
< 0.40
E

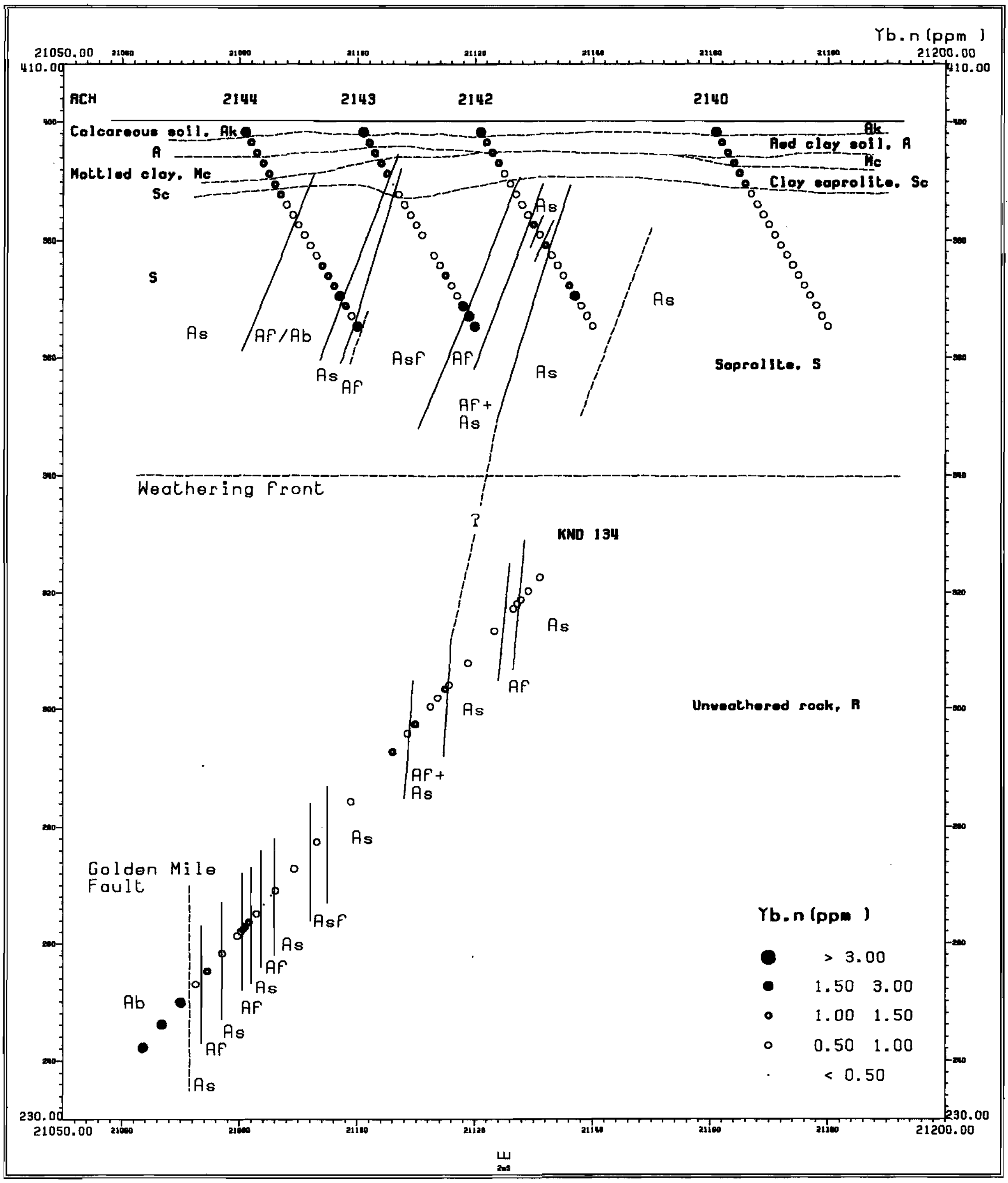

V.x (ppm)
21050.00
21200.00
410.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
AsF
Golden Mile
Fault
As
Af
As
Af
Ab
As
Af
As
V.x (ppm)
> 650
400 650
300 400
175 300
< 175
230.00
21050.00
21200.00
E

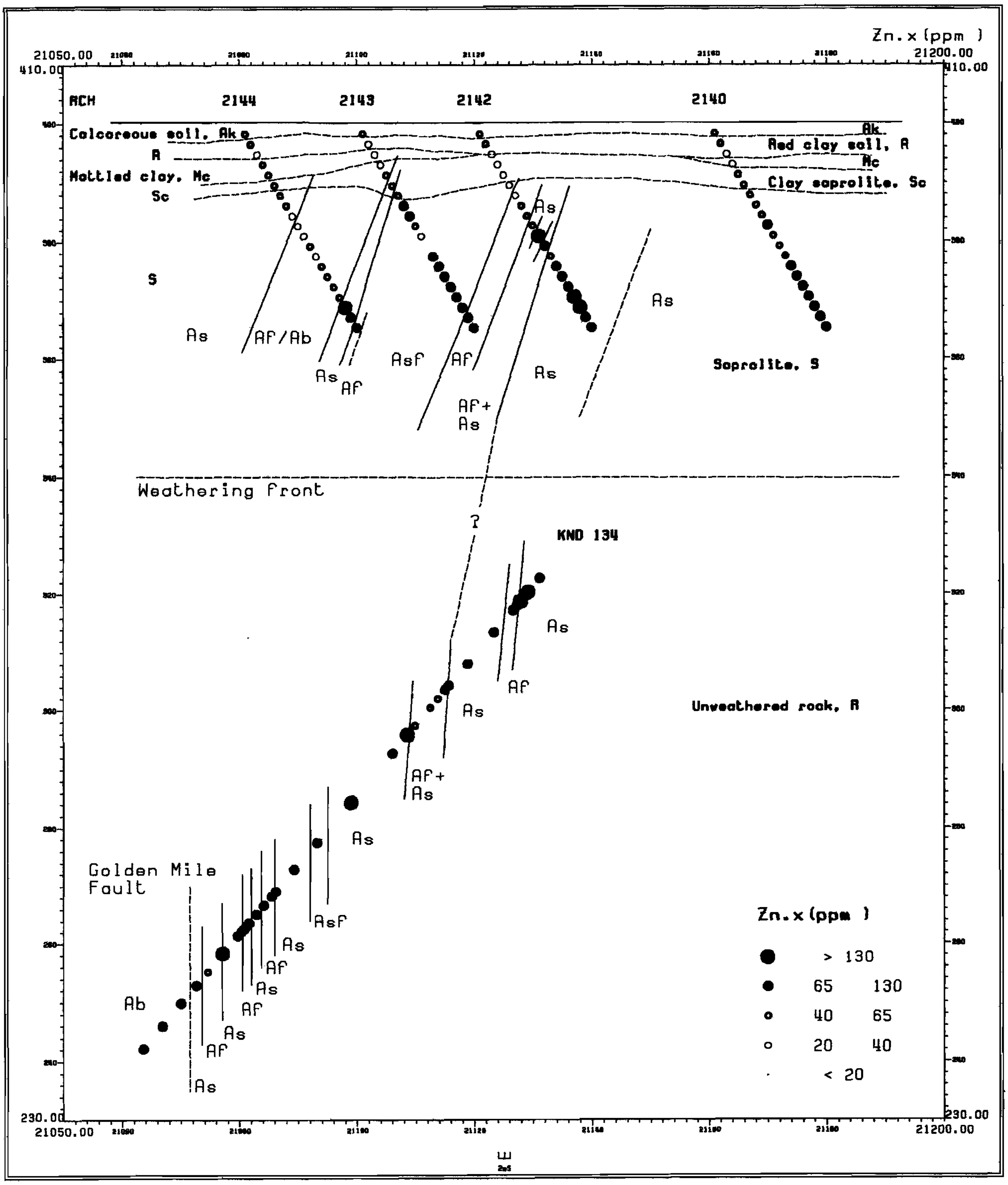


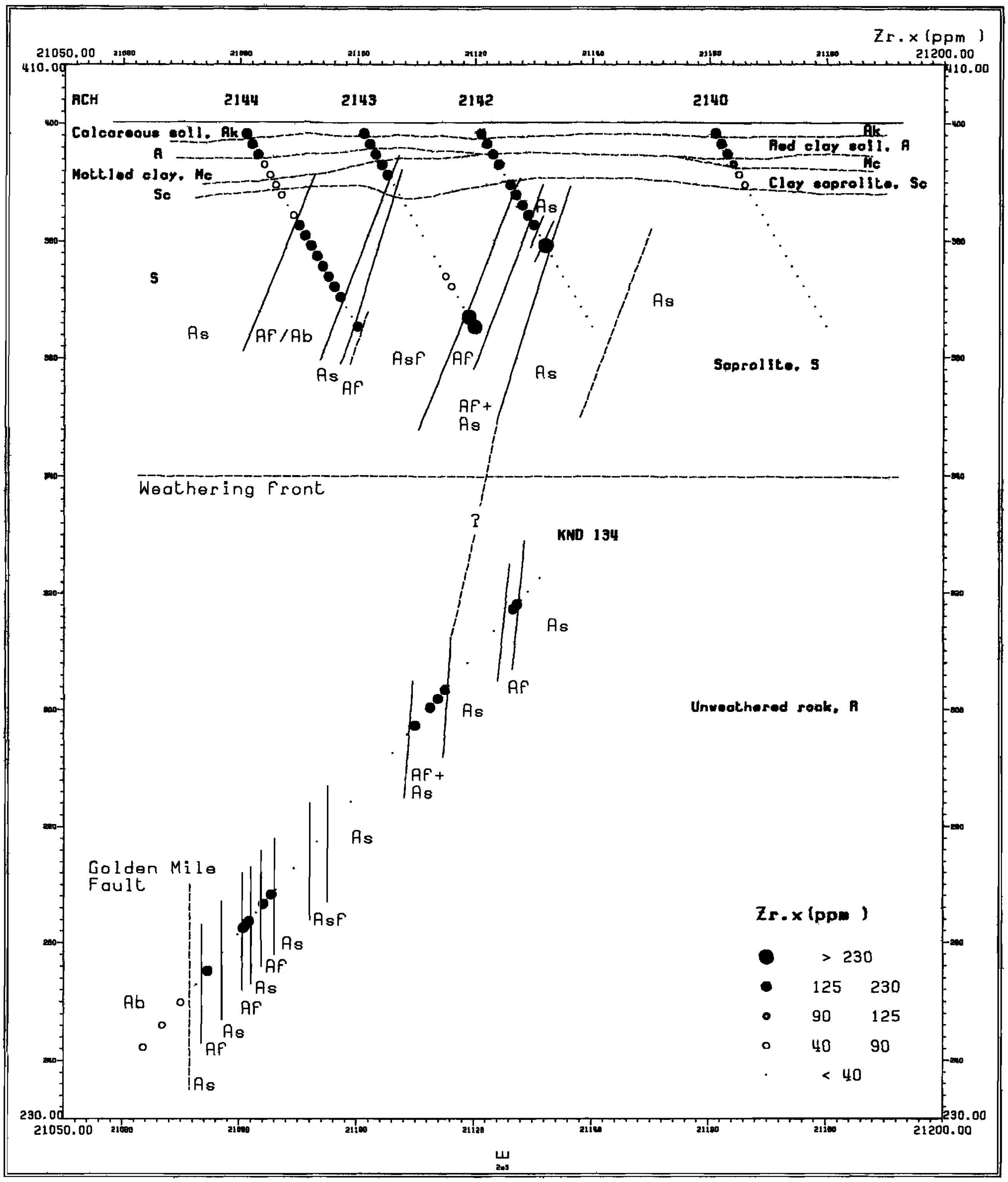
W.n (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Af+
As
Unweathered rock, R
As
Golden Mile
Fault
AsF
As
Af
As
Af
As
Af
Ab
As
W.n (ppm)
> 40.00
25.00 40.00
5.00 25.00
2.00 5.00
< 2.00



Y.x (ppm)
21050.00
21200.00
410.00
230.00
RCH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
AsF
Golden Mile
Fault
As
Af
As
Af
As
Af
Ab
As
Y.x (ppm)
> 24
18 24
12 18
6 12
< 6
E


Yb.n (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
Af+
As
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Unweathered rock, R
Af+
As
As
Golden Mile
Fault
Asf
As
Af
As
Af
As
Af
Ab
As
Yb.n (ppm)
> 3.00
1.50 3.00
1.00 1.50
0.50 1.00
< 0.50
E


Zn.x (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
Red clay soil, R
Mottled clay, Mc
Clay saprolite, Sc
S
Saprolite, S
Weathering front
KND 134
Unweathered rock, R
Golden Mile Fault
As
Af/Ab
Asf
Af
Af+ As
Ab
Zn.x (ppm)
> 130
65 130
40 65
20 40
< 20
E


Zr.x (ppm)
21050.00
21200.00
410.00
230.00
ACH
2144
2143
2142
2140
Calcareous soil, Ak
A
Mottled clay, Mc
Sc
Ak
Red clay soil, A
Mc
Clay saprolite, Sc
S
As
Af/Ab
As
Af
Asf
Af
As
Af+
As
As
Saprolite, S
Weathering front
?
KND 134
As
Af
As
Af+
As
Unweathered rock, R
As
Golden Mile
Fault
Asf
As
Af
As
Af
As
Af
Ab
As
Zr.x (ppm)
> 230
125 230
90 125
40 90
< 40
E

APPENDIX II

TABULATED STATISTICS

TABLE II/1. Trace element detection limits and methods

Element	Detection Limit (ppm)	Methods
As	2	INAA
Au	0.005	INAA
Ba	15	XRF
Br	2	INAA
Cd	5	XRF
Ce	2	INAA
Co	1	INAA
Cr	5	INAA
Cs	1	INAA
Cu	3	XRF
Eu	1	INAA
Ga	4	XRF
Ge	3	XRF
Hf	1	INAA
In	5	XRF
Ir	0.02	INAA
La	0.5	INAA
Lu	0.2	INAA
Mn	3	XRF
Mo	5	INAA
Nb	3	XRF
Ni	10	XRF
Pb	3	XRF
Rb	3	XRF
Sb	0.2	INAA
Sc	0.1	INAA
Se	10	INAA
Sm	0.2	INAA
Sn	5	XRF
Sr	3	XRF
Ta	1	INAA
Th	0.5	INAA
U	2	INAA
V	10	XRF
W	3	INAA
Y	3	XRF
Yb	0.5	INAA
Zn	3	XRF
Zr	4	XRF

INAA: Instrumental Neutron Activation Analysis; Becquerel Laboratories
XRF: X-ray Fluorescence Analysis; CSIRO, Floreat Park

Table II/2. Comparative statistics: major and alkaline earth elements.

TALC CHLORITE ULTRAMAFIC ROCKS

Comparison of arithmetic means

Horizon		N. %	Fe.n %	SiO_2 %	Al_2O_3 %	MgO %	CaO %	Sr.x ppm	Ba.x ppm
M	Mottled clay	2	14.10	55.40	12.25	1.69	0.02	18	146
Sc	Clay saprolite	4	15.92	51.77	13.98	1.48	0.04	4	276
S	Saprolite	27	10.02	57.35	8.49	8.62	0.12	28	140
R	Fresh rock	16	6.58	41.94	7.41	16.43	6.08	589	34

Comparison of standard deviation

Horizon		N. %	Fe.n %	SiO_2 %	Al_2O_3 %	MgO %	CaO %	Sr.x ppm	Ba.x ppm
M	Mottled clay	2	1.13	1.83	1.45	0.29	0.01	18	42
Sc	Clay saprolite	4	4.64	11.48	5.10	1.37	0.02	3	195
S	Saprolite	27	1.93	6.89	1.94	6.32	0.39	30	171
R	Fresh rock	16	0.32	3.31	0.65	4.16	1.63	314	52

Comparison of geometric means

Horizon		N. %	Fe.n %	SiO_2 %	Al_2O_3 %	MgO %	CaO %	Sr.x ppm	Ba.x ppm
M	Mottled clay	2	14.07	55.33	12.20	1.68	0.02	12	143
Sc	Clay saprolite	4	15.41	50.72	13.15	0.90	0.04	3	231
S	Saprolite	27	9.84	56.92	8.29	5.00	0.03	12	73
R	Fresh rock	16	6.57	41.78	7.38	15.85	5.89	449	18

FUCHSITE CARBONATE ROCKS

Comparison of arithmetic means

Horizon		N. %	Fe.n %	SiO_2 %	Al_2O_3 %	MgO %	CaO %	Sr.x ppm	Ba.x ppm
Sc	Clay saprolite	2	9.99	69.07	8.82	0.44	0.03	47.	218.
S	Saprolite	11	10.08	64.07	9.28	0.64	0.10	44.	367.

Comparison of standard deviation

Horizon		N. %	Fe.n %	SiO_2 %	Al_2O_3 %	MgO %	CaO %	Sr.x ppm	Ba.x ppm
Sc	Clay saprolite	2	0.87	2.55	0.16	0.26	0.01	49	35.
S	Saprolite	11	3.45	9.02	1.38	1.11	0.20	40	188.

Comparison of geometric means

Horizon		N. %	Fe.n %	SiO_2 %	Al_2O_3 %	MgO %	CaO %	Sr.x ppm	Ba.x ppm
Sc	Clay saprolite	2	9.96	68.97	8.82	0.40	0.03	31	216.
S	Saprolite	11	9.49	63.49	9.18	0.38	0.05	19	330.

Comparative Statistics: major and alkaline earth elements.

FELSIC PORPHYRIES

Comparison of arithmetic means

Horizon		N. %	Fe.n %	SiO_2 %	Al_2O_3 %	MgO %	CaO %	Sr.x ppm	Ba.x ppm
Sc	Clay saprolite	2	6.75	63.04	18.95	0.41	0.05	81	874
S	Saprolite	13	4.33	64.23	16.88	0.72	0.09	43	782.
R	Fresh rock	12	2.89	61.38	14.06	3.19	3.28	341	788.

Comparison of standard deviation

Horizon		N. %	Fe.n %	SiO_2 %	Al_2O_3 %	MgO %	CaO %	Sr.x ppm	Ba.x ppm
Sc	Clay saprolite	2	0.07	3.66	1.94	0.05	0.01	8	25.
S	Saprolite	13	1.41	7.06	1.28	0.28	0.15	35	172.
R	Fresh rock	12	0.59	6.89	0.76	0.72	1.45	252	368.

Comparison of geometric means

Horizon		N. %	Fe.n %	SiO_2 %	Al_2O_3 %	MgO %	CaO %	Sr.x ppm	Ba.x ppm
Sc	Clay saprolite	2	6.75	62.92	18.89	0.40	0.04	80	872
S	Saprolite	13	4.08	63.79	16.82	0.69	0.06	26	763
R	Fresh rock	12	2.83	60.94	14.03	3.11	3.00	200	675

Table II/3. Comparative statistics: elements associated with mineralization

TALC CHLORITE ULTRAMAFIC ROCKS

Comparison of arithmetic means

Horizon		N	Au.n ppb	S.x %	Sb.n ppm	As.n ppm	W.n ppm
M	Mottled clay	2	7.0	0.335	2.80	11.30	1.00
Sc	Clay saprolite	4	2.5	0.458	4.29	29.02	2.12
S	Saprolite	27	14.1	0.190	3.19	18.40	1.475
R	Fresh rock	16	2.7	0.027	1.29	1.88	1.00

Comparison of standard deviation

Horizon		N	Au.n ppb	S.x %	Sb.n ppm	As.n ppm	W.n ppm
M	Mottled clay	2	6.4	0.242	0.29	1.41	0.00
Sc	Clay saprolite	4	0.0	0.288	1.29	19.58	1.45
S	Saprolite	27	36.2	0.158	1.80	21.30	1.45
R	Fresh rock	16	0.9	0.028	0.54	1.04	0.00

Comparison of geometric means

Horizon		N	Au.n ppb	S.x %	Sb.n ppm	As.n ppm	W.n ppm
M	Mottled clay	2	5.4	0.288	2.80	11.25	1.00
Sc	Clay saprolite	4	2.5	0.378	4.14	23.81	1.77
S	Saprolite	27	4.8	0.111	2.70	8.77	1.21
R	Fresh rock	16	2.6	0.018	1.21	1.64	1.00

FUCHSITE CARBONATE ULTRAMAFIC ROCKS

Comparison of arithmetic means

Horizon		N	Au.n ppb	S.x %	Sb.n ppm	As.n ppm	W.n ppm
Sc	Clay saprolite	2	34.6	0.243	5.28	8.77	5.10
S	Saprolite	11	8.7	0.218	5.33	5.93	3.64

Comparison of standard deviation

Horizon		N	Au.n ppb	S.x %	Sb.n ppm	As.n ppm	W.n ppm
Sc	Clay saprolite	2	45.4	0.187	1.07	1.48	1.90
S	Saprolite	11	16.3	0.214	1.11	3.02	3.00

Comparison of geometric means

Horizon		N	Au.n ppb	S.x %	Sb.n ppm	As.n ppm	W.n ppm
Sc	Clay saprolite	2	12.9	0.204	5.22	8.71	4.92
S	Saprolite	11	3.9	0.155	5.23	5.28	2.52

Comparative statistics: elements associated with mineralization

FELSIC PORPHYRY

Comparison of arithmetic means

Horizon		N	Au.n ppb	S.x %	Sb.n ppm	As.n ppm	W.n ppm
Sc	Clay saprolite	2	2.5	0.282	15.55	3.71	7.47
S	Saprolite	13	33.3	0.249	7.70	6.15	6.85
R	Fresh rock	12	3.0	0.065	2.99	2.39	4.99

Comparison of standard deviation

Horizon		N	Au.n ppb	S.x %	Sb.n ppm	As.n ppm	W.n ppm
Sc	Clay saprolite	2	0.0	0.133	2.47	0.22	4.14
S	Saprolite	13	67.7	0.228	3.25	4.83	6.55
R	Fresh rock	12	1.7	0.060	1.43	1.58	4.10

Comparison of geometric means

Horizon		N	Au.n ppb	S.x %	Sb.n ppm	As.n ppm	W.n ppm
Sc	Clay saprolite	2	2.5	0.266	15.44	3.71	6.87
S	Saprolite	13	7.3	0.203	7.15	4.98	3.95
R	Fresh rock	12	2.8	0.045	2.79	1.97	3.22

Table II/4. Comparative statistics: alkali metals and bromine.

TALC CARBONATE ULTRAMAFIC ROCKS

Comparison of arithmetic means

Horizon		N.	Na_2O %	K_2O %	Rb.x ppm	Cs.n ppm	Br.n ppm
M	Mottled clay	2	0.60	0.06	3.	1.33	38.80
Sc	Clay saprolite	4	0.32	0.25	9.	2.29	27.15
S	Saprolite	27	0.53	0.29	11.	1.54	11.14
R	Fresh rock	16	0.63	0.17	7.	1.70	1.12

Comparison of standard deviation

Horizon		N.	Na_2O %	K_2O %	Rb.x ppm	Cs.n ppm	Br.n ppm
M	Mottled clay	2	0.08	0.02	0.	0.42	9.48
Sc	Clay saprolite	4	0.20	0.37	13.	1.32	17.70
S	Saprolite	27	0.29	0.36	13.	1.05	8.74
R	Fresh rock	16	0.43	0.38	10.	2.07	0.46

Comparison of geometric means

Horizon		N.	Na_2O %	K_2O %	Rb.x ppm	Cs.n ppm	Br.n ppm
M	Mottled clay	2	0.59	0.06	3.	1.29	38.18
Sc	Clay saprolite	4	0.25	0.12	5.	1.83	23.09
S	Saprolite	27	0.43	0.13	6.	1.22	7.43
R	Fresh rock	16	0.38	0.03	4.	1.07	1.07

FUCHSITE CARBONATE ULTRAMAFIC ROCKS

Comparison of arithmetic means

Horizon		N.	Na_2O %	K_2O %	Rb.x ppm	Cs.n ppm	Br.n ppm
Sc	Clay saprolite	2	0.20	1.71	63.	4.95	11.41
S	Saprolite	11	0.21	1.45	53.	3.62	4.76

Comparison of standard deviation

Horizon		N.	Na_2O %	K_2O %	Rb.x ppm	Cs.n ppm	Br.n ppm
Sc	Clay saprolite	2	0.12	0.08	7.	0.55	5.07
S	Saprolite	11	0.20	0.42	14.	1.17	2.70

Comparison of geometric means

Horizon		N.	Na_2O %	K_2O %	Rb.x ppm	Cs.n ppm	Br.n ppm
Sc	Clay saprolite	2	0.18	1.71	63.	4.93	10.83
S	Saprolite	11	0.16	1.40	51.	3.41	4.06

Comparative statistics: alkali metals and bromine

FELSIC PORPHYRY

Comparison of arithmetic means

Horizon		N.	Na_2O %	K_2O %	Rb.x ppm	Cs.n ppm	Br.n ppm
Sc	Clay saprolite	2	0.38	3.10	114.	8.45	8.78
S	Saprolite	13	1.39	3.17	98.	7.90	5.05
R	Fresh rock	12	6.32	0.71	23.	1.33	1.00

Comparison of standard deviation

Horizon		N.	Na_2O %	K_2O %	Rb.x ppm	Cs.n ppm	Br.n ppm
Sc	Clay saprolite	2	0.03	0.10	4.	0.64	0.74
S	Saprolite	13	1.14	0.65	19.	1.58	3.81
R	Fresh rock	12	0.99	0.91	28.	1.22	0.00

Comparison of geometric means

Horizon		N.	Na_2O %	K_2O %	Rb.x ppm	Cs.n ppm	Br.n ppm
Sc	Clay saprolite	2	0.38	3.10	114.	8.43	8.76
S	Saprolite	13	0.90	3.09	95.	7.75	3.84
R	Fresh rock	12	6.24	0.30	11.	0.95	1.00

Table II/5. Comparative statistics: base and transition metals.

TALC CHLORITE ULTRAMAFIC ROCKS

Comparison of arithmetic means

Horizon		N	Pb.x ppm	Zn.x ppm	Cu.x ppm	Mn.x ppm	Co.n ppm	Ni.x ppm
M	Mottled clay	2	3.	56.	103.	105.	32.	767
Sc	Clay saprolite	4	3.	50.	117.	253.	56.	790
S	Saprolite	27	4.	86.	83.	893.	135.	1768
R	Fresh rock	16	3.	134.	34.	1226.	86.	987

Comparison of standard deviation

Horizon		N	Pb.x ppm	Zn.x ppm	Cu.x ppm	Mn.x ppm	Co.n ppm	Ni.x ppm
M	Mottled clay	2	0.	5.	11.	41.	9.	49.
Sc	Clay saprolite	4	0.	7.	47.	134.	38.	177.
S	Saprolite	27	2.	38.	19.	971.	110.	759.
R	Fresh rock	16	1.	72.	7.	144.	6.	148.

Comparison of geometric means

Horizon		N	Pb.x ppm	Zn.x ppm	Cu.x ppm	Mn.x ppm	Co.n ppm	Ni.x ppm
M	Mottled clay	2	3.	55.	103.	101.	31.	764.
Sc	Clay saprolite	4	3.	50.	109.	211.	46.	773.
S	Saprolite	27	4.	79.	81.	523.	104.	1587.
R	Fresh rock	16	3.	120.	33.	1215.	85.	974.

FUCHSITE CARBONATE ULTRAMAFIC ROCKS

Comparison of arithmetic means

Horizon		N	Pb.x ppm	Zn.x ppm	Cu.x ppm	Mn.x ppm	Co.n ppm	Ni.x ppm
Sc	Clay saprolite	2	3.	45.	74.	245.	37.	623.
S	Saprolite	11	7.	80.	109.	438.	77.	871.

Comparison of standard deviation

Horizon		N	Pb.x ppm	Zn.x ppm	Cu.x ppm	Mn.x ppm	Co.n ppm	Ni.x ppm
Sc	Clay saprolite	2	0.	12.	1.	74.	2.	31.
S	Saprolite	11	9.	26.	34.	576.	74.	617.

Comparison of geometric means

Horizon		N	Pb.x ppm	Zn.x ppm	Cu.x ppm	Mn.x ppm	Co.n ppm	Ni.x ppm
Sc	Clay saprolite	2	3.	44.	74.	239.	37.	622.
S	Saprolite	11	5.	76.	103.	281.	60.	759.

Comparative statistics: base and transition metals.

FELSIC PORPHYRIES

Comparison of arithmetic means

Horizon		N	Pb.x ppm	Zn.x ppm	Cu.x ppm	Mn.x ppm	Co.n ppm	Ni.x ppm
Sc	Clay saprolite	2	6.	39.	55.	67.	7.	182.
S	Saprolite	13	9.	54.	47.	117.	33.	303.
R	Fresh rock	12	7.	68.	22.	547.	16.	55.

Comparison of standard deviation

Horizon		N	Pb.x ppm	Zn.x ppm	Cu.x ppm	Mn.x ppm	Co.n ppm	Ni.x ppm
Sc	Clay saprolite	2	1.	1.	19.	9.	0.	23.
S	Saprolite	13	3.	26.	32.	199.	58.	382.
R	Fresh rock	12	3.	8.	10.	226.	5.	15.

Comparison of geometric means

Horizon		N	Pb.x ppm	Zn.x ppm	Cu.x ppm	Mn.x ppm	Co.n ppm	Ni.x ppm
Sc	Clay saprolite	2	6.	39.	53.	66.	7.	181.
S	Saprolite	13	9.	49.	41.	64.	15.	195.
R	Fresh rock	12	6.	68.	20.	504.	16.	53.

Table II/6. Comparative statistics: lithophile elements

TALC CHLORITE ULTRAMAFIC ROCKS

Comparison of arithmetic means

Horizon		N	Sc.n ppm	TiO_2 %	V.x ppm	Cr.n ppm
M	Mottled clay	2	34.30	0.63	377.	5150.
Sc	Clay saprolite	4	38.70	0.67	352.	4853.
S	Saprolite	27	29.01	0.38	196.	3407.
R	Fresh rock	16	25.76	0.30	158.	2294.

Comparison of standard deviation

Horizon		N	Sc.n ppm	TiO_2 %	V.x ppm	Cr.n ppm
M	Mottled clay	2	1.13	0.05	13.	184.
Sc	Clay saprolite	4	13.96	0.26	106.	2071.
S	Saprolite	27	4.57	0.10	49.	726.
R	Fresh rock	16	1.62	0.03	12.	200.

Comparison of geometric means

Horizon		N	Sc.n ppm	TiO_2 %	V.x ppm	Cr.n ppm
M	Mottled clay	2	34.26	0.62	376.	5137.
Sc	Clay saprolite	4	36.71	0.63	339.	4349.
S	Saprolite	27	28.68	0.37	190.	3332.
R	Fresh rock	16	25.69	0.30	158.	2281.

FUCHSITE CARBONATE ULTRAMAFIC ROCKS

Comparison of arithmetic means

Horizon		N	Sc.n ppm	TiO_2 %	V.x ppm	Cr.n ppm
Sc	Clay saprolite	2	27.95	0.44	227.	2980.
S	Saprolite	11	31.60	0.46	241.	3151.

Comparison of standard deviation

Horizon		N	Sc.n ppm	TiO_2 %	V.x ppm	Cr.n ppm
Sc	Clay saprolite	2	1.48	0.06	6.	608.
S	Saprolite	11	3.85	0.13	113.	482.

Comparison of geometric means

Horizon		N	Sc.n ppm	TiO_2 %	V.x ppm	Cr.n ppm
Sc	Clay saprolite	2	27.91	0.43	227.	2943.
S	Saprolite	11	31.32	0.45	225.	3110.

Comparative statistics: lithophile elements

FELSIC PORPHYRIES

Comparison of arithmetic means

Horizon		N	Sc.n ppm	TiO_2 %	V.x ppm	Cr.n ppm
Sc	Clay saprolite	2	18.65	1.00	208.	317.
S	Saprolite	13	14.30	0.73	131.	299.
R	Fresh rock	12	10.28	0.52	81.	141.

Comparison of standard deviation

Horizon		N	Sc.n ppm	TiO_2 %	V.x ppm	Cr.n ppm
Sc	Clay saprolite	2	0.07	0.04	6.	78.
S	Saprolite	13	5.79	0.25	42.	182.
R	Fresh rock	12	2.93	0.06	17.	52.

Comparison of geometric means

Horizon		N	Sc.n ppm	TiO_2 %	V.x ppm	Cr.n ppm
Sc	Clay saprolite	2	18.64	1.00	208.	312.
S	Saprolite	13	13.32	0.69	124.	243.
R	Fresh rock	12	9.88	0.51	79.	130.

Table II/7. Comparative statistics: immobile elements, Ga and Ge

TALC CHLORITE ULTRAMAFIC ROCKS

Comparison of arithmetic means

Horizon		N	Zr.x ppm	Hf.n ppm	Th.n ppm	Nb.x ppm	Ta.n ppm	Ga.x ppm	Ge.x ppm
M	Mottled clay	2	59.	1.83	2.09	3.	0.50	19.	3
Sc	Clay saprolite	4	46.	1.32	1.64	3.	0.66	16.	3
S	Saprolite	27	22.	0.62	0.59	3.	0.54	10.	3
R	Fresh rock	16	19.	0.50	0.30	3.	0.50	9.	3

Comparison of standard deviation

Horizon		N	Zr.x ppm	Hf.n ppm	Th.n ppm	Nb.x ppm	Ta.n ppm	Ga.x ppm	Ge.x ppm
M	Mottled clay	2	6.	0.09	0.14	0.	0.00	1.	0.
Sc	Clay saprolite	4	13.	0.58	0.42	0.	0.31	5.	0.
S	Saprolite	27	10.	0.26	0.44	0.	0.16	3.	1.
R	Fresh rock	16	4.	0.00	0.21	0.	0.00	1.	0.

Comparison of geometric means

Horizon		N	Zr.x ppm	Hf.n ppm	Th.n ppm	Nb.x ppm	Ta.n ppm	Ga.x ppm	Ge.x ppm
M	Mottled clay	2	59.	1.82	2.09	3.	0.50	19.	3.
Sc	Clay saprolite	4	44.	1.19	1.60	3.	0.61	15.	3.
S	Saprolite	27	21.	0.58	0.47	3.	0.53	9.	3.
R	Fresh rock	16	18.	0.50	0.27	3.	0.50	9.	3.

FUCHSITE CARBONATE ULTRAMAFIC ROCKS

Comparison of arithmetic means

Horizon		N	Zr.x ppm	Hf.n ppm	Th.n ppm	Nb.x ppm	Ta.n ppm	Ga.x ppm	Ge.x ppm
Sc	Clay saprolite	2	30.	0.50	1.08	3.	0.50	12.	4.
S	Saprolite	11	24.	0.69	0.55	3.	0.50	11.	4.

Comparison of standard deviation

Horizon		N	Zr.x ppm	Hf.n ppm	Th.n ppm	Nb.x ppm	Ta.n ppm	Ga.x ppm	Ge.x ppm
Sc	Clay saprolite	2	12.	0.00	0.57	0.	0.00	0.	1.
S	Saprolite	11	11.	0.43	0.64	0.	0.00	3.	1.

Comparison of geometric means

Horizon		N	Zr.x ppm	Hf.n ppm	Th.n ppm	Nb.x ppm	Ta.n ppm	Ga.x ppm	Ge.x ppm
Sc	Clay saprolite	2	28.	0.50	1.00	3.	0.50	12.	4.
S	Saprolite	11	23.	0.61	0.39	3.	0.50	11.	4.

Comparative statistics: immobile elements, Ga and Ge

FELSIC PORPHYRIES

Comparison of arithmetic means

Horizon		N	Zr.x ppm	Hf.n ppm	Th.n ppm	Nb.x ppm	Ta.n ppm	Ga.x ppm	Ge.x ppm
Sc	Clay saprolite	2	203.	5.10	7.02	7.	0.50	27.	3.
S	Saprolite	13	194.	4.76	9.89	6.	0.89	24.	3.
R	Fresh rock	12	153.	3.78	5.95	4.	1.14	19.	3.

Comparison of standard deviation

Horizon		N	Zr.x ppm	Hf.n ppm	Th.n ppm	Nb.x ppm	Ta.n ppm	Ga.x ppm	Ge.x ppm
Sc	Clay saprolite	2	8.	0.33	0.42	1.	0.00	0.	0.
S	Saprolite	13	36.	0.89	4.35	2.	0.55	2.	0.
R	Fresh rock	12	9.	0.31	0.71	1.	0.93	2.	0.

Comparison of geometric means

Horizon		N	Zr.x ppm	Hf.n ppm	Th.n ppm	Nb.x ppm	Ta.n ppm	Ga.x ppm	Ge.x ppm
Sc	Clay saprolite	2	202.	5.09	7.01	6.	0.50	27.	3.
S	Saprolite	13	191.	4.68	9.05	6.	0.76	24.	3.
R	Fresh rock	12	152.	3.77	5.91	4.	0.90	19.	3.

Table II/8. Comparative statistics: rare earth elements

TALC CHLORITE ULTRAMAFIC ROCKS

Comparison of arithmetic means

HORIZON		N	Y.x ppm	La.n ppm	Ce.n ppm	Sm.n ppm	Eu.n ppm	Yb.n ppm	Lu.n ppm
M	Mottled clay	2	12.	2.52	2.05	1.59	0.44	1.38	0.29
Sc	Clay saprolite	4	10.	2.61	3.26	1.26	0.33	1.09	0.23
S	Saprolite	27	8.	2.92	5.83	1.28	0.32	0.86	0.12
R	Fresh rock	16	8.	1.32	1.67	0.89	0.25	0.85	0.10

Comparison of standard deviation

HORIZON		N	Y.x ppm	La.n ppm	Ce.n ppm	Sm.n ppm	Eu.n ppm	Yb.n ppm	Lu.n ppm
M	Mottled clay	2	2.	0.27	1.48	0.06	0.27	0.07	0.01
Sc	Clay saprolite	4	3.	0.68	1.57	0.53	0.16	0.56	0.09
S	Saprolite	27	3.	1.86	7.13	0.65	0.20	0.25	0.05
R	Fresh rock	16	1.	0.81	1.62	0.15	0.00	0.09	0.00

Comparison of geometric means

HORIZON		N	Y.x ppm	La.n ppm	Ce.n ppm	Sm.n ppm	Eu.n ppm	Yb.n ppm	Lu.n ppm
M	Mottled clay	2	11.	2.51	1.76	1.59	0.40	1.38	0.29
Sc	Clay saprolite	4	9.	2.55	2.82	1.15	0.31	0.90	0.22
S	Saprolite	27	8.	2.42	3.41	1.16	0.29	0.83	0.11
R	Fresh rock	16	8.	1.20	1.34	0.88	0.25	0.85	0.10

FUCHSITE CARBONATE ULTRAMAFIC ROCKS

Comparison of arithmetic means

HORIZON		N	Y.x ppm	La.n ppm	Ce.n ppm	Sm.n ppm	Eu.n ppm	Yb.n ppm	Lu.n ppm
Sc	Clay saprolite	2	4.	3.18	2.67	0.56	0.25	0.55	0.10
S	Saprolite	11	9.	7.91	12.08	2.30	0.59	0.93	0.13

Comparison of standard deviation

HORIZON		N	Y.x ppm	La.n ppm	Ce.n ppm	Sm.n ppm	Eu.n ppm	Yb.n ppm	Lu.n ppm
Sc	Clay saprolite	2	1.	1.74	2.37	0.09	0.00	0.04	0.00
S	Saprolite	11	8.	13.85	25.76	3.86	0.96	0.44	0.08

Comparison of geometric means

HORIZON		N	Y.x ppm	La.n ppm	Ce.n ppm	Sm.n ppm	Eu.n ppm	Yb.n ppm	Lu.n ppm
Sc	Clay saprolite	2	4.	2.93	2.09	0.55	0.25	0.55	0.10
S	Saprolite	11	8.	2.59	2.89	1.21	0.35	0.87	0.11

Comparative statistics: rare earth elements

FELSIC PORPHYRIES

Comparison of arithmetic means

HORIZON		N	Y.x ppm	La.n ppm	Ce.n ppm	Sm.n ppm	Eu.n ppm	Yb.n ppm	Lu.n ppm
Sc	Clay saprolite	2	12.	29.20	19.70	2.51	0.71	1.19	0.21
S	Saprolite	13	14.	54.18	99.50	8.98	1.87	1.16	0.22
R	Fresh rock	12	13.	32.16	64.77	6.42	1.39	0.92	0.18

Comparison of standard deviation

HORIZON		N	Y.x ppm	La.n ppm	Ce.n ppm	Sm.n ppm	Eu.n ppm	Yb.n ppm	Lu.n ppm
Sc	Clay saprolite	2	1.	19.80	2.12	0.80	0.20	0.13	0.01
S	Saprolite	13	11.	31.37	60.41	6.21	1.35	0.63	0.16
R	Fresh rock	12	4.	3.59	6.98	0.59	0.34	0.43	0.08

Comparison of geometric means

HORIZON		N	Y.x ppm	La.n ppm	Ce.n ppm	Sm.n ppm	Eu.n ppm	Yb.n ppm	Lu.n ppm
Sc	Clay saprolite	2	12.	25.60	19.63	2.45	0.70	1.19	0.21
S	Saprolite	13	12.	45.92	81.94	7.09	1.48	1.03	0.18
R	Fresh rock	12	13.	31.96	64.37	6.39	1.35	0.80	0.16

APPENDIX III

DATA LISTINGS

LOGGING CODES

Archaean bedrock

Hannan's Lake Serpentinite
As Talc chlorite carbonate ultramafic rocks (undifferentiated)

Asf	Fuchsite carbonate ultramafic rocks

Black Flag Beds
Ab Black Flag Beds (undifferentiated)

Intrusives
Af Porphyry (undifferentiated)

Regolith

Ak	Calcareous red clay soil
A	Non-calcareous red cla soil
M	Mottled zone
Mc	Mottled clay
Sc	Clay saprolite
S	Saprolite
R	Unweathered rock

MT. PERCY NORTH. DATA LISTINGS

RCH2144
EASTING = 21080.0 INCLINATION = 60.0
NORTHING = 17350.0 AZIMUTH = 90.0
RL = 400.0

Sample Number	EASTING m	NORTHING m	RL m	UDep m	LDep m	GEO	REG	SiO_2 %	Al_2O_3 %	Fe.n %	TiO_2 %	CaO %	MgO %	Na_2O %	K_2O %
MW2001	21081.0	17350.0	398.3	0.00	2.00		Ak	52.08	12.67	10.20	0.95	3.62	0.91	0.23	0.61
MW2002	21082.0	17350.0	396.5	2.00	4.00		A	58.14	15.08	9.58	1.06	0.18	0.93	0.65	0.68
MW2003	21083.0	17350.0	394.8	4.00	6.00		A	56.82	16.39	10.10	1.03	0.19	1.06	0.68	0.59
MW2004	21084.0	17350.0	393.1	6.00	8.00	As	M	54.11	11.23	14.90	0.59	0.03	1.90	0.54	0.07
MW2005	21085.0	17350.0	391.3	8.00	10.00	As	M	56.70	13.28	13.30	0.66	0.01	1.49	0.65	0.05
MW2006	21086.0	17350.0	389.6	10.00	12.00	As	Sc	57.58	13.36	12.20	0.55	0.02	2.16	0.49	0.05
MW2007	21087.0	17350.0	387.9	12.00	14.00	As	S	55.64	10.62	10.30	0.51	0.03	2.86	0.51	0.07
MW2008	21088.0	17350.0	386.1	14.00	16.00	As	S	56.42	9.04	10.30	0.45	0.05	1.49	0.40	0.05
MW2009	21089.0	17350.0	384.4	16.00	18.00	As	S	57.10	10.94	9.47	0.54	0.04	0.90	0.91	0.15
MW2010	21090.0	17350.0	382.7	18.00	20.00	Af	S	59.30	17.42	3.77	0.58	0.10	0.59	0.29	1.48
MW2011	21091.0	17350.0	380.9	20.00	22.00	Af	S	74.99	18.83	2.97	0.44	0.04	0.81	0.33	3.82
MW2012	21092.0	17350.0	379.2	22.00	24.00	Af	S	67.96	16.88	2.71	0.44	0.05	0.65	1.30	3.29
MW2013	21093.0	17350.0	377.5	24.00	26.00	Af	S	71.34	17.35	1.76	0.44	0.02	0.67	1.81	3.66
MW2014	21094.0	17350.0	375.8	26.00	28.00	Af	S	62.18	16.77	5.16	0.80	0.04	0.84	0.96	3.43
MW2015	21095.0	17350.0	374.0	28.00	30.00	Af	S	60.63	17.26	5.27	1.07	0.05	0.50	1.77	3.63
MW2016	21096.0	17350.0	372.3	30.00	32.00	Af	S	65.49	17.89	5.15	1.03	0.06	0.56	2.15	3.67
MW2017	21097.0	17350.0	370.6	32.00	34.00	Af	S	62.59	16.87	5.30	1.01	0.08	0.65	3.11	2.95
MW2018	21098.0	17350.0	368.8	34.00	36.00	As	S	63.19	10.99	9.42	0.50	0.08	4.79	1.44	0.42
MW2019	21099.0	17350.0	367.1	36.00	38.00	As	S	65.73	8.81	8.81	0.40	0.04	7.38	0.70	0.29
MW2020	21100.0	17350.0	365.4	38.00	40.00	AsAf	S	64.32	16.01	5.31	0.86	0.06	2.10	4.12	2.08

	As.n ppm	Au.n ppb	Ba.x ppm	Br.n ppm	Ce.n ppm	Co.n ppm	Cr.n ppm	Cs.n ppm	Cu.x ppm	Eu.n ppm	Ga.x ppm	Ge.x ppm	Hf.n ppm	La.n ppm	Lu.n ppm	Mn.x ppm
MW2001	15.00	32.9	231	12.10	33.23	25	492	2.62	58	0.83	18	3	3.91	18.40	0.32	552
MW2002	15.20	12.7	237	38.40	11.60	13	632	2.81	45	0.25	24	3	4.91	8.44	0.23	195
MW2003	15.30	2.5	255	62.00	11.20	18	1210	2.38	54	0.25	26	3	4.75	7.47	0.23	195
MW2004	12.30	11.5	176	32.10	3.10	38	5020	1.03	111	0.63	20	3	1.89	2.71	0.28	134
MW2005	10.30	2.5	116	45.50	1.00	26	5280	1.62	95	0.25	18	3	1.76	2.33	0.30	76
MW2006	12.70	2.5	111	28.50	4.17	27	6150	0.50	91	0.25	16	3	1.45	2.44	0.27	66
MW2007	22.00	2.5	102	29.20	2.90	26	5340	1.05	71	0.25	15	3	1.13	2.56	0.23	152
MW2008	52.00	2.5	48	19.80	1.00	26	3640	0.50	81	0.25	13	3	0.50	2.17	0.10	156
MW2009	90.80	2.5	167	32.90	6.60	28	2880	1.70	67	0.25	15	3	1.36	5.89	0.10	73
MW2010	18.80	20.3	548	5.13	51.00	10	321	7.57	39	0.93	27	3	4.75	26.90	0.10	48
MW2011	13.30	2.5	953	5.36	47.50	6	202	8.36	39	0.83	25	3	3.87	24.90	0.10	37
MW2012	5.07	2.5	864	5.62	48.10	6	194	9.83	27	0.61	22	3	3.87	25.30	0.10	28
MW2013	2.18	2.5	948	2.30	51.30	4	160	5.22	14	0.80	22	3	3.85	25.70	0.10	21
MW2014	6.58	26.4	784	3.03	95.40	11	398	10.60	48	1.66	24	3	4.52	48.20	0.24	62
MW2015	3.90	2.5	960	1.00	139.00	16	85	8.54	30	2.34	27	3	5.34	67.20	0.27	56
MW2016	2.78	2.5	1069	2.52	144.00	17	77	6.98	34	2.59	27	3	5.16	72.50	0.30	55
MW2017	4.52	2.5	851	2.52	150.00	21	108	5.44	45	2.60	24	3	5.49	79.40	0.32	70
MW2018	5.52	60.7	150	10.40	17.50	125	3340	3.71	107	0.58	13	3	1.01	7.24	0.10	200
MW2019	3.66	8.7	150	1.00	4.59	213	3170	3.00	71	0.58	10	3	0.50	3.81	0.10	1056
MW2020	1.00	2.5	579	3.29	83.20	75	508	5.02	48	2.22	23	3	4.19	47.20	0.27	253

RCH2144

Sample Number	Nb.x ppm	Ni.x ppm	Pb.x ppm	Rb.x ppm	S.x %	Sb.n ppm	Sc.n ppm	Sm.n ppm	Sr.x ppm	Ta.n ppm	Th.n ppm	V.x ppm	W.n ppm	Y.x ppm	Yb.n ppm	Zn.x ppm	Zr.x ppm
MW2001	8	160	16	33	2.063	1.16	28.40	3.93	457	1.47	9.14	279	1.00	17	1.91	48	144
MW2002	10	127	13	36	0.211	1.37	31.20	1.58	6	0.50	10.00	264	2.43	9	1.35	45	170
MW2003	8	195	8	32	0.380	1.62	33.30	1.48	94	1.59	8.52	292	1.00	10	1.42	38	169
MW2004	3	801	3	3	0.506	2.60	33.50	1.63	31	0.50	2.19	386	1.00	10	1.33	59	63
MW2005	3	732	3	3	0.164	3.01	35.10	1.55	5	0.50	1.99	368	1.00	13	1.43	52	55
MW2006	3	744	3	3	0.629	2.79	34.50	1.67	8	1.13	1.56	321	1.00	12	1.36	48	48
MW2007	3	707	3	3	0.312	2.15	31.20	1.36	2	0.50	1.28	260	1.00	9	1.19	47	42
MW2008	3	595	3	3	0.354	2.41	24.30	1.01	5	0.50	0.72	258	1.00	7	0.95	41	35
MW2009	3	617	3	5	0.516	2.32	26.50	1.59	5	0.50	1.45	230	2.62	8	0.96	28	55
MW2010	6	190	6	40	0.144	4.26	10.70	4.44	11	0.50	6.64	113	18.30	9	0.89	28	191
MW2011	5	149	5	97	0.135	4.79	8.10	3.95	3	0.50	5.34	89	20.80	7	0.62	38	160
MW2012	6	131	8	94	0.134	4.95	8.60	4.01	15	0.50	5.48	76	6.42	6	0.68	43	161
MW2013	5	72	8	105	0.149	5.86	8.43	4.21	76	1.01	5.66	73	9.76	6	0.69	36	157
MW2014	7	119	7	105	0.250	8.70	14.40	8.17	76	0.50	9.49	153	7.05	12	1.08	55	187
MW2015	8	112	9	111	0.418	9.38	16.20	11.80	89	1.84	13.30	167	1.00	14	1.33	56	218
MW2016	6	101	8	110	0.186	9.77	16.30	12.90	79	1.95	12.90	157	1.00	18	1.47	58	207
MW2017	7	133	10	93	0.133	8.19	16.90	13.80	29	1.40	12.20	155	1.00	20	1.54	62	202
MW2018	3	1531	9	15	0.299	5.31	33.70	2.52	31	1.13	0.60	206	1.00	11	1.08	196	33
MW2019	3	2153	6	9	0.076	3.44	30.70	1.91	61	0.50	0.73	200	1.00	9	0.87	125	16
MW2020	3	736	7	72	0.049	5.35	16.70	9.56	7	0.50	5.69	161	1.00	23	1.57	79	170

RCH2143

EASTING = 21100.0 **INCLINATION = 60.0**
NORTHING = 17350.0 **AZIMUTH = 90.0**
RL = 400.0

Sample Number	EASTING m	NORTHING m	RL m	UDep m	LDep m	GEO	REG	SiO_2 %	Al_2O_3 %	Fe.n %	TiO_2 %	CaO %	MgO %	Na_2O %	K_2O %
MW2021	21101.0	17350.0	398.3	0.00	2.00		Ak	59.54	14.12	12.10	1.16	0.35	0.88	0.54	0.65
MW2022	21102.0	17350.0	396.5	2.00	4.00		A	65.99	15.30	11.80	1.09	0.18	0.82	0.59	0.63
MW2023	21103.0	17350.0	394.8	4.00	6.00	AsAf	Mc	62.37	14.47	10.40	1.07	0.06	0.54	0.48	1.53
MW2024	21104.0	17350.0	393.1	6.00	8.00	Af	Sc	65.63	20.33	6.70	1.03	0.05	0.44	0.36	3.17
MW2025	21105.0	17350.0	391.3	8.00	10.00	Af	Sc	60.45	17.58	6.80	0.98	0.04	0.37	0.40	3.03
MW2026	21106.0	17350.0	389.6	10.00	12.00	As	Sc	63.96	7.27	11.90	0.40	0.04	0.21	0.07	0.80
MW2027	21107.0	17350.0	387.9	12.00	14.00	Asf	Sc	70.87	8.94	10.60	0.39	0.04	0.26	0.12	1.66
MW2028	21108.0	17350.0	386.1	14.00	16.00	Asf	S	57.83	7.78	11.50	0.46	0.03	0.29	0.16	1.78
MW2029	21109.0	17350.0	384.4	16.00	18.00	As	S	56.10	7.52	13.40	0.41	0.03	0.23	0.06	0.68
MW2030	21110.0	17350.0	382.7	18.00	20.00	Asf	S	61.19	8.35	10.10	0.39	0.03	0.18	0.12	1.04
MW2031	21111.0	17350.0	380.9	20.00	22.00	Asf	S	67.72	10.14	5.37	0.44	0.05	0.26	0.12	1.26
MW2032	21113.0	17350.0	377.5	24.00	26.00	Asf	S	62.43	9.27	9.35	0.41	0.03	0.25	0.10	1.12
MW2033	21114.0	17350.0	375.8	26.00	28.00	Asf	S	57.02	10.20	10.00	0.43	0.03	0.27	0.09	1.24
MW2034	21115.0	17350.0	374.0	28.00	30.00	Asf	S	55.54	10.37	17.40	0.80	0.69	0.24	0.12	1.69
MW2035	21116.0	17350.0	372.3	30.00	32.00	Asf	S	60.00	11.67	12.60	0.59	0.13	0.34	0.10	1.68
MW2036	21117.0	17350.0	370.6	32.00	34.00	Asf	S	65.64	7.77	9.02	0.36	0.03	0.51	0.14	1.41
MW2037	21118.0	17350.0	368.8	34.00	36.00	Asf	S	58.30	9.05	11.10	0.43	0.05	3.99	0.46	0.76
MW2038	21119.0	17350.0	367.1	36.00	38.00	Af	S	48.96	15.33	6.58	1.00	0.07	0.99	2.06	2.59
MW2039	21120.0	17350.0	365.4	38.00	40.00	Af	S	55.60	13.68	5.35	0.88	0.59	1.53	3.59	2.51

	As.n ppm	Au.n ppb	Ba.x ppm	Br.n ppm	Ce.n ppm	Co.n ppm	Cr.n ppm	Cs.n ppm	Cu.x ppm	Eu.n ppm	Ga.x ppm	Ge.x ppm	Hf.n ppm	La.n ppm	Lu.n ppm	Mn.x ppm
MW2021	18.90	47.4	235	21.10	26.80	18	546	2.79	52	0.73	19	3	4.99	14.40	0.34	414
MW2022	18.50	2.5	232	47.60	10.50	12	866	3.04	55	0.25	23	3	4.83	8.30	0.23	190
MW2023	13.20	6.1	527	38.50	6.25	15	1490	6.93	70	0.25	25	3	4.01	10.80	0.23	116
MW2024	3.56	2.5	892	8.26	21.20	8	262	8.00	41	0.85	27	3	5.33	43.20	0.20	73
MW2025	3.87	2.5	856	9.30	18.20	7	372	8.90	68	0.57	27	3	4.86	15.20	0.22	60
MW2026	12.50	2.5	180	11.00	1.00	24	1790	3.43	64	0.25	9	3	0.50	2.02	0.10	247
MW2027	9.82	2.5	193	7.83	1.00	39	2550	4.56	73	0.25	12	5	0.50	4.41	0.10	297
MW2028	8.06	2.5	281	11.10	1.00	63	3040	3.63	85	0.25	11	3	0.50	0.94	0.10	396
MW2029	8.64	2.5	164	5.44	1.00	74	2850	1.41	87	0.25	9	3	0.50	1.37	0.10	375
MW2030	6.58	2.5	285	3.01	1.00	47	2290	1.60	52	0.25	10	3	0.50	0.73	0.10	186
MW2031	2.63	2.5	350	5.24	1.00	33	2470	3.67	88	0.25	12	3	0.50	0.84	0.10	119
MW2032	2.54	2.5	471	4.14	1.00	55	3310	1.81	108	0.25	10	3	0.50	1.10	0.10	281
MW2033	3.09	2.5	207	4.93	1.00	52	3640	3.48	156	0.25	10	5	0.50	1.28	0.10	300
MW2034	12.90	16.6	295	4.42	2.40	54	3210	4.61	143	0.25	17	3	1.70	5.78	0.10	235
MW2035	6.97	2.5	548	6.51	30.80	63	3010	5.22	139	0.74	15	6	1.38	30.30	0.10	294
MW2036	4.71	2.5	818	2.41	4.37	110	3200	4.74	117	0.25	8	3	0.50	2.13	0.10	2121
MW2037	6.36	56.2	149	6.57	85.10	289	3460	3.01	136	3.46	10	3	0.50	40.50	0.38	604
MW2038	2.63	139.0	529	14.70	205.00	99	644	9.50	139	4.69	23	3	6.51	111.00	0.64	229
MW2039	3.32	221.0	662	1.00	192.00	206	551	7.58	66	4.15	21	3	5.95	106.00	0.39	757

RCH2143

Sample Number	Nb.x ppm	Ni.x ppm	Pb.x ppm	Rb.x ppm	S.x %	Sb.n ppm	Sc.n ppm	Sm.n ppm	Sr.x ppm	Ta.n ppm	Th.n ppm	V.x ppm	W.n ppm	Y.x ppm	Yb.n ppm	Zn.x ppm	Zr.x ppm
MW2021	8	138	15	34	0.364	1.55	31.30	3.00	78	0.50	10.50	343	1.00	16	1.68	62	167
MW2022	9	149	12	32	0.557	2.39	30.60	1.48	74	0.50	9.23	334	1.00	8	1.30	39	157
MW2023	7	208	3	61	0.365	9.57	29.60	1.31	23	0.50	6.36	326	5.35	9	1.18	36	152
MW2024	6	198	5	117	0.188	17.30	18.70	3.08	86	0.50	7.32	204	10.40	13	1.29	38	208
MW2025	7	165	7	111	0.376	13.80	18.60	1.95	75	0.50	6.72	212	4.54	11	1.10	40	197
MW2026	3	578	3	28	0.145	5.87	22.70	0.54	1	0.50	1.08	222	4.06	5	0.25	61	30
MW2027	3	645	3	58	0.111	6.03	26.90	0.49	12	0.50	0.67	231	6.44	3	0.58	53	21
MW2028	3	722	3	63	0.151	6.25	30.90	0.55	93	0.50	0.25	252	2.81	6	0.69	67	19
MW2029	3	976	3	25	0.193	4.84	27.00	0.91	71	0.50	0.25	209	1.00	7	0.71	82	17
MW2030	3	692	3	38	0.104	4.89	30.00	0.63	92	0.50	0.25	200	1.00	7	0.73	54	19
MW2031	3	481	3	49	0.073	4.86	30.70	0.62	12	0.50	0.25	195	4.05	6	0.81	37	21
MW2032	3	619	3	43	0.125	4.73	33.40	0.95	2	0.50	0.25	201	6.00	8	0.87	80	20
MW2033	3	674	3	44	0.156	5.07	35.20	1.01	12	0.50	0.25	229	5.35	7	0.94	75	21
MW2034	3	736	8	62	0.193	4.52	32.00	1.54	3	0.50	0.96	561	8.51	10	1.17	95	40
MW2035	3	803	5	62	0.547	5.32	34.00	4.19	82	0.50	2.33	289	1.00	9	0.98	121	48
MW2036	3	936	32	52	0.199	3.60	32.40	0.86	31	0.50	0.25	174	1.00	5	0.70	79	13
MW2037	3	2670	11	27	0.718	5.11	35.50	13.50	84	0.50	0.81	186	1.00	33	2.15	120	28
MW2038	8	874	12	95	0.958	10.70	27.40	20.90	99	0.50	18.00	201	1.00	42	2.77	93	269
MW2039	10	1367	13	93	0.137	15.80	22.40	19.10	18	0.50	16.40	180	1.00	28	1.79	119	250

RCH2142
EASTING = 21120.0 INCLINATION = 60.0
NORTHING = 17350.0 AZIMUTH = 90.0
RL = 400.0

Sample Number	EASTING m	NORTHING m	RL m	UDep m	LDep m	GEO	REG	SiO_2 %	Al_2O_3 %	Fe.n %	TiO_2 %	CaO %	MgO %	Na_2O %	K_2O %
MW2041	21121.0	17350.0	398.3	0.00	2.00		Ak	49.81	12.29	9.45	0.97	2.32	0.93	0.21	0.65
MW2042	21122.0	17350.0	396.5	2.00	4.00		A	52.02	12.83	10.30	1.07	0.76	0.84	0.48	0.66
MW2043	21123.0	17350.0	394.8	4.00	6.00	AsAf	ASc	57.89	13.48	10.00	1.02	0.05	0.56	0.71	0.35
MW2044	21124.0	17350.0	393.1	6.00	8.00	AsAf	Sc	60.83	14.60	8.76	1.09	0.03	0.51	0.31	0.44
MW2045	21125.0	17350.0	391.3	8.00	10.00	Asf	Sc	67.26	8.71	9.37	0.48	0.02	0.63	0.28	1.77
MW2046	21126.0	17350.0	389.6	10.00	12.00	AfAs	S	67.86	14.91	4.46	0.52	0.02	0.67	0.26	3.66
MW2047	21127.0	17350.0	387.9	12.00	14.00	Af	S	70.17	17.94	3.09	0.56	0.04	0.55	0.20	3.42
MW2048	21128.0	17350.0	386.1	14.00	16.00	Af	S	69.12	16.95	3.73	0.55	0.03	0.51	0.28	3.43
MW2049	21129.0	17350.0	384.4	16.00	18.00	Af	S	66.68	16.25	5.45	0.72	0.03	0.56	0.23	3.35
MW2050	21130.0	17350.0	382.7	18.00	20.00	AsAf	S	51.79	10.50	7.92	0.89	0.03	0.44	0.28	2.05
MW2051	21131.0	17350.0	380.9	20.00	22.00	As	S	58.44	7.20	11.80	0.47	0.03	0.36	0.09	0.31
MW2052	21132.0	17350.0	379.2	22.00	24.00	AsAf	S	54.81	14.35	7.46	0.91	0.05	0.76	0.50	2.37
MW2053	21133.0	17350.0	377.5	24.00	26.00	Asf	S	86.51	7.24	4.41	0.33	0.02	0.34	0.74	1.77
MW2054	21134.0	17350.0	375.8	26.00	28.00	Asf	S	72.60	10.21	10.00	0.45	0.04	0.42	0.15	2.24
MW2055	21135.0	17350.0	374.0	28.00	30.00	As	S	75.25	7.54	9.80	0.29	0.04	0.27	0.07	0.95
MW2056	21136.0	17350.0	372.3	30.00	32.00	As	S	67.10	10.30	13.20	0.40	0.04	0.87	0.61	0.87
MW2057	21137.0	17350.0	370.6	32.00	34.00	As	S	70.78	8.50	9.70	0.40	0.05	4.85	0.17	0.90
MW2040	21138.0	17350.0	368.8	34.00	36.00	As	S	53.88	7.36	9.15	0.46	0.08	3.70	0.47	1.11
MW2058	21139.0	17350.0	367.1	36.00	38.00	As	S	66.93	7.05	11.90	0.36	0.41	4.14	0.27	0.73
MW2059	21140.0	17350.0	365.4	38.00	40.00	As	S	65.11	6.98	10.50	0.33	2.03	5.52	0.31	0.65

	As.n ppm	Au.n ppb	Ba.x ppm	Br.n ppm	Ce.n ppm	Co.n ppm	Cr.n ppm	Cs.n ppm	Cu.x ppm	Eu.n ppm	Ga.x ppm	Ge.x ppm	Hf.n ppm	La.n ppm	Lu.n ppm	Mn.x ppm
MW2041	14.30	51.6	223	19.00	34.30	23	481	2.19	63	0.90	18	3	3.90	16.70	0.30	436
MW2042	16.20	19.3	239	24.30	13.80	13	531	2.15	55	0.25	21	3	4.97	10.10	0.25	266
MW2043	11.60	2.5	155	51.10	18.40	11	1300	1.62	75	1.01	24	3	4.68	28.80	0.28	117
MW2044	8.22	2.5	250	26.90	76.80	13	1400	1.90	92	2.80	24	3	6.02	58.80	0.27	76
MW2045	7.73	66.7	242	15.00	4.35	36	3410	5.34	75	0.25	12	3	0.50	1.95	0.10	193
MW2046	9.63	607.0	640	9.27	11.20	9	786	8.88	42	0.25	25	3	3.45	7.37	0.10	54
MW2047	4.68	2.5	665	6.77	21.90	6	378	7.81	30	0.66	25	3	3.88	17.60	0.10	55
MW2048	3.85	2.5	678	9.42	55.80	8	309	6.90	33	0.77	25	3	3.93	43.00	0.10	39
MW2049	8.34	6.6	658	6.27	92.50	18	459	8.43	73	1.74	24	3	4.75	56.60	0.10	58
MW2050	5.44	11.2	527	11.50	83.80	38	1110	8.00	78	1.75	22	3	5.06	49.90	0.24	160
MW2051	5.50	2.5	119	5.29	12.20	57	2300	2.46	115	0.25	10	3	1.13	6.53	0.10	188
MW2052	3.88	11.3	471	14.60	150.00	32	1020	9.35	78	3.09	23	3	6.35	84.50	0.36	99
MW2053	4.21	2.5	253	1.00	4.26	24	3040	3.37	64	0.25	9	5	0.50	1.88	0.10	58
MW2054	7.22	2.5	382	3.02	1.00	55	3990	4.63	108	0.25	12	5	0.50	1.54	0.10	229
MW2055	12.60	9.6	717	4.18	2.03	56	3140	2.50	65	0.25	7	6	0.50	1.22	0.10	346
MW2056	19.10	40.0	236	1.00	27.50	288	4000	1.60	119	0.25	8	5	0.50	1.19	0.10	1075
MW2057	13.80	2.5	621	1.00	25.50	541	3480	1.24	107	1.18	10	3	0.50	5.13	0.30	3720
MW2040	23.70	183.0	237	12.50	5.45	114	3360	4.43	109	0.55	10	3	0.50	4.51	0.22	227
MW2058	41.30	14.2	250	2.04	5.89	110	3390	2.18	79	0.25	8	8	0.50	1.49	0.10	739
MW2059	59.40	2.5	194	1.00	3.61	125	3180	2.33	76	0.25	8	6	0.50	1.18	0.10	1096

RCH2142

Sample Number	Nb.x ppm	Ni.x ppm	Pb.x ppm	Rb.x ppm	S.x %	Sb.n ppm	Sc.n ppm	Sm.n ppm	Sr.x ppm	Ta.n ppm	Th.n ppm	V.x ppm	W.n ppm	Y.x ppm	Yb.n ppm	Zn.x ppm	Zr.x ppm
MW2041	9	164	13	33	0.814	1.12	28.90	3.33	113	0.50	9.87	274	1.00	16	1.58	46	151
MW2042	9	135	10	35	0.226	1.45	30.10	1.87	67	1.21	10.70	295	1.00	11	1.30	42	156
MW2043	9	195	11	18	0.401	4.44	26.90	5.15	14	0.50	9.22	282	1.00	12	1.08	22	171
MW2044	9	262	19	21	0.326	7.38	26.50	11.80	95	0.50	12.60	236	5.22	21	1.35	22	219
MW2045	3	601	3	68	0.376	4.52	29.00	0.62	81	0.50	1.48	223	3.76	5	0.53	36	38
MW2046	3	181	6	118	0.189	5.55	12.20	1.18	41	0.50	5.99	105	5.92	6	0.60	27	144
MW2047	3	151	8	109	0.162	5.21	10.80	1.89	2	0.50	6.16	101	4.95	5	0.57	30	160
MW2048	3	225	13	108	0.173	5.15	10.00	3.94	33	0.50	6.75	94	7.47	7	0.67	42	163
MW2049	7	316	15	114	0.262	7.31	15.70	7.61	34	1.31	10.20	143	9.27	12	0.95	42	203
MW2050	7	458	12	78	0.291	14.10	23.10	7.98	43	0.50	10.60	212	5.48	13	1.40	57	194
MW2051	5	697	5	10	0.369	5.98	23.60	1.67	32	0.50	2.02	171	1.00	7	0.79	148	33
MW2052	9	497	12	91	0.536	14.20	26.60	14.50	913	0.50	16.40	203	7.65	19	1.46	69	249
MW2053	3	389	3	63	0.036	6.62	21.30	0.68	71	0.50	0.25	148	8.31	5	0.57	60	17
MW2054	3	855	3	75	0.101	7.64	32.20	0.77	1	0.50	0.25	220	1.00	7	0.64	97	20
MW2055	3	883	3	33	0.194	4.58	24.80	0.52	71	0.50	0.53	151	1.00	3	0.53	82	17
MW2056	3	1855	7	33	0.201	5.58	45.60	1.22	71	0.50	0.25	210	1.00	8	1.09	108	17
MW2057	3	3519	3	34	0.022	6.45	33.10	3.60	42	0.50	0.68	206	2.30	14	1.80	142	14
MW2040	3	3062	8	40	0.275	5.78	30.50	1.81	83	0.50	1.01	221	1.00	17	0.94	135	28
MW2058	3	2288	3	27	0.023	6.10	28.30	1.06	62	0.50	0.25	196	3.68	8	0.91	126	16
MW2059	3	1949	7	25	0.015	4.94	27.60	0.94	54	0.50	0.55	188	7.99	8	0.93	103	15

RCH2140

EASTING = 21160.0 **INCLINATION = 60.0**
NORTHING = 17350.0 **AZIMUTH = 90.0**
RL = 400.0

Sample Number	EASTING m	NORTHING m	RL m	UDep m	LDep m	GEO	REG	SiO_2 %	Al_2O_3 %	Fe.n %	TiO_2 %	CaO %	MgO %	Na_2O %	K_2O %
MW2060	21161.0	17350.0	398.3	0.00	2.00		Ak	55.64	14.83	12.90	0.99	2.00	1.13	0.19	0.65
MW2061	21162.0	17350.0	396.5	2.00	4.00		A	63.06	17.12	9.71	1.00	0.22	1.05	0.70	0.73
MW2062	21163.0	17350.0	394.8	4.00	6.00		A	59.72	20.53	10.10	1.13	0.14	0.93	0.53	0.70
MW2063	21164.0	17350.0	393.1	6.00	8.00	As	Mc	43.73	21.89	18.30	0.91	0.10	0.55	0.54	0.20
MW2064	21165.0	17350.0	391.3	8.00	10.00	As	Sc	37.72	19.33	21.30	1.00	0.05	0.47	0.48	0.07
MW2065	21166.0	17350.0	389.6	10.00	12.00	As	Sc	47.82	15.97	18.30	0.71	0.06	3.06	0.25	0.06
MW2066	21167.0	17350.0	387.9	12.00	14.00	As	S	54.37	12.79	14.50	0.52	0.06	7.11	0.35	0.04
MW2067	21168.0	17350.0	386.1	14.00	16.00	As	S	56.53	12.59	12.00	0.57	0.05	9.38	0.58	0.05
MW2068	21169.0	17350.0	384.4	16.00	18.00	As	S	47.99	10.18	12.90	0.40	0.01	10.38	0.45	0.04
MW2069	21170.0	17350.0	382.7	18.00	20.00	As	S	53.07	9.89	8.11	0.41	0.02	12.47	0.61	0.05
MW2070	21171.0	17350.0	380.9	20.00	22.00	As	S	50.27	8.92	10.30	0.33	0.01	12.59	0.58	0.03
MW2071	21172.0	17350.0	379.2	22.00	24.00	As	S	52.39	7.18	8.80	0.26	0.03	14.37	0.49	0.05
MW2072	21173.0	17350.0	377.5	24.00	26.00	As	S	51.86	7.92	9.22	0.31	0.04	13.97	0.41	0.06
MW2073	21174.0	17350.0	375.8	26.00	28.00	As	S	51.94	8.19	9.16	0.33	0.01	13.57	0.65	0.04
MW2074	21175.0	17350.0	374.0	28.00	30.00	As	S	52.39	6.44	8.78	0.33	0.01	15.42	0.53	0.04
MW2075	21176.0	17350.0	372.3	30.00	32.00	As	S	53.28	6.37	8.17	0.27	0.02	16.05	0.59	0.06
MW2076	21177.0	17350.0	370.6	32.00	34.00	As	S	52.83	6.41	7.71	0.26	0.01	16.63	0.65	0.04
MW2077	21178.0	17350.0	368.8	34.00	36.00	As	S	52.45	6.92	7.83	0.27	0.02	16.80	0.84	0.05
MW2078	21179.0	17350.0	367.1	36.00	38.00	As	S	52.95	6.53	7.58	0.22	0.01	17.88	0.83	0.03
MW2079	21180.0	17350.0	365.4	38.00	40.00	As	S	54.40	6.01	7.62	0.28	0.01	18.67	0.78	0.03

	As.n ppm	Au.n ppb	Ba.x ppm	Br.n ppm	Ce.n ppm	Co.n ppm	Cr.n ppm	Cs.n ppm	Cu.x ppm	Eu.n ppm	Ga.x ppm	Ge.x ppm	Hf.n ppm	La.n ppm	Lu.n ppm	Mn.x ppm
MW2060	18.00	30.1	246	11.40	29.00	26	702	4.29	62	0.86	21	3	4.30	17.50	0.33	504
MW2061	17.30	10.1	207	37.10	16.50	16	705	3.59	52	0.25	24	3	4.65	10.00	0.21	257
MW2062	18.20	2.5	260	41.60	9.91	21	1140	2.74	53	0.25	25	3	5.14	7.85	0.25	186
MW2063	31.90	10.7	318	42.90	10.20	82	4270	2.13	135	0.25	25	3	3.00	3.39	0.22	343
MW2064	51.40	2.5	554	51.40	3.40	104	6090	3.11	162	0.25	22	3	1.85	2.39	0.26	367
MW2065	39.50	2.5	259	17.70	4.45	68	5380	2.11	151	0.57	18	3	1.48	3.59	0.31	332
MW2066	33.50	2.5	148	17.00	2.63	63	4550	1.66	102	0.25	15	3	1.04	1.97	0.10	253
MW2067	24.70	2.5	103	27.20	3.47	68	4530	0.50	87	0.25	12	3	0.50	1.89	0.10	202
MW2068	22.00	2.5	15	16.70	1.00	76	4460	1.87	97	0.25	11	3	0.50	1.45	0.10	269
MW2069	11.40	5.6	35	18.90	2.38	104	4240	0.50	58	0.25	10	3	0.50	1.03	0.10	340
MW2070	15.60	2.5	13	15.30	2.05	86	3610	0.50	78	0.25	9	3	0.50	1.09	0.10	339
MW2071	11.00	2.5	101	11.40	3.79	89	2700	1.36	64	0.25	7	3	0.50	1.60	0.10	363
MW2072	10.60	2.5	35	6.24	2.33	88	3160	0.50	74	0.25	9	3	0.50	1.49	0.10	379
MW2073	4.02	2.5	8	13.40	3.16	93	3910	0.50	109	0.25	8	3	0.50	1.54	0.10	304
MW2074	1.00	2.5	29	6.38	5.63	218	2960	0.50	67	0.25	8	3	0.50	3.08	0.10	1583
MW2075	1.00	2.5	22	7.25	11.30	306	2770	0.50	65	0.25	7	3	0.50	5.59	0.10	3199
MW2076	1.00	2.5	13	8.50	1.00	219	2700	1.34	67	0.25	7	3	0.50	4.06	0.10	2209
MW2077	1.00	2.5	57	11.60	1.00	160	2890	1.80	101	0.25	7	3	0.50	3.66	0.10	1671
MW2078	1.00	7.2	32	7.88	1.00	158	2770	0.50	79	0.25	6	3	0.50	3.95	0.10	2015
MW2079	1.00	6.6	11	7.15	1.00	124	2670	1.36	51	0.25	8	3	0.50	2.27	0.10	1588

RCH2140

Sample Number	Nb.x ppm	Ni.x ppm	Pb.x ppm	Rb.x ppm	S.x %	Sb.n ppm	Sc.n ppm	Sm.n ppm	Sr.x ppm	Ta.n ppm	Th.n ppm	V.x ppm	W.n ppm	Y.x ppm	Yb.n ppm	Zn.x ppm	Zr.x ppm
MW2060	7	216	15	36	1.063	1.63	32.70	3.68	813	0.50	10.40	343	1.00	16	1.51	44	148
MW2061	10	164	7	40	0.554	1.36	31.10	1.85	97	0.50	10.30	261	1.00	10	1.19	45	159
MW2062	9	212	9	36	1.021	1.87	33.50	1.44	84	0.50	8.96	286	1.00	11	1.16	37	178
MW2063	6	638	9	11	0.871	4.32	44.80	1.03	42	0.50	5.39	396	2.05	8	1.27	27	94
MW2064	3	834	3	3	0.765	4.58	56.10	1.18	2	0.50	2.03	470	2.40	10	1.45	44	62
MW2065	3	1003	3	3	0.291	3.93	41.50	1.66	4	0.50	1.90	396	1.00	12	1.31	48	44
MW2066	3	1071	3	3	0.294	3.18	29.10	1.07	2	0.50	0.95	317	1.00	7	0.87	50	32
MW2067	3	1242	3	3	0.352	2.76	30.70	0.94	1	0.50	0.54	265	1.00	7	0.85	59	31
MW2068	3	1544	3	3	0.313	2.69	32.70	0.81	4	0.50	0.25	286	1.00	7	0.79	64	24
MW2069	3	1676	3	3	0.415	1.40	32.00	0.49	1	0.50	0.25	131	1.00	3	0.52	74	21
MW2070	3	1549	3	3	0.427	1.77	31.60	0.78	8	0.50	0.25	198	1.00	5	0.70	59	18
MW2071	3	1708	3	3	0.203	1.76	26.30	0.84	5	0.50	0.56	158	1.00	5	0.71	58	15
MW2072	3	1789	3	3	0.028	1.91	30.20	0.99	8	0.50	0.25	169	1.00	8	0.72	64	18
MW2073	3	2016	3	3	0.048	1.63	31.60	0.95	8	0.50	0.25	176	1.00	7	0.50	72	18
MW2074	3	2247	3	3	0.031	1.82	26.60	1.20	7	0.50	0.58	161	1.00	8	0.71	86	17
MW2075	3	2588	3	3	0.034	2.19	24.80	1.70	81	1.06	0.77	147	1.00	9	0.99	85	18
MW2076	3	2543	3	3	0.051	2.07	24.70	1.37	5	0.50	0.25	139	1.00	10	0.86	81	15
MW2077	3	2311	3	3	0.032	0.74	27.60	1.11	31	0.50	0.25	151	1.00	9	0.69	77	13
MW2078	3	2426	3	3	0.031	1.10	24.80	1.18	3	0.50	0.25	135	1.00	10	0.89	70	13
MW2079	3	2202	3	3	0.028	1.17	23.70	0.89	4	0.50	0.25	143	1.00	10	0.69	68	14

KND 134

EASTING = 21150.0   INCLINATION = 50.0
NORTHING = 17500.0   AZIMUTH = 270.0
RL = 400.0

Sample Number	EASTING m	NORTHING m	RL m	UDep m	LDep m	GEO	REG	SiO_2 %	Al_2O_3 %	Fe.n %	TiO_2 %	CaO %	MgO %	Na_2O %	K_2O %
MW2080	21085.1	17500.0	322.6	100.00	101.00	As	R	42.09	7.13	6.47	0.30	6.23	20.41	1.29	0.01
MW2081	21083.2	17500.0	320.3	103.00	104.00	As	R	40.29	6.34	6.76	0.28	6.21	20.30	1.09	0.02
MW2082	21081.9	17500.0	318.8	105.00	106.00	As	R	41.16	7.70	6.82	0.35	5.64	20.14	0.98	0.01
MW2083	21081.2	17500.0	318.0	106.20	107.00	Af	R	65.39	14.39	2.35	0.43	2.02	3.27	7.10	0.35
MW2084	21080.6	17500.0	317.3	107.00	108.00	Af	R	67.30	14.65	2.23	0.44	1.51	2.98	6.72	0.57
MW2085	21077.4	17500.0	313.4	112.00	113.00	As	R	40.59	6.30	6.11	0.28	8.74	15.87	0.02	0.01
MW2086	21072.9	17500.0	308.1	119.00	120.00	As	R	43.02	7.61	6.70	0.31	4.67	21.47	0.88	0.02
MW2087	21069.7	17500.0	304.2	124.00	125.00	As	R	43.67	7.86	6.70	0.33	5.91	20.22	0.08	0.01
MW2088	21069.0	17500.0	303.5	125.20	126.00	Af	R	61.66	14.20	3.50	0.61	3.46	4.37	7.07	0.07
MW2089	21067.7	17500.0	301.9	127.00	128.00	Af	R	67.39	14.62	2.43	0.46	3.26	2.55	6.62	0.50
MW2090	21066.4	17500.0	300.4	129.00	130.00	Af	R	68.70	14.77	2.31	0.47	2.11	3.08	7.44	0.08
MW2091	21063.9	17500.0	297.4	133.00	134.00	Af	R	60.06	12.72	3.20	0.50	6.32	4.14	6.52	0.04
MW2092	21062.6	17500.0	295.8	135.00	136.00	As	R	46.49	8.26	6.99	0.25	5.06	18.98	0.45	0.03
MW2093	21060.0	17500.0	292.8	139.00	140.00	As	R	50.07	8.55	7.10	0.28	4.47	18.57	0.90	0.09
MW2094	21052.9	17500.0	284.3	150.00	151.00	As	R	39.14	7.12	6.27	0.25	9.11	13.05	0.55	0.22
MW2095	21047.2	17500.0	277.4	159.00	160.00	Asf	R	44.64	7.50	6.93	0.27	3.88	18.33	0.67	0.17
MW2096	21043.3	17500.0	272.8	165.00	166.00	As	R	45.32	7.53	6.76	0.28	4.58	18.90	0.72	0.04
MW2097	21040.2	17500.0	269.1	170.00	170.90	As	R	42.70	8.19	6.91	0.33	7.80	17.06	1.10	0.01
MW2098	21039.4	17500.0	268.2	170.90	172.00	Af	R	68.44	14.88	2.37	0.51	1.61	2.33	6.69	0.72
MW2099	21038.2	17500.0	266.7	173.00	174.00	Af	R	65.71	14.67	2.32	0.52	2.84	1.92	4.21	3.10
MW2100	21036.9	17500.0	265.2	175.10	176.00	As	R	39.99	7.33	6.19	0.32	8.67	15.87	0.21	0.01
MW2101	21035.6	17500.0	263.6	177.00	178.00	Af	R	52.76	12.95	3.51	0.57	4.49	3.93	5.41	1.27
MW2102	21034.9	17500.0	262.9	178.00	179.00	Af	R	50.42	13.39	3.46	0.56	4.94	3.10	6.51	0.16
MW2103	21034.6	17500.0	262.5	179.00	179.50	Af	R	51.43	14.22	3.40	0.57	2.95	3.27	6.81	0.03
MW2104	21034.3	17500.0	262.1	179.50	180.00	As	R	38.86	6.93	6.36	0.30	5.71	9.82	0.03	0.00
MW2105	21033.7	17500.0	261.3	180.00	181.00	As	R	40.70	7.37	6.30	0.29	4.96	9.85	0.72	0.98
MW2106	21031.1	17500.0	258.3	184.00	185.00	As	R	36.27	7.63	6.65	0.32	4.20	9.88	0.99	0.01
MW2107	21028.5	17500.0	255.2	188.00	189.00	Af	R	57.25	13.30	3.59	0.56	3.89	3.35	4.80	1.68
MW2108	21026.6	17500.0	252.9	191.00	192.00	As	R	40.64	6.70	6.15	0.28	5.26	12.46	0.13	1.28
MW2109	21024.0	17500.0	249.9	195.00	196.00	Asf	R	39.24	11.77	6.15	0.56	9.90	3.86	0.17	3.37
MW2110	21020.8	17500.0	246.0	200.00	201.00	Asf	R	42.48	12.40	5.85	0.58	8.87	3.42	0.53	2.75
MW2111	21017.6	17500.0	242.2	205.00	206.00	Asf	R	39.83	12.46	6.06	0.56	11.24	3.14	0.88	2.44

KND 134

Sample Number	As.n ppm	Au.n ppb	Ba.x ppm	Br.n ppm	Ce.n ppm	Co.n ppm	Cr.n ppm	Cs.n ppm	Cu.x ppm	Eu.n ppm	Ga.x ppm	Ge.x ppm	Hf.n ppm	La.n ppm	Lu.n ppm	Mn.x ppm
MW2080	3.14	2.5	11	1.00	1.00	81	2120	0.50	37	0.25	8	3	0.50	0.98	0.10	1226
MW2081	3.93	2.5	7	1.00	1.00	83	2190	1.16	44	0.25	8	3	0.50	1.18	0.10	1385
MW2082	1.00	2.5	3	1.00	2.24	87	2390	0.50	41	0.25	10	3	0.50	1.14	0.10	1296
MW2083	1.00	8.3	166	1.00	60.60	13	120	0.50	13	1.17	21	3	3.27	28.60	0.10	363
MW2084	2.44	2.5	207	1.00	57.00	8	116	0.50	9	0.89	20	3	3.53	28.20	0.10	250
MW2085	1.00	2.5	31	1.00	1.00	78	2010	0.50	27	0.25	9	3	0.50	0.95	0.10	1378
MW2086	2.02	6.1	23	1.00	1.00	91	2330	0.50	39	0.25	9	3	0.50	1.07	0.10	1182
MW2087	2.75	2.5	13	1.00	1.00	87	2410	0.50	27	0.25	9	3	0.50	1.17	0.10	1180
MW2088	2.49	2.5	1024	1.00	64.90	20	190	1.52	48	1.63	19	3	4.11	33.40	0.22	639
MW2089	1.00	2.5	774	1.00	64.20	14	102	0.50	17	1.29	19	3	3.45	30.00	0.10	402
MW2090	1.00	2.5	1082	1.00	56.70	14	111	1.75	21	1.37	21	3	3.62	30.80	0.10	404
MW2091	5.81	2.5	833	1.00	60.50	17	157	0.50	28	1.90	17	3	3.82	28.10	0.21	999
MW2092	1.00	2.5	7	1.00	2.96	91	2410	2.75	33	0.25	9	3	0.50	1.23	0.10	1112
MW2093	1.00	2.5	15	1.00	1.00	93	2570	4.04	32	0.25	10	3	0.50	1.16	0.10	1101
MW2094	2.23	2.5	16	1.00	1.00	80	2130	8.36	35	0.25	9	3	0.50	1.58	0.10	1474
MW2095	2.61	2.5	17	1.00	1.00	94	2510	5.83	20	0.25	9	3	0.50	0.84	0.10	1071
MW2096	1.00	2.5	18	1.00	1.00	91	2480	2.24	29	0.25	9	3	0.50	1.09	0.10	1099
MW2097	3.62	2.5	10	1.00	1.00	91	2470	1.21	33	0.25	10	3	0.50	1.58	0.10	1282
MW2098	3.40	2.5	564	1.00	78.30	14	80	0.50	22	0.83	21	3	4.32	38.90	0.10	318
MW2099	4.64	2.5	880	1.00	76.30	12	46	3.95	17	1.17	21	3	3.85	38.70	0.10	387
MW2100	2.07	2.5	37	1.00	7.28	74	1890	0.50	32	0.25	9	3	0.50	4.25	0.10	1249
MW2101	2.56	2.5	979	1.00	67.90	21	193	1.84	33	1.81	18	3	3.62	32.70	0.27	699
MW2102	2.40	2.5	915	1.00	62.00	20	183	0.50	19	1.44	17	3	3.72	31.80	0.25	784
MW2103	1.00	2.5	568	1.00	59.90	21	200	0.50	23	1.64	18	3	3.90	32.40	0.28	628
MW2104	1.00	2.5	18	1.00	1.00	90	2490	1.06	21	0.25	9	3	0.50	0.95	0.10	1191
MW2105	1.00	2.5	132	1.00	1.00	87	2350	0.50	30	0.25	6	3	0.50	0.94	0.10	1106
MW2106	2.37	2.5	13	2.84	2.29	92	2410	0.50	32	0.25	10	3	0.50	1.03	0.10	1423
MW2107	1.00	2.5	1468	1.00	68.90	23	197	3.37	18	1.52	17	3	4.18	32.30	0.28	691
MW2108	1.00	2.5	191	1.00	1.00	78	2060	2.31	48	0.25	7	3	0.50	0.83	0.10	927
MW2109	5.07	8.1	186	1.00	7.56	54	520	4.87	56	0.69	12	3	1.20	3.37	0.28	1646
MW2110	2.58	2.5	162	1.00	8.70	54	534	4.96	54	0.67	13	3	1.41	3.92	0.29	1404
MW2111	1.00	2.5	243	1.00	9.59	54	526	4.43	40	0.76	13	3	1.28	3.73	0.28	1781

KND 134

Sample Number	Nb.x ppm	Ni.x ppm	Pb.x ppm	Rb.x ppm	S.x %	Sb.n ppm	Sc.n ppm	Sm.n ppm	Sr.x ppm	Ta.n ppm	Th.n ppm	V.x ppm	W.n ppm	Y.x ppm	Yb.n ppm	Zn.x ppm	Zr.x ppm
MW2080	3	898	3	3	0.019	1.07	25.20	0.90	617	0.50	0.25	161	1.00	7	0.78	106	16
MW2081	3	1011	3	3	0.118	1.24	24.50	0.94	911	0.50	0.25	139	1.00	9	0.82	187	19
MW2082	3	909	3	3	0.044	0.91	28.10	0.96	89	0.50	0.25	168	1.00	9	0.93	182	18
MW2083	3	62	13	10	0.039	3.15	7.76	5.68	512	1.49	5.03	66	7.23	10	0.58	69	145
MW2084	3	68	12	16	0.006	4.08	7.65	5.52	413	3.69	4.95	63	9.70	10	0.66	82	144
MW2085	3	825	3	3	0.011	0.93	23.60	0.81	634	0.50	0.25	142	1.00	6	0.81	95	16
MW2086	3	1052	3	3	0.029	1.08	26.00	0.84	912	0.50	0.25	175	1.00	7	0.83	84	19
MW2087	3	998	3	3	0.041	1.13	26.30	0.86	916	0.50	0.25	166	1.00	9	0.89	98	19
MW2088	5	64	3	3	0.043	1.92	13.10	6.89	17	0.50	6.45	104	1.00	17	1.41	75	160
MW2089	3	42	6	14	0.037	2.34	8.29	6.22	718	1.29	5.35	69	4.26	12	0.79	54	147
MW2090	5	49	3	3	0.034	2.61	8.19	5.70	14	0.50	5.64	63	6.56	11	0.80	62	150
MW2091	5	50	10	3	0.129	2.31	12.70	6.77	718	0.50	5.39	89	1.00	16	1.09	61	137
MW2092	3	1020	3	3	0.003	1.00	28.00	0.93	913	0.50	0.25	168	1.00	8	0.88	222	19
MW2093	3	1144	3	6	0.005	0.94	28.00	0.71	811	0.50	0.25	174	1.00	9	1.07	86	18
MW2094	3	984	3	15	0.017	0.70	24.30	1.02	622	0.50	0.25	158	1.00	9	0.90	175	16
MW2095	3	1095	3	12	0.009	1.08	26.90	0.83	210	0.50	0.25	176	1.00	8	0.86	104	22
MW2096	3	1105	3	3	0.015	1.07	26.80	0.79	112	0.50	0.25	164	1.00	9	0.88	103	21
MW2097	3	1014	6	3	0.026	1.21	28.00	0.94	225	0.50	0.25	172	1.00	8	0.94	83	22
MW2098	3	39	7	23	0.185	2.28	6.81	6.37	78	0.50	6.94	62	7.17	7	0.25	75	167
MW2099	3	23	9	89	0.171	1.96	6.47	6.16	313	1.11	7.16	66	6.70	9	0.25	67	163
MW2100	3	655	3	3	0.007	0.97	24.40	1.36	56	0.50	1.07	148	1.00	7	0.86	125	30
MW2101	5	59	5	43	0.030	2.65	13.50	7.33	428	1.26	6.28	99	1.00	16	1.38	73	154
MW2102	5	62	7	5	0.045	2.64	13.10	6.64	231	0.50	6.11	95	1.00	16	1.21	72	152
MW2103	6	80	5	3	0.019	2.82	12.30	6.54	522	1.79	6.08	95	1.00	16	1.34	65	165
MW2104	3	1113	3	3	0.009	1.71	24.60	0.79	833	0.50	0.25	152	1.00	6	0.72	80	18
MW2105	3	1129	3	3	0.042	1.82	23.60	0.81	633	0.50	0.25	149	1.00	7	0.75	79	16
MW2106	3	1187	3	3	0.028	2.03	25.80	0.87	723	0.50	0.25	154	1.00	8	0.83	343	17
MW2107	5	64	5	60	0.048	7.16	13.50	7.18	126	0.50	6.08	97	13.20	16	1.29	64	151
MW2108	3	749	3	44	0.011	2.78	24.90	0.76	421	0.50	0.25	141	1.00	6	0.74	89	14
MW2109	3	152	3	101	0.067	4.93	29.40	2.07	714	0.50	0.25	189	10.40	14	1.56	72	47
MW2110	3	171	6	88	0.044	5.81	33.10	2.15	117	0.50	0.89	199	1.00	15	1.55	77	51
MW2111	3	148	5	81	0.017	6.76	31.20	2.10	32	0.50	0.79	192	1.00	14	1.66	76	50

KND 133

EASTING = 21230.0 INCLINATION = 60.0000
NORTHING = 16900.0 AZIMUTH = 270.000
RL = 400.0

Sample Number	EASTING m	NORTHING m	RL m	UDep m	LDep m	GEO	REG	SiO_2 %	Al_2O_3 %	Fe.n %	TiO_2 %	CaO %	MgO %	Na_2O %	K_2O %
MW2112	21190.4	16900.0	331.5	78.10	79.10	Asf	R	30.48	4.77	5.74	0.22	7.10	15.71	1.04	0.02
MW2113	21185.4	16900.0	322.8	88.20	89.20	Af	R	43.01	14.38	3.40	0.56	3.32	2.91	7.10	0.05
MW2114	21175.5	16900.0	305.6	108.00	109.00	As	R	43.67	6.41	7.26	0.28	2.69	25.43	0.06	0.02
MW2115	21168.5	16900.0	293.5	122.00	123.00	As	R	21.36	5.50	6.43	0.24	6.02	20.44	0.05	0.09
MW2116	21165.0	16900.0	287.4	129.00	130.00	As	R	40.50	6.15	6.80	0.28	4.59	20.17	0.05	0.53
MW2117	21162.1	16900.0	282.4	134.80	135.80	Af	R	43.99	14.11	2.34	0.42	2.76	1.86	6.51	0.96
MW2118	21154.0	16900.0	268.4	151.00	152.00	Af	R	66.14	15.41	2.41	0.52	2.66	0.97	4.60	2.51
MW2119	21137.5	16900.0	239.8	184.00	185.00	Asf	R	40.46	6.23	6.46	0.27	5.50	21.31	0.16	0.65
MW2120	21131.5	16900.0	229.4	196.00	197.00	Asf	R	30.31	5.99	6.43	0.22	5.34	21.65	0.05	0.46
MW2121	21124.0	16900.0	216.4	211.00	212.00	Asf	R	30.61	5.57	6.27	0.24	5.66	21.73	0.57	0.20
MW2122	21115.0	16900.0	200.8	229.00	230.00	Af	R	58.14	14.70	4.10	0.64	3.06	3.41	7.08	0.03

	As.n ppm	Au.n ppb	Ba.x ppm	Br.n ppm	Ce.n ppm	Co.n ppm	Cr.n ppm	Cs.n ppm	Cu.x ppm	Eu.n ppm	Ga.x ppm	Ge.x ppm	Hf.n ppm	La.n ppm	Lu.n ppm	Mn.x ppm
MW2112	1.00	2.5	234	1.00	1.00	81	1870	0.50	32	0.25	5	3	0.50	0.25	0.10	1170
MW2113	1.00	2.5	1186	1.00	69.70	19	177	0.50	31	1.48	20	3	3.93	32.80	0.26	670
MW2114	1.00	2.5	17	1.00	1.00	108	2490	1.32	34	0.25	8	3	0.50	0.25	0.10	962
MW2115	2.32	2.5	23	1.00	1.00	98	2240	3.08	30	0.25	7	3	0.50	0.25	0.10	1314
MW2116	1.00	2.5	18	1.00	1.00	96	2370	14.40	41	0.25	7	3	0.50	0.25	0.10	1170
MW2117	4.42	17.6	559	1.00	60.40	14	120	1.07	22	1.15	21	3	3.44	29.00	0.10	379
MW2118	1.00	2.5	882	1.00	76.70	10	44	3.27	7	1.18	21	3	3.89	38.90	0.10	360
MW2119	1.00	2.5	17	1.00	1.00	96	2390	19.40	33	0.25	7	3	0.50	0.25	0.10	954
MW2120	3.19	2.5	19	1.00	1.00	86	2220	14.70	15	0.25	7	3	0.50	0.25	0.10	1553
MW2121	1.00	2.5	12	1.00	1.00	92	2150	7.71	24	0.25	6	3	0.50	0.25	0.10	1498
MW2122	2.73	2.5	26	1.00	37.40	27	167	0.50	36	0.96	21	3	2.88	17.60	0.10	677

Sample	Nb.x ppm	Ni.x ppm	Pb.x ppm	Rb.x ppm	S.x %	Sb.n ppm	Sc.n ppm	Sm.n ppm	Sr.x ppm	Ta.n ppm	Th.n ppm	V.x ppm	W.n ppm	Y.x ppm	Yb.n ppm	Zn.x ppm	Zr.x ppm
MW2112	3	1113	3	3	0.035	0.78	18.20	0.65	914	0.50	0.25	110	1.00	6	0.52	72	9
MW2113	5	60	5	3	0.051	2.29	12.80	7.25	216	0.50	6.18	94	1.00	15	1.26	79	162
MW2114	3	1455	3	3	0.021	0.74	24.40	0.68	11	0.50	0.25	149	1.00	6	0.67	85	10
MW2115	3	1445	3	6	0.022	0.76	21.60	0.57	913	0.50	0.25	128	1.00	6	0.50	100	9
MW2116	3	1271	3	39	0.020	0.88	23.50	0.67	911	0.50	0.25	147	1.00	6	0.63	120	9
MW2117	3	52	10	25	0.072	2.33	7.67	5.60	813	2.08	5.32	64	7.94	9	0.77	68	138
MW2118	3	25	5	67	0.033	2.24	6.55	6.16	315	0.50	6.76	60	1.00	8	0.50	77	163
MW2119	3	1245	3	43	0.007	2.11	22.80	0.55	111	0.50	0.25	147	1.00	3	0.57	110	11
MW2120	3	1151	3	30	0.014	1.76	22.30	0.72	915	0.50	0.25	128	1.00	3	0.63	149	9
MW2121	3	1318	3	13	0.012	0.75	20.80	0.63	11	0.50	0.25	128	1.00	5	0.25	111	10
MW2122	5	97	3	3	0.483	1.19	15.80	4.48	724	0.50	2.90	121	1.00	12	1.06	91	107