第3章　ボーリング孔の地質及び鉱化作用

3－1　AG－04孔

(1) 目的：第二年次に実施したＡＧ－０１及びＡＧ　０３の南～南西部における鉱化帯の広がりと地質構造解明のため実施された。

(2) 位置：ＩＰ測線Ｇ－H Line の中間で，測点№８付近

緯　距　　7,250 96 N

経　距　　70140 E

標　高　　460 m

(3) 岩質：３８０mで着岩，６５００m付近まで石墨質雲母片岩を主体として，角閃岩～角閃片岩の薄層を挟在する。石墨質雲母片岩中には片理面又はフラクチャーに沿って黄鉄鉱がフィルム状に発達する。

６５００m～１８７３５m間は雲母片岩をもとし，角閃岩～角閃片岩の薄層又は厚層を挟在する。特に１６５００m～１８４６５m間の角閃岩～角閃片岩は"Perau Horizon"の上盤に広く且つ厚く発達するものである。

１８７３５m～２２０００m間は"Perau Horizon"が発達し炭酸塩岩片岩，鉱化帯，石墨片岩－千枚岩及び石灰岩（及び苦灰岩）－炭酸塩岩互層などから成る。

９１５０m～１１４００m付近に磁鉄鉱結晶が散点するがいわゆる"Magnetite zone"は１８７３５m～１９０３０m間に発達する。

鉱化帯は１９６９５m～１９７１５m（０２０m）間で重晶石－硫化物帯を捕捉したが鉛・亜鉛の鉱化作用は極めて弱い。１９９８０m～１９９９０m（０１０m）及び２００６５m～２００７５m（０１０m）間で方鉛鉱の鉱染部が珪質片岩（チャート質）及び炭酸塩岩片岩互層中に挟在する。鏡下では方鉛鉱黄鉄鉱のみで閃亜鉛鉱は認められない。これらの鉱化作用の規模はＡＧ－０３よりも更に劣化して鉱床末端部の様相を示している。

鉱床下盤のKey bedとなる石墨片岩－千枚岩層は２０５５５m～２１２５５m（６００m）間で捕捉され，２１２５５m以下で石灰岩－炭酸塩岩互層を確認したので２２０００mで掘進を終了した。

(4) 鉱化作用及び品位：鉱石部の分析値はTable A－4に示すとおりであるが，主な鉱化部の品位は下記のとおりである。

深　度（m）	長　さ	サンプル数	Pb %	Zn %	Cu ppm	Ag ppm
19695～19715	020m	1	160	046	330	26
19980～19990	010	1	800	003	18	200
20065～20075	010	1	450	1.60	30	100

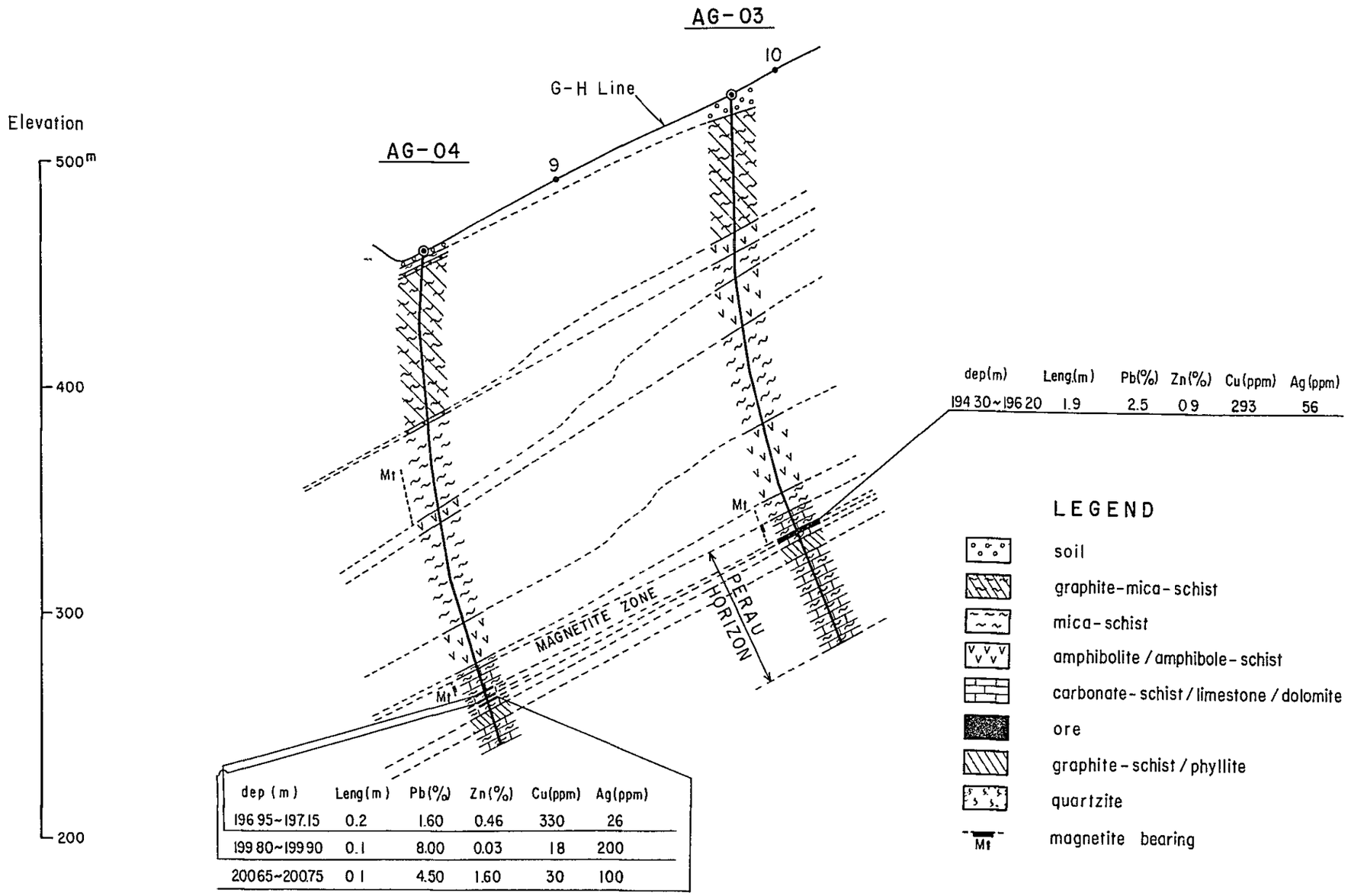


Fig. Ⅲ-3-1 Geological Profile for AG-04 and AG-03

１９６９５ｍ～１９７１５ｍ間の鉱化部は重晶石－硫化物の鉱化帯に対比されるが，鉱化作用は極めて弱い。他の２者は方鉛鉱のみの鉱染帯である。

３－２　ＡＧ－０５孔

(1) 目的：第三年次にＡＧ－０１で捕捉した鉱化帯の西側への連続性と地質構造の解明のため実施された。

(2) 位置：ＩＰ測線Ｇ Ｌｉｎｅの測点№７

緯　距　　7,25103Ｎ

経　距　　70118Ｅ

標　高　　４９０ｍ

(3) 岩質：０ｍ～２２４.２０ｍ間は石墨質雲母片岩を主とし，角閃岩－角閃片岩及び雲母片岩を挟在する。このうち９３３０ｍ～１４３２０ｍ間は雲母片岩が優勢となり，石墨片岩は少ない。石墨質雲母片岩中では片理面やフラクチャーに沿って黄鉄鉱がフィルム状に発達する。

２２４２０ｍ～３４１５５ｍ間は雲母片岩を主とし，角閃石－角閃片岩を挟在する。石墨質雲母片岩は認められない。

３０５００ｍ～３３５５０ｍ間は“Perau Horizon”の上盤に発達する厚い角閃岩～角閃片岩層である。又，この中で，３１９３０ｍ～３２８６０ｍ間は角閃岩層かつ熱水変質作用を蒙り，珪化帯及び粘土化帯を形成しており，この変質帯の通過が極めて困難であった。

３４１５５ｍ～３６１６０ｍ間は“Perau Horizon”の炭酸塩岩片岩，石墨片岩層から成る。３４３００ｍ～３５１５０ｍ間には磁鉄鉱の濃集した“Magnetite zone”が発達する。　３５４６５ｍ～３５８３５ｍ間で重晶石－硫化物帯の鉛・亜鉛鉱化帯を捕捉した。３５９５０ｍ～３６１６０ｍ間で鉱床下盤の石墨片岩層を確認して３６１６０ｍで掘進を終了した。

(4) 鉱化作用及び品位：鉱化帯及び周辺部の分析値はTable Ａ－４に示すとおりである。

重晶石－硫化鉱物帯の鉱石部（良好部）は３５４６５ｍ～３５５６５ｍ（1.0ｍ）間及び３５７.８５ｍ～３５８３５ｍ（０５ｍ）間で，方鉛鉱・閃亜鉛鉱及び黄鉄鉱が重晶石～炭酸塩岩片岩中に鉱染している。３５７６５ｍ～３５７.８５ｍ間は弱鉱化帯で小褶曲構造の著しい重晶石－炭酸塩岩片岩中に主として黄鉄鉱が鉱染し，少量の方鉛鉱，閃亜鉛鉱を伴う。

主な分析値は下記のとおりである。

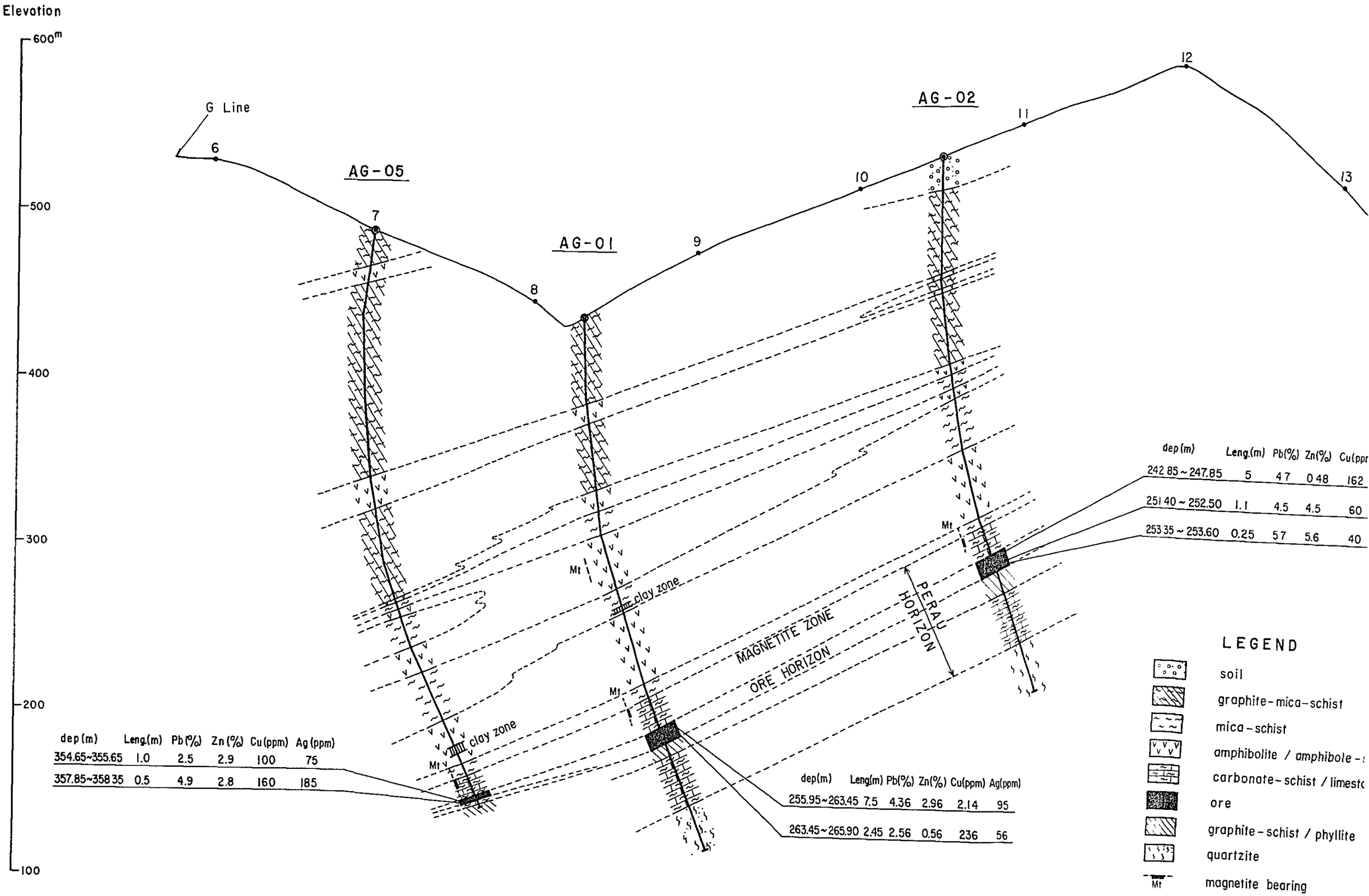


Fig. Ⅲ-3-2 Geological Profile for AG-05, AG-01 and AG-02

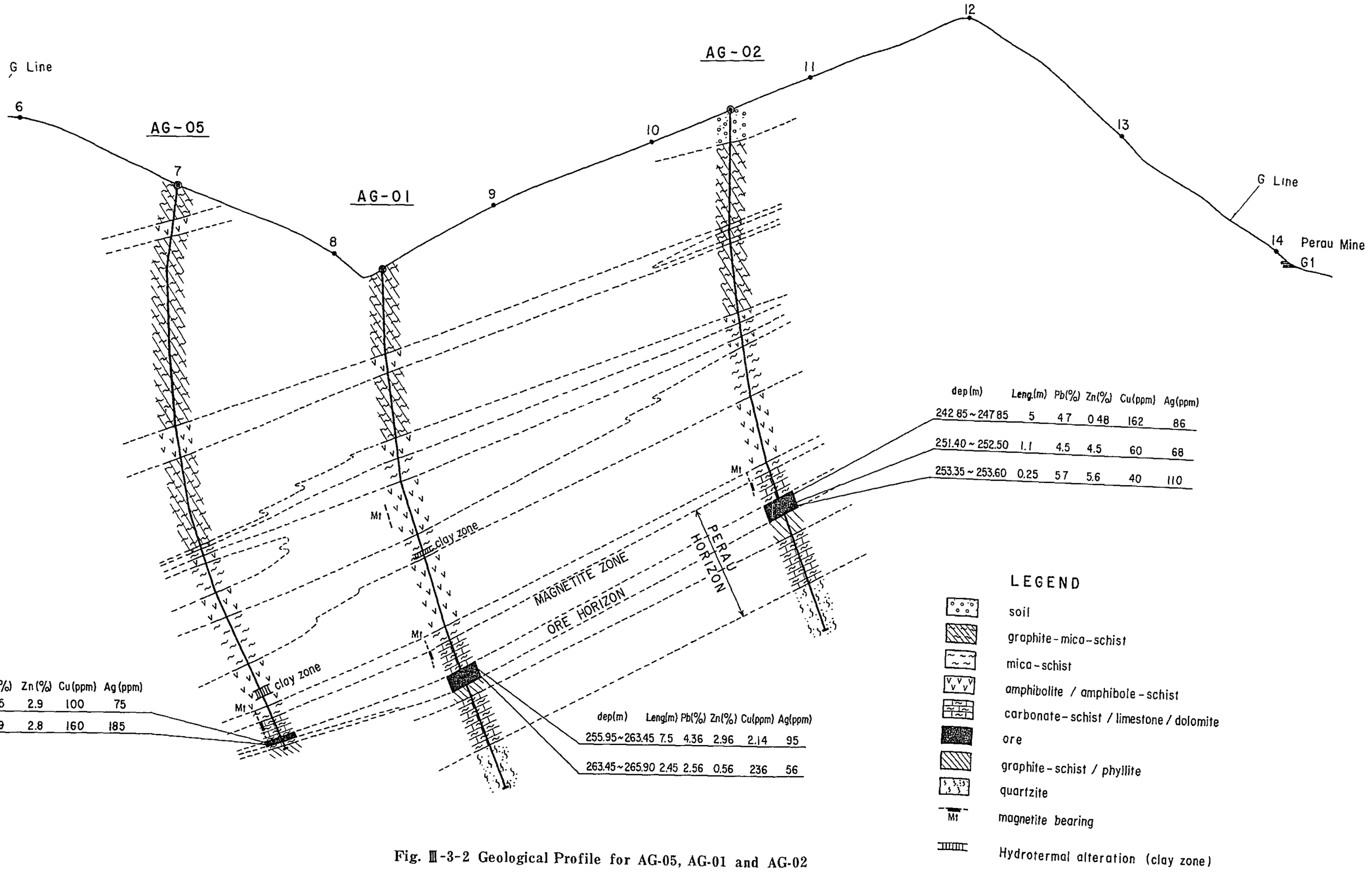


Fig. Ⅲ-3-2 Geological Profile for AG-05, AG-01 and AG-02

深　度（m）	長 さ(m)	サンプル数	Pb %	Zn %	Cu ppm	Ag ppm
35465～35565	10	1	25	29	100	75
357.85～35835	05	1	49	28	160	185

本鉱化帯はＡＧ－０１，ＡＧ－０２に比べて鉱化帯の層厚が減少し，鉱床の周辺部に近いことを示している。

3－3　AG－06孔

(1) 目的：第三年次のＡＧ－０１孔で捕捉した優勢な重晶石－硫化物層状鉱床の北部延長を確認する為に実施された。

(2) 位置：ＩＰ測線Ｆ－Ｇ Line 中間の測点№８付近

緯　距　　7,25138 N

経　距　　70118 E

標　高　　440 m

(3) 岩質：４００mで着盤，４００m～１７４３０m間は石墨質雲母片岩をもとし，角閃岩～角閃片岩及び雲母片岩を挟在する。５０１０m～７６００m，１０８００m～１２８２０m及び１７５９０m～１８０１０m付近に輝緑岩岩脈が上記の各層を貫いて発達する。石墨質雲母片岩中に黄鉄鉱化作用が強い。１７４３０～３０４３０m間は雲母片岩及び角閃岩－角閃片岩が発達し，石墨質雲母片岩は認められない。２２１６５m～２９６００m間はPerau Horizon 上盤の厚い角閃岩～角閃片岩が発達する。

３０４３０m～３５０００m間は“Perau Horizon”の炭酸塩岩片岩，鉱化帯，石墨片岩－千枚岩，石灰岩－炭酸塩岩片岩層などから成る。

磁鉄鉱結晶が１８８７０m～１９６００m，２１４００m～２２１５０m付近の雲母片岩中に点在し，又，“Magnetite zone”は２９９００m～３１２５０m間で，特に３０７.５０m～３１２５０m間で優勢となる。

３２７５５m～３２９４０m間で，重晶石－硫化物帯の鉛・亜鉛鉱化帯を捕捉した。３２９４０m～３４６５０m間で鉱床下盤のKey bedの石墨片岩－千枚岩層を確認し，更にその下盤の石灰岩～炭酸塩岩片岩を確認して３５０００mで掘進を終了した。

(4) 鉱化作用及び品位：鉱化帯及び周辺部の分析値はTabla Ａ－４に示すとおりである。

重晶石－硫化物帯の鉱石部は３２７５５m～３２８０５m間で方鉛鉱，黄鉄鉱の鉱染が認められる。

３２８０５m～３２９４０m間は黄鉄鉱及び磁硫鉄鉱の鉱染が主で鉛・亜鉛の鉱

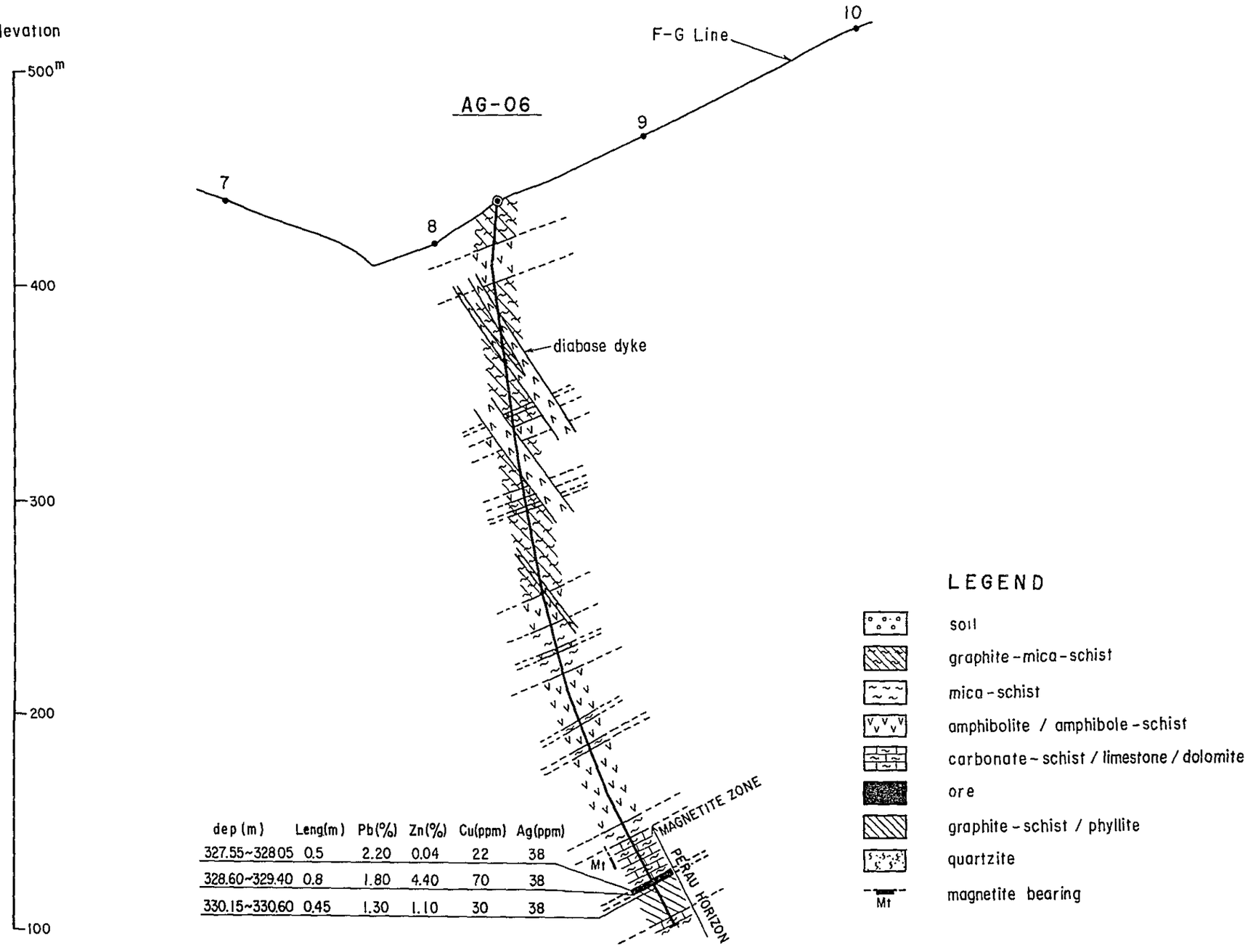


Fig. Ⅲ-3-3 Geological Profile for AG-06

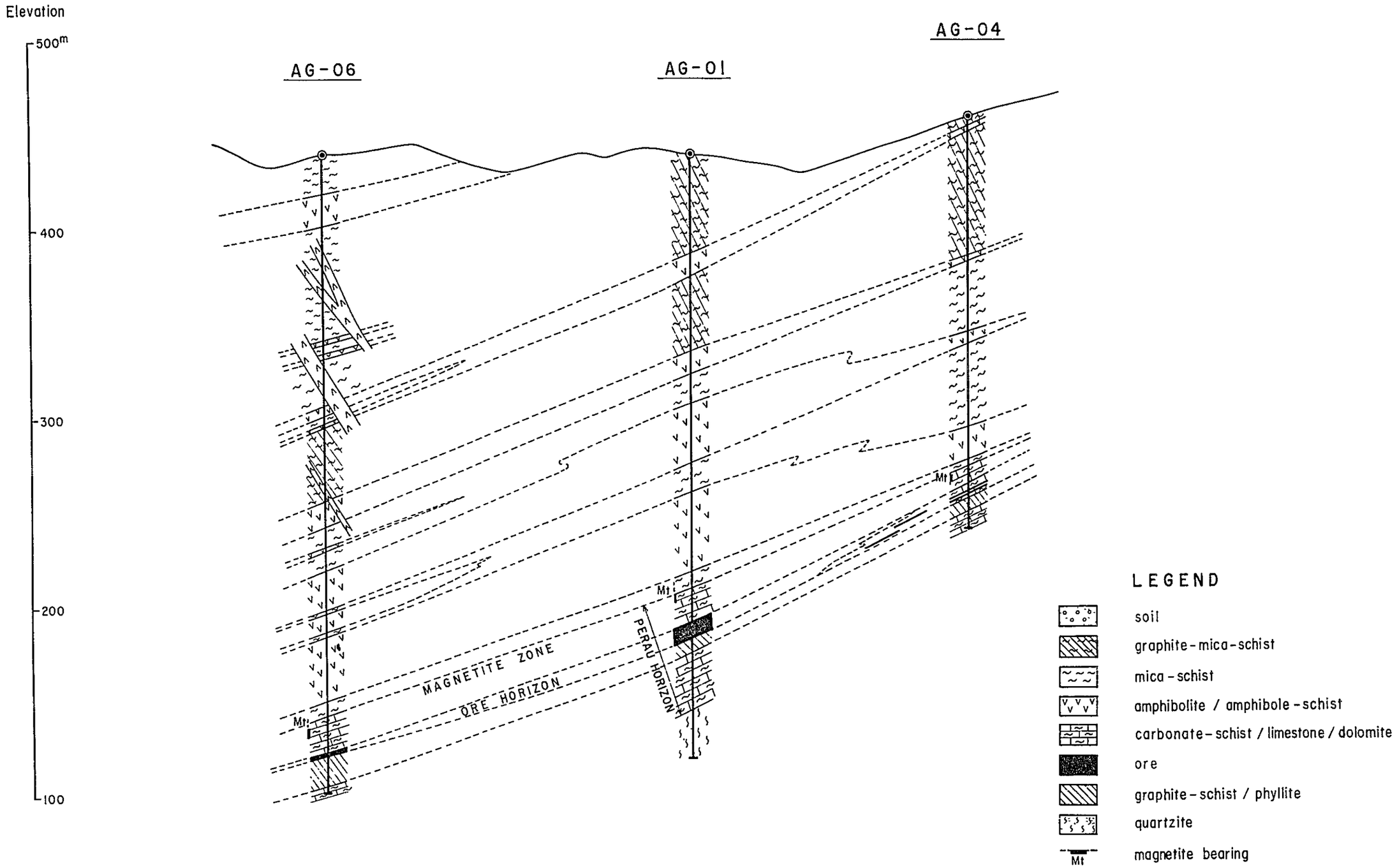


Fig. Ⅲ-3-4 Geological Profile for AG-06, AG-01 and AG-04

化作用は弱い。

主な分析値は下記のとおりである。

深　度（m）	長さ（m）	サンプル数	Pb %	Zn %	Cu ppm	Ag ppm
32755～32805	05	1	220	004	22	38
32860～32940	08	1	180	440	70	38
33015～33060	045	1	130	110	30	38

本鉱化帯は品位，層厚共にＡＧ－０１及びＡＧ－０２に比べて著しく劣化しており，重晶石－硫化鉱物層状鉱床の末端部と考えられる。

3－4　ＡＧ－Ｂ１孔

(1) 目的：第三年次に実施したＳＩＰの測線ＢＨ，測点№１１付近の異常帯の状況解明と地質構造を解明するため実施された。

(2) 位置：ＳＩＰ測線ＢＨ 測点№１１

緯　距　　7,26549Ｎ

経　距　　70260Ｅ

標　高　　630m

(3) 岩質：0m～4580m間は表土，局所的に雲母片岩の構造が認められる。403m～4490m間は黒色～暗褐色の"Coffee powder"状の土で炭酸塩岩が風化したものと考えられる。4580mで着盤，4580m～300m間は緑泥石・雲母片岩が主で，含炭質－炭酸塩岩片岩（11930m～12370m），緑泥石－角閃片岩（14400m～16200m）等を挟在する。

57m付近まで酸化帯で，フラクチャーに酸化鉄が発達し，コアーが割れ易くなる。57m～90m付近は珪化作用を受けた緑泥石雲母片岩で，石英脈と黄鉄鉱の細脈～鉱染帯が発達する。16850m～265m付近では，しばしば熱水変質を蒙った粘土脈が認められる。

27690m～28030m間は斑状～塊状黄鉄鉱を伴った石英脈が捕捉され，その前後に珪化帯を伴っている。

(4) 鉱化作用：本孔では黄鉄鉱の鉱化帯を捕捉したが，その他顕著な鉱化作用は認められない。

主な黄鉄鉱帯は次のとおり。

57m～78m付近　　…珪化帯及び石英脈中に細脈状～鉱染状に発達

147m～181m付近　…弱い鉱染状に分布

206m～290m付近　…細脈状，鉱染状又は斑状に発達，特に22670m

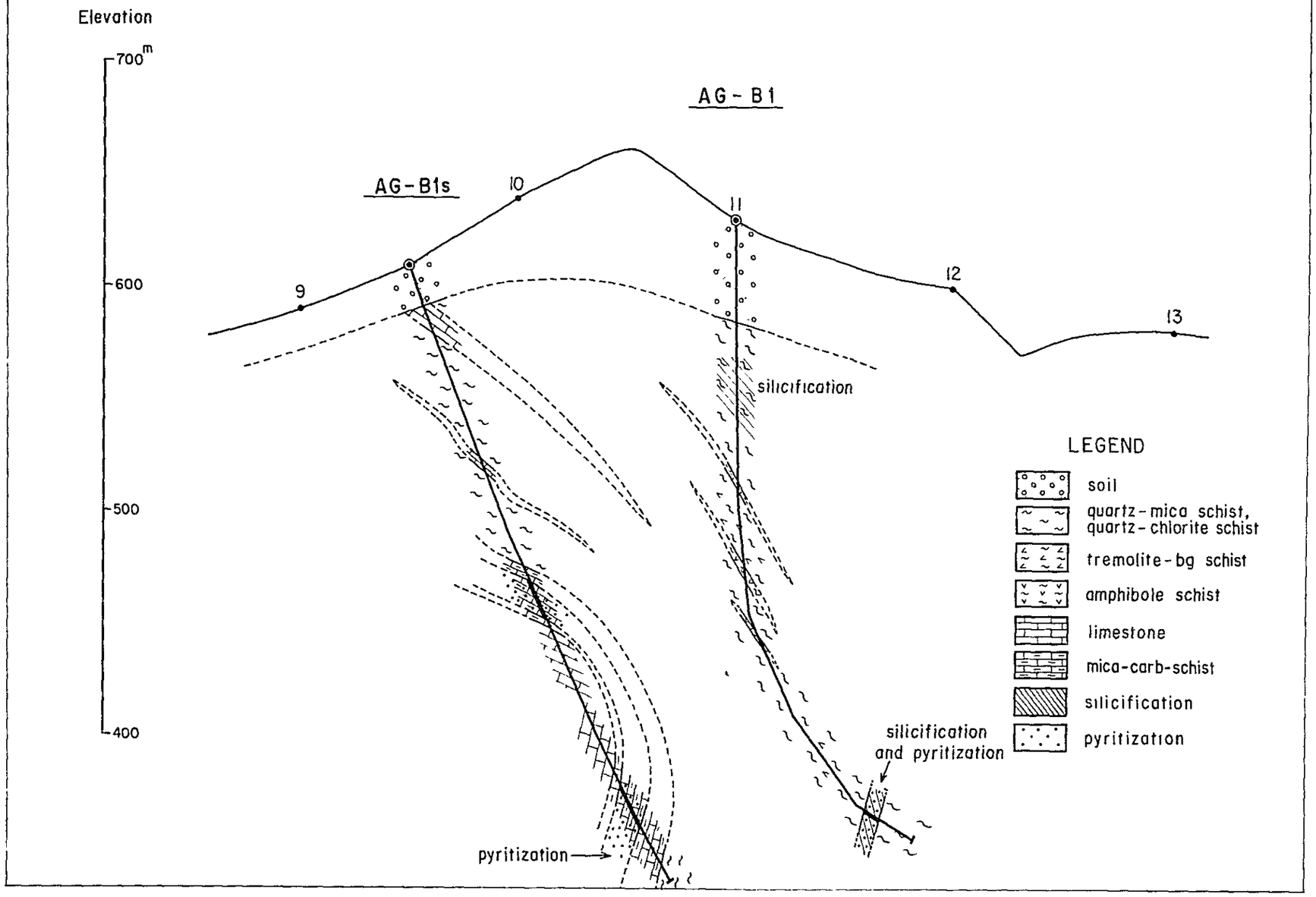


Fig. Ⅲ-3-5 Geological Profile for AG-B1

～２２８７ｍの珪化帯中及び２７６９０ｍ～２８０３０ｍの石英脈中で優勢となる。

３－５　ＡＧ－Ｂ２孔

(1) 目的．第三年次に実施したＩＰ調査の結果，抽捉されたＩＰ異常帯の状況解明と地質構造解明のため実施された。

(2) 位置：ＩＰ測線ＢＤ 測点№３

緯　距　　7,26671Ｎ

経　距　　70283Ｅ

標　高　　５１０ｍ

(3) 岩質：１１７０ｍで着盤，１１７０ｍ～１１３２０ｍ間は雲母片岩を主とし，石英質片岩，石墨質雲母片岩等を挟在する，７０ｍ付近から石墨質物質を含有する。

１１３２０ｍ～３００ｍ間は石墨質雲母片岩をもとし，石英質片岩層（13205ｍ～１９０２０ｍ）を挟在する。石墨の見掛けの含有量は下部に向って多くなる傾向を示す。石墨質片岩層中では黄鉄鉱が鉱染状又は層理面及びフラクチャーに沿ってフィルム状に発達する。

上記の各層を貫いて輝緑岩岩脈が捕捉されている。

(4) 鉱化作用：３０ｍ付近より孔底まで黄鉄鉱の細脈，鉱染及びフィルムが認められる。特に石墨質雲母片岩中で優勢となる。その他の顕著な鉱化作用は認められない。

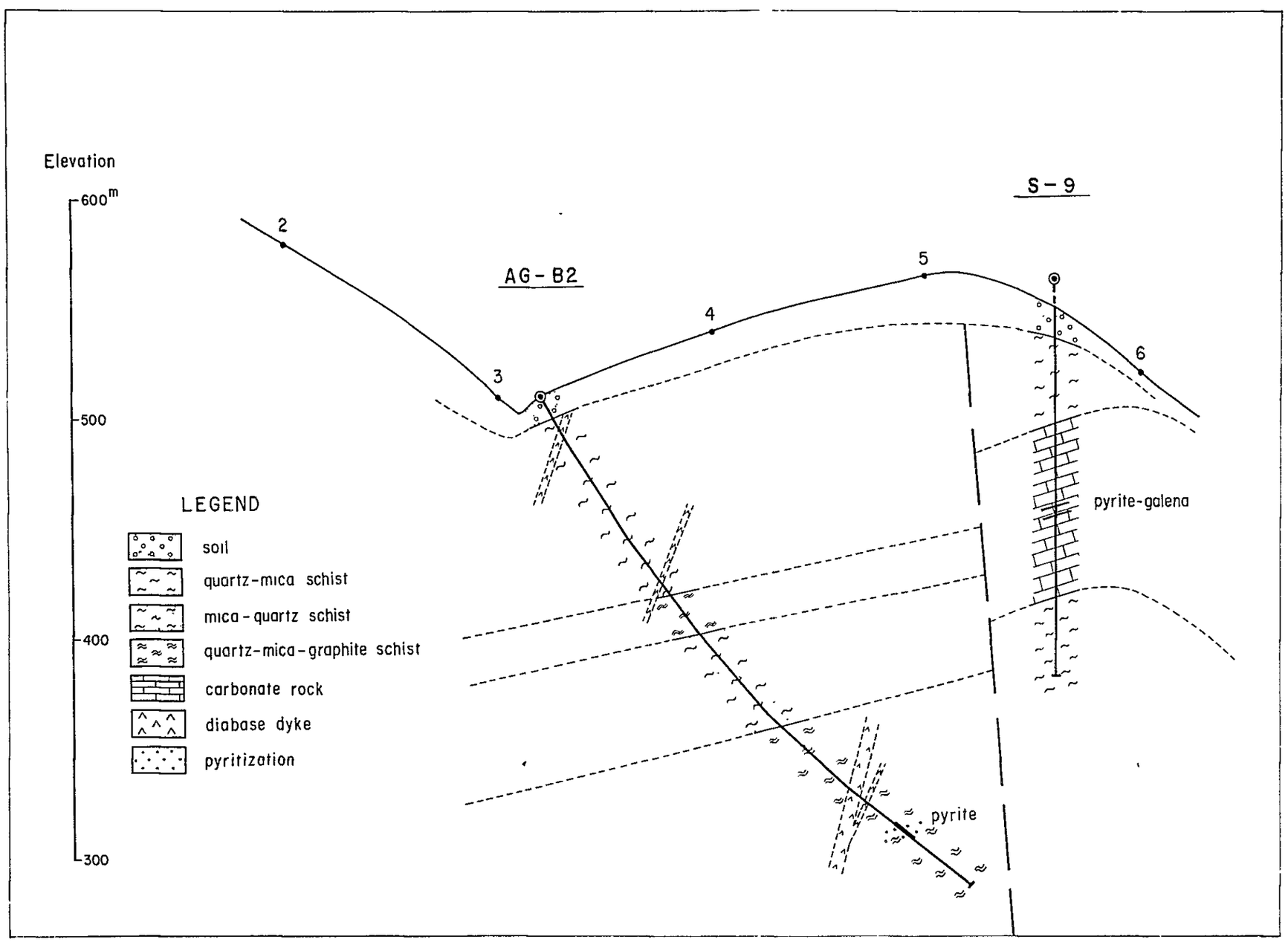


Fig. Ⅲ-3-6 Geological Profile for AG-B2

第4章　ボーリング調査結果の考察

4－1　Perau 地区

第四年次に実施された3本のボーリング（ＡＧ－０４，０５，０６孔）の結果から次のようなことが判明した。

1）地質層序について

既有のデータと今回得られたデータにより，地質層序の詳細な対比が可能となった。

本地区の主要地質は Açungui I 層下部の雲母片岩，角閃岩～角閃片岩及び鉛・亜鉛鉱床を胚胎する炭酸塩岩片岩類等から成り，下記のように細分される。

石墨質雲母片岩，角閃岩～角閃片岩

雲母片岩，角閃岩～角閃片岩

Magnetite zone
炭酸塩岩片岩－鉱化帯
石墨片岩～千枚岩
石灰岩，炭酸塩岩片岩
　　＞ "Perau Horizon"

更に上記各層を貫いて輝緑岩岩脈がＡＧ－０６孔に認められる。

2）地質構造について

本地区は Perau 背斜の北西翼部に位置し，雲母片岩や炭酸塩岩片岩中では小褶曲構造が認められるが，大局的には緩傾斜（２５～３０°）の同斜状構造を示す。

3）鉱床について

第三年次のボーリング調査に続き第四年次のボーリングで捕捉された鉱床は，重晶石を伴う硫化鉱物（方鉛鉱，閃亜鉛鉱，黄鉄鉱及び磁硫鉄鉱）の層状鉱床で，物理探査測線Ｇ－Line に沿ってＮＥ－ＳＷ方向に伸張した分布形態を示す。

ＡＧ－０３孔及びＡＧ－０４孔付近が鉱床南限，又ＡＧ－０６孔付近が鉱床西北限と考えられる。又，ＡＧ－０５孔では比較的優勢な鉱化作用が認められるが，ＡＧ－０１孔に比べ鉱化帯の規模，品位共に劣化する傾向を示す。

Pb，Zn 鉱化作用はＡＧ－０１孔で優勢で，ＡＧ－０５孔で閃亜鉛鉱の割合が多くなり，ＡＧ－０６孔では磁硫鉄鉱を多量に含有する等，水平的な変化が認められる。

これまでのボーリング結果（６本）より，期待される鉱量は１００万ｔと推定される。算出根拠は，４００m（長径）×２００m（短径）×５m（厚さ）×３（比重）×０８５（実収率）≒1,000,000ｔ である。平均品位はＰｂ４％，Ｚｎ２％，Ａｇ８５ｇ／ｔ，ＢａＯ１４％である。

4）今後の探鉱余地

ＡＧ－０２孔北部及び北東部の空白地で，Perau 鉱山までの間が探鉱すべき有望地域と

考えられる。

4－2　Barrinha 地区

第三年次に実施した物理探査（ＩＰ，ＳＩＰ法）で抽出された異常帯に実施した２本のボーリング（ＡＧ－Ｂ1，ＡＧ－Ｂ2孔）とブラジル側が追加実施したＡＧ－Ｂ１Ｓ孔の結果，複雑な地質構造と探鉱余地を解明する為に極めて有効なデーター が得られた。

1　ＡＧ－Ｂ1孔付近の地質とＳＩＰ異常帯の関連性

本孔はQuatro鉱床の南部に位置し，急傾斜の褶曲構造が発達する。

表土・風化帯が厚く，その直下に珪化帯，石英細脈帯が発達する為に見掛比抵抗値が高く表われる。

ＡＧ－Ｂ1Ｓ孔で捕捉された炭酸塩岩類中に黄鉄鉱化帯が発達し，ＩＰ効果をもたらしたと考えられる。

この黄鉄鉱化帯はQuatro鉱床と同様の地質環境にあり，この黄鉄鉱化帯中にPb鉱床が胚胎する可能性が考えられる。

2）　ＡＧ－Ｂ2孔付近の地質とＩＰ異常帯の関連性

ＡＧ－Ｂ2孔では，石灰岩層及び有望な鉱化帯を捕捉できなかったが，Barrinha鉱山側が実施したボーリングＳ－９孔のデーター を参照すると，両孔の間に断層構造が推定される。Ｓ－９孔で捕捉された苦灰岩～石灰岩層中には黄鉄鉱，方鉛鉱の鉱化帯が確認されている。ＡＧ－Ｂ2孔では石墨質雲母片岩中に黄鉄鉱がフィルム状，鉱染状に発達しており，この周辺に分布するＩＰ異常帯は，これら両者によるＩＰ効果の複合したものと考えられる。

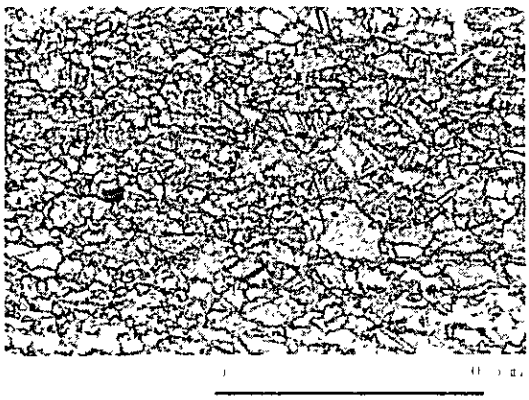
3）　今後この周辺で探鉱する場合，推定断層以南の石灰岩層の探鉱が望ましい。

APPENDICES

Photo A—1 Microphotograph of Thin Section

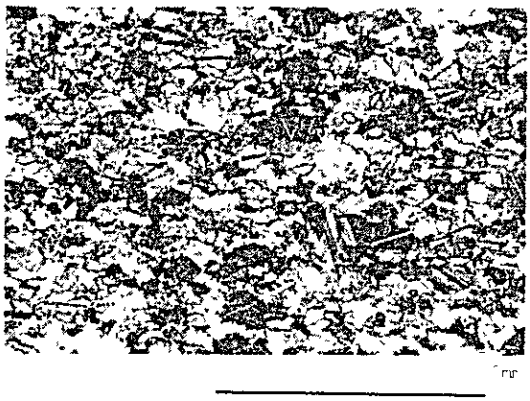
Abbreviations

q quartz
pl : plagioclase
K–F: potash felspar
bt : biotite
mus : muscovite
hb : hornblende
chl · chlorite
cpx . clinopyroxene
act : actinolite
myr : myrmekite
diop : diopside
spn · sphane
zir . zircon
ep . epidote
hem : hematite
grp : graphite
cor · cordierite
And . andalusite
chlori : chloritoide

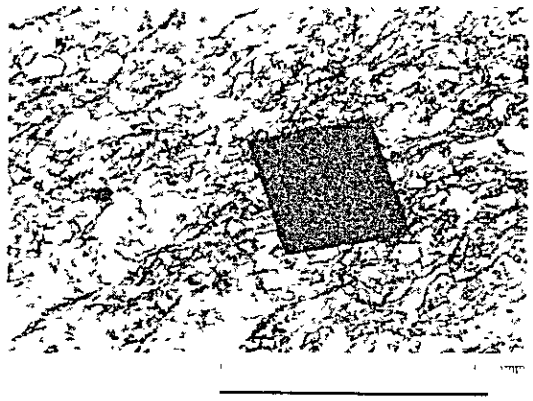


Sample No NI 06
Rock name fine cry limestone ($AIIIL_2$)
Location SPO State Highway 165
Texture lepidoblastic, granoblastic

(only lower polar)

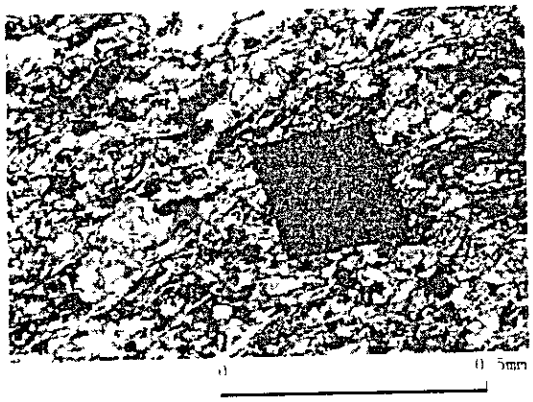


(crossed polars)

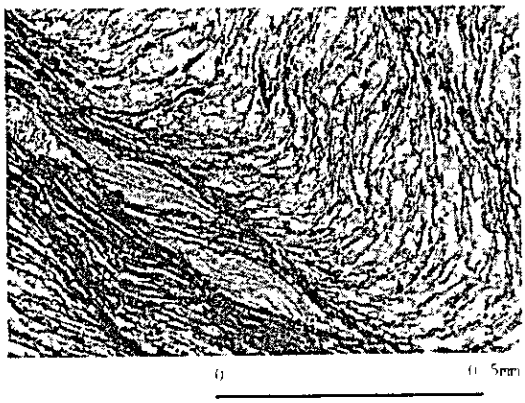


Sample No JG 14
Rock name : limy dolomite ($AIIIL_2$)
Location east area
Texture granoblastic, lepidoblastic

(only lower polar)

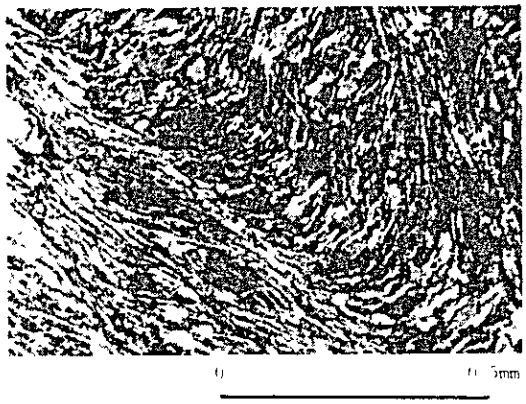


(crossed polars)

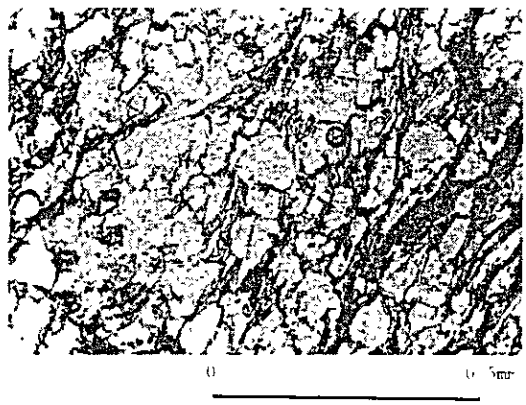


NI--29
chl-qtz-ser schist
($AIIIS_2$)
Corrego Furnas
lepidoblastic

(only lower polar)

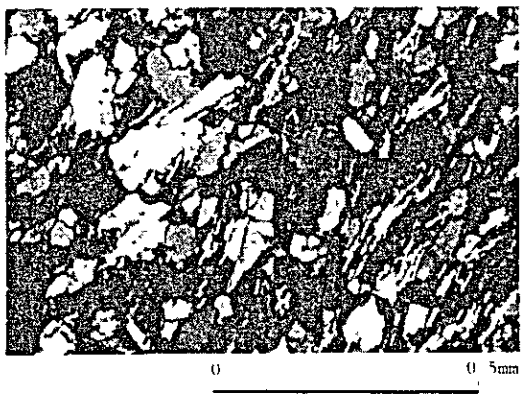


(crossed polars)

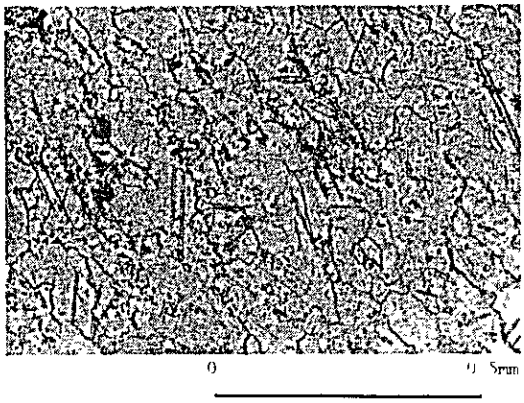


JG--09
ser-qtz schist
($AIIIS_2$)
FE--13 7
lepidoblastic

(only lower polar)



(crossed polars)



JG-12
limestone
($AIIIL_3lsA$)
FI 11 5
granoblastic

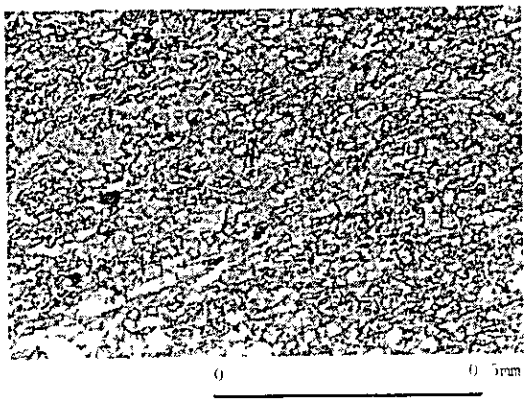
(only lower polar)

(crossed polars)

NI-28
banded cry dol limestone
($AIIIL_3 dolA_1$)
Maxixal
porphyroblastic

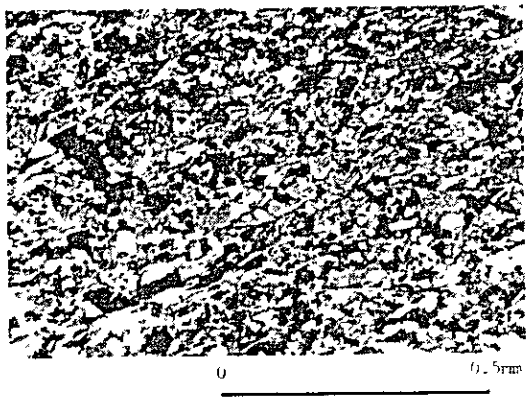
(only lower polar)

(crossed polars)

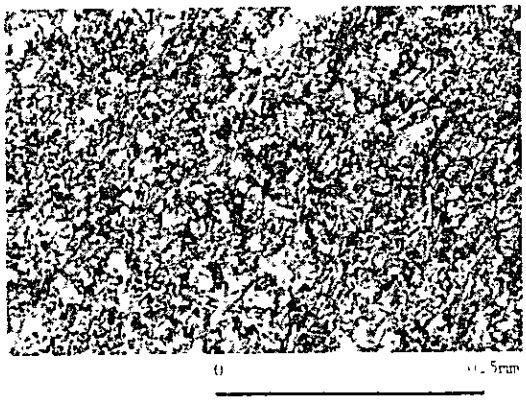


NI -08
fine pelitic dolomite
($AIIIL_3 dolA_2$)
SPO State Highway 165
lepidoblastic

(only lower poler)

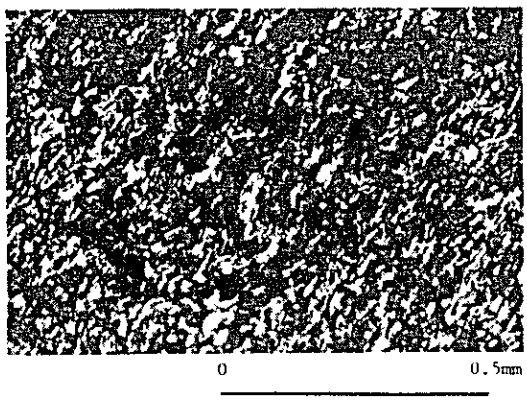


(crossed polars)

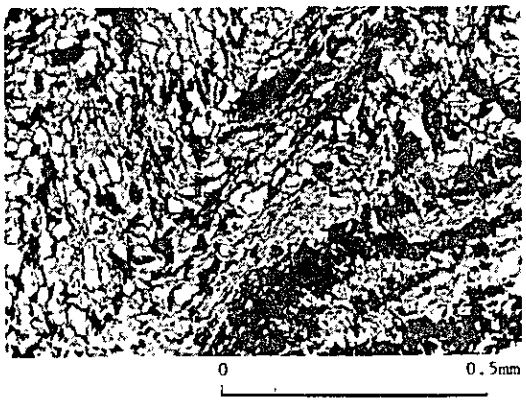


NI–54
qtz-ser schist
($AIIIL_3 psA$)
SPO State Highway 165
lepidoblastic

(only lower polar)

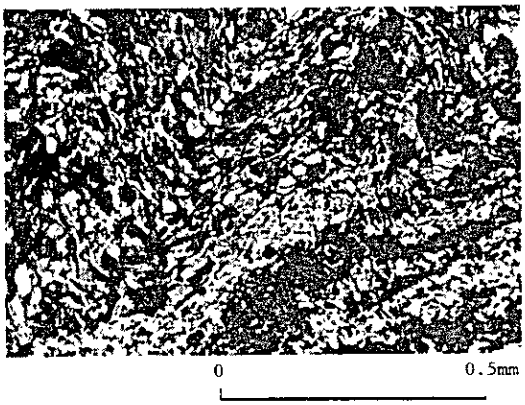


(crossed polars)

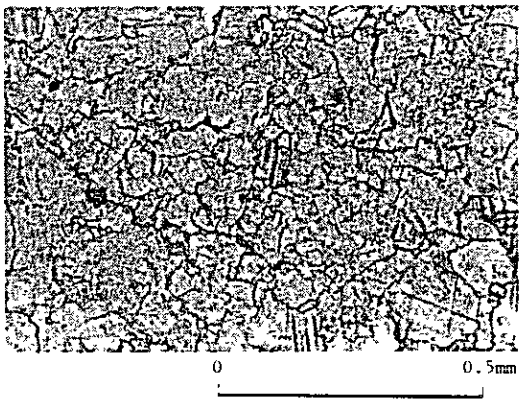


: NI–56
: alt. of ser sch. & ser-qtz sch
($AIIIL_3psB$)
SPO State Highway 165
. lepidoblastic

(only lower polar)

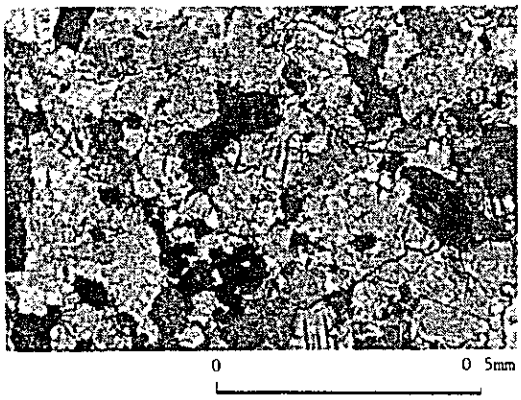


(crossed polars)

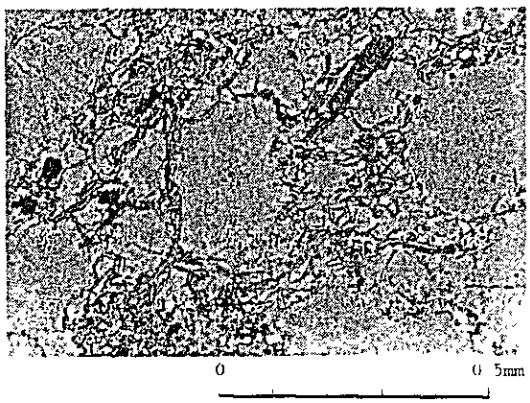


JG–06
dolomite
($AIIIL_3C$)
west area
granoblastic

(only lower polar)

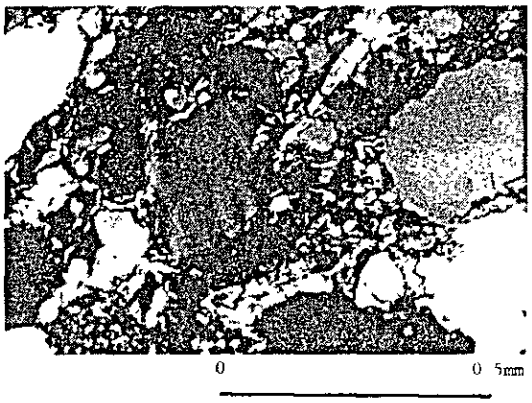


(crossed poalrs)

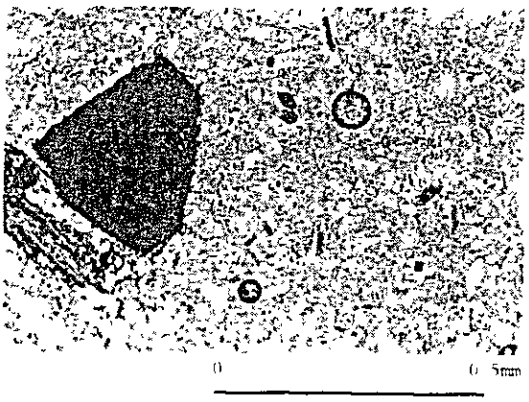


NI-03
meta qtz sandstone ($AIIIS_3$)
SPO State Highway 165
blastopsammtic

(only lower polar)

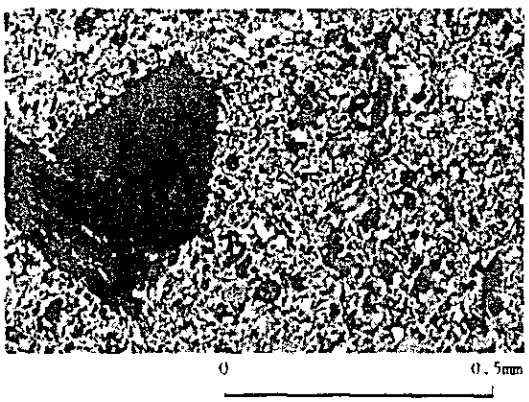


(crossed polars)



NI 04
metasiltstone ($AIIIS_3$)
SPO State Highway 165
blastoclastic

(only lower polar)



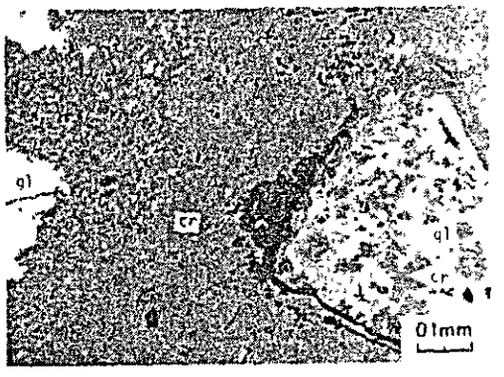
(crossed polars)

Photo A—2 Microphotograph of Polished Section

Abbreviation

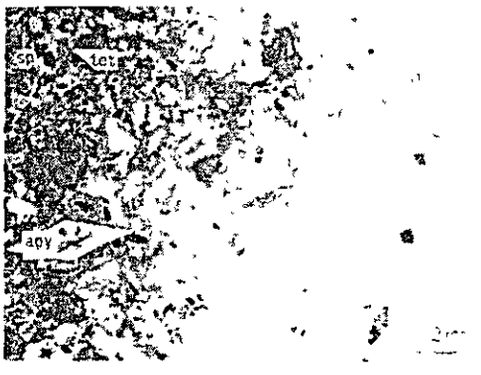
Gn : galena
Py · pyrite
Te : tetrahedrite
Sp . sphalerite
Cp : chalcopyrite
Po : pyrrhotite
Mt magnetite
Hm : hematite
Cr cerussite
Ge · goethite
Cc . chalcocite
Dg : digenite

(Geological Survey)



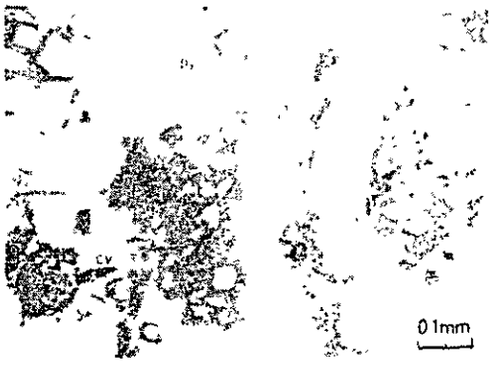
Sample No . NI -18
Location St Antonio de Cima
Ore name Cerussite-Galena Ore

(only lower polar)



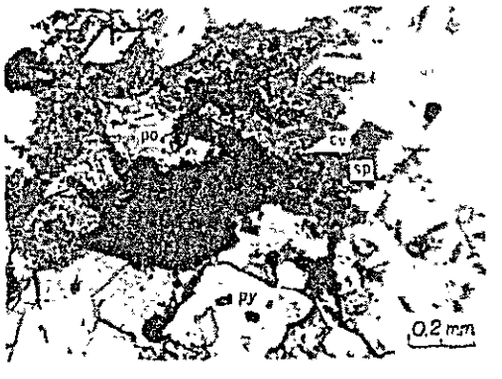
Sample No NI- 24A
Location east side of Barreira
Ore name Galena Ore

(only lower polar)



Sample No : NI- 25
Location . São Jose
Ore name Cerussite-Galena Ore

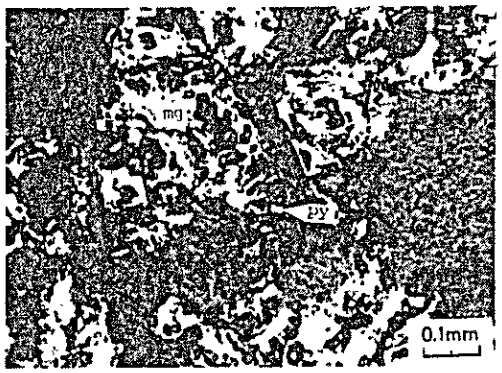
(only lower polar)



Sample No NI–52B
Location St Oswaldo
Ore name Galena Ore

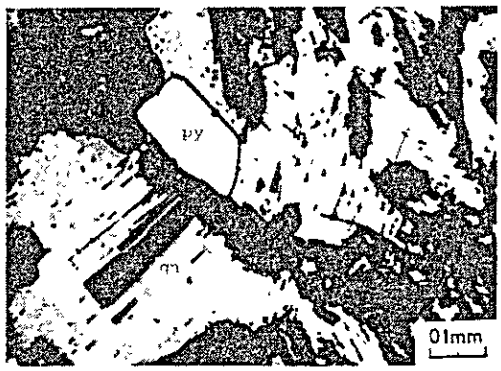
(only lower polar)

(Logging Core)



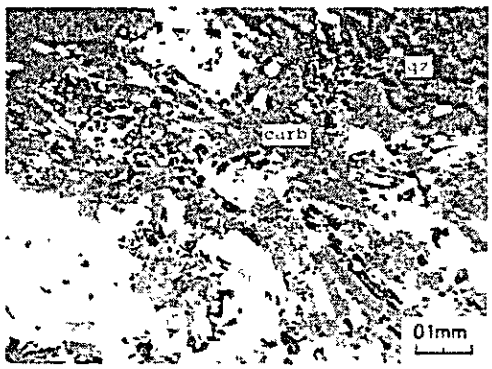
Sample No ED 39b
Depth AG 04, 188 60 m
Ore name Magnetite Ore

(only lower polar)



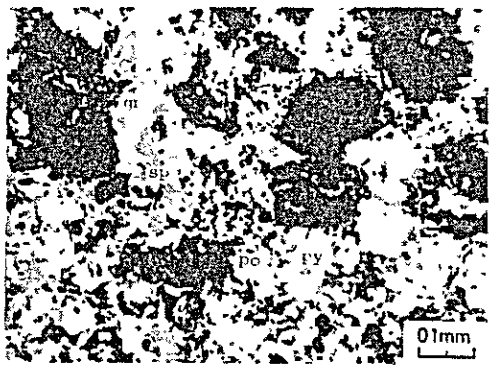
Sample No TS 17
Depth MG 04, 198 85 m
Ore name Pyrite-Galena Ore

(only lower polar)



Sample No ED-68c
Depth AG-06 328 80 m
Ore naem Pyrrhotite-Pyrite-Sphalerite Ore

(only lower polar)



Sample No ED-68g
Depth AG-06, 329 20 m
Ore name Pyrite-Sphalerite-Pyrrhotite Ore

(only lower polar)

Table A-1 List of Mines and Showings in Furnas Area

No.	Name of Mine & Showing	Kind of Ore	Type	Status	Location	Host Rock	Ore Deposits		Grade				Ore Mineral	Remarks
							Strike & dip	Average Width	Pb%	Zn%	Cu%	Ag g/t		
1	São Manoel	Pb, Ag	Vein & pipe-like	closed	Furnas Mine	AIII L_3 ℓsA doℓ~doℓ ℓm	N85°W, 75°NI	0.15 m				-	Gn, Hm	adit of N15°W in direction and 10m in length
2	Maxixal	do	do	do	do	AIII L_3 doℓA_1 banded doℓ ℓm	N80°E, 75°SE	0.2~1.5m	31.46	0.06	0.0	1208.0	Gn, Cer	adit of S30°W in direction and 800m in length
3	Santa Barbara 2	Pb, Ag (Zn)	do	operating	do	AIII L_3 doℓA_2 doℓ~ℓm	N80°E~80°W, 70°S~90°	0.6~10m	12.60	3.82	0.11	2586.0	Gn, Sp, Py	adit S40°W, 1.5km(+) in length
4	Santa Barbara 1	do	do.	do	do	do	N60°E~80°W, 70°S	0.5~5m	30.37	0.14	0.04	181.7	Gn, Py	adit S20°W, 500m(+) in length
5	595m - E level	do	do.	closed	do	do	N60°E, 60°~85°SE	1.0 m	3.43	2.80	0.15	8.7	Gn, Cer, Sp	adit S35°W, 200m in length
6	645m level	do	do.	do	do	do	N60°E, 85°SE	0.6m >						adit S35°W, 100m in length
7	open pit A	do	do	do	do	AIII L_3 ℓsA limstone	N50°E	5m >						open pit N50°E 125 x 7m
8	open pit B	do.	do	do	do	do	(E ~ W)	10m <						do E-W, 40 x 25m
9	open pit C	do	do.	do	do	AIII L_3 doℓ A_1 banded doℓ	do	10m <					-	do E-W, 30 x 20~30m
10	open pit D	do	do	do	do	AIII L_3 doℓ A_2 limy doℓ	do	5~15m						do E-W, 60 x 25m
11	Vala 8	do	do	do	do	do	N15°E, 75°SE	0.15m	16.17	18.57	0.06	249.5	Gn, Cer	open pit 110 x 6 m , N60°E
12	east of Barreira	do	Vein	do	do	do doℓ ℓm	E-W, 55°S	1.0m	68.75	1.93	0.03	2404.0	Gn, Sp, Cer	trench 6m, adit 6m , E-W
13	Barreira	do	Vein & pipe like	do	do	do	E ~ W	10m <						open pit E-W 60 x 30m
14	Coqueirinho	do	do	do	do	do	N80°W	4m >						trench 50m x 5m, N80°W
15	São José	do	Vein	do	do	AIII L_3 doℓ A_1 banded doℓ	N50°W, 70°SW	0.3m	70.96	0.77	0.06	779.8	Gn, Cer, Py	do 30m x 5~10m S10°E
16	Laranjeiras	do	Vein & pipe like	do	do	AIII L_3 doℓ A_2 doℓ ℓm	N80°W	5m >						open pit 50 x 20m N80°W
17	595m-W level	do	do	do	do	do								adit S35°W, 80m in length
18	St Osvaldo	Pb, Ag	do.	do	do	do	do	ϕ1.5m	72.12 2.92	0.60 0.60	0.01 0.03	1339.0 79.8	Gn, Cer, Hm	open pit 18 x 7m, N45°E
19	none	(Pb)	Vein	new occurrence and abandonted prospect	eastern Furnas Mine Area	do ℓm,	N65°W, 45°NE	2 ~ 5cm	0.57 0.53	0.02 0.02	0.03 0.25	26.8 23.9	Gn, Cer	float?
20	do	(Pb)	?	do	FA-10.4	float of doℓ ℓm in soil								adit of S65°W in direction, 10m in length
21	do		Bedded vein	do	FB-7.7	AIII L_3 doℓ B doℓ	N70°E, 40°NW	0.6m	0.09	0.01	0.00	0.3	Hm	quartz vein
22	do	–	?	do	FB-7.9	float of quartz in soil								trench N30°E, 3m in length adit N10°E, 5m in length
23	do	(Pb)	pyrite imp	do	FBC-10.0	AIII L_3 doℓ A_2 doℓ ℓm								trench of S15°E in direction, 20m in length
24	St Antônio de Cima	Pb, Ag	pipe-like	do	FC-9.5 east	do		ϕ2m	51.17	0.44	0.03	1036.0	Cer, Gn	trench of S10°E in direction, 6m in length
25	none	(Pb)	?	do	FC-9.5	only soil								trench of S60°E in direction, 5m in length
26	do	(Pb)	?	do	FC-9.6~9.9	only soil								trench of S20°E in direction, 30m in length
27	do	(Pb)	?	do	FC-9.2 west									adit
28	St Antônio de Baixo	Pb, Ag	pipe-like	do	FCD-8.8	AIII L_3 doℓ A_2 doℓ ℓm,		"	25.58	0.24	0.04	150.5	Gn, Cer Hm, Goe	open pit ϕ10m
29	none	(Pb)	?	do	FCD-9.7	only soil								trench of S5°E in direction, 20m in length
30	do	(Pb)	Bedded vein	do	FD-8.5	AIII L_3 doℓ A_2 limy doℓ	N60°E, 40°NW	30 cm	0.07	0.02	0.00	5.9	Gn, Cer	outcrop
31	do	(Pb)	?	do.	FF-10.2	float of doℓ ℓm in soil								trench of S50°W in direction, 3m in length
32	do	(Pb)	?	do.	FFG-7.0				0.13 0.16	0.01 0.01	0.00 0.03	1.2 1.4	Hm, Goe	floats of gossan
33	do	(Pb)	?	do	FGH-10.0	only soil								trench of S55°W in direction, 4m in length
34	do	(Pb)	?	do	FH-10.2				0.99	0.02	0.00	6.1	Hm	floats of gossan
35	do	(Pb)	?	do	FGH-11.0									trench
36	Três Bocas de Baixo	(Pb)	pyrite imp	do	FHI-9.5	AIII L_3 doℓ A_2 limy doℓ							Py	adit of N30°E, N40°E and N90°E in direction
37	Três Bocas de Cima	(Pb)	pipe-like?	do	do	do, doℓ ℓm,			0.20 0.33	0.12 0.02	0.04 0.09	0.9 0.9	Hm, Goe	trench of S30°W in direction, 6m in length
38	none	(Pb)	?	do	FJ-10.0	float of quartz in soil			0.08	0.01	0.00	0.2	-	trench of N20°E in direction, 3m in length
39	do.	(Pb)	Bedded vein	do	FJK-3.5	AIII L_3 doℓ B dolomite	N70°E, 52°NW	5.0cm	0.08	0.01	0.01	3.0	(Gn), (Hm)	qtz-limo vein
40	do.	(Pb)	?	do	west side of FK-10.0				0.67	0.41	0.03	3.5	Hm	float of gossan
41	do.	(Pb)	Bedded vein	do	the western extremity	AIII L_3 doℓ A_2 doℓ ℓm	N75°W, 35°NE	0.1~1.0m	0.41	0.02	0.01	4.7	Gn, Cer	limo-cal vein
42	do.	(Pb)	do	do.	do	AIII L_3 doℓ A_1 banded doℓ	-	0.1~0.2m	0.43	0.02	0.04	29.1	do	float of gn-qtz vein
43	do	Au	?	do.	east side of the area	AIII L_1psB			2.24	0.15	0.01	23.4	-	float of gossan, Au 125.3 g/t

Table A-2 Microscopic Observations (Thin Section) (Geological Survey)

Member	Sample No.	Location	Rock Name	Texture	quartz	plagioclase	k-feldspar	biotite	muscovite	clinopyroxene	anthophyllite	tremolite	actinolite	hornblende	garnet	opaque m.	tourmaline	chloritoid	andalusite	staurolite	zircon	sphene	apatite	graphite	sericite	chlorite	zoisite	epidote	calcite	dolomite	Remarks
AIII S_1	NI – 05	SPO State Highway 165	qtz-mus-ser schist	lepidoblastic, granoblastic	◎				○							○	•				•				◎	•		•			crenulation
AIII L_2	NI – 06	do	fine cry limestone	granoblastic	○	•		•	•							•										•		•	◎		calcite· 95%, qtz + mica: 5%>
	NI – 35	west area	limy dolomite	do.	○	•			•							•													○	◎	qtz-calcite vein (w: 0.15 mm), qtz + mica· 20%, siderite?
	JG – 14	east area	do.	do , lepidoblastic	○			•	•							•					•								○	◎	quartz· 10%, mica. 10%
AIII S_2	NI – 29	Corrego Furnas	chl-qtz-ser schist	lepidoblastic	◎	•			•							○	•				•		•	•	◎	◎		•			
	JG – 09	FE-13.7	sericite-quartz schist (fine metasandstone)	do.	◎			•	○							○									○	○		•			
	JG – 10	do.	sericite schist	do.	○											○								•	◎		•	•			crenulation
AIII L_3ℓsA	NI – 43	FH-11.3	dolomite	porphyroblastic	•	•			○							•														◎	intergrowth of qtz and muscovite. 5%, calcite-qtz vein (w: 0.05 mm)
	JG – 12	FI-11 5	limestone	granoblastic	•	•										•													◎		quartz 4%
	NI – 50	FJ-10 7	meta quartz sandstone	granoblastic, porphyroblastic	◎	•	•		○							•					•					•					
AIII L_3doℓA	NI – 28	Maxival	banded cry. dolomite	porphyroblastic	○	•			•							•														◎	cal 50%, dol. 30%, qtz + mica. 15%
	NI – 08	SPO State Highway 165	fine pelitic dolomite	lepidoblastic	○				○							•														◎	dolomite 65%, qtz: 10 ~ 20%, mica· 10%
	NI – 20	Tres Bocas	dolomitic limestone	granoblastic	•											○								•					◎	○	quartz: 1 ~ 2%
	NI – 37	west area	dolomite	lepidoblastic	○	•			○							•										•		•		◎	quartz: 10 ~ 20%, mica· 20%
AIII L_3psA	NI – 36	do	bt-chl-ser-qtz schist	do	◎			•	•							○							•		○	○					
	NI – 54	SPO State Highway 165	quartz-sericite schist	do.	◎											○					•				◎	•					calcite vein
AIII L_3B	NI – 13	west area	cry dolomitic limestone	granoblastic	•				•							•					•								◎	○	calcite + dolomite: 85%, qtz + mica: 12%
	NI – 55	SPO State Highway 165	dolomite	granoblastic, lepidoblastic	○				•							○														◎	qtz· 10 ~ 15%, mica: 2 ~ 3%
	NI – 46	FG-7.0	meta quartz sandstone	granoblastic, porphyroblastic	◎	•	•		○							•					•					•					
AIII L_3psB	NI – 56	SPO State Highway 165	alternation of ser schist and ser-qtz schist	lepidoblastic	◎				•							○					•				◎	•					crenulation
AIII L_3C	JG – 01	FC-1.0	dolomitic limestone	granoblastic	•											•												•	◎	•	quartz 1% >
	JG – 02	FC-0.2	dolomite	do												•												•	○	◎	
	JG – 06	west area	do	do.												•													•	◎	
AIII S_3	NI – 03	SPO State Highway 165	meta quartz sandstone	blastopsammitic	◎				○							•	•					•			•	•		•			
	NI – 04	do.	meta siltstone	blastoclastic	◎				•							○	○				•				○	○		•	•		lithic fragment
	JG – 07	west area	quartzite	blastopsammitic	◎		•	•	○							•					•				•	•		•			

Table A-3-1 Microscopic Observations (Polished Section)
(Geological Survey)

No.	Sample No.	Location	Ore Name	Galena	Sphalerite	Pyrite	Pyrrhotite	Arsenopyrite	Marcasite	Chalcopyrite	Tetrahedrite	Chalcocite	Covellite	Maghemite	Hematite	Cerussite	Anglesite	Goethite
1	NI – 16	the western extremity	Cerussite-Galena Ore	•		•				●						•	•	
2	NI – 18	St Antonio de Cima	do.	◎		•										●	•	•
3	NI – 19	St. Antonio de Baixo	Geothite-Hematite Ore												○		•	●
4	NI – 21	Tres Bocas	Hematite-Goethite Ore			○				•			•		●			○
5	NI – 22	do	do.		•	•	•		•	•	•			•	●			○
6	NI – 23	Vala 8	Cerussite-Galena Ore	○	•	•					•							●
7	NI – 24A	east side of Barreira	Galena Ore	○	●	•		•			•					●	•	●
8	NI – 24B	do	do.	○		●				•						●	•	
9	NI – 25	São José	Cerussite-Galena Ore	○	•	●									•	○		●
10	NI – 30	the eastern outside	Hematite-Goethite Ore												●			○
11	NI – 40	FA-9 0	Galena Ore	●												•		
12	NI – 41	do.	do	•		•				•		•				•		
13	NI – 51A	FB-7 7	Hematite Ore			•						○			●			
14	NI – 51B	do	do.												•			•
15	NI – 52A	St Oswaldo	Cerussite-Galena Ore	○		•				•						○		
16	NI – 52B	do	Galena Ore	○	●	●	•						○			●	•	●
17	NI – 53A	do.	Hematite Ore		•										○			●
18	NI – 53B	do.	Hematite-Goethite Ore											•	○			○
19	NI - 57	FJK-3 5	Galena Ore	○		•									○			
20	JG – 15	FD-8.5	do	•		○										•		
21	JG – 19	FFG-7.0	Hematite-Goethite Ore												○			○
22	JG – 20	do.	do											•	●			○

Remarks: ◎ abundant ○ common ● a little • rare

1 NJ-16

Macroscopic Observation

Ore minerals mainly occur in quartz meanwhile very fine grains of ore minerals are disseminated in the laminated black silicified zone

Microscopic Observation

Constituent Minerals	Area Ratio(%)
galena	1
cerussite	1
chalcopyrite	tr
pyrite	tr
anglesite	tr
gangue minerals	98

Galena occurs intimately associated with cerussite The texture under the microscope shows that cerussite replaces galena (see Photo NJ-16) Many tiny galena grains of irregular shapes are found in cerussite Galena and cerussite occur along the cracks formed in quartz mass meanwhile very fine chalcopyrite and pyrite grains of subhedral or euhedral shapes are disseminated in the black silicified zone A small amount of anglesite is also observed in the silicified zone

2 NJ 18

Macroscopic Observation

The polished surface shows the zonal structure that is black cerussite zone occurs at the marginal parts of larger galena grains and at the outer zone of cerussite reddish brown aggregates of goethite and gangue minerals distribute

Microscopic Observation

Constituent Minerals	Area Ratio(%)
galena	70
cerussite	15
pyrite	4
anglesite	1
goethite and gangue	10

Galena predominates in sulfide minerals Galena contains pyrite of subhedral or euhedral grains and is replaced by cerussite along the cleavage and marginal parts The cerussite zone bordering galena contains many irregular grains of galena and small euhedral grains of pyrite Anglesite occurs in the aggregates of goethite and gangue minerals which show thin-tabular and stringer textures

3 NJ 19

Macroscopic Observation

The sample is an oxide ore consisting mainly of goethite and hematite

Microscopic Observation

Constituent Minerals	Area Ratio(%)
hematite	50
anglesite	tr
goethite and gangue	50

The sample is an oxide ore No sulfide minerals are observed Major constituent minerals are aggregates of fine-grain hematite and goethite A small amount of anglesite occurs filling up the grain boundary of gangue minerals

4 NJ-2[illegible]

Macroscopic Observation

This sample is a reddish brown oxide ore

Microscopic Observation

Constituent Minerals	Area Ratio(%)
chalcopyrite	less than 1
covellite	tr
pyrite	tr
hematite	10
goethite and gangue	90

A small amount of sulfide minerals (less than 1%) occurs in the mass consisting mostly of goethite Goethite mass contains a small amount of hematite (anhedral or thin tabular shapes) The rim of one pyrite grain is partly replaced by covellite

5 NJ 22

Macroscopic Observation

This sample is an oxide ore poor in sulfides

Microscopic Observation

Constituent Minerals	Area Ratio(%)
marcasite	4
pyrite	2
sphalerite	1
chalcopyrite	less than 1
[illegible]	less than 1
tetrahedrite	less than 1
hematite	[illegible]
[illegible]	[illegible]
goethite and gangue	[illegible]

Goethite is the main ore mineral and occupies the most area of the polished surface Goethite is partly altered hematite showing a [illegible] surface [illegible] replaces [illegible] many marcasite [illegible] of [illegible] irregular shapes Marcasite [illegible] shows [illegible] texture [illegible] In [illegible] the mass small amounts of [illegible] and [illegible] pyrite are [illegible] observed

6 NJ [illegible]

Macroscopic Observation

The rim of galena grains is replaced by a black band of cerussite [illegible] parts [illegible] of oxidized minerals and gangue [illegible]

Microscopic Observation

Constituent Minerals	Area Ratio(%)
galena	6?
pyrite	[illegible]
sphalerite	[illegible]
tetrahedrite	tr
cerussite	[illegible]
goethite and gangue	18

Galena predominates in the ore minerals [illegible] at very smooth surface with many cleavage cracks Galena grain is large (0 5mm [illegible]) and also contains many euhedral or corroded subhedral grains of pyrite Small amounts of sphalerite and tetrahedrite are included in galena The rim of a galena grain is replaced by cerussite Cerussite occasionally develops along the cleavage cracks in large galena grain Cerussite contains many tiny relicts of galena of irregular shape

Grain size galena, 0 5mm - 1cm pyrite 10 - 1000μm sphalerite 30 - 500 m tetrahedrite 10 - 100μm

7 NJ-24A

Macroscopic Observation

This sample is rich in galena. The rim of large galena grain is surrounded with cerussite of blackish color.

Microscopic Observation

Constituent Minerals	Area Ratio (%)
galena	60
sphalerite	5
pyrite	4
arsenopyrite	1
tetrahedrite	tr
cerussite	10
anglesite	tr
goethite and gangue	20

Galena occupies the most area of the polished surface. Large grains of galena (0.5 - 1cm) form a compact mass. In galena mass, many grains of irregularly corroded sphalerite and pyrite are observed. Sphalerite contains tiny grains of galena and pyrite of idiomorphic or lath shapes. Relatively large grains of pyrite contain galena grains. Arsenopyrite of an idiomorphic shape occurs in galena. The cleavage lines and triangular pits are very common in galena, and galena along them are partly replaced by cerussite. Cerussite also replaces the rim of galena grain. In cerussite, many tiny relicts of galena are observed. Grain size: galena, 10um -1cm, sphalerite 30um - 2mm, pyrite 20um - 1.5mm, arsenopyrite 50 - 300um, tetrahedrite [illegible] 20um

8 NJ-24B

Macroscopic Observation

This sample contains several aggregates of galena and pyrite. Each aggregate is relatively large (0.5 - 1 cm).

Microscopic Observation

Constituent Minerals	Area Ratio(%)
galena	5[illegible]
pyrite	10
chalcopyrite	tr
cerussite	[illegible]
[illegible]site	tr
gangue	30

[illegible] minerals are mostly of galena and pyrite. Galena grain is large (max [illegible]). The rim of galena grain is replaced by cerussite. Cerussite also develops intensively along the cleavage cracks formed in galena grains. Pyrite grain is relatively large (max 0.8mm). At the marginal part of pyrite grain, anglesite aggregates of needle-like or thin-tabular textures occur. Aggregates of anglesite are also observed in the gangue minerals. Cerussite includes many relicts of galena of corroded shapes.

9 [illegible]

Macroscopic Observation

This sample [illegible] galena [illegible] surrounds the galena grain.

Microscopic Observation

Constituent Minerals	Area Ratio (%)
galena	5[illegible]
pyrite	5
sphalerite	less than 1
cerussite	[illegible]0
hematite	less than 1
goethite and gangue	[illegible]2

Galena predominates in ore minerals and shows a compact mass. In the mass of galena, many irregularly corroded grains of pyrite are observed, and cerussite develops along the cleavage cracks. The rim around galena grain is also replaced by cerussite which contains many tiny relicts of galena of irregularly corroded shapes. Hematite [illegible] occasionally after the pseudomorph of pyrite grains. Grain size: galena [illegible] - [illegible]2cm, pyrite 20 - 2[illegible]0um, sphalerite [illegible]0 [illegible]

[illegible]

Macroscopic Observation

This is an oxidized sample without any sulfide minerals.

Microscopic Observation

Constituent Minerals	Area Ratio (%)
hematite	[illegible]5
goethite and gangue	85

No sulfide minerals are observed. The opaque mineral is only the aggregates of hematite. The surface is not smooth because of many cracks and aggregates of goethite and gangue minerals.

11 NJ-4[illegible]

Macroscopic Observation

Ore minerals such as galena and cerussite occur in gangue mass consisting mainly of quartz.

Microscopic Observation

Constituent Minerals	Area Ratio (%)
galena	[illegible]
cerussite	[illegible]
gangue minerals	[illegible]4

A small amount of opaque minerals disseminates in the gangue mass consisting mainly of quartz. Opaque minerals are principally galena. Galena occurs as an euhedral or corroded subhedral grain, and as a veinlet. Cerussite replaces the rim of galena grains and also fills up the cleavage cracks of galena. The tiny relicts of galena (< [illegible]0um) of irregularly corroded shapes are observed in the aggregates of cerussite.

17 NI-[illegible]A

Macroscopic Observation

This is a reddish brown [illegible]

Microscopic Observation

Constituent Minerals	Area Ratio(%)
sphalerite	less than 1
hematite	60
goethite and gangue	40

A small amount of irregularly corroded sphalerite grains is observed in hematite and goethite aggregates. Sphalerite rarely contains tiny hematite grains. Hematite is the major minerals in this sample. Hematite shows two types [illegible] on the basis of [illegible] texture. The one is large grains [illegible] a compact mass, and the other shows the colloform and reniform textures. The later is intimately associated with goethite [illegible] the rim of goethite aggregate changes to hematite. Goethite shows commonly the colloform and reniform textures, and [illegible] intergrowth with hematite.

18 NI-53B

Macroscopic Observation

This sample is a reddish brown oxide ore.

Microscopic Observation

Constituent Minerals	Area Ratio(%)
hematite	10
maghemite(?)	[illegible]
goethite	[illegible]
gangue	[illegible]

This sample consists of hematite [illegible] minerals. [illegible] sulfide minerals are observed. Hematite [illegible] associated with [illegible] tabular and laminated textures [illegible]

[illegible] lath-shaped hematite and [illegible]

[illegible]

Macroscopic Observation

[illegible]

Microscopic Observation

Constituent Minerals	Area Ratio(%)
[illegible]	[illegible]
[illegible]	[illegible]
hematite	[illegible]
gangue	[illegible]

[illegible] pyrite. A few amount [illegible]

[illegible]

Macroscopic Observation

[illegible] few [illegible]

Microscopic Observation

Constituent Minerals	Area Ratio(%)
[illegible]	[illegible]
[illegible]	[illegible]
cerussite	[illegible]
gangue	[illegible]

[illegible] minerals are very rare [illegible] galena and cerussite [illegible] cracks [illegible] mass. Cerussite [illegible] replace [illegible] part of [illegible] contains very few amount of tiny [illegible]

[illegible]

Macroscopic Observation

The sample is a reddish brown [illegible]

Microscopic Observation

Constituent Minerals	Area Ratio(%)
hematite	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]

[illegible] associated with [illegible] hematite. And also [illegible]

[illegible]

Macroscopic Observation

The polished surface shows [illegible] structure.

Microscopic Observation

Constituent Minerals	Area Ratio(%)
[illegible]	[illegible]
hematite	[illegible]
goethite [illegible]	[illegible]

[illegible] sulfide minerals are observed [illegible] mass of polished [illegible] few amount of hematite is [illegible] fine-grained [illegible] hematite.

12 NI-41

Macroscopic Observation

This sample is an ore disseminated in quartz

Microscopic Observation

Constituent Minerals	Area Ratio(%)
galena	1
pyrite	1
chalcopyrite	less than 1
chalcocite	less than 1
cerussite	2
gangue	91

Opaque minerals are very little Ore minerals consist mostly of galena and cerussite and they occur in quartz Aggregate of galena occur forming a thin band along the grain boundary of quartz Galena is partly or wholly replaced by cerussite Chalcopyrite which is partly replaced by chalcocite is very seldomly observed In gangue minerals except for quartz fine euhedral grains of pyrite disseminate

13 NI-51A

Macroscopic Observation

A corroded rectangular grain of hematite occurs in quartz

Microscopic Observation

Constituent Minerals	Area Ratio(%)
pyrite	tr
chalcocite	tr
hematite	5
gangue	95

Ore minerals besides hematite are scarcely observed Rectangular aggregate of hematite of fine grains predominates in ore minerals A small amount of pyrite of euhedral or irregularly corroded subhedral shapes disseminatesin quartz Chalcocite occurs after the pseudomorph of chalcopyrite

14 NI-51B

Macroscopic Observation

Very few ore minerals disseminate in quartz

Microscopic Observation

Constituent Minerals	Area Ratio(%)
hematite	1
goethite	3
gangue	96

The opaque mineral is only hematite Hematite forms the aggregates of very fine grains and contains the aggregates of goethite grains No sulfide minerals are observed

15 NI-52A

Macroscopic Observation

Nearly a half of the polished surface of this sample is occupied by galena The rim of galena is bordered with a thin dark band of cerussite

Microscopic Observation

Constituent Minerals	Area Ratio %)
galena	60
pyrite	less than 1
chalcopyrite	less than 1
cerussite	25
gangue	15

A large crystal of galena occurs as a subhedral shape It occupies nearly a half of the polished surface and is intensively replaced by cerussite along the cleavage cracks In galena triangular pits along the cleavage lines are very common Cerussite occupies the large area next to galena and mostly occurs as the replacement of the rim of galena At the cerussite area near the rim of galena, many relicts of galena of irregularly corroded shapes are observed With the distance from the rim of galena the number of relicts of galena in cerussite decreases

16 NI-52B

Macroscopic Observation

The sample is rich in galena

Microscopic Observation

Constituent Minerals	Area Ratio %)
galena	55
pyrite	5
sphalerite	4
pyrrhotite	tr
covellite	tr
cerussite	15
anglesite	less than 1
goethite and gangue	20

Galena predominant area in sulfide minerals, that is it occupies near 70 % of the polished surface Cerussite replaces the rim of galena grain and fills up the cleavage cracks of galena Cerussite contains tiny relicts of galena of irregularly corroded subhedral shapes Some euhedral or subhedral pyrite grains occur in galena and cerussite Pyrite also occurs as grains having mutual boundaries with goethite and gangue minerals The size of pyrite grain ranges from 10 - 400um Small amounts of sphalerite and pyrrhotite are observed in galena Covellite occurs as aggregates replacing sphalerite and pyrrhotite Goethite occurs as the aggregates and veinlets and the rim of goethite aggregate is partly replaced by anglesite

Table A-3-2 Microscopic Observations (Polished Section) (Logging Core)

No	Sample No	Depth	Ore Name	Galena	Sphalerite	Pyrite	Chalcopyrite	Pyrrhotite	Magnetite
1	ED-39b	AG-04, 188 60 m	Magnetite Ore			(•)			
2	TS-17	do 198.85 m	Pyrite-Galena Ore	○		◉	(•)		
3	TS-15a	do 200 70 m	Sphalerite-Galena Ore	◉	◉	•	(•)		
4	ED-125d	AG-05, 355.05 m	Galena-Sphalerite-Pyrite Ore	•	•	◉			
5	ED-66d	AG-06, 327 85 m	Galena Ore	•	(•)	•			
6	ED- 68c	do. 328.80 m	Pyrrhotite-Pyrite-Sphalerite Ore	•		◉		◉	
7	ED-68d	do 328 90 m	do.	•	◉	◉		◉	
8	ED-68f	do. 329.10 m	Pyrrhotite-Pyrite-Sphalerite Ore	•	◉	◉		◉	
9	ED-68g	do 329 20 m	Pyrite-Sphalerite-Pyrrhotite Ore	◉					
10	ED-70c	do 330 30 m	Pyrrhotite-Sphalerite Ore	•	◉	•		◉	

Remarks: ◎ : abundant, ○ : common, ◉ a little, • rare

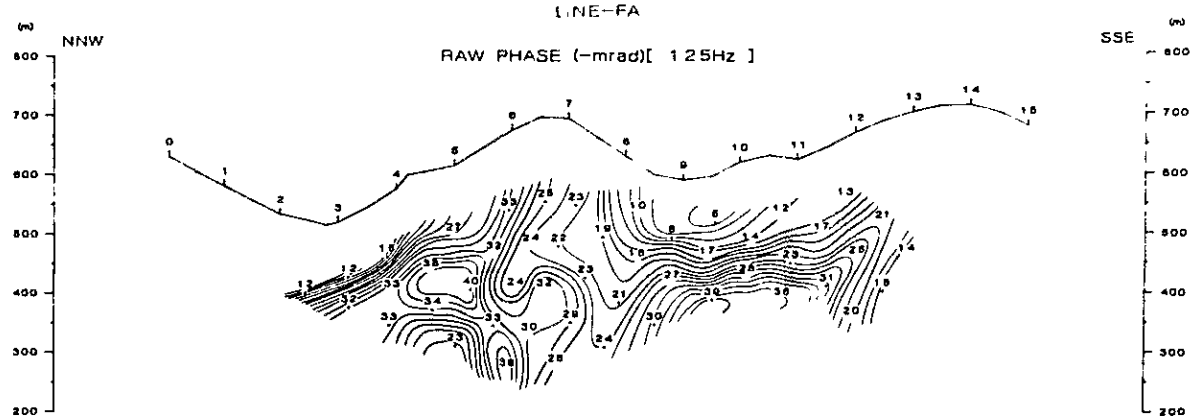
Table A-4 Assay Results of Drilling Core

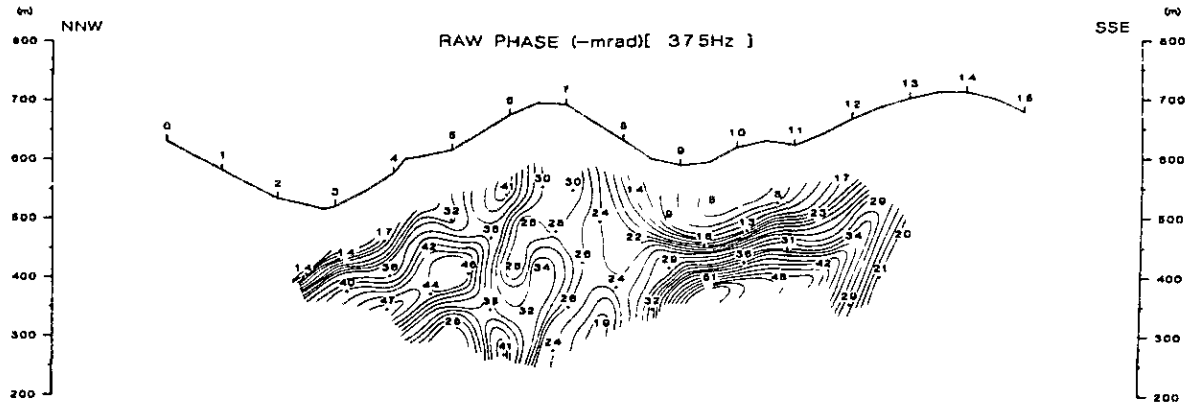
No	Sample No	Depth (m)	Width (m)	Rock Type	Pb (%)	Zn (%)	Cu (ppm)	Ag (ppm)
AG-04		195 15						
1	TS-21	~196.95	1 8	amph-se-q-sch, carb-sch	0 03	0.01	190	3 5
2	TS-20	~197 15	0 2	gl.-zb in barite	1 60	0.46	330	26
3	TS-19	~198 15	1 0	carb-sch	2 30	0 20	75	34
4	TS-18	~199 80	1 65	carb-sch	0 07	0 03	410	2 5
5	TS-17	~199.90	0.1	gl ore	8 00	0 03	18	200
6	TS-16	~200 65	0 75	carb-sch	0.50	0.02	45	4 5
7	TS-15	~200 75	0.1	gl ore	4 50	1.60	30	100
8	TS-14	~201.75	1 0	carb-sch	0 03	0.01	50	2
AG-05		353 65						
9	ED-124	~354 65	1.0	carb-sch	0 008	0.014	28	1
10	ED-125	~355 65	1 0	gl -zb in barite	2.5	2 9	100	75
11	ED-126	~356 65	1.0	do	0 19	0 056	35	14
12	ED-127	~357 85	1.2	do	0.06	0 07	55	8
13	ED-128	~358.35	0 5	do	4.9	2 8	160	185
14	ED-129	~359 50	1 15	carb-sch	0.006	0.006	60	0 8
15	ED- 130	~360 50	1 0	grph-sch	0.015	0 0035	40	0.8
AG-06		326 55						
16	ED-65	~327 55	1 0	carb-sch	0.04	0.01	25	1
17	ED-66	~328 05	0 5	gl.-zb. in barite	2 20	0 04	22	38
18	ED-67	~328 60	0.55	gl -zb poor ore	0 04	0.04	20	3
19	ED-68	~329 40	0 8	gl.-zb ore	1 80	4 40	70	38
20	ED-69	~330 15	0.75	graph-sch	0.19	0.18	23	6
21	ED-70	~330 60	0 45	gl.-zb. ore	1.30	1 10	30	38
22	ED-71	~331.60	1 0	grph-sch	0.07	0.04	25	1

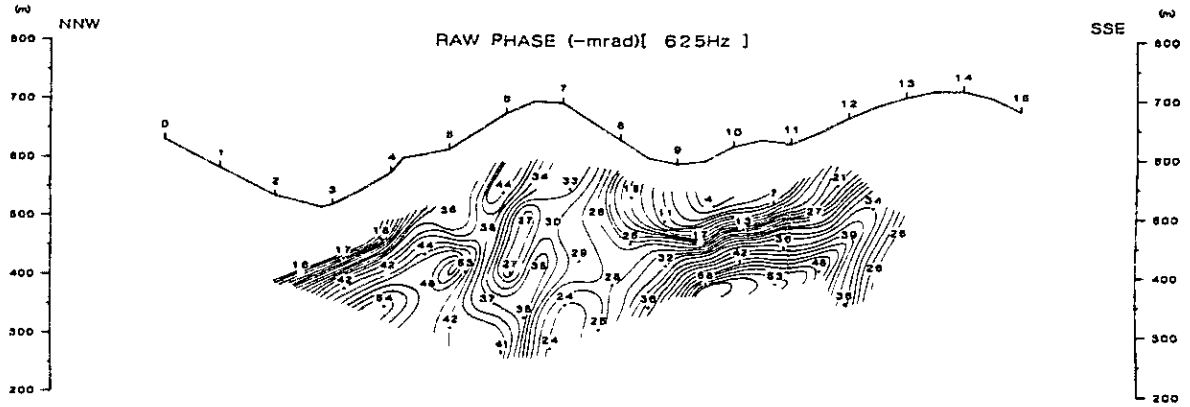
Fig. A-1 Raw Phase Pseudosection of Each Frequency

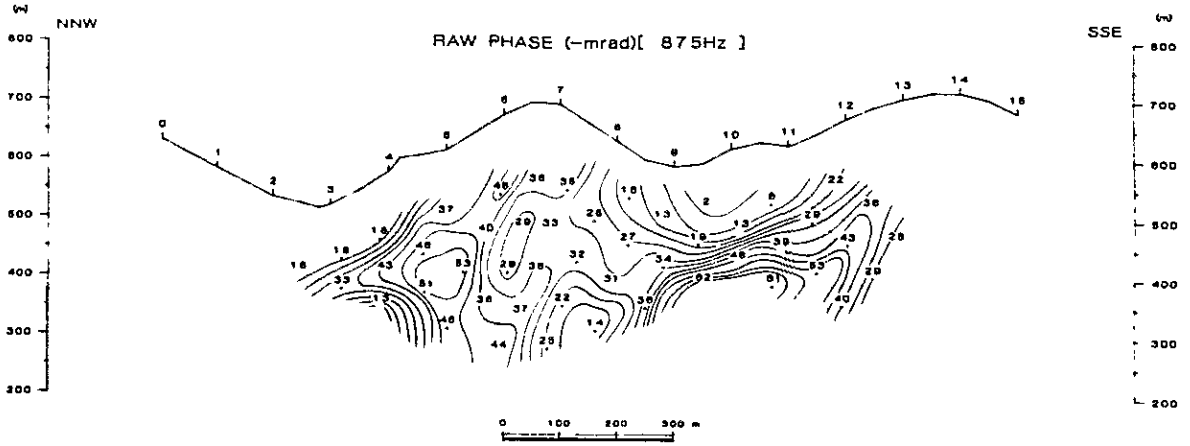
(Line-FA, FD, FI)

LINE-FA


NNW
SSE
RAW PHASE (-mrad)[125Hz]

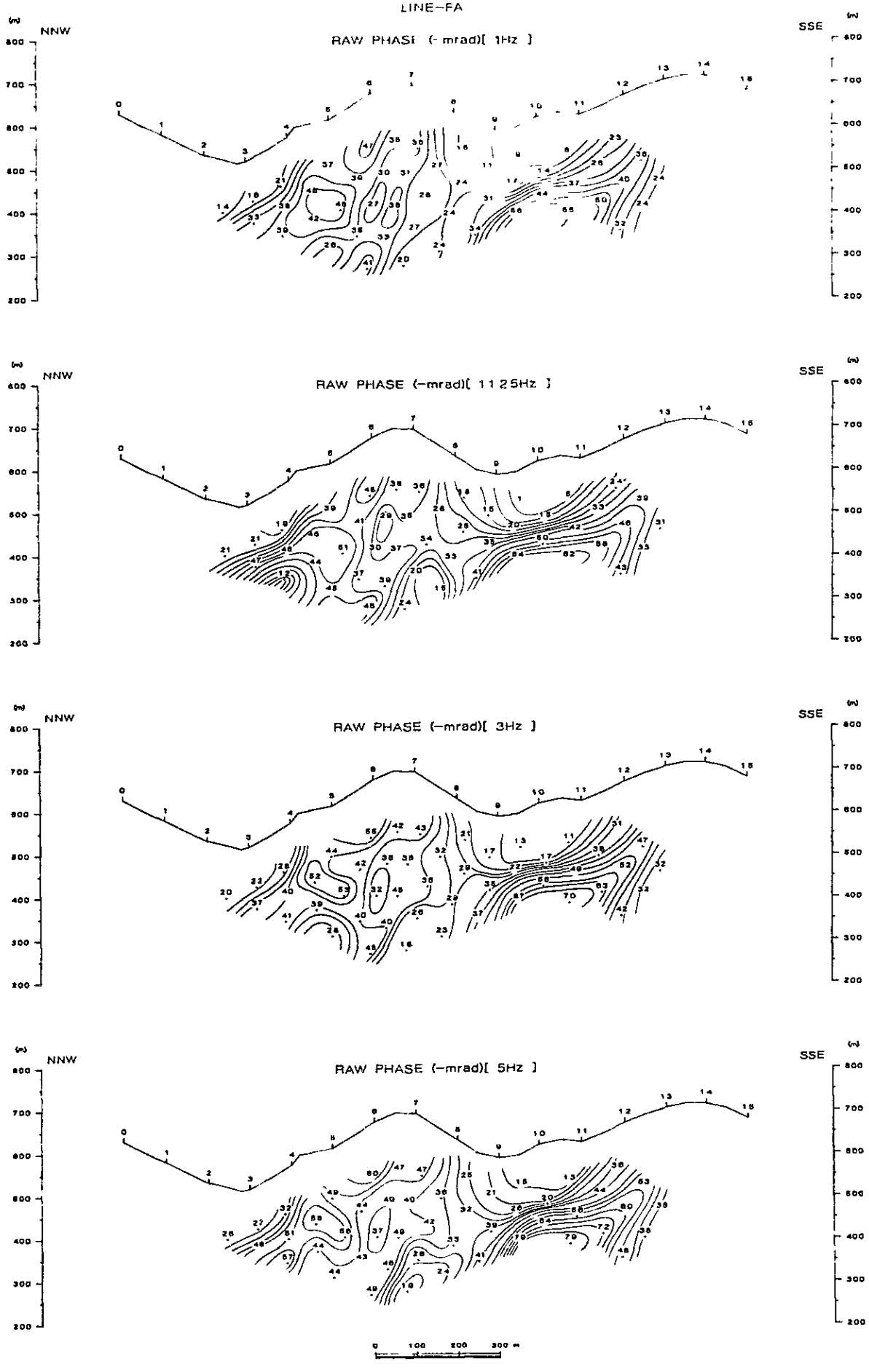

NNW
SSE
RAW PHASE (-mrad)[375Hz]


NNW
SSE
RAW PHASE (-mrad)[625Hz]


NNW
SSE
RAW PHASE (-mrad)[875Hz]
0 100 200 300 m

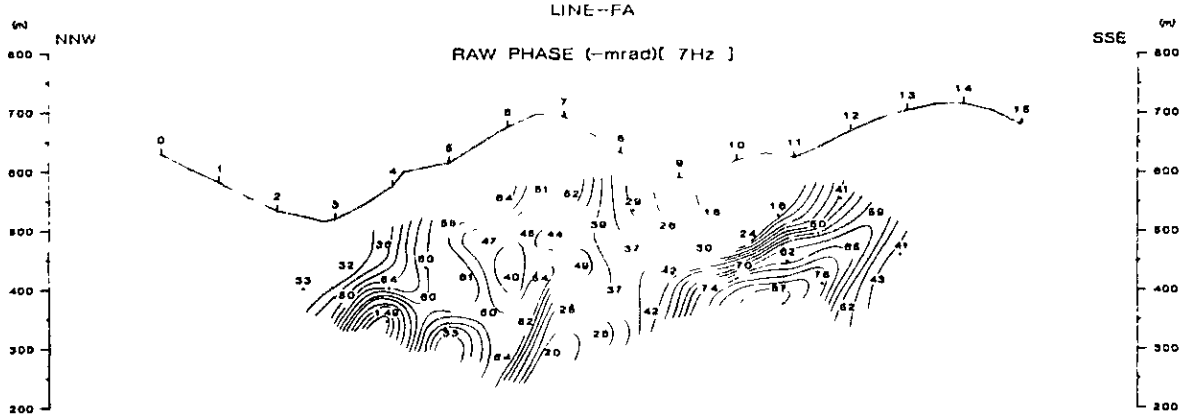
FA- 1

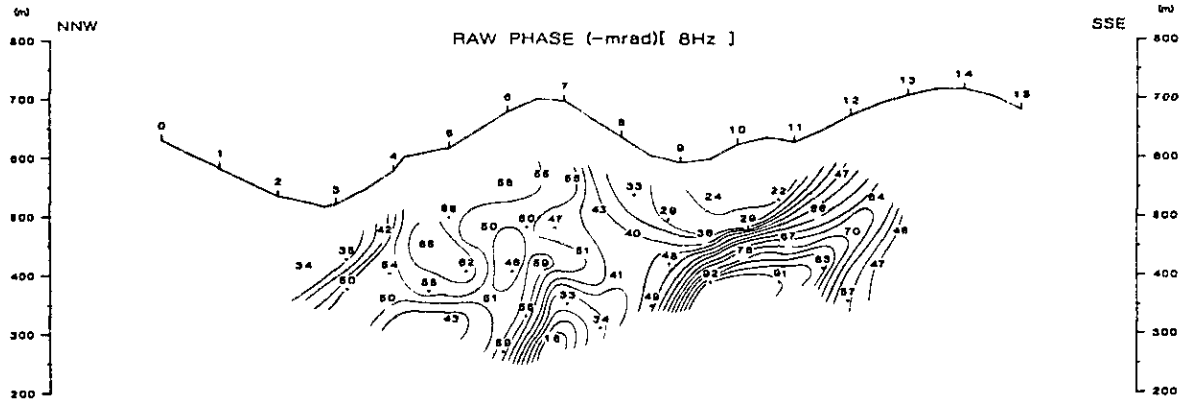
LINE-FA

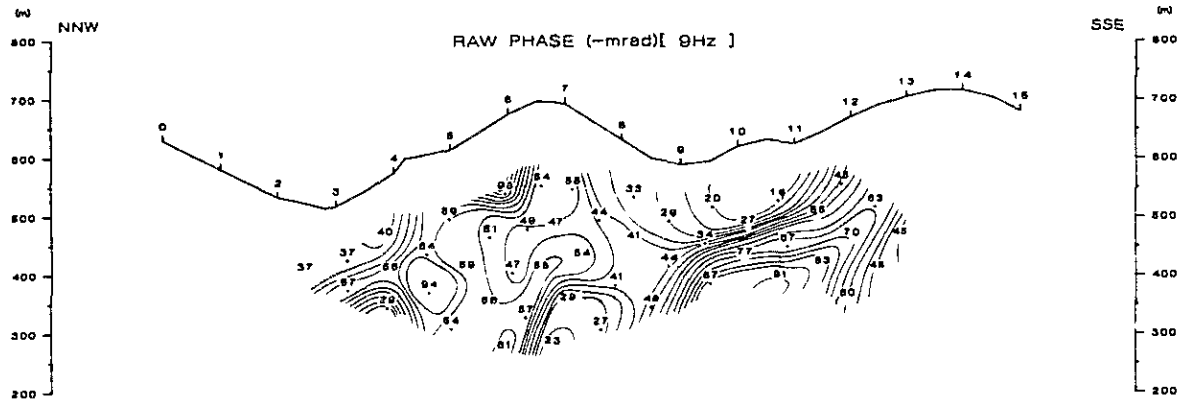

NNW
SSE
RAW PHASE (-mrad)[1Hz]
RAW PHASE (-mrad)[1.125Hz]
RAW PHASE (-mrad)[3Hz]
RAW PHASE (-mrad)[5Hz]
0 100 200 300 m

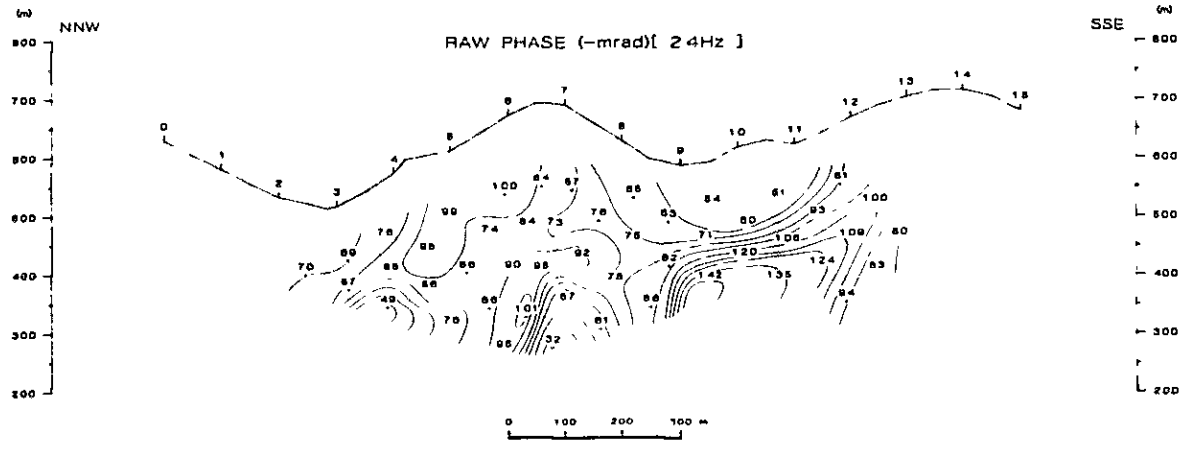
FA- 2

LINE--FA

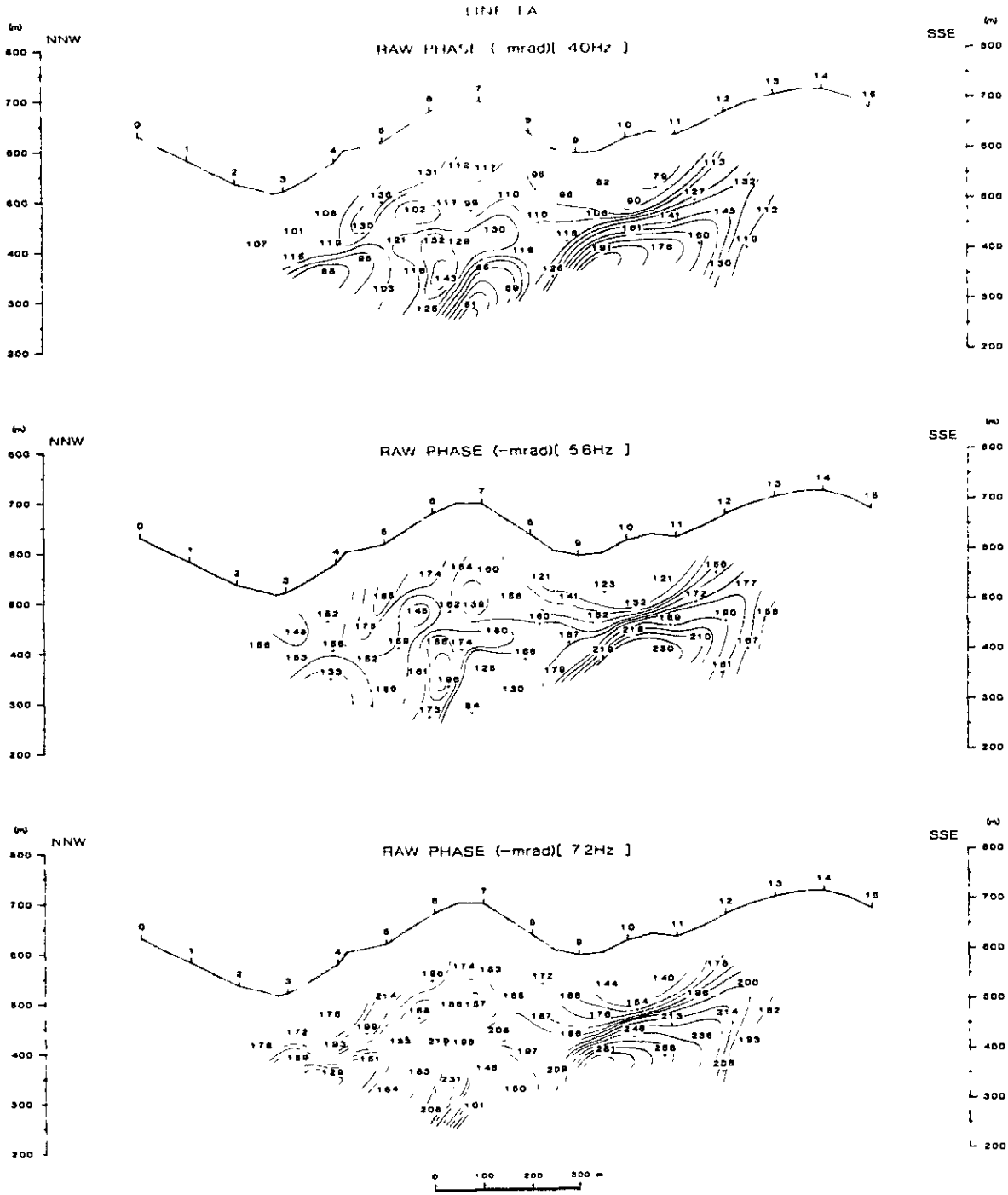

NNW
SSE
RAW PHASE (-mrad)[7Hz]


NNW
SSE
RAW PHASE (-mrad)[8Hz]


NNW
SSE
RAW PHASE (-mrad)[9Hz]

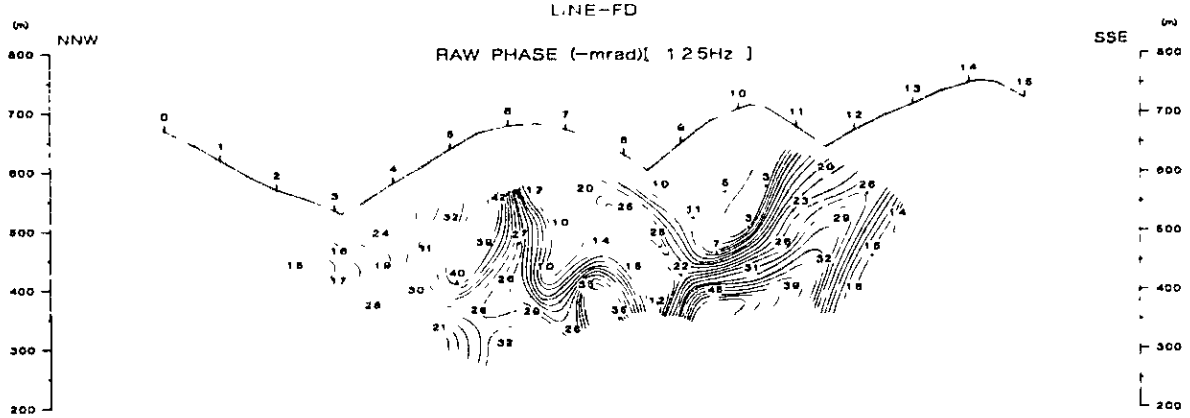

NNW
SSE
RAW PHASE (-mrad)[24Hz]
0
100
200
300 m

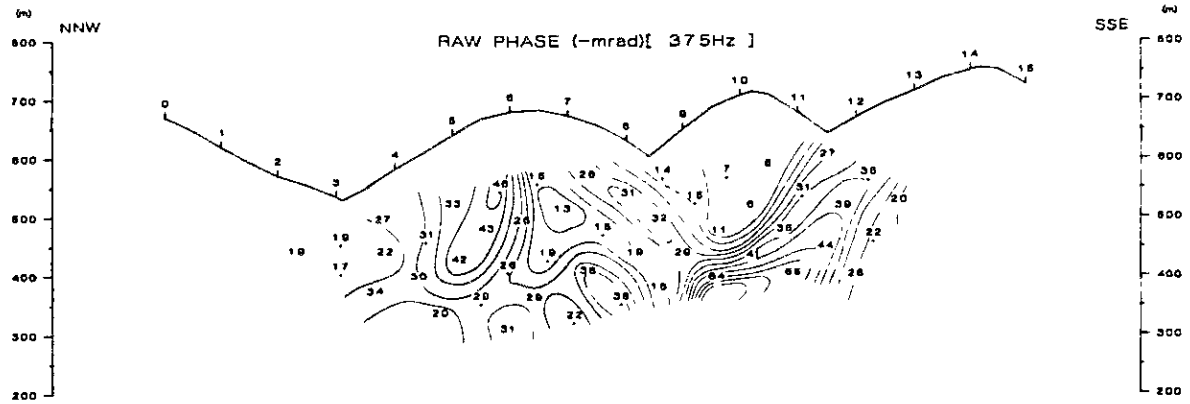
FA- 3

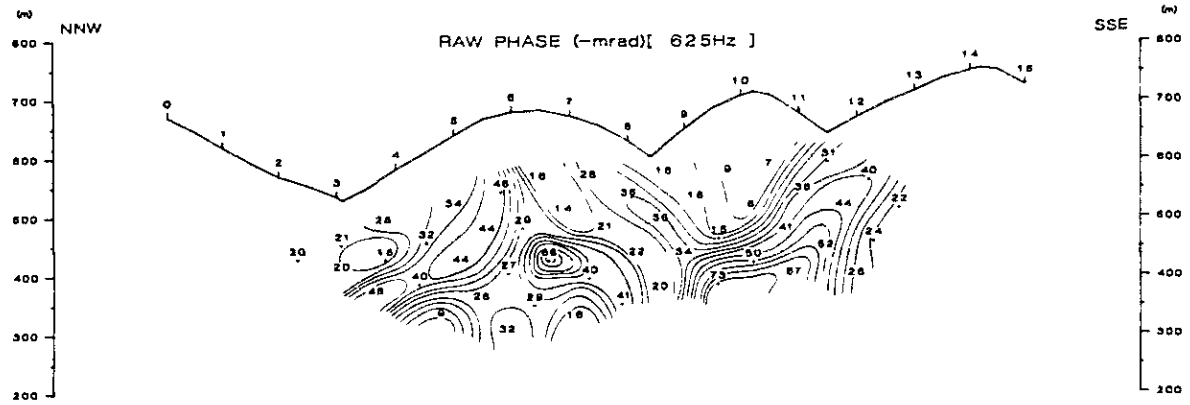

LINE FA
RAW PHASE (mrad)[40Hz]
NNW
SSE
RAW PHASE (-mrad)[56Hz]
NNW
SSE
RAW PHASE (-mrad)[72Hz]
NNW
SSE
0 100 200 300 m

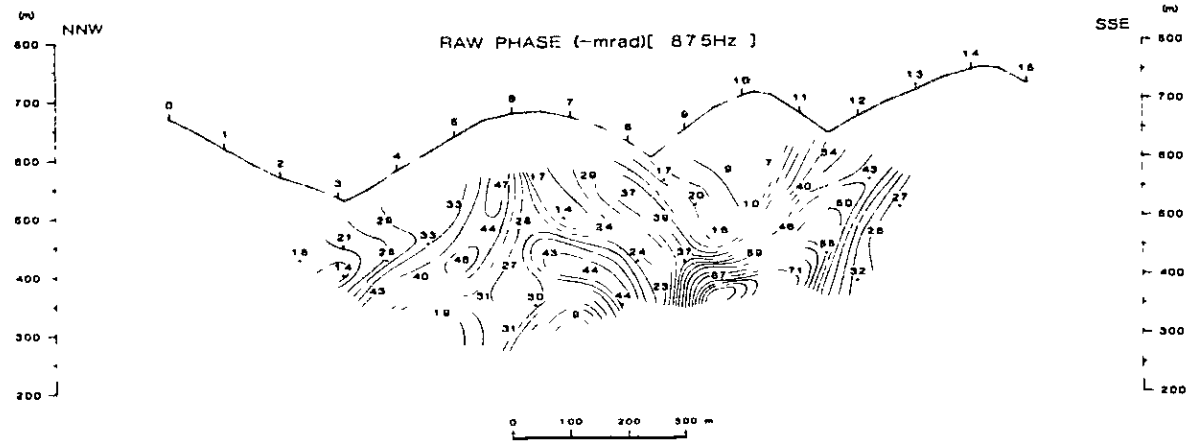
FA– 4

LINE-FD


RAW PHASE (-mrad)[1.25Hz]
NNW
SSE

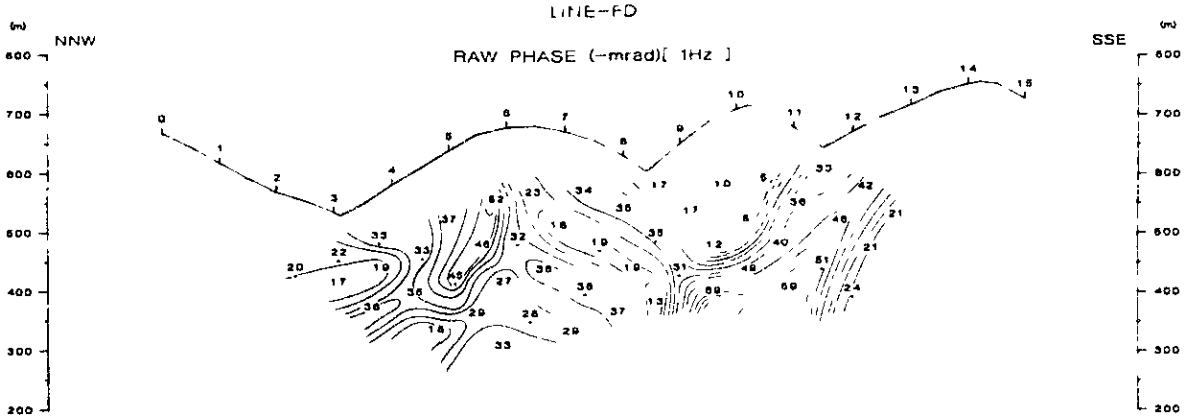

RAW PHASE (-mrad)[3.75Hz]
NNW
SSE

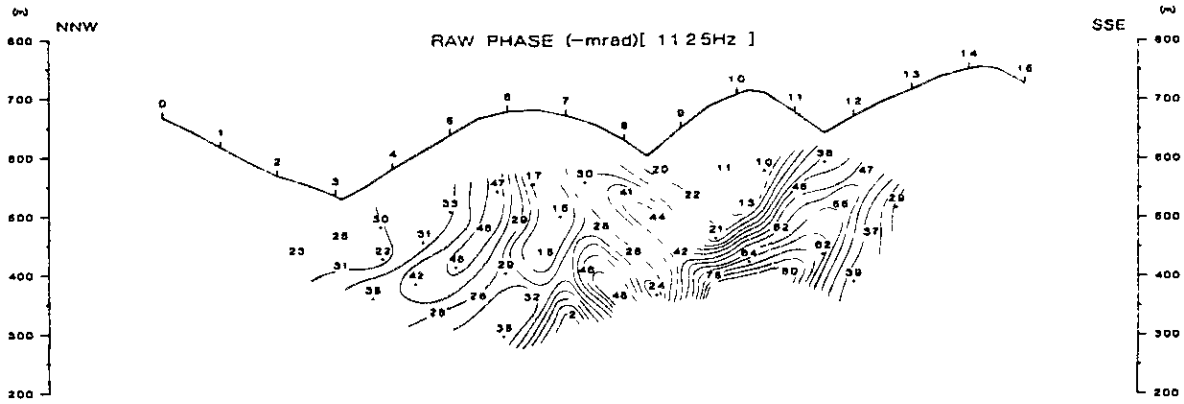

RAW PHASE (-mrad)[6.25Hz]
NNW
SSE

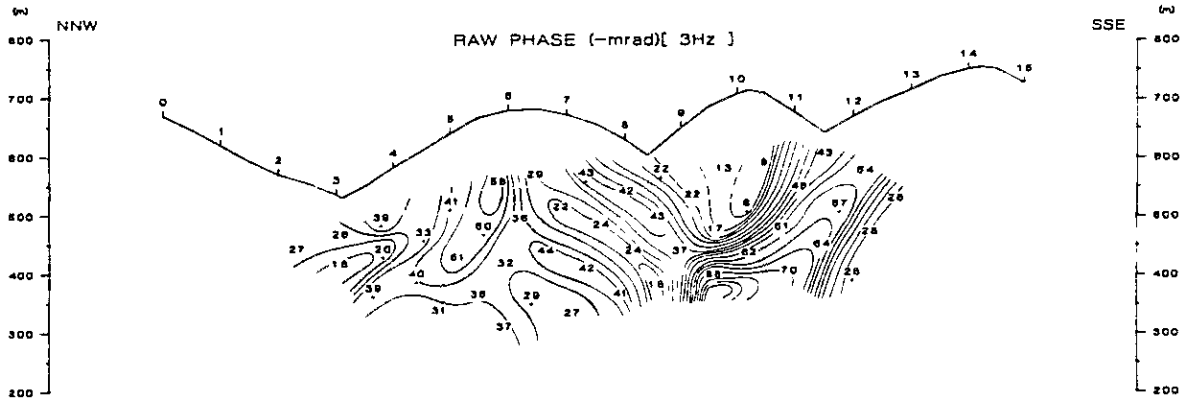

RAW PHASE (-mrad)[8.75Hz]
NNW
SSE
0 100 200 300 m

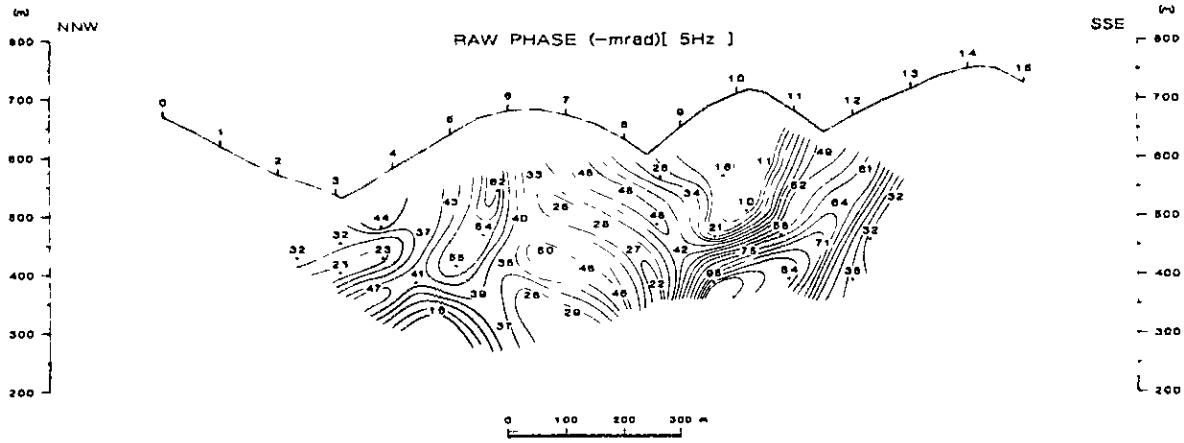
FD- 1

LINE-FD


NNW
SSE
RAW PHASE (-mrad)[1Hz]

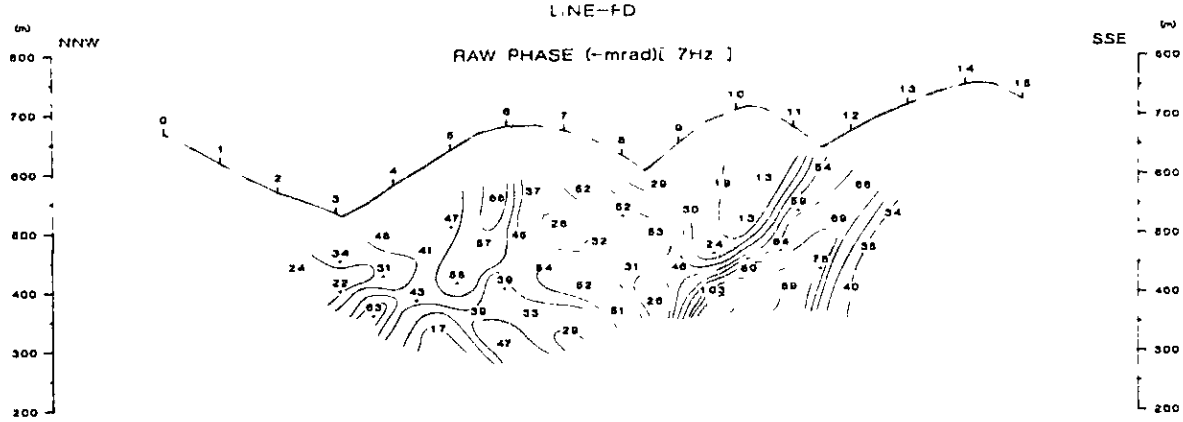

NNW
SSE
RAW PHASE (-mrad)[1.125Hz]

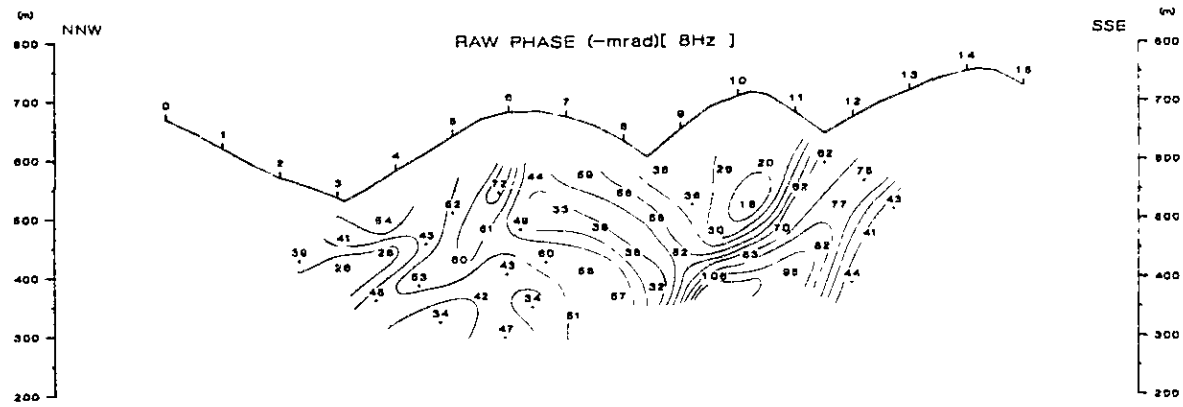

NNW
SSE
RAW PHASE (-mrad)[3Hz]

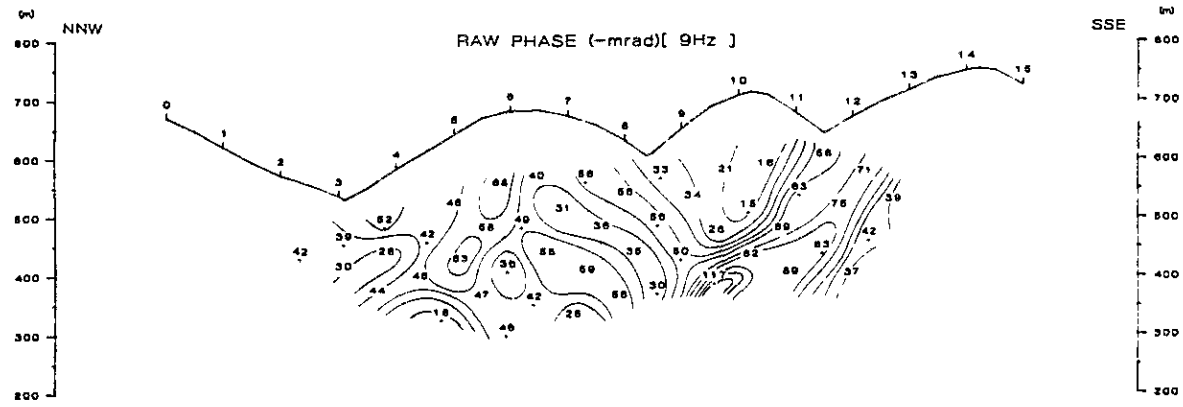

NNW
SSE
RAW PHASE (-mrad)[5Hz]
0 100 200 300 m

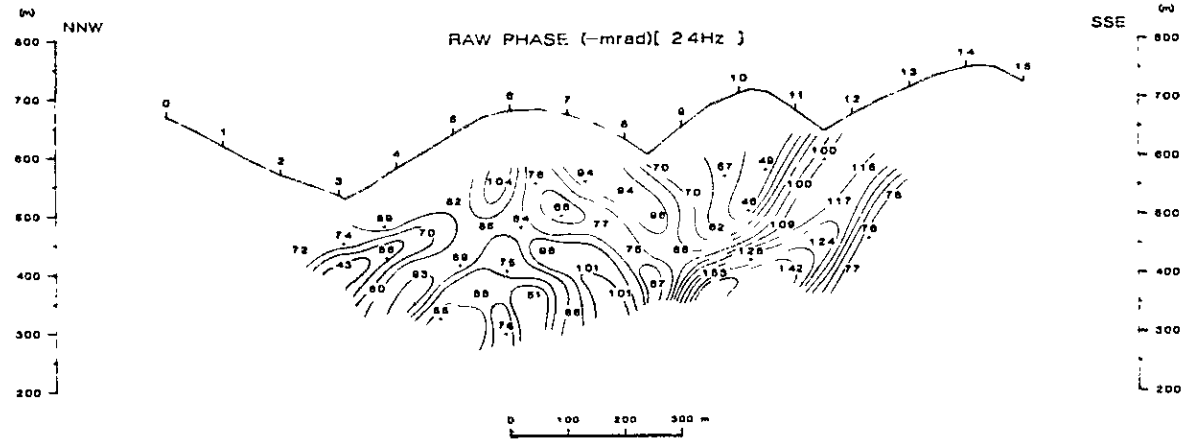
FD- 2

LINE-FD

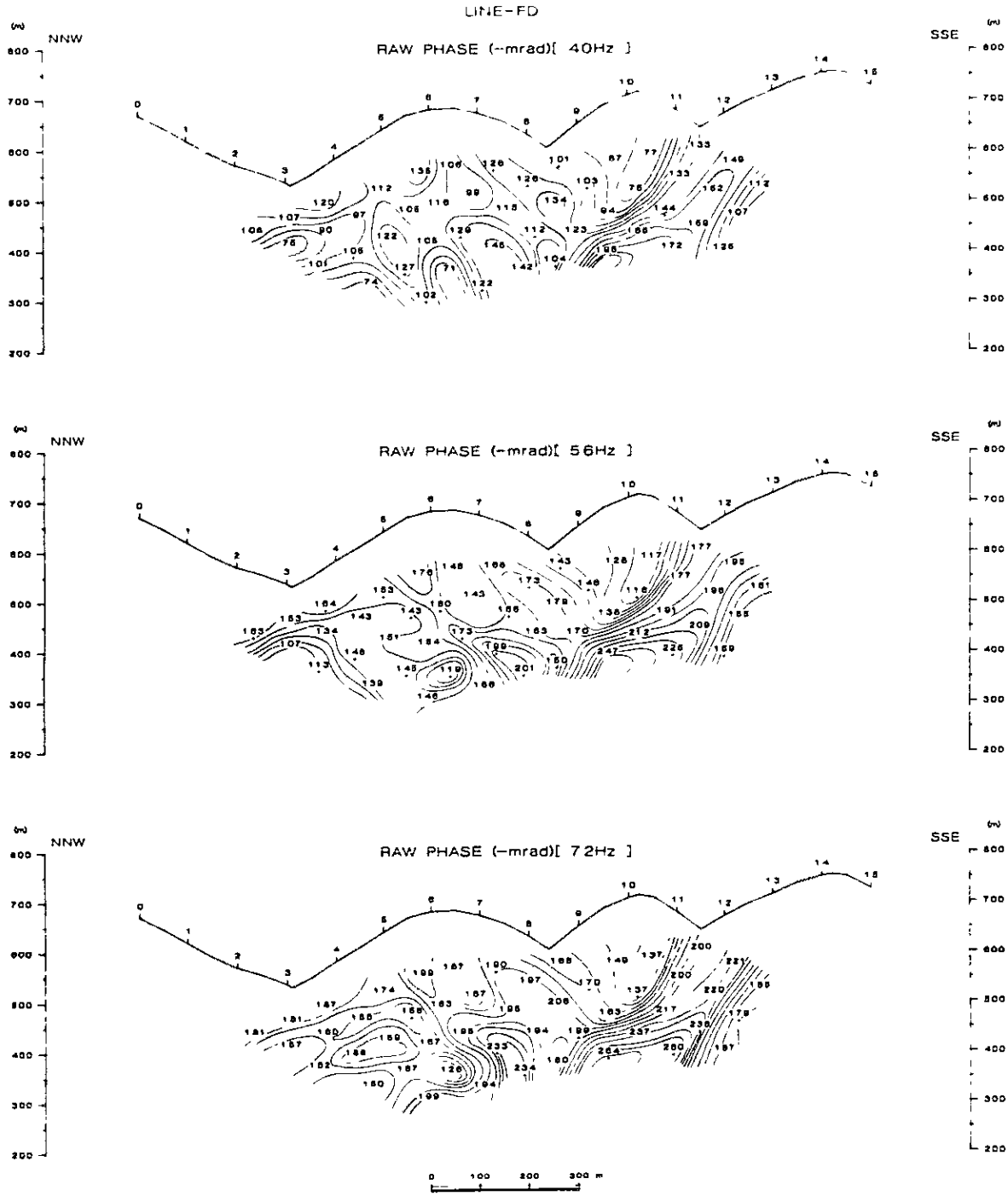

NNW
SSE
RAW PHASE (-mrad)[7Hz]


NNW
SSE
RAW PHASE (-mrad)[8Hz]


NNW
SSE
RAW PHASE (-mrad)[9Hz]

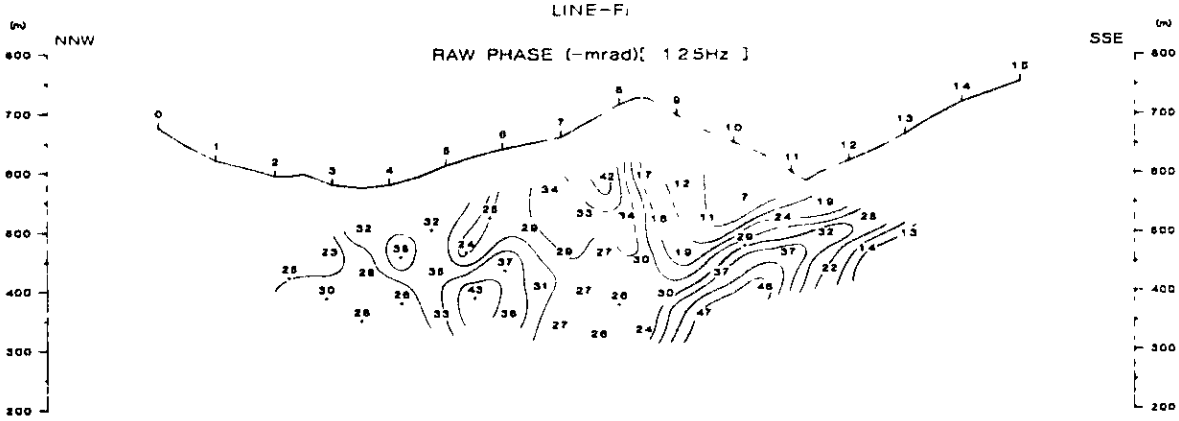

NNW
SSE
RAW PHASE (-mrad)[24Hz]
0 100 200 300 m

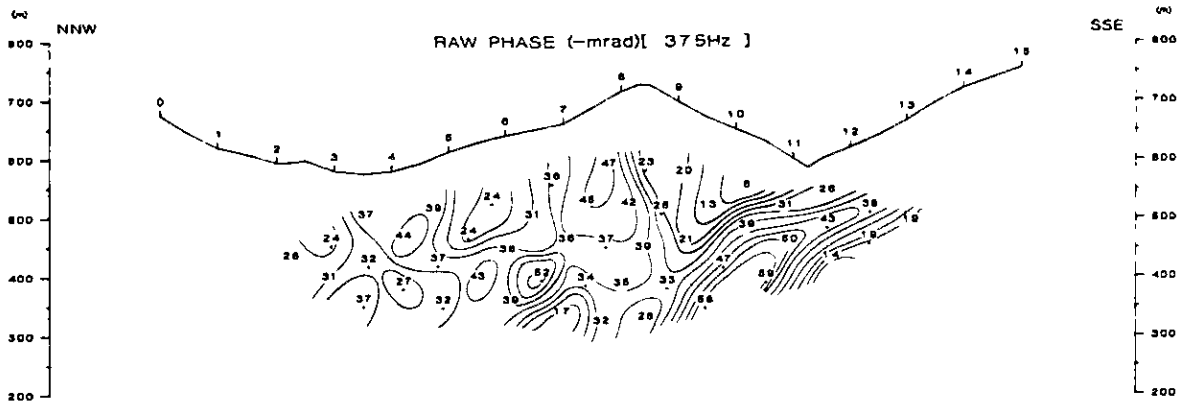
FD- 3

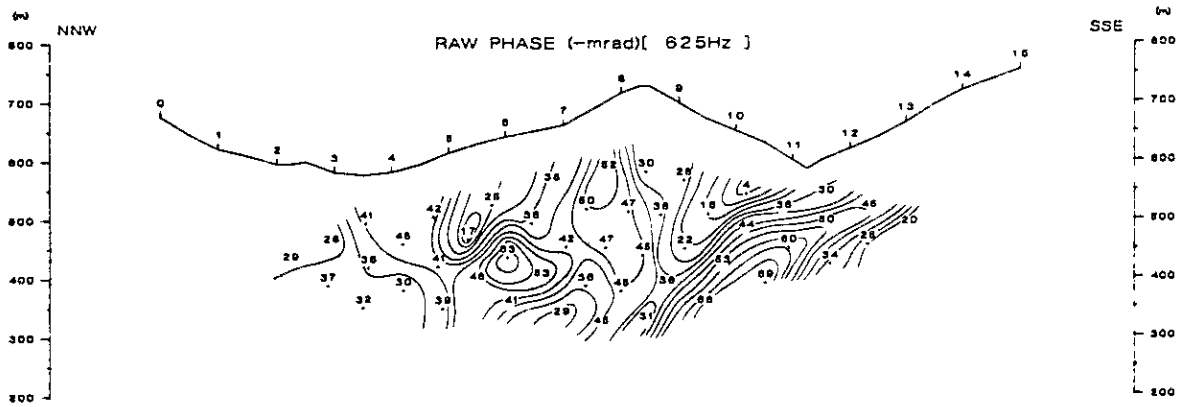

LINE-FD
RAW PHASE (-mrad)[40Hz]
RAW PHASE (-mrad)[56Hz]
RAW PHASE (-mrad)[72Hz]
NNW
SSE
(m)
800
700
600
500
400
300
200
0 100 200 300 m

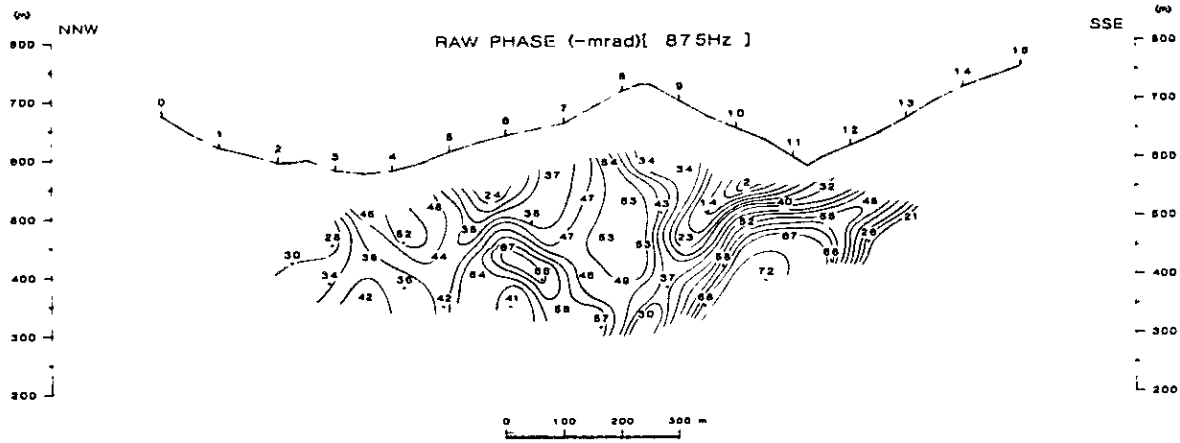
FD- 4

LINE-F1

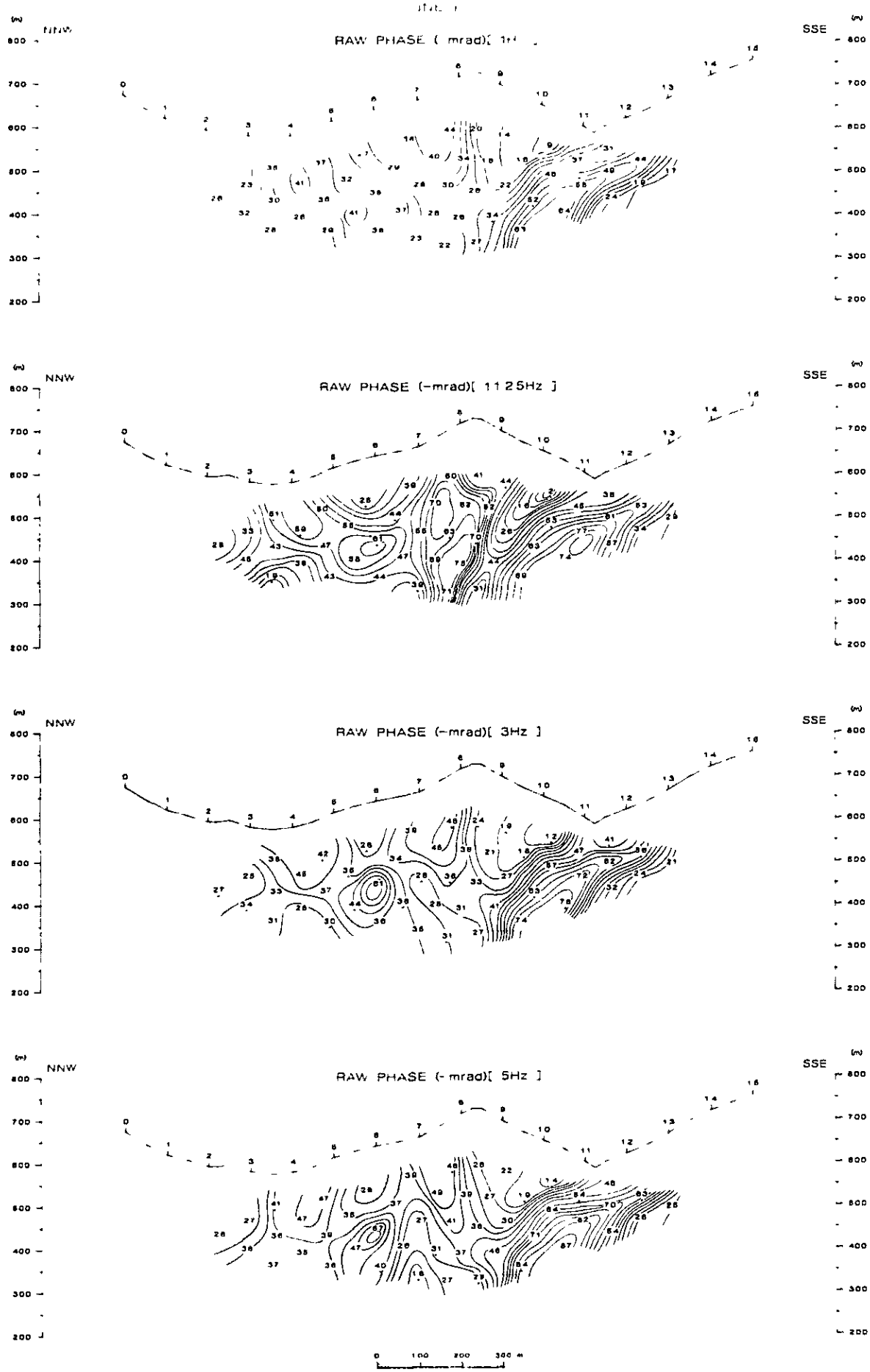

NNW
SSE
RAW PHASE (-mrad)[1.25Hz]


NNW
SSE
RAW PHASE (-mrad)[3.75Hz]

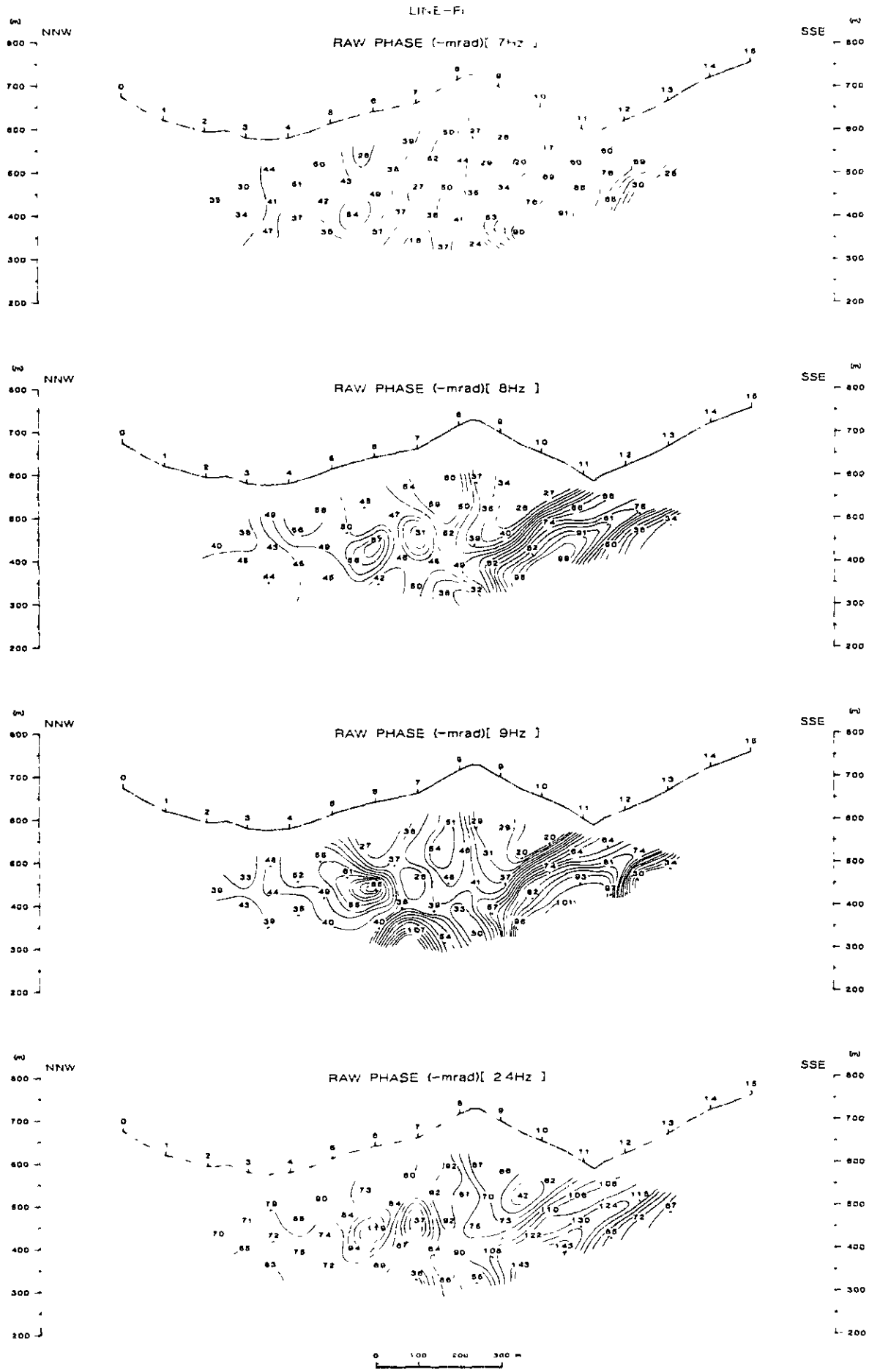

NNW
SSE
RAW PHASE (-mrad)[6.25Hz]


NNW
SSE
RAW PHASE (-mrad)[8.75Hz]
0 100 200 300 m

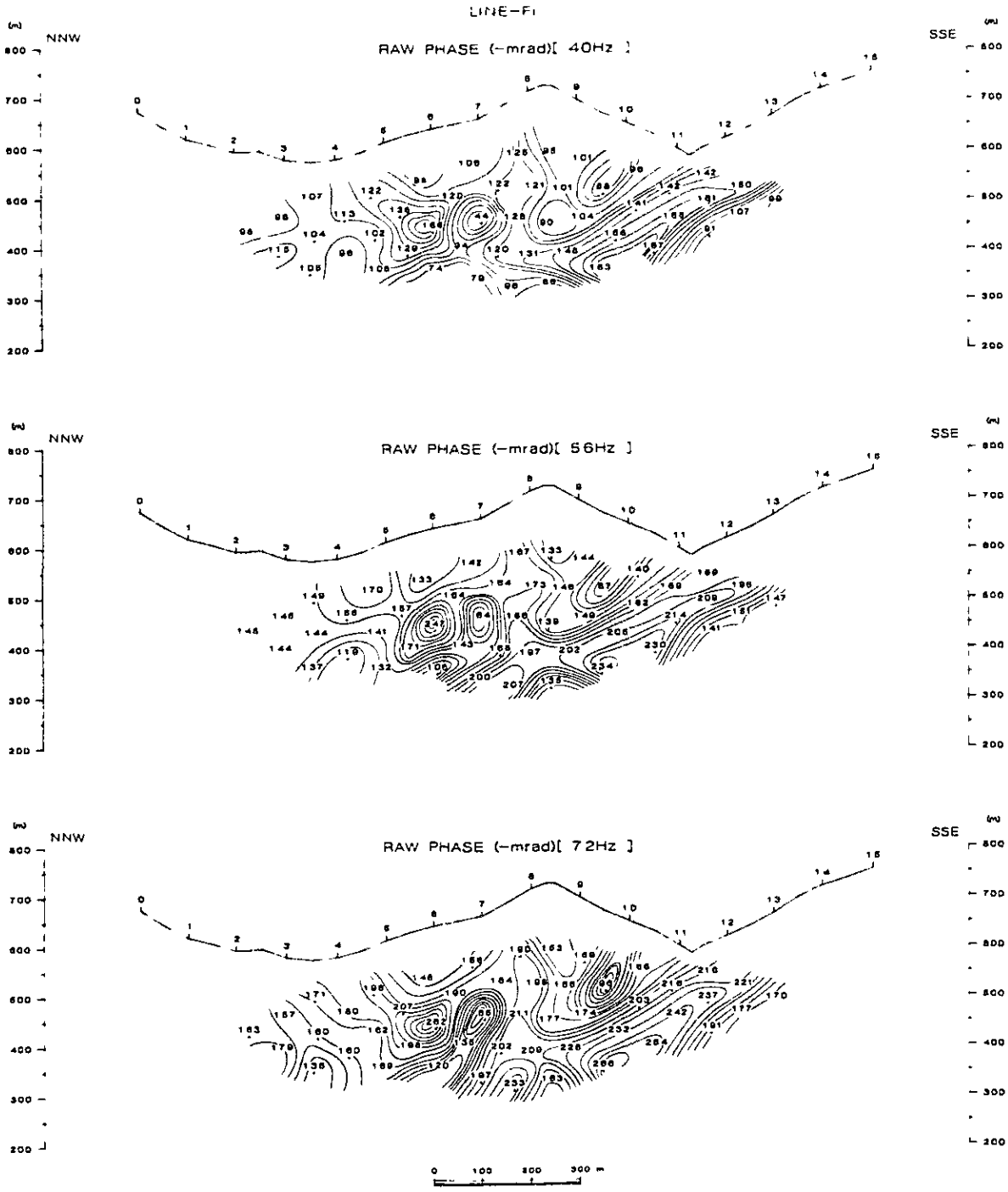
F1- 1


NNW
SSE
RAW PHASE (mrad)[1Hz]
RAW PHASE (-mrad)[1.25Hz]
RAW PHASE (-mrad)[3Hz]
RAW PHASE (-mrad)[5Hz]
(m)
800
700
600
500
400
300
200
0
100
200
300 m

FI− 2


LINE-F1
RAW PHASE (-mrad)[7Hz]
RAW PHASE (-mrad)[8Hz]
RAW PHASE (-mrad)[9Hz]
RAW PHASE (-mrad)[24Hz]
NNW
SSE
(m)
800
700
600
500
400
300
200
0
100
200
300 m

FI- 3


LINE-F1
RAW PHASE (-mrad)[40Hz]
RAW PHASE (-mrad)[56Hz]
RAW PHASE (-mrad)[72Hz]
NNW
SSE
(m)
800
700
600
500
400
300
200
0 100 200 300 m

FI- 4