

MINNOVA

MEMORANDUM

DATE:

November 13, 1990

A. J. Davidson

COPIES A
COPIES TO:

D. Watkins, I. D. Pirie

DE
FROM:

C. Burge

SUJET
SUBJECT:1990 Diamond Drill Proposal - Seneca Option**INTRODUCTION**

A 3500 meter diamond drill program is proposed to follow up high grade massive sulphide intercepts and explore new horizons at the Seneca property near Harrison Lake. B.C. The target is a precious metal rich volcanogenic massive sulphide deposit similar to those in the Noranda or Kuroko districts. The Seneca deposit has a reserve figure of 1.5 Mt of 3.57% Zn, 0.15% Pb, 0.63% Cu, 1.2 g/t Ag and .024 g/t Au as calculated by Wright Engineers in 1984. The Seneca mineralization consists, for the most part, of extraordinarily rich massive sulphide fragments of various sizes occurring within a debris flow. The footwall rocks to this mineralization show no appreciable alteration and contain no stockwork or stringer mineralization. These factors combined with the erratic nature of grades and MS intercepts within the deposit area suggest ore is of a transported nature.

The Minnova 1990 mapping and corelogging program has generated spectacular targets; a zinc exhalite similar in appearance to the Winston Lake horizon was intersected 1 km SW of the Seneca occurrence and 200 meters below in the stratigraphic pile. This horizon has been mapped across the property to form the hanging wall package to impressive stockwork type mineralization known as the Vent zone. The Vent stockwork sulphide system is accompanied by strong soda depletion affecting a number of units typical of footwall alteration pipes. Although this property has had more than 130 holes drilled, exploration is still in its infancy. No previous workers have explored using the concept of multiple potentially productive horizons or recognized the presence

of synvolcanic faults and the role they may play in localizing ore deposits.

The 1990 drill program is a two phase program. The first phase will consist of mandatory drilling to follow-up existing massive sulphide intercepts existing on the property (87-12, 85-3) and the second phase to test specific geological and geochemical targets conceptually recognized as having high potential.

GEOLOGY OF THE SENECA PROPERTY

The Seneca stratigraphy consists of dacitic lava flows, pyroclastics, andesitic flows, pyroclastics and argillite accumulations. These units have been cut by numerous felsic dikes interpreted to be feeding overlying felsic flows. The Seneca package forms an upright shallow dipping panel striking 140° SW and rock units have been exceptionally well preserved without penetrative cleavage development.

Figures 4 and 5 illustrate the geology and targets in the Pit and the Vent areas. The stratigraphic succession from oldest to youngest is described in the following sections.

Pit Area Geology and Targets (Figure 4)

Lower Dacite Pyroclastics - a thick partially welded ash flow tuff intersected in drill core only. This unit is identical to Britannia "GMS" and is a likely precursor to caldera collapse and subsequent dome building. At present it cannot be traced northwest toward the Vent area (eroded?) and shows no appreciable alteration or mineralization.

Lower Sediment Horizon - a series of ash tuff, siltstone, argillite and chert beds. Litho sampling obtained a 1635 ppm Zn from these units. (the Britannia contact)

Trough Flow - a feldspar porphyritic dacite lava dome brecciated toward the northwest. This unit is strongly silicified toward its

top and contains disseminated sphalerite mineralization.

Trough Sediments - an epiclastic sequence consisting of a distinctive quartz phyric crystal tuff, wackes and turbidite beds. These finely laminated turbidite beds are significantly enriched in zinc (0.75% Zn/1.37 m and 0.52% Zn/.91 m). This package dips beneath the Seneca stratigraphy and is relatively untested.

Pit Flow - feldspar porphyritic auto brecciated flow. 1990 mapping discovered significant disseminated zinc mineralization within this unit.

Pit Volcaniclastic - This unit is a very distinctive, heterolithic, fragment supported, fresh, lapilli size tuff which forms the footwall to the Seneca package. The unit is rich in dome clasts and its areal extent suggests it may be in some way related to the NE trending synvolcanic fault through the pit area. Northwest of the structure hematitic chert (Jasper) fragments occur at the base of this unit and toward the SW a quartz-sphalerite stockwork has developed again at the base of the unit (bottom of 85-7, 83-15, 85-6, 85-5, 83-14).

Seneca Ore Sequence - consists of a peculiar amygdaloidal andesite-basalt flow (coincident with best MS hits) often brecciated with an argillite matrix. The matrix may carry well formed pebbles of massive sulphide or other foreign fragments. A sedimentary unit referred to as the "ore zone conglomerate" may occur in place of the andesite. This unit is composed of MS fragments and foreign fragments in a ground baritic matrix. The Seneca sequence is bound by massive argillite and crystal tuff units. No alteration or stringer mineralization has been identified in this package. Massive sulphide intercepts are abrupt and quite spectacular in grade.

Seneca Andesites Pyroclastics - consists primarily of andesite crystal tuff and ash beds with minor flows. No alteration is known

in the uppermost unit in the Pit area, however argillites situated 70 meters above the Seneca Ore sequence are zinc rich. (0.45% Zn/.80 meters)

Vent Area Geology and Targets (Figure 5)

Lower Andesites - predominantly ash, crystal tuffs and andesite flows. No alteration or significant mineralization is known at present.

Lower Dacite Flow - a massive flow/dome with stockwork mineralization and a massive sulphide intercept at the top. (87-12: 5.65% Zn, 2.55% Pb, .47% Cu, 293 g/t Ag, 2.25 g/t Au /.45 meters) This intercept represents the primary follow-up target for Vent area drilling.

Dacite pyroclastics - dominantly ash and crystal tuff beds with minor lapilli tuffs. The thickness of this unit at present is unknown.

Andesite Pyroclastics - a distinctive pile of andesitic lapilli tuffs, tuff breccias containing blocks and bombs of feldspar porphyritic dome material. This unit contains copper and zinc stringer and disseminated mineralization and is strongly chlorite altered beneath the Vent dome (-Na₂O, +MgO, +K₂O). An important horizon occurs at the contact between this unit and the overlying Vent Dome. Hole 86-13 intersected 3.92% Zn, .69% Cu, .5 g/t Ag, .03 g/t Au / 3.00 meters at this contact.

Vent Flow - a massive feldspar porphyritic lava dome. This unit hosts a spectacular stockwork sulphide system. The stockwork is accompanied by soda depletion, potash enrichment and can be traced out laterally to a weak pseudobreccia. The stockwork system grades 1.39% Zn, .24% Cu, 5.7 g/t Ag, .11 g/t Au / 20 meters at the surface. The system has a vertical extent of approximately 100 meters. The intersection of this alteration pipe and overlying

sediments must be considered the primary target on the property.

Trough Sediments - in the Vent area this succession lacks argillaceous units of the pit and is represented by dacite ash tuffs and minor wackes. This unit hosts beds of laminated pyrite and pyrite rich cherty beds. These epiclastics are barium enriched.

Intrusives

Two main varieties exist, quartz feldspar porphyries and feldspar porphyritic hornblende bearing dikes. The dikes appear to be vertical to sub-vertical in nature and often, but not always trend 135°. They are usually 10 to 30 meters wide and are frequently fault bounded. The contacts with host units are never chilled and no hornfelsing occurs on the property. These units are extremely massive and always fresh with respect to mineralization and alteration. The feldspar-hornblende variety contains distinctive, vague mafic patches interpreted to be xenoliths.

The frequency of the dikes is at present a serious concern on the property. They will, no doubt, present the biggest obstacle to building tons in the event of a discovery.

TARGET AREAS

Pit Area

Nine holes are proposed for the pit area. P1 will test the immediate downdip potential of the 85-3 intercept and P11 is contingent on P1 and will assess the NW strike extent and postulated fault offset of the Seneca horizon. Two holes P5 and P2 (an extension of 85-7) will test the zinc exhalite as it dips beneath the pit area. P3 is designed to follow-up the zinc exhalite intersected in 79-21 and 79-19 and P4 and P13 will test separate soil and rock geochem. anomalies associated with the Trough sediment package. P9 and P10 are deep holes and will test

pit mineralization well downdip. These last two holes will require considerable rehabilitation of old logging roads.

Vent Area

Six holes are proposed for the Vent area. Four holes will evaluate the strike potential of mineralization encountered in 87-12 with 250 meter step-outs. P7 will test the strike extension of the trough sediments and the postulated intersection of the Vent alteration pipe. P15 will evaluate the Vent stockwork system immediately west of a large dike.

CONCLUSIONS

Despite having more than 130 holes drilled, the Seneca property remains under-explored. Early exploration was confined to the pit area and all drillholes were terminated a matter of meters below the ore horizon. The Vent area has yet to be explored using a volcanogenic massive sulphide deposit model despite the impressive stockwork exposed at surface.

The concept of stacked horizons and synvolcanic faults are novel on this property. The drill testing by previous workers clearly demonstrates that this geologic environment can produce tremendously high grade material over good widths. The proposed program will complete mandatory follow-up work as a result of previous operators intercepts and begin evaluating new horizons showing excellent promise.

Table 1. Proposed Diamond Drilling Holes – Seneca Property

Hole #	Line	Stn.	Azim.	Dip	Length	Cost	Target
			(deg)	(deg)			
P1*	2+40E	2+50N	050	-60	300 m	\$19,500	A 200 meter step-out on 85-3 MS intercept (10.1% Zn, .17 opt Au/0.64 m) situated above a 20 meter pyrite/gypsum stockwork sulphide system
P2*	1+50E	3+00S	230	-80	100 m	\$6,500	Will test zinc bearing sediments stratigraphically below the Seneca deposit. This hole is an extension of 85-7 which was terminated in Qtz-Py-Zn mineralization
P3	4+50E	10+50S	230	-70	100 m	\$6,500	P3 will test the SE strike extension of zinc bearing turbidites and a coincident barium soil anomaly.
P4*	5+00W	4+50S	230	-80	150 m	\$9,750	Will test a Cu-Pb-Ba soil anomaly within the zinc exhalite sediment package 400 m east of previous drilling.
P5	3+10W	1+20S	230	-80	100 m	\$9,750	Will test zinc bearing sediments situated stratigraphically below Seneca and in the vicinity of a postulated synvolcanic fault.
P6	92+15E	4+00N	050	-70	250 m	\$16,250	P6 will follow up MS intercept in 87-12 on section 9200E
P7*	93+20E	5+20N	050	-80	350 m	\$22,750	P7 located 250 m west of 87-2 will follow-up mineralization encountered at 200 m (.4% Zn/.6 m above 15 m of soda depletion Vent type dome stockwork
P8*	94+65E	2+20N	050	-80	200 m	\$13,000	P8 will test the east strike extension (towards the Vent) of massive sulphides intersected in 87-12.
P9	8+00W	9+00N	230	-70	750 m	\$48,750	P9 will test the Seneca deposit sequence 500 m west of the pit and 500 m down dip. This hole will also test the down dip potential of barite enriched Trough sediments.

Table 1. Proposed Diamond Drilling Holes – Seneca Property (cont.)

Hole #	Line	Stn.	Azim.	Dip	Length	Cost	Target
			(deg)	(deg)			
P10	8+50W	1+50S	230	-75	500 m	\$32,500	P10 will test the Seneca deposit sequence 750 m E and will also test barite enriched Trough seds, 300 meters downdip.
P11	00+00	4+00N	230	-80	50 m	\$3,250	P11 will test postulated occurrence of the Seneca deposit sequence stratigraphically above previous drilling 300 m W of the pit.
P12	90+00E	3+10N	050	-80	200 m	\$13,000	P12 is contingent on results of P6 and P8 and will test massive sulphides in 87-12, 250 m to the west.
P13*	7+10E	11+00S	230	-85	100 m	\$6,500	P13 will test a Cu, Pb and Zn anomaly in Trough sediments more than 500 meters SE of all previous drilling.
P14	92+15E	1+20N	230	-70	200 m	\$13,000	P14 will test the continuity of massive sulphides intercepted in 87-12, 200 m S.
P15	96+65E	2+35N	050	-80	150 m	\$9,750	P15 will test postulated extension of Vent stockwork west of an FHP dike.
Total 3500 m \$227,500 3150 m							

Costs include direct drilling costs, assays, salaries @ \$65/m

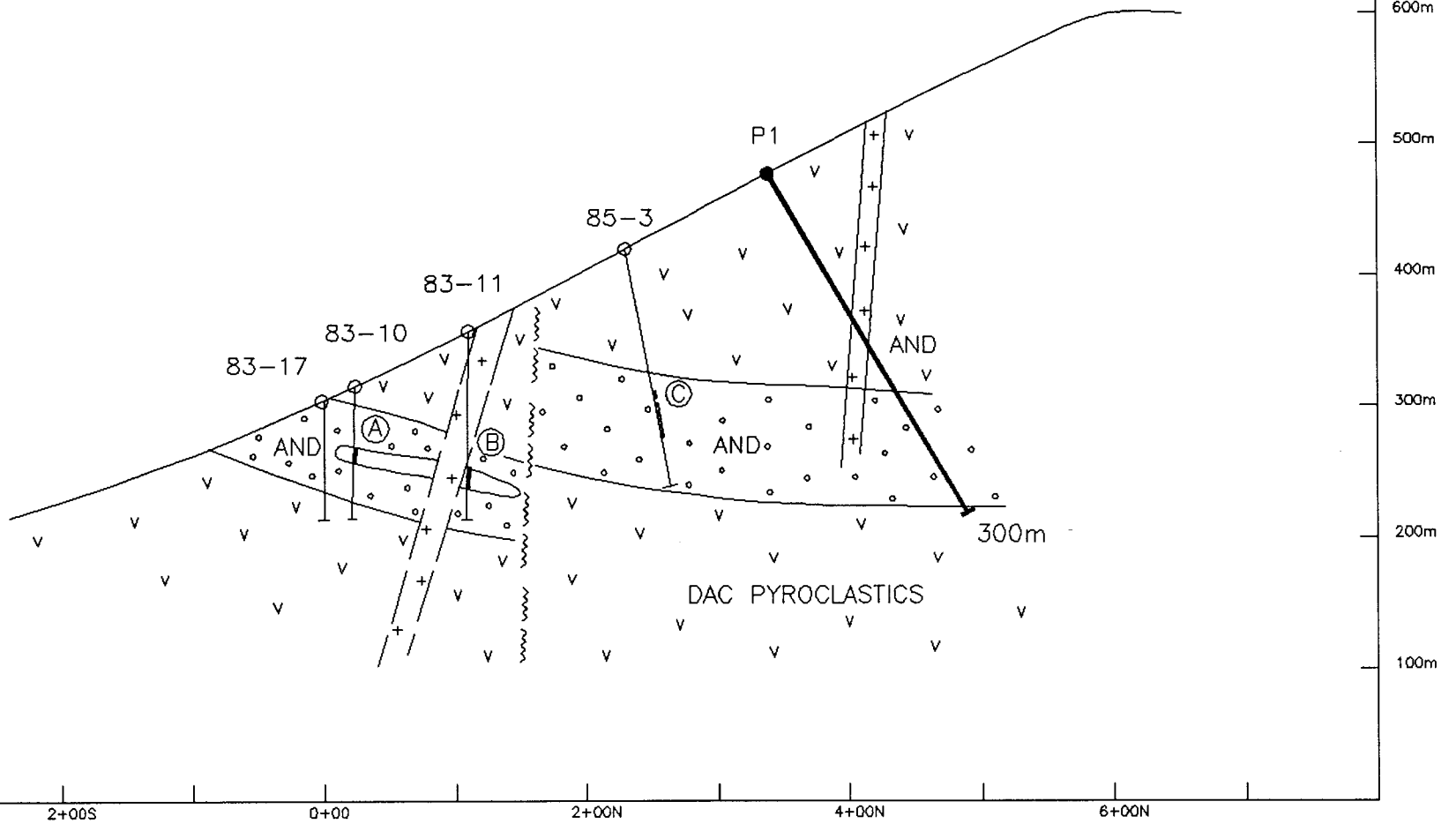
** are top priority holes for the 1990 program: 1000 m, \$65,000*

P9 and P10 are proposed for the 1991 field season

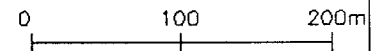
SW

NE

- Ⓐ .88% Cu, 3.56% Zn, .17% Pb, 64g/t Ag, 1.07g/t Au/10.30m
- Ⓑ .70% Cu, 5.20% Zn, .09% Pb, 48g/t Ag, 1.47g/t Au/4.14m
- Ⓒ .36% Cu, 10.10% Zn, .72% Pb, 247g/t Ag, 5.97g/t Au/0.64m



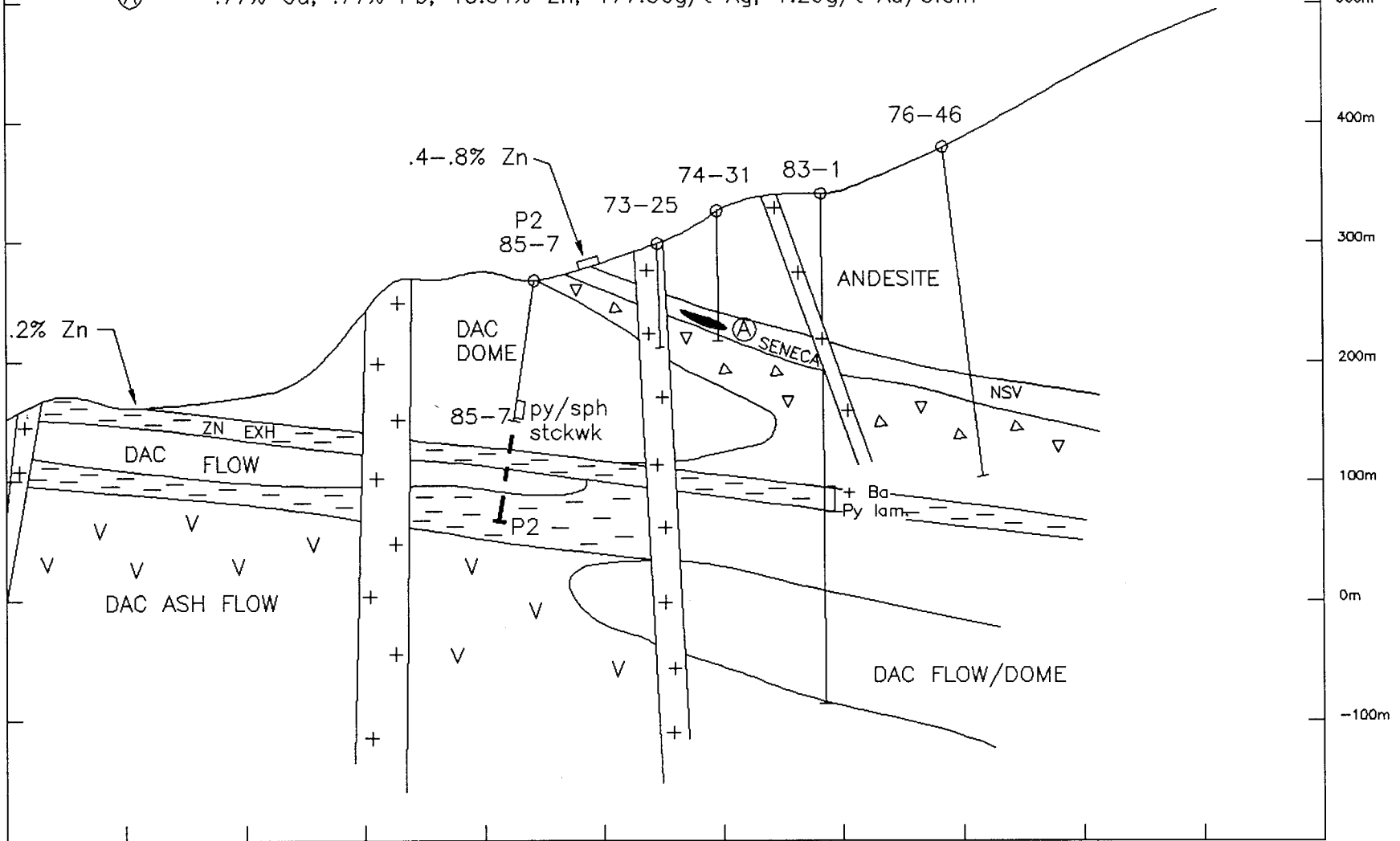
SECTION 0+00 (P1)



SW

NE

Ⓐ .77% Cu, .77% Pb, 15.91% Zn, 177.56g/t Ag, 1.29g/t Au/5.0m



4+00S

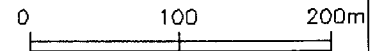
2+00S

0+00

2+00N

4+00N

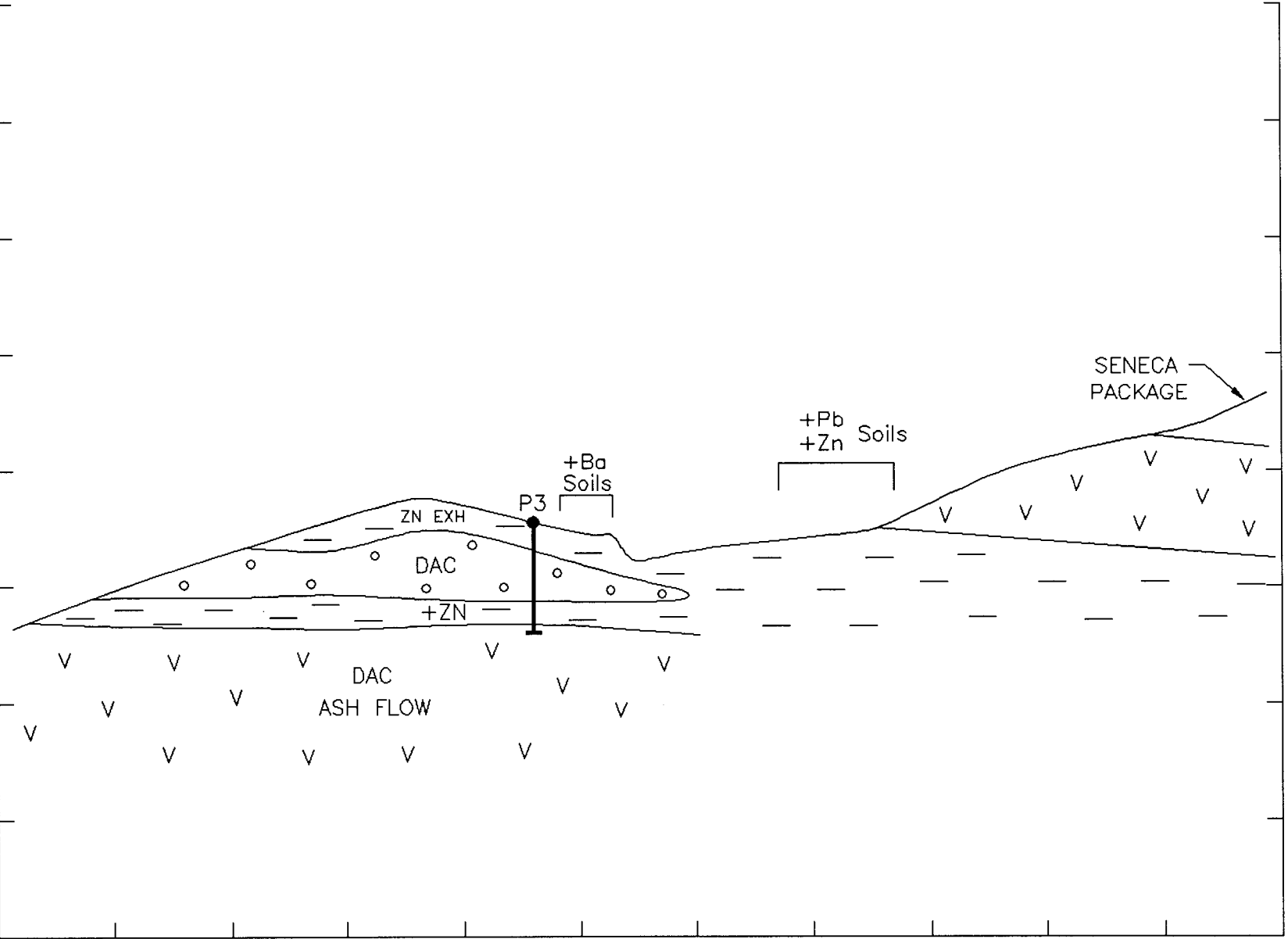
SECTION 3+50 EAST (P2 -EXTENSION OF 85-7)



SW

NE

500m
400m
300m
200m
100m
0m
-100m



6+00S

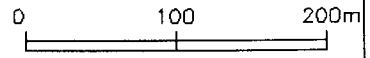
4+00S

2+00S

0+00

2+00N

SECTION 11+50E (P3)



SW

NE

Ⓐ

2.53% Cu, .13% Pb, 10.5% Zn, 69.2g/t Ag, 3.25g/t Au/6.4m

600m

500m

400m

300m

200m

100m

0m

SENECA PIT

74-37

+Ba,+Cu,+Pb
Soil Anomaly

P4

P5

DAC FLOW

ASH FLOW

DAC FLOW

ZN EXH

ZN EXH

150m

100m

10+00S

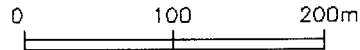
8+00S

6+00S

4+00S

2+00S

SECTION 0+50W LOOKING NORTHWEST (P4, P5)



SW

NE

Ⓐ

.49% Cu, 1.15% Pb, 4.67% Zn, 76.8g/t Ag, .80g/t Au/3.05m
includes .45 meters of MS grading .46% Cu, 1.76% Pb, 5.59% Zn,
294g/t Ag, 2.25g/t Au

500m

400m

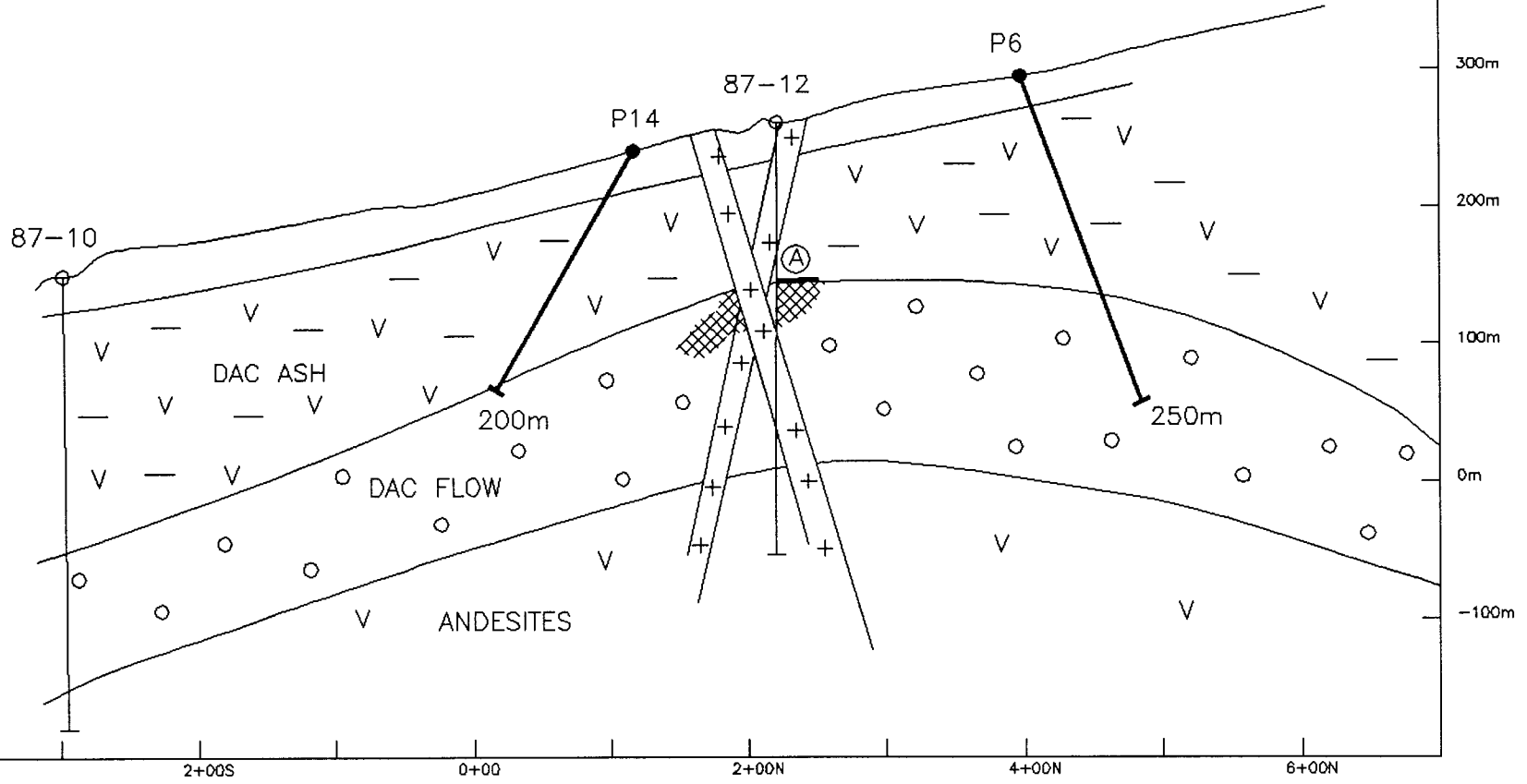
300m

200m

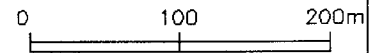
100m

0m

-100m



SECTION 92+20E (P6, P14)



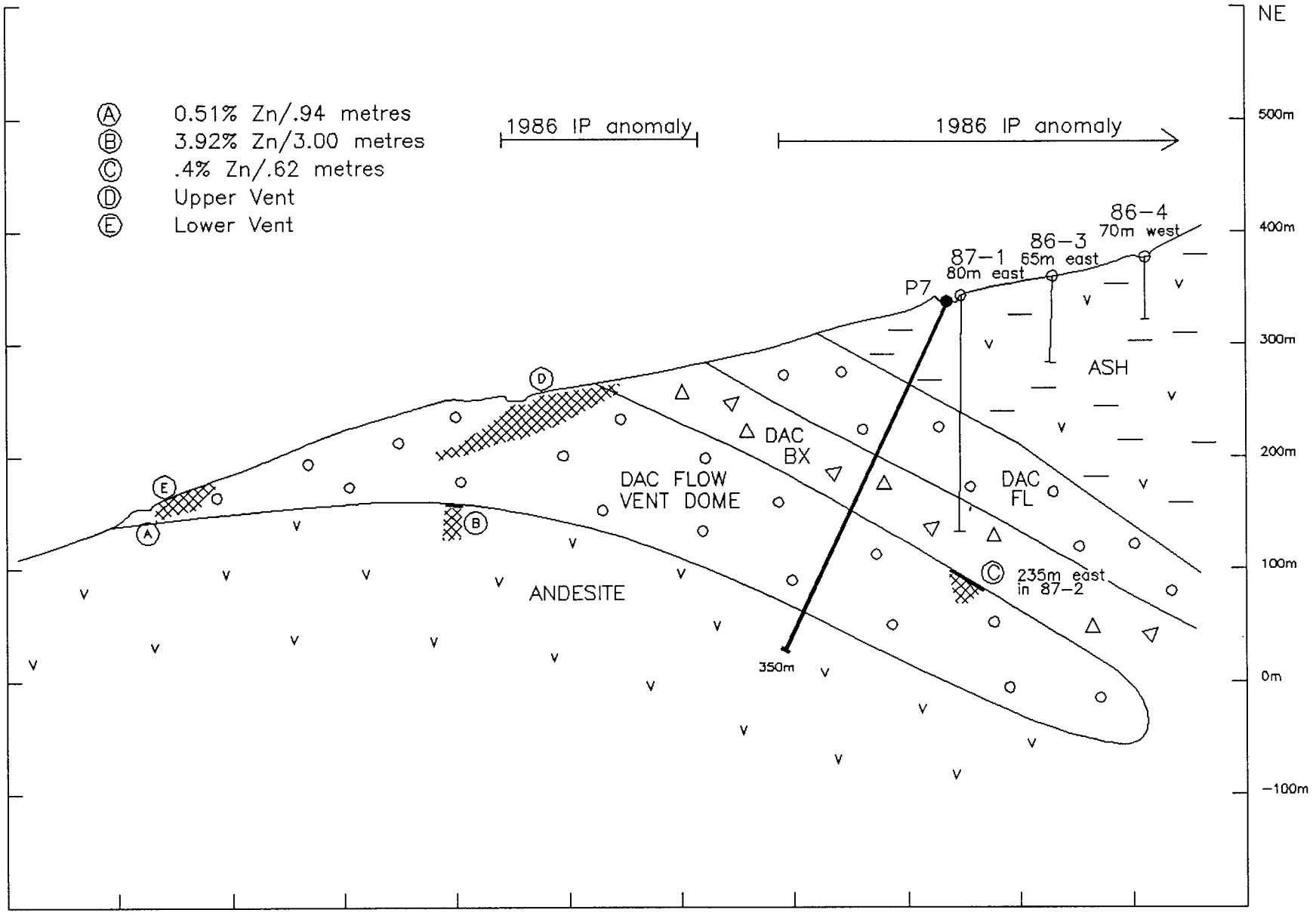
SW

NE

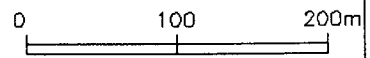
- (A) 0.51% Zn/.94 metres
- (B) 3.92% Zn/3.00 metres
- (C) .4% Zn/.62 metres
- (D) Upper Vent
- (E) Lower Vent

1986 IP anomaly

1986 IP anomaly



SECTION 98+20E (P7)



SW

NE

1986 IP anomaly

500m

400m

300m

200m

100m

0m

-100m

P8

DAC ASH

DAC ASH

200m

ANDESITE

2+00S

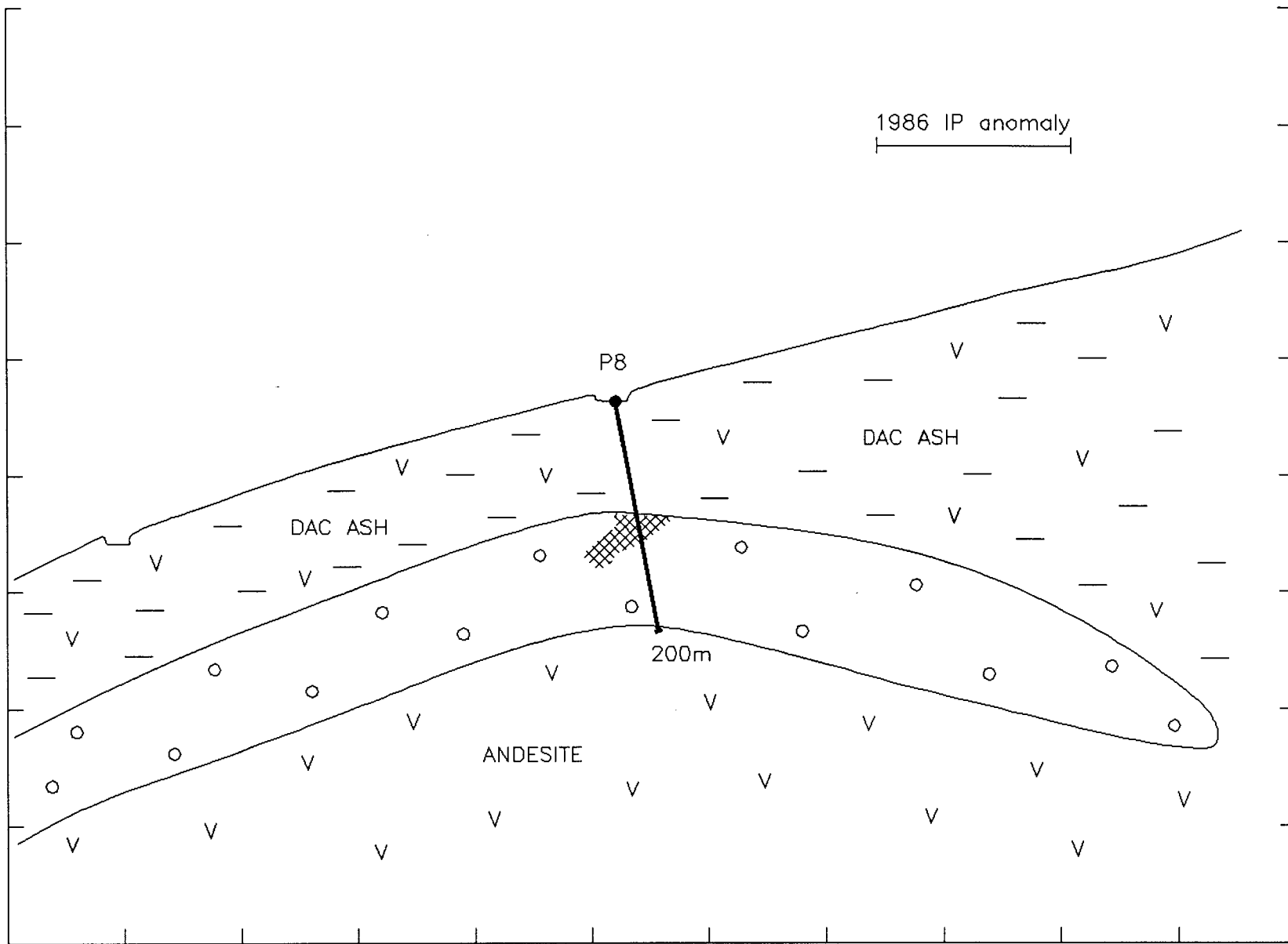
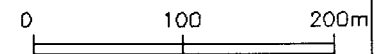
0+00

2+00N

4+00N

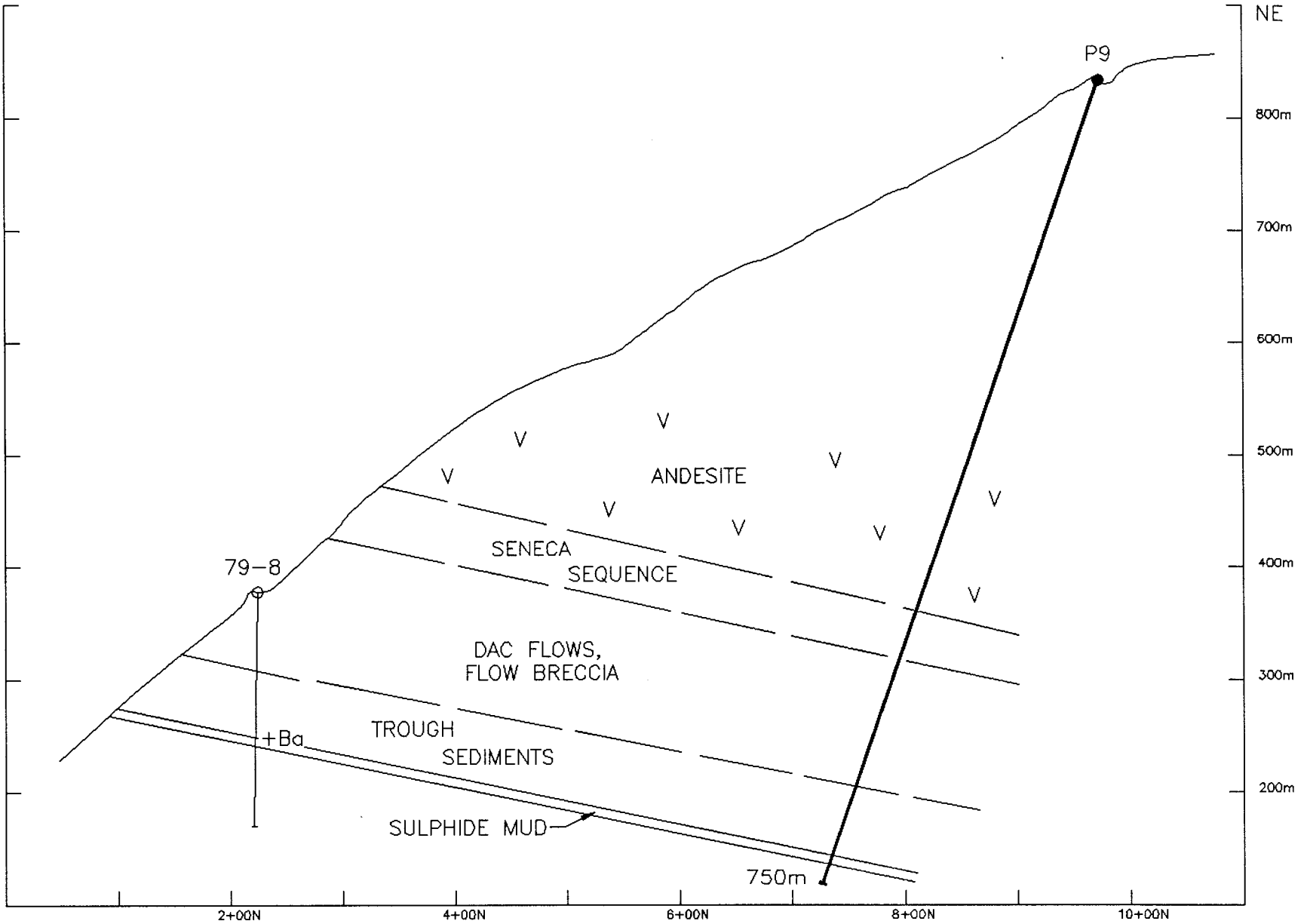
6+00N

SECTION 94+65E (P8)

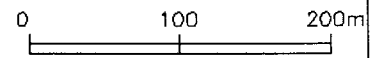


SW

NE



SECTION 5+00W (P9)



SW

NE

600m

500m

400m

300m

200m

100m

0m

P10

ANDESITE

SENECA PACKAGE

TROUGH SEDIMENTS

DAC FLOW

75-42

+Ba
.8% Zn

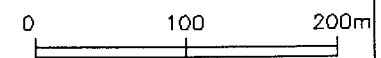
79-15 +Zn Soils

+Zn
+Pb Soils

AND
DYKE
QTZ
SPH
STCKWK

500m

SECTION 7+00E (P10)



SW

NE

700m

600m

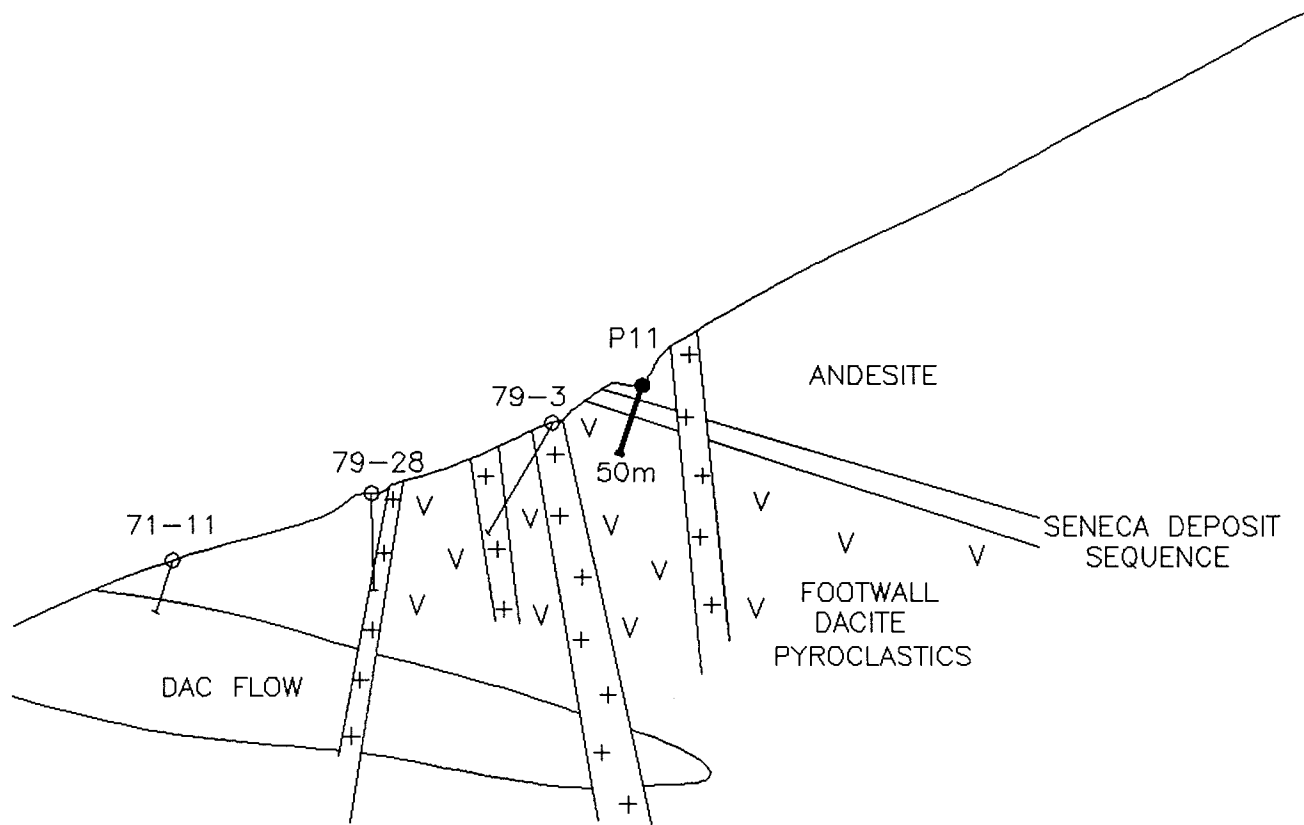
500m

400m

300m

200m

100m



2+00S

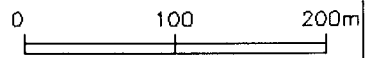
0+00

2+00N

4+00N

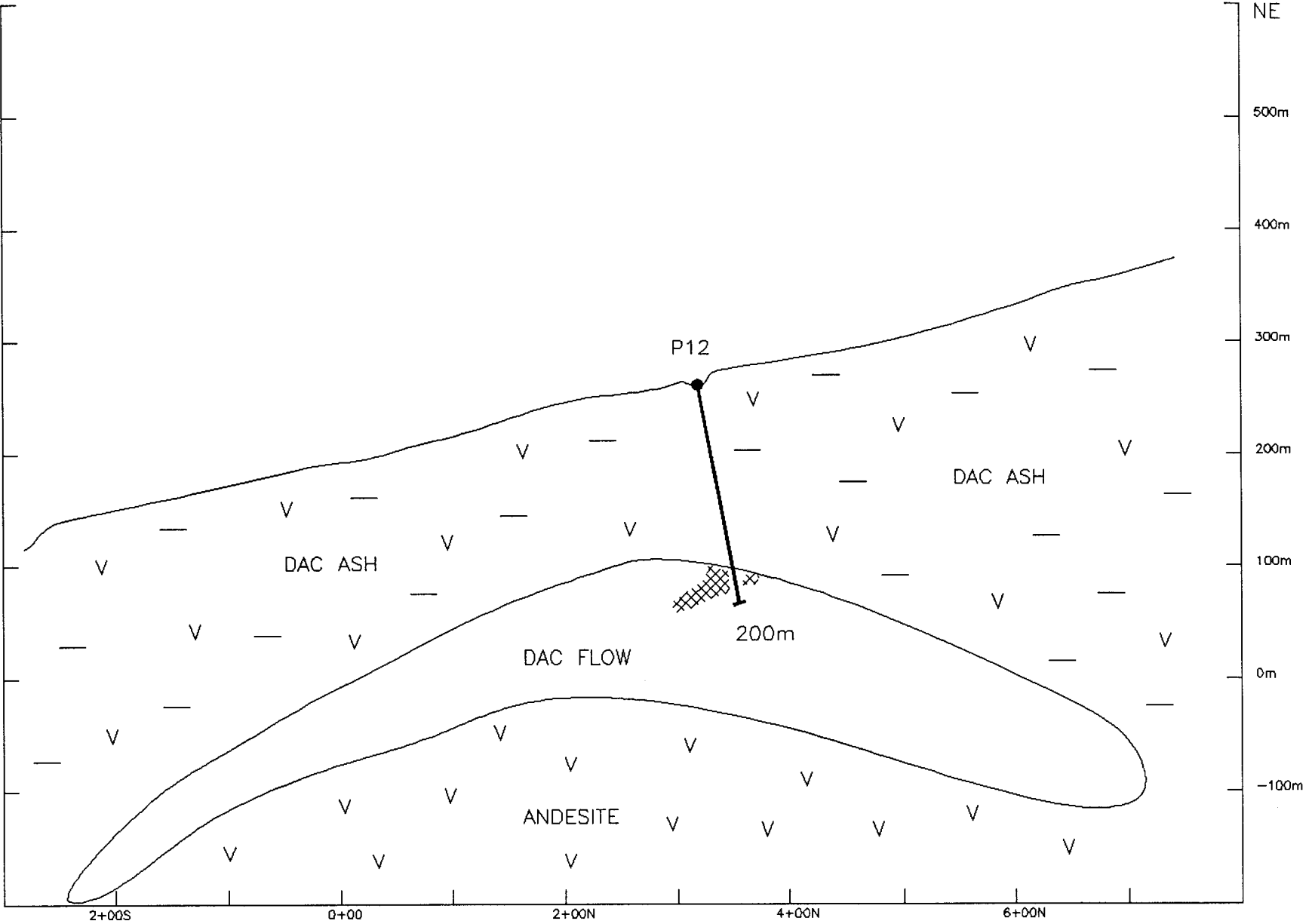
6+00N

SECTION 3+20W (P11)

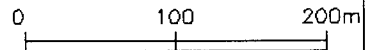


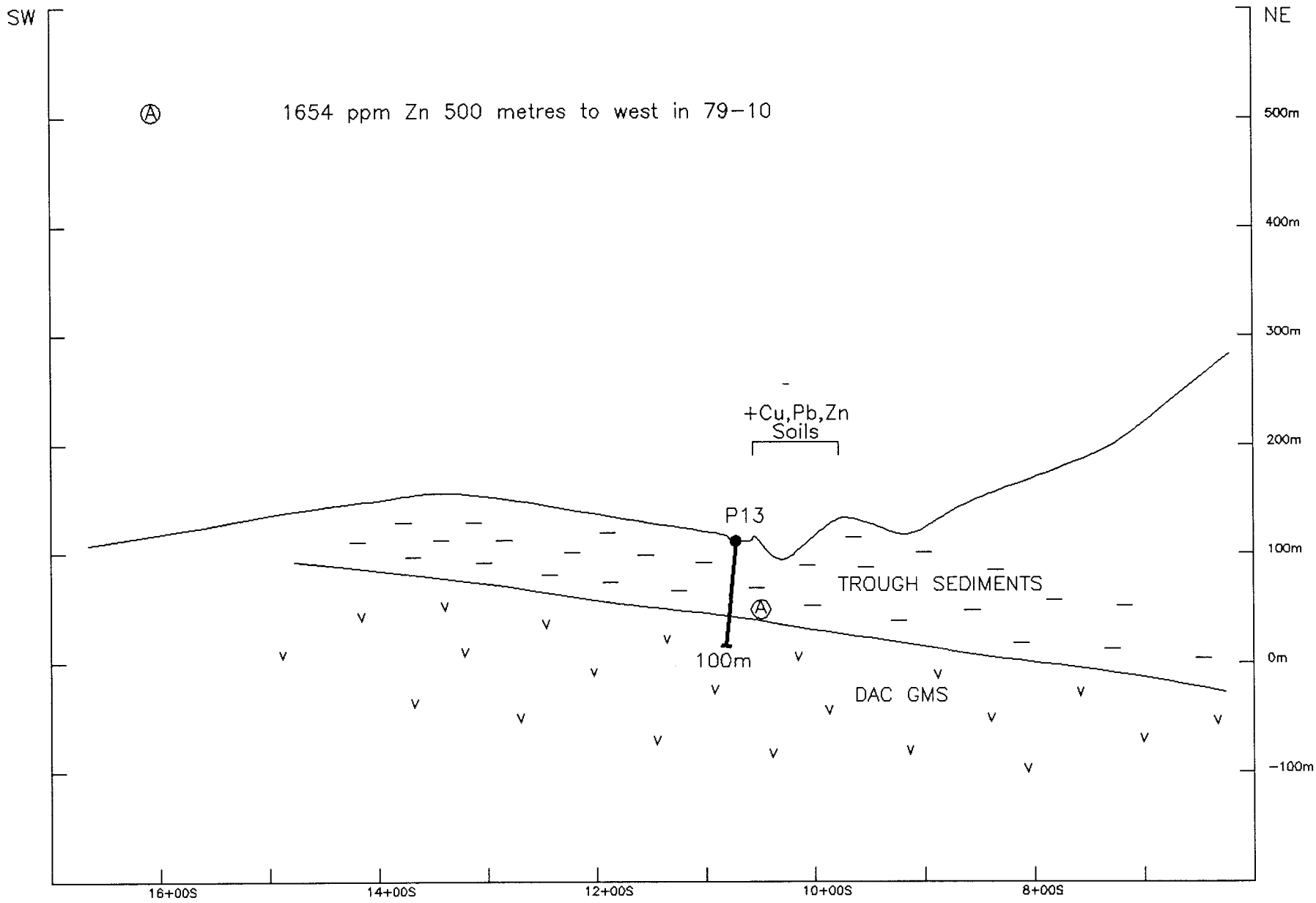
SW

NE



SECTION 90+00E (P12)





SECTION 13+50E (P13)

SW

NE

500m

400m

300m

200m

100m

0m

-100m

1986 IP anomaly

P15

DAC ASHES

DAC FLOW

ANDESITE

150m

0+00

2+00N

4+00N

6+00N

8+00N

SECTION 96+65E (P15)

