092H/05
Seneca

FIELD

820838

MINNOVA

MEMORANDUM

DATE: April 25, 1991

A TO: A. J. Davidson

COPIES À COPIES TO: D. H. Watkins, I. D. Pirie

DE FROM: C. Burge

SUJET SUBJECT: **1991 Diamond Drill Proposal - Seneca Option**

The following proposal is designed to supplement the 1990 diamond drill proposal (November 13, 1990).

A **4000 meter** drill program is proposed to follow up high grade massive sulphide intercepts and explore new horizons at the Seneca property. The program will take place in two stages; a spring 3000 meter program and a fall program consisting of 1000 meters.

Seneca Pit Area Targets

The Seneca pit area is the site of the Seneca deposit. The deposit consists of several massive sulphide intersections at the same stratigraphic interval over an area measuring 450m by 250 m. Unfortunately infill drilling was unable to establish continuity between these zones. The apparent random distribution of massive sulphides, lack of metal zonation and lack of a footwall stockwork/alteration pipe suggest that massive sulphides have been mechanically transported to their current position.

The potential in the Seneca pit area will be evaluated with four holes that will test the downdip potential. P1 (and P11) will follow up massive sulphides intersected in 85-3 situated 35 meters above the Seneca horizon. This intercept is underlain by a 20 meter gypsum bearing sphalerite-pyrite stockwork and may represent an important new horizon. P9 and P10 are 700m and 400m stepouts north and east of the deposit and will be drilled in the fall due to access difficulties (snow).

A total of four short holes and one extension (85-7) will test zinc bearing turbidite situated 100 meters stratigraphically below the Seneca horizon. The holes will test trace element soil anomalies emanating from this highly prospective sediment package. The target horizon is underlain by a dacitic ash flow tuff, an important contact in the nearby Britannia camp (P2,3,4,5,13).

Vent Area Targets

The Vent showing is located 1.8 km. west of the Seneca occurrence and was discovered during a logging operation in 1985. The Vent discovery is a spectacular sphalerite rich stockwork developed in a felsic dome and outcrop channel samples yielded zinc values averaging 9% over 9 meters. The mineralization is accompanied by a soda depletion zone measuring 200m by 400m and cuts across several units in a northerly direction. P15 will test stratigraphy above the most intense and stratigraphically highest alteration in the Vent area.

Six holes are proposed to follow up a 1987 intercept grading .43% Cu, 1.2% Pb, 5.68% Zn, 80 gpt Ag and .8 gpt Au/3.03 meters (P6-8, P12, P14, P15). The immediate hanging wall unit contains over 5% barium and the sulphides are underlain by a 25 meter soda depleted zinc rich stockwork. This intersection is open in all directions and occurs about 800 meters west of the spectacular Vent stockwork showing.

P16, located 200m east of the Vent zone, will test the lower contact of the Vent dome where a 3 meter zone graded 3.92% Zn. P17 will test the Vent rhyolite lower contact where it coincides with a Mag and VLF conductor.

Geophysics

A VLF-EM and Mag survey has just been completed over the Vent area and has provided conductors that support our geologic interpretation. Two main conductive zones occur above and below the Vent rhyolite. The strongest conductor occurs in the area grid northwest of the Vent stockwork system and west of S-90-01. The conductive zone measures 500 meters (L93E to L98E at 3+75N) and will be tested by P7.

All drillholes will be probed using Pulse EM methods and if mineralized zones provide a response a large in-loop survey of the Vent area will be undertaken.

Conclusions

The 1991 drill program will test top priority targets generated during the 1990 field season. A complete evaluation of all previous work combined with an integrated exploration approach has led to development of good solid targets and further refinement of the geologic model for the property. The Vent area has not been tested using VMS exploration concepts despite being within 2 km of transported Kuroko type ore of the Seneca deposit. The 1991 program will complete mandatory follow-up work as a result of previous operators and begin evaluating new horizons showing excellent promise.

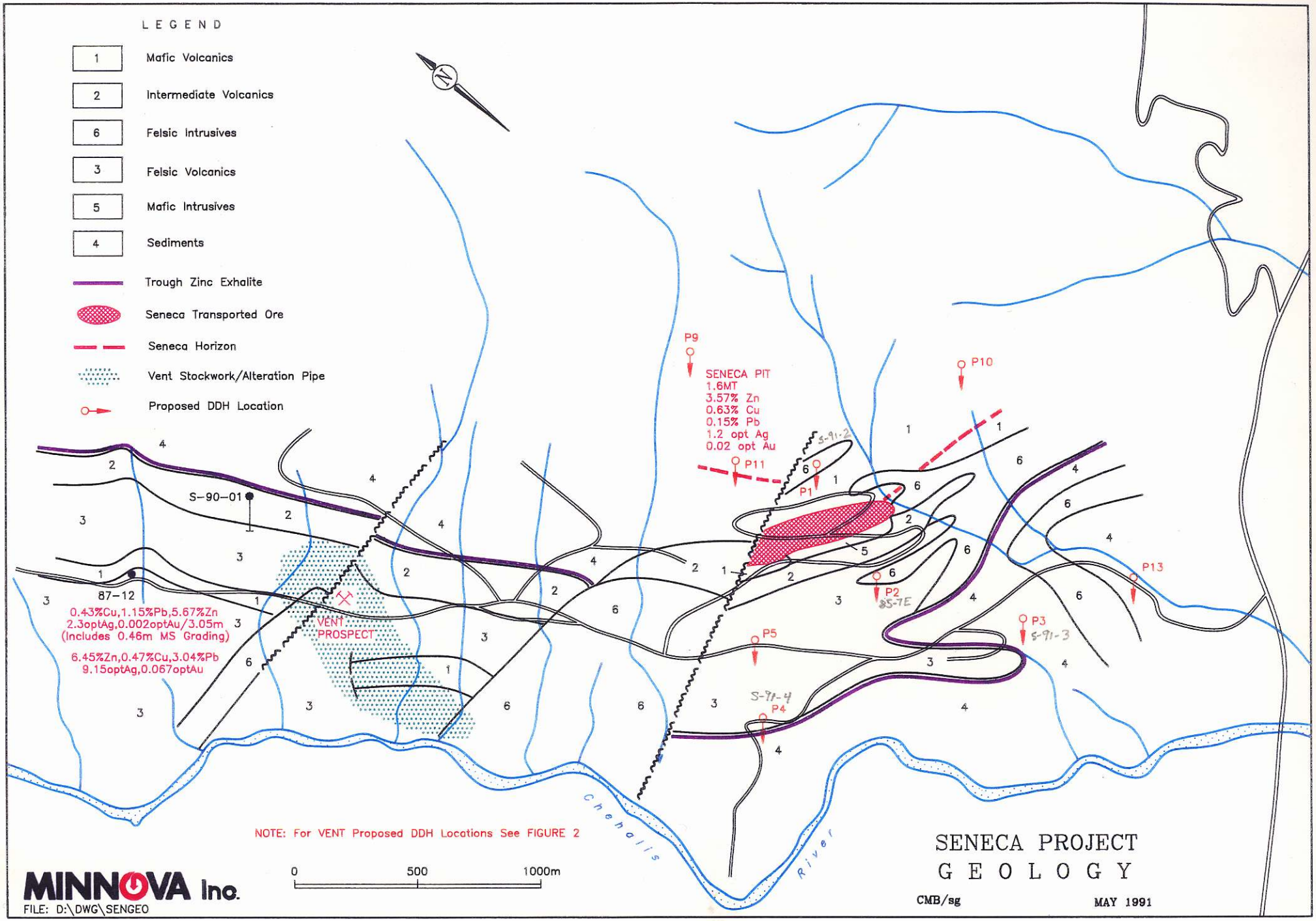
Table 1. Proposed Diamond Drilling Holes – Seneca Property

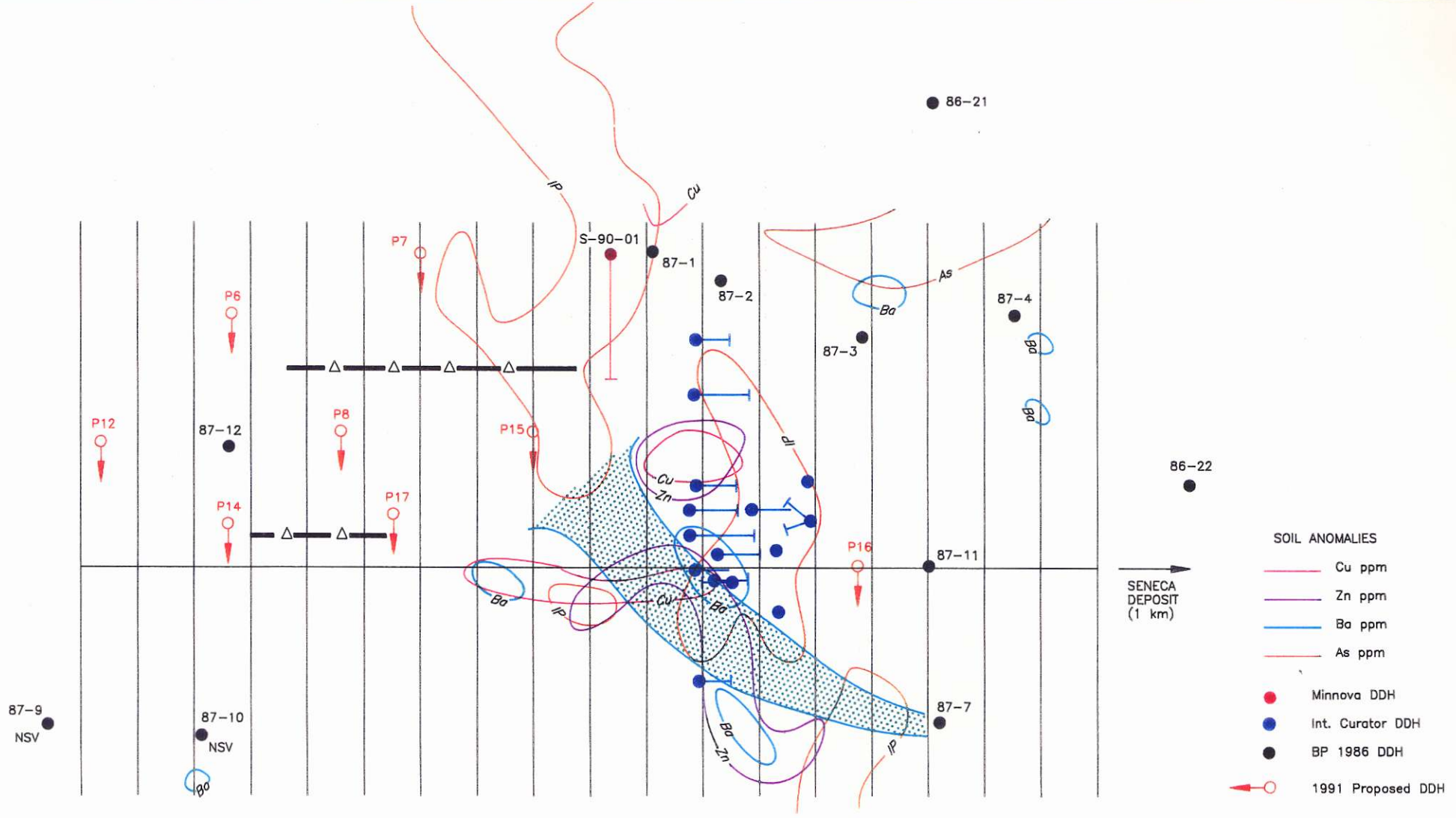
	Hole #	Line	Stn.	Azim. (deg)	Dip (deg)	Length	Cost	Target	
S91-02	P1	2+40E	2+50N	050	-60	300.2 300 m	$19,500	A 200 meter step-out on 85-3 MS intercept (10.1% Zn, .17 opt Au/0.64 m) situated above a 20 meter pyrite/gypsum stockwork sulphide system	S91-02
85-7	P2	1+50E	3+00S	230	-80	170.1 100 m	$6,500	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	
S91-03	P3	4+35E	10+20S	050	-80	159.7 100 m	$6,500	P3 will test the SE strike extension of zinc bearing turbidites and a coincident barium soil anomaly.	
S91-04	P4	5+00W	4+50S	230	-80	149.7 150 m	$9,750	Will test a Cu-Pb-Ba soil anomaly within the zinc exhalite sediment package 400 m east of previous drilling. rods stuck	
	P5	3+10W	1+20S	230	-80	150 m	$9,750	Will test zinc bearing sediments situated stratigraphically below Seneca and in the vicinity of a postulated synvolcanic fault.	
S91-09	P6	92+15E	4+00N	~~050~~	-90 ~~-70~~	206.5 250 m	$16,250	P6 will follow up MS intercept in 87-12, 250 m North	
S91-05	P7	96+00E	5+70N	230 ~~050~~	-80	275.8 350 m	$22,750	P7 will test an IP anomaly west of S-90-01	
S91-07	P8	94+65E	2+20N	050	~~-80~~ -75	211.8 200 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 westof the pit and 500 m downdip. This hole will also test the downip potential of barite enriched Trough sediments.	

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

	Hole #	Line	Stn.	Azim. (deg)	Dip (deg)	Length	Cost	Target
	P10	8+50W	1+50S	230	–75	600 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.
S-91-10	P12	90+00E	3+10N	230 ~~050~~	-75 ~~–80~~	246.3 200 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.
S91-08	P14	91+85E	1+30N	230	-80 ~~–70~~	221.9 ~~200 m~~	$13,000	P14 will test the continuity of massive sulphides intercepted in 87–12, 200 m S.
S91-06	P15	97+00E	1+80N	050 ~~280~~	–80	226.8 200 m	$13,000	P15 will test the Vent alteration pipe 300 m west and continue testing the 87–12 MS horizon 525 m E.
	P16	101+87E	0+15S	230	–80	200 m	$13,000	P16 tests Vent dome/And–white fragment breccia contact
	P17	95+35E	0+35S	230	–80	100 m	$6,500	P17 will test the lower Vent horizon and a coincident Mag/VLF anomaly
			Total			4000 m	260,000	

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


LEGEND
1 Mafic Volcanics
2 Intermediate Volcanics
6 Felsic Intrusives
3 Felsic Volcanics
5 Mafic Intrusives
4 Sediments
Trough Zinc Exhalite
Seneca Transported Ore
Seneca Horizon
Vent Stockwork/Alteration Pipe
Proposed DDH Location
P9
SENECA PIT
1.6MT
3.57% Zn
0.63% Cu
0.15% Pb
1.2 opt Ag
0.02 opt Au
P10
P11
P1
S-91-2
S-90-01
87-12
0.43%Cu,1.15%Pb,5.67%Zn
2.3optAg,0.002optAu/3.05m
(Includes 0.46m MS Grading)
6.45%Zn,0.47%Cu,3.04%Pb
9.15optAg,0.067optAu
VENT
PROSPECT
P2
85-7E
P3
S-91-3
P5
S-91-4
P4
P13
Chehalis
River
NOTE: For VENT Proposed DDH Locations See FIGURE 2
0
500
1000m
MINNOVA Inc.
FILE: D:\DWG\SENGEO
SENECA PROJECT
GEOLOGY
CMB/sg
MAY 1991



87-12 : 0.43%Cu,1.15%Pb,5.67%Zn,79.8g/tAg,0.79g/tAu/3.05m @ 125m depth

IP Anomaly

Na2O Depletion Zone

VLF Conductor Axis

0 100 200 300m

SCALE: 1 : 10000

SENECA PROJECT
VENT GRID

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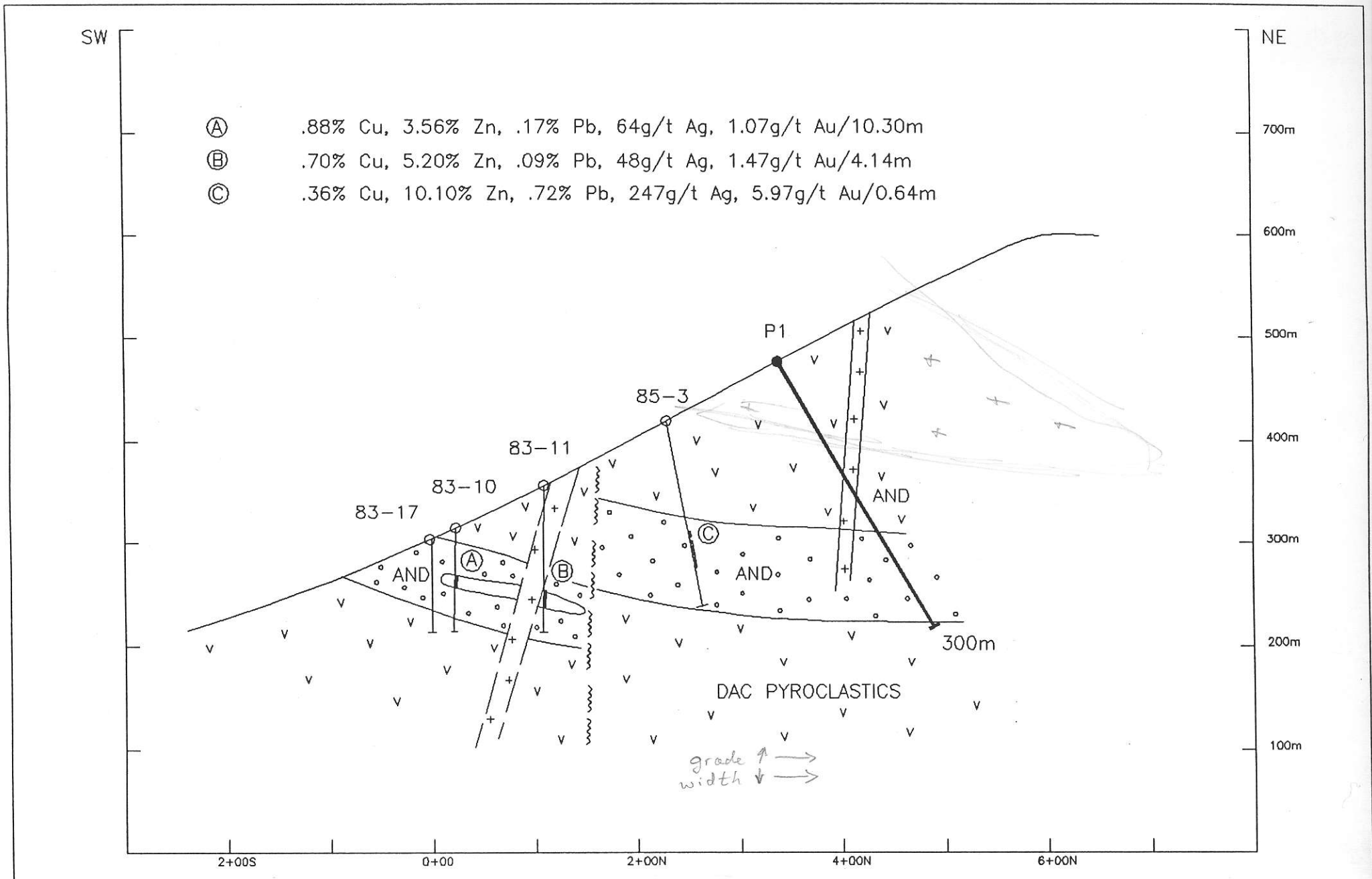
FILE: VENTME.DWG



SECTION 0+00 (P1)

0 100 200m

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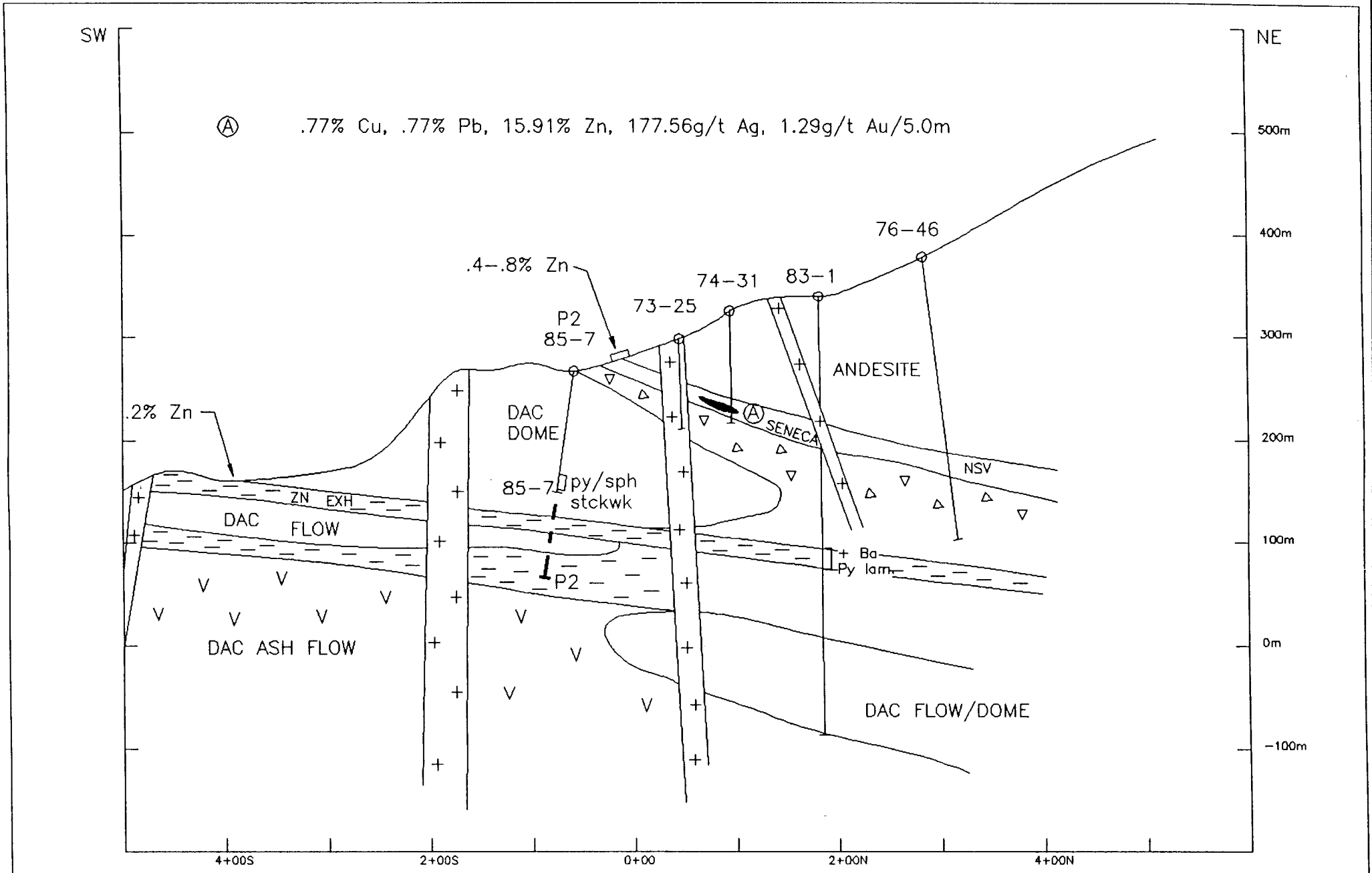

SECTION 3+50 EAST (P2 -EXTENSION OF 85-7)

0 100 200m

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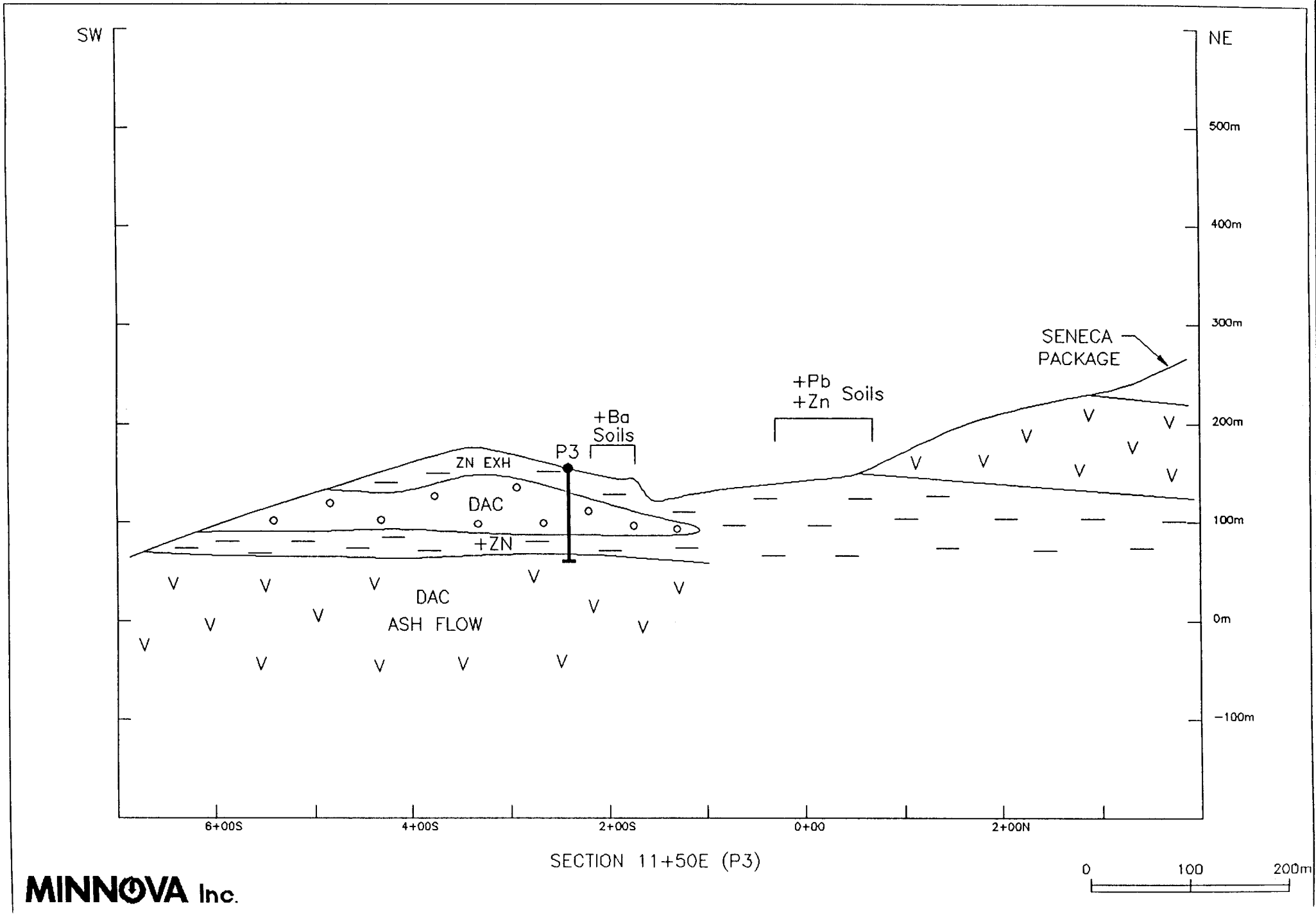
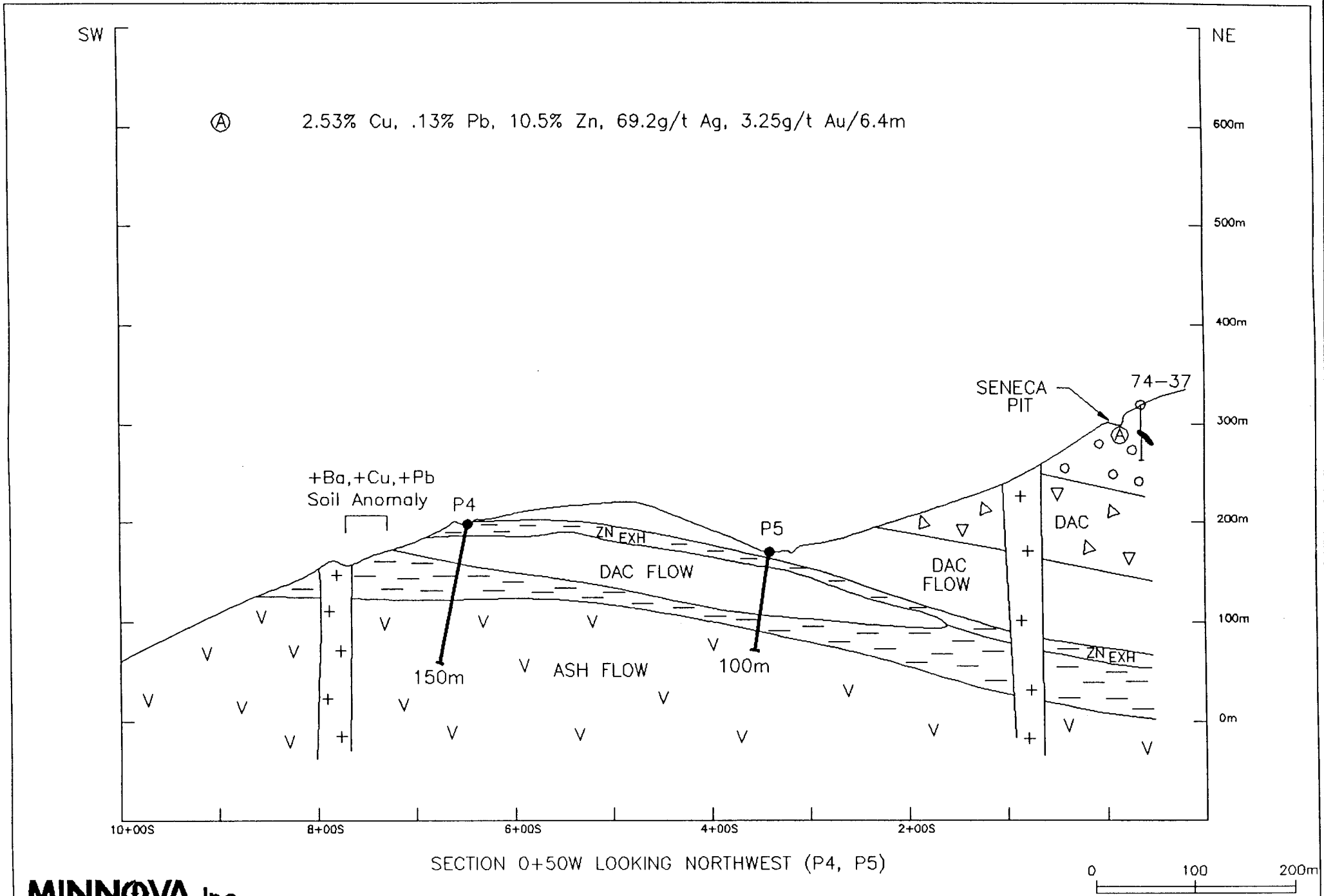


SECTION 11+50E (P3)

0 100 200m

MINNOVA Inc.



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

0 100 200m

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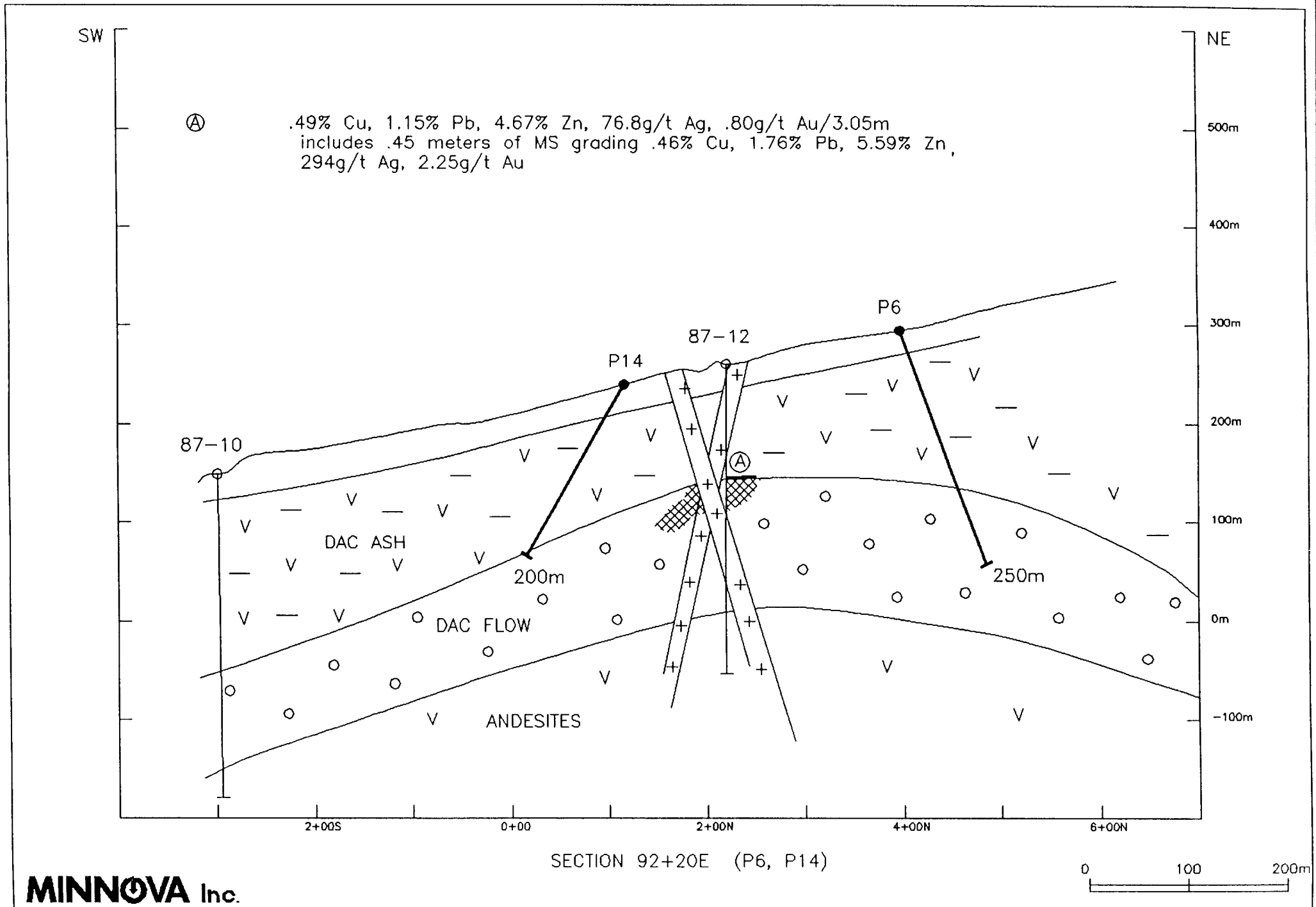
SW
NE
Ⓐ .49% Cu, 1.15% Pb, 4.67% Zn, 76.8g/t Ag, .80g/t Au/3.05m
includes .45 meters of MS grading .46% Cu, 1.76% Pb, 5.59% Zn,
294g/t Ag, 2.25g/t Au
87-10
P14
87-12
P6
Ⓐ
DAC ASH
DAC FLOW
ANDESITES
200m
250m
500m
400m
300m
200m
100m
0m
-100m
2+00S
0+00
2+00N
4+00N
6+00N
SECTION 92+20E (P6, P14)
0
100
200m
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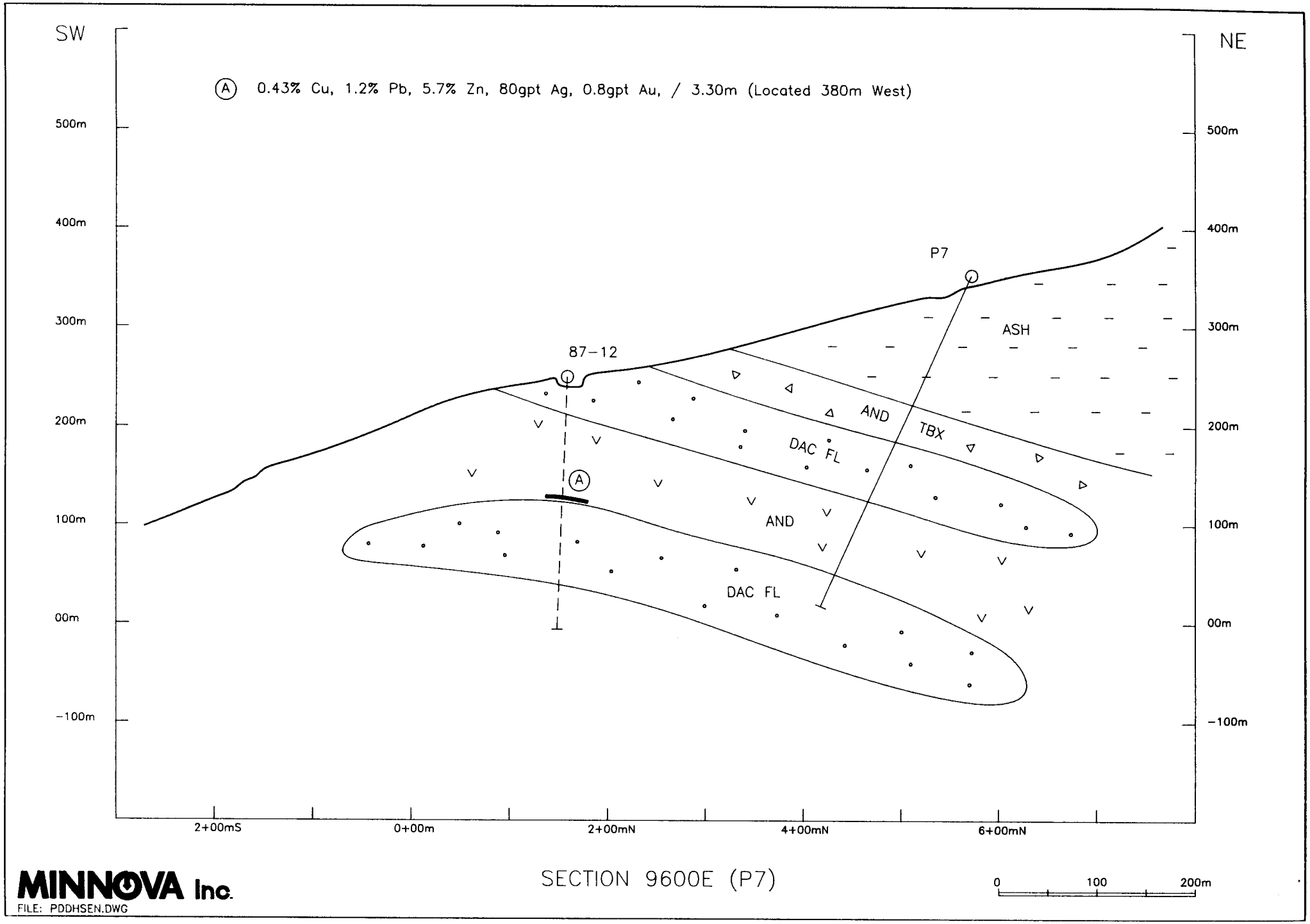

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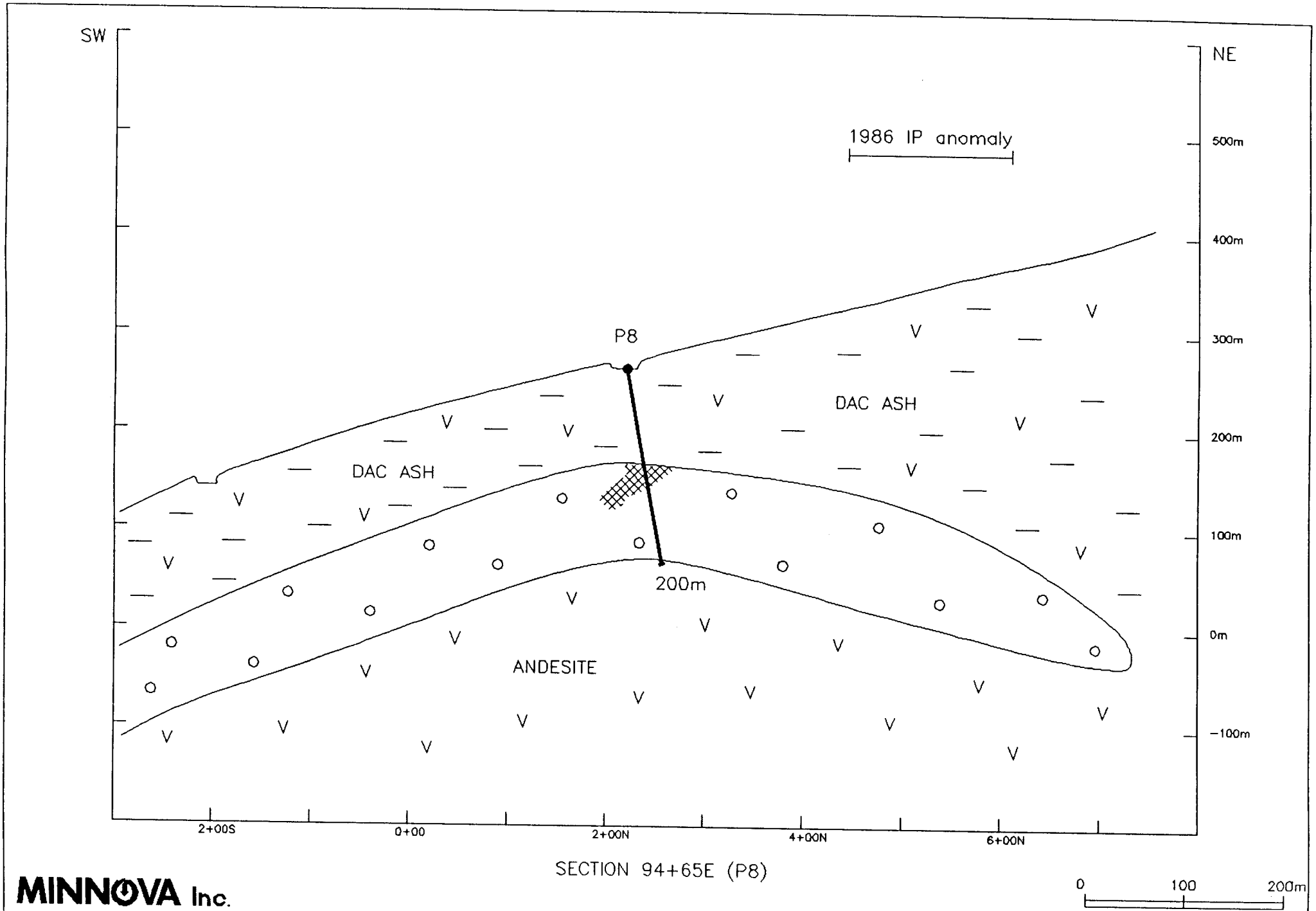
SECTION 9600E (P7)



SECTION 94+65E (P8)

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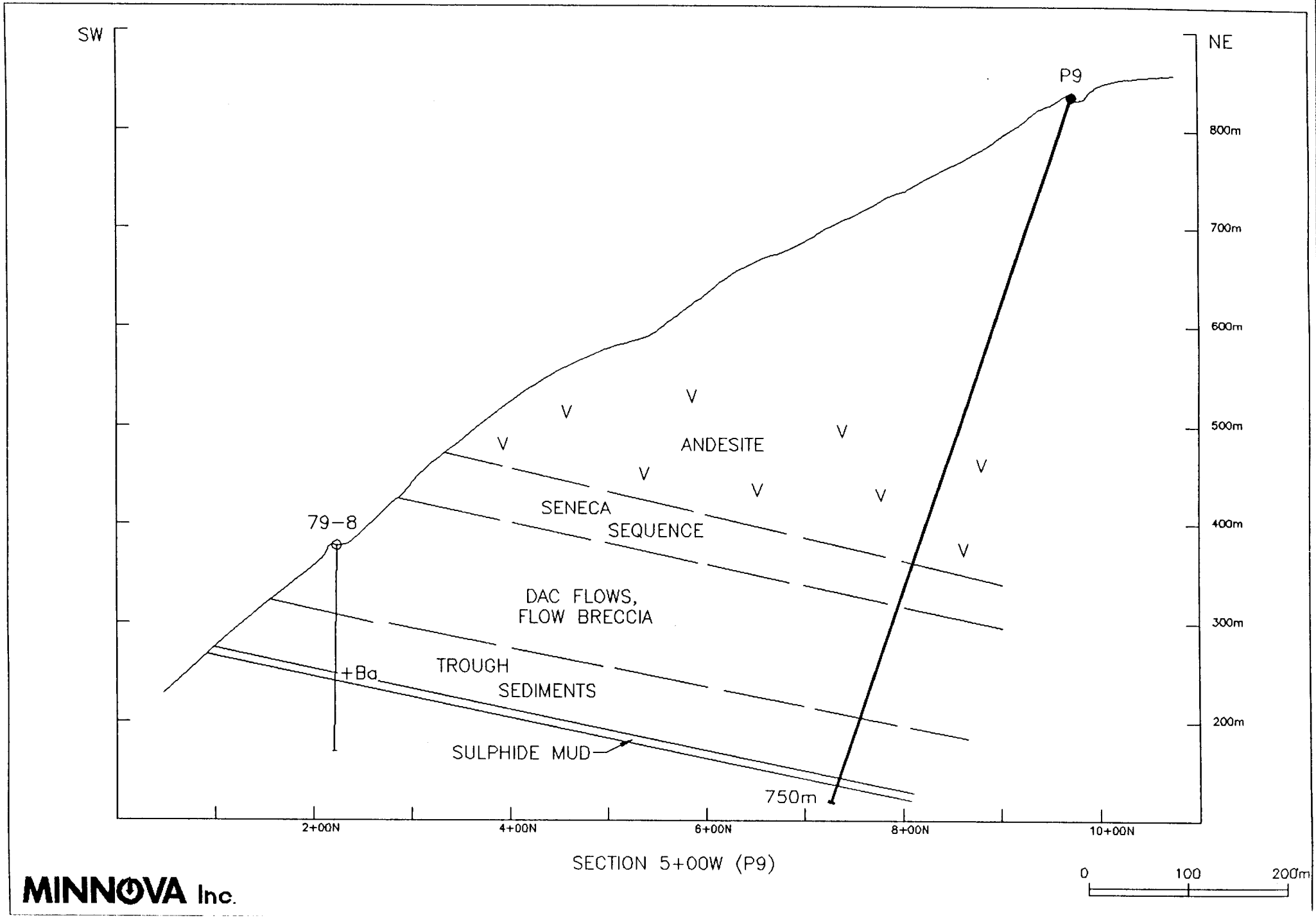
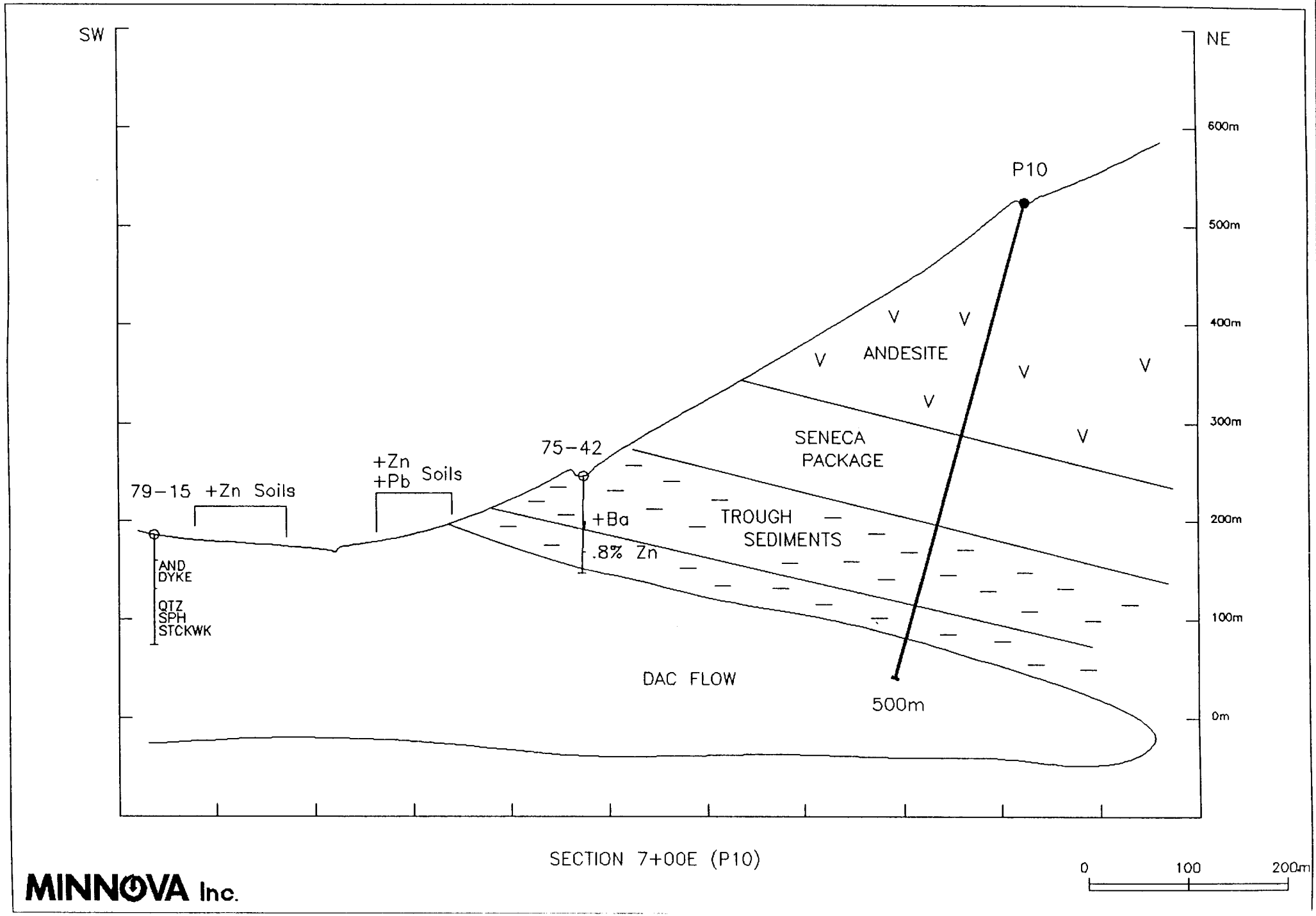
0 100 200m

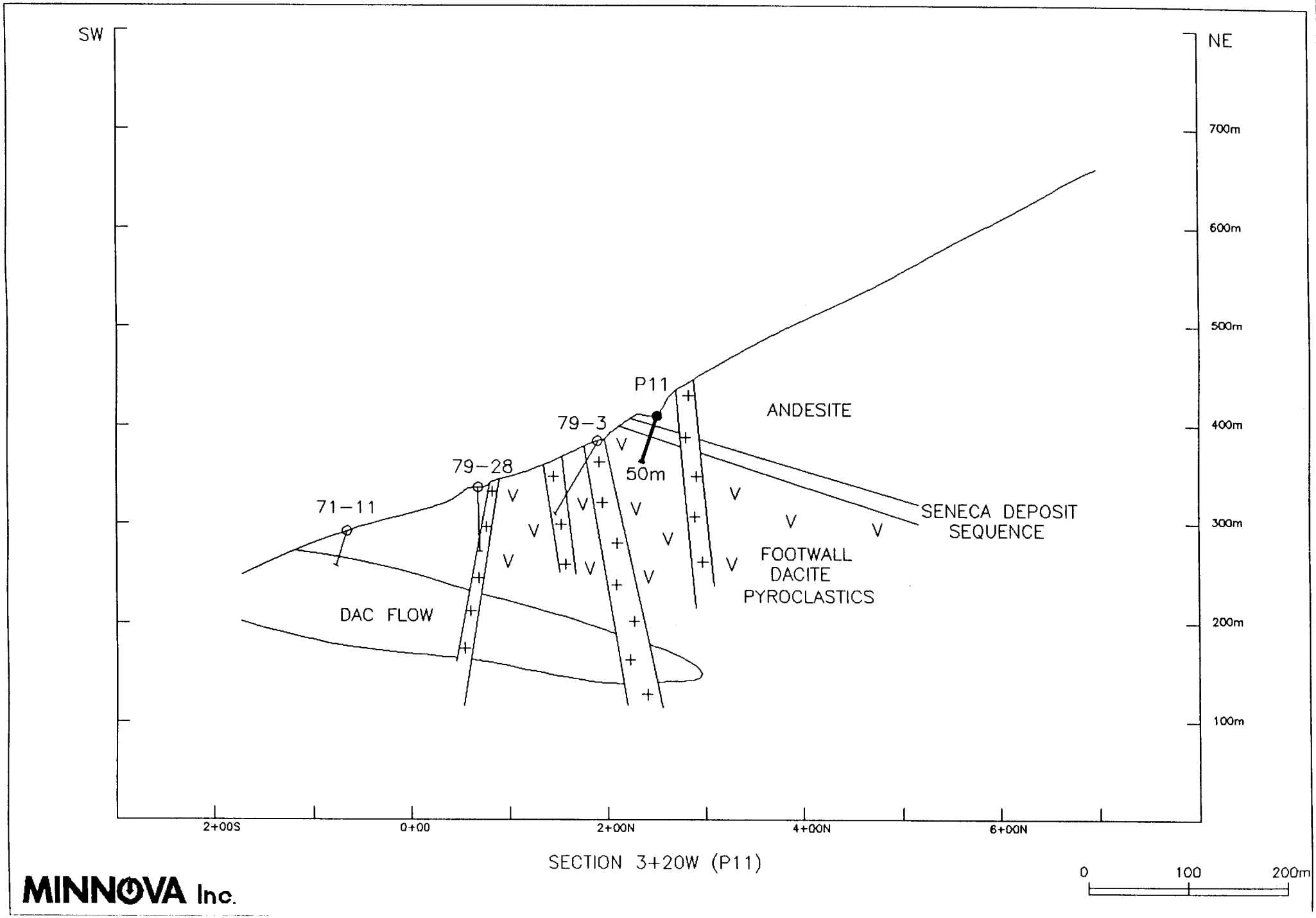

SW
NE
P9
800m
700m
600m
500m
400m
300m
200m
ANDESITE
SENECA
SEQUENCE
79–8
DAC FLOWS,
FLOW BRECCIA
+Ba
TROUGH
SEDIMENTS
SULPHIDE MUD
750m
2+00N
4+00N
6+00N
8+00N
10+00N
SECTION 5+00W (P9)
0
100
200m
MINNOVA Inc.

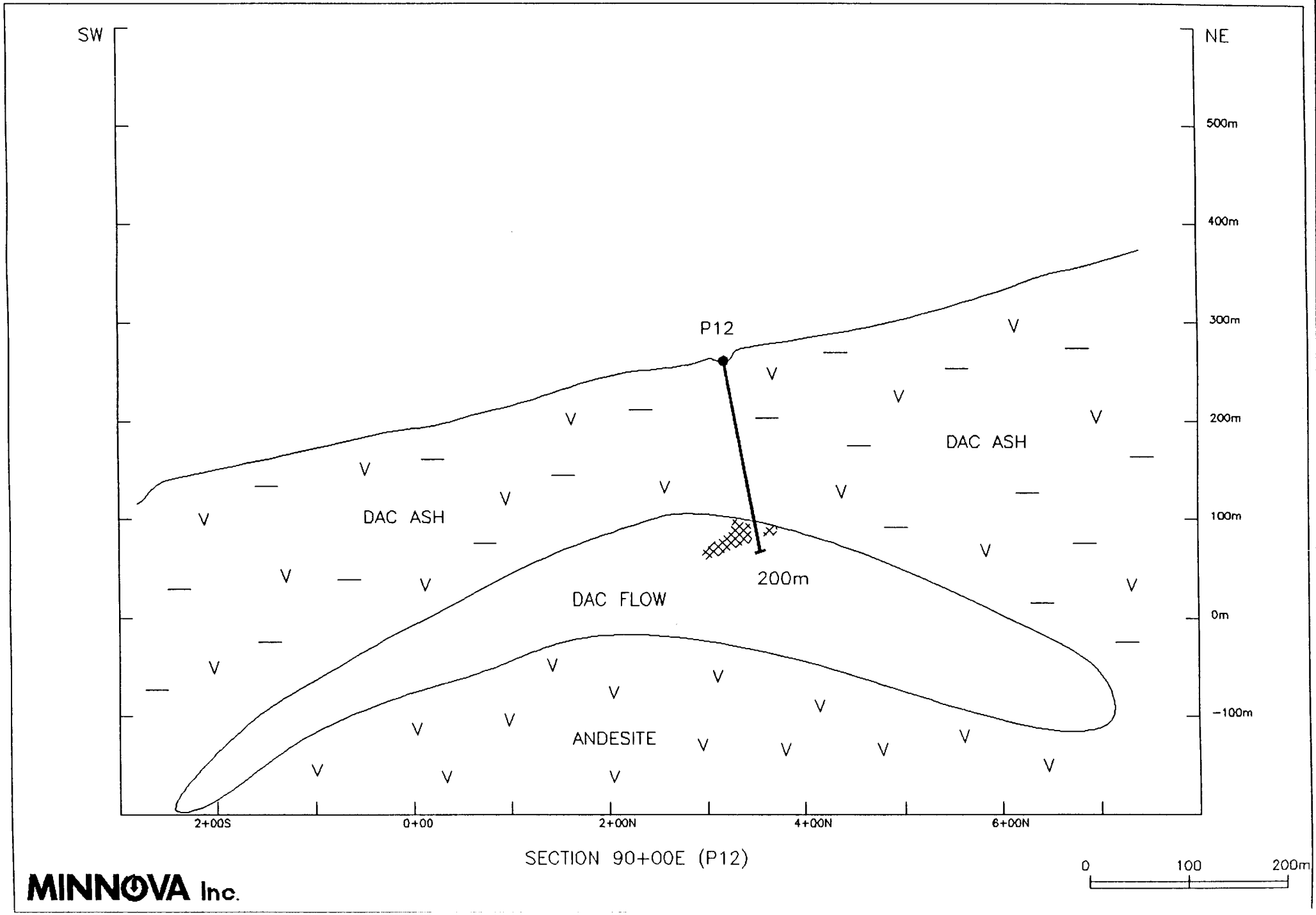


SECTION 7+00E (P10)

0 100 200m

MINNOVA Inc.


SW
NE
700m
600m
500m
400m
300m
200m
100m
P11
79-3
79-28
71-11
50m
ANDESITE
SENECA DEPOSIT
SEQUENCE
FOOTWALL
DACITE
PYROCLASTICS
DAC FLOW
2+00S
0+00
2+00N
4+00N
6+00N
SECTION 3+20W (P11)
0
100
200m
MINNOVA Inc.



SECTION 90+00E (P12)

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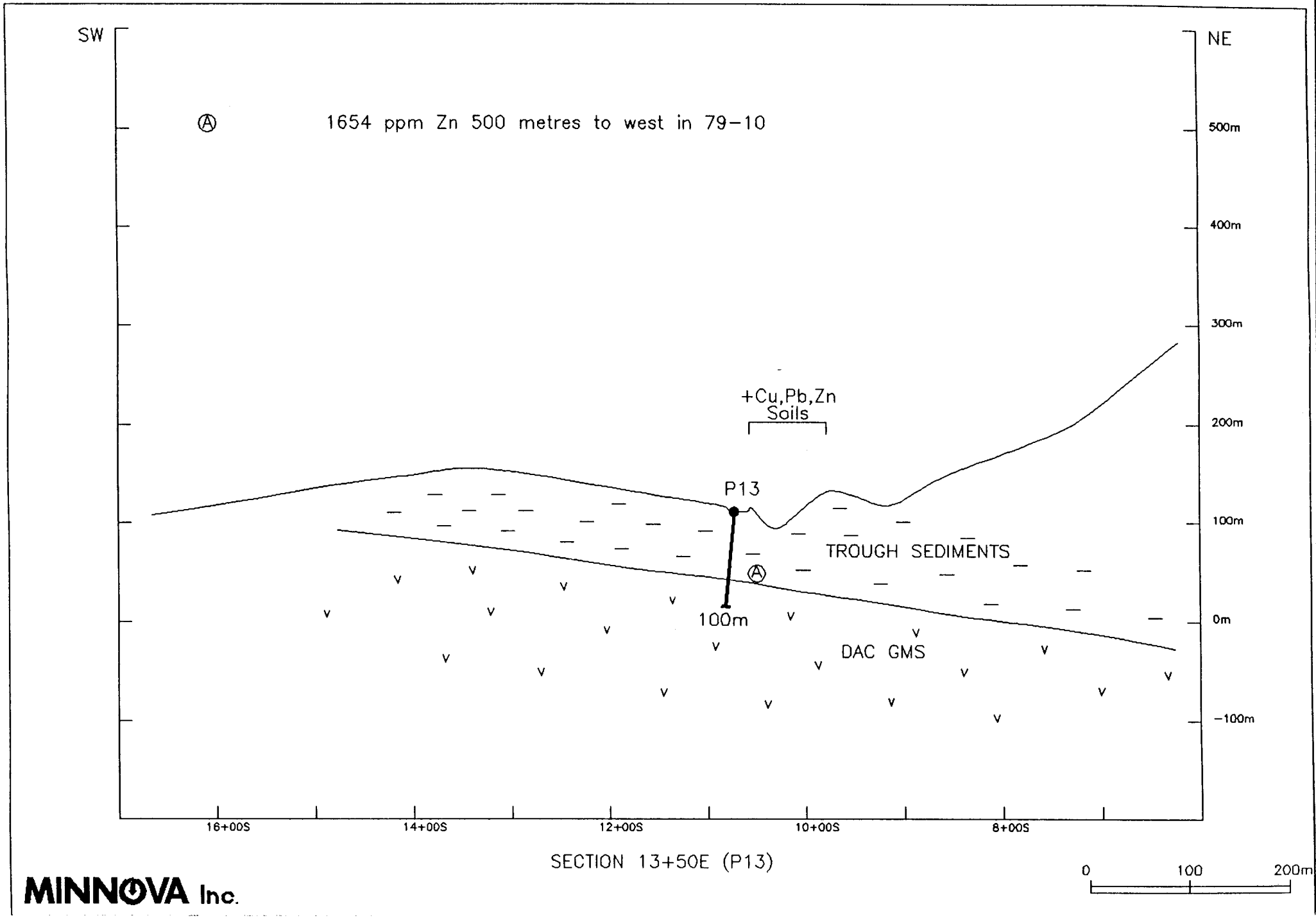
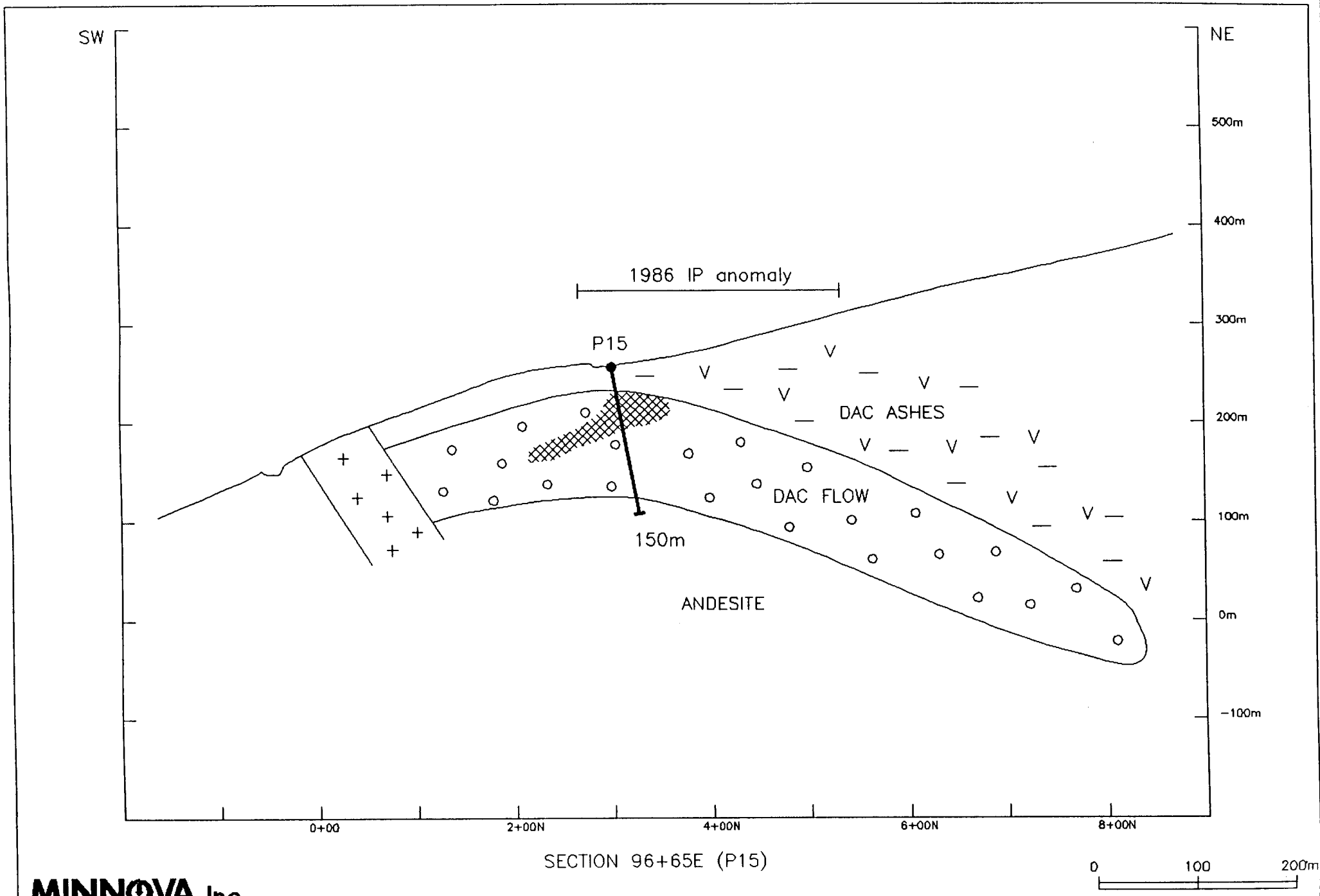
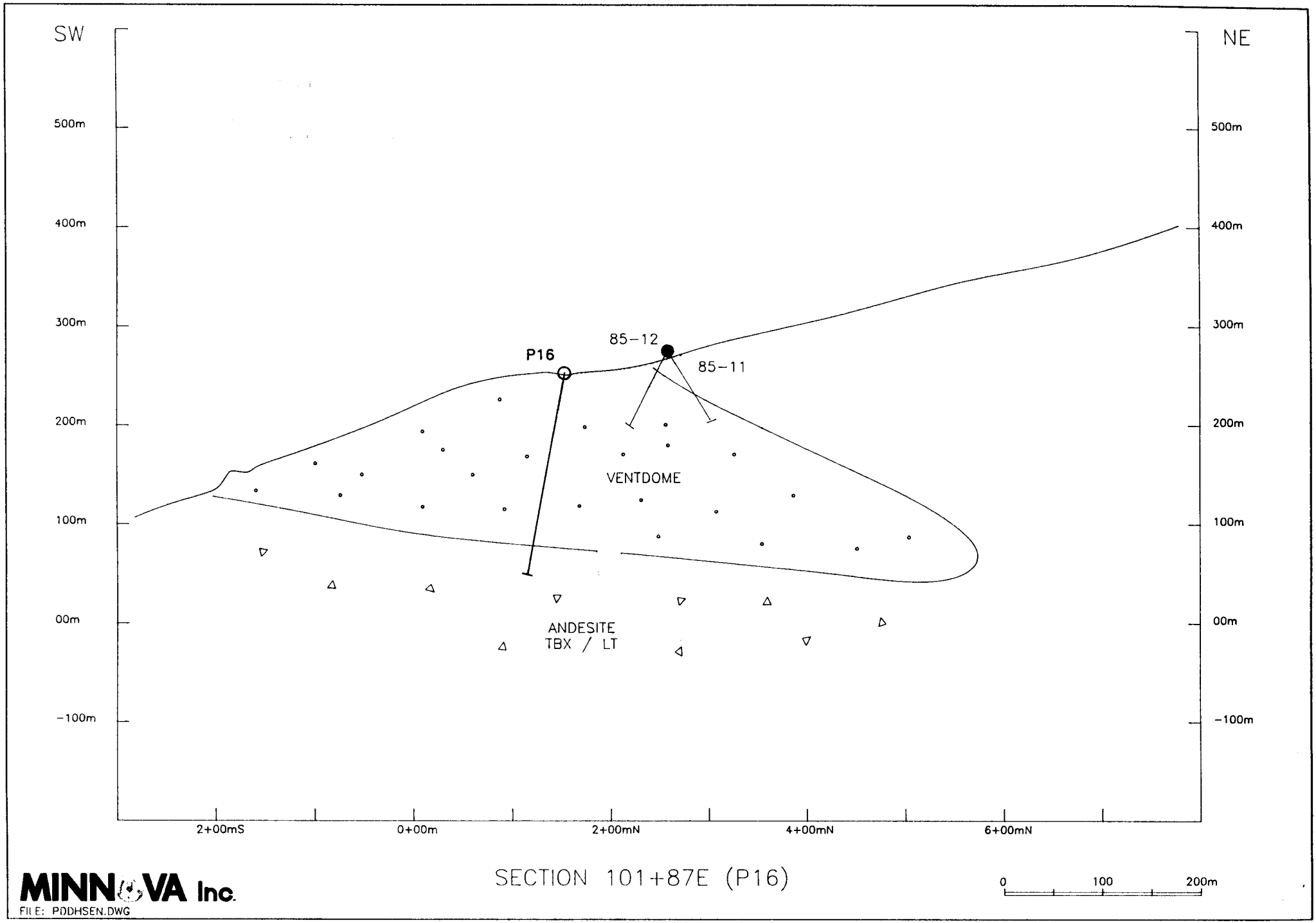


SECTION 13+50E (P13)

0 100 200m

MINNOVA Inc.


SW
NE
500m
400m
300m
200m
100m
0m
-100m
1986 IP anomaly
P15
DAC ASHES
DAC FLOW
150m
ANDESITE
0+00
2+00N
4+00N
6+00N
8+00N
SECTION 96+65E (P15)
0
100
200m
MINNOVA Inc.



SECTION 101+87E (P16)

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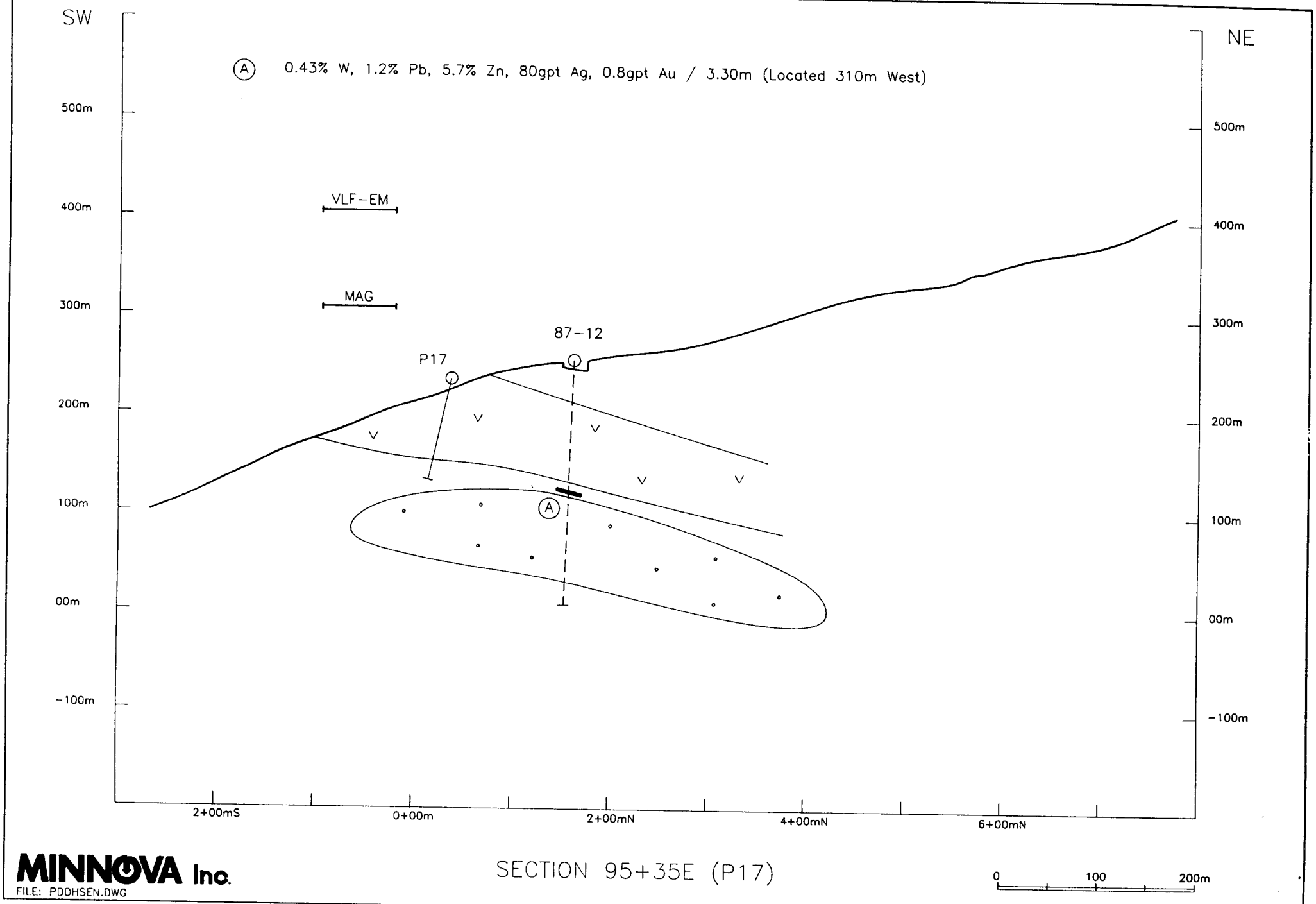

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FILE: PDDHSEN.DWG

SECTION 95+35E (P17)

Section line for trough work

Order of drilling: P1, 2, 3, 4, 5, 7, 15, P8, P6, 12, 14, 16, 17

13 on the way out.

What about P16?

Table 1. Proposed Diamond Drilling Holes – Seneca Property

Field

Hole #	Line	Stn.	Azim. (deg)	Dip (deg)	Length	Cost	Target
S91-02	P1	2+40E	2+50N	050	−60	300.2 300 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 expect ore at 210m – 245m
85-7	P2	1+50E	3+00S	230	−80	170.1 100 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 we already 354ft Trough Stratigraphy
Trough Strata	P3 91-63 Need new FS	4+35E	10+20S + BS	050	−80	159.7 100 m	$6,500	P3 will test the SE strike extension of zinc bearing turbidites and a coincident barium soil anomaly. 2600 ft water line. NO S.I at Dome,
	P4 S91-04	5+00W 0+25E sect	4+50S 670 S	230	−80	149.7 150 m	$9,750	Will test a Cu-Pb-Ba soil anomaly within the zinc exhalite sediment package 400 m east of previous drilling. Collar into Dome. west
	P5	3+10W sect 1+00W	1+20S	230	−80	150 m	$9,750	Will test zinc bearing sediments situated stratigraphically below Seneca and in the vicinity of a postulated synvolcanic fault.
Vent	P6	92+15E	4+00N	050	−70	250 m	$16,250	P6 will follow up MS intercept in 87-12, 250 m North
S91-05	P7	96+00E	5+70N	050 230	−80	275.8 350 m	$22,750	P7 will test an IP anomaly west of S-90-01 change shroons
S91-07	P8	94+65E	2+20N	050	−85 −75	200 m 211.8	$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 westof the pit and 500 m downdip. This hole will also test the downip potential of barite enriched Trough sediments.

Next program

S91-02 shutdown 25m doc Lith LAPTOP ft.

HH 2705 1049 3754

1605 ft water line

16 after 7?

Find a casing in pit area to drill deep & test trough.

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

Hole #	Line	Stn.	Azim. (deg)	Dip (deg)	Length	Cost	Target
P10	8+50W	1+50S	230	−75	600 m	$32,500	P10 will test the Seneca deposit sequence 750 m E and will also test barite enriched Trough seds, 300 meters downdip.
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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	91+85E	1+30N	230	−80 −70	200 m	$13,000	P14 will test the continuity of massive sulphides intercepted in 87–12, 200 m S.
P15	97+00E	1+80N	230 050	−80 −90	200 m	$13,000	P15 will test the Vent alteration pipe 300 m west and continue testing the 87–12 MS horizon 525 m E.
P16	101+87E	0+15S	230	−80	200 m	$13,000	P16 tests Vent dome/And–white fragment breccia contact
P17	95+35E	0+35S	230	−80 −85	100 m	$6,500	P17 will test the lower Vent horizon and a coincident Mag/VLF anomaly
				Total	4000 m	260,000	

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

LTH : LM

LT Lap T

FL FLow

FL/Bx flow Bx

BLT Blkl Lapilli Tuff

Block
20% >6cm

2-6cm lapilli ash tuff.

<2cm

DAC
AND
RHY
BAS

FHBD + FPD orange boundside feldspar porph dyke

QFPD pink.

Alt
Small letters
W weak
m mod
S strong
I intens

epi epidote
chl
ser
Si silica

microclasts
Floppd >5%
PY
cp
sph

Stkwk

MS > 95%

Chemex
Assay ~~& Geochem.~~

mg-eq
LITHOS + ppm geochem