SOVEREIGN CREEK PLACER PROPERTY

BRITISH COLUMBIA, CANADA

REPORT ON
REFRACTION SEISMIC SURVEY

Cariboo Mining Division – NTS 93B/16E

Latitude 52° 58.5' North – Longitude 122° 02.5' West

UTM Easting 564,300 – Northing 5,869,600 – NAD 1927

Owner

D.E Sargent

306 – 424 Wilson Street

Quesnel, British Columbia

V2J 2V9

By

BAKKER GEOLOGICAL CONSULTING

Ebo Bakker, P.Geol. (Alberta)

402 – 868 West 16th Street

Vancouver, B.C., V5Z 1T1, Canada

For

PEGASUS EARTH SENSING CORPORATION

1645 – 1185 West Georgia Street

Vancouver, B.C. V6E 4E6, Canada

April 17, 1998

SUMMARY

A refraction seismic survey was carried out in February 1998 on four of a group of ten placer claims in the Cariboo Mining Division East of Quesnel. The claims are registered in the name of Douglas E. Sargent of Quesnel, B.C. and are in good standing.

The survey area is located about 45 km east of Quesnel in an area bordered by the Swift River and by Sovereign Creek. The area is easily reached by paved and dirt road. Elevations range from 800 to 925 m. The area is undulating with evergreen forest, cleared areas and swampland. It is mainly underlain by glacial till, which is locally underlain by potentially auriferous pre-glacial sediments.

The seismic survey was carried out along three lines, spaced about 450 and 350 m, of respectively three, four and five spreads each. The spreads totalled 1380 m. Each spread c onsisted of 24 geophones spaced 5 m. Five to eight shot points were used for each spread.

A paleochannel had been identified in a 1989 drilling program east of the Sargent property. The present seismic survey located the continuation of this paleochannel on to the Sargent property, where the trend changes from east-west to a northerly direction. The paleochannel is about 80 m wide and 60 m deep and forms part of a paleovalley. The paleovalley is about 220 m wide and 40 m deep. Benches bordering the valley have a depth of 23 m or less. Bench, paleovalley and paleochannel have a gradient of about 56 m over 2.3 km, (2½°). An about 100 m deep 'trough' at the north-westerly end is either a feature scoured by ice pr is a phantom caused by similarities between seismic velocities in till and in bedrock.

Four layers were identified. An inhomogeneous surficial layer (gravel, weathered till or till derived sediments), till (a unit that can include sand and/or gravel layers), low velocity bedrock (possibly shale), and high velocity bedrock (possibly andesite). A discrepancy exists in the south-east between seismic determined depths to bedrock and depths to bedrock reported in the 1989 drilling program.

The interpretation of the seismic survey was successful and resulted in a coherent picture, although the interpretation of the seismic data was severely hampered by noise causes by a frozen layer, often great depth to bedrock, velocity similarities between till and some bedrock and by layer irregularities such as post-glacial erosional channels and boulders.

Four alternative trends for the continuation of the paleochannel are given: (A) to the north following a trend of swamps, (B) to the north-west following the present topography, (C) to the west following the trend of swamps and lakes across the Swift River, and (D) to the south-west. A follow-up seismic survey is recommended to clear problems and to locate the extension of the paleochannel beyond the area studied. About fifteen spreads are anticipated, details are shown on Figure 8. The work is expected to proceed faster with better results, because geophones will be placed in unfrozen ground.

The survey of shot points and geophones should be carried out by utilising the Global Surveyor for real time differential corrected GPS.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

A. INTRODUCTION

A.1 Scope of Work

Pegasus Earth Sensing Corporation ('Pegasus') of Vancouver, B.C. was requested by Mr. Douglas E. Sargent of Quesnel, B.C. to locate a paleochannel on placer claims near Sovereign Creek, east of Quesnel, (Figure 1).

For this purpose, a refraction seismic survey was executed by the author in the period February 11 to 18, 1998. The field data were subsequently interpreted and evaluated at Pegasus' office in Vancouver.

A.2 Legal Status

The fieldwork was done on four of a group of ten placer claims in the Cariboo Mining Division, ('Sargent Claim Block' on Figure 2). All these claims are registered in the name of Douglas E. Sargent of Quesnel, B.C. and are in good standing, (Table 1).

A.3 Location and Access

The Sovereign placer claims are situated east of the Swift River and south of Sovereign Creek, about 45 km east of Quesnel. The claims can be reached from the Quesnel – Wells highway by a dirt road that branches off just east of Cottonwood House.

A.4 Physiography and Geology

The placer claims are in an area typified by an undulating landscape with low hills, level areas and valleys with swamps and lakes. The low areas are drained by creeks to the Swift River and its tributary, Sovereign Creek. The elevations range from about 800 to 925 m, (2650 to 3050 feet). Evergreen forest, cleared areas and swampland cover the area.

The area is blanketed by glacial till. A thin layer of weathered till or erosional material derived from the till commonly covers the till. Post-glacial stream deposits are found in eroded valleys. The till rests usually on bedrock, but is locally underlain by pre-glacial sediments. Auriferous pre-glacial gravels exist in the area.

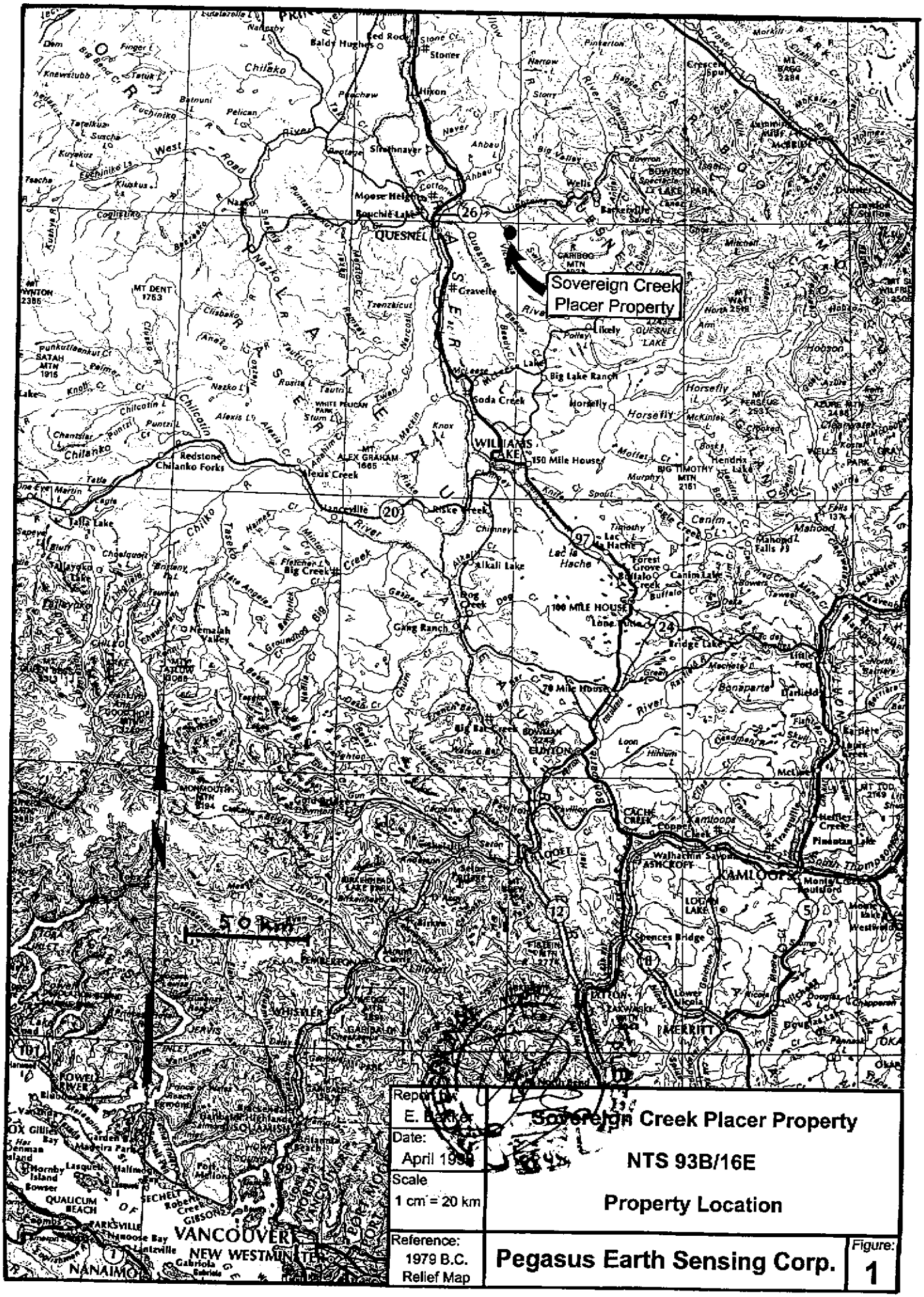

Sovereign Creek
Placer Property
QUESNEL
WILLIAMS LAKE
100 MILE HOUSE
KAMLOOPS
MERRITT
VANCOUVER
NEW WESTMINSTER
NANAIMO
Report by:
E. Bartha
Date:
April 1998
Scale
1 cm = 20 km
Reference:
1979 B.C.
Relief Map
Sovereign Creek Placer Property
NTS 93B/16E
Property Location
Pegasus Earth Sensing Corp.
Figure:
1

Table 1: Sargent's Claims

B.C. Ministry of Energy and Mines

Mineral Titles Searchable Database

Title Search by Owner

Client Number: 123719
Tenure Type: Placer Only
Standing: Good

Tenures held by SARGENT, DOUGLAS ERIC:

There were 15 results.

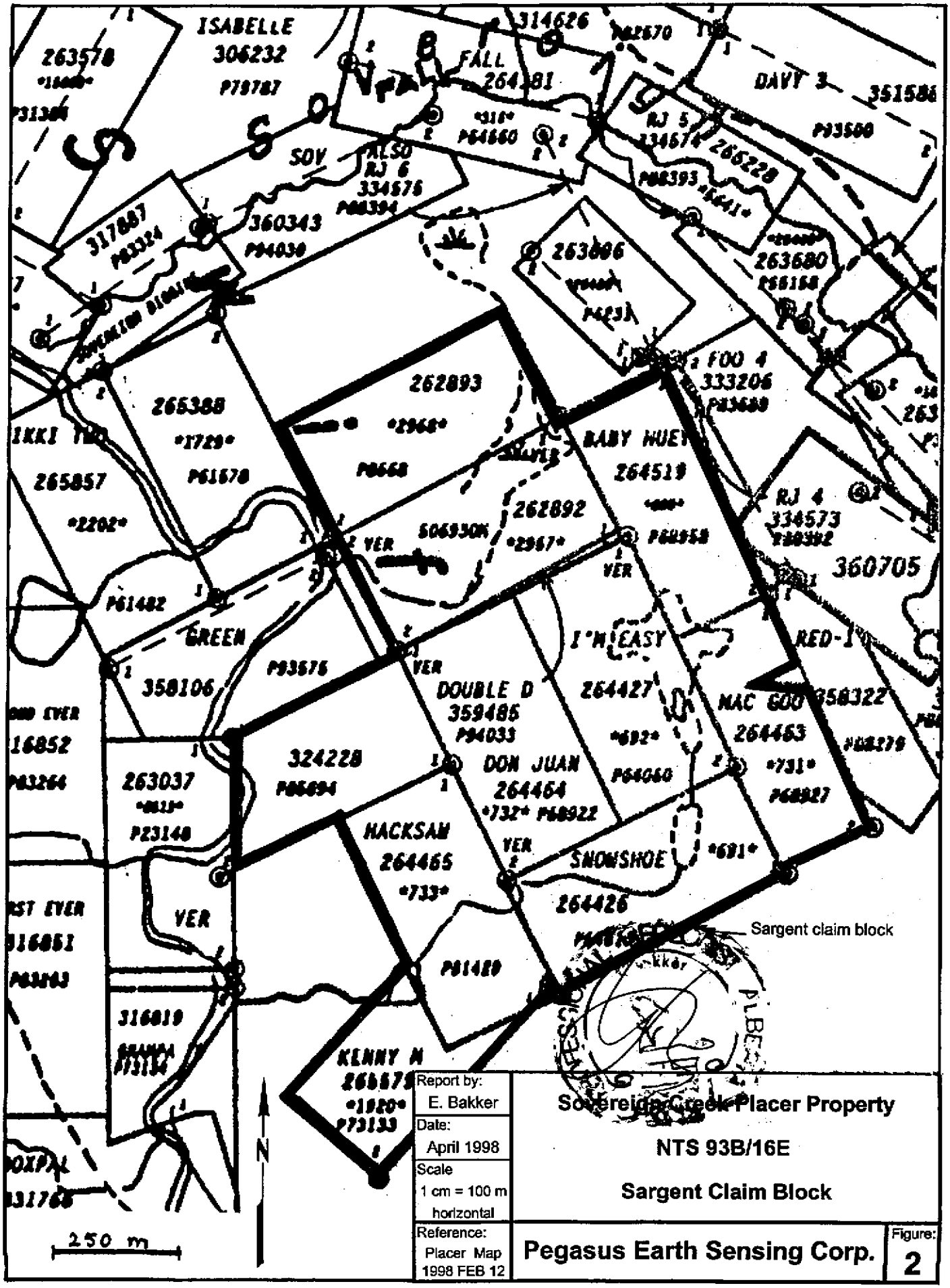
Tenure Number	Claim Name	Owner Number	Map Number	Work Recorded To	Status	Mining Division	Units	Tag Number
262892		123719 100%	093B16E	20000324	Good Standing 20000324	3 Cariboo	0	506930M
262893		123719 100%	093B16E	20000324	Good Standing 20000324	3 Cariboo	0	P8568
264426	SNOWSHOE	123719 100%	093B16E	20010116	Good Standing 20010116	3 Cariboo	1	P64613
264427	I'M EASY	123719 100%	093B16E	20010116	Good Standing 20010116	3 Cariboo	1	P64060
264463	MAC GOO	123719 100%	093B16E	20010129	Good Standing 20010129	3 Cariboo	1	P68927
264464	DON JUAN	123719 100%	093B16E	20010128	Good Standing 20010128	3 Cariboo	1	P68922
264465	HACKSAW	123719 100%	093B16E	20010128	Good Standing 20010128	3 Cariboo	1	P61429
264519	BABY HUEY	123719 100%	093B16E	20010207	Good Standing 20010207	3 Cariboo	1	P68958
265579	KENNY M	123719 100%	093B16E	20000601	Good Standing 20000601	3 Cariboo	1	P73133
324228	ROCKY.	123719 100%	093B16E	20000329	Good Standing 20000329	3 Cariboo	1	P85694
359485	DOUBLE D	123719 100%	093B16E	19981005	Good Standing 19981005	3 Cariboo	1	P94033
361450	KELLY	123719 100%	093B16E	19990220	Good Standing 19990220	3 Cariboo	1	P94529
361451	RITA	123719 100%	093B16E	19990223	Good Standing 19990223	3 Cariboo	1	P94034
361694	MACLEOD	123719 100%	093B16E	19990318	Good Standing 19990318	3 Cariboo	1	P94552
361716	RAINDROP	123719 100%	093B16E	19990322	Good Standing 19990322	3 Cariboo	1	P94553

Claim block Figure 2

To download this information to a comma delimited text file click here.

Shortcuts: Main Menu Free Miner Tenure Number Owner Locator Map Claim Name Tag Number Lot Glossary

Logged in as user: EboBakker



Report by: E. Bakker	Sovereign Creek Placer Property	
Date: April 1998	NTS 93B/16E	
Scale 1 cm = 100 m horizontal	Sargent Claim Block	
Reference: Placer Map 1998 FEB 12	Pegasus Earth Sensing Corp.	Figure: 2

B. EXPLORATION HISTORY

B.1 Previous Exploration

Exploration and small scale mining for gold has been done off and on in various parts of the area where the claims are located. Relevant to the subject of this report are the exploration programs by Auramet International Ltd. in 1985[1] and by the Malaysia Mining Corporation ('MMC') in 1989. Pegasus was involved in both programs.

Auramet excavated a 23 m deep test pit on the I'M EASY claim ca. 100 m west of seismic Line 1, (Figure 5). The pit, starting at an elevation of 911 m at the bottom of a seven metre deep meltwater channel, encountered (Figure 9-4, Reimchen, 1995):

6 m	post-glacial surface gravels
6 m	glacial till
3 m	reddish paleosol
7 m	pre-glacial bouldery gravels, Fe staining, clay layers
1 m	cemented sand, paleosol?
3 m	coarse angular and rounded gravel with silt lenses, schist fragments

No bedrock was reached.

MMC executed an extensive drilling and pitting program in the area east of the Sargent claims, (partly shown on Figure 5). In addition, seven holes were drilled on Sargent's claims. No detailed logs were unfortunately made of most of these holes. The holes are, (Figure 5):

DH-24	till	7.5	siliceous argillite @ 7.5 m				
DH-25	?	61.5	no bedrock reached				
DH-26	?	41.5	bedrock @ 41.5 m				
DH-27	till*	58.5	carbonaceous shale @ 58.5 m				(*including ?)
DH-28	till	16.5	no bedrock reached				
DH-31	till	1.5	sand 25.5	till 13.5	sand 1.5	andesite @ 42 m	
DH-32	till	1.5	sand 18	till 22.5	no bedrock reached at 42 m.		

[1] Reimchen, T.H.F. (1995): Discovery of a gold bearing preglacial valley, Sovereign Creek, Cariboo Goldfields of British Columbia: a case history; *in* Drift Exploration in the Canadian Cordillera, Bobrowsky, P.T. et al., Editors, B.C. Ministry of Energy, Mines and Petroleum Resources, Paper 1995-2, pp. 97-105.

The MMC drilling identified an east-west trending pre-glacial channel (Paleochannel). This channel extends west onto Sargent's claims.

B.2 Recent Exploration

Recent exploration consisted of the seismic survey here reported. The survey attempted to locate the extension of the MMC paleochannel on the Sargent Claim Block. The seismic survey was done with the assistance of Doug and Paul Sargent, Dennis, Lynn and Dave Healy, and Bryce Blair (blaster).

C. REFRACTION SEISMIC SURVEY

C.1 Introduction

The refraction seismic method is commonly used to identify layers in relative shallow sedimentary deposits and to establish depths to bedrock. The method is based on the fact that different materials transmit sound with different velocities and that deeper layers transmit sound waves faster. This is usually the case, as deeper sedimentary layers tend to be more compact. A layer that transmits waves slower than the overlying layer can not be 'seen' and depths of contacts between normal layers below the invisible layer are found too deep.

Energy is put into the ground at selected points ('shot points'), either by hammering, vibration or by explosive charges. The ground waves generated by these energy pulses are registered at geophones elsewhere. The geophone information and the timing of the energy pulses are fed into a dedicated computer by special cables. Shot point and geophone locations and elevations are manually entered into the computer.

The refraction seismic method takes only the times of the first arrivals of waves in account. Refracted waves travel along the surface or along the interface between two layers with a velocity determined by the lower layer. A wave travelling along a deeper interface can arrive before a wave travelling along a shallower interface, when the distance travelled faster along the deeper interface is long enough to compensate for the increase in distance travelled through the slower layer above this interface. The switch from first arrival from a wave that travels along a shallower to one that travels along a

deeper interface depends on the thickness of the shallower layer and the velocity ratio between the layers. Increasing the distance between shot point and geophone increases the likelihood of receiving a wave travelling along a deeper interface as the first arrival, and thus increases the chance of getting information about a deeper layer. However, increasing the shot point – geophone distance requires more and more energy (e.g. more and more dynamite) as the energy loss is a power function of the distance.

Depths of interfaces and velocities of layers are calculated by computer based on times of first arrivals of waves and their corresponding layers as selected by the operator.

C.2 Equipment

The equipment for the seismic survey consisted of the Geometrics StrataView SN75162 seismograph with necessary cables and geophones to use the StrataView as a 24-channel seismograph for refraction seismics. The 486 computer of the seismograph uses the Rimrock Geophysics SIPQC refraction interpretation software for preliminary field interpretations.

Co-ordinates of selected points were established with the Trimble Scoutmaster GPS in ACU mode (accuracy estimated to within 30 m) and relative elevations of selected points were established with a Pretel Altiplus D2 altimeter (accuracy ± 1 m).

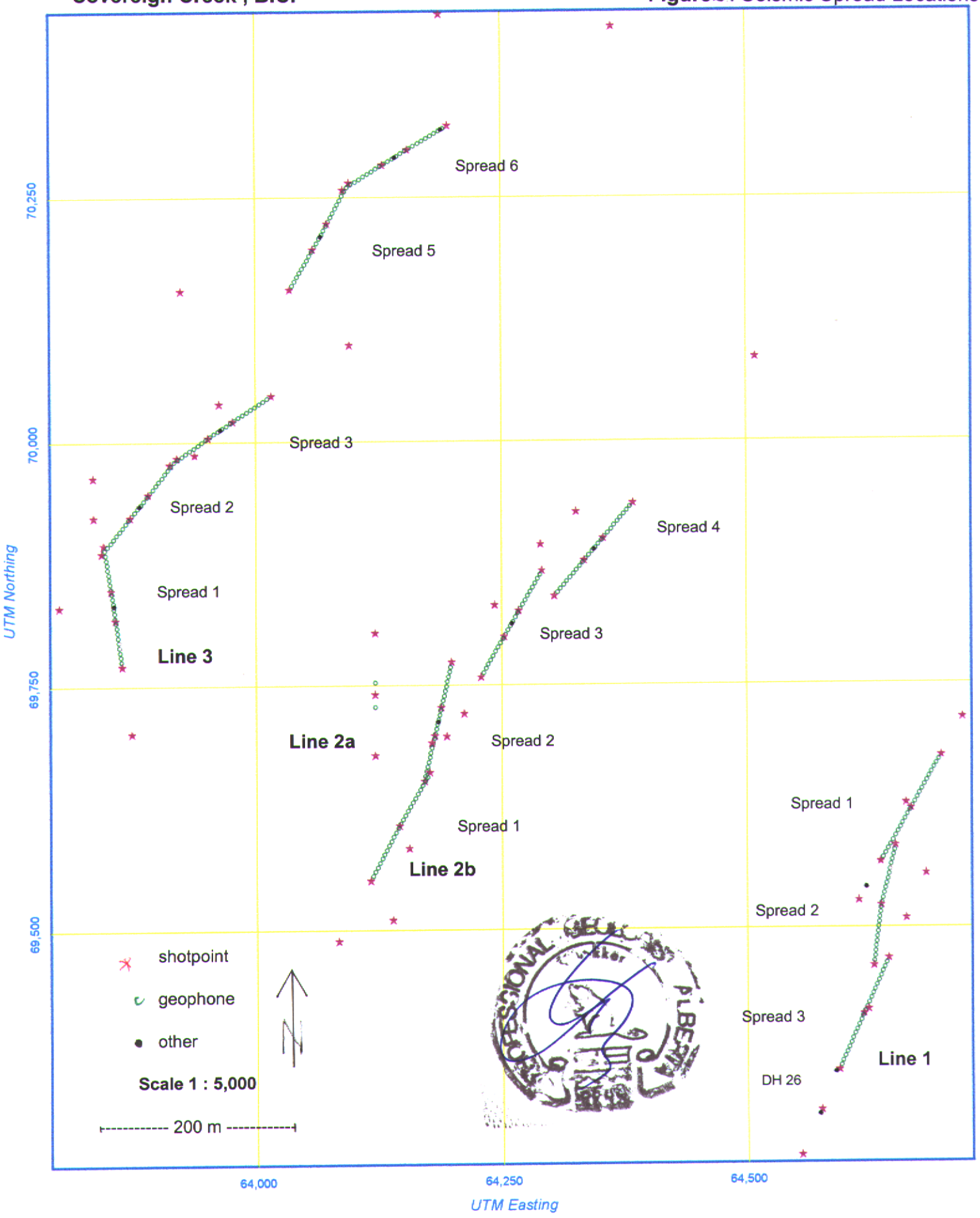
Re-interpretation of the field data was done with the more sophisticated Rimrock Geophysics SIPT2 refraction interpretation software on a 200MHz Pentium Micron Millenia Plus computer.

C.3 Methodology

Three lines (Lines 1 to 3) were selected mostly at easily accessible places along the expected trend of the paleochannel and perpendicular to this trend. At each location several seismic spreads were laid out, (Figure 3). Each spread consisted of 24 geophones, spaced 5 m along a 115 m straight line. Proper placement of geophones was difficult because of the frozen ground and because it showed that for best results, the geophones had to be placed in ground under the frozen layer. A good and firm ground

Sovereign Creek , B.C.

Figure 3: Seismic Spread Locations



Pegasus Earth Sensing Corp.

contact is essential for good results. Variable amounts of dynamite were used as energy source. Shot points were selected at the centre of the 115 m spread and at 5 m offsets on either side. Instead of a centre shot point, later two shot points each 15 m offset from the centre were selected for safety reasons, (the seismograph had to be positioned close to the centre of each spread). In addition shot points were selected at 50, 75 100, 150 and/or 200 m offsets at either side of the spread, depending on the results of the previous shots for that spread. All geophones and shot points were positioned along a straight line, (except at one spread).

Geophone # 1 on the first spread of each line was labelled 1000 m. Geophones # 2 to 24 were positioned to the south of # 1, relative distances also increased to the south. The system was reversed for the last two spreads (2b-4, and 3-6), as the cable pattern had to be changed because of a broken cable. Locations for end geophones on adjacent spreads were the same where possible, however, it was often more practical to shift the next spread as to coincide with easier terrain.

C.4 Topographic Survey

Relative elevations were measured of all shot points and of some other points such as breaks in the slope. Spreads and lines were tied together with extra measurements. The measured elevations were recalculated with reference to geophone # 1 on the first spread of the first line, a point that was estimated on the 1:50,000 topographic map 93B/1E½ to be at 2914 feet or 888.2 m, (Table 2a).

The azimuth of each spread and the distances and azimuths between end geophones of adjacent spreads were measured.

GPS co-ordinates were measured for the geophones # 1 and #24 of each spread and for some shot points. GPS measurements were averaged and adjusted to fit the 115 m spread lengths, the measured azimuths and the measured offsets between spreads, (Table 2b).

Sovereign Creek, B.C.

Table 2a: Elevation Calculations

spread #	location	m line coord.	elev. m	date Febr.	time h:mm	comments	adjusted values by: spread		line		overall	final
						Line 1						
1	C	**1057.5**	**1001**	**12**	**9:39**		**1001.0**		**1001.0**		1013.2	888.2
1	1	1000.0	1002	12	9:40		1002.0		1002.0		1014.2	889.2
1	s	995.0				=@1000						
1	s	950.0	1004	12	9:42		1004.0		1004.0		1016.2	891.2
1	sC	**1057.5**	**1001**	**12**	**9:43**		**1001.0**		**1001.0**		**1013.2**	888.2
1	24	1115.0	1000	12	9:45		1000.2		1000.2		1012.4	887.4
1	s	1120.0				=@1115						
1	s	1165.0	998	12	9:47		998.4		998.4		1010.6	885.6
1	edge	1150.0	1000	12	9:48		1000.5		1000.5		1012.7	887.7
1	C	**1057.5**	**1000**	**12**	**9:53**		**1001.0**		**1001.0**		1013.2	888.2
2	s	**1065.0**	**1016**	12	**1:04**	=@1057.5	**1016.0**		**1001.0**		**1013.2**	888.2
2	1	1115.0				=@1110						
2	s	1110.0	1016	12	1:05		1012.2	1012.2	997.2		1013.4	888.4
2	sC	*1172.5*	*1014*	*12*	*1:07*		*1014.5*	**1014.6**	999.6		1011.7	886.7
2	24	1230.0				=@1235						
2	s	1235.0	1012	12	1:09		1012.8	1012.9	997.9		1010.0	885.0
2	s	1280.0	1011	12	1:10		1012.0	1012.1	997.1		1009.2	884.2
2	sC	*1172.5*	*1013*	*12*	*1:14*		*1014.7*	**1014.6**	999.6		1011.9	886.9
2	s	**1065.0**	**1014**	12	**1:16**	=@1057.5	**1016.0**		**1001.0**		**1013.2**	888.2
1	C	**1057.5**	**1008**	**12**	**4:14**		**1008.0**		**1001.0**		**1013.2**	888.2
3	s	1130.0	1006	12	4:20		1006.3	1006.3	999.3		1011.5	886.5
3	s	1180.0	1006	12	4:28		1006.6	1006.6	999.6		1011.8	886.8
3	s	1225.0	1006	12	4:30		1006.7	1006.7	999.7		1011.9	886.9
3	1	1230.0				=@1225						
3	sC	*1287.5*	*1003*	*12*	*4:34*		*1003.9*	**1003.9**	996.9		1009.1	884.1
3	24	1345.0	1004	12	4:36		1004.5				1010.2	885.2
3	s	1350.0	1003	12	4:36		1004.0	1004.0	997.0		1009.2	884.2
3	s	1395.0	1001	12	4:38		1002.0	1002.0	995.0		1007.6	882.6
3	s	1445.0	999	12	4:39		1000.1	1000.1	993.1		1005.3	880.3
3	sC	*1287.5*	*1002*	*12*	*4:56*		*1003.8*	**1003.9**	996.9		1009.0	884.0
1	C	**1057.5**	**1006**	**12**	**5:00**		**1008.0**		**1001.0**		**1013.2**	888.2
						Line 2b						
1	sC	**1057.5**	**1000**	**13**	**4:02**		**1003.0**		**1003.0**		995.6	870.6
1	s	1190.0	997	13	4:05		998.9		998.9		991.5	866.5
1	s	1120.0	1002	13	4:08		1002.8		1002.8		995.4	870.4
1	24	1115.0				=@1120						
1	sC	**1057.5**	**1003**	**13**	**4:10**		**1003.0**		**1003.0**		995.6	870.6
1	s	925.0	1010	13	4:14		1009.4		1009.4		1002.0	877.0
1	1	1000.0				=@995						
1	s	995.0	1007	13	4:16		1006.1		1006.1		998.7	873.7
1	sC	**1057.5**	**1004**	**13**	**4:17**		**1003.0**		**1003.0**		995.6	870.6
1	C	**1057.5**	**1077**	**14**	**2:08**		**1083.0**		**1003.0**		995.6	870.6
2	s	1075.0	1086	14	2:15		1089.2		1009.2		1001.8	876.8
2	s	1150.0	1090	14	2:21		1090.8		1010.8		1003.4	878.4
1	C	**1057.5**	**1083**	**14**	**2:23**		**1083.0**		**1003.0**		995.6	870.6
2	s	1005.0	1085	14	2:25		1085.3		1005.3		997.9	872.9
2	24	1000.0				=@1005						
2	s	957.5				=@942.5						
2	C	942.5	1087	14	2:27		1087.5		1007.5		1000.1	875.1
2	s	927.5				=@942.5						
2	s	810.0	1084	14	2:39		1086.1		1006.1		998.7	873.7
2	s	735.0	1081	14	2:42		1083.5		1003.5		996.1	871.1
2	s	880.0	1085	14	2:46		1088.0		1008.0		1000.6	875.6
2	1	885.0				=@880						
1	C	**1057.5**	**1079**	**14**	**2:54**		**1083.0**		**1003.0**		995.6	870.6
1	C	**1057.5**	**1019**	**15**	**8:21**		**1019.0**		**1003.0**		995.6	870.6

Table 2a: Elevation Calculations

spread #	location	m line coord.	elev. m	date Febr.	time h:mm	comments	adjusted values by: spread		line		overall	final
3	s	890.0	1027	15	8:24		*1026.9*		*1010.9*	**1010.6**	1003.5	878.5
3	24	*885.0*				=@890						
3	s	960.0	1028	15	8:45		1027.4		1011.4	1011.2	1004.0	879.0
3	s	842.5										
3	s	812.5										
3	1	770.0				=@765					**1001.8**	876.8
3	s	765.0	1026	15	8:50		1025.2		1009.2	1009.2	1001.8	876.8
3	s	695.0	1022	15	8:52		1021.2		1005.2	1005.1	997.8	872.8
1	C	**1057.5**	**1020**	**15**	**8:59**		**1019.0**		**1003.0**		995.6	870.6
3,4	1	**770.0**	**993**	**17**	**11:58**		**993.0**		**1009.2**		1001.8	876.8
4	s	970.0	994	17	12:00	570	994.0		1010.2	1010.2	1002.8	877.8
4	s	775.0	993	17	12:04	765	993.0		1009.2	1009.3	1001.8	876.8
4	s	727.5	996	17	12:05	812.5	996.0		1012.2	1012.3	1004.8	879.8
4	s	697.5	993	17	12:06	842.5	993.0		1009.2	1009.3	1001.8	876.8
4	24	655.0				=@650						
4	s	650.0	990	17	12:07	890	990.0		1006.2	1006.3	998.8	873.8
4	s	455.0	1017	17	12:13	1085	1017.0		1033.2	1033.4	1025.8	900.8
4	18	685.0	991	17	12:18	855	991.0		1007.2	1007.5	999.8	874.8
4	s	712.5	995	17	12:19	827.5	995.0		1011.2	1011.5	1003.8	878.8
3	24	*885.0*	*994*	*17*	*12:22*		*994.0*		*1010.2*	**1010.6**	1002.8	877.8
3,4	1	**770.0**	**993**	**17**	**12:24**		**993.0**		**1009.2**		1001.8	876.8
						Line 3						
1	C	**1057.5**	**1001**	**15**	**11:26**		**1005.0**		**1005.0**		**1005.3**	880.3
1	s	1120.0	994	15	11:27		997.3		997.3		997.6	872.6
1	s	1190.0	990	15	11:29		992.0		992.0		992.3	867.3
1	24	1115.0				=@1120						
1	s	1072.5										
1	C	**1057.5**	**1005**	**15**	**11:32**		**1005.0**		**1005.0**	**1005.0**	**1005.3**	880.3
1	s	1042.5										
1,2	1,24	1000.0				=@995						
1	s	995.0	1006	15	11:34		1006.0		1006.0	**1007.1**	**1007.0**	882.0
1	s	925.0	1012	15	11:36		1012.0		1012.0	1012.7	1012.6	887.8
1	C	**1057.5**	**1005**	**15**	**11:40**		**1005.0**		**1005.0**	**1005.0**	**1005.3**	880.3
1	C	**1057.5**	**1001**	**15**	**1:43**		**1001.0**		**1005.0**	**1005.0**	**1005.3**	880.3
2	s	1075.0	1004	15	1:49		1004.8		1008.8	1008.8	1008.8	883.8
2	s	1005.0	1003	15	1:52		1004.1		1008.1	**1007.1**	1007.0	882.0
2,1	24,1	1000.0				=@1005						
2,3	1,24	885.0				=@880						
2	s	880.0	1002	15	1:55		1003.5		1007.5	**1008.0**	1007.8	882.8
2	s	810.0	1002	15	1:57		1003.8		1007.8	1008.1	1007.9	882.9
2	s	927.5	1002	15	2:03		1004.5		1008.5	1008.7	1008.1	883.1
2	C	942.5								1008.7	**1008.2**	883.2
2	s	957.5	1002	15	2:04		1004.6		1008.6	1008.7	1008.4	883.4
1	C	**1057.5**	**998**	**15**	**2:07**		**1001.0**		**1005.0**	**1005.0**	**1005.3**	880.3
1	C	**1057.5**	**989**	**15**	**4:41**		**989.0**		**1005.0**	**1005.0**	**1005.3**	880.3
3	s	985.0	993	15	4:45		993.3		1009.3	1009.0	1009.0	884.0
3	s	890.0	992	15	4:47		992.4		1008.4	**1008.0**	**1007.8**	882.8
3,2	24,1	885.0				=@890						
3	s	670.0	987	15	4:51		987.7		1003.7	1003.3	1003.1	878.1
3	s	765.0	987	15	4:54		987.9		1003.9	1003.6	1003.4	878.4
3	1	770.0				=@765						
3	s	812.5	988	15	5:04		989.6		1005.6	1005.5	1005.3	880.3
3	C	827.5								1006.1	**1005.8**	880.8
3	s	842.5	989	15	5:06		990.7		1006.7	1006.6	1006.5	881.5
1	C	**1057.5**	**987**	**15**	**5:10**		**989.0**		**1005.0**	**1005.0**	**1005.3**	880.3
3	24	**885.0**	**990**	**16**	**3:56**							
3	24	**885.0**	**987**	**16**	**3:56**							

Sovereign Creek, B.C.

Table 1: Elevation Calculations

spread #	loca-tion	m line coord.	elev. m	date Febr.	time h:mm	comments	adjusted values by: spread		line		overall	final
3	24	**885.0**	**987**	**16**	**3:57**							
3	24	**885.0**	**989**	**16**	**3:57**							
3	24	**885.0**	**989**	**16**	**3:58**		**988.0**		**1008.0**		**1008.0**	883.0
5	s	855.0	983	16	4:00		983.1		1003.1		1003.3	878.3
5	s	660.0	984	16	4:03		984.2		1004.2		1004.7	879.7
5	24	655.0				=@545						
5	s	612.5	984	16	4:04		984.3		1004.2		1004.9	879.9
5	s	582.5	984	16	4:05		984.3		1004.3		1005.0	880.0
5,6	1,1	540.0				=@420					**1005.2**	880.2
5	s	535.0	984	16	4:06		984.3		1004.3		**1005.2**	880.2
5	s	340.0	984	16	4:10		984.5		1004.5		1005.1	880.1
3	24	**885.0**	**987**	**16**	**4:21**		**988.0**		**1008.0**		**1008.0**	883.0
5,6	1,1	**540.0**	**994**	**17**	**2:47**	**425**	**994.0**		**1004.7**		**1005.2**	880.2
6	10	*495.0*	*993*	*17*	*2:48*	*470*	*993.1*	**992.7**	1003.8		1004.3	879.3
6	9	500.0	995	17	2:48	465	995.1	**994.7**	1005.8		1006.3	881.3
6	C	482.5	992	17	2:49	482.5	992.2	992.1	1002.9		1003.4	878.4
6	s	497.5	992	17	2:50	467.5	992.3	992.4	1003.0		1003.5	878.5
6	10	*495.0*	*992*	*17*	*2:51*	*470*	*992.4*	**992.7**	1003.1		1003.6	878.6
6	s	467.5	990	17	2:52	497.5	990.5	990.8	1001.2		1001.7	876.7
6	21	440.0	989	17	2:54	525	989.6	989.9	1000.3		1000.8	875.8
6	24	425.0	994	17	2:55	540	994.6	994.8	1005.4		1005.9	880.9
6	s	420.0	995	17	2:56	545	995.8	995.9	1006.5		1007.0	882.0
5,6	1,1	**540.0**	**993**	**17**	**2:58**	**425**	**994.0**		**1004.7**		**1005.2**	880.2
Lines tied in												
Ln 3	1 @5,6	**540.0**	**989**	**17**	**4:01**	**425**	**987.0**	see below		**1005.2**		880.2
Ln 3	s @ 6	740.0	989	17	4:06	225	988.0			1006.2		881.2
Ln 3	1 @5,6	**540.0**	**987**	**17**	**4:11**	**425**	**987.0**	see below		**1005.2**		880.2
Ln 3	C @ 1	1057.5	987	17	4:19		987.0	see below		**1005.3**		880.3
Ln 3	C @ 2	942.5	989	17	4:21		989.0	see below		**1008.2**		883.2
Ln 3	C @ 3	827.5	987	17	4:24		987.0	see below		**1005.8**		880.8
Ln 3	1 @5,6	**540.0**	**987**	**17**	**4:28**	**425**	**987.0**	see below		**1005.2**		880.2
Ln 1	C @ 1	1057.5	994	17	4:33		995.0			1013.2	*	**888.2**
Ln 2b	1 @ 3	770.0	981	17	4:41		983.6			1001.8		876.8
Ln 3	s @ 6	110.0	999	17	4:51	740	1003.6			1021.8		896.8
Ln 3	1 @5,6	**540.0**	**981**	**17**	**4:58**		**987.0**	see below		**1005.2**		880.2

* this location on 1:50,000 topo 93B/16E (1955) is just over 2900 feet elevation (~888 m)

Line 3		first group		second group			average
spread	@	spread	by line	first	diff.	adjusted	elev. m
1 C	1057.5	1005.0	**1005.0**	987	18.0	1005.6	**1005.3**
2 C	942.5	average	1008.7	989	19.7	1007.6	**1008.2**
3 #24	885.0	=@890	1008.0				
3 C	827.0	average	1006.1	987	19.1	1005.6	**1005.8**
3 #24	885.0	988.0	1008.0				
5 #1	540.0	=@420	1004.7				
5,6 #1	540.0	994.0	**1004.7**	987	17.7	1005.6	**1005.2**
		average difference			**18.6**		

Sovereign Creek, B.C.

Table 2b: Survey Calculations

LnSpGph		dist.	direct.	change to		survey coord.		GPS	UTM NAm 1927 Conus				altim.	diff. (UTM-survey)			adjusted UTM coord.	
from	to	m	azim.	east	north	easting	northing	ACU-	E 10 5...	N U 58...	elev.	pnts.	elev.	east	north	elev.	E 10 5...	N U 58...
	1101					0	0	001	64,670	69,707	972	47	889.2	64,670	69,707	83	**64,695.8**	**69,671.2**
1101	centre	57.5	209.5	-28.31	-50.05	-28.31	-50.05										64,667.5	69,621.2
centre	1124	57.5	210	-28.75	-49.80	-57.06	-99.84	002	64,625	69,570	922	300	887.4	64,682	69,670	35	64,638.8	69,571.4
1124	1202	10.8	78	10.56	2.25	-46.50	-97.60										64,649.3	69,573.6
1202	centre	52.5	194	-12.70	-50.94	-59.20	-148.54										64,636.6	69,522.7
centre	1224	57.5	187	-7.01	-57.07	-66.21	-205.61	004	64,633	69,477	955	454	885.0	64,699	69,683	70	64,629.6	69,465.6
1224	1301	12.7	98	12.58	-1.77	-53.63	-207.38	568*	64,638	69,460	937	574	886.9	64,692	69,667	50	64,642.2	69,463.8
1301	centre	57.5	204	-23.39	-52.53	-77.02	-259.91										64,618.8	69,411.3
centre	1324	57.5	204	-23.39	-52.53	-100.41	-312.43	009	64,610	69,375	963	265	885.2	64,710	69,687	78	64,595.4	69,358.8
1202	1201	5	14	1.21	4.85	-45.29	-92.75	003	64,652	69,562	947	438	888.4	64,697	69,655	59	64,650.5	69,578.5
1301	13off	100	*24*	40.67	91.35	-12.96	-116.02	007	64,700	69,542	931	101	886.5	64,713	69,658	45	64,682.9	69,555.2
1324	DH26	9	219	-5.66	-6.99	-106.07	-319.43										64,589.8	69,351.8
										weighed average difference				**64,695.8**	**69,671.2**			
	2010					0	0										64,120.0	69,581.5
2010	centre	12.5	180	0.00	-12.50	0.00	-12.50	010	64,120	69,569	906	541		64,120	69,582	906	**64,120.0**	**69,569.0**
centre	2015	12.5	180	0.00	-12.50	0.00	-25.00										64,120.0	69,556.5
	2124					0	0	011	64,120	69,569	906	541	870.4	64,120	69,569	36	**64,118.4**	**69,555.5**
2124	centre	57.5	28	26.99	50.77	26.99	50.77										64,145.4	69,606.3
centre	2101	57.5	30	28.75	49.80	55.74	100.57	012	64,169	69,646	874	318	873.7	64,113	69,545	0	64,174.1	69,656.1
2101	2224	2.2	285	-2.13	0.57	53.62	101.14	013	64,140	69,648	921	1386	872.9	64,086	69,547	48	64,172.0	69,656.7
2224	centre	57.5	13	12.93	56.03	66.55	157.16										64,184.9	69,712.7
centre	2201	57.5	13	12.93	56.03	79.49	213.19	014	64,194	69,781	873	1007	875.6	64,115	69,568	-3	64,197.9	69,768.7
2201	2324	34	100	33.48	-5.90	112.97	207.28	017	64,232	69,763	892	913	878.5	64,119	69,556	14	64,231.4	69,762.8
2324	centre	57.5	30	28.75	49.80	141.72	257.08										64,260.1	69,812.6
centre	2301	57.5	30	28.75	49.80	170.47	306.88	016	64,306	69,852	848	700	876.8	64,136	69,545	-29	64,288.9	69,862.4
2301	2401	25.8	135	18.24	-18.24	188.72	288.63	025	64,316	69,845	910	1437	876.8	64,127	69,556	33	64,307.1	69,844.2
2401	centre	57.5	40	36.96	44.05	225.68	332.68										64,344.1	69,888.2
centre	2424	57.5	40	36.96	44.05	262.64	376.73	026	64,399	69,942	891	1134	873.8	64,136	69,565	17	64,381.0	69,932.2
2201	22off	150	*??*					015	64,290	69,894	900	405	871.1			29	**64,290.0**	**69,894.0**
2324	23off	75	*210*	-37.50	-64.95	75.47	142.33	018	64,212	69,644	817	179	879.0	64,137	69,502	-62	64,193.9	69,697.9
										weighed average difference				**64,118.4**	**69,555.5**			
	3124					0	0	019	63,871	69,774	945	1454	872.6	63,871	69,774	72	**63,862.6**	**69,775.7**
3124	centre	57.5	352	-8.00	56.94	-8.00	56.94										63,854.6	69,832.6
centre	3101	57.5	351	-9.00	56.79	-17.00	113.73	020	63,837	69,890	892	1730	882.0	63,854	69,776	10	**63,845.6**	**69,889.4**
3101	3224	0		0.00	0.00	-17.00	113.73	020									63,845.6	69,889.4
3224	3201	115	38	70.80	90.62	53.80	204.35	021	63,916	69,939	861	590	882.8	63,862	69,735	-22	63,916.4	69,980.0

Sovereign Creek, B.C.

Table 2b: Survey Calculations

LnSpGph		dist.	direct.	change to		survey coord.		GPS	UTM NAm 1927 Conus				altim.	diff. (UTM-survey)			adjusted UTM coord.	
from	to	m	azim.	east	north	easting	northing	ACU-	E 10 5...	N U 58...	elev.	pnts.	elev.	east	north	elev.	E 10 5...	N U 58...
3201	3324	0		0.00	0.00	53.80	204.35	021									63,916.4	69,980.0
3324	centre	57.5	55	47.10	32.98	100.90	237.33										63,963.5	70,013.0
centre	3301	57.5	57	48.22	31.32	149.13	268.65	022	64,013	70,056	806	2191	878.4	63,864	69,787	-72	64,011.7	70,044.3
										weighed average difference				**63,863**	**69,776**			
	3524					0	0	023	64,035	70,169	890	2629	879.7	64,035	70,169	10	**64,037.7**	**70,160.1**
3524	centre	57.5	30	28.75	49.80	28.75	49.80										64,066.4	70,209.9
centre	3501	57.5	28	26.99	50.77	55.74	100.57	024	64,096	70,248	844	2955	880.2	64,040	70,147	-36	64,093.4	70,260.6
3501	3601	0		0.00	0.00	55.74	100.57										64,093.4	70,260.6
3601	centre	57.5	58	48.76	30.47	104.51	131.04										64,142.2	70,291.1
centre	3624	57.5	59	49.29	29.61	153.79	160.65	027	64,191	70,331	861	1350	880.9	64,037	70,170	-20	64,191.5	70,320.7
										weighed average difference				**64,038**	**70,160**			
														wgh'd aver. diff.		**4.91**	m in elevation	

LnSpGph	
11.. etc.	line 1, spread 1, 2, 3
20..	line 2a
21.. etc.	line 2b, spread 1 to 4
31.. etc.	line 3, spread 1 to 3, 5, 6

*	005	64,631	69,456	903	271
	006	64,647	69,451	992	190
	008	64,638	69,483	924	113
weighed aver.		64,638	69,460	937	574

C.5 Selected locations, (Figure 3 and Table 3)

Line 1: Three spreads (1 to 3, 1000 to 1345 m) located from NNE to SSE along and adjacent to a road). The southernmost geophone is north of a swamp. The MMC drill hole # 26 is reportedly just south of this geophone, not further east as shown on the MMC map, (Figure 5).

Line 2a: Ca 550 m WNW of Line 1 in a swamp with ice. Test shots indicated that most energy was transmitted through the frozen layer. The location was abandoned.

Line 2b: East of the Line 2a swamp and 400 to 500 m WNW of Line 1. Four spreads from SSW to NNE (1 to 4, 1115 to 770 m) with Spread 1 and the south half of Spread 2 along an old road in a forest and the remainder across gravel tailings. Two shot points of Spread 2 were east of the spread line.

Line 3: About 350 m NW of Line 2b. Three spreads (1 to 3, 1115 to 770m) from S to NE along a road. Two spreads (5 and 6, 655 to 425 m) along a road and across a swamp from SW to NE.

C.6 Data Analysis

Layer Characteristics

The computer programs require that for each shot, for each channel (i.e. geophone) the time of the first wave arriving is manually selected ('picked') for good results. The computer in the next step combines the results of a spread, but the times of the picked first arrivals are manually assigned to a particular layer, (see time-geophone graphs in Appendix). In the third step, the computer calculates the depths and velocities that best fit the chosen first arrivals and layers.

The quality of the waves received, depends on the amount of dynamite used, the ground contact of the geophones, the distance of the shot point, and wind (particularly when working in a forest, e.g. Line 2b/Spread 1). A surficial frozen layer was occasionally the source of much noise. An estimate of wave quality is shown in Table 4. Different

Table 3: Adjusted Coordinates

line	spread	m line	geoph.	offset	shot file			GPS	adjusted coordinates**		
#	#	coord.	#	m	direct.	name		ACU-	E 10 5...	N U 58...	elev. m
1	1	950		50	21198	1-3	A		64,720.4	69,714.7	**891.2**
1	1	995		5	21198	1-2	B		64,698.3	69,675.5	**889.2**
1	1	1000	1					001	**64,695.8**	**69,671.2**	**889.2**
1	1	1005	2						64,693.3	69,666.9	889.1
1	1	1010	3						64,690.9	69,662.5	889.0
1	1	1015	4						64,688.4	69,658.2	888.9
1	1	1020	5						64,686.0	69,653.8	888.9
1	1	1025	6						64,683.5	69,649.5	888.8
1	1	1030	7						64,681.0	69,645.1	888.7
1	1	1035	8						64,678.6	69,640.8	888.6
1	1	1040	9						64,676.1	69,636.4	888.5
1	1	1045	10						64,673.7	69,632.1	888.4
1	1	1050	11						64,671.2	69,627.7	888.3
1	1	1055	12						64,668.7	69,623.4	888.2
1	1	1057.5		C	21198	1-1	C		**64,667.5**	**69,621.2**	**888.2**
1	1	1060	13						64,666.3	69,619.0	888.2
1	1	1065	14						64,663.8	69,614.7	888.1
1	1	1070	15						64,661.3	69,610.4	888.0
1	1	1075	16						64,658.8	69,606.0	888.0
1	1	1080	17						64,656.3	69,601.7	887.9
1	1	1085	18						64,653.8	69,597.4	887.8
1	1	1090	19						64,651.3	69,593.1	887.7
1	1	1095	20						64,648.8	69,588.7	887.7
1	1	1100	21						64,646.3	69,584.4	887.6
1	1	1105	22						64,643.8	69,580.1	887.5
1	1	1110	23						64,641.3	69,575.7	887.5
1	1	1115	24					002	**64,638.8**	**69,571.4**	**887.4**
1	1	1120		5	21198	1-4	D		64,636.3	69,567.1	**887.4**
1	1	1150			edge slope				64,621.3	69,541.1	**887.7**
1	1	1165		50	21198	1-5	E		64,613.8	69,528.1	**885.6**
1	2	1065		50	21198	1-6	F		64,662.6	69,627.0	**888.2**
1	2	1110		5	21198	1-10	G		64,651.7	69,583.4	**888.4**
1	2	1115	1					003	**64,650.5**	**69,578.5**	**888.4**
1	2	1120	2						**64,649.3**	**69,573.6**	888.3
1	2	1125	3						64,648.1	69,568.8	888.1
1	2	1130	4						64,646.9	69,563.9	888.0
1	2	1135	5						64,645.7	69,559.1	887.8
1	2	1140	6						64,644.5	69,554.2	887.7
1	2	1145	7						64,643.3	69,549.4	887.5
1	2	1150	8						64,642.0	69,544.5	887.4
1	2	1155	9						64,640.8	69,539.7	887.3
1	2	1160	10						64,639.6	69,534.8	887.1
1	2	1165	11						64,638.4	69,530.0	887.0
1	2	1170	12						64,637.2	69,525.1	886.8
1	2	1172.5		C	21198	1-14	H		**64,636.6**	**69,522.7**	**886.8**
1	2	1175	13						64,636.3	69,520.2	886.7
1	2	1180	14						64,635.7	69,515.3	886.5
1	2	1185	15						64,635.1	69,510.3	886.4
1	2	1190	16						64,634.5	69,505.3	886.2
1	2	1195	17						64,633.9	69,500.4	886.1
1	2	1200	18						64,633.3	69,495.4	885.9

line	spread	m line	geoph.	offset	shot file			GPS	adjusted coordinates**		
#	#	coord.	#	m	direct.	name		ACU-	E 10 5...	N U 58...	elev. m
1	2	1205	19						64,632.6	69,490.4	885.8
1	2	1210	20						64,632.0	69,485.5	885.6
1	2	1215	21						64,631.4	69,480.5	885.5
1	2	1220	22						64,630.8	69,475.5	885.3
1	2	1225	23						64,630.2	69,470.6	885.2
1	2	1230	24					004	**64,629.6**	**69,465.6**	**885.0**
1	2	1235		5	21198	1-15	I		64,629.0	69,460.6	**885.0**
1	2	1280		50	21198	1-16	J		64,623.5	69,415.9	**884.2**
1	3	1130		100	21198	1-24	K	007	**64,682.9**	**69,555.2**	**886.5**
1	3	1180		50	21198	1-19	L		64,662.5	69,509.5	**886.8**
1	3	1225		5	21198	1-20	M		64,644.2	69,468.4	**886.9**
1	3	1230	1					005,6,8	**64,642.2**	**69,463.8**	**886.9**
1	3	1235	2						64,640.2	69,459.2	886.6
1	3	1240	3						64,638.1	69,454.7	886.4
1	3	1245	4						64,636.1	69,450.1	886.1
1	3	1250	5						64,634.1	69,445.5	885.9
1	3	1255	6						64,632.0	69,441.0	885.6
1	3	1260	7						64,630.0	69,436.4	885.4
1	3	1265	8						64,628.0	69,431.8	885.1
1	3	1270	9						64,625.9	69,427.3	884.9
1	3	1275	10						64,623.9	69,422.7	884.6
1	3	1280	11						64,621.9	69,418.1	884.4
1	3	1285	12						64,619.8	69,413.6	884.1
1	3	1287.5		C	21198	1-18	N		**64,618.8**	**69,411.3**	**884.0**
1	3	1290	13						64,617.8	69,409.0	884.1
1	3	1295	14						64,615.7	69,404.5	884.2
1	3	1300	15						64,613.7	69,399.9	884.3
1	3	1305	16						64,611.7	69,395.3	884.4
1	3	1310	17						64,609.6	69,390.8	884.5
1	3	1315	18						64,607.6	69,386.2	884.6
1	3	1320	19						64,605.6	69,381.6	884.7
1	3	1325	20						64,603.5	69,377.1	884.8
1	3	1330	21						64,601.5	69,372.5	884.9
1	3	1335	22						64,599.5	69,367.9	885.0
1	3	1340	23						64,597.4	69,363.4	885.1
1	3	1345	24					009	**64,595.4**	**69,358.8**	**885.2**
1	3	1350		5	21198	1-21	O		64,593.4	69,354.2	**884.2**
1	DH26								**64,589.8**	**69,351.8**	*883.3*
1	3	1395		50	21198	1-22	P		64,575.1	69,313.1	**882.6**
1	3	1400			edge swamp				64,573.0	69,308.6	*880.3*
1	3	1445		100	21198	1-23	Q		64,554.7	69,267.5	**880.3**
2a		1120		5	21398	2-7			64,121.0	69,678.5	
2a		1070	15						**64,121.0**	**69,728.5**	
2a		1057.5		C	21398	2-1		010	**64,121.0**	**69,741.0**	
2a		1045	10						**64,121.0**	**69,753.5**	
2a		995		5	21398	2-6			64,121.0	69,803.5	

line	spread	m line	geoph.	offset	shot file			GPS	adjusted coordinates**		
#	#	coord.	#	m	direct.	name		ACU-	E 10 5...	N U 58...	elev. m
2b	1	925		75	21398	3-6	A		64,211.5	69,721.1	**877.0**
2b	1	995		5	21398	3-5	B		64,176.6	69,660.4	**873.7**
2b	1	1000	1					012	**64,174.1**	**69,656.1**	**873.7**
2b	1	1005	2						64,171.6	69,651.8	873.4
2b	1	1010	3						64,169.1	69,647.4	873.2
2b	1	1015	4						64,166.6	69,643.1	872.9
2b	1	1020	5						64,164.1	69,638.8	872.6
2b	1	1025	6						64,161.6	69,634.4	872.4
2b	1	1030	7						64,159.1	69,630.1	872.1
2b	1	1035	8						64,156.6	69,625.8	871.8
2b	1	1040	9						64,154.1	69,621.5	871.5
2b	1	1045	10						64,151.6	69,617.1	871.3
2b	1	1050	11						64,149.1	69,612.8	871.0
2b	1	1055	12						64,146.6	69,608.5	870.7
2b	1	1057.5		C	21398	3-1	C		**64,145.4**	**69,606.3**	**870.6**
2b	1	1060	13						64,144.2	69,604.1	870.6
2b	1	1065	14						64,141.9	69,599.7	870.6
2b	1	1070	15						64,139.5	69,595.3	870.6
2b	1	1075	16						64,137.2	69,590.8	870.5
2b	1	1080	17						64,134.8	69,586.4	870.5
2b	1	1085	18						64,132.5	69,582.0	870.5
2b	1	1090	19						64,130.1	69,577.6	870.5
2b	1	1095	20						64,127.8	69,573.2	870.5
2b	1	1100	21						64,125.4	69,568.8	870.5
2b	1	1105	22						64,123.1	69,564.3	870.4
2b	1	1110	23						64,120.7	69,559.9	870.4
2b	1	1115	24					011	**64,118.4**	**69,555.5**	**870.4**
2b	1	1120		5	21398	3-3	D		64,116.1	69,551.1	**870.4**
2b	1	1190		75	21398	3-2	E		64,083.2	69,489.2	**866.5**
2b	2	742	*	143	21398	5-6	F	015	**64,290.0**	**69,894.0**	**871.1**
2b	2	813.5	*	71.5	21398	4-9	G		64,242.9	69,831.7	**873.7**
2b	2	880		5	21398	4-8	H		64,199.0	69,773.6	**875.6**
2b	2	885	1					014	**64,197.9**	**69,768.7**	**875.6**
2b	2	890	2						64,196.8	69,763.8	875.5
2b	2	895	3						64,195.6	69,759.0	875.5
2b	2	900	4						64,194.5	69,754.1	875.4
2b	2	905	5						64,193.4	69,749.2	875.4
2b	2	910	6						64,192.2	69,744.4	875.3
2b	2	915	7						64,191.1	69,739.5	875.2
2b	2	920	8						64,190.0	69,734.6	875.2
2b	2	925	9						64,188.9	69,729.7	875.1
2b	2	927.5			21398	5-2	I		64,188.3	69,727.3	**875.1**
2b	2	930	10						64,187.7	69,724.9	875.1
2b	2	935	11						64,186.6	69,720.0	875.1
2b	2	940	12						64,185.5	69,715.1	875.1
2b	2	942.5		C					**64,184.9**	**69,712.7**	**875.1**
2b	2	945	13						64,184.3	69,710.3	875.1
2b	2	950	14						64,183.2	69,705.4	875.1
2b	2	955	15						64,182.1	69,700.5	875.1
2b	2	957.5			21398	5-3	J		64,181.5	69,698.1	**875.1**
2b	2	960	16						64,181.0	69,695.7	875.0

line	spread	m line	geoph.	offset	shot file			GPS	adjusted coordinates**		
#	#	coord.	#	m	direct.	name		ACU-	E 10 5...	N U 58...	elev. m
2b	2	965	17						64,179.9	69,690.8	874.7
2b	2	970	18						64,178.7	69,685.9	874.5
2b	2	975	19						64,177.6	69,681.0	874.2
2b	2	980	20						64,176.5	69,676.2	873.9
2b	2	985	21						64,175.4	69,671.3	873.7
2b	2	990	22						64,174.2	69,666.4	873.4
2b	2	995	23						64,173.1	69,661.6	873.2
2b	2	1000	24					013	**64,172.0**	**69,656.7**	**872.9**
2b	2	1005		5	21398	4-7	K		64,170.9	69,651.8	**872.9**
2b	2	1075		75	21398	5-4	L		64,155.2	69,583.7	**876.8**
2b	2	1150		150	21398	5-5	M		64,138.3	69,510.6	**878.4**
2b	3	695		75	21398	6-6	N		64,326.5	69,927.4	**872.8**
2b	3	765		5	21398	6-8	O		64,291.4	69,866.7	**876.8**
2b	3	770	1					016	**64,288.9**	**69,862.4**	**876.8**
2b	3	775	2						64,286.4	69,858.1	876.8
2b	3	780	3						64,283.9	69,853.7	876.8
2b	3	785	4						64,281.4	69,849.4	876.8
2b	3	790	5						64,278.9	69,845.1	876.8
2b	3	795	6						64,276.4	69,840.7	876.8
2b	3	800	7						64,273.9	69,836.4	876.8
2b	3	805	8						64,271.4	69,832.1	876.8
2b	3	810	9						64,268.9	69,827.8	876.8
2b	3	812.5			21398	6-1	P		64,267.6	69,825.6	876.8
2b	3	815	10						64,266.4	69,823.4	876.8
2b	3	820	11						64,263.9	69,819.1	876.8
2b	3	825	12						64,261.4	69,814.8	876.8
2b	3	827.5		C					**64,260.1**	**69,812.6**	**876.8**
2b	3	830	13						64,258.9	69,810.4	876.9
2b	3	835	14						64,256.4	69,806.1	877.0
2b	3	840	15						64,253.9	69,801.8	877.1
2b	3	842.5			21398	6-2	Q		64,252.6	69,799.6	877.1
2b	3	845	16						64,251.4	69,797.4	877.2
2b	3	850	17						64,248.9	69,793.1	877.3
2b	3	855	18						64,246.4	69,788.8	877.4
2b	3	860	19						64,243.9	69,784.5	877.5
2b	3	865	20						64,241.4	69,780.1	877.6
2b	3	870	21						64,238.9	69,775.8	877.8
2b	3	875	22						64,236.4	69,771.5	877.9
2b	3	880	23						64,233.9	69,767.1	878.0
2b	3	885	24					017	**64,231.4**	**69,762.8**	**878.1**
2b	3	890		5	21398	6-5	R		64,228.9	69,758.5	**878.1**
2b	3	960		75	21398	6-7	S	018	**64,193.9**	**69,697.9**	**879.0**
2b	4	455		200	21398	7-9	Y		64,509.3	70,085.2	**900.8**
2b	4	650		5	21398	7-5	X		64,384.2	69,936.0	**873.8**
2b	4	655	24					026	**64,381.0**	**69,932.2**	**873.8**
2b	4	660	23						64,377.8	69,928.4	874.0
2b	4	665	22						64,374.6	69,924.5	874.1
2b	4	670	21						64,371.4	69,920.7	874.3
2b	4	675	20						64,368.2	69,916.9	874.5
2b	4	680	19		foot of slope				64,365.0	69,913.1	874.6
2b	4	685	18						64,361.7	69,909.2	**874.8**

line #	spread #	m line coord.	geoph. #	offset m	shot file direct.	shot file name		GPS ACU-	adjusted coordinates** E 10 5...	N U 58...	elev. m
2b	4	690	17						64,358.5	69,905.4	875.6
2b	4	695	16						64,355.3	69,901.6	876.4
2b	4	697.5			21398	7-6	W		64,353.7	69,899.7	**876.8**
2b	4	700	15						64,352.1	69,897.8	877.1
2b	4	705	14						64,348.9	69,893.9	877.8
2b	4	710	13						64,345.7	69,890.1	878.5
2b	4	712.5		C	edge of slope				**64,344.1**	**69,888.2**	**878.8**
2b	4	715	12						64,342.5	69,886.3	879.0
2b	4	720	11						64,339.3	69,882.5	879.3
2b	4	725	10						64,336.1	69,878.6	879.6
2b	4	727.5			21398	7-7	V		64,334.4	69,876.7	**879.8**
2b	4	730	9						64,332.8	69,874.8	879.6
2b	4	735	8						64,329.6	69,871.0	879.3
2b	4	740	7						64,326.4	69,867.2	878.9
2b	4	745	6						64,323.2	69,863.3	878.6
2b	4	750	5						64,320.0	69,859.5	878.2
2b	4	755	4						64,316.8	69,855.7	877.9
2b	4	760	3						64,313.5	69,851.9	877.5
2b	4	765	2						64,310.3	69,848.0	877.2
2b	4	770	1					025	**64,307.1**	**69,844.2**	**876.8**
2b	4	775		5	21398	7-4	U		64,303.9	69,840.4	**876.8**
2b	4	970		200	21398	7-8	T		64,178.4	69,691.2	**877.8**
3	1	925		75	21598	1-8	A		63,833.9	69,963.5	**887.8**
3	1	995		5	21598	1-3	B		63,844.8	69,894.3	**882.0**
3	1	1000	1					020	**63,845.6**	**69,889.4**	**882.0**
3	1	1005	2						63,846.4	69,884.5	881.9
3	1	1010	3						63,847.2	69,879.5	881.7
3	1	1015	4						63,847.9	69,874.6	881.6
3	1	1020	5						63,848.7	69,869.6	881.4
3	1	1025	6						63,849.5	69,864.7	881.3
3	1	1030	7						63,850.3	69,859.8	881.1
3	1	1035	8						63,851.1	69,854.8	881.0
3	1	1040	9						63,851.9	69,849.9	880.8
3	1	1042.5			21598	1-6	C		63,852.3	69,847.4	880.7
3	1	1045	10						63,852.6	69,844.9	880.7
3	1	1050	11						63,853.4	69,840.0	880.5
3	1	1055	12						63,854.2	69,835.1	880.4
3	1	1057.5		C					**63,854.6**	**69,832.6**	**880.3**
3	1	1060	13						63,854.9	69,830.1	880.0
3	1	1065	14						63,855.6	69,825.2	879.3
3	1	1070	15						63,856.3	69,820.2	878.6
3	1	1072.5			21598	1-7	D		63,856.7	69,817.8	878.3
3	1	1075	16						63,857.0	69,815.3	878.0
3	1	1080	17						63,857.7	69,810.3	877.3
3	1	1085	18						63,858.4	69,805.4	876.6
3	1	1090	19						63,859.1	69,800.4	875.9
3	1	1095	20						63,859.8	69,795.5	875.3
3	1	1100	21						63,860.5	69,790.5	874.6
3	1	1105	22						63,861.2	69,785.6	873.9
3	1	1110	23						63,861.9	69,780.6	873.3
3	1	1115	24					019	**63,862.6**	**69,775.7**	**872.6**

line #	spread #	m line coord.	geoph. #	offset m	shot file direct.	shot file name		GPS ACU-	adjusted coordinates** E 10 5...	N U 58...	elev. m
3	1	1120		5	21598	1-4	E		63,863.3	69,770.8	**872.6**
3	1	1190		75	21598	1-5	F		63,873.0	69,701.5	**867.3**
3	2	810		75	21598	2-7	G		63,962.6	70,039.1	**882.9**
3	2	880		5	21598	2-5	H		63,919.5	69,983.9	**882.8**
3	2	885	1					021	**63,916.4**	**69,980.0**	**882.8**
3	2	890	2						63,913.3	69,976.1	882.8
3	2	895	3						63,910.2	69,972.1	882.9
3	2	900	4						63,907.2	69,968.2	882.9
3	2	905	5						63,904.1	69,964.2	882.9
3	2	910	6						63,901.0	69,960.3	883.0
3	2	915	7						63,897.9	69,956.4	883.0
3	2	920	8						63,894.9	69,952.4	883.0
3	2	925	9						63,891.8	69,948.5	883.1
3	2	927.5			21598	2-4	I		63,890.2	69,946.5	**883.1**
3	2	930	10						63,888.7	69,944.5	883.1
3	2	935	11						63,885.6	69,940.6	883.2
3	2	940	12						63,882.5	69,936.7	883.2
3	2	942.5							63,881.0	69,934.7	**883.2**
3	2	945	13						63,879.5	69,932.7	883.2
3	2	950	14						63,876.4	69,928.8	883.3
3	2	955	15						63,873.3	69,924.9	883.4
3	2	957.5			21598	2-3	J		63,871.8	69,922.9	**883.4**
3	2	960	16						63,870.2	69,920.9	883.3
3	2	965	17						63,867.1	69,917.0	883.2
3	2	970	18						63,864.1	69,913.0	883.0
3	2	975	19						63,861.0	69,909.1	882.8
3	2	980	20						63,857.9	69,905.2	882.7
3	2	985	21						63,854.8	69,901.2	882.5
3	2	990	22						63,851.8	69,897.3	882.3
3	2	995	23						63,848.7	69,893.3	882.2
3	2	1000	24					020	**63,845.6**	**69,889.4**	**882.0**
3	2	1005		5	21598	2-6	K		63,842.5	69,885.5	**882.0**
3	2	1075		75	21598	2-8	L		63,799.4	69,830.3	**883.8**
3	3	670		100	21598	3-8	M		64,095.5	70,098.7	**878.1**
3	3	765		5	21598	3-3	N		64,015.9	70,047.0	**878.4**
3	3	770	1					022	**64,011.7**	**70,044.3**	**878.4**
3	3	775	2						64,007.5	70,041.6	878.6
3	3	780	3						64,003.3	70,038.9	878.8
3	3	785	4						63,999.1	70,036.1	879.1
3	3	790	5						63,994.9	70,033.4	879.3
3	3	795	6						63,990.7	70,030.7	879.5
3	3	800	7						63,986.6	70,028.0	879.7
3	3	805	8						63,982.4	70,025.2	880.0
3	3	810	9						63,978.2	70,022.5	880.2
3	3	812.5			21598	3-2	O		63,976.1	70,021.2	**880.3**
3	3	815	10						63,974.0	70,019.8	880.4
3	3	820	11						63,969.8	70,017.1	880.6
3	3	825	12						63,965.6	70,014.4	880.7
3	3	827.5		C					**63,963.5**	**70,013.0**	**880.8**
3	3	830	13						63,961.5	70,011.6	880.9
3	3	835	14						63,957.4	70,008.7	881.2

Table 3: Adjusted Coordinates

line #	spread #	m line coord.	geoph. #	offset m	shot file direct.	shot file name		GPS ACU-	adjusted coordinates** E 10 5...	N U 58...	elev. m
3	3	840	15						63,953.3	70,005.8	881.4
3	3	842.5			21598	3-1	P		63,951.2	70,004.4	**881.5**
3	3	845	16						63,949.2	70,003.0	881.6
3	3	850	17						63,945.1	70,000.1	881.7
3	3	855	18						63,941.0	69,997.2	881.9
3	3	860	19						63,936.9	69,994.3	882.1
3	3	865	20						63,932.8	69,991.5	882.2
3	3	870	21						63,928.7	69,988.6	882.4
3	3	875	22						63,924.6	69,985.7	882.6
3	3	880	23						63,920.5	69,982.9	882.7
3	3	885	24					021	**63,916.4**	**69,980.0**	**882.9**
3	3	890		5	21598	3-7	Q		63,912.3	69,977.1	**882.8**
3	3	985		100	21598	3-9	R		63,834.5	69,922.6	**884.0**
3	5	340		200	21598	5-5	S		64,187.3	70,436.9	**880.1**
3	5	535		5	21598	5-4	T		64,095.7	70,265.0	**880.2**
3	5	540	1					024	**64,093.4**	**70,260.6**	**880.2**
3	5	545	2						64,091.1	70,256.2	880.2
3	5	550	3						64,088.7	70,251.8	880.2
3	5	555	4						64,086.4	70,247.4	880.1
3	5	560	5						64,084.0	70,243.0	880.1
3	5	565	6						64,081.7	70,238.6	880.1
3	5	570	7						64,079.3	70,234.1	880.1
3	5	575	8						64,077.0	70,229.7	880.0
3	5	580	9						64,074.6	70,225.3	880.0
3	5	582.5			21598	5-1	U		64,073.4	70,223.1	**880.0**
3	5	585	10						64,072.3	70,220.9	880.0
3	5	590	11						64,069.9	70,216.5	880.0
3	5	595	12						64,067.6	70,212.1	880.0
3	5	597.5		C					**64,066.4**	**70,209.9**	880.0
3	5	600	13						64,065.2	70,207.7	879.9
3	5	605	14						64,062.7	70,203.4	879.9
3	5	610	15						64,060.2	70,199.1	879.9
3	5	612.5			21598	5-2	V		64,058.9	70,196.9	**879.9**
3	5	615	16						64,057.7	70,194.7	879.9
3	5	620	17						64,055.2	70,190.4	879.9
3	5	625	18						64,052.7	70,186.1	879.8
3	5	630	19						64,050.2	70,181.8	879.8
3	5	635	20						64,047.7	70,177.4	879.8
3	5	640	21						64,045.2	70,173.1	879.8
3	5	645	22						64,042.7	70,168.8	879.7
3	5	650	23						64,040.2	70,164.4	879.7
3	5	655	24					023	**64,037.7**	**70,160.1**	**879.7**
3	5	660		5	21598	5-3	W		64,035.2	70,155.8	**879.7**
3	5	855		200	21598	5-7	X		63,937.9	69,986.9	**878.3**
3	6	225		200	21598	6-6	Z		64,363.0	70,423.7	**896.8**
3	6	420		5	21598	6-4	A		64,195.8	70,323.3	**882.0**
3	6	425	24					027	**64,191.5**	**70,320.7**	**880.9**
3	6	427.5			edge of slope				64,189.4	70,319.4	880.1
3	6	430	23						64,187.2	70,318.1	879.2
3	6	435	22						64,182.9	70,315.6	877.5
3	6	440	21		foot of slope				64,178.6	70,313.0	**875.8**

Table 3: Adjusted Coordinates

line #	spread #	m line coord.	geoph. #	offset m	shot file direct.	shot file name		GPS ACU-	adjusted coordinates** E 10 5...	N U 58...	elev. m
3	6	445	20						64,174.4	70,310.4	876.0
3	6	450	19						64,170.1	70,307.8	876.1
3	6	455	18						64,165.8	70,305.3	876.3
3	6	460	17						64,161.5	70,302.7	876.5
3	6	465	16						64,157.2	70,300.1	876.6
3	6	467.5			21598	6-2	B		64,155.1	70,298.8	**876.7**
3	6	470	15						64,152.9	70,297.5	877.0
3	6	475	14						64,148.6	70,295.0	877.6
3	6	480	13						64,144.3	70,292.4	878.1
3	6	482.5		C					**64,142.2**	**70,291.1**	**878.4**
3	6	485	12						64,140.1	70,289.8	878.4
3	6	490	11						64,135.8	70,287.1	878.5
3	6	495	10		foot of slope				64,131.6	70,284.5	**878.6**
3	6	497.5			21598	6-1	C		64,129.5	70,283.1	**878.5**
3	6	500	9		edge of slope				64,127.3	70,281.8	**881.3**
3	6	505	8						64,123.1	70,279.2	881.2
3	6	510	7						64,118.9	70,276.5	881.0
3	6	515	6						64,114.6	70,273.9	880.9
3	6	520	5						64,110.4	70,271.2	880.8
3	6	525	4						64,106.1	70,268.6	880.6
3	6	530	3						64,101.9	70,265.9	880.5
3	6	535	2						64,097.6	70,263.3	880.3
3	6	540	1					024	**64,093.4**	**70,260.6**	**880.2**
3	6	545		5	21598	6-3	D		64,089.2	70,257.9	880.2
3	6	740		200	21598	6-5	E		63,923.7	70,154.5	**881.2**

Notes

* geophone F on Line 2b is offset dX = 143.0 m and dY = 62.4 m

* geophone G on Line 2b is offset dX = 71.5 m and dY = 29.6 m

** UTM (meters) in datum N.Am. 1927 Conus

All spreads have geophones 1 to 24 from about NNE to SSW, except Line 2b Spread 4 and Line 3 Spread 6 with geophones 1 to 24 from SSW to NNE.

Sovereign Creek, B.C.

Table 4: Shot Results

line #	spread #	m line coord.	offset m	shot file C:\	name		quality first arrivals	dyna-mite
1	1	950	50	SIP\1	1-3	A	obscure	
1	1	995	5	SIP\1	1-2	B	clear to poor	
1	1	1057.5	C	SIP\1	1-1	C	good to unclear	
1	1	1120	5	SIP\1	1-4	D	good to unclear	
1	1	1165	50	SIP\1	1-5	E	difficult	
1	2	1065	50	SIP\1	1-6	F	clear to difficult	
1	2	1110	5	SIP\1	1-10	G	very clear	
1	2	1172.5	C	SIP\1	1-14	H	much noise	1 cap
1	2	1235	5	SIP\1	1-15	I	very clear	1/2 stick
1	2	1280	50	SIP\1	1-16	J	good	1 stick
1	3	1130	100	SIP\1	1-24	K	very noisy	3 sticks
1	3	1180	50	SIP\1	1-19	L	reasonable	
1	3	1225	5	SIP\1	1-20	M	good	
1	3	1287.5	C	SIP\1	1-18	N	reasonable	1/8 stick
1	3	1350	5	SIP\1	1-21	O	very good	
1	3	1395	50	SIP\1	1-22	P	very good	1 stick
1	3	1445	100	SIP\1	1-23	Q	reasonable	3 sticks
2b	1	925	75	SIP\2b	3-6	A	good	
2b	1	995	5	SIP\2b	3-5	B	good	
2b	1	1057.5	C	SIP\2b	3-1	C	reasonable	
2b	1	1120	5	SIP\2b	3-3	D	good	
2b	1	1190	75	SIP\2b	3-2	E	reasonable	
2b	2	742	143	SIP\2b	5-6	F	very noisy, good to difficult	5 sticks
2b	2	813.5	71.5	SIP\2b	4-9	G	good	
2b	2	880	5	SIP\2b	4-8	H	excellent	
2b	2	927.5		SIP\2b	5-2	I	excellent	
2b	2	957.5		SIP\2b	5-3	J	very good	
2b	2	1005	5	SIP\2b	4-7	K	very good	
2b	2	1075	75	SIP\2b	5-4	L	good	
2b	2	1150	150	SIP\2b	5-5	M	reasonable	5 sticks
2b	3	695	75	SIP\2b	6-6	N	reasonable	
2b	3	765	5	SIP\2b	6-8	O	good	
2b	3	812.5		SIP\2b	6-1	P	good, irregular	
2b	3	842.5		SIP\2b	6-2	Q	good	
2b	3	890	5	SIP\2b	6-5	R	very good	
2b	3	960	75	SIP\2b	6-7	S	reasonable	
2b	4	455	200	SIP\2b	7-9	Y	difficult, very noisy	
2b	4	650	5	SIP\2b	7-5	X	difficult, very noisy, frostlayer	
2b	4	697.5		SIP\2b	7-6	W	reasonable	
2b	4	727.5		SIP\2b	7-7	V	reasonable	
2b	4	775	5	SIP\2b	7-4	U	good	
2b	4	970	200	SIP\2b	7-8	T	reasonable	
3	1	925	75	SIP\3	1-8	A	clear	
3	1	995	5	SIP\3	1-3	B	very good	
3	1	1042.5		SIP\3	1-6	C	very noisy	
3	1	1072.5		SIP\3	1-7	D	noisy, reasonable	
3	1	1120	5	SIP\3	1-4	E	good	
3	1	1190	75	SIP\3	1-5	F	good	

Table 4: Shot Results

line #	spread #	m line coord.	offset m	shot file C:\	name		quality first arrivals	dyna-mite
3	2	810	75	SIP\3	2-7	G	very good	
3	2	880	5	SIP\3	2-5	H	good	
3	2	927.5		SIP\3	2-4	I	very good	
3	2	957.5		SIP\3	2-3	J	reasonable	
3	2	1005	5	SIP\3	2-6	K	good	
3	2	1075	75	SIP\3	2-8	L	good	
3	3	670	100	SIP\3	3-8	M	noisy, reasonable	
3	3	765	5	SIP\3	3-3	N	very good	
3	3	812.5		SIP\3	3-2	O	very good	
3	3	842.5		SIP\3	3-1	P	poor	
3	3	890	5	SIP\3	3-7	Q	good	
3	3	985	100	SIP\3	3-9	R	good	
3	5	340	200	SIP\3	5-5	S	very good	
3	5	535	5	SIP\3	5-4	T	very good	
3	5	582.5		SIP\3	5-1	U	very good	
3	5	612.5		SIP\3	5-2	V	very erratic (frost layer)	
3	5	660	5	SIP\3	5-3	W	very good	
3	5	855	200	SIP\3	5-7	X	very noisy, difficult	2 shots
3	6	225	200	SIP\3	6-6	Z	very noisy, reasonable	5 sticks
3	6	420	5	SIP\3	6-4	A	noisy, irregular, reasonable	2 sticks
3	6	467.5		SIP\3	6-2	B	very good	
3	6	497.5		SIP\3	6-1	C	good, noisy	
3	6	545	5	SIP\3	6-3	D	very good, noisy	2 sticks
3	6	740	200	SIP\3	6-5	E	very noisy, difficult	5 sticks

choices are frequently possible for the time of first arrival when the results are noisy. Results of different choices have then to be studied in the context of the other results for that spread in order to select the most likely time of first arrival of the significant wave.

The first arrivals of the first (top) layer could usually be picked accurately. The fist arrivals for a particular interface would lie on a straight line on the times–geophone graph (see Appendix) if the material were homogeneous, (i.e. if the velocity is constant). The velocity and the dip of the interface determine the slope of this line. Irregularities in the top of the sedimentary layers cause the lines on the graph to be irregular as well. The lines that correspond to the surface wave (first layer) are usually irregular, likely due to rapidly changing characteristics of this layer. This layer, with velocities of 966 to 1664 m/s, (Table 5) and thickness of 1 m (Line 2/Spread 1) to 26 m (Line 1/Spread 1) has likely a variable composition. The layer might consist of gravel, weathered till, and materials derived from till, with one or the other dominant in different locations.

The arrivals of the interface between the first and second layer are usually clear and regular. Although, whether a particular arrival belongs to the first or the second layer is sometimes obscure. The second layer with velocities of 1670 to 2487 m/s and thickness up to 63 m (line 3/Spread 6) or 102 m? (Line 3/Spread 5) is interpreted as a till. This unit likely includes other materials such as sand and/or gravel layers, (compare for instance the MMC drill hole information). Variations in this layer are indicated by slight changes in the slopes of the lines on the time-geophone graphs. The changes, however, are not regular or pronounced enough as to belong to different layers. Sudden jumps in these lines are caused by irregularities, such as post-glacial channels.

Times of first arrivals from the interface between the second and third layer were usually difficult to pick. This interface shows, because of its greater depth, normally only at the arrivals from the far away shot points, travel distances become than so large that much energy is lost and first arrivals are hard to separate from the background noise. For instance, at Line 3/Spread 5 the travel distance has been calculated to increase from 303 m to 427 m when the first arrival switches from the 2nd to the 3^{d} interface. Because of the longer travel distance also more irregularities are encountered, causing the received

Table 5: Layer Velocities

line #	spread #	file SIP\...	layer velocity (meter/second) 1	2	3	4
1	1	1\1BD	1,047	2,487		4,373
1	2	1\2N	966	1,739	3,065	4,833
1	3	1\3N	1,163	2,002	2,973	
		average	*1,059*	*2,076*	*3,019*	*4,603*
2b	1	2b\1B	630	2,134	2,956	
2b	2	2b\2C	1,086	2,450	3,149	
2b	3	2b\3B	1,386	2,245	2,944	
2b	4	2b\4B	1,664	2,133	3,225	
		average	*1,192*	*2,241*	*3,069*	
3	1	3\1B	1,393	1,894	2,937	
3	2	3\2B	1,177	1,670	2,714	
3	3	3\3B	1,163	2,255	2,857	
3	5	3\5B	1,467	2,072		5,010
3	6	3\6B	1,194	2,154	2,958	
		average	*1,279*	*2,009*	*2,867*	*5,010*
	average velocity		**1,195**	**2,103**	**2,707**	**4,739**

EB Velocities 4/16/98

Table 6: Depth to Bedrock

	bench		paleovalley		paleochannel		trough	
meters	depth	elevation	depth	elevation	depth	elevation	depth	elevation
DH 9	5.0						absent	
DH 15			24.3	ca. 890				
DH 16A					45	ca. 869		
Line 1								
NNE side	outside line		44.5	844	58.1	829	absent	
SSW side	21.1	864	36.2	850				
Line 2b								
NE side	24.4	852	43.8	833	62.5	815	absent	
SSW side	21.9	851	42.2	833				
Line 3								
NE side	outside line		outside line		61.4	813	92.1	779
S side	24.3	856	39.7	838	no spread		101.1	788

EB Bedrock 4/16/98

signals being more irregular. Nevertheless, the 'noise' seems to be extraordinary high whenever the first arrivals come form the bedrock interface, even when bedrock is rather shallow. A likely explanation is that the bedrock is overlain by very inhomogeneous material (e.g. boulder gravel or boulder till). A frequent problem in some areas was the assignment of time of first arrival, either to the second or to the third layer, because the differences in slope of the lines on the time-geophone graphs are small in those areas, i.e. the difference in velocities is small. Two types of bedrock clearly show to be present: a low velocity type (2714 to 3225 m/s), occasionally difficult to separate from till, and a high velocity type (4373 to 5010 m/s). The low velocity type might correspond to the carbonaceous shale in MMC drill hole 27 and the high velocity type to the andesite in drill hole 31.

Combined Results, (Figure 4)

The combined interpretations, which were reached after much effort to solve unclear situations, show a coherent picture, (Figure 4). The results fit a pattern with bedrock at three or four levels. A wide valley (paleovalley) cuts the shallowest bedrock level (bench). A narrow (paleo-)channel with a through (Line 3/Spread 5-6) is cut into the paleovalley.

The depth of the bench close to the edge of the paleovalley is about 23 m, (Table 6). The depth of the bedrock in the paleovalley is about 40 m and its width is about 220 m (Line 2b). The depth of the bedrock in the paleochannel is about 60 m and its width is about 80 m (Line 1). Similar depths were found in MMC drill holes to the east. The sudden widening of the Line 3 valley and channel intersections is most likely caused by a change in trend of valley and channel to a northerly direction.

The bench has a shallow valley cut south of the main paleovalley with depth to bedrock of 24 m (Line 2b/Spread 1) to 48 m (Line 3/Spread 2).

The trough with depths of 92 to 101 m is unusual. The picking of first arrivals and the time-geophone graphs at Spread 5 were clear. The trough could be a feature scoured by ice or alternatively it is a phantom. It is possible that two layers of bedrock are present.

Compare for instance the high velocity in the bedrock under the trough with the much lower velocities in the bedrock on either side, and the situation at Line 1/Spread 2. The contact between till and an upper bedrock layer would not show if that bedrock layer has a velocity close to the overlying till.

A major discrepancy exists between the results of Line 1 and the MMC drill holes 26 (just south of Spread 1) and 31 (west of the northern end of Spread 1). Spread 3 shows at the south-end bedrock at a depth of 26 m, (DH-26 has bedrock at 41.5 m) and near the north-end at 27 m, (DH-31 has andesite at 42 m). The interpretation of the Spread 3 data is univocal, and an andesite contact at 42 m should have shown, but is not. On the other hand, the clear contact at about 11 m is not reflected in DH-31, (it has: 1.5 m till – 25.5 m sand – 13.5 m till – 1.5 m sand).

The MMC drill holes 32 (bedrock >42 m, not far from the paleochannel), 27 (shale at 58.5 m, in the paleochannel), and 28 (bedrock >16.5, near the edge of the paleovalley) fit the seismic results.

D. OVERVIEW AND FUTURE WORK

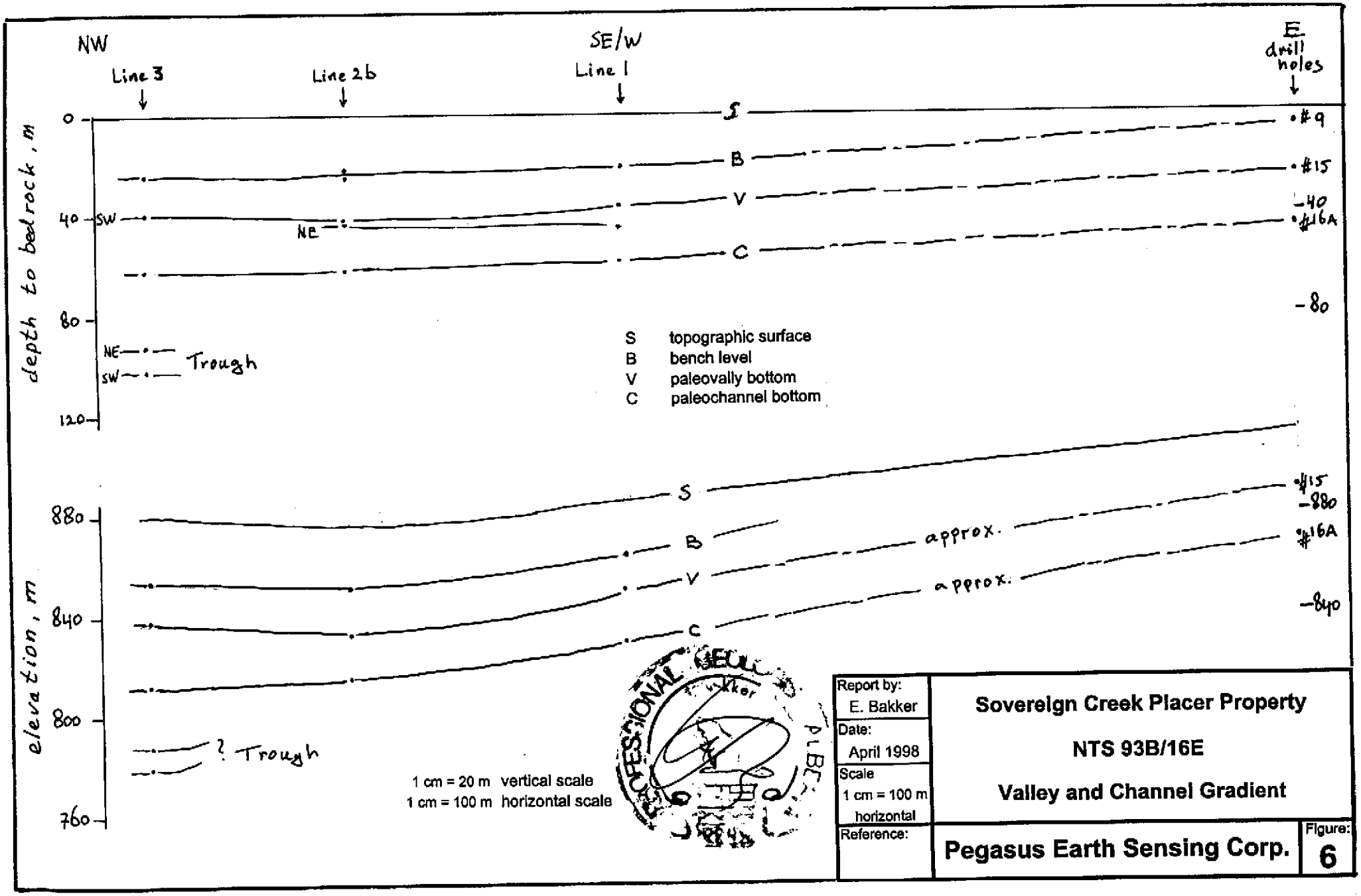
The trend of the paleovalley and paleochannel is shown on Figure 5. Comparisons of depths and elevations of the bedrock at the bench, paleovalley and paleochannel with results of three MMC drill holes (9, 15 and 16A) show a regular pattern with bedrock slightly dipping to the west, (Table 6 and Figure 6).

Possible extensions of the trend of the paleovalley and -channel and other explanations for the widening at Line 3 are shown in Figure 7. In order of likelihood:

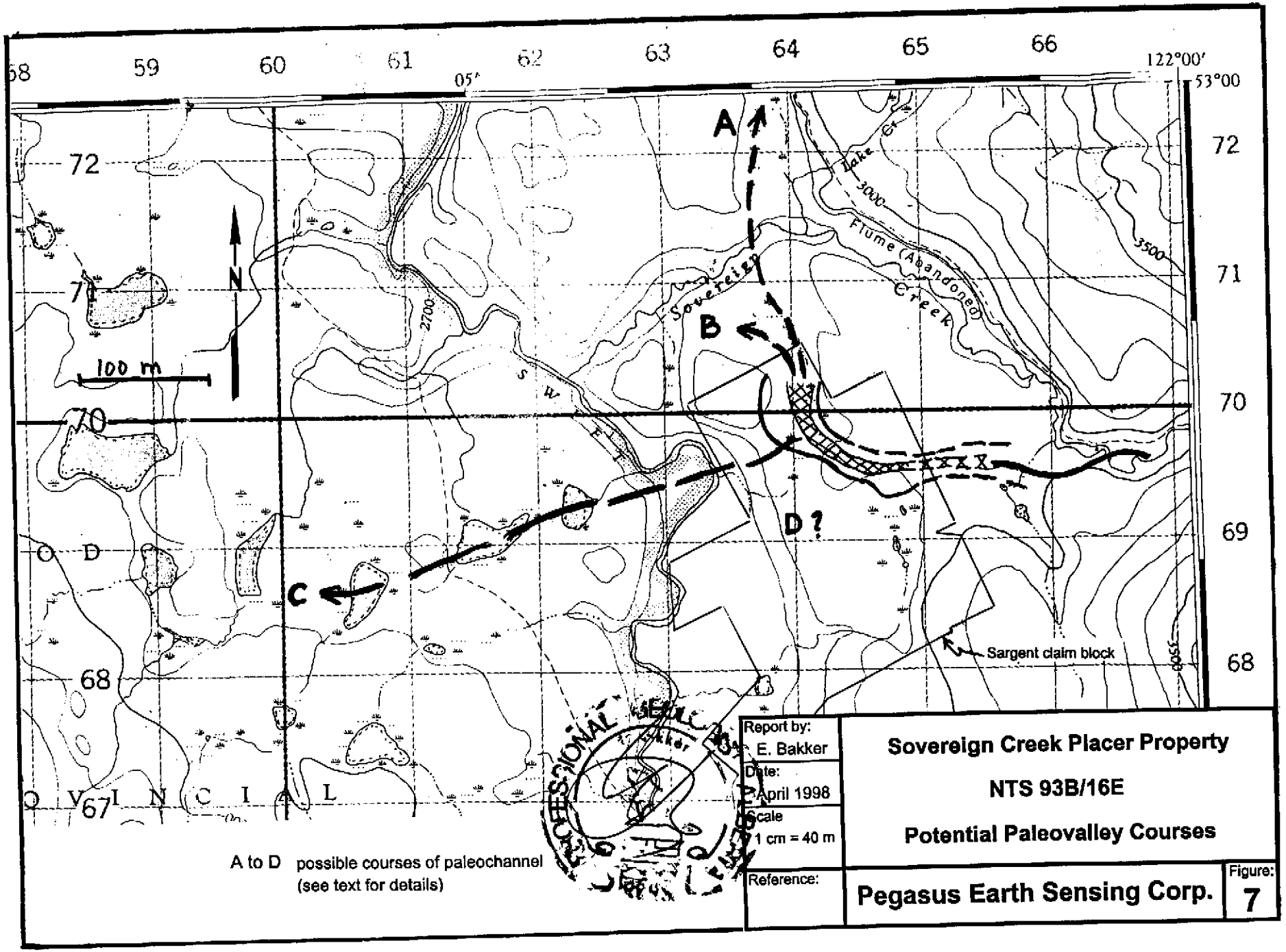
A. Trend A follows the trend of swamps on either side of Sovereign Creek. This trend implies a major change in direction.

B. Trend B follows the present topography. This trend involves only a slight meandering.

C. Trend C follows the trend of swamps and lakes across the Swift River. There is no major change in direction and the 'widening' is explained by a tributary from the north joining the main valley and channel,



Report by: E. Bakker	**Sovereign Creek Placer Property**
Date: April 1998	**NTS 93B/16E**
Scale 1 cm = 100 m horizontal	**Valley and Channel Gradient**
Reference:	**Pegasus Earth Sensing Corp.** — Figure: **6**



A to D possible courses of paleochannel
(see text for details)

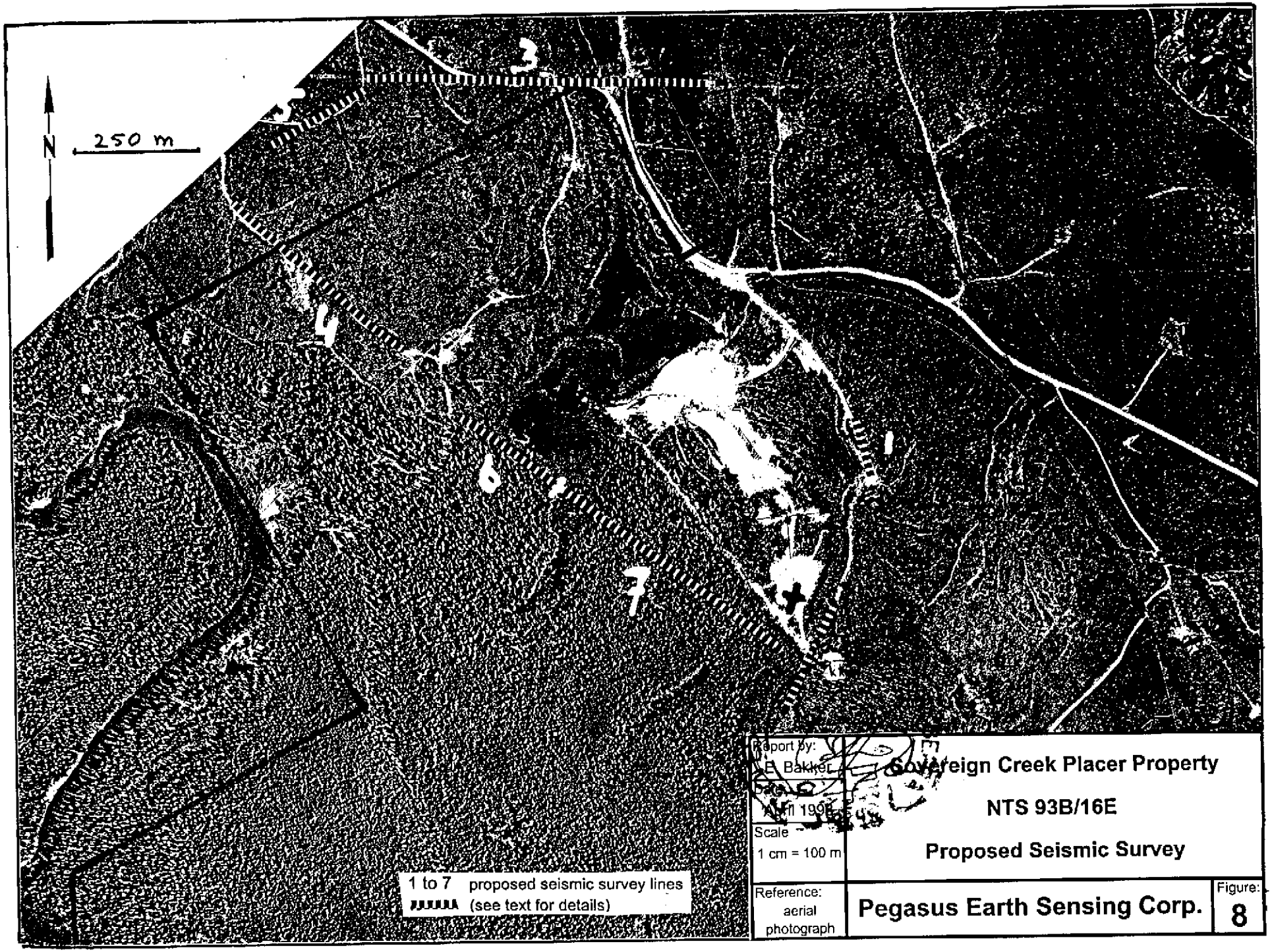
D. Trend D is similar to C but the main valley and channel head in a southwesterly direction.

The following seismic work is proposed to solve some problems and to test the various possibilities, (Figure 8):

1. Extend Line 1 by one spread north along the road to locate the northern edge of the paleovalley.
2. Repeat Line 1/Spread 1 and extend Line 1 by one spread to the south across the swamp to solve the discrepancy with the MMC drill holes.
3. Execute two spreads along the road north of Line 3 to locate the extension of the paleovalley and –channel, (Trend A). Extend the line to west and/or to east by one or more spreads, depending on the results of the first two spreads.
4. Execute four spreads along the road west of Line 3 to test trend B,
5. Two spreads along a road only if 3 and/or 4 are not clear.
6. Execute two spreads to test Trend C,
7. If any of the above does not find an extension: execute up to five spreads to confirm that no channel heads off south (Trend D).

The spreads should be as before (i.e. 24 geophones, spaced 5 m). Shot points should be at the centre of the spread, and at 5 m and at 200 m offsets. More dynamite has to be used to get better signals or shots have to be repeated with less dynamite, (increases the signal/noise ratio). For instance: at least ¼ stick at the centre, ½ to 1 stick at 5 m offsets, and 2 x 3 sticks (or more) at 200 m offsets. Received signals are expected to be better and work should proceed much faster, as the geophones can be placed faster and better in unfrozen ground.

In addition, locations of any MMH drill holes on the Sargent Claim Block should be established by GPS. For future work the Global Surveyor in combination with a Scoutmaster should be used. This real time differential corrected GPS system is reportedly accurate to within 10 metres. Rental costs are $ 125/week.



Report by: E. Bakker

Date: April 1998

Scale: 1 cm = 100 m

Reference: aerial photograph

Sovereign Creek Placer Property

NTS 93B/16E

Proposed Seismic Survey

Pegasus Earth Sensing Corp.

Figure: **8**

E. CONCLUSIONS AND RECOMMENDATIONS

E.1 Conclusions

1. A paleochannel that was identified in the Malaysia Mining Corporation (MMC) 1989 drilling program east of the Sargent claims has been shown with a refraction seismic survey to continue west on the Sargent claims. The trend of the channel changes from east-west to a northerly direction.
2. The about 80 m wide and 60 m deep channel is present in an about 220 m wide and 40 m deep paleovalley. The paleovalley is bordered by benches with a depth of about 23 m, (but likely less where surficial layers have been eroded).
3. Bench, paleovalley and paleochannel dip slightly west with a drop of about 56 m over 2.3 km from MMC drill holes 9, 15 and 16A.
4. Four layers were identified:

   Surficial layer (velocities 966 to 1664 m/s and thickness of 1 to 26 m) consisting of a variety of materials (gravel, weathered till, materials derived from till).

   Till (velocities 1670 to 2487 m/s and thickness up to 63 (or 102) m). Other materials, such as sand and/or gravel layers are likely included in this unit.

   Low velocity bedrock (2714 to 3225 m/s), possibly carbonaceous shale.

   High velocity bedrock (4373 to 5010 m/s), possibly andesite.
5. An 92 to 101 m deep 'trough' at the north-westerly end, which is underlain by a high velocity bedrock is either a feature scoured by ice or is a phantom caused by similar velocities in an upper bedrock layer and the overlying till.
6. A discrepancy exists between Line 1/Spread 3 results and two MMC drill holes. Four other MMC drill holes match the seismic results.
7. The interpretation of the seismic data was successful but was severely complicated by: noise caused by a frozen layer, by often great depth to bedrock (which required large amounts of dynamite), by velocity similarities between till and some bedrock, and by irregularities in the layers (caused by e.g. the presence of erosional channels and boulders).

E.2 Recommendations

1. A second seismic survey is recommended in order to clear some problems encountered during the first survey and to locate the extension of the paleochannel beyond the area studied. Recommended is the following, (Figure 7 and 8):

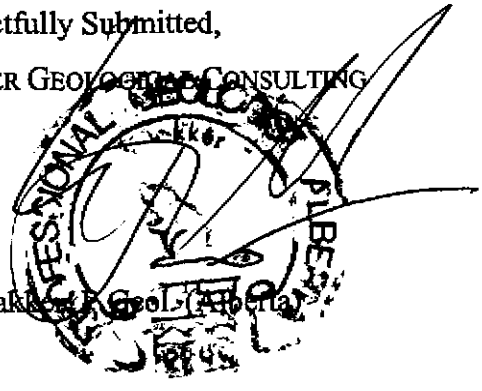
1. Extend Line 1 by one spread north along the road to locate the northern edge of the paleovalley.
2. Repeat Line 1/Spread 1 and extend Line 1 by one spread to the south across the swamp to solve the discrepancy with the MMC drill holes.
3. Execute two spreads along the road north of Line 3 to locate the extension of the paleovalley and –channel, (Trend A). Extend the line to west and/or to east by one or more spreads, depending on the results of the first two spreads.
4. Execute four spreads along the road west of Line 3 to test trend B,
5. Two spreads along a road only if 3 and/or 4 are not clear.
6. Execute two spreads to test Trend C,
7. If any of the above does not find an extension: execute up to five spreads to confirm that no channel heads off south (Trend D).

The spreads should be as before with shot points at the centre of the spread, and at 5 m and at 200 m offsets, and with at least ¼ stick dynamite at the centre, ½ to 1 stick at 5 m offsets, and 2 x 3 sticks (or more) at 200 m offsets.

2. Locations of any MMH drill holes on the Sargent Claim Block should be established by GPS. For future work the Global Surveyor in combination with a Scoutmaster should be used.

Respectfully Submitted,

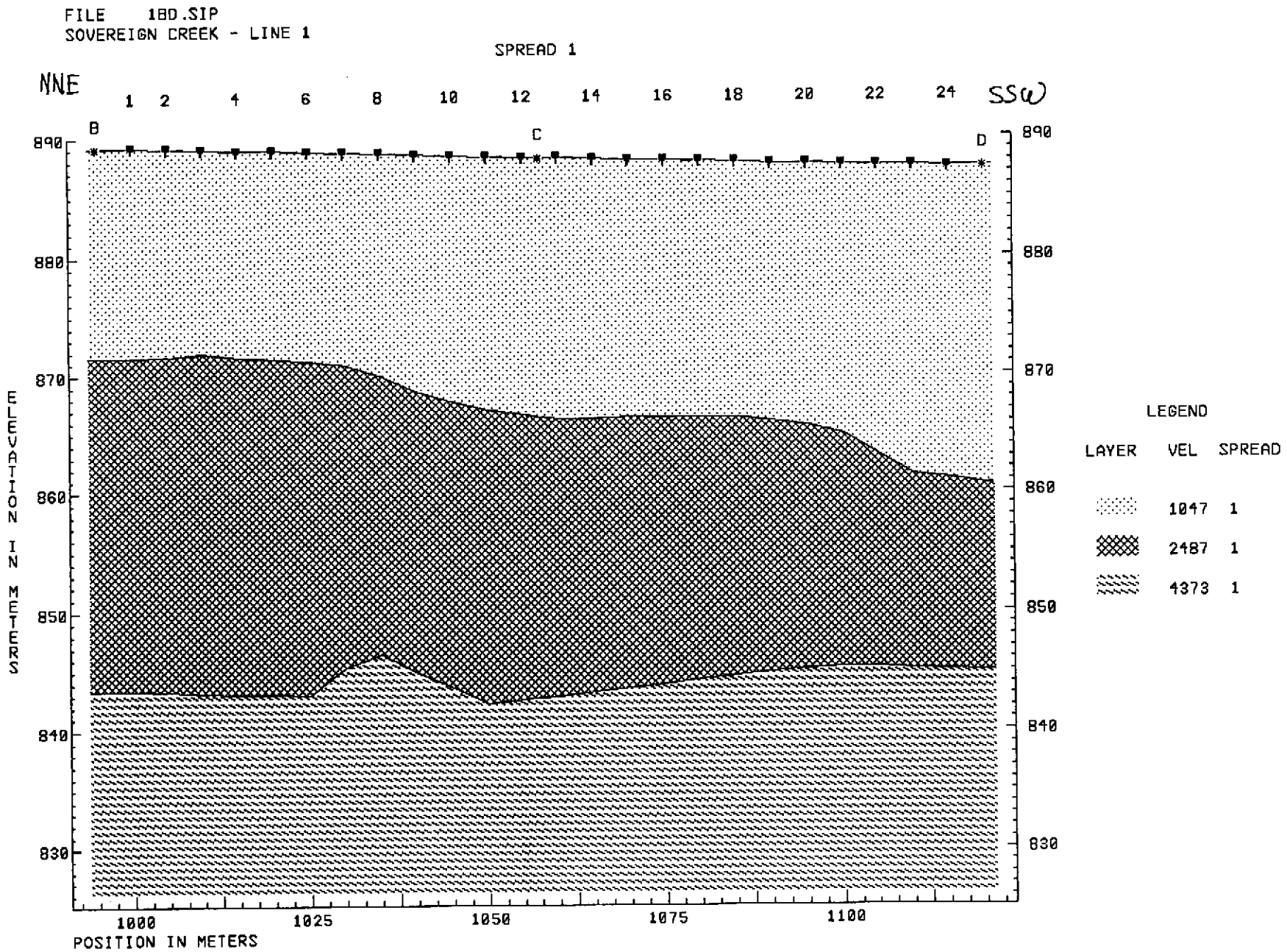
BAKKER GEOLOGICAL CONSULTING



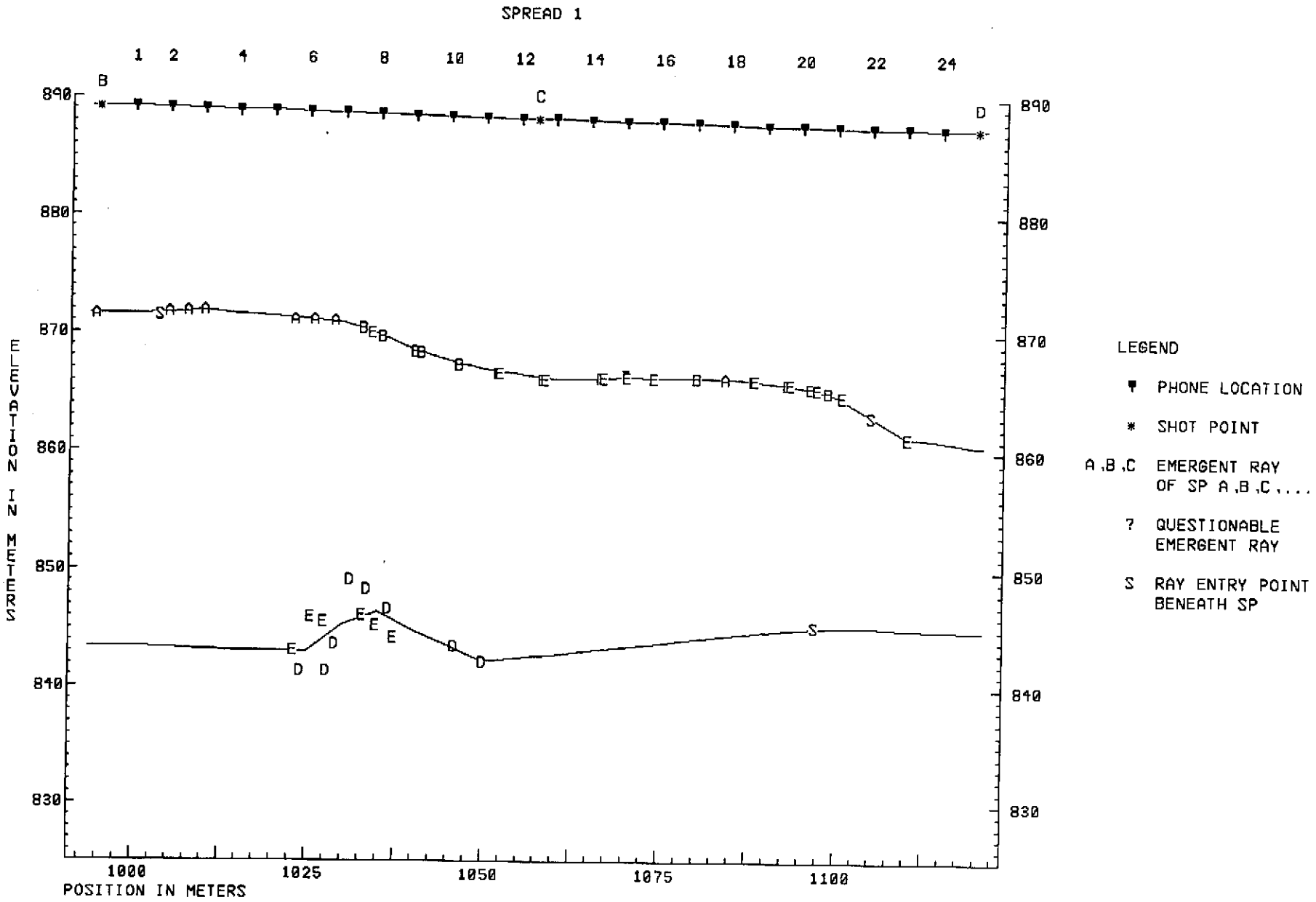
Ebo Bakker, P.Geol. (Alberta)

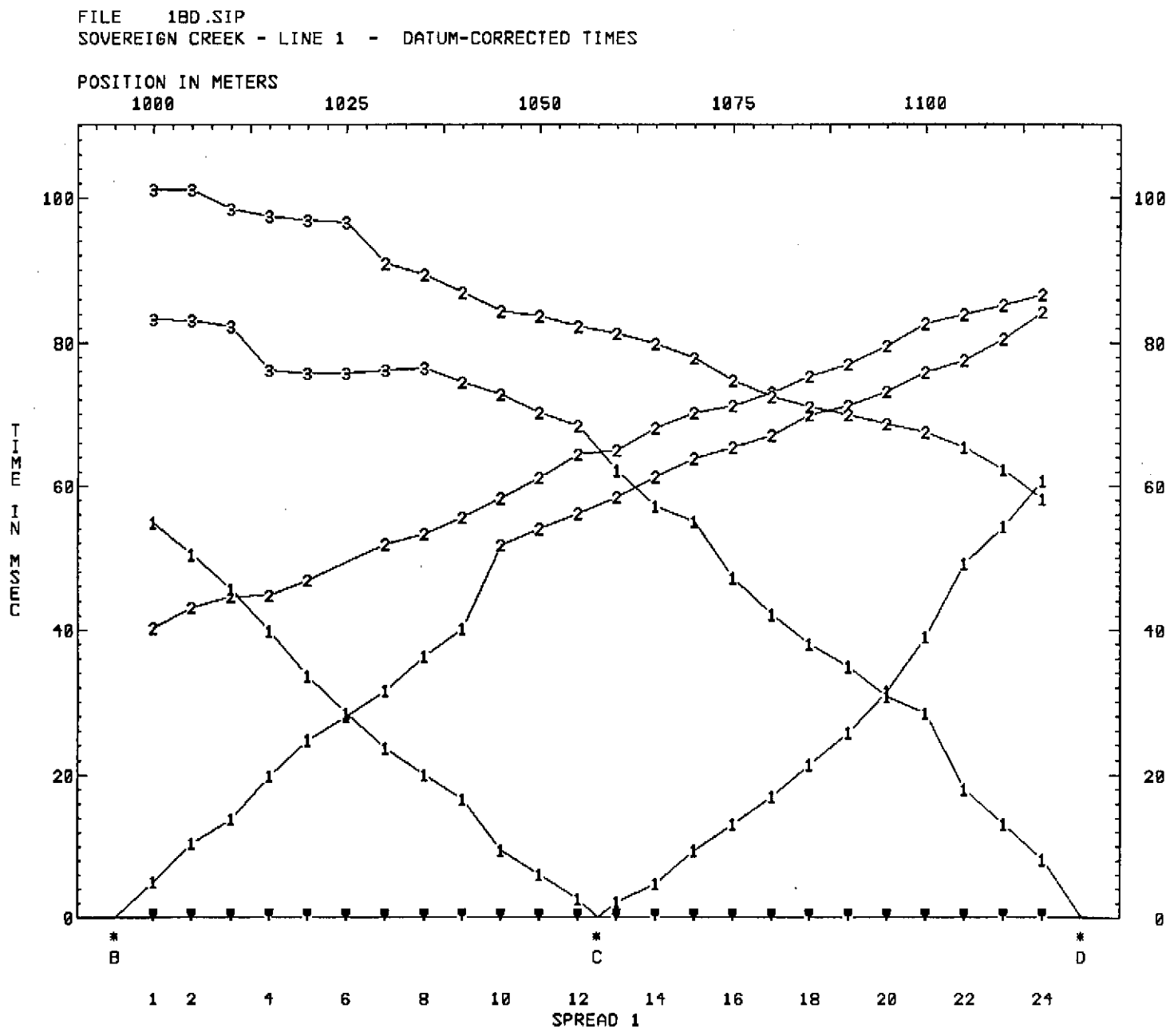
APPENDIX 1

Seismic Graphs

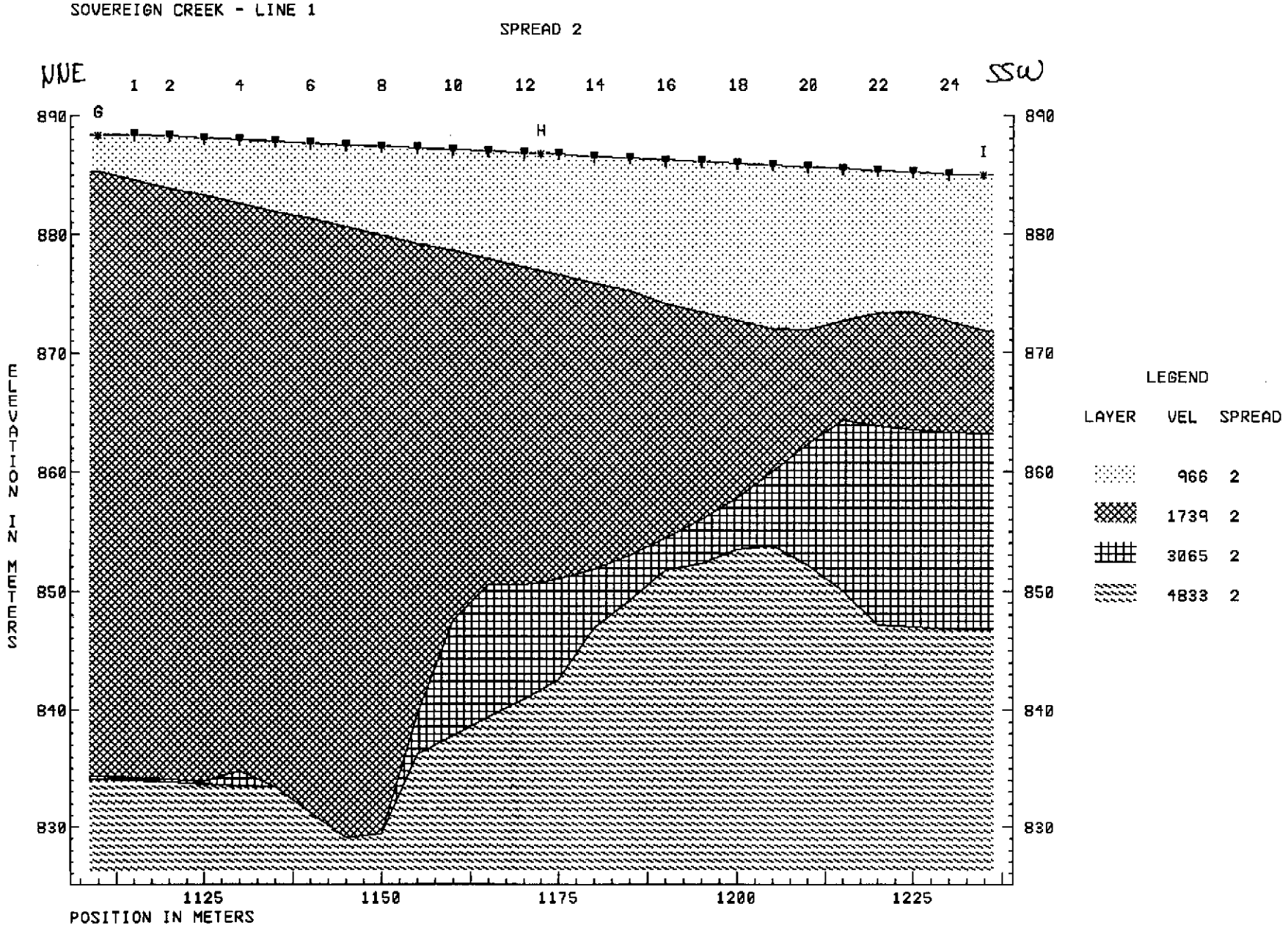

FILE 1BD.SIP
SOVEREIGN CREEK - LINE 1
SPREAD 1
NNE
SSW
1 2 4 6 8 10 12 14 16 18 20 22 24
B
C
D
890
880
870
860
850
840
830
ELEVATION IN METERS
1000
1025
1050
1075
1100
POSITION IN METERS
LEGEND
LAYER VEL SPREAD
1047 1
2487 1
4373 1

FILE 1BD.SIP
SOVEREIGN CREEK - LINE 1



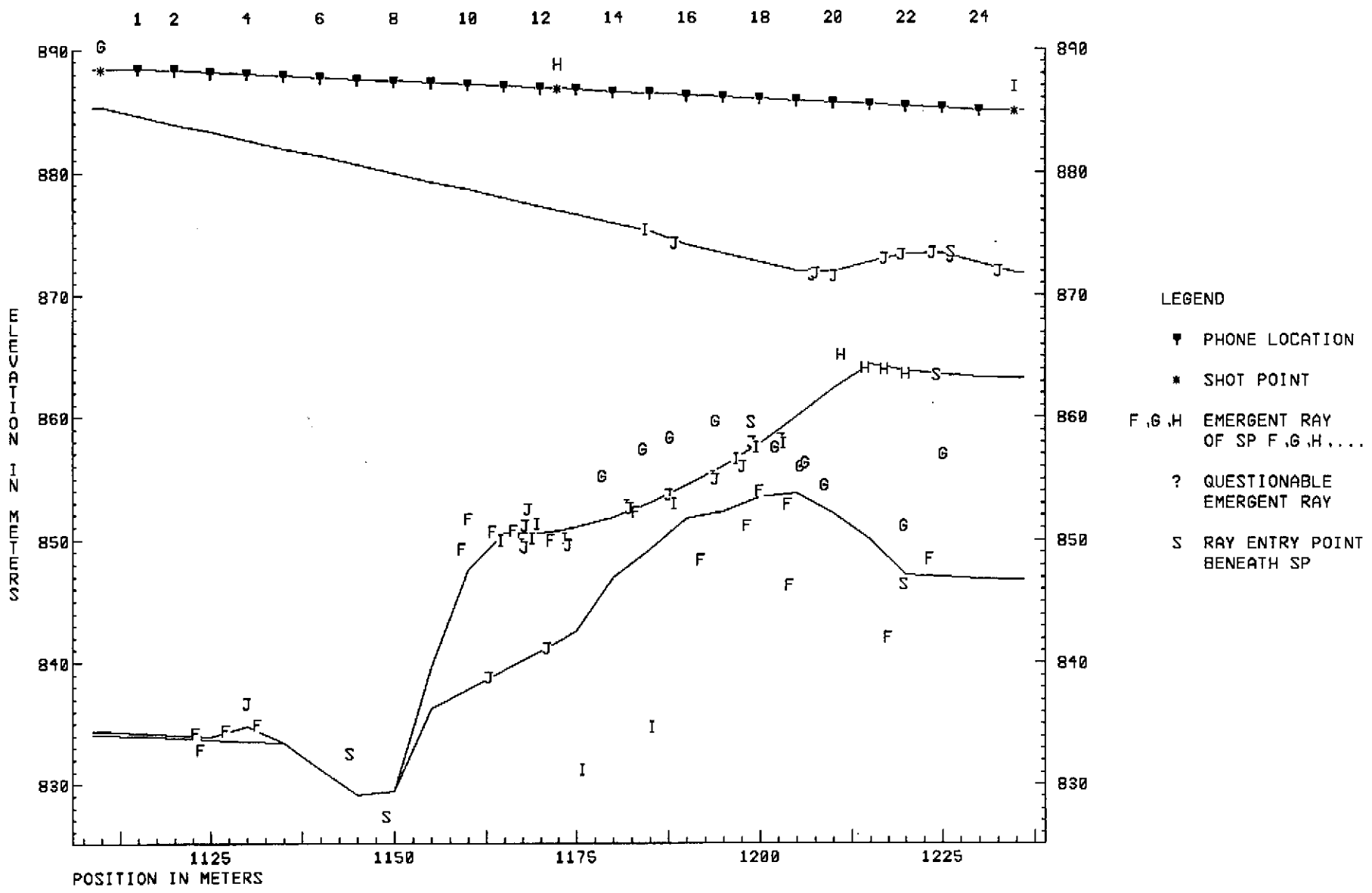

FILE 18D.SIP
SOVEREIGN CREEK - LINE 1 - DATUM-CORRECTED TIMES
POSITION IN METERS
1000
1025
1050
1075
1100
TIME IN MSEC
100
80
60
40
20
0
B
C
D
1 2 4 6 8 10 12 14 16 18 20 22 24
SPREAD 1

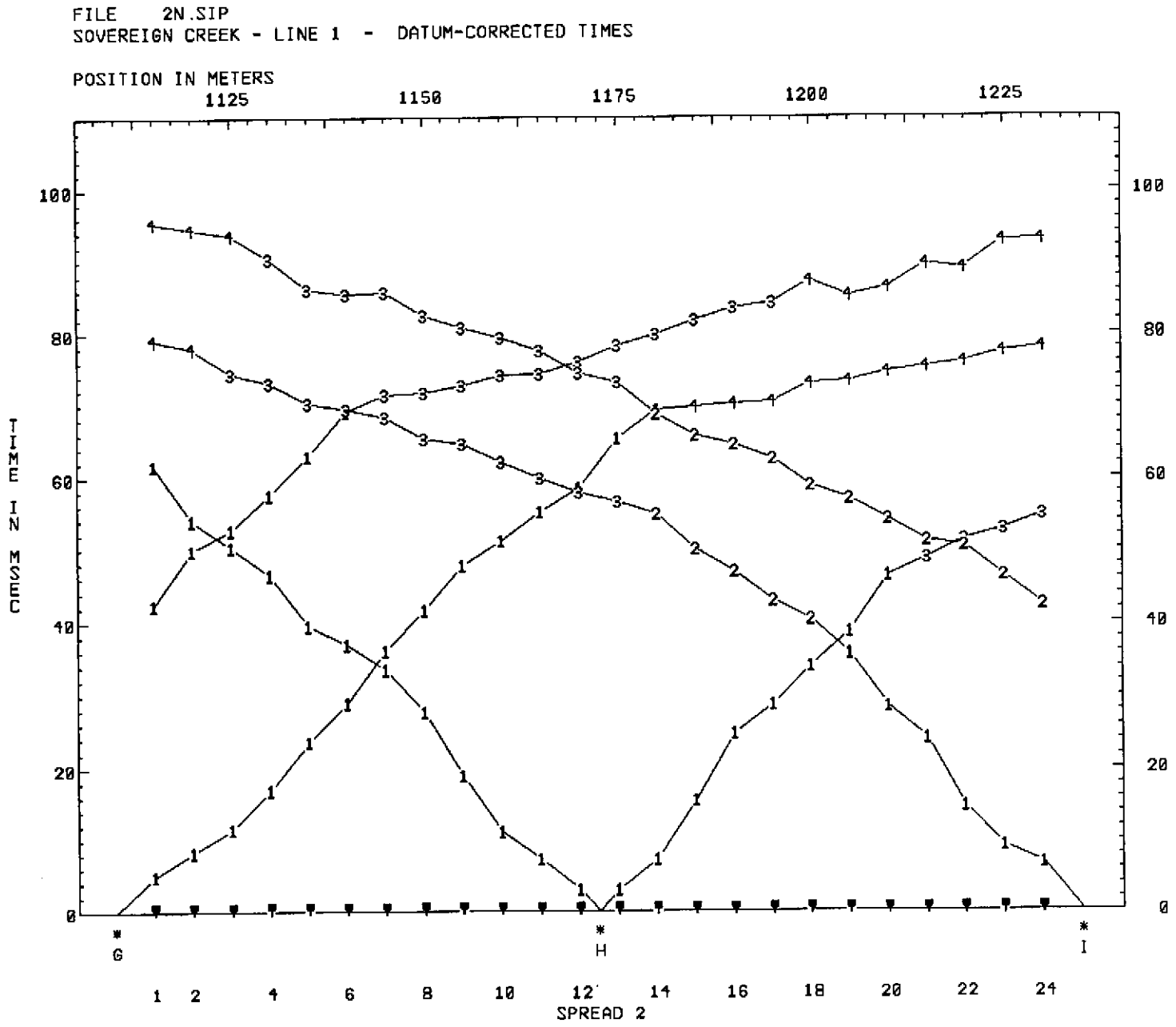
FILE 2N.SIP
SOVEREIGN CREEK - LINE 1



FILE 2N.SIP
SOVEREIGN CREEK - LINE 1

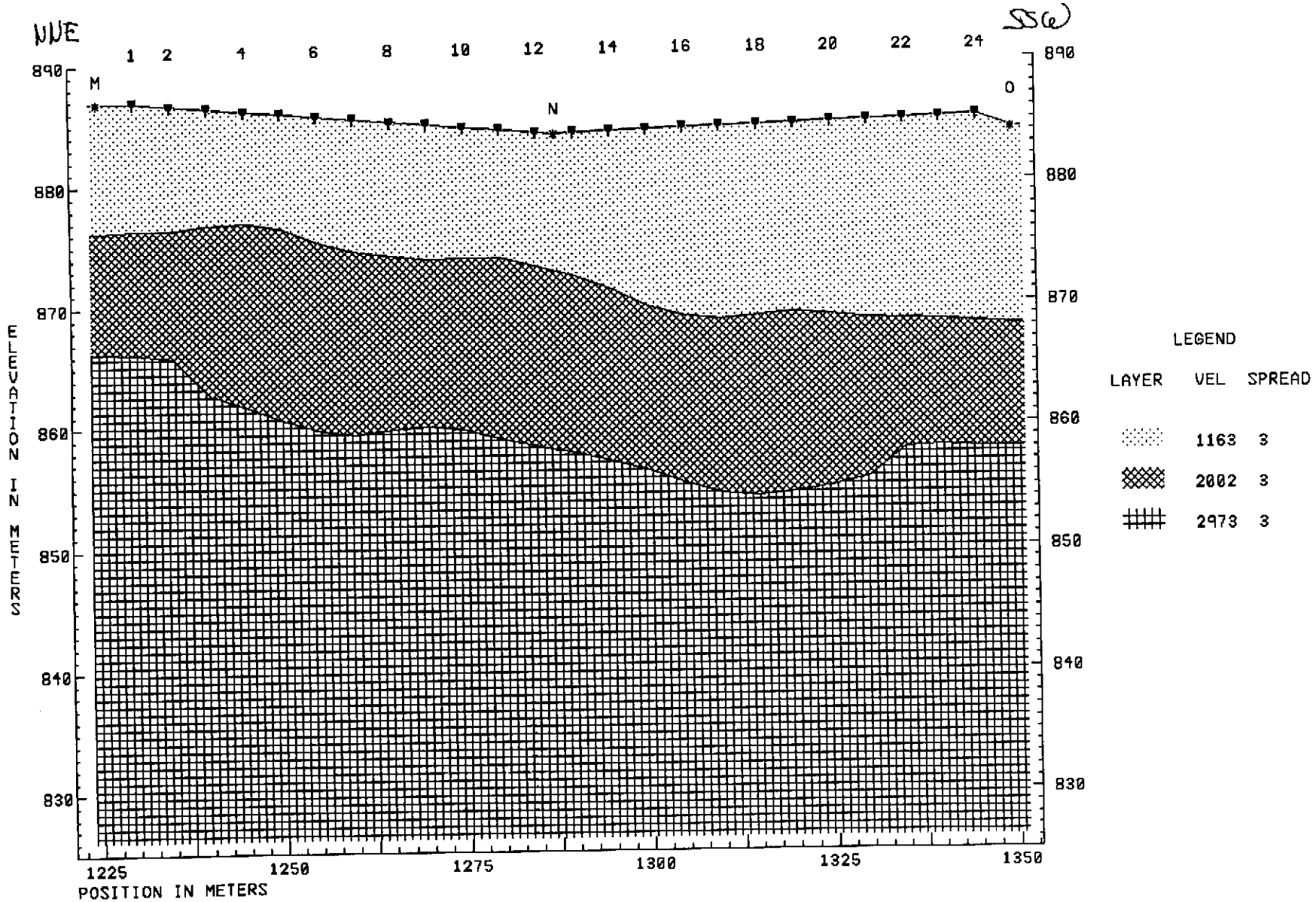
SPREAD 2




FILE 2N.SIP
SOVEREIGN CREEK - LINE 1 - DATUM-CORRECTED TIMES
POSITION IN METERS
1125
1150
1175
1200
1225
TIME IN MSEC
100
80
60
40
20
0
G
H
I
1 2 4 6 8 10 12 14 16 18 20 22 24
SPREAD 2

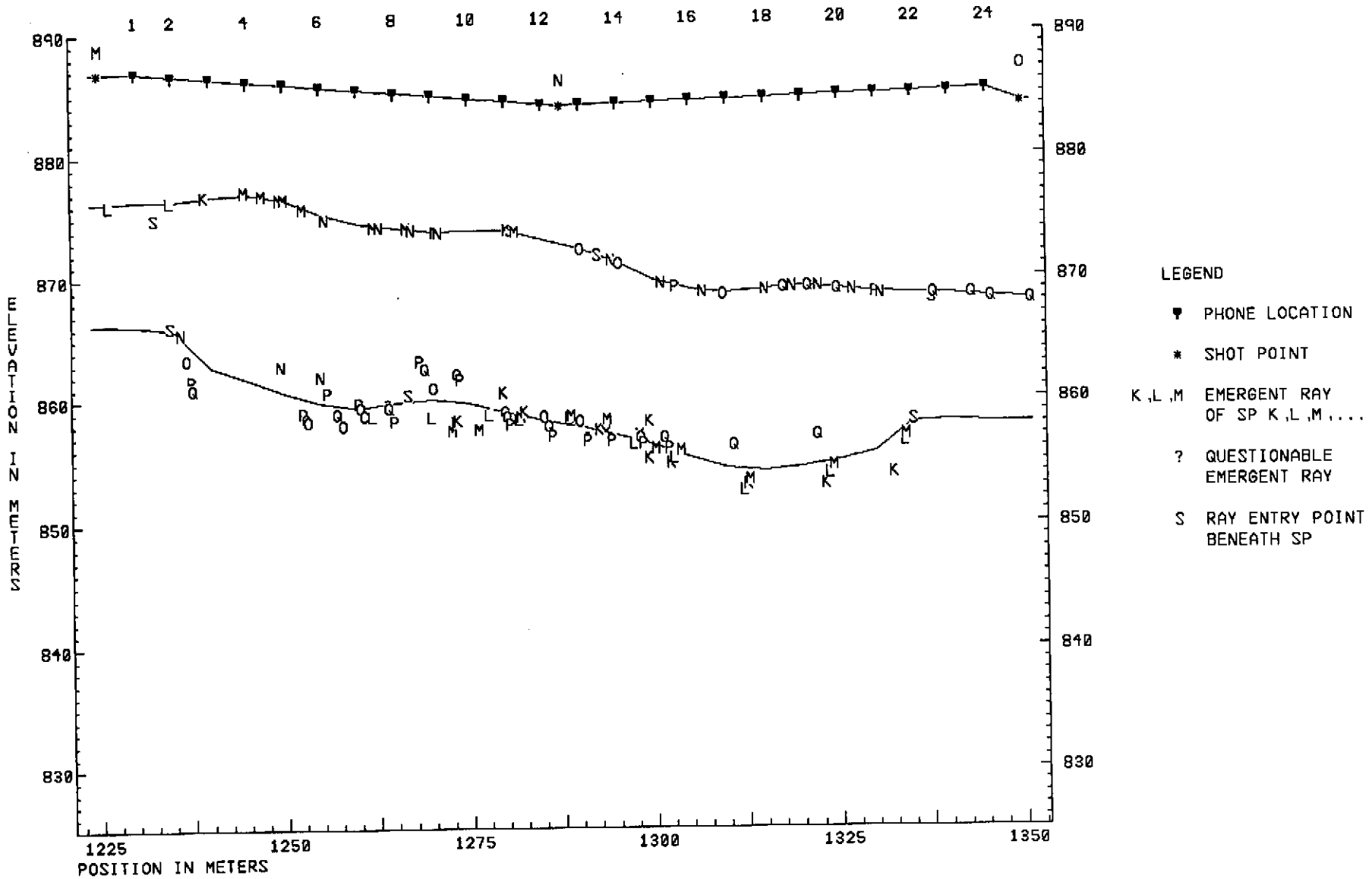
FILE 3N.SIP
SOVEREIGN CREEK - LINE 1

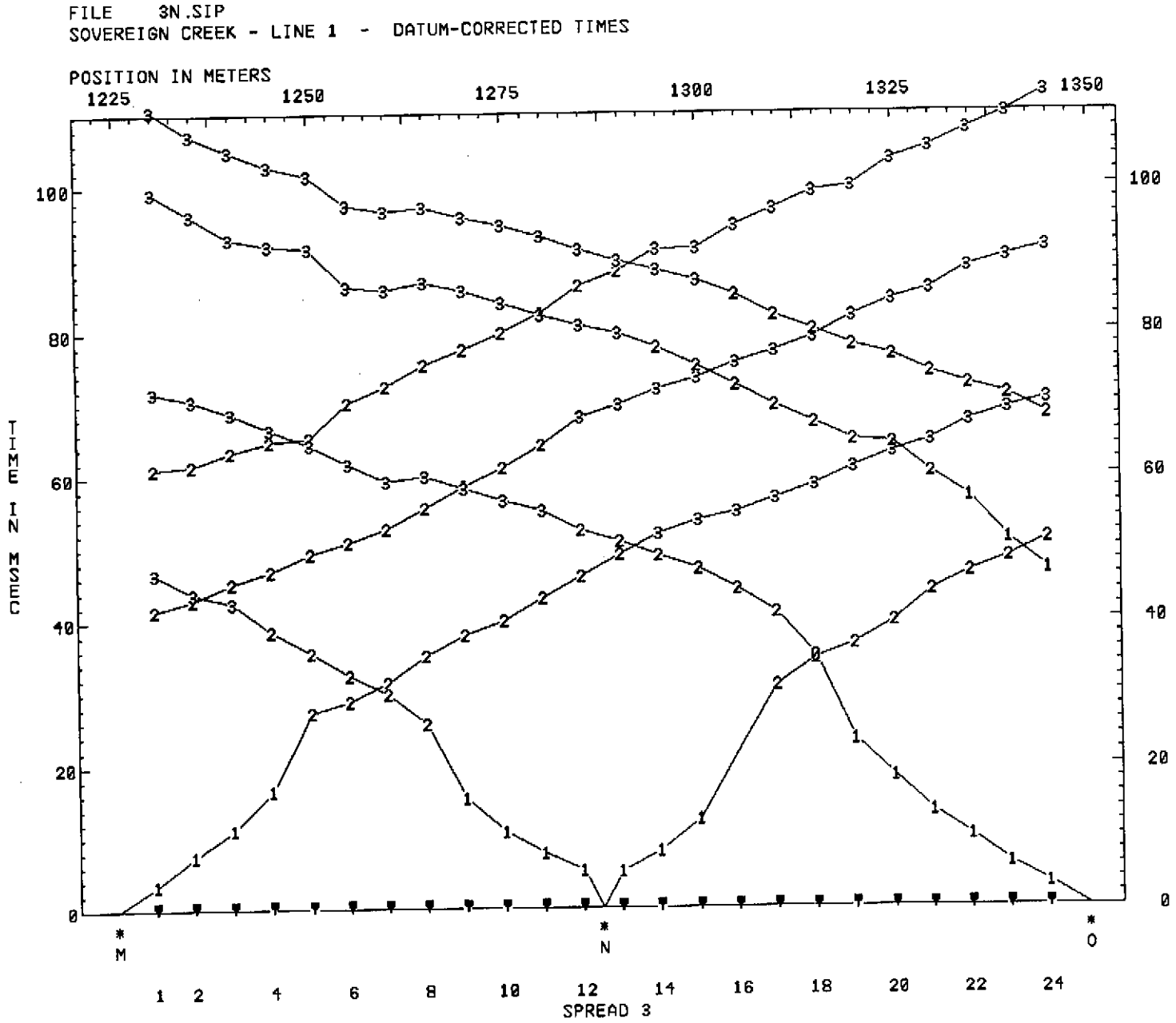
SPREAD 3



FILE 3N.SIP
SOVEREIGN CREEK - LINE 1

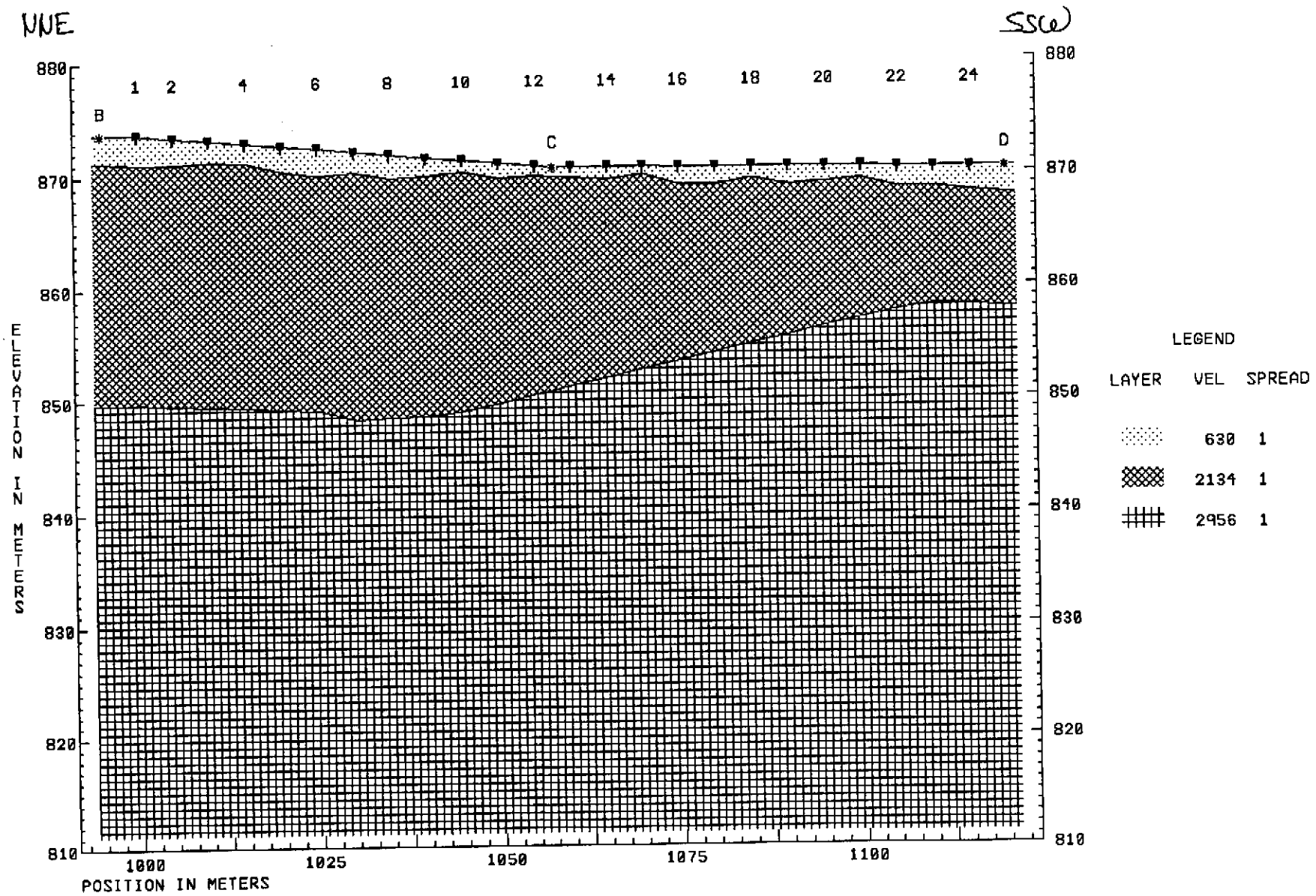
SPREAD 3




FILE 3N.SIP
SOVEREIGN CREEK - LINE 1 - DATUM-CORRECTED TIMES
POSITION IN METERS
1225
1250
1275
1300
1325
1350
TIME IN MSEC
0
20
40
60
80
100
M
N
O
1
2
4
6
8
10
12
14
16
18
20
22
24
SPREAD 3

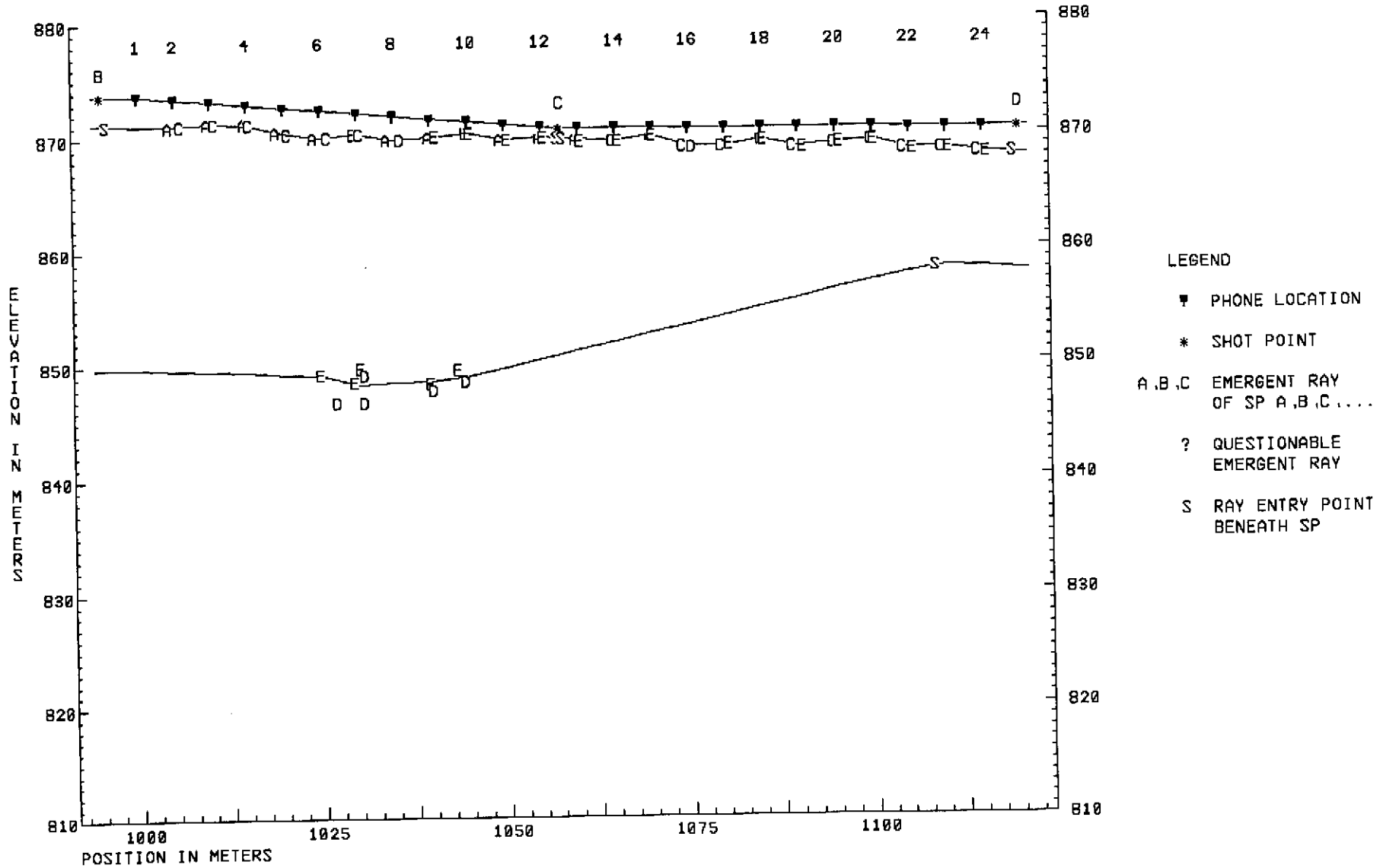
FILE 1B.SIP
SOVEREIGN CREEK - LINE 2B

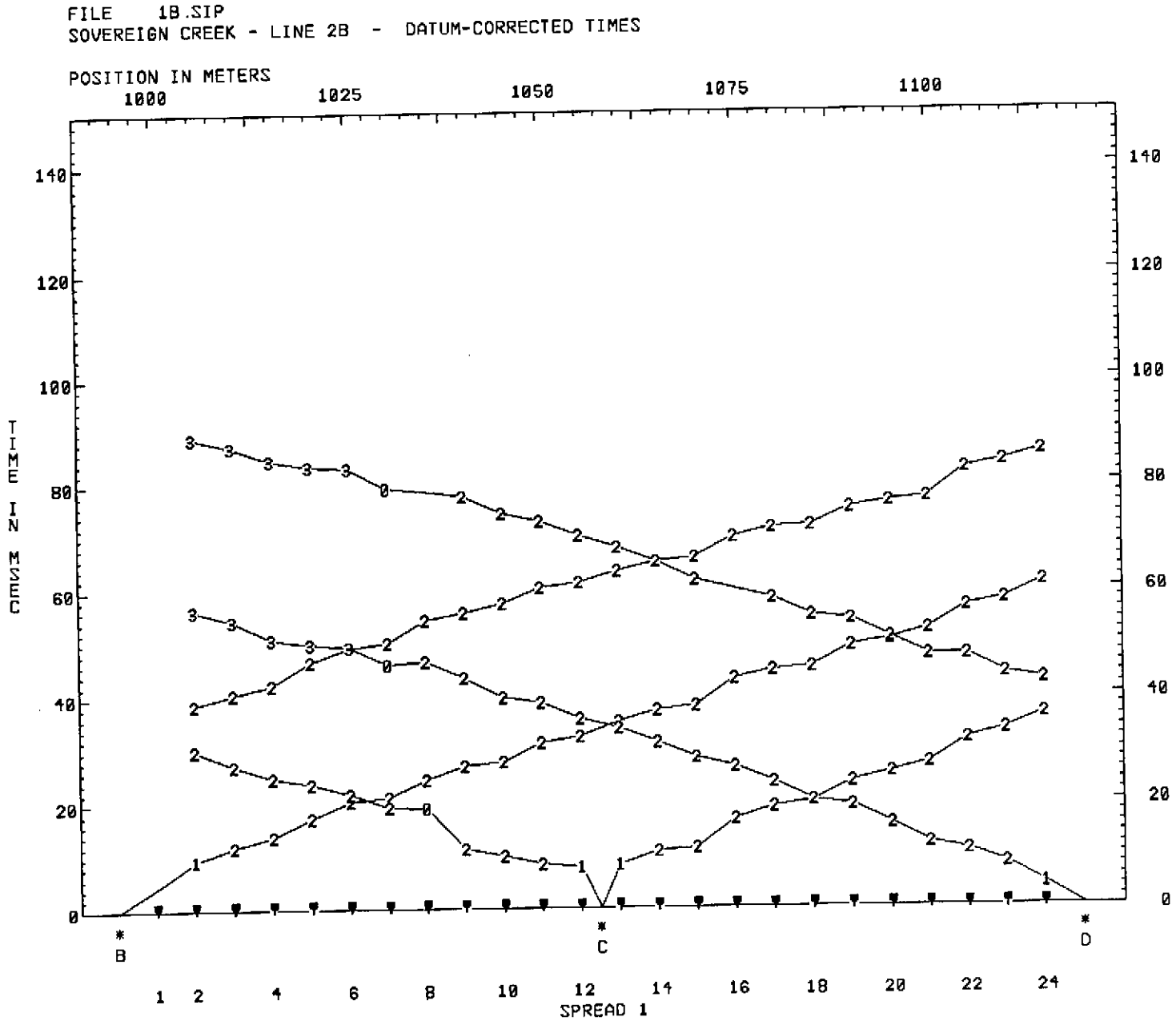
SPREAD 1



FILE 1B.SIP
SOVEREIGN CREEK - LINE 2B

SPREAD 1



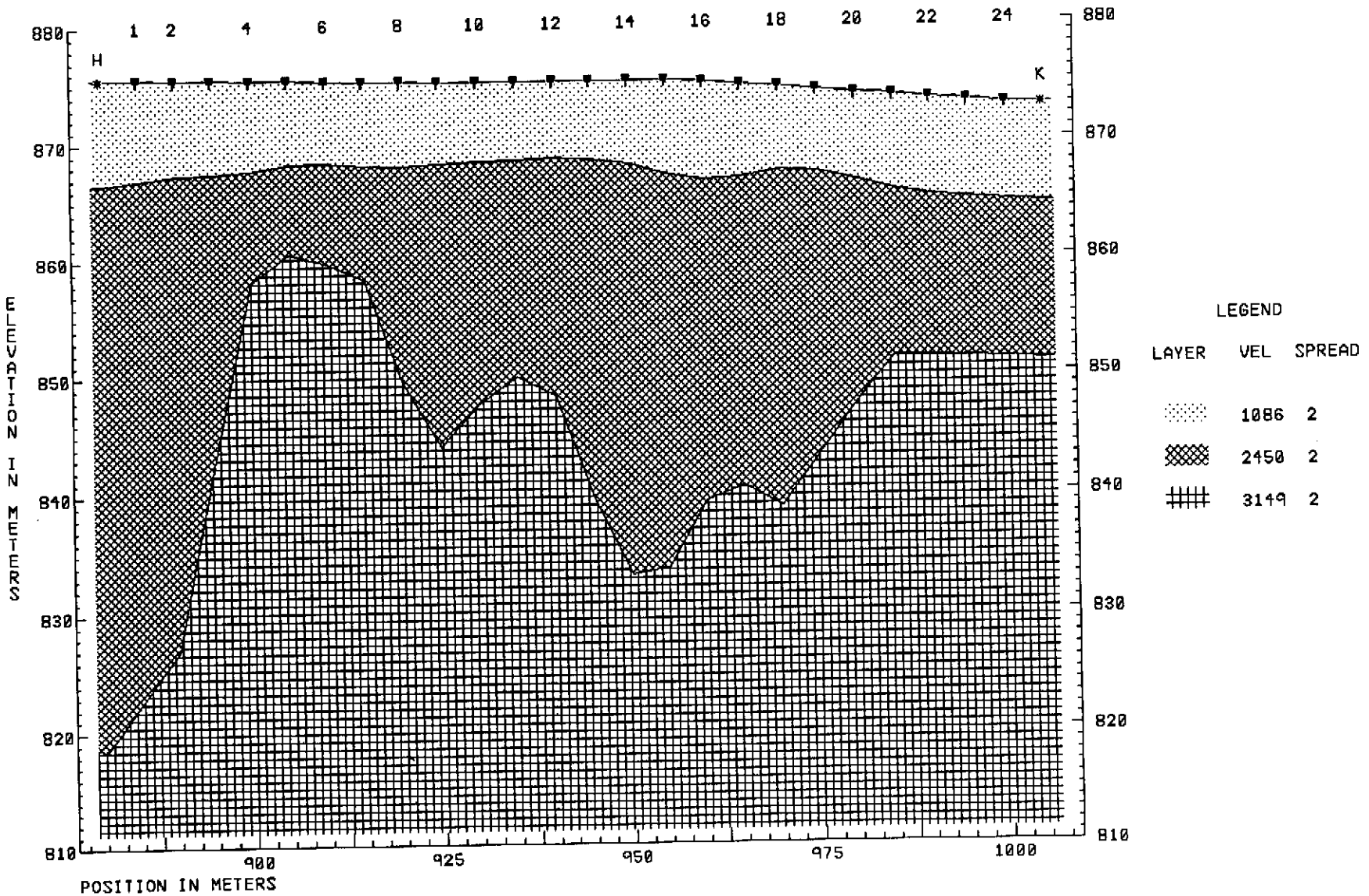

FILE 1B.SIP
SOVEREIGN CREEK - LINE 2B - DATUM-CORRECTED TIMES
POSITION IN METERS
1000
1025
1050
1075
1100
TIME IN MSEC
0
20
40
60
80
100
120
140
B
C
D
1 2 4 6 8 10 12 14 16 18 20 22 24
SPREAD 1

FILE 2C.SIP
SOVEREIGN CREEK - LINE 2B

SPREAD 2

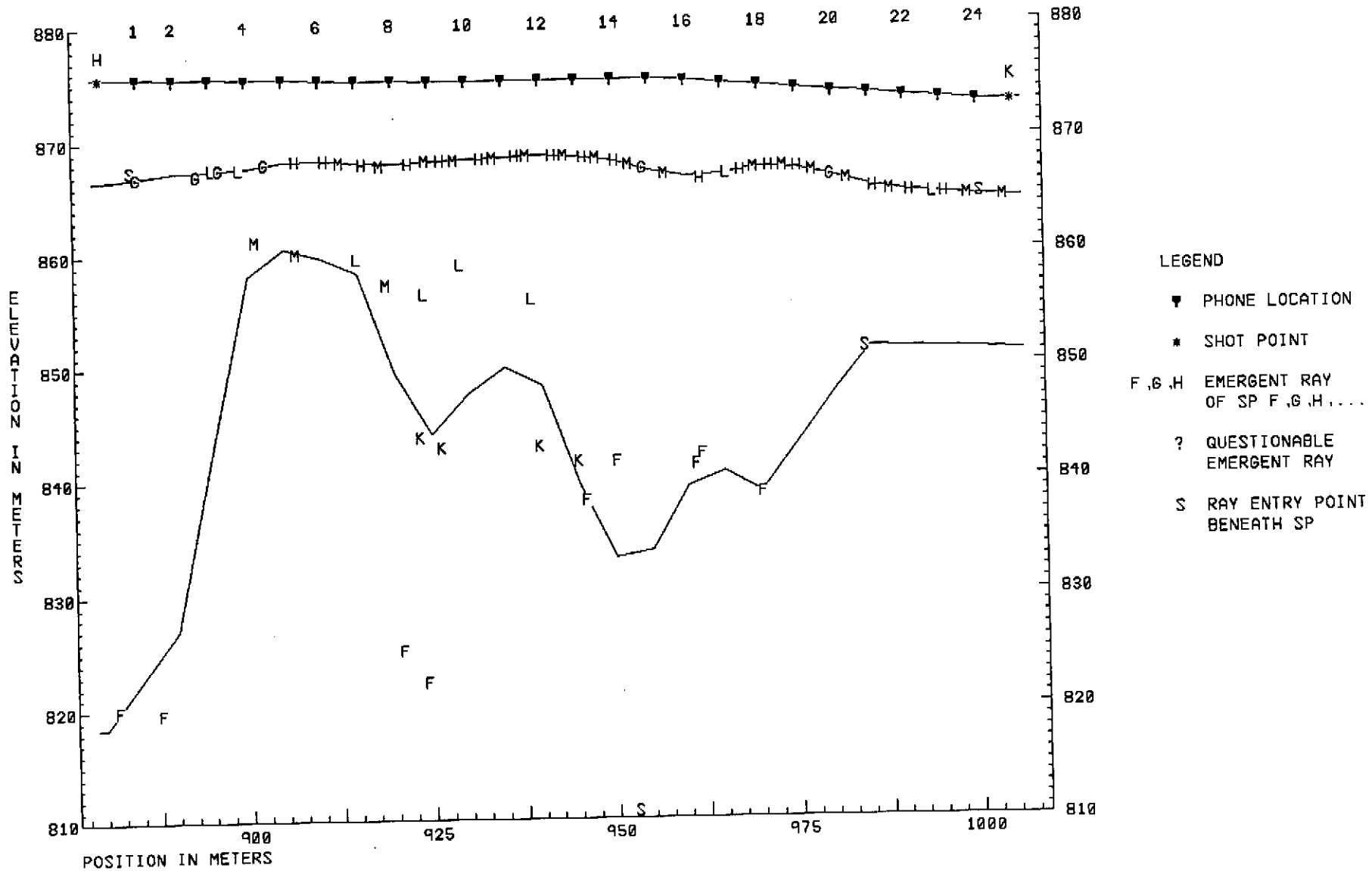
NNE

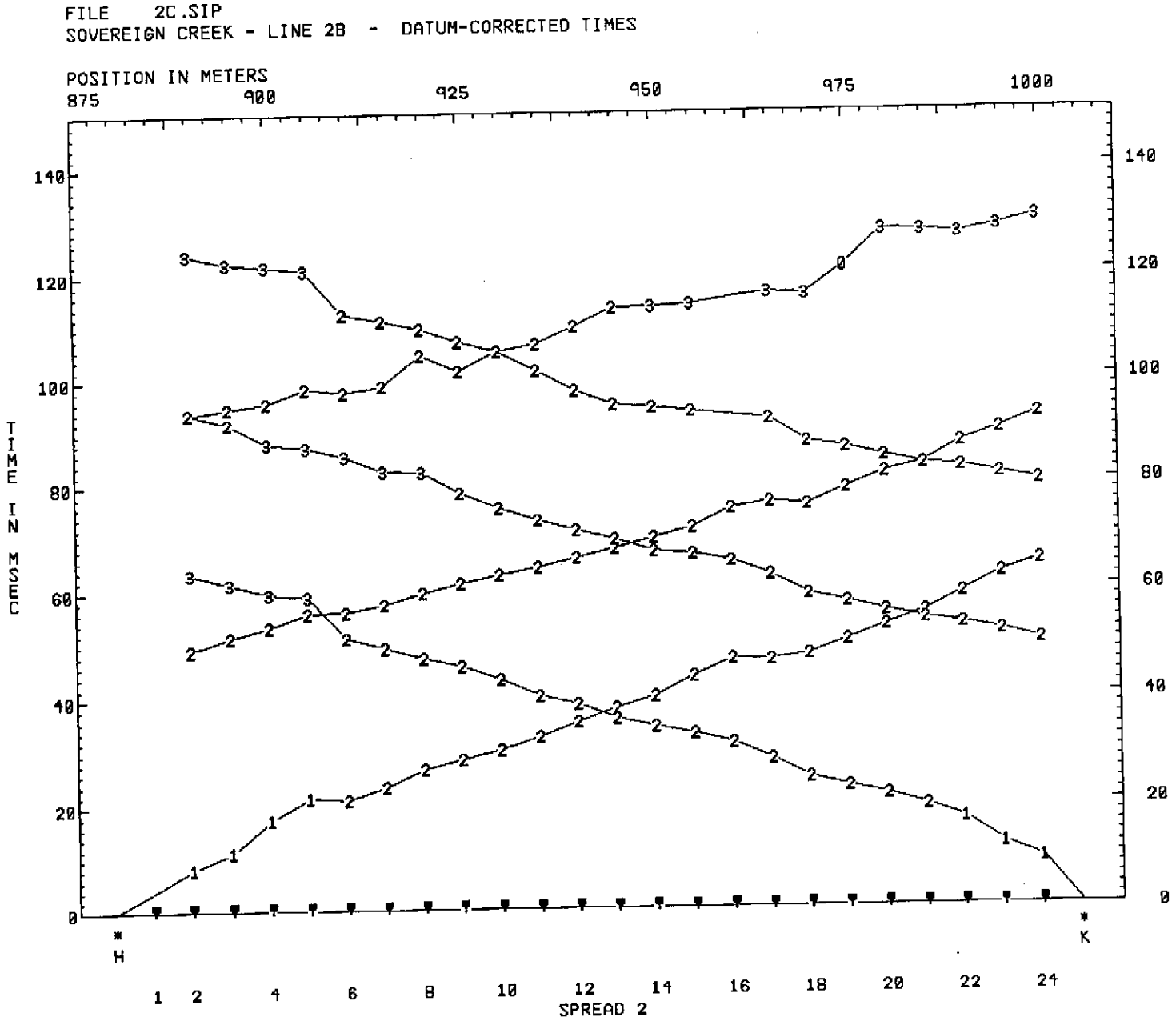
SSW

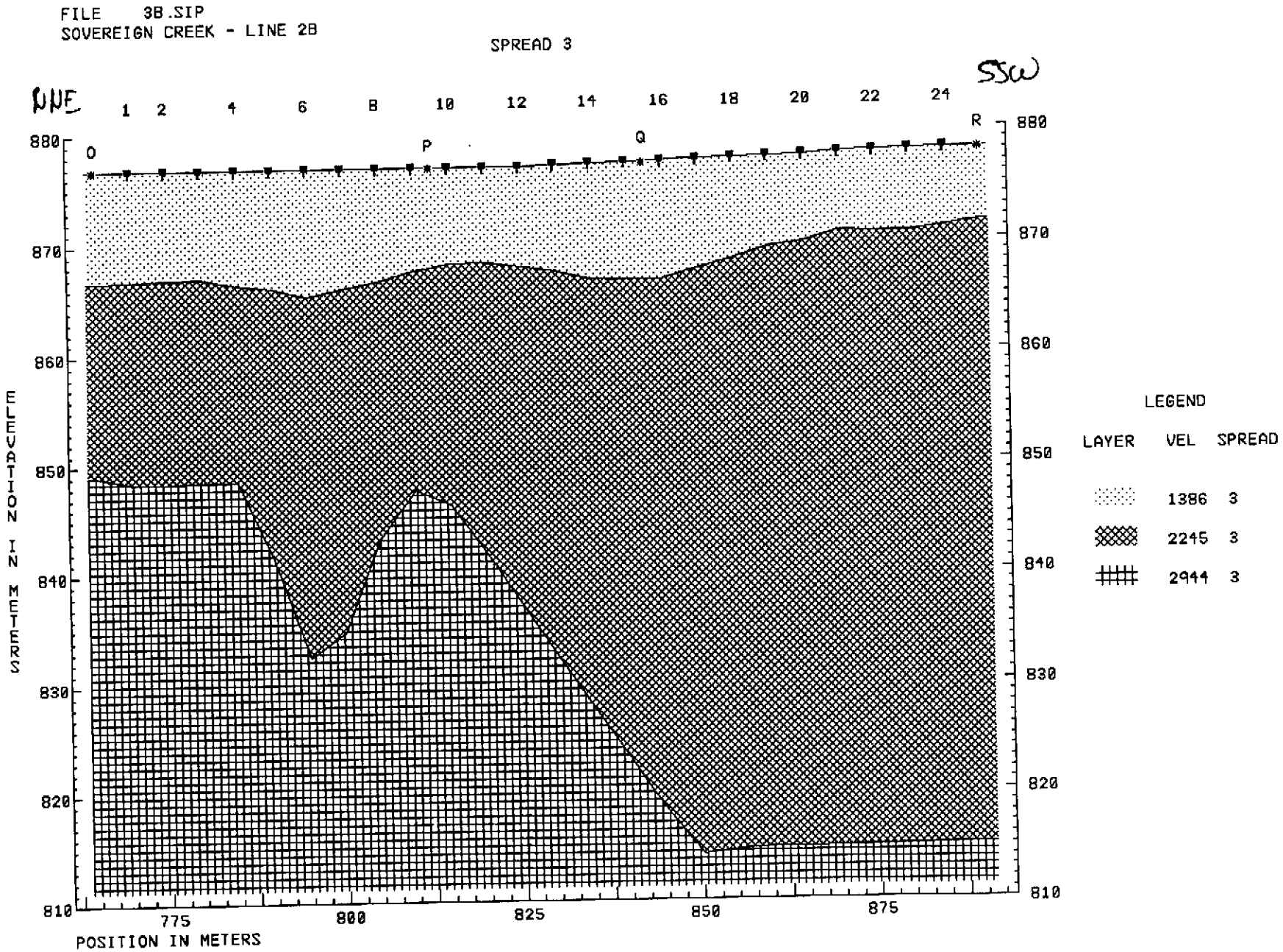


FILE 2C.SIP
SOVEREIGN CREEK - LINE 2B

SPREAD 2

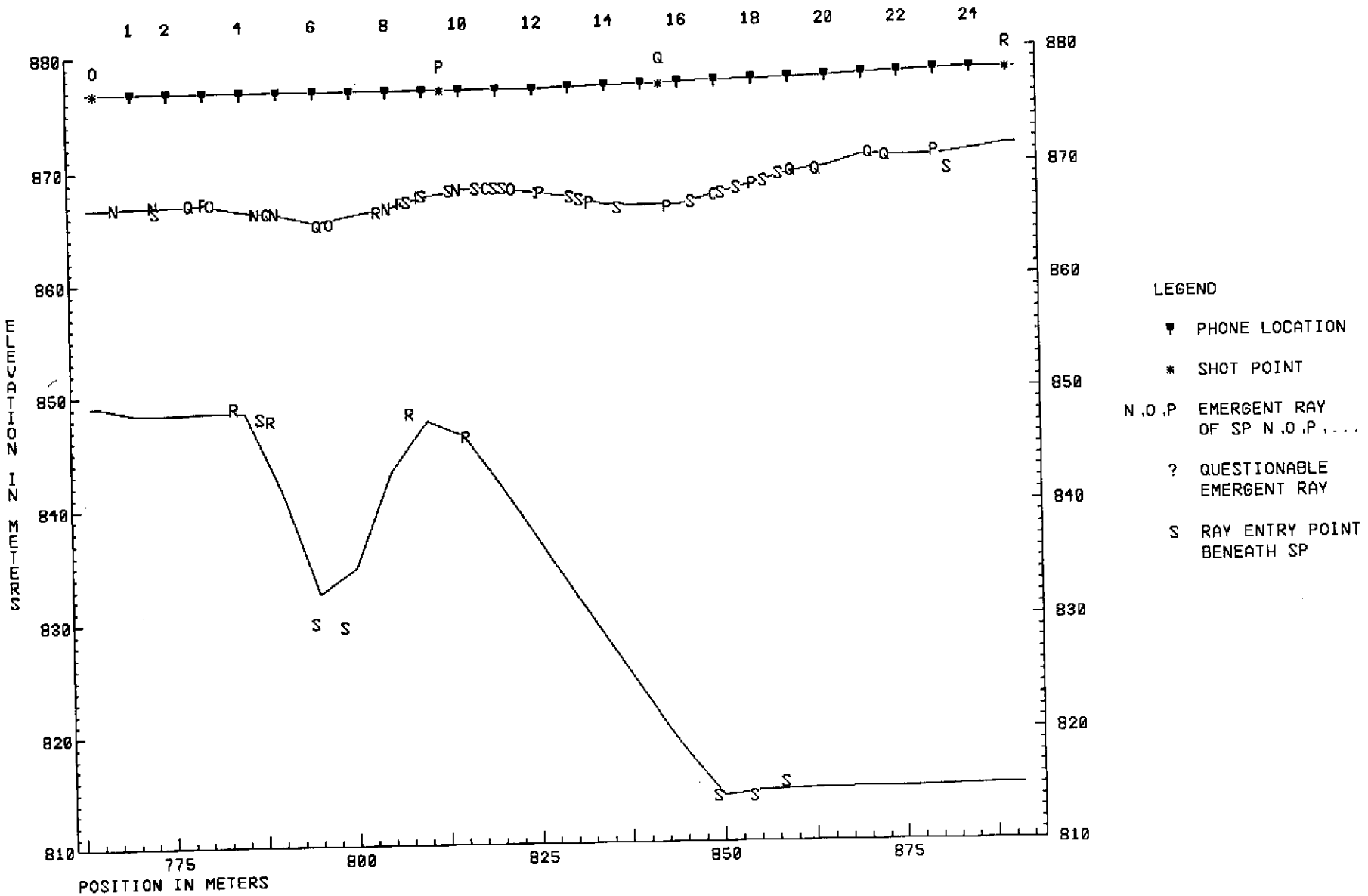


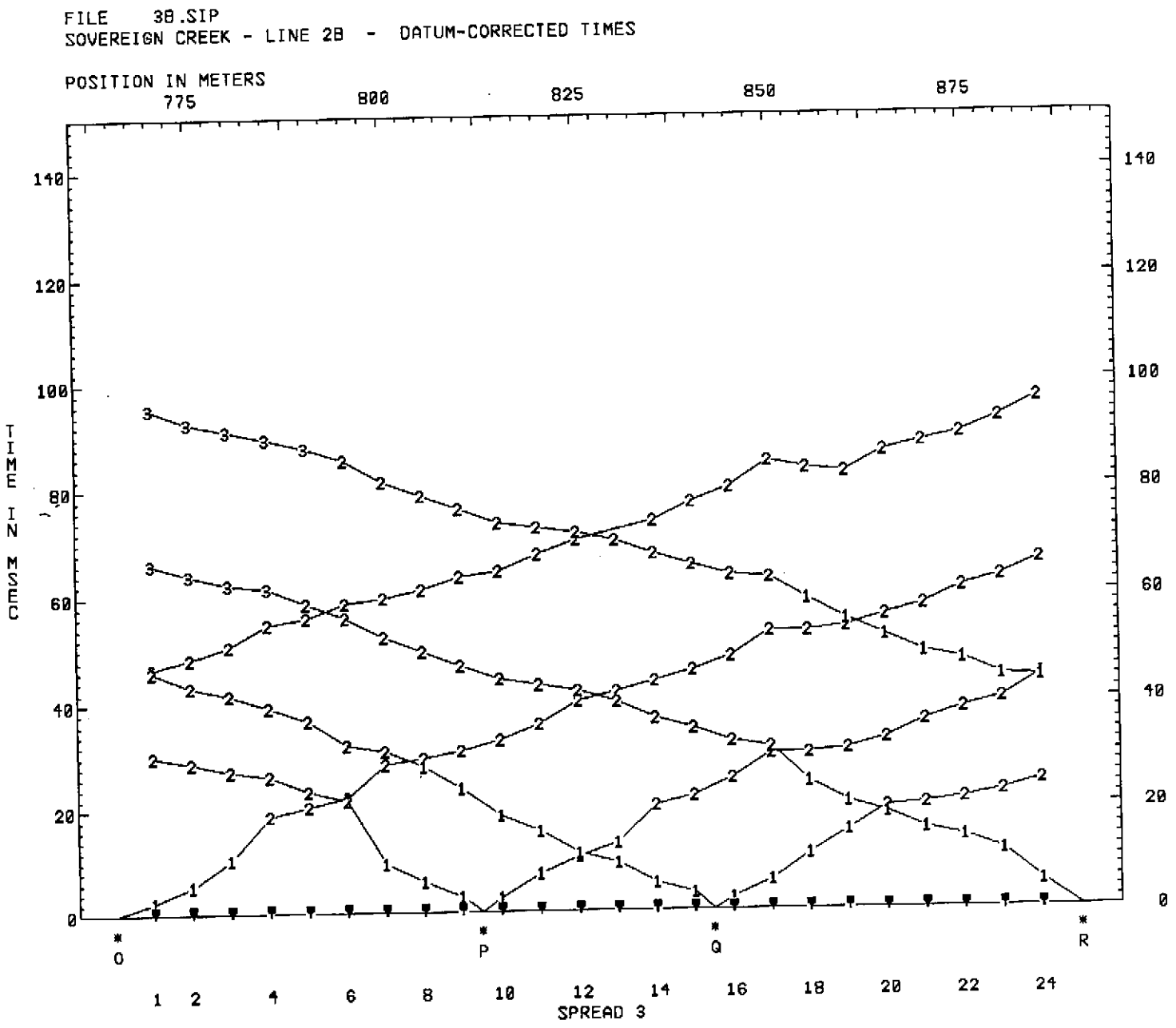

FILE 2C.SIP
SOVEREIGN CREEK - LINE 2B - DATUM-CORRECTED TIMES
POSITION IN METERS
875
900
925
950
975
1000
TIME IN MSEC
0
20
40
60
80
100
120
140
*
H
*
K
1
2
4
6
8
10
12
14
16
18
20
22
24
SPREAD 2


FILE 3B.SIP
SOVEREIGN CREEK - LINE 2B
SPREAD 3
SSW
ONE
1 2 4 6 8 10 12 14 16 18 20 22 24
O
P
Q
R
880
870
860
850
840
830
820
810
ELEVATION IN METERS
775
800
825
850
875
POSITION IN METERS
LEGEND
LAYER VEL SPREAD
1386 3
2245 3
2944 3

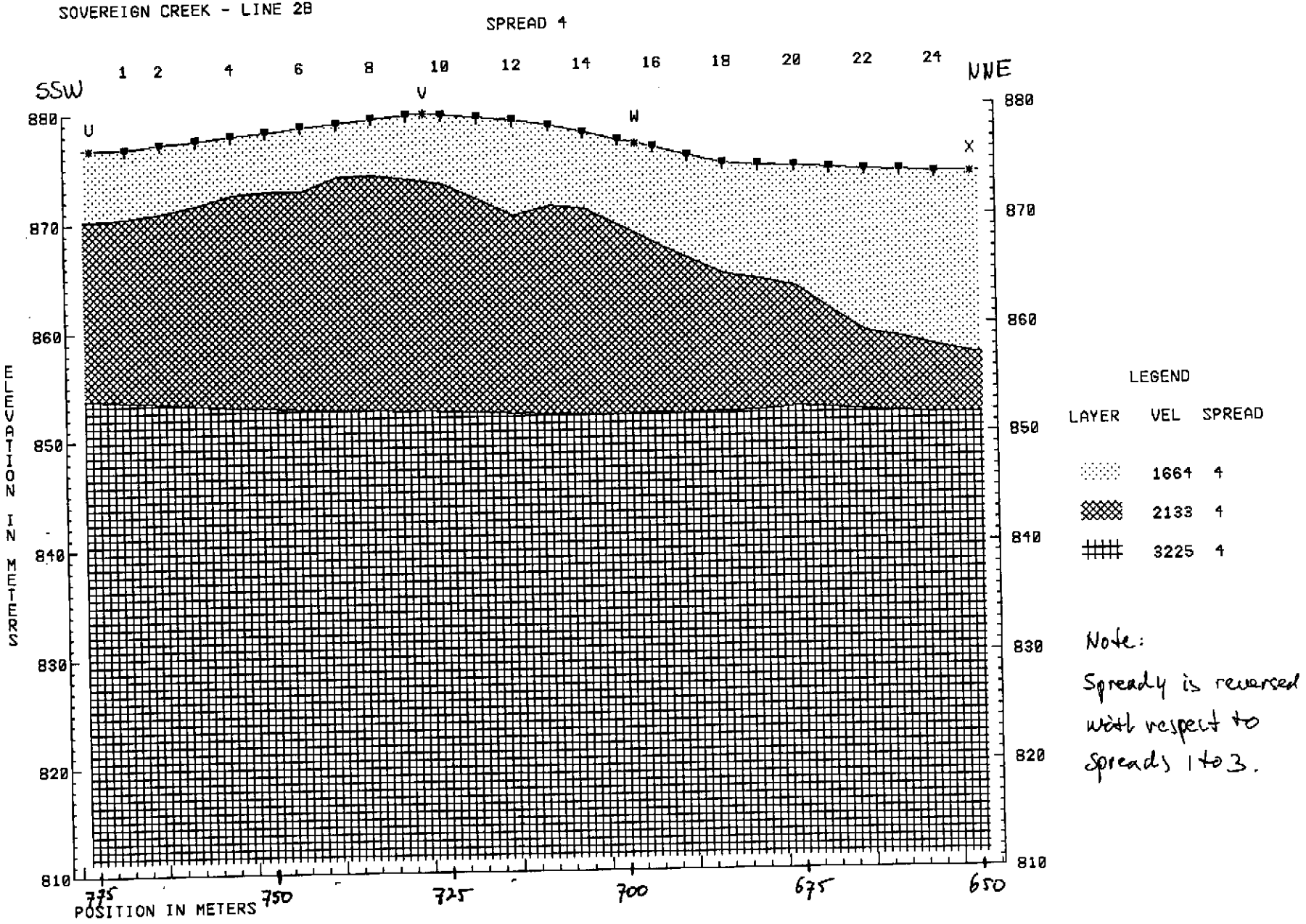
FILE 3B.SIP
SOVEREIGN CREEK - LINE 2B

SPREAD 3



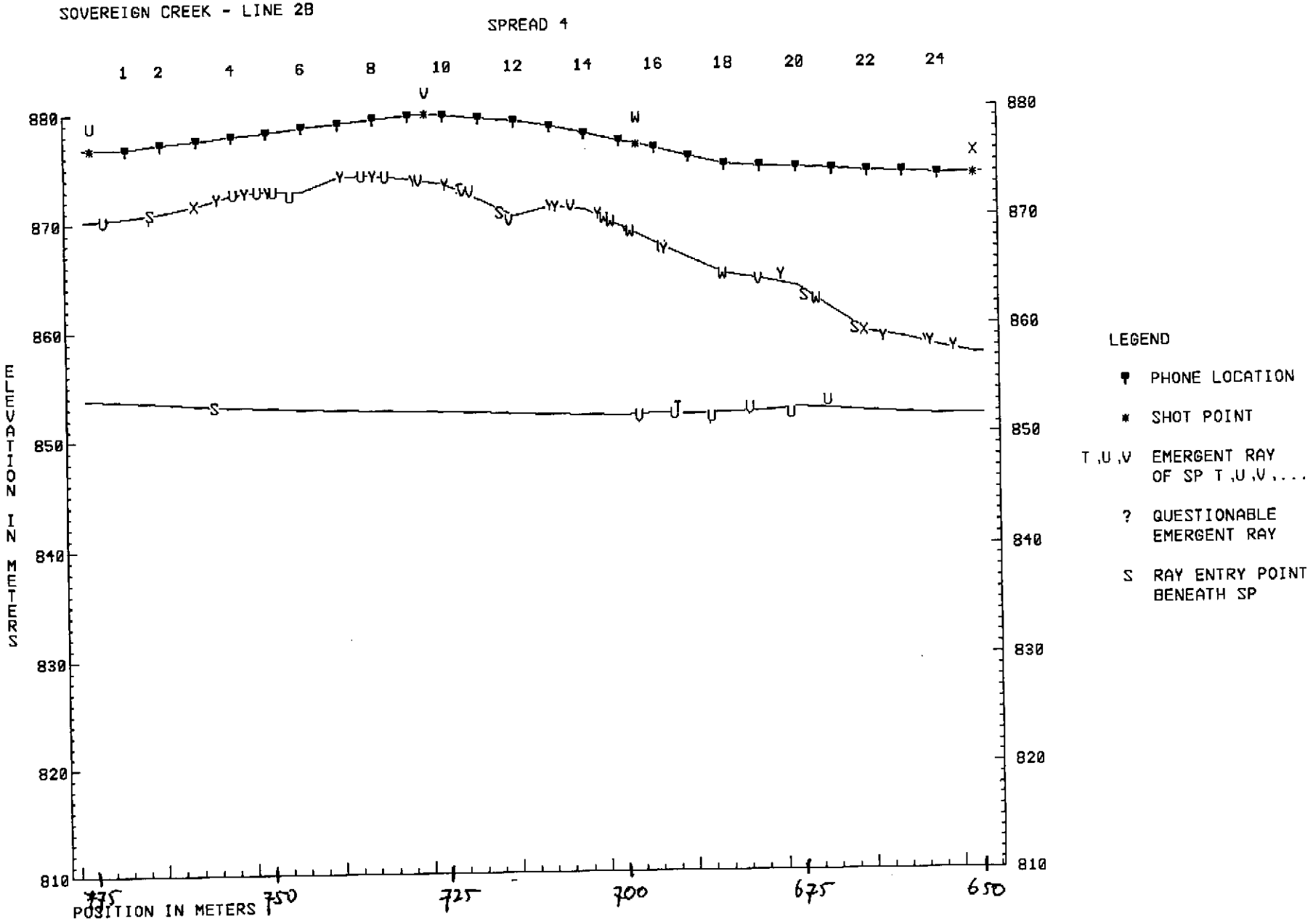

FILE 38.SIP
SOVEREIGN CREEK - LINE 2B - DATUM-CORRECTED TIMES
POSITION IN METERS
775
800
825
850
875
TIME IN MSEC
0
20
40
60
80
100
120
140
O
P
Q
R
1 2 4 6 8 10 12 14 16 18 20 22 24
SPREAD 3

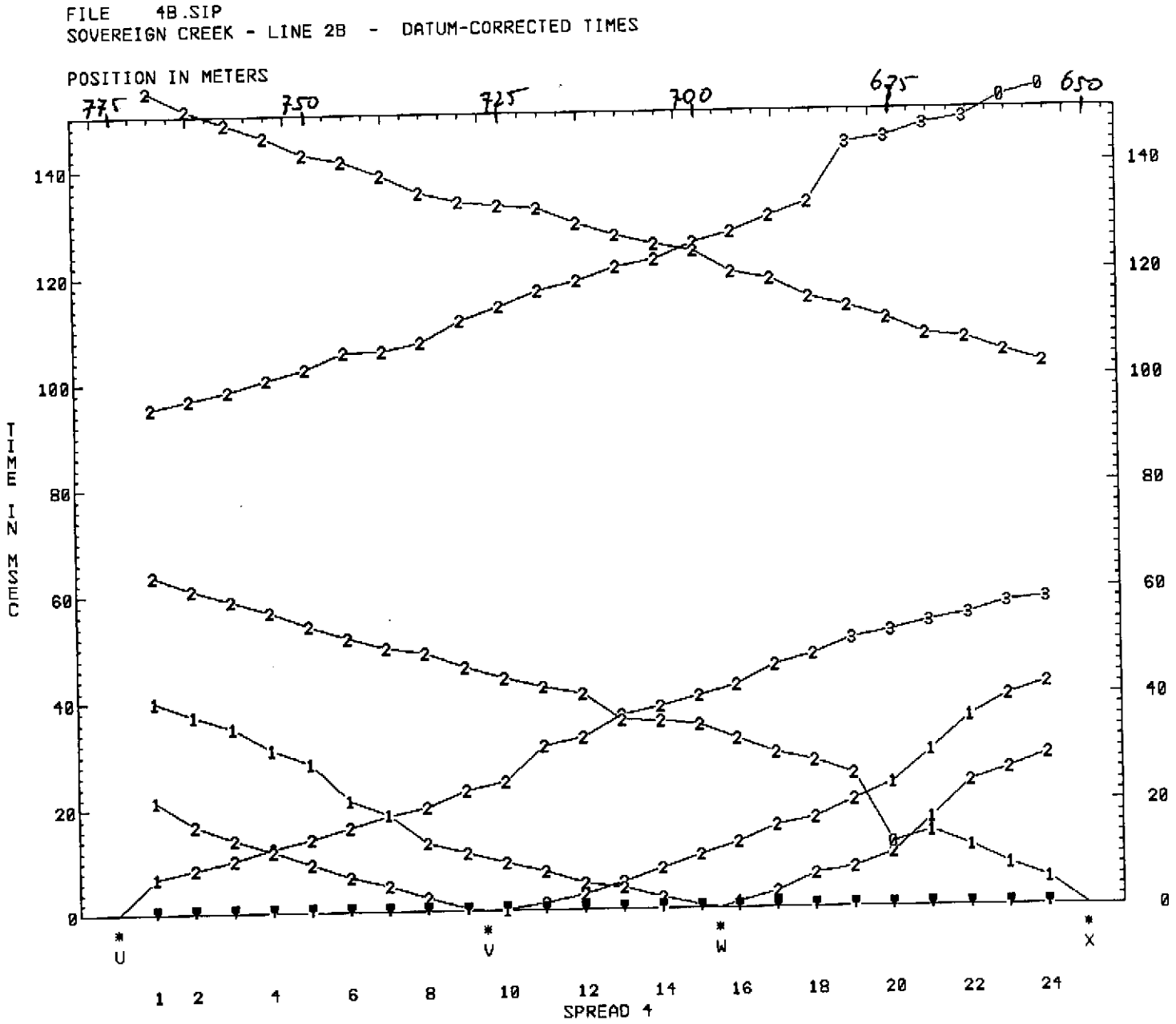
FILE 4B.SIP
SOVEREIGN CREEK - LINE 2B



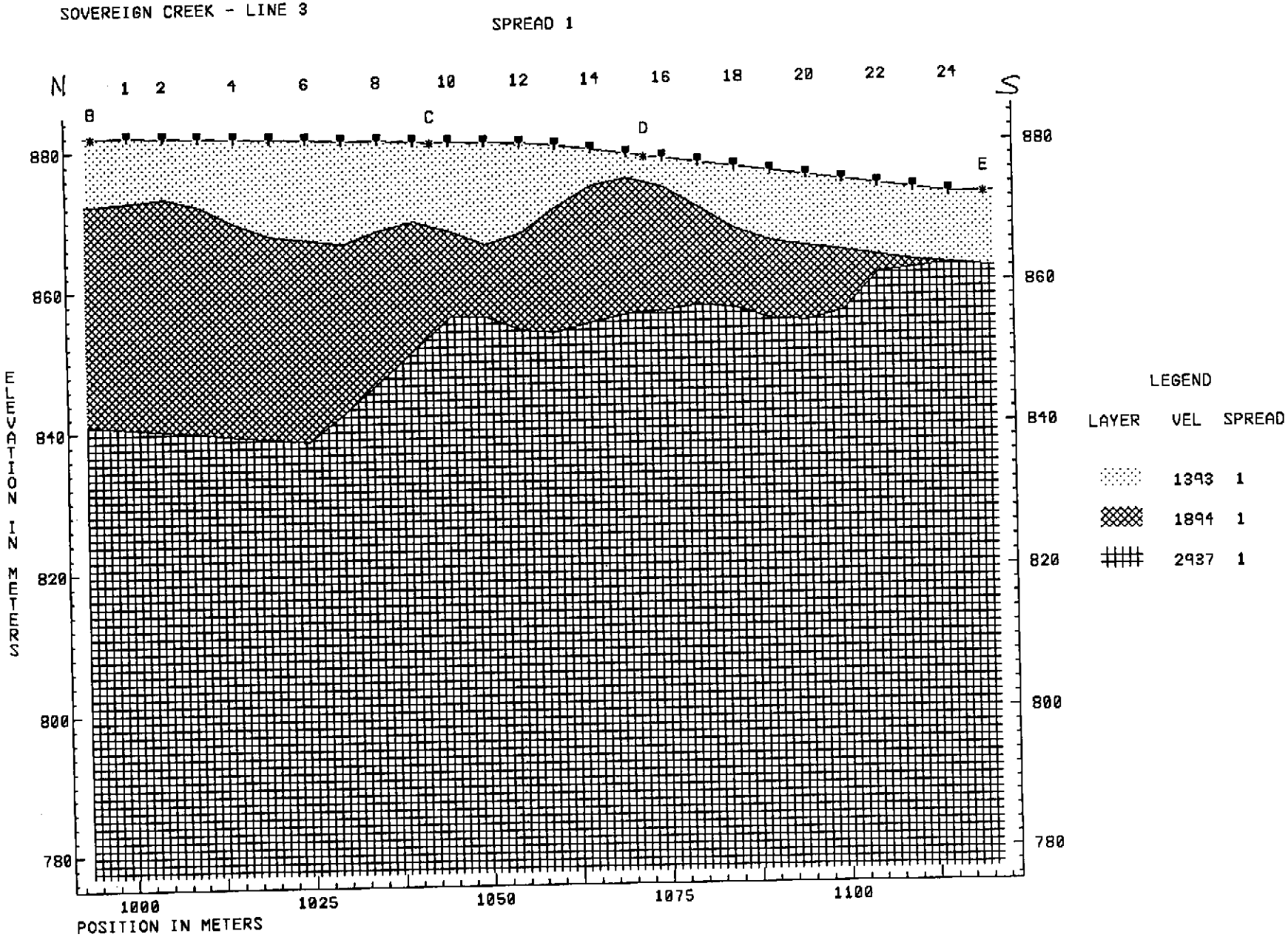
Note:
Spread4 is reversed with respect to spreads 1 to 3.

FILE 48.SIP
SOVEREIGN CREEK - LINE 2B



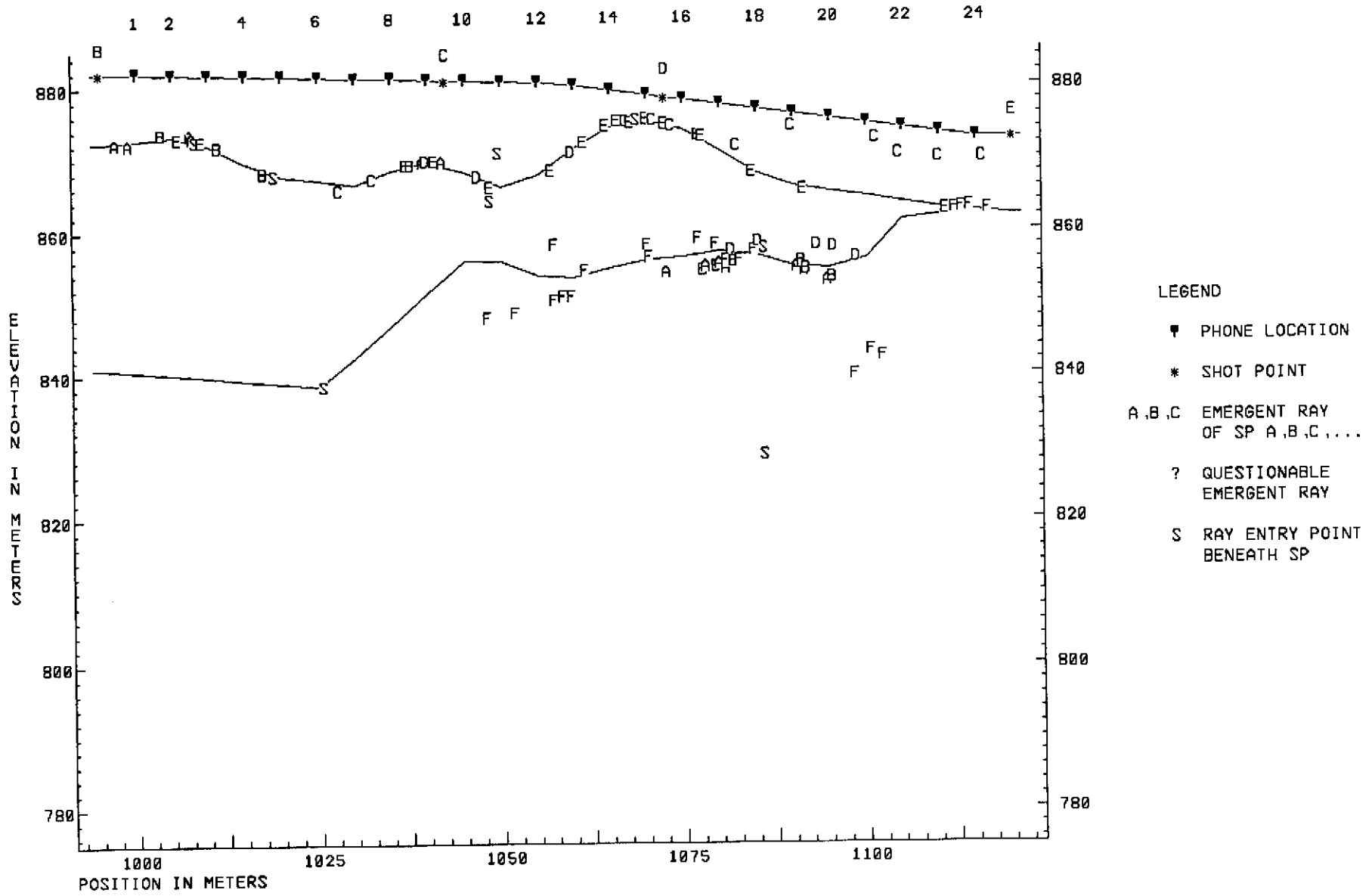

FILE 4B.SIP
SOVEREIGN CREEK - LINE 2B - DATUM-CORRECTED TIMES
POSITION IN METERS
775
750
725
700
675
650
TIME IN MSEC
140
120
100
80
60
40
20
0
U
V
W
X
1 2 4 6 8 10 12 14 16 18 20 22 24
SPREAD 4

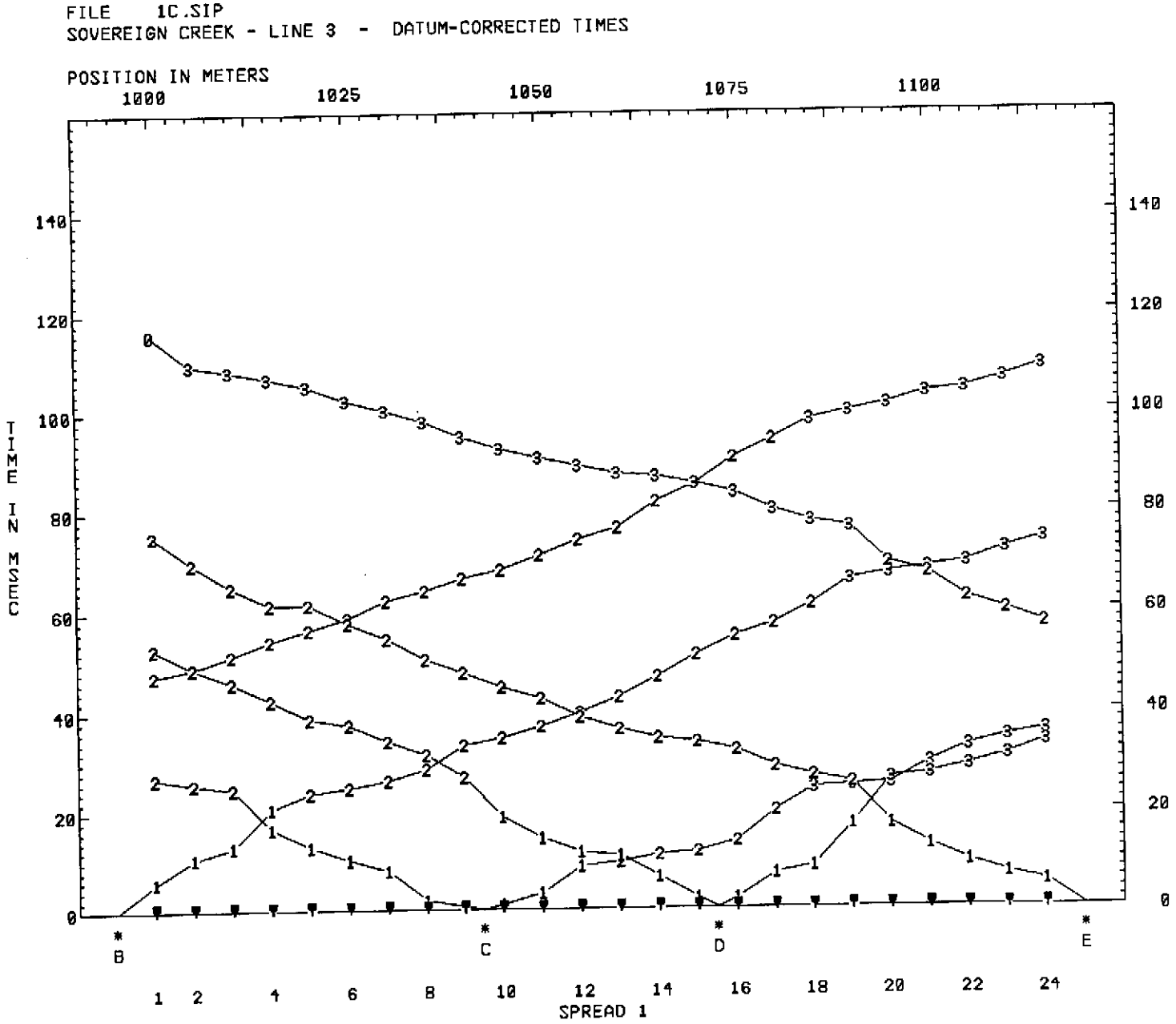
FILE 1C.SIP
SOVEREIGN CREEK - LINE 3

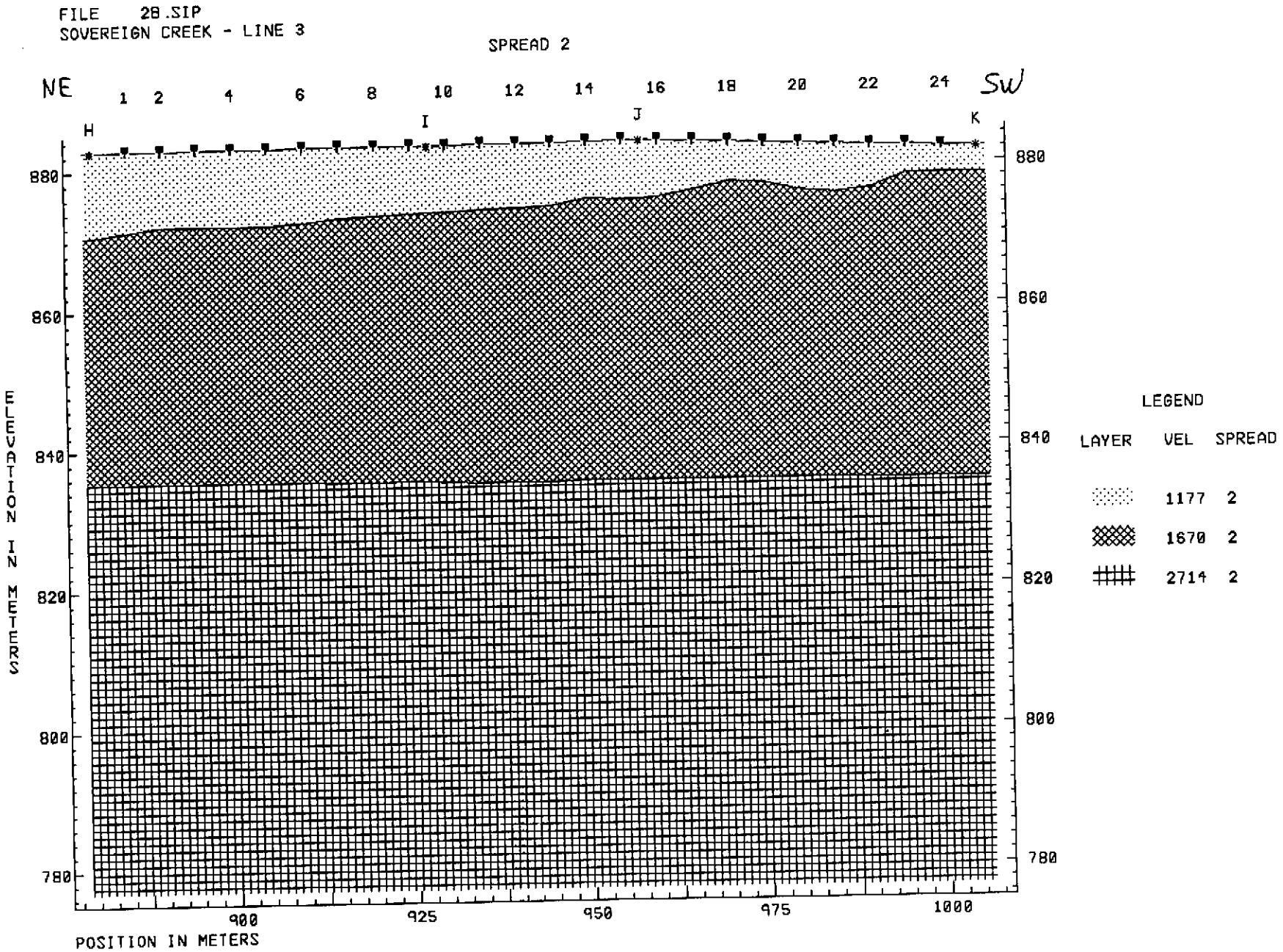


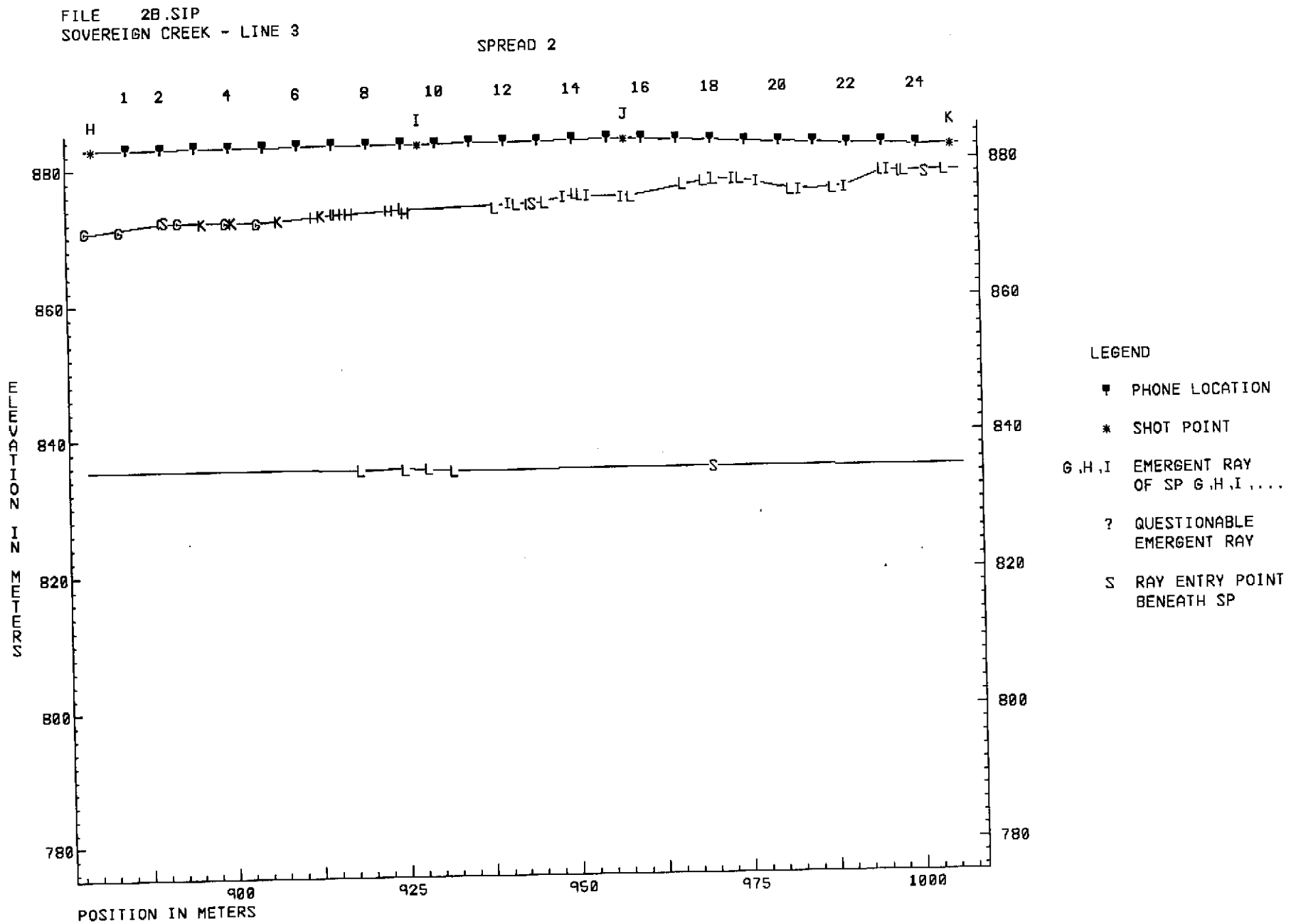
FILE 1C.SIP
SOVEREIGN CREEK - LINE 3

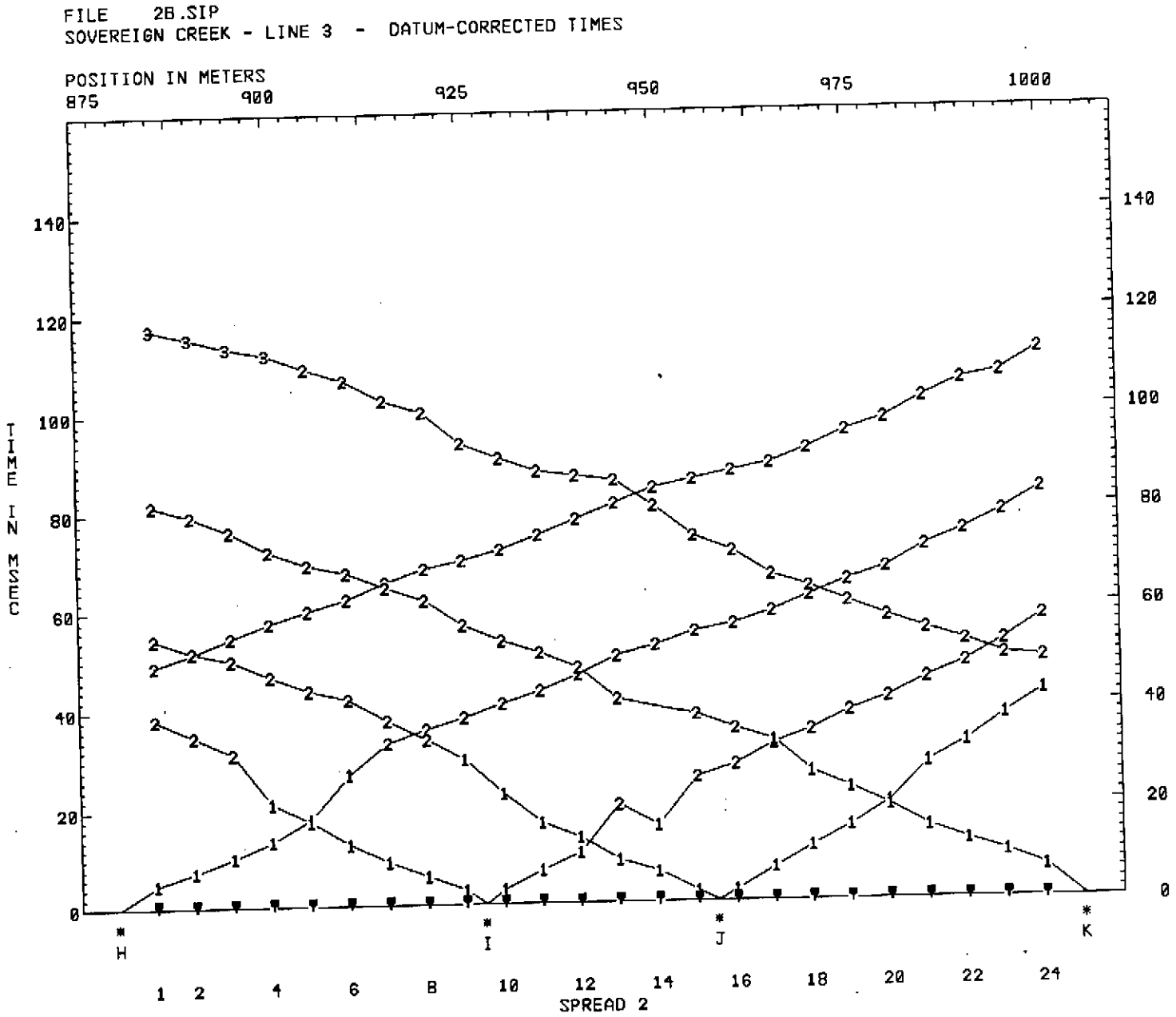
SPREAD 1

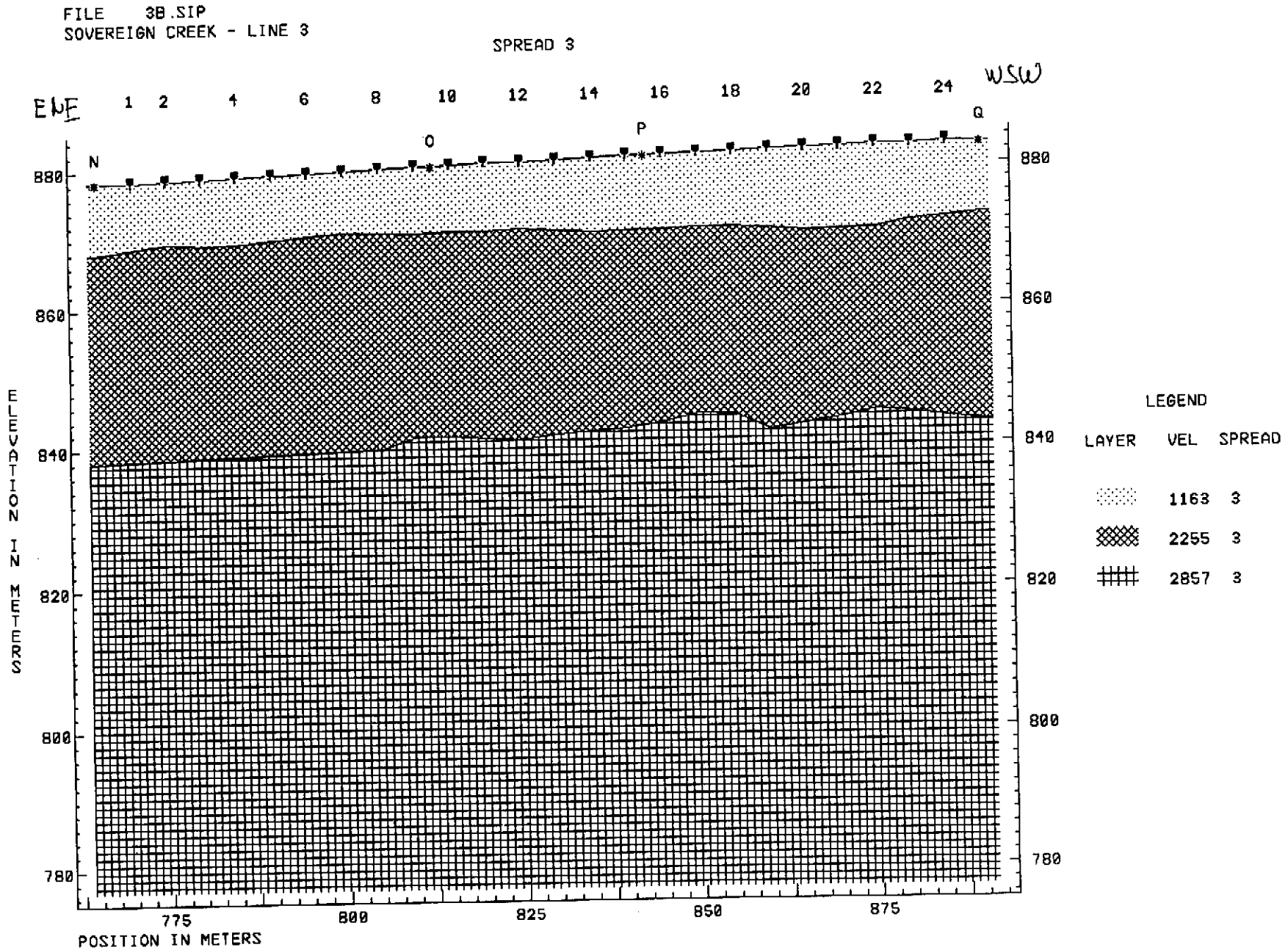


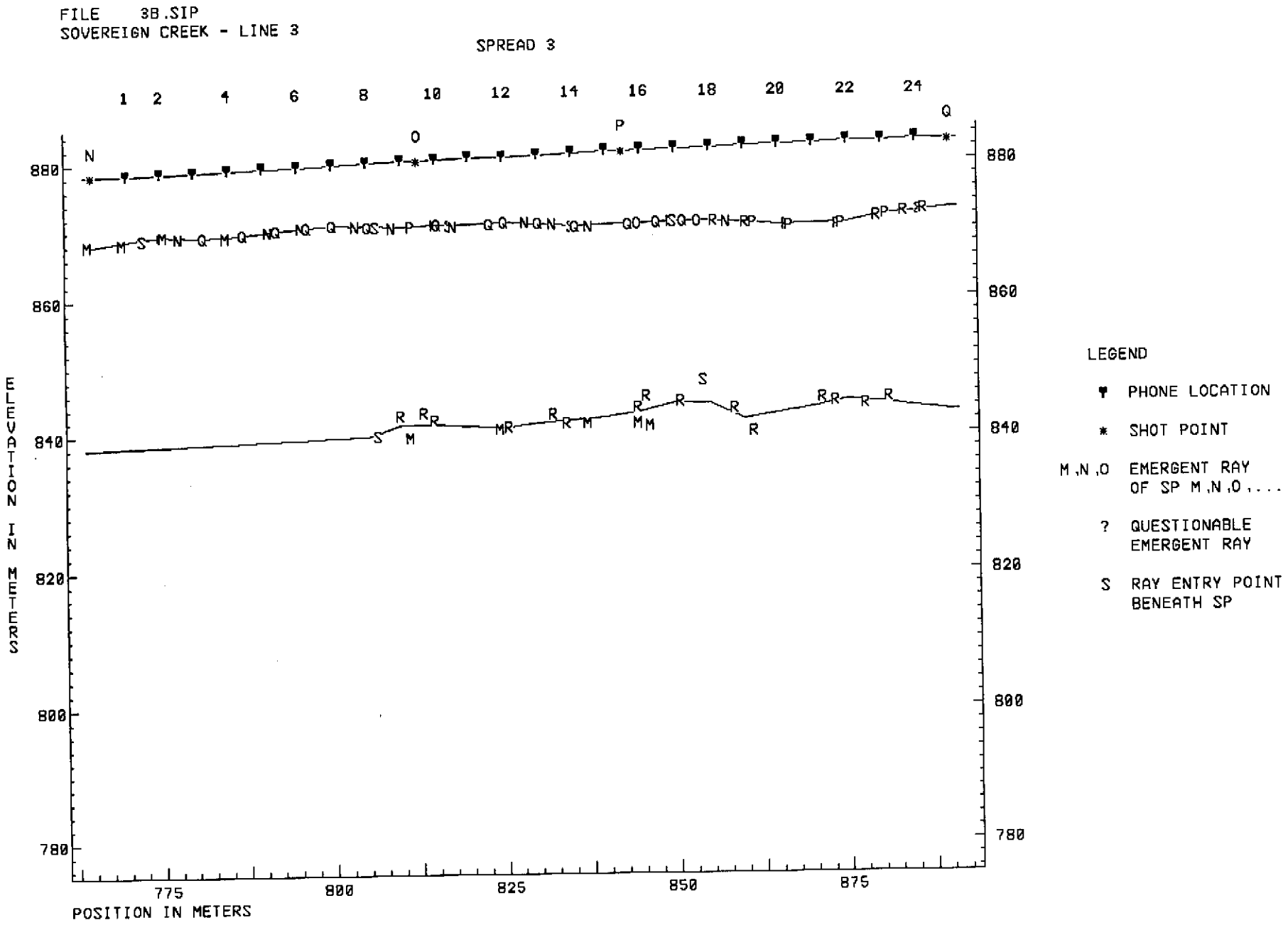

FILE 1C.SIP
SOVEREIGN CREEK - LINE 3 - DATUM-CORRECTED TIMES
POSITION IN METERS
1000
1025
1050
1075
1100
TIME IN MSEC
0
20
40
60
80
100
120
140
B
C
D
E
1 2 4 6 8 10 12 14 16 18 20 22 24
SPREAD 1

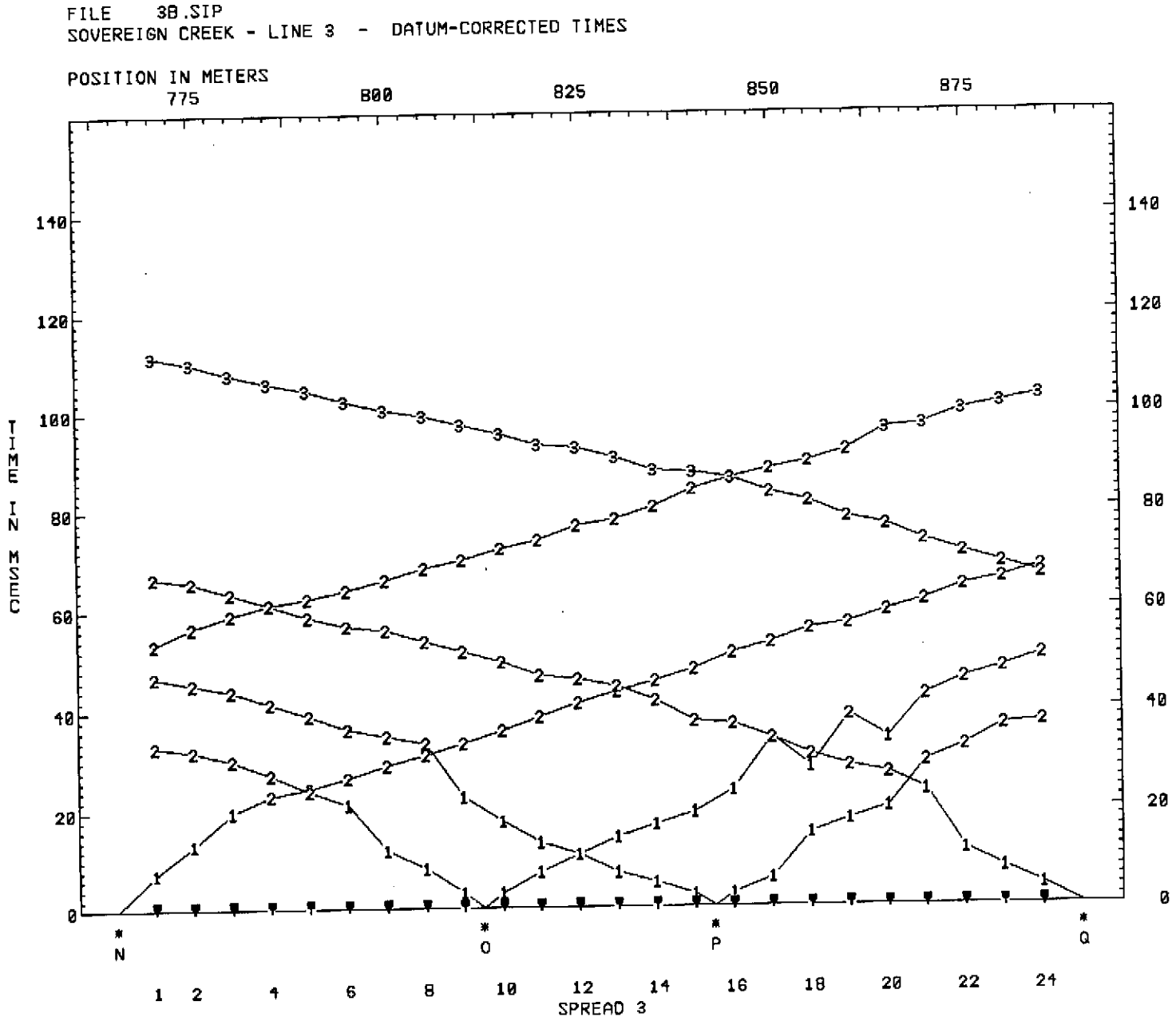

FILE 28.SIP
SOVEREIGN CREEK - LINE 3
SPREAD 2
NE
SW
1 2 4 6 8 10 12 14 16 18 20 22 24
H
I
J
K
880
860
840
820
800
780
ELEVATION IN METERS
900
925
950
975
1000
POSITION IN METERS
LEGEND
LAYER VEL SPREAD
1177 2
1670 2
2714 2


FILE 2B.SIP
SOVEREIGN CREEK - LINE 3
SPREAD 2
1 2 4 6 8 10 12 14 16 18 20 22 24
H
I
J
K
880
860
840
820
800
780
ELEVATION IN METERS
900
925
950
975
1000
POSITION IN METERS
LEGEND
PHONE LOCATION
SHOT POINT
G ,H ,I EMERGENT RAY OF SP G ,H ,I ,...
? QUESTIONABLE EMERGENT RAY
S RAY ENTRY POINT BENEATH SP


FILE 2B.SIP
SOVEREIGN CREEK - LINE 3 - DATUM-CORRECTED TIMES
POSITION IN METERS
875
900
925
950
975
1000
TIME IN MSEC
0
20
40
60
80
100
120
140
H
I
J
K
1 2 4 6 8 10 12 14 16 18 20 22 24
SPREAD 2

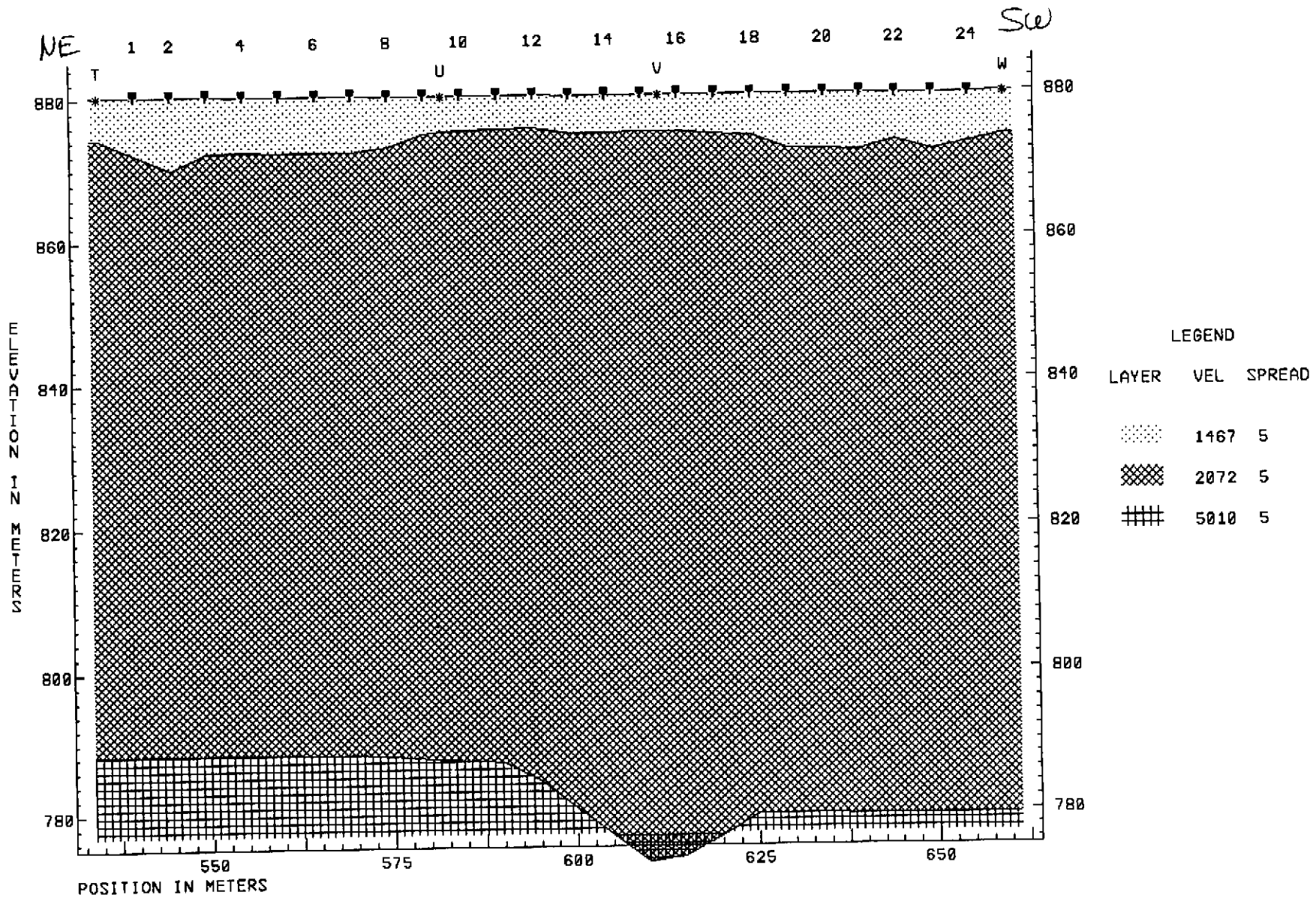

FILE 3B.SIP
SOVEREIGN CREEK - LINE 3
SPREAD 3
ENE
WSW
1 2 4 6 8 10 12 14 16 18 20 22 24
N
O
P
Q
880
860
840
820
800
780
ELEVATION IN METERS
775
800
825
850
875
POSITION IN METERS
LEGEND
LAYER VEL SPREAD
1163 3
2255 3
2857 3


FILE 3B.SIP
SOVEREIGN CREEK - LINE 3
SPREAD 3
1 2 4 6 8 10 12 14 16 18 20 22 24
N
O
P
Q
880
860
840
820
800
780
ELEVATION IN METERS
775
800
825
850
875
POSITION IN METERS
LEGEND
PHONE LOCATION
SHOT POINT
M,N,O EMERGENT RAY OF SP M,N,O,...
? QUESTIONABLE EMERGENT RAY
S RAY ENTRY POINT BENEATH SP


FILE 3B.SIP
SOVEREIGN CREEK - LINE 3 - DATUM-CORRECTED TIMES
POSITION IN METERS
775
800
825
850
875
TIME IN MSEC
0
20
40
60
80
100
120
140
N
O
P
Q
1 2 4 6 8 10 12 14 16 18 20 22 24
SPREAD 3

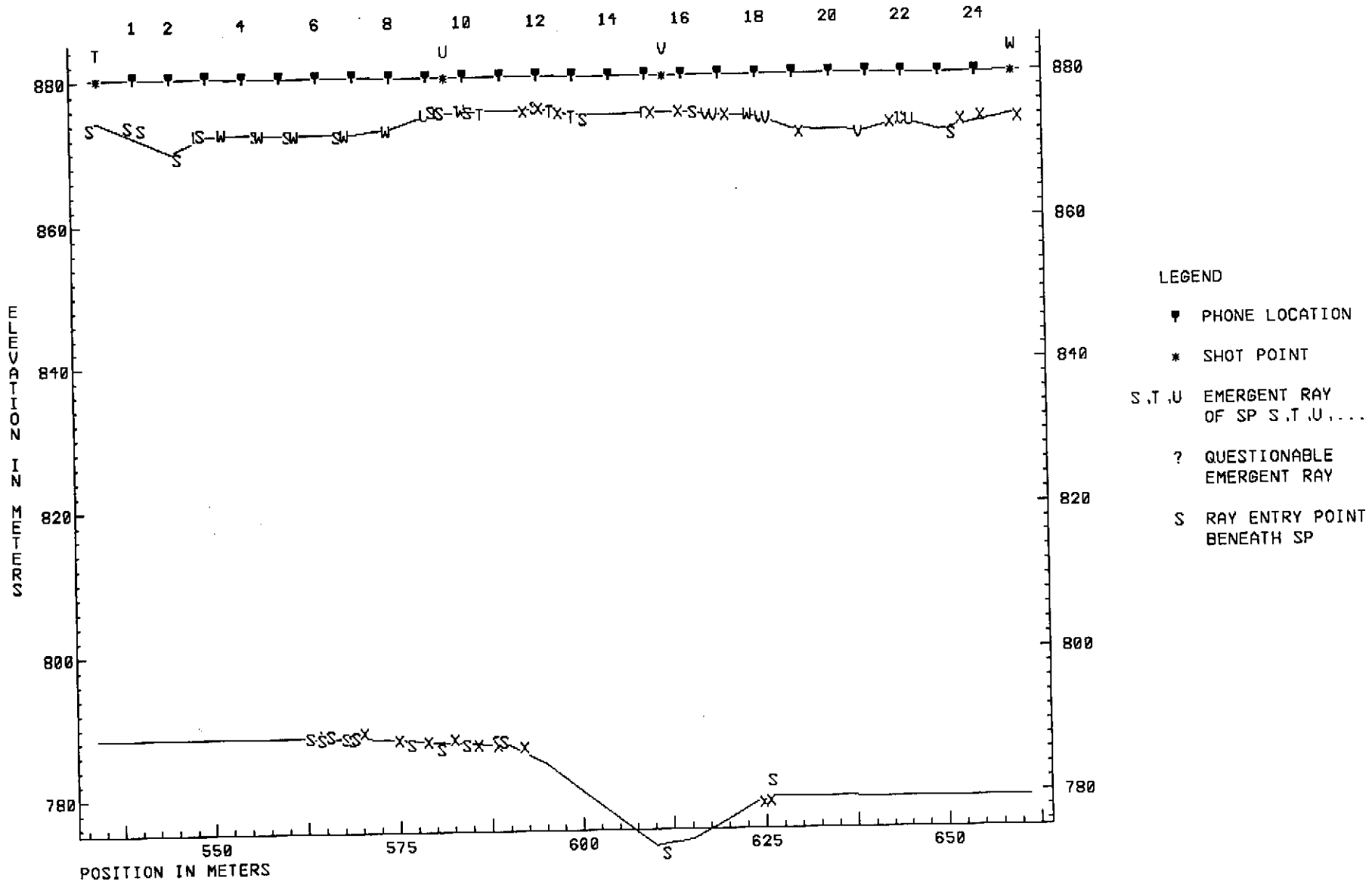
FILE 5B.SIP
SOVEREIGN CREEK - LINE 3

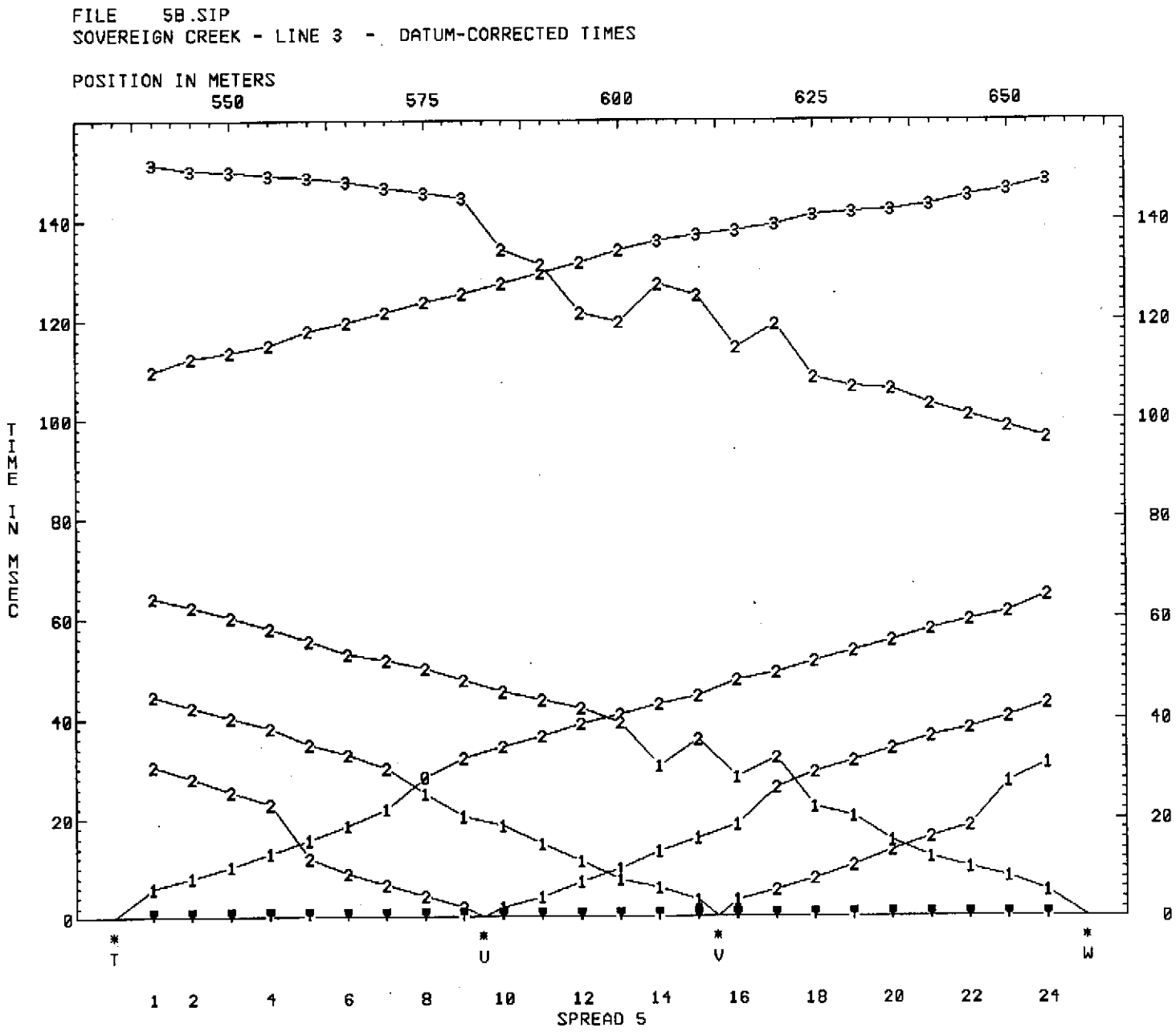
SPREAD 5



FILE 5B.SIP
SOVEREIGN CREEK - LINE 3

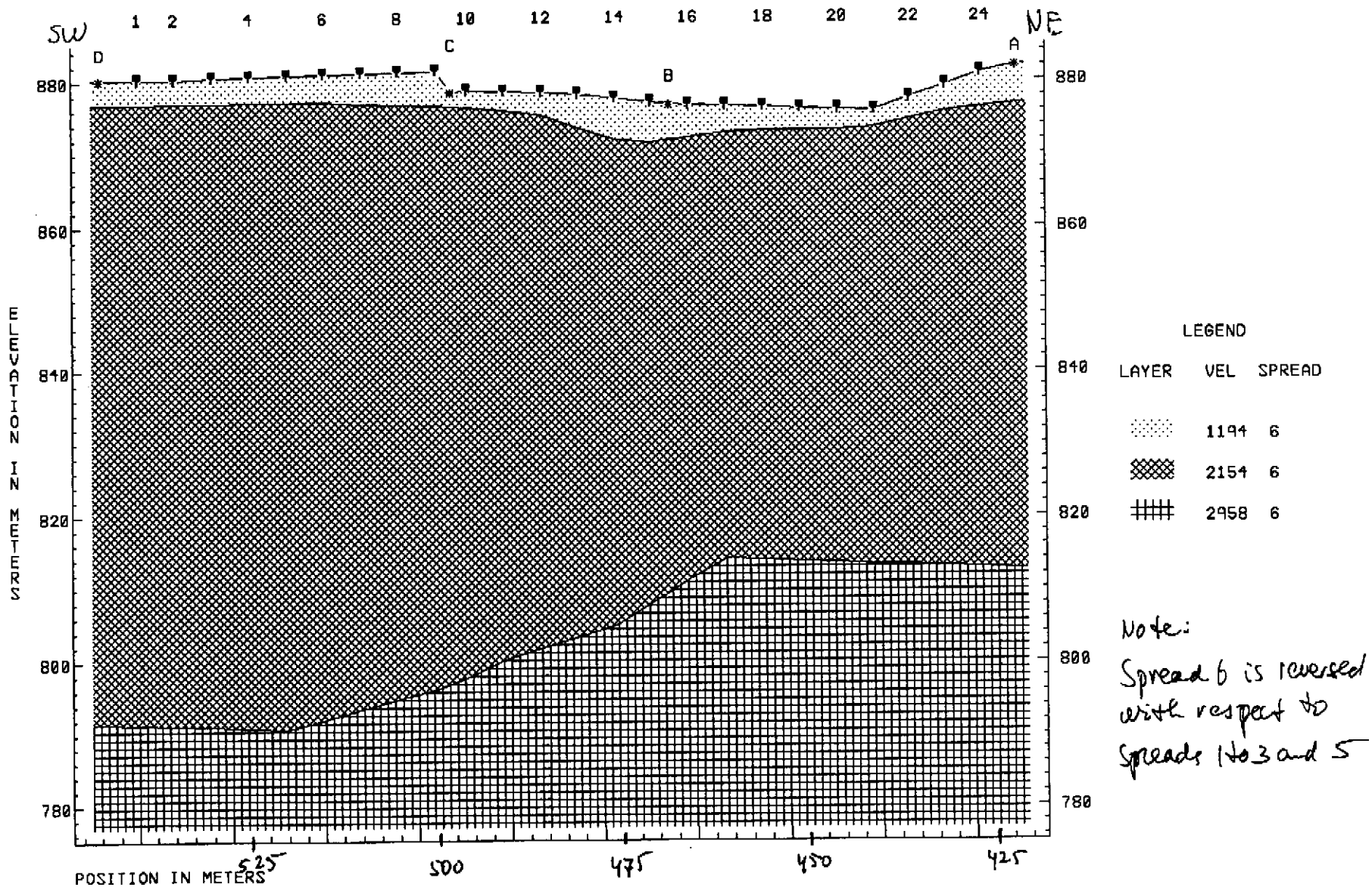
SPREAD 5




FILE 5B.SIP
SOVEREIGN CREEK - LINE 3 - DATUM-CORRECTED TIMES
POSITION IN METERS
550
575
600
625
650
TIME IN MSEC
0
20
40
60
80
100
120
140
T
U
V
W
1 2 4 6 8 10 12 14 16 18 20 22 24
SPREAD 5

FILE 6B.SIP
SOVEREIGN CREEK - LINE 3

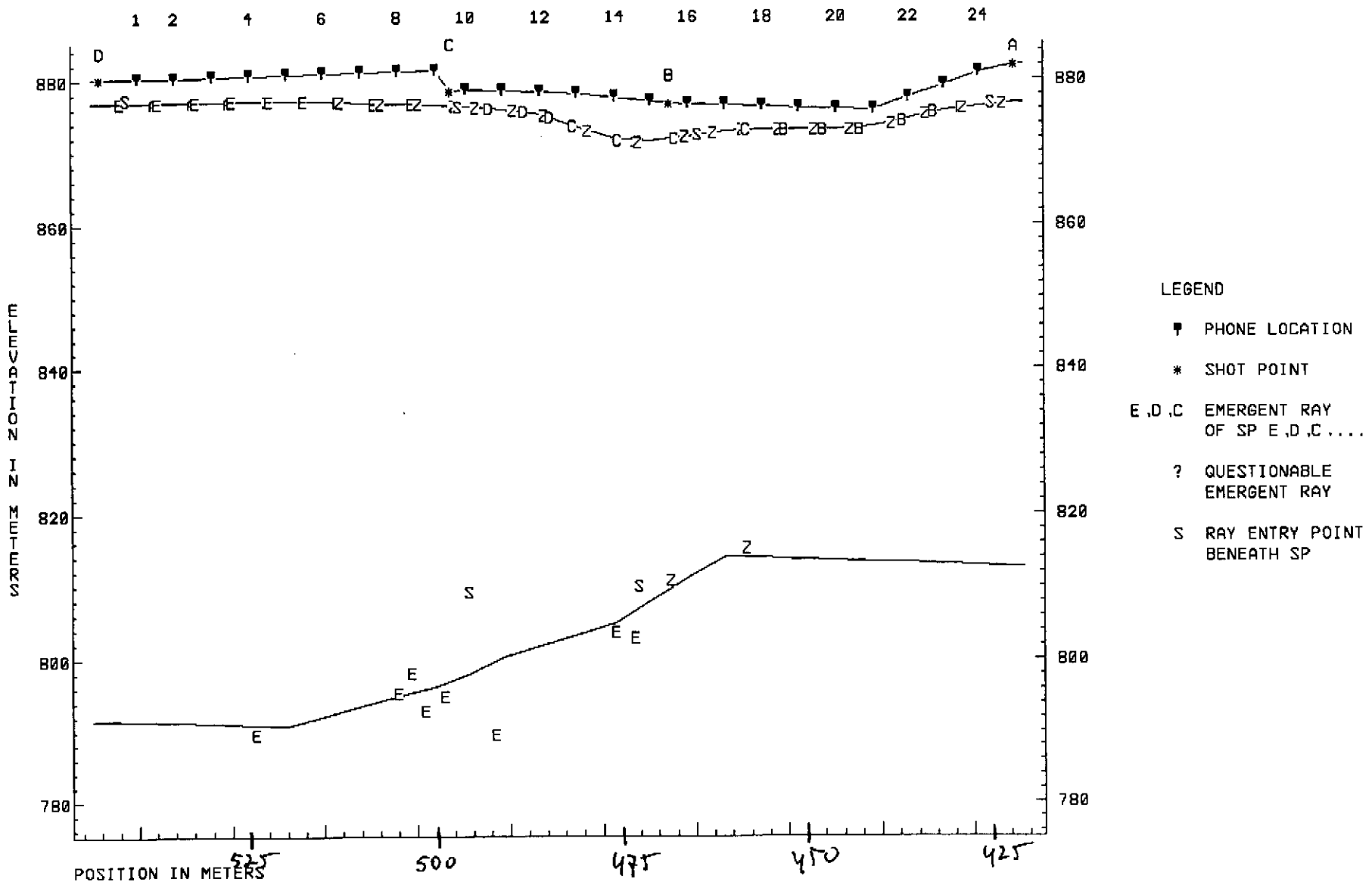
SPREAD 6

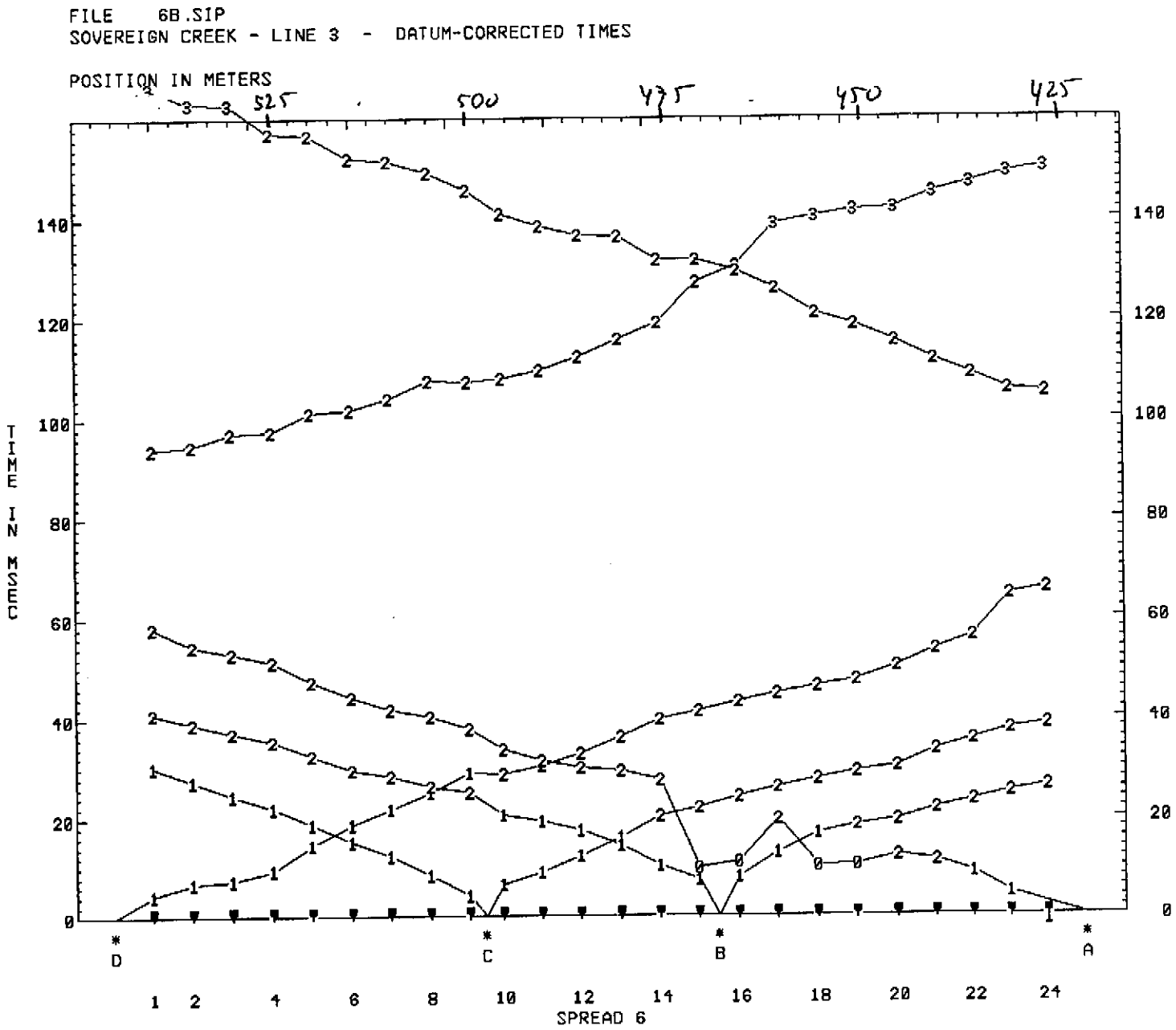


Note:
Spread 6 is reversed with respect to Spreads 1 to 3 and 5

FILE 6B.SIP
SOVEREIGN CREEK - LINE 3

SPREAD 6




FILE 6B.SIP
SOVEREIGN CREEK - LINE 3 - DATUM-CORRECTED TIMES
POSITION IN METERS
525
500
475
450
425
TIME IN MSEC
0
20
40
60
80
100
120
140
D
C
B
A
1 2 4 6 8 10 12 14 16 18 20 22 24
SPREAD 6

APPENDIX 2

Statement of Qualifications

STATEMENT OF QUALIFICATIONS

I, Ebo Bakker, of 402 – 868 West 16th Avenue, Vancouver B.C., do hereby certify that:

1. I am registered as a Professional Geologist with the Association of Professional Engineers, Geologists and Geophysicists of Alberta, since 1985.

2. I am a Fellow of the Geological Association of Canada since 1981 and a Member of the Irish Association of Economic Geology since 1992.

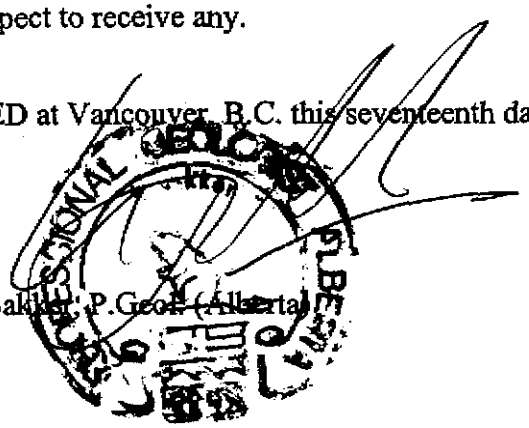
3. I am a graduate of the University of Leiden in the Netherlands where I obtained a B.Sc. Degree in Geology with Mathematics, Physics and Chemistry in 1973, and an M.Sc. Degree in Geology in 1979.

4. I have practiced my profession as a geologist since 1973 in Sweden, Canada, U.S.A., Mexico, Turkey, Costa Rica, Brazil and Ghana.

5. I am the author of this report on the Sargent placer property near Quesnel in British Columbia, Canada. The report is based on work on the property by myself in February 1998, on subsequent data analysis, and on a review of existing material..

6. I am an independent consulting geologist and have no direct or indirect interests in the Sargent placer property, nor in Pegasus Earth Sensing Corporation, nor do I expect to receive any.

DATED at Vancouver, B.C. this seventeenth day of April 1998.



Ebo Bakker, P.Geol. (Alberta)

ATTN: ALLAN WILCOX RE: ASSESSMENT WORK 25529

PEGASUS
earth sensing corporation

4761 COVE CLIFF ROAD
NORTH VANCOUVER, BRITISH COLUMBIA
CANADA, V7G 1H8
PHONE: (604)-929-0637
FAX: (604)-929-7231

FINAL INVOICE

May 7, 1998

Sargent Construction & Supply
C/o 306-424 Wilson Street
Quesnel, B.C.
V2J 2V9 1-250-992-3107

For professional services rendered to date including planning and execution of seismic survey to locate trace of paleochannel, acquisition and rental of geophysical equipment, interpretation and discussions

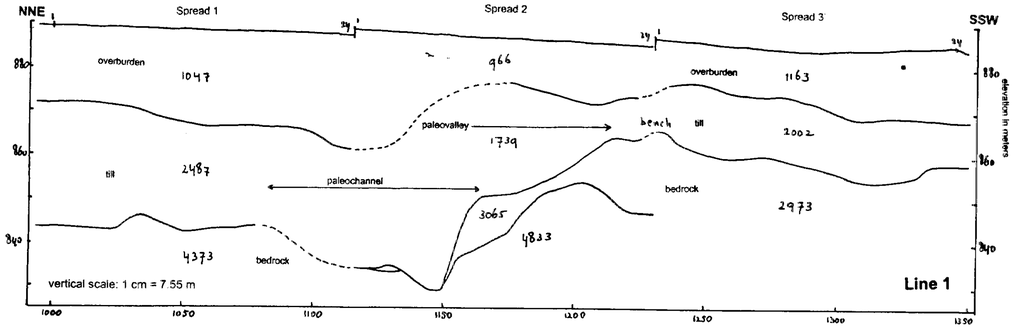
Professional Services:

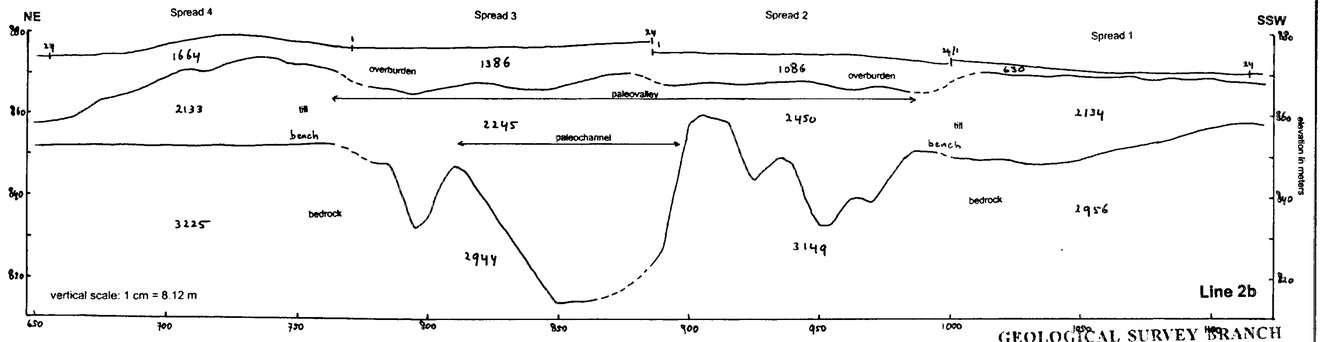
Ted H. F. Reimchen 36 hours @	$85/hr: charge 2 hours	=$ 170.00
Ebo Bakker 299.5 hours. @	$50	=$14,975.50

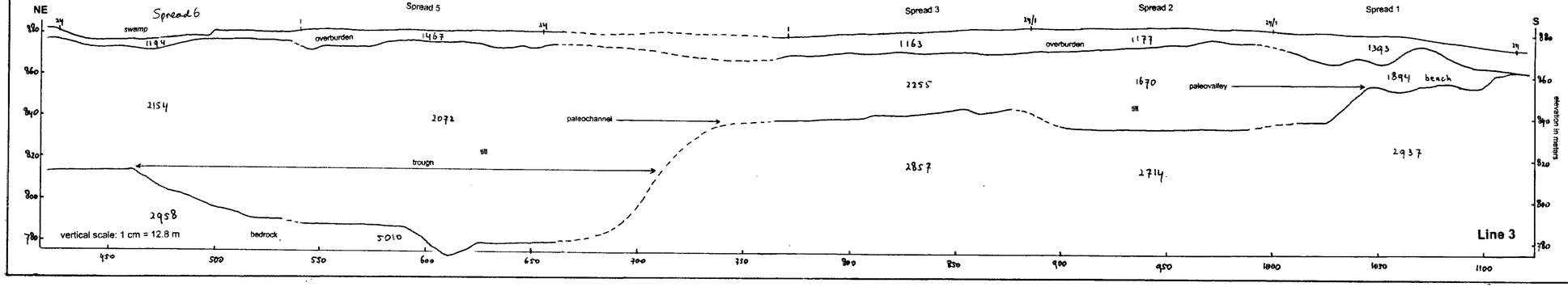
Disbursements

Ebo's expenses	=$ 211.53
Paid on Pegasus credit card	=$ 1,780.88
Telephone/fax	=$ 219.55
Photocopy 417 @ 0.25	=$ 104.25
Digital processing of Imagery 4 hrs @ $32	=$ 128.00
Workstation for digital processing 24 hrs @ $17	=$ 408.00
Rental of geophysical equipment –Terraplus	=$ 4,008.22
Sub-total	=$ 6,860.53
G.S.T.	=$1540.42
TOTAL————	=$22,006.03
Less Payment of	=$ 7,000.00
Balance of	**=$15,006.03**

GST Registration R122934417
Pegasus reserves the right to charge 2%/ mo. on overdue accounts.







GEOLOGICAL SURVEY BRANCH
ASSESSMENT REPORT

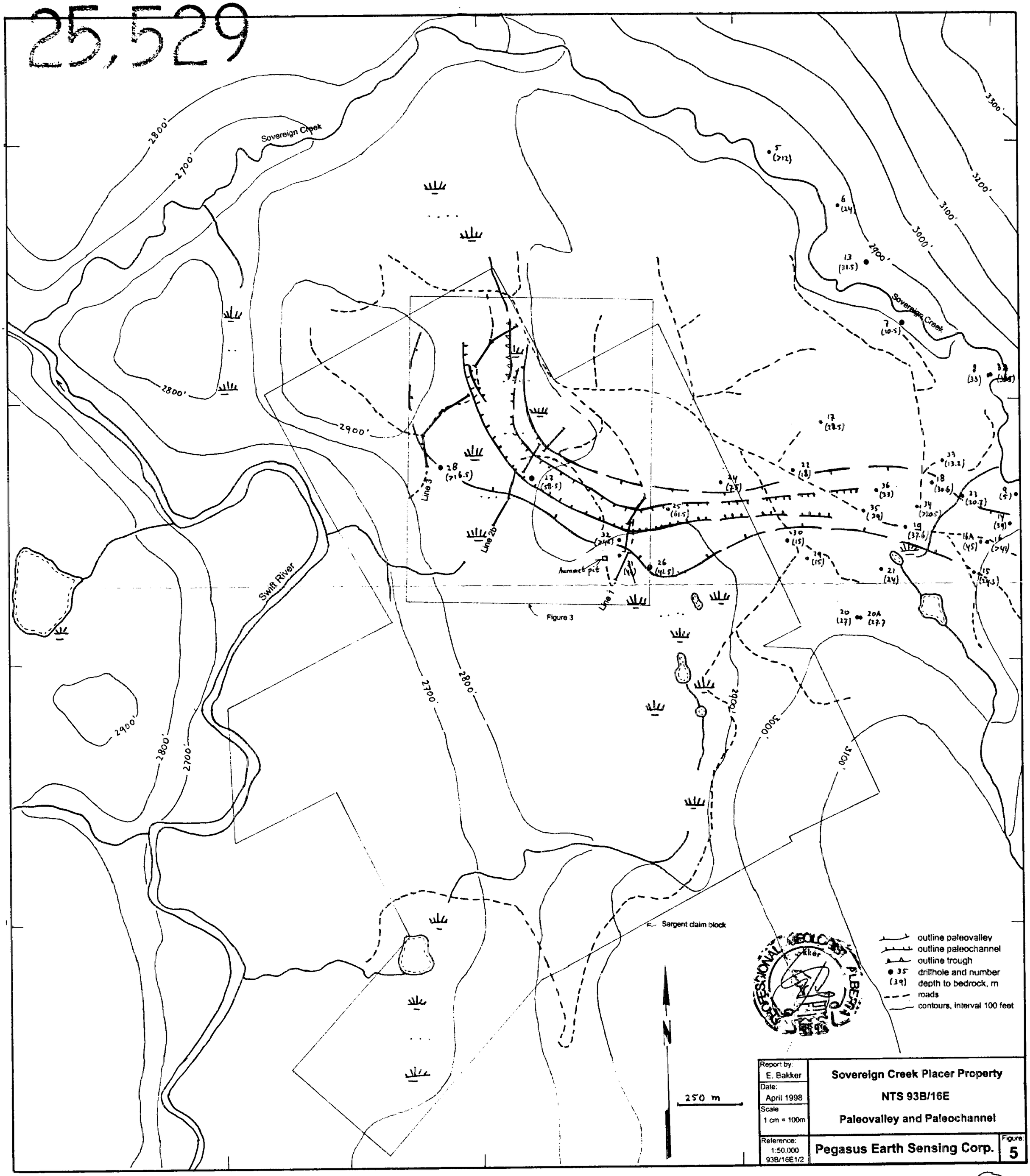
25,529

established lithological contact
assumed lithological contact
2450 seismic velocity, meters/second

PROFESSIONAL GEOLOGIST
E. BAKKER
BRITISH COLUMBIA

Report by: E. Bakker	Sovereign Creek Placer Property
Date: April 1998	NTS 93B/16E
Scale: 1 cm = 12.5 m horizontal	Combined Seismic Sections
Reference:	Pegasus Earth Sensing Corp. — Figure: 4

(1)



(2)