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VIDEO PROBE INSPECTION OF ROOFBOLT HOLES AT KIDD CREEK MINE

G. Herget and B. Arjang

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VIDEO PROBE INSPECTION OF ROOFBOLT HOLES AT KIDD CREEK MINE

by

G. Herget* and B. Arjang*

SUMMARY

Sixty-three roofbolt holes have been inspected with a colour video probe and recorded on videotape at the Kidd Creek mine of Falconbridge Ltd. The records are needed as a background document for the description for an in-situ trial on the Swellex roof support system. The test site at the Kidd Creek mine is located on 2500 level at the 2526 stope undercut and the holes were drilled in the week of January 16-20, 1989. The hole inspection was carried out on January 24 and 25, 1989. The rock mass consists of massive sulfides with only a few holes showing geological discontinuities.

A slight concentration of cracks occurs about 1.2 m to 1.6 m from the collar. On viewing the video tape the observer needs to consider that the linear magnification is about fivefold and the real magnification is 28-fold. The rock mass can be classified as good to very good.

KEYWORDS: Video borehole inspection, borehole surveys, roof support.

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INSPECTION PAR SONDE VIDÉO DE TROUS DE BOULONS D'ANCRAGE À LA MINE KIDD CREEK

par

G. Herget* et B. Arjang*

SOMMAIRE

Soixante-trois trous de boulons d'ancrage ont été inspectés avec une sonde vidéo couleur et les données ont été enregistrées sur bande vidéo à la mine Kidd Creek de la Falconbridge Ltée. Les données enregistrées servent de document de base pour décrire un essai in situ du système de soutènement Swellex. Le lieu d'essai à la mine Kidd Creek est situé sur le niveau 2 500 au havage en galerie 2 526 et les trous ont été forés pendant la semaine du 16 au 20 novembre 1989. Le massif rocheux est composé de sulfures où des discordances géologiques n'ont été révélées que par quelques trous.

Une faible concentration de fissures se trouve entre 1,2 et 1,6 m environ, de l'orifice. En visionnant l'enregistrement vidéo, il faut tenir compte du fait que le grossissement linéaire est d'environ cinq et que le grossissement réel est de 28. Le massif rocheux peut être classé de bon à très bon.

MOTS-CLÉS: inspection des trous par sonde vidéo; examen des trous de sonde; soutènement du toit.

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INTRODUCTION

On request by the Nickel Development Institute, Toronto a borehole survey was carried out with a colour video probe and recorded on tape at the Kidd Creek mine of Falconbridge Ltd. near Timmins, Ontario (1). The 63 holes are 1.8 m deep, have a diameter of 38.1 mm and are located on 2500 level. The 2526 stope undercut is located in massive sulfides which are composed primarily of pyrite, sphalerite, chalcopyrite, galena and pyrrhotite (2). The mining method for the Kidd Creek orebody is blasthole stoping with delayed rock fill (3).

The video survey was conducted to provide background information for an in-situ test of the stainless steel Swellex roof support system at a number of mine sites.

VIDEO EQUIPMENT

The video borehole inspection equipment consisted of a Video Probe V1635-50 ($US 23,700), a video processor V1678 (VPII 1 colour/LED - $US 13,400), a monitor V1572 (colour 13" RGB/Composite Panasonic #MT1340 - $US 890), a keyboard V1504II - $US 600) and a Lloyds VCR (Fig. 1).

The video probe 2000 system is manufactured by Welch Allyn, Inc., Video Division, State Street Road, Box 220, Skaneateles Falls, NY, 13153-0220, phone (315) 685-4599. The Canadian representative is Flolite Industries, 8 Ripley Avenue, Toronto, Ontario, M6S 3N9, phone (416) 767-2755.

The equipment was obtained on loan from INCO Ltd., Copper Cliff, Ontario.

The video probe has a length of 15.4 m (50 ft) and the O.D. of the camera head and cable are 10.2 mm (0.402 in.). The probe provides an axial view but can be equipped with a side viewing attachment. The image on the monitor can be complemented by written comments through keyboard

entries (three pages maximum) or by spoken comments with the aid of a microphone. The illumination is controlled by an automatic level controller which is very effective in finding optimum illumination levels.

For the vertical holes the video probe was led through aluminum rods and tied to the top with electricians tape. This protected the cable and allowed rotation of the video head in the hole. The side viewing attachment was used only once (first hole) because the mirror collected dust very easily and the obtained picture was a composite of axial and side view.

BOREHOLE INSPECTION

The Swellex test site is located on 2500 level in the 2526 stope undercut (Fig. 2). Twenty-one sets of three holes of 38.1 mm diameter (1.5 in.) had been drilled 1.80 m (6 ft) into the roof (Fig. 3). All holes were inspected and a record is available in colour on tape 1. Figure 4 explains the borehole identification which consists of a seven position alphanumeric with the first two identifying the mine (KC = Kidd Creek), the next two the level (25 = 2500 level), the next letter the location (S = South, V = Vertical, N = North) and the last two digits the row number (11 = row number 11). Logging of the individual holes started with row one at the west end and progressed E until row number 21 was reached. In total 63 holes were surveyed.

Figure 5 shows the geology of the site provided by Kidd Creek mine. Nearly all the holes were located in massive sulfides consisting of yellow pyrite (FeS_2) and brown stringers or areas of sphalerite (ZnS). Only occasionaly the holes showed quartz veins. All holes were slightly fractured at the collar from blasting. In a number of places the roof required scaling. In total the rock mass is very competent and only occasionally do the borehole walls show small breakouts from micro cracking or some subhorizontal jointing. Only seven holes showed vertical fractures (Table 1).

The video tape starts in all cases at the top of the hole and is lowered slowly to display the axial view of the borehole wall. If anything of interest appeared, the footage was repeated. In some cases a complete run was made from the collar upwards. The video head was rotated back and forth to achieve better light distribution in the hole. Half way down the hole the video display often shakes because one rod is unscrewed to allow rod clearance for retraction.

A logging sheet was prepared for each hole (Fig. 6) but they are not reproduced in this report. Table 1 contains the information on the logging sheets in a condensed format. If the videotape counter is set to zero at the start of the tape, the locations for the individual holes is easily found with the aid of Table 1.

TABLE 1 - Swellex Borehole Inspection Summary for Kidd Creek Mine 2526 Stope U/C (Video tape Nr. 1)

HOLE Nr	TAPE COUNTER POSITION
KC25S01	0000 - 0042(sideview)-0096[1]
KC25V01	0098 - 0114
KC25N01	0114 - 0233[1]
KC25S02	0233 - 0273
KC25V02	0273 - 0327
KC25N02	0327 - 0389[1]
KC25S03	0389 - 0434
KC25V03	0434 - 0506
KC25N03	0506 - 0547
KC25S04	0547 - 0592
KC25V04	0592 - 0625
KC25N04	0625 - 0654
KC25S05	0654 - 0677
KC25V05	0677 - 0711
KC25N05	0711 - 0738
KC25S06	0741 - 0781
KC25V06	0781 - 0837
KC25N06	0837 - 0883-932
KC25S07	0932 - 0977
KC25V07	0977 - 1020
KC25N07	1058 - 1085
KC25S08	1086 - 1130
KC25V08	1130 - 1170
KC25N08	1170 - 1202
KC25S09	1202 - 1229
KC25V09	1229 - 1252
KC25N09	1252 - 1284
KC25S10	1284 - 1313
KC25V10	1313 - 1336
KC25N10	1336 - 1350

1) minor cracking

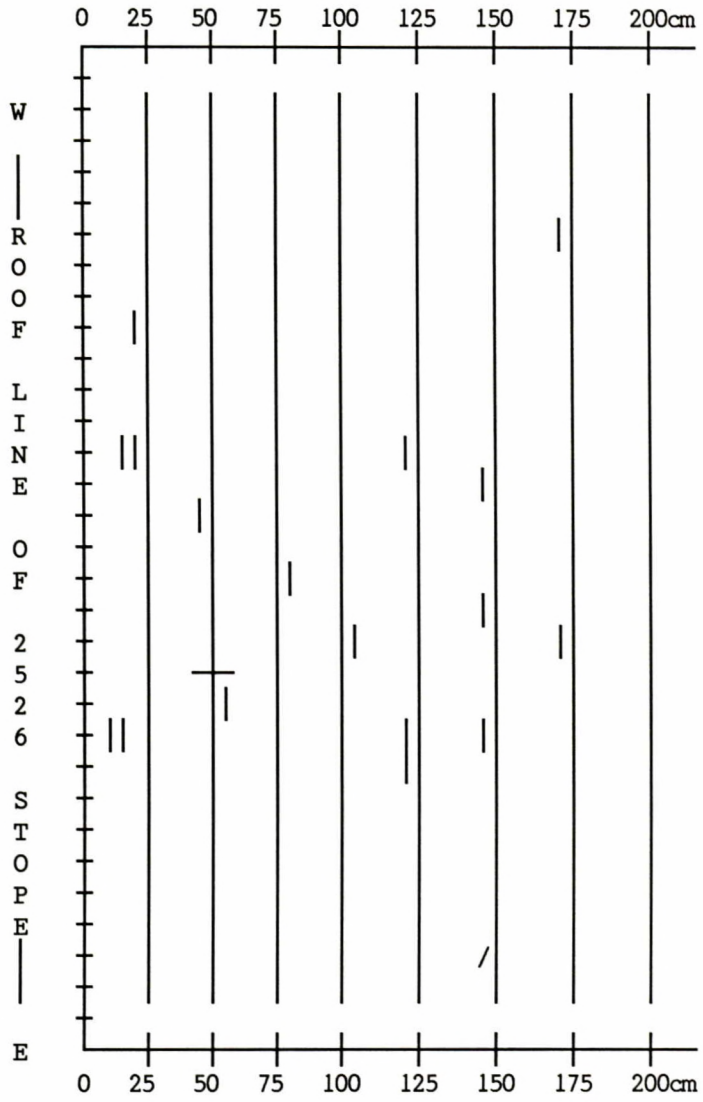
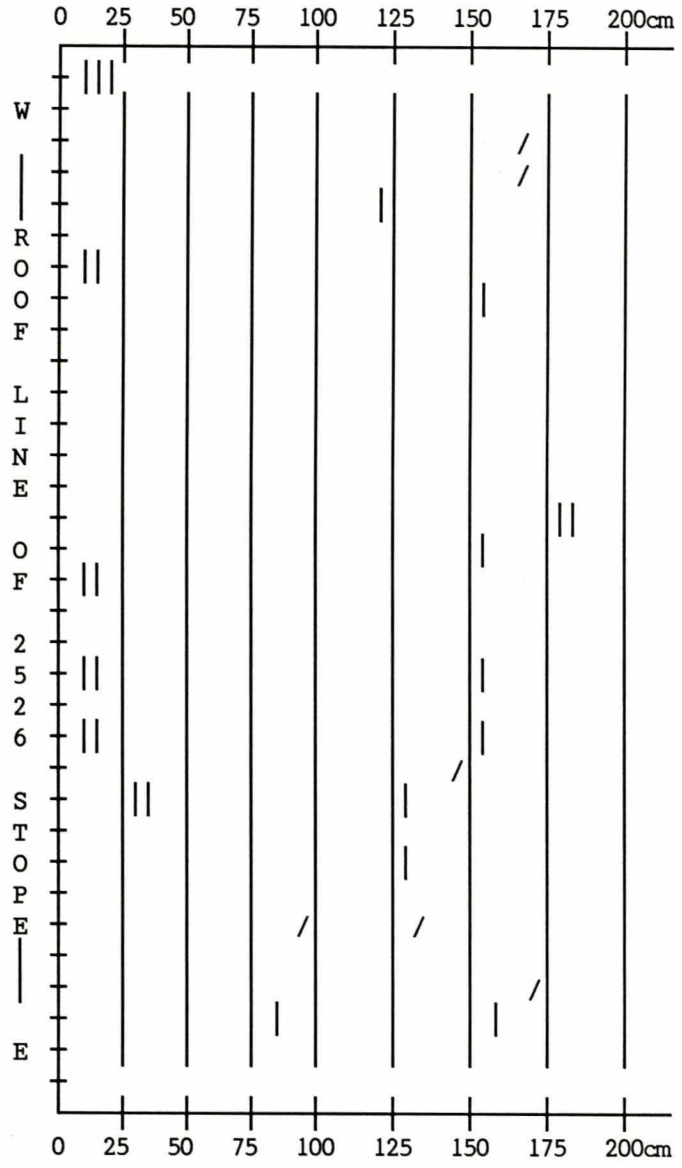


TABLE 1 (cont'd)

HOLE Nr	TAPE COUNTER POSITION
KC25S11	1351 - 1386
KC25V11	1386 - 1411
KC25N11	1411 - 1434
KC25S12	1434 - 1463
KC25V12	1463 - 1484
KC25N12	1484 - 1501
KC25S13	1501 - 1527[2]
KC25V13	1527 - 1546
KC25N13	1546 - 1580
KC25S14	1580 - 1614
KC25V14	1614 - 1638
KC25N14	1638 - 1654
KC25S15	1654 - 1669
KC25V15	1669 - 1689
KC25N15	1689 - 1731[3]
KC25S16	1731 - 1765
KC25V16	1765 - 1810-1837
KC25N16	1837 - 1854
KC25S17	1854 - 1870[4]
KC25V17	1872 - 1895
KC25N17	1895(up)-1904(down)-1922
KC25S18	1922 - 1946
KC25V18	1946 - 1969
KC25N18	1969 - 1993[5]
KC25S19	1993 - 2015
KC25V19	2015 - 2038
KC25N19	2038 - 2054
KC25S20	2054 - 2073
KC25V20	2073 - 2095
KC25N20	2095(up)-2115(down)-2146
KC25S21	2155 - 2167
KC25V21	2167 - 2179
KC25N21	2182 - 2191



2) rough wall of collar
3) (2 runs), back of hole cracked (1724)
4) breakouts
5) rough wall

CONCLUSIONS

The video probe inspection showed that the rock mass at the site consists of massive sulfides varying in composition from bright yellow pyrite (FeS_2) to light brown sphalerite (ZnS).

Nearly all holes had some fracturation close to the collar. Only a few holes displayed intersections of subhorizontal and vertical discontinuities.

The video camera system is bulky to move about and needs to be operated in a dry environment. The picture quality is excellent. The illumination could be improved by centering the camera head in the hole and more distortion free detail could be observed by improving the right angle viewing attachment.

ACKNOWLEDGEMENTS

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The authors are also endebted to INCO Ltd., Sudbury, who made the video equipment available.

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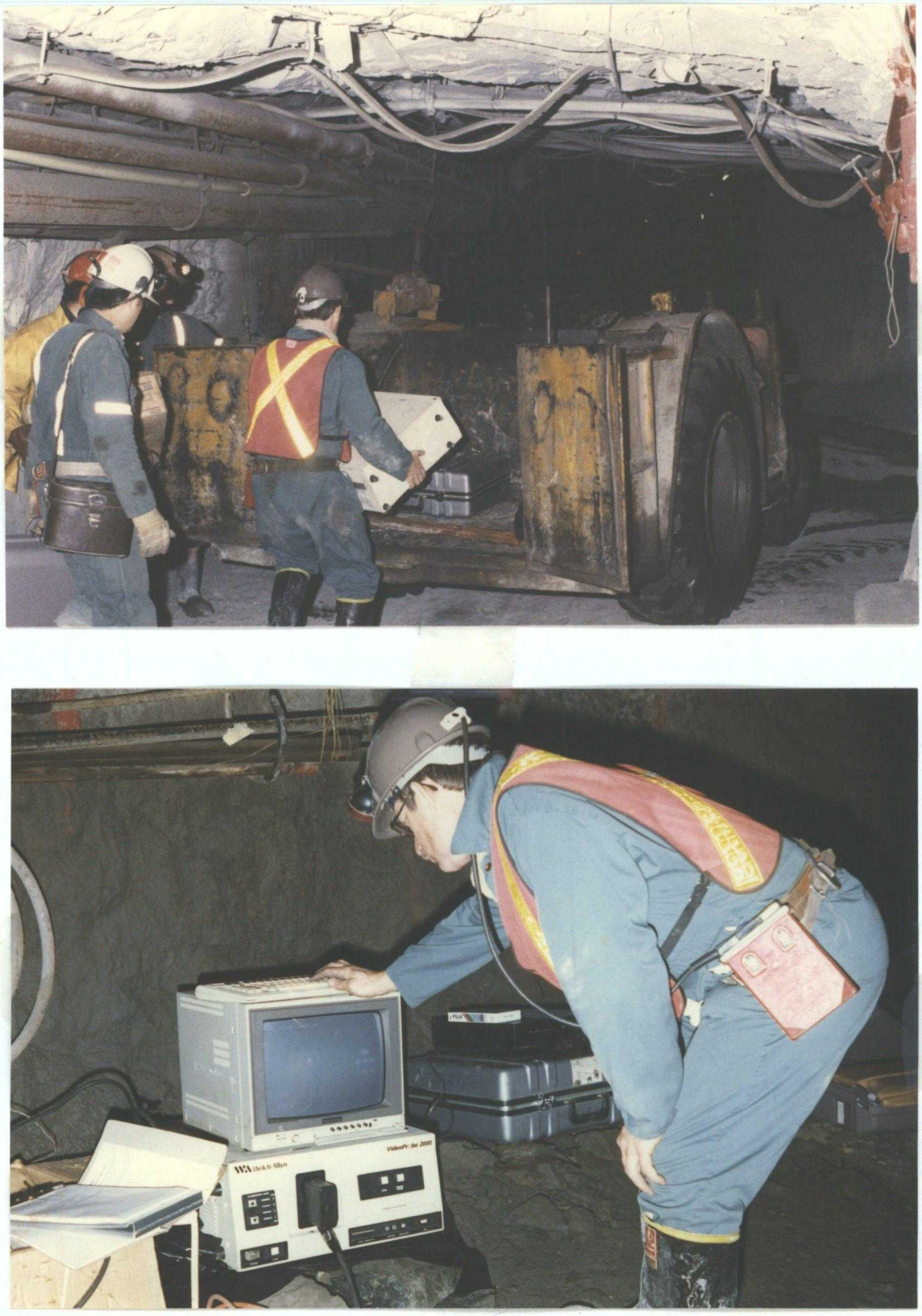

Fig. 1 - Borehole inspection equipment at Kidd Creek mine

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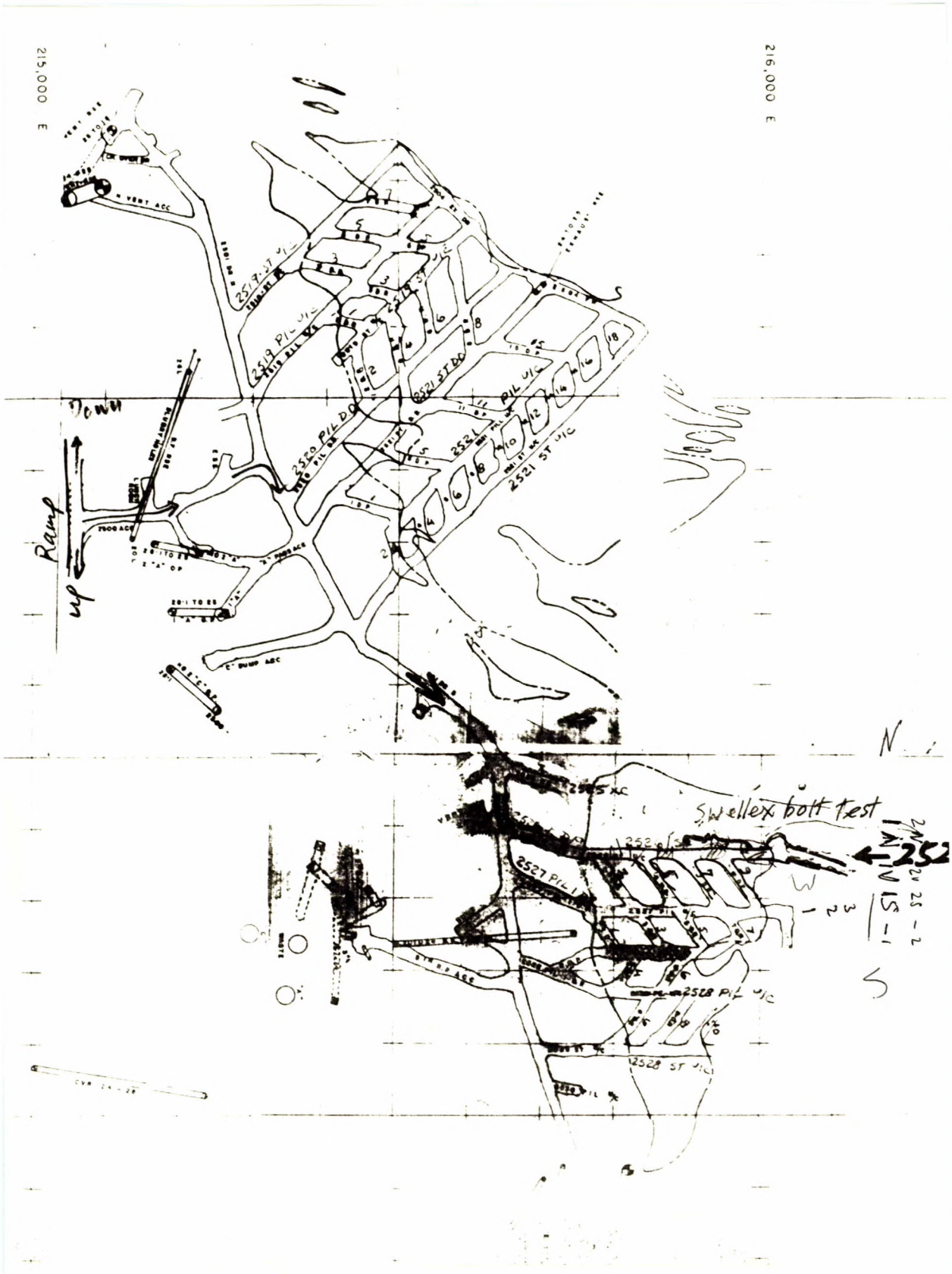


Fig. 2 - 2500 level mine openings

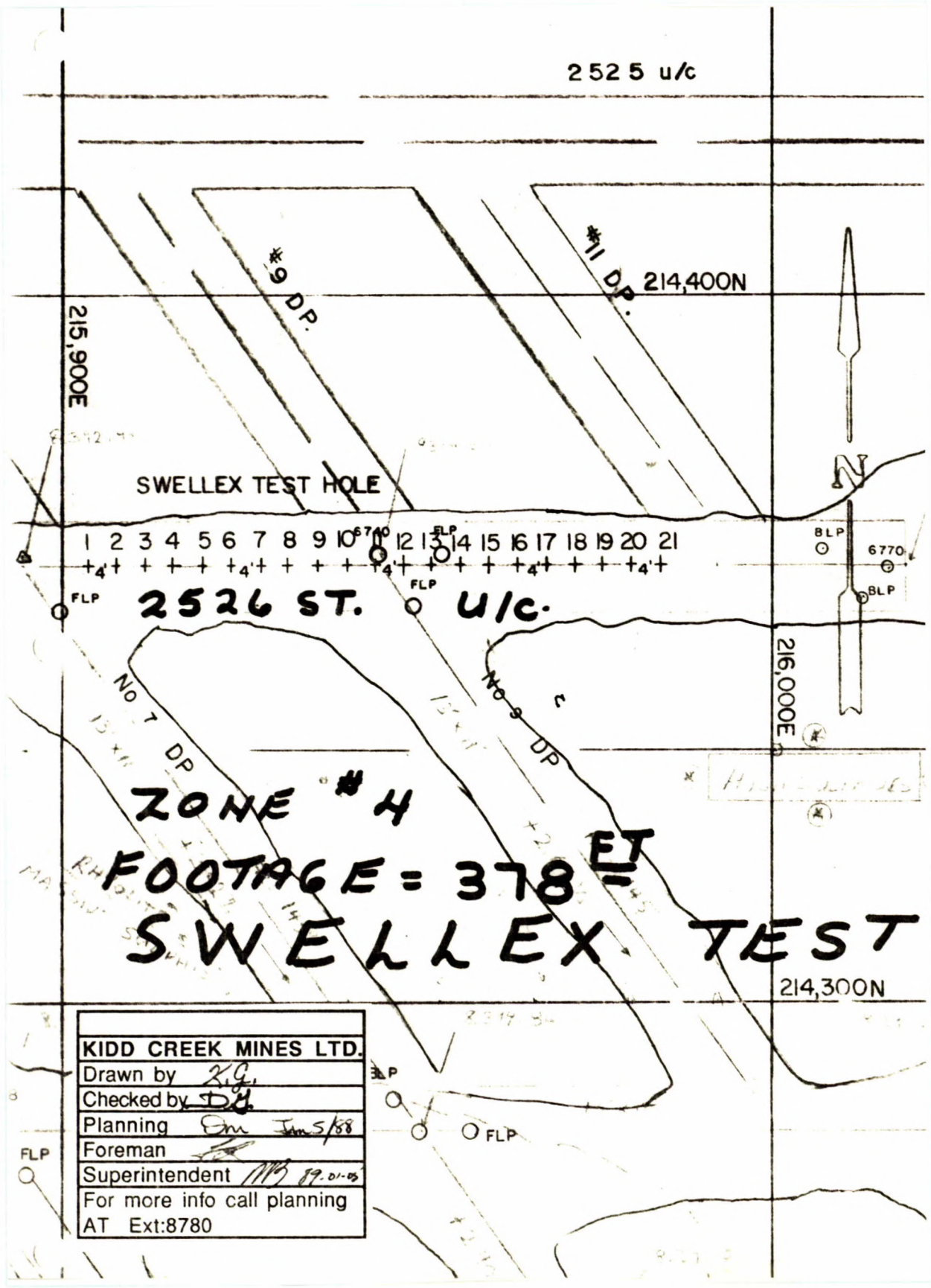
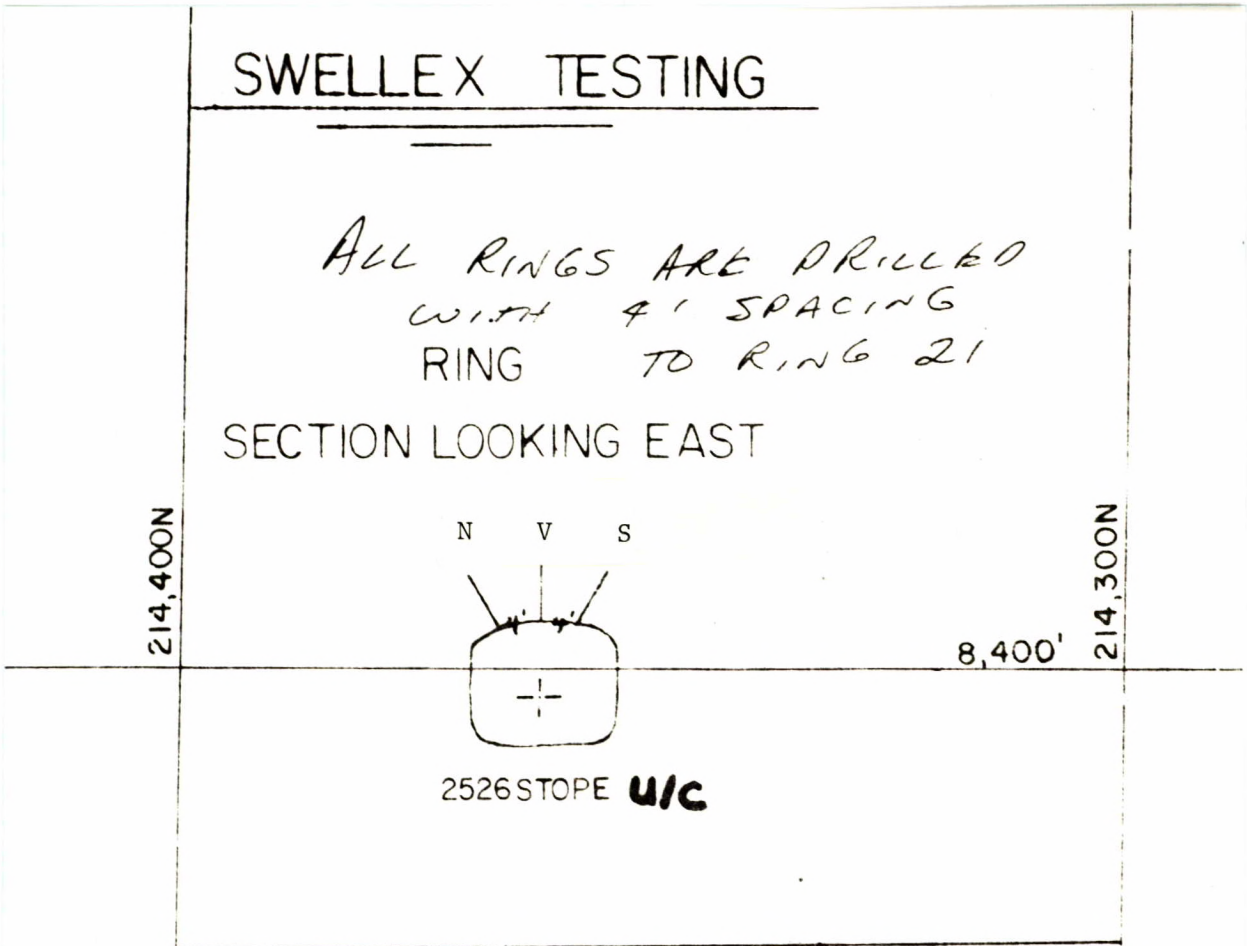


Fig. 3 - Borehole location



HOLE	DUMP	DIP	DEPTH	DRILLED	COMMENT
1	-90°	+58°N	6'		
2	-90°	+90°	6'		
3	-90°	+62°S	6'		
TOTAL			18'		

Holes are identified by a 7 digit alpha-numeric

e.g. K C 25 V II

- K C — Kidd Creek
- 25 — 2500 Level
- V — Vertical Hole
- II — Section II

Fig. 4 - Borehole identification

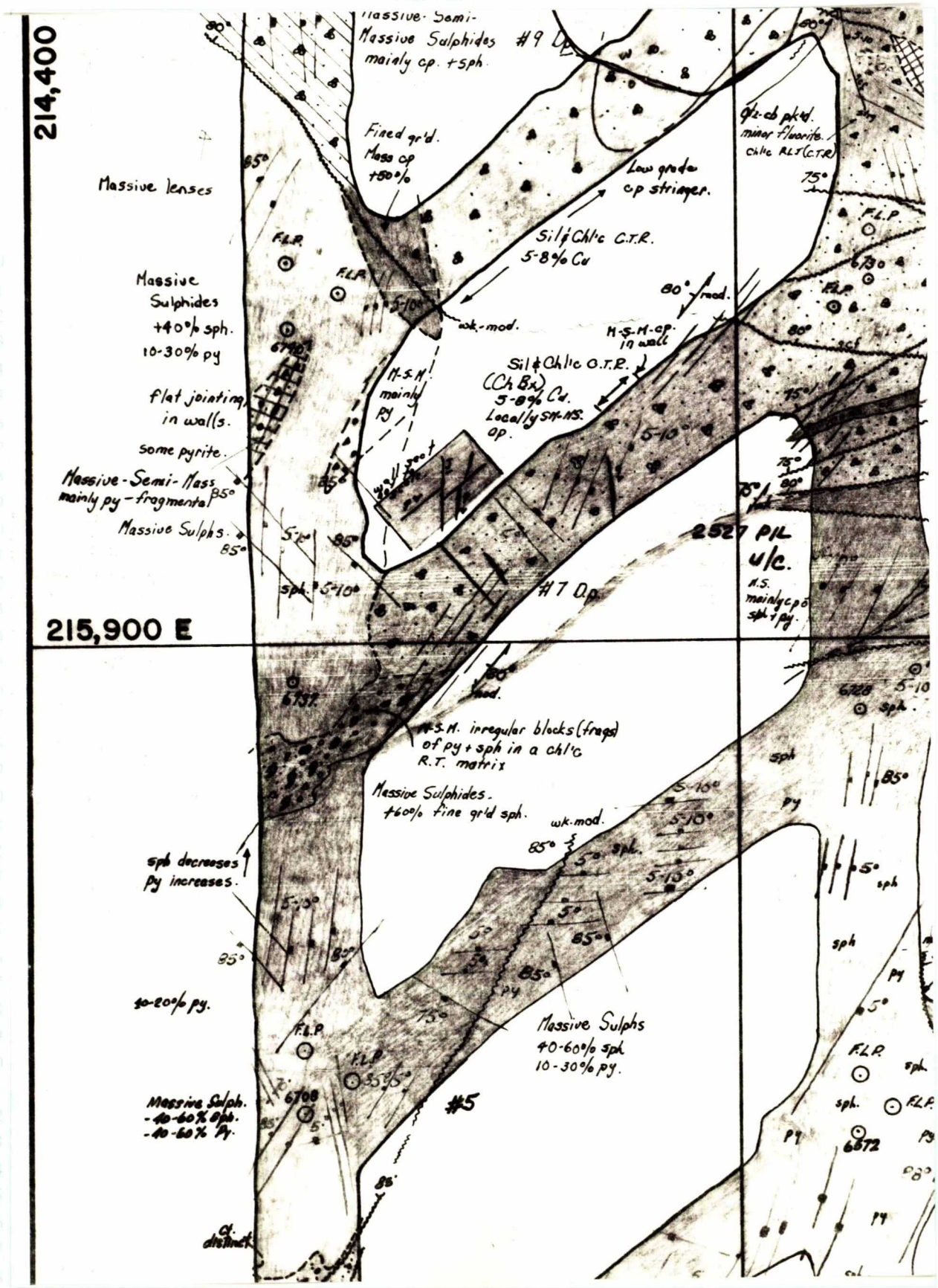


Fig. 5 - Geology of Swellex test site on 2500 level

Hole Identification: Date: Operator:

(Identification consists of a seven position alphanumeric: 2 letters for mine,e.g. Kidd Creek=KD; 2 digits for level,e.g. 2800 level=28; 3 digits for hole number,e.g. hole nr. 1=001)

Collar position and hole orientation: Diameter:
(e.g. east wall 60 degrees up)

Trend: Plunge:

OBSERVATIONS

Roof appearance: stable, sagging, minor spalling, fractured

Rock mass: massive, bedded, jointed - sprayed

Rock type at collar:

Bore hole wall inspection:

depth from collar(m)	!	rock type, colour, fractures, angle of intercept, open or filled joints

Photograph:

Number of discontinuities/m: Core recovery: RQD:

Remarks: additional records, video tape location, core logs

Fig. 6 - Logging sheet