

## 第III部 ボーリング

## 第 Ⅲ 部      ボーリング

第 1 章   ボーリングの概要 .....	Ⅲ- 6
第 2 章   ボーリング工法および使用機械 .....	Ⅲ- 9
第 3 章   ボーリング作業 .....	Ⅲ- 13
3-1   設 営 作 業 .....	Ⅲ- 13
3-2   移 設 作 業 .....	Ⅲ- 13
3-3   撤 収 作 業 .....	Ⅲ- 17
3-4   掘 進 作 業 .....	Ⅲ- 17

## Maps

Fig. 3-1	Location Map of Drillings .....	III - 7
Fig. 3-2	Location Map Showing Surface Drill Sites and Underground Workings .....	III - 8

## Tables

Table 3-1	Drilling Machines Used and Materials Consumed .....	III - 10
	A. Surface Drilling Machines; S-37A, S-17 .....	III - 10
	B. Underground Drilling Machines; BBU-2, JV-8 .....	III - 11
	C. Supplies and Drill Parts Consumed .....	III - 12
Table 3-2	Moving Operation .....	III - 14
Table 3-3	Summary Record of Drilling Results by Hole Underground No. 1 .....	III - 22
Table 3-4	Summary Record of Drilling Results by Hole Underground No. 2 .....	III - 23
Table 3-5	Summary Record of Drilling Results by Hole Underground No. 3 .....	III - 24
Table 3-6	Summary Record of Drilling Results by Hole Underground No. 4 .....	III - 25
Table 3-7	Summary Record of Drilling Results by Hole Underground No. 5 .....	III - 26
Table 3-8	Summary Record of Drilling Results by Hole Underground No. 6 .....	III - 27
Table 3-9	Summary Record of Drilling Results by Hole Underground No. 7 .....	III - 28
Table 3-10	Summary Record of Drilling Results by Hole Underground No. 9 .....	III - 29
Table 3-11	Summary Record of Drilling Results by Hole Underground No. 10 .....	III - 30
Table 3-12	Summary Record of Drilling Results by Hole Underground No. 11 .....	III - 31

Table 3-13	Summary Record of Drilling Results by Hole Underground No. 12 .....	III - 32
Table 3-14	Summary Record of Drilling Results by Hole Underground No. 13 .....	III - 33
Table 3-15	Summary Record of Drilling Results by Hole Underground No. 14 .....	III - 34
Table 3-16	Summary Record of Drilling Results by Hole Underground No. 15 .....	III - 35
Table 3-17	Summary Record of Drilling Results by Hole Underground No. 16 .....	III - 36
Table 3-18	Summary Record of Drilling Results by Hole Underground No. 17 .....	III - 37
Table 3-19	Summary Record of Drilling Results by Hole Surface No. 1 .....	III - 38
Table 3-20	Summary Record of Drilling Results by Hole Surface No. 2 .....	III - 39
Table 3-21	Summary Record of Drilling Results by Hole Surface No. 3 .....	III - 40
Table 3-22	Summary Record of Drilling Results by Hole Surface No. 8 .....	III - 41
Table 3-23	Generalized Results of Diamond Core Drilling .....	III - 42
Table 3-24	Time Distribution in Drilling Works Underground No. 1 .....	III - 44
Table 3-25	Time Distribution in Drilling Works Underground No. 2 .....	III - 45
Table 3-26	Time Distribution in Drilling Works Underground No. 3 .....	III - 46
Table 3-27	Time Distribution in Drilling Works Underground No. 4 .....	III - 47
Table 3-28	Time Distribution in Drilling Works Underground No. 5 .....	III - 48
Table 3-29	Time Distribution in Drilling Works Underground No. 6 .....	III - 49
Table 3-30	Time Distribution in Drilling Works Underground No. 7 .....	III - 50
Table 3-31	Time Distribution in Drilling Works Underground No. 9 .....	III - 51

Table 3-32	Time Distribution in Drilling Works Underground No. 10 .....	III - 52
Table 3-33	Time Distribution in Drilling Works Underground No. 11 .....	III - 53
Table 3-34	Time Distribution in Drilling Works Underground No. 12 .....	III - 54
Table 3-35	Time Distribution in Drilling Works Underground No. 13 .....	III - 55
Table 3-36	Time Distribution in Drilling Works Underground No. 14 .....	III - 56
Table 3-37	Time Distribution in Drilling Works Underground No. 15 .....	III - 57
Table 3-38	Time Distribution in Drilling Works Underground No. 16 .....	III - 58
Table 3-39	Time Distribution in Drilling Works Underground No. 17 .....	III - 59
Table 3-40	Time Distribution in Drilling Works Surface No. 1 .....	III - 60
Table 3-41	Time Distribution in Drilling Works Surface No. 2 .....	III - 61
Table 3-42	Time Distribution in Drilling Works Surface No. 3 .....	III - 62
Table 3-43	Time Distribution in Drilling Works Surface No. 8 .....	III - 63

#### Appendices (Drilling)

Annex 1	The Metrage Drilled by Each Diamond Bits .....	A - 62
Annex 2	Progress Record of Diamond Drilling Underground No. 1 .....	A - 68
Annex 3	Progress Record of Diamond Drilling Underground No. 2 .....	A - 69
Annex 4	Progress Record of Diamond Drilling Underground No. 3 .....	A - 70
Annex 5	Progress Record of Diamond Drilling Underground No. 4 .....	A - 71

Annex 6	Progress Record of Diamond Drilling Underground No. 5 .....	A - 72
Annex 7	Progress Record of Diamond Drilling Underground No. 6 .....	A - 73
Annex 8	Progress Record of Diamond Drilling Underground No. 7 .....	A - 74
Annex 9	Progress Record of Diamond Drilling Underground No. 9 .....	A - 75
Annex 10	Progress Record of Diamond Drilling Underground No. 10 .....	A - 76
Annex 11	Progress Record of Diamond Drilling Underground No. 11 .....	A - 77
Annex 12	Progress Record of Diamond Drilling Underground No. 12 .....	A - 78
Annex 13	Progress Record of Diamond Drilling Underground No. 13 .....	A - 79
Annex 14	Progress Record of Diamond Drilling Underground No. 14 .....	A - 80
Annex 15	Progress Record of Diamond Drilling Underground No. 15 .....	A - 81
Annex 16	Progress Record of Diamond Drilling Underground No. 16 .....	A - 82
Annex 17	Progress Record of Diamond Drilling Underground No. 17 .....	A - 83
Annex 18	Progress Record of Diamond Drilling Surface No. 1 .....	A - 84
Annex 19	Progress Record of Diamond Drilling Surface No. 2 .....	A - 85
Annex 20	Progress Record of Diamond Drilling Surface No. 3 .....	A - 86
Annex 21	Progress Record of Diamond Drilling Surface No. 8 .....	A - 87

## 第 1 章 ボーリングの概要

本工事は Michiquillay 鉱床の賦存状況調査を目的とし、1974年3月25日より坑内ボーリングを、また、3月28日より坑外ボーリングを開始し、1975年3月27日に終了した。この期間285日間に実施した作業量は坑内16孔で1,893.72m、坑外4孔で706.28mボーリング総延長は2,600mである。又坑内ボーリングはすべて水平掘進、坑外ボーリングはすべて垂直掘進とした。

作業は日本人技術者と MINERO PERU 技術者の指導の下に現地人技術者と現地人労務者により、2交代制で実施した。また、現地人技術者、現地人労務者の教育も併せて行った。

ボーリング機械は坑内用にBBU-2、JV-8、坑外用にS-37A、S-17を使用し、工法はワイヤーライン工法、普通工法によった。

工程は20m/日～25m/日 を目標としたが、全体に湧水多量であり、加えて破碎帯が頻繁に出現したため、ロッド、ケーシング、コアバレルおよびビット類の消耗が甚しく、実掘進長は平均で最高810m/日、最低200m/日にとどまった。

なおボーリング位置はFig. 3-1、Fig. 3-2 に示すとおりである。

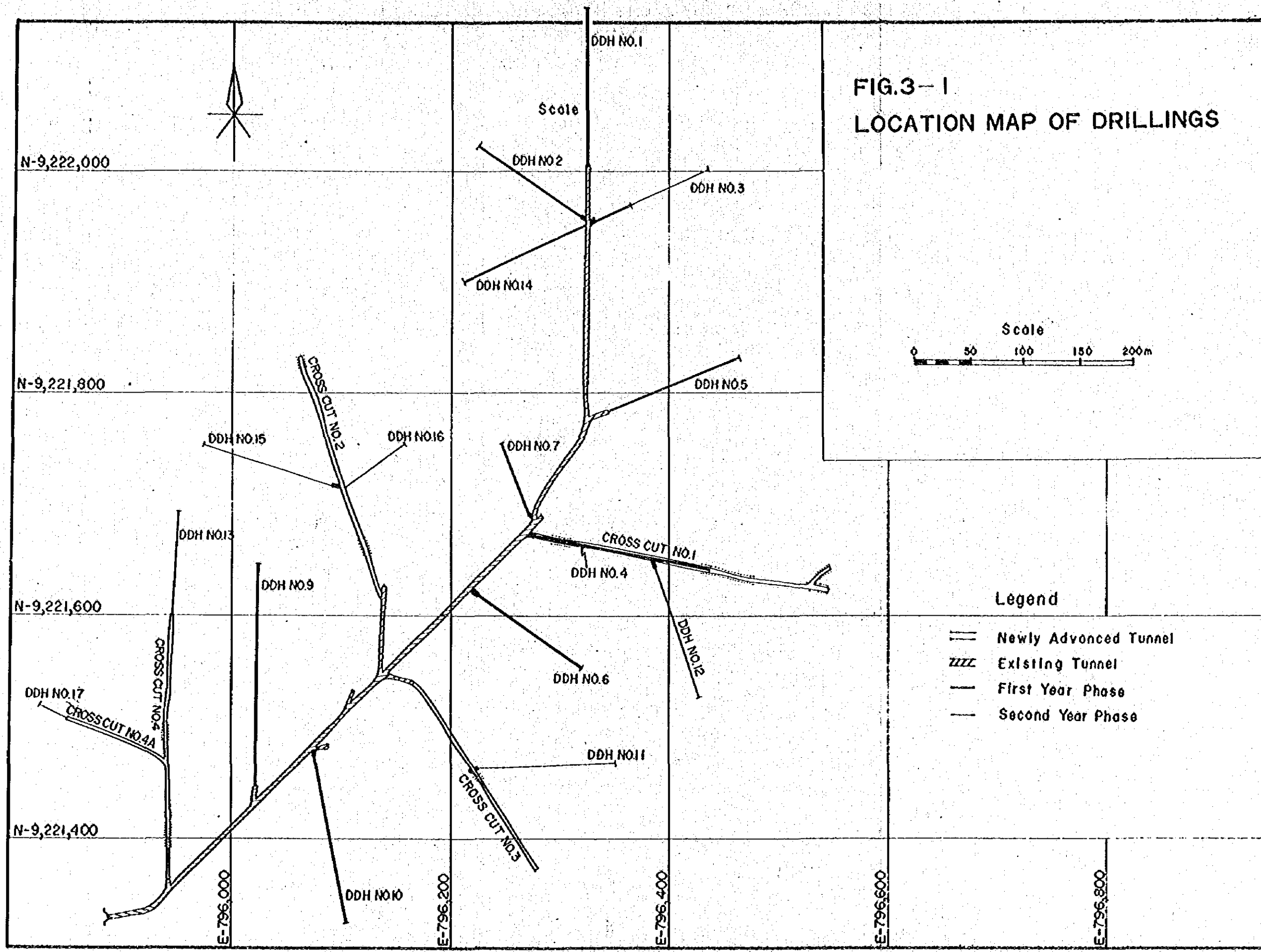
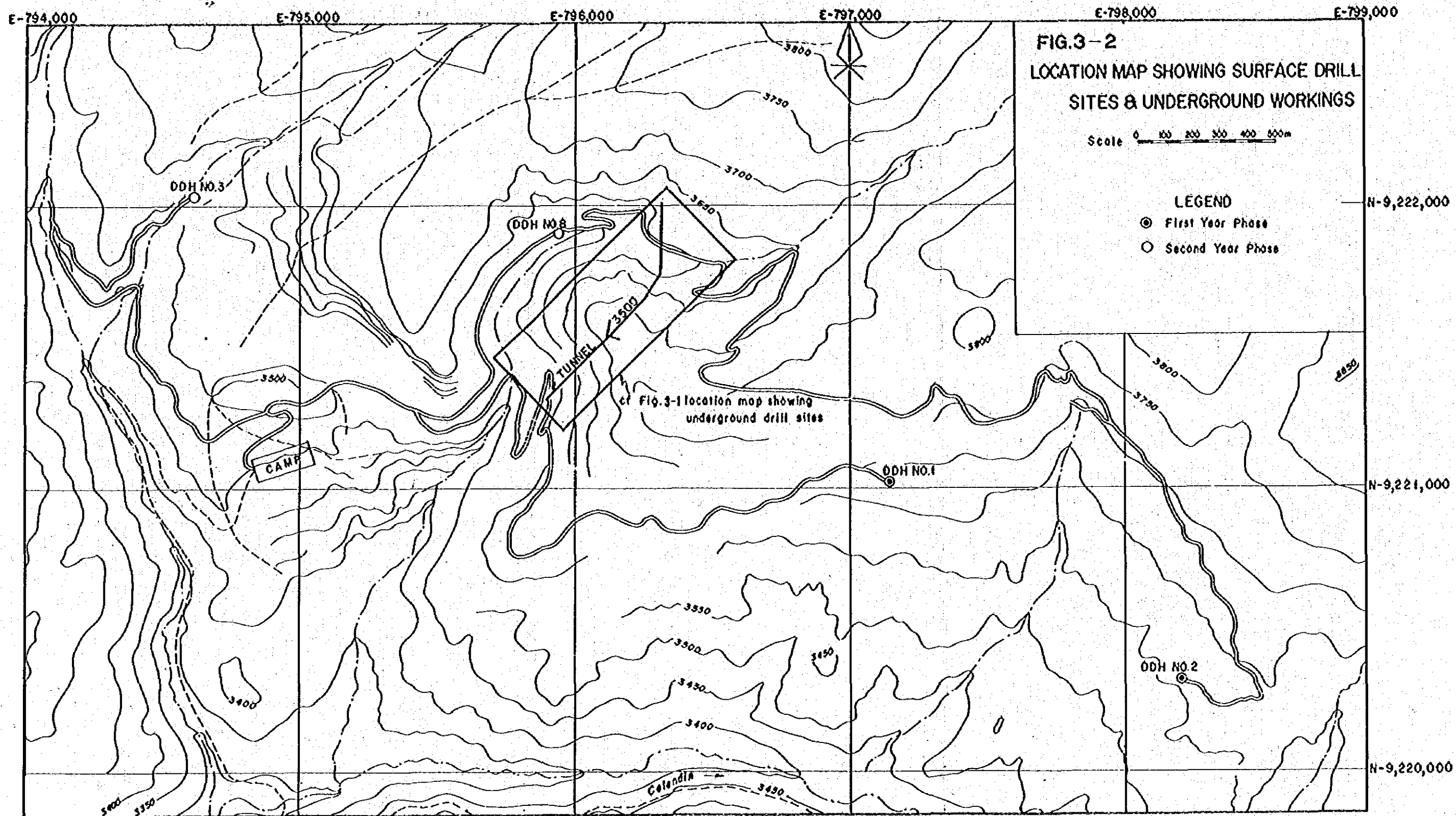


FIG.3-1  
LOCATION MAP OF DRILLINGS

Legend

- Newly Advanced Tunnel
- Existing Tunnel
- First Year Phase
- Second Year Phase





**FIG.3-2**  
**LOCATION MAP SHOWING SURFACE DRILL**  
**SITES & UNDERGROUND WORKINGS**

Scale 0 100 200 300 400 500m

- LEGEND**
- First Year Phase
  - Second Year Phase

## 第2章 ボーリング工法および使用機械

対象となる主たる岩石は、モンソナイト斑岩、また一部粘土化帯、破砕帯の存在と湧水を予想してワイヤライン工法を策定した。

使用した試錐機械、部品及び消耗物品はTable 3-1に示すとおりである。

Table 3-1 Drilling Machines Used and Materials Consumed

A Surface Drilling Machines; S-37A, S-17

Item	Model	Quantity	Capacity, Type, and Specification
Drilling Machine	S-37A	1 set	Capacity NX 400 m Inner Diameter of Spindle 86 m/m Weight (excl. engine) 1,200 kg
Drilling Machine	S-17	1 set	Capacity NX 150 m Inner Diameter of Spindle 48 m/m Weight (excl. engine) 800 kg
Drill Engine	2713 E	1 set	Diesel Engine 1,250 rpm/55 HP -- 2,500 rpm/96 HP
Drill Engine	1564 E	1 set	Diesel Engine 1,300 rpm/25 HP -- 2,600 rpm/50 HP
Pump	BBP 25	1 set	Capacity 40 l/min -- 120 l/min
Engine for Pump	ES-785	1 set	Diesel Engine 2,600 rpm/20 HP
Generator	GM-205B4M	1 set	2.5 KVA 230 V 11 A
Generator Engine		1 set	Gasoline Engine
Derrick		1 set	Steel-pipe Made, Tripod Type, Height 9 m
Mud Mixer		1 set	Jet Type
Rod Holder		1 set	
Drill Rods		65 pcs.	NX 3.05 m
		80 pcs.	BX 3.05 m
Casing Pipes		15 pcs.	114 m/m 3.05 m
		40 pcs.	NX 3.05 m
		80 pcs.	BX 3.05 m

B Underground Drilling Machines; BBU-2, JV-8

Item	Model	Quantity	Capacity, Type, and Specification
Drilling Machine	BBU-2	2 sets	Capacity NX 240 m BX 300 m Inner Diameter of Spindle 46 m/m Weight 467 kg
Drilling Machine	JV-8	1 set	Capacity NX 100 m BX 120 m Inner Diameter of Spindle 46 m/m Weight 247 kg
Motor		2 sets	Built-in Air Motor 1,000 rpm/20 HP
Motor		1 set	Built-in Air Motor 1,000 rpm/10 HP
Hoist		3 sets	Built-in Hoist and Rod Puller
Drill Rods		60 pcs.	NX 3.05 m
		80 pcs.	BX 3.05 m
		100 pcs.	42 m/m 3.05 m
Casing Pipes		40 pcs.	NX 3.05 m
		100 pcs.	BX 3.05 m

C. Supplies and Drill Parts Consumed

Description	Specification	Unit	Quantity																				Total
			Underground										Surface										
			No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.9	No.10	No.11	No.12	No.13	No.14	No.15	No.16	No.17	No.1	No.2	No.3	No.4	
Gasoline		l																2,744	2,390	1,390	1,020	6,534	
Light Oil		l	9,999	5,140	8,100	6,178	4,718	6,573	4,770	5,200	7,120	6,600	4,660	3,280	4,790	5,610	2,210	450	2,792	5,031	2,680	4,280	99,881
Mobil Oil		l	58	45	115	61	30	27	55	29	62	107	86	63	74	63	34	12	68	85	43	105	1,242
Transmission Oil		l																					18
Grease		kg	21	6	11	69	52	48	19	70	25	9	10	6	6	24	4	3	19	10	9	8	407
Tricone Bit	3-7/8"	pcs.																					1
Tricone Bit	4-3/4"	pcs.																					1
Metal Crown	NCP	pcs.																					4
Diamond Bit	NCD	pcs.																					3
Diamond Bit	NK	pcs.	10	4	5	3	6	3	4	6	4	5	4	3	3	5	1	1	12	9	6	6	100
Diamond Bit	BK	pcs.	1	2	4	3	3	2	5	3	3	2	1	3	2	2	2	3	5	1	4	4	54
Casing Shoe	NK	pcs.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6
Casing Shoe	BK	pcs.																					1
Double Core Tube	NK-w/L	set	1	1	1	1	2	2	1	2	1	1	1	1	1	1	1	2	1	1	1	1	19
Double Core Tube	BK-w/L	set	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	2	1	1	1	1	17
Subs. Rod Box to Pin	NK x 42 m/m	pcs.	1	1	1	2	3	2	4	1	4	1	1	1	1	1	1	1	1	1	1	1	17
Subs. Rod Box to Pin	BK x 42 m/m	pcs.	1	1	1	2	1	1	3	1	3	1	1	1	1	1	1	1	1	1	1	1	12
Core Lifter	NK	pcs.	3	2	2	4	3	2	2	3	2	2	3	3	1	2	1	2	4	5	3	3	51
Core Lifter	BK	pcs.	1	1	2	2	2	2	1	2	2	1	1	1	1	1	1	2	4	1	1	3	31
Core Lifter Case	NK	pcs.	3	2	2	3	2	3	2	3	2	2	3	2	1	2	1	1	3	3	3	3	47
Core Lifter Case	BK	pcs.	1	1	2	2	2	1	2	2	1	1	1	1	1	1	1	1	2	4	1	3	31
Nail	150 m/m	kg	2	1	4	1	2	1	3	2	3	2	3	1	3	3	1	1	5	5	5	5	93
Wire Rope	5 m/m	m	300																300			900	900
Wire Rope	12 m/m	m								30									20			50	80
Electric Bulb	220V x 60W	pc																	12	10	10	10	42
Board		m <sup>2</sup>	0.2	0.2	0.5	0.1	0.8	0.1	0.5	1	0.5	0.5						1	1	1	2	8.4	8.4
Square Lumber		m <sup>3</sup>	0.1			0.1		0.1		0.5									1		0.5	1	3.5
Log		m <sup>3</sup>																					1.1
Bentonite		kg																	860	990	1,290	1,405	4,545
Cement		kg																		1,093		999	1,088
Wire	#12	kg	2	1	8	5			5	3	5	10	5	3	5	2	1					60	60
Wire	#10	kg																	10	15	15	15	61
Carbide		kg	250	200	160	200	200	200	100	250	150	140	115	80	115	70	25					2,385	2,385
Quick Hardener		can																					4

## 第 3 章 ボーリング作業

### 3-1 設営作業

あらかじめ立案した、第1年次計画にもとづき早期掘進を目標に諸準備を進めた。1974年3月28日坑外№1孔に対する取付道路及び試錐座の建設がMINERO PERUの手により完了したので、トラックによりボーリング機材の運搬を開始した。又坑内ボーリングは、3月25日既存坑道を利用出来る№9孔のボーリング予定地にボーリング機械の運搬を開始した。ボーリング用水は坑外ボーリングでは川又は近くの湿地帯より取水し、坑内ボーリングは坑内側溝の流水と一部坑道掘進用さく岩用水を利用した。

事務所、倉庫等については坑道掘さく工事に建設したものを利用した。

### 3-2 移設作業

各孔の移設作業の内容についてはTable 3-2に示すとおりである。

Table 3-2 Moving Operation

Items	Underground No. 1		Underground No. 2		Underground No. 3		Underground No. 4		Underground No. 5		Underground No. 6		Underground No. 7		Underground No. 9		
	Days	Manshifts	Days	Manshifts	Days	Manshifts	Days	Manshifts	Days	Manshifts	Days	Manshifts	Days	Manshifts	Days	Manshifts	
Preparation	Site Clearing				1.0	7.0									3.0	12.0	
	Transportation	0.5	3.0	0.5	3.0			0.5	2.0	0.5	2.0	1.0	7.0	1.0	5.0		
	Installation	1.0	5.0	1.0	5.0	1.0	7.5	0.5	2.0	0.5	2.0	0.5	2.0	1.0	7.0	2.0	10.0
	Water Piping	0.5	6.0							0.5	2.0				1.0	5.0	
	Test Run & Others			0.5	2.0					0.5	2.0				3.0	15.0	
Total	2.0	14.0	2.0	10.0	2.0	14.5	1.0	4.0	2.0	8.0	1.0	4.0	2.0	14.0	10.0	47.0	
Withdrawal	Dismantling	1.0	5.0	1.0	4.0	1.0	5.0	1.0	4.0	1.0	4.0	1.0	4.0	1.0	6.0	7.0	
	Removal of Piping																
	Transportation	1.0	5.0			1.0	6.0										
	Others																
	Total	2.0	10.0	1.0	4.0	2.0	11.0	1.0	4.0	1.0	4.0	1.0	4.0	1.0	6.0	1.0	7.0
Grand Total	4.0	24.0	2.5	14.0	4.0	25.5	2.0	8.0	3.0	12.0	2.0	8.0	3.0	20.0	11.0	54.0	

Moving Operation

Items	Underground No. 10		Underground No. 11		Underground No. 12		Underground No. 13		Underground No. 14		Underground No. 15		Underground No. 16		Underground No. 17	
	Days	Manshifts	Days	Manshifts	Days	Manshifts	Days	Manshifts	Days	Manshifts	Days	Manshifts	Days	Manshifts	Days	Manshifts
Site Clearing			0.5	3.0												
Transportation	0.5	2.0	0.5	6.0			0.3	2.5			1.0	7.0	0.5	5.0	1.0	4.0
Installation	2.5	8.0	1.0	6.0	1.0	10.0	0.2	2.5	1.0	3.0	0.5	4.0	0.5	4.0	1.0	7.0
Water Piping																
Test Run & Others																
Total	3.0	10.0	2.0	15.0	1.0	10.0	0.5	5.0	1.0	3.0	1.5	11.0	1.0	9.0	2.0	11.0
Dismantling																
Removal of Piping	1.0	3.0	3.0	17.0	0.5	3.0	1.0	8.0	1.0	4.0	1.0	5.0	1.0	4.0	1.0	10.0
Transportation																
Others																
Total	1.0	3.0	3.0	17.0	0.5	3.0	1.0	8.0	1.0	4.0	1.0	5.0	1.0	4.0	1.0	10.0
Grand Total	4.0	13.0	5.0	32.0	1.5	13.0	1.5	13.0	2.0	7.0	2.5	16.0	2.0	13.0	3.0	21.0



Moving Operation

Items	D D H No.	Surface No. 1		Surface No. 2		Surface No. 3		Surface No. 8	
		Days	Manshifts	Days	Manshifts	Days	Manshifts	Days	Manshifts
Preparation	Site Clearing							2.0	11.0
	Transportation	2.0	8.0	0.5	4.0	2.0	17.0		
	Installation	1.5	7.0	0.5	4.5	2.0	17.0	3.5	15.0
	Water Piping	0.5	2.0					0.5	7.0
	Test Run & Others								
	Total	4.0	17.0	1.0	8.5	4.0	34.0	6.0	33.0
Withdrawal	Dismantling								
	Removal of Piping	1.0	3.0	1.0	6.5	0.5	5.0	2.0	11.0
	Transportation								
	Others								
	Total	1.0	3.0	1.0	6.5	0.5	5.0	2.0	11.0
	Grand Total	5.0	20.0	2.0	15.0	4.5	39.0	8.0	44.0

### 3-3 撤収作業

坑内ボーリングは1975年3月26日に№17孔を終了後、又坑外ボーリングは1975年3月27日№8孔終了後、それぞれ直ちにケーシングパイプの抜管、試錐機の撤収作業を行いトラックにて搬出した。

### 3-4 掘進状況 (Table 3-23 参照)

実施した坑内17孔、坑外4孔計21孔の掘進状況は次のとおりである。又坑内ボーリングはすべて水平掘進、坑外ボーリングはすべて垂直掘進とした。

#### 3-4-1 坑内№1孔 (Table 3-3, 3-24 参照)

掘進長144.38m コア採取率77.4% 方位N 0° 27' 51" E

NXCビットにて掘進開始、122mまでNXCビットにて掘進し、BXケーシング挿入後BXCビットにて144.38mまで掘進したが、孔壁崩壊はなほだしいため掘進不可能の状態となり中止した。

口元より湧水多くかつ岩質が粘土混りの破砕帯のため、ロッドのジャーミング事故もあり、コア採取率も低下した。

#### 3-4-2 坑内№2 (Table 3-4, 3-25 参照)

掘進長116.19m コア採取率59.8% 方位N 54° 40' 11" W

NXCビットにて掘進開始、83.67mまでNXCビットにて掘進し、BXケーシング挿入後、BXCビットにて116.19mまで掘進したが、湧水も40ℓ/minから80ℓ/minに増加し、孔壁崩壊のため掘進不可能の状態となり中止した。粘土混りの破砕帯のためコア採取率も極度に低下した。

#### 3-4-3 坑内№3 (Table 3-5, 3-26 参照)

掘進長114.21m コア採取率76.9% 方位N 65° 43' 29" E

NXCビットにて掘進開始、67.30mまでNXCビットにて掘進し、BXケーシング挿入後、BXCビットにて96.71mまで掘進したが、71m付近の粘土混りの破砕帯のため孔壁崩壊があり掘進不可能となる。BXケーシングシュールにて75.99mまでリーミングを行い、BXケーシング挿入の上114.21mまで掘進したが、102m付近の粘土混りの破砕帯のため孔壁崩壊のため、孔内洗浄中104m付近にてジャーミング状態となり、BXロッドとコアバレルの継目から切断した。タップにて回収作業を行ったが孔壁崩壊のためBXコアチューブとBXCビットの回収不可能となり中止した。

#### 3-4-4 坑内№4 (Table 3-6, 3-27 参照)

掘進長163.45m コア採取率91.3% 方位S 78° 00' 00" E

NXCビットにて掘進開始、95.80mまでNXCビットにて掘進し、BXケーシング挿入

後、BXCビットにて163.45mまで掘進したところ、BXケーシングが2.5m付近で切断した。2.0mから4.0m間は粘土混りの破砕帯であり、孔壁崩壊のため空洞状態となり、切断個所のケーシングの口元を把握することが出来ず、NCDビット（外径92%）にて2.5mまでリーミングを行いケーシングの回収をしようとしたがBXケーシングの口元を把握出来ず中止した。

#### 3-4-5 坑内№5（Table 3-7, 3-28参照）

掘進長129.90m    コア採取率95%    方位N67°35'38" E

NXCビットにて掘進開始。9.0mまでNXCビットにて掘進しBXケーシング挿入後、BXCビットにて129.90mまで掘進したが12.5m付近より孔壁崩壊のため、掘進不可能となったので、BXケーシングを延長するために一旦BXケーシングを抜管して、NXCビットにてリーミングを行った。10.9mまでリーミングしたところ3.0m付近にてロッドが切断したため、NCDビットにてリーミングを行い、回収しようとしたがロッドの切断個所を把握することが出来ず、回収不可能のまま中止した。

#### 3-4-6 坑内№6（Table 3-8, 3-29参照）

掘進長115.75m    コア採取率    方位S55°18'52" E

NXCビットにて掘進開始。115.75mまでNXCビットにて掘進したところ、孔壁崩壊のため掘進不可能となったので、NXCビットにて孔内洗浄中、11.3m付近にてジャーミング状態となり、コアチューブとコアパレルの継目から切断した。タップにて回収作業を行ったが孔壁崩壊甚しくコアチューブの回収は出来なかった。止むを得ず11.2m付近より傾斜掘さくを行ったところ、11.4m付近でビットとコアチューブの継手より切断して回収不可能となり中止した。

#### 3-4-7 坑内№7（Table 3-9, 3-30参照）

掘進長721.5m    コア採取率60.1%    方位N22°22'34" W

NXCビットにて掘進開始。30.63mまでNXCビットにて掘進したが粘土混りの破砕帯のため孔壁崩壊のため、掘進不可能となったので、NCDビットにて孔内洗浄中、29.63mにてビットとコアチューブの継手より切断した。ビットを回収後NXケーシングを30.63mまで挿入し、以後NXCビットにて41.54mまで掘進したが3.8m付近で孔壁崩壊甚しいため更にBXケーシングを46.82mまで挿入して、その後BXCビットにて721.5mまで掘進した。しかし再度6.4m付近で孔壁崩壊のため掘進不可能となったので、BXケーシングを延長するために、一旦抜管してリーミングを行ったが5.8m付近で孔壁崩壊はなほだしく掘進不可能となったため中止した。

#### 3-4-8 坑内№9（Table 3-10, 3-31参照）

掘進長200m    コア採取率94.6%    方位N0°30'41" E

NXCビットにて掘進開始。8.2mまでNXCビットにて掘進し、BXCビットに切り替えて9.0mまで掘進した。しかし孔壁崩壊はなほだしく再度NXCビットにて10.2mまで掘進し、BXケーシングを挿入して以後BXCビットにて20.0mまで掘進し完了した。

3-4-9 坑内№10 (Table 3-11, 3-32参照)

掘進長154.96m コア採取率66.6% 方位S10°54'40"E

NXCビットにて掘進開始。108.50mまでNXCビットにて掘進し、BXケーシング挿入後、BXCビットにて154.96mまで掘進した。しかしながら湧水約100ℓ/minとなり、孔壁崩壊もありロッド挿入が不可能となったため中止した。

3-4-10 坑内№11 (Table 3-12, 3-33参照)

掘進長126.52m コア採取率88.2% 方位N87°51'17"E

NXCビットにて掘進開始。92.26mまでNXCビットで掘進し、BXケーシング挿入後BXCビットにて98.21mまで掘進したが、9.5m付近の孔壁崩壊のため掘進不可能となり、一旦BXケーシングを抜管し、NXCビットで98.21mまでリーミングしてBXケーシング挿入後、126.52mまでBXCビットで掘進したが、11.9m付近に粘土層があり20ℓ/minの湧水と孔壁崩壊のため孔内洗浄中ジャーミング状態となり掘進不可能となり中止した。

3-4-11 坑内№12 (Table 3-13, 3-34参照)

掘進長121.74m コア採取率86.8% 方位S19°10'17"E

NXCビットにて掘進開始。91.90mまでNXCビットで掘進し、BXケーシング挿入後BXCビットで121.74mまで掘進したが、10.8m付近からの破砕帯のため孔壁崩壊を生じて、孔内洗浄中ロッドとコアバレルの継手より切断したためビットおよびコアチューブアセンブリが残留した。タップにて回収作業を行ったが、孔壁崩壊のため回収不能となり中止した。

3-4-12 坑内№13 (Table 3-14, 3-35参照)

掘進長95.95m コア採取率73.5% 方位N5°15'02"E

NXCビットにて掘進開始。74.31mまでNXCビットで掘進したが破砕帯のため孔壁崩壊はなほだしく、BXケーシングを挿入し、BXCビットで95.95mまで掘進したが、8.8m付近の孔壁崩壊のため孔底までロッドが降下出来なくなったので、BXケーシングを延長挿入するために一旦ケーシングの抜管に入った。しかし全体に破砕帯のためケーシングがジャーミング状態となっていたので、ドライブハンマーにて打上げを行い抜管した。ケーシング抜管後、NXCビットでリーミングに入ったが、BXケーシング抜管後は孔壁崩壊のため掘進不可能となり中止した。

3-4-13 坑内№14 (Table 3-15, 3-36参照)

掘進長123.20m コア採取率78.3% 方位S65°36'40"W

NXCビットにて掘進開始。50.08mまでNXCビットにて掘進したが、孔壁崩壊のため

ためBXケーシングを挿入し、BXCビットにて123.30mまで掘進したが、湧水が200ℓ/minにも達し孔壁崩壊のため掘進不可能となり中止した。

3-4-14 坑内№15 (Table 3-16, 3-37 参照)

掘進長121.95m コア採取率78.9% 方位N72°47'56"W

NXCビットにて掘進開始。70.10mまでNXCビットで掘進し、BXケーシング挿入後、BXCビットで121.95mまで掘進したが、孔壁崩壊のためジャーミング状態となり、掘進不可能となったので中止した。

3-4-15 坑内№16 (Table 3-17, 3-38参照)

掘進長67.67m コア採取率84.9% 方位N55°21'00"E

NXCビットにて掘進開始。NXCビットで23.90mまで掘進したが孔壁崩壊甚しく、21m付近より20ℓ/minの湧水もあり、NXCビットでの掘進は不可能となったので、BXケーシングを挿入し、BXCビットで67.67mまで掘進した。しかし60.50m付近からの孔壁崩壊のため、BXケーシングを延長するため抜管しようとしたところジャーミング状態となり、掘進不可能となり中止した。

3-4-16 坑内№17 (Table 3-18, 3-39参照)

掘進長25.70m コア採取率68.3% 方位N70°22'56"W

NXCビットにて掘進開始。NXCビットにて25.70mまで掘進し、全作業完了した。

3-4-17 坑外№1 (Table 3-19, 3-40参照)

掘進長200m コア採取率90.5%

$3\frac{7}{8}$ トリコンビットにて掘進開始。トリコンビットにて3mまで掘進して114%ケーシングを打込み挿入し、NCDビットにて22.90mまで掘進してNXケーシングを挿入した。その後NXCビットで132.65mまで掘進したが亀裂の多い頁岩のため逸水と孔壁崩壊のため、BXケーシングを挿入し、以後BXCビットで200mまで掘進して完了した。

3-4-18 坑外№2 (Table 3-20, 3-41参照)

掘進長150.55m コア採取率81.8%

$3\frac{7}{8}$ トリコンビットにて掘進開始。トリコンビットにて12.20mまで掘進して114%ケーシングを挿入し、NCDビットにて掘進しながらNXケーシングを21.30mまで挿入した。その後NXCビットで35.80mまで掘進したところ、破砕帯のため孔壁崩壊のため、ジャーミング状態となり回収出来なくなり、ダイナマイトをロッド内に装填し発破をおこなってロッドのみ回収した。しかしビット、コアーチューブが回収不可能のため、掘り直しすることに決定した。

掘り直し掘進は12.20mまで $4\frac{3}{4}$ トリコンビットを使用して、114%ケーシングを挿入し、 $3\frac{7}{8}$ トリコンビットで17.95mまで掘進してNXケーシングを挿入し、その後NXCビットで21.30mまで掘進したが孔壁崩壊はなほだしく、NXケーシングシュートにてリーミングして、

NXケーシングを21.30mまで延長した。NXCビットで5.7mまで掘進したが、破砕帯で孔壁崩壊はなほだしく、セメンテーションを行いBXCビットで7.4mまで掘進してBXケーシングを67.50mまで挿入したが、これ以上挿入困難なため、一旦全ケーシング抜管して、再度114%ケーシングを20mまで、NXケーシングを55.95mまで更にBXケーシングを72.40mまで挿入後BXCビットにて150.55mまで掘進した。しかし120m付近で孔壁崩壊はなほだしく掘進不可能となったので、孔内洗浄を行っていたところ、ロッドとコアバレルヘッドより切断して回収不可能となったため中止した。

#### 3-4-19 坑外No3 (Table 3-21, 3-42参照)

掘進長201.50m コア採取率93.3%

4<sup>3</sup>/<sub>4</sub>トリコンビットにて掘進開始。トリコンビットで5.20mまで掘進して114%ケーシングを挿入した。NXCビットで97.90mまで掘進したが、7m付近で孔壁崩壊があるため、NXケーシングシュールにてリーミングし、14.50mまでNXケーシングを延長した。以後NXCビットで193.10mまで掘進したが、190m付近で孔壁崩壊があるため、BXケーシングを挿入した。BXCビットで196mまで掘進したが、194m付近で粘土質破砕帯のため、孔壁崩壊があり掘進不可能なため、一旦BXケーシングを抜管し、NXCビットで195.40mまでリーミングし、BXケーシングを195.40mまで延長して、BXCビットで201.50mまで掘進して完了した。102m付近より60~100ℓ/minの湧水があったが全体に孔壁崩壊も少く工事も順調であった。

#### 3-4-20 坑外No8 (Table 3-22, 3-43参照)

掘進長154.23m コア採取率70.4%

4<sup>3</sup>/<sub>4</sub>トリコンビットにて掘進開始。3.05mまでトリコンビットで掘進して、114%ケーシング挿入し、NXCビットで6.49mまで掘進したが、孔壁崩壊のため、114%ケーシングを一旦抜管し、トリコンビットで9.14mまでリーミングおよび掘進して、114%ケーシングを延長挿入した。NXCビットで29.41mまで掘進したが破砕帯のため孔壁崩壊はなほだしく、NXケーシングシュールにてリーミングし、NXケーシングを29.41mまで挿入した。その後NXCビットで72.69mまでセメンテーションを繰り返しながら掘進を行い、BXケーシングを挿入、以後BXCビットで掘進とBXケーシングシュールにてリーミングを繰り返しながら、BXケーシングを105.77mまで延長挿入した。BXCビットで154.23mまで掘進したが、135m付近の破砕帯のため孔壁崩壊のため、ジャーミング状態となり、BXケーシングの延長も困難であったため、掘進不可能となり中止した。

Summary Record of Drilling Results by Hole

Table 3-3 Underground NO.1

DRILLING PERIODS	TOTAL DAYS		NET WORKING (DAYS)		LAYOFFS		TOTAL MANSHIFTS			
	PREPARATION	2	2				14			
	DRILLING	39	32		7		256			
	REMOVING	3	2		1		10			
TOTAL	44	36		8		280				
DRILLED LENGTH	PLANNED LENGTH	200 <sup>m</sup>			CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION					
	INCREASE OR DECREASE IN DRILLED LENGTH	-5562 <sup>m</sup>	CORE LENGTH	11173 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL
	LENGTH DRILLED	14438 <sup>m</sup>	CORE RECOVERY	77.4%	0 - 100 <sup>m</sup>	80.1%	80.1%			
					100 - 200 <sup>m</sup>	71.1%	77.4%			
					200 - 300 <sup>m</sup>					
WORKING TIME (HRS.)	DRILLING	222°25'	30.1%	28.8%	EFFICIENCY OF DRILLING					
	HOISTING & LOWERING RODS	86°35'	11.7%	11.2%						
	HOISTING & LOWERING I.T.	137°00'	18.6%	17.8%						
	MISCELLANEOUS	174°10'	23.6%	22.6%	144.38 <sup>m</sup> /WORK PERIOD		3.28 <sup>m</sup> /DAY			
	REPAIRING	21°20'	2.9%	2.8%	144.38 <sup>m</sup> /WORKING DAYS		4.01 <sup>m</sup> /DAY			
	OTHERS	97°00'	13.1%	12.5%	144.38 <sup>m</sup> /DRILLING PERIOD		3.70 <sup>m</sup> /DAY			
	TOTAL	738°30'	100%	95.7%	144.38 <sup>m</sup> /NET DRILLING DAYS		4.51 <sup>m</sup> /DAY			
	REMOVING	PREPARATION	24°00'		3.1%					
		MOVING	9°00'		1.2%	TOTAL MANSHIFTS/14438 <sup>m</sup>		194MANSHIFTS/m		
GRAND TOTAL	771°30'		100%	DRILLING MANSHIFTS/14438 <sup>m</sup>		1773MANSHIFTS/m				
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED	INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.			
	BX 122.00 <sup>m</sup>	84.5%	100%		92		198			
					REMARKS					

Summary Record of Drilling Results by Hole

Table 3-4 Underground NO.2

DRILLING PERIODS		TOTAL DAYS		NET WORKING (DAYS)		LAYOFFS		TOTAL MANSHIFTS					
PREPARATION		2		2				10					
DRILLING		19		17		2		111					
REMOVING		1		1				4					
TOTAL		22		20		2		125					
DRILLED LENGTH		PLANNED LENGTH		200 <sup>m</sup>		CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION							
		INCREASE OR DECREASE IN DRILLED LENGTH		-8381 <sup>m</sup>		CORE LENGTH		69.5 <sup>m</sup>		DEPTH OF HOLE			
		LENGTH DRILLED		11619 <sup>m</sup>		CORE RECOVERY		59.8%		DEPTH OF HOLE			
						0 - 100 <sup>m</sup>		63.4%		63.4%			
						100 - 200 <sup>m</sup>		33.6%		59.8%			
WORKING TIME (HRS)		DRILLING		93'10"		23.6%		22.9%		200 - 300 <sup>m</sup>			
		HOISTING & LOWERING RODS		152'40"		38.8%		37.6%					
		HOISTING & LOWERING I.T.											
		MISCELLANEOUS		94'10"		23.9%		23.2%		116.19 <sup>m</sup> /WORK PERIOD		5.28 <sup>m</sup> /DAY	
		REPAIRING		12'30"		3.2%		3.1%		116.19 <sup>m</sup> /WORKING DAYS		5.81 <sup>m</sup> /DAY	
		OTHERS		41'30"		10.5%		10.2%		116.19 <sup>m</sup> /DRILLING PERIOD		6.12 <sup>m</sup> /DAY	
		TOTAL		394'00"		100%		97.0%		116.19 <sup>m</sup> /NET DRILLING DAYS		6.83 <sup>m</sup> /DAY	
		REMOVING		PREPARATION		8'00"		2.0%					
		MOVING		4'00"		1.0%		TOTAL MANSHIFTS/11619 <sup>m</sup>		108MANSHIFTS/m			
GRAND TOTAL		406'00"				100%		DRILLING MANSHIFTS/11619 <sup>m</sup>		098MANSHIFTS/m			
CASING PIPE INSERTED		PIPE SIZE & METERAGE INSERTED		INSERTED LENGTH DRILLED LENGTH		RECOVERY OF CASING PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.			
		BK 83.67 <sup>m</sup>		72.0%		100%		181					
								REMARKS					



Summary Record of Drilling Results by Hole

Table 3-5 Underground NO.3

DRILLING PERIODS	TOTAL DAYS		NET WORKING (DAYS)		LAYOFFS			TOTAL MANSHIFTS			
	PREPARATION	2	2							14.5	
	DRILLING	53	33		46					221.5	
	REMOVING	2	2							11	
TOTAL	57	37		46					247		
DRILLED LENGTH	PLANNED LENGTH	200 <sup>m</sup>			CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION						
	INCREASE OR DECREASE IN DRILLED LENGTH	-85.79 <sup>m</sup>	CORE LENGTH	87.87 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL	
	LENGTH DRILLED	1142 <sup>m</sup>	CORE RECOVERY	76.9%	0 - 100 <sup>m</sup>	77.6%	77.6%				
					100 - 200 <sup>m</sup>	72.3%	76.9%				
WORKING TIME (HRS)	DRILLING	72 <sup>h</sup> 10 <sup>'</sup>	11.2%	10.5%	200 - 300 <sup>m</sup>						
	HOISTING & LOWERING RODS	172 <sup>h</sup> 25 <sup>'</sup>	26.7%	25.1%	EFFICIENCY OF DRILLING						
	HOISTING & LOWERING I.T.				114.21 <sup>m</sup> /WORK PERIOD						
	MISCELLANEOUS	257 <sup>h</sup> 55 <sup>'</sup>	40.0%	37.6%	2.00 <sup>m</sup> /DAY						
	REPAIRING	70 <sup>h</sup> 00 <sup>'</sup>	10.9%	10.2%	114.21 <sup>m</sup> /WORKING DAYS			3.09 <sup>m</sup> /DAY			
	OTHERS	72 <sup>h</sup> 00 <sup>'</sup>	11.2%	10.5%	114.21 <sup>m</sup> /DRILLING PERIOD			2.15 <sup>m</sup> /DAY			
	TOTAL	644 <sup>h</sup> 30 <sup>'</sup>	100%	93.9%	m <sup>3</sup> /NET DRILLING DAYS			3.46 <sup>m</sup> /DAY			
	REMOVING	PREPARATION	35 <sup>h</sup> 30 <sup>'</sup>		5.2%						
	MOVING	6 <sup>h</sup> 00 <sup>'</sup>		0.9%	TOTAL MANSHIFTS/11421 <sup>m</sup>			216 MANSHIFTS/m			
GRAND TOTAL	686 <sup>h</sup> 00 <sup>'</sup>		100%	DRILLING MANSHIFTS/11421 <sup>m</sup>			194 MANSHIFTS/m				
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED	INSERTED LENGTH	DRILLED LENGTH	RECOVERY OF CASING PIPES	TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.				
	NX 26.60 <sup>m</sup>	23.3%		100%	183						
	BX 75.99 <sup>m</sup>	66.5%		100%	REMARKS						

Summary Record of Drilling Results by Hole

Table 3-6 Underground NO.4

DRILLING PERIODS	TOTAL DAYS		NET WORKING (DAYS)		LAYOFFS		TOTAL MANSHIFTS			
	PREPARATION	1	1				4			
	DRILLING	40	36		4		244			
	REMOVING	1	1				4			
TOTAL	42	38		4		252				
DRILLED LENGTH	PLANNED LENGTH	200m	CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION							
	INCREASE OR DECREASE IN DRILLED LENGTH	-36.55 <sup>m</sup>	CORE LENGTH	149.20 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL
	LENGTH DRILLED	163.45 <sup>m</sup>	CORE RECOVERY	91.3%	0 - 100 <sup>m</sup>	94.0%	94.0%			
WORKING TIME (HRS)	DRILLING	158 <sup>00</sup> '	25.7%	24.8%	100 - 200 <sup>m</sup>	87.1%	91.3%			
	HOISTING & LOWERING RODS	19 <sup>42</sup> '	31.5%	30.4%	200 - 300 <sup>m</sup>					
	HOISTING & LOWERING I.T.				EFFICIENCY OF DRILLING					
	MISCELLANEOUS	115 <sup>00</sup> '	18.7%	18.0%	163.45 <sup>m</sup> /WORK PERIOD			3.89 <sup>m</sup> /DAY		
	REPAIRING	7 <sup>34</sup> '	12.0%	11.5%	163.45 <sup>m</sup> /WORKING DAYS			4.30 <sup>m</sup> /DAY		
	OTHERS	7 <sup>45</sup> '	12.1%	11.7%	163.45 <sup>m</sup> /DRILLING PERIOD			4.09 <sup>m</sup> /DAY		
	TOTAL	616 <sup>00</sup> '	100%	96.4%	163.45 <sup>m</sup> /NET DRILLING DAYS			4.54 <sup>m</sup> /DAY		
	REMOVING - PREPARATION	15 <sup>00</sup> '		2.3%						
	MOVING	8 <sup>00</sup> '		1.3%	TOTAL MANSHIFTS/16345 <sup>m</sup>			154MANSHIFTS/m		
	GRAND TOTAL	639 <sup>00</sup> '		100%	DRILLING MANSHIFTS/16345 <sup>m</sup>			149MANSHIFTS/m		
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED	INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.			
	BX 95.80 <sup>m</sup>	58.6%	74%		164					
					REMARKS					

Summary Record of Drilling Results by Hole

Table 3-7 Underground NO.5

DRILLING PERIODS	TOTAL DAYS		NET WORKING (DAYS)		LAYOFFS		TOTAL MANSHIFTS				
	PREPARATION	3	2	1	8						
	DRILLING	57	42	15	255						
	REMOVING	1	1		4						
	TOTAL	61	45	16	267						
DRILLED LENGTH	PLANNED LENGTH	200 <sup>m</sup>	CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION								
	INCREASE OR DECREASE IN DRILLED LENGTH	-70.10 <sup>m</sup>	CORE LENGTH	123.45 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL	
	LENGTH DRILLED	129.90 <sup>m</sup>	CORE RECOVERY	95.0%	0 - 100 <sup>m</sup>	96.3%	96.3%				
WORKING TIME (HRS)					100 - 200 <sup>m</sup>	90.4%	95.0%				
	DRILLING	96 <sup>25</sup> '	15.6%	15.2%	200 - 300 <sup>m</sup>						
	HOISTING & LOWERING RODS	156 <sup>35</sup> '	25.4%	24.7%	EFFICIENCY OF DRILLING						
	HOISTING & LOWERING I.T.				129.90 <sup>m</sup> /WORK PERIOD		2.13 <sup>m</sup> /DAY				
	MISCELLANEOUS	158 <sup>00</sup> '	25.6%	24.9%	129.90 <sup>m</sup> /WORKING DAYS		2.89 <sup>m</sup> /DAY				
	REPAIRING	91 <sup>00</sup> '	14.8%	14.4%	129.90 <sup>m</sup> /DRILLING PERIOD		2.28 <sup>m</sup> /DAY				
	OTHERS	114 <sup>30</sup> '	18.6%	18.1%	129.90 <sup>m</sup> /NET DRILLING DAYS		3.09 <sup>m</sup> /DAY				
	TOTAL	616 <sup>30</sup> '	100 %	97.3%							
	REMOVING	PREPARATION	11 <sup>00</sup> '		1.7%						
	MOVING	6 <sup>00</sup> '		1.0%	TOTAL MANSHIFTS/129.90 <sup>m</sup>		206MANSHIFTS/ <sup>m</sup>				
GRAND TOTAL	633 <sup>30</sup> '		100 %	DRILLING MANSHIFTS/12990 <sup>m</sup>		196MANSHIFTS/ <sup>m</sup>					
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED	INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.				
	BX 90.00 <sup>m</sup>	69.3%	67%		151						
					REMARKS						

Summary Record of Drilling Results by Hole

Table 3-8 Underground NO.6

DRILLING PERIODS			TOTAL DAYS	NET WORKING (DAYS)	LAYOFFS	TOTAL MANSHIFTS				
	PREPARATION		2	1	1	4				
	DRILLING		33	29	4	202				
	REMOVING		1	1		4				
	TOTAL		36	31	5	210				
DRILLED LENGTH	PLANNED LENGTH	200 <sup>m</sup>			CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION					
	INCREASE OR DECREASE IN DRILLED LENGTH	-8425 <sup>m</sup>	CORE LENGTH	101.90 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL
	LENGTH DRILLED	11575 <sup>m</sup>	CORE RECOVERY	88.0%	0 - 100 <sup>m</sup>	91.9%	91.9%			
WORKING TIME (HRS)	DRILLING	122°25'	23.1%	22.4%	100 - 200 <sup>m</sup>	58.3%	88.0%			
	HOISTING & LOWERING RODS	143°25'	27.0%	26.2%	200 - 300 <sup>m</sup>					
	HOISTING & LOWERING I.T.				EFFICIENCY OF DRILLING					
	MISCELLANEOUS	87°30'	16.5%	16.0%	115.75 <sup>m</sup> /WORK PERIOD		3.21 <sup>m</sup> /DAY			
	REPAIRING	107°10'	20.2%	19.6%	115.75 <sup>m</sup> /WORKING DAYS		3.73 <sup>m</sup> /DAY			
	OTHERS	70°30'	13.2%	12.8%	115.75 <sup>m</sup> /DRILLING PERIOD		3.51 <sup>m</sup> /DAY			
	TOTAL	531°00'	100%	97.0%	115.75 <sup>m</sup> /NET DRILLING DAYS		3.99 <sup>m</sup> /DAY			
	REMOVING PREPARATION	8°00'		1.5%						
	MOVING	8°00'		1.5%	TOTAL MANSHIFTS/115.75 <sup>m</sup>		181MANSHIFTS/ <sup>m</sup>			
	GRAND TOTAL	547°00'		100%	DRILLING MANSHIFTS/115.75 <sup>m</sup>		1.75MANSHIFTS/ <sup>m</sup>			
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED	INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.			
	BX 113 <sup>m</sup>	97.6%	100%		116					
					REMARKS					

Summary Record of Drilling Results by Hole

Table 3-9 Underground NO.7

DRILLING PERIODS	TOTAL DAYS		NET WORKING (DAYS)		LAYOFFS		TOTAL MANSHIFTS				
	PREPARATION	2	2				14				
	DRILLING	28	24	4			165				
	REMOVING	1	1				6				
<b>TOTAL</b>	<b>31</b>	<b>27</b>	<b>4</b>			<b>185</b>					
DRILLED LENGTH	PLANNED LENGTH	200 <sup>m</sup>	CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION								
	INCREASE OR DECREASE IN DRILLED LENGTH	-127.85 <sup>m</sup>	CORE LENGTH	43.39%	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL	
	LENGTH DRILLED	7215 <sup>m</sup>	CORE RECOVERY	60.1%	0 - 100 <sup>m</sup>	60.1%	60.1%				
WORKING TIME (HRS)	DRILLING	41 <sup>25</sup> '	8.3%	8.0%	100 - 200 <sup>m</sup>						
	HOISTING & LOWERING RODS	95 <sup>30</sup> '	17.9%	17.1%	200 - 300 <sup>m</sup>						
	HOISTING & LOWERING I.T.	9 <sup>50</sup> '	1.9%	1.8%	EFFICIENCY OF DRILLING						
	MISCELLANEOUS	175 <sup>45</sup> '	33.0%	31.5%	72.15 <sup>m</sup> /WORK PERIOD			2.33 <sup>m</sup> /DAY			
	REPAIRING	153 <sup>00</sup> '	28.7%	27.4%	72.15 <sup>m</sup> /WORKING DAYS			2.67 <sup>m</sup> /DAY			
	OTHERS	54 <sup>00</sup> '	10.2%	9.7%	72.15 <sup>m</sup> /DRILLING PERIOD			2.58 <sup>m</sup> /DAY			
	<b>TOTAL</b>	<b>533<sup>00</sup>'</b>	<b>100 %</b>	<b>95.5%</b>	72.15 <sup>m</sup> /NET DRILLING DAYS			3.01 <sup>m</sup> /DAY			
	REMOVING	PREPARATION	20 <sup>00</sup> '		3.6%						
	MOVING	5 <sup>00</sup> '		0.9%	TOTAL MANSHIFTS/7215 <sup>m</sup>			25.6 MANSHIFTS/m			
<b>GRAND TOTAL</b>	<b>558<sup>00</sup>'</b>		<b>100 %</b>	DRILLING MANSHIFTS/7215 <sup>m</sup>			22.9 MANSHIFTS/m				
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED	INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.				
	NX 2810m	38.9%	100%		111		21				
	BX 4120m	52.1%	100%		REMARKS						

Summary Record of Drilling Results by Hole

Table 3-10 Underground NO.9

DRILLING PERIODS			TOTAL DAYS	NET WORKING (DAYS)	LAYOFFS	TOTAL MANSHIFTS				
	PREPARATION		11	10	1	47				
	DRILLING		51	38	13	255				
	REMOVING		2	1	1	7				
TOTAL		64	49	15	309					
DRILLED LENGTH	PLANNED LENGTH	200 <sup>m</sup>			CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION					
	INCREASE OR DECREASE IN DRILLED LENGTH	-	CORE LENGTH	189.25 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL
	LENGTH DRILLED	200 <sup>m</sup>	CORE RECOVERY	94.6%	0 - 100 <sup>m</sup>	96.4%	96.4%			
WORKING TIME (HRS)					100 - 200 <sup>m</sup>	92.9%	94.6%			
	DRILLING		122°35'	18.1%	16.5%	200 - 300 <sup>m</sup>				
	HOISTING & LOWERING RODS		215°30'	31.8%	29.0%	EFFICIENCY OF DRILLING				
	HOISTING & LOWERING I.T.					200 <sup>m</sup> /WORK PERIOD		3.13 <sup>m</sup> /DAY		
	MISCELLANEOUS		115°50'	16.5%	15.1%	200 <sup>m</sup> /WORKING DAYS		4.08 <sup>m</sup> /DAY		
	REPAIRING		83°30'	12.3%	11.2%	200 <sup>m</sup> /DRILLING PERIOD		3.92 <sup>m</sup> /DAY		
	OTHERS		144°05'	21.3%	19.4%	200 <sup>m</sup> /NET DRILLING DAYS		5.26 <sup>m</sup> /DAY		
	TOTAL		677°30'	100%	91.2%					
	REMOVING	PREPARATION	45°00'		6.1%	TOTAL MANSHIFTS/200 <sup>m</sup>		1.55MANSHIFTS/m		
		MOVING	20°00'		2.7%	DRILLING MANSHIFTS/200 <sup>m</sup>		1.28MANSHIFTS/m		
GRAND TOTAL		742°30'		100%						
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED		INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES	TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.			
	BX 102 <sup>m</sup>		51%	100%	186					
					REMARKS					

Summary Record of Drilling Results by Hole

Table 3-11 Underground NO.10

DRILLING PERIODS	TOTAL DAYS		NET WORKING (DAYS)		LAYOFFS		TOTAL MANSHIFTS				
	PREPARATION	6	3	3	3	10					
	DRILLING	31	24	7	185						
	REMOVING	1	1		3						
	<b>TOTAL</b>	<b>38</b>	<b>28</b>	<b>10</b>	<b>198</b>						
DRILLED LENGTH	PLANNED LENGTH	200 <sup>m</sup>	CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION								
	INCREASE OR DECREASE IN DRILLED LENGTH	-45.04 <sup>m</sup>	CORE LENGTH	103.23 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL	
	LENGTH DRILLED	154.96 <sup>m</sup>	CORE RECOVERY	66.6%	0 - 100 <sup>m</sup>	72.6%	72.6%				
					100 - 200 <sup>m</sup>	54.5%	66.6%				
WORKING TIME (HRS)	DRILLING	144°30'	22.3%	21.0%	200 - 300 <sup>m</sup>						
	HOISTING & LOWERING RODS	68°55'	13.4%	12.7%	EFFICIENCY OF DRILLING						
	HOISTING & LOWERING I.T.	97°10'	18.9%	17.9%	154.96 <sup>m</sup> /WORK PERIOD		4.08 <sup>m</sup> /DAY				
	MISCELLANEOUS	151°10'	30.0%	28.3%	154.96 <sup>m</sup> /WORKING DAYS		5.53 <sup>m</sup> /DAY				
	REPAIRING	22°15'	4.3%	4.1%	154.96 <sup>m</sup> /DRILLING PERIOD		5.00 <sup>m</sup> /DAY				
	OTHERS	57°00'	11.1%	10.5%	154.96 <sup>m</sup> /NET DRILLING DAYS		6.46 <sup>m</sup> /DAY				
	TOTAL	514°00'	100 %	94.5%							
	REMOVING	PREPARATION	27°00'		4.0%						
	MOVING	8°00'		1.5%	TOTAL MANSHIFTS/154.96 <sup>m</sup>		128MANSHIFTS/m				
	GRAND TOTAL	544°00'		100 %	DRILLING MANSHIFTS/154.96 <sup>m</sup>		1.19MANSHIFTS/m				
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED	INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.				
	BK 111.20 <sup>m</sup>	71.8%	100%		94		108				
					REMARKS						

Summary Record of Drilling Results by Hole

Table 3-12 Underground NO.11

DRILLING PERIODS			TOTAL DAYS	NET WORKING (DAYS)	LAYOFFS	TOTAL MANSHIFTS						
	PREPARATION		2	2		15						
	DRILLING		23	21	2	142						
	REMOVING		3	3		17						
	TOTAL		28	26	2	174						
DRILLED LENGTH	PLANNED LENGTH		120 <sup>m</sup>		CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION							
	INCREASE OR DECREASE IN DRILLED LENGTH		65.2 <sup>m</sup>	CORE LENGTH	111.61 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL	
	LENGTH DRILLED		126.52 <sup>m</sup>	CORE RECOVERY	88.2%	0 - 100 <sup>m</sup>	88.3%	88.3%				
						100 - 200 <sup>m</sup>	87.7%	88.2%				
WORKING TIME (HRS)	DRILLING		86°15'	18.2%	17.2%	200 - 300 <sup>m</sup>						
	HOISTING & LOWERING RODS		160°45'	34.0%	32.0%							
	HOISTING & LOWERING I.T.					EFFICIENCY OF DRILLING						
	MISCELLANEOUS		144°00'	30.4%	28.7%	126.52 <sup>m</sup> /WORK PERIOD			4.52 <sup>m</sup> /DAY			
	REPAIRING		1°30'	3.2%	3.0%	126.52 <sup>m</sup> /WORKING DAYS			4.87 <sup>m</sup> /DAY			
	OTHERS		67°30'	14.2%	13.4%	126.52 <sup>m</sup> /DRILLING PERIOD			5.50 <sup>m</sup> /DAY			
	TOTAL		472°00'	100%	94.0%	126.52 <sup>m</sup> /NET DRILLING DAYS			6.02 <sup>m</sup> /DAY			
	REMOVING	PREPARATION		27°00'		5.4%						
		MOVING		3°00'		0.6%	TOTAL MANSHIFTS/126.52 <sup>m</sup>			138MANSHIFTS/m		
	GRAND TOTAL		502°00'		100%	DRILLING MANSHIFTS/126.52 <sup>m</sup>			121MANSHIFTS/m			
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED		INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.				
	BX 98.21 <sup>m</sup>		77.6%	100%		183						
						REMARKS						



Summary Record of Drilling Results by Hole

Table 3-13 Underground NO.12

DRILLING PERIODS		TOTAL DAYS		NET WORKING (DAYS)		LAYOFFS		TOTAL MANSHIFTS			
PREPARATION		1		1				10			
DRILLING		42.5		29.5		13		166			
REMOVING		0.5		0.5				3			
TOTAL		44		31		13		179			
DRILLED LENGTH		PLANNED LENGTH		120 <sup>m</sup>		CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION					
		INCREASE OR DECREASE IN DRILLED LENGTH		1.74 <sup>m</sup>		CORE LENGTH		105.72 <sup>m</sup>			
LENGTH DRILLED		LENGTH DRILLED		121.74 <sup>m</sup>		CORE RECOVERY		86.8%			
						DEPTH OF HOLE		SECT - ION		TOTAL	
						0 - 100 <sup>m</sup>		88.3%		88.3%	
WORKING TIME (HRS)		DRILLING		98 <sup>00</sup> '		19.6%		18.8%			
		HOISTING & LOWERING RODS		159 <sup>40</sup> '		32.0%		30.6%			
		HOISTING & LOWERING I.T.									
		EFFICIENCY OF DRILLING									
		MISCELLANEOUS		125 <sup>35</sup> '		25.2%		24.0%		121.74 <sup>m</sup> /WORK PERIOD	
		REPAIRING		18 <sup>30</sup> '		3.7%		3.5%		121.74 <sup>m</sup> /WORKING DAYS	
		OTHERS		97 <sup>00</sup> '		19.5%		18.6%		121.74 <sup>m</sup> /DRILLING PERIOD	
		TOTAL		498 <sup>45</sup> '		100%		95.5%		121.74 <sup>m</sup> /NET DRILLING DAYS	
		REMOVING		21 <sup>15</sup> '				4.1%			
		MOVING		2 <sup>00</sup> '				0.4%		TOTAL MANSHIFTS/121.74 <sup>m</sup>	
		GRAND TOTAL		522 <sup>00</sup> '		100%		100%		DRILLING MANSHIFTS/121.74 <sup>m</sup>	
CASING PIPE INSERTED		PIPE SIZE & METERAGE INSERTED		BX 91.90 <sup>m</sup>		INSERTED LENGTH / DRILLED LENGTH		75.5%		RECOVERY OF CASING PIPES	
								100%		TIMES OF HOISTING & LOWERING RODS	
										180	
										TIMES OF HOISTING & LOWERING I.T.	
										REMARKS	

Summary Record of Drilling Results by Hole

Table 3-14 Underground NO.13

DRILLING PERIODS			TOTAL DAYS	NET WORKING (DAYS)	LAYOFFS	TOTAL MANSHIFTS					
	PREPARATION		0.5	0.5		5					
	DRILLING		25.5	23.5	2	140					
	REMOVING		1	1		8					
TOTAL		27	25	2	153						
DRILLED LENGTH	PLANNED LENGTH		120 <sup>m</sup>		CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION						
	INCREASE OR DECREASE IN DRILLED LENGTH		-24.05 <sup>m</sup>	CORE LENGTH	70.57 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL
	LENGTH DRILLED		95.95 <sup>m</sup>	CORE RECOVERY	73.5%	0 - 100 <sup>m</sup>	73.5%	73.5%			
						100 - 200 <sup>m</sup>					
WORKING TIME (HRS)	DRILLING		73°30'	18.8%	17.9%	200 - 300 <sup>m</sup>					
	HOISTING & LOWERING RODS		126°25'	32.3%	30.8%						
	HOISTING & LOWERING I.T.					EFFICIENCY OF DRILLING					
	MISCELLANEOUS		122°05'	31.1%	29.8%	95.95 <sup>m</sup> /WORK PERIOD			3.55 <sup>m</sup> /DAY		
	REPAIRING		14°45'	3.8%	3.6%	95.95 <sup>m</sup> /WORKING DAYS			3.84 <sup>m</sup> /DAY		
	OTHERS		54°45'	14.0%	13.4%	95.95 <sup>m</sup> /DRILLING PERIOD			3.76 <sup>m</sup> /DAY		
	TOTAL		391°30'	100 %	95.5%	95.95 <sup>m</sup> NET / DRILLING DAYS			4.08 <sup>m</sup> /DAY		
	REMOVING	PREPARATION		16°00'		3.9%					
		MOVING		2°30'		0.6%	TOTAL MANSHIFTS/9595 <sup>m</sup>			1.59 MANSHIFTS/m	
	GRAND TOTAL		410°00'		100 %	DRILLING MANSHIFTS/9595 <sup>m</sup>			4.46 MANSHIFTS/m		
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED		INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.			
	BX 74.31 <sup>m</sup>		77.4%	100%		152					
	REMARKS										

Summary Record of Drilling Results by Hole

Table 3-15 Underground NO.14

DRILLING PERIODS	TOTAL DAYS		NET WORKING (DAYS)		LAYOFFS			TOTAL MANSHIFTS		
	PREPARATION	2	1	1	1			3		
	DRILLING	18	16	2				110		
	REMOVING	1	1					4		
<b>TOTAL</b>	<b>21</b>	<b>18</b>	<b>3</b>	<b>117</b>						
DRILLED LENGTH	PLANNED LENGTH	200 <sup>m</sup>	CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION							
	INCREASE OR DECREASE IN DRILLED LENGTH	-76.80 <sup>m</sup>	CORE LENGTH	965 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL
	LENGTH DRILLED	12320 <sup>m</sup>	CORE RECOVERY	78.3%	0 - 100 <sup>m</sup>	77.9%	77.9%			
					100 - 200 <sup>m</sup>	80.2%	78.3%			
					200 - 300 <sup>m</sup>					
WORKING TIME (HRS)	DRILLING	86'45"	23.5%	23.0%	EFFICIENCY OF DRILLING					
	HOISTING & LOWERING RODS	166'25"	45.2%	44.2%	123.20 <sup>m</sup> /WORK PERIOD					
	HOISTING & LOWERING I.T.				5.87 <sup>m</sup> /DAY					
	MISCELLANEOUS	69'50"	19.0%	18.6%	123.20 <sup>m</sup> /WORKING DAYS					
	REPAIRING	4'00"	1.1%	1.1%	6.84 <sup>m</sup> /DAY					
	OTHERS	41'30"	11.2%	11.0%	123.20 <sup>m</sup> /DRILLING PERIOD					
	TOTAL	368'30"	100%	97.9%	123.20 <sup>m</sup> /NET DRILLING DAYS					
	REMOVING PREPARATION	6'00"		1.6%	7.70 <sup>m</sup> /DAY					
	MOVING	2'00"		0.5%	TOTAL MANSHIFTS/12320 <sup>m</sup>					
GRAND TOTAL	376'30"		100%	0.95MANSHIFTS/m						
				DRILLING MANSHIFTS/12320 <sup>m</sup>						
				0.89MANSHIFTS/m						
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED	INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES		TIMES OF HOISTING & LOWERING RODS			TIMES OF HOISTING & LOWERING I.T.		
	BX 50 <sup>m</sup>	40.9%	100%		213					
					REMARKS					

Summary Record of Drilling Results by Hole

Table 3-16 Underground No.15

DRILLING PERIODS			TOTAL DAYS	NET WORKING (DAYS)	LAYOFFS	TOTAL MANSHIFTS					
	PREPARATION		1.5	1.5		11					
	DRILLING		29.5	23.5	6	145					
	REMOVING		1	1		5					
	TOTAL		32	26	6	161					
DRILLED LENGTH	PLANNED LENGTH		120 <sup>m</sup>	CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION							
	INCREASE OR DECREASE IN DRILLED LENGTH		1.95 <sup>m</sup>	CORE LENGTH	96.19 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL
	LENGTH DRILLED		121.95 <sup>m</sup>	CORE RECOVERY	78.9%	0 - 100 <sup>m</sup>	75.4%	75.4%			
						100 - 200 <sup>m</sup>	94.5%	78.9%			
WORKING TIME (HRS)	DRILLING		99°45'	22.1%	20.9%	200 - 300 <sup>m</sup>					
	HOISTING & LOWERING RODS		156°50'	34.9%	32.9%						
	HOISTING & LOWERING I.T.					EFFICIENCY OF DRILLING					
	MISCELLANEOUS		10°20'	23.0%	21.7%	121.95 <sup>m</sup> /WORK PERIOD		3.81 <sup>m</sup> /DAY			
	REPAIRING		27°35'	6.1%	5.8%	121.95 <sup>m</sup> /WORKING DAYS		4.69 <sup>m</sup> /DAY			
	OTHERS		62°00'	13.8%	13.0%	121.95 <sup>m</sup> /DRILLING PERIOD		4.13 <sup>m</sup> /DAY			
	TOTAL		449°30'	100 %	94.3%	121.95 <sup>m</sup> /NET DRILLING DAYS		5.19 <sup>m</sup> /DAY			
	REMOVING	PREPARATION		25°30'		5.3%					
		MOVING		2°00'		0.4%	TOTAL MANSHIFTS/121.95 <sup>m</sup>		132MANSHIFTS/m		
	GRAND TOTAL		477°00'		100 %	DRILLING MANSHIFTS/121.95 <sup>m</sup>		119MANSHIFTS/m			
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED		INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.			
	BX 70.10 <sup>m</sup>		57.5%	100%		213					
						REMARKS					

Summary Record of Drilling Results by Hole

Table 3-17 Underground No.16

DRILLING PERIODS	TOTAL DAYS		NET WORKING (DAYS)		LAYOFFS		TOTAL MANSHIFTS			
	PREPARATION	1	1				9			
	DRILLING	13	12		1		75			
	REMOVING	2	1		1		4			
TOTAL	16	14		2		88				
DRILLED LENGTH	PLANNED LENGTH	120 <sup>m</sup>	CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION							
	INCREASE OR DECREASE IN DRILLED LENGTH	-5233 <sup>m</sup>	CORE LENGTH	57.43 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL
	LENGTH DRILLED	6767 <sup>m</sup>	CORE RECOVERY	84.9%	0 - 100 <sup>m</sup>	84.9%	84.9%			
WORKING TIME (HRS)	DRILLING	50°50'	21.4%	20.3%	100 - 200 <sup>m</sup>					
	HOISTING & LOWERING RODS	67°20'	28.3%	27.0%	200 - 300 <sup>m</sup>					
	HOISTING & LOWERING I.T.				EFFICIENCY OF DRILLING					
	MISCELLANEOUS	95°50'	40.3%	38.3%	67.67 <sup>m</sup> /WORK PERIOD			4.23 <sup>m</sup> /DAY		
	REPAIRING	2°00'	0.8%	0.8%	67.67 <sup>m</sup> /WORKING DAYS			4.84 <sup>m</sup> /DAY		
	OTHERS	22°00'	9.2%	8.8%	67.67 <sup>m</sup> /DRILLING PERIOD			5.21 <sup>m</sup> /DAY		
	TOTAL	238°00'	100 %	95.2%	67.67 <sup>m</sup> /NET DRILLING DAYS			5.64 <sup>m</sup> /DAY		
	REMOVING	PREPARATION 9°30'		3.8%						
	MOVING 2°30'		1.0%	TOTAL MANSHIFTS/6767 <sup>m</sup>			130MANSHIFTS/ <sup>m</sup>			
GRAND TOTAL	250°00'		100 %	DRILLING MANSHIFTS/6767 <sup>m</sup>			111MANSHIFTS/ <sup>m</sup>			
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED	INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASINO PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.			
	BX 23.90 <sup>m</sup>	35.3%	100%		94					
REMARKS										

Summary Record of Drilling Results by Hole

Table 3-18 Underground No.17

DRILLING PERIODS	TOTAL DAYS		NET WORKING (DAYS)		LAYOFFS		TOTAL MANSHIFTS			
	PREPARATION	2	2				11			
	DRILLING	6	3		3		21			
	REMOVING	1	1				10			
<b>TOTAL</b>	<b>9</b>	<b>6</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>42</b>				
DRILLED LENGTH	PLANNED LENGTH	120 <sup>m</sup>			CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION					
	INCREASE OR DECREASE IN DRILLED LENGTH	-9430 <sup>m</sup>	CORE LENGTH	17.55 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL
	LENGTH DRILLED	2570 <sup>m</sup>	CORE RECOVERY	68.3%	0 - 100 <sup>m</sup>	68.3%	68.3%			
					100 - 200 <sup>m</sup>					
WORKING TIME (HRS)	DRILLING	18 <sup>h</sup> 40'	31.1%	18.7%	200 - 300 <sup>m</sup>					
	HOISTING & LOWERING RODS	11 <sup>h</sup> 50'	19.7%	11.8%	EFFICIENCY OF DRILLING					
	HOISTING & LOWERING I.T.				25.70 <sup>m</sup> /WORK PERIOD		2.86 <sup>m</sup> /DAY			
	MISCELLANEOUS	16 <sup>h</sup> 45'	27.9%	16.8%	25.70 <sup>m</sup> /WORKING DAYS		4:28 <sup>m</sup> /DAY			
	REPAIRING	3 <sup>h</sup> 45'	6.3%	3.7%	25.70 <sup>m</sup> /DRILLING PERIOD		4.28 <sup>m</sup> /DAY			
	OTHERS	9 <sup>h</sup> 00'	15.0%	9.0%	25.70 <sup>m</sup> /NET DRILLING DAYS		8.57 <sup>m</sup> /DAY			
	TOTAL	60 <sup>h</sup> 00'	100%	60.0%						
	REMOVING PREPARATION	3 <sup>h</sup> 00'		30.0%						
	MOVING	10 <sup>h</sup> 00'		10.0%	TOTAL MANSHIFTS/2570 <sup>m</sup>		1.63MANSHIFTS/m			
GRAND TOTAL	100 <sup>h</sup> 00'		100%	DRILLING MANSHIFTS/2570 <sup>m</sup>		0.82MANSHIFTS/m				
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED	INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES	TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.				
				38						
				REMARKS						

Summary Record of Drilling Results by Hole

Table 3-19 Surface No.1

DRILLING PERIODS			TOTAL DAYS	NET WORKING (DAYS)	LAYOFFS	TOTAL MANSHIFTS					
	PREPARATION		4	4		17					
	DRILLING		45	29	16	192					
	REMOVING		1	1		3					
TOTAL		50	34		212						
DRILLED LENGTH	PLANNED LENGTH		200 <sup>m</sup>		CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION						
	INCREASE OR DECREASE IN DRILLED LENGTH			CORE LENGTH	180.95 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL
	LENGTH DRILLED		200 <sup>m</sup>	CORE RECOVERY	90.5%	0 - 100 <sup>m</sup>	89.9%	89.9%			
WORKING TIME (HRS)	DRILLING		18 <sup>h</sup> 10'	33.7%	32.0%	100 - 200 <sup>m</sup>	90.9%	90.5%			
	HOISTING & LOWERING RODS		29 <sup>h</sup> 00'	5.2%	4.9%	200 - 300 <sup>m</sup>					
	HOISTING & LOWERING I.T.		85 <sup>h</sup> 20'	15.2%	14.4%	EFFICIENCY OF DRILLING					
	MISCELLANEOUS		184 <sup>h</sup> 15'	32.9%	31.2%	200 <sup>m</sup> /WORK PERIOD			4.00 <sup>m</sup> /DAY		
	REPAIRING		8 <sup>h</sup> 00'	1.4%	1.4%	200 <sup>m</sup> /WORKING DAYS			5.88 <sup>m</sup> /DAY		
	OTHERS		64 <sup>h</sup> 45'	11.6%	10.9%	200 <sup>m</sup> /DRILLING PERIOD			4.44 <sup>m</sup> /DAY		
	TOTAL		560 <sup>h</sup> 30'	100%	94.8%	200 <sup>m</sup> /NET DRILLING DAYS			6.90 <sup>m</sup> /DAY		
	REMOVING	PREPARATION		28 <sup>h</sup> 00'		4.7%					
		MOVING		3 <sup>h</sup> 00'		0.5%	TOTAL MANSHIFTS/200 <sup>m</sup>			106 MANSHIFTS/ <sup>m</sup>	
	GRAND TOTAL		591 <sup>h</sup> 30'		100%	DRILLING MANSHIFTS/200 <sup>m</sup>			096 MANSHIFTS/ <sup>m</sup>		
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED		INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.			
	114 <sup>m</sup> /3 <sup>m</sup>		1.5%	100%		31		170			
	NX 22.90 <sup>m</sup>		11.5%	100%		REMARKS					
BX 132.65 <sup>m</sup>		66.3%	100%								

Summary Record of Drilling Results by Hole

Table 3-20 Surface No.2

DRILLING PERIODS	TOTAL DAYS		NET WORKING (DAYS)		LAYOFFS		TOTAL MANSHIFTS			
	PREPARATION	1	1				8.5			
	DRILLING	56	51		5		398.5			
	REMOVING	1	1				6.5			
	TOTAL	58	53		5		413.5			
DRILLED LENGTH	PLANNED LENGTH	200 <sup>m</sup>			CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION					
	INCREASE OR DECREASE IN DRILLED LENGTH	-49.45 <sup>m</sup>	CORE LENGTH	12320 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL
	LENGTH DRILLED	150.55 <sup>m</sup>	CORE RECOVERY	81.8%	0 - 100 <sup>m</sup>	73.9%	73.9%			
WORKING TIME (HRS)					100 - 200 <sup>m</sup>	97.4%	81.8%			
	DRILLING	157 <sup>25</sup> '	16.4%	15.7%	200 - 300 <sup>m</sup>					
	HOISTING & LOWERING RODS	34 <sup>15</sup> '	3.6%	3.4%	EFFICIENCY OF DRILLING					
	HOISTING & LOWERING I.T.	54 <sup>15</sup> '	5.7%	5.4%	150.55 <sup>m</sup> /WORK PERIOD		2.60 <sup>m</sup> /DAY			
	MISCELLANEOUS	282 <sup>20</sup> '	29.4%	28.2%	150.55 <sup>m</sup> /WORKING DAYS		2.84 <sup>m</sup> /DAY			
	REPAIRING	334 <sup>45</sup> '	34.9%	33.4%	150.55 <sup>m</sup> /DRILLING PERIOD		2.69 <sup>m</sup> /DAY			
	OTHERS	96 <sup>00</sup> '	10.0%	9.6%	150.55 <sup>m</sup> /NET DRILLING DAYS		2.95 <sup>m</sup> /DAY			
	TOTAL	959 <sup>00</sup> '	100%	95.7%						
	REMOVING	PREPARATION	25 <sup>00</sup> '		2.5%					
	MOVING	18 <sup>00</sup> '		1.8%	TOTAL MANSHIFTS/150.55 <sup>m</sup>		275 MANSHIFTS/m			
GRAND TOTAL	1002 <sup>00</sup> '		100%	DRILLING MANSHIFTS/150.55 <sup>m</sup>		265 MANSHIFTS/m				
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED	INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASING PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.			
	114 <sup>m</sup> /m 20 <sup>m</sup>	13.3%	100%		48		134			
	NX 55.95 <sup>m</sup>	37.2%	100%		REMARKS					
	BX 72.40 <sup>m</sup>	48.1%	100%							



Summary Record of Drilling Results by Hole

Table 3-21 Surface No.3

DRILLING PERIODS			TOTAL DAYS	NET WORKING (DAYS)	LAYOFFS	TOTAL MANSHIFTS					
	PREPARATION		4	4		34					
	DRILLING		20.5	19.5	1	129					
	REMOVING		0.5	0.5		5					
	TOTAL		25	24	1	168					
DRILLED LENGTH	PLANNED LENGTH	200 <sup>m</sup>			CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION						
	INCREASE OR DECREASE IN DRILLED LENGTH	150 <sup>m</sup>	CORE LENGTH	18810 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL	
	LENGTH DRILLED	20150 <sup>m</sup>	CORE RECOVERY	93.3%	0 - 100 <sup>m</sup>	91.2%	91.2%				
WORKING TIME (HRS)	DRILLING	165 <sup>20</sup> '	39.2%	36.1%	100 - 200 <sup>m</sup>	95.5%	93.3%				
	HOISTING & LOWERING RODS	1 <sup>25</sup> '	3.4%	3.2%	200 - 300 <sup>m</sup>	93.3%	93.3%				
	HOISTING & LOWERING I.T.	61 <sup>35</sup> '	14.6%	13.4%	EFFICIENCY OF DRILLING						
	MISCELLANEOUS	117 <sup>10</sup> '	27.8%	25.6%	201.50 <sup>m</sup> /WORK PERIOD			8.06 <sup>m</sup> /DAY			
	REPAIRING	24 <sup>30</sup> '	5.8%	5.3%	201.50 <sup>m</sup> /WORKING DAYS			8.40 <sup>m</sup> /DAY			
	OTHERS	39 <sup>00</sup> '	9.2%	8.5%	201.50 <sup>m</sup> /DRILLING PERIOD			9.83 <sup>m</sup> /DAY			
	TOTAL	422 <sup>00</sup> '	100%	92.1%	201.50 <sup>m</sup> /NET DRILLING DAYS			10.33 <sup>m</sup> /DAY			
	REMOVING	PREPARATION	32 <sup>00</sup> '		7.0%						
		MOVING	1 <sup>00</sup> '		0.9%	TOTAL MANSHIFTS/20150 <sup>m</sup>			0.83MANSHIFTS/m		
		GRAND TOTAL	458 <sup>00</sup> '		100%	DRILLING MANSHIFTS/20150 <sup>m</sup>			0.64MANSHIFTS/m		
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED	INSERTED LENGTH DRILLED LENGTH	RECOVERY OF CASINO PIPES		TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.				
	114 <sup>m</sup> /m 5.20 <sup>m</sup>	2.6%	100%		14		152				
	NK 14.50 <sup>m</sup>	7.2%	100%		REMARKS						
	BK 195.40 <sup>m</sup>	97.0%	100%								

Summary Record of Drilling Results by Hole

Table 3-22 Surface No.8

DRILLING PERIODS	TOTAL DAYS		NET WORKING (DAYS)		LAYOFFS		TOTAL MANSHIFTS			
	PREPARATION	6	6				33			
	DRILLING	50	42		8		265			
	REMOVING	2	2				11			
TOTAL	58	50		8		309				
DRILLED LENGTH	PLANNED LENGTH	200 <sup>m</sup>			CORE RECOVERY FOR EACH 100 <sup>m</sup> SECTION					
	INCREASE OR DECREASE IN DRILLED LENGTH	-4577 <sup>m</sup>	CORE LENGTH	10718 <sup>m</sup>	DEPTH OF HOLE	SECT - ION	TOTAL	DEPTH OF HOLE	SECT - ION	TOTAL
	LENGTH DRILLED	15423 <sup>m</sup>	CORE RECOVERY	70.4%	0 - 100 <sup>m</sup>	61.4%	61.4%			
					100 - 200 <sup>m</sup>	84.4%	70.4%			
WORKING TIME (HRS)	DRILLING	111°40'	13.6%	12.9%	200 - 300 <sup>m</sup>					
	HOISTING & LOWERING RODS	28°30'	3.5%	3.3%						
	HOISTING & LOWERING I.T.	93°15'	11.4%	10.7%	EFFICIENCY OF DRILLING					
	MISCELLANEOUS	378°40'	46.3%	43.6%	154.23 <sup>m</sup> /WORK PERIOD			2.66 <sup>m</sup> /DAY		
	REPAIRING	124°25'	15.2%	14.3%	154.23 <sup>m</sup> /WORKING DAYS			3.08 <sup>m</sup> /DAY		
	OTHERS	82°00'	10.0%	9.4%	154.23 <sup>m</sup> /DRILLING PERIOD			3.08 <sup>m</sup> /DAY		
	TOTAL	818°30'	100 %	94.3%	154.23 <sup>m</sup> NET /DRILLING DAYS			3.67 <sup>m</sup> /DAY		
	REMOVING	PREPARATION	43°30'		5.0%					
	MOVING	6°00'		0.7%	TOTAL MANSHIFTS/15423 <sup>m</sup>			200MANSHIFTS/ <sup>m</sup>		
	GRAND TOTAL	868°00'		100 %	DRILLING MANSHIFTS/15423 <sup>m</sup>			1.72MANSHIFTS/ <sup>m</sup>		
CASING PIPE INSERTED	PIPE SIZE & METERAGE INSERTED	INSERTED LENGTH DRILLED	LENGTH	RECOVERY OF CASING PIPES	TIMES OF HOISTING & LOWERING RODS		TIMES OF HOISTING & LOWERING I.T.			
	114 <sup>m</sup> / <sup>m</sup> 9.14 <sup>m</sup>	5.9%		100%	41		187			
	NX 29.41 <sup>m</sup>	19.1%		100%	REMARKS					
	BX 105.77 <sup>m</sup>	68.6%		100%						

Table 3-23 Generalized Results of Diamond Core Drilling

Drill Hole No. Underground	Type of Machine	Total Days	Drilled Length m	Core		Numbers of Drilling Shift			Drilling Speed	
				Length m	Recovery %	Drilling Shift	Casing, etc. Shift	Total Shift	*m/Shift	**m/Shift
No. 1	BBU-2	32	114.38	111.73	77.4	64	1	65	1.76	1.79
No. 2	JV-S	17	116.19	69.52	59.8	34	1	35	3.32	3.42
No. 3	JV-S BBU-2	33	114.21	87.87	76.9	40	31	71	1.61	2.85
No. 4	BBU-2	36	163.45	149.20	91.3	58	1	59	2.77	2.82
No. 5	BBU-2	42	129.90	123.45	95.0	52	2	54	2.41	2.50
No. 6	BBU-2	29	115.75	101.90	88.0	42	12	54	2.14	2.76
No. 7	BBU-2	24	72.15	43.39	60.1	25	5	30	2.41	2.89
No. 9	BBU-2	38	200.00	189.25	94.6	56	3	59	3.39	3.57
No. 10	BBU-2	24	154.96	103.23	66.6	41	2	43	3.60	3.78
No. 11	BBU-2	21	126.52	111.61	88.2	37	4	41	3.09	3.42
No. 12	BBU-2	29.5	121.74	105.72	86.8	42	4	46	2.65	2.90
No. 13	JV-S	23.5	95.95	70.57	73.5	33	4	37	2.59	2.91
No. 14	JV-S	16	123.20	96.51	78.3	32	1	33	3.73	3.85
No. 15	BBU-2 JV-S	23.5	121.95	96.19	78.9	40	2	42	2.90	3.05
No. 16	JV-S	12	67.67	57.43	84.9	19	3	22	3.08	3.56
No. 17	BBU-2	3	25.70	17.55	68.3	6		6	4.28	4.28
Total			1,893.72	1,559.09	84.0	621	76	697	2.72	3.05

Notes: \* Drilled length per one shift covering total works conducted.  
 \*\* Drilled length per one shift covering net drilling operations.

Generalized Results of Diamond Core Drilling

Drill Hole No. Surface	Type of Machine	Total Days	Drilled Length m	Core		Numbers of Drilling Shift			Drilling Speed	
				Length m	Recovery %	Drilling Shift	Casing, etc. Shift	Total Shift	*m/Shift	**m/Shift
No. 1	S-37A	29	200.00	180.95	90.5	44	3	47	4.26	
No. 2	S-37A	51	150.55	123.20	81.8	40	23	63	2.39	3.76
No. 3	S-37A	19.5	201.50	188.10	93.3	32	4	36	5.60	6.30
No. 8	S-17	42	154.23	107.18	70.4	52	22	74	2.08	2.97
Total			706.28	599.43	84.9	168	52	220	3.21	4.20

Notes: \* Drilled length per one shift covering total works conducted.  
 \*\* Drilled length per one shift covering net drilling operations.

Time Distribution in Drilling Works

Table 3-24 Underground No. 1

Working Time & Efficiency Depth of Section	Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I.T.		Miscellaneous		Repairing		Others		Total		Manshifts	
	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Total Man-shifts	Man-shifts/M
0 - 50 m (0 - 50.50 m)	62'25"	1'25"	14'40"	0'17"	21'15"	0'25"	36'10"	0'43"	6'00"	0'07"	27'00"	0'32"	167'30"	3'19"	64.5	1.28
50 - 100 m (50.50 - 100.10 m)	89'15"	1'48"	5'45"	0'07"	59'10"	1'12"	52'20"	1'03"	9'00"	0'11"	28'30"	0'34"	244'00"	4'55"	82	1.65
100 - 150 m (100.10 - 144.38 m)	70'45"	1'36"	66'10"	1'30"	56'35"	1'17"	85'40"	1'56"	6'20"	0'08"	41'30"	0'56"	327'00"	7'23"	109.5	0.25
150 - 200 m ( )																
Total	222'25"	1'32"	86'35"	0'36"	137'00"	0'57"	174'10"	1'13"	21'20"	0'09"	97'00"	0'40"	738'30"	5'07"	256	1.77
	30.1%		11.7%		18.5%		23.6%		2.9%		13.2%		100%			

Time Distribution in Drilling Works

Table 3-25 Underground No. 2

Depth of Section	Working Time & Efficiency	Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I.T.		Miscellaneous		Repairing		Others		Total		Manshifts	
		Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Total man-shifts	Man-shifts/M
0 - 50 m (0 - 50.29 m)		47°20'	0°56'	47°05'	0°56'			35°09'	0°42'	11°00'	0°13'	19°30'	0°23'	160°00'	3°10'	46	0.91
50 - 100 m (50.29 - 102.41 m)		35°00'	0°40'	83°45'	1°36'			42°45'	0°49'	1°30'	0°02'	17°00'	0°20'	180°00'	3°27'	53	1.02
100 - 150 m (102.41 - 116.19 m)		10°51'	0°47'	21°50'	1°35'			16°20'	1°11'			5°00'	0°22'	54°00'	3°55'	12	0.87
150 - 200 m ( )																	
Total		93°10'	0°48'	152°40'	1°19'			94°10'	0°49'	12°30'	0°06'	41°30'	0°21'	394°00'	3°23'	111	0.96
		23.6%		38.7%				23.9%		3.2%		10.6%		100%			

Time Distribution in Drilling Works

Table 3-26 Underground No. 3

Depth of Section	Working Time & Efficiency		Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I.T.		Miscellaneous		Repairing		Others		Total		Manshifts	
	Working Time	Efficiency	Working Time/M	Time	Working Time/M	Time	Working Time/M	Time	Working Time/M	Time	Working Time/M	Time	Working Time/M	Time	Working Time/M	Time	Total Man-shifts	Man-shifts/M
0 - 50 m (0 - 49.56 m)	34°30'		0°42'	50°30'	1°01'				72°30'	1°28'	1°00'	0°01'	27°30'	0°33'	186°00'	3°45'	79.5	1.60
50 - 100 m (49.56 - 98.05 m)	28°25'		0°35'	78°10'	1°37'				135°25'	2°47'	56°30'	1°10'	31°30'	0°39'	330°00'	6°48'	103	2.12
100 - 150 m (98.05 - 114.21 m)	9°15'		0°34'	43°45'	2°42'				50°00'	3°07'	12°30'	0°46'	13°00'	0°48'	128°30'	7°57'	39	2.41
150 - 200 m ( )																		
Total	72°10'		0°38'	172°25'	1°30'				257°55'	2°15'	70°00'	0°37'	72°00'	0°38'	644°30'	5°38'	221.5	1.94
	11.2%			26.7%					40.0%		10.9%		11.2%		100%			

Time Distribution in Drilling Works

Table 3-27 Underground No. 4

Depth of Section	Working Time & Efficiency		Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I.F.		Miscellaneous		Repairing		Others		Total		Manshifts	
	Working Time	Efficiency	Working Time/M	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Total Man-shifts	Man-shifts/M
0 - 50 m (0 - 49.85 m)	54°20'		1°05'	0°37'	30°40'				27°40'	0°33'	7°30'	0°09'	15°00'	0°18'	135°00'	2°42'	54.5	1.09
50 - 100 m (49.85 - 98.80 m)	45°50'		0°56'	1°27'	79°15'			46°25'	0°57'	10°30'	0°13'	25°00'	0°31'	207°00'	4°14'	89.5	1.83	
100 - 150 m (98.80 - 150.55 m)	46°10'		0°53'	1°14'	64°05'			25°00'	0°29'				22°45'	0°26'	158°00'	3°03'	60	1.16
150 - 200 m (150.55 - 163.45 m)	12°00'		0°56'	1°24'	20°20'			15°55'	1°14'				12°00'	0°56'	116°00'	8°59'	40	3.10
Total	158°10'		0°58'	1°13'	194°20'			115°00'	0°42'	73°45'	0°27'	74°45'	0°27'	616°00'	30°47'	244	1.49	
	25.7%		31.5%					18.7%		12.0%		12.1%		100%				



Time Distribution in Drilling Works

Table 3-28. Underground No. 5

Depth of Section	Working Time & Efficiency		Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I.T.		Miscellaneous		Repairing		Others		Total		Man-shifts	
	Working Time	Efficiency	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Total Man-shifts	Man-shifts/M
0 - 50 m (0 - 49.20 m)	33°05'		33°05'	0°40'	49°15'	1°00'			21°40'	0°26'	29°00'	0°35'	60°00'	1°13'	193°00'	3°55'	79	1.61
50 - 100 m (49.20 - 101.05 m)	38°45'		38°45'	0°43'	51°55'	1°00'			42°30'	0°49'	13°00'	0°15'	23°50'	0°27'	170°00'	3°17'	72	1.39
100 - 150 m (101.05 - 129.40 m)	24°15'		24°15'	0°51'	54°15'	1°54'			95°20'	3°21'	49°00'	1°45'	30°40'	1°05'	253°30'	8°56'	104	3.67
150 - 200 m ( )																		
Total	96°05'		96°05'	0°45'	155°25'	1°12'			159°30'	1°14'	91°00'	0°42'	114°30'	0°53'	616°30'	4°46'	255	1.97
	15.6%				25.2%				25.8%		14.9%		18.6%		100%			

Time Distribution in Drilling Works

Table 3-29 Underground No. 6

Depth of Section	Working Time & Efficiency	Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I.R.		Miscellaneous		Repairing		Others		Total		Manshifts	
		Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M
0 - 50 m (0 - 50.80 m)		52°50'	1°01'	26°00'	0°31'			22°20'	0°26'	5°50'	0°07'	19°00'	0°22'	126°00'	2°29'	50	0.98
50 - 100 m (50.80 - 100.70 m)		56°10'	1°08'	77°50'	1°33'			35°10'	0°42'	8°20'	0°10'	27°30'	0°33'	205°00'	4°06'	72	1.44
100 - 150 m (100.70 - 115.75 m)		13°25'	0°53'	39°35'	2°38'			30°00'	1°59'	93°00'	6°11'	24°00'	1°36'	200°00'	13°17'	80	5.35
150 - 200 m ( )																	
Total		122°25'	1°03'	143°25'	1°15'			87°30'	0°45'	107°10'	0°56'	70°30'	0°36'	531°00'	4°35'	202	1.75
		23.1%		27.0%				16.5%		20.2%		13.2%		100%			

Time Distribution in Drilling Works

Table 3-30 Underground No. 7

Depth of Section	Working Time & Efficiency	Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I.T.		Miscellaneous		Repairing		Others		Total		Manshifts	
		Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M
0 - 50 m (0 - 49.77 m)		33 <sup>00</sup> 25'	0 <sup>00</sup> 40'	48 <sup>00</sup> 30'	0 <sup>00</sup> 58'	9 <sup>00</sup> 50'	0 <sup>00</sup> 12'	112 <sup>00</sup> 30'	2 <sup>00</sup> 17'	43 <sup>00</sup> 45'	0 <sup>00</sup> 53'	31 <sup>00</sup> 30'	0 <sup>00</sup> 38'	279 <sup>00</sup> 30'	5 <sup>00</sup> 37'	87	1.75
50 - 100 m (49.77 - 72.15 m)		11 <sup>00</sup> 00'	0 <sup>00</sup> 29'	47 <sup>00</sup> 00'	2 <sup>00</sup> 06'			63 <sup>00</sup> 15'	2 <sup>00</sup> 50'	1 <sup>09</sup> 015'	4 <sup>00</sup> 53'	23 <sup>00</sup> 00'	1 <sup>00</sup> 02'	253 <sup>00</sup> 30'	11 <sup>00</sup> 20'	78	3.49
100 - 150 m ( )																	
150 - 200 m ( )																	
Total		44 <sup>00</sup> 25'	0 <sup>00</sup> 37'	95 <sup>00</sup> 30'	1 <sup>00</sup> 19'	9 <sup>00</sup> 50'	0 <sup>00</sup> 08'	175 <sup>00</sup> 45'	2 <sup>00</sup> 26'	153 <sup>00</sup> 00'	2 <sup>00</sup> 07'	54 <sup>00</sup> 30'	0 <sup>00</sup> 45'	533 <sup>00</sup> 00'	7 <sup>00</sup> 23'	165	2.29
		8.3%		17.9%		1.8%		33.0%		28.8%		10.2%		100%			

Time Distribution in Drilling Works

Table 3-31 Underground No. 9

Depth of Section	Working Time & Efficiency	Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I.T.		Miscellaneous		Repairing		Others		Total		Manshifts	
		Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Total	Man-shifts /M
0 - 50 m (0 - 50.25 m)		18'00"	0'21"	24'50"	0'30"			6'20"	0'08"	2'00"	0'02"	41'50"	0'50"	93'00"	1'51"	37	0.76
50 - 100 m (50.25 - 101.00 m)		25'20"	0'30"	50'30"	1'00"			29'10"	0'34"	38'30"	0'45"	60'30"	1'01"	204'00"	4'01"	79	1.56
100 - 150 m (101.00 - 151.40 m)		32'45"	0'39"	63'20"	1'15"			35'10"	0'42"	35'00"	0'42"	20'45"	0'25"	187'00"	3'43"	72	1.43
150 - 200 m (151.40 - 200 m)		46'30"	0'57"	76'50"	1'35"			41'10"	0'51"	8'00"	0'10"	21'00"	0'26"	193'30"	3'59"	67	1.38
Total		122'35"	0'37"	215'30"	1'04"			111'51"	0'34"	83'30"	0'25"	144'05"	0'43"	677'30"	3'23"	255	1.28
		18.1%		31.8%				16.5%		12.3%		21.3%		100%			

Time Distribution in Drilling Works

Table 3-32 Underground No.10

Depth of Section	Working Time & Efficiency	Drilling		Hoisting & Lowering Load		Hoisting & Lowering I.T.		Miscellaneous		Repairing		Others		Total		Manshifts	
		Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M
0 - 50 m (0 - 51.18 m)		39 <sup>20</sup>	0 <sup>46</sup>	39 <sup>35</sup>	0 <sup>46</sup>			19 <sup>05</sup>	0 <sup>22</sup>	1 <sup>00</sup>	0 <sup>01</sup>	17 <sup>00</sup>	0 <sup>21</sup>	116 <sup>00</sup>	2 <sup>16</sup>	45	0.88
50 - 100 m (51.18 - 101.50 m)		37 <sup>40</sup>	0 <sup>45</sup>	10 <sup>20</sup>	0 <sup>12</sup>	40 <sup>40</sup>	0 <sup>48</sup>	40 <sup>35</sup>	0 <sup>48</sup>	18 <sup>45</sup>	0 <sup>22</sup>	20 <sup>00</sup>	0 <sup>24</sup>	168 <sup>00</sup>	3 <sup>20</sup>	70	1.39
100 - 150 m (101.50 - 154.96 m)		37 <sup>30</sup>	0 <sup>42</sup>	19 <sup>00</sup>	0 <sup>21</sup>	57 <sup>10</sup>	1 <sup>04</sup>	94 <sup>30</sup>	1 <sup>46</sup>	2 <sup>30</sup>	0 <sup>02</sup>	20 <sup>00</sup>	0 <sup>22</sup>	230 <sup>40</sup>	4 <sup>19</sup>	70	1.31
150 - 200 m ( )																	
Total		114 <sup>30</sup>		68 <sup>55</sup>		97 <sup>50</sup>		154 <sup>10</sup>		22 <sup>15</sup>		57 <sup>00</sup>		514 <sup>40</sup>		185	1.19
		22.2%		13.4%		19.2%		29.9%		4.3%		11.0%		100%			

Time Distribution in Drilling Works

Table 3-33 Underground No.11

Depth of Section	Working Time & Efficiency	Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I.T.		Miscellaneous		Repairing		Others		Total		Manshifts	
		Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M
0 - 50 m (0 - 50.84 m)		32'15"	0'38"	32'00"	0'38"			21'45"	0'26"	2'00"	0'02"	25'30"	0'30"	113'30"	2'14"	41	0.81
50 - 100 m (50.84 - 100.31 m)		38'00"	0'46"	77'00"	1'33"			60'00"	1'13"	10'00"	0'12"	22'30"	0'27"	207'00"	4'11"	62	1.25
100 - 150 m (100.31 - 126.52)		16'00"	0'27"	51'45"	1'58"			62'15"	2'22"	1'30"	0'03"	19'30"	0'45"	151'00"	5'46"	39	1.49
150 - 200 m ( )																	
Total		86'15"	0'41"	160'45"	1'16"			144'00"	1'08"	13'30"	0'06"	67'30"	0'32"	472'00"	3'43"	142	1.12
		18.3%		34.0%				30.5%		2.9%		14.3%		100%			

Time Distribution in Drilling Works

Table 3-24 Underground No.12

Depth of Section	Working Time & Efficiency	Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I.T.		Miscellaneous		Repairing		Others		Total		Manshifts	
		Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Total	Time/M
0 - 50 m (0 51.05 m)		43°30'	0°51'	47°05'	0°55'			39°55'	0°47'	10°00'	0°12'	30°15'	0°35'	170°45'	3°20'	64	1.25
50 - 100 m (51.05 - 101.16 m)		38°50'	0°46'	73°30'	1°28'			41°40'	0°50'			40°00'	0°48'	194°00'	3°52'	59	1.12
100 - 150 m (101.16 - 121.74 m)		15°40'	0°46'	39°05'	1°54'			44°00'	2°08'	8°30'	0°25'	26°45'	1°18'	134°00'	6°31'	43	2.09
150 - 200 m ( )																	
Total		98°00'	0°48'	159°40'	1°19'			125°35'	1°02'	18°30'	0°09'	97°00'	0°48'	498°45'	4°06'	166	1.36

Time Distribution in Drilling Works

Table 3-35 Underground No.13

Depth of Section	Working Time & Efficiency	Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I. T.		Miscellaneous		Repairing		Others		Total		Manshifts		
		Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Total Man-shifts
0 - 50 m (0 - 50.02 m)		39°35'	0°47'	63°40'	1°16'			38°30'	0°46'	7°30'	0°09'	30°45'	0°37'	180°00'	3°35'		66	1.32
50 - 100 m (50.02 - 95.95 m)		33°55'	0°44'	62°45'	1°22'			83°35'	1°49'	7°15'	0°09'	24°00'	0°31'	211°30'	4°35'		74	1.61
100 - 150 m ( )																		
150 - 200 m ( )																		
Total		73°30'	0°46'	126°25'	1°19'			122°05'	1°16'	14°45'	0°09'	54°45'	0°34'	391°30'	4°04'		140	1.46
		19.0%		32.2%				31.1%		3.7%		14.0%		100%				



Time Distribution in Drilling Works

Table 3-36 Underground No.14

Working Time & Efficiency	Drilling		Hoisting & Lowering Rod		Hoisting & Lowering L.T.		Miscellaneous		Repairing		Others		Total		Manshifts	
	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Total Man-shifts	Man-shifts/M
0 - 50 m (0 - 50.22 m)	42'10"	0'50"	59'15"	1'11"			34'35"	0'41"	4'00"	0'05"	18'00"	0'20"	158'00"	3'07"	51	1.01
50 - 100 m (50.22 - 99.24 m)	30'00"	0'37"	68'30"	1'24"			19'15"	0'24"			14'15"	0'17"	132'00"	2'42"	38	0.78
100 - 150 m (99.24 - 123.20 m)	14'35"	0'36"	38'40"	1'37"			16'00"	0'40"			9'15"	0'23"	78'30"	3'16"	21	0.88
150 - 200 m ( )																
Total	86'45"	0'42"	166'05"	1'21"			69'50"	0'34"	4'00"	0'02"	41'30"	0'20"	368'30"	2'59"	110	0.89
	23.5%		45.2%				18.9%		1.1%		11.2%		100%			

Time Distribution in Drilling Works

Table 3-37 Underground No.15

Depth of Section	Working Time & Efficiency	Drilling		Hoisting & Lowering Rod		Hoisting & Lowering Lm		Miscellaneous		Repairing		Others		Total		Manshifts	
		Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M
0 - 50 m (0 - 52.21 m)		49°15'	0°56'	61°20'	1°05'			41°50'	0°48'	26°35'	0°31'	31°30'	0°36'	210°30'	3°56'	71	0.74
50 - 100 m (52.21 - 98.88 m)		36°00'	0°46'	61°45'	1°19'			31°30'	0°40'			18°45'	0°24'	148°00'	3°10'	46	1.01
100 - 150 m (98.88 - 121.95 m)		14°30'	0°38'	33°45'	1°28'			30°00'	1°18'	1°00'	0°03'	11°45'	0°31'	91°00'	3°57'	28	0.82
150 - 200 m ( )																	
Total		99°45'	0°49'	156°50'	1°17'			109°20'	0°51'	27°35'	0°14'	62°00'	0°31'	449°30'	3°41'	145	0.84
		22.2%		34.9%				23.0%		6.1%		13.8%		100%			

Time Distribution in Drilling Works

Table 3-38 Underground No. 16

Depth of Section	Working Time & Efficiency		Drilling		Hoisting & Lowering Rod		Hoisting & Lowering		Miscellaneous		Repairing		Others		Total		Manshifts	
	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Total Man-shifts	Man-shifts /M
0 - 59 m (0 - 48.52 m)	39'00"	0'48"	42'40"	0'53"			58'50"	1'13"	2'00"	0'02"	14'00"	0'17"	156'30"	2'13"	50	0.97		
50 - 100 m (48.52 - 67.67 m)	11'50"	0'37"	24'40"	1'17"			37'00"	1'56"			8'00"	0'25"	81'30"	4'01.5"	25	0.77		
100 - 150 m ( )																		
150 - 200 m ( )																		
Total	50'50"	0'45"	67'20"	1'00"			95'50"	1'25"	2'00"	0'02"	22'00"	0'20"	238'00"	3'31"	75	0.90		
	21.3%		28.5%				40.3%		0.8%		9.3%		100%					

Time Distribution in Drilling Works

Table 3-39 Underground No. 17

Depth of Section	Working Time & Efficiency		Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I. T.		Miscellaneous		Repairing		Others		Total		Man-shifts		
	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Total	Man-shifts /M	
0 - 50 m (0 25.70 m)	18'40"	0'44"	11'50"	0'28"	16'45"	0'39"	3'45"	0'09"	0'21"	60'00"	2'20"	21	1.22						
50 - 100 m ( )																			
100 - 150 m ( )																			
150 - 200 m ( )																			
Total	18'40"	0'44"	11'50"	0'28"	16'45"	0'39"	3'45"	0'09"	0'21"	60'00"	2'20"	21	1.22	31.1%	19.7%	27.9%	6.3%	15.0%	100%

Time Distribution in Drilling Works

Table 3-40 Surface No. 1

Depth of Section	Working Time & Efficiency		Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I. T.		Miscellaneous		Repairing		Others		Total		Manshifts	
	Working Time	Efficiency	Working Time/M	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Total Man-shifts	/M
0 - 50 m (0 - 55.50 m)	51 <sup>0</sup> 45'		0 <sup>0</sup> 56'	8 <sup>0</sup> 00'	0 <sup>0</sup> 09'	17 <sup>0</sup> 00'	0 <sup>0</sup> 18'	77 <sup>0</sup> 30'	1 <sup>0</sup> 24'	4 <sup>0</sup> 00'	0 <sup>0</sup> 04'	29 <sup>0</sup> 45'	0 <sup>0</sup> 32'	188 <sup>0</sup> 00'	3 <sup>0</sup> 23'	60	1.08	
50 - 100 m (55.50 - 100.95)	56 <sup>0</sup> 45'		1 <sup>0</sup> 15'	5 <sup>0</sup> 00'	0 <sup>0</sup> 07'	20 <sup>0</sup> 30'	0 <sup>0</sup> 27'	19 <sup>0</sup> 45'	0 <sup>0</sup> 26'	3 <sup>0</sup> 00'	0 <sup>0</sup> 04'	11 <sup>0</sup> 00'	0 <sup>0</sup> 14'	116 <sup>0</sup> 00'	2 <sup>0</sup> 33'	40	0.88	
100 - 150 m (100.95 - 148.60 m)	39 <sup>0</sup> 00'		0 <sup>0</sup> 49'	11 <sup>0</sup> 00'	0 <sup>0</sup> 14'	23 <sup>0</sup> 30'	0 <sup>0</sup> 29'	64 <sup>0</sup> 30'	1 <sup>0</sup> 21'			14 <sup>0</sup> 00'	0 <sup>0</sup> 18'	152 <sup>0</sup> 00'	3 <sup>0</sup> 11'	55.5	1.16	
150 - 200 m (148.60 - 200)	42 <sup>0</sup> 10'		0 <sup>0</sup> 49'	5 <sup>0</sup> 00'	0 <sup>0</sup> 06'	24 <sup>0</sup> 20'	0 <sup>0</sup> 28'	22 <sup>0</sup> 30'	0 <sup>0</sup> 26'	1 <sup>0</sup> 00'	0 <sup>0</sup> 01'	10 <sup>0</sup> 00'	0 <sup>0</sup> 12'	105 <sup>0</sup> 00'	2 <sup>0</sup> 02'	36.5	0.71	
Total	189 <sup>0</sup> 40'		0 <sup>0</sup> 57'	29 <sup>0</sup> 00'	0 <sup>0</sup> 09'	85 <sup>0</sup> 20'	0 <sup>0</sup> 26'	184 <sup>0</sup> 15'	0 <sup>0</sup> 55'	8 <sup>0</sup> 00'	0 <sup>0</sup> 02'	64 <sup>0</sup> 45'	0 <sup>0</sup> 19'	561 <sup>0</sup> 00'	2 <sup>0</sup> 48'	192	0.96	
	33.8%		5.2%		15.2%		32.8%		1.5%			11.5%		100%				

Time Distribution in Drilling Works

Table 3-41 Surface No. 2

Depth of Section	Working Time & Efficiency	Drilling		Hoisting & Lowering Rod		Hoisting & Lowering L. I. T.		Miscellaneous		Repairing		Others		Total		Manshifts Total Man-shifts /M	
		Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M		
0 - 50 m (0 - 53.30 m)		61°45'	1°09'	13°30'	0°14'	10°45'	0°11'	71°45'	1°27'	109°15'	2°02'	27°00'	0°29'	294°00'	5°32'	110.5	2.07
50 - 100 m (53.30 - 98.30 m)		46°15'	1°02'	13°15'	0°18'	20°10'	0°27'	131°50'	2°56'	113°30'	2°31'	32°00'	0°42'	357°00'	7°56'	134.5	2.99
100 - 150 m (98.30 - 150.55 m)		49°25'	0°57'	7°30'	0°09'	23°20'	0°27'	78°45'	1°30'	112°00'	2°09'	37°00'	0°42'	308°00'	5°54'	153.5	2.93
150 - 200 m ( )																	
Total		157°25'	1°03'	34°15'	0°14'	54°15'	0°22'	282°20'	1°52'	334°45'	2°13'	96°00'	0°38'	959°00'	6°22'	398.5	2.65
		16.4%		3.6%		5.6%		29.4%		35.0%		10.0%		100%			

Time Distribution in Drilling Works

Table 3-42 Surface No. 3

Working Time & Efficiency	Drilling	Hoisting & Lowering Rod		Hoisting & Lowering I. T.		Miscellaneous		Repairing		Others		Total		Manshifts			
		Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Total Man-shifts /M	
0 - 50 m (0 - 53.90 m)	46°20'	0°52'	1°25'	0°02'	0°02'	9°20'	0°10'	21°55'	0°24'			11°00'	0°12'	90°00'	1°40'	23.5	0.44
50 - 100 m (53.90 - 102.05 m)	35°00'	0°46'	2°00'	0°02'	0°02'	12°00'	0°15'	17°00'	0°21'			6°00'	0°07'	72°00'	1°30'	24.5	0.51
100 - 150 m (102.05 - 152.70 m)	36°15'	0°43'	1°00'	0°01'	0°01'	18°45'	0°22'	10°00'	0°12'			6°00'	0°07'	72°00'	1°25'	22.5	0.44
150 - 200 m (152.70 - 201.50)	47°45'	0°58'	10°00'	0°12'	0°12'	21°30'	0°26'	68°15'	1°23'	24°30'	0°30'	16°00'	0°19'	188°00'	3°48'	58.5	1.18
Total	165°20'	0°49'	14°25'	0°04'	0°04'	61°35'	0°18'	117°10'	0°35'	24°30'	0°07'	39°00'	0°12'	422°00'	2°06'	129	0.64
	39.2%		3.4%			14.6%		27.8%		5.8%		9.2%		100%			

Time Distribution in Drilling Works

Table 3-43 Surface No. 8

Working Time & Efficiency Depth of Section	Drilling		Hoisting & Lowering Rod		Hoisting & Lowering I. T.		Miscellaneous		Repairing		Others		Total		Manshifts	
	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Working Time	Time/M	Total Man-shifts	Man-shifts /M
0 - 50 m (0 48.80 m)	36 <sup>00</sup>	0 <sup>44</sup>	10 <sup>30</sup>	0 <sup>13</sup>	20 <sup>15</sup>	0 <sup>25</sup>	80 <sup>55</sup>	3 <sup>26</sup>	1 <sup>39</sup>	41 <sup>00</sup>	0 <sup>50</sup>	356 <sup>00</sup>	7 <sup>17</sup>	122	2.50	
50 - 100 m (48.80 - 99.00 m)	33 <sup>50</sup>	0 <sup>40</sup>	11 <sup>00</sup>	0 <sup>13</sup>	34 <sup>40</sup>	0 <sup>41</sup>	36 <sup>00</sup>	2 <sup>39</sup>	0 <sup>43</sup>	24 <sup>00</sup>	0 <sup>29</sup>	272 <sup>30</sup>	5 <sup>25</sup>	90	1.79	
100 - 150 m (99.00 - 154.23 m)	41 <sup>50</sup>	0 <sup>45</sup>	7 <sup>00</sup>	0 <sup>08</sup>	38 <sup>20</sup>	0 <sup>42</sup>	7 <sup>30</sup>	1 <sup>25</sup>	0 <sup>08</sup>	17 <sup>00</sup>	0 <sup>18</sup>	190 <sup>00</sup>	3 <sup>26</sup>	53	0.96	
150 - 200 m ( )																
Total	111 <sup>40</sup>	0 <sup>43</sup>	28 <sup>30</sup>	0 <sup>11</sup>	93 <sup>15</sup>	0 <sup>36</sup>	124 <sup>25</sup>	2 <sup>27</sup>	0 <sup>49</sup>	82 <sup>00</sup>	0 <sup>32</sup>	818 <sup>30</sup>	5 <sup>18</sup>	265	1.72	
	13.6%		3.5%		11.4%		46.3%		15.2%		10.0%	100%				



**APPENDICES**  
**(Geological Data)**

## APPENDICES

### GEOLOGY

- A-1 List of Rock Samples
- A-2 Locality Map of Rock Samples on Level 3,500 m, Michiquillay Ore Deposit
- A-3 List of Microphotographs Thin Sections
- A-4 List of Microphotographs Polished sections
- A-5 Chart of Xray Diffraction Analysis
- A-6 Photographs of Fossils
- A-7 Flowsheet of Preparation of Assay Samples
- A-8 Flowsheet of Chemical Analysis
- A-9 Comparison of Ore Grades between Crosscut No.1 and Underground Drill Hole No.4
- A-10 Comparison of Assays between C.R.L. and Plenge C.R.L. :

Central Research Laboratory of Mitsui Mining and Smelting Co., Tokyo.

**A-1 List of Rock Samples**

Sample No.	Location	Formation	Rock	Thin Section	Polished section	Chemical analysis		X-ray analysis	Fossil	Remarks
						Rock	Ore			
3101	Cross cut No.1		qtz monzonite porphyry	o	o			o		
3102			"	o	o			o		
3103			"	o	o					
3104			"	o	o					
1432			"	o	o		o			
1818			"	o	o		o			
3201	Cross cut No.2		qtz monzonite porphyry	o	o			o		
3202			"	o	o			o		
3203			"	o	o					
3204			"	o	o					
3205			"	o	o				o	
3206			"	o	o			o		
2508	"	o	o			o				
3301	Cross cut No.3		qtz monzonite porphyry	o	o					
3302			"	o	o					
3303			"	o	o				o	
3304			"	o	o				o	
3305			"	o	o				o	
3306			"	o	o				o	
3515	"	o	o				o			

qtz : quartz

Sample No.	Location	Formation	Rock	Thin section	Polished section	Chemical analysis		X-ray analysis	Fossil	Remarks
						Rock	Ore			
3401			qtz monzonite porphyry	o	o					
3402			"	o	o			o		
3403			"	o	o			o		
3404			"	o	o			o		
3405			"	o	o					
5221	Cross cut No. 4-A		qtz monzonite porphyry	o	o	o	o			
4501	No. 5		qtz monzonite porphyry	o	o					
4601	No. 6		"	o	o					
4701	No. 7		"	o	o					
2821	Surface Boring No. 8		qtz monzonite porphyry	o	o					
2822			"	o	o					
2102	Surface		sandstone / magnetite	o	o					
2103	Boring		magnetite	o	o					
2104	No. 1		porphyrite	o						
2201	Surface	Inca	andestic sandy tuff	o						
2202	Boring	"	shale with sandstone	o						
2203	No. 2	"	black shale (tuff)	o						
2301	Surface		porphyrite	o						
2302	Boring		qtz monzonite porphyry	o						
2303	No. 3		"	o						

qtz : quartz

Sample No.1	Location	Formation	Rock	Thin section	Polished section	Chemical analysis		X-ray analysis	Fossil	Remarks
						Rock	Ore			
2304	Surface Boring No.3		qtz monzonite porphyry	o						
2305			"	o						
2306			"	o						
2307			"	o						
0401A			qtz monzonite porphyry	o						
0401B		Inca	silicified rock	o						
0401C		"	"							
0402A		"	shale							
0402B		"	"							
0402C		"	quartzite							
0402D		"	shale							
0402E		"	"							
0402F		"	sandy shale							
0403		"	shale							
0601		Chulec	limestone & skarn	o						
0602		"	garnet skarn							
0901		Inca	quartzite & skarn							
1001			monz. & shale contact	o						
1002			qtz monzonite porphyry	o						
0201		Inca	shale	o						

qtz : quartz

monz : monzonite

Sample No.	Location	Formation	Rock	Thin section	Polished section	Chemical analysis		X-ray analysis	Fossil	Remarks	
						Rock	Ore				
0202	Magnetite Hill	Inca	qtz monzonite porphyry	o							
0203			"		o						
0204			shale			o					
0205			monz. with xenolith			o					
3000			qtz monzonite porphyry			o					
2801	Western Valley	Inca	shale								
2802		Goyaris-quizga	quartzite								
2803		"	quartzite & shale								
2804		"	quartzite								
2805			qtz monzonite porphyry		o						
2806			"		o						
2807			Gossan								
2808	Western Valley	Chulec	qtz monzonite porphyry								
2809			"								
2810			limestone								
2811			qtz monzonite porphyry								
2812			"			o					
2813			sandstone								
2901	Inca	Inca	qtz monzonite porphyry								
2902			magnetite		o						

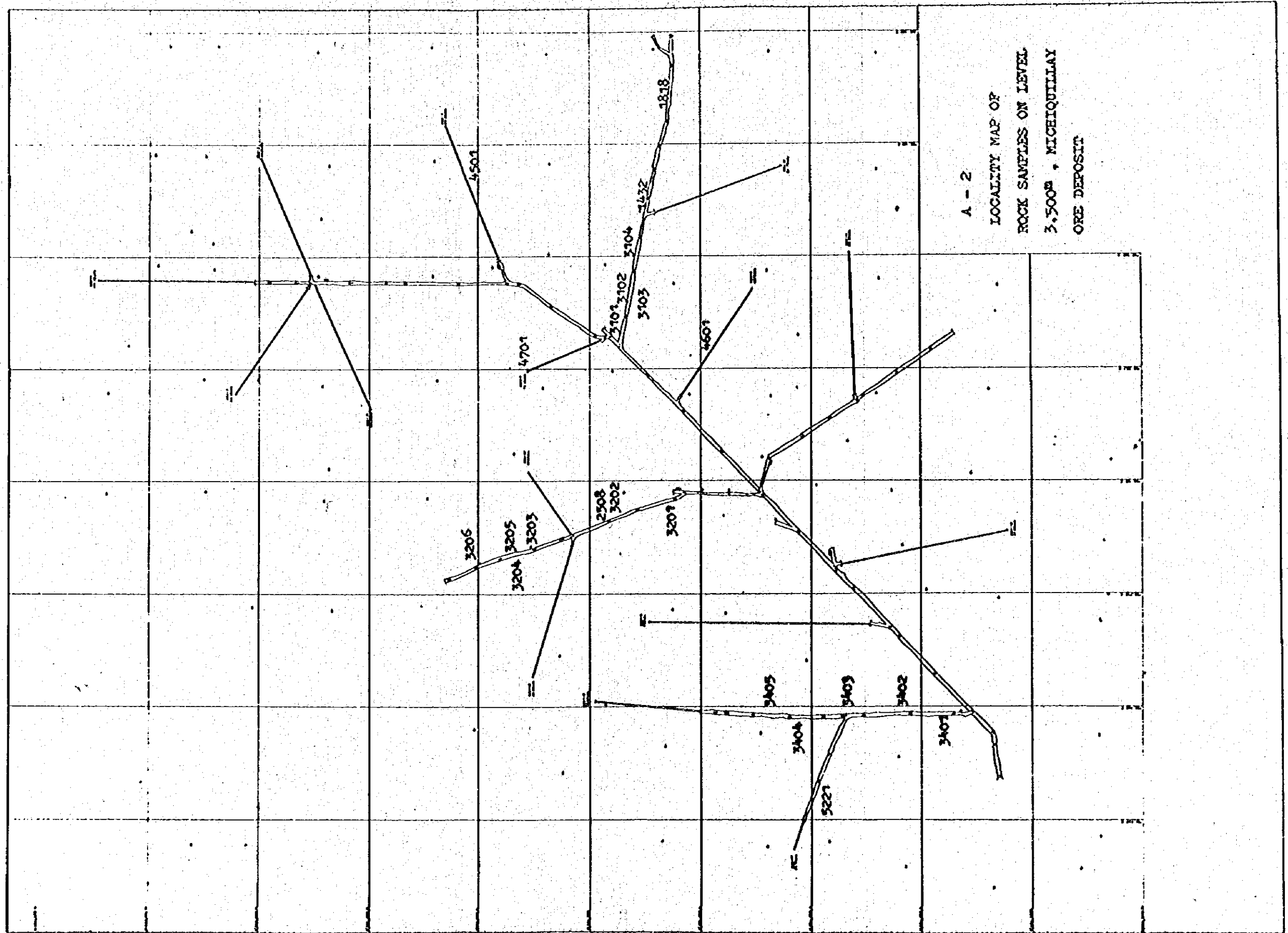
qtz : quartz

monz : monzonite

Sample No.	Location	Formation	Rock	Thin section	Polished section	Chemical analysis		X-ray analysis	Fossil	Remarks
						Rock	Ore			
2903	Western Valley	Inca	gossan							
2904		"	sandy shale	◊						
1001		"	"							
2905		"	brecciated shale	◊						
1002		"	"							
1301	Western Valley	Goyaris-Quizga	sandstone							
1302		Chulec	limestone							
1303		Inca	fossile						◊	
1304			porphyrite							
1305		Inca	fossile		◊				◊	
1306		Chulec	"						◊	
2905	Eastern Valley (Celendin R.)	Chulec	fossile						◊	
2906		"	"						◊	
2907		"	andesite tuff		◊					
3001		"	fossile						◊	
3002		"	"						◊	
3003		"	"						◊	



A-2      **Locality Map of Rock Samples on Level 3,500 m,  
Michiquillay Ore Deposit**



A - 2  
LOCALITY MAP OF  
ROCK SAMPLES ON LEVEL  
3,500M, MICHIQUILLAY  
ORE DEPOSIT

A-3 List of Microphotographs

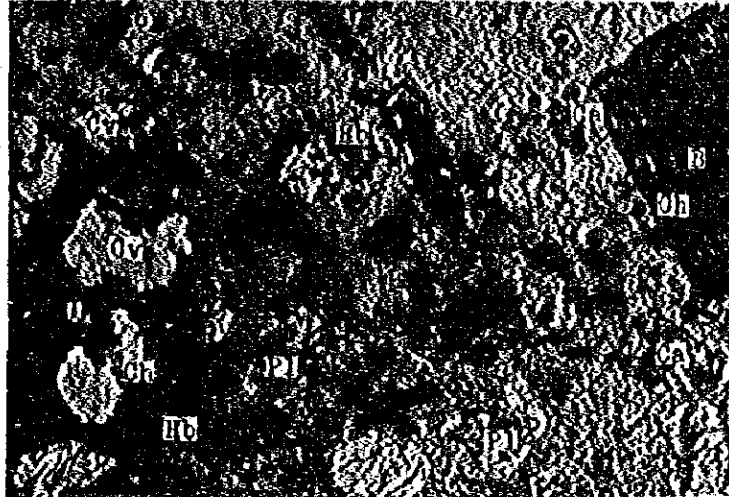
Thin Sections

	Sample No.	Rock Name	Location
(1)	2805	hornblende quartz monzonite porphyry	western valley
(2)	2307	"	surface boring No.3
(3)	2821	biotite quartz monzonite porphyry	surface boring No.8
(4)	1818	"	crosscut No.1
(5)	1432	"	crosscut No.1
(6)	3202	"	crosscut No.2
(7)	5221	"	crosscut No.4-A
(8)	5221	"	"
(9)	3101	"	crosscut No.1
(10)	3515	"	crosscut No.3
(11)	3515	"	crosscut No.3

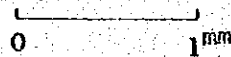
Sample No. 2805

Location: western valley

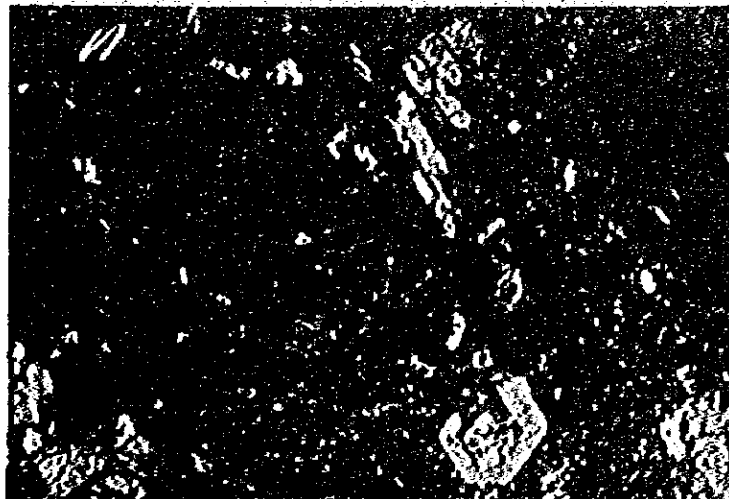
Rock Name: hornblende quartz monzonite porphyry



opened nicol



Hb: hornblende  
Pl: plagioclase  
Ca: calcite  
Ch: chlorite  
B : green biotite  
Ap: apatite  
Cv: cavity

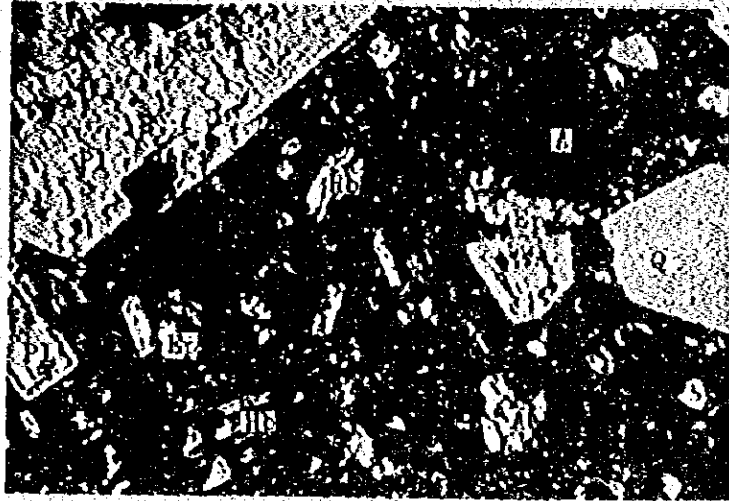


crossed nicols



Sample No. 2307

Location: surface boring No. 3  
Rock Name: hornblende quartz monzonite porphyry



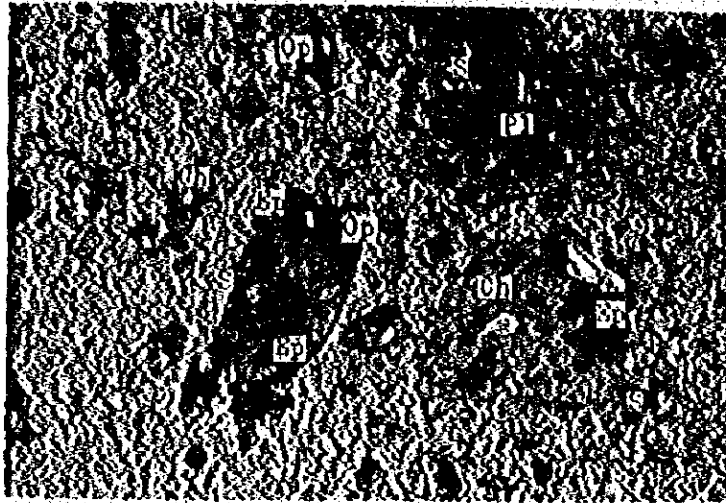
crossed nicols

Hb: hornblende  
Q : quartz  
Pl: plagioclase  
Epi: epidote  
A : antiperthite

0 ————— 1 mm

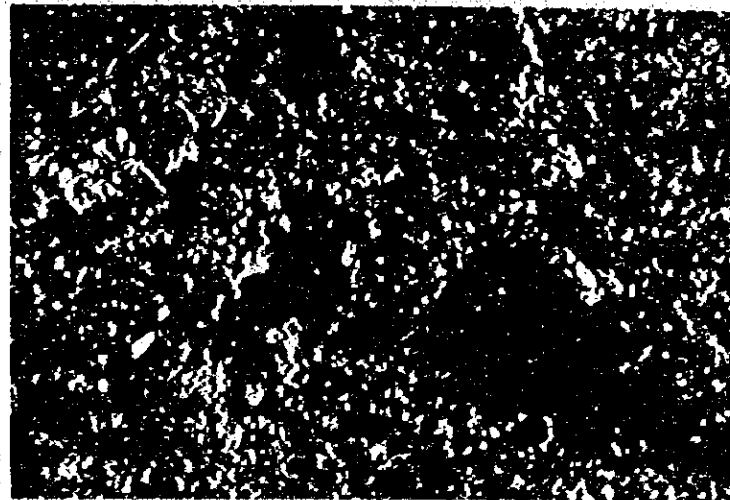
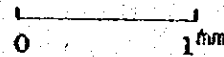
Sample No. 2821

Location: surface boring No. 8

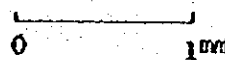


opened nicol

Ch: chlorite  
Ep: epidote  
S: siderite  
Pl: plagioclase  
Op: opaque



crossed nicols

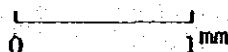


Sample No.1818

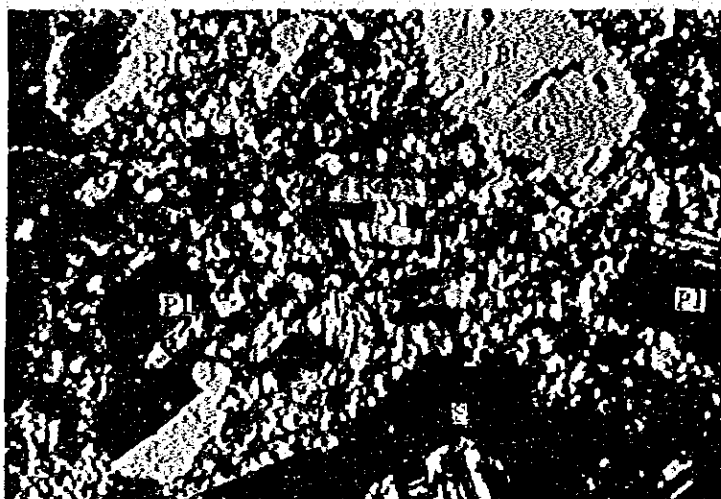
Location: crosscut No.1



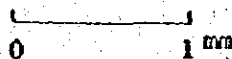
opened nicol



B : biotite  
Pl : plagioclase  
S : sericite

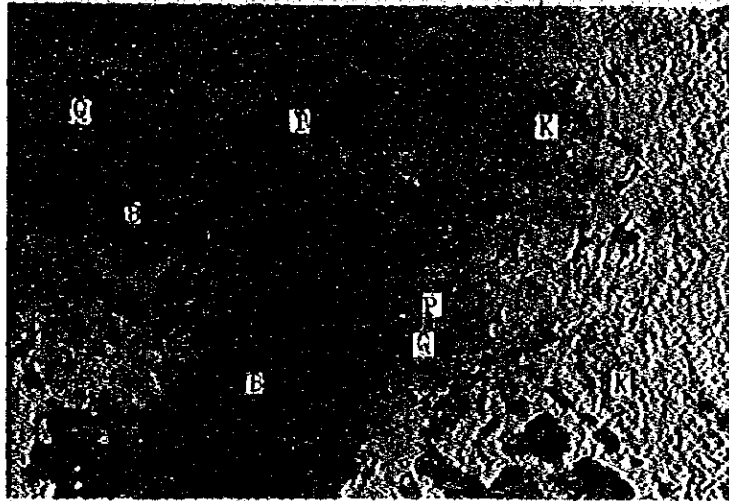


crossed nicols



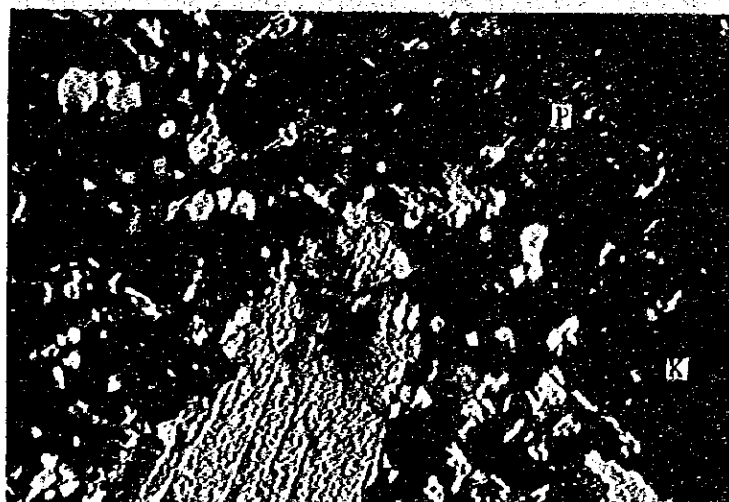
Sample No.1432

Location: crosscut No.1



B : biotite  
K : orthoclase  
P : perthite  
Q : quartz

0 0.5mm



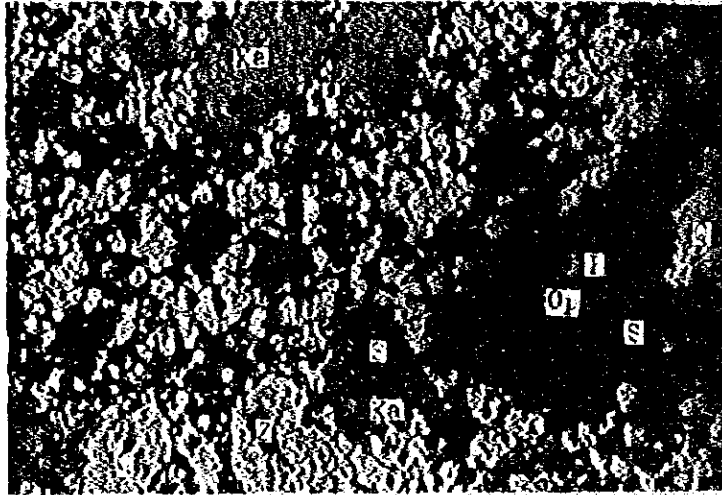
crossed nicols

0 0.5mm



Sample No.3202

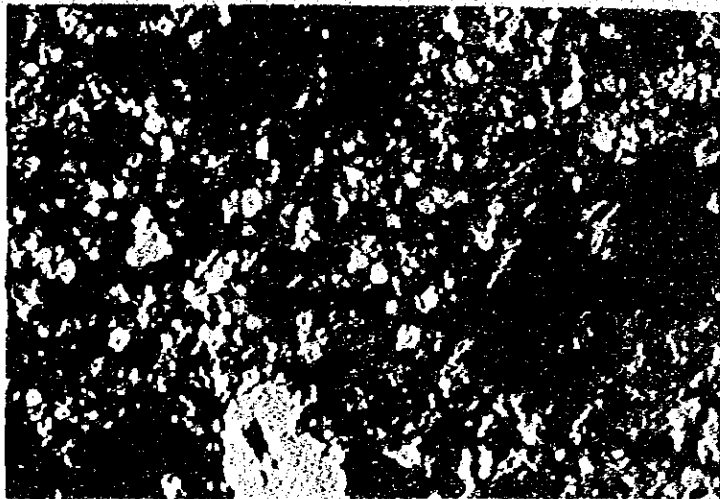
Location: crosscut No.2



opened nicol

Q : quartz  
B : biotite  
Z : zircon  
Ka : kaoline  
S : sericite  
Op : opaque

0 1 mm

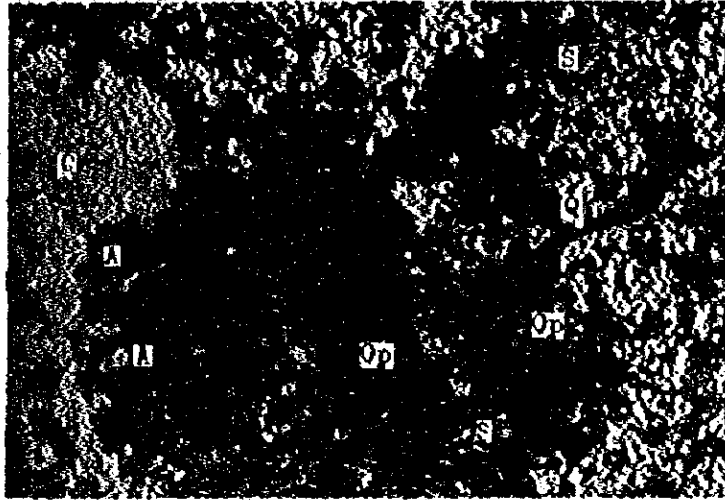


crossed nicols

0 1 mm

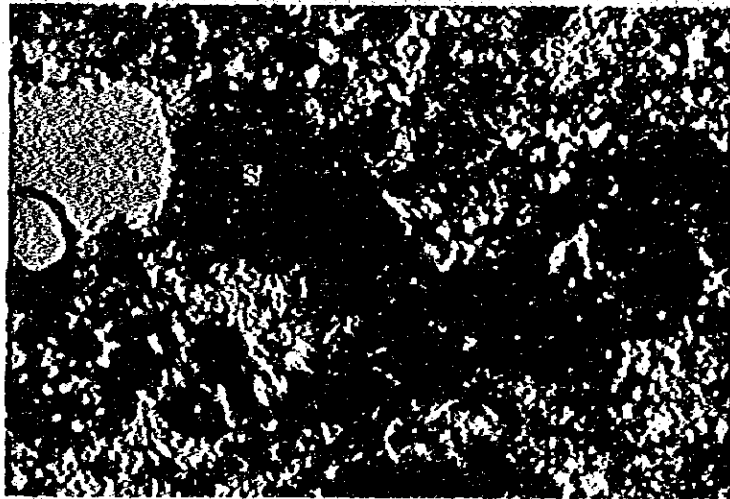
Sample No. 5221

Location: crosscut No. 4-A



opened nicol

Q : quartz  
A : andalusite  
S : sericite  
Op: opaque

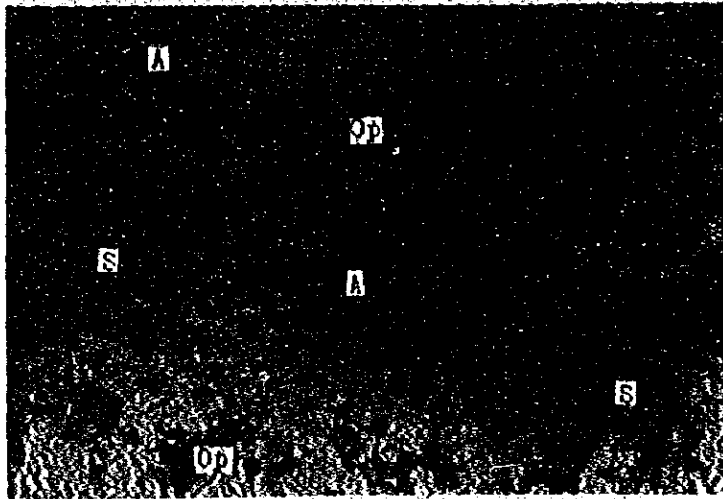


crossed nicols



Sample No. 5221

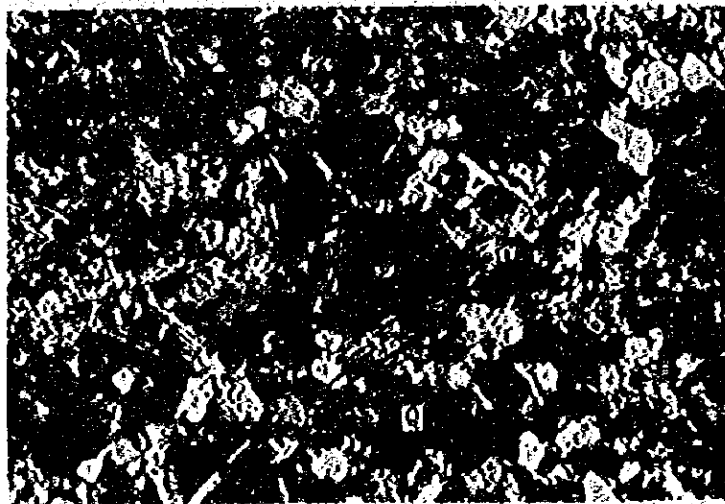
Location: crosscut No. 4-A



opened nicol

0 0.5 mm

A : andalucite  
Q : quartz  
S : sericite  
Op : opaque

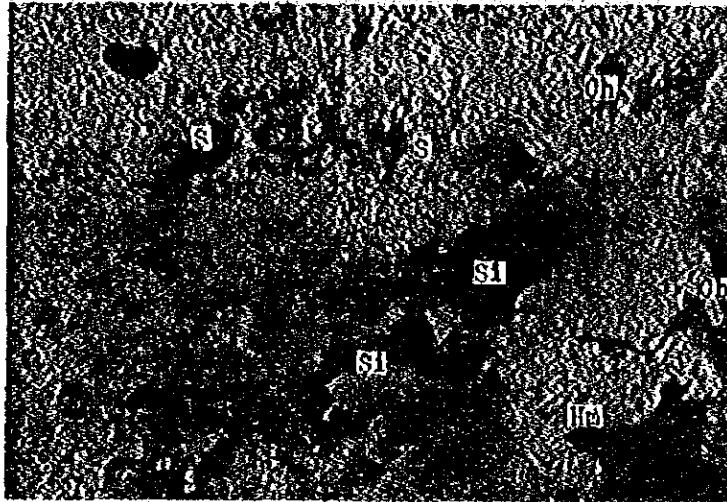


crossed nicols

0 0.5 mm

Sample No. 3101

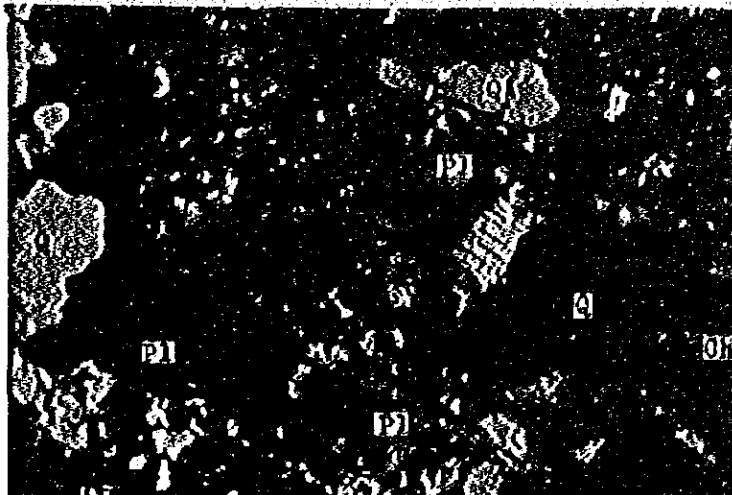
Location: crosscut No. 1



opened nicol



Si: siderite  
Ch: chlorite  
S: sericite  
Hm: hematite  
Pl: Plagioclase  
Q: quartz

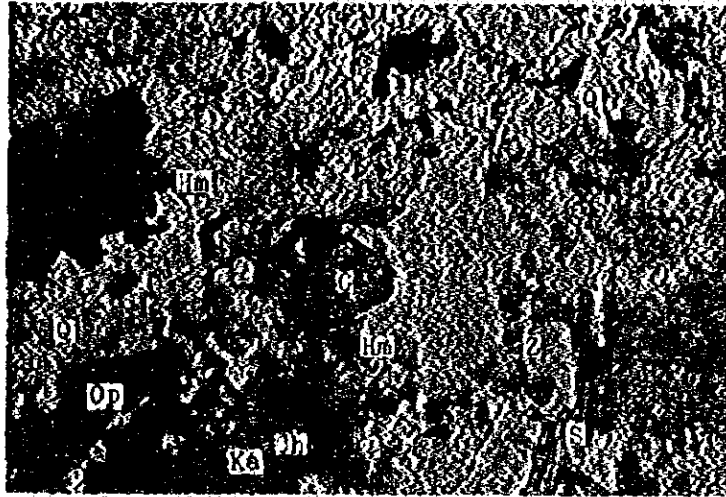


crossed nicols



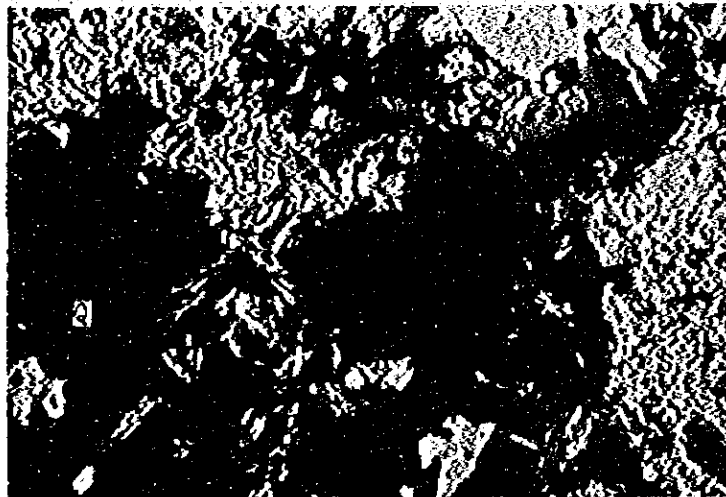
Sample No. 3515

Location: crosscut No. 3



- G : garnet
- Q : quartz
- Z : zircon
- S : sericite
- Ka : kaolinite
- Ch : chlorite
- Hm : hematite
- Op : opaque

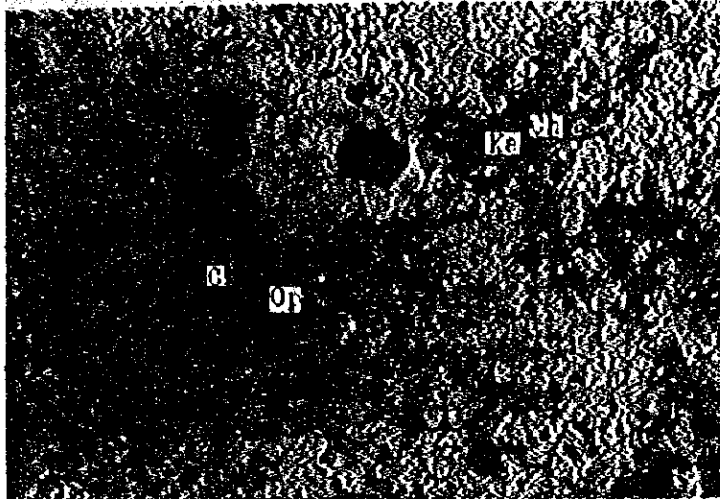
0 0.5mm



0 0.5mm

Sample No. 3515

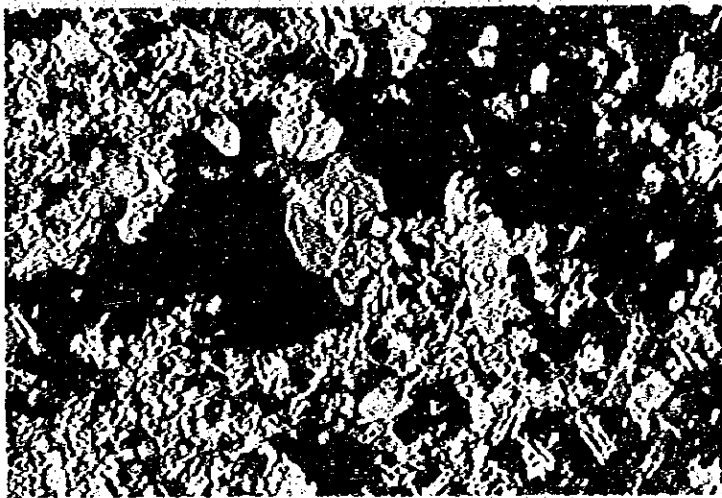
Location: crosscut No. 3



opened nicol

0 0.5 mm

C : corundum  
Q : quartz  
S : sericite  
Ka: kaolinite  
Ch: chlorite  
Op: opaque



crossed nicols

0 0.5 mm

A-4 List of Microphotographs

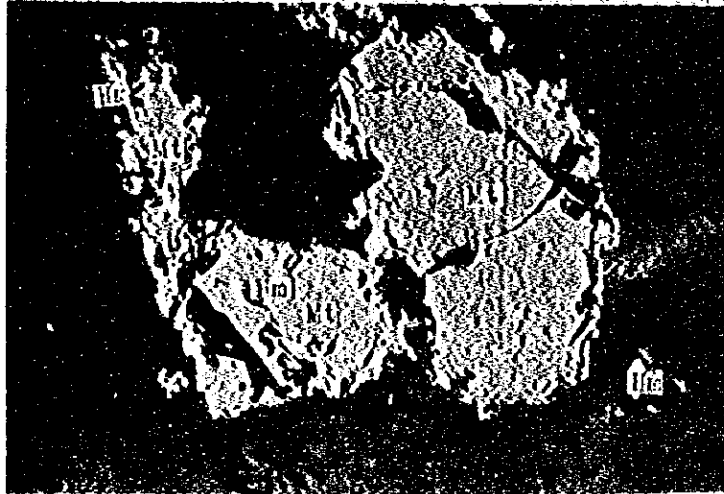
Polished Sections

	Sample No.	Rock Name	Location
(1)	3000	Hornblende quartz monzonite porphyry	Magnetite hill
(2)	3101	Biotite quartz monzonite porphyry	Crosscut No.1
(3)	1818	"	Crosscut No.1
(4)	1432	"	Crosscut No.1
(5)	3306	"	Crosscut No.3
(6)	3402	"	Crosscut No.4
(7)	3203	"	Crosscut No.3
(8)	4501	"	Underground boring No.5
(9)	3403	"	Crosscut No.4
(10)	3205	"	Crosscut No.2
(11)	3515	"	Crosscut No.3
(12)	3201	"	Crosscut No.2

Sample No.3000

Location: magnetite hill

Rock Name: hornblende quartz monzonite porphyry

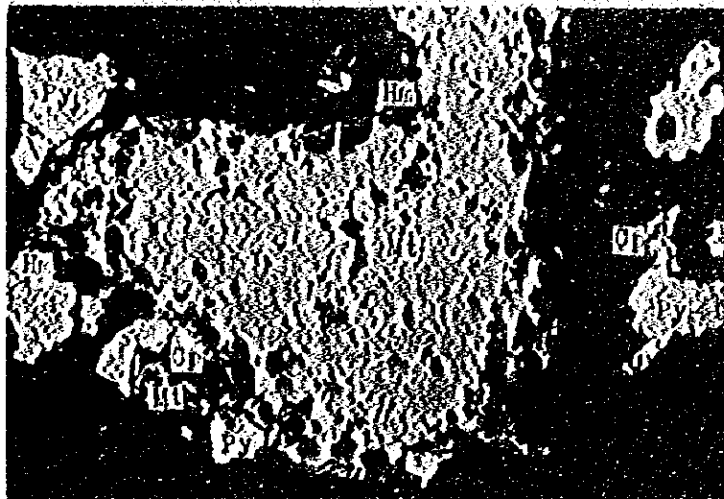


0 0.5 mm

Mt: magnetite  
Hm: hematite

Sample No.3101

Location: crosscut No.1



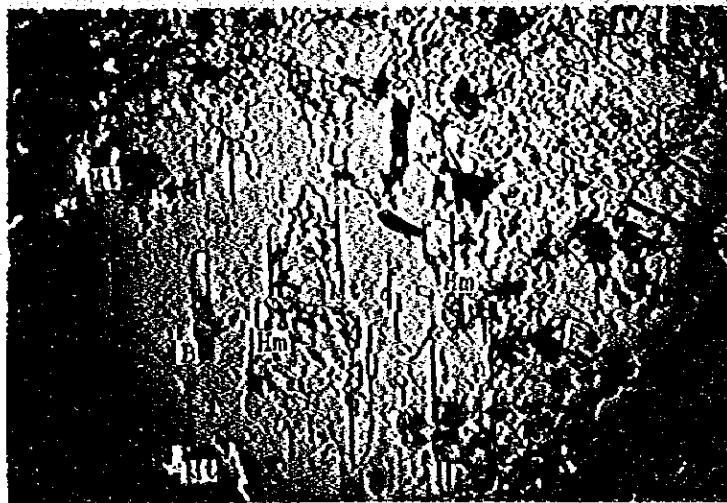
0 0.5 mm

Mt: magnetite  
Hm: hematite  
Py: pyrite  
Cp: chalcopyrite



Sample No. 1818

Location: crosscut No. 1

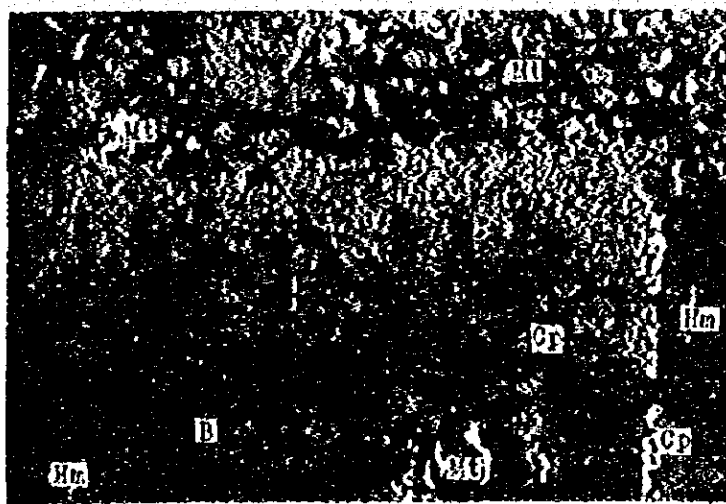


0 1 mm

B : biotite  
Mt: magnetite  
Hm: hematite

Sample No. 1432

Location: crosscut No. 1

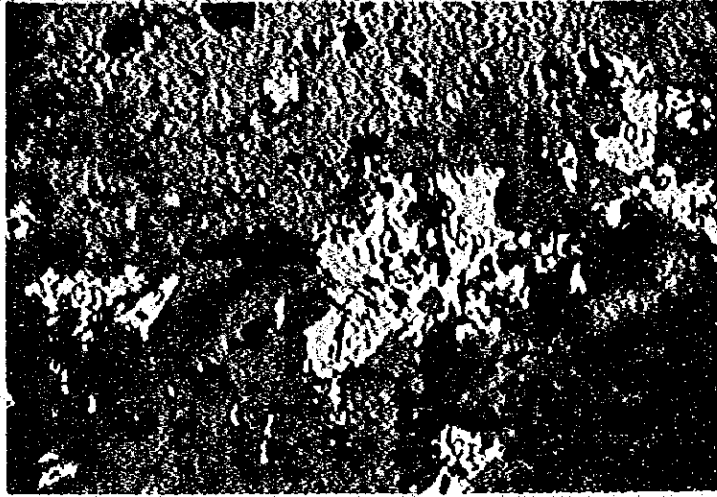


0 0.5 mm

B : biotite  
Cp: chalcopyrite  
Mt: magnetite  
Hm: hematite

Sample No. 3306

Location: crosscut No. 3

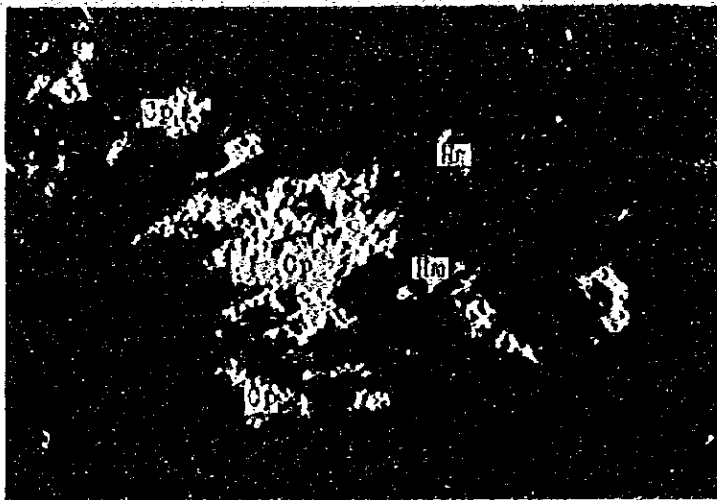


0 0.5 mm

Cp: chalcopyrite

Sample No. 3402

Location: crosscut No. 4

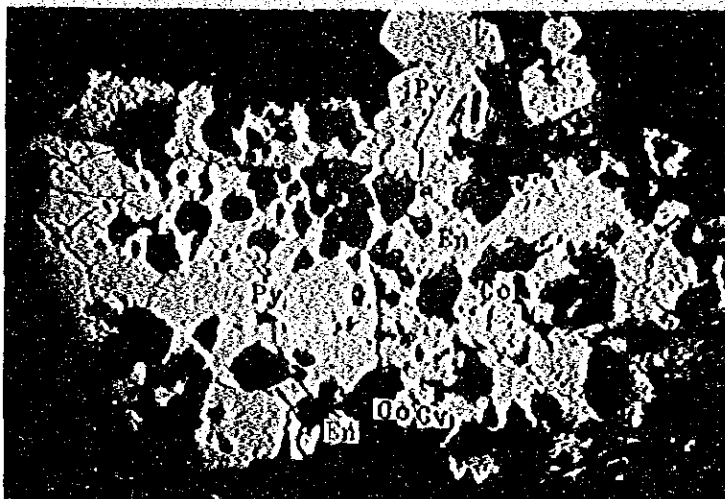


0 0.5 mm

Cp: chalcopyrite  
Hm: hematite

Sample No.3203

Location: crosscut No.3

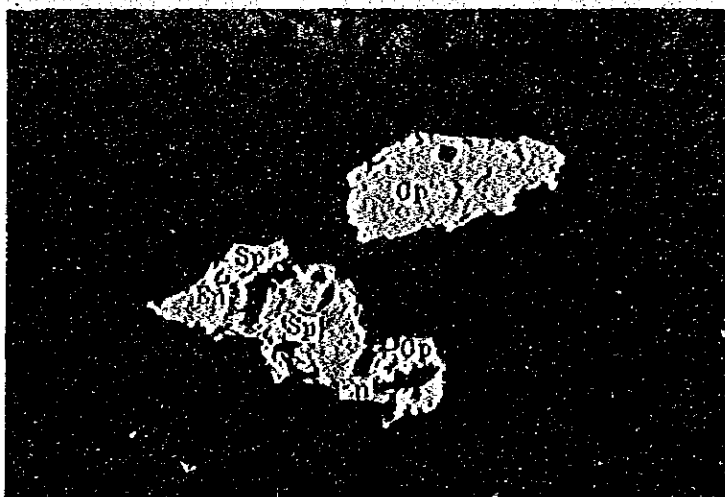


Py: pyrite  
En: enargite  
Co: chalcocite  
Cv: covellite

0 1 mm

Sample No.4501

Location: underground boring No.5

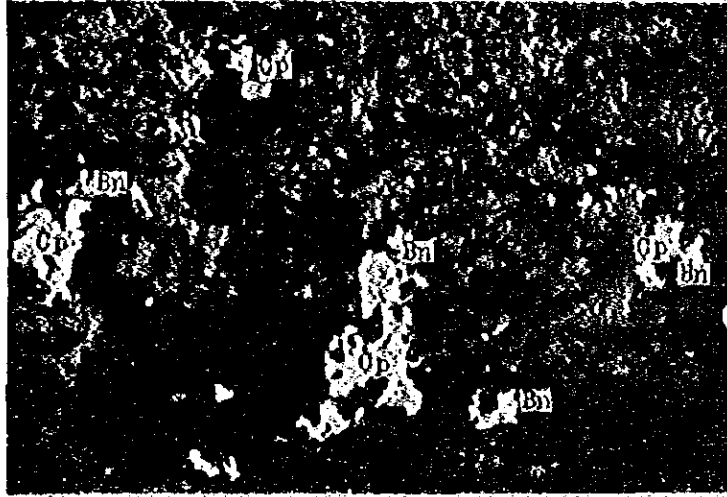


Cpt: chalcopyrite  
En: enargite  
Sp: sphalerite

0 0.5 mm

Sample No. 3403

Location: crosscut No. 4

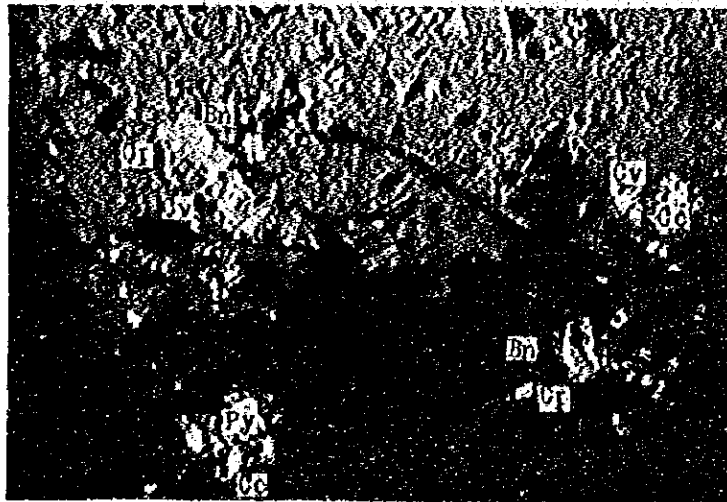


Cp: chalcopyrite  
Bn: bornite

0 0.5 mm

Sample No. 3205

Location: crosscut No. 2

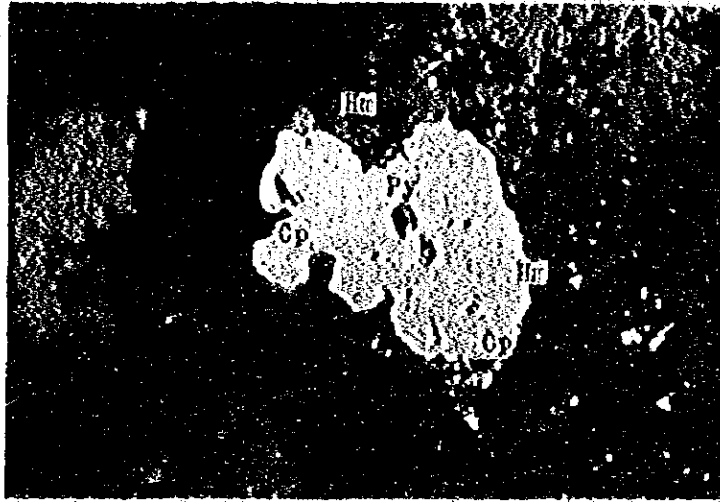


Py: pyrite  
Cp: chalcopyrite  
Bn: bornite  
Cv: covellite  
Cc: chalcocite

0 0.5 mm

Sample No. 3515

Location: crosscut No. 3

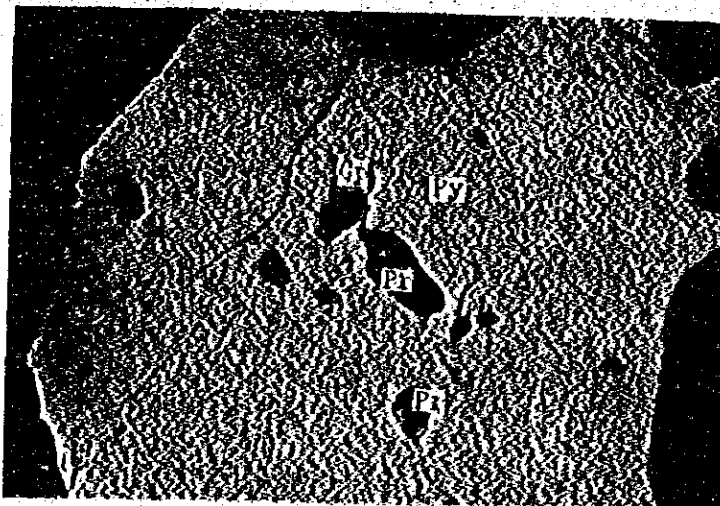


Py: pyrite  
Hm: hematite  
Cp: chalcopyrite

0 0.5 mm

Sample No. 3201

Location: crosscut No. 2

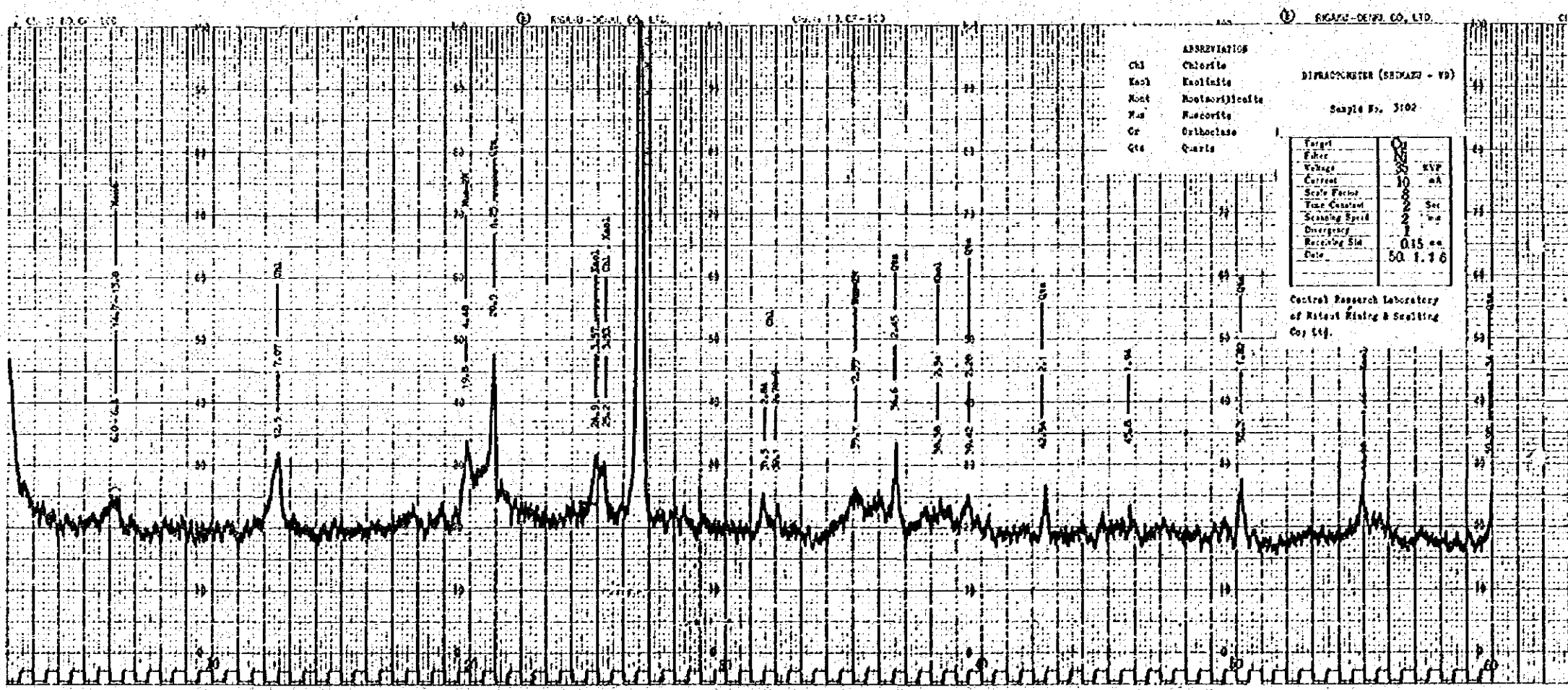
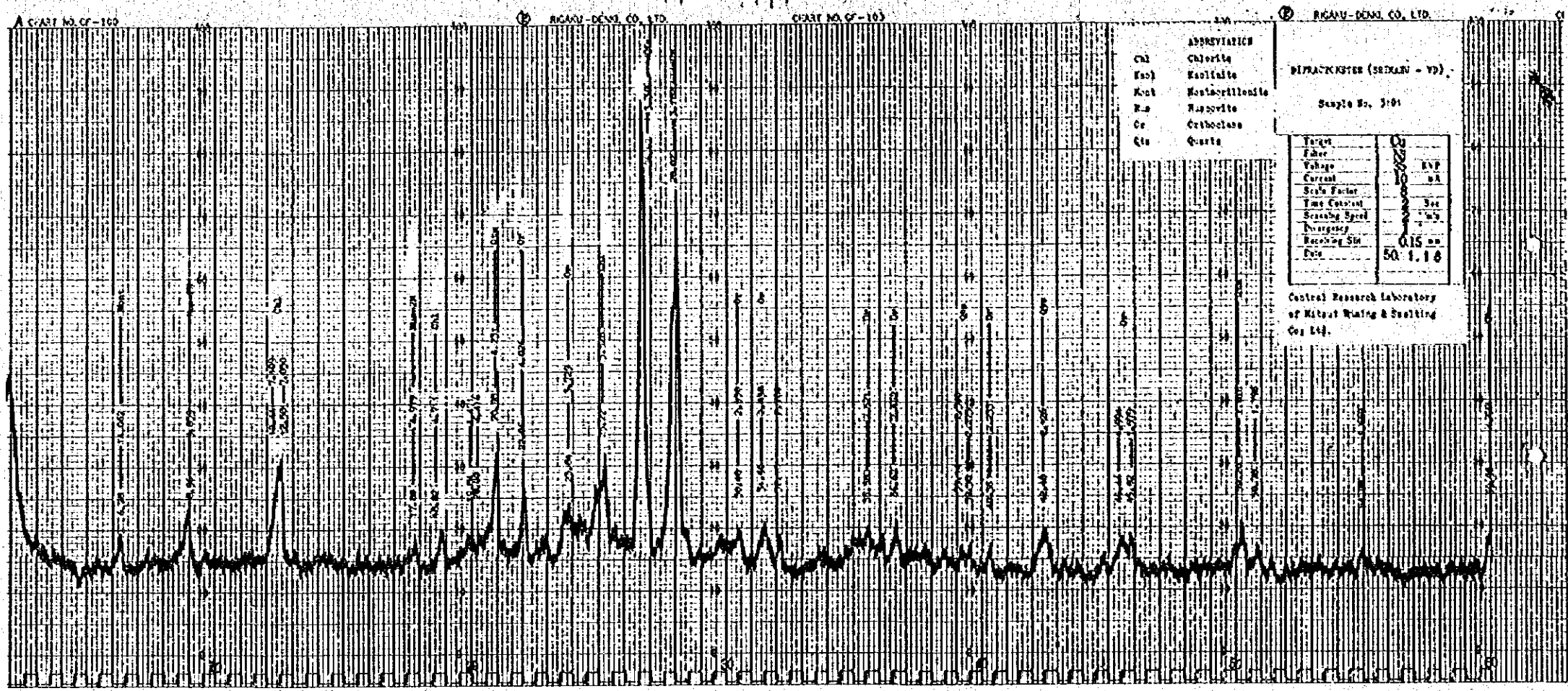


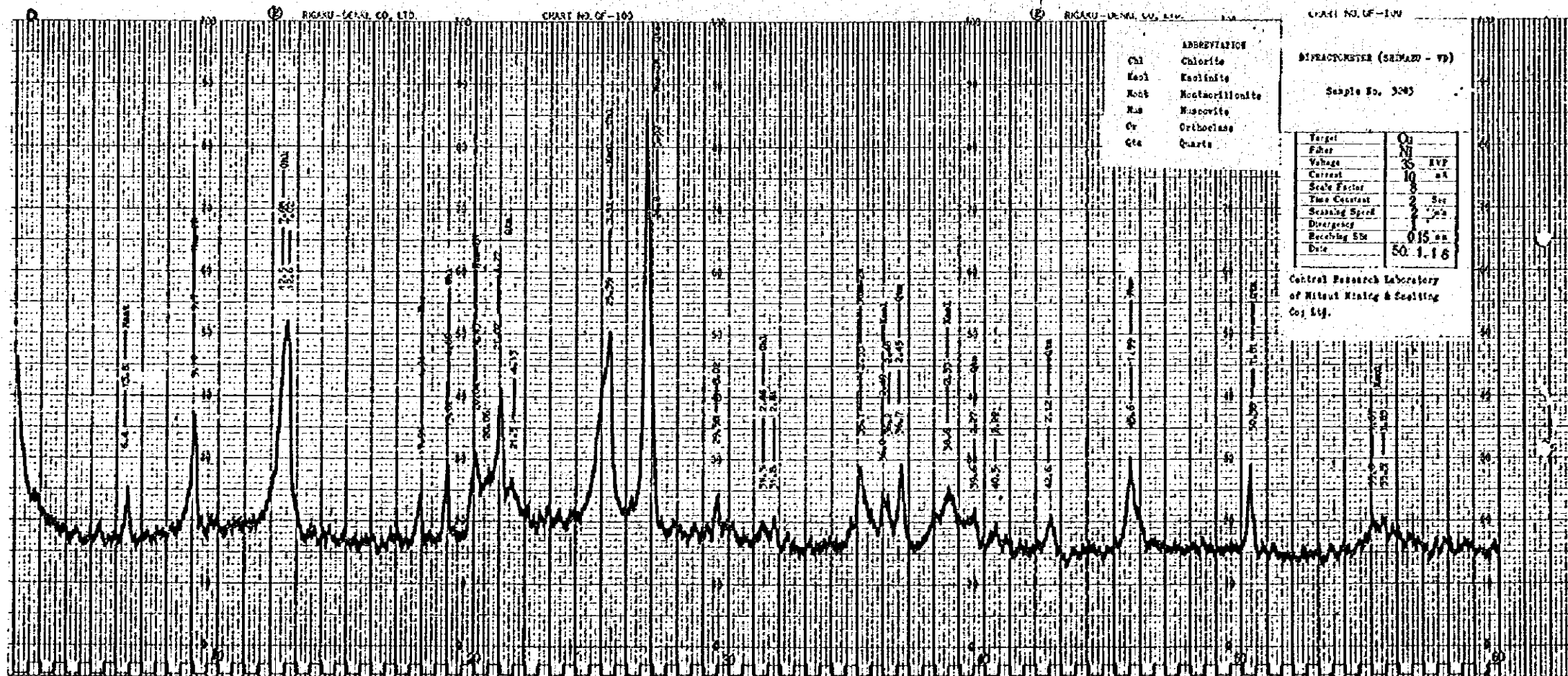
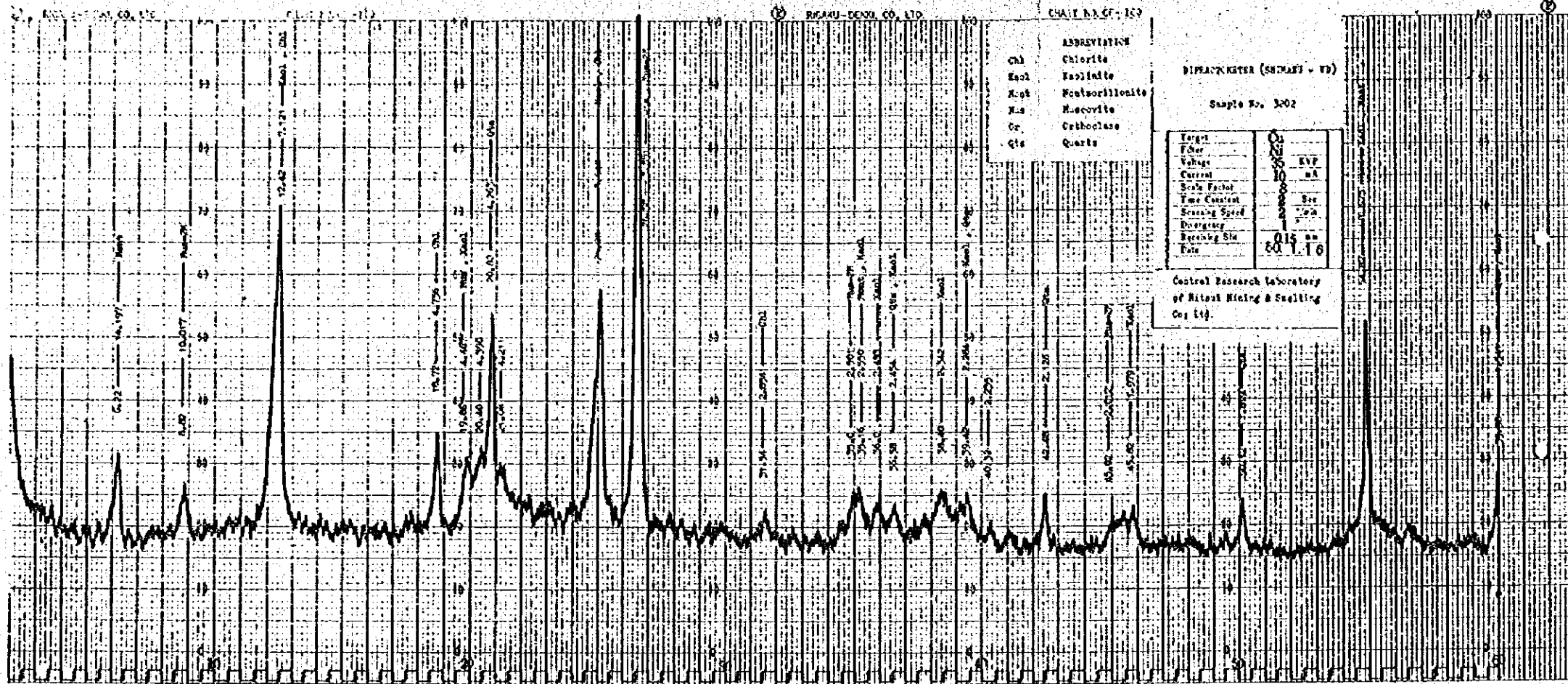
Py: pyrite  
Cp: chalcopyrite  
Pr: pyrrhotite

0 0.5 mm

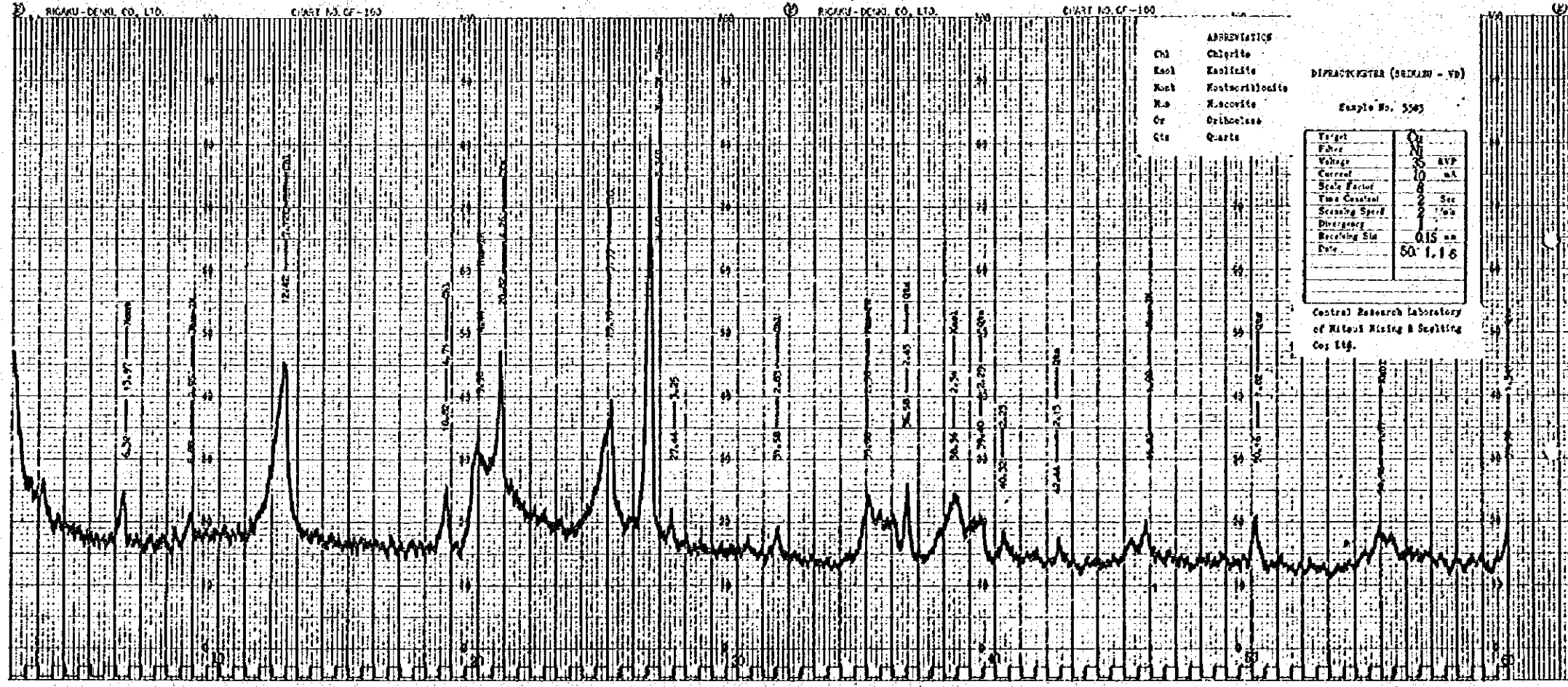
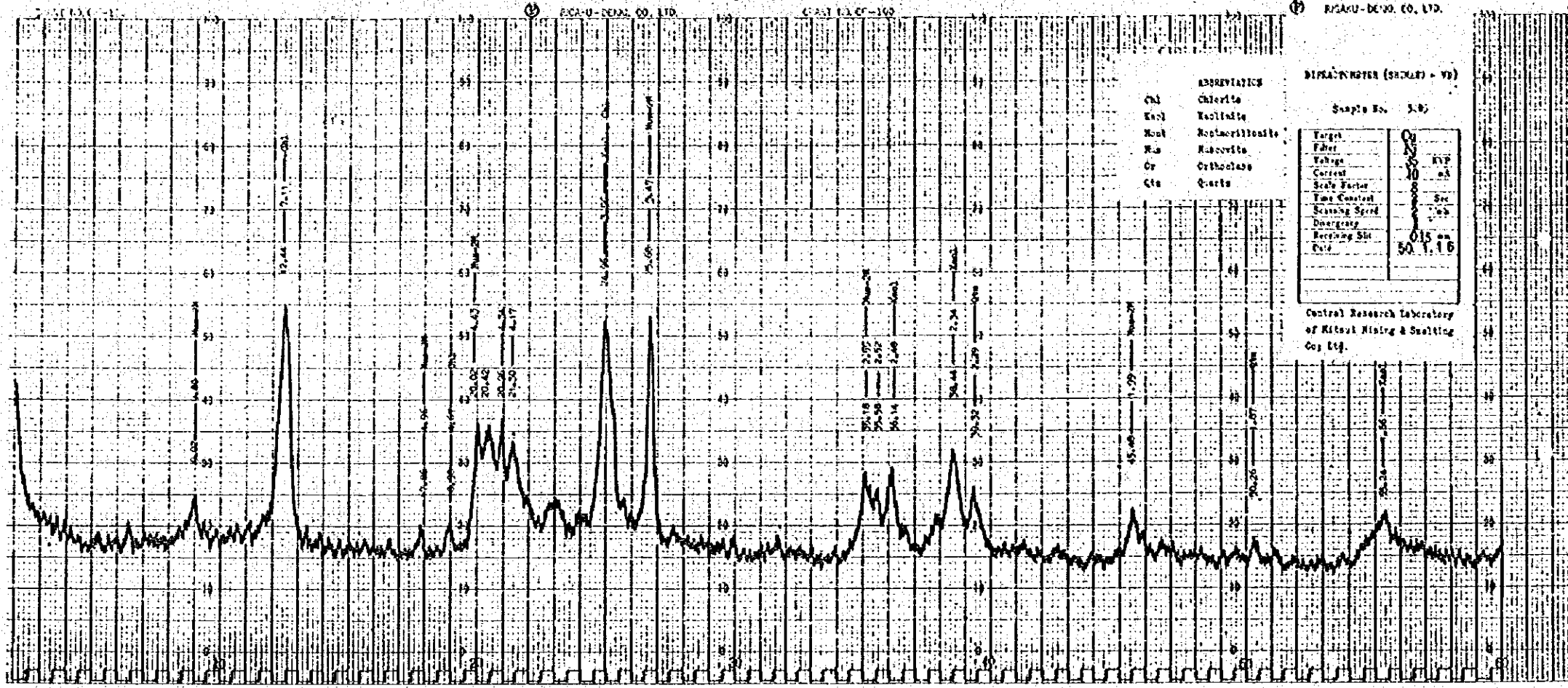
A-5 Chart of X-ray Diffractive Analysis

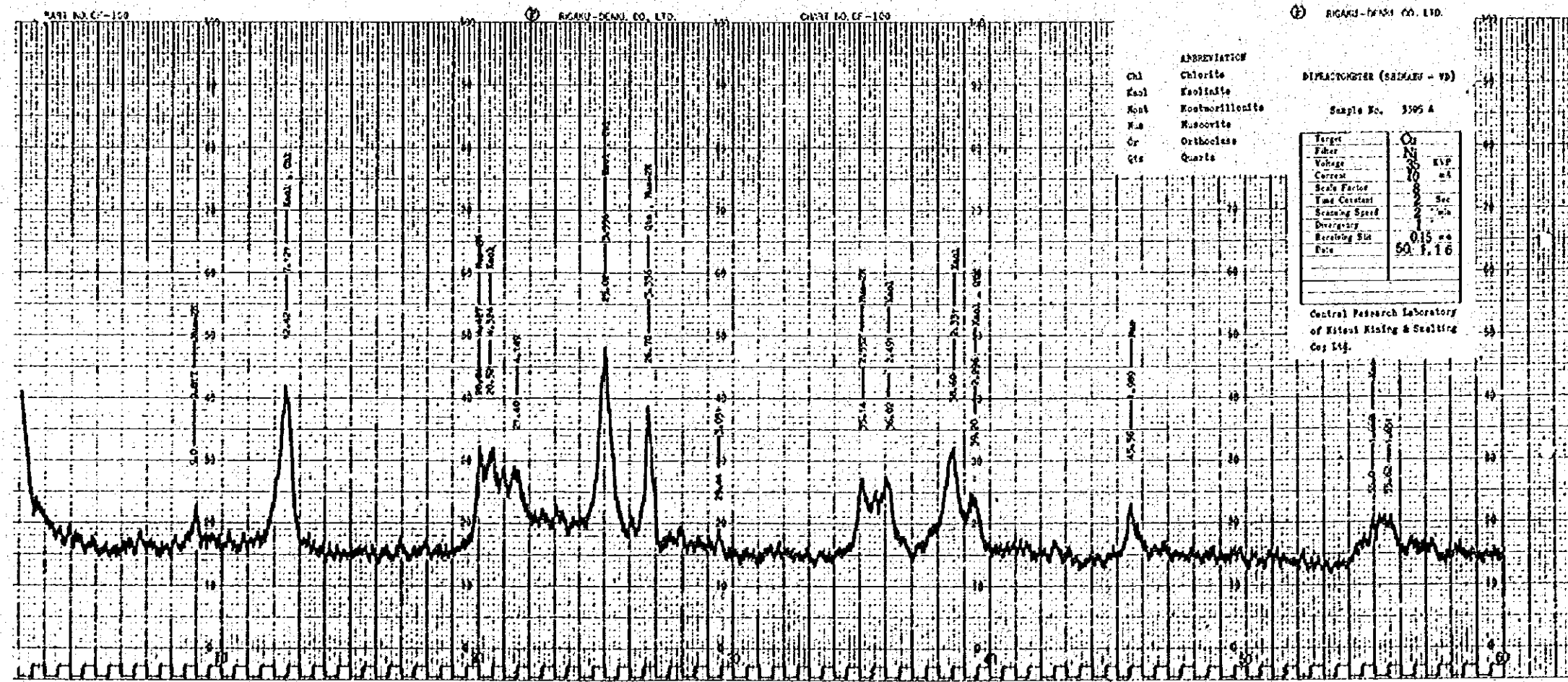
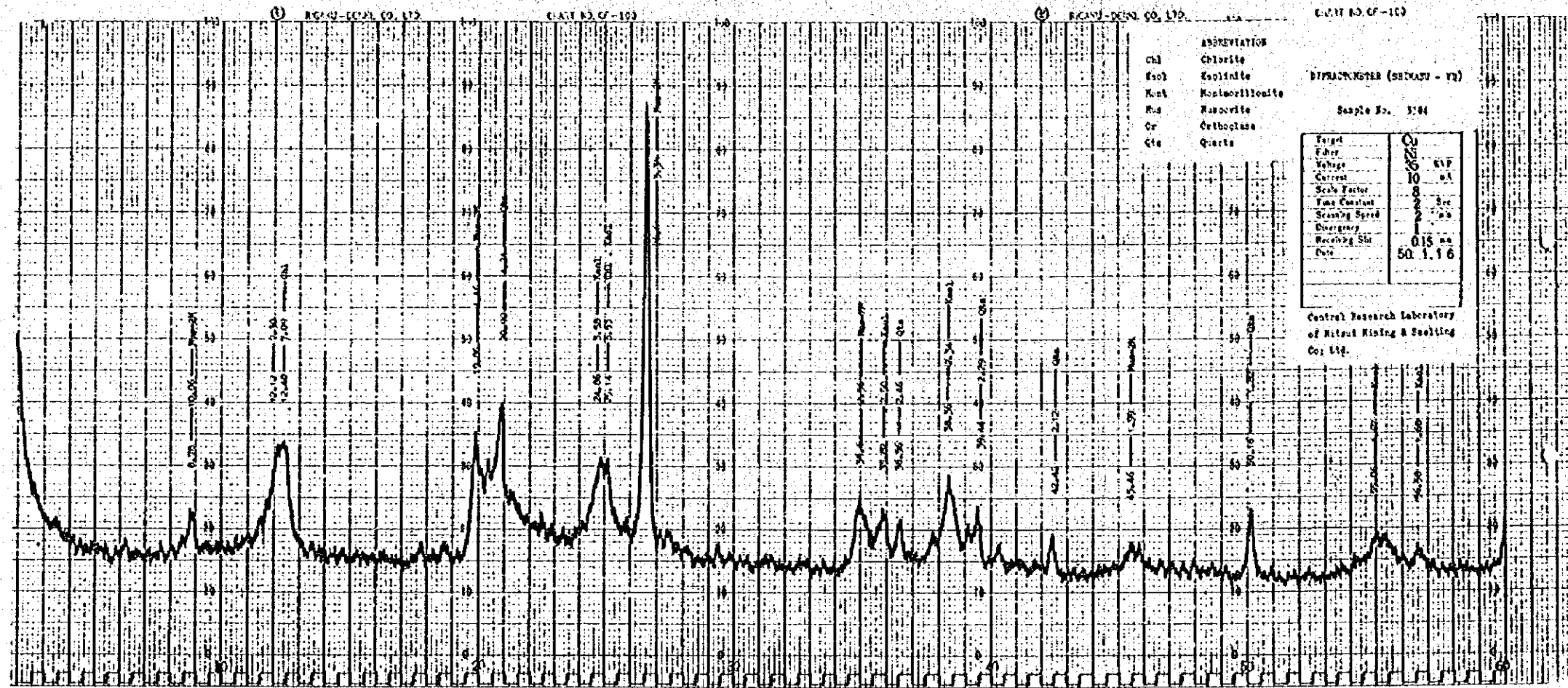
Sample No.	Location
3101	Crosscut No. 1
3102	ditto
3202	Crosscut No. 2
3203	ditto
3205	ditto
3303	Cross cut No. 3
3304	ditto
3305A	ditto
3305B	ditto
3306A	ditto
3402	Crosscut No. 4
3403A	ditto
3404	ditto

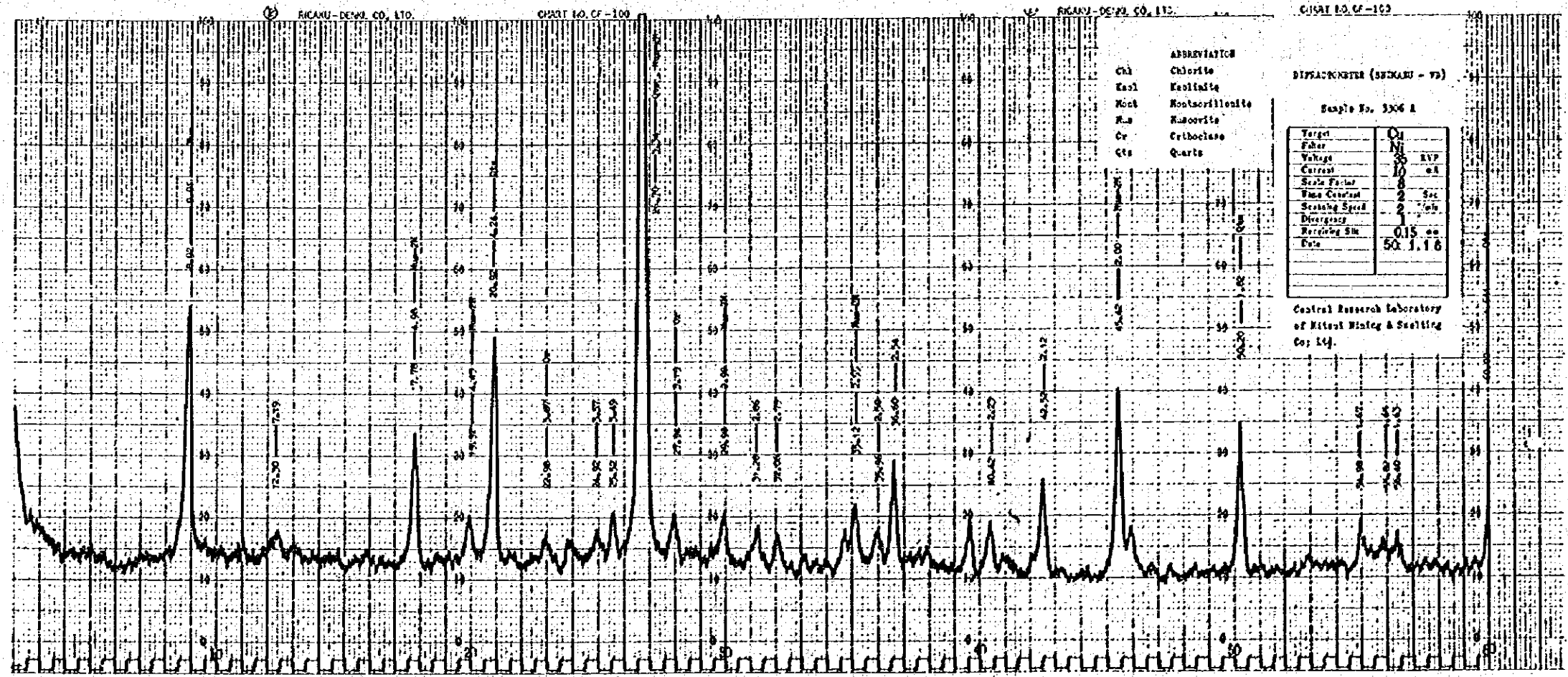


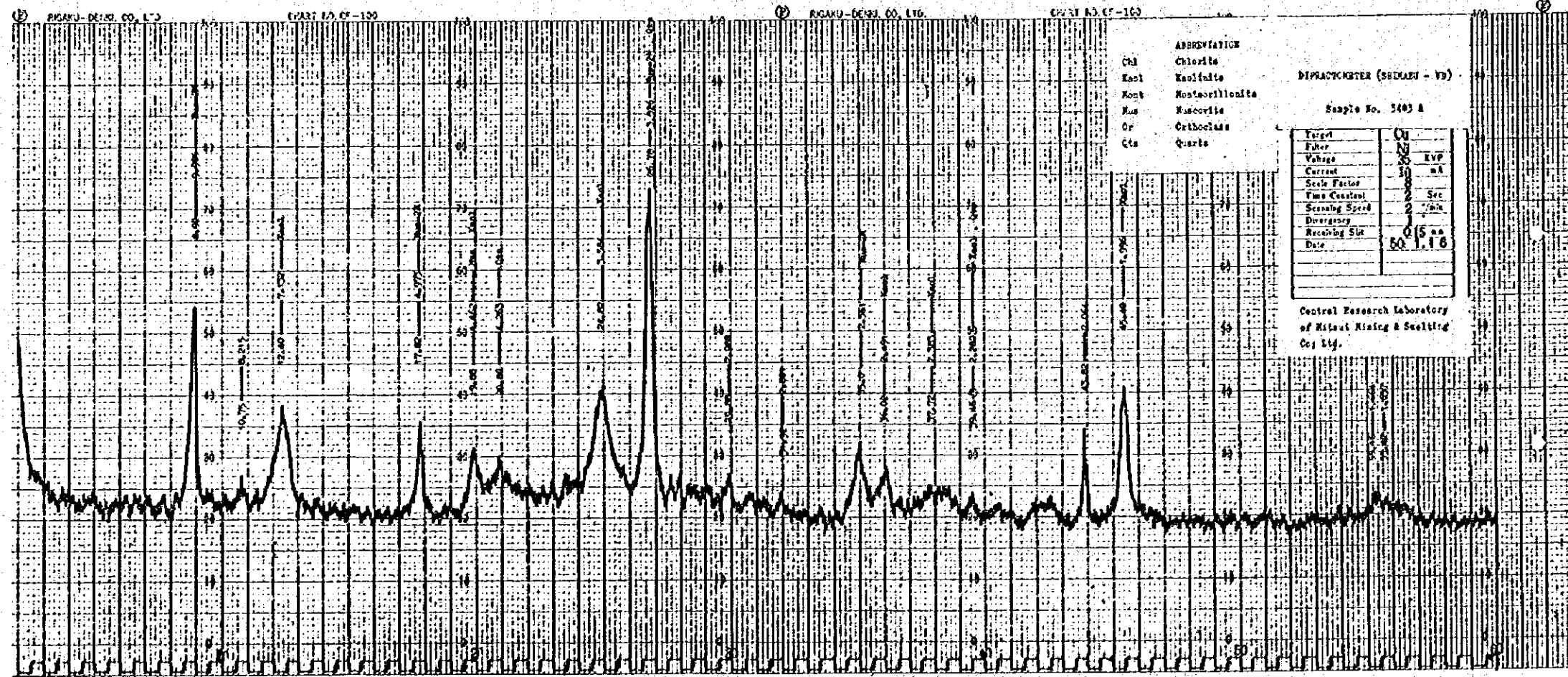
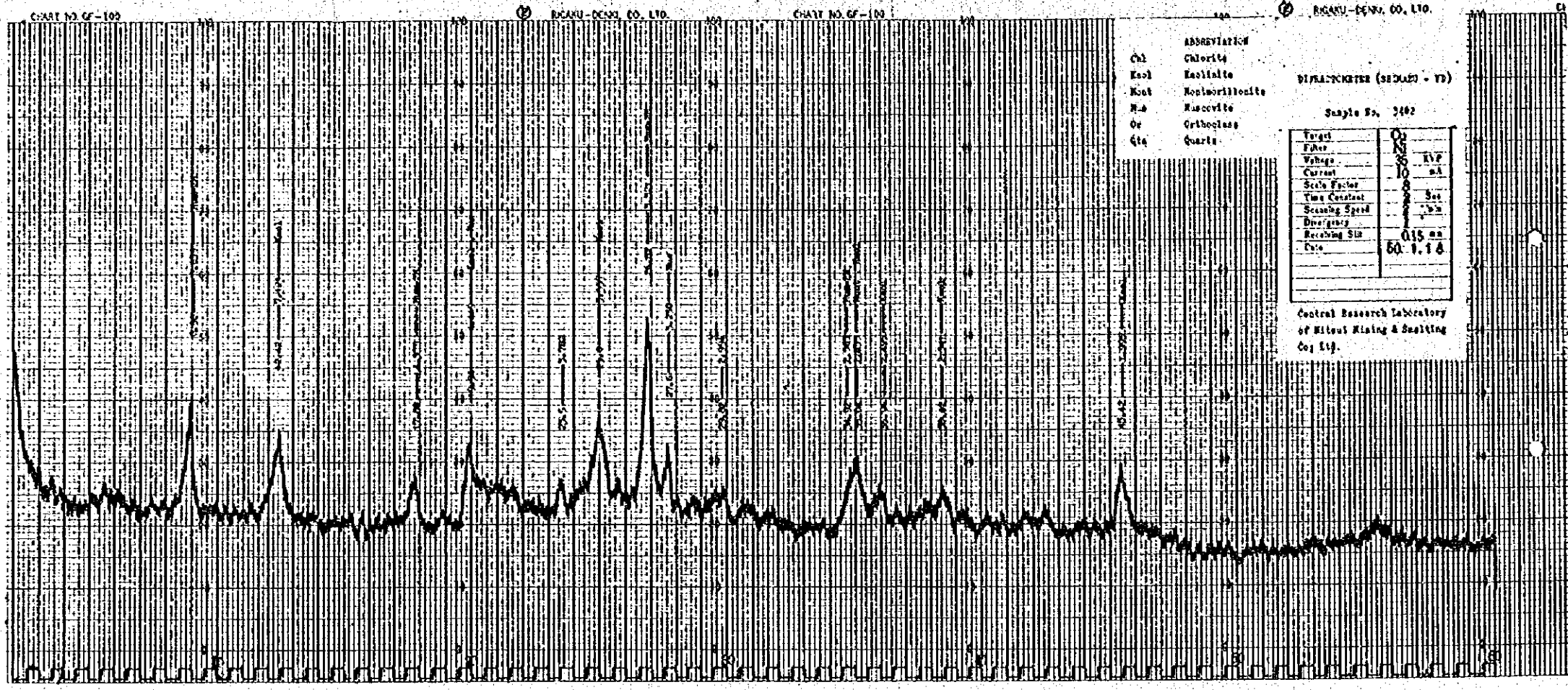


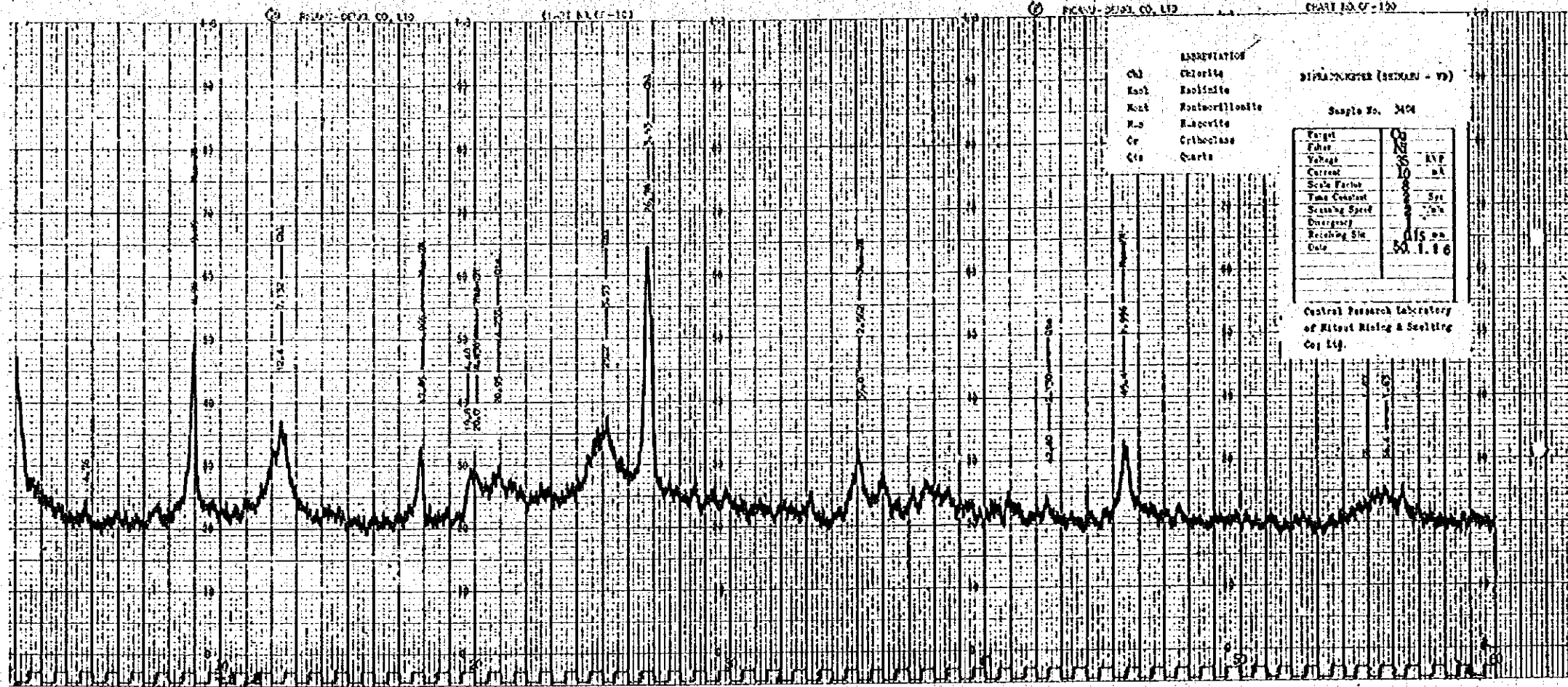












**A-6 Photographs of Fossils**

(All figures X 1)

Fig. 1. "Chlamys" sp. Sample No. 3003.

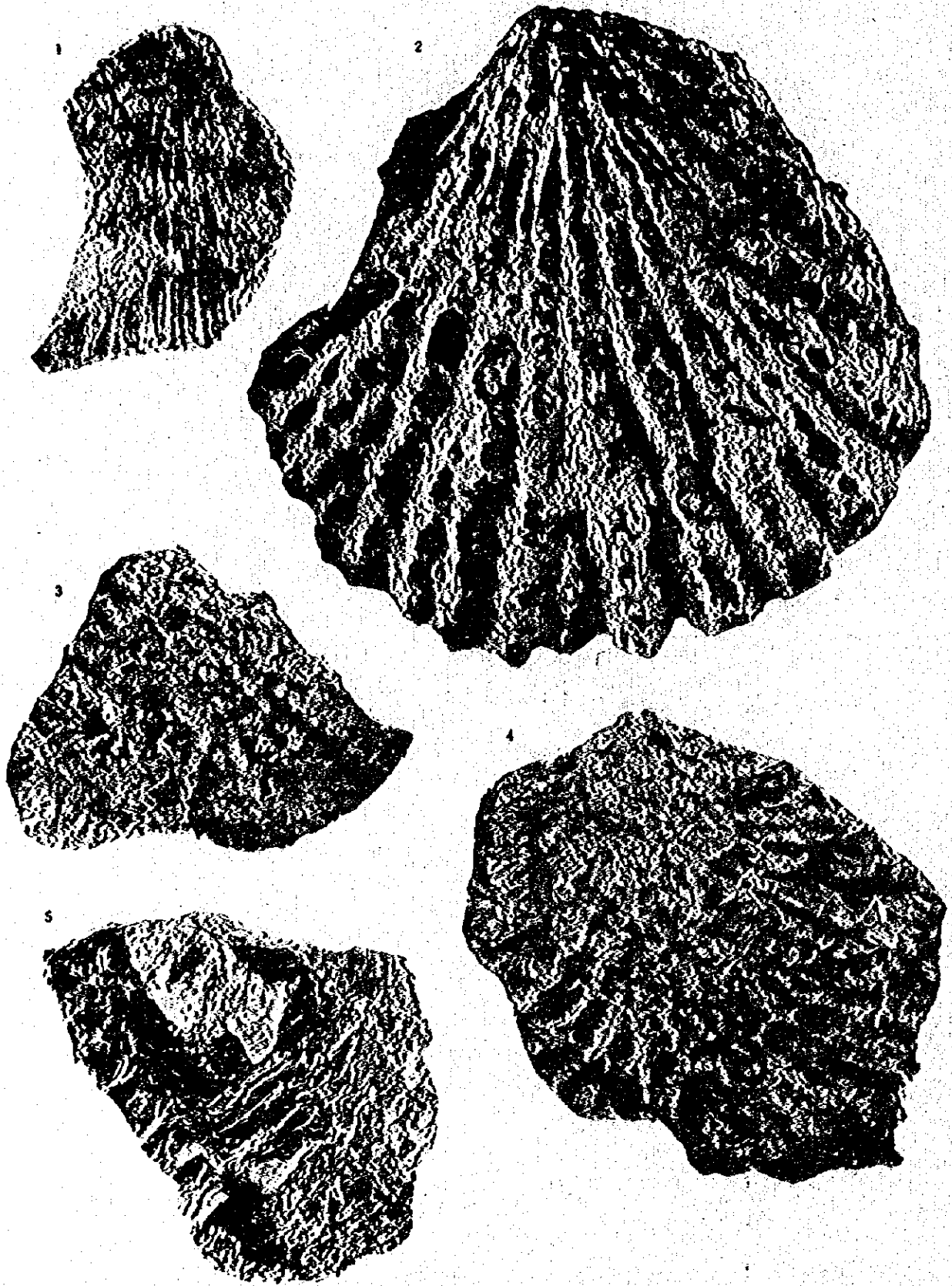
Figs. 2-5. Lopha (Actinosteon) aff. bellaplicata (Shumard)

fig. 2. Lateral view of a large left valve. Sample No. 3003

fig. 3. Lateral view of a fragmental left valve. Sample No. 2904.

fig. 4. Lateral view of a typical left valve. Sample No. 2906.

fig. 5. Interior view of a fragmental left valve. Sample No. 3002.





Figs. 1-6. Gryphaea (s. l.) aff. regionis Camacho

figs. 1a-d. Left, posterior, anterior and right views of a left valve,  
X 1. Sample No. 3001-A.

figs. 2a, b. Left and right views of a left valve, and left view of an  
another fragmental left valve, X 1. Sample No. 3001-B.

figs. 3, 4. Left view of the left valves, X 1. Sample Nos. 3001-C, -D.

figs. 5a-d. Left, posterior, anterior and right views of a left valve,  
X 1. Sample No. 3001-E.

fig. 6. Right view of a small right valve, X 2. Sample No. 1305-A.

Figs. 7a, b. Yoldia ? sp. Right and left valves, X 1. Sample No. 2905.

Figs. 9, 10. Neithea (Neithea) ficalhoi (Choffat)

Lateral view of two right valves, X 1.5. Sample No. 1306.

Figs. 8a, b. Cucullaëa ? sp.

Anterior and lateral views of a fragmental left valve, X 1.5.  
Sample No. 1305-B.

Figs. 11, 12. Protarca sp.

Lateral view of the left and right valves, X 1.  
Sample Nos. 1305-C, -D.

Figs. 13, 15. Astarte ? sp.

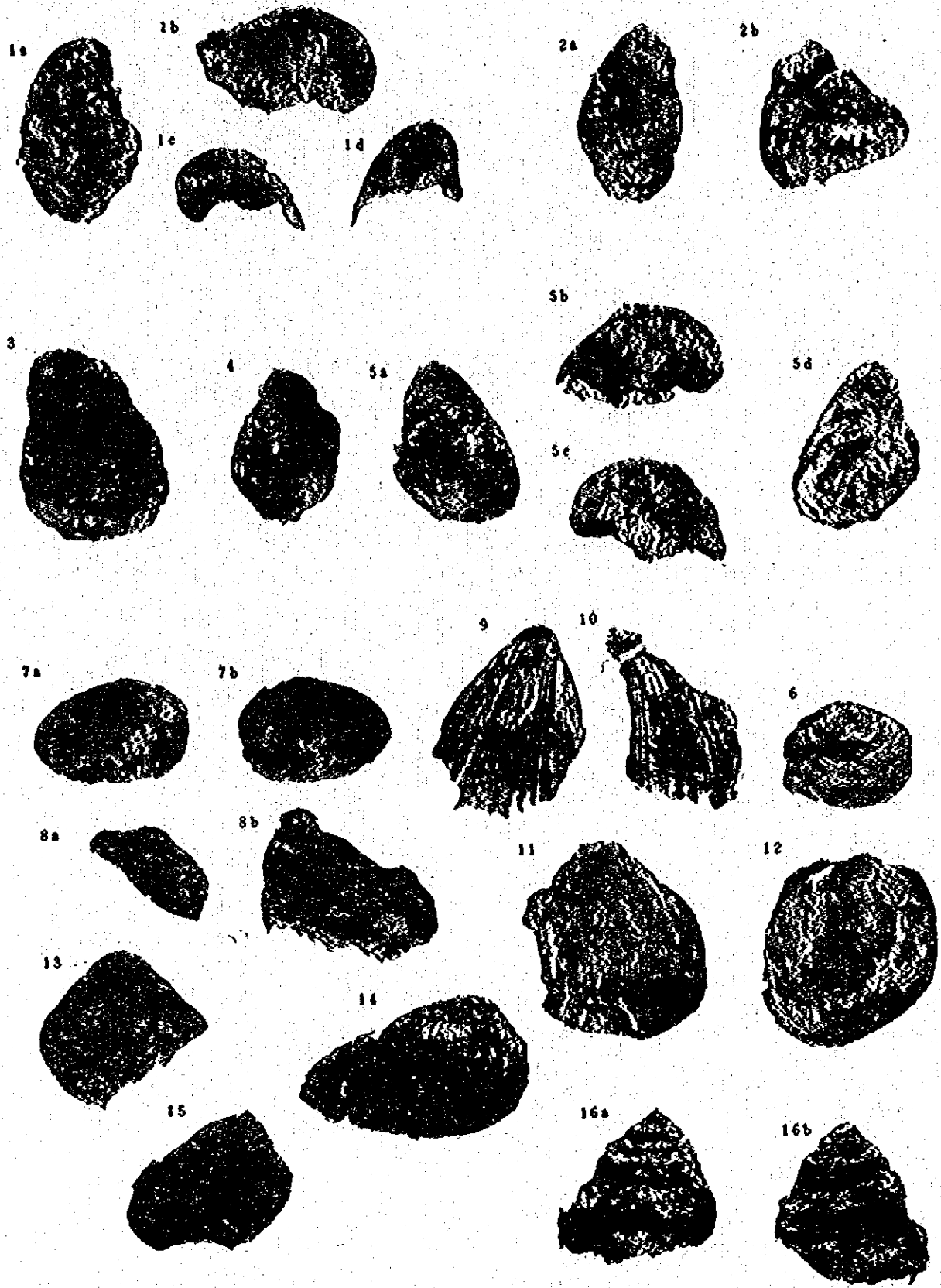
Left and right valves, X 1.5. Sample Nos. 1305-E, -F.

Figs. 14. Etea ? sp.

Lateral view of an ill-preserved right valve, X 1.5.  
Sample No. 1305-G.

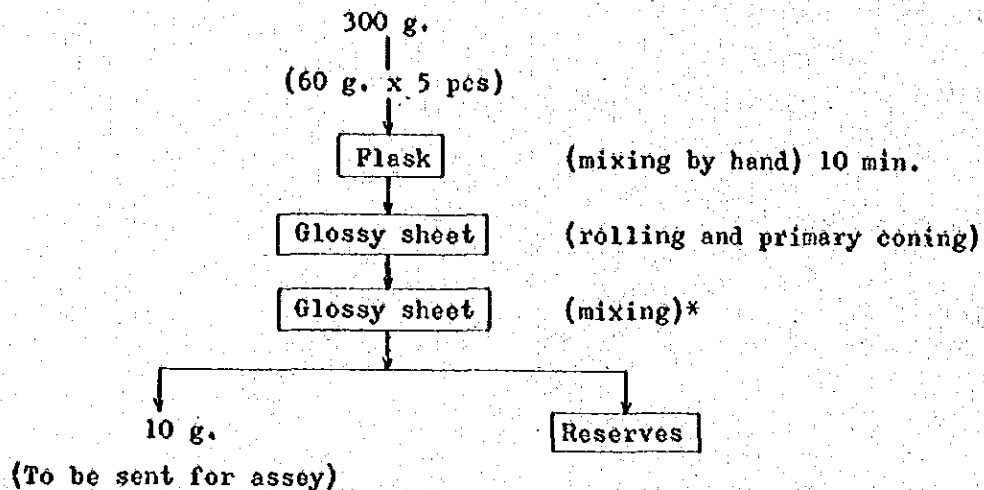
Figs. 16a, b. Conominolia ? sp.

Adapertural and apertural views of an ill-preserved specimen,  
X 2.5. Sample No. 1305-H.



**A-7 Flowsheet of Preparation of Assay Samples**

Preparation of 15 m composite  
for MoS<sub>2</sub>, Au, Ag, Fe and S

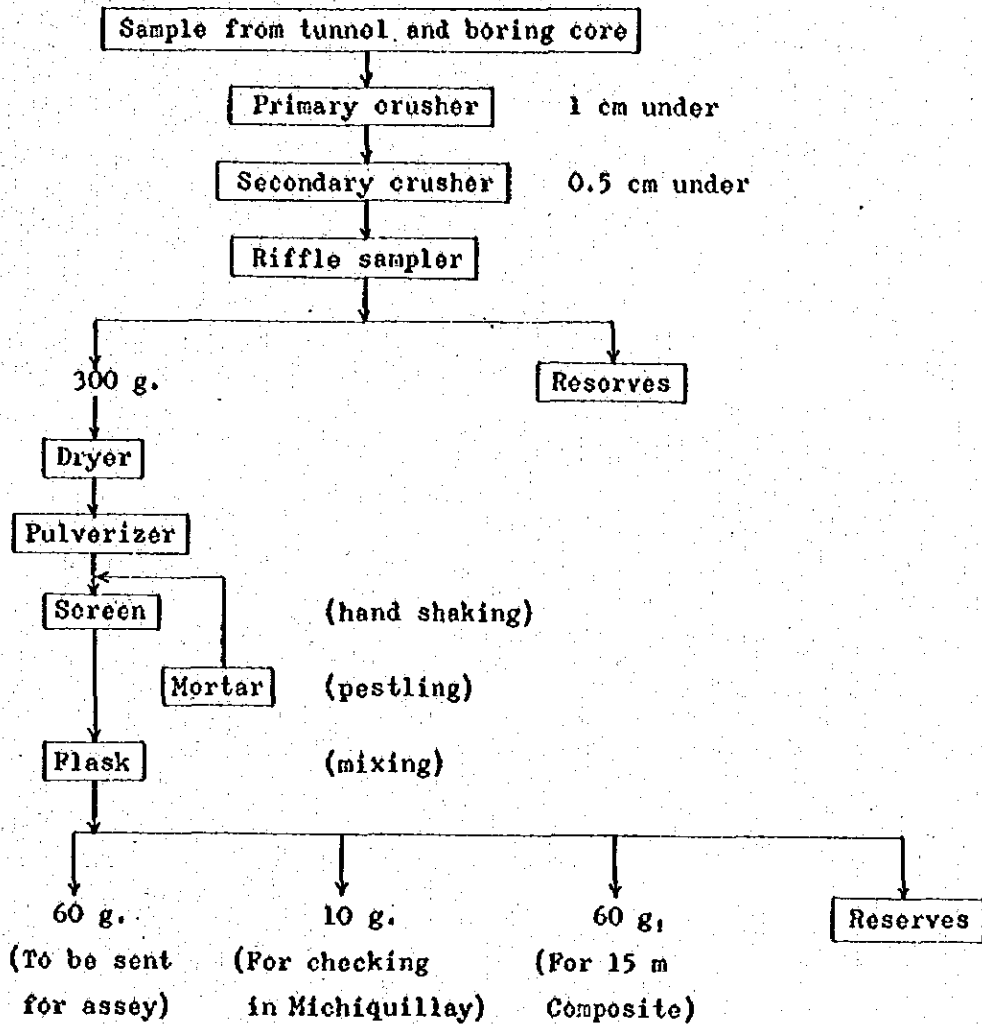


\* Procedure to Heap Up the sample into the Secondary Cone

- (1) Flattening the primary cone into rectangular shape,
- (2) Dividing the rectangle into 30 small rectangles as illustrated below,
- (3) Scooping the sample by spatula from the first small rectangular section and spreading it over the glossy sheet,
- (4) Repeating the scooping and spreading as stated above, but the sample is to be spread over the pre-spread sample, from the second spreading on.
- (5) Repeating the said procedure of (4) until the entire sample is removed by picking up samples from the small section, in order of numbering given on the illustration, and heaping each of them so that to build up the secondary cone
- (6) Repeating the entire round for half an hour

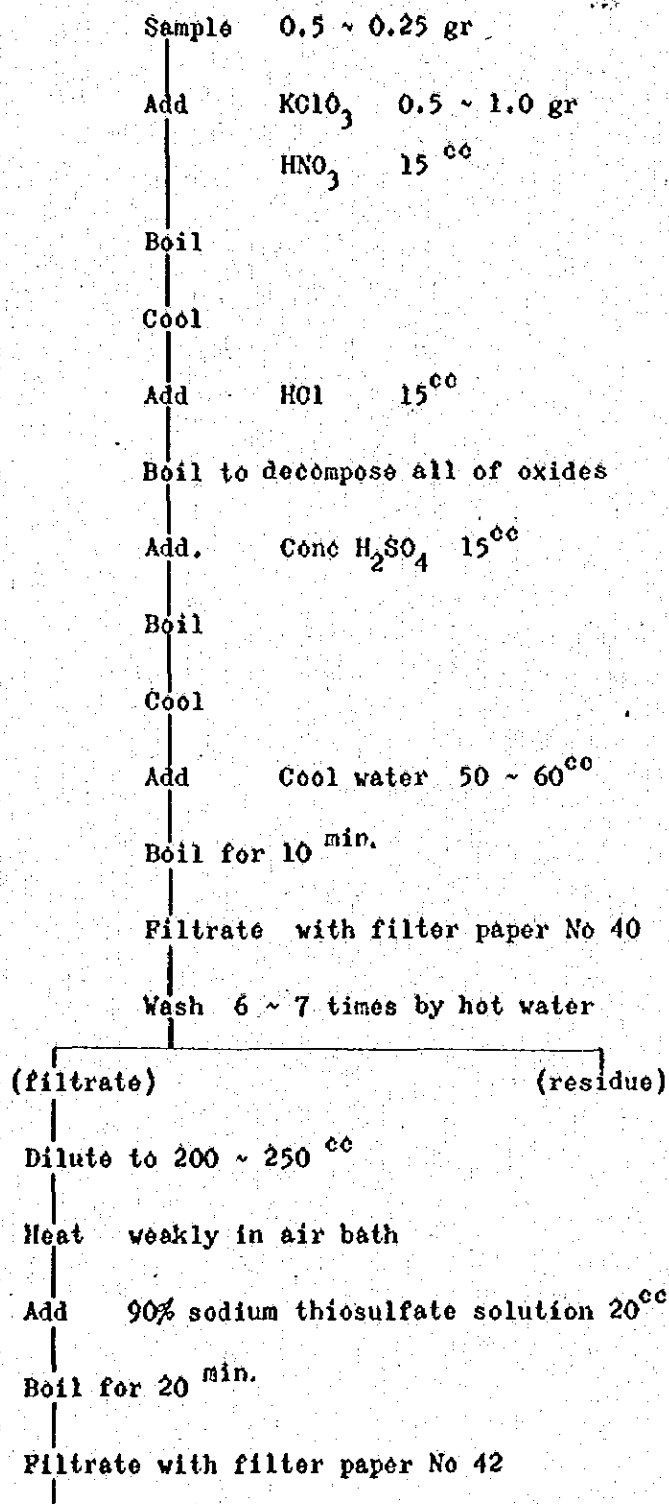
13	16	10	25	1
20	11	17	2	26
12	21	3	18	6
27	4	22	7	19
5	28	8	23	14
30	9	29	15	24

Preparation of sample for T-Cu and S-Cu



**A-8 Flowsheet of Analysis**

Flow Sheet of Assay Method of Total-Cu.



Wash 8 times by hot water.

(residue)

(filtrate)

Dry in air bath

Carbide at 500°C for 1/2 hour in electric muffle furnace

Cool

Add a few crystals of  $KClO_3$

Wash by  $HNO_3$  10<sup>cc</sup>

Heat weakly to dissolve

Add  $HNO_3$  5<sup>cc</sup>

Evaporate at low temperature

Add  $H_2O$  15<sup>cc</sup>

Add ammonium until the color of solution changes to blue

Boil until the vapor of ammonium is smelled

Add acetic acid a few c.c.

Boil until the vapor of acetate is smelled

Cool

Dilute to 1000<sup>cc</sup> by water

Add 10%  $AgNO_3$  2 drops

4%  $KI$  5 cc

Almidon\* 5 cc

Titrate by standard sodium hyposulphite\*\*

$$Cu\% = \frac{\text{c.c. of standard solution} \times \text{factor} \times 100}{\text{weight of sample}}$$



\* Almidon

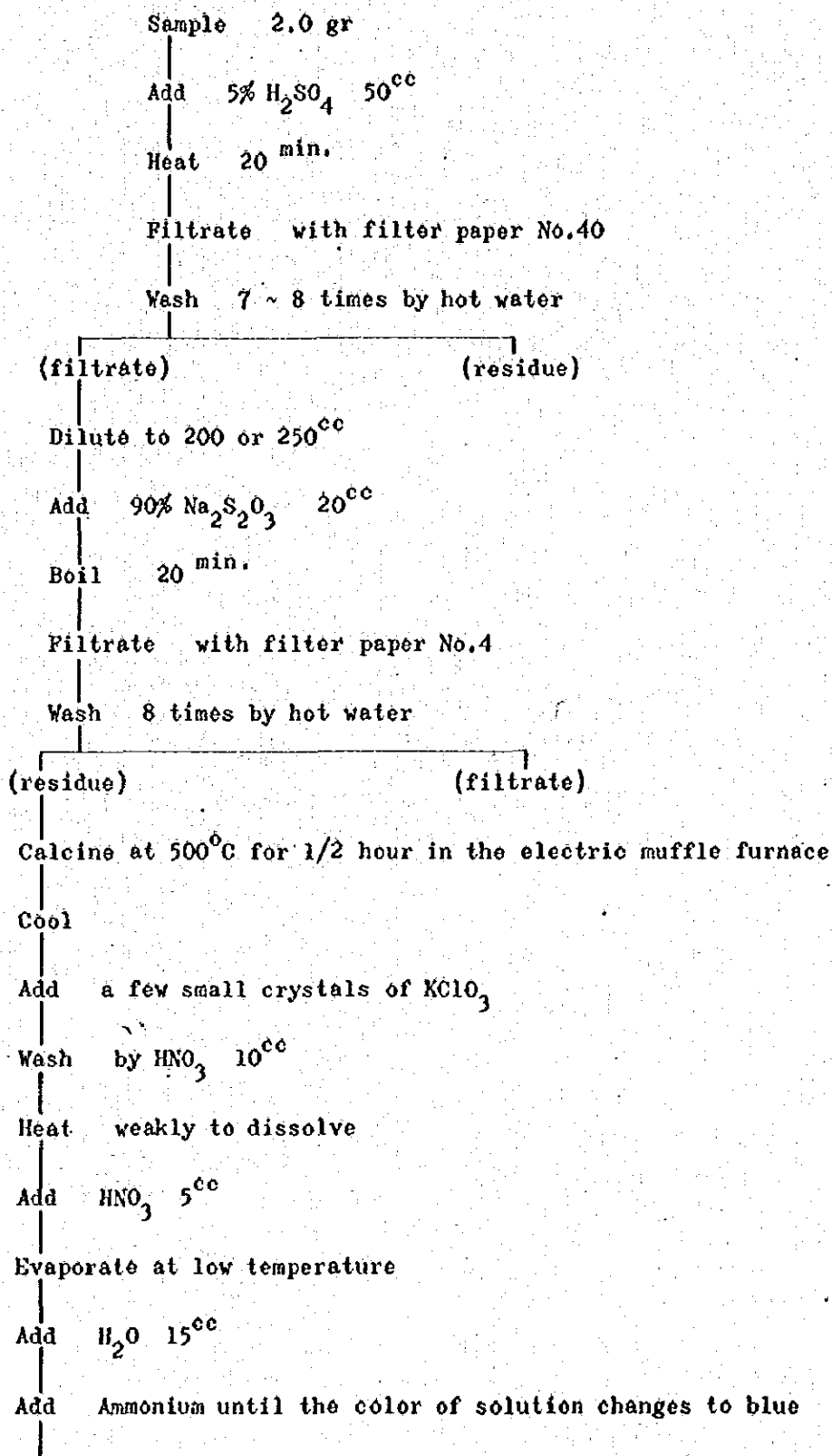
Starch	5 gr	} dilute to 1000 cc of H <sub>2</sub> O
KI	10 gr	
ZnCl <sub>2</sub>	4 gr	

\*\* Standard sodium hyposulphite

hyposulphite	20 g	} dilute to 1000 <sup>cc</sup> of H <sub>2</sub> O
NaOH	20 g	

in this case the factor is 0.005.

The Flow Sheet of Assay Method of Soluble Cu



Boil until the ammonium vapor is smelled.

Add acetic acid 5<sup>cc</sup>

Boil 10<sup>min.</sup> until the vapor of acetate is smelled.

Cool

Add 10% AgNO<sub>3</sub> 2 drops

20% KI 5 ~ 10<sup>cc</sup>

Almidon \* 5<sup>cc</sup>

Titrate by standard sodium hyposulphite solution \*\*

$$\text{Soluble Cu \%} = \frac{\text{c.c. of standard solution} \times \text{factor} \times 100}{\text{weight of sample}}$$

\* Almidon

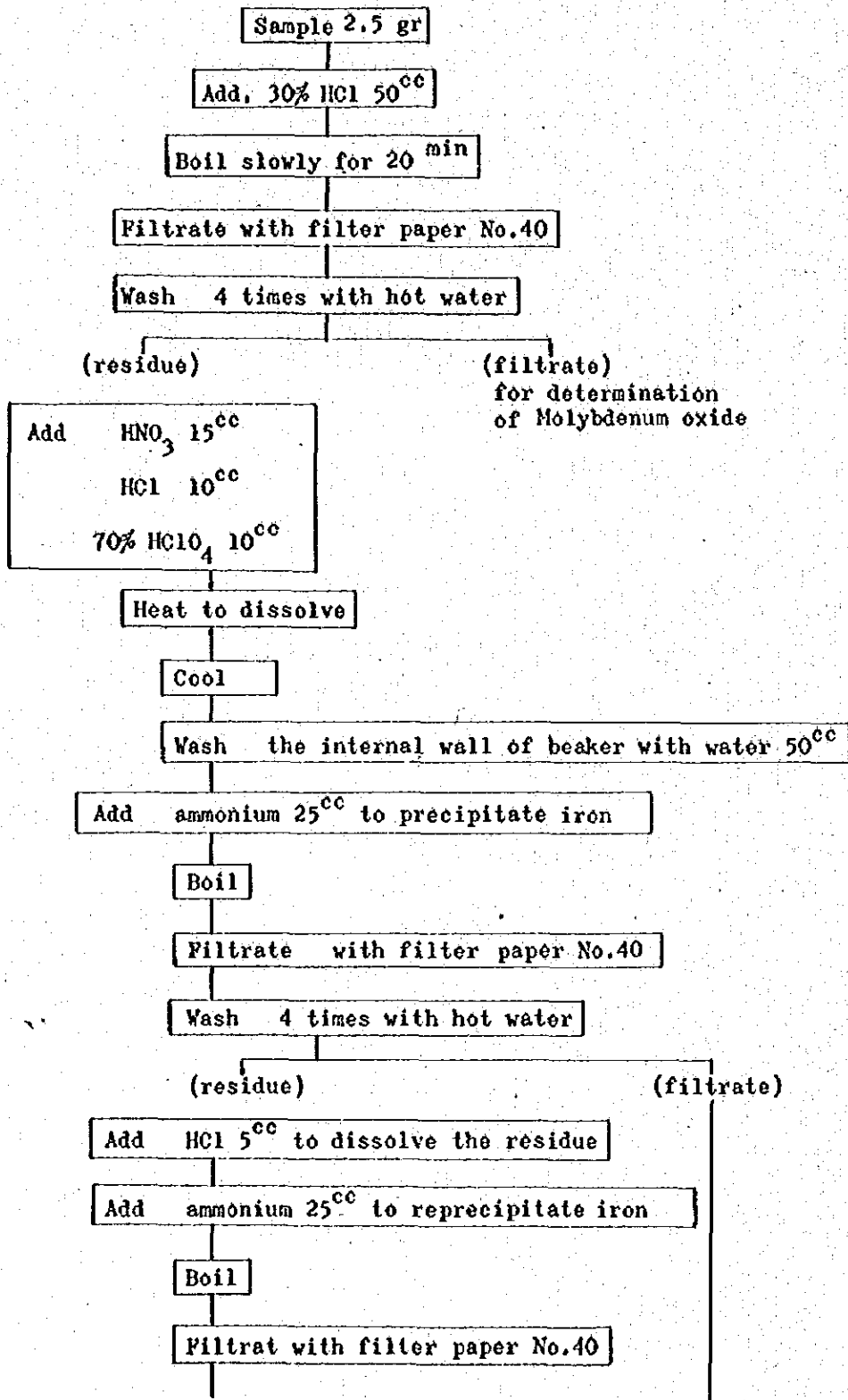
Starch	5 g	} dilute to 1000 <sup>cc</sup> of H <sub>2</sub> O
KI	10 g	
Zn Cl <sub>2</sub>	4 g	

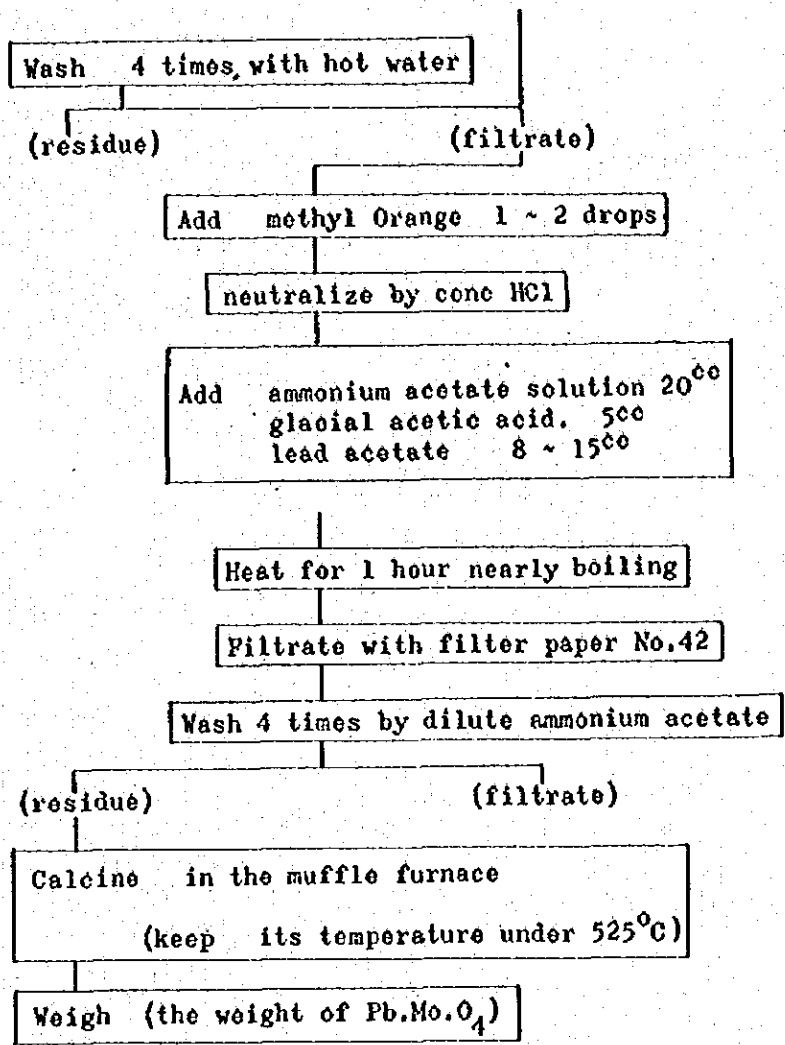
\*\* Standard sodium hyposulphite solution

hyposulphite	20 grs	} dilute to 1000 <sup>cc</sup> of H <sub>2</sub> O
NaOH	20 grs	

in this case the factor is 0.005.

The Flow Sheet of Assay Method of  $\text{MoS}_2$

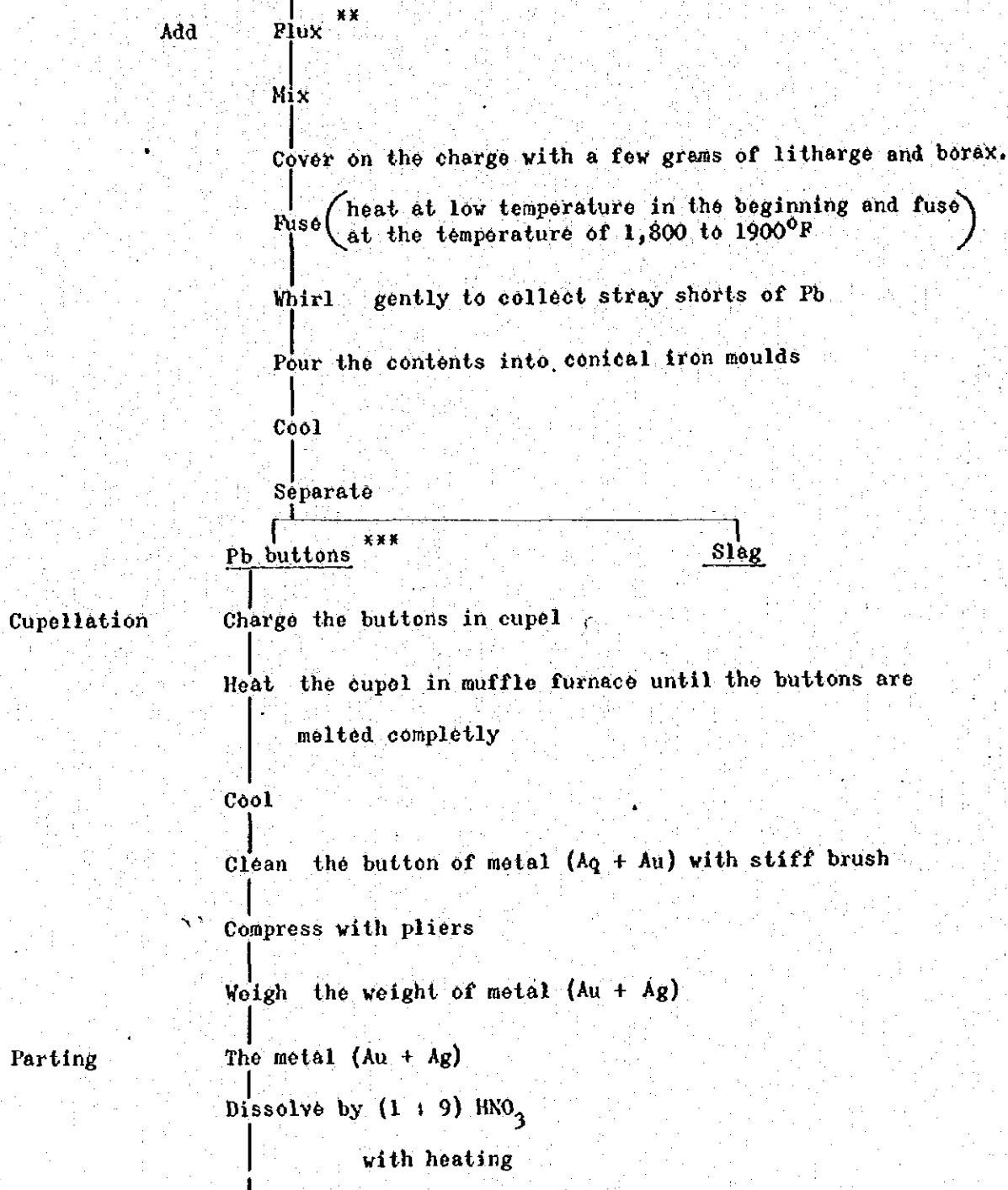




$$\text{MoS}_2 \% = \frac{\text{weight of Pb.Mo.O}_4 \times 0.2613}{\text{weight of sample} \times 0.5995} \times 100$$

The Flow Sheet of Assay Methods of Au and Ag<sup>\*</sup>

Sample 1 = 29.16667 gr (assay-ton)



Decant the acid

Wash with water and (1 : 9) ammonium hydroxide solution

Dry

Calcine in the muffle furnace about 10 min.

Cool

Weigh the weight of metal (Au).

#### Calculation

for 1 assay ton of sample, the calculation is as follow.

oz/ton Ag = weight of metal (Au+Ag)  $\frac{\text{mgs}}{\text{mgs}}$  weight of metal Au  $\frac{\text{mgs}}{\text{mgs}}$ ,

oz/ton Au = Weight of metal Au  $\frac{\text{mgs}}{\text{mgs}}$ .

The amount of flux

\* The analysis of Au and Ag has been carried out by the assay ton system of furnace method.

\*\* Depends on a sample as follow

crude ore cabezas : 5 ~ 30 gr  $\text{KNO}_3$  + 50 gr litharge

Tailing : 2 ~ 25 gr  $\text{KNO}_3$  + 50 gr litharge

Cu concentrate : 15 gr  $\text{KNO}_3$  + 25 gr litharge + 25 gr Flux - B

Pb concentrate : 10 gr  $\text{KNO}_3$  + 25 gr litharge + 25 gr Flux -B

Zn concentrate : 15 gr  $\text{KNO}_3$  + 50 gr Flux B

Fe concentrate : 20 gr  $\text{KNO}_3$  + 50 gr Flux B

Quality of  $\text{KNO}_3$  depend on Fe contents of sample.

In case of less Fe content, add a few grams of flour.

Flux - B consists of

PbO	18.75 kg
Na <sub>2</sub> CO <sub>3</sub>	7.50 kg
Na <sub>2</sub> B <sub>4</sub> O <sub>7</sub>	3.00 kg
SiO <sub>2</sub>	1.20 kg

\*\*\* If the weight of Pb buttons are more than 28 gr, repeat the scorification.



The Flow Sheet of Assay Method of  $\text{SiO}_2$

Sample 1.0 gr

Mix with 8 to 10 gr of flux (sodium hydroxide  
1 : Sodium peroxide 1)

Fuse for 5 min. by Bunsen burner

Wash by hot dilute hydrochloric acid

Dissolve

Add conc hydrochloric acid

Evaporate with air bath, stay 10 min.  
in a state of dry.

Cool

Add hydrochloric acid 5 cc  
hot water 30 cc

Heat to dissolve

Filtrate with filter paper No.42 in a state of hot.

Wash by hot dilute hydrochloric acid 2 times, then by  
hot water 8 times.

(residue)

(filtrate)

Calcine in muffle furnace

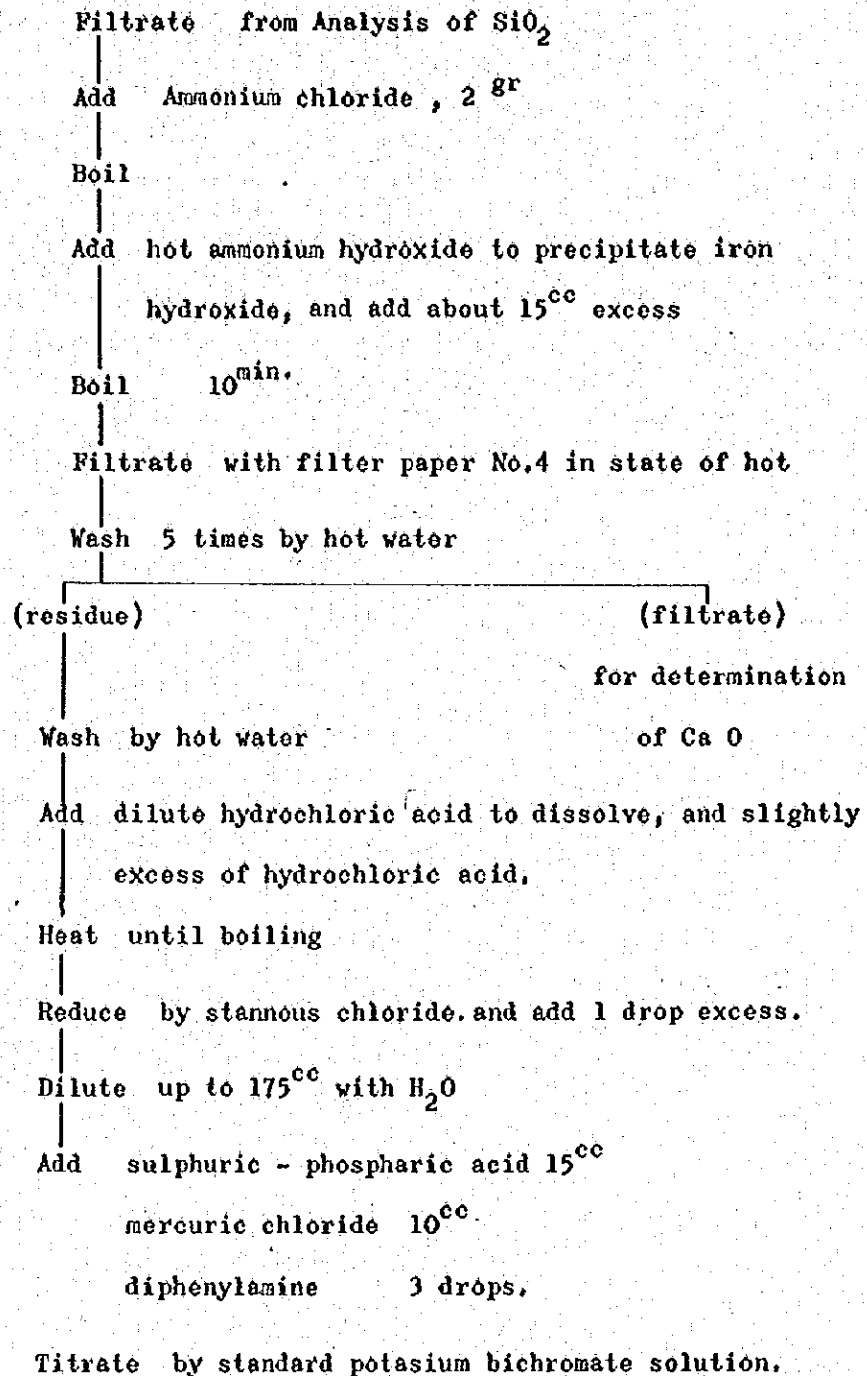
for determine of Fe

Weigh

Weight of  $\text{SiO}_2$

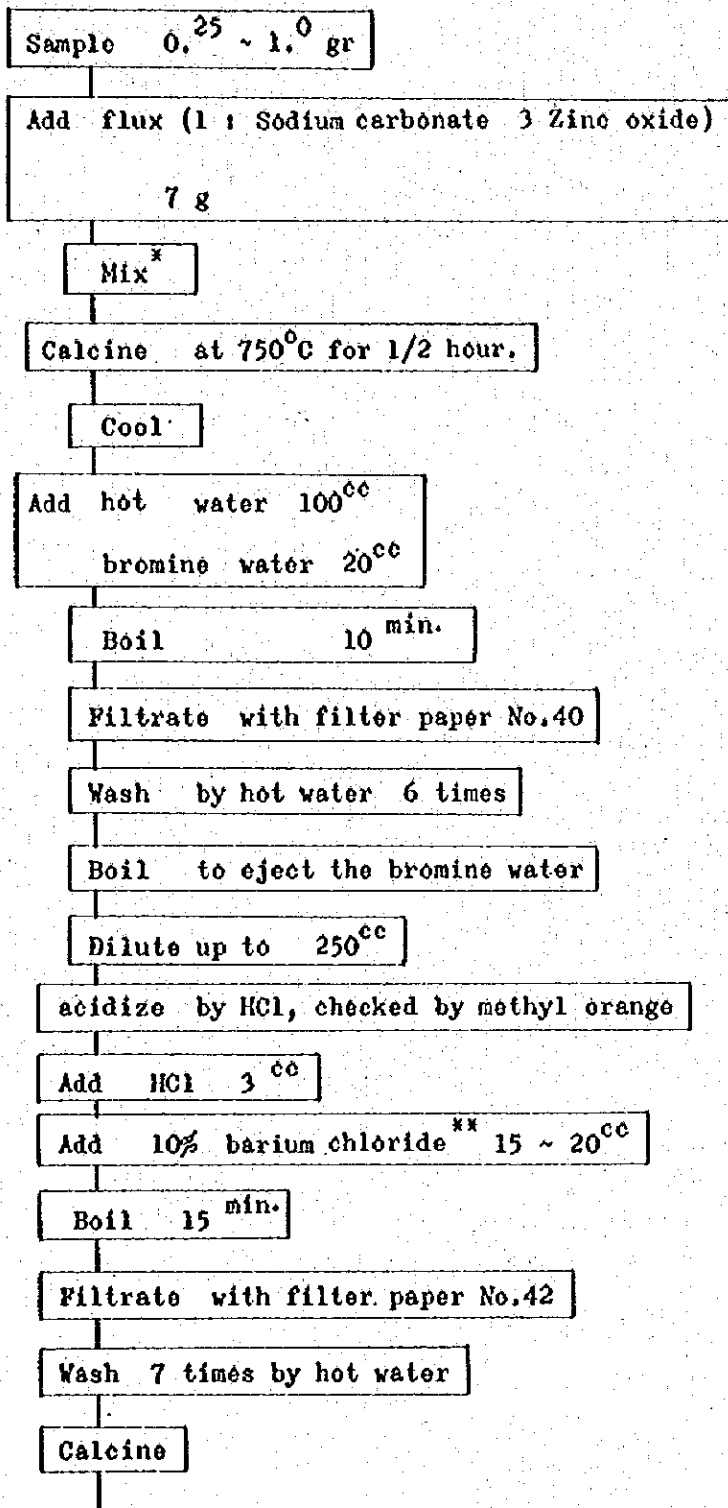
$$\text{SiO}_2 \% = \frac{\text{weight of SiO}_2}{\text{weight of sample}} \times 100$$

The Flow Sheet of Assay Method of Fe



$$\text{Fe \%} = \frac{\text{c.c of standard solution} \times \text{factor} \times 100}{\text{weight of sample}}$$

The Flow Sheet of Assay Method of S



Weigh the weight of BaSO<sub>4</sub>

$$S\% = \frac{\text{wt. BaSO}_4 \times 0.13734 \times 100}{\text{Weight of sample}}$$

\* Flux 3 zinc oxide, 1 sodium carbonate.

\*\* Barium Chloride

117 gr of Barium Chloride

diluting to 1000 cc

A-9 Comparison of Ore Grades between Crosscut No. 1 and Underground Drill Hole No. 4

Distance		Crosscut No. 1		Underground Drill Hole No. 4	
From	To	Sample No.	Cu. %	Sample No.	Cu. %
0	3	3101	0.11	1401	0.10
3	6	2	0.14	2	0.09
6	9	3	0.13	3	0.09
9	12	4	0.12	4	0.12
12	15	5	0.10	5	0.13
15	18	6	0.09	6	0.17
18	21	7	0.14	7	0.10
21	24	8	0.09	8	0.16
24	27	9	0.15	9	0.10
27	30	3110	0.12	1410	0.11
30	33	1	0.16	1	0.09
33	36	2	0.12	2	0.11
36	39	3	0.09	3	0.12
39	42	4	0.22	4	0.23
42	45	5	0.26	5	0.07
45	48	6	0.09	6	0.08
48	51	7	0.06	7	0.08
51	54	8	0.13	8	0.11
54	57	9	0.07	9	0.23
57	60	3120	0.20	1420	0.24
60	63	1	0.16	1	0.71
63	66	2	0.50	2	0.58
66	69	3	0.43	3	0.33
69	72	4	0.64	4	0.69
72	75	5	0.77	5	0.72
75	78	6	0.74	6	0.74
78	81	7	0.80	7	0.97
81	84	8	0.56	8	0.56
84	87	9	0.95	9	0.66
87	90	3130	0.89	1430	0.74
90	93	1	1.14	1	0.84
93	96	2	0.89	2	0.69
96	99	3	0.87	3	1.18
99	102	4	0.66	4	0.72
102	105	5	0.66	5	0.97
105	108	6	0.84	6	0.87
108	111	7	0.59	7	0.87
111	114	8	0.77	8	0.77
114	117	9	0.89	9	0.82
117	120	3140	0.92	1440	0.70
120	123	1	0.95	1	0.79
123	126	2	0.79	2	0.72
126	129	3	0.84	3	0.79
129	132	4	1.09	4	0.66
132	135	5	0.95	5	0.84
135	138	6	0.79	6	1.16
138	141	7	0.74	7	0.85
141	144	8	0.74	8	0.68
144	147	9	0.69	9	0.60
147	150	3150	0.59	1450	0.63
150	153	1	0.61	1	0.60
153	156	2	0.57	2	0.92
156	159	3	0.54	3	0.84
159	162	4	0.54	4	0.75

A-10 Comparison of Assays between C.R.L. and Plenge  
 C.R.L. : Central Research Laboratory of Mitsui  
 Mining and Smelting Co., Tokyo

Sample No.	P l e n g e		C. R. L.	
	Total-Cu %	MoS <sub>2</sub> %	Total-Cu %	MoS <sub>2</sub> %
0116	0.54	0.030	0.52	0.011
0132	0.28	0.017	0.28	0.013
0219	0.60	0.032	0.59	0.023
0317	0.75		0.60	
0418	0.11	0.007	0.11	0.003
0436	0.87	0.003	0.85	0.003
0514	0.95	0.003	0.86	0.003
0529	0.82	0.002	0.78	0.003
0620	0.31	tr.	0.16	0.003
0712	0.30	0.002	0.17	0.003
0917	0.41	0.027	0.36	0.038
0934	0.66	0.028	0.64	0.032
0951	1.00	0.008	0.96	0.007
1035	1.30	0.135	1.22	0.098
1050	0.43	0.042	0.41	0.090
1114	0.68		0.67	
1128	0.74		0.87	
1214	0.46		0.44	
1228	0.69		0.66	
1316	0.91		0.88	
1414	1.46	0.008	1.36	0.003
1428	0.43	0.005	0.42	0.003
1514	0.79		0.75	
1528	0.95		0.87	
1612	1.07		1.03	
1705	0.77		0.72	
2104	0.20	tr.	0.15	0.003
2816	0.07		0.07	
2833	0.10		0.09	
3120	0.20		0.19	
3140	0.92		0.83	
3150	0.59		0.52	
3160	0.55		0.49	
3180	1.16		1.04	
3219	0.24	0.005	0.24	0.003
3239	1.18	0.010	1.12	0.007
3317	0.30	0.005	0.28	0.005
3334	0.87	0.005	0.82	0.003
3351	0.38	0.008	0.35	0.007
3420	0.84	0.217	0.80	0.234
3440	1.43	0.077	1.38	0.060
3460	1.33		1.22	
3516	1.68		1.66	
4210	1.71	0.003	1.08	0.003
4310	0.89	0.015	0.82	0.010
4504	2.10		1.56	
4605	1.38	0.012	1.72	0.025

# **APPENDICES**

## **(Drilling Data)**

The Metrage Drilled by Each Diamond Bit

Annex 1

Item	Size	No.	Drill Holes (Underground)																	Total	
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 9	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15	No. 16	No. 17			
Diamond Bit	NC-VL	10424					13.80													13.80	
		14019										10.70									10.70
		14021					11.70														11.70
		14486								29.96											29.96
		14616	1.50																		1.50
		15590	10.05																		10.05
		15685	11.85																		11.85
		15686	8.10																		8.10
		15984	33.80																		33.80
		15985	3.55																		3.55
		15986						13.35													13.35
		15987	4.05					51.60													51.60
		16004					23.00														23.00
		16005					18.23								23.38						41.61
		16006					44.50														44.50
		16007					28.30														28.30
		16008													38.40						38.40
		16009	28.70																		28.70
		16010	5.70																		5.70
		16011	13.40																		13.40
		16012							9.02												9.02
		16014		10.29											13.89						24.18
		16015		16.22											32.83						49.05
		16017		40.48																	40.48
		16437		16.68							0.82										17.50
		18050									10.76									9.14	19.90
		18051															0.75			21.19	21.94



The Metrage Drilled by Each Diamond Bit

Item	Size	No.	Drill Holes (Underground)																	Total	
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 9	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15	No. 16	No. 17			
Diamond Bit	NX-VL	18055															19.75			19.75	
		18056		9.32								32.44									41.76
		18058										26.46									26.46
		18037		24.73																	24.73
		18038										16.62									16.62
		18234											30.74								30.74
		18331														1.04					1.04
		19103														0.91				25.70	26.61
		19115	1.30																		1.30
		19117						35.70													35.70
		19218				20.20															20.20
		19236											8.70							23.90	32.60
		19237														47.07					47.07
		19238											23.60								23.60
		18907										15.99									15.99
		18908		6.00																	6.00
		18909															24.60				24.60
		18910															19.54				19.54
		18911														25.29					25.29
		18912															28.86				28.86
		18913																		10.12	10.12
		23766						29.60													29.60
		23767														7.20					7.20
		23768														1.00					1.00
		23879				14.70															14.70
		20091					44.70														44.70
		200688														22.00					22.00

23. 5

### The Metrage Drilled by Each Diamond Bit

Item	Size	No.	Drill Holes (Underground)																	Total		
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15	No. 16	No. 17			
Diamond Bit	NX-VL	8376								18.40											18.40	
	BX-VL	15901															40.06					40.06
		15902								14.33												14.33
		15978																				74.40
		15979							17.05													17.05
		15980							10.55													10.55
		15981							46.15													46.15
		15982	22.38																			22.38
		15988																				27.12
		15989									8.60											8.60
		15990		12.48																		12.48
		15991																				19.22
		15992		20.04								7.83										17.73
		15993											4.88									24.92
		15994				17.53					12.90											12.90
		15995																				17.53
		15996																			8.26	16.83
		15997															21.64					21.64
		15998															23.92					23.92
		15999					29.05													23.16		46.78
		16000				0.33																52.21
		16001												5.45								5.78
		16002													20.34							20.34
		16003																			13.96	13.96
		16475																			37.89	37.89
																						5.92

The Metrage Drilled by Diamond Bit

Item	Size	No.	Drill Holes (Underground)																	Total
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 9	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15	No. 16	No. 17		
Diamond Bit	HC-VL	17326				12.30														12.30
		17441						8.45												8.45
		19950																	12.55	12.55
		15900							3.57											3.57
		17325							22.15											22.15
Total			144.28	116.19	114.21	163.45	129.90	115.75	76.15	200.00	194.96	126.52	121.74	95.95	123.20	121.95	67.67	25.70		1893.72

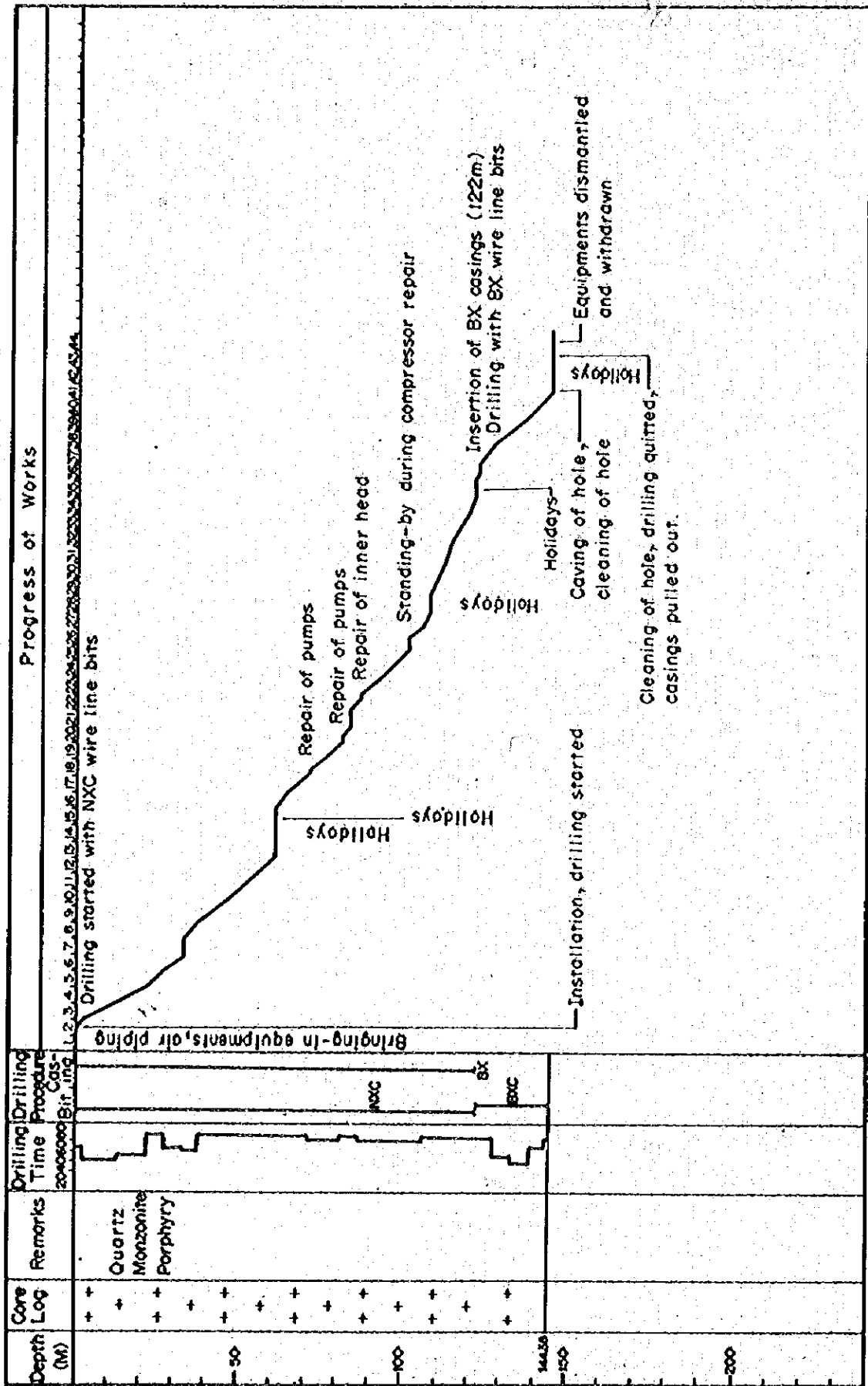
The Metrage Drilled by Each Diamond Bit

Item	Size	No.	Drill Holes (Surface)														Total	
			No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	No. 13	No. 14		
Diamond Bit	NF-VL	14020	3.65															3.65
		14027	7.70															7.70
		14074	22.80															22.80
		14079	1.55															1.55
		15656	10.25															10.25
		15896		17.00														17.00
		15898		0.85														0.85
		15913	13.15															13.15
		15914	14.05	3.70	46.90													64.65
		15916			16.85													16.85
		15985			24.65													24.65
		16004			38.65													38.65
		16005			42.75													42.75
		18234				0.37												0.37
		19020	5.20															5.20
		19115	11.60															11.60
		19116	7.30															7.30
		19235							23.89									23.89
		19238							13.87									13.87
		18909							13.71									13.71
		18910							17.07									17.07
		18911							0.73									0.73
		19881		30.00														30.00
		23880	4.50															4.50
		23881	25.30															25.30
		77956		0.80	10.30													11.10
		1945	1.50															1.50

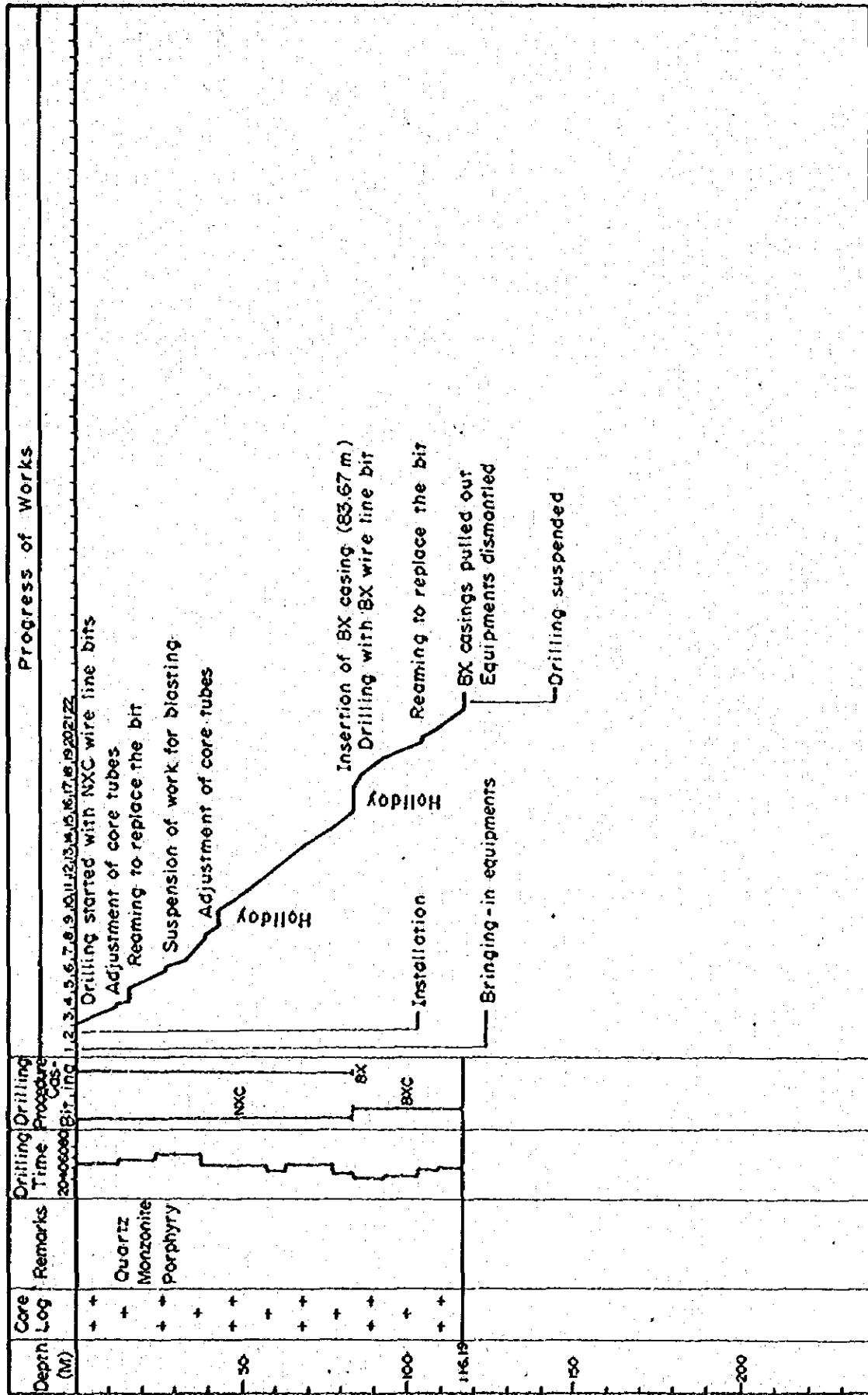
The Meusage Drilled by Each Diamond Bit

Item	No.	Size	Drill Holes (Surface)													Total			
			No. 1	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2	No. 2				
Diamond Bit	13341	3X-VL			16.20														16.20
	14238			20.85															20.85
	15412			23.00															23.00
	15498			15.50															15.50
	15916			3.50															3.50
	15895			38.30															38.30
	15896			20.25															20.25
	15897			17.20															17.20
	15898			8.80															8.80
	15996								20.21										20.21
	16001								13.83										13.83
16458								9.15										9.15	
16459								38.35										38.35	
Tricone Bit		3-7/8"	4.10	6.15															10.25
		4-3/4"		12.00	5.20	3.05													20.25
Total			200.00	170.55	201.50	154.23													706.28

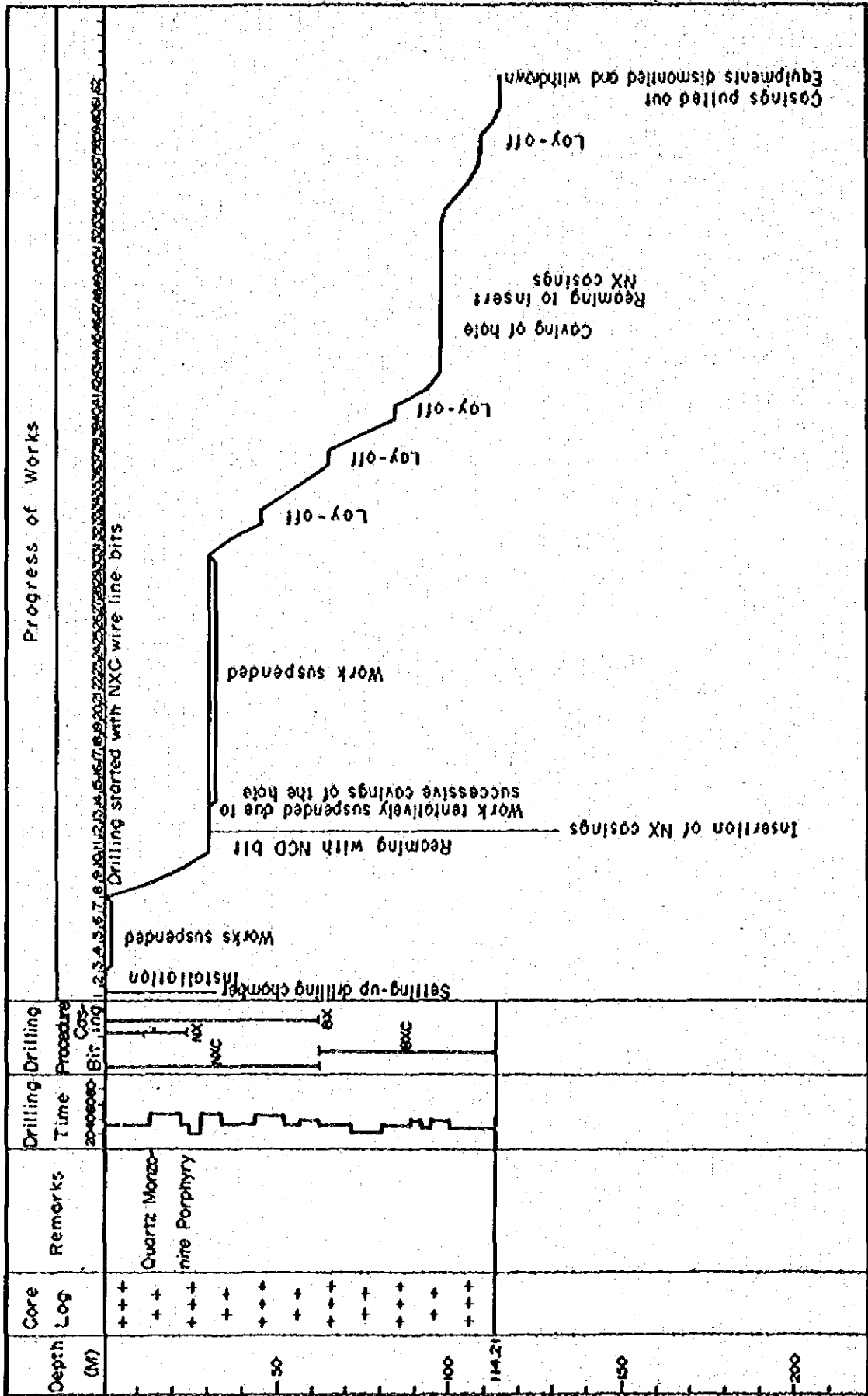
ANNEX 2 PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No.1



ANNEX 3 PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No.2

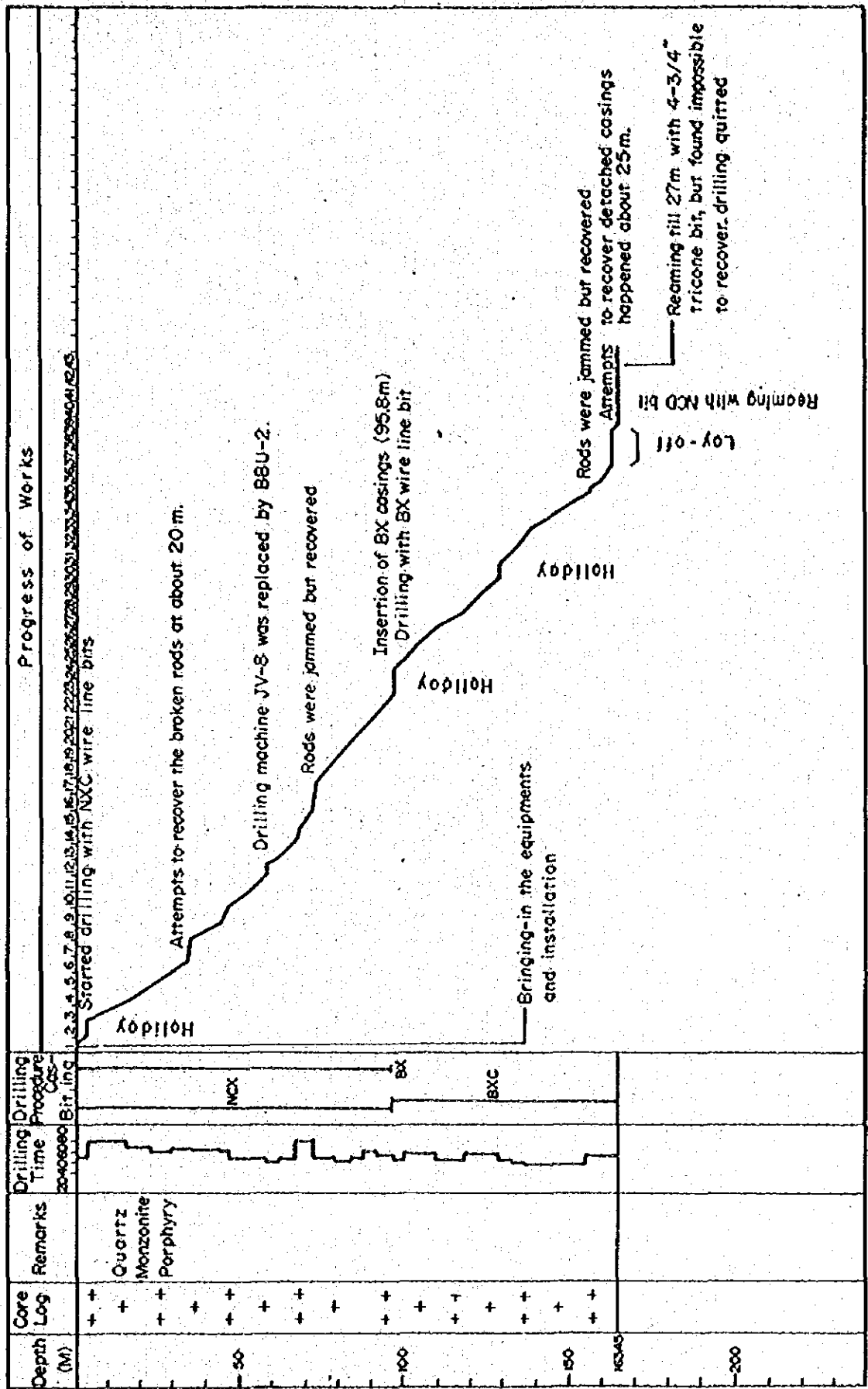


ANNEX 4 PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No.3

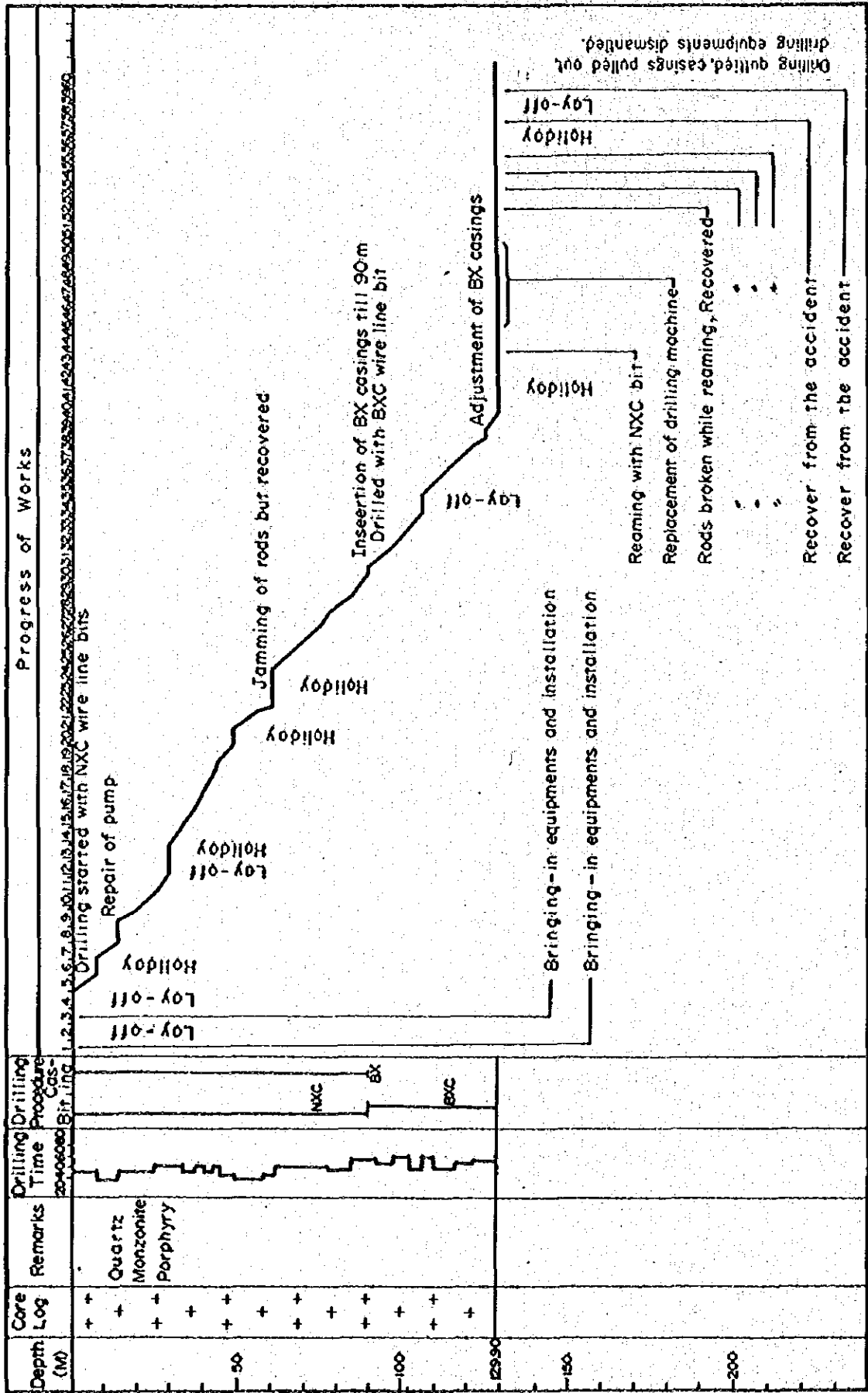




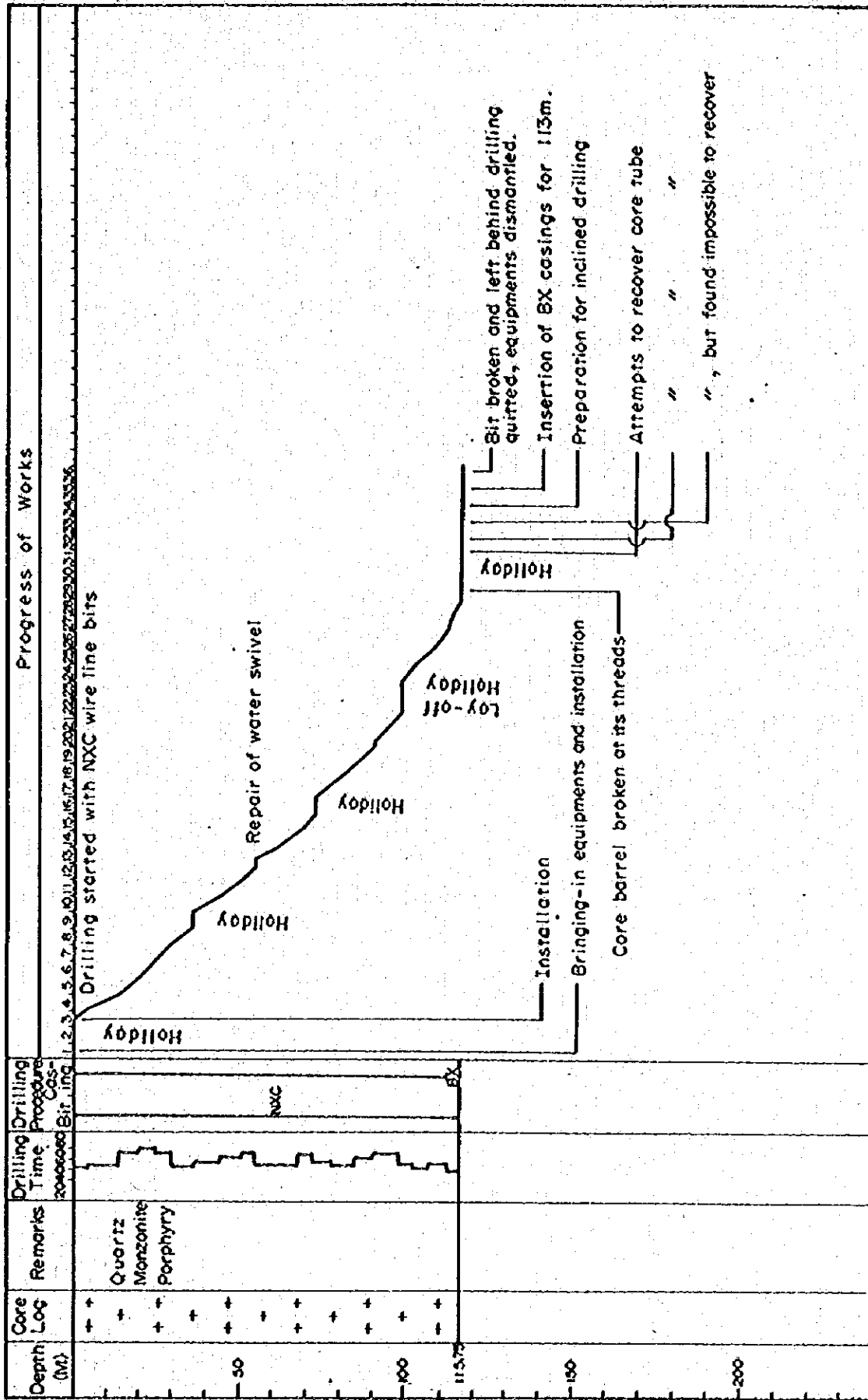
ANNEX 5 PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No. 4



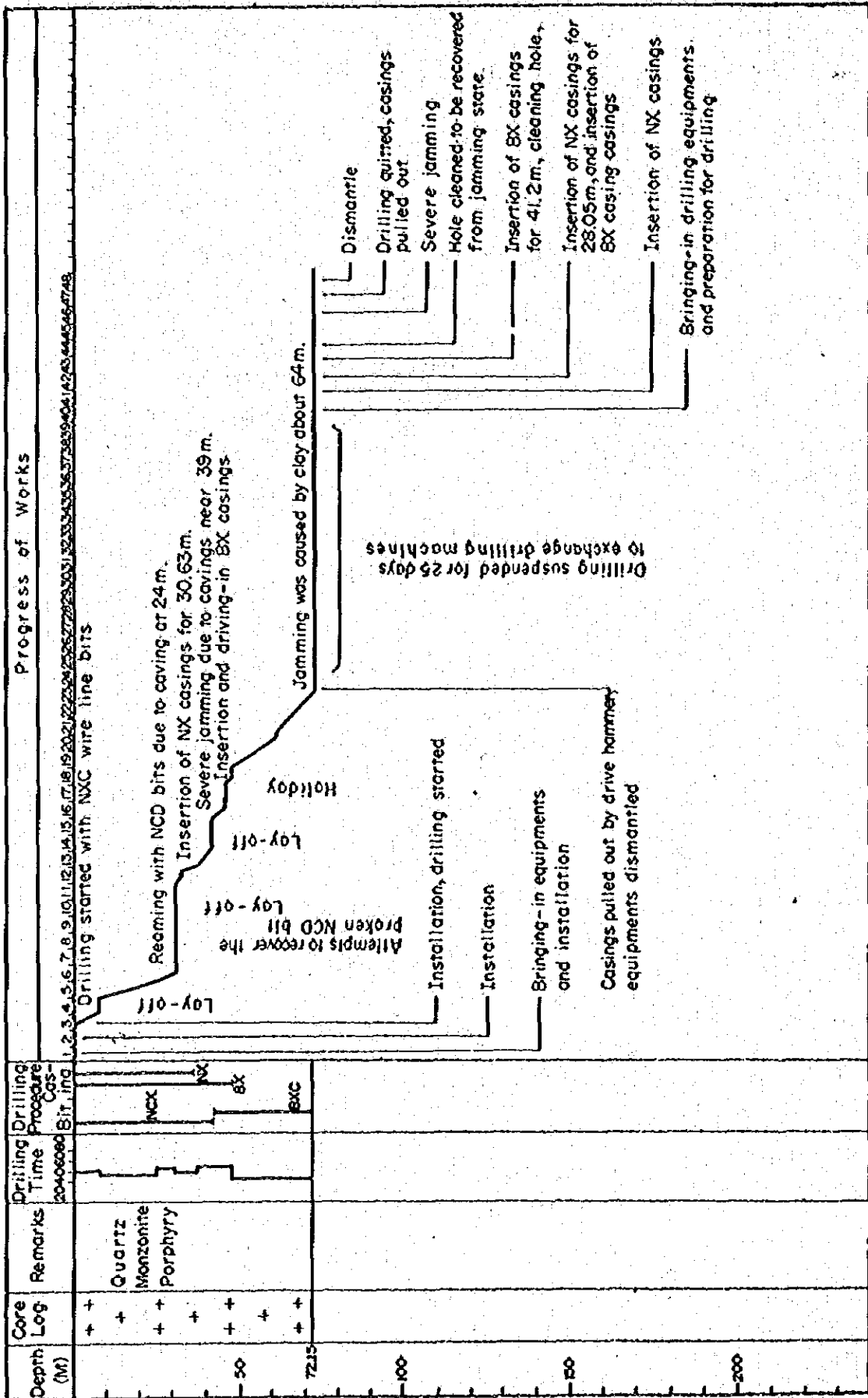
ANNEX 6 PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No.5



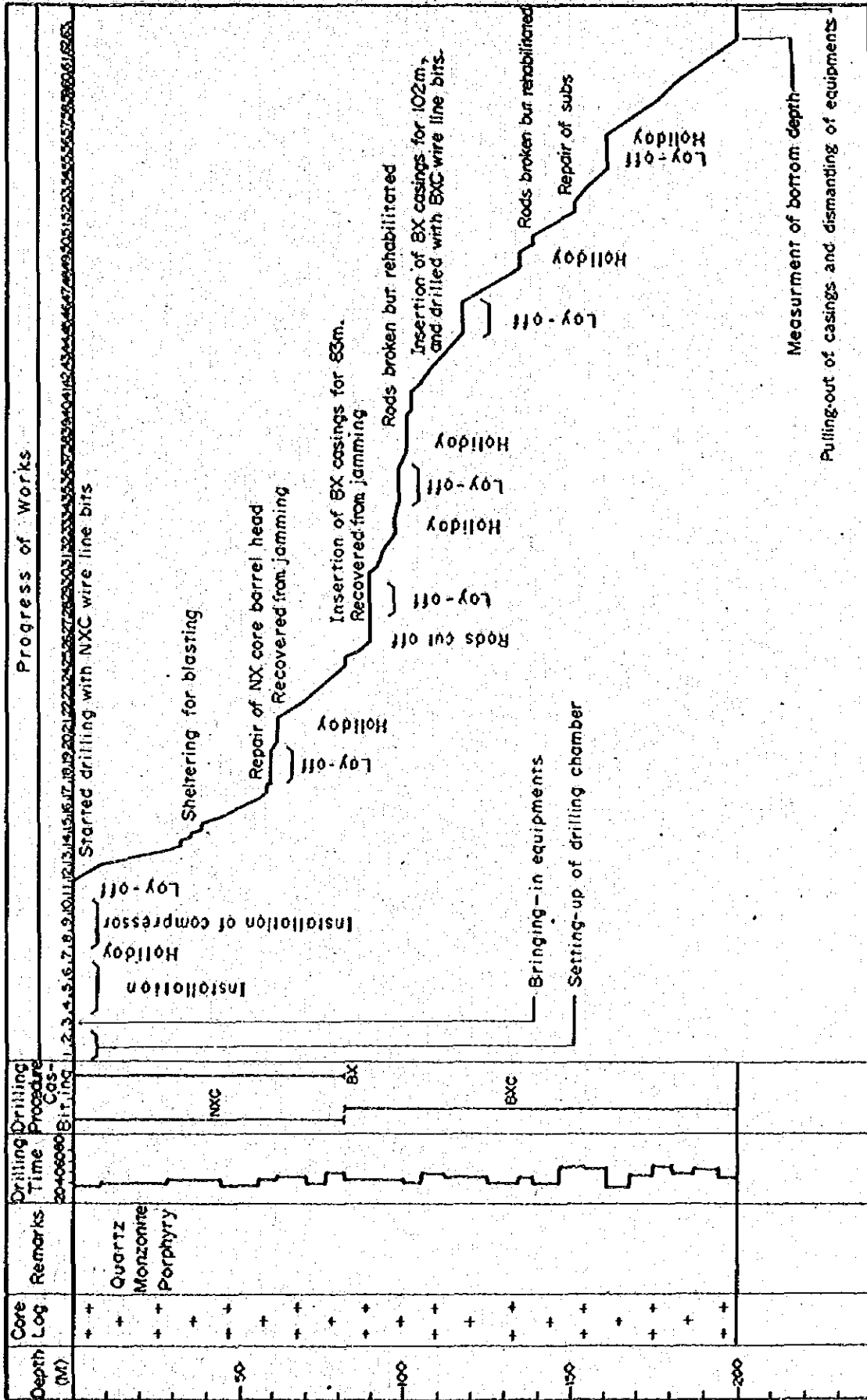
ANNEX 7 PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No. 6



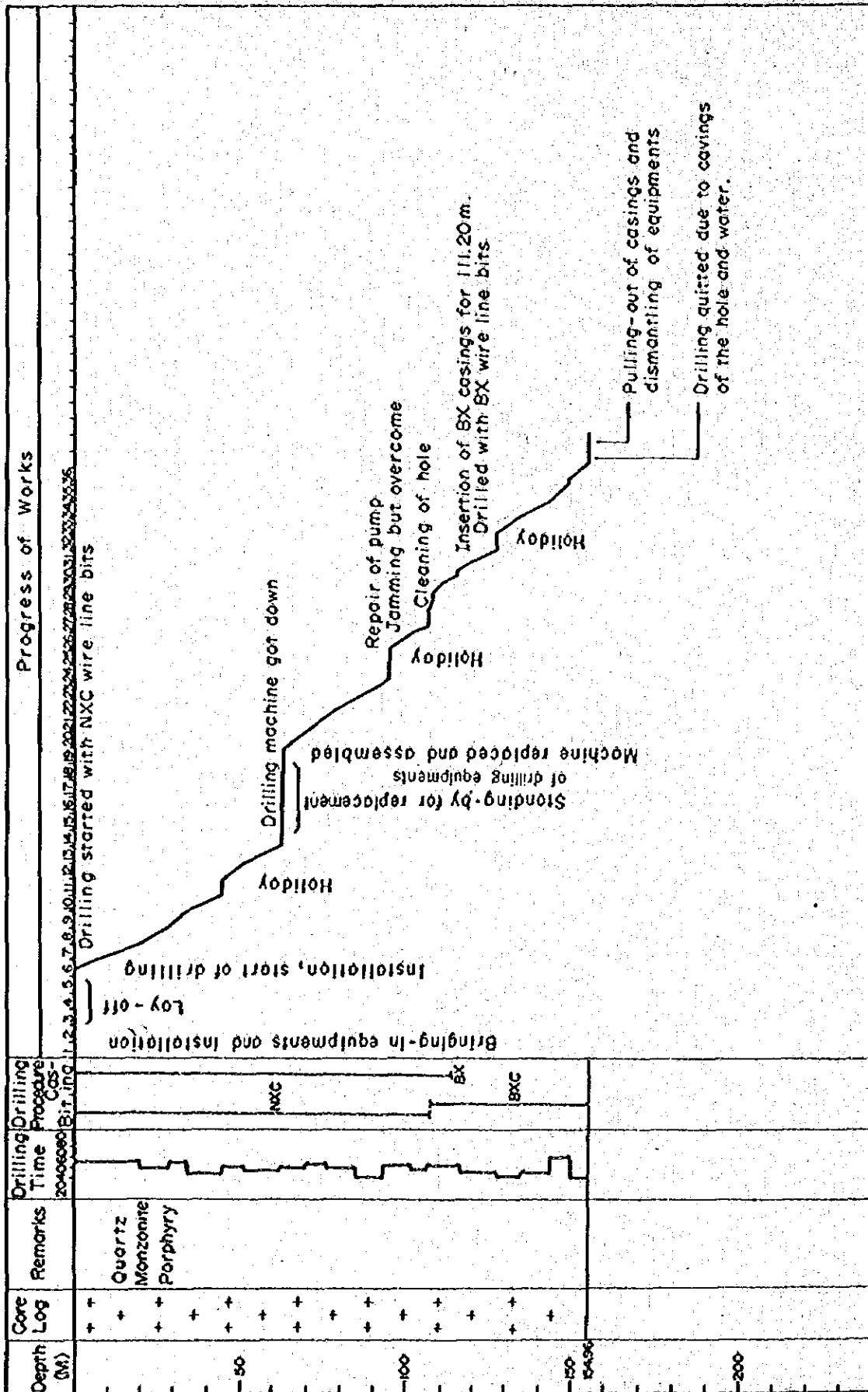
ANNEX 8 PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No.7



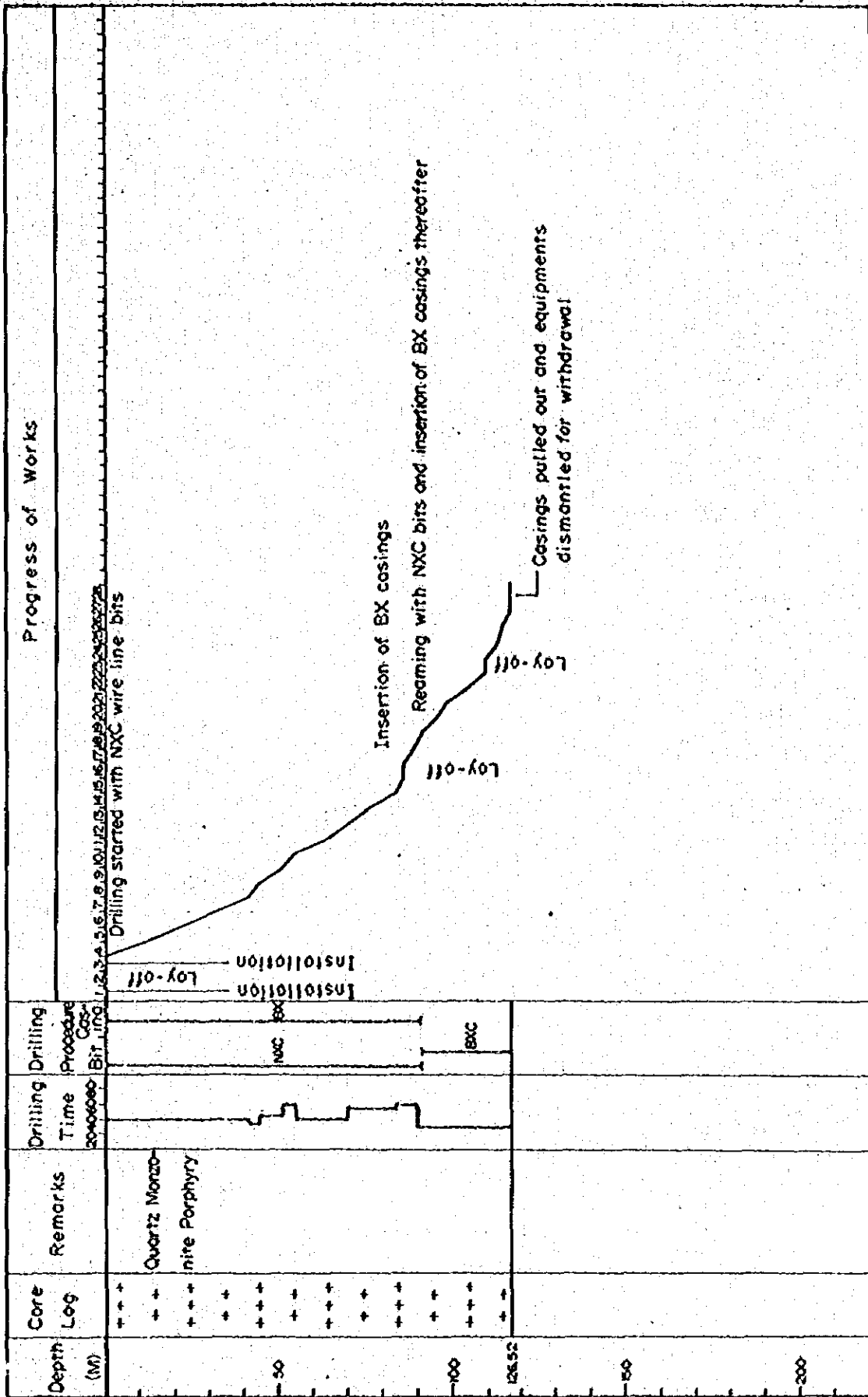
ANNEX 9 PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No.9



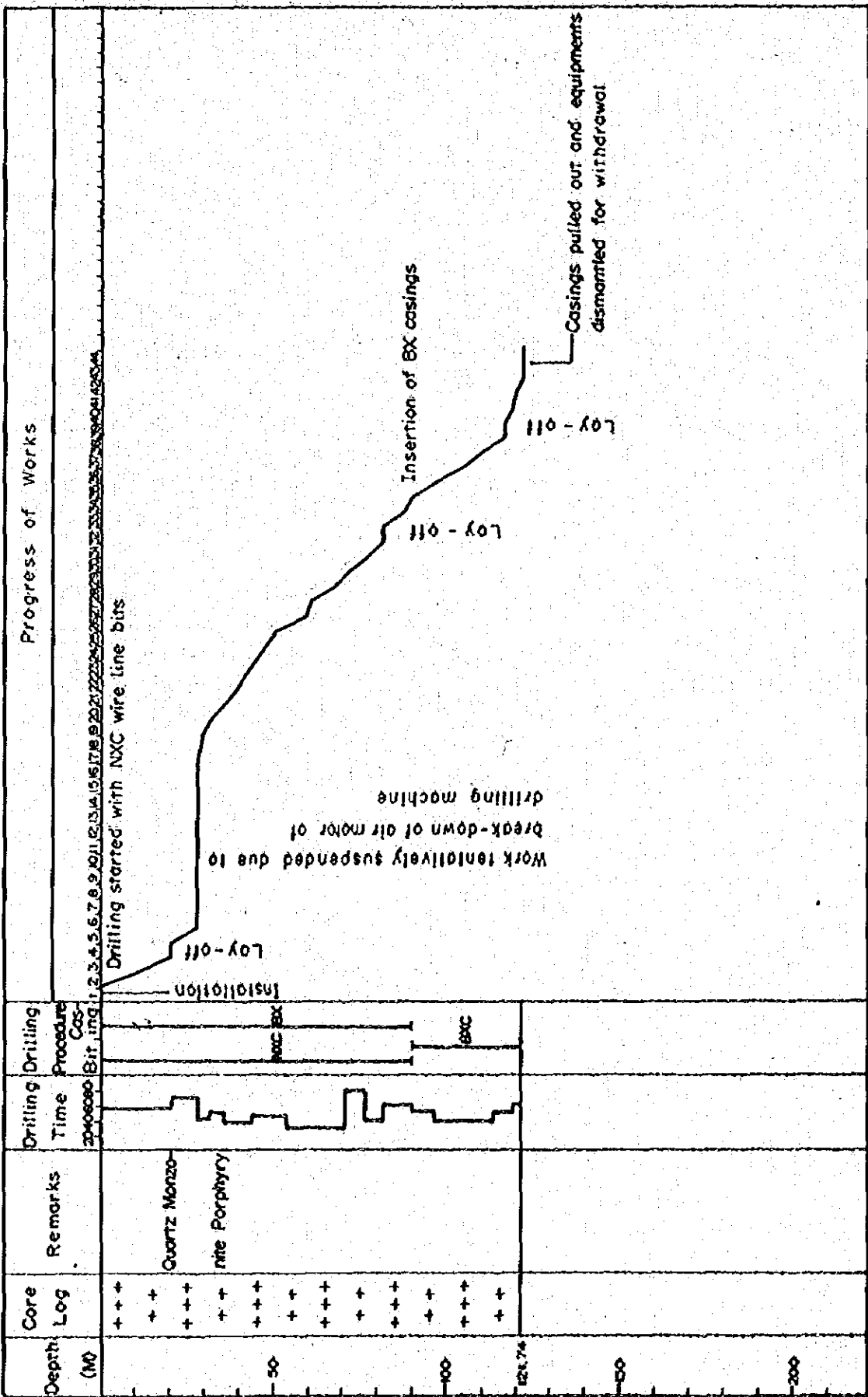
ANNEX 10 PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No.10



ANNEX II PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No.11

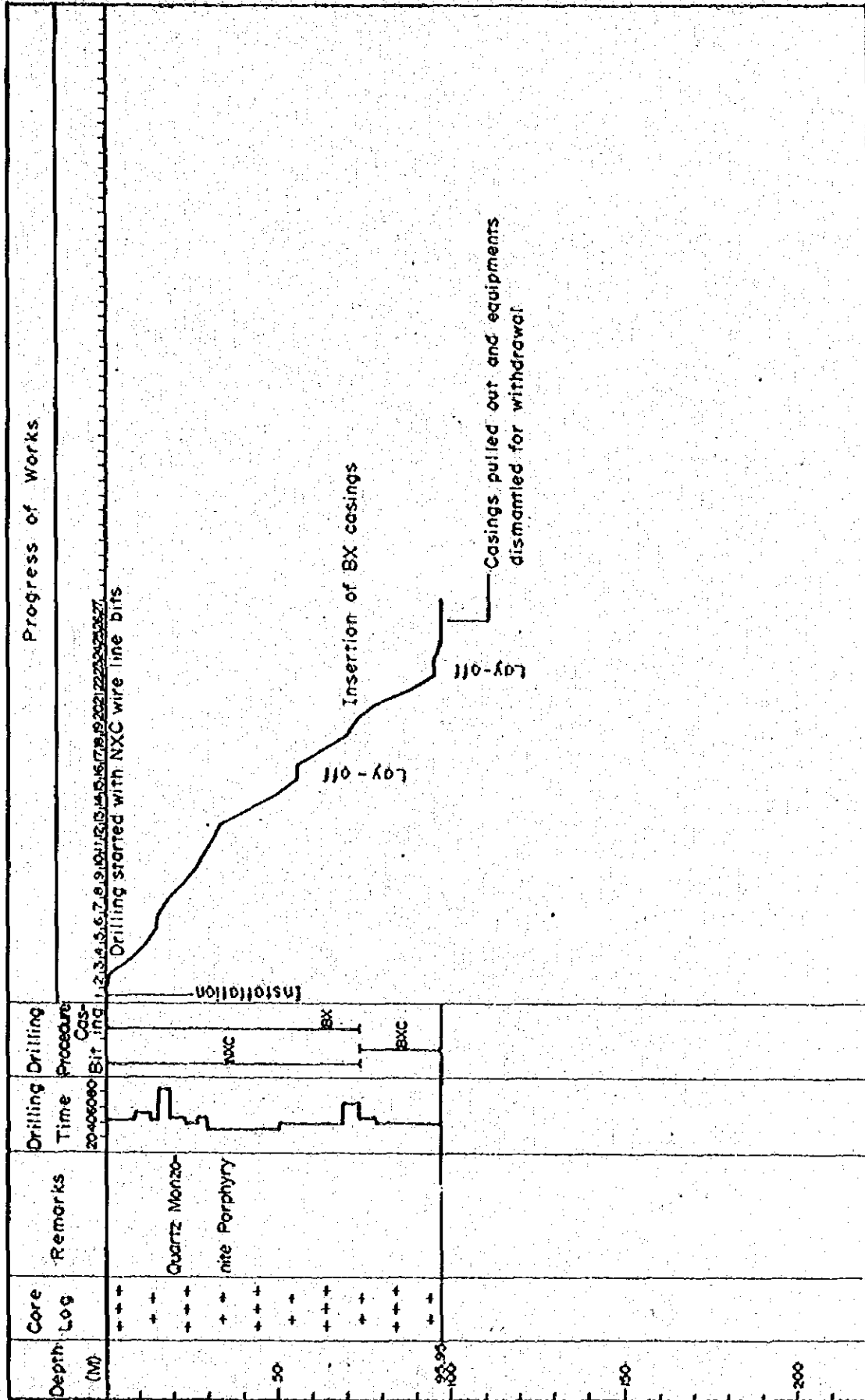


ANNEX 12 PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No.12

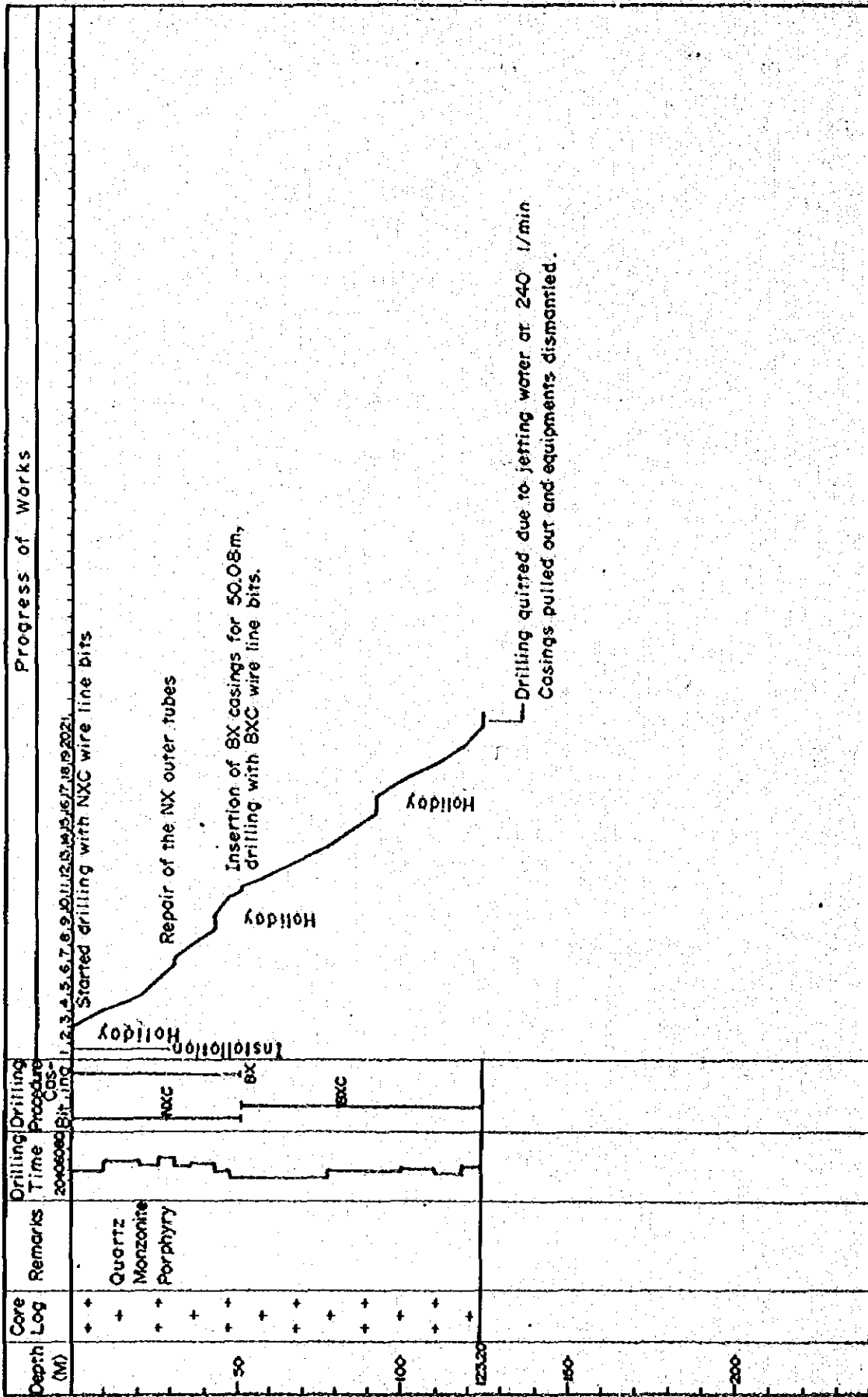




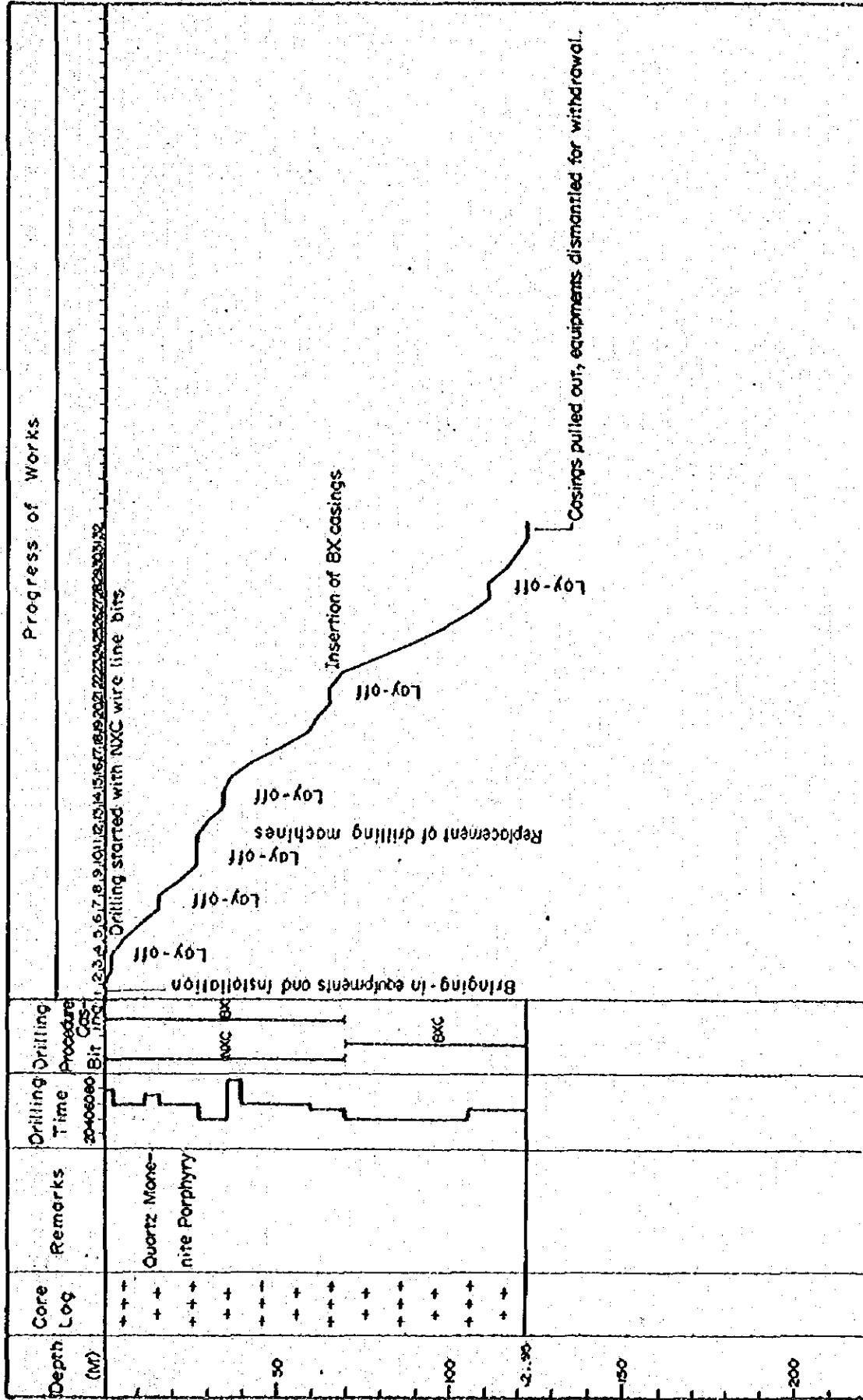
ANNEX 13 PROGRESS RECORD OF DIAMOND DRILLING  
UNDERGROUND No.13



ANNEX 14 PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No.14



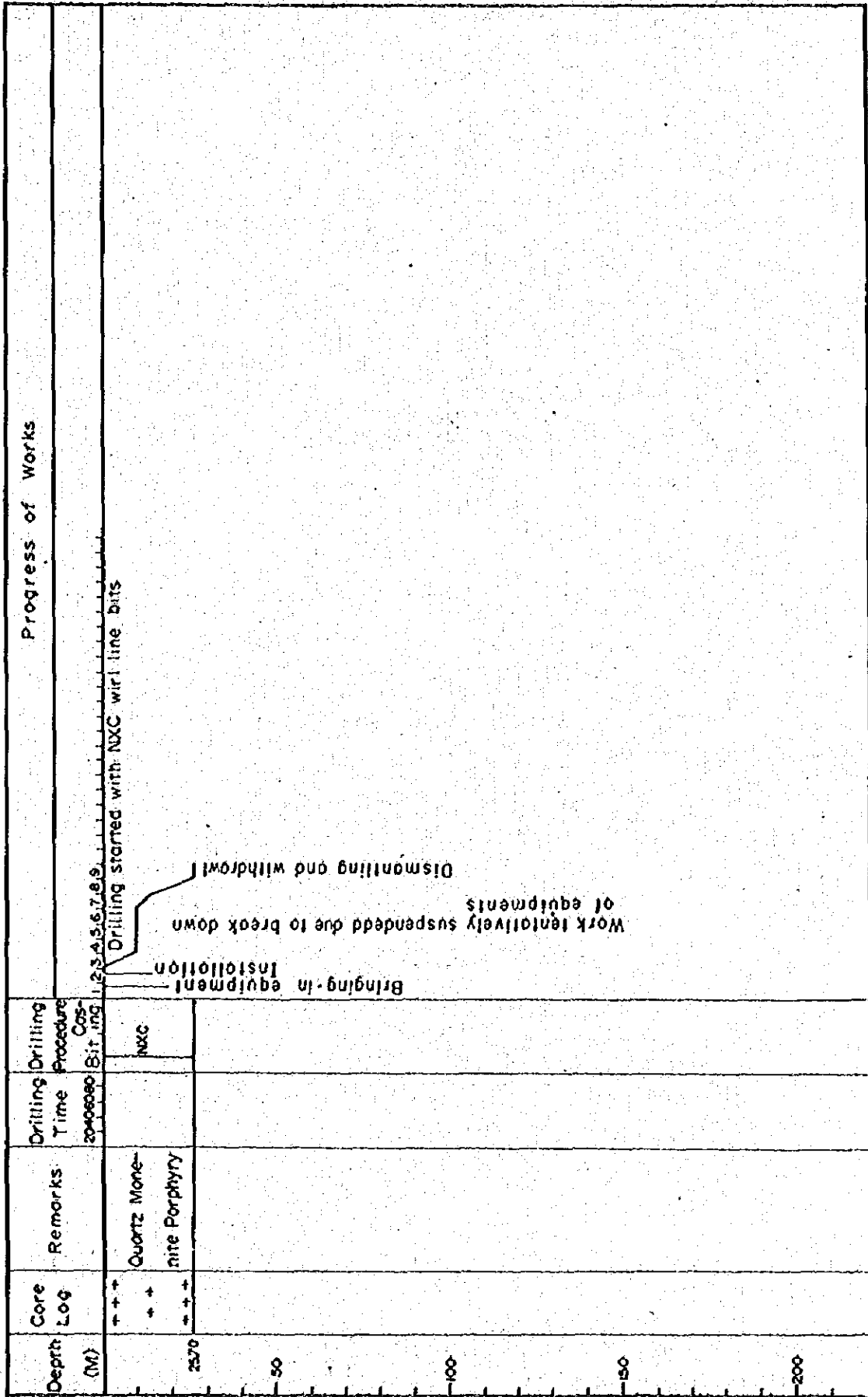
ANNEX 15 PROGRESS RECORD OF DIAMOND DRILLING  
ANDERGROUND No.15



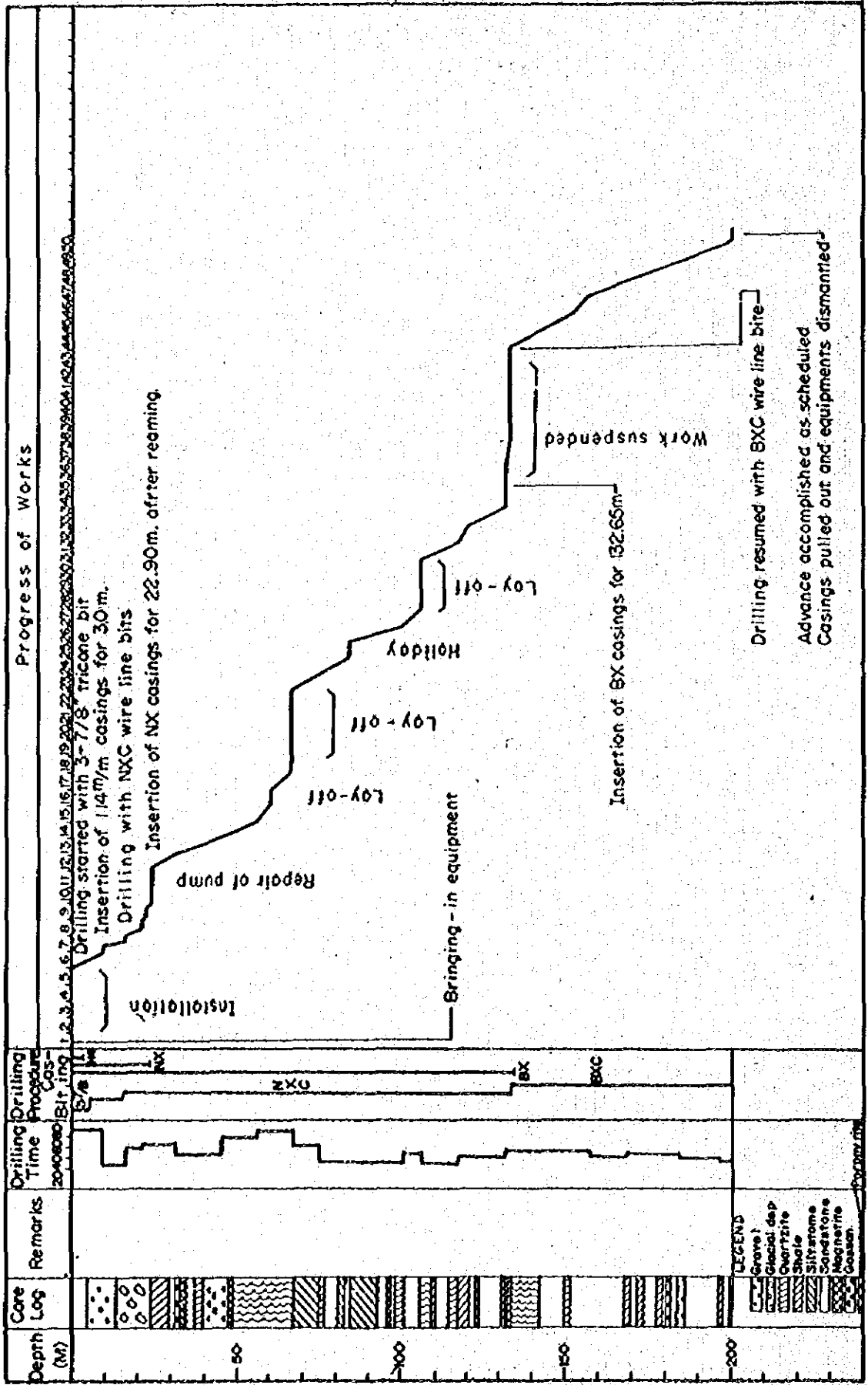
ANNEX 16 PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No.16

Depth (M)	Core Log	Remarks	Drilling Time	Drilling Procedure	Progress of Works
0	+		20:00:00	Bitting	1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17.
0	+	Quartz Monzonite Porphyry		NXC BX	Drilling started with NXC wire line bits
0	+			BXC	Insertion of BX casings
50	+				LoY-off
67.67	+				LoY-off
100	+				LoY-off
150	+				LoY-off
200	+				LoY-off

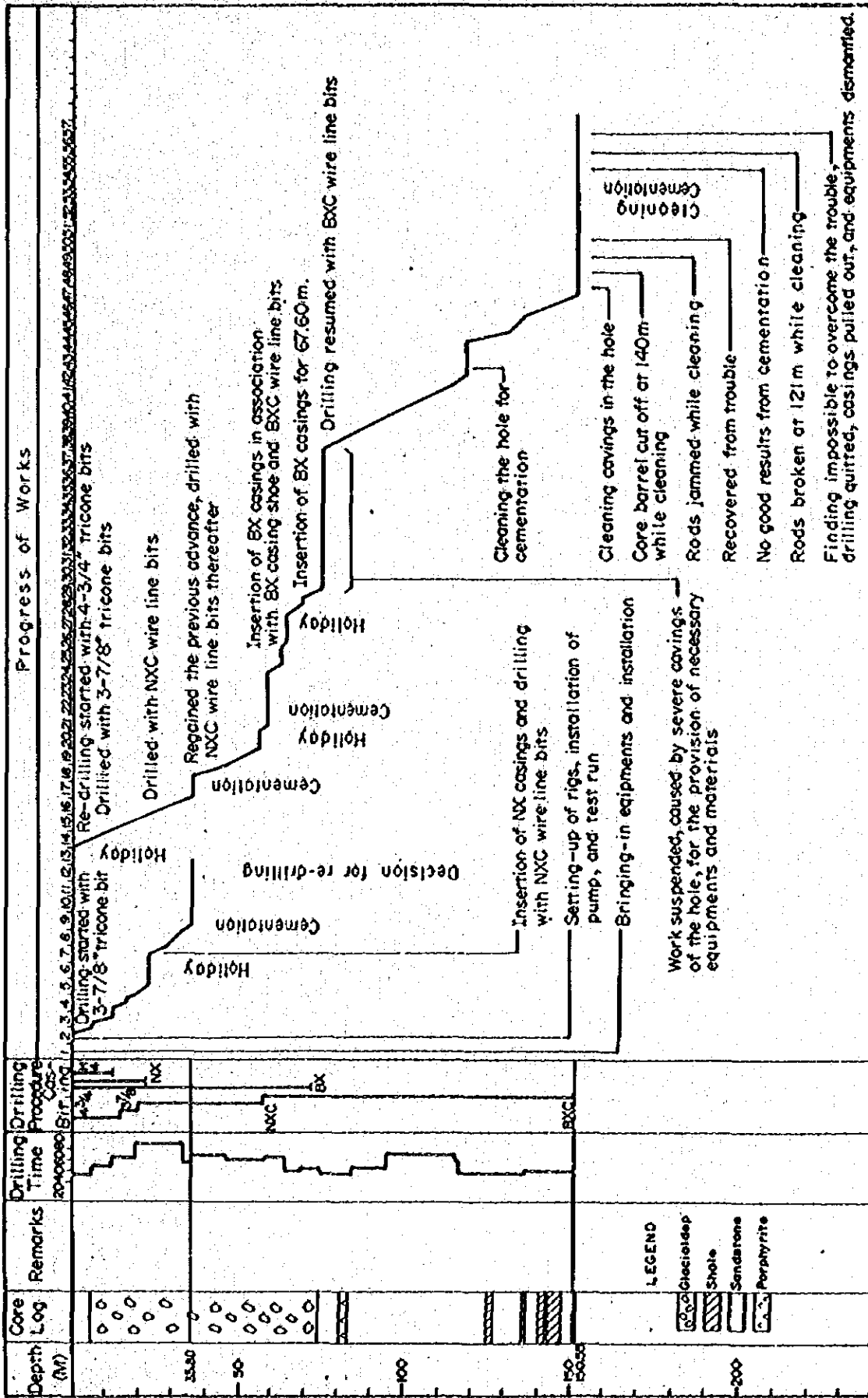
ANNEX 17 PROGRESS RECORD OF DIAMOND DRILLING UNDERGROUND No.17



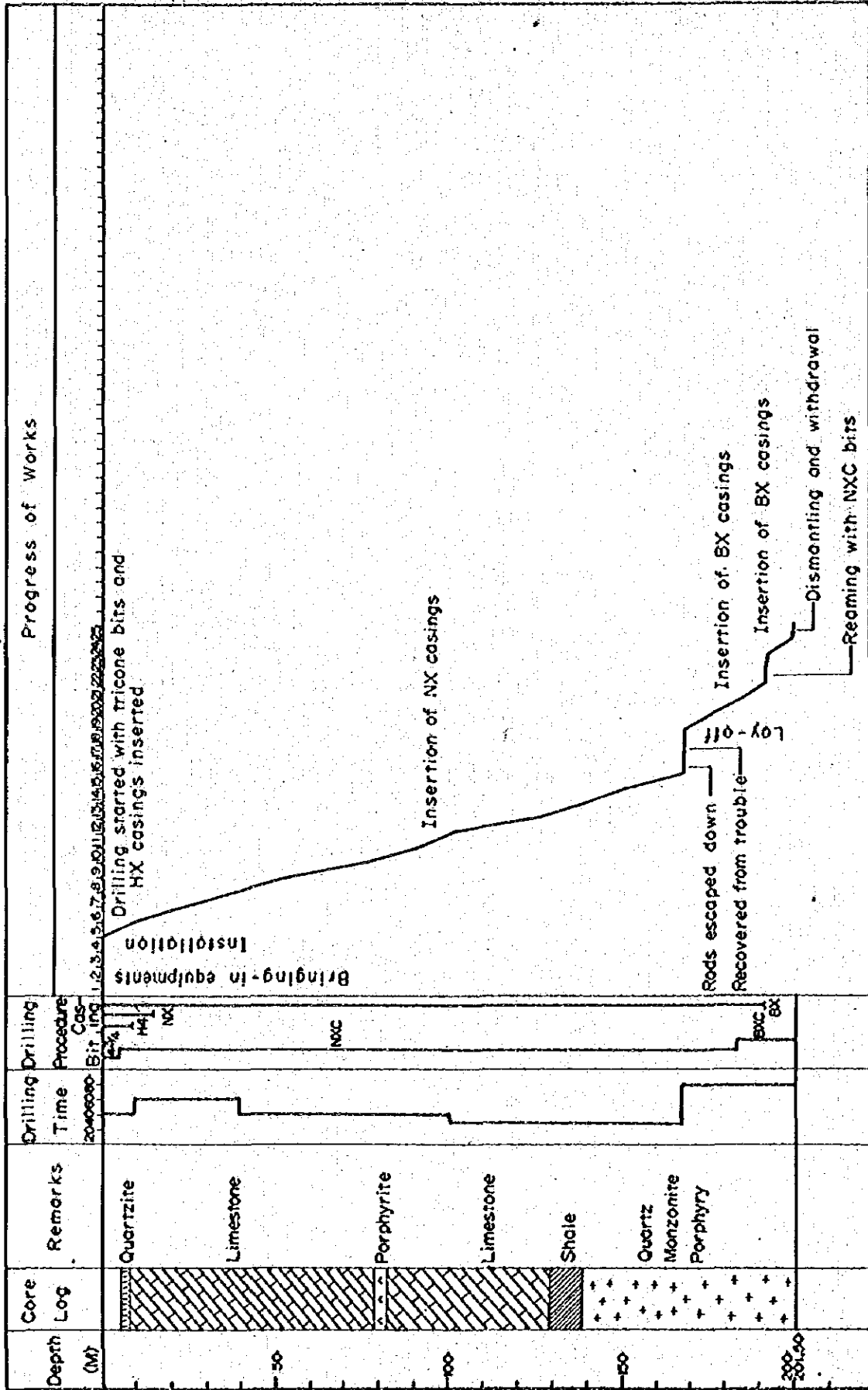
ANNEX 18 PROGRESS RECORD OF DIAMOND DRILLING  
SURFACE No.1



ANNEX 19 PROGRESS RECORD OF DIAMOND DRILLING SURFACE No.2



ANNEX 20 PROGRESS RECORD OF DIAMOND DRILLING  
SURFACE No.3





ANNEX 21 PROGRESS RECORD OF DIAMOND DRILLING SURFACE No.8

