

Appendix 9 Results and Charts of X-Ray Diffractive Analysis

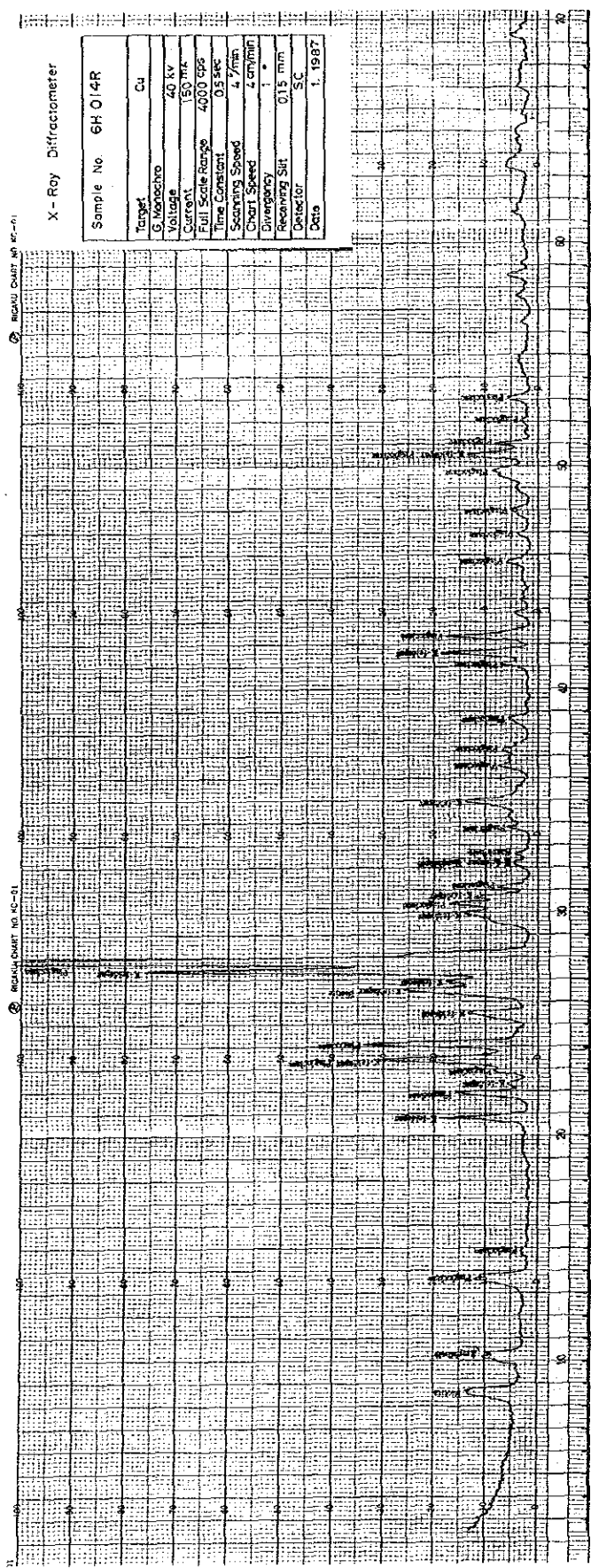
No.	Sample No.	Sector	Minerals		Quartz	Plagioclase	K-feldspar	Nepherine	Biotite	Clinopyroxene	Amphibole	Calcite	Ankerite	Siderite	Strontinite	Monazite	Apatite	Pyrochlore	Kutlle	Barite	Sericite	Smeccite	Halloysite	Analcite	Goethite	
			Rock Name																							
1	6H014R	Mongoiwe	Trachyte		⊙		○	△	△		△															
2	6H017R	Achirundu	Lamprophyre		○		○	△	△															○		
3	6M001R	Tundulu	Syenite aplite		⊙		⊙					△													△	
4	6M002R	Tundulu	Trachyte		△		•	•?	•?														△			
5	6M003R	Tundulu	Nepherine syenite				⊙	△	⊙			○														
6	6M010R	Matoponi	Granulite		•		⊙	△	⊙																	
7	6M012R	Namangale	Syenite porphyry				⊙															○				
8	6M018R	Tundulu	Monzonite		△		⊙					⊙														•
9	6M030R	Chilwa Island	Carbonatite		⊙				•			⊙	△													•
10	6M041R	Chikala	Perthosite		⊙		⊙																			
11	6M055R	Kapiri	Carbonatite		○							⊙	△													△
12	6M062R	Nsala	Nepherine syenite				⊙	△	△	△																
13	6M065R	Aligomba	Lamprophyre		○		○	△	•			△	△	⊙												
14	6M073R	Mindi	Trachyte		⊙		⊙																			•
15	6M078R	Mindi	Clinopyroxenite						⊙	○	△															
16	6M079R	Mindi	Gabbro		⊙		⊙		⊙	△	△															
17	6Y026R	Namangale	Phonolite		△		△	△	△	△	△															
18	6Y045R	Chikala	Amphibolite					△	△	○																
19	6Y047R	Mongoiwe	Nepherine syenite		⊙		⊙		△	△		△														
20	6Y061R	Kangankunde	Carbonatite									○	⊙	⊙	○	△										•
21	6Y062R	Kangankunde	Carbonatite		○							•	⊙	⊙	•	•										•
22	6Y063R	Kangankunde	Carbonatite		△							⊙	⊙	⊙			○									△
23	6Y064R	Kangankunde	Carbonatite		△							△	⊙	⊙												△
24	6Y072R	Kapiri	Carbonatized tuff		•	△		△					⊙	△												
25	6Y074R	Nsala	Lamprophyre					△	⊙	△																

⊙ Abundant ○ Common △ Little • Rare

X - Ray Diffractometer

Sample No. 6H 014R

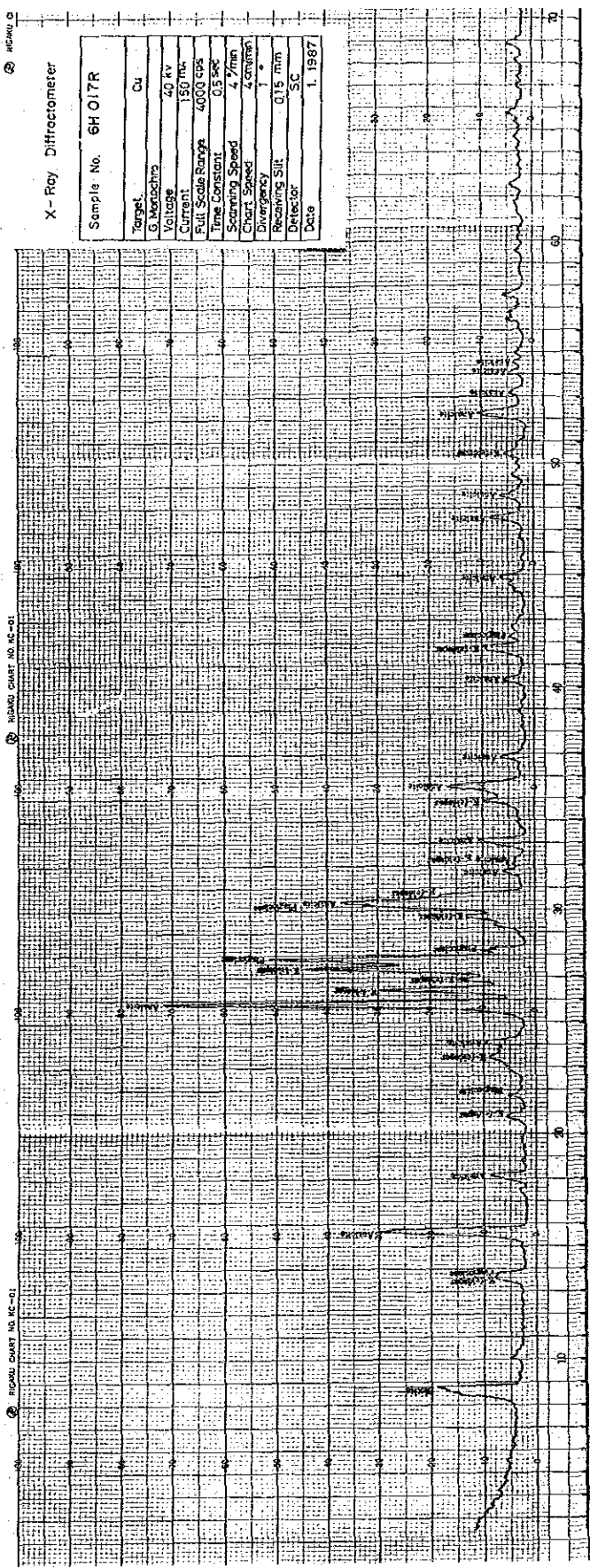
Target	Cu
G Monochro	
Voltage	40 kV
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 7/min
Chart Speed	4 cm/min
Divergency	1 °
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



X - Ray Diffractometer

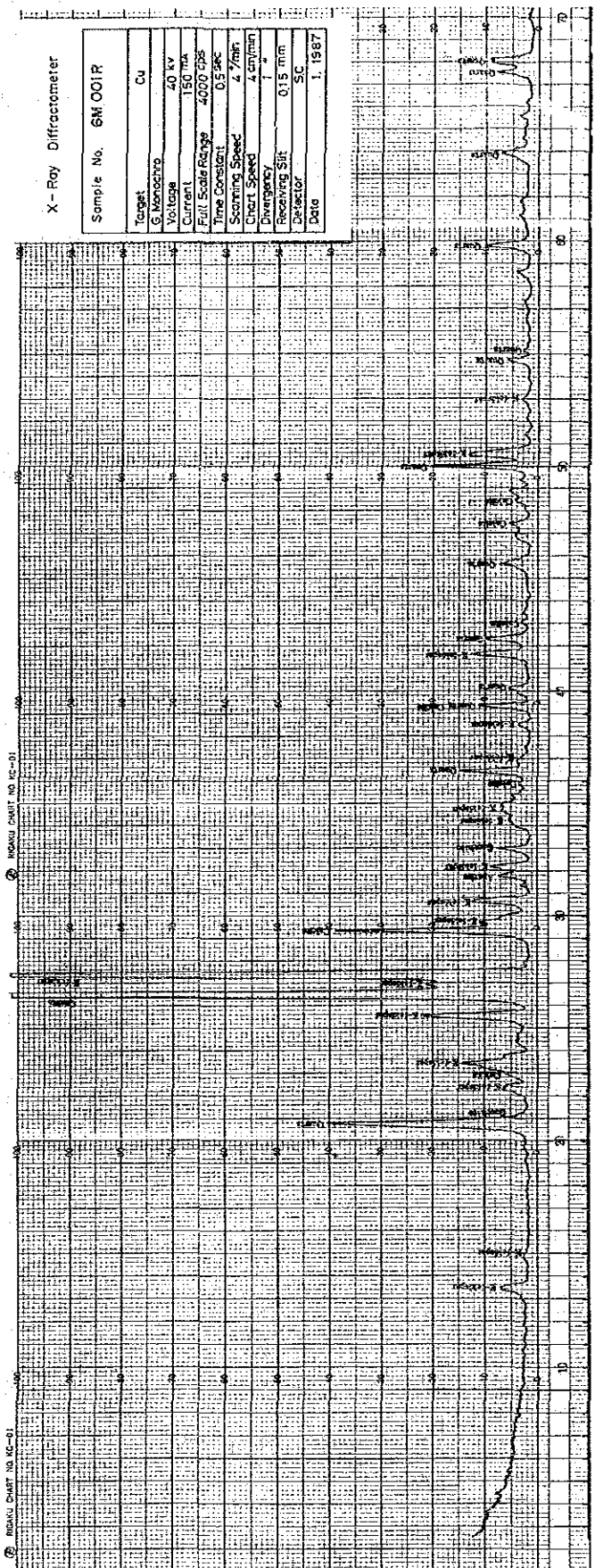
Sample No. 6H 017R

Target	Cu
G Monochro	
Voltage	40 kV
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 7/min
Chart Speed	4 cm/min
Divergency	1 °
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



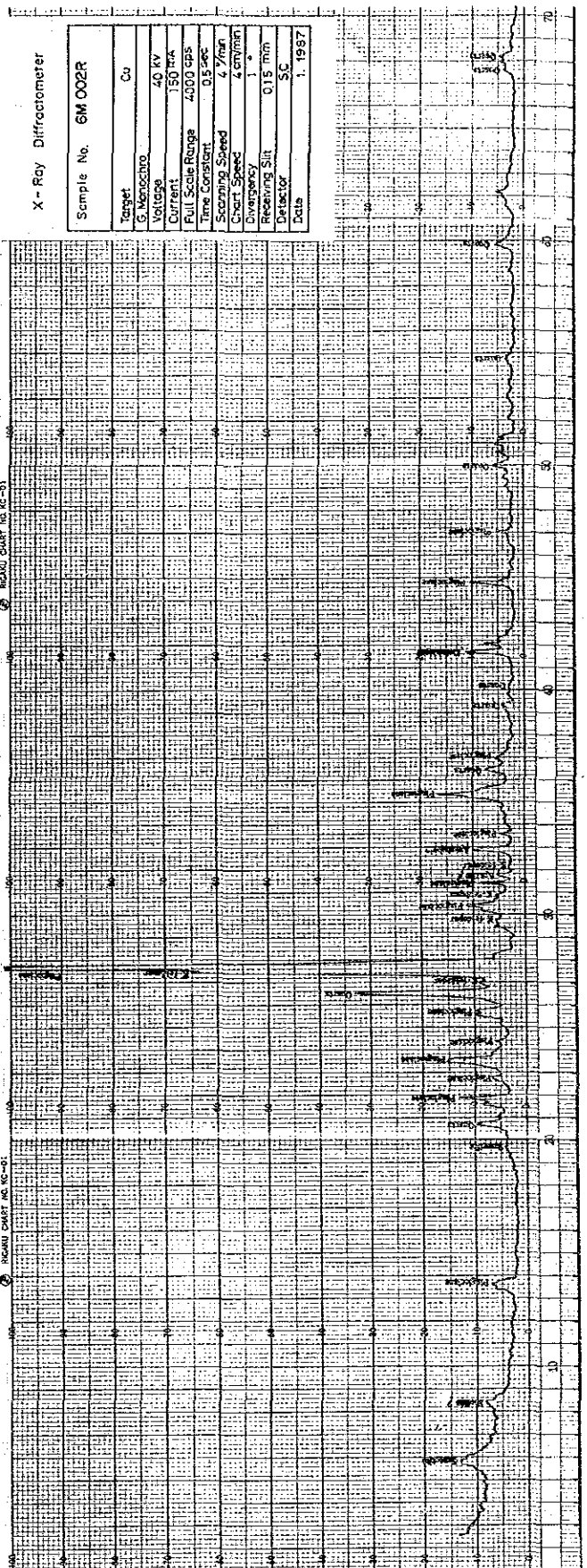
X-Ray Diffractometer

Sample No.	6M 001R
Target	Cu
G. Monochro	
Voltage	40 kv
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 /min
Chart Speed	4 cm/min
Divergency	1 °
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



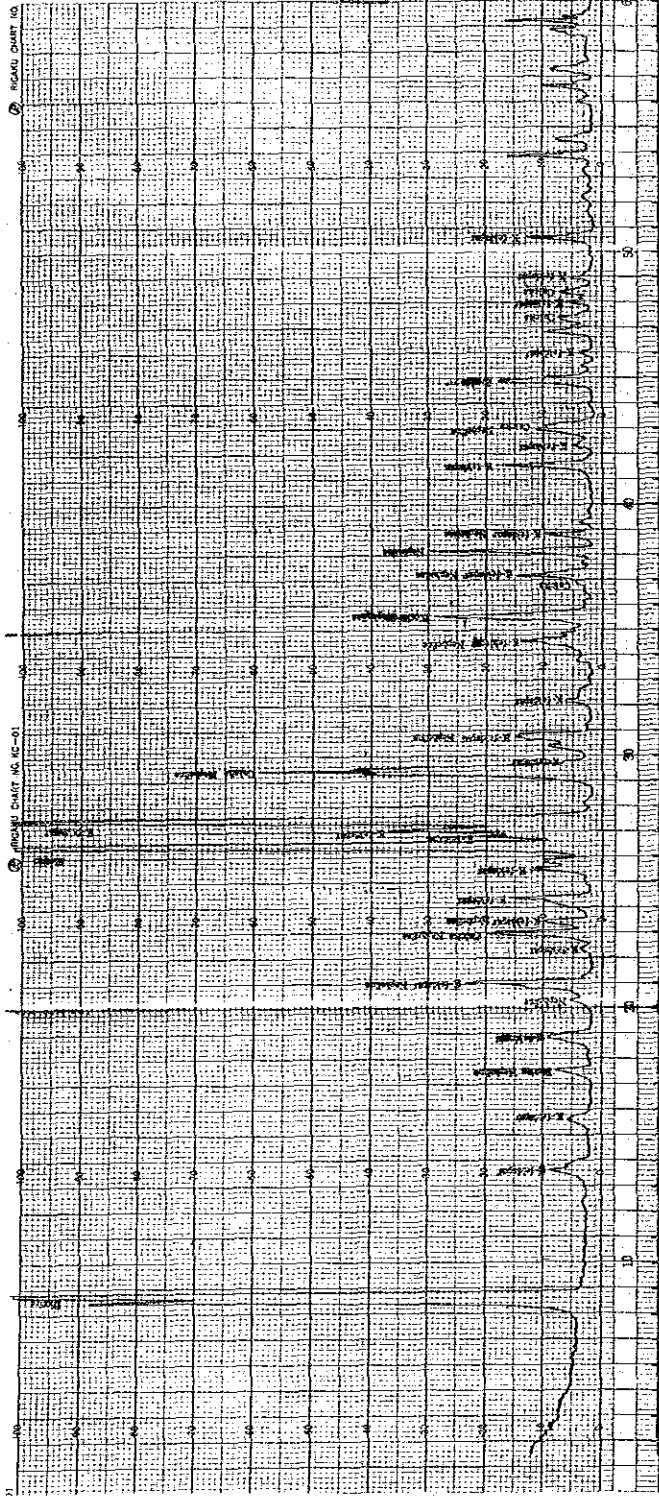
X-Ray Diffractometer

Sample No.	6M 002R
Target	Cu
G. Monochro	
Voltage	40 kv
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 /min
Chart Speed	4 cm/min
Divergency	1 °
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



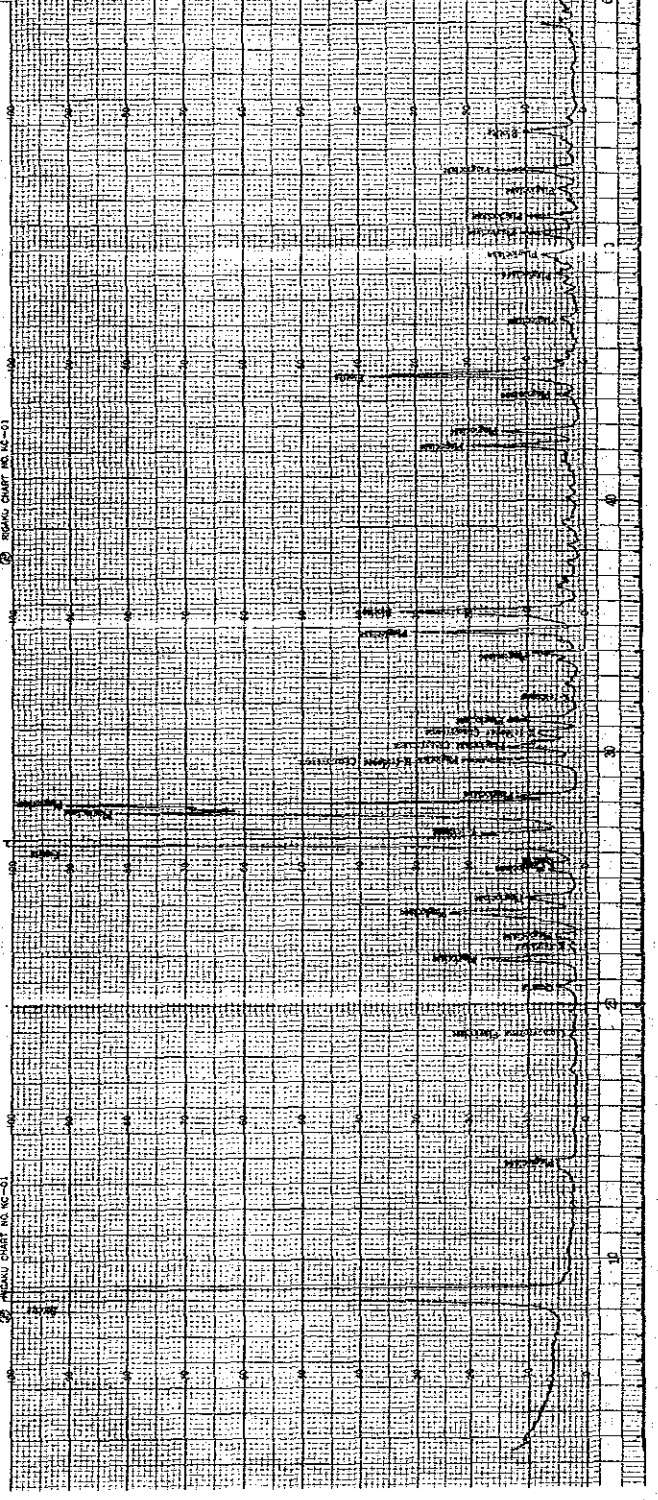
X - Ray Diffractometer

Sample No.	6M 003R
Target	Cu
G. Monochro	
Voltage	40 kV
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 7/min
Chart Speed	4 cm/min
Divergency	1°
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



X - Ray Diffractometer

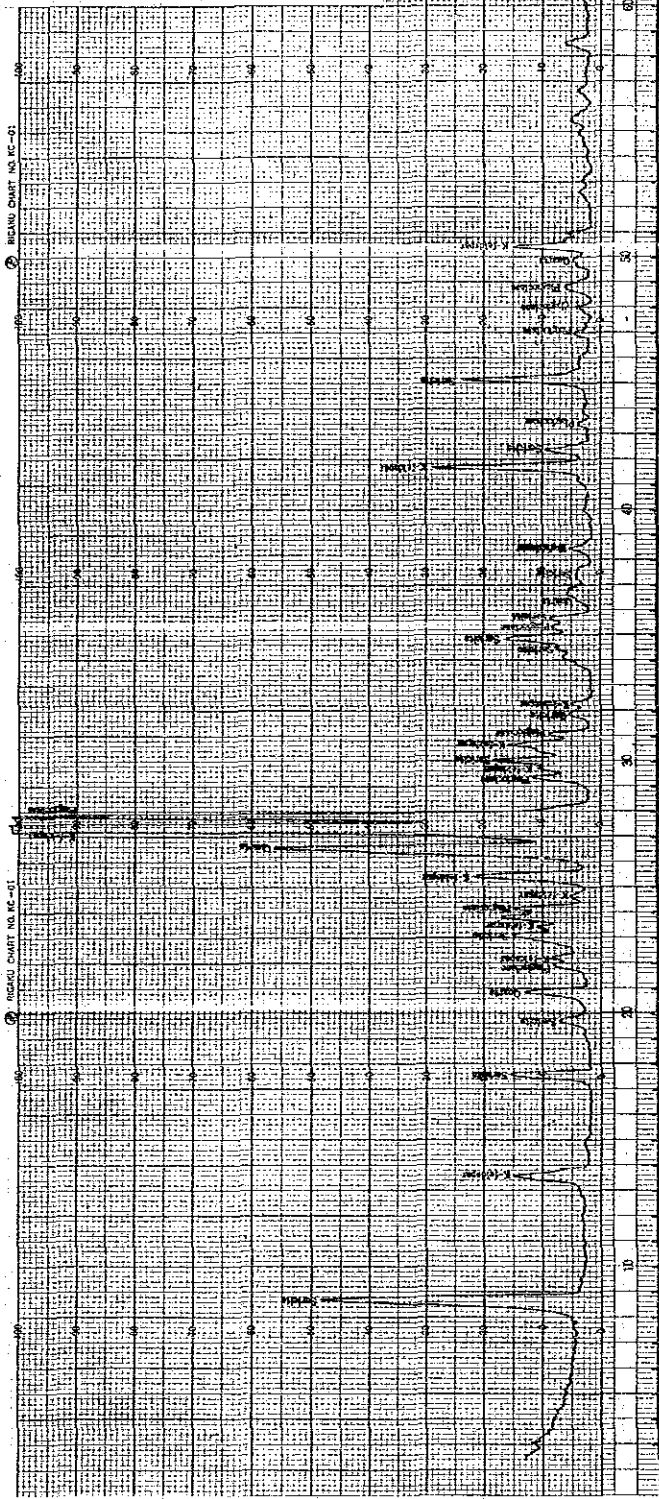
Sample No.	6M 01DR
Target	Cu
G. Monochro	
Voltage	40 kV
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 7/min
Chart Speed	4 cm/min
Divergency	1°
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



X - Ray Diffractometer

Sample No. 6M 012R

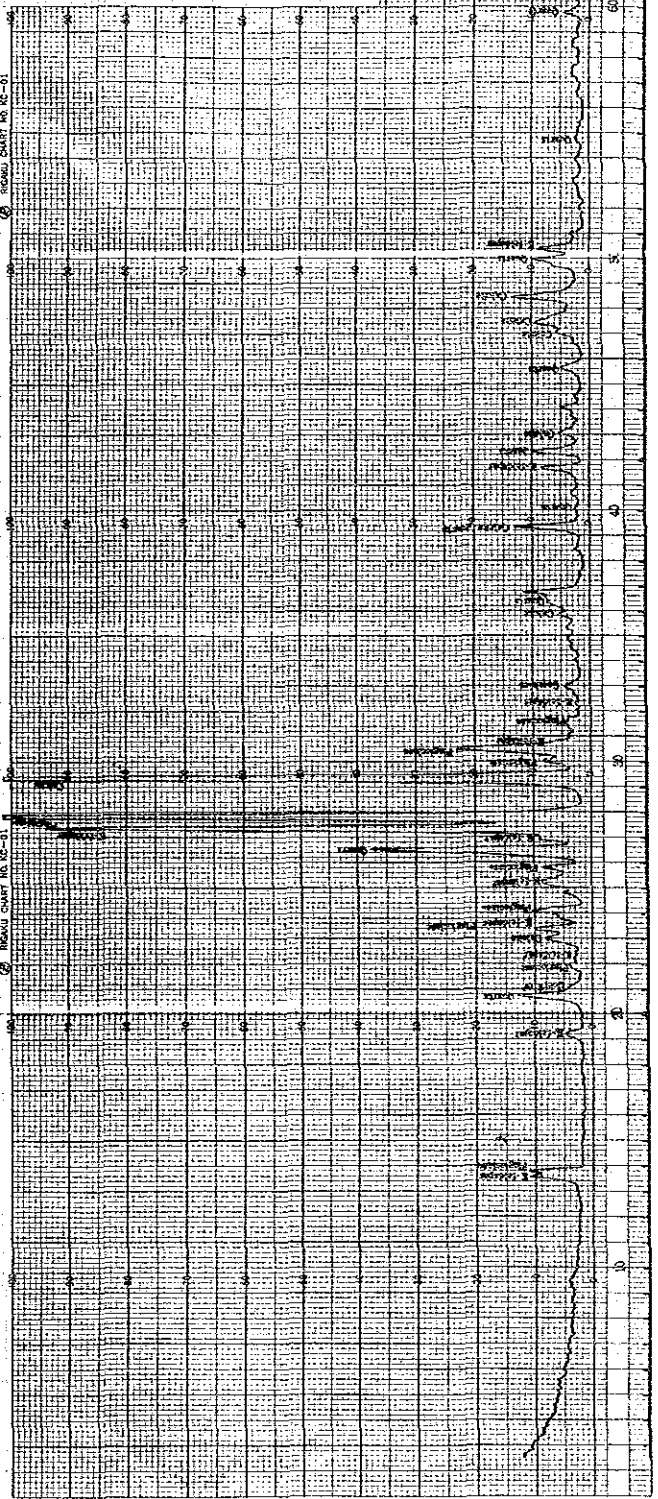
Target	Cu
G. Monochro	
Voltage	40 kV
Current	150 mA
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 2/min
Chart Speed	4 cm/min
Divergency	1 °
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



X - Ray Diffractometer

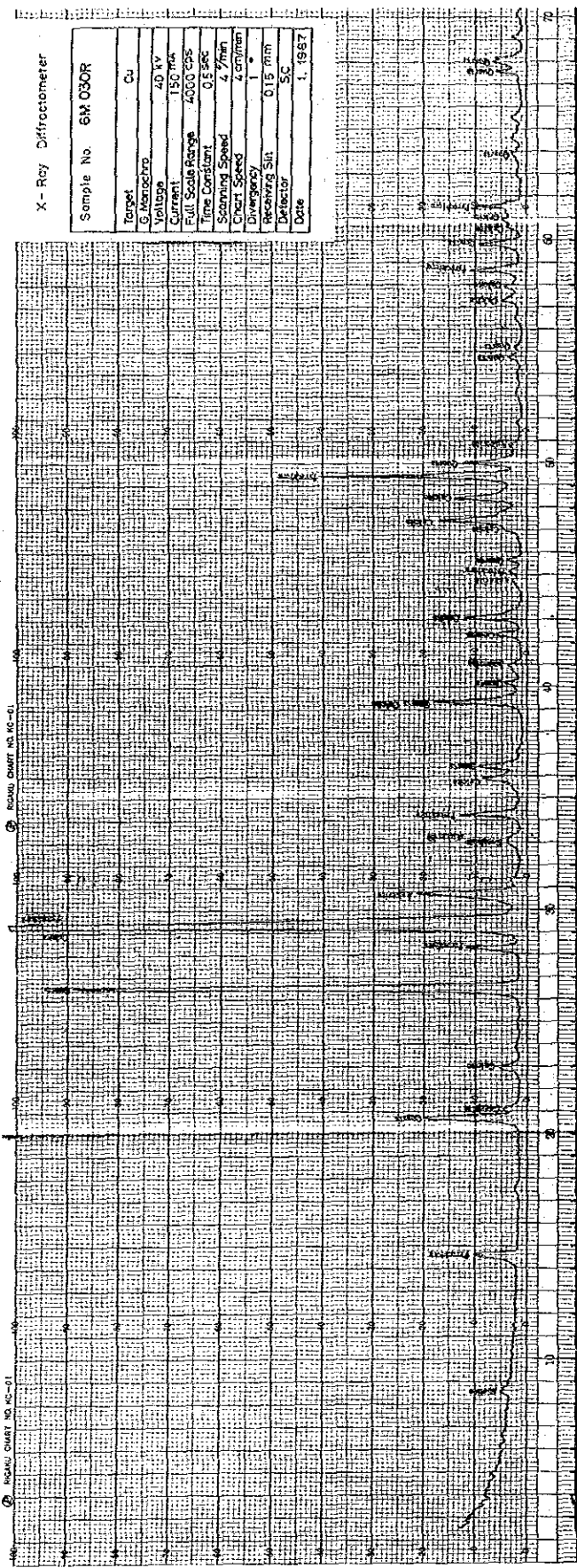
Sample No. 6M 018R

Target	Cu
G. Monochro	
Voltage	40 kV
Current	150 mA
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 2/min
Chart Speed	4 cm/min
Divergency	1 °
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



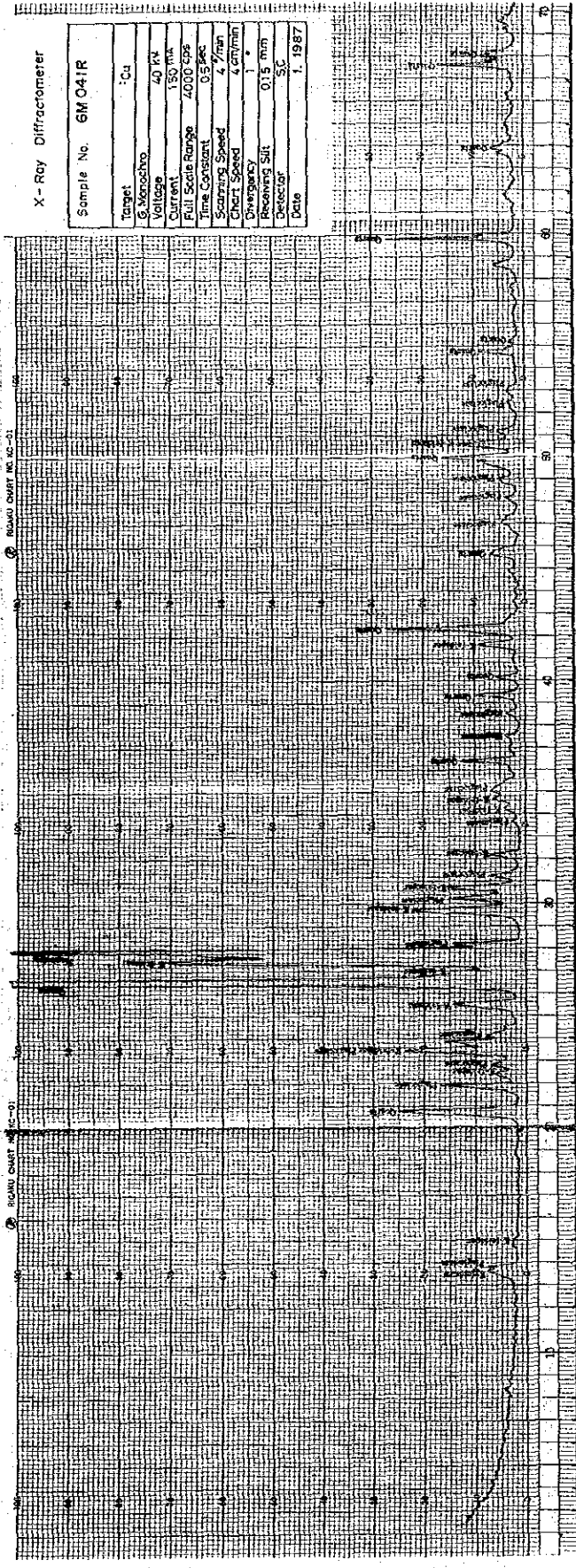
X - Ray Diffractometer

Sample No.	6M 030R
Target	Cu
G. Monochro	
Voltage	40 KV
Current	150 mA
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 7/min
Chart Speed	4 cm/min
Divergency	1 °
Receiving slit	0.15 mm
Detector	SC
Date	1. 1987



X - Ray Diffractometer

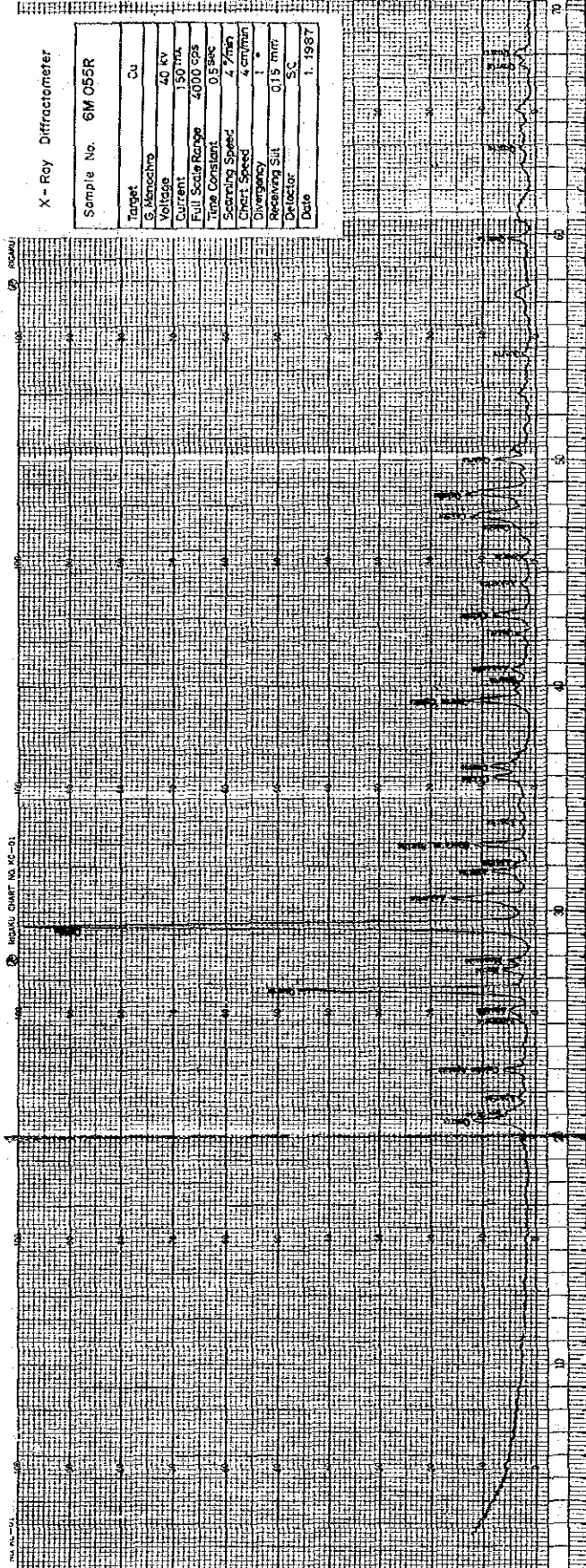
Sample No.	6M 041R
Target	Cu
G. Monochro	
Voltage	40 KV
Current	150 mA
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 7/min
Chart Speed	4 cm/min
Divergency	1 °
Receiving slit	0.15 mm
Detector	SC
Date	1. 1987



X-Ray Diffractometer

Sample No. 6M 055R

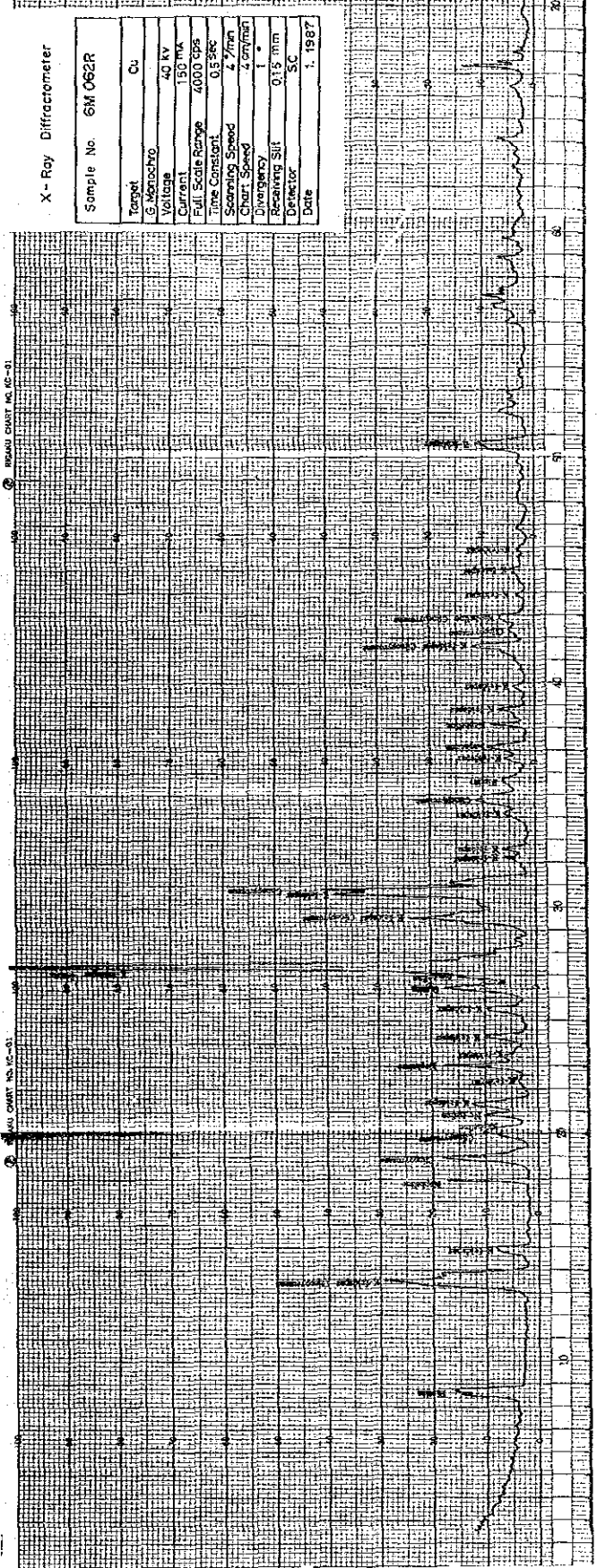
Target	Cu
G. Monochro	
Voltage	40 kv
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 °/min
Chart Speed	4 cm/min
Divergency	1 °
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



X-Ray Diffractometer

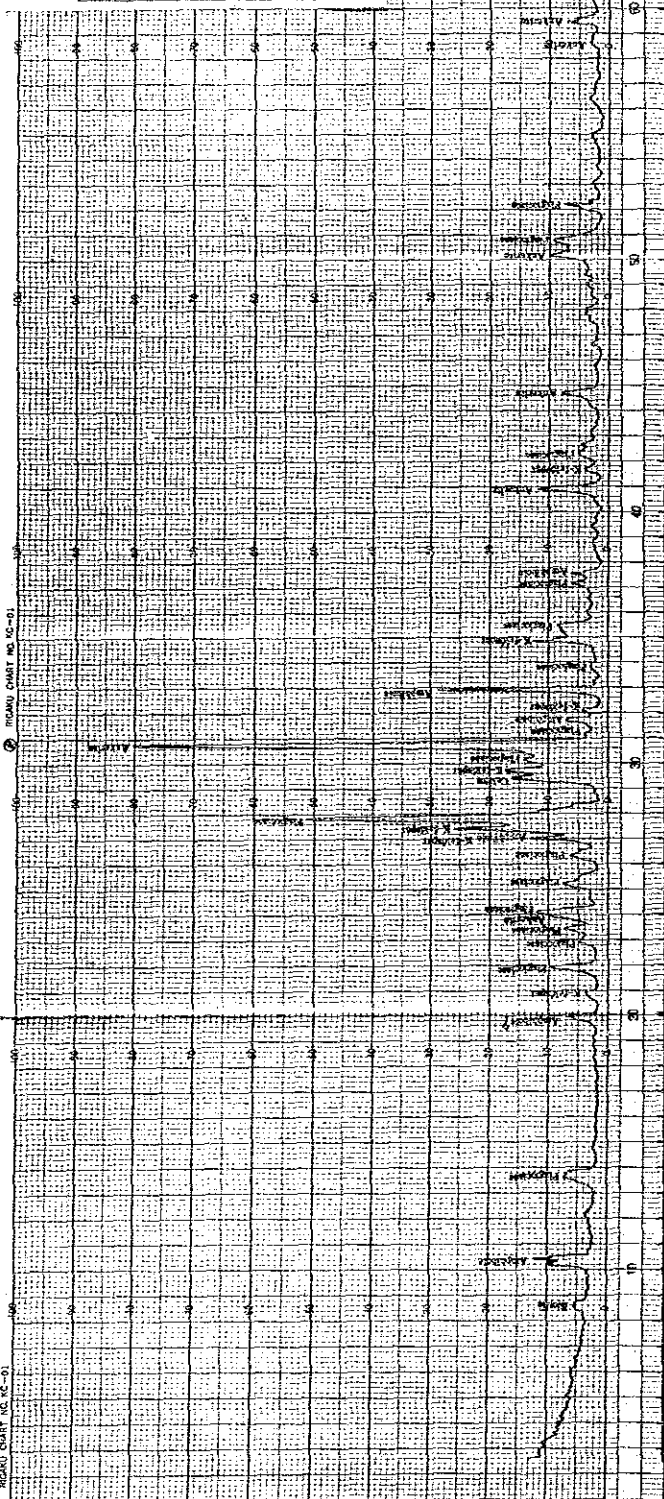
Sample No. 6M 062R

Target	Cu
G. Monochro	
Voltage	40 kv
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 °/min
Chart Speed	4 cm/min
Divergency	1 °
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



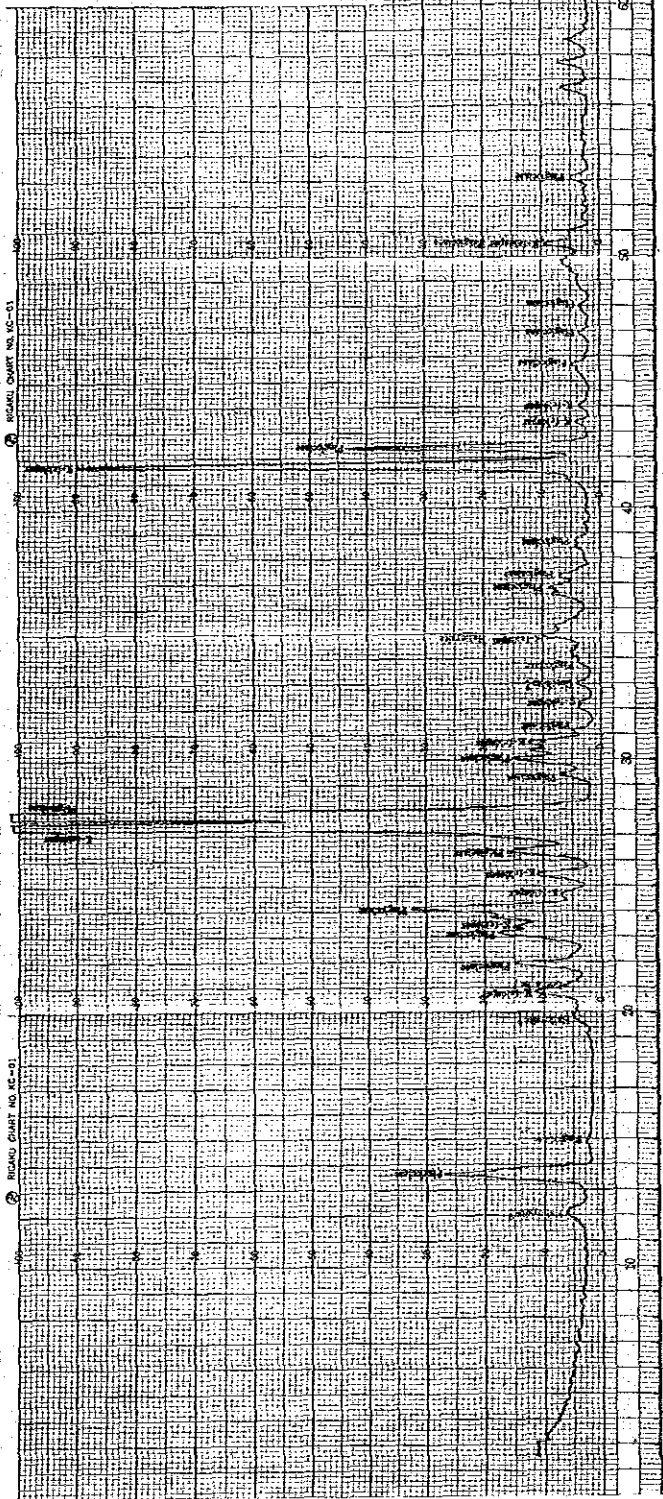
X-Ray Diffractometer

Sample No.	6M 065R
Target	Cu
G. Monochro	
Voltage	40 kv
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 /min
Chart Speed	1 "
Divergency	1 "
Receiving slit	0.15 mm
Detector	SC
Date	1. 1967



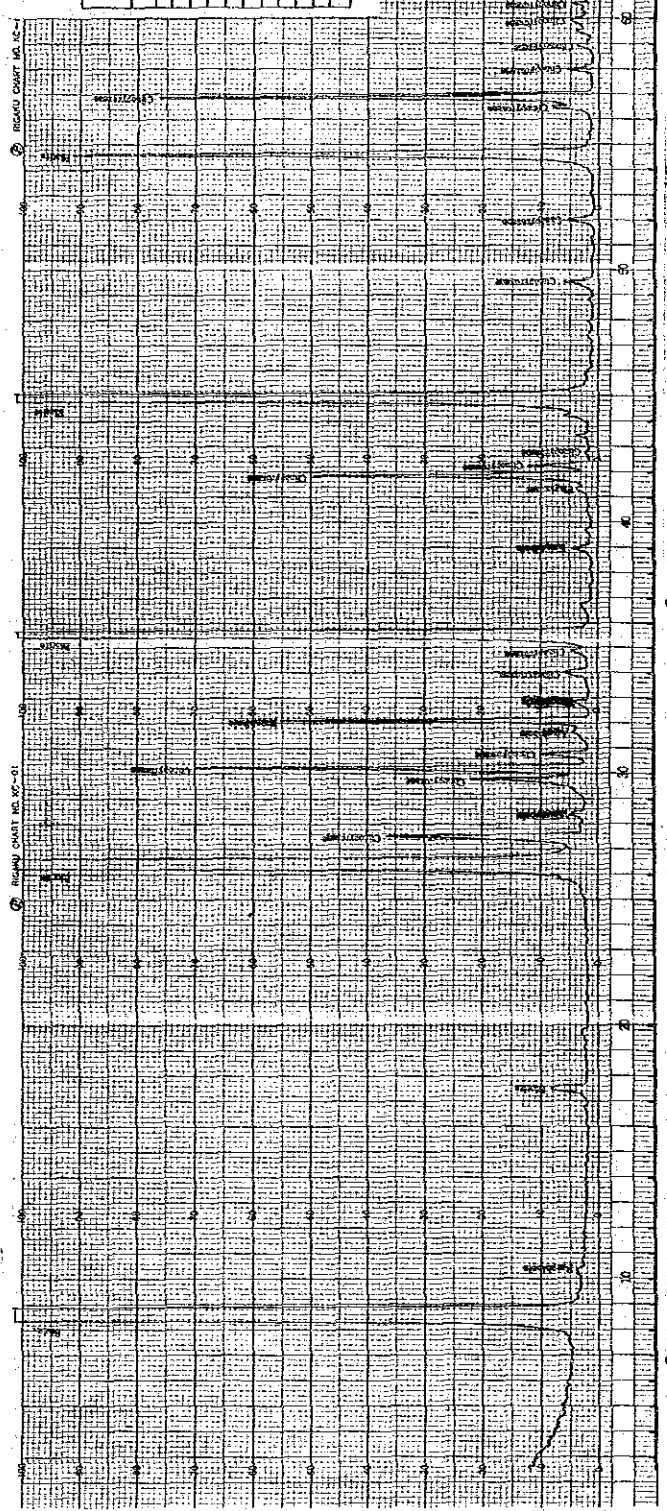
X-Ray Diffractometer

Sample No.	6M 073R
Target	Cu
G. Monochro	
Voltage	40 kv
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 /min
Chart Speed	1 "
Divergency	1 "
Receiving slit	0.15 mm
Detector	SC
Date	1. 1967



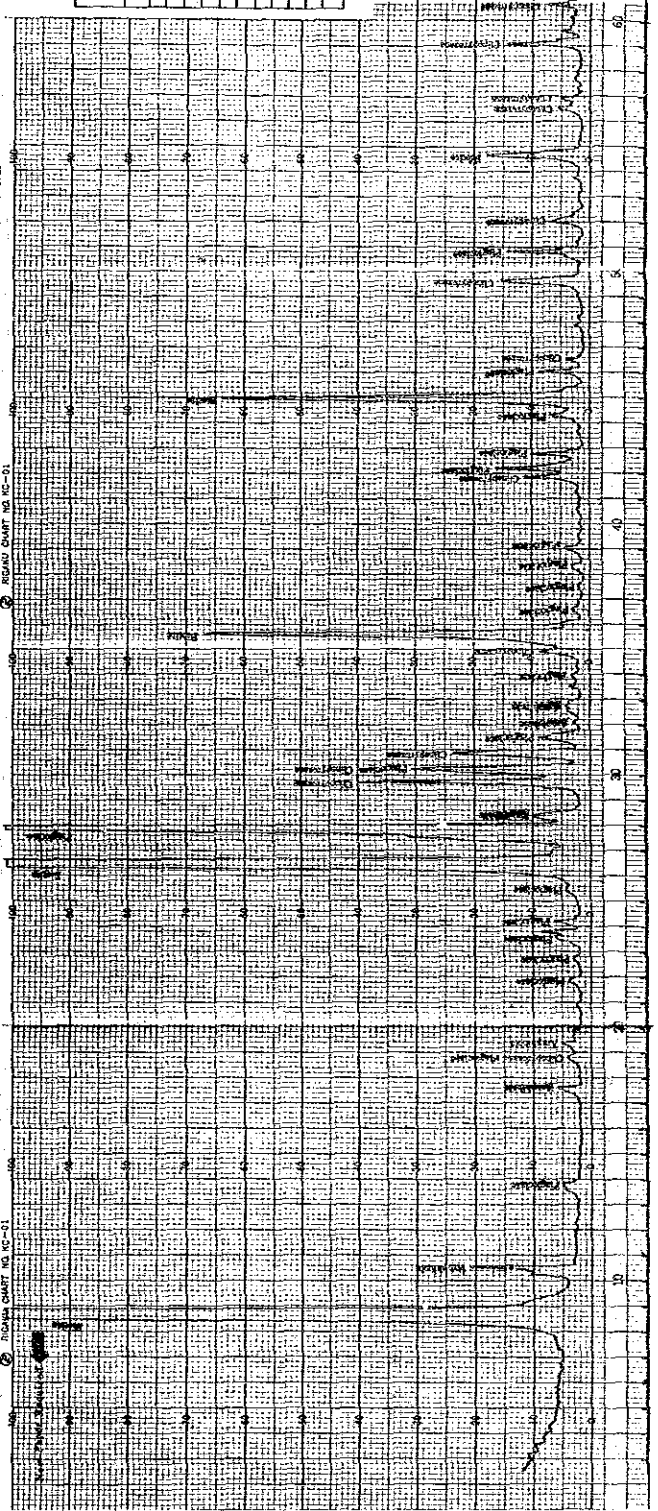
X - Ray Diffractometer

Sample No. 6M 078R	
Target	Cu
G. Monochro	
Voltage	40 kv
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 7/min
Chart Speed	4 cm/min
Divergency	1 °
Receiving Slit	0.15 mm
Detector	SC
Date	1, 1967



X - Ray Diffractometer

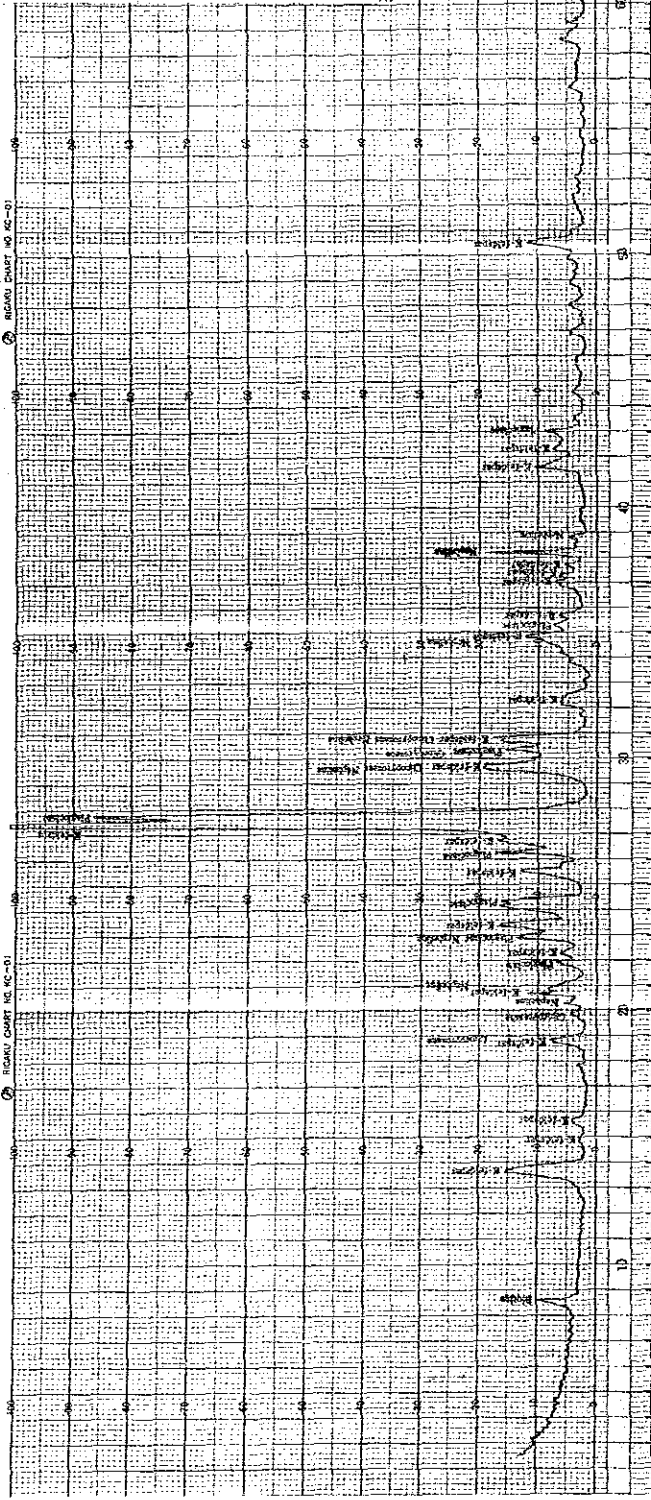
Sample No. 6M 079R	
Target	Cu
G. Monochro	
Voltage	40 kv
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 7/min
Chart Speed	4 cm/min
Divergency	1 °
Receiving Slit	0.15 mm
Detector	SC
Date	1, 1967



X - Ray Diffractometer

Sample No. 6Y 026R

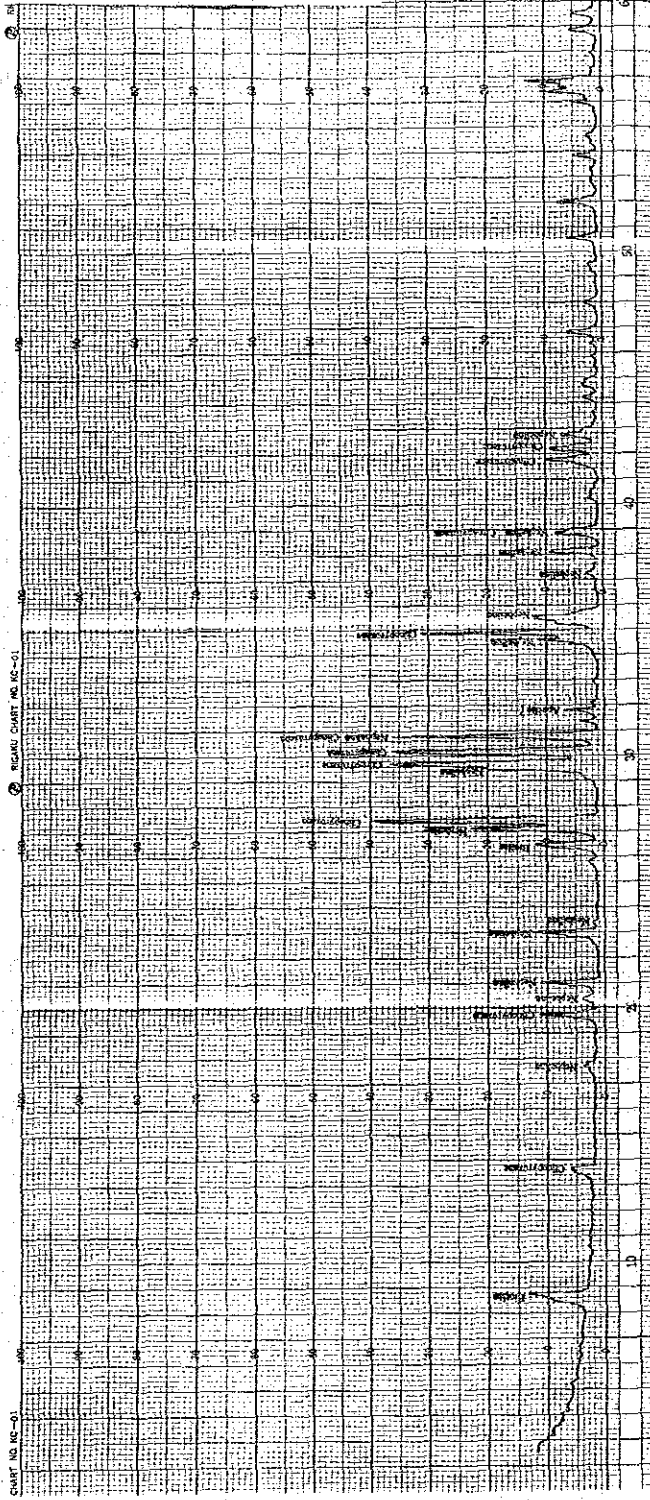
Target	Cu
G. Monochro	
Voltage	40 kv
Current	150 mA
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 /min
Chart Speed	4 /min
Divergency	1°
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



X - Ray Diffractometer

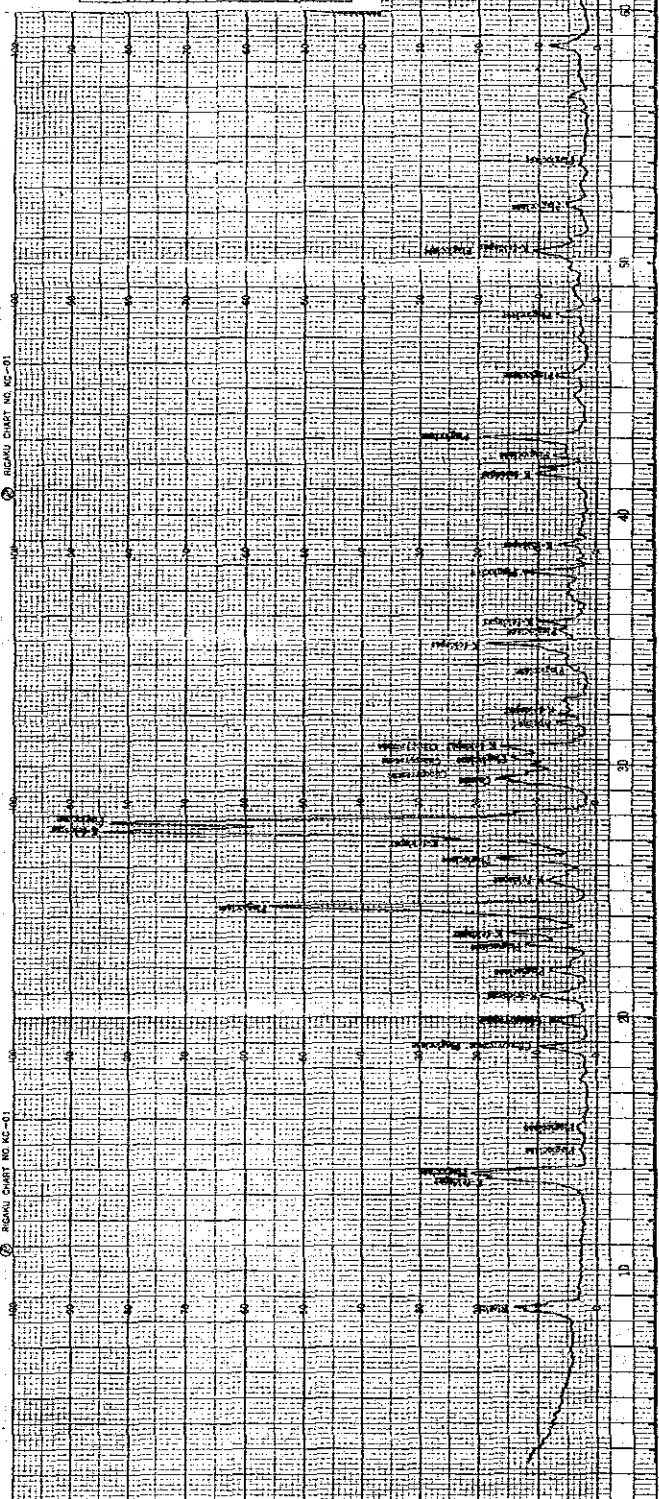
Sample No. 6Y 045R

Target	Cu
G. Monochro	
Voltage	40 kv
Current	150 mA
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 /min
Chart Speed	4 /min
Divergency	1°
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



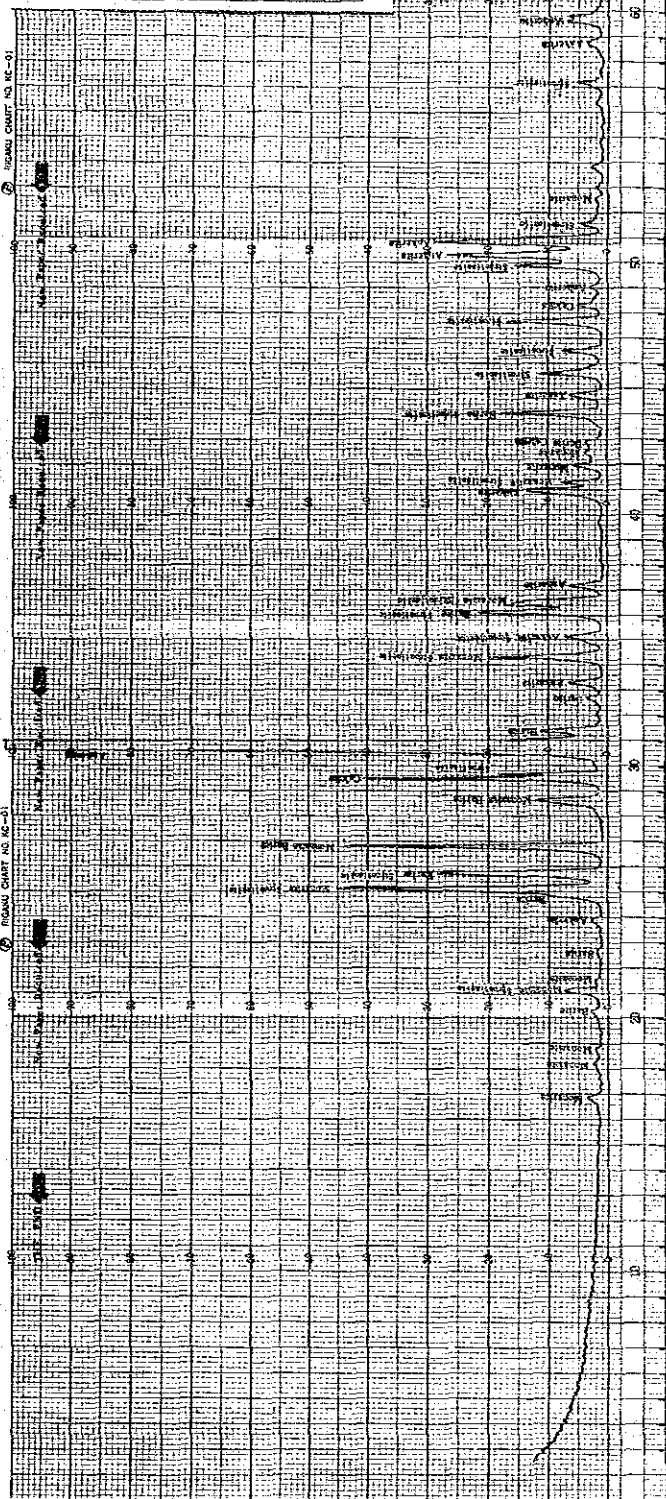
X - Ray Diffractometer

Sample No.	6Y 047R
Target	Cu
G. Monochro	
Voltage	40 kv
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 1/2 min
Chart Speed	4 cm/min
Divergency	1 °
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1967



X - Ray Diffractometer

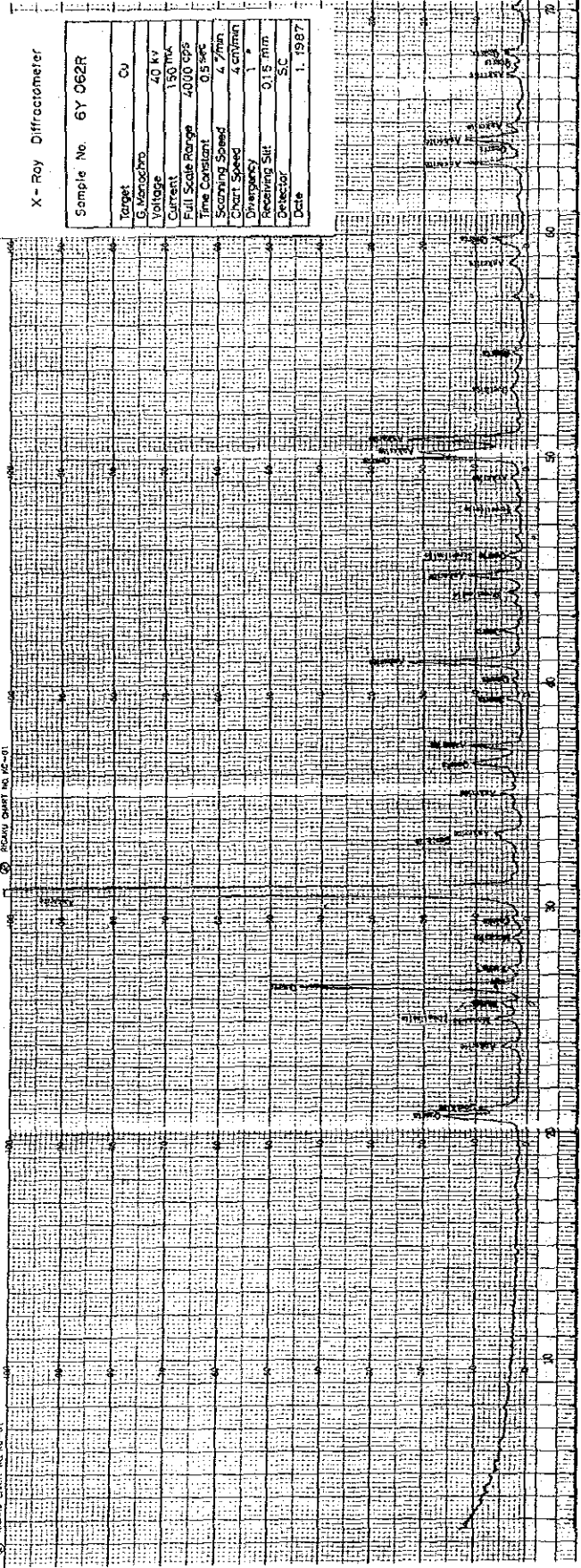
Sample No.	6Y 061R
Target	Cu
G. Monochro	
Voltage	40 kv
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 1/2 min
Chart Speed	4 cm/min
Divergency	1 °
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1967



X-Ray Diffractometer

Sample No. 6Y 062R

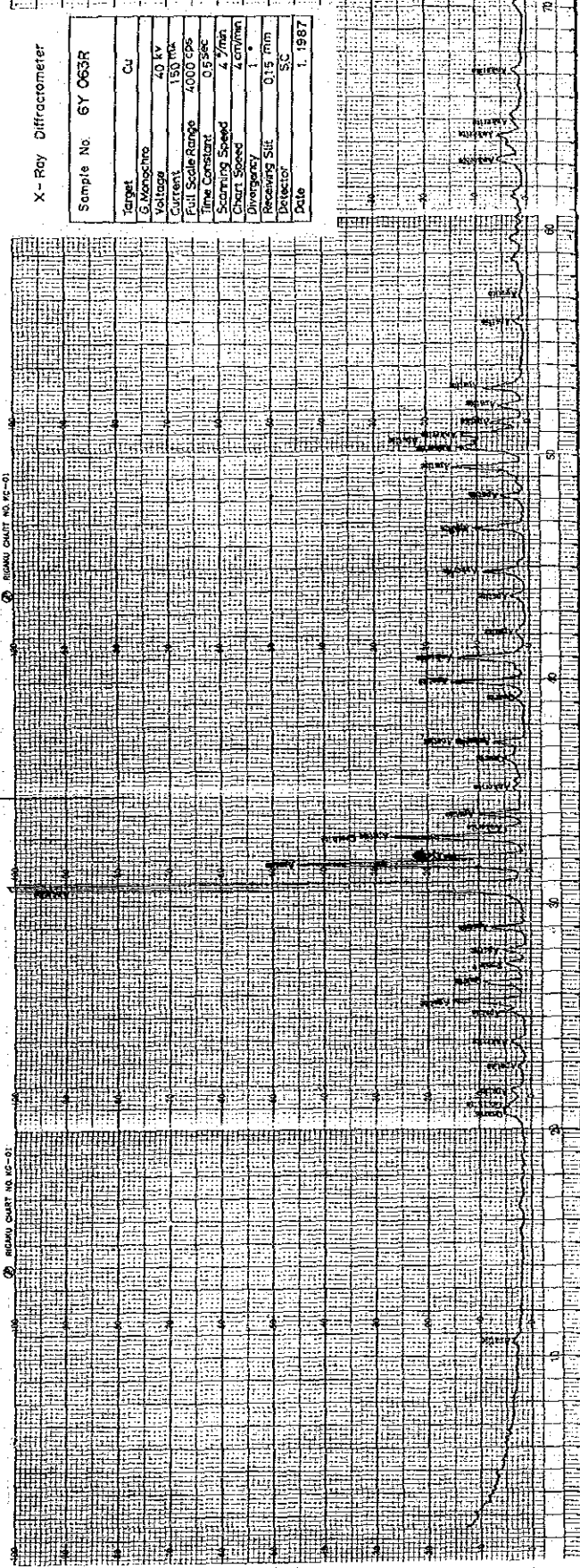
Target	Cu
G. Monochro	
Voltage	40 kV
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 $\frac{1}{min}$
Chart Speed	4 cm/min
Divergency	1 $^{\circ}$
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



X-Ray Diffractometer

Sample No. 6Y 063R

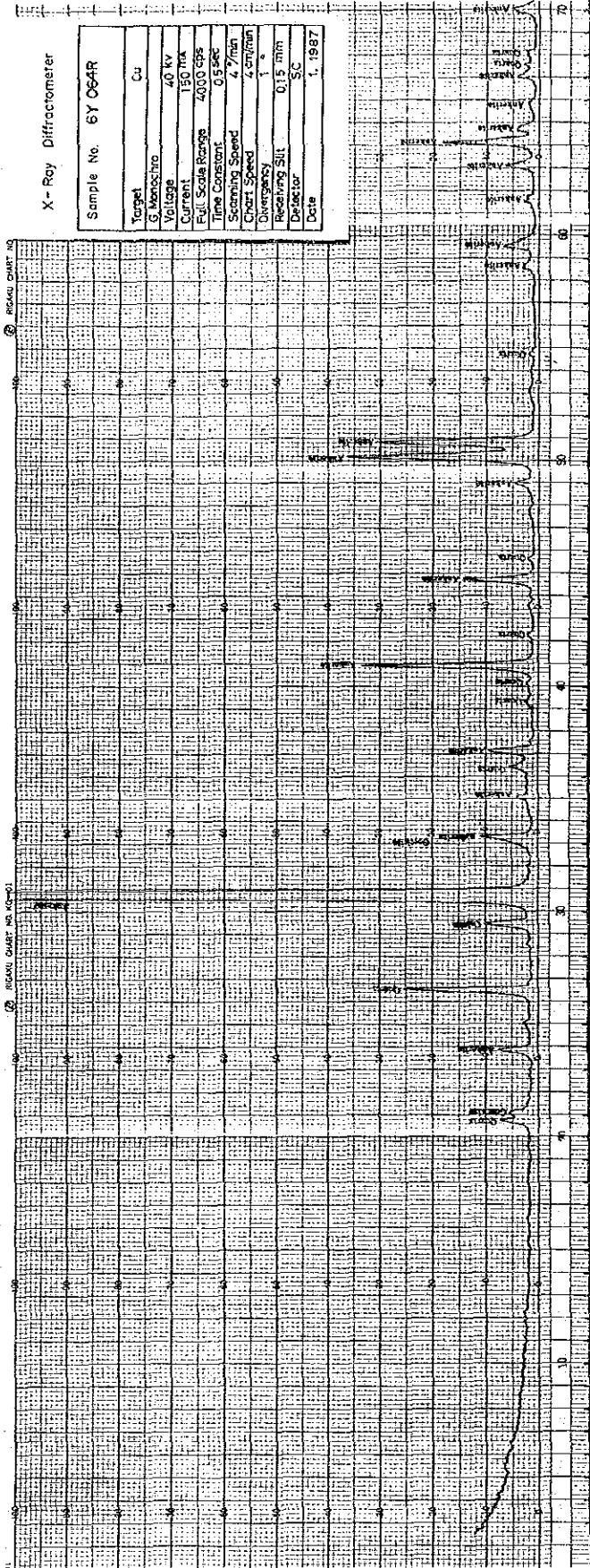
Target	Cu
G. Monochro	
Voltage	40 kV
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.5 sec
Scanning Speed	4 $\frac{1}{min}$
Chart Speed	4 cm/min
Divergency	1 $^{\circ}$
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1987



X - Ray Diffractometer

Sample No. 6Y 064R

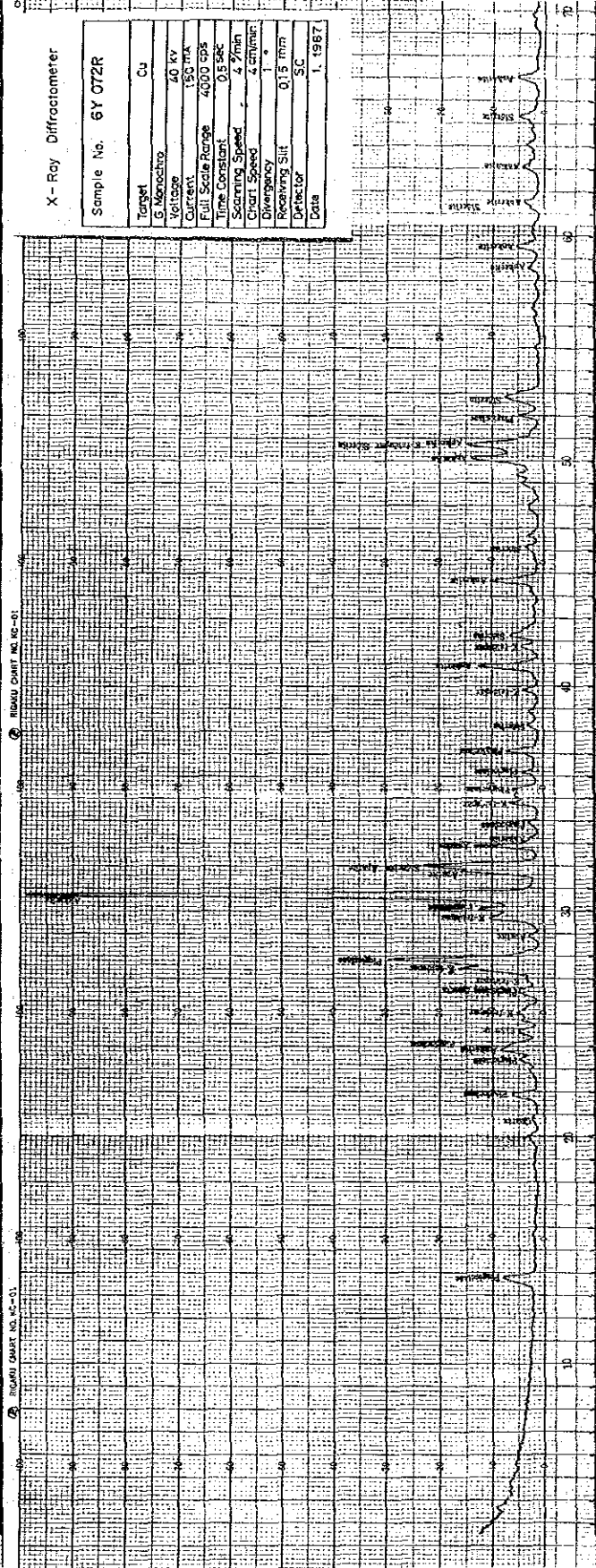
Target	Cu
G Monochro	
Voltage	40 kv
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.15 sec
Scanning Speed	4 7/min
Chart Speed	4 cm/min
Divergency	1°
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1967



X - Ray Diffractometer

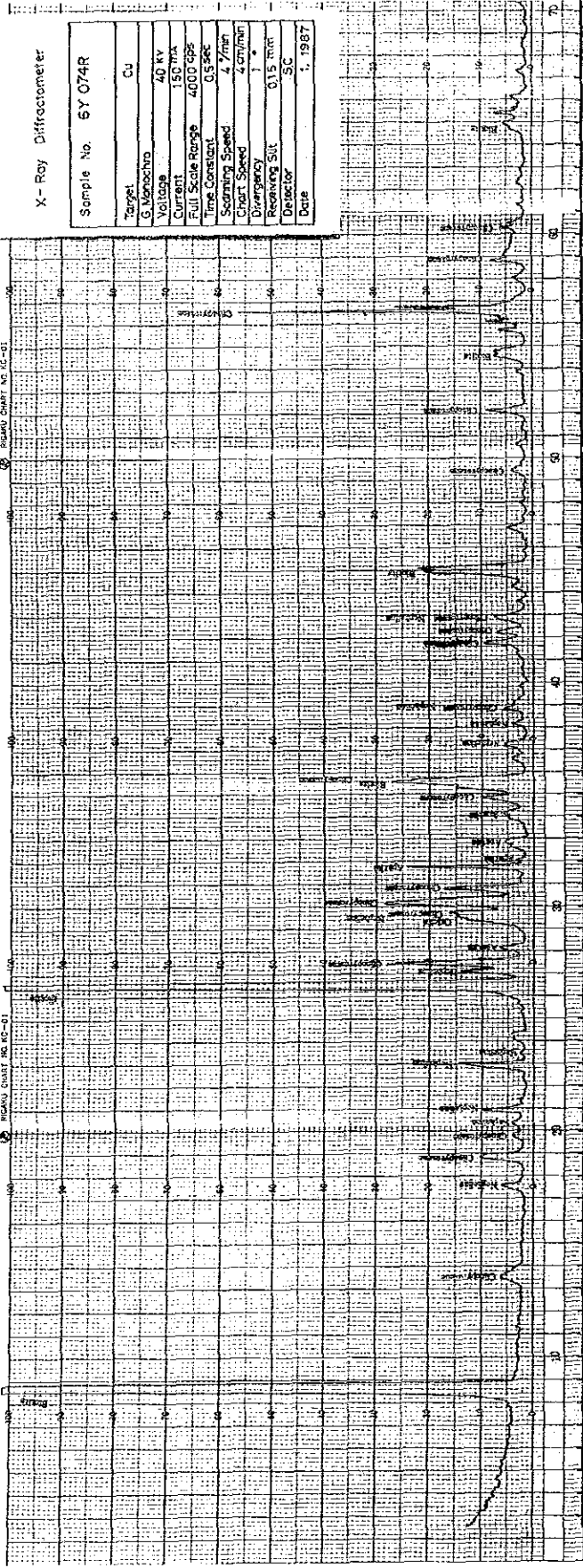
Sample No. 6Y 072R

Target	Cu
G Monochro	
Voltage	40 kv
Current	150 ma
Full Scale Range	4000 cps
Time Constant	0.15 sec
Scanning Speed	4 7/min
Chart Speed	4 cm/min
Divergency	1°
Receiving Slit	0.15 mm
Detector	SC
Date	1. 1967



X-Ray Diffractometer

Sample No.	6Y 074R
Target	Cu
G. Monochromator	
Voltage	40 KV
Current	150 mA
Full Scale Range	400 CPS
Time Constant	0.5 sec
Scanning Speed	4°/min
Chart Speed	4 cm/min
Divergency	1°
Resolving slit	0.15 mm
Detector	SC
Date	1. 1987



Appendix 10 Results of Isotopic Age Determination

Sample No.	Sector	Rock name	Mineral	K (wt.%)	Ar ⁴⁰ (10 ⁻⁸ ccSTP/g)	K-Ar age (Ma)	Air conc. (%)	Remarks
6M003R	Tundulu	Nepheline syenite	biotite	7.15 +0.14	3927±26 3812±23	136.2±2.8 132.4±2.7	4.3 4.4	
6Y026R	Namangale	Phonolite	hornblende	1.21 +0.02	623.9±4.0 654.2±4.8	128.2±2.6 134.2±2.8	10.6 10.4	including pyroxene
6Y047R	Mongolwe	Nepheline syenite	hornblende	1.08 +0.02	693.6±5.6 704.6±4.9	158.3±3.3 160.7±3.3	10.9 10.0	including pyroxene
6M041R	Chikala	Perthosite	whole rock	4.15 +0.08	3100±20 3147±19	182.8±3.7 185.5±3.7	3.8 3.7	
6Y072R	Kapiri	Nephelinite	hornblende	0.19 +0.01	153.0±2.4 166.6±2.2	196±10 213±10	54.8 49.8	including pyroxene
6M079R	Mindi	Gabbro	biotite	7.14 +0.14	15887±106 15816±91	497.8±9.2 495.8±9.0	1.0 1.0	
6M062R	Nsala	nepheline syenite	hornblende	1.23 +0.02	563.9±5.0 561.0±6.2	114.4±2.4 113.8±2.5	31.7 31.1	including pyroxene

