



Telecopy phone number
+358-0-452 2273

TELEFAX MESSAGE

Date 9.1. - 90

Number of pages 1+1

TO:

H. ALANISKA / BIZJOUASSE

COPY TO H. NORANEN / OKIC

FROM:

H. WELLING

IF TRANSMISSION NOT COMPLETE, PLEASE INFORM US.

RE: K-malmi / bullekirikaste

Olen antanut oheiset tiedot
puhelimitse Noraudalle ja Hobo-
kenille 5.1. Tutkivat asiaa.

Terv,
Heikki

annettu puhelinnumero HHO Ilmesty Drilille 5.1.90
- 11 - - 11 - Notanda Kivi Rosille

Biogras / Te - PÄÖNEN RIKASTE

TOORAINEMÄSTÄ

~~MAKES~~ 3000 - 3500 T - RIK

ANAL

Cu	15 %
Au	150-200 μ
Te	1-2 %
Fe	25 %
Ni	0,6 %
Co	0,12 %
Zn	0,02 %
Pb	0,1 %
S	28 %
As	0,07 %
Sb	0,015 %
Bi	0,15 %
Cd	5 μ
Hg	1 μ
Cf	0,01 %
SO ₂	17 %
Al ₂ O ₃	4 %
CaO	4 %

TOIMIVUUS

- ~ 1000 T / HEIKKINEN LOPPU
- ~ 1000 T / HUUSI
- ~ 1000 T / TOUKO

Bidjovaggen B-vest malmin tärypöytärikasteiden mineraalipitoisuuksia

	Au g/t	Bi %	Te %	Fe %	S %	Cu %	Ni %	Pb %	Summa %
TPR 12.12/2cm/5min	1504	10.9	16.2	27.9	32.5	6.8	1.08	1.32	96.9
TPR 13.12/3.5min	1504	11.7	14.9	27.5	32.0	14.1	0.26	1.77	102.3
TPR 14.12	1380	0.9	12.9	34.6	39.0	2.3	2.71	0.54	93.1
TPRK 13.12	7570	10.7	37.5	17.0	16.7	8.5	5.06	5.93	102.1

	CUK %	SK %	MEL %	TEB %	ALT %	CAL %	Te calc.	Summa %
TPR 12.12/2cm/5min	19.8	48.0	5.9	21.3	2.1	0.3	15.9	97.5
TPR 13.12/3.5min	40.6	33.5	1.4	22.9	2.9	0.3	13.3	101.5
TPR 14.12	6.6	68.9	14.8	1.8	0.9	0.3	13.4	93.3
TPRK 13.12	24.4	15.3	27.7	20.9	9.6	1.7	37.0	99.7

CUK = Kuparikiisu
 SK = Fyriitti
 MEL = Meloniitti, NiTe2
 TEB = Tellurovismutiitti, Bi2Te3
 ALT = Altaiitti, PbTe
 CAL = Calaveriitti, AuTe2

MS/GAL
HU

ANALYYSITULOKSIA KUUKAUSINÄYTTEISTÄ

	Fire assay		Lecot		Titraus		AAS				
	Au (g/t)	Ag (g/t)	S(%)	C(%)	Cu (%)	Cu(%)	Fe(%)	Zn(%)	Co(%)	As(%)	Pb(%)
Kesäkuu; Malmi	4.1 ^{2.62} _{4.14}	0.9	3.52	2.67		0.95 ^{0.97} _{0.97}	4.6	0.023	0.015	< 0.01	< 0.01
Jäte	0.9 ^{0.87} _{0.86}	0.4	0.57	2.52		0.05	2.4	0.016	0.004	< 0.01	< 0.01
Rikaste	44.3 ^{32.8} _{38.0}	8.1	30.4	3.35	10.1		29.5	0.086	0.121	0.01	0.09
Syyskuu; Malmi	3.9 ^{4.48} _{4.24}	0.7	4.19	2.87		1.00 ^{1.12} _{1.15}	5.0	0.026	0.017	< 0.01	< 0.01
Jäte	0.8 ^{0.88} _{0.90}	0.3	1.12	2.46		0.04	2.8	0.016	0.006	< 0.01	< 0.01
Rikaste	42.9 ^{38.8} _{38.4}	6.2	31.3	4.42	10.8		29.9	0.098	0.123	0.01	0.07
Lokakuu; Malmi	3.1 ^{2.8} _{2.7}	0.8	3.53	2.24		1.18 ^{1.28} _{1.23}	4.9	0.037	0.016	< 0.01	< 0.01
Jäte	0.6 ^{0.57} _{0.57}	0.2	0.50	2.10		0.05	2.1	0.025	0.004	< 0.01	< 0.01
Rikaste	26.3 ^{20.0} _{13.6}	5.9	33.4	2.75	12.6		31.2	0.066	0.136	0.01	0.03

GAL/H Ukkonen

	Bi-%	Se-%	Te-%	Sb-%
Rikaste	0.020	0.006	0.092	0.0001
Malmi	0.0035	0.0007	0.010	<0.0001
Jäte	0.0014	0.0002	0.0034	<0.0001
Rikaste	0.011	0.005	0.075	<0.0001
Malmi	0.0023	0.0007	0.009	<0.0001
Jäte	0.0020	0.0002	0.0047	0.0001
Rikaste	0.010	0.006	0.066	<0.0001
Malmi	0.0034	0.0007	0.008	<0.0001
Jäte	0.0014	0.0001	0.0027	0.0001

ANALYYSITULOKSIA KUUKAUSINÄYTTEISTÄ

	Fire assay		Lecot		Titraus		AAS				
	Au (g/t)	Ag (g/t)	S (%)	C (%)	Cu (%)	Cu (%)	Fe (%)	Zn (%)	Co (%)	As (%)	Pb (%)
Kesäkuu; Malmi	4.1	0.9	3.52	2.67	10.1	0.95	4.6	0.023	0.015	< 0.01	< 0.01
	0.9	0.4	0.57	2.52		0.05	2.4	0.016	0.004	< 0.01	< 0.01
	44.3	8.1	30.4	3.35		29.5	0.086	0.121	0.01	0.09	
Syyskuu; Malmi	3.9	0.7	4.19	2.87	10.8	1.00	5.0	0.026	0.017	< 0.01	< 0.01
	0.8	0.3	1.12	2.46		0.04	2.8	0.016	0.006	< 0.01	< 0.01
	42.9	6.2	31.3	4.42		29.9	0.098	0.123	0.01	0.07	
Lokakuu; Malmi	3.1	0.8	3.53	2.24	12.6	1.18	4.9	0.037	0.016	< 0.01	< 0.01
	0.6	0.2	0.50	2.10		0.05	2.1	0.025	0.004	< 0.01	< 0.01
	26.3	5.9	33.4	2.75		31.2	0.066	0.136	0.01	0.03	

GAL/H Ukkonen

	Bi-%	Se-%	Te-%	Sb-%
Rikaste	0.020	0.006	0.092	0.0001
Malmi	0.0035	0.0007	0.010	<0.0001
Jäte	0.0014	0.0002	0.0034	<0.0001
Rikaste	0.011	0.005	0.075	<0.0001
Malmi	0.0023	0.0007	0.009	<0.0001
Jäte	0.0020	0.0002	0.0047	0.0001
Rikaste	0.010	0.006	0.066	<0.0001
Malmi	0.0034	0.0007	0.008	<0.0001
Jäte	0.0014	0.0001	0.0027	0.0001

GEOANALYTICAL LABORATORY

Date

Number of pages
(This page incl.)

22.12.1989

To:

Matti Lehto

Copy to:

FAX

From:

Hannu Ukonen

Additional instructions:

MESSAGE:

*OHJESSA KUUVAUSNÄYTTEIDEN ANALYYSITULOKSIA, JOSTA
TEHTIIN ERITYISMÄÄRITYSTEN LISÄSI MYÖS XRF*

*LISÄSI MYÖS YHDEN KÄÄTÖNÄYTTEEN XRF, JOSTA
TEHTIIN MYÖS AU-VERRAILU BIODIAGNOOSIN JA
BALIN KESKEN KÄÄTÖNÄYTTEEN OTETTAVAN
28.11.*

TERV. HANNU

If transmission not complete, please inform us.

Address:

Telephone:

Telex:

Telefax:

PO BOX 74

NAT. 973-5561

SF-83501 Outokumpu

INT. +358 73 5561

46113

FINLAND

NAT. 973-556610

INT. +358 73 556610

OUTOKUMPU OY, MINING SERVICES, GEOANALYTTINEN LABORATORIO
 XRF-ANALYYSITULOKSIA 14.12.89

TILAAJA: HU/GAL
 ALUE: BIDJUVAGGE

LASK.P: BIDJUVAGGE OPER: MLM 279
 KARTTAL.: KAATON JAKELU: HU 2, MLM

	2911891KA
	%
STO2	58.5
TI02	0.623
AL2O3	13.0
CR2O3	0.0001
V2O3	0.0303
FE0	9.08
MNO	0.0813
MGO	0.93
CA0	3.94
RB2O	0.0006
SRO	0.0041
BAD	0.009
NA2O	7.34
K2O	0.194
ZR02	0.0118
P2O5	0.078
CO2	3.960
OKSUM	98.6
CU	0.818
NI	0.0417
CO	0.0288
ZN	0.0013
PB	0.003
AG	0.000
S	5.07
AS	0.0007
SB	0.000
BI	0.003
TE	0.022
Y	0.0017
NB	0.0000
MO	0.0011
SN	0.001
W	0.003
PT	
CL	0.013
BR	0.0000
TH	0.0003
U	0.0014
CS	0.001
LA	0.002
CE	0.005
PR	0.001
NO	0.01
SM	0.00
EU	0.00
GD	0.00
TS	0.00
DY	0.00
HO	0.00
ER	0.00
TM	0.00
YB	0.00
LU	0.00
HF	0.001
TA	0.000

OUTOKUMPU OY, MINING SERVICES, GEDANALYYTTINEN LABORATORIO
 XRF-ANALYYSITULOKSIA

14.12.89

TILAAJA: ME/BIDJOVAGGE
 ALUE: BIDJO

LASK.P: BIDJOVAGGE OPER: MLM 279
 KARTTAL.: JAKELU: HU 2, MLM

	8912101MA	8912102RI	8912103JA
	%	%	%
SI02	55.8	14.4	60.9
TI02	0.585	0.207	0.656
AL203	13.1	3.58	14.2
CR203	0.0002	0.0001	0.0000
V203	0.0297	0.0136	0.0324
FE0	6.72	36.95	3.12
MNO	0.116	0.0351	0.120
MGG	2.87	0.47	2.91
CA0	5.52	1.25	5.90
RB20	0.0008	0.0010	0.0009
SRO	0.0040	0.0000	0.0049
BAG	0.007	0.011	0.009
NA20	7.52	1.90	8.20
K20	0.356	0.076	0.392
ZR02	0.0116	0.0059	0.0131
P205	0.073	0.016	0.083
CO2	8.213	10.083	7.700
OKSUM	98.8	95.3	99.2
CU	1.20	11.98	0.0547
NI	0.0252	0.163	0.0091
CO	0.0183	0.129	0.0059
ZN	0.0081	0.0491	0.0037
PB	0.008	0.057	0.003
AG	0.000	0.000	0.000
S	4.44	35.9	0.843
AS	0.0015	0.0062	0.0014
SB	0.000	0.000	0.000
BI	0.001	0.010	0.001
TE	0.004	0.059	0.000
Y	0.0015	0.0012	0.0020
NB	0.0000	0.0000	0.0000
MO	0.0016	0.0119	0.0005
SN	0.001	0.000	0.001
W	0.003	0.000	0.004
PT			
CL	0.014	0.012	0.013
BR	0.0000	0.0000	0.0000
TH	0.0000	0.0000	0.0010
U	0.0030	0.0040	0.0032
CS	0.002	0.000	0.004
LA	0.001	0.003	0.002
CE	0.005	0.006	0.006
PR	0.001	0.000	0.000
NO	0.00	0.01	0.00
SM	0.00	0.00	0.00
EU	0.00	0.00	0.00
GD	0.00	0.00	0.00
TS	0.00	0.00	0.00
OY	0.00	0.00	0.00
HO	0.00	0.00	0.00
ER	0.00	0.00	0.00
TM	0.00	0.00	0.00
YB	0.00	0.00	0.00
LU	0.00	0.00	0.00
HF	0.001	0.000	0.001
TA	0.000	0.000	0.000

OUTOKUMPU OY, MINING SERVICES, GEONALYTTINEN LABORATORIO
 XRF-ANALYYSITULOKSIA

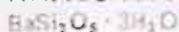
14.12.89

TILAAJA: ME/BIDJOVAGGE
 ALUE: BIDJO

LASK.P: BIDJOVAGGE OPER: MLM 279
 KARTTAL.: JAKELU: HU 2, MLM

	8912061MA	8912062RY	8912063JA	8912091MA	8912092RI	8912093JA
	%	%	%	%	%	%
SI02	54.8	10.3	59.2	54.7	17.0	59.1
TI02	0.573	0.228	0.622	0.556	0.202	0.618
AL203	12.5	4.29	13.5	12.5	4.23	13.4
CR203	0.0001	0.0000	0.0000	0.0001	0.0000	0.0001
V203	0.0272	0.0125	0.0278	0.0266	0.0117	0.0295
FE0	6.70	34.58	3.59	6.98	34.82	4.03
MNO	0.132	0.0394	0.137	0.138	0.0358	0.146
MGO	3.48	1.04	3.59	3.01	0.66	3.14
CA0	7.03	1.78	7.31	6.62	1.39	7.11
RB20	0.0008	0.0010	0.0010	0.0008	0.0013	0.0006
SRO	0.0040	0.0012	0.0051	0.0057	0.0003	0.0060
BA0	0.010	0.010	0.011	0.013	0.008	0.007
NA20	7.13	2.30	7.65	7.29	2.29	7.82
K20	0.326	0.151	0.347	0.317	0.081	0.337
ZR02	0.0121	0.0055	0.0132	0.0118	0.0054	0.0130
P205	0.076	0.015	0.083	0.074	0.015	0.080
CG2	9.790	12.283	9.240	10.523	16.206	9.020
OKSUM	98.8	95.5	99.2	98.8	95.5	99.1
CU	0.926	9.37	0.0449	0.942	10.11	0.0367
NI	0.0249	0.167	0.0111	0.0268	0.161	0.0126
CO	0.0156	0.120	0.0059	0.0179	0.120	0.0086
ZN	0.0110	0.0734	0.0034	0.0151	0.0825	0.0079
PB	0.014	0.10	0.005	0.012	0.092	0.004
AG	0.000	0.000	0.000	0.000	0.000	0.000
S	4.03	33.8	0.866	4.55	33.9	1.38
AS	0.0038	0.0124	0.0015	0.0018	0.0046	0.0018
SB	0.000	0.000	0.000	0.000	0.000	0.000
BT	0.003	0.019	0.001	0.002	0.010	0.001
TE	0.007	0.091	0.001	0.006	0.073	0.000
Y	0.0018	0.0007	0.0020	0.0018	0.0008	0.0021
NR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
MC	0.0016	0.0120	0.0005	0.0019	0.0104	0.0007
SN	0.001	0.000	0.002	0.001	0.000	0.002
W	0.003	0.000	0.003	0.003	0.001	0.004
PT						
CL	0.015	0.015	0.012	0.012	0.009	0.012
BR	0.0000	0.0002	0.0000	0.0000	0.0003	0.0000
TH	0.0007	0.0015	0.0001	0.0000	0.0006	0.0000
U	0.0033	0.0040	0.0030	0.0027	0.0047	0.0027
CS	0.001	0.003	0.002	0.001	0.002	0.001
LA	0.004	0.005	0.004	0.003	0.001	0.004
CE	0.007	0.006	0.008	0.006	0.004	0.007
PR	0.000	0.000	0.001	0.000	0.000	0.000
NO	0.00	0.00	0.01	0.00	0.01	0.01
SM	0.00	0.00	0.00	0.00	0.00	0.00
EU	0.00	0.00	0.00	0.00	0.00	0.00
GD	0.00	0.00	0.00	0.00	0.00	0.00
TB	0.00	0.00	0.00	0.00	0.00	0.00
DY	0.00	0.00	0.00	0.00	0.00	0.00
HO	0.00	0.00	0.00	0.00	0.00	0.00
ER	0.00	0.00	0.00	0.00	0.00	0.00
TK	0.00	0.00	0.00	0.00	0.00	0.00
YB	0.00	0.00	0.00	0.00	0.00	0.00
LU	0.00	0.00	0.00	0.00	0.00	0.00
HF	0.001	0.000	0.001	0.002	0.000	0.001
TA	0.000	0.000	0.000	0.000	0.000	0.000
LOI						

KRAUSKOPFITE



CRYSTAL SYSTEM: Monoclinic

CLASS: $2/m$

SPACE GROUP: $F2_1/a$

Z: 4

LATTICE CONSTANTS:

$a = 8.460$

$b = 10.622$

$c = 7.837$

$\beta = 94^\circ 32'$

3 STRONGEST DIFFRACTION LINES:

3.84 (100)

6.36 (45)

5.34 (45)

OPTICAL CONSTANTS:

$\alpha = 1.574$

$\beta = 1.587$

$\gamma = 1.599$

$(-)\rho V = 88^\circ$

HARDNESS: ~4

DENSITY: 3.14 (Meas.)

3.10 (Calc.)

CLEAVAGE: {010} perfect
{001} perfect

A third poor cleavage or fracture at a high angle to the other two.

HABIT: Equidimensional to short prismatic grains up to 6 mm long; commonly grains are 3 mm or less in length.

COLOR-LUSTER: White to colorless; subvitreous; nearly on cleavage plates. White streak.

MODE OF OCCURRENCE: Found as a vein-forming mineral commonly associated with unadonidite, opal, and witherite in sanbornite-bearing metamorphic rocks in eastern Fresno County, California.

BEST REF IN ENGLISH: Alfors, John T., Stinson, Melvin C., Matthews, Robert A., and Pribst, Adolf, *Am. Min.*, 50: 314-340 (1965).

KREMERSITE



Erythrosiderite Series

CRYSTAL SYSTEM: Orthorhombic

CLASS: $2/m 2/m 2/m$

SPACE GROUP: $Fm\bar{3}m$

Z: 4

LATTICE CONSTANTS:

$a = 13.78$

$b = 9.85$

$c = 7.09$

OPTICAL CONSTANTS:

$\alpha = 1.715$

$\beta = 1.75$

$\gamma = 1.80$

$(+)\rho V = 62^\circ$

HARDNESS: Not determined.

DENSITY: 2.00 (Synthetic)

CLEAVAGE: {210} perfect
{011} perfect

HABIT: Crystals pseudo-octahedral.

COLOR-LUSTER: Red to brownish red. Vitreous.

Displacement.

MODE OF OCCURRENCE: Occurs in fumaroles on Mt. Etna, and in association with hematite and malachite in fumaroles on Mt. Vesuvius, Italy.

BEST REF. IN ENGLISH: Palache, et al., "Dana's System of Mineralogy," 7th Ed., v. II, p. 101-103, New York, Wiley, 1951.

KRENNERITE



CRYSTAL SYSTEM: Orthorhombic

CLASS: $mm2$

SPACE GROUP: $Fma2$

Z: 8

LATTICE CONSTANTS:

$a = 16.54$

$b = 8.82$

$c = 4.46$

3 STRONGEST DIFFRACTION LINES:

1.03 (100)

2.11 (70)

2.94 (60)

HARDNESS: 2-3

DENSITY: 8.63 (Meas.)

8.86 (Calc.)

CLEAVAGE: {001} perfect

Fracture subconchoidal to uneven. Brittle.

HABIT: Crystals commonly short prismatic {001}; vertical zone striated {001}.

COLOR-LUSTER: Silver white to pale yellowish white, opaque; metallic.

MODE OF OCCURRENCE: Occurs usually in low-temperature veins, also in moderate to high-temperature veins, but deposited toward the low-temperature limit for the deposit in which it occurs. Found with calaverite at several mines in the Cripple Creek district, Teller County, Colorado; in Montbroy Township, Rouyn district, Quebec, Canada; at Nagyág, Transylvania; and associated with other tellurides at Kalgoorlie and Mulgabbie, Western Australia.

BEST REF. IN ENGLISH: Palache, et al., "Dana's System of Mineralogy," 7th Ed., v. I, p. 333-335, New York, Wiley, 1944. Tunell, George, and Murata, K. J., *Am. Min.*, 35: 959-964 (1950).

KRIBERGITE [Species status uncertain]



3 STRONGEST DIFFRACTION LINES:

11.6 (100)

5.02 (25)

6.62 (20)

OPTICAL CONSTANTS:

mean index = 1.484

HARDNESS: Not determined.

DENSITY: 1.92

CLEAVAGE: Not determined.

TABLE 1

GOLD-BEARING MINERALS*

<u>NATIVE GOLD</u>	Au
<u>ELECTRUM</u>	(Au, Ag)
CUPROAURITE	(Au, Cu)
PURPURITY	(Au, Pd)
RHODITE	(Au, Rh)
TRIDITE GOLD	(Au, Ir)
PLATINUM GOLD	(Au, Pd)
BISMUTHAURITE	(Au, Bi)
AMALGAM	Au ₂ Hg ₃ (?)
MAUDSLIITE	Au ₂ Bi
AURICUPRITE	AuCu ₃
ROZHKOVITE	(Cu, Pd) ₃ Au ₂
CALAVERITE	AuTe ₂
KRENNERITE	(Au, Ag)Te ₂
MUNTZITE	(Au, Sb) ₂ Te ₃
PETZITE	Ag ₃ AuTe ₂
MUTHMANITE	(Ag, Au)Te
SYLVANITE	(Au, Ag) ₁₀ Te ₄
KOSTOVITE	Au ₂ Te ₄
MAGYASITE	Pb ₃ Au(Te, Sb) ₄ S ₅₋₆
GOLD TELLURATE (?)	
UYTENBROEKITE	Ag ₃ AuS ₂
AUROSTIBITE	AuSb ₂
FISCHERITE	Ag ₃ AuS ₂
* Modified from Boyer (1972)	

OR/BRL LAB. 189 12/13 12149

BEST REF. IN ENGLISH: Paladini, *et al.*, *Journal of Mineralogy*, 7(1), 1968, p. 1-10, Wiley, 1968.

MONOHYDROCALCITE

CaCO₃ H₂O

CRYSTAL SYSTEM: Hexagonal

SPACE GROUP: P3₁12

Z: 9

LATTICE CONSTANTS:

(synthetic)

a = 10.42

c = 7.54

3 STRONGEST DIFFRACTION LINES

(natural) (synthetic)

2.17 (100) 4.30 (100)

1.926 (100) 3.05 (100)

4.49 (100) 1.93 (100)

OPTICAL CONSTANTS

n_ω = 1.528

ε = 1.511

(+) (natural) (-) (synthetic)

DENSITY: 38 (Meas.)

376 (Calc.)

HABIT: Masses, fine-grained

COLOR: LUSTER: White

MODE OF OCCURRENCE: Occurs with the

bottom sediments of Lake Issyk-Kul, Kirgizia, USSR

BEST REF. IN ENGLISH: Semenov, *et al.*, *Mineralogicheskii Zhurnal*, 11:51 (1964)

MONREPITE = Bixite

MONSMEDITE

K₂O · Ti₂O₃ · 8SiO₂ · 7H₂O

CRYSTAL SYSTEM: Cubic

3 STRONGEST DIFFRACTION LINES:

3.403 (100)

3.560 (80)

2.860 (80)

OPTICAL CONSTANT

n = 1.6081

HARDNESS: 2

DENSITY: 3.00 (Meas.)

CLEAVAGE: Cubic, rarely octahedral

HABIT: Cubes; from tenths of a millimeter to

mostly 0.25-0.50 cm. Forms (111) and (100) faces

COLOR-LUSTER: Dark green to black, mainly opaque

large crystals, pearly

MODE OF OCCURRENCE: Occurs as nodules with

casite, barite, and iron sulfides in the oxidized zone

hydrothermal deposit containing pyrite, arsenopyrite

and accessory pyrrhotite, stibnite, chalcocite and

stibnite at Bad Spring, Roumania

BEST REF. IN ENGLISH: *Journal of Mineralogy*, 7(1), 1968, p. 1-10, Wiley, 1968.

MONTANITE (Inadequately described mineral)

Ca₂(Fe, Mn)Si₂O₇

CRYSTAL SYSTEM: Monoclinic

SPACE GROUP: P2₁

Z: 2

LATTICE CONSTANTS:

(natural)

a = 10.9

b = 11

c = 12.1

HARDNESS: Non-determinable

DENSITY: 3.75 (Meas.)

CLEAVAGE: Not determined

HABIT: Massive, compact, granular

COLOR: LUSTER: Yellowish, also greenish or white

MODE OF OCCURRENCE: Occurs in the

metamorphic zone of the

Colorado, New Mexico, Texas

BEST REF. IN ENGLISH: *Journal of Mineralogy*, 7(1), 1968, p. 1-10, Wiley, 1968.

MONTEBRASITE
Ca₂(Fe, Mn)Si₂O₇

CRYSTAL SYSTEM: Monoclinic

SPACE GROUP: P2₁

Z: 2

LATTICE CONSTANTS:

a = 12.10 a = 104° 30.5'

b = 13.46 b = 97° 14.5'

c = 10.80 c = 107° 53.0'

3 STRONGEST DIFFRACTION LINES:

2.09 (100)

2.98 (80)

2.95 (80)

HARDNESS: 2.5

DENSITY: 4.94 (Meas.)

CLEAVAGE: {110} distinct

{011} distinct

{111} distinct

HABIT: Prisms, also irregular

COLOR: LUSTER: Dark white to pale yellow

MODE OF OCCURRENCE: Occurs in the

metamorphic zone of the

Colorado, New Mexico, Texas

BEST REF. IN ENGLISH: *Journal of Mineralogy*, 7(1), 1968, p. 1-10, Wiley, 1968.

BEST REF. IN ENGLISH: *Journal of Mineralogy*, 7(1), 1968, p. 1-10, Wiley, 1968.

MONTEBRASITE

Ca₂(Fe, Mn)Si₂O₇

CRYSTAL SYSTEM: Monoclinic

SPACE GROUP: P2₁

Z: 2

LATTICE CONSTANTS:

(natural)

a = 10.9

b = 11

c = 12.1

HARDNESS: Non-determinable

DENSITY: 3.75 (Meas.)

CLEAVAGE: Not determined

HABIT: Massive, compact, granular

COLOR: LUSTER: Yellowish, also greenish or white

MODE OF OCCURRENCE: Occurs in the

174 PETALITE

CRYSTAL SYSTEM: Monoclinic

CLASS: 2/m

SPACE GROUP: $C2/m$

Z: 2

LATTICE CONSTANTS:

$a = 11.78$

$b = 5.14$

$c = 7.62$

$\beta = 112^{\circ}54'$

3 STRONGEST DIFFRACTION LINES:

3.73 (100)

3.67 (90)

3.51 (30)

OPTICAL CONSTANTS:

$n = 1.504$

$\beta = 1.510$

$\gamma = 1.516$

$(-)\rho V = 87^{\circ}24'$

HARDNESS: 6-6.5

DENSITY: 2.3-2.5 (Meas.)

2.454 (Calc.)

CLEAVAGE: {001} perfect

{201} distinct

Fracture subconchoidal, brittle.

HABIT: Crystals subhedral, small, rare. Usually massive, as large cleavable blocky aggregates. Twining on {001}, polysynthetic.

COLOR-LUSTER: Colorless, white, gray, yellow. Transparent to translucent. Vitreous to resinous.

MODE OF OCCURRENCE: Occurs in granitic aggregates in association with charnockites, quartz, and lepidolite. Found at Pala and Kilauea, San Diego County, California; at Bolton, Worcester County, Massachusetts; at Paris, Oxford County, Maine; on the island of Uto, Sweden; Elba, Italy; USSR; and elsewhere.

BEST REF. IN ENGLISH: Vose, R. A., "Mineralogy of Rare Elements," v. II, p. 35-38; Int'l Program for Scientific Translations, 1966.

PETZITE



CRYSTAL SYSTEM: Cubic

CLASS: 432

SPACE GROUP: $Fm\bar{3}m$

Z: 8

LATTICE CONSTANT:

$a = 10.38$

3 STRONGEST DIFFRACTION LINES:

2.77 (100)

2.12 (80)

2.03 (70)

HARDNESS: 2.5-3

DENSITY: 8.7-9.4 (Meas.)

8.74 (Calc.)

CLEAVAGE: {100} *

Fracture subconchoidal. Slightly sectile in hand.

HABIT: Commonly massive. Dec. granules to compact, rarely as small single crystals (frequently intergrown) with limonite.



COLOR-LUSTER: Steel-gray to iron black, often iridescent, crystalline. Opaque.

MODE OF OCCURRENCE: Occurs as vein deposits with siliceous minerals at Bolina and Nagygy. Transylvania, Romania; Timmins, Ontario, Canada; Kalamazoo, Western Australia; and at several localities in Colorado and California.

BEST REF. IN ENGLISH: Frenn, Alfred J. Jr., *Am. Min.* 46: 693-704 (1956); Vose, R. A., "Mineralogy of Rare Elements," v. II, p. 714-715; Int'l Program for Scientific Translations, 1966.

PHACOLITE = Variety of Chabazite

PHARMACOLITE



CRYSTAL SYSTEM: Monoclinic

CLASS: $m\bar{2}c$ 2/m

SPACE GROUP: $A2/a$ or Aa

Z: 4

LATTICE CONSTANTS:

$a = 6.00 \text{ \AA}$

$b = 15.40$

$c = 6.29$

$\beta = 114^{\circ}47'$

3 STRONGEST DIFFRACTION LINES:

4.32 (100)

3.09 (100)

2.71 (90)

OPTICAL CONSTANTS:

$n = 1.583$

$\beta = 1.589$ (Na)

$\gamma = 1.594$

$(-)\rho V = 79^{\circ}24'$

HARDNESS: 1-2.5

DENSITY: 2.68 (Meas.)

2.674 (Calc.)

CLEAVAGE: {010} perfect

Fracture uneven. Thin laminae flexible.

HABIT: Crystals flattened on {010} or acicular, or as clusters of acicular crystals or thin fibers.

COLOR-LUSTER: Colorless, white, grayish. Transparent to translucent. Vitreous, partly or always fibrous material silky.

MODE OF OCCURRENCE: Occurs with erythrite and malachite at the O.K. mine, San Gabriel Canyon, Los Angeles County, California, and with limonite at the White mine, Manhattan, Nye County, Nevada. It also is found Wittichen in the Black Forest and at several other localities in Germany; at Jochimschthal (Jochymov), Bohemia, Czechoslovakia; and at Markirah, Alsace, France.

BEST REF. IN ENGLISH: Palache, et al., "Dana's System of Mineralogy," 7th Ed., v. II, p. 706-708, New York Wiley, 1951.

PHARMACOSIDERITE



MUSCOVITE

KAl₂Sr₃Cl₂(OH)₂F₂
Micro Green
Var: Fuchsite
Muscovite
Ph. 100
Spec. 10

CRYSTAL SYSTEM Monoclinic

CLASS 2/M
SPACE GROUP C2/c
Z: 4

LATTICE CONSTANTS:

(mic) a = 0.517
b = 0.914
c = 0.362
beta = 90.30

3 STR. REFRACTIVE IND.

2.37
9.93
2.57

OPTIC CONSTANTS

552-1.574
582-1.510
581-1.616

(-): -30-47

HARDNESS: 2 1/2 parallel (100)
4 perpendicular (100)

DENSITY: 2.77-2.88 (theas)

CLEAVAGE: {001} perfect

Thin: can be flexible and elastic when

Hand: Cleavages usually tabular,
shaped as thin-section. Commonly in
massive crystalline or compact. In
plumose and of rounded angular
sem-crystals.

Crystal Cluster: common in
green shales, etc.
Trans: not transparent
Streak: colorless

MODE OF OCCURRENCE:

C widespread in many geo-synclinal
granites and granite pegmatites,
gneisses and in detrital or colligatory
occurrences, and in some of the
at overthrusts in California, Colorado,
New Hampshire, Massachusetts,
Vermont and North Carolina,
Greenland, Norway, Sweden, etc.
India and elsewhere. Crystals
mainly from pegmatites in the Platte
at a single crystal 10 feet in
length, weighing 85 tons, was taken in
mine, Nellum, India.

... IN ENGLISH: ...

MUSCOVITE

... SYSTEM Hexagonal
... CONSTANTS

... DIFFER. ...

OPTICAL CONSTANTS

... REFRACTIVE IND.
... HARDNESS
... OPTIC CONSTANTS

... MODE OF OCCURRENCE
... BEST IN ENGLISH

MUTHYANNITE (Speculation)
... University of Toronto

... SYSTEM, U
... LEAVAGE: One perfect
... OCCURRENCE
... BEST IN ENGLISH
... New York

COLOR-LUSTER: Colorless to white; transparent to translucent.

MODE OF OCCURRENCE: Occurs rarely in cavities in rocks, visible, or impregnated on gneiss crystallizing from cavities in Franklin, Ore., and also associated with rhodochrosite, at Franklin, New Jersey; also found at Capriolo Mine, near Rome, Italy, and in a shale-hosted ore deposit at the Kinnaburg mine, Arendal, Norway.

BEST REF. IN ENGLISH: Palache, et al., "Dana's System of Mineralogy," 7th Ed., p. 186-187, New York, Wiley, 1951. *Trans. Chem. Soc. Lond. Buerger, M.J., Am. Min., 46: 1077-1085 (1951).*

CAIRNGORM = Smoky quartz

CALAMINE = *Malachite*

CALAVERITE

As_2Te_2

CRYSTAL SYSTEM: Monoclinic

CLASS: *J* of 2

SPACE GROUP: *C* (*m*) *2* *C*

Z: 2

LATTICE CONSTANTS:

a = 7.19

b = 4.40

c = 5.08

β = 90°30'

3 STRONGEST DIFFRACTION LINES:

2.99 (100)

2.09 (90)

2.91 (70)

OPTICAL CONSTANTS: (variable)

HARDNESS: 2½-3

DENSITY: 9.10-9.40 (Mez.)

9.3 (Calc.)

CLEAVAGE: None

Fracture smooth to subconchoidal. Very brittle.

HABIT: Crystals lath-like or bladed and as short to slender prisms striated in direction of elongation. Also massive, granular. Twinning on {101}, {111}, or {310}.

COLOR-LUSTER: Brass yellow to silver white. Dpaque. Metallic. Streak greenish to yellowish gray.

MODE OF OCCURRENCE: Occurs in low- to high temperature vein deposits, commonly associated with native gold, fluorite, quartz, sulfides, sulfates, and silicates. Found as one of the principal gold ore minerals of the Cripple Creek district, Teller County, and in lesser amounts in Boulder, Costilla, LaPlata, and Montezuma counties, Colorado; at the Scimitous, Melones, and Margin mines on Carbon Hill, Calaveras County, and in Inyo and Tuolumne counties, California; in the Kiskadee Lake district and elsewhere in Ontario, Canada; and at localities in Mexico, El Salvador, Romania, USSR, Philippine Islands, and Australia.

BEST REF. IN ENGLISH: Vlasov, E. A., "Mineralogy of Rare Elements," 1, D, p. 698-703, Intern. Program for Scientific Translations, 1966.

CALCIBORITE

Ca_2O_4

CRYSTAL SYSTEM: Monoclinic (*m*)

Z: 1

3 STRONGEST DIFFRACTION LINES:

3.445 (100)

1.867 (100)

1.970 (90)

HARDNESS: ~ 3½

DENSITY: 2.878

CLEAVAGE: None

Fracture conchoidal, on aggregates conchoidal.

HABIT: Massive, at nodular aggregates.

COLOR-LUSTER: White.

MODE OF OCCURRENCE: Occurs associated with cliv and dolomite, with some amounts of garnet, magnetite and pyroxene, in deep dull zones in the contact of Miss Devonian limestone with quartz diorite in a copper deposit of the storm type in the Ural.

BEST REF. IN ENGLISH: Wilson, E. A., *Am. Min.*, 815 (1956). Malinko, S. V., Krasnaya, M. N., Ponomerova, V. M., and Kyzinskaya, L. I., *Am. Min.*, 49: (1964).

CALCIOCELESTINE = Variety of celestine containing small amounts of calcium sulfating chromite.

CALCIOCOPIAPITE (Yuzika)

$\text{CaFe}_2(\text{SO}_4)_2(\text{OH})_2 \cdot 12\text{H}_2\text{O}$

3 STRONGEST DIFFRACTION LINES:

3.108 (100)

3.027 (100)

2.609 (100)

HABIT: Fibrous crust.

COLOR-LUSTER: Grayish yellow to brownish yellow.

MODE OF OCCURRENCE: Occurs associated with iron oxides, chloranthite, and malachite as a superproduct of weathering of magnetite ores containing pyrite and calcite at Dzhakane, Mirdzhik, Caucasus, Azerbaidzhan.

BEST REF. IN ENGLISH: Kaidas, B. A., and Alekseev, M., *Am. Min.*, 47: 807-808 (1962).

CALCOFERRITE

$\text{Ca}_2\text{Fe}_2(\text{PO}_4)_2(\text{OH}) \cdot 7\text{H}_2\text{O}$

CRYSTAL SYSTEM: Hexagonal (*m*)

OPTICAL CONSTANTS:

ω = 1.57-1.58 (variable)

(-)

HARDNESS: 2½

DENSITY: 2.57

CLEAVAGE: Perfect parallel to foliation. Brittle.

HABIT: As foliated nodules or nodular masses.

COLOR-LUSTER: Yellowish, white to yellow, also bluish yellow to yellowish green. Dpaque; thin laminae lustrous. Pearly.

HABIT: Lustrous, prismatic with faces (100) and (010).
 COLOR-LUSTER: Colorless, transparent.
 MOD. OF OCCURRENCE: As much as 2% in quartz, orthoclase, biotite, diopside, and other silicates.
 LOCALITY: In the albitite of the Khibiny Mountains, Kola Peninsula, U.S.S.R.
 BEST REF. IN ENG. LIT.: *Am. Mineralogist*, 49, 111 (1964).

KORZHINSKITE (Inadansu, Cuba, $Ca_2H_2O_2$)

CRYSTAL SYSTEM: Unknown
 STRONGEST DIFFRACTION LINES: 2.02 (100), 1.78 (100), 1.81 (100)
 OPTICAL CONSTANTS: $n_x = 1.672$, $n_y = 1.672$, $n_z = 1.672$
 (+) $2V = 43.6^\circ$
 CLEAVAGE: One in direction (100)
 HARDNESS: 4.5
 COLOR-LUSTER: Colorless, transparent
 MOD. OF OCCURRENCE: In albitite of the Khibiny Mountains, Kola Peninsula, U.S.S.R.
 LOCALITY: In the albitite of the Khibiny Mountains, Kola Peninsula, U.S.S.R.
 BEST REF. IN ENG. LIT.: *Am. Mineralogist*, 49, 111 (1964).

KOSTOVITE (Madagascar, Ca_2Co_2)

CRYSTAL SYSTEM: Monoclinic
 STRONGEST DIFFRACTION LINES: 3.00 (100), 2.97 (100), 2.94 (100)
 HARDNESS: 5.5
 DENSITY: Not determined
 CLEAVAGE: Distinct in one direction
 HABIT: Homometric, prismatic, up to 0.5 mm in diameter
 LOCALITY: In the albitite of the Khibiny Mountains, Kola Peninsula, U.S.S.R.
 BEST REF. IN ENG. LIT.: *Am. Mineralogist*, 49, 111 (1964).

HABIT: Lustrous, prismatic with faces (100) and (010).
 COLOR-LUSTER: Colorless, transparent.
 MOD. OF OCCURRENCE: As much as 2% in quartz, orthoclase, biotite, diopside, and other silicates.
 LOCALITY: In the albitite of the Khibiny Mountains, Kola Peninsula, U.S.S.R.
 BEST REF. IN ENG. LIT.: *Am. Mineralogist*, 49, 111 (1964).

KOTOITE (Madagascar, Ca_2Co_2)

CRYSTAL SYSTEM: Monoclinic
 CLASS: $2/m2/m2/m$
 SPACE GROUP: C_{2h}^2
 OPTICAL CONSTANTS: $n_x = 1.672$, $n_y = 1.672$, $n_z = 1.672$
 (+) $2V = 43.6^\circ$
 CLEAVAGE: One in direction (100)
 HABIT: Homometric, prismatic, up to 0.5 mm in diameter
 LOCALITY: In the albitite of the Khibiny Mountains, Kola Peninsula, U.S.S.R.
 BEST REF. IN ENG. LIT.: *Am. Mineralogist*, 49, 111 (1964).

KOTIGITE (Madagascar, Ca_2Co_2)

CRYSTAL SYSTEM: Monoclinic
 CLASS: $2/m2/m2/m$
 SPACE GROUP: C_{2h}^2
 OPTICAL CONSTANTS: $n_x = 1.672$, $n_y = 1.672$, $n_z = 1.672$
 (+) $2V = 43.6^\circ$
 CLEAVAGE: One in direction (100)
 HABIT: Homometric, prismatic, up to 0.5 mm in diameter
 LOCALITY: In the albitite of the Khibiny Mountains, Kola Peninsula, U.S.S.R.
 BEST REF. IN ENG. LIT.: *Am. Mineralogist*, 49, 111 (1964).

KOTOLSKITE (Madagascar, Ca_2Co_2)

CRYSTAL SYSTEM: Monoclinic
 CLASS: $2/m2/m2/m$
 SPACE GROUP: C_{2h}^2
 OPTICAL CONSTANTS: $n_x = 1.672$, $n_y = 1.672$, $n_z = 1.672$
 (+) $2V = 43.6^\circ$
 CLEAVAGE: One in direction (100)
 HABIT: Homometric, prismatic, up to 0.5 mm in diameter
 LOCALITY: In the albitite of the Khibiny Mountains, Kola Peninsula, U.S.S.R.
 BEST REF. IN ENG. LIT.: *Am. Mineralogist*, 49, 111 (1964).

HARDNESS -20
DENSITY 1.05 g/cm³

TRANSMISSION (100%)
100%

HAZARD: No known hazard

Material obtained from...

Color: Colorless to pale yellow

Crystal habit: prismatic

Company specimens available

Line: 100-100000

Ref: 100-100000

John D. ...

SYNTHETIC
As...

CRYSTAL SYSTEM: Monoclinic

Space Group: P2₁

LA: 100-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

200-100000

SYNTHETIC

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

100-100000

NAGATELITE

NAGYAGITE

Pyrite

RY: 100-1000

CLASS: 2

SPALL: 1000

EARTH CHEMISTRY

100-1000

STRONGEST DIFFRACTION

100-1000

100-1000

100-1000

HARDNESS

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

MANGLITE

Pyrite

RY: 100-1000

CLASS: 2

SPALL: 1000

EARTH CHEMISTRY

100-1000

STRONGEST DIFFRACTION

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

100-1000

Canyon North and County, etc
 in 11
 Survey in 1858
 well
 20
 South
 50
 60
 70
 80
 90
 100
 110
 120
 130
 140
 150
 160
 170
 180
 190
 200
 210
 220
 230
 240
 250
 260
 270
 280
 290
 300
 310
 320
 330
 340
 350
 360
 370
 380
 390
 400
 410
 420
 430
 440
 450
 460
 470
 480
 490
 500
 510
 520
 530
 540
 550
 560
 570
 580
 590
 600
 610
 620
 630
 640
 650
 660
 670
 680
 690
 700
 710
 720
 730
 740
 750
 760
 770
 780
 790
 800
 810
 820
 830
 840
 850
 860
 870
 880
 890
 900
 910
 920
 930
 940
 950
 960
 970
 980
 990
 1000

AURIC
 FULL

AURORITH
 100

CRIST
 CLASS
 3.5
 4
 5
 6
 7
 8
 9
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20
 21
 22
 23
 24
 25
 26
 27
 28
 29
 30
 31
 32
 33
 34
 35
 36
 37
 38
 39
 40
 41
 42
 43
 44
 45
 46
 47
 48
 49
 50
 51
 52
 53
 54
 55
 56
 57
 58
 59
 60
 61
 62
 63
 64
 65
 66
 67
 68
 69
 70
 71
 72
 73
 74
 75
 76
 77
 78
 79
 80
 81
 82
 83
 84
 85
 86
 87
 88
 89
 90
 91
 92
 93
 94
 95
 96
 97
 98
 99
 100

AURORITH

AURORITH
 Auto

CRIST
 CLASS
 SPA
 2
 3
 4
 5
 6
 7
 8
 9
 10
 11
 12
 13
 14
 15
 16
 17
 18
 19
 20
 21
 22
 23
 24
 25
 26
 27
 28
 29
 30
 31
 32
 33
 34
 35
 36
 37
 38
 39
 40
 41
 42
 43
 44
 45
 46
 47
 48
 49
 50
 51
 52
 53
 54
 55
 56
 57
 58
 59
 60
 61
 62
 63
 64
 65
 66
 67
 68
 69
 70
 71
 72
 73
 74
 75
 76
 77
 78
 79
 80
 81
 82
 83
 84
 85
 86
 87
 88
 89
 90
 91
 92
 93
 94
 95
 96
 97
 98
 99
 100



Eng
 the
 will
 the
 want
 want
 omitt
 the
 New
 the
 Bro



outokumpu
MINING

TELEFAX MESSAGE

ANALYTICAL LABORATORY

TO :

Metallurgiska AB

Box 100, 00101 Helsinki

FROM :

RE :

...

DATE :

RECEIVED :

NO. OF PAGES :

ADDITIONAL INFO :

PO BOX 100, FIN-00101 HELSINKI, FINLAND
TEL. +358 73 55610 46103

TEL. +358 73 55610
INT. +358 73 556610

UNIVERSITY OF
MICHIGAN LIBRARY
ANN ARBOR MI 48106

11 11 1981
122 11 11111

Wayte N 8D 0.42% Cu, 41.28 g/A An, redwood 16.45 g/A

UNIVERSITY OF MICHIGAN LIBRARY

11 11 1981
122 11 11111

1700

1701

1702

1703

1704

1705

1706

1707

1700

1701

1702

1703

1704

1705

1706

1707

1700

1701

1702

1703

1704

1705

1706

1707

1700

1701

1702

1703

1704

1705

1706

1707

1700

1701

1702

1703

1704

1705

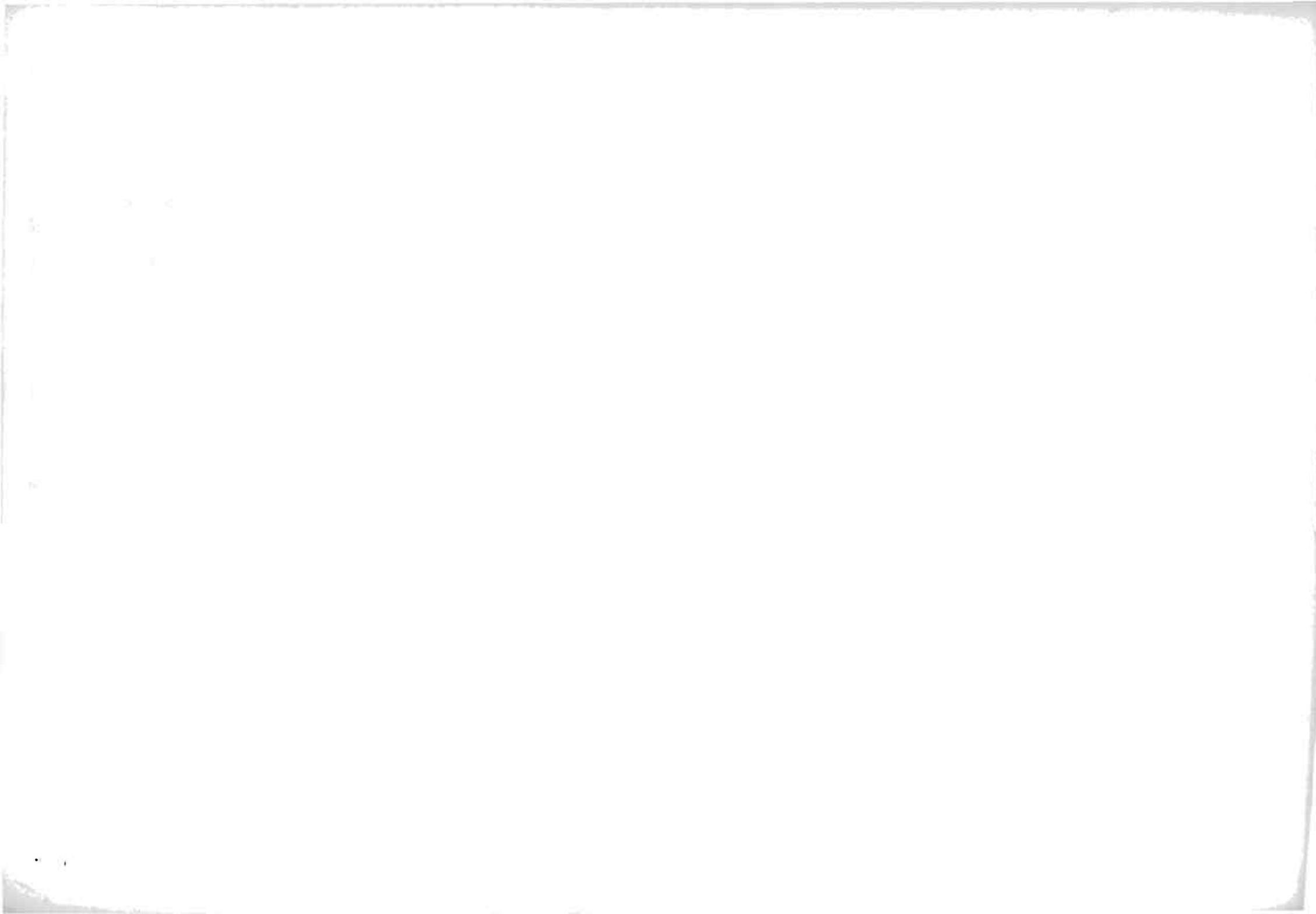
1706

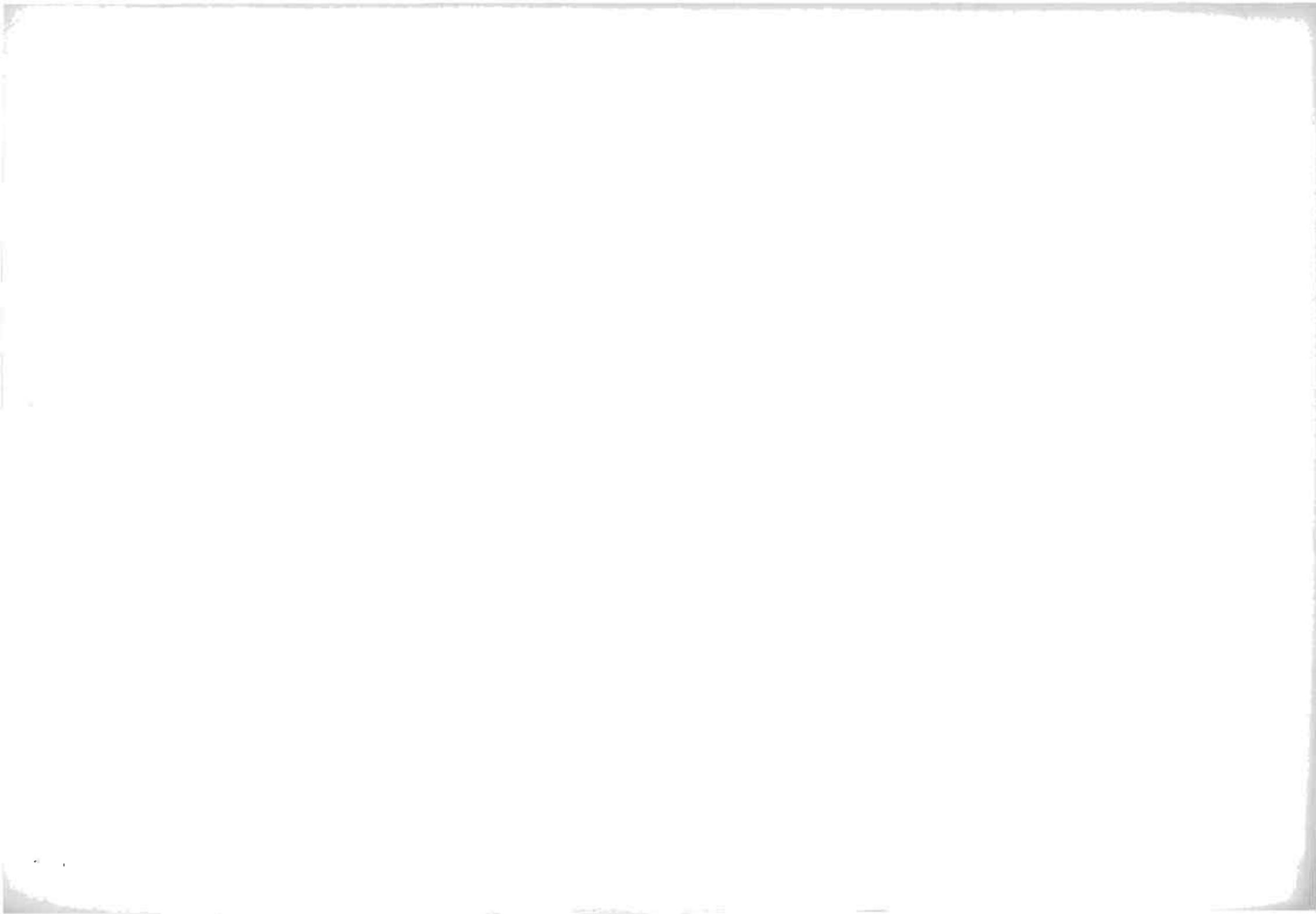
1707

1700

1701

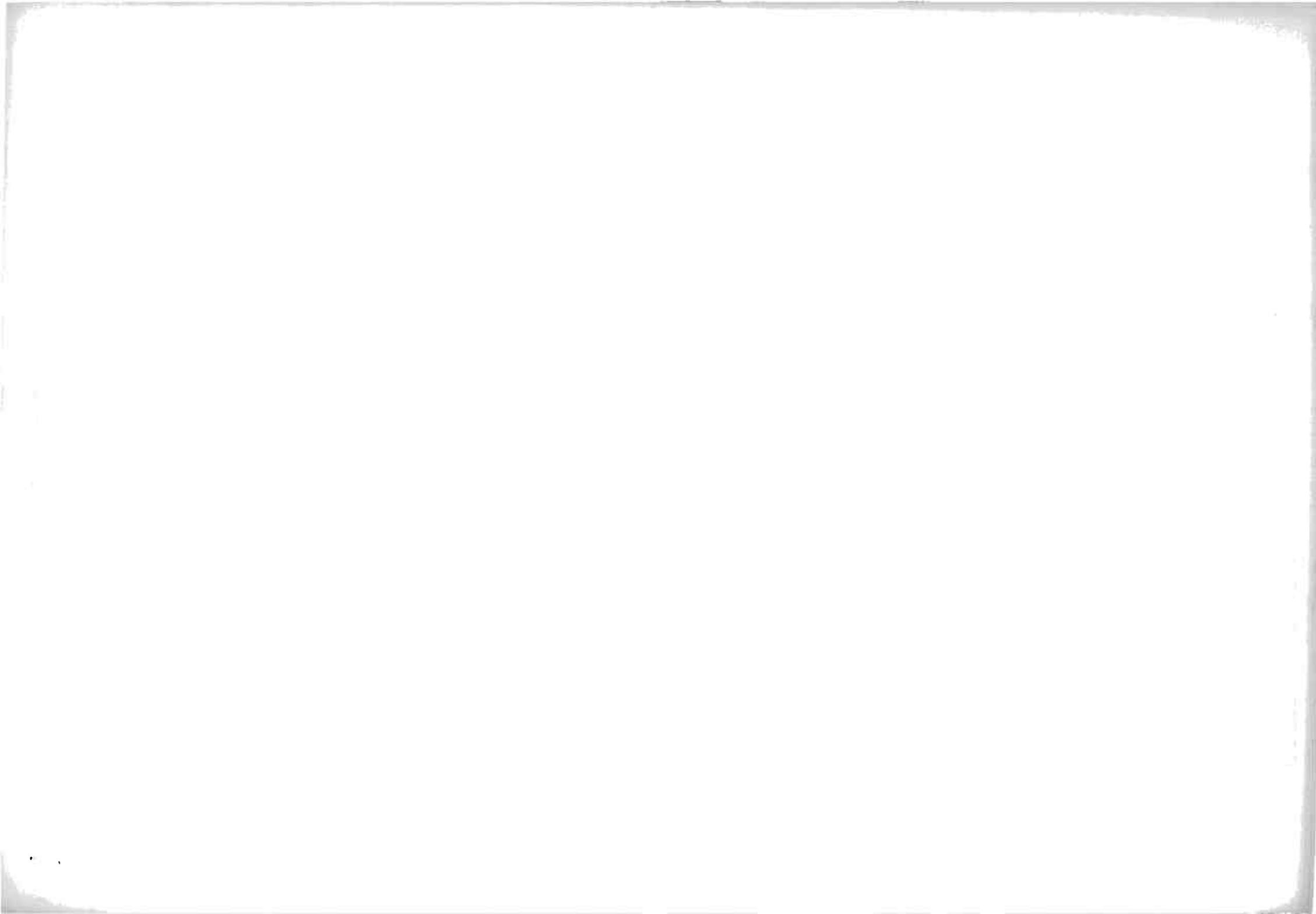
1702











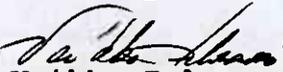


November 3, 1989

LABORATORY FROTH FLOTATION TESTWORK OF BIDJOVAGGE B-VEST ORE ^{=K-ORE}

Veikko Palosaari
Esko Hänninen

Geoanalytical Laboratory


Veikko Palosaari
Manager

DISTR. Bidjovagge/T. Östby, H. Alaniska, M. Ekberg
Geoanalytical Laboratory/VIP, EH
Archives

LABORATORY FROTH FLOTATION TESTWORK OF BIDJOVAGGE B-VEST ORE

CONTENTS	PAGE NUMBER
1 Summary	2
2 Introduction	3
3 Preparation and analysis of feed sample	3
4. Mineralogy	4
5. Analytical methods	4
6. Procedure of froth flotation tests	4
6.1. Grinding	4
6.2. Conditioning	4
6.3. Flotation	4
7. Grinding tests	5
8. Regrinding tests	6
9. Tellurium depression test	6
10. Proposal for process development	6

Appendices

1. XRF analysis of the feed and products
2. Flowsheet and reports of the grinding tests BV01-03
3. Flowsheet and reports of the regrinding tests BV04-05
4. Grade-recovery and closed circuit estimation graph, test BV05
5. Flowsheet and reports of the tellurium depression tests BV06-07

1. SUMMARY

A sample of Bidjovagge B-vest ore was submitted to Geoanalytical laboratory for froth flotation tests.

The elemental assays of the sample were: Cu 0.313 %, Au 26.0 g/t, S 0.88 % and Te 0.062 %. The predominant gold bearing mineral is calaverite AuTe_2 , and only about 15 % of the total gold occurs as native gold.

In the flotation tests with regrinding of the rougher tailing total recovery of gold was 96.0 % and concentrate grade 132.4 g/t Au. In two stage open cleaning of rougher concentrate Au grade 1140 g/t was achieved on the recovery 71.1 %. The estimated total recovery of gold in closed circuit is 88 % at the concentrate grade 800 g/t.

Because the exceptional mineralogy of the sample tellurium assay of the second cleaner concentrate was at the level 2.0 - 2.5 % and tellurium recovery as good as that of copper.

Adjustment of pH by lime to the level 10.5 - 11.5 in xanthate flotation had no depressive effect on tellurium minerals.

2. INTRODUCTION

A sample of Bidjovagge B-vest ore from the drill hole N98D was received 23.8.1989 by Geoanalytical Laboratory of Outokumpu Mining Services from Mr. Markus Ekberg, Bidjovagge A/S for metallurgical tests by froth flotation.

The aim of the testwork was to measure the degree of grinding fineness necessary for gold/copper flotation and to estimate concentrate grade and recoveries. Later, when it was found in the mineralogical research that gold is mostly connected to tellurium minerals also some tellurium depression tests were performed.

3. PREPARATION AND ANALYSIS OF FEED SAMPLE

The drill core sample was crushed to -3 mm by jaw and roll crusher, homogenised and divided by sample splitter to subsamples of 8 kg which were further divided to 1000 g flotation test samples (flotation feed) by bottle divider and packed to plastic bags. The test samples were stored in freezer to avoid oxidation. One 1000 g sample was prepared for analysis. The elemental assays were as follows:

	Cu (%)	Au (g/t)	S (%)	Te (%)
Bidjovagge B-vest N98D	0.313	26.0	0.88	0.062

The XRF-analysis of flotation feed for 53 elements is in Appendix 1.

4. MINERALOGY

Sulphide contents of the mineralisation is about 2 wt-%. One half consists of chalcopyrite and the other half of iron sulphides mainly pyrite.

Native gold is rarely seen even in the most gold rich samples. It occurs as fine grained (about 10-20 μm) dissemination in silicates and tellurides. The predominant gold mineral in the mineralisation is calaverite, AuTe_2 . According to microprobe investigation carried out on the cleaner concentrate (CC2) about 77 % of gold is in calaverite, about 19 % as native gold, and the rest 4 % in a bismuth bearing gold telluride (Table 1). The largest grain of gold mineral observed was 20*35 μm . About 78 % of gold is in mineral grains smaller than 20 μm and 22 % in grains smaller than 10 μm .

Table 1 Distribution of gold in cleaner concentrate (CC2).

Size (μm)	20-30	10-20	5-10	<5	Sum
Calaverite, AuTe_2	22.2	33.8	19.0	2.2	77.2
Native gold	-	18.5	-	0.5	19.1
AuBi-telluride	-	3.7	-	-	3.7
Total	22.2	56.0	19.0	2.7	100.0

5. ANALYTICAL METHODS

The feed, test products, and sieve fractions were analysed for gold by aqua regia dissolution and organic extraction by dibutylketone/dibutylsulfide. The determination was made by flame AAS. Sample weight 5 g was used when possible.

XRF-analysis for 53 elements were made with Philips PW 1400 spectrometer and fundamental parameter correction calculation (RRFPO).

Sieve analysis of the tailings were made by the sieves 37, 74, 105 μm of Tyler serie. The fines were washed off through 37 μm sieve before dry sieving of the coarser fractions.

6. PROCEDURE OF FROTH FLOTATION TESTS

6.1. Grinding

The test samples were ground in laboratory ball mill (1kg sample/500 ml water/6.8 kg iron balls). The first addition of collector (Aerophine 3418 A and KAX) was made to the mill. In two step grinding the tailing of coarse flotation was settled. The pulp density in regrinding was approximately similar to that in first grinding stage (50 %).

6.2. Conditioning

One to three minute conditioning times were used for frother. Rpm's of the cell were the same as in flotation.

6.3. Flotation

Outokumpu laboratory flotation machine was used both in conditioning and flotation. The cell conditions of 2.0 litre cell in rougher flotation were 1500 rpm and 1.5 l/min air. In cleaner flotation cell of 1.6 l volume was used.

Aerophine 3418 A and Kalium Amyl xanthate (KAX) were used as collectors and Dowfroth 210 as frother throughout the tests. Lime was used as pH regulator.

7. GRINDING TESTS

In the test BV01-03 the effect of grinding time was studied. The fineness of flotation tailing was between 60.0 - 92.8 % -74 μm . The flotation results for gold were the better the finer the grinding. The recoveries in 6 min rougher flotation were 80.6 - 87.8 %. In two stage open cleaning the concentrate grade 1140-1290 g/t Au on the recovery 64.8 - 71.6 % was achieved. The total loss to scavenger tailing was 10.5 % and tailing assay 4.6 g/t on the finest grinding tested (92.8 % - 74 μm). The highest assay 5.36 g/t was in the sieve +37-74 μm which means that collector dosage has been too low for the grinding fineness used. Because the mineralogy of the sample tellurium content of the second cleaner concentrate (BV01/CC2) was 2.52 % and tellurium recovery 81.5 %.

The copper assay of the concentrate 13.4 % and recovery nearly same as that of tellurium 82.7 %.

8. REGRINDING TESTS

In the tests BV04-05 the process of Bidjovagge concentrator was simulated as closely as it is possible laboratory scale. The rougher flotation was performed after 20 min grinding and the tailing was sieved wet by 37 μm sieve. The coarse fraction of tailing was settled and clear water was separated before regrinding. Pulp density in regrinding was approximately 50 %. The variables in the tests were collector dosages and time of regrinding.

The results of the tests were very similar. Total recovery of gold in the combination of rougher and scavenger flotations (BV04) was 96.0 % and concentrate grade 132.4 g/t Au. In two stage open cleaning of rougher concentrate (RC) concentrate grade 1140 g/t was achieved on the recovery 71.1 %. The gold assay of rougher tailing in sieve fraction - 37 μm is rather low, 1.6 g/t. In the scavenger flotation with one cleaning the concentrate grade was 320 g/t and the recovery 5.7 %. The estimated total recovery in closed circuit is 88 % at the concentrate grade 800 g/t. The estimation is based on assumption that 2/3 of gold content of the cleaner tailings will be recovered in closed flotation circuit (Appendix 4).

9. TELLURIUM DEPRESSION TESTS

In the tests TB06-07 the pH of flotation was raised by lime and Kalium Amylxanthate was used as collector to test the depression of tellurides. The tests showed that these changes in the process had no effect on telluride flotation.

10. PROPOSAL FOR PROCESS DEVELOPMENT

Tellurium minerals are a new phenomena in gold flotation processes and that is why the knowledge about them is very limited. The basic research of their behaviour in flotation is best to start in a small scale (Hallimond tube 1 g/test) on selected rich samples and it can be supported by surface chemical measurements (for example FTIR-determinations).

WULFF MUOVIKIELIHAKEMISTO
200 PLASTTAB-REGISTER 218206/A4

1

2

3

4

5

6

1

OUTOKUMPU OY
MALMINETSINTI
GEDANALYTTINEN LABORATORIO
25.08.89

TILAAJA : BIDJOVAGGE
ALUE :
KUST.TILI : 5534307

JAKELU : ~~VAT~~,EH,MLP,IAH,MLM
KARTTALEHTI :
OPERAATTORI : MLM 190

*** PHILIPS PW1400 RYNTGENSPEKTROMETRIN TULOKSIA ***

Feed
8908098D

SI02	64.4
Ti02	0.687
AL203	14.6
CR203	0.0212
V203	0.0261
FE0	2.13
MNO	0.0533
MGO	0.05
CA0	6.43
RB20	0.0004
SRO	0.0057
BA0	0.022
NA20	8.35
K20	0.083
ZRO2	0.0253
P205	0.095
CO2	
OKSUM	98.1
CU	0.262
NI	0.0232
CO	0.0050
ZN	0.0042

PB	0.004
AG	0.000
S	1.31
AS	0.0003
SB	0.000
BI	0.007
TE	0.062
Y	0.0035
NB	0.0000
MO	0.0042
SN	0.001
W	0.000
PT	
CL	0.008
BR	0.0000
TH	0.0005
U	0.0064
CS	0.000
LA	0.002
CE	0.005
FR	0.000
ND	0.00
SM	0.00
EU	0.00
GD	0.00
TB	0.00
DY	0.00
HO	0.00
ER	0.00
TM	0.00
YS	0.00
LU	0.00
HF	0.002
TA	0.000

OUTOKUMPU OY, MINING SERVICES, GEOANALYTTINEN LABORATORIO
XRF-ANALYSAATTORIN TULOKSIA 05.10.89

TILAAJA: E. HANNINEN/GAL
ALUE: BIDJOVAGGE B-V06

LASK.P: 5534307
K.LEHTI:

OPER: MLM 222
JAKELU: VIP, IAH, MLM

CC2 CT1 CT2 SC ST
8910601R2 8910602J1 8910603J2 8910604RH 8910605JA

	%	%	%	%	%
SI02	23.8	63.2	54.4	61.5	67.7
TI02	0.367	0.665	0.614	0.671	0.684
AL203	6.58	16.1	14.6	15.9	15.8
CR203	0.0223	0.0220	0.0238	0.0223	0.0207
V203	0.0191	0.0255	0.0247	0.0262	0.0271
FE0	29.48	2.77	7.02	3.26	0.714
MNO	0.0920	0.0615	0.0974	0.0688	0.0522
MGO	0.19	0.06	0.16	0.10	0.05
CA0	10.6	7.00	10.8	8.35	6.05
RB20	0.0027	0.0005	0.0007	0.0005	0.0003
SA0	0.0035	0.0053	0.0060	0.0058	0.0049
BA0	0.016	0.006	0.007	0.004	0.003
NA20	3.63	8.68	7.81	8.57	8.44
K20	0.035	0.087	0.079	0.087	0.091
ZR02	0.0160	0.0197	0.0257	0.0218	0.0138
P205	0.186	0.071	0.115	0.101	0.092
CO2					
OKSUM	96.7	99.6	98.2	99.6	99.9
CU	6.81	0.108	0.300	0.0708	0.0093
NI	0.390	0.0188	0.0470	0.0172	0.0035
CO	0.0874	0.0165	0.0209	0.0134	0.0070
ZN	0.0052	0.0001	0.0011	0.0009	0.0001
PB	0.048	0.003	0.006	0.003	0.001
AG	0.000	0.000	0.000	0.000	0.000
S	21.4	1.19	3.45	1.46	0.130
AS	0.0000	0.0006	0.0006	0.0005	0.0005
SB	0.013	0.000	0.000	0.000	0.000
BI	0.12	0.005	0.010	0.003	0.001
TE	1.45	0.032	0.081	0.013	0.002
Y	0.0028	0.0034	0.0047	0.0041	0.0028
NB	0.0000	0.0000	0.0000	0.0000	0.0000
MO	0.0553	0.0043	0.0106	0.0031	0.0018
SN	0.002	0.001	0.002	0.001	0.000
W	0.001	0.000	0.000	0.000	0.000
PT					
CL	0.008	0.009	0.005	0.007	0.008
BR	0.0000	0.0000	0.0000	0.0000	0.0000
TH	0.0074	0.0009	0.0017	0.0010	0.0000
U	0.0338	0.0080	0.0128	0.0090	0.0041
CS	0.000	0.000	0.000	0.000	0.001
LA	0.005	0.001	0.002	0.003	0.003
CE	0.017	0.005	0.007	0.005	0.006
PH	0.000	0.000	0.001	0.001	0.000
ND	0.01	0.00	0.01	0.00	0.00
SM	0.00	0.00	0.00	0.00	0.00
EU	0.00	0.00	0.00	0.00	0.00
GD	0.00	0.00	0.00	0.00	0.00
TB	0.00	0.00	0.00	0.00	0.00
DY	0.00	0.00	0.00	0.00	0.00
HO	0.00	0.00	0.00	0.00	0.00
ER	0.01	0.00	0.00	0.00	0.00
TM	0.01	0.00	0.00	0.00	0.00
YB	0.00	0.00	0.00	0.00	0.00
LU	0.00	0.00	0.00	0.00	0.00
HF	0.000	0.001	0.001	0.002	0.001
TA	0.002	0.000	0.000	0.000	0.000
LOI					

GUTOKUMPU OY, MINING SERVICES, GEOKEMIAALINEN LABORATORIO
 XRF-ANALYSAATTORIN TULOKSIA

11.10.89

TILAAJA: E. HANNINEN/GAL
 ALUE: BIDJOVAGGE V07

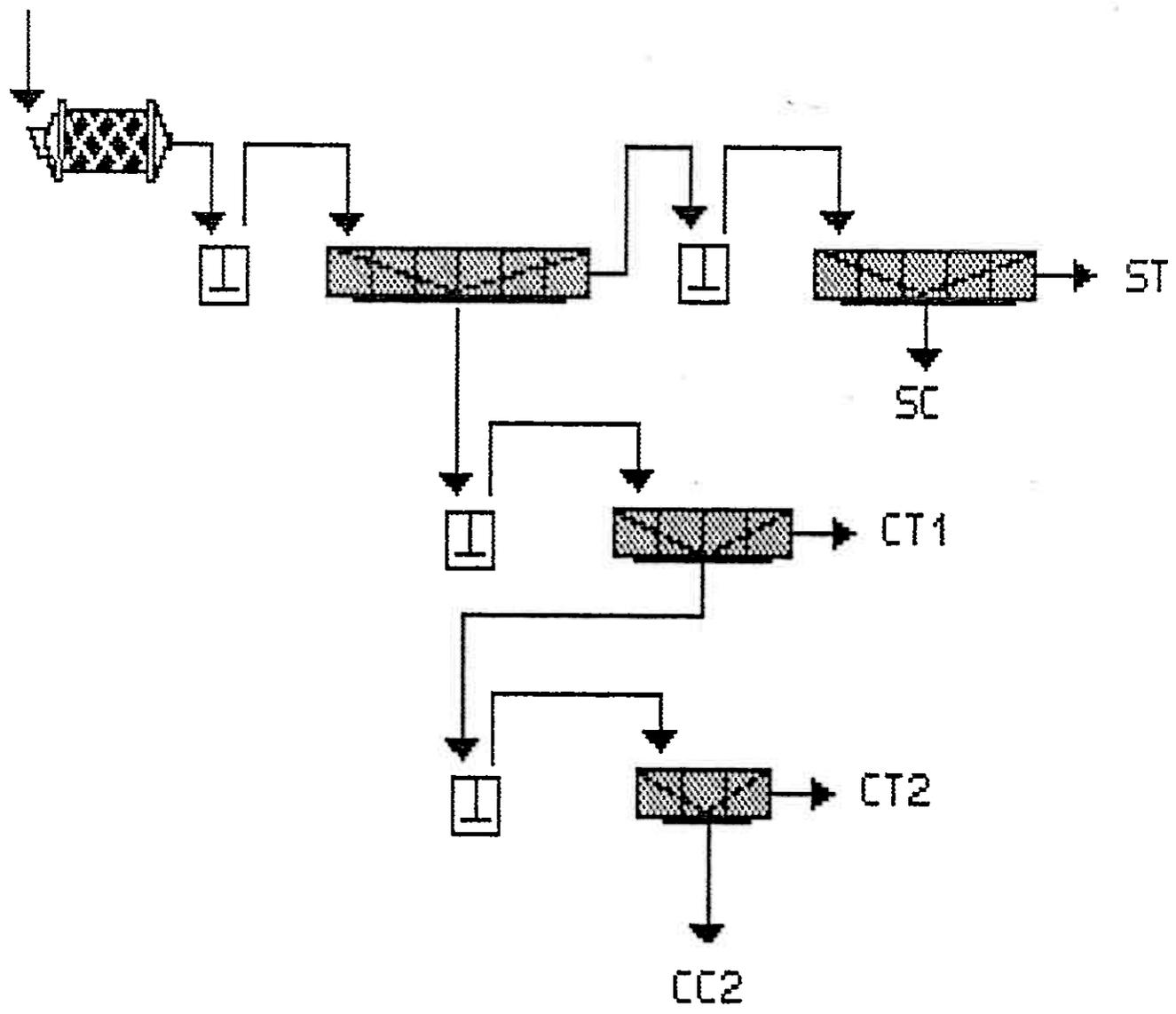
LASK.P: 5534307
 K.LEHTI:

OPER: MLM 226
 JAKELU: VIP, IAH, MLM

	<i>CCR</i>	<i>CT1</i>	<i>CTR</i>	<i>SC</i>	<i>ST</i>
	8910701R2	8910702J1	8910703J2	8910704RR	8910705JA
	%	%	%	%	%
SI02	20.1	59.1	48.8	62.1	67.1
TI02	0.276	0.637	0.587	0.651	0.688
AL203	5.45	15.3	13.7	16.3	15.8
CR203	0.0196	0.0228	0.0255	0.0210	0.0205
V203	0.0171	0.0256	0.0234	0.0240	0.0245
FE0	31.71	4.91	11.58	2.66	1.10
MNO	0.0514	0.0773	0.106	0.0681	0.0501
MGO	0.10	0.10	0.21	0.05	0.01
CA0	5.81	9.18	11.5	8.06	6.11
BB20	0.0051	0.0000	0.0007	0.0003	0.0004
SRO	0.0021	0.0054	0.0057	0.0055	0.0050
BA0	0.014	0.005	0.012	0.005	0.007
NA20	2.87	8.25	7.14	8.77	8.56
K20	0.032	0.081	0.076	0.079	0.089
ZRO2	0.0166	0.0210	0.0273	0.0225	0.0149
P205	0.063	0.084	0.134	0.083	0.091
CO2					
OKSUM	96.5	99.4	98.6	99.7	99.9
CU	10.87	0.167	0.705	0.0818	0.0125
NI	0.496	0.0375	0.120	0.0181	0.0060
CO	0.0966	0.0157	0.0322	0.0097	0.0071
ZN	0.0093	0.0004	0.0014	0.0006	0.0001
PB	0.061	0.004	0.014	0.004	0.001
AG	0.000	0.000	0.000	0.000	0.000
S	26.5	2.36	6.21	1.09	0.375
AS	0.0000	0.0003	0.0002	0.0002	0.0004
SB	0.018	0.000	0.000	0.000	0.000
BI	0.064	0.016	0.035	0.012	0.002
TE	1.91	0.074	0.310	0.038	0.008
Y	0.0024	0.0038	0.0042	0.0037	0.0027
NB	0.0000	0.0000	0.0000	0.0000	0.0000
MO	0.0789	0.0060	0.0239	0.0038	0.0021
SN	0.003	0.001	0.002	0.001	0.000
W	0.000	0.001	0.000	0.000	0.000
PT					
CL	0.003	0.004	0.006	0.004	0.008
BR	0.0007	0.0000	0.0000	0.0000	0.0000
TH	0.0059	0.0018	0.0027	0.0016	0.0005
U	0.0421	0.0099	0.0178	0.0096	0.0047
CS	0.000	0.000	0.000	0.000	0.002
LA	0.001	0.005	0.004	0.004	0.005
CE	0.018	0.007	0.013	0.007	0.004
PR	0.000	0.000	0.000	0.000	0.000
ND	0.01	0.00	0.01	0.01	0.00
SM	0.00	0.00	0.00	0.00	0.00
EU	0.00	0.00	0.00	0.00	0.00
GD	0.00	0.00	0.00	0.00	0.00
TB	0.00	0.00	0.00	0.00	0.00
DY	0.00	0.00	0.00	0.00	0.00
HO	0.00	0.00	0.00	0.00	0.00
ER	0.00	0.00	0.00	0.00	0.00
TM	0.00	0.00	0.00	0.00	0.00
YB	0.00	0.00	0.00	0.00	0.00
LU	0.00	0.00	0.00	0.00	0.00
HF	0.000	0.001	0.002	0.001	0.001
TA	0.001	0.000	0.000	0.000	0.000

LOT

Flowsheet for tests BU01-BU03, BU06-BU07



OUTOKUMPU
Mining Services
Geoanalytical Laboratory

Sieve fractions of the scavenger tails

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORE

Purpose

Grinding test 1

Test

BV01

FRACTION µm	Weight %	Cu		Au		S	
		%	R-%	g/t	R-%	%	R-%
+105	22.9	0.017	13.7	10.40	34.9	0.08	9.0
+74-105	17.1	0.018	10.8	7.89	19.8	0.52	43.7
+37-74	24.9	0.020	17.5	7.52	27.5	0.33	40.4
-37	35.1	0.047	58.0	3.46	17.8	0.04	6.9
Bulk	100.0	0.028	100.0	6.82	100.0	0.20	100.0

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO- DUCT	WEIGHT		GRADES AND RECOVERIES								
		G r i n n g m i n	C o n d i t i o n m i n	F l o t a t i o n m i n	Ca(OH) ₂ kg/t	KAX g/t	Dow- froth 210 g/t	Aero- phine 3418A g/t	V o l l	A i r l/min	S p e e d rpm			g	%	Cu		Au		S		Te		
															%	R-%	g/t	R-%	%	R-%	%	R-%	%	R-%
												9.0	FEED	1010	100.0	0.314	100.0	30.9	100.0	0.7	100.0	0.060	100.0	
Rougher	ORE	20	3	6			30	40					RC	154	15.2	1.880	91.2	169.7	83.7	4.1	85.2	0.367	93.3	
									2.0	1.5	1500		RT	856	84.8	0.033	8.8	5.9	16.3	0.1	14.8	0.005	6.7	
Scaveng.	RT		2	5			20						SC	63	6.2	0.080	1.6	11.6	2.3	0.6	5.0	0.014	1.4	
									2.0	1.5	1500		ST	793	78.6	0.029	7.2	5.5	14.0	0.1	9.7	0.004	5.2	
1st clean.	RC		1	4									CC1	44	4.4	6.221	86.2	552.7	77.9	12.4	74.2	1.188	86.2	
									1.6	1.5	1200		CT1	110	10.9	0.144	5.0	16.5	5.8	0.7	11.1	0.039	7.1	
2nd clean.	CC1		1	3									CC2	20	1.9	13.400	82.7	1140.0	71.6	24.6	65.7	2.520	81.5	
									1.6	1.5	1200		CT2	24	2.4	0.455	3.5	81.0	6.3	2.6	8.5	0.118	4.8	
													RC+SC	217	21.4	1.360	92.8	124.0	86.0	3.1	90.3	0.265	94.8	

OUTOKUMPU
Mining Services
Geoanalytical Laboratory

Sieve fractions of the scavenger tails

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORE

Purpose

Grinding test 2

Test

BVO2

FRACTION µm	Weight %	Cu		Au		S	
		%	R-%	g/t	R-%	%	R-%
+105	6.3	0.020	5.1	36.30	41.7	0.28	8.3
+74-105	13.2	0.019	10.1	6.28	15.1	0.47	29.2
+37-74	32.0	0.019	24.4	4.15	24.2	0.34	51.1
-37	48.5	0.031	60.4	2.15	19.0	0.05	11.4
Bulk	100.0	0.025	100.0	5.49	100.0	0.21	100.0

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO- DUCT	WEIGHT		GRADES AND RECOVERIES					
		G r i n n g	C o n d i t	F l o t	Ca(OH) ₂	KAX	Dow- froth 210	Aero- phine 3418A	V o l	A i r	S p e e d			g	%	Cu		Au		S	
		min	min	min	kg/t	g/t	g/t	g/t	l	l/min	rpm					%	R-%	g/t	R-%	%	R-%
												9.0	FEED	1020	100.0	0.311	100.0	32.3	100.0	0.8	100.0
Rougher	ORE	30	3	6			30	40	2.0	1.5	1500		RC	181	17.8	1.587	90.4	146.7	80.6	3.7	78.3
													RT	839	82.2	0.036	9.6	7.6	19.4	0.2	21.7
Scaveng.	RT		2	5			20		2.0	1.5	1500		SC	71	6.9	0.093	2.1	8.8	1.9	0.9	7.2
													ST	768	75.3	0.031	7.5	7.5	17.5	0.2	14.5
1st clean.	RC		1	4					1.6	1.5	1200		CC1	37	3.6	7.256	84.1	636.3	71.1	13.9	60.6
													CT1	144	14.1	0.140	6.4	21.7	9.5	1.0	17.7
2nd clean.	CC1		1	3					1.6	1.5	1200		CC2	17	1.6	15.200	80.4	1270.0	64.8	26.5	52.5
													CT2	20	2.0	0.583	3.7	104.0	6.3	3.4	8.0
													RC+SC	252	24.7	1.168	92.5	108.0	82.5	2.9	85.5

OUTOKUMPU
Mining Services
Geoanalytical Laboratory

Sieve fractions of the scavenger tails

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORE

Purpose

Grinding test 3

Test

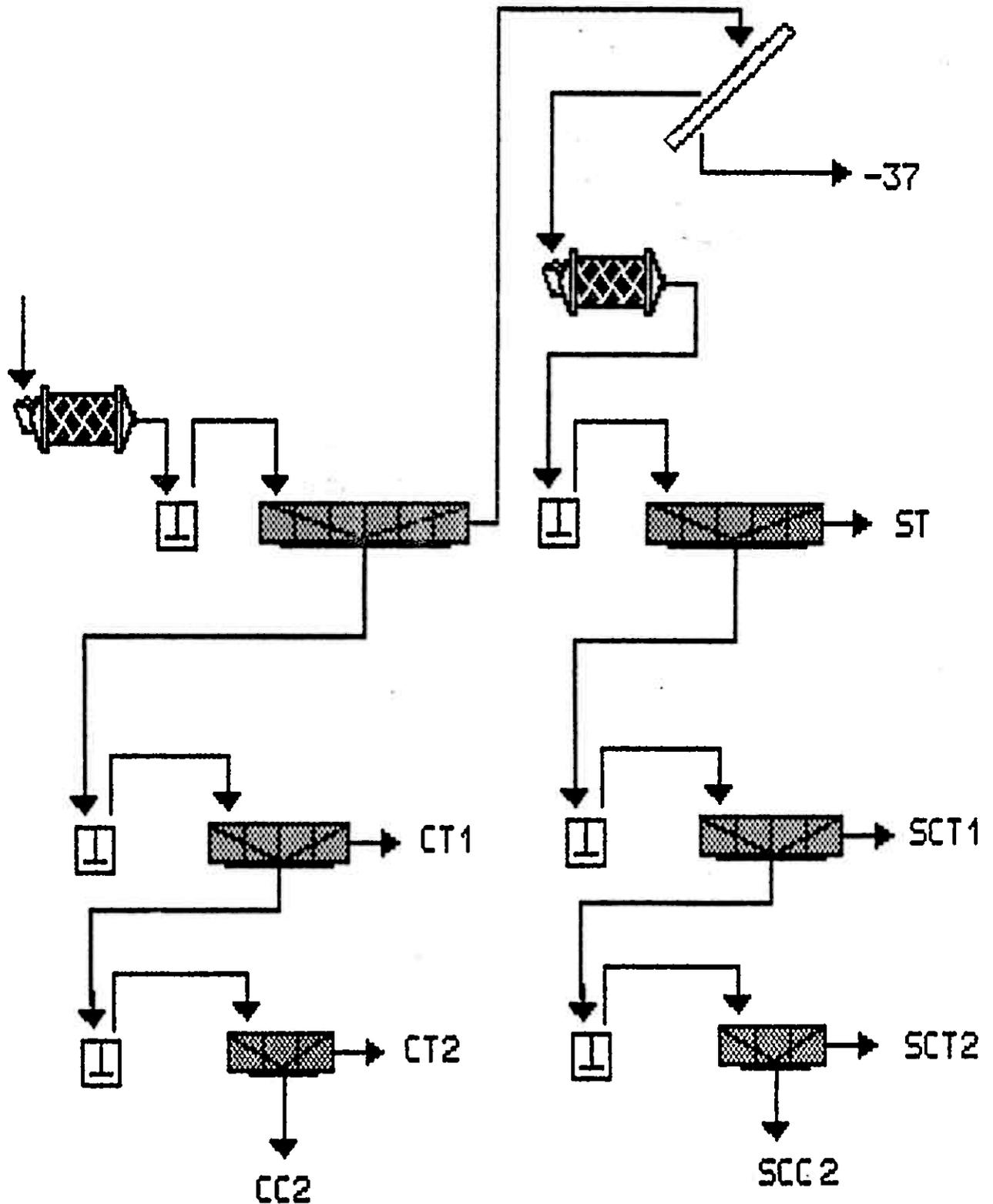
BV03

FRACTION µm	Weight %	Cu		Au		S	
		%	R-%	g/t	R-%	%	R-%
+105	0.5	0.021	0.4	81.60	9.9	0.64	2.1
+74-105	7.3	0.021	5.9	8.56	15.1	0.64	30.6
+37-74	32.5	0.018	22.5	5.36	42.2	0.28	59.5
-37	59.7	0.031	71.2	2.27	32.8	0.02	7.8
Bulk	100.0	0.026	100.0	4.13	100.0	0.15	100.0

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO- DUCT	WEIGHT		GRADES AND RECOVERIES							
		G r i n n g m i n	C o n d i t i o n m i n	F l o a t i n g m i n	Ca(OH) ₂ kg/t	KAX g/t	Dow- froth 210 g/t	Aero- phine 3418A g/t	V o l u m e l i t r e s l l/m i n	A i r r a t i o n l/m i n	S p e e d r p m			g	%	Cu		Au		S			
															%	R-%	g/t	R-%	%	R-%			
												9.0	FEED	1011	100.0	0.302	100.0	31.0	100.0	0.8	100.0		
Rougher	ORE	40	3	6		30	40	2.0	1.5	1500			RC	225	22.2	1.243	91.5	122.5	87.8	3.0	85.1		
													RT	786	77.8	0.033	8.5	4.9	12.2	0.2	14.9		
Scaveng.	RT		2	5		20		2.0	1.5	1500			SC	72	7.1	0.091	2.2	7.4	1.7	0.8	6.9		
													ST	714	70.6	0.027	6.3	4.6	10.5	0.1	8.0		
1st clean.	RC		1	4				1.6	1.5	1200			CC1	43	4.3	5.980	84.8	568.4	78.5	11.7	63.6		
													CT1	182	18.0	0.113	6.7	16.1	9.3	1.0	21.6		
2nd clean.	CC1		1	3				1.6	1.5	1200			CC2	17	1.7	14.300	81.0	1290.0	71.2	24.6	53.2		
													CT2	26	2.6	0.444	3.8	88.3	7.3	3.2	10.4		
													RC+SC	297	29.4	0.963	93.7	94.5	89.5	2.5	92.0		

7/4

Flowsheet for tests BU04-BU05



OUTOKUMPU
Mining Services
Geoanalytical Laboratory

Sieve fractions of the scavenger tails

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORE

Purpose

Grinding test 4

Test

BV04

FRACTION µm	Weight %	Cu		Au		S	
		%	R-%	g/t	R-%	%	R-%
+105	0.8	0.042	1.5	15.80	4.9	0.98	2.0
+74-105	8.3	0.017	6.5	6.86	22.1	0.98	20.7
+37-74	37.6	0.015	25.9	3.09	45.1	0.31	29.7
-37	53.3	0.027	66.1	1.35	27.9	0.35	47.6
Bulk	100.0	0.022	100.0	2.58	100.0	0.39	100.0

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO- DUCT	WEIGHT		GRADES AND RECOVERIES							
		G r i n d m i n	C o n d m i n	F l o t m i n	Ca(OH) ₂ kg/t	KAX g/t	Dow- froth 210 g/t	Aero- phine 3418A g/t	V o l l l/min	A i r l/min	S p e e d rpm			g	%	Cu		Au		S			
															%	R-%	g/t	R-%	%	R-%			
												9.0	FEED	1000	100.0	0.302	100.0	30.8	100.0	0.81	100.0		
Rougher	ORE	20	3	6			30	40	2.0	1.5	1500		RC	168	16.8	1.661	92.3	162.4	88.7	3.87	80.3		
													RT	832	83.2	0.028	7.7	4.2	11.3	0.19	19.7		
1st clean.	RC		1	4					1.6	1.5	1200		CC1	43	4.3	6.158	87.0	570.9	79.2	12.37	65.1		
													CT1	125	12.5	0.128	5.3	23.2	9.4	0.98	15.1		
2nd clean.	CC1		1	3					1.6	1.5	1200		CC2	19	1.9	13.000	82.5	1140.0	71.1	23.30	55.2		
													CT2	24	2.4	0.568	4.4	106.0	8.1	3.44	10.0		
Classif.	RT												+37	579	57.9	0.023	4.4	5.1	9.5	0.27	19.1		
													-37	253	25.3	0.040	3.3	2.2	1.8	0.02	0.6		
Scaveng.	RT +37	20	2	5			20	15	2.0	1.5	1500		SC	55	5.5	0.070	1.3	40.8	7.3	0.43	2.9		
													ST	524	52.4	0.018	3.1	1.3	2.2	0.25	16.2		
Scaveng. 1st clean.	RC		1	4					1.6	1.5	1200		SCC1	6	0.6	0.452	0.8	320.0	5.7	3.42	2.3		
													SCT1	50	5.0	0.028	0.5	9.8	1.6	0.10	0.6		
													RC+SC	223	22.3	1.268	93.5	132.4	96.0	3.03	83.2		
													CC1+SCC1	48	4.8	5.507	87.8	542.3	85.0	11.35	67.5		
													CC2+SCC1	25	2.5	10.206	83.4	957.4	76.9	18.87	57.5		
													ST+ -37	777	77.7	0.025	6.5	1.6	4.0	0.18	16.8		

3/2

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORE

Purpose

Grinding test 5

Test

BV05

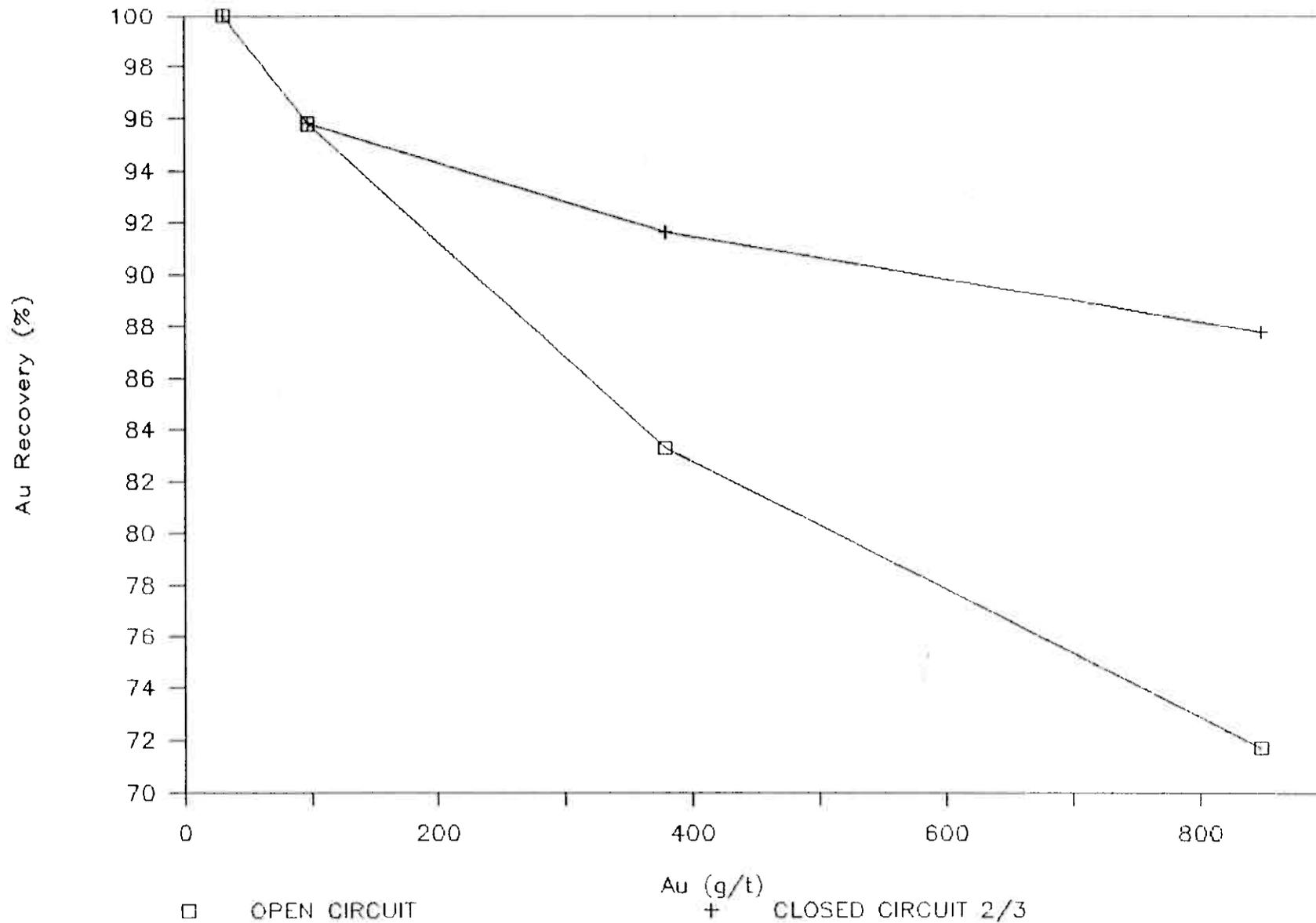
FRACTION µm	Weight %	Cu		Au		S	
		%	R-%	g/t	R-%	%	R-%
+105	0.0	:	:	:	:	:	:
+74-105	3.8	0.011	6.5	8.40	15.0	3.01	23.7
+37-74	25.2	0.004	15.8	3.19	37.7	0.67	35.0
-37	71.0	0.007	77.7	1.42	47.3	0.28	41.2
Bulk	100.0	0.0063	100.0	2.13	100.0	0.4820	100.0

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO- DUCT	WEIGHT		GRADES AND RECOVERIES							
		G r i n d min	C o n d min	F l o t min	Ca(OH) ₂ kg/t	KAX g/t	Dow- froth 210 g/t	Aero- phine 3418A g/t	v o l l	A i r l/min	S p e e d rpm			g	%	Cu		Au		S			
															%	R-%	g/t	R-%	%	R-%			
												9.0	FEED	1018	100.0	0.288	100.0	29.5	100.0	1.04	100.0		
Rougher	ORE	20	3	6			30	60	2.0	1.5	1500		RC	220	21.6	1.289	96.5	118.0	86.4	3.17	65.9		
													RT	799	78.4	0.013	3.5	5.1	13.6	0.45	34.1		
1st clean.	RC		1	4					1.6	1.5	1200		CC1	55	5.4	4.885	91.1	415.5	75.8	10.23	53.0		
													CT1	165	16.2	0.095	5.3	19.3	10.6	0.83	13.0		
2nd clean.	CC1		1	3					1.6	1.5	1200		CC2	22	2.2	11.320	86.5	892.0	66.6	20.99	44.5		
													CT2	32	3.2	0.422	4.6	85.1	9.2	2.76	8.4		
Classif.	RT												+37	570	55.9	0.009	1.8	6.6	12.5	0.59	31.9		
													-37	229	22.5	0.022	1.7	1.4	1.1	0.10	2.2		
Scaveng.	RT +37	30	2	7			20	30	2.0	1.5	1500		SC	79	7.7	0.042	1.1	36.0	9.4	0.66	4.9		
													ST	491	48.2	0.004	0.7	1.9	3.1	0.58	27.0		
Scaveng. 1st clean.	RC		1	4					1.6	1.5	1200		SCC1	11	1.1	0.252	0.9	208.3	7.4	3.33	3.4		
													SCT1	68	6.7	0.009	0.2	8.8	2.0	0.24	1.5		
Scaveng. 2nd clean.	SCC1		1	3					1.6	1.5	1200		SCC2	3	0.3	0.752	0.8	518.0	5.2	9.31	2.6		
													SCT2	8	0.8	0.057	0.1	87.7	2.3	1.00	0.7		
													RC+SC	298	29.3	0.960	97.6	96.4	95.8	2.51	70.9		
													CC1+SCC1	65	6.4	4.127	92.1	381.6	83.2	9.10	56.4		
													CC2+SCC2	25	2.5	10.072	87.3	847.8	71.8	19.61	47.2		
													ST+ -37	720	70.7	0.010	2.4	1.7	4.2	0.43	29.1		

3/3

BIDJOVAGGE B-VEST

BV05

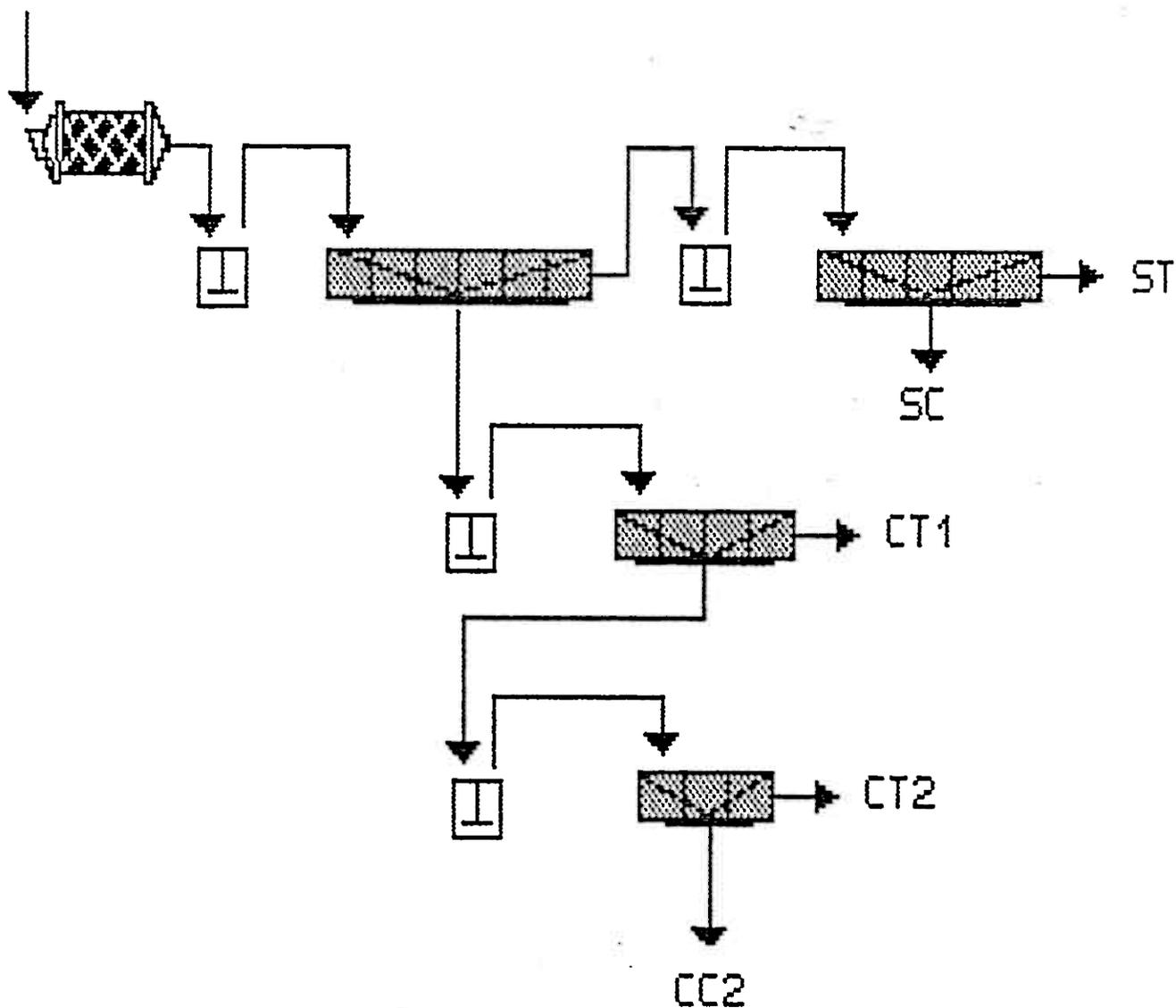


APPENDIX 4



5

Flowsheet for tests BU01-BU03, BU06-BU07



OUTOKUMPU
Mining Services
Geoanalytical Laboratory

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORE

Purpose

KAX, pH

Test

BV06

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO- DUCT	WEIGHT		GRADES AND RECOVERIES								
		G r i n min	C o n d min	F l o t min	Ca(OH) ₂ kg/t	KAX g/t	Dow- froth 210 g/t	Aero- phine 3418A g/t	V o l l	A i r l/min	S p e e d rpm			g	%	Cu		Au		S		Te		
															%	R-%	g/t	R-%	%	R-%	%	R-%		
												9.2	FEED	997 : 100.0	0.287 : 100.0	30.1 : 100.0	1.2 : 100.0	0.063 : 100.0						
Rougher	ORE	20	3	6	0.1	100	30		2.0	1.5	1500	10.5	RC RT	195 : 19.6 802 : 80.4	1.413 : 96.3 0.013 : 3.7	131.3 : 85.4 5.5 : 14.6	5.4 : 85.9 0.2 : 14.1	0.310 : 96.5 0.003 : 3.5						
Scaveng.	RT		2	5			20		2.0	1.5	1500		SC ST	52 : 5.2 751 : 75.3	0.071 : 1.3 0.009 : 2.4	17.0 : 2.9 4.7 : 11.7	1.5 : 6.1 0.1 : 7.9	0.013 : 1.1 0.002 : 2.4						
1st clean.	RC		2	4	0.1				1.6	1.5	1200	10.5	CC1 CT1	71 : 7.1 124 : 12.4	3.693 : 91.6 0.108 : 4.7	317.1 : 75.0 25.0 : 10.3	12.8 : 73.9 1.2 : 12.0	0.794 : 90.2 0.032 : 6.3						
2nd clean.	CC1		1	3					1.6	1.5	1200		CC2 CT2	37 : 3.7 34 : 3.4	6.810 : 88.0 0.300 : 3.6	559.0 : 68.9 53.8 : 6.1	21.4 : 64.4 3.5 : 9.5	1.450 : 85.8 0.081 : 4.4						
													RC+SC	247 : 24.7	1.133 : 97.6	107.5 : 88.3	4.6 : 92.1	0.248 : 97.6						

5/12

OUTOKUMPU
Mining Services
Geoanalytical Laboratory

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORE

Purpose

KAX, pH

Test

BV07

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO- DUCT	WEIGHT		GRADES AND RECOVERIES							
		G r i n min	C o n d min	F l o t min	Ca(OH) ₂ kg/t	KAX g/t	Dow- froth 210 g/t	Aero- phine 3418A g/t	V o l l	A i r l/min	S p e e d rpm			g	%	Cu		Au		S		Te	
																%	R-%	g/t	R-%	%	R-%	%	R-%
												8.8	FEED	1001	100.0	0.275	100.0	29.7	100.0	1.2	100.0	0.060	100.0
Rougher	ORE	20	3	6	0.5	60	30	2.0	1.5	1500	11.5	RC RT	111 : 890	11.1 : 88.9	2.354 : 0.016	94.8 : 5.2	202.5 : 8.2	75.5 : 24.5	7.6 : 0.4	69.7 : 30.3	0.467 : 0.010	85.8 : 14.2	
Scaveng.	RT		2	5			20	2.0	1.5	1500		SC ST	48 : 843	4.7 : 84.2	0.082 : 0.013	1.4 : 3.8	23.9 : 7.3	3.8 : 20.7	1.1 : 0.4	4.3 : 26.1	0.038 : 0.008	3.0 : 11.2	
1st clean.	RC		2	4	0.3			1.6	1.5	1200	11.5	CC1 CT1	36 : 76	3.5 : 7.5	7.004 : 0.167	90.2 : 4.6	579.3 : 25.3	69.1 : 6.4	18.8 : 2.4	55.0 : 14.7	1.302 : 0.074	76.6 : 9.3	
2nd clean.	CC1		1	3				1.6	1.5	1200		CC2 CT2	22 : 14	2.2 : 1.3	10.870 : 0.705	86.7 : 3.5	863.0 : 117.0	63.8 : 5.3	26.5 : 6.2	48.1 : 6.9	1.910 : 0.310	69.6 : 6.9	
												RC+SC	159	15.8	1.673	96.2	149.0	79.3	5.7	73.9	0.338	88.8	

5/3

TΦ, ME

OUTOKUMPU
Mining Services
Geoanalyttinen laboratorio
Veikko Palosaari/Heikki Oravainen 28.12.1989

BIDJOVAGGE B-VEST MALMIN ARVIOIDUT TUOTTEET

	Syöte	Bulk-rikaste	Cu-rikaste	Au-rikaste
paino (%)	100.0	3.0	1.45	1.55
Cu (%)	0.50/	15.0	26.0	4.7
Cu-saanti (%)	100.0	92.0	75.4	16.6
Au (g/t)	8.0/	216	80	343
Au-saanti (%)	100.0	81.0	14.5	66.5
Te (%)	0.060	1.80	0.15	3.3
Te-saanti (%)	100.0	90.0	3.6	86.4
Fe (%)			27.0	23.0
Ni (%)			0.14	1.02
Co (%)			0.063	0.17
Zn (%)			0.025	0.010
Pb (%)			0.018	0.14
Ag (g/t)			<10	<10
S (%)			31.0	26.5
As (%)			0.12	0.016
Sb (%)			0.015	0.010
Bi (%)			0.01	0.23
Cd (%)			0.0002	0.0001
Hg (g/t)			<1	<1
Y (%)			0.0004	0.0004
Nb (%)			<0.0001	<0.0001
Mo (%)			0.018	0.046
Sn (%)			0.002	0.006
W (%)			<0.001	0.001
Cl (%)			0.006	0.008
Br (%)			<0.0001	0.0008
Th (%)			0.003	0.010
U (%)			0.007	0.051
Cs (%)			0.002	<0.001
La (%)			0.002	0.001
Ce (%)			0.005	0.031
Pr (%)			<0.001	<0.001
Nd (%)			0.01	0.01
Lantanoidit (Sm...Tm) (%)			<0.01	<0.01
Yb (%)			0.01	<0.01
Lu (%)			<0.01	<0.01
Hf (%)			<0.001	<0.001
Ta (%)			0.001	0.001
SiO ₂ (%)			10.0	24.5
TiO ₂ (%)			0.13	0.24
Al ₂ O ₃ (%)			2.3	5.7
Cr ₂ O ₃ (%)			0.01	0.02
V ₂ O ₃ (%)			0.010	0.021
MnO (%)			0.024	0.060
MgO (%)			0.16	0.28
CaO (%)			1.6	5.9
Rb ₂ O ₃ (%)			0.003	0.004
SrO (%)			0.0001	0.002
BaO (%)			0.01	0.01
Na ₂ O (%)			0.56	3.45
K ₂ O (%)			0.016	0.026
ZrO ₂ (%)			0.005	0.008
P ₂ O ₅ (%)			0.005	0.052

Jakelu: OKHI/Heikki Nopanen
Bidjovagge/Heino Alaniska

MS/Heikki Oravainen
MS/GAL/VIP

Oravainen m.k.t.

18. 10. 1989
Esko Hänninen

ENNAKKOTIEDONANTO BIDJOVAGGEN B-VEST MALMIN VAAHDOTUSKOKEISTA

Syöte

Koenäytteen syöte sisältää kuparia 0.3 %, rikkiä 0.8 %, kultaa 30 g/t ja telluuria 0.06 %. Sulfidipitoisuudet ovat kuparikiisu n. 1.0 % ja pyriitti+magneettikiisu n. 1.0 %. Erilaisia tellurideja on syötteessä n. 0.1 %.

Kullan mineralogia

Rikasteesta (koe 5, KR2) tehdyn mikroanalyyttitutkimuksen mukaan kullasta on n. 80 % tellurideissa, pääosin calaveriitissa, AuTe₂ ja loput n. 20 % metallisena kultana. B-vest malmin kullan mineraloginen jakautuma poikkeaa siis selvästi aiemmin tutkituista malmoista, joissa kulta esiintyy pääosin metallisena. Tutkitussa rikasteessa (jauhatus 20 min) Au-mineraalien raekoko oli enimmäkseen välillä 10-30 µm.

Vaahdotuskokeet

Kokeissa 1-3 tutkittiin yksivaiheisella jauhatuksella jauhatusajan vaikutusta vaahdotustuloksiin. Kokeissa 4-5 tehtiin vaahdotukset kaksivaiheisen jauhatuksen jälkeksi. Kokeissa 6-7 testattiin, saako pH:ta säätämällä ja kokoojaa vaihtamalla häitättellurideja painetuksi jätteeseen.

Kullan saanti näyttää nousevan sitä korkeammaksi, mitä hienommaksi materiaali on jauhettu. Parhaat kullan saannit on kokeissa, joissa on ollut kaksivaiheinen jauhatus.

Kultapitoisuus nousee parhaimmissa kertausrikasteissa yli 1 kg/t, kuparipitoisuus 15 %:iin ja sulfidipitoisuus n. 70 %:iin.

Telluuripitoisuus saattaa kerratuissa rikasteissa olla jopa 2 %. Kokeissa 6 ja 7 yritettiin häitättellurideja painaa nostamalla pH:ta ja käyttämällä kokoojana KAX:a. Näillä konsteilla ei ollut juuri mitään vaikutusta telluridien vaahdotuvuuteen, mikä oli kaikissa kokeissa erinomainen.

OUTOKUMPU
Mining Services
Geoanalytical Laboratory

Sieve fractions of the scavenger tails

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORE

Purpose

Grinding test 1

Test

BV01

FRACTION µm	Weight %	Cu		Au		S	
		%	R-%	g/t	R-%	%	R-%
+105	22.9	0.017	13.7	10.40	34.9	0.08	9.0
+74-105	17.1	0.018	10.8	7.89	19.8	0.52	43.7
+37-74	24.9	0.020	17.5	7.52	27.5	0.33	40.4
-37	35.1	0.047	58.0	3.46	17.8	0.04	6.9
Bulk	100.0	0.028	100.0	6.82	100.0	0.20	100.0

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO- DUCT	WEIGHT		GRADES AND RECOVERIES							
		G r i n d i n g	C o n d i t i o n	F l o a t i o n	Ca(OH) ₂	KAX	Dow- froth 210	Aero- phine 3418A	V o l u m e	A i r f l o w	S p e e d			g	%	Cu		Au		S		Te	
		min	min	min	kg/t	g/t	g/t	g/t	l	l/min	rpm					%	R-%	g/t	R-%	%	R-%	%	R-%
												9.0	FEED	1010	100.0	0.314	100.0	30.9	100.0	0.7	100.0	0.060	100.0
Rougher	ORE	20	3	6			30	40	2.0	1.5	1500		RC	154	15.2	1.880	91.2	169.7	83.7	4.1	85.2	0.367	93.3
													RT	856	84.8	0.033	8.8	5.9	16.3	0.1	14.8	0.005	6.7
Scaveng.	RT		2	5			20		2.0	1.5	1500		SC	63	6.2	0.080	1.6	11.6	2.3	0.6	5.0	0.014	1.4
													ST	793	78.6	0.029	7.2	5.5	14.0	0.1	9.7	0.004	5.2
1st clean.	RC		1	4					1.6	1.5	1200		CC1	44	4.4	6.221	86.2	552.7	77.9	12.4	74.2	1.188	86.2
													CT1	110	10.9	0.144	5.0	16.5	5.8	0.7	11.1	0.039	7.1
2nd clean.	CC1		1	3					1.6	1.5	1200		CC2	20	1.9	13.400	82.7	1140.0	71.6	24.6	65.7	2.520	81.5
													CT2	24	2.4	0.455	3.5	81.0	6.3	2.6	8.5	0.118	4.8
													RC+SC	217	21.4	1.360	92.8	124.0	86.0	3.1	90.3	0.265	94.8

OUTOKUMPU
Mining Services
Geoanalytical Laboratory

Sieve fractions of the scavenger tails

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORE

Purpose

Grinding test 2

Test

BV02

FRACTION µm	Weight %	Cu		Au		S	
		%	R-%	g/t	R-%	%	R-%
+105	6.3	0.020	5.1	36.30	41.7	0.28	8.3
+74-105	13.2	0.019	10.1	6.28	15.1	0.47	29.2
+37-74	32.0	0.019	24.4	4.15	24.2	0.34	51.1
-37	48.5	0.031	60.4	2.15	19.0	0.05	11.4
Bulk	100.0	0.025	100.0	5.49	100.0	0.21	100.0

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO- DUCT	WEIGHT		GRADES AND RECOVERIES					
		G r i n d i n g t i m e	C o n d i t i o n	F l o t i n g t i m e	Ca(OH) ₂	KAX	Dow- froth 210	Aero- phine 3418A	V o l u m e	A i r f l o w	S p e e d			g	%	Cu	Au	S			
		min	min	min	kg/t	g/t	g/t	g/t	l	l/min	rpm					%	R-%	g/t	R-%	%	R-%
												9.0	FEED	1020	100.0	0.311	100.0	32.3	100.0	0.8	100.0
Rougher	ORE	30	3	6			30	40	2.0	1.5	1500		RC	181	17.8	1.587	90.4	146.7	80.6	3.7	78.3
													RT	839	82.2	0.036	9.6	7.6	19.4	0.2	21.7
Scaveng.	RT		2	5			20		2.0	1.5	1500		SC	71	6.9	0.093	2.1	8.8	1.9	0.9	7.2
													ST	768	75.3	0.031	7.5	7.5	17.5	0.2	14.5
1st clean.	RC		1	4					1.6	1.5	1200		CC1	37	3.6	7.256	84.1	636.3	71.1	13.9	60.6
													CT1	144	14.1	0.140	6.4	21.7	9.5	1.0	17.7
2nd clean.	CC1		1	3					1.6	1.5	1200		CC2	17	1.6	15.200	80.4	1270.0	64.8	26.5	52.5
													CT2	20	2.0	0.583	3.7	104.0	6.3	3.4	8.0
													RC+SC	252	24.7	1.168	92.5	108.0	82.5	2.9	85.5

OUTOKUMPU
Mining Services
Geoanalytical Laboratory

Sieve fractions of the scavenger tails

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORE

Purpose

Grinding test 3

Test

BV03

FRACTION µm	Weight %	Cu		Au		S	
		%	R-%	g/t	R-%	%	R-%
+105	0.5	0.021	0.4	81.60	9.9	0.64	2.1
+74-105	7.3	0.021	5.9	8.56	15.1	0.64	30.6
+37-74	32.5	0.018	22.5	5.36	42.2	0.28	59.5
-37	59.7	0.031	71.2	2.27	32.8	0.02	7.8
Bulk	100.0	0.026	100.0	4.13	100.0	0.15	100.0

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO-DUCT	WEIGHT		GRADES AND RECOVERIES									
		G r i n min	C o n d min	F l o t min	Ca(OH) ₂ kg/t	KAX g/t	Dow- froth 210 g/t	Aero- phine 3418A g/t	V o l l	A i r l/min	S p e e d rpm			g	%	Cu		Au		S					
															%	R-%	g/t	R-%	%	R-%					
												9.0	FEED	1011	100.0	0.302	100.0	31.0	100.0	0.8	100.0				
Rougher	ORE	40	3	6			30	40					RC	225	22.2	1.243	91.5	122.5	87.8	3.0	85.1				
													RT	786	77.8	0.033	8.5	4.9	12.2	0.2	14.9				
Scaveng.	RT		2				20						SC	72	7.1	0.091	2.2	7.4	1.7	0.8	6.9				
													ST	714	70.6	0.027	6.3	4.6	10.5	0.1	8.0				
1st clean.	RC		1	4									CC1	43	4.3	5.980	84.8	568.4	78.5	11.7	63.6				
													CT1	182	18.0	0.113	6.7	16.1	9.3	1.0	21.6				
2nd clean.	CC1		1	3									CC2	17	1.7	14.300	81.0	1290.0	71.2	24.6	53.2				
													CT2	26	2.6	0.444	3.8	88.3	7.3	3.2	10.4				
													RC+SC	297	29.4	0.963	93.7	94.5	89.5	2.5	92.0				

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORI

Purpose

Grinding test 4

Test

BV04

FRACTION µm	Weight %	Cu		Au		S	
		%	R-%	g/t	R-%	%	R-%
+105	0.8	0.042	1.5	15.80	4.9	0.98	2.0
+74-105	8.3	0.017	6.5	6.86	22.1	0.98	20.7
+37-74	37.6	0.015	25.9	3.09	45.1	0.31	29.7
-37	53.3	0.027	66.1	1.35	27.9	0.35	47.6
Bulk	100.0	0.022	100.0	2.58	100.0	0.39	100.0

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO- DUCT	WEIGHT		GRADES AND RECOVERIES							
		G r i n d min	C o n d min	F l o t min	Ca(OH) ₂ kg/t	KAX g/t	Dow- froth 210 g/t	Aero- phine 3418A g/t	V o l l	A i r l/min	S p e e d rpm			g	%	Cu		Au		S			
															%	R-%	g/t	R-%	%	R-%			
												9.0	FEED	1000	100.0	0.302	100.0	30.8	100.0	0.81	100.0		
Rougher	ORE	20	3	6			30	40					RC	168	16.8	1.661	92.3	162.4	88.7	3.87	80.3		
									2.0	1.5	1500		RT	832	83.2	0.028	7.7	4.2	11.3	0.19	19.7		
1st clean.	RC		1	4					1.6	1.5	1200		CC1	43	4.3	6.158	87.0	570.9	79.2	12.37	65.1		
													CT1	125	12.5	0.128	5.3	23.2	9.4	0.98	15.1		
2nd clean.	CC1		1	3					1.6	1.5	1200		CC2	19	1.9	13.000	82.5	1140.0	71.1	23.30	55.2		
													CT2	24	2.4	0.568	4.4	106.0	8.1	3.44	10.0		
Classif.	RT												+37	579	57.9	0.023	4.4	5.1	9.5	0.27	19.1		
													-37	253	25.3	0.040	3.3	2.2	1.8	0.02	0.6		
Scaveng.	RT +37	20	2	5			20	15					SC	55	5.5	0.070	1.3	40.8	7.3	0.43	2.9		
									2.0	1.5	1500		ST	524	52.4	0.018	3.1	1.3	2.2	0.25	16.2		
Scaveng. 1st clean.	RC		1	4					1.6	1.5	1200		SCC1	6	0.6	0.452	0.8	320.0	5.7	3.42	2.3		
													SGT1	50	5.0	0.028	0.5	9.8	1.6	0.10	0.6		
													RC+SC	223	22.3	1.268	93.5	132.4	96.0	3.03	83.2		
													CC1+SCC1	48	4.8	5.507	87.8	542.3	85.0	11.35	67.5		
													CC2+SCC1	25	2.5	10.206	83.4	957.4	76.9	18.87	57.5		
													ST+ -37	777	77.7	0.025	6.5	1.6	4.0	0.18	16.8		

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORE

Purpose

Grinding test 5

Test

BV05

FRACTION µm	Weight %	Cu		Au		S	
		%	R-%	g/t	R-%	%	R-%
+105	0.0	:	:	:	:	:	:
+74-105	3.8	0.011	6.5	8.40	15.0	3.01	23.7
+37-74	25.2	0.004	15.8	3.19	37.7	0.67	35.0
-37	71.0	0.007	77.7	1.42	47.3	0.28	41.2
Bulk	100.0	0.0063	100.0	2.13	100.0	0.4820	100.0

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO- DUCT	WEIGHT		GRADES AND RECOVERIES					
		G r i n d i n g	C o n d i t i o n	F l o a t i o n	Ca(OH) ₂	KAX	Dow- froth 210	Aero- phine 3418A	V o l u m e	A i r f l o w	S p e e d			g	%	Cu		Au		S	
		min	min	min	kg/t	g/t	g/t	g/t	l	l/min	rpm					%	R-%	g/t	R-%	%	R-%
												9.0	FEED	1018	100.0	0.288	100.0	29.5	100.0	1.04	100.0
Rougher	ORE	20	3	6			30	60	2.0	1.5	1500		RC	220	21.6	1.289	96.5	118.0	86.4	3.17	65.9
													RT	799	78.4	0.013	3.5	5.1	13.6	0.45	34.1
1st clean.	RC		1	4					1.6	1.5	1200		CC1	55	5.4	4.885	91.1	415.5	75.8	10.23	53.0
													CT1	165	16.2	0.095	5.3	19.3	10.6	0.83	13.0
2nd clean.	CC1		1	3					1.6	1.5	1200		CC2	22	2.2	11.320	86.5	892.0	66.6	20.99	44.5
													CT2	32	3.2	0.422	4.6	85.1	9.2	2.76	8.4
Classif.	RT												+37	570	55.9	0.009	1.8	6.6	12.5	0.59	31.9
													-37	229	22.5	0.022	1.7	1.4	1.1	0.10	2.2
Scaveng.	RT +37	30	2	7			20	30	2.0	1.5	1500		SC	79	7.7	0.042	1.1	36.0	9.4	0.66	4.9
													ST	491	48.2	0.004	0.7	1.9	3.1	0.58	27.0
Scaveng. 1st clean.	RC		1	4					1.6	1.5	1200		SCC1	11	1.1	0.252	0.9	208.3	7.4	3.33	3.4
													SCT1	68	6.7	0.009	0.2	8.8	2.0	0.24	1.5
Scaveng. 2nd clean.	SCC1		1	3					1.6	1.5	1200		SCC2	3	0.3	0.752	0.8	518.0	5.2	9.31	2.6
													SCT2	8	0.8	0.057	0.1	87.7	2.3	1.00	0.7
													RC+SC	298	29.3	0.960	97.6	96.4	95.8	2.51	70.9
													CC1+SCC1	65	6.4	4.127	92.1	381.6	83.2	9.10	56.4
													CC2+SCC2	25	2.5	10.072	87.3	847.8	71.8	19.61	47.2
													ST+ -37	720	70.7	0.010	2.4	1.7	4.2	0.43	29.1

OUTOKUMPU
Mining Services
Geoanalytical Laboratory

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORE

Purpose

KAX. pH

Test

BV06

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO- DUCT	WEIGHT		GRADES AND RECOVERIES							
		G r i n min	C o n d min	F l o t min	Ca(OH) ₂ kg/t	KAX g/t	Dow- froth 210 g/t	Aero- phine 3418A g/t	V o l l	A i r l/min	S p e e d rpm			g	%	Cu		Au		S		Te	
																%	R-%	g/t	R-%	%	R-%	%	R-%
												9.2	FEED	997	100.0	0.287	100.0	30.1	100.0	1.2	100.0	0.063	100.0
Rougher	ORE	20	3	6	0.1	100	30	2.0	1.5	1500	10.5	RC RT	195 : 802	19.6 : 80.4	1.413 : 0.013	96.3 : 3.7	131.3 : 5.5	85.4 : 14.6	5.4 : 0.2	85.9 : 14.1	0.310 : 0.003	96.5 : 3.5	
Scaveng.	RT		2	5			20	2.0	1.5	1500		SC ST	52 : 751	5.2 : 75.3	0.071 : 0.009	1.3 : 2.4	17.0 : 4.7	2.9 : 11.7	1.5 : 0.1	6.1 : 7.9	0.013 : 0.002	1.1 : 2.4	
1st clean.	RC		2	4	0.1			1.6	1.5	1200	10.5	CC1 CT1	71 : 124	7.1 : 12.4	3.693 : 0.108	91.6 : 4.7	317.1 : 25.0	75.0 : 10.3	12.8 : 1.2	73.9 : 12.0	0.794 : 0.032	90.2 : 6.3	
2nd clean.	CC1		1	3				1.6	1.5	1200		CC2 CT2	37 : 34	3.7 : 3.4	6.810 : 0.300	88.0 : 3.6	559.0 : 53.8	68.9 : 6.1	21.4 : 3.5	64.4 : 9.5	1.450 : 0.081	85.8 : 4.4	
												RC+SC	247	24.7	1.133	97.6	107.5	88.3	4.6	92.1	0.248	97.6	

OUTOKUMPU
Mining Services
Geoanalytical Laboratory

FLOTATION REPORT

Date 17.10.1989

Sample

BIDJOVAGGE/B-VEST ORE

Purpose

KAX, pH

Test

BVO7

STEP	FEED	TIME			REAGENTS				CELL			pH	PRO-DUCT	WEIGHT		GRADES AND RECOVERIES								
		G r i n min	C o n d min	F l o t min	Ca(OH) ₂ kg/t	KAX g/t	Dow- froth 210 g/t	Aero- phine 3418A g/t	V o l l	A i r l/min	S p e e d rpm			g	%	Cu		Au		S		Te		
															%	R-%	g/t	R-%	%	R-%	%	R-%	%	R-%
												8.8	FEED	1001	100.0	0.275	100.0	29.7	100.0	1.2	100.0	0.060	100.0	
Rougher	ORE	20	3	6	0.5	60	30		2.0	1.5	1500	11.5	RC RT	111 : 890	11.1 : 88.9	2.354 : 0.016	94.8 : 5.2	202.5 : 8.2	75.5 : 24.5	7.6 : 0.4	69.7 : 30.3	0.467 : 0.010	85.8 : 14.2	
Scaveng.	RT		2	5			20		2.0	1.5	1500		SC ST	48 : 843	4.7 : 84.2	0.082 : 0.013	1.4 : 3.8	23.9 : 7.3	3.8 : 20.7	1.1 : 0.4	4.3 : 26.1	0.038 : 0.008	3.0 : 11.2	
1st clean.	RC		2	4	0.3				1.6	1.5	1200	11.5	CG1 CT1	36 : 76	3.5 : 7.5	7.004 : 0.167	90.2 : 4.6	579.3 : 25.3	69.1 : 6.4	18.8 : 2.4	55.0 : 14.7	1.302 : 0.074	76.6 : 9.3	
2nd clean.	CC1		1	3					1.6	1.5	1200		CC2 CT2	22 : 14	2.2 : 1.3	10.870 : 0.705	86.7 : 3.5	863.0 : 117.0	63.8 : 5.3	26.5 : 6.2	48.1 : 6.9	1.910 : 0.310	69.6 : 6.9	
													RC+SC	159	15.8	1.673	96.2	149.0	79.3	5.7	73.9	0.338	88.8	

Mineralogy

Sulphide contents of the mineralization is about 2 weight per cent one half consisting of chalcopyrite and the other half of iron sulphides, mainly pyrite.

Native gold is seen rarely even in the most gold-rich samples. It occurs as fine-grained ($> 10 \mu\text{m}$) dissemination in silicates and tellurides. The predominant gold mineral in B-vest mineralization is calaverite, AuTe_2 . According to microprobe investigation carried out from the cleaner concentrate 2 (table x) we found that about 77 per cent of gold is in calaverite, about 19 per cent as native gold and the rest 4 per cent in a bismuth bearing gold telluride. The largest gold mineral grain observed was $20 \times 35 \mu\text{m}$. About 78 per cent of gold is in minerals smaller than $20 \mu\text{m}$ and 22 per cent smaller than $10 \mu\text{m}$.

Table x. Distribution of gold in cleaner concentrate 2.

	20-30	10-20	5-10	<5	Sum
Calaverite	22.2	33.8	19.0	2.2	77.2
Native Au	-	18.5	-	0.5	19.1
Au-Bi-telluride	-	3.7	-	-	3.7
	22.2	56.0	19.0	2.7	100.0

B-V01

Product	Weight %	Cu		Au		Te		Ni		Bi		S	
		Assay	Recov.	Assay	Recov.	Assay	Recov.	Assay	Recov.	Assay	Recov.	Assay	Recov.
		%	%	g/t	%	%	%	%	%	%	%	%	%
Feed	100.0	0.309	100.0	30.5	100.0	0.059	100.0	0.020	100.0	0.006	100.0	0.72	100.0
RC	15.2	1.850	91.0	167.1	83.4	0.362	93.2	0.093	70.9	0.033	84.5	4.01	85.0
RT	84.8	0.033	9.0	6.0	16.6	0.005	6.8	0.007	29.1	0.001	15.5	0.13	15.0
SC	6.2	0.080	1.6	11.6	2.4	0.014	1.5	0.014	4.2	0.002	2.1	0.59	5.1
ST	78.6	0.029	7.4	5.5	14.3	0.004	5.3	0.006	24.9	0.001	13.4	0.09	9.9
CC1	4.3	6.175	85.9	548.9	77.5	1.179	86.0	0.275	59.3	0.103	75.2	12.29	73.8
CT1	10.9	0.144	5.1	16.5	5.9	0.039	7.2	0.021	11.7	0.005	9.3	0.74	11.3
CC2	1.9	13.400	82.4	1140.0	71.1	2.520	81.2	0.563	53.7	0.210	67.9	24.60	65.2
CT2	2.4	0.455	3.5	81.0	6.4	0.118	4.8	0.046	5.6	0.018	7.4	2.55	8.5

1297010

Bidjovagge, B-vest. Results of the flotation test BV05.

PRODUCT	Weight %	Cu		Au		S		Cp	Py	Others
		Assay %	Recov. %	Assay g/t	Recov. %	Assay %	Recov. %	Assay %	Assay %	Assay %
FEED	100.0	0.288	100.0	29.6	100.0	1.04	100.0	0.8	1.4	97.8
RC	21.6	1.287	96.5	117.9	86.2	3.17	65.9	3.7	3.5	92.8
RT	78.4	0.013	3.5	5.2	13.8	0.45	34.1	0.0	0.8	99.1
SC	7.7	0.043	1.1	36.9	9.6	0.67	5.0	0.1	1.2	98.7
ST	48.2	0.004	0.7	1.9	3.1	0.58	26.9	0.0	1.1	98.9
CC1	5.4	4.862	91.1	413.8	75.6	10.19	53.0	14.1	9.9	76.0
CT1	16.2	0.095	5.3	19.3	10.6	0.83	12.9	0.3	1.4	98.3
CC2	2.2	11.320	86.4	892.0	66.4	20.99	44.5	32.7	18.0	49.3
CT2	3.2	0.422	4.7	85.1	9.2	2.76	8.5	1.2	4.4	94.4
SCC1	1.1	0.247	0.9	205.1	7.6	3.27	3.5	0.7	5.7	93.6
SCT1	6.6	0.009	0.2	8.8	2.0	0.24	1.5	0.0	0.4	99.5
SCC2	0.3	0.752	0.8	518.0	5.3	9.31	2.7	2.2	16.0	81.8
SCT2	0.8	0.057	0.2	87.7	2.4	1.00	0.8	0.2	1.8	98.1
-37 μm	22.5	0.022	1.7	1.4	1.1	0.10	2.2	0.1	0.1	99.8
+37 μm	55.9	0.009	1.8	6.7	12.7	0.59	31.9	0.0	1.1	98.9
RC	21.6	1.287	96.5	117.9	86.2	3.17	65.9	3.7	3.5	92.8
RC + SC	29.3	0.960	97.6	96.6	95.8	2.51	70.9	2.8	2.9	94.3
CC1 + SCC1	6.5	4.081	92.1	378.5	83.3	9.02	56.4	11.8	9.2	79.0
CC2 + SCC2	2.5	10.052	87.2	847.1	71.7	19.59	47.2	29.0	17.7	53.2
ST + -37 μm	70.7	0.010	2.4	1.75	4.2	0.43	29.1	0.0	0.8	99.2

Sieve fractions of the scavenger tails.

+105 μm	-	-	-	-	-	-	-	-	-	-
+74-105 μm	3.8	0.011	6.5	8.40	15.0	3.01	23.7	0.0	5.6	94.3
+37-74 μm	25.2	0.004	15.8	3.19	37.7	0.67	35.0	0.0	1.2	98.7
-37 μm	71.0	0.007	77.7	1.42	47.3	0.28	41.2	0.0	0.5	99.5
Bulk	100.0	0.006	100.0	2.13	100.0	0.48	100.0	0.0	0.9	99.1

Bidjovagge, B-vest. Results of the flotation test BV04.

PRODUCT	Weight %	Cu		Au		S		Cp	Py	Others
		Assay %	Recov. %	Assay g/t	Recov. %	Assay %	Recov. %	Assay %	Assay %	Assay %
FEED	100.0	0.300	100.0	30.8	100.0	0.81	100.0	0.9	1.0	98.2
RC	16.8	1.647	92.1	161.3	88.1	3.86	80.0	4.8	4.1	91.1
RT	83.2	0.028	7.9	4.4	11.9	0.19	20.0	0.1	0.3	99.6
SC	5.5	0.074	1.4	43.6	7.8	0.46	3.1	0.2	0.7	99.1
ST	52.4	0.018	3.1	1.3	2.2	0.25	16.2	0.1	0.4	99.5
CC1	4.3	6.061	86.8	562.9	78.7	12.22	64.9	17.5	11.4	71.0
CT1	12.5	0.128	5.3	23.2	9.4	0.98	15.1	0.4	1.6	98.0
CC2	1.9	13.000	82.3	1140.0	70.4	23.30	54.7	37.6	19.1	43.3
CT2	2.4	0.568	4.5	106.0	8.3	3.44	10.2	1.6	5.4	93.0
SCC1	0.6	0.452	0.9	320.0	6.2	3.42	2.5	1.3	5.6	93.1
SCT1	4.9	0.028	0.5	9.8	1.6	0.10	0.6	0.1	0.1	99.8
-37 µm	25.3	0.040	3.4	2.2	1.8	0.02	0.6	0.1	0.0	99.9
+37 µm	57.9	0.023	4.5	5.3	10.0	0.27	19.3	0.1	0.5	99.5
RC	16.8	1.647	92.1	161.3	88.1	3.86	80.0	4.8	4.1	91.1
RC + SC	22.3	1.259	93.5	132.3	95.9	3.02	83.2	5.0	2.4	92.6
CC1 + SCC1	4.9	5.374	87.7	533.1	84.9	11.14	67.4	15.5	10.7	73.7
ST + -37 µm	77.7	0.025	6.5	1.61	4.1	0.18	16.8	0.1	0.3	99.6

Sieve fractions of the scavenger tails.

+105 µm	0.8	0.042	1.5	15.80	4.9	0.98	2.0	0.1	1.8	98.1
+74-105 µm	8.3	0.017	6.5	6.86	22.1	0.98	20.7	0.0	1.8	98.1
+37-74 µm	37.6	0.015	25.9	3.09	45.1	0.31	29.7	0.0	0.6	99.4
-37 µm	53.3	0.027	66.1	1.35	27.9	0.35	47.6	0.1	0.6	99.3
Bulk	100.0	0.022	100.0	2.58	100.0	0.39	100.0	0.1	0.7	99.2

Bidjovagge, B-vest. Results of the flotation test BV03.

PRODUCT	Weight %	Cu		Au		S		Cp	Py	Others
		Assay %	Recov. %	Assay g/t	Recov. %	Assay %	Recov. %	Assay %	Assay %	Assay %
Feed	100.0	0.301	100.0	30.9	100.0	0.79	100.0	0.9	0.9	98.2
RC	22.3	1.233	91.5	121.6	87.8	3.01	85.1	3.6	3.3	93.1
RT	77.7	0.033	8.5	4.9	12.2	0.15	14.9	0.1	0.2	99.7
SC	7.1	0.091	2.2	7.4	1.7	0.76	6.8	0.3	1.3	98.5
ST	70.6	0.027	6.3	4.6	10.5	0.09	8.0	0.1	0.1	99.8
CC1	4.3	5.922	84.7	563.4	78.4	11.65	63.5	17.1	10.7	72.2
CT1	18.0	0.113	6.8	16.1	9.4	0.95	21.7	0.3	1.6	98.1
CC2	1.7	14.300	80.9	1290.0	71.0	24.60	53.0	41.3	19.1	39.6
CT2	2.6	0.444	3.8	88.3	7.4	3.19	10.5	1.3	5.1	93.6

Sieve fractions of the scavenger tails.

+105 μm	0.5	0.020	0.4	81.6	9.9	0.64	2.1	0.1	1.2	98.8
+74-105 μm	7.3	0.021	5.9	8.6	15.1	0.64	30.6	0.1	1.2	98.8
+37-74 μm	32.5	0.018	22.5	5.4	42.2	0.28	59.5	0.1	0.5	99.5
-37 μm	59.7	0.031	71.2	2.3	32.8	0.02	7.8	0.1	0.0	99.9
Bulk	100.0	0.026	100.0	4.1	100.0	0.15	100.0	0.1	0.2	99.7

Bidjovagge, B-vest. Results of the flotation test BV02.

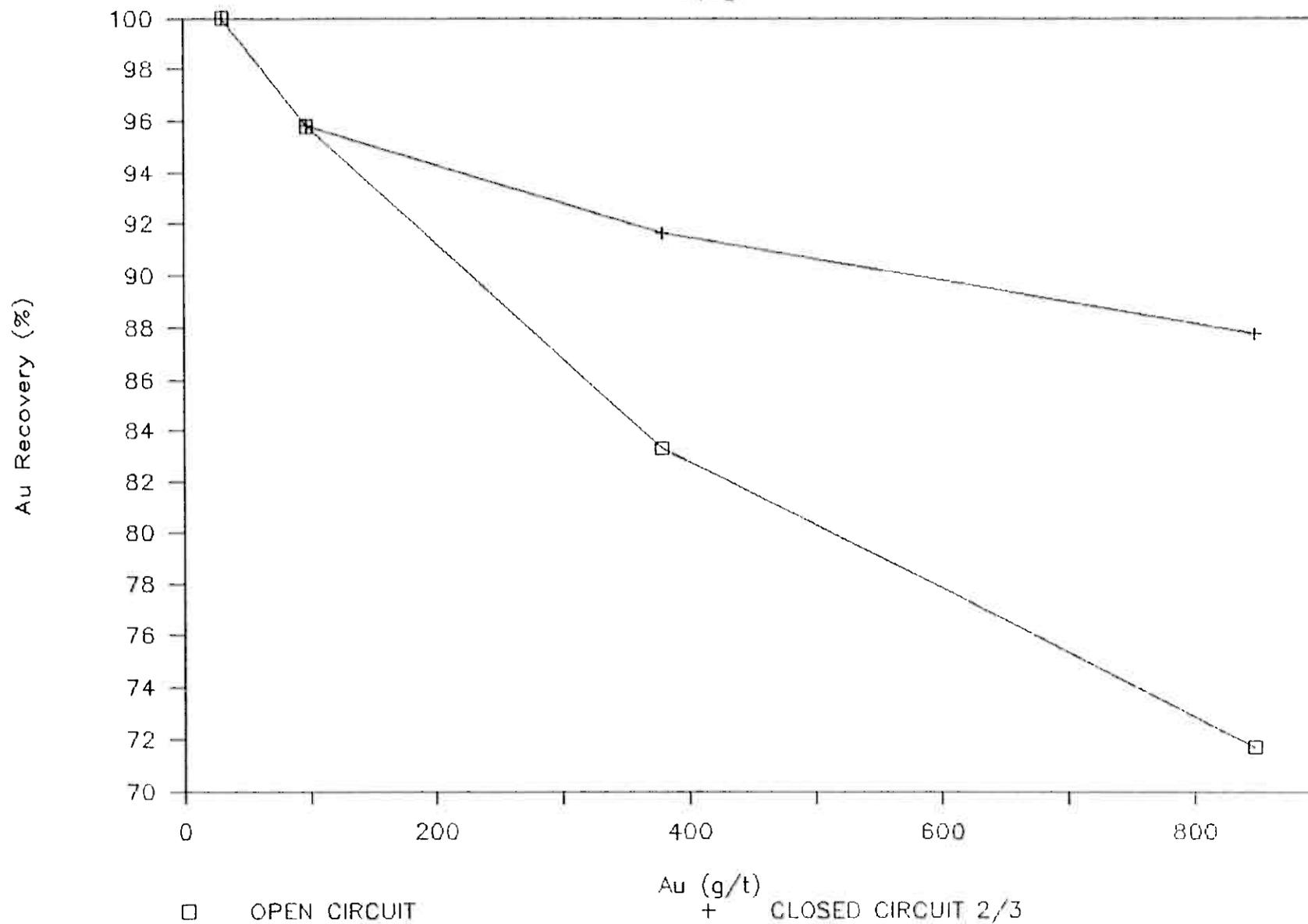
PRODUCT	Weight %	Cu		Au		S		Cp	Py	Others
		Assay %	Recov. %	Assay g/t	Recov. %	Assay %	Recov. %	Assay %	Assay %	Assay %
Feed	100.0	0.320	100.0	33.0	100.0	0.85	100.0	0.9	1.0	98.1
RC	17.8	1.628	90.7	150.2	81.0	3.74	78.7	4.7	3.9	91.4
RT	82.2	0.036	9.3	7.6	19.0	0.22	21.3	0.1	0.3	99.6
SC	6.9	0.093	2.0	8.8	1.8	0.87	7.1	0.3	1.5	98.3
ST	75.3	0.031	7.3	7.5	17.2	0.16	14.2	0.1	0.2	99.7
CC1	3.7	7.299	84.5	639.7	71.7	14.01	61.3	21.1	12.5	66.4
CT1	14.1	0.140	6.2	21.7	9.3	1.04	17.3	0.4	1.7	97.9
CC2	1.7	15.200	80.9	1270.0	65.4	26.50	53.3	43.9	21.0	35.1
CT2	2.0	0.583	3.6	104.0	6.3	3.40	8.0	1.7	5.3	93.0

Sieve fractions of the scavenger tails.

+105 μm	6.3	0.020	5.1	36.3	41.7	0.28	8.3	0.1	0.5	99.5
+74-105 μm	13.2	0.019	10.1	6.3	15.1	0.47	29.2	0.1	0.8	99.1
+37-74 μm	32.0	0.019	24.4	4.2	24.2	0.34	51.1	0.1	0.6	99.3
-37 μm	48.5	0.031	60.4	2.2	19.0	0.05	11.4	0.1	0.0	99.9
Bulk	100.0	0.025	100.0	5.5	100.0	0.21	100.0	0.1	0.4	99.6

BIDJOVAGGE B-VEST

BV05



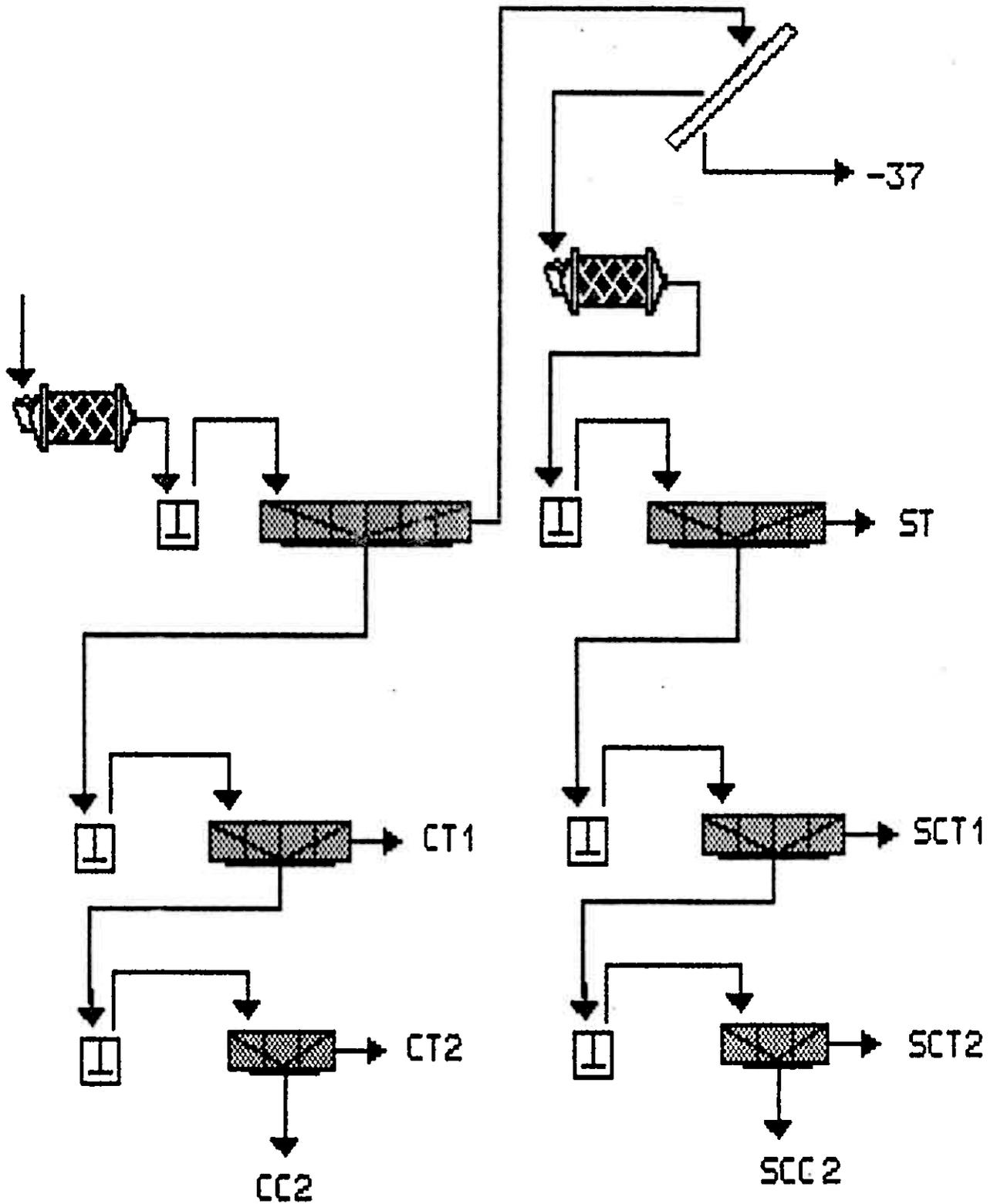
Bidjovagge, B-vest. Results of the flotation test BV01.

PRODUCT	Weight %	Cu		Au		S		Cp	Py	Others
		Assay %	Recov. %	Assay g/t	Recov. %	Assay %	Recov. %	Assay %	Assay %	Assay %
Feed	100.0	0.309	100.0	30.5	100.0	0.72	100.0	0.9	0.8	98.3
RC	15.2	1.850	91.0	167.1	83.4	4.01	85.0	5.3	4.0	90.6
RT	84.8	0.033	9.0	6.0	16.6	0.13	15.0	0.1	0.2	99.7
SC	6.2	0.080	1.6	11.6	2.4	0.59	5.1	0.2	1.0	98.8
ST	78.6	0.029	7.4	5.5	14.3	0.09	9.9	0.1	0.1	99.8
CC1	4.3	6.175	85.9	548.9	77.5	12.29	73.8	17.8	11.4	70.8
CT1	10.9	0.144	5.1	16.5	5.9	0.74	11.3	0.4	1.1	98.5
CC2	1.9	13.400	82.4	1140.0	71.1	24.60	65.2	38.7	20.8	40.5
CT2	2.4	0.455	3.5	81.0	6.4	2.55	8.5	1.3	3.9	94.8

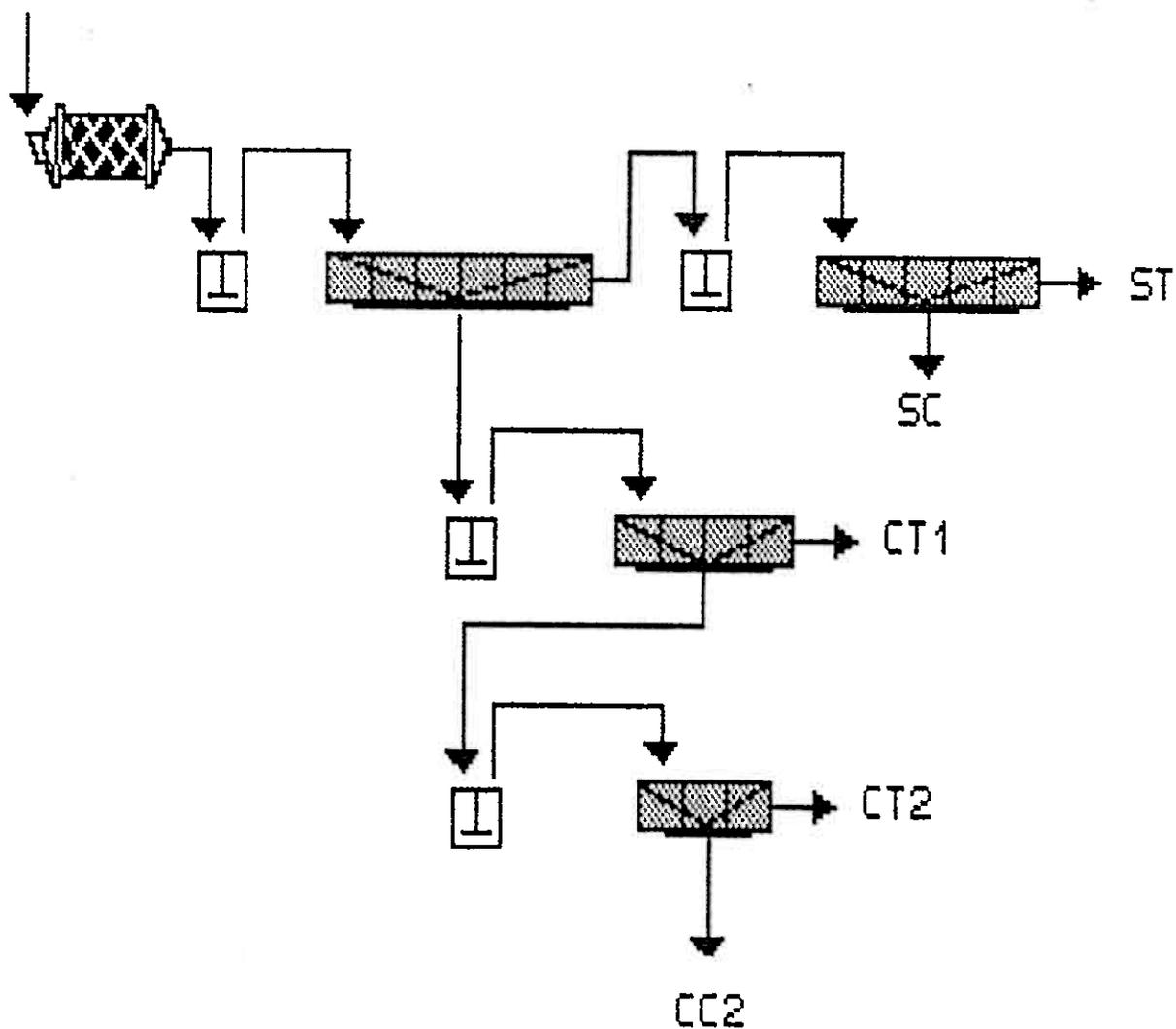
Sieve fractions of the scavenger tails.

+105 μm	22.9	0.017	13.7	10.4	34.9	0.08	9.0	0.0	0.1	99.8
+74-105 μm	17.1	0.018	10.8	7.9	19.8	0.52	43.7	0.1	0.9	99.0
+37-74 μm	24.9	0.020	17.5	7.5	27.5	0.33	40.4	0.1	0.6	99.4
-37 μm	35.1	0.047	58.0	3.5	17.8	0.04	6.9	0.1	0.0	99.9
Bulk	100.0	0.028	100.0	6.8	100.0	0.20	100.0	0.1	0.3	99.6

Flowsheet for tests BU04-BU05



Flowsheet for tests BU01-BU03



100000 + 900 R

Te 4.8
Au 45.0
Cu 1.5

269 ml/kg
50000 ml/kg
13 ml/kg

20kg 1t
1kg
130kg
Te
Au
Cu

A/S BIDJOVAGGE GRUBER
Postboks 160
N-9520 KAUTOKEINO
NORWAY

sendt 25/10

AD

Telephone + 47 84 56202 or 56245
Telefax + 47 84 56202 or 56245

TELEFAX COVER SHEET

Date: 25.10.1985
To: Veikko Palosaari
Company: Gal
Telefax number: 095-358-73556610
Number of pages (including this cover sheet): 7
Re: Puh. keskustelu 25.10.
From: Markus Elberg / Bidjo

Olen lähettänyt kalori laatikkoa halkaisijoin
kaurarydämiä. Lantikerien tunnus NS46
misällä = veian tunnus. Lisäksi on paketsen
tullee palojn kieitä marken. Hiipalan analyysi
Cu 0.45% Au 23.5 g/t

Rikastustekkeen näyteen laadettu pitrisuus
(yhdistely) Cu 0.70%, Au 9.13 g/t (red),
Au 17.49 g/t vedusormatru.

Rikastusnäyte kahden laatikossa koston
ei maksumus yhteen, kysereää kuitenkin
yksi näyte

Markus Elberg

095-358-73-556610

A/S BIDJØVAGGE GRUBER
Postboks 160
N-9520 KAUTOKEIM
NORWAY

Telephone →
Telefax →

Sendt 17/8-89

TELEFAX COVER SHEET

Date: 17.8.

AO

To: Gal

Company: _____

Telefax number: +558 73 20010

Number of pages (including this cover sheet): 1-4

Re: _____

From: Markus Ekberg / A/S BG

Ohera nkartuskiteen materiaalin Liittymä
kairaryöntäraportti analyysitulokseen. Näytteet
ovat: yhteisnäyte an.nrot 73383 - 73395 (nk.kc)

ph-palat, numerointi 98D ja annan 3 vilm nroa

Malmi on uusi B-malmin lämpöpuolelta

löydetty kultamalmi (~75000 t, Cu 0.32%, Au 11.03 g/t (red))

Työnnimi malmitte on B-vest.

Markus Ekberg

OUTOKUMPU OY

Kunta:
 Leikkaus n:o
 Esiintymä: BIDJO
 Suunta:
 Sijainti: B (LÄNSI)
 Kaltevuus:
 Kairattu aikana: 8/89
 Geologi: DAL
 Lisätietoja:

N 980
 270°
 25°

Reikä n:o
 Koordinaatit X: 980,06
 Y: 457,58
 Z: 611,43

KAIRAUSRAPORTTI

Kaltevuus- mittaukset	16/17	24/25	32/33	40/41	70/79	56/57	64/65	72/73
	m	m	m	m	m	m	m	m
	m	m	m	m	m	m	m	m

Syvyys m	Kivilaji- lyhennys	Kivilajiseloste	Analyysit												
			Kalkosum.	Sisältö	Si	Ca	Am	Ca+Am	59	61	63	65	N:o		
8,8	MAATA														
9,75	ABPST		6	80											
11,0	KLK	SESSA KOHT. KV, VÄHÄN SK	1												
12,0	ABPST	FI CUK	15												
13,0	ABPST	SK-LÄISKIÄ, VÄHÄN Cuk, SIS. TRE		90		0,589	0,24	0,829							
14,0	ABPST	KOHT. RUNS. Cuk, KOHT. SK, SIS. TRE				2,352	2,39	4,742							89-73368
15,0	ABPST	KOHT. SK + Cuk, SIS. TRE/KLO				1,277	1,72	2,99							73369
16,0	ABPST	SIS. TRE/KLO + VÄHÄN Cuk	12			0,19	0,32	0,51							73370
17,0	ABPST	VÄHÄN SK + Cuk	15			0,159	0,32	0,48							73371
18,0	ABPST	KOHT. SK, VÄHÄN Cuk				0,279	0,66	0,879							73372
19,0	ABPST	VÄHÄN SK, HYVIN VÄHÄN Cuk				0,192	0,23	0,428							73373
20,0	ABPST	VÄHÄN SK + Cuk		100		0,270	0,34	0,61							73374
21,0	ABPST	VÄHÄN KRB + KOHT. Cuk		120		0,476	0,30	0,776							73375
22,0	ABPST	KOHT. Cuk	10			0,647	1,47	2,117							73376
23,0	ABPST	SIS. KRB + KLO + SK + VÄHÄN Cuk				0,500	0,96	1,46							73377
24,0	ABPST	KOHT. SK + MAONK + VÄHÄN Cuk		130		0,369	0,31	0,679							73378
				120											73379

An
 firearm

Reikä n:o Leikkaus n:o

Kivim	Kivilaji lyhennys	Kivilajiseloste	Analyysit										N:o
			Ka	Si	Fe	Ca	Al	Cu+An	51	55	61	66	
25.0	ABFST	VÄHÄN SK.	8-19	190		0.198	0.12	0.299					73380
26.0	ABFST	VÄHÄN SK + HYVÄ VÄHÄN LUK.	/	130		0.145	0.44	0.585					73381
27.0	ABFST	VÄHÄN SK + LUK		190		0.222	0.45	0.67					73382
28.0	ABFST	- II -		1		0.337	2.92	3.257					73383
29.0	ABFST	KOHT. LUK. 28.75-28.95-SH		200		1.304	10.51	11.804					73384
30.0	ABFST	RUNN. MÄLK. VÄHÄN LUK		110		0.77	4.17	4.907					73385
		ETENÄIN MENTÄSSÄ KIVI ON HYVÄ SAMANKALTAISTA PATKON HIEHÄ PUNETTAVAA ABFST, JOSA NÄKIVISÄ VAALETA JUVIA JA MEKKERÄ VOIMAKASTA DEE + METÄH. (31/10/1000)											
		PATKON ES. DAVIDIITTA MUUSTATAVAA TUMMAA MINERALIA, JOSSA YHÄNÄKILIA HEIK. KEMIISSILYT KEMIA VAALEAA MINERALIA. SK:Y											
		MÄKKÄ HYVÄ VÄHÄN LUK ES. PATKON MUITTI KOUKUN											
31.0	ABFST	KULSARST.	10	130		0.025	8.23	8.255					73386
32.0	ABFST	- II -	/	1		0.227	21.8	22.027					73387
33.0	ABFST	- II -		180		0.048	23.9	23.948					73388
34.0	ABFST	- II -		195		0.271	6.57	6.841					73389
35.0	ABFST	- II -		170		0.053	47.1	47.153					73390
36.0	ABFST	- II -		190		0.025	11.2	11.225					73391
37.0	ABFST	- II -		275		0.045	358.2	358.245					73392
38.0	ABFST	- II -		230		0.127	30.7	30.827					73393

(41.28)
0.42 / 16.45
13m

73382 - 395 : pinta-kielit + hiestekerä gal:ssa

N:o N 980

Leikkaus n:o

N 980

(4)

Kiviyys m.	Kivilaji-lyhennys	Kivilajiseloste	Analyysit										N:o			
			Katkosluok.	Sisältö	Puus	Ca	Al	Cu+An								
630	MDB/ABST	VÄHÄN KRÖ, HUUU VÄHÄN SK	6	26	31	36	41	46	51	56	61	66				
640	MDB/ABST	KRÖ - JUOLA	}	}	}	0,05	0,00						73416			
650	MDB/ABST	VÄHÄN KRÖ														
660	MDB/ABST	- II -														
670	MDB/ABST	VÄHÄN SK + Ck							0,04	0,06						73417
680	MDB/ABST	VÄHÄN KRÖ + SK							0,03	0,08						73418
690	MDB/ABST	KOHTE. KRÖ + Ck, VÄHÄN SK							0,31	0,05						73419
700	ABST	VÄHÄN SK + Ck, KOHTI KRÖ							0,27	0,12						73420
		KILPESÄ PÄIKKILÄ Ck,														
		MUITTI KUNSASTI,														
		JONKIN VOYRAN KRÖ + SK														
710	ABST	KOHTE. KUNSASTI TRK/KLO		90		0,12	0,05						73421			
720	ABST	}	}	}		0,43	0,13						73422			
730	ABST							0,37	0,08						73423	
740	ABST							0,06	0,15						73424	
750	ABST							0,09	0,23						73425	
760	ABST							0,12	0,14						73426	
770	ABST							0,05	0,03						73427	
780	ABST						110	0,55	0,32						73428	
790	ABST							0,04	0,07						73429	
800	ABST						120	0,007	0,05						73430	

1920

pv	Näyte	Au g/t	Cu %
	Bidjovaggen VRK-näyteet Heino Alaniska		
17.12.89	VRK Jäte	0.75	0,023
	Malmi	—	0,526
	Rikaste	55.2	13.0
18.12.89	VRK Jäte	0.48	0,011
	Malmi	—	0,704
	Rikaste	47.9	13.4
19.12.89	VRK Jäte	0.44	0,017
	Malmi	3.31	0.797
	Rikaste	44.1	10.0
20.12.89	VRK Jäte	0.52	0.021
	Malmi	—	1.03
	Rikaste	32.8	9.98
20.12.89	Koatenäyte K-malmi	7.92	1.77

	To	T. P. K. K. H.
	From	M. LAU
	Date	No. of pages

1987 8.250 20x95

Ø UT: ME



30% CurE } ma
4-5% SL }

35% CurE } rikasta
45% SL }

1% SL jute

Rikasta
CurE + 105 40%

SL - 37 40%

+ 74 } 50%
+ 37 }

27.

28

CurE 35% CurE 39%

SL 45% SL 41%

Saliz. 20%

Handwritten notes in red ink

