

APPENDIXES

Appendix 1 Pb-Pb Age Dating

Appendix 2 Whole Rock Analysis of Samples from the Mombasa Area

Appendix-1 Pb-Pb Age Dating

Code No.	Sample No.	Area Name	Observation of Sample	Calculated Age (Ma)
1	KN-05	Kinangoni 140ML, pit bench	massive galena crystal in fault clay	231.9
2	KN-35	Kinangoni 140ML, pit bench	galena-quartz vein in silicified sandstone	239.7
3	KN-41	Kinangoni 170ML, underground	galena-angle site vein in hanging wall	240.7
4	VT-03	Vitengeni old mining pit	galena-chalcopryrite-(calcite)-quartz vein	213.2
5	VT-05	Vitengeni old mining pit	float, massive galena	231.9
6	VT-24	Vitengeni northern most pit	galena crystal in barite	237.4
7	MW-06	Mwachi River northern most pit	galena-quartz-calcite vein	229.7
8	MW-09	Mwachi River north showing	galena-(sphalerite)-(quartz)-calcite vein	214.3
9	MK-17	Mkundi North showing	galena-(anglesite)-quartz vein	170.1
10	TO-03	Lunga-Lunga old mining pit	galena-barite vein	96.4
11	MI-04	Mwereni eastern	float, galena fragment	160.9

The calculations are based on the assumption that they are single stage leads and using the following formula:

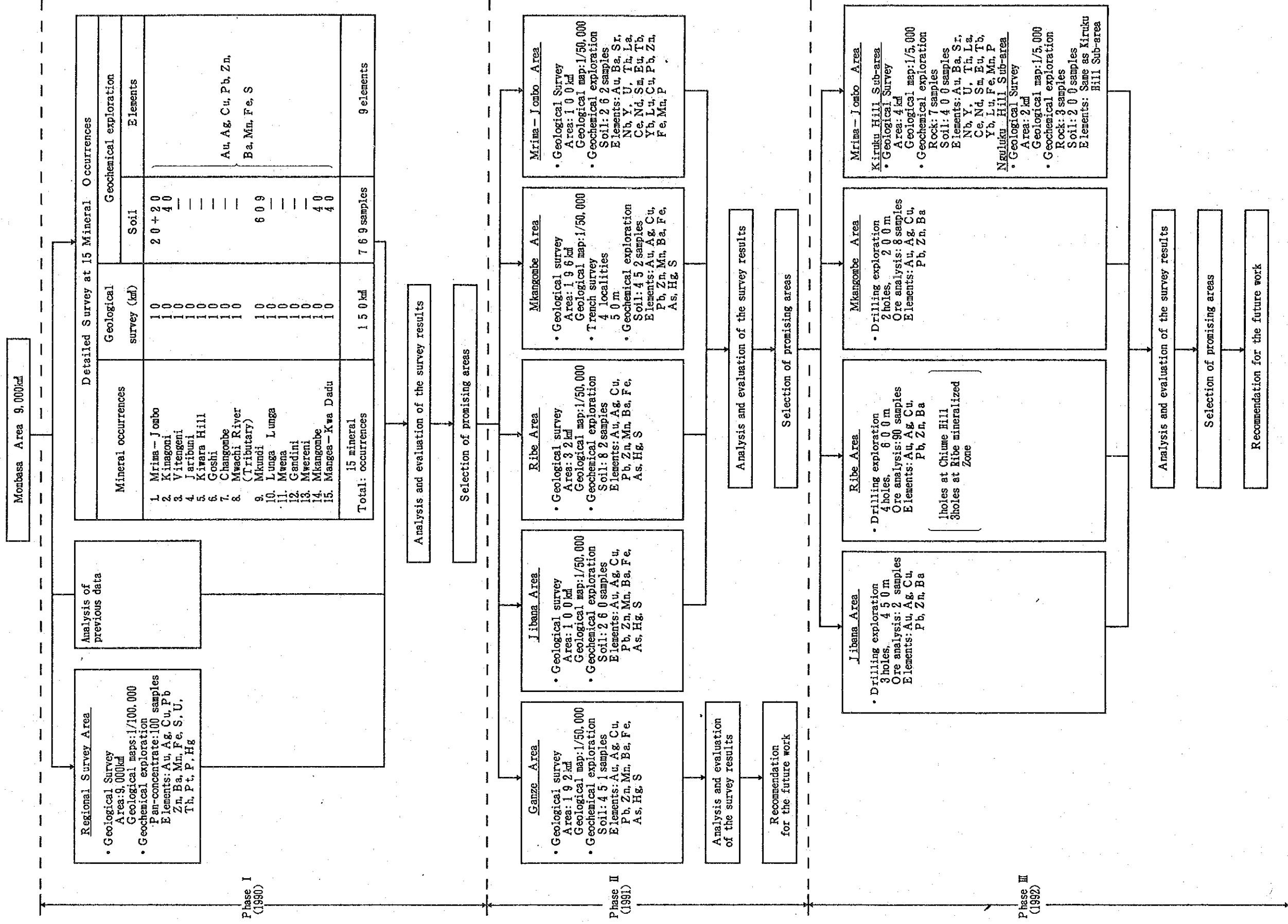
$$M = \left(\frac{207 \text{ pb}/204 \text{ pb} - 10.294}{208 \text{ Pb}/204 \text{ Pb} - 9.307} \right)$$

Appendix-2 Whole Rock Analysis of Samples from the Mombasa Area

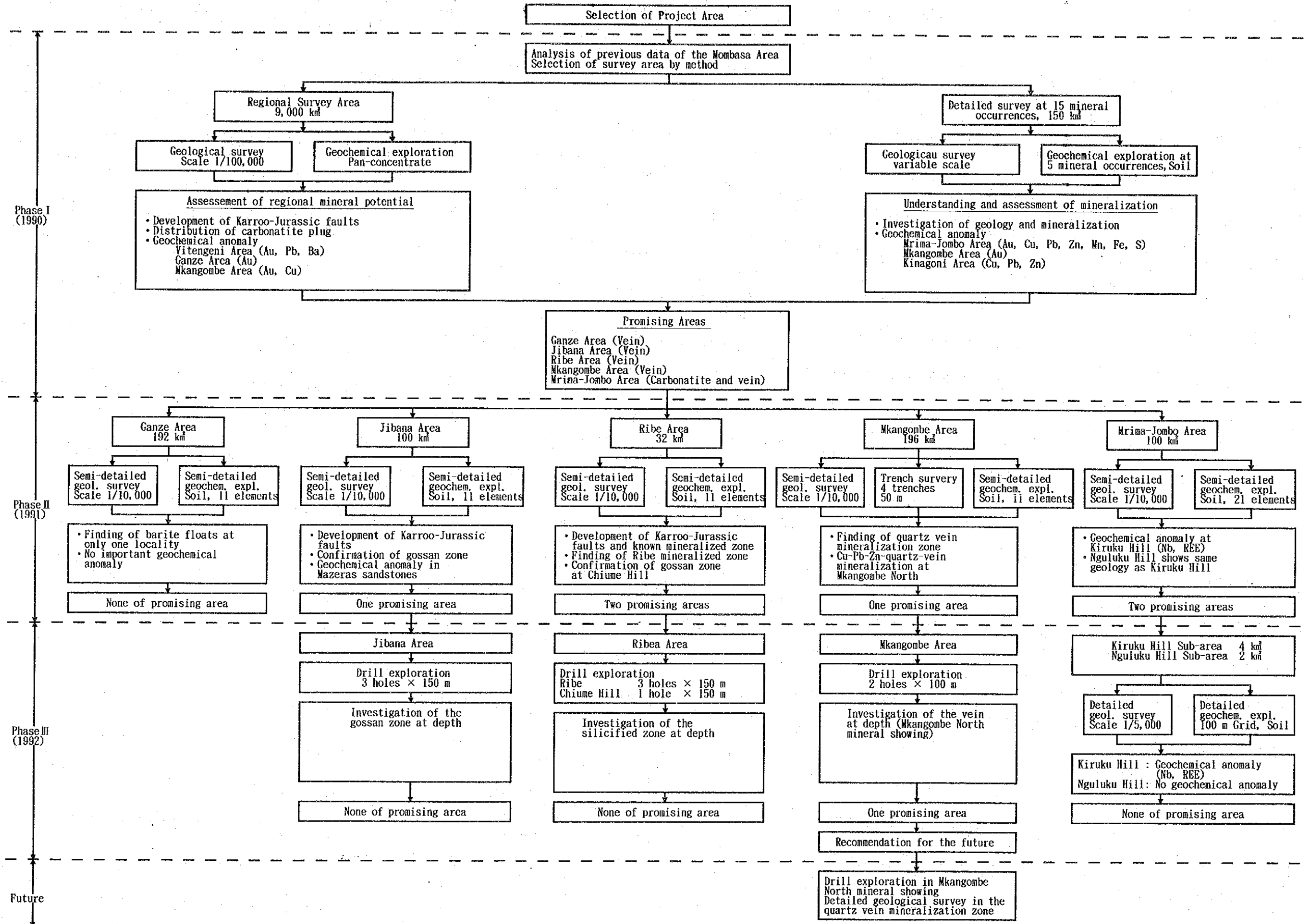
Sample	CEOL.	Lon.	Lat.	SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	P2O5	BaO	LOI	TOTAL
				%	%	%	%	%	%	%	%	%	%	%	%	%	%
CO-009		32784	392206	6.90	0.04	0.97	0.43	0.19	0.05	0.66	48.18	0.09	0.18	0.27	0.18	39.87	98.05
KR-006	MkI	35617	393086	58.31	0.77	16.29	2.02	5.11	0.09	2.70	2.63	3.09	3.01	0.21	0.09	4.71	99.60
KR-007	MkI	35617	393086	70.64	0.48	13.59	1.29	1.12	0.04	0.87	1.85	4.11	3.36	0.12	0.11	1.80	99.50
KR-009	Ig	35820	393902	39.79	2.63	11.44	4.84	5.98	0.17	10.35	11.28	2.70	1.76	0.63	0.33	5.73	98.30
KR-010	MvCu	34952	392098	73.40	0.30	11.78	0.59	0.80	0.06	0.58	3.05	5.54	1.12	0.13	0.03	2.84	100.30
KR-013	Tu	34815	391388	74.06	0.32	10.73	1.59	0.40	0.01	0.90	0.58	3.19	3.02	0.09	1.74	2.62	99.29
KR-014	Tm	34686	390697	63.85	0.46	13.78	0.64	2.75	0.08	1.68	3.10	4.96	2.53	0.09	0.08	3.58	97.88
KR-017	Ig	42832	390769	48.93	2.06	17.51	5.71	2.08	0.21	1.88	4.82	6.89	2.07	0.46	0.07	6.05	98.97
KR-018	Ig	42845	390706	43.39	2.49	16.54	4.85	2.93	0.21	2.52	8.03	6.91	4.12	0.47	0.13	5.26	98.17
KR-020A	Ig	42762	390796	63.33	0.45	18.84	2.27	0.14	0.05	0.23	0.39	7.25	5.01	0.06	0.11	0.97	99.11
KR-020B	Ig	42762	390796	54.18	2.34	19.72	7.44	0.38	0.28	1.06	1.15	6.14	4.13	0.45	0.13	2.81	100.20
KR-020C	Ig	42762	390796	57.71	0.64	20.37	1.60	1.50	0.15	0.63	2.96	7.77	5.04	0.10	0.07	1.09	99.80
KR-021	Ig	42600	390800	47.73	2.16	18.06	3.88	3.12	0.17	2.76	6.53	6.16	3.98	0.36	0.12	4.04	99.43
KR-022	Ig	42524	390778	44.35	2.70	15.50	4.80	4.17	0.18	5.19	8.83	5.02	3.23	0.56	0.08	3.77	98.83
KR-023	Ig	42448	390755	42.35	3.42	16.39	5.50	3.55	0.23	3.89	8.26	6.98	1.63	0.66	0.14	5.71	99.10
KR-025	Ig	42682	391246	46.27	2.85	16.22	3.70	5.64	0.21	3.68	8.46	5.81	3.30	0.75	0.14	1.12	98.76
KR-026	Ig	42722	391246	44.43	3.19	14.69	3.63	7.54	0.21	5.48	9.81	4.70	2.28	0.83	0.07	0.86	98.55
KR-027	Ig	42754	391021	62.42	0.62	18.82	1.84	1.39	0.07	0.44	1.88	6.42	6.43	0.08	0.07	0.65	101.30
KR-028	Ig	42731	391120	57.28	1.15	18.09	2.59	3.03	0.12	1.32	3.50	6.18	5.00	0.22	0.09	1.15	100.05
KR-030	Ig	42642	392021	46.49	1.53	19.82	5.41	1.37	0.26	1.12	4.78	9.85	5.73	0.21	0.22	2.46	99.40

Sample	Lon.	Lat.	SiO2 %	TiO2 %	Al2O3 %	Fe2O3 %	FeO %	MnO %	MgO %	CaO %	Na2O %	K2O %	P2O5 %	BaO %	LOI %	TOTAL %	
KR-031	Ig	42549	391148	53.16	0.56	21.35	3.14	0.54	0.12	0.45	1.98	10.36	4.74	0.10	0.15	0.95	98.25
KR-032	Ig	42590	391280	49.89	1.18	20.81	3.36	1.77	0.18	0.86	3.89	9.31	5.25	0.18	0.51	1.04	98.20
KR-033	Ig	42553	391260	53.19	0.61	21.03	3.28	1.04	0.16	0.50	2.32	10.66	4.80	0.07	0.13	1.08	98.97
KR-034	Ig	42500	391244	47.01	2.35	18.65	3.68	3.50	0.19	2.00	6.25	8.26	4.27	0.38	0.17	0.73	97.83
KR-039	Ig	42840	391536	20.96	4.69	22.57	25.90	0.17	1.06	0.57	0.34	0.08	0.05	2.73	1.84	12.09	93.08
KR-101	Ig	42899	391513	3.68	0.58	0.73	7.81	0.20	1.57	3.24	37.26	0.20	0.05	4.88	2.49	31.27	93.97
KR-102A	Ig	42813	391547	3.17	0.18	0.85	1.59	4.02	2.48	13.07	22.70	0.11	0.05	0.13	3.93	37.28	90.00
KR-104	Ig	42529	390549	43.04	2.49	15.48	4.50	3.88	0.24	4.78	8.68	5.21	3.18	0.50	0.29	4.88	97.57
KR-106	Ig	30594	394938	42.41	2.00	10.91	3.33	6.89	0.18	15.10	10.91	2.80	1.56	0.63	0.12	1.00	98.60
KR-109	Ig	42784	391735	59.70	1.53	6.62	14.14	0.23	3.25	0.29	0.45	0.12	0.12	0.78	3.84	6.39	97.49
MD-008	K	31082	394611	4.34	0.03	0.67	0.09	0.19	0.06	0.72	49.84	0.09	0.16	0.03	0.01	41.04	97.28
MK-001	Ig	42287	391536	38.80	2.86	15.35	6.04	3.47	0.25	3.85	10.25	4.86	3.60	0.84	0.14	7.57	98.26
MK-026	Ig	42320	391530	41.74	3.08	16.46	5.60	3.81	0.18	3.92	8.32	6.50	2.26	0.78	0.18	5.03	98.30
MR-106	Ig	42872	391493	37.75	1.60	9.26	23.96	1.62	0.01	0.16	2.29	0.80	7.08	2.54	0.27	10.11	97.56
MR-111	Ig	42573	391174	46.60	1.67	21.21	3.83	2.10	0.20	1.26	4.96	10.46	4.68	0.26	0.24	1.15	98.85
MR-113	Ig	42445	391516	39.16	1.47	7.37	3.74	5.88	0.23	6.00	10.42	1.83	2.49	1.83	0.09	17.17	98.33
SH-005	K	35054	393754	37.59	1.37	8.60	0.86	0.68	0.50	0.51	24.44	1.59	2.83	0.54	0.05	19.14	98.77
SH-013	M21	33278	393523	81.74	1.37	6.88	1.69	1.45	0.16	0.60	1.73	2.00	1.58	0.14	0.04	1.25	100.80
SH-028	Tu	34875	391361	64.44	0.54	12.74	3.04	0.79	0.05	2.32	1.90	2.28	4.36	0.15	0.05	5.42	98.16
SH-034	Ig	42905	390772	34.80	2.98	9.77	2.68	6.34	0.16	10.03	10.70	2.47	2.97	0.75	0.10	13.48	97.98

FLOW CHART OF THE MOMBASA PROJECT



SELECTION FLOW OF PROMISING AREA FOR MINERAL DEPOSITS



GEOLOGICAL MAP OF THE MOMBASA AREA

SUMMARISING THE RESULTS OF THE MINERAL EXPLORATION, 1990-1992

JICA/MMAJ-MGD

Scale 1:200,000

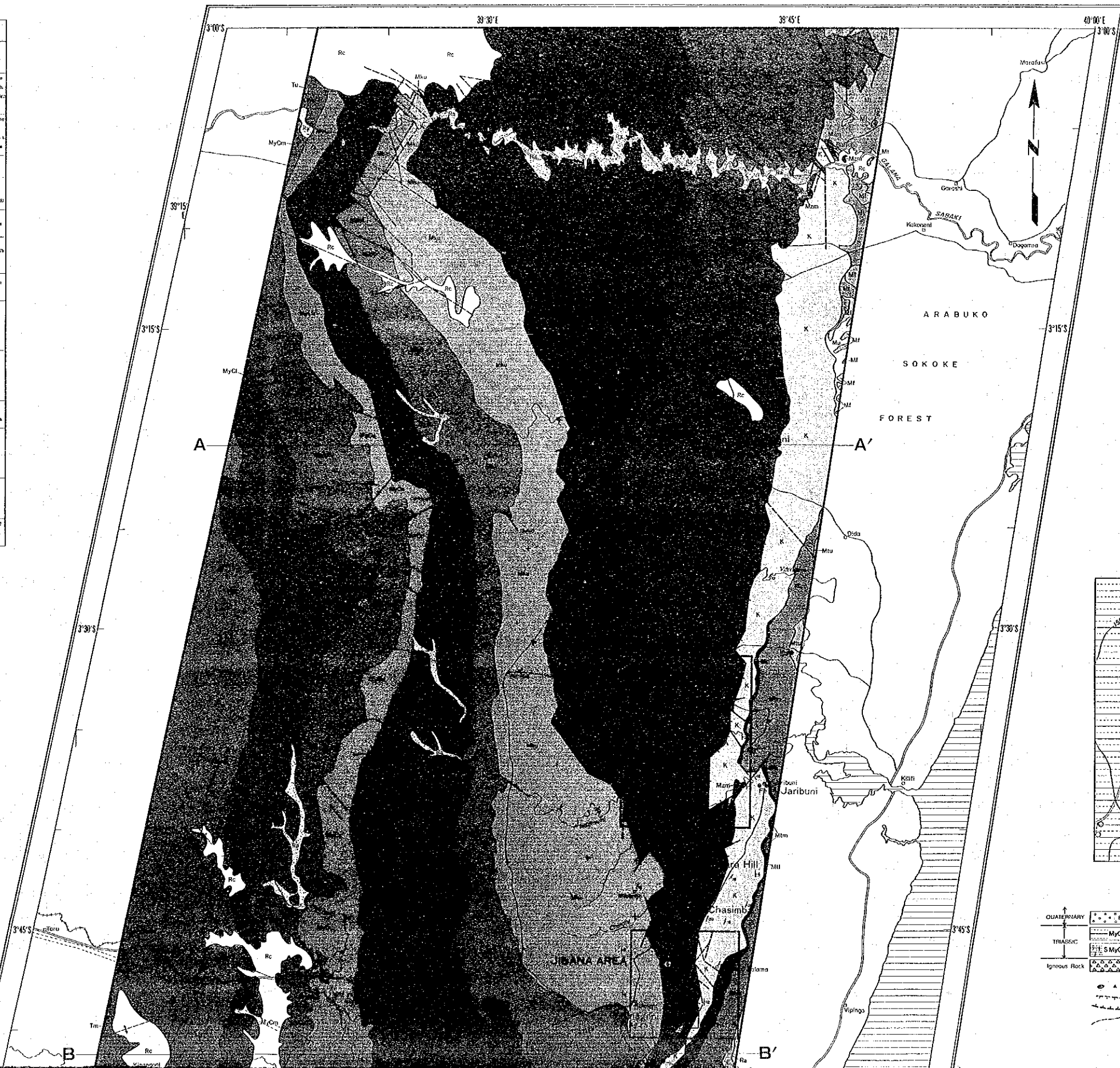
REPORT ON THE MINERAL EXPLOITATION
IN THE MOMBASA AREA
REPUBLIC OF KENYA

PREPARED BY JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) AND
METAL MINING AGENCY OF JAPAN (MMAJ) IN COOPERATION WITH MINES
AND GEOLOGICAL DEPARTMENT OF MINISTRY OF ENVIRONMENT AND
NATURAL RESOURCES OF KENYA. FEBRUARY, 1993

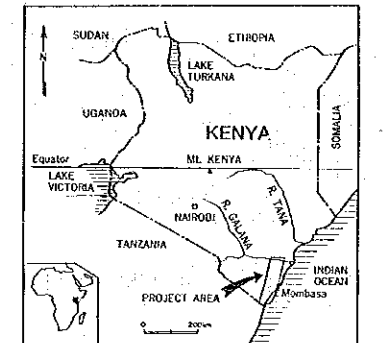
No.	Name of Occurrence	Kind of Occurrence	Owner	Location	Geology	Mineral	Remarks
1	1.1.1.1	Quartzite	State	...	...	Quartz	...
2	1.1.1.2	Quartzite	State	...	...	Quartz	...
3	1.1.1.3	Quartzite	State	...	...	Quartz	...
4	1.1.1.4	Quartzite	State	...	...	Quartz	...
5	1.1.1.5	Quartzite	State	...	...	Quartz	...
6	1.1.1.6	Quartzite	State	...	...	Quartz	...
7	1.1.1.7	Quartzite	State	...	...	Quartz	...
8	1.1.1.8	Quartzite	State	...	...	Quartz	...
9	1.1.1.9	Quartzite	State	...	...	Quartz	...
10	1.1.1.10	Quartzite	State	...	...	Quartz	...

FIELD AND LABORATORY WORKS CARRIED OUT THROUGH THE MOMBASA PROJECT

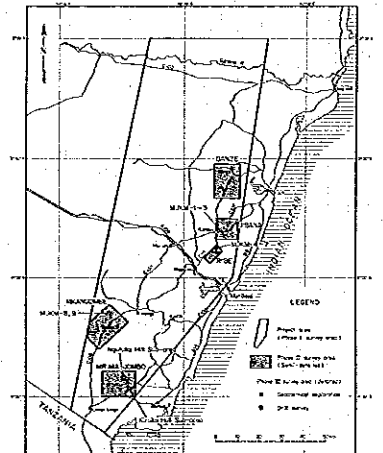
Phase	Phase I (1990)	Phase II (1991)	Phase III (1992)
1. GEOLOGICAL SURVEY			
1.1 Regional survey	8,500 sq km	8,500 sq km	8,500 sq km
1.2 Semi-detailed survey	150 sq km	150 sq km	150 sq km
1.3 Detailed survey	150 sq km	150 sq km	150 sq km
2. GEOCHEMICAL SURVEY			
2.1 Regional survey	8,500 sq km	8,500 sq km	8,500 sq km
2.2 Semi-detailed survey	150 sq km	150 sq km	150 sq km
2.3 Detailed survey	150 sq km	150 sq km	150 sq km
3. DRILLING SURVEY			
3.1 Drill holes	10	10	10
3.2 Test pits	10	10	10
3.3 Other	10	10	10
4. LABORATORY WORKS			
4.1 Mineralogical	10	10	10
4.2 Petrological	10	10	10
4.3 Geochemical	10	10	10
4.4 Other	10	10	10



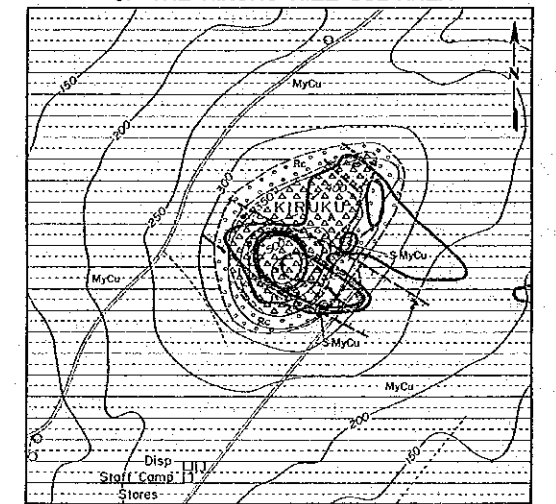
LOCATION MAP OF THE MOMBASA AREA



INDEX MAP OF THE SURVEY AREAS

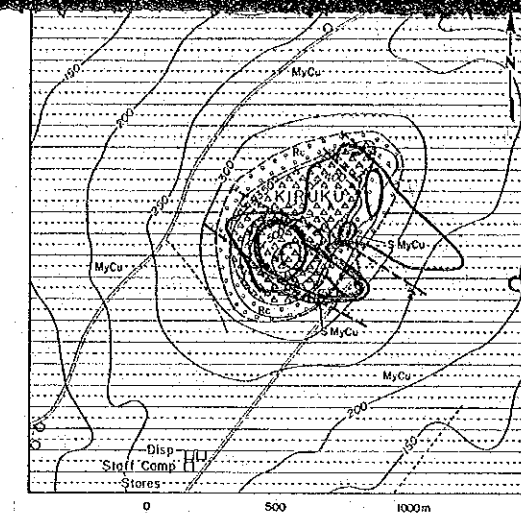


GEOCHEMICAL INTERPRETATION MAP OF THE KIRUKU HILL SUB-AREA



Element	Anomaly	Threshold
Au	○	≥ 50ppm
Nb	○	≥ 1100ppm
Y	○	≥ 4200ppm
La+Ce+Nd	○	≥ 3500ppm
Sm+Eu+Tb	○	≥ 100ppm
Yb+Lu	○	≥ 350ppm

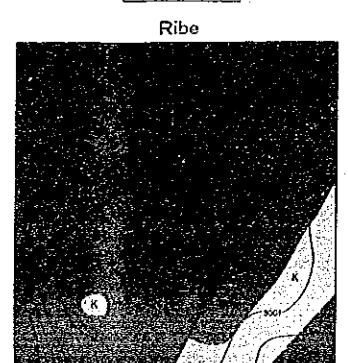
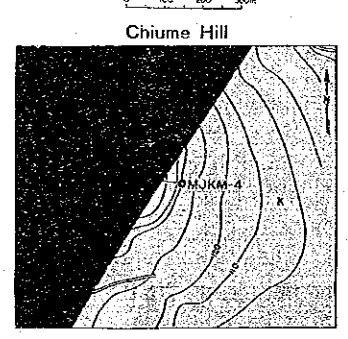
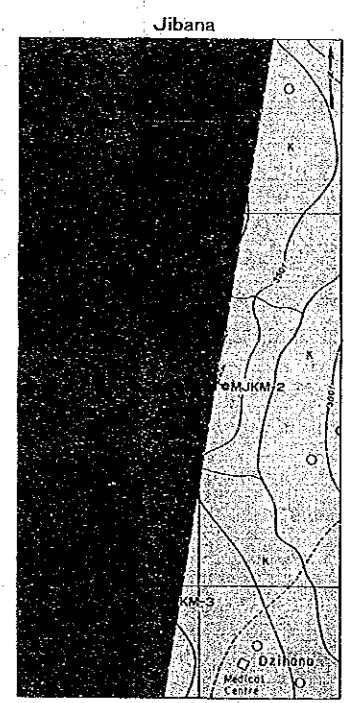
Period of Time	Phase I (1980 - Feb. 1981)	Phase II (1981)	Phase III (1982)
I. QUANTITATIVE DATA			
a) Regional survey	5,000 sq. km	5,000 sq. km	5,000 sq. km
b) Detailed survey	100 sq. km (100% coverage)	100 sq. km (100% coverage)	100 sq. km (100% coverage)
II. GEOLOGICAL DATA			
a) Regional survey	5,000 sq. km	5,000 sq. km	5,000 sq. km
b) Detailed survey	100 sq. km (100% coverage)	100 sq. km (100% coverage)	100 sq. km (100% coverage)
c) Detailed survey	100 sq. km (100% coverage)	100 sq. km (100% coverage)	100 sq. km (100% coverage)
III. MINING DATA			
a) This section	60	30	30
b) Detailed section	30	10	10
c) Detailed this section	20	0	0
d) Waste rock analysis	10 (10 elements)	0	0
e) Chemical analysis of ore	100 (10 elements)	50 (5 elements)	100 (5 elements)
f) Trace element analysis	10	30	30
g) BSL Test	20	0	0
h) Mining	10 (10 elements)	0	0
IV. MINING DATA			
a) This section	60	30	30
b) Detailed section	30	10	10
c) Detailed this section	20	0	0
d) Waste rock analysis	10 (10 elements)	0	0
e) Chemical analysis of ore	100 (10 elements)	50 (5 elements)	100 (5 elements)
f) Trace element analysis	10	30	30
g) BSL Test	20	0	0
h) Mining	10 (10 elements)	0	0



LEGEND

Symbol	Description	Geochemical Anomaly
Coloured box	Colours	Element Anomaly Threshold
Stippled box	Sandstone covered by soils	Au ≥ 5000
Box with MyCu	Upper Member of Mungwa Formation	Nb $\geq 100ppm$
Box with S MyCu	Agglomerate vein (sparsely laminated)	V $\geq 400ppm$
Box with A, O, A, O, A	Strongly steepled rock (gabbro/diabase)	La + Ce + Nd $\geq 3000ppm$
Box with S, S, S	Inferred steepled rock zone	Sm + Eu + Tb $\geq 100ppm$
Box with S, S, S	Geological boundary	Yb + Lu $\geq 35ppm$

DRILL SURVEY AREAS



LEGEND

- Diamond drill hole
- Trench
- Gossan zone, Slicked zone
- Quartz vein outcrop
- Fault
- Geological boundary



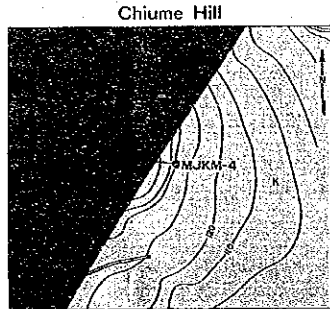
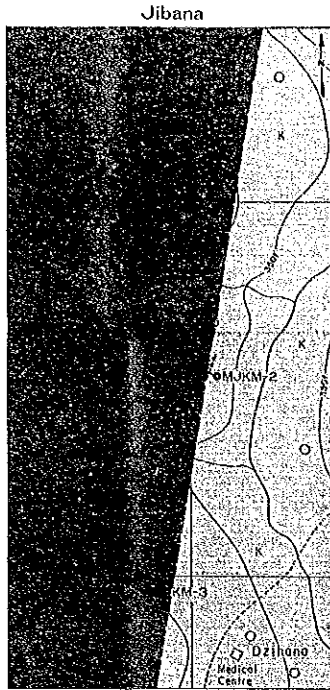
LEGEND

Period	Formation	Member	Description
QUATERNARY	Recent	Rc	Alluvium
QUATERNARY	Pleistocene	Ph2	Colluvium and residual soils
		Ph1	Sands
		Pw	Sands
TERTIARY	Pliocene	Mu	Beef complex (undifferentiated) Limestones/calcarene/sandstone
		Mu	Sands
TERTIARY	Miocene	Mf1	Sandstones/sands, subordinate shales/muds
		Mf2	Sandstones, subordinate limestones/shales
		Mf3	Sandstones, subordinate limestones/shales
CRETACEOUS	MTOIKILU FORMATION (M)	Upper Member	Shales, subordinate limestones
		Middle Member	Shales, subordinate sandstones
		Lower Member	Shales/siltstones/sandstones
JURASSIC	KAMBE FORMATION (K)	Upper Member	Limestones, subordinate shales/siltstones/sandstones
		Middle Member	Sandstones/arkoses
		Lower Member	Sandstones/arkoses, subordinate shales/siltstones
TRIASSIC	MAZEPAS FORMATION (M)	Upper Member	Sandstones/arkoses
		Middle Member	Sandstones/arkoses, subordinate shales/siltstones
		Lower Member	Sandstones
TRIASSIC	MABAKANI FORMATION (M)	Upper Member	Sandstones
		Middle Member	Sandstones, subordinate shales/siltstones
		Lower Member	Sandstones
TRIASSIC	MAJ-YA-CHUMU FORMATION (M)	Upper Member	Sandstones/shales/siltstones
		Middle Member	Shales/siltstones, subordinate sandstones
		Lower Member	Shales with nodules containing fossil fish, subordinate sandstones
PERMIAN	TARU FORMATION (T)	Upper Member	Arkoses/sandstones/shales/siltstones, subordinate conglomerate/limestones
		Middle Member	Arkoses/sandstones/conglomerates, subordinate shales/siltstones
CRETACEOUS	INTRUSIVES (I)		Alkaline intrusive rocks, Agglomerate, A; Carbonate, C; Ferrite, F; Lamprophyric dyke, Lp

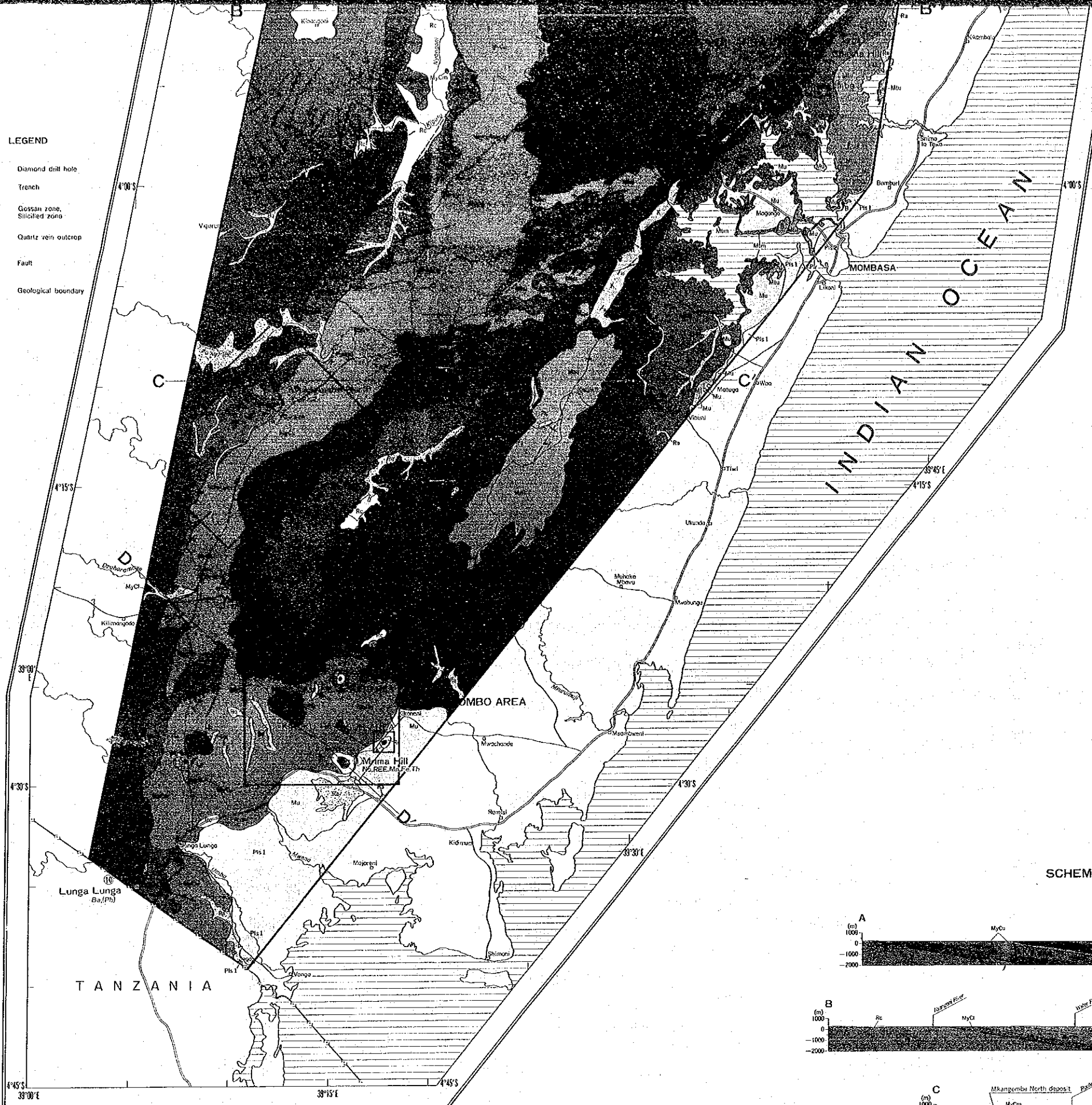
OTHER SYMBOLS

- Geological boundary
- Fault, downthrow indicated
- Fault inferred, downthrow indicated
- Bedding, dip indicated
- Flat bedding
- Anticline, plunge indicated
- Syncline, plunge indicated
- Mine, working
- Mine, abandoned
- Mineral occurrence
- Line of section
- Drill survey area

DRILL SURVEY AREAS



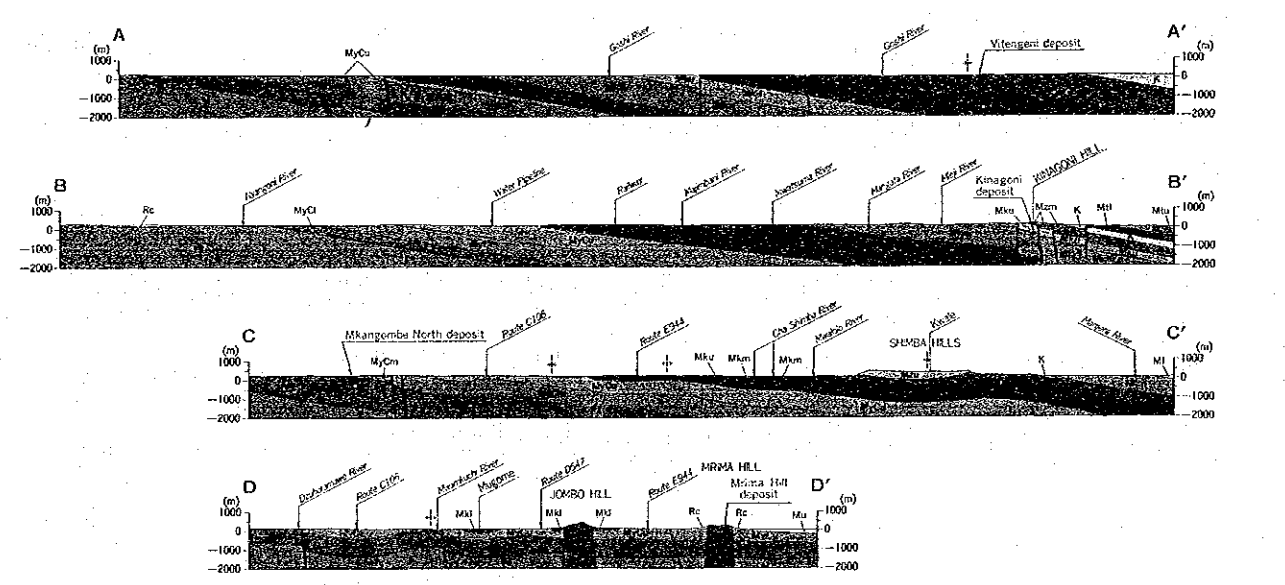
- LEGEND**
- Diamond drill hole
 - Trench
 - Gossan zone, Silicified zone
 - Quartz vein outcrop
 - Fault
 - Geological boundary



- LEGEND**
- | | | |
|-----------------|--|---|
| QUATERNARY | Recent | Alluvium |
| | | Colluvium and residual soils |
| | | Sands |
| Pleistocene | | Sands |
| | | Reef complex (unconsolidated) Limestone/calcarenite/sandstone |
| TERTIARY | Pliocene | Sands |
| | MIOCENE | Sandstones/sands, subordinate shales/marls |
| | | Sandstones, subordinate limestones/shales |
| CRETACEOUS | Upper Member | Shales, subordinate limestones |
| | Middle Member | Shales, subordinate sandstones |
| | Lower Member | Shales/siltstones/sandstones |
| JURASSIC | Limestones, subordinate shales/siltstones/sandstones | |
| | Upper Member | Sandstones/arkoses |
| | Middle Member | Sandstones/arkoses, subordinate shales/siltstones |
| TRIASSIC | Lower Member | Sandstones/arkoses |
| | Upper Member | Sandstones |
| | Middle Member | Sandstones, subordinate shales/siltstones |
| PERMIAN | Upper Member | Sandstones |
| | Middle Member | Shales/siltstones, subordinate sandstones, shales with nodules containing fossil fish |
| | Lower Member | Shales/siltstones, subordinate sandstones |
| CRETACEOUS | Upper Member | Arkoses/sandstones/shales/siltstones, subordinate conglomerate/limestones |
| | Middle Member | Arkoses/sandstones/conglomerates, subordinate shales/siltstones |
| INTRUSIVES (IG) | | Alkaline intrusive rocks |
| | | Anorthosite, A: Carbonatite, C: Felsite, F: Lamprophyric dyke, Lp |

- OTHER SYMBOLS**
- Geological boundary
 - Fault, downthrow indicated
 - Fault inferred, downthrow indicated
 - Bedding, dip indicated
 - Flat bedding
 - Anticline, plunge indicated
 - Syncline, plunge indicated
 - Mine, working
 - Mine, abandoned
 - Mineral occurrence
 - Line of section A-A'
 - Drill survey area

SCHMATIC GEOLOGICAL SECTIONS



MyCu is mapped in the geochemical interpretation map of the Kinjua Hill sub-area based on the phase II survey results, but is not mapped in the Kinjua Hill sub-area in the 1:200,000 geological map, because the boundary between MyCu and Mu has not been determined.

Results of the Chemical Analysis of Drill Core Samples, Mombasa Area

Sample No.	SiO ₂	TiO ₂	Al ₂ O ₃	FeO	MnO	MgO	CaO	Na ₂ O	K ₂ O	Total
K10 AN 30/30/1	64.32	0.00	15.00	10.00	0.00	0.00	0.00	0.00	0.00	79.32
K10 AN 30/30/2	62.00	0.00	15.00	10.00	0.00	0.00	0.00	0.00	0.00	77.00
K10 AN 30/30/3	61.50	0.00	15.00	10.00	0.00	0.00	0.00	0.00	0.00	76.50
K10 AN 30/30/4	61.00	0.00	15.00	10.00	0.00	0.00	0.00	0.00	0.00	76.00
K10 AN 30/30/5	60.50	0.00	15.00	10.00	0.00	0.00	0.00	0.00	0.00	75.50
K10 AN 30/30/6	60.00	0.00	15.00	10.00	0.00	0.00	0.00	0.00	0.00	75.00
K10 AN 30/30/7	59.50	0.00	15.00	10.00	0.00	0.00	0.00	0.00	0.00	74.50
K10 AN 30/30/8	59.00	0.00	15.00	10.00	0.00	0.00	0.00	0.00	0.00	74.00
K10 AN 30/30/9	58.50	0.00	15.00	10.00	0.00	0.00	0.00	0.00	0.00	73.50
K10 AN 30/30/10	58.00	0.00	15.00	10.00	0.00	0.00	0.00	0.00	0.00	73.00

