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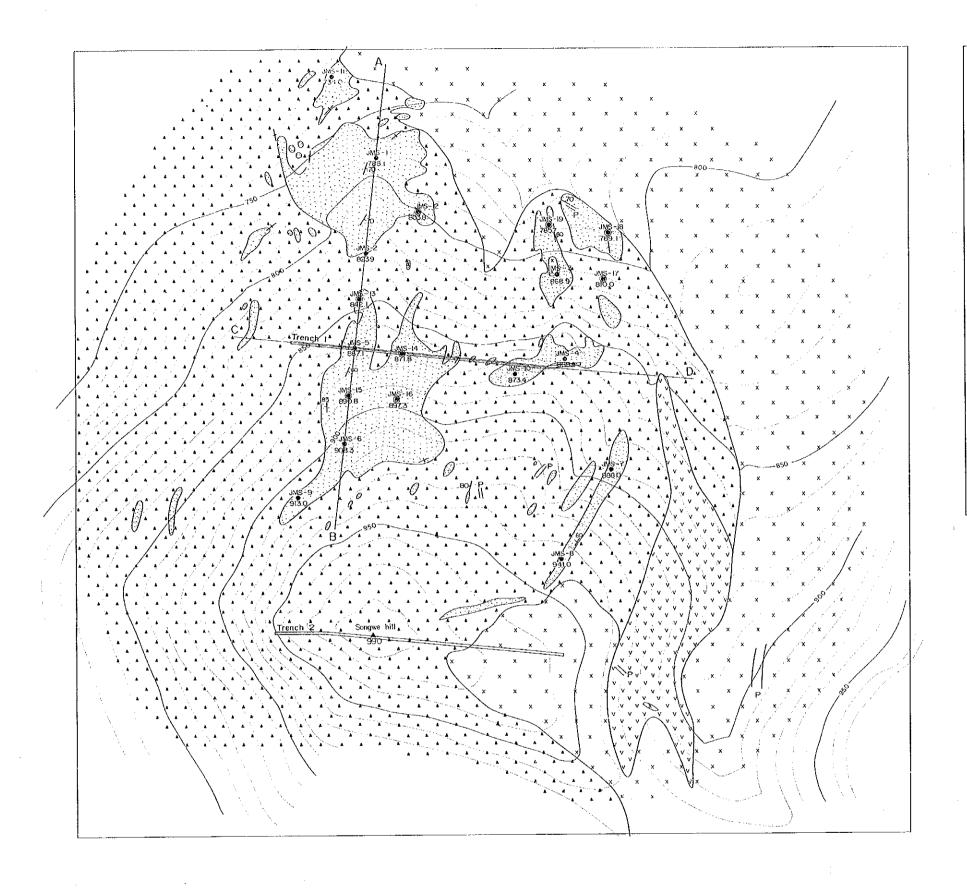
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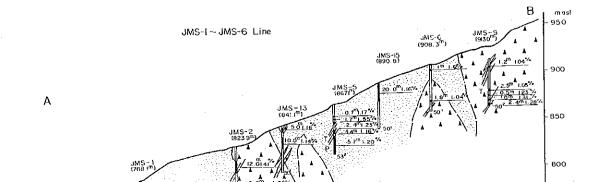


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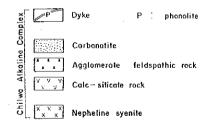




# COOPERATIVE MINERAL EXPLORATION IN THE CHILWA, ALKALINE AREA, REPUBLIC OF MALAWI (PHASE III) DETAILED GEOLOGICAL MAP AND PROFILES OF SONGWE SECTOR JAPAN INTERNATIONAL COOPERATION AGENCY METAL MINING AGENCY OF JAPAN FEBRUARY 1989

### LEGEND

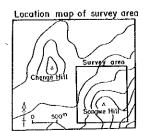
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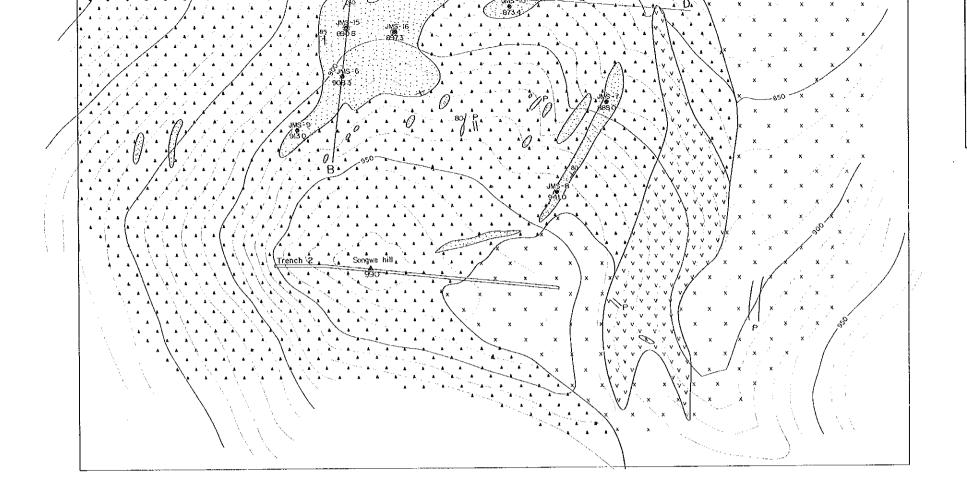


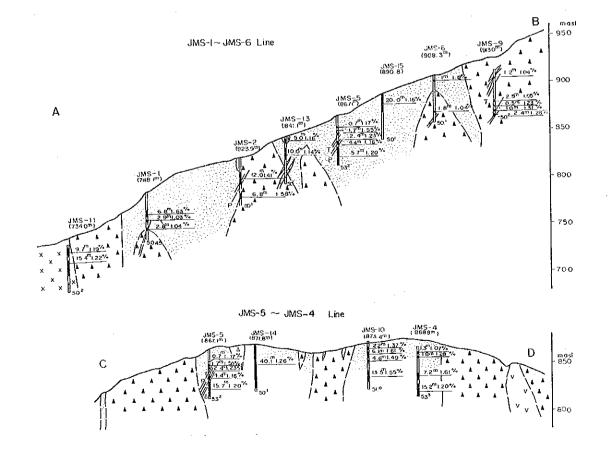
- Drilling site (1987)
   Drilling site (1988)
- Thickness<sup>m</sup> REO% (La,Ce,Nd,Sm,Eu<sub>)</sub>

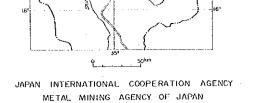
Trench

A 8 Profile line

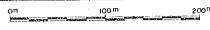




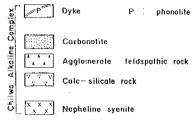




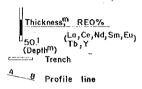
FEBRUARY 1989

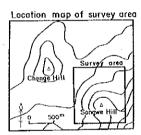


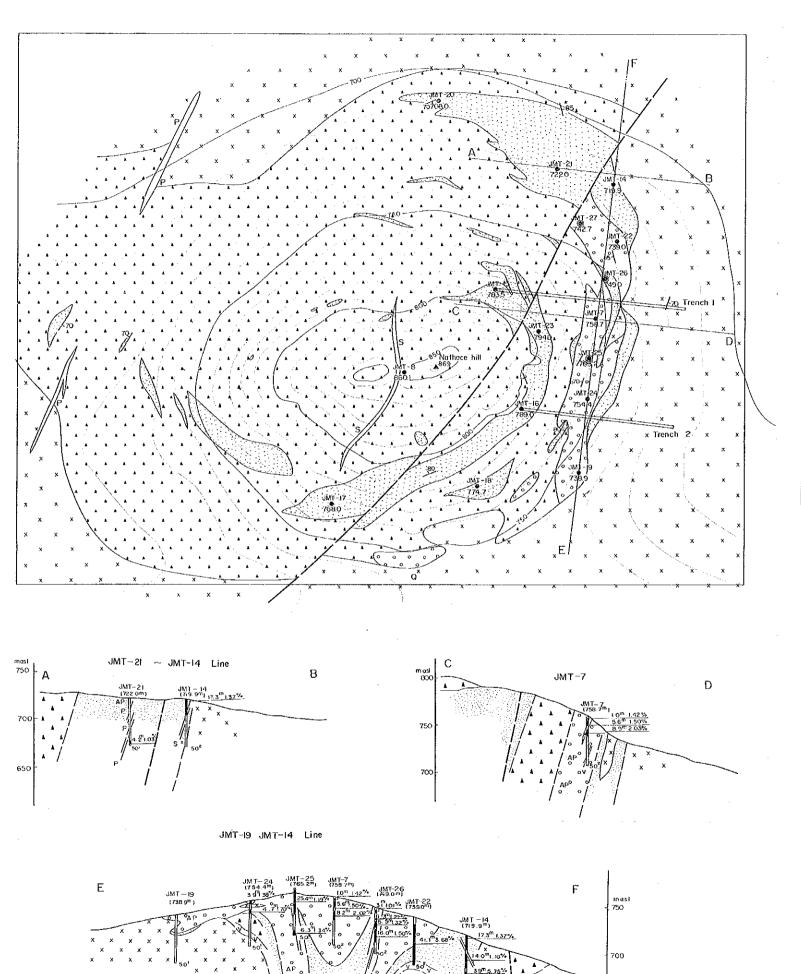
Scale | 1 . 2,000

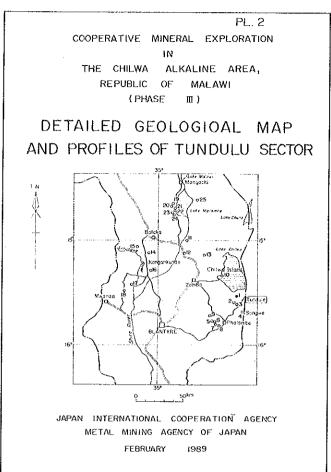


- Drilling site (1987)
- Drilling site (1988)









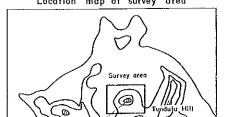
LEGEND

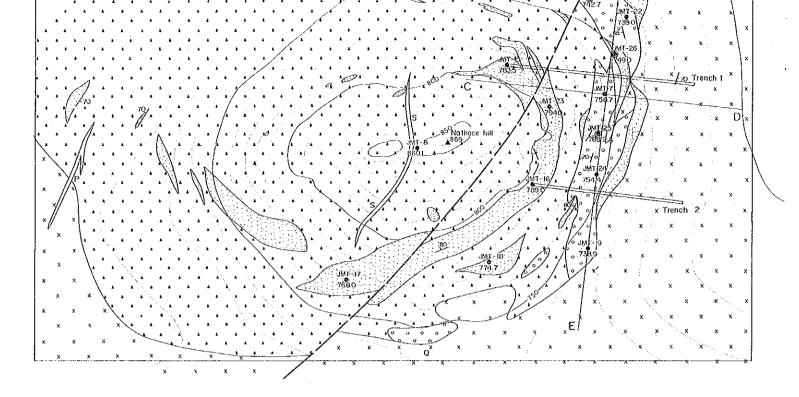
ြံ့ႏွိရ**ွိ** Apatite rock Agglomerate / feldspathic rock  $\begin{bmatrix} x & x & x \\ x & x \end{bmatrix}$  Nepheline syenite

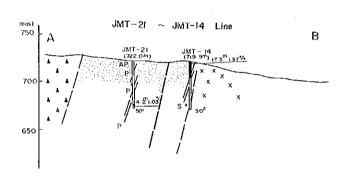
Scale 1:2,000

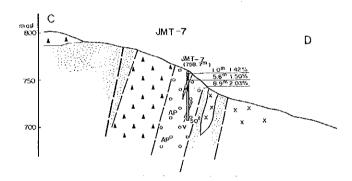
Thickness, REO% (Lo,Ce,Nd,Sm,Eu)
(Depth<sup>m</sup>)
Trench A B Profile line

Location map of survey area

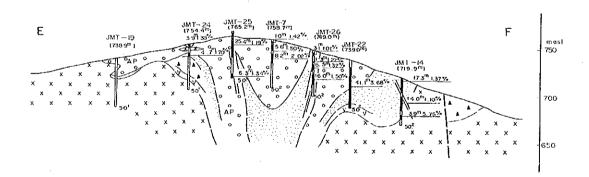


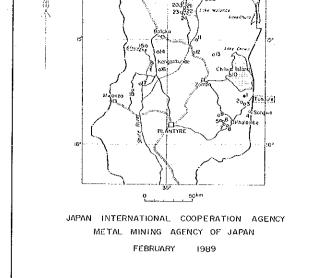






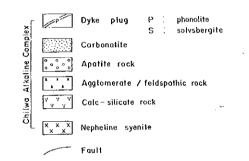
JMT-19 JMT-14 Line



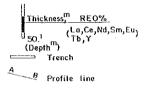


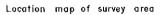


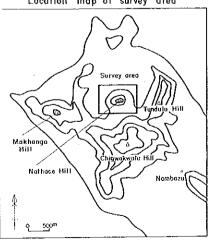
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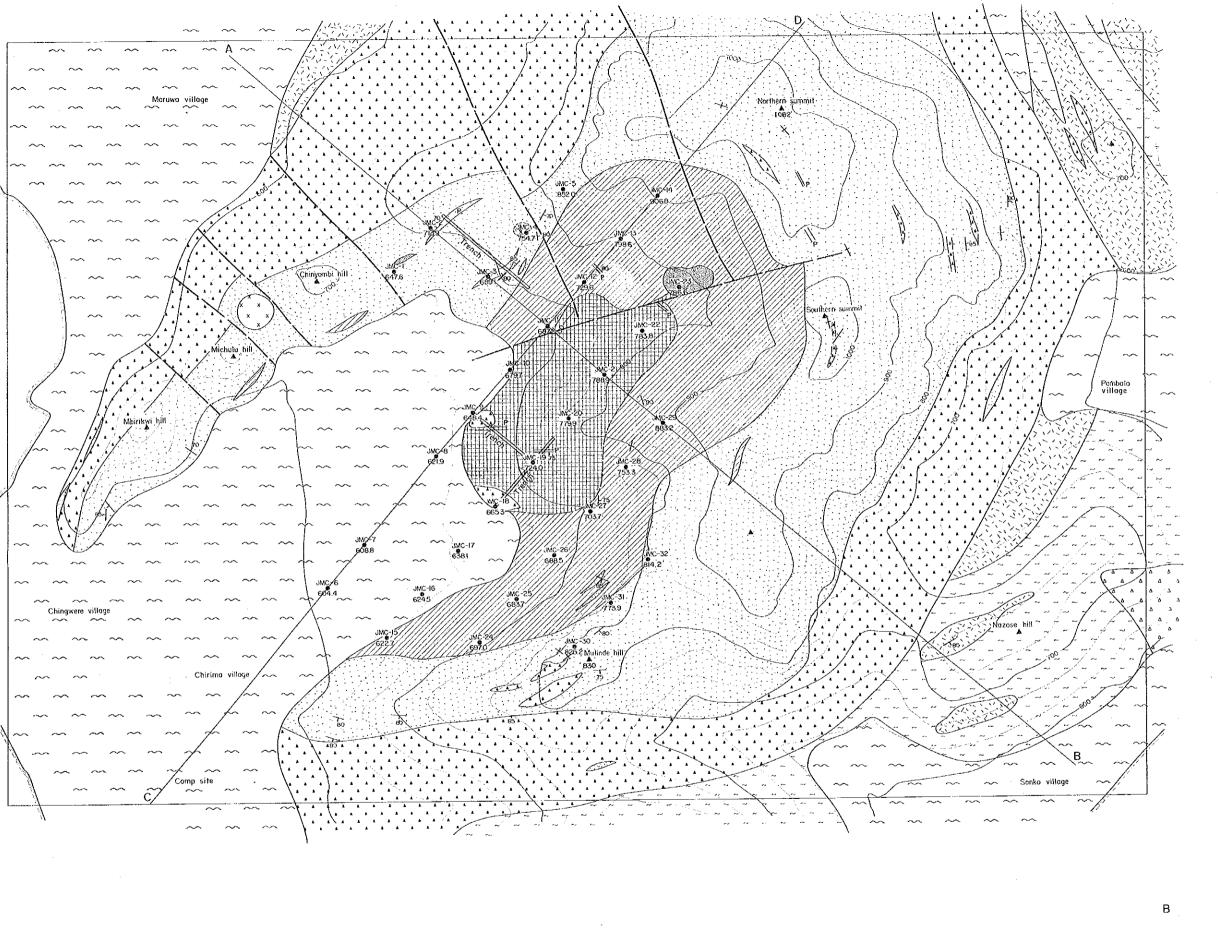


- Drilling site (1987)
- Drilling site (1980)









B

• Drilling site (1986

Trench

• B Profile line

Location map of su

COOPERATIVE MINER

THE CHILWA AL REPUBLIC OF ( PHASE

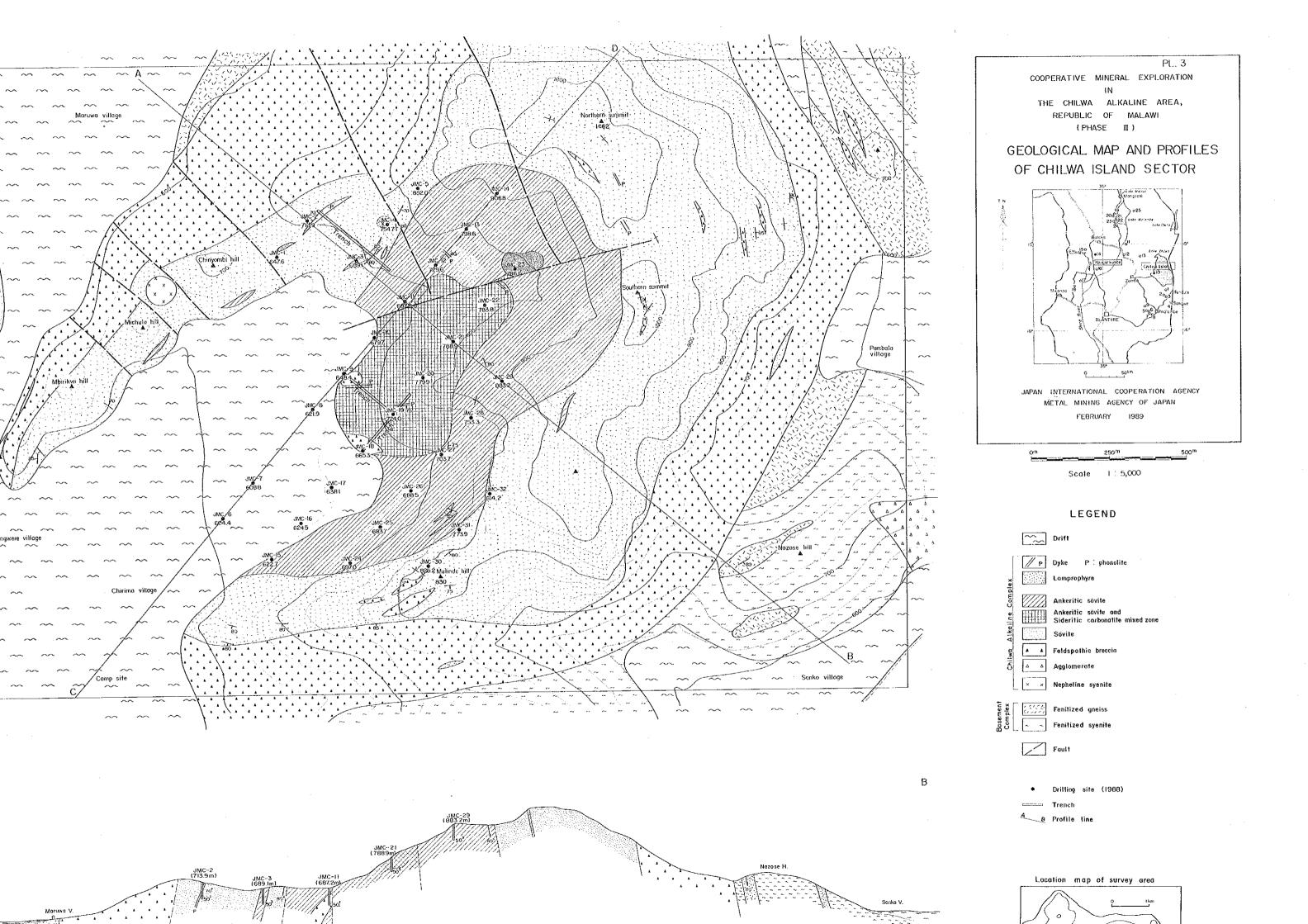
GEOLOGICAL MAR OF CHILWA ISLA

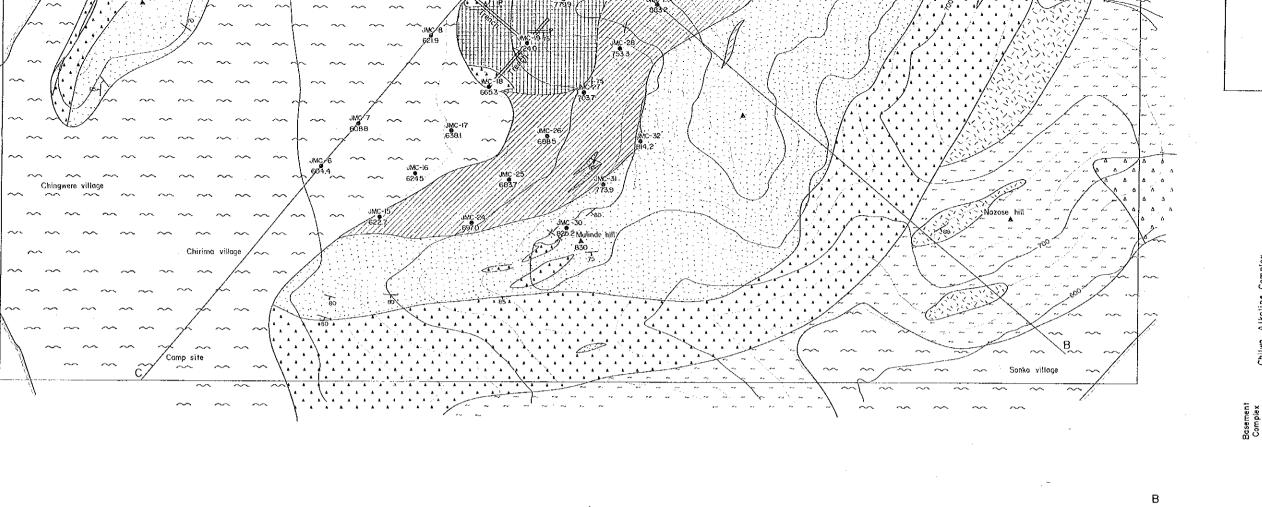
> JAPAN INTERNATIONAL C METAL MINING AGE

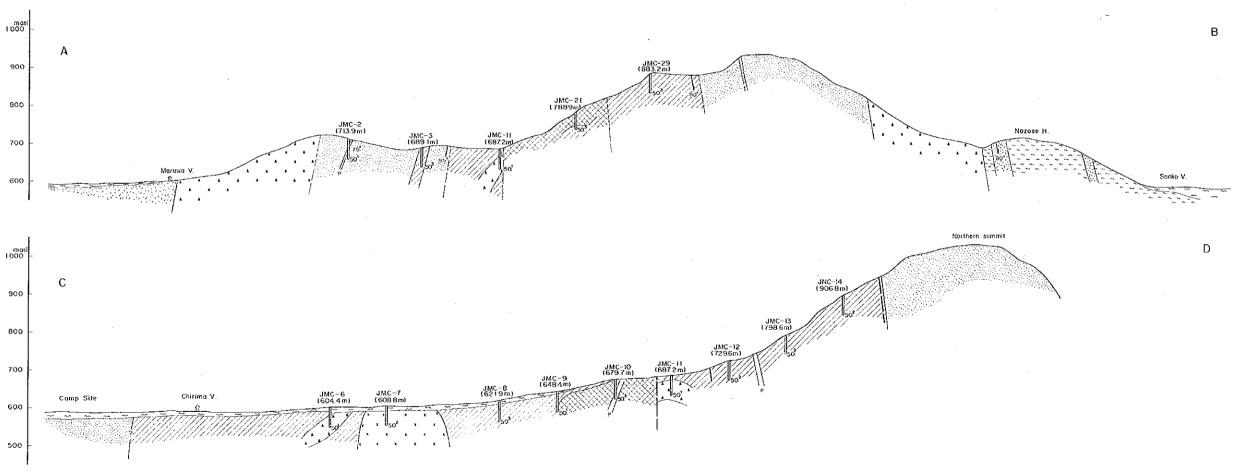
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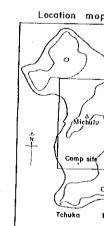


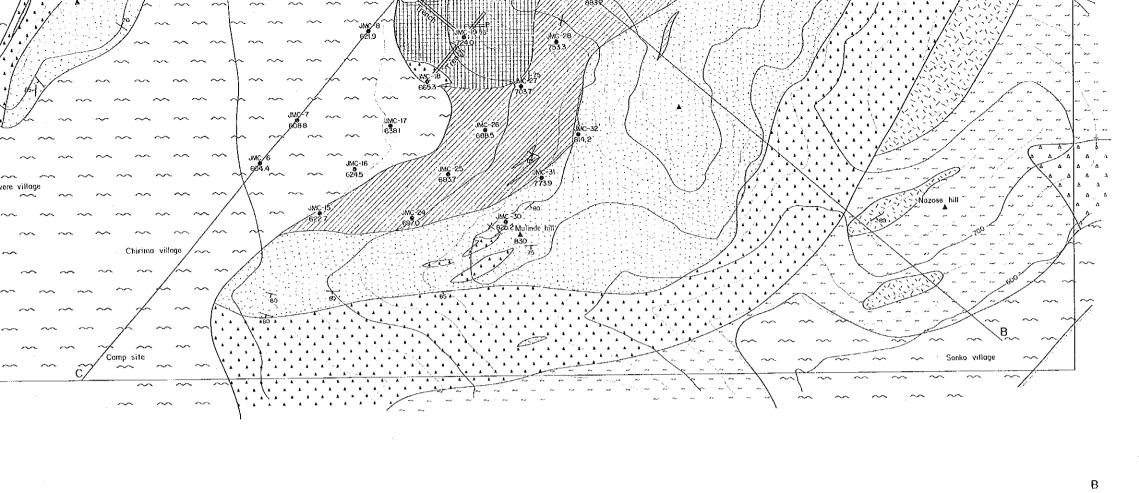


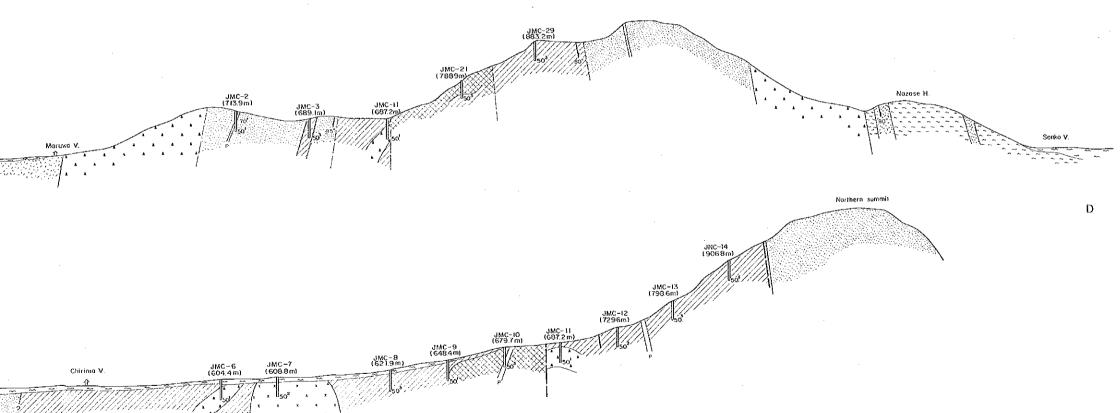




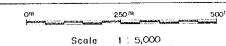


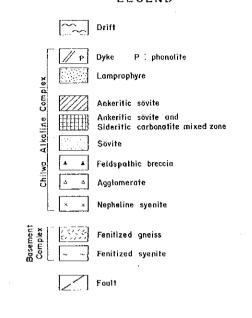




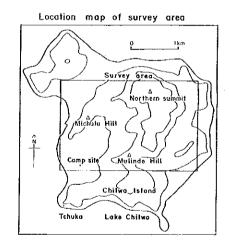


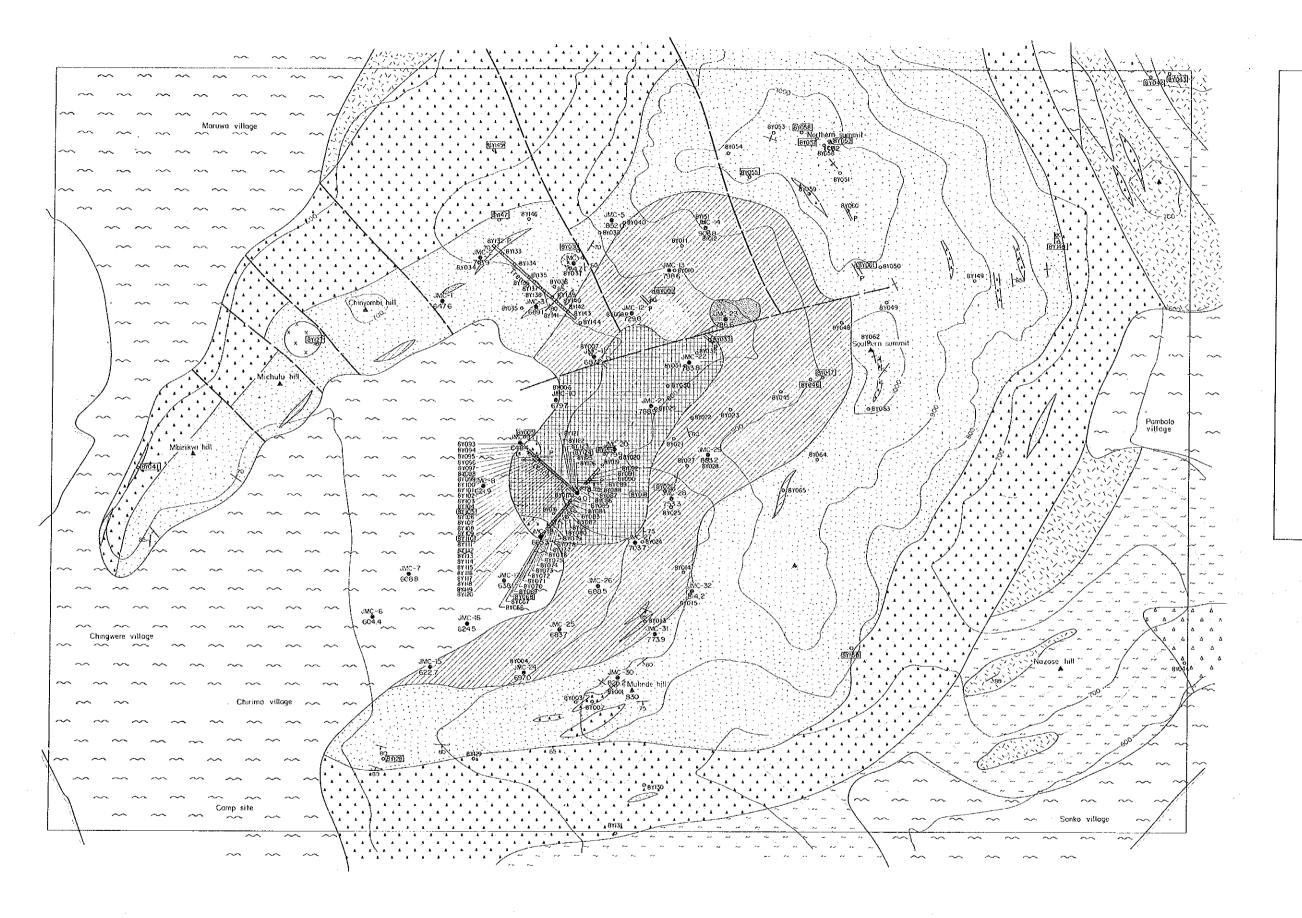
# JAPAN INTERNATIONAL COOPERATION AGENCY METAL MINING AGENCY OF JAPAN FEBRUARY 1989











COOPERATIVE

THE CHILWA REPUBLIO

LOCATION MA SAMPLES AN OF CHILW



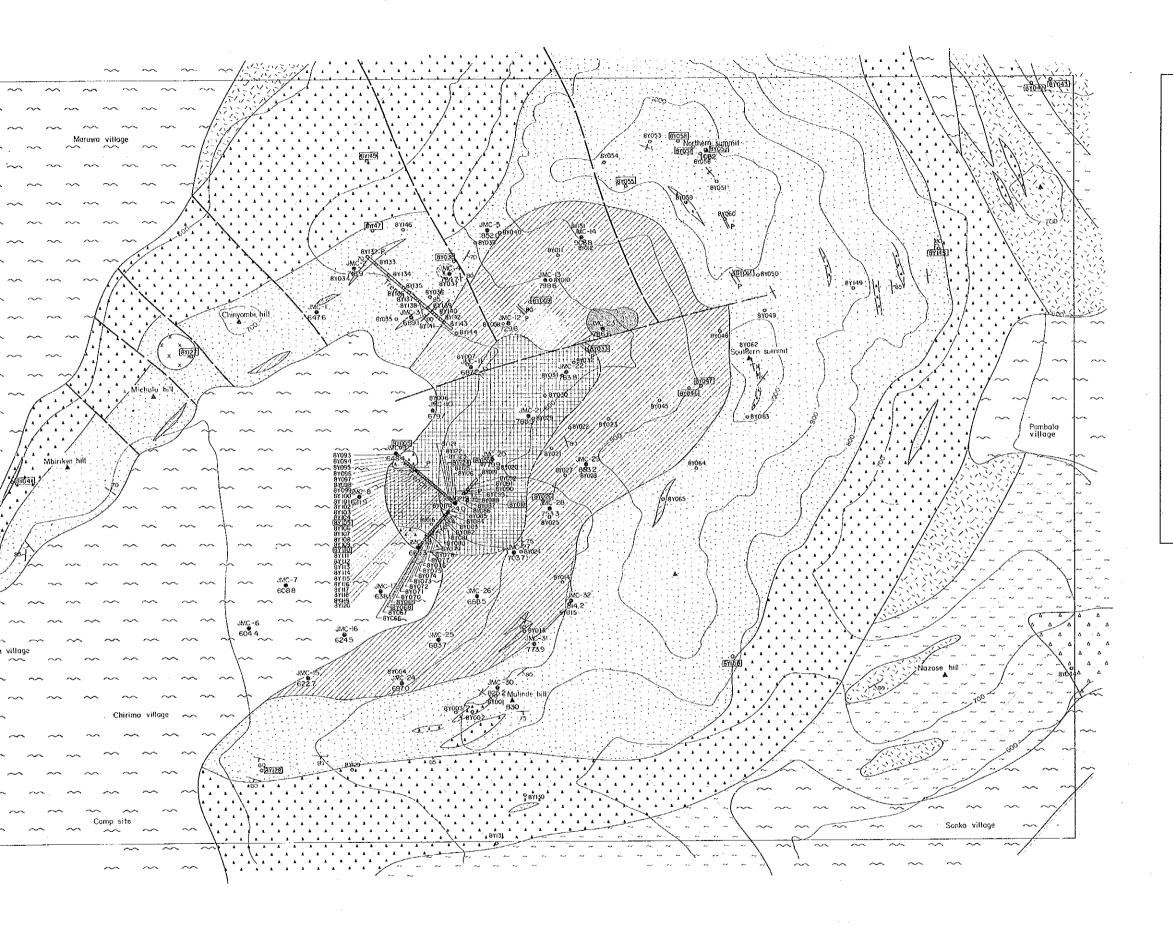
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PL. 4

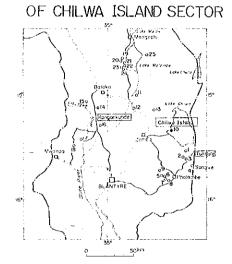
COOPERATIVE MINERAL EXPLORATION

IN

THE CHILWA ALKALINE AREA, REPUBLIC OF MALAWI

(PHASE II)

LOCATION MAP OF GEOCHEMICAL SAMPLES AND ROCK SAMPLES



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1989

FEBRUARI 190

Scale 1:5,000

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Geochemical and rock sampling point

YOO! Geochemical sample No

BYOOI Rock sample No.

PL. 5

COOPERATIVE MINERAL EXPLORATION

IN

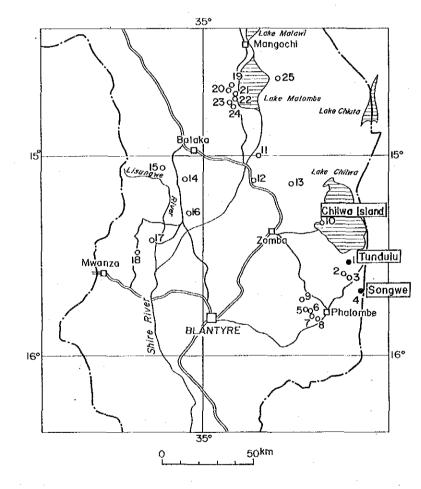
THE CHILWA ALKALINE AREA,

REPUBLIC OF MALAWI

(PHASE II)

# GEOLOGICAL DRILL LOG (1/200)

T.N.



JAPAN INTERNATIONAL COOPERATION AGENCY

METAL MINING AGENCY OF JAPAN

FEBRUARY 1989

a gog promote et les accions les décembres de	and an experience to the control of	negion	The second secon	Assay (ppm)												
Depth (m)	}	ay Bu	Description	Sample No.	Depth (m)	Thick- ness (m)	La	Се	Nd	Sm	Eu	Тb	Nb	Sr	Υ	Р
		^			6.90											
7.10	x x		Deeply weathered, limonitized biotite micro nepheline syenite	C0101		6.80	196	388	118	22.5	3.5	<0.1	432	1428	43	2421
13.70	F A		Limonitized brown feld. br.	C0102	13.70 16.40	2.70	664	1101	277	45.0	10.6	<0.1	443	1590	93	2637
16.40	M.N.		Limonitized dark gray mdg melano- cratic nephelinite	C0103	19.00	2.60	487	958	285	53.0	12.8	8.0	579	2520	80	6873
20	M.N.		Olivine, biotite, pyroxene bearing melanocratic nephelinite	C0104		3.30	318	629	198	29.9	8.9	<0.1	416	2762	64	3606
24.50	M. N.	1	Brown anker. sovite vein  Limonitized brown anker. sovite	C0105	22.30	2.90	766	1246	348	55.3	16,5	<0.1	436	3047	92	6163
25,20	M. N.		Partly anker. sovite vein	C0106		4.40	425	823	253	46.1	14.3	<0.1	469	3443	81	7502
30 <sup>29.60</sup>		600	Limonitized mdg anker. sövite	C0107	-29.60 -34.60	5.00	214	408	108	14.6	7.3	<0.1	291	2388	44	1760
	109	60°	Calcite vein (w:lcm)  Calcite vein (w:0.5cm)	C0108	34.00	6.10	1116	1758	474	88.7	25.0	8.3	443	2550	130	5124
40.70 41.30 42.60 42.80	L	70°	Green altered dyke Dark green compact lamprophyre  White csg sovite with sphalerite	C0109	40.70	3.60	290	492	122	17.9	7.6	<0.1	311	6430	49	2466
44.30 46.20 46.60	x x 27777777	72	Mdg melanocratic nepheline syenite with pyrite	C0110		5.90	252	467	120	19.6	8.0	2.4	354	6564	53	1758
50 49.50 50 50.20	М. N. Х				50.20		-									

### GEOLOGIC DRILL LOG DDH JMC-1

(PHASE II)

Elevation 647.6m
Total Depth 50.2m
Inclination - 90°

1:200

M M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövite
Carbonate - Silicate rock
F:Feldspathic breccia, A: Agglomerate
XXXX Syenite
X <sub>x</sub> X <sub>x</sub> X Nepheline syenite
Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Iamprophyre
Joint, Fissure
60 % of carbonatite content
Mn Manganese mineral
HM Hematite
<u>cal</u> Calcite
Ap Apatite

Drusy feld. br. bearing sövite  7.20  83.0  P  11.20  P  11.20  P  11.20  CO202  1.20  CO202  1.20  1.			ion		Assay (ppm)												
Column   C	- 1	1	Lineat	Description	Sample No.	Depth (m)	Thick ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	Р
Drusy sovite   Drus	4.00 5,30	<ul><li>₩</li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li><li></li></ul>		gray sövite  Drusy feld. br. bearing sövite		0.70		736	1349	348	51.8	21.3	10.0	1336	5369	189	32492
Light brown limonitized phonolite   C0203   13.00   18.80   175   322   70   14.7   5.7   <0.1   286   1532     1532	) —	F A		Drusy sovite	C0202	4	4.00	861	1490	405						129	
C0204   3.80   514   908   241   26.6   16.9   <0.1   1194   7401      C0205   14.20   92   183   39   6.0   3.1   <0.1   261   324     C0206   700   P		P	80	Light brown limonitized phonolite	C0203		1.80	175	322	70	14.7	5.7	<0.1	286	1532	69	1370
Limonitized phonolite  P  20 20 30 P  Dark gray porphyritic phonolite  C0205		<b>®</b>			C0204		3.80	514	908	241	26.6	16.9	<0.1	1194	7401	117	6172
27.00 P Light brown limonitized phonolite  31.00 Gray mdg sovite with pyrite  33.20 P 60° Feld. br. bearing gray to white mdg sovite with pyrite  38.5m galena 40.1 sphalerite  27.00 P		P P	70°		C0205		14.20	92	183	39	6.0	3.1	<0.1	261	324	33	532
31.00 Gray mdg sövite with pyrite 33.20 P Greenish gray phonolite 33.90 Feld. br. bearing gray to white mdg sövite with pyrite 38.5m galena 40.1 sphalerite  CO208 5.40 651 1173 379 47.0 21.0 7.0 958 4088  1.10 785 1265 385 68.1 21.4 6.8 920 4180		p	/	Light brown limonitized phonolite		71.00											
36.40 38.5m galena 40.1 sphalerite C0207 37.50 1.10 785 1265 385 68.1 21.4 6.8 920 4180 60 60 60 60 60 60 60 60 60 60 60 60 60	3 I.00 33.20	<b>⊚</b> P	ég.	Greenish gray phonolite Feld. br. bearing gray to white	C0206		5.40	651	1173	379	47.0	21.0	7.0	958	4088	137	4687
37.50/7/44/22 40.1 sphalerite  40.1 sphalerite  C0208 5.00 199 519 347 56.6 27.5 2.1 761 8011	Ł	///64///		38.5m galena	C0207	1	1.10	785	1265	385	68.1	21.4	6.8	920	4180	159	11512
42.50					C0208		5.00	199	519	347	56.6	27.5	2.1	761	8011	114	1928
		⊗			C0209		5,00	425	856	483	95.7	37.7	4.0	980		157	3943
48.0m galena C0210 2.60 671 1098 378 50.2 22.5 4.9 480 12045	) <sub>50.10</sub>			48.0m galena	C0210		2.60	671	1098	378	50.2	22.5	4.9	480	12045	130	5279

### GEOLOGIC DRILL LOG DDH JMC-2

Elevation 713.9m
Total Depth 50.1m
Inclination - 90°

1:200

### LEGEND

M M	Orift	
	Sideritic co	ırbonatite
	Ankeritic S	övite
	Sövite	
V,V,V	Carbonate -	Silicate rock
Δ F Δ A Δ	F:Feldspath	ic breccia, A: Agglomerate
XXXXX	Syenite	
× <sub>x</sub> × <sub>x</sub> ×	Nepheline	syenite
	Dykes	T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Tamprophyre
	Joint, Fissu	re
60)	% of carb	onatite content
Mn	Mangane	se mineral
HM	Hematite	
cal	Calcite	

AP Apatite

Depth Geolog (m)	w Lineation	Description		Assay (ppm)											
1.10	~		Sample No.	Depth (m)	Thick-ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	Р
4.48		Buff to black mdg anker. sovite with feld. br.	C0301	1.10	3.30	4466	6007	1409	213.2	44.3	8.5	262	3938	227	3846
5.00 5.70 6.30 P 7.40	77700	Altered phonolite  Pale green altered phonolite	C0302	4.40	5.20	1629	2769	960	178.6	42.4	5.5	<b>48</b> 5	5763	164	4757
10 9.60 P	77760°	Feld. br. bearing carb.  Pale green to buff altered phonolite	C0303	9.60 12.10	2.50	1004	1562	444	77.2	19.4	6.2	700	6065	101	5959
15.70 P		Altered phonolite bearing dark brown anker. sovite	C0304	40.76	4.60	4080	5231	1115	199.4	43.5	4.7	685	4538	197	4124
20 19.80 P		Deeply weathered phonolite	C0305	16.70	5.50	4954	7013	1833	331.9	68.9	9.6	470	4869	290	4476
22.20		Partly altered phonolite bearing reddish brown anker. sövite with siderite, agglomerate, & feld. br.	C0306		5.00	2654	3750	927	156.3	34.1	0.6	708	9080	123	10172
30		29.6m bastnaesite (?)	C0307		5.00	4089	6105	1778	356.2	89.4	21.3	278	4060	439	3444
86			C0308	32.20	5.00	2259	3711	1102	209.9	52.4	7.7	534	7425	249	7963
39.10 P	700	Pale green altered phonolite	C0309		5.00	6363	8696	2035	356.1	81.7	32.7	543	6261	416	6716
989		43.3 kaolinizes agglomerate	C0310	42.20	5.00	8870	11326	2680	504.3	104.4	31.7	498	4657	454	8186
47.90 P 48.70 50 50 50.30			C0311	47.20 50.30	3.10	1161	1933	610	128.9	35.5	6.6	352	4120	153	4133

### GEOLOGIC DRILL LOG DDH JMC-3

(PHASE III)

Elevation 689.1m
Total Depth 50.3m
Inclination - 90 °

1:200

M M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövite
Carbonate – Silicate rock
A A A A F: Feldspathic breccia, A: Agglomerate
X X X X     Syenite
x <sub>x</sub> x <sub>x</sub> x Nepheline syenite
Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Lamprophyre
Joint, Fissure
60 % of carbonatite content
Mn Manganese mineral .
HM Hematite
cal Calcite
Ap Apatite

Depth		ıtion		Assay (ppm)												
Depth (m)		Line	Description	Sample No.	Depth (m)	Thick- ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	р
3,50	ΛΛ ΛΛ ΛΛ			and all all the sound lives of the dark half the sound in the	-3.50	***************************************									-wine 10 ki da - was ay yaning	
6.00	F (i) F		Pinkish brown feld. br. with anker. sovite	C0401		6.10	872	1143	233	42.5	14.3	2.3	213	986	76	1364
8.40 IO <u>9.60</u>	* * * * *		Sludge Mn bearing sovite Carbonatized nepheline syenite		9.60				*****							
12.30 13.70	.∷. <b>⊚</b> .∷.		Manganiferous sovite	C0402		7.90	308	582	176	18.4	8.9	<0.1	339	1590	35	3254
17.50	40 x		Carbonatized nepheline syenite	·												
19.00	∷: <b>©</b> ∷:		Feld. br. bearing carbonatized rock ·	C0403	17.50	5.00	606	876	199	29.4	7.9	1.6	232	1650	52	2860
	* * * * * * * * * * * * * * * * * * *		Carbonatized nepheline syenite	C0404	22.50	4.80	447	746	204	29.8	8.6	<0.1	289	1876	57	4677
26.50- 27.30-	Clay		Fissure, clay		27.30				<del> </del>							
30 <del></del>	F 40 A		Sövite bearing reddish brown feld. br.	C0405		4.90	460	802	275	58.6	18.2	<0.1	327	1135	96	1478
32.20 33.60 33.80	Clay x x <del>√®0∵zz</del>	leo"	Fissure, green clay and br. Limonitized weathered nepheline syenite with sovite		32.20											
	х (© х		Green, gray, brown altered nepheline syenite	C0406	39.00	6.80	445	730	240	43.9	13.6	<0.1	283	5063	71	3238
41.00	x x		White sovite Altered nepheline syenite	C0407		6.00	793	1461	597	123.0	31.0	1.5	290	4448	136	4270
43.80 - 44.40 - 44.60 - 45.00	x		White sovite with pyrite & barite	00405	45.00	E 00	770		40-	00.0	0.7	F -	007	0077	46	4704
50 <sub>50.20</sub>	30 x x		Carbonatized nepheline syenite	C0408	50.20	5.20	336	601	187	26.9	8.3	5.7	297	2833	48	4761
	- Encourage of															

### GEOLOGIC DRILL LOG DDH JMC-4

Elevation 754.7m Total Depth 50.2m Inclination - 90°

1:200

M Drift
Sideritic carbonatite
//////////////////////////////////////
Sövite
Carbonate – Silicate rock
F:Feldspathic breccia, A:Agglomero
X X X X Syenite
X <sub>x</sub> X <sub>x</sub> X Nepheline syenite
Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Lamprophyre
Joint, Fissure
60 % of carbonatite content
Mn Manganese mineral
HM Hematite
cal Calcite
AD Angitto

		neation		Assay (ppm)												
Depth (m)		Linea	Description	Sample No.	Depth (m)	Thick- ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	Р
	w w		Sövite boulder		<u>.</u>											
2.80			Weathered buff sovite with limonite	C0501	2.80	2.70	85	80	35	<0.1	2.1	6.8	42	139	27	2893
5.50			:		5.50			700	4.40	40.4	7.7	440	704	607	co	7055
8.30			Sludge	C0502	8.30	2.80	200	360	148	<0.1	7.3	14.2	324	603	69	3655
10			Deeply weathered limonite bearing buff fng sovite										:			
	: ®		bull ing borito	C0503		6.70	59	94	47	<0.1	2.5	<0.1	51	434	27	3170
					15.00						-					
15.00			Reddish brown fng anker. sovite with limonite, partly brecciated		10.00			447		0.0	7.0	-0.1	107	7066	40	4704
				C0504		4.90	53	117	56	2.9	3.2	<0.1	193	3066	40	4794
20 <u>19.90</u> 20.80	(/////// 		Limonite bearing drusy sövite		19.90											
				C0505	:	4.10	400	728	241	37.4	14.1	4.4	674	4980	143	16754
24.00			White mdg to csg pyrite bearing	-	24.00		ļ									
			sovite	C0506		5.00	777	1408	457	38.7	19.1	10.9	729	3769	152	5648
	∵ (@)				29.00									\ <u>.</u>		
30				C0507		5.00	412	743	273	18.0	12.4	9.5	504	3523	134	9440
					34.00											
						5.00		7-70	007	40.7	477	1	770	7470	120	6702
	: (0):			C0508		5.00	447	778	287	18.3	13.3	4.8	772	3436	120	0702
40			38.4m pyrite		39.00		<u>:</u>						<u> </u>		<u></u>	
40				C0509		5.00	257	522	218	3.4	9.3	4.3	361	3303	90	3332
					44.00			<u> </u>		<u> </u>						
	: ::	60°	Foliation 46.7-48.0 drusy,											0000	450	4040
			manganiferous	C0510		6.30	515	1128	465	63.0	26.4	5.7	772	2922	156	4619
50 <sub>50,30</sub>					50.30											

### GEOLOGIC DRILL LOG DDH JMC-5

Elevation 852.0m
Total Depth 50.3m
Inclination - 90°

1:200

M M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövite
Carbonate – Silicate rock
F:Feldspathic breccia, A: Agglomerate
x x x X Syenite
X <sub>X</sub> X <sub>X</sub> X Nepheline syenite
Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Tamprophyre
Joint, Fissure
60 % of carbonatite content
Mn Manganese mineral
HM Hematite
cal Calcite
AD Anatito

			Hion		Assay (ppm)											er gun troop The	
Depth (m)	.	ology	Lineation	Description	Sample No.	Depth (m)	Thick- ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	р
	M.	M		Reddish brown soil with carbonatite	C0601	5.20	5.20	1917	3466	1234	258.0	64.0	5.5	1164	4034	324	13248
10	^	w		float •	C0602	0.20	6.40	1292	2253	816	174.5	47.8	7.8	1046	4072	247	8662
11.60	x	×		Deeply weathered carbonatized feld. br. bearing nepheline syemite	C0603	11.60	6.10	112	278	105	27.1	10.8	<0.1	712	784	64	741
20	F A	A F		Carb. & nepheline syenite br. bearing agglomerate	C0604	17.70	5.00	185	479	246	75.4	22.3	8.2	1065	1284	115	1269
22.70 23.30 23.30	F	) <b>4</b>		Weathered sideritic carb.  Carb. bearing carbonatized feld. br. with mica & nepheline syenite	C0605	27.70	5.00	55	194	53	21.4	6.8	3.1	768	1125	48	429
30	F F€	<b>A</b>			C0606	-32.70	5.00	248	495	80	28.9	8.8	<0.1	774	825	59	644
	F	9 <b>A</b>		· , · •	C0607	37.70	5.00	70	221	81	15.4	7.1	<0.1	718	607	52	1105
40-42.0-	F	<b>)</b> •			C0608	42.00	4.30	115	307	112	28.0	7.1	<0.1	659	949	54	1487
	<b>4</b>	)F		Reddish brown carbonatized feld. br. with sovite, Mn mineral & limonite	C0609	47.00	5.00	393	838	392	73.1	24.1	14.7	879	1666	126	4620
49.50 50 <del>50.10</del>	F	<b>A</b>		Weathered nepheline syenite bearing feld. br.	C0610	50.10	3.10	947	2025	779	167.8	45.1	11.2	1091	1994	224	2295

### GEOLOGIC DRILL LOG DDH JMC-6

Elevation 604.4m
Total Depth 50.1m
Inclination - 90°

1:200

•
M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövițe
Carbonate - Silicate rock
F:Feldspathic breccia, A:Agglomerate
X   X   X     Syenite
X <sub>X</sub> X <sub>X</sub> X Nepheline syenite
Dykes  T — Trachyte P — Phonotite S — Sölvsbergite D — Dolerite L — Tamprophyre
Joint, Fissure
60 % of carbonatite content
Mn Manganese mineral
HM Hematite
cal Calcite
AP Apatite

	han da	rion	encedanget. Discrete halle hall and the second control of the seco	<u> </u>	ACCORDED NOT CONTROL OF	pynteriotet blassen		/	4ssa	ıy	( k	opm)	The second of th	a Mary Milyan Arabay (Mary)	<del></del>	
Depth (m	Geolog	Lineation	Description	Sample No.	Depth (m)	Thick ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	Р
	M M M M M		Brown to dark brown soil	C0701		9.70	1839	3354	1158	220.5	53.1	24.8	889	4772	255	13599
IO <u>-9.70</u>	x x		Creamy white weathered, carbonatized nepheline syenite	C0702	9.70	3.80	77	191	45	7.2	1.1	6.5	474	1641	20	1749
13.50 15.60	80		Dark brown Mn mineral bearing anker. sovite  Feld. br. bearing dark brown	C0703	13.50	3.80	6176	8116	1911	318.6	58.7	20.4	90	3525	377	7230
20	x 40 x		Deeply weathered carbonatized nepheline syenite	C0704	17.30	6.10	1836	2420	471	73.7	14.6	0.7	307	2231	102	2557
23.40 24.40			No core		23.40 24.40											
25.40	x x		Carbonatized nepheline syenite  Buff to creamy yellow sphane bearing carbonatized nepheline syenite	C0705		5.00	193	394	124	24.2	5.8	<0.1	239	1703	40	2212
30	(49 . x . x	45° 50° 50°	Carbonate vein (w:1cm) Carbonate vein (w:5cm)	C0706	29.40	5.00	490	935	231	37.3	8.6	<0.1	271	2060	51	2434
34.60 34.90	х	50°	Brecciated Carbonate vein (w:lcm)	C0707	34.40	5.00	585	884	176	38.9	7.6	0.8	346	1725	57	1930
40		20°	Carbonate vein (w:lcm) Carbonate vein (w:lcm) Reddish brown to creamy yellow sphane bearing carbonatized	C0708	39.40	5.10	231	459	106	18.2	4.2	<0.1	321	3601	43	2877
44.50	x x x 40		Buff to greenish gray altered nepheline syenite (carbonatized) constituents of minerals mica, feldspar, sphane,	C0709	44.50	5.70	208	387	91	13.5	3.4	<0.1	274	8320	32	1944
50 <sub>50.20</sub>	X ·		nepheline, pyroxene		50.20			encima sidden de meirele (en	****				·	www.com		

### GEOLOGIC DRILL LOG DDH JMC-7

Elevation 608.8m

Total Depth 50.2m

Inclination - 90°

1:200

M M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövite
Carbonate - Silicate rock
F:Feldspathic breccia, A: Agglomerate
X X X X     Syenite
X <sub>x</sub> X <sub>x</sub> X Nepheline syenite
Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Tamprophyre
Joint, Fissure
60 % of carbonatite content
Mn Manganese mineral
HM Hematite
<u>cal</u> Calcite
AP Apatite

er 2= 0 20 4 7 1 1	g a marindologica de la companya di anticada de deservos	ion	AND A SECOND COMMON ON A MANAGEMENT OF A COMMON STREET, STREET SECOND COMMON AND A PERSON AND A COMMON AND A COMMON ASSESSMENT OF A COMMO	Assay (ppm)												
Depth (m)	Geology	Lineat	Description	Sample No.	Depth (m)	Thick- ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	þ
	.M .M .M .M .M		Drift boulder: sideritic carb. anker. sovite feld. br.	C0801	2.40	7.00	1534	2663	712	111.0	24.8	13.1	313	1488	179	574
10 <u>9.40</u> 10.90	n M		Deeply weathered pale greenish gray anker. sovite  Deeply weathered mdg to fng buff anker. sovite with partly sideritic	C0802		5.00	250	492	139	25.6	7.4	4.3	436	2286	40	3293
	(ēĢ		carb. & sphane	C0803	19.40	5.00	283	556	155	27.6	8.7	<0.1	388	2467	45	4191
20			Reddish brown feld. br.	C0804		5.00	253	494	163	15.9	7.1	<0.1	338	2709	43	3046
	(ēQ)		Pale green mineral bearing mdg brown anker. sövite (altered nepheline syenite ?)	C0805	29.40	5.00	283	541	183	23.6	7.9	8.4	381	1947	4€	1792
30			Buff fng alteredanker. sövite	C0806	32.20	2.80	185	347	7 9	13.8	2.4			:		1830
38.50 39.00	90		Deeply weathered  Dark brown anker. sovite	C0807	38,50	6.30	516	968	320	48.6	13.2	0.3	493	2978	67	7 799
39.00 40 42.40	60		Biotite rich anker. sovite with pyroxene & feld. br.  Dark gray to brown anker. sovite	C0808	42.40											
46.00	(6) (8)		(pyroxenite ?)  Reddish brown brecciated buff anker. sovite	C0809	46.00	4.30										
50 <sub>50.30</sub>					50.30											

### GEOLOGIC DRILL LOG DDH JMC-8

Elevation 621.9m
Total Depth 50.3m
Inclination - 90°

1:200

an M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövite
Carbonate – Silicate rock
F:Feldspathic breccia, A: Agglomerate
x x x x Syenite
X <sub>x</sub> X <sub>x</sub> X Nepheline syenite
Dulas
Dykes Trachyte
PPhonolite SSölvsbergite
D — Dolerite
L— Tamprophyre
Joint, Fissure
60) % of carbonatite content
Mn Manganese mineral
HM Hematite
<u>cal</u> Calcite
Ap Apatite

Donth		Description		Assay (ppm)											
(m)	Geology	Description	Samp <del>le</del> No.	Depth (m)	Thick- ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	Р
	M M M			5.70											
5.70	100	Buff to reddish brown anker.	C0901		4.50	1552	2510	708	96.1	22.8	<0.1	365	3829	115	8245
10 10.20 10.50		Siderite bearing dark brown Mn mineral & anker. sovite	C0902	10.20 12.40	2.20	366	723	231	36.5	11.2	<0.1	879	1470	62	4713
		Feld. br. bearing weathered drusy anker. sovite	C0903		7.20	860	1793	728	98.9	23.9	<0.1	688	3027	145	11325
20 <sup>19.60</sup>	98	Dark reddish brown anker. sövite with feld. rock patch	C0904	19.60	5.00	330	666	202	32.1	9.9	<0.1	904	1725	49	8379
27.20 28.30		Feld. br. bearing anker. sovite	C0905	24.60 28.30	3.70	322	589	150	25.5	6.9	<0.1	876	1094	41	3894
30	<b>1</b>	•	C0906	33.30	5.00	175	327	78	14.1	3.1	3.5	624	725	30	1507
34.80 35.40			C0907		2.10	196	356	85	14.7	<0.1	3.9	430	685	27	3656
40			C0908	40.40	5.00	202	377	97	8.2	4.7	2.2	438	822	29	3095
43.30		Reddish brown feld. br. bearing	C0909	44.70	4.30	675	1093	263	27.9	8.0	<0.1	589	1522	45	4629
44.70		anker. sövite  Dark green pyroxene, biotite bearing anker. sövite (pyroxenite ?)	C0910	:	5.40	466	734	144	18.5	5.5	<0.1	732	1126	26	2889
50 <sub>50.10</sub>				50.10											

### GEOLOGIC DRILL LOG DDH JMC-9

Elevation 648.4m
Total Depth 50.1m
Inclination - 90°

1:200

M M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövițe
Carbonate - Silicate rock
F:Feldspathic breccia, A: Agglomerate
XXXX Syenite
X <sub>X</sub> X <sub>X</sub> X Nepheline syenite
Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Tamprophyre
Joint, Fissure
60 % of carbonatite content
Mn Manganese mineral
HM Hematite
<b>ca</b> Calcite
AP Apatite

Depth		tion		Assay (ppm)												
Depth (m)	Geology	Lined	Description	Sample No.	Depth (m)	Thick- ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	Р
2.20			Dark brown to buff fng anker.	ر در	2.20											
4.00 4.40			Buff fng anker. sovite with calcite vein, partly deep	C1001		5.00	867	1579	488	71.2	16.4	<0.1	291	7665	102	7562
		45°	weathered	<u></u>	7.20											
8.80 9.20 10		45°	Siderite bearing anker. sovite  Black & buff siderite bearing Mn anker. sovite with feld. br.	C1002		5.70	8901	14964	2994	375.1	57.1	18.7	263	7248	288	10091
12.90 13.50 13.60 14.00	breccia breccia		Gray deeplyweathered fault br.  Dark brown to black sideritic carb.	C1003	12.90	3.50	2918	4862	945	125.7	20.3	2.7	443	5112	103	5954
16.40 17.40 17.90	P /// <b>50</b> ////	45°	Greenish gray altered phonolite Phonolite bearing feld. br.	C1004	16.40	2.20	2530	4219	1034	114.1	19.3	<0.1	344	3927	90	3870
18.60 20 2100		400	Siderite, feld. br. bearing dark brown to buff fng anker. sovite with calcite vein	C1005	18.60	3.60	4971	9367	2269	330.3	61.0	23.0	236	7984	282	7451
22.20	P	70°	Deeply weathered greenish gray to pink carb, phonolite	C1006	22.20	5.80	640	1206	326	34.8	9.2	<0.1	410	1861	55	1883
25.00 25.20	777 <b>3</b> 37777 P		•	01000		0.00	010	1200	02.0					\		
29.00	<del></del>		Feld. br. bearing anker. sovite	C1007	-28.00 -30.10	2.10	971	1852	530	68.1	15.7	2.9	159	2793	121	3172
30 <sub>30.10</sub> 2	P			C1008		3.70	445	836	248	32.2	<0.1	<0.1	471	2223	52	2468
33.80 34.50			Mn anker. sovite with calcite vein	C1009	33.80	5.30	4312	7933	1625	243.8	38.1	17.5	362	2818	172	2503
37.60 39.10 40	P    //89///		Deeply weathered phonolite Feld. br. bearing dark brown manganiferous anker. sovite	C1010	39.10	3.50	1866	4586	1579	256.5	46.8	<0.1	184	4728	171	4597
42.60 46.00	P		Deeply weathered carbonatized phonolite	C1011	42.60	7.70	545	1080	279	39.8	11.5	25.1	484	2297	65	2502
	(// <b>(5</b> )(/// (0) P		Fold he hoosing only souths				J70	1000	213	03.0		20.1	,51			
50 49.60 50.30	///58////		Feld. br. bearing anker. sovite		50.30											

### GEOLOGIC DRILL LOG DDH JMC-10

Elevation 679.7m
Total Depth 50.3m
Inclination - 90°

1:200

### LEGEND

		•
M M	Drift	
	Sideritic car	bonatite
	Ankeritic Sö	vite
	Sövițe	
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Carbonate – S	Silicate rock
Δ F Δ/A Δ	F:Feldspathic	: breccia, A: Agglomerate
XXXX	Syenite	
x x x x	Nepheline sy	venite
	Dykes	T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Tamprophyre
	Joint, Fissure	
60	% of carbon	atite content
Mn	Manganese	mineral
HM	Hematite	
cal	Calcite	

Ap Apatite

		tion		Assay (ppm)												
Depth (m)		Lineati	Description	Sample No.	Depth (m)	Thick ness (m)	La	Се	Nd	Sm	Eu	Тb	Nb	Sr	Υ	þ
		50°	Feld. br. bearing dark brown anker. sovite, bracciated Foliation	C1101	1.10	6.20	4243	7681	1972	306.5	58.5	7.8	217	6210	304	8954
8.80 IO	<b>A</b> F		Dark brown anker. sövite, crushed Crushed Fault breccia with clay Dark brown manganiferous anker.	C1102	7.30	4.40	2916	5569	1361	218.6	38.5	<0.1	189	2250	202	2301
11.70 15.10 15.50	F A 60 A F		sovite  Fault breccia with clay	C1103	11.70	3.80	708	1244	349	32.9	8.6	<0.1	345	1044	68	1137
20	<b>F                                    </b>		· •	C1104	20.50	5.00	1672	2959	661	116.7	22.9	17.4	271	2799	120	2988
	<b>△</b> F (		Feld. br. with small amount of anker. sovite	C1105	20.00	5.00	1001	1917	475	72.5	16.3	<0.1	381	2799	83	3302
30	5 5 4 F		Core crushed Fault breccia with clay Carbonatized	C1106	25.50	5.00	2358	3978	713	131.8	16.5	0.5	317	2060	109	1963
31.50	F 40 A 450 F		Brown fng anker, sovite	C1107	30.50 34.30	3.80	3032	4908	1225	175.4	26.3	<0.1	270	2770	142	2697
35.00 38.50 39.10 40		٥٠	Feld. br. bearing white to brown fng anker. sovite  Pale greenish gray fng altered Fault breccia	C1108	38.50	4.20	3189	4883	1254	223.6	40.6	13.9	368	7011	195	6121
	F		Fault breccia with clay Carbonatized	C1109	44.30	5.80	1231	1916	417	55.8	10.7	15.2	269	2920	63	2320
44.30 45.30	F <b>A</b>		Feld. br. fng white anker. sovite with baryte and pyrite Partly anker. sovite bearing pale greenish gray, carbonatized	C1110	77.40	5.80	2200	3749	995	136.5	24.5	<0.1	131	1824	130	939
50 <sub>50.10</sub>	A F		49.2m fluorite		50.10				70°74°74°81°75°8							

### GEOLOGIC DRILL LOG DDH JMC-11

Elevation 687.2m

Total Depth 50.1m

Inclination - 90°

1:200

### LEGEND

M M	Drift
	Sideritic carbonatite
	Ankeritic Sövite
	Sövițe
V,V,V	Carbonate - Silicate rock
AF AAA	F:Feldspathic breccia,A:Agglomerat
XXXXX	Syenite
XXXX	Nepheline syenite
	Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Lamprophyre
	Joint, Fissure
60	% of carbonatite content
Mn	Manganese mineral
HM	Hematite
cal	Calcite

Ap Apatite

and distribution and distribution with the		Description		- Louis Alfandorae	<u> </u>	West - Inches (Flag III)	1	Assc	ıy	( <b>k</b>	opm)		tamadaya abarana ettibi vi	Recent Amphiments (mission on an	
Depth (m)		Description	Sample No.	Depth (m)	Thick- ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	р
2.20 2.60	^^ ^^ ********************************	Dark brown manganiferous No core White fng anker. sovite bearing dark brown manganiferous anker. sovite	C1201	2.20 6.40	4.20	9907	17745	5190	683.6	116.7	26.5	42	6192	413	6463
10			C1202		5.00	3559	6838	2434	349.9	64.5	25.8	240	4701	252	4546
11.40 12.80 13.60	99 99 99	Brecciated dark brown and white anker. sovite White fng anker. sovite Brecciated reddish brown altered anker. sovite with feld. br. Greenish gray brecciated, fluorite	C1203	11.40	5.80	2077	3626	964	124.5	20.4	7.3	288	5709	117	4936
17.20	<b>99</b>	Reddish brown to greenish gray  Fluorite & pyrite bearing greenish gray brecciated anker. Sovite	C1204		5.00	1569	2666	685	89.6	16.7	8.4	220	6196	102	5264
24.60		Fluorite & pyrite bearing anker. sovite	C1205	22. <u>2</u> 0 25.20	3.00	4692	7339	1628	190.4	<0.1	17.0	211	6864	157	5160
25,20	5	Phonolite br. bearing anker. sovite Altered phonolite Phonolite / carb. banded texture Phonolite / carb. banded texture	C1206		5.80	864	1570	479	75.9	15.9	<0.1	422	6079	109	7336
31.00 32.50 33.00		White fng anker. sovite  Brecciated, pyrite bearing	C1207	31.00 34.20	3.20	4575	8275	2409	309.5	48.4	13.3	382	5386	205	4824
34,20	45	White fng anker. sovite with fluorite, pyrite & baryte	C1208	-39.70	5.50	4138	7290	1993	279.1	47.9	17.1	58	2556	250	1739
40 <sup>39.70</sup> 41.70 42.80		Greenish gray banded anker. sovite, partly brecciated Fluorite bearing Greenish gray fng	C1209		5.20	3564	4986	1071	142.6	23.4	3.4	366	5854	127	5802
44.90	<b>66</b>	Banded, brecciated fng white and greenish gray anker. sovite with pyrite	C1210		5.30	4935	7194	1405	180.8	28.1	0.7	294	2999	155	2497
50 <sub>50.20</sub>				50.20					and posterior						

# GEOLOGIC DRILL LOG DDH JMC-12

Elevation 729.6m
Total Depth 50.2m
Inclination - 90°

1:200

M M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövite
Carbonate - Silicate rock
F:Feldspathic breccia, A: Agglomerate
XXXX Syenite
X X X X Nepheline syenite
Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Tamprophyre
Joint, Fissure
% of carbonatite content
Mn Manganese mineral
HM Hematite
cal Calcite
AP Apatite

		Description	<u> </u>	WE CONTRACTOR	ACTION CONTRACTOR AND		Thomson dalpmonths	4ssc	ly	1)	opm)		The second second second second	naire a Crimate Resident State Control	
Depth (m)		Description	Sample No.	Depth (m)	Thick- ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	Р
1,80	M M		the procedure of the San	1.80	-										
5.20	89	Brown brecciated manganiferous anker. sovite with feld. br. and siderite	C1301	5.20	3.40	1193	2794	888	127.8	29.0	8.3	234	7601	139	6030
		Fng altered anker. sovite  Anker./ siderite vein(w:10cm)	C1302		5.50	1160	2081	686	109.3	24.3	18.7	263	7652	109	5479
10 10.70		Brown manganiferous anker. sovite		10.70											
13,00		Altered anker. sovite	C1303	40.50	5.80	1385	2730	1016	181.9	43.4	<0.1	282	8572	149	6927
16.50	5	Feld. br. bearing white to gray fng anker. sovite	C1304	16.50	6.00	1161	2596	1054	160.4	38.2	<0.1	280	6095	183	10648
20 <sub>20.40</sub> 21.20 21.80 22.50	5 11,00 11,0	Foliation Dark brown manganiferous Dark brown manganiferous		22.50										,,,,	
		Gray to white fng anker. sovite with feld. br.	C1305		5.40	868	1828	747	134.6	40.5	13.7	484	7287	341	23552
26.80 27.90	<i></i>	Greenish gray porphyritic (carbonatized phonolite ?)		27.90								·			
30		Pyrite bearing drusy fng white to light gray anker. sovite with small amount of feld. rock 30.2m: pyrochlore?	C1306	70.00	5.00	820	1889	874	123.8	30.1	13.6	579	4629	200	36969
			C1307	32.90	5.00	893	1803	734	120.1	33.5	0.4	784	5821	209	28251
38.20 38.50 40		Dark brown manganiferous	C1308	37.90	5.00	1273	3080	1021	141.4	31.2	0.5	685	3595	148	19618
				42.90											
			C1309	47.90	5.00	1173	2326	1016	169.4	44.2	27.0	566	5367	226	17217
50 <u>50.30</u>		Dark brown manganiferous	C1310		2.40	1144	2424	1024	165.1	43.4	6.0	640	4485	231	13493

### GEOLOGIC DRILL LOG DDH JMC-13

Elevation 798.6m
Total Depth 50.3m
Inclination - 90 °

1:200

M M	Drift
	Sideritic carbonatite
	Ankeritic Sövite
	Sövițe
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Carbonate – Silicate rock
Δ F Δ/A Δ Δ Δ	F:Feldspathic breccia,A:Agglomerate
XXXXX	Syenite
$x \times x \times x$	Nepheline syenite
	Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Tamprophyre
	Joint, Fissure
60	% of carbonatite content
Mn	Manganese mineral
НМ	Hematite
cal	Calcite
Ap ]	Apatite

Donal		ology		Assay (ppm)												
Depti (n	n)		Description	Sample No.	Depth (m)	Thick- ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	Р
	00 // 0 50 // 0 20 // 0		Gray fng. anker. sövite  Brown limonitized anker. sövite Feld. rock bearing fng anker. sövite Drusy, limonitized	C1401	5.20	4.80	546	961	358	54.4	14.6	<0.1	112	3955	52	2664
6,2 7,0 7,7 9,0	70		Blueish gray fng anker. sövite Drusy, limonitized Brown & white fng anker. sövite	C1402	9.00	3.80	2831	4336	1233	207.2	47.5	12.9	141	3665	91	4608
10 - 10.5 10.9 11.4	60 60 70 10	700		C1 403		9.00	774	1400	E 77	00.0	06.7	7.0	000	7470	00	8507
14.5		60	Brown and gray fng  Buff (carbonatized phonolite ?)	C1403		8.00	731	1492	573	99.8	25.3	3.6	298	7170	99	6593
20-		45°	White & dark brown manganiferous anker. sovite	C1404	17.00	5.00	1003	2037	858	151.7	39.0	15.2	234	3270	144	9764
	(60)	45°	Foliation	C1405	22.00	5.00	982	2006	804	126.8	35.0	14.2	365	2624	108	1168
30 <sup>28.38</sup>	///100		Dark brown manganiferous Dark brown & white	C1406	27.00 31.40	4.40	1114	2434	1121	165.0	40.3	10.1	220	2746	144	2051
31.40 34.80 35.20			Dark brown manganiferous  Brown & white	C1407		4.80	2327	4222	1580	266.6	64.7	17.7	263	2076	133	1867
36.20	V//GY	50°	Dark brown manganiferous  Gray & brown fng anker, sovite	C1408	36.20	5.00	2276	3732	1336	272.3	71.0	27.9	174	4437	162	7988
,				C1409	41.20	5.00	1643	2899	1050	170.8	40.5	4.2	188	2733	92	1185
47.90 4 <b>8</b> .20	2000		Dark brown	C1410	46.20	4.00	1646	3465	1485	242.8	56.6	16.7	130	3188	108	2237
50 <sub>50.20</sub>			Gray and white	·	50.20											

### GEOLOGIC DRILL LOG DDH JMC-14

Elevation 906.8m

Total Depth 50.2m

Inclination - 90°

1:200

M M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövite
Carbonate - Silicate rock
F:Feldspathic breccia, A: Agglomerate
Ÿ <sub>X</sub> X X Syenite
X <sub>x</sub> X <sub>x</sub> X Nepheline syenite
Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Lamprophyre
Joint, Fissure
% of carbonatite content
Mn Manganese mineral
HM Hematite
cal Calcite
AP Apolite

ON COMMENT AND STATE OF THE STA	pathan manananananananananananananananananan	tion		Assay (ppm)												
Depth (m)		Lineati	Description	Sample No.	Depth (m)	Thick- ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	Р
	^^											·				
2,60			Buff to brown weathered anker. sovite with feld. br.		2.60											
5.30 6.60	P		Purplish brown weathered carbona- tized phonolite with carbonate vein	C1501		7.00	587	1072	287	53.5	12.5	2.9	442	2185	93	14491
10 <u>9.60</u>			Buff to brown weathered		9.60											
			Buff to brown Purplih brown Buff to brown	C1502		4.70	928	1683	776	184.4	45.1	7.0	1215	3149	155	18610
14.00 14.30			J411 55 010		14.30							,			A	
	<b>169</b>		Buff to reddish brown	C1503		5.00	904	1626	493	88.8	22.9	3.3	529	3398	142	21871
20 <del>20. 10</del> 20.30		60°	Grayish green altered carbonatized phonolite	C1504	19.30	4.70	643	1264	397	53.4	17.5	<0.1	1138	3233	112	20917
24.00			Brecciated buff to brown	·	24.00											
27.10	® <sub>~</sub> ⁄®		Sheared zone between anker. sovite and carbonatized phonolite	C1505	27.10	3.10	497	932	276	46.4	12.8	4.9	439	1810	78	11820
27.80 28.10 30	P	69.	Purplish brown carbonatized phonolite with pyroxene, biotite & sphane Carbonate vein (w:0.5cm)	C1506	70.10	5.00	366	654	191	31.9	10.6	8.7	218	1255	63	4160
32,60-	. Р 20Р	60°			32.10											
34.50	€9† ⊕°		Carbonate vein bearing purplish brown carbonatized phonolite	C1507	37.10	5.00	287	529	169	18.3	8.1	2.7	231	1801	54	4894
38.90- 40	 ⊗ P			C1508		4.80	584	1066	324	62.9	18.0	18.3	257	1737	99	5589
41.90	P		Sheared zone in carbonatized phonolite	C1509	41.90	2.70	625	1049	353	78.5	22.1	5.1	322	2026	104	4348
4460	60		Carbonatized phonolite bearing purplish brown to buff anker.	C1510		5.60	1485	2095	459	90.4	20.0	9.2	264	2465	114	5209
50 <sub>50.20</sub>					50.20											
				organi apiya daga daga daga daga daga daga daga da					77						11000	

### GEOLOGIC DRILL LOG DDH JMC-15

Elevation 622.7m

Total Depth 50.2m

Inclination - 90°

1:200

M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövițe
Carbonate - Silicate rock
F:Feldspathic breccia, A: Aggiomerate
xxxx Syenite
x <sub>x</sub> x <sub>x</sub> x Nepheline syenite
Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Iamprophyre
Joint, Fissure
60 % of carbonatite content
Mn Manganese mineral
HM Hematite
<u>cal</u> Calcite
Ap Apatite

Carlo Brooks (Carlo Brooks)		rion	THE LANCE A MAKE AND HER HOUSE AND A PROCESSION THE STEEL THE PROCESSION AND A STEEL THE STEEL T	Assay (ppm)												
Depth (m)	Geology	Linea	Description	Sample No.	Depth (m)	Thick- ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	р
	 								·.							
4.00 5.00 6.60	▲ (8) F		Weathered limonitized reddish brown feld. br. Feld. br. bearing white anker. sovite White sovite bearing pinkish brown feld. br.	C1601		5.00	1464	2365	903	223.5	60.0	15.4	394	3391	231	5553
9.00 IO <u>10.30</u>	V///#\\//		Deeply weathered anker. sovite  Limonitized anker, sovite with mica, sphane  (original rock: nepheline	C1602	9.00	5.00	457	817	223	34.6	11.1	5.9	1096	1597	70	7069
17.70 18.00 18.30			syenite ?)	C1603	19.00	5.00	747	1340	390	68.5	17.0	<0.1	638	2108	122	10858
20-	0	7	Reddish brown anker. sovite	C1604	24.00	5.00	674	1262	367	60.4	16.1	<0.1	763	2174	104	12053
25.40 25.80		60°	Carbonate veinlet (w:0.1cm)  Grayish green clay	C1605	27,00	5.80	515	939	265	45.4	12.6	1.6	555	2545	81	13802
30 <sup>29,80</sup>	<u> </u>	45°	Greenish gray altered nepheline syenite with mica, feldspar etc.	C1606	29.80 30.80		463	881	274	42.5	11.6	<0.1	483	5531	75	17217
1	P ///80///2 P	'		C1607	35.40	4.60	385	731	255	37.5	8.9	<0.1	440	17909	62	8449
35,40	х х х 40 х	50°	Carbonate vein bearing carbonatized greenish gray nepheline syenite	C1608	00.40	5.40	503	906	298	41.0	10.5	2.0	363	9858	70	13582
40.80 43.90	x x		Altered nepheline syenite bearing brown anker. sovite with mica, pyrite siderite	C1609	40.80 43.90	3.10	358	610	236	38.5	9.8	<0.1	427	5059	78	8554
	x x 30 x ; x 40		Biotite, calcite patch bearing greenish gray to white carbonatized nepheline syenite	C1610		6.30	382	628	189	26.8	5.6	8.0	435	7486	52	1207
50 <sub>50.20</sub>	× ×				50.20									d. 111 100 100 100 100 100 100 100 100 10		

### GEOLOGIC DRILL LOG DDH JMC-16

Elevation 624.5m
Total Depth 50.2m
Inclination - 90°

1:200

M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövite
Carbonate - Silicate rock
$\frac{\Delta F}{\Delta}$ F:Feldspathic breccia,A:Agglomerate
xxxx Syenite
x <sub>x</sub> x <sub>x</sub> x Nepheline syenite
Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Tamprophyre
Joint, Fissure
60 % of carbonatite content
Mn Manganese mineral
HM Hematite
cal Calcite
AP Apatite

	The same of the sa	rtion		Assay (ppm)												
Depth (m)		Linec	Description	Sample No.	Depth (m)	Thick- ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	Р
	лл лл		Sövite boulder bearing soil	C1701	2.00	2.00	528	932	311	13.4	13.8	2.1	138	2202	6	3064
2.00			Debree: sovite feld.br anker. sovite clay	C1702	2,00	7.60	1089	1996	905	152.3	42.3	10.3	428	932	167	7 5361
IO 9.60 12.50	99 750		Deeply weathered anker. sovite	C1703	9.60	4.40	563	1011	379	63.7	16.5	<0.1	360	250	85	1287
13.80 14.00 15.10 15.80 16.70	Clay		Reddish brown feld. br. Hematite bearing anker. sovite	C1704	14.00	3.30	415	729	225	43.5	13.2	<0.1	376	1126	82	3486
20 20 21.20	F A		Weathered anker, sövite with feld. br. Deeply weathered anker. sövite & feld. br. mixed zone	C1705		4.40	442	803	286	33.3	14.0	1.9	291	1620	85	2504
21.70° 23.40 24.30°	[ <u> </u>		Reddish brown feld. br. with anker. sovite Brown anker. sovite Anker. carb. veinlet bearing feld.	C1706	21.70	4.10	609	1546	933	176.2	36.0	<0.1	190	4453	189	4784
23.60	F (2) A	1	br. Fluorite bearing dark brown to black sideritic carb. with feld. br.	C1707	25.80	4.60	669	2222	1692	281.0	58.7	12.6	643	1085	207	11994
30 30.40 30.80 31.30 31.60	59 59 59	600	Melanocratic biotite rich anker. sovite Brown anker. sovite Melanocratic biotite rich anker.	C1708	30.40	5.90	495	1007	376	66.6	17.9	<0.1	1171	395	86	21892
34.40 35.30 36.00 36.30 36.70			Biotite rich		36.30											
38.70 40 <u>40.50</u> 41.00	59/10/10/10/10/10/10/10/10/10/10/10/10/10/	15°	Biotite rich Buff to brown	C1709	41.00	4.70	496	944	342	61.6	16.9	1.2	955	525	103	13898
43.10 44.30 45.20	60		Biotite rich Feld. br. bearing anker. sövite Biotite	C1710	-	5.20	754	1473	472	77.7	20.7	19.3	537	2763	110	22540
46.20		.	Buff Melanocratic biotite rich anker. Övite with partly feld. br.	C1711	46.20	4.00	381	697	225	46.1	11.8	<0.1	503	138	62	2890
50 <sub>50.20</sub>					50.20											

### GEOLOGIC DRILL LOG DDH JMC-17

Elevation 638.1m
Total Depth 50.2m
Inclination - 90°

1:200

M M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövite
Carbonate – Silicate rock
F:Feldspathic breccia, A:Aggiomerate
X X X X Syenite
X X X X Nepheline syenite
Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Tamprophyre
Joint, Fissure
60 % of carbonatite content
Mn Manganese mineral
HM Hernatite
<u>cal</u> Calcite
Ap Apatite

inference in Control of Africa Post		tion		Assay (ppm)												
Depth (m)	. 1	Lineati	Description	Sample No.	Depth (n)	Thick ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	Р
Agrada ) perrojo-do-Silva Myradica	 				-3.50											
3.50 4.60	HHH/30/HH	50	Reddish brown weathered sideritic carb. & anker. sovite mixed zone Reddish brown anker. sovite with sideritic carb.	C1801	0.00	5.00	931	2024	688	112.0	26.8	<0.1	467	492	128	4904
10	<b>759</b>			C1802	8.50	3.20	1358	2562	929	152.0	34.5	6.1	515	4186	188	4478
	60	45,	Limonitized black sideritic carb. with fluorite (fissure: 13.5-13.8m)	C1803	14.20	2.50	695	2354	1306	172.8	33.2	13.5	1	440	130	2272
	60	45°	Reddish brown anker. sovite  Sideritic carb. with fluorite	C1804		5.00	1121	2295	840	136.3	29.3	4.3	483	533	163	2053
20			Reddish brown brecciated anker, sovite with small amount of fluorite	C1805	19.20	5.00	1223	2527	987	160.7	36.3	2.8	453	456	181	2034
			•	· · · · · · · · · · · · · · · · · · ·	24.20											
26,50 27.20	///E/V///		Sheared ankeritic sovite	C1806		6.00	968	1785	611	98.9	23.1	9.1	487	573	131	2167
30	100		•		30.20						·-					
32.00 33.60	^⊕ F		Anker. sovite bearing feld. br.	C1807		5.00	1345	2277	727	115.0	25.2	7.1	568	1471	111	4396
	90	<i>1</i>	Brecciated reddish brown anker. sovite with feld. br. and sideritic carb. vein	C1808	35.20	5.00	1154	2020	702	121.2	27.1	4.3	466	744	158	2438
40	80	45°	Siderite vein with calcite(w:10cm)		40.20									<u> </u>		
42.50 43.00	<u> </u>		Pale green altered feld. br. with pyrite Brecciated reddish brown anker.	C1809		7.60	854	1700	619	103.7	24.5	9.1	639	587	137	2595
47.80	A F		Fluorite veinlet bearing pale green altered feld. br. with pyrite	C1810	47.80 50.10	2.30	875	1563	507	78.5	19.3	<0.1	509	4244	105	4780
50 <sub>50.10</sub>								ر مار در رواند و مار در رواند و رواند								-

### GEOLOGIC DRILL LOG DDH JMC-18

Elevation 665.3m

Total Depth 50.1m

Inclination - 90 °

1:200

M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövite
Carbonate – Silicate rock
F:Feldspathic breccia, A: Agglomerate
x x x x Syenite
x <sub>x</sub> x <sub>x</sub> x Nepheline syenite
T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Tamprophyre
Joint, Fissure
60 % of carbonatite content
Mn Manganese mineral
HM Hematite
cal Calcite
Ap Apatite

graph (marganina) seumitiko (materi Alem		lion		Assay (ppm)												
Depth (m)	Geology	Lineat	Description	Sample No.	Depth (m)	Thick- noss (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	Р
1.00 4.50 4.60	\$0 	40°	Reddish brown feld. rock & anker. sovite bearing black to dark brown sideritic carb, with bastnaesite Calcite vein (w:10cm)  Dark brown to brown anker. sovite	C1901	1.00 5.70	4.70	2704	7073	2776	360.2	65.9	20.0	43	4687	484	6414
5.70	90	30°	Reddish brown to black sider. carb. with anker. sovite and feld. rock	C1902	0.70	5.20	2920	6970	2733	378.2	72.9	32.5	110	1430	407	861
10.90 11.00 11.80 12.50 13.00		Fng buff anker. sovite		C1903	10.90	2.10	2088	5301	1854	215.8	40.5	6.5	340	4514	229	6742
13.00	70		Limonitized sideritic carb. with feld. br.	C1904	13.00	5.30	2724	5496	1790	245.4	45.1	9.0	89	3622	225	3588
18,30	69		Sideritic carb. bearing reddish brown anker. sovite	C1905	18.30	7.00	1479	2743	809	120.8	27.9	11.5	428	3567	129	10646
25.30 26.70 27.40	P (40)	50°	Greenish gray anker. sovite Buff fng anker. sovite Weathered crushed buff phonolite	C1906 C1907	25.30 27.40 29.30	2.10	942 61	<u> </u>		ļ	22.3	10.9	259 71	1853 554		· · · · · · · · · · · · · · · · · · ·
29.30 30	Ρ		Greenih gray porphyritic phonolite with calcite vein Biotite, magnetite bearing	C1908	-29. <b>3</b> 0	8.70	26	61	32	<0.1	3.5	13.4	57	1683	25	4101
	Р				70.00											
38.00	Р		Weathered greenish gray to buff altered phonolite	C1909	38.00 40.50	2.50	59	118	55	12.2	1.4	<0.1	76	521	36	5251
40 <del></del>	69		Reddish brown anker. sovite with feld. br.  Brown to gray anker. sovite with feld. br. & sideritic carb.	C1910		5.00	1673	3597	1225	184.8	42.7	8.8	204	5273	190	10364
	60	90°	Teru. Dr. & Sideritic Carp.	C1911	45.50	4.70	1510	2742	880	138.2	32.5	17.8	438	6598	149	11896
50 <sub>50.20</sub>					50.20											

### GEOLOGIC DRILL LOG DDH JMC-19

Elevation 724.0m
Total Depth 50.2m
Inclination - 90°

1:200

### LEGEND

÷
M M Drift
Sideritic carbonatite
Ankeritic Sövite
Sövite
Carbonate - Silicate rock
F:Feldspathic breccia, A:Agglomerate
x x x x Syenite
X <sub>X</sub> X <sub>X</sub> X Nepheline syenite
Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Tamprophyre
Joint, Fissure
% of carbonatite content
Mn Manganese mineral
HM Hernatite
<u>cal</u> Calcite

AP Apatite

		rion		Assay (ppm)												
Depth (m		ogy it	Description	Sample No.	Depth (m)	Thick ness (m)	La	Се	Nd	Sm	Eu	Tb	Nb	Sr	Υ	Р
			Feld. br. bearing sideritic carb.	C2001	10.40	2.80	11128	18374	4132	549.2	95.9	35.6	246	6532	412	3745
3.20	###60	609	Fissure with sideritic carb.  Dark brown manganiferous sideritic	-	3.20											
	<b>∞</b>		carb. & anker. sovite	C2002		4.60	8743	14675	3594	465.1	82.8	15.5	. 31	3623	474	1561
7.80					7.80										·	
10			Buff to reddish brown feld. br. bearing anker. sovite	C2003		3.50	2706	4278	967	126.7	23.0	3.9	233	6661	135	4515
1 1.00			Feld. br. bearing buff brecciated		11.30											
	<b>1</b> 89		anker. sovite	C2004		4.60	1721	2689	668	94.8	18.4	4.1	337	6697	112	5473
15.90					15.90											
			Dark brown to black manganiferous sideritic carb. with fluorite, bastnaesite?	C2005		5.50	3490	7789	2453	316.4	55.7	8.7	72	2731	296	1911
20 <sub>20.30</sub>	//60		20.0m concentric texture		21.40											
21.40			Pinkish brown to buff anker. sovite											:		
				C2006		6.40	1341	2228	580	83.1	17.1	1.4	236	6642	86	5515
27.80			altered phonolite		27.80											·
27.80 28.20	P P		Bluish gray biotite, pyroxene, magnetite bearing phonolite	02007		E 20	1041	1829	499	69.1	14.5	6.1	237	7187	75	3741
30.90 32.00	V//tro		,	· C2007		5.20	1041	1029	455	03.1	14.0	0.1	237	7107	,3	37.41
33.00 33.80 34.50	Р 777 <i>6</i> 37		Pinkish brown anker. sovite		33.00								·			
34.30			Brown to pinkish brown	C2008		6.40	1436	2471	656	94.1	19.3	0.2	277	4730	102	6099
40 <del>39.40</del>	///60/		Feld. br. bearing anker. sovite with banded texture		39.40											
41.00				C2009		5.60	1486	2870	848	112.9	23.3	16.4	214	5136	114	4840
43.60 45.00	//69		Feld. br. bearing anker. sovite	***************************************	45.00											
		[ <del>]]]]</del> ]	Dark brown to black manganiferous sideritic carb.	C2010		5.20	4430	8791	2435	291.5	51.1	15.8	239	6253	239	5205
47.60				<b>02010</b>			1,00	3,01	2,00		, • ·	10.0			3	
50 <del>49.90</del>					50.20			·			-					

### GEOLOGIC DRILL LOG DDH JMC-20

Elevation 779.0m
Total Depth 50.2m
Inclination - 90 °

1:200

M M	Drift
	Sideritic carbonatite
	Ankeritic Sövite
	Sövite
V,V,V	Carbonate – Silicate rock
Δ F Δ/A Δ	F:Feldspathic breccia,A:Agglomerate
XXXX	Syenite
x x x x	Nepheline syenite
	Dykes  T — Trachyte P — Phonolite S — Sölvsbergite D — Dolerite L — Tamprophyre
	Joint, Fissure
60	% of carbonatite content
Mn	Manganese mineral
HM_	Hematite
cal	Calcite
Ар	Apatite