

SAMPLE	Depth (m)	Depth Thick-ness (m)	La	Ce	Nd	Sm	Eu	Tb	Nb	Sr	Y	P	REO
T2501	1.6	6.6	2053	4218	1517	264.40	96.30	36.20	2483.0	22242	1047	89758.0	11146.3
T2502	6.6	10.6	2885	4913	1485	266.90	83.70	35.50	2021.0	16252	1098	94042.0	12990.6
T2503	10.6	15.6	2418	4498	1440	273.70	91.70	32.40	771.0	5803	1427	136253.0	12312.2
T2504	15.6	20.6	2488	4660	1521	271.50	88.10	14.40	1437.0	5499	1362	129063.0	12577.7
T2505	20.6	24.7	2361	3499	941	186.80	72.40	35.90	1458.0	6462	1457	141406.0	10355.7
T2506	24.7	27.0	2451	4254	1309	274.00	100.80	24.10	3287.0	9439	1632	138915.0	12160.2
T2507	27.0	32.0	1405	2632	916	224.80	93.10	26.90	478.0	5468	1506	141350.0	8387.4
T2508	32.0	37.7	1583	2883	968	234.00	91.90	24.70	1050.0	5260	1559	142559.0	8912.1
T2509	44.0	50.3	2602	4978	1672	316.50	104.10	43.60	1797.0	4723	1401	113384.0	13431.8
T2601	4.7	7.3	2219	4048	1317	258.57	91.73	30.89	1527.7	8680	1392	124633.6	11319.0
T2602	7.8	12.5	1779	3947	1430	263.10	82.10	24.80	3232.0	4114	878	78724.0	10144.9
T2603	12.5	13.8	1405	2893	1175	177.30	62.40	13.30	2924.0	3147	640	42474.0	7676.8
T2604	14.8	17.8	2496	5151	1734	289.10	84.10	28.40	5198.0	4690	755	47295.0	12599.4
T2605	17.8	21.3	4287	4045	1291	200.40	66.80	17.10	945.0	4135	645	48168.0	10337.9
T2606	21.7	28.3	5395	6253	1671	234.20	65.90	19.40	1402.0	31602	513	30519.0	15577.5
T2607	28.3	33.3	1971	3653	1295	270.40	75.90	54.10	1668.0	3950	684	68280.0	18796.9
T2608	33.3	37.7	3790	5919	1854	288.90	78.00	31.60	745.0	22528	787	47773.0	9711.2
T2609	37.7	39.9	1603	3017	1055	315.60	92.70	28.10	714.0	52372	857	52865.0	15470.1
T2610	39.9	46.7	1752	2989	1082	171.70	53.60	1.20	1648.0	6538	495	28838.0	7706.6
T2611	46.7	50.2	111	175	12	165.80	50.60	21.20	432.0	4522	417	26887.0	7792.1
T2701	1.5	6.4	2614	4256	1303	211.95	64.70	25.21	1439.4	13054	604	43746.5	10928.2
T2702	6.4	10.5	41	150	51	5.40	6.30	3.20	221.0	15693	72	8361.0	400.4
T2703	10.5	12.4	52	137	22	6.60	3.80	1.20	190.0	8095	33	6718.0	310.2
T2704	12.4	17.4	25	129	66	31.60	19.40	15.80	195.0	2238	201	19741.0	597.3
T2705	17.4	21.4	1332	2666	1039	152.80	45.30	12.70	314.0	2565	350	26032.0	6736.6
T2706	21.4	26.4	1887	3132	959	151.00	48.80	18.60	372.0	2615	408	25967.0	7949.0
T2707	26.4	30.5	1797	3399	1194	209.50	72.80	26.40	1169.0	2598	727	53748.0	8955.1
T2708	30.5	35.7	1349	2595	943	167.90	58.20	23.80	414.0	3218	545	48249.0	6850.3
T2709	39.4	42.6	1965	3433	1191	219.40	71.20	13.30	1259.0	24576	624	41173.0	9054.1
T2710	42.6	49.9	3186	5086	1509	228.10	52.50	24.50	969.0	24200	246	14542.0	12408.3
(10 Samples)			3713	5308	1332	186.10	42.00	11.40	1196.0	28671	196	11995.0	12953.2
			1716	2862	897	144.22	43.68	14.52	698.2	12938	349	25834.6	7249.6
JMT07	0.0		8103	9770	1635	229.60	32.40	10.20	146.0	37783	41	89.0	23776.5
JMT22	0.0		13965	15452	2429	348.10	35.50	5.00	508.0	56987	40	2.5	38689.7
JMT26	0.0		16328	18221	2623	354.30	35.80	6.90	35.0	68647	34	2.5	45090.1
8Y153	0.0		337	718	368	124.50	66.00	62.70	5	5965	2260	129629.0	4869.31
8Y154	0.0		269	558	277	73.00	45.30	46.70	5	5292	1367	114074.0	3631.72
(11 Samples)													

SAMPLE	Depth~ (m)	Depth Thick- ness (m)	La	Ce	Nd	Sm	Eu	Tb	Nb	Sr	Y	P	REO
C0101	6.9	13.7	196	388	118	22.50	3.50	0.05	432.0	1428	43	2421.0	928.8
C0102	13.7	16.4	664	1101	277	45.00	10.60	0.05	443.0	1590	93	2637.0	2636.5
C0103	16.4	19.0	487	953	285	53.00	12.80	0.80	579.0	2520	80	6873.0	2258.8
C0104	19.0	22.3	318	629	198	29.90	8.90	0.05	416.0	2762	64	3506.0	1502.6
C0105	22.3	25.2	766	1246	348	55.30	16.50	0.05	486.0	3047	92	6163.0	3034.5
C0106	25.2	29.6	425	823	253	46.10	14.30	0.05	469.0	3443	81	7502.0	1977.1
C0107	29.6	34.6	214	408	108	14.60	7.30	0.05	291.0	2388	44	1750.0	959.3
C0108	34.6	40.7	1116	1758	474	83.70	25.00	8.30	443.0	2550	130	5124.0	4327.1
C0109	40.7	44.3	290	492	122	17.90	7.60	0.05	311.0	6430	49	2466.0	1178.5
C0110	44.3	50.2	252	467	120	19.60	8.00	2.40	354.0	6564	53	1758.0	1111.1
C0201	0.7	7.2	461	301	223	38.53	11.30	1.58	408.9	3303	71	3776.9	1934.3
C0202	7.2	11.2	736	1349	348	51.80	21.30	10.00	1335.0	5369	189	32492.0	3262.0
C0203	11.2	13.0	861	1490	405	75.30	21.70	5.70	2161.0	2423	129	8024.0	3594.8
C0204	13.0	16.8	175	322	70	14.70	5.70	0.05	286.0	1532	69	1370.0	793.7
C0205	16.8	31.0	92	908	241	26.60	16.90	0.05	1194.0	7401	117	6172.0	2198.0
C0206	31.0	36.4	651	1173	379	47.00	21.00	7.00	958.0	4088	137	4687.0	430.6
C0207	36.4	37.5	785	1265	385	68.10	21.40	5.80	920.0	4180	159	11512.0	3236.7
C0208	37.5	42.5	199	519	347	56.60	27.50	2.10	761.0	8011	114	1928.0	1520.1
C0209	42.5	47.5	425	856	483	95.70	37.70	4.00	980.0	6819	157	3943.0	2471.5
C0210	47.5	50.1	671	1098	378	50.20	22.50	4.90	480.0	12045	130	5279.0	2831.2
C0301	1.1	4.4	426	786	265	41.93	17.51	3.59	854.7	4296	109	7243.3	1984.9
C0302	4.4	9.6	466	6007	1409	213.20	44.30	8.50	262.0	3938	227	3846.0	14854.8
C0303	9.6	12.1	1629	2769	960	178.60	42.40	5.50	485.0	5763	164	4757.0	6901.4
C0304	12.1	16.7	1004	1562	444	77.20	19.40	6.20	700.0	6065	101	5959.0	3861.0
C0305	16.7	22.2	4080	5231	1115	199.40	43.50	4.70	685.0	4538	197	4124.0	13046.9
C0306	22.2	27.2	4954	7013	1833	331.90	68.90	9.60	470.0	4869	290	4476.0	17404.4
C0307	27.2	32.2	2654	3750	927	156.30	34.10	0.60	708.0	9080	123	10172.0	9176.7
C0308	32.2	37.2	4089	6105	1778	356.20	89.40	21.30	278.0	4060	439	3444.0	15465.3
C0309	37.2	42.2	2259	3711	1102	209.90	52.40	7.70	534.0	7425	249	7963.0	9121.1
C0310	42.2	47.2	8870	11326	2680	504.30	104.40	31.70	498.0	6261	416	6716.0	21588.9
C0311	47.2	50.3	1161	1933	610	128.90	35.50	6.60	352.0	4657	454	8186.0	28756.7
C0401	3.5	9.6	3994	5583	1432	261.82	59.23	12.95	503.4	5609	269	5917.3	4839.4
C0402	9.6	17.5	872	1143	233	42.50	14.30	2.30	213.0	986	76	1364.0	2863.2
C0403	17.5	22.5	308	582	176	18.40	8.90	0.05	339.0	1590	35	3254.0	1357.4
C0404	22.5	27.3	606	876	199	29.40	7.90	1.60	232.0	1650	52	2860.0	2129.7
C0405	27.3	32.2	447	746	204	28.80	8.60	0.05	289.0	1876	57	4677.0	1795.3
C0406	32.2	39.0	460	802	275	58.50	18.20	0.05	327.0	1135	96	1478.0	2056.1
C0407	39.0	45.0	445	730	240	43.90	13.60	0.05	283.0	5063	71	3238.0	1855.2
C0408	45.0	50.2	793	1461	597	123.00	31.00	1.50	290.0	4448	136	4270.0	3773.4
			336	601	187	26.90	8.30	5.70	297.0	2833	48	4761.0	1458.5
			529	863	264	46.21	13.90	1.33	285.6	2510	71	3220.9	2149.2

SAMPLE	Depth (m)	Depth (m)	Thick- ness(m)	La	Ce	Nd	Sm	Eu	Tb	Nb	Sr	Y	P	RBO
C0501	2.8	5.5	2.7	85	80	35	0.05	2.10	6.80	42.0	139	27	2893.0	283.4
C0502	5.5	8.3	2.8	200	360	148	0.05	7.30	14.20	324.0	603	69	3655.0	961.7
C0503	8.3	15.0	6.7	59	94	47	0.05	2.50	0.05	51.0	434	27	3170.0	276.7
C0504	15.0	19.9	4.9	53	117	56	2.90	3.20	0.05	193.0	3066	40	4794.0	329.1
C0505	19.9	24.0	4.1	400	728	241	37.40	14.10	4.40	674.0	4980	143	16754.0	1890.6
C0506	24.0	29.0	5.0	777	1408	457	38.70	19.10	10.90	729.0	3769	152	5648.0	3445.9
C0507	29.0	34.0	5.0	412	743	273	18.00	12.40	9.50	504.0	3523	134	9440.0	1930.4
C0508	34.0	39.0	5.0	447	778	287	18.30	13.30	4.80	772.0	3436	120	6702.0	2008.9
C0509	39.0	44.0	5.0	257	522	218	3.40	9.30	4.30	361.0	3303	90	3332.0	1330.6
C0510	44.0	50.3	6.3	515	1128	465	63.00	26.40	5.70	772.0	2922	156	4619.0	2839.8
C0601	0.0	(10 Samples)	5.2	333	627	236	20.15	11.65	5.48	458.2	2715	99	6024.8	1603.1
C0602	5.2	11.6	6.4	1917	3466	1234	258.00	64.00	5.50	1164.0	4034	324	13248.0	8734.9
C0603	11.6	17.7	6.1	1292	2253	816	174.50	47.80	7.80	1046.0	4072	247	8662.0	5814.1
C0604	17.7	22.7	5.0	112	278	105	27.10	10.80	0.05	712.0	784	64	741.0	720.5
C0605	22.7	27.7	5.0	185	479	246	75.40	22.30	8.20	1065.0	1284	115	1269.0	1360.8
C0606	27.7	32.7	5.0	55	194	53	2.140	6.80	3.10	768.0	1125	48	429.0	461.8
C0607	32.7	37.7	5.0	248	495	80	28.90	8.80	0.05	774.0	825	59	644.0	1110.8
C0608	37.7	42.0	4.3	70	221	81	15.40	7.10	0.05	718.0	607	52	1105.0	540.1
C0609	42.0	47.0	5.0	115	307	112	28.00	7.10	0.05	659.0	949	54	1487.0	751.8
C0610	47.0	50.1	3.1	393	838	392	73.10	24.10	14.70	879.0	1666	126	4620.0	2236.8
C0701	0.0	(10 Samples)	9.7	947	2025	779	167.80	45.10	11.20	1091.0	1994	224	2295.0	5050.1
C0702	9.7	13.5	3.8	541	1055	388	86.53	24.36	4.88	884.8	1789	131	3546.5	2684.0
C0703	13.5	17.3	3.8	1839	3354	1158	220.50	53.10	24.80	889.0	4772	255	13599.0	8295.8
C0704	17.3	23.4	6.1	77	191	45	7.20	1.10	6.50	474.0	1641	20	1749.0	419.9
C0705	24.4	29.4	5.0	6176	8116	1911	318.60	58.70	20.40	90.0	3525	377	7230.0	20378.9
C0706	29.4	34.4	5.0	1836	2420	471	73.70	14.60	0.70	307.0	2231	102	2557.0	5907.3
C0707	34.4	39.4	5.0	193	394	124	24.20	5.80	0.05	239.0	1703	40	2212.0	940.5
C0708	39.4	44.5	5.1	490	935	231	37.30	8.60	0.05	271.0	2060	51	2434.0	2110.4
C0709	44.5	50.2	5.7	585	884	176	38.90	7.60	0.80	346.0	1725	57	1930.0	2104.2
C0801	2.4	9.4	7.0	231	459	106	18.20	4.20	0.05	321.0	3601	43	2877.0	1038.9
C0802	9.4	14.4	5.0	208	387	91	13.50	3.40	0.05	274.0	8320	32	1944.0	885.6
C0803	14.4	19.4	5.0	1250	1920	513	91.43	19.96	7.16	408.9	3511	117	4883.4	4708.5
C0804	19.4	24.4	5.0	1534	2663	712	111.00	24.80	13.10	313.0	1488	179	574.0	6299.6
C0805	24.4	29.4	5.0	250	492	139	25.60	7.40	4.30	436.0	2286	40	3293.0	1153.5
C0806	29.4	32.2	2.8	283	556	155	27.60	8.70	0.05	388.0	2467	45	4191.0	1294.8
C0807	32.2	38.5	6.3	253	494	163	15.90	7.10	0.05	338.0	2709	43	3046.0	1174.8
C0808	38.5	42.4	3.9	283	541	183	23.60	7.90	8.40	381.0	1947	45	1792.0	1314.3
C0809	42.4	46.0	3.6	185	347	91	13.80	2.40	0.05	318.0	2160	31	1830.0	807.4
C0810	46.0	50.3	4.3	516	968	320	48.60	13.20	0.30	493.0	2978	67	7997.0	2324.2
				229	433	121	18.40	7.70	0.05	452.0	2021	35	4483.0	1016.2
				362	697	204	26.00	9.70	4.60	482.0	2503	49	6151.0	1627.3
				465	901	308	37.90	11.10	7.60	443.0	2734	58	6778.0	2150.2
				502	923	271	39.95	11.10	4.32	403.0	2316	67	3964.6	2186.9

SAMPLE	Depth (m)	Depth Thick-ness (m)	La	Ce	Nd	Sm	Eu	Tb	Nb	Str	Y	P	REO
C0901	5.7	10.2	1552	2510	708	96.10	22.80	0.05	365.0	3829	115	8245.0	6012.3
C0902	10.2	12.4	366	723	231	36.50	11.20	0.05	879.0	1470	62	4713.0	1720.6
C0903	12.4	19.6	860	1793	728	98.90	23.90	0.05	688.0	3027	145	11325.0	4386.0
C0904	19.6	24.6	330	666	202	32.10	9.90	0.05	904.0	1725	49	8379.0	1551.5
C0905	24.6	28.3	322	589	150	25.50	6.90	0.05	876.0	1094	41	3894.0	1365.6
C0906	28.3	33.3	175	327	78	14.10	3.10	3.50	624.0	725	30	1507.0	759.9
C0907	33.3	35.4	196	356	85	14.70	0.05	3.90	430.0	685	27	3656.0	822.1
C0908	35.4	40.4	202	377	97	8.20	4.70	2.20	438.0	822	29	3095.0	867.3
C0909	40.4	44.7	675	1093	263	27.90	8.00	0.05	589.0	1522	45	4629.0	2539.5
C0910	44.7	50.1	468	734	144	18.50	5.50	0.05	732.0	1126	26	2889.0	1676.8
C1001	2.2	7.2	553	996	303	41.48	10.76	0.86	652.9	1728	63	5564.6	2366.4
C1002	7.2	12.9	867	1579	488	71.20	16.40	0.05	291.0	7665	102	7562.0	3756.2
C1003	12.9	16.4	8901	14964	2994	375.10	57.10	18.70	263.0	7248	288	10091.0	33196.2
C1004	16.4	18.6	2918	4862	945	125.70	20.30	2.70	443.0	5112	103	5954.0	10798.5
C1005	18.6	22.2	2530	4219	1034	114.10	19.30	0.05	344.0	3927	90	3870.0	9623.3
C1006	22.2	28.0	4971	9367	2269	330.30	61.00	23.00	236.0	7984	282	7451.0	20817.7
C1007	28.0	30.1	640	1206	326	34.80	9.20	0.05	410.0	1861	55	1883.0	2732.7
C1008	30.1	33.8	971	1852	530	68.10	15.70	2.90	159.0	2793	121	3172.0	4285.4
C1009	33.8	39.1	445	836	248	32.20	0.05	0.05	471.0	2223	52	2468.0	1941.3
C1010	39.1	42.6	4312	7933	1625	248.80	38.10	17.50	362.0	2818	172	2503.0	17260.0
C1011	42.6	50.3	1866	4586	1579	256.50	46.80	0.05	184.0	4728	171	4597.0	10230.5
C1101	1.1	7.3	545	1080	279	39.80	11.50	25.10	484.0	2297	65	2502.0	2461.8
C1102	7.3	11.7	2697	4857	1112	152.48	26.64	10.23	350.4	4344	135	4716.0	10814.6
C1103	11.7	15.5	4243	7681	1972	306.50	58.50	7.80	217.0	6210	304	8954.0	17527.0
C1104	15.5	20.5	2916	5569	1361	218.60	38.50	0.05	189.0	2250	202	2301.0	12400.9
C1105	20.5	25.5	708	1244	349	32.90	8.60	0.05	345.0	1044	68	1137.0	2899.6
C1106	25.5	30.5	1672	2959	661	116.70	22.90	17.40	271.0	2799	120	2988.0	6700.0
C1107	30.5	34.3	1001	1917	475	72.50	16.30	0.05	381.0	2799	83	3302.0	4290.5
C1108	34.3	38.5	2358	3978	713	131.80	16.50	0.05	317.0	2060	109	1953.0	8793.3
C1109	38.5	44.3	3032	4908	1225	175.40	26.30	0.05	270.0	2770	142	2697.0	11426.2
C1110	44.3	50.1	3189	4833	1254	223.60	40.60	13.90	368.0	7011	195	6121.0	11769.2
C1201	2.2	6.4	2200	1916	417	55.80	10.70	15.20	269.0	2920	63	2320.0	4457.7
C1202	6.4	11.4	2282	3749	995	136.50	24.50	0.05	131.0	1824	130	939.0	8696.4
C1203	11.4	17.2	9907	17745	5190	149.25	26.90	5.83	269.9	3227	144	3389.5	9026.8
C1204	17.2	22.2	3559	6838	2434	683.60	116.70	26.50	42.0	6192	143	6463.0	40946.4
C1205	22.2	25.2	2077	3626	964	349.90	64.50	25.80	240.0	4701	252	4546.0	16240.1
C1206	25.2	31.0	1569	2666	685	124.50	20.40	7.30	288.0	5709	117	4936.0	8338.1
C1207	31.0	34.2	4692	7339	1628	89.60	16.70	8.40	220.0	6196	102	5264.0	6175.5
C1208	34.2	39.7	864	1570	479	75.90	0.05	17.00	211.0	6864	157	5160.0	16854.1
C1209	39.7	44.9	4575	8275	2409	309.50	48.40	13.30	382.0	5079	109	7336.0	3744.9
C1210	44.9	50.2	4138	7290	1993	279.10	47.90	17.10	58.0	5386	205	4824.0	19027.8
C1211	50.2	55.3	3564	4986	1071	142.60	23.40	3.40	366.0	2556	250	1739.0	16846.2
C1212	55.3	60.2	4935	7194	1405	180.80	28.10	0.70	294.0	5854	127	5802.0	11909.9
C1213	60.2	65.1	3760	6351	1715	229.74	37.41	11.12	254.8	2999	155	2497.0	16701.1
C1214	65.1	70.2								5148	183	4817.9	14764.3

SAMPLE	Depth (m)	Depth (m)	Thick- ness(m)	La	Ce	Nd	Sm	Eu	Tb	Nb	Sr	Y	P	REO
C1301	1.8	5.2	3.4	1193	2794	888	127.80	29.00	8.30	234.0	7601	139	6030.0	6233.7
C1302	5.2	10.7	5.5	1160	2081	686	109.30	24.30	18.70	263.0	7652	109	5479.0	5030.9
C1303	10.7	16.5	5.8	1385	2730	1016	181.90	43.40	0.05	282.0	8572	149	6927.0	6612.3
C1304	16.5	22.5	6.0	1161	2596	1054	160.40	38.20	0.05	280.0	6095	183	10648.0	6241.5
C1305	22.5	27.9	5.4	868	1828	747	134.60	40.50	13.70	484.0	7287	341	23552.0	4785.8
C1306	27.9	32.9	5.0	820	1889	874	123.80	30.10	13.60	579.0	4629	200	36969.0	4748.8
C1307	32.9	37.9	5.0	893	1803	734	120.10	33.50	0.40	784.0	5821	209	28251.0	4561.4
C1308	37.9	42.9	5.0	1273	3080	1021	141.40	31.20	0.50	685.0	3595	148	19618.0	6854.6
C1309	42.9	47.9	5.0	1173	2326	1016	169.40	44.20	27.00	566.0	5367	226	17217.0	5982.7
C1310	47.9	50.3	2.4	1144	2424	1024	165.10	43.40	6.00	640.0	4485	231	13493.0	6054.6
C1401	(10 Samples)	5.2	4.8	1106	2341	902	143.29	35.69	8.82	469.6	6214	133	17000.8	5686.1
C1402	5.2	9.0	3.8	546	961	358	54.40	14.60	0.05	112.0	3955	52	2664.0	2384.1
C1403	9.0	17.0	8.0	2831	4336	1233	207.20	47.50	12.90	141.0	3665	91	4608.0	10508.8
C1404	17.0	22.0	5.0	731	1492	573	99.80	25.30	3.60	298.0	7170	99	6593.0	3632.7
C1405	22.0	27.0	5.0	1003	2037	858	151.70	39.00	15.20	234.0	3270	144	9764.0	5099.9
C1406	27.0	31.4	4.4	982	2006	804	126.80	35.00	14.20	365.0	2624	108	1168.0	4893.8
C1407	31.4	36.2	4.8	1114	2434	1121	165.00	40.30	10.10	220.0	2746	144	2051.0	6035.3
C1408	36.2	41.2	5.0	2327	4222	1580	266.60	64.70	17.70	263.0	2076	133	1867.0	10329.9
C1409	41.2	46.2	5.0	2276	3732	1336	272.30	71.00	27.90	174.0	4437	162	7988.0	9446.4
C1410	46.2	50.2	4.0	1643	2899	1050	170.80	40.50	4.20	188.0	2733	92	1185.0	7078.2
C1501	(10 Samples)	9.6	7.0	1434	2635	998	169.31	42.06	11.68	221.1	3323	113	4226.9	8420.9
C1502	9.6	14.3	4.7	587	1072	287	53.50	12.50	2.90	442.0	2185	93	14491.0	2537.6
C1503	14.3	19.3	5.0	928	1683	776	184.40	45.10	7.00	1215.0	3149	155	18610.0	4531.1
C1504	19.3	24.0	4.7	904	1626	493	88.80	22.90	3.30	529.0	3398	142	21871.0	3945.6
C1505	24.0	27.1	3.1	643	1264	397	53.40	17.50	0.05	1138.0	3233	112	20917.0	2993.8
C1506	27.1	32.1	5.0	497	932	276	46.40	12.80	4.90	499.0	1810	78	11620.0	2222.6
C1507	32.1	37.1	5.0	366	654	191	31.90	10.60	8.70	218.0	1255	63	4160.0	1594.4
C1508	37.1	41.9	4.8	287	529	169	18.30	8.10	2.70	231.0	1801	54	4894.0	1285.6
C1509	41.9	44.6	2.7	584	1066	324	62.90	18.00	18.30	257.0	1737	99	5539.0	2612.5
C1510	44.6	50.2	5.6	625	2095	459	78.50	22.10	5.10	322.0	2026	104	4348.0	2687.5
C1601	(10 Samples)	9.0	5.0	1485	2095	459	90.40	20.00	6.20	264.0	2465	114	5209.0	5133.2
C1602	9.0	14.0	5.0	1706	1218	372	70.40	18.64	9.20	503.9	2327	102	11475.2	2997.7
C1603	14.0	19.0	5.0	1464	2365	903	223.50	60.00	15.40	394.0	3331	231	5553.0	6314.2
C1604	19.0	24.0	5.0	457	817	223	34.60	11.10	5.90	1096.0	1597	70	7069.0	1948.0
C1605	24.0	29.8	5.8	747	1340	390	68.50	17.00	0.05	638.0	2108	122	10858.0	3230.6
C1606	29.8	30.8	1.0	674	1262	367	60.40	16.10	0.05	763.0	2174	104	12053.0	2989.1
C1607	30.8	35.4	4.6	515	939	265	45.40	12.60	1.60	555.0	2545	81	13802.0	2238.1
C1608	35.4	40.8	5.4	463	881	274	42.50	11.60	0.05	483.0	5531	75	17217.0	2102.5
C1609	40.8	43.9	3.1	385	731	255	37.50	8.90	0.05	440.0	17909	62	8449.0	1779.2
C1610	43.9	50.2	6.3	503	906	298	41.00	10.50	2.00	363.0	9858	70	13582.0	2201.0
	(10 Samples)	50.2	6.3	358	610	236	38.50	9.80	0.05	427.0	5059	78	8554.0	1599.3
				382	628	189	26.80	5.60	8.00	435.0	7486	52	1207.0	1552.5
				610	1068	345	63.27	16.64	3.85	567.2	5738	96	9118.3	2647.2

SAMPLE	Depth (m)	Depth (m)	Thick- ness(m)	La	Ce	Nd	Sm	Eu	Tb	Nb	Sr	Y	P	REO
C1701	0.0	2.0	2.0	528	932	311	13.40	13.80	2.10	138.0	2202	67	3064.0	2245.5
C1702	0.0	9.6	7.6	1089	1996	905	152.30	42.30	10.30	428.0	932	167	5361.0	5233.8
C1703	9.6	14.0	4.4	563	1011	379	63.70	16.50	0.05	360.0	250	85	1287.0	2544.8
C1704	14.0	17.3	3.3	415	729	225	43.50	13.20	0.05	376.0	1126	82	3486.0	1814.3
C1705	17.3	21.7	4.4	442	803	285	33.30	14.00	1.90	291.0	1620	85	2504.0	2003.0
C1706	21.7	25.8	4.1	609	1546	933	176.20	36.00	0.05	190.0	4453	189	4784.0	4186.9
C1707	25.8	30.4	4.6	669	2222	1692	281.00	58.70	12.60	643.0	1085	207	11994.0	6157.6
C1708	30.4	36.3	5.9	495	1007	376	66.60	17.90	0.05	1171.0	395	86	21892.0	2462.9
C1709	36.3	41.0	4.7	496	944	342	61.60	16.90	1.20	955.0	525	103	13898.0	2363.0
C1710	41.0	46.2	5.2	754	1473	472	77.70	20.70	19.30	537.0	2753	110	22540.0	3519.7
C1711	46.2	50.2	4.0	381	697	225	46.10	11.80	0.05	503.0	138	62	2890.0	1711.1
				623	1291	597	100.41	25.58	5.10	549.3	1323	119	9424.2	3317.5
				(11 Samples)										
C1801	3.5	8.5	5.0	931	2024	688	112.00	26.80	0.05	467.0	492	128	4904.0	4703.3
C1802	8.5	11.7	3.2	1358	2562	929	152.00	34.50	6.10	515.0	4186	188	4478.0	6284.3
C1803	11.7	14.2	2.5	695	2354	1306	172.80	33.20	13.50	1.0	440	130	2272.0	5648.3
C1804	14.2	19.2	5.0	1121	2295	840	136.30	29.30	4.30	483.0	533	163	2053.0	5516.6
C1805	19.2	24.2	5.0	1223	2527	987	160.70	36.30	2.80	453.0	456	181	2034.0	6150.1
C1806	24.2	30.2	6.0	968	1785	611	98.90	23.10	9.10	487.0	573	131	2167.0	4358.2
C1807	30.2	35.2	5.0	1345	2277	727	115.00	25.20	7.10	568.0	1471	111	4396.0	5533.3
C1808	35.2	40.2	5.0	1154	2027	702	121.20	27.10	4.30	466.0	744	158	2438.0	5030.3
C1809	40.2	47.8	7.6	854	1700	619	103.70	24.50	9.10	639.0	587	137	2595.0	4144.2
C1810	47.8	50.1	2.3	875	1563	507	78.50	19.30	0.05	509.0	4244	105	4780.0	3783.7
				1057	2082	762	122.46	27.60	5.79	488.9	1087	144	3065.5	5048.2
				(10 Samples)										
C1901	1.0	5.7	4.7	2704	7073	2776	360.20	65.90	20.00	43.0	4687	484	6414.0	16226.1
C1902	5.7	10.9	5.2	2920	6970	2733	378.20	72.90	32.50	110.0	1430	407	861.0	16248.4
C1903	10.9	13.0	2.1	2088	5301	1854	215.80	40.50	6.50	340.0	4514	229	6742.0	11716.2
C1904	13.0	18.3	5.3	2724	5496	1790	245.40	45.10	9.00	89.0	3622	225	3588.0	12654.5
C1905	18.3	25.3	7.0	1479	2743	809	120.80	27.90	11.50	428.0	3567	129	10646.0	6396.1
C1906	25.3	27.4	2.1	942	1695	532	88.10	22.30	10.90	259.0	1853	116	9694.0	4094.6
C1907	27.4	29.3	1.9	61	150	59	8.90	4.80	0.05	71.0	554	31	4321.0	379.9
C1908	29.3	38.0	8.7	26	61	32	0.05	3.50	13.40	57.0	1683	25	4101.0	194.0
C1909	38.0	40.5	2.5	59	118	55	12.20	1.40	0.05	76.0	521	36	5251.0	339.8
C1910	40.5	45.5	5.0	1673	3597	1225	184.80	42.70	8.80	204.0	5273	190	10364.0	8323.1
C1911	45.5	50.2	4.7	1510	2742	880	136.20	32.50	17.80	438.0	6598	149	11896.0	6572.2
				1524	3343	1183	163.93	33.83	13.66	191.0	3280	188	6655.0	7756.4
				(11 Samples)										
C2001	0.4	3.2	2.8	11128	18374	4132	549.20	95.90	35.60	246.0	6532	412	3745.0	41746.7
C2002	3.2	7.8	4.6	8743	14675	3594	465.10	82.80	15.50	31.0	3623	474	1561.0	33722.3
C2003	7.8	11.3	3.5	2706	4278	967	126.70	23.00	3.90	233.0	6661	135	4515.0	9904.6
C2004	11.3	15.9	4.6	1721	2689	668	94.80	18.40	4.10	337.0	6697	112	5473.0	6378.0
C2005	15.9	21.4	5.5	3490	7789	2453	316.40	55.70	8.70	72.0	2731	296	1911.0	17336.3
C2006	21.4	27.8	6.4	1341	2228	580	83.10	17.10	1.40	236.0	5642	86	5515.0	5212.3
C2007	27.8	33.0	5.2	1041	1829	499	69.10	14.50	6.10	237.0	7187	75	3741.0	4248.2
C2008	33.0	39.4	6.4	1436	2471	656	94.10	19.30	0.20	277.0	4730	102	6099.0	5745.0
C2009	39.4	45.0	5.6	1486	2870	848	112.90	23.30	16.40	214.0	5136	114	4840.0	6577.8
C2010	45.0	50.2	5.2	4430	8791	2435	291.50	51.10	15.80	239.0	6253	239	5205.0	19550.0
				3263	5833	1525	199.57	36.66	9.38	211.8	5533	189	4353.6	13294.8
				(10 Samples)										

SAMPLE	Depth (m)	Depth Thick- ness(m)	La	Ce	Nd	Sm	Eu	Tb	Nb	Sr	Y	P	REO
C2101	1.5	4.7	1594	3597	1202	141.30	30.40	4.90	50.0	1735	245	1112.0	8205.6
C2102	4.7	10.2	1806	3187	906	111.80	25.90	17.60	266.0	7227	150	5728.0	7458.9
C2103	10.2	15.2	2652	6034	1892	250.60	49.30	21.70	302.0	6998	278	6763.0	13452.4
C2104	15.2	21.6	1412	2512	723	98.90	22.50	25.90	466.0	9430	125	7690.0	5913.4
C2105	21.6	26.6	2284	5237	1589	201.40	36.60	18.70	262.0	6554	207	5173.0	11523.4
C2106	26.6	31.8	3289	7272	2059	249.00	45.20	21.00	98.0	2479	379	4184.0	16035.5
C2107	31.8	36.7	2905	5629	1577	201.90	40.00	16.90	293.0	9220	226	7541.0	12745.8
C2108	36.7	41.6	2330	4733	1328	173.50	34.10	0.05	322.0	9973	216	7268.0	10608.8
C2109	41.6	46.5	3610	6812	1753	214.20	38.50	7.10	426.0	9069	261	8892.0	15276.4
C2110	46.5	50.3	1928	3541	1001	128.70	27.00	0.05	410.0	10545	154	8920.0	8153.3
(10 Samples)													
C2201	1.0	6.8	2388	4854	1397	176.90	34.89	14.50	299.1	7477	222	6548.1	10935.8
C2202	6.8	10.8	3871	5711	1237	168.90	35.00	7.70	629.0	7733	264	5787.0	13576.7
C2203	10.8	14.5	1210	2180	556	82.00	16.00	1.50	464.0	6537	141	6265.0	5039.1
C2204	14.5	19.3	1431	2870	670	97.50	19.50	0.05	320.0	11837	147	7911.0	6306.6
C2205	19.3	24.6	1591	3082	731	102.20	21.40	0.60	391.0	7950	142	5664.0	6827.7
C2206	24.6	29.5	3951	6913	1758	227.10	40.00	14.50	450.0	10988	270	7409.0	15842.9
C2207	29.5	32.7	1256	2399	651	89.80	18.30	0.05	667.0	9983	130	6756.0	5468.8
C2208	32.7	37.0	573	1298	294	47.50	9.40	2.60	273.0	10205	50	6986.0	2741.4
C2209	37.0	43.9	2414	4442	738	84.70	14.30	18.50	335.0	5054	166	2506.0	9493.8
C2210	43.9	47.7	1641	2709	696	97.20	18.50	2.70	595.0	6901	129	4457.0	6394.2
C2211	47.7	50.2	3322	4808	914	117.20	18.40	14.50	331.0	2214	108	952.0	11177.8
(11 Samples)													
C2301	9.6	12.6	2203	3718	851	114.92	21.84	5.98	478.7	7896	160	5454.5	8510.2
C2302	12.6	17.4	229	380	144	27.20	5.50	0.05	152.0	1381	45	4231.0	998.3
C2303	17.4	20.6	424	700	224	30.20	7.90	0.05	152.0	2068	49	4460.0	1724.6
C2304	20.6	22.0	407	667	209	32.10	6.60	1.20	325.0	5038	35	3689.0	1630.9
C2305	22.0	27.2	589	959	300	50.80	11.80	4.60	1935.0	3315	69	5430.0	2383.9
C2306	27.2	34.0	370	584	198	36.50	8.20	6.20	177.0	6729	49	4174.0	1503.2
C2307	34.0	41.2	581	971	280	44.30	9.60	0.05	326.0	7013	57	3534.0	2335.3
C2308	41.2	44.8	390	627	203	30.10	9.10	0.30	169.0	8085	49	3990.0	1572.2
C2309	44.8	49.7	529	886	261	40.90	10.60	2.10	363.0	7042	56	4043.0	2146.1
C2310	49.7	50.1	567	941	304	49.00	11.40	0.90*	158.0	8976	56	4047.0	2317.3
(10 Samples)													
C2401	3.0	6.2	455	748	235	37.25	8.96	1.42	286.5	5487	43	981.0	2241.8
C2402	6.2	12.3	500	921	474	144.10	35.00	0.05	309.0	2404	124	4018.5	1847.5
C2403	12.3	17.4	638	1075	293	53.20	15.80	0.05	332.0	4488	88	1906.0	2635.4
C2404	17.4	21.4	1122	1712	375	73.50	17.60	5.20	349.0	1907	96	2330.0	2601.9
C2405	21.4	24.1	78	149	57	16.90	3.40	0.05	96.0	10079	30	5326.0	4089.2
C2406	24.1	29.2	1096	1439	247	41.10	9.90	0.05	343.0	2752	77	2151.0	3497.7
C2407	29.2	34.2	536	809	206	28.70	10.20	5.80	408.0	1256	66	1745.0	1998.0
C2408	34.2	39.2	1158	1158	356	69.40	17.40	3.60	298.0	733	97	1514.0	2747.8
C2409	39.2	44.2	384	770	256	59.80	17.00	3.50	298.0	8348	93	2295.0	1905.7
C2410	44.2	50.3	358	699	184	23.70	8.70	0.05	291.0	4923	65	1371.0	1613.0
(10 Samples)													
C2410	44.2	50.3	463	910	256	62.10	15.20	3.00	350.0	5383	87	1571.0	2162.7
C2410	44.2	50.3	564	963	269	55.58	14.77	2.35	315.1	4266	82	2130.0	2345.2

SAMPLE	Depth (m)	Depth Thick-ness (m)	La	Ce	Nd	Sm	Eu	Tb	Nb	Sr	Y	P	REO
C2501	2.9	7.2	1918	2751	771	147.40	36.20	4.50	417.0	7589	174	7048.0	6966.1
C2502	7.2	11.8	1324	2017	741	156.40	39.80	2.10	378.0	5252	162	4343.0	5329.6
C2503	11.8	15.1	3381	5139	1430	235.40	53.50	9.70	392.0	6389	268	5118.0	12630.5
C2504	15.1	18.4	814	1535	728	155.00	37.90	15.40	418.0	4166	141	3373.0	4109.1
C2505	18.4	23.2	685	1420	848	199.20	53.30	11.30	348.0	5527	208	3981.0	4106.0
C2506	23.2	27.6	822	1512	633	127.50	33.70	7.40	537.0	3241	154	2052.0	3950.0
C2507	27.6	33.9	1543	2905	1902	424.00	96.10	28.50	429.0	15334	290	14132.0	8599.2
C2508	33.9	40.7	751	1344	527	122.90	32.60	6.30	507.0	4174	149	3190.0	3522.6
C2509	40.7	47.0	1065	1978	838	203.80	52.50	10.20	311.0	3517	177	3593.0	5189.1
C2510	47.0	50.1	1088	1794	633	125.70	29.80	9.20	508.0	4754	145	5592.0	4592.4
(10 Samples)													
C2601	2.0	6.4	1271	2162	922	197.87	48.62	10.89	422.1	6235	189	5447.8	5759.7
C2602	6.4	11.4	1936	3566	1944	373.20	86.70	21.90	266.0	8256	334	6111.0	9899.4
C2603	11.4	15.0	1495	2727	1078	246.20	64.00	18.70	785.0	5971	316	4399.0	7141.9
C2604	15.0	18.9	1878	3108	1053	226.40	57.10	17.30	613.0	7606	310	6192.0	7989.7
C2605	18.9	26.3	1957	5822	3574	565.80	113.00	29.20	187.0	7286	422	5784.0	14969.0
C2606	26.3	28.2	2622	4674	1705	291.60	77.00	19.90	469.0	6684	466	5509.0	11845.5
C2607	28.2	33.2	999	3838	2219	309.10	52.40	4.00	0.5	1295	180	534.0	9124.7
C2608	33.2	36.1	2208	5622	2966	517.60	118.10	28.00	428.0	7320	470	5653.0	14318.5
C2609	36.1	43.5	2440	4727	1957	358.60	86.20	8.80	406.0	9078	413	6740.0	11999.2
C2610	43.5	47.9	2018	4759	2463	371.50	76.90	24.90	437.0	3357	361	2799.0	12090.1
C2611	47.9	50.2	1131	4907	3612	443.90	77.30	18.70	36.0	2747	216	1858.0	12464.3
(11 Samples)													
C2701	1.5	6.5	1893	4362	2229	363.59	80.18	20.05	395.2	5795	358	4488.6	11168.3
C2702	6.5	10.7	1138	2014	664	124.40	34.20	10.00	116.0	5138	137	5760.0	4951.7
C2703	10.7	14.3	754	1121	336	51.20	15.90	1.70	172.0	5544	83	5420.0	2838.0
C2704	14.3	18.6	951	3111	1417	195.10	42.10	6.20	248.0	4147	119	4489.0	7021.4
C2705	18.6	25.0	2096	3660	1047	210.50	62.50	18.70	182.0	4147	209	6597.0	8777.4
C2706	25.0	31.8	433	778	322	52.60	15.60	2.20	742.0	3496	76	5115.0	2016.9
C2707	31.8	37.5	386	691	239	40.30	14.40	16.50	72.0	4597	52	4101.0	1728.5
C2708	37.5	43.3	1063	4224	2224	294.40	59.20	29.30	54.0	2663	223	2058.0	9754.2
C2709	43.3	47.0	463	972	383	50.80	16.50	1.20	103.0	3988	82	3879.0	2366.9
C2710	47.0	50.2	941	2712	1401	178.60	40.40	0.05	14.0	6551	125	4263.0	6480.5
(10 Samples)													
C2801	1.8	6.8	829	1919	798	119.79	30.41	10.31	329.0	3343	57	2530.0	1853.1
C2802	6.8	11.8	1462	3251	1516	247.60	63.50	15.00	210.2	4578	115	4410.9	4591.2
C2803	11.8	16.0	1828	3808	1692	270.50	65.80	22.50	372.0	7282	149	2177.0	8042.1
C2804	16.0	21.7	905	1756	730	104.40	31.00	7.40	405.0	6425	137	2541.0	9383.2
C2805	21.7	26.7	1007	1991	833	115.80	32.60	8.30	386.0	695	93	407.0	4352.7
C2806	26.7	31.7	1051	2700	1339	242.50	58.30	9.80	86.0	2689	124	1740.0	4936.6
C2807	31.7	36.7	2224	5091	2431	386.50	89.30	32.60	298.0	6330	274	10134.0	12632.3
C2808	36.7	41.7	988	2527	1264	189.60	48.10	12.40	100.0	6420	178	3907.0	6263.6
C2809	41.7	46.7	1189	2864	1421	230.70	56.90	3.80	103.0	7061	231	3337.0	7199.8
C2810	46.7	50.2	1197	2434	1001	150.70	44.20	20.00	304.0	6790	165	4238.0	6018.8
(10 Samples)													
			1422	2718	1096	175.90	55.80	29.50	486.0	8471	629	52071.0	7385.1
			1334	2944	1352	214.75	55.00	15.89	252.3	5793	205	7391.3	7347.4

SAMPLE	Depth (m)	Depth-Thick- ness (m)	La	Ce	Nd	Sm	Eu	Tb	Nb	Sr	Y	P	REO
C2901	0.4	5.4	3246	4956	1445	219.10	50.00	16.60	117.0	5041	222	5410.0	12191.5
C2902	5.4	10.4	3458	5547	1647	231.30	54.60	22.10	125.0	3657	199	2487.0	18398.1
C2903	10.4	15.4	1600	2707	924	131.80	36.00	3.00	186.0	3321	229	7706.0	6767.2
C2904	15.4	20.4	1725	3222	1371	207.80	50.00	5.40	22.0	4793	135	2125.0	8055.2
C2905	20.4	25.4	1892	2548	891	118.80	29.70	2.00	39.0	3557	96	1735.0	6097.1
C2906	25.4	30.4	2055	3457	1117	174.30	40.90	5.10	46.0	4964	163	4518.0	8420.6
C2907	30.4	35.4	2410	4406	1678	323.80	75.80	14.70	91.0	3588	180	1736.0	10903.0
C2908	35.4	40.4	2179	3771	1257	212.30	51.10	14.20	396.0	5051	168	4558.0	9187.6
C2909	40.4	45.4	1892	3565	1337	238.00	61.10	23.00	120.0	4675	262	13403.0	8862.1
C2910	45.4	50.3	1962	4111	1765	332.90	82.30	24.50	284.0	5797	255	5898.0	10241.2
C3001	0.0	5.2	186	3828	1342	218.78	53.09	13.04	148.3	4442	191	5053.9	9410.7
C3002	5.2	10.2	250	480	107	9.30	6.20	13.60	523.0	3607	18	10908.0	988.9
C3003	10.2	15.2	1098	450	177	17.80	11.60	2.80	222.0	4133	112	4822.0	1231.8
C3004	15.2	20.2	549	1710	517	64.50	21.50	11.90	521.0	2428	161	6706.0	4308.5
C3005	20.2	25.3	386	914	314	31.20	16.40	4.80	540.0	2286	141	4778.0	2872.3
C3006	26.3	32.3	321	678	249	33.80	15.30	16.30	596.0	3124	146	10755.0	1836.8
C3007	32.3	38.8	174	576	223	47.20	17.90	5.70	446.0	4036	107	9346.0	1561.8
C3008	38.8	44.0	437	293	111	11.10	7.10	2.40	188.0	3620	57	9529.0	789.6
C3009	44.0	50.2	282	833	343	64.30	30.60	14.00	449.0	3813	252	9595.0	2381.6
C3101	7.0	14.0	396	482	192	24.80	12.20	0.05	234.0	2831	78	7156.0	1288.6
C3102	14.0	15.5	199	691	242	33.18	15.17	7.78	407.4	3330	117	7706.8	1808.5
C3103	15.5	20.5	670	356	139	36.70	14.10	0.20	300.0	1394	56	2329.0	962.9
C3104	20.5	26.5	237	1095	357	73.70	19.40	0.10	262.0	1904	93	10133.0	2773.0
C3105	26.5	33.0	198	346	129	29.80	8.40	0.05	319.0	3104	55	2753.0	1038.7
C3106	33.0	39.6	226	429	109	31.00	9.40	0.05	282.0	1954	57	2493.0	903.5
C3107	39.6	43.1	209	381	150	52.50	16.40	0.05	275.0	2501	61	2293.0	1124.2
C3108	43.1	47.2	93	177	84	45.20	14.70	0.05	257.0	2844	58	2536.0	1040.4
C3109	47.2	50.2	308	576	264	27.80	7.00	5.70	319.0	3201	23	3476.0	500.5
C3201	2.5	7.0	249	933	391	114.80	32.70	10.30	294.0	3718	72	2531.0	1650.8
C3202	7.0	8.7	124	447	171	126.30	37.70	2.40	322.0	4029	103	4794.0	2530.6
C3203	8.7	13.4	291	212	55	52.93	16.22	1.67	290.6	2624	60	2981.8	1198.6
C3204	13.4	15.0	409	527	171	28.30	10.50	12.90	280.0	4297	49	6310.0	592.0
C3205	15.0	20.1	305	744	227	79.30	8.40	0.05	329.0	5201	50	4544.0	1300.4
C3206	20.1	26.5	780	549	178	24.40	6.80	0.30	220.0	4463	127	5964.0	1956.1
C3207	26.5	31.5	1329	503	170	31.00	13.00	0.05	261.0	4804	59	2202.0	1350.9
C3208	31.5	36.5	844	2272	645	122.20	35.50	5.90	592.0	4313	78	4443.0	1881.0
C3209	36.5	41.0	897	1589	457	105.10	35.50	7.50	3398.0	5697	185	20038.0	5532.0
C3210	41.0	46.0	953	1524	469	52.20	19.00	5.20	1224.0	10163	138	13394.0	3880.8
C3211	46.0	50.1	46	1697	496	88.60	31.00	5.00	957.0	6695	253	12365.0	3734.3
			503	1029	403	24.20	16.40	7.60	654.0	5608	175	5652.0	4245.9
			656	1074	325	59.60	26.80	0.05	737.0	13036	159	6323.0	439.2
						64.86	22.87	5.96	1616.1	6482	145	9351.9	2625.7
													2759.9

Appendix 3
Microscopic observations and
microphotographs

Plain polarized (transmitted light)



Sample No. C0709
Sector: Chilwa Is.
Rock name: Syenite
Observation Note:

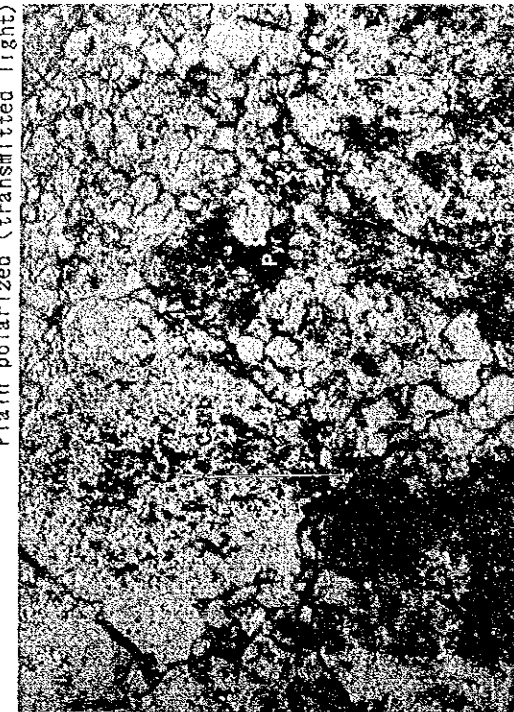
The specimen is mainly composed of potassium feldspar and plagioclase. Potassium feldspar occurs as an euhedral or subhedral grain of about 0.15 to 2.5 mm, which is mostly altered to muscovite and chlorite. Plagioclase shows comparatively fresh occurrence. Mafic minerals are mainly presented as biotite (0.05 to 0.9 mm in diameter) and clinopyroxene (less than 0.5 mm in diameter). Small amount of sphene, apatite carbonate minerals and magnetite which is partly altered to goethite are also observed. Clinopyroxene is closely associated with biotite and is partly decomposed into carbonate minerals.

Plain polarized (transmitted light)

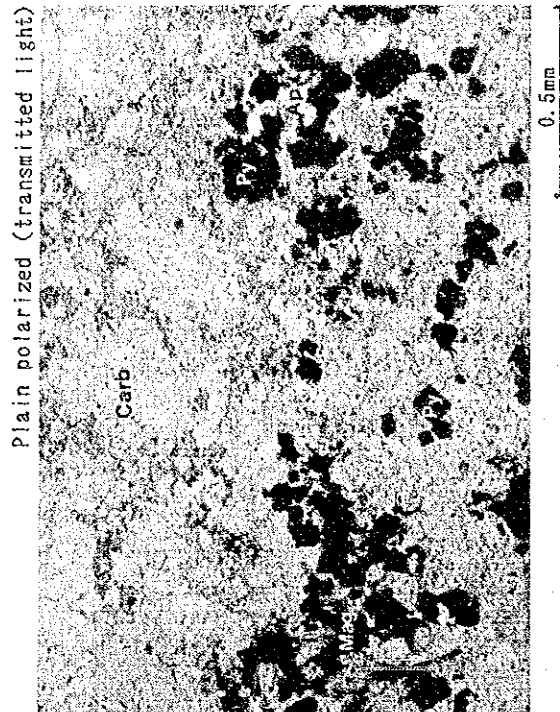


Sample No. C1208
Sector: Chilwa Is.
Rock name: Sovite
Obsevation Note:

The specimen shows porphyritic texture with euhedral to anhedral carbonate mineral (0.1 mm in diameter) and euhedral to subhedral fluorite (0.5 to 2.0 mm in diameter). Phenocrysts of carbonate minerals (0.5 to 2.0 mm in diameter) are also observed. Anhedral plugged quartz (0.1 to 0.2 mm in diameter) and barite, and anhedral dusty or granular magnetite which is partly altered to goethite are also rarely detected.

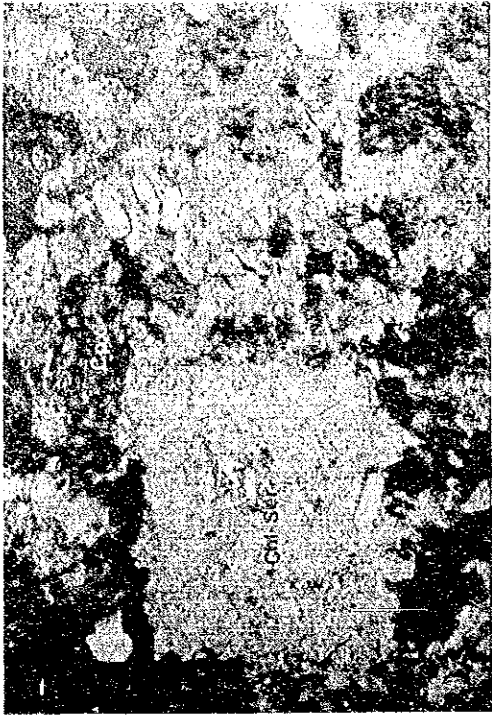


Sample No. C1304
 Sector: Chilwa Is.
 Rock name: Ankeritic sovite
 Observation Note:
 The specimen is mainly composed of carbonate mineral which occurs as a porphyritic texture. The porphyritic part consists of grains from 0.35 to 1.75 mm in diameter, and the matrix is formed by grains less than 0.15 mm in diameter. The area proportion between porphyritic and matrix parts are almost same. Dark green subhedral to anhedral pyrochlore (less than 0.2 mm in diameter) and plugged quartz and magnetite are rarely detected.



Sample No. C1306
 Sector: Chilwa Is.
 Rock name: Apatite Sovite
 Observation Note:
 The specimen consists of two fine grained parts; carbonate-rich and apatite-rich parts. The carbonate-rich part occurs as a granular mosaic texture with 0.05 to 0.5 mm in grain size. The apatite-rich part is very fine (less than 0.15 mm in diameter) and irregularly associates with plugged carbonate minerals. A small amount of barite, quartz, pyrite, magnetite and pyrochlore is also observed, but barite is not detected in the apatite-rich part.

Plain polarized (transmitted light)



Sample No. C1607

Sector: Chilwa Is.

Rock name: Syenite

Observation Note:

The specimen is mainly composed of medium to coarse grained plagioclase and potassium feldspar, and medium grained clinopyroxene, biotite and magnetite. Plagioclase occurs as an euhedral or subhedral grain and is almost completely decomposed into Sericite (muscovite) + chlorite. Potassium feldspar is subhedral to anhedral and is mostly altered to albite. Clinopyroxene is euhedral to subhedral with light green in color, which is partly altered to carbonate + opaque minerals. Biotite shows anhedral to subhedral and platy shape with light brown or dark brown in color, which is associated with clinopyroxene. Magnetite is generally anhedral and is altered to hematite. Apatite, carbonate and sphene are rarely observed.

0.5mm

Plain polarized (transmitted light)



Sample No. C1610

Sector: Chilwa Is.

Rock name: Nepheline Syenite

Observation Note:

The rock may be originally coarse grained plutonic rock such as nepheline syenite which is composed of feldspar, biotite, clinopyroxene and pyrite. However, feldspar is almost completely altered to sericite and carbonate and only a few plagioclase is remained. Biotite is partly decomposed of plagioclase, carbonate, chlorite, sericite, magnetite and goetite. Clinopyroxene is also partly altered to carbonate, magnetite and goetite.

0.5mm

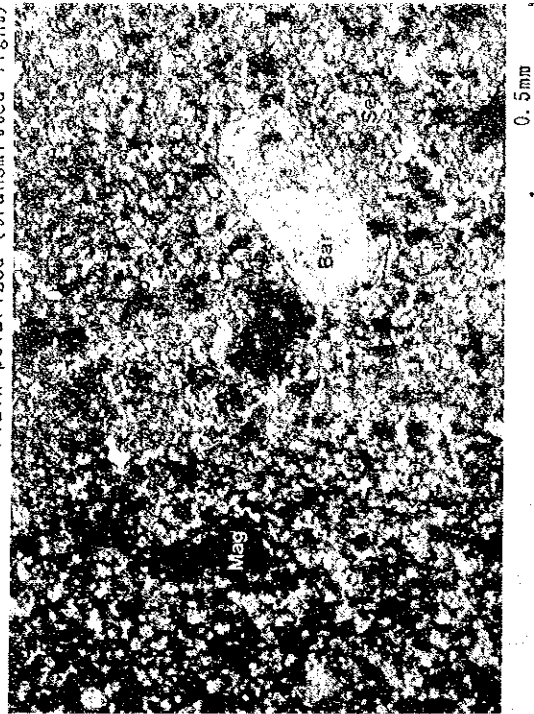
Plain polarized (transmitted light)



Sample No. C1901
Sector: Chilwa Is.
Rock name: Altered Sideritic Carbonatite
Observation Note:

The specimen is severely altered. Magnetite is decomposed into goethite and hematite along its grain surface and crack. Siderite is completely altered to goethite and carbonate. Plugged potassium feldspar and quartz are rarely observed.

Plain polarized (transmitted light)



Sample No. C2007
Sector: Chilwa Is.
Rock name: Phonolite
Observation Note:

The primary rock had most probably an intergranular texture with feldspar and feldspathoid, but were completely altered to sericite. The specimen consists of euhedral to subhedral feldspar or feldspathoid, subhedral clinopyroxene and anhedral biotite. Phenocrysts of barite (0.6 mm in diameter) and biotite (less than 0.3 mm in diameter) are observed. Magnetite and secondary carbonate are also detected.

Sample No. C2106

Sector: Chilwa Is.

Rock name: Altered Sideritic Carbonatite

Observation Note:

The specimen consists mainly of euhedral to subhedral magnetite and goethite. The texture shows porphyritic part (1.5 to 7 mm in grain size) and matrix part (less than 0.5 mm in grain size). AnhedraI quartz (less than 0.3 mm), yellowish brown to colorless carbonate and potassium feldspar (less than 0.3 mm) are rarely observed in the matrix part.

Plain polarized (transmitted light)



Sample No. C2208

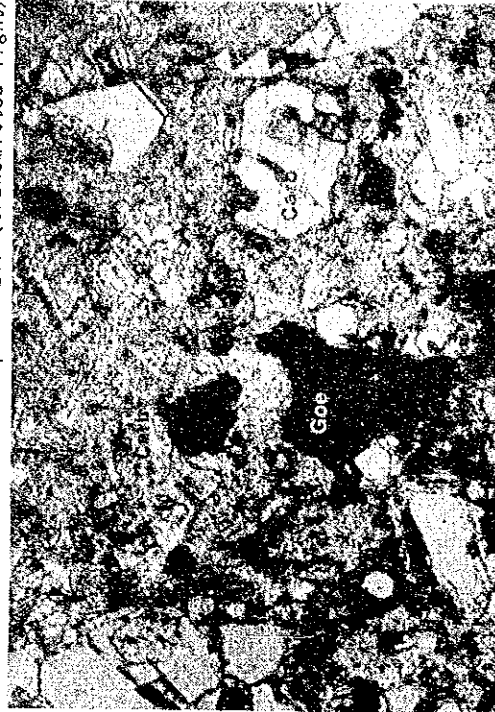
Sector: Chilwa Is.

Rock name: Ankeritic Sovite

Observation Note:

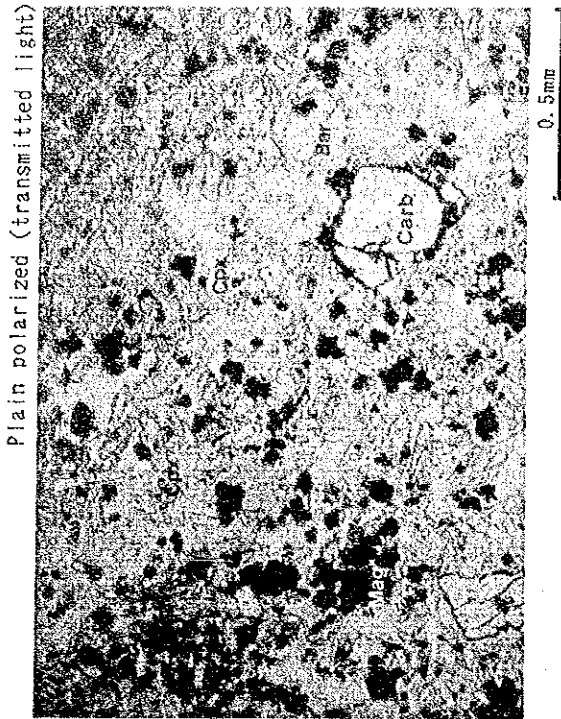
The specimen mainly consists of carbonate and shows porphyritic texture with 0.2 to 1.0 mm porphyritic part and very fine grained matrix. Euhedral to subhedral grains are common in the porphyritic part but anhedraI in the matrix part. Siderite is involved in the matrix carbonate minerals. AnhedraI to euhedral magnetite which is altered to goethite and hematite, and granular to plugged quartz are rarely observed.

Plain polarized (transmitted light)



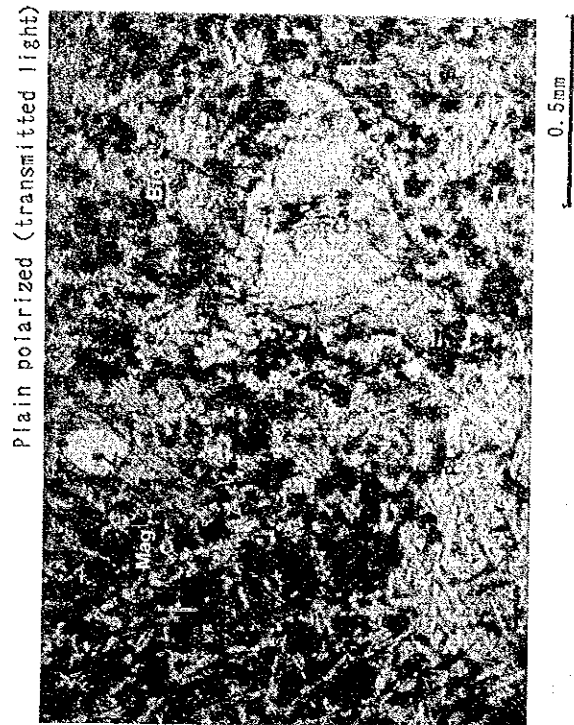
Sample No. C2301
Sector: Chilwa Is.
Rock name: Comptonite
Observation Note:

The specimen shows a panidiomorphic texture and is composed of euhedral clinopyroxene, platy biotite, granular magnetite and plugged sericite. The other porphyritic mineral is also observed, which is completely decomposed into chlorite and carbonate except partly remained barite.



Sample No. C2404
Sector: Chilwa Is.
Rock name: Lamprophyre
Observation Note:

The specimen shows a panidiomorphic texture with plagioclase (0.15 mm in diameter), platy biotite (ca.0.05 mm) and hornblende (ca. 0.05 mm). Biotite pseudomorphs displaced to chlorite and carbonate are observed. A small amount of magnetite and pyrite is present.



Plain polarized (transmitted light)



Sample No. C2408
Sector: Chilwa Is.
Rock name: Sideritic Carbonatite
Observation Note:
The specimen shows a porphyritic texture. Phenocrysts consist of euhedral to subhedral light yellowish brown siderite (0.2 to 1.75 mm in diameter) and subordinate colorless carbonate. The groundmass is composed of siderite, barite, fluorite and quartz. Siderite shows a spherulitic texture and fluorite concentrates as a pool (8 mm in diameter). Quartz and barite occur as aggregates (less than 0.6 mm in diameter). Opaque mineral is little observed.

Plain polarized (transmitted light)



Sample No. C2606
Sector: Chilwa Is.
Rock name: Sideritic carbonatite
Observation Note:
The specimen is severely altered. Magnetite is altered to goethite, and feldspar is decomposed into sericite. Aggregate of goethite and carbonate is also formed, which suggests siderite is the primary mineral. Magnetite, quartz, fluorite and barite are barely remained as the primary mineral.

Plain polarized (transmitted light)



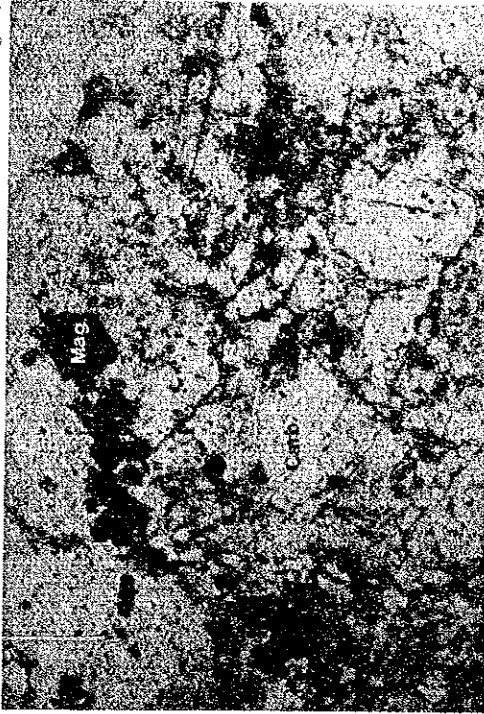
Sample No. C2609
Sector: Chilwa Is.
Rock name: Sideritic carbonate
Observation Note:
The specimen is mainly composed of magnetite, fluorite, quartz, potassium feldspar and carbonate. Magnetite is mostly altered to hematite and goethite. Aggregate of carbonate and goethite (0.2 mm in diameter) which is originated from siderite is observed. Fluorite is euhedral to anhedral and less than 0.7 mm in diameter. Pyrochlore is rarely detected. Anhedral quartz and potassium feldspar occur as a vein or pool (less than 1.25 mm in diameter). Primary carbonate mineral is also observed as an anhedral grain of ca. 0.3 mm in diameter.

Plain polarized (transmitted light)



Sample No. C2810
Sector: Chilwa Is.
Rock name: Ankeritic Sovite
Observation Note:
The specimen shows a mosaic texture of colorless carbonate (0.1 to 0.25 mm in diameter). The other rock forming minerals are potassium feldspar, quartz, barite, fluobrite and opaque mineral. Potassium feldspar generally forms an aggregate of fine grains including magnetite and carbonate. Opaque mineral involves euhedral to subhedral pyrite (0.07 to 0.7 mm in diameter) and magnetite (0.05 to 0.1 mm in diameter). A very few muscovite is also observed as the secondary mineral.

Plain polarized (transmitted light)



Sample No. C2904
Sector: Chilwa Is.
Rock name: Ankeritic Sovite
Observation Note:

The specimen is mostly composed of anhedral granular carbonate (0.1 to 0.7 mm in diameter). Anhedral granular quartz is subordinately present and forms an aggregate (0.2 to 0.7 mm in diameter). Subhedral to anhedral pyrite and magnetite which is severely altered to goetite are rarely observed.

Plain polarized (transmitted light)



Sample No. C2907
Sector: Chilwa Is.
Rock name: Altered Sideritic Carbonatite
Observation Note:

The specimen is altered severely. Magnetite is probably decomposed into goetite, and siderite into carbonate and goetite. No siderite is observed. Two types of carbonate minerals; colorless and brown grain, are present, which are both less than 0.2 mm in diameter.

Sample No. C3003

Sector: Chilwa Is.

Rock name: Sovite

Observation Note:

The specimen is mainly composed of carbonate (0.05 to 0.7 mm in diameter) with a mosaic texture. Barite, quartz and pyrite are subordinately present. Quartz is less than 0.2 mm in diameter and is accompanied with pyrite which is mostly altered to goetite.

Plain polarized (transmitted light)



0.5mm

Sample No. C3009

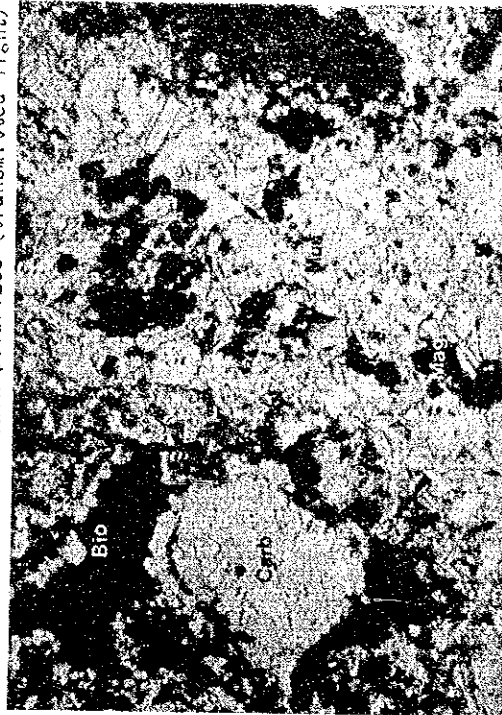
Sector: Chilwa Is.

Rock name: Contamination of Alkali rock & Carbonatite

Observation Note:

The specimen is composed of carbonate, muscovite, biotite and magnetite. Carbonate is anhedral grain with less than 0.5 mm in diameter. Biotite shows a porphyritic occurrence and is altered to aggregate of recrystallized fine biotite. Magnetite partly shows a porphyritic texture and is decomposed into hematite, goetite, carbonate. Apatite and titan mineral are also observed a little.

Plain polarized (transmitted light)



0.5mm

Sample No. C3109
Sector: Chilwa Is.
Rock name: Syenite
Observation Note:

The specimen is probably originated from a felspathic syenite (or trachyte), but the feldspar is mostly altered to sericite including kaoline. The mafic minerals are also altered to carbonate and goetite except a small amount of biotite, magnetite and apatite. Carbonate vein is observed.

Plain polarized (transmitted light)



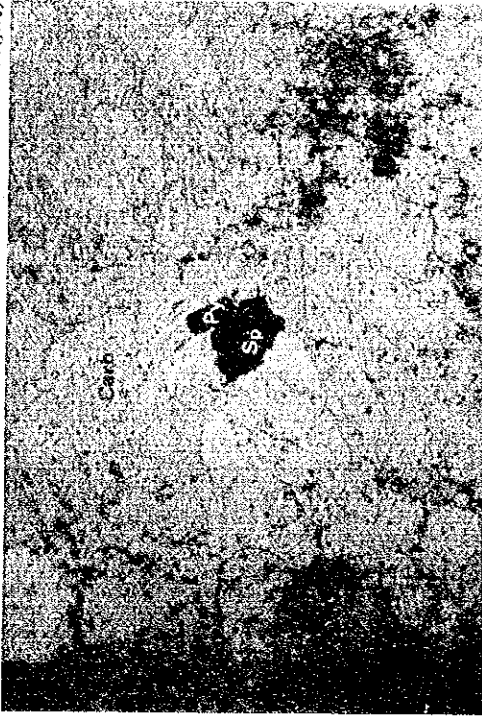
Sample No. C3210
Sector: Chilwa Is.
Rock name: Sovite
Observation Note:

The specimen is composed of carbonate with a mosaic texture (0.07 to 0.25 mm in diameter). Opaque mineral is partly distributed. It is euhedral to subhedral magnetite (0.3 mm in diameter) and pyrite (0.6 mm in diameter). Muscovite and pyrochlore are the other rock forming minerals.

Plain polarized (transmitted light)



Plain polarized (transmitted light)



Sample No. C3211
Sector: Chilwa Is.
Rock name: Sovite
Observation Note:
The specimen is mainly composed of anhedral granular carbonate (0.1 to 0.3 mm in diameter) with a mosaic texture. Apatite is partly concentrated and forms plugged aggregates. Zoned pyrochlore (0.1 mm in diameter), sphalerite and pyrite is rarely observed.

Plain polarized (transmitted light)



Sample No. S1404
Sector: Songwe
Rock name: Carbonized Agglomerate
Observation Note:
The specimen is mainly composed of carbonate, potassium feldspar and opaque mineral. Carbonate is anhedral granular (less than 0.3 mm in diameter) and potassium feldspar is anhedral to anhedral porphyritic (less than 1.1 mm in diameter). Opaque mineral is primarily magnetite but is altered to goethite. Dusty opaque is distributed in the matrix.

Plain polarized (transmitted light)



0.5mm

Sample No. S1510
Sector: Chilwa Is.
Rock name: Sovite
Observation Note:

The specimen is mainly composed of anhedral granular carbonate (0.05 to 0.45 mm in diameter) with a mosaic texture. Anhedral to euhedral magnetite and hematite are observed. Potassium feldspar altered to albite and light brown carbonate are also observed.

Plain polarized (transmitted light)



0.5mm

Sample No. S1604
Sector: Songwe
Rock name: Iron Oxide Ore
Observation Note:

The specimen is mainly composed of euhedral to subhedral magnetite and hematite (less than 0.1 mm in diameter). Magnetite and hematite form roughly banded texture. Carbonate shows intergranular occurrence and the size is less than 0.2 mm in diameter. Barite is also rarely observed. These subordinate minerals are usually distributed in the part where magnetite and hematite is poor, and form aggregates with coarse grained carbonate.

Sample No. S1907

Sector: Songwe

Rock name: Altered nepheline syenite

Observation Note:

The specimen had probably trachytic texture with phenocrysts of feldspar in the primary form, but feldspar and feldspathoid were almost completely altered to albite. The groundmass is decomposed into sericite, chlorite, hematite, goetite, carbonate and partly biotite without potassium feldspar. A small amount of fluorite is also observed.

Plain polarized (transmitted light)



0.5mm

Sample No. T2501

Sector: Tundulu

Rock name: Apatite Rock

Observation Note:

The specimen is mainly composed of apatite, quartz, carbonate and opaque mineral. Apatite is very rich and is euhedral (0.07 to 0.15 mm in diameter). Quartz is anhedral and the size is less than 0.6 mm in diameter. Opaque mineral is euhedral or subhedral (less than 2.5 mm in diameter), and is mostly altered to goetite and carbonate.

Plain polarized (transmitted light)



0.5mm

Sample No. T2606

Sector: Tundulu

Rock name: Altered Sideritic Carbonate

Observation Note:

The specimen is severely altered, which is composed of medium to coarse grained euhedral to subhedral carbonate. Granular quartz and carbonate less than 0.35 mm in diameter are occurred like a vein. Opaque mineral mostly consists of goethite and hematite. Siderite is altered to opaque and carbonate. Euhedral pyrochlore (less than 0.25 mm in diameter) is present in opaque minerals. Apatite and barite are also observed a little.

Plain polarized (transmitted light)



Sample No. T2607

Sector: Tundulu

Rock name: Apatite Rock

Observation Note:

The specimen is mainly composed of apatite, carbonate, quartz, potassium feldspar and opaque mineral. Opaque mineral is euhedral and is less than 2.5 mm in diameter. It is mostly altered to hematite, goethite and carbonate. Euhedral pyrochlore is rarely observed (less than 0.25 mm). Euhedral apatite is also observed (less than 0.4 mm). Quartz is plugged anhedral crystal with wavy extinction. Potassium feldspar is subhedral to anhedral and is less than 1.2 mm in diameter.

Plain polarized (transmitted light)



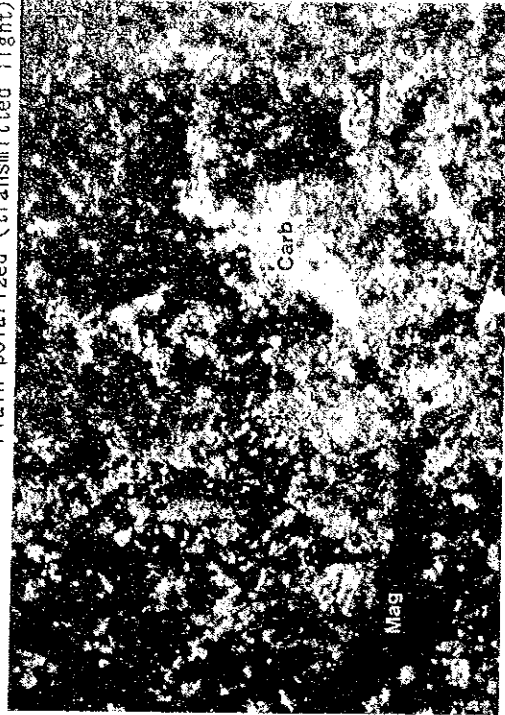
Plain polarized (transmitted light)



Sample No. T2611
Sector: Tundulu
Rock name: Biotite rich carbonatite
Observation Note:

The specimen is mainly composed of biotite, potassium feldspar, carbonate and opaque mineral. Biotite showing euhedral to subhedral shape is very abundant and the grain size is less than 1.4 mm in diameter. Carbonate is anhedral (less than 1.7 mm in diameter) and sometimes displaces opaque mineral. Potassium feldspar is a subhedral to anhedral crystal of less than 1.75 mm in grain size, and is mostly altered to chlorite + sericite. Opaque mineral is almost decomposed into goethite, hematite and carbonate but a small amount of magnetite is remained. Olivine and quartz are rarely observed.

Plain polarized (transmitted light)



Sample No. 8Y033
Sector: Chilwa Is.
Rock name: Altered Trachyte
Observation Note:

The specimen may originally show a porphyritic texture, but the alteration is very severe and the whole rock is altered to sericite, goethite and hematite. Pseudomorph of feldspar composed of carbonate and sericite is observed (less than 0.6 mm in diameter).

Sample No. 8Y042
Sector: Chilwa Is.
Rock name: Syenite
Observation Note:

The specimen is mainly composed of coarse grained potassium feldspar and fine to medium grained clinopyroxene, plagioclase and quartz. Clinopyroxene is an euhedral to subhedral crystal (less than 0.7 mm in diameter) and shows green in color. Most of the crystal forms aggregates, 0.1 mm in diameter. Potassium feldspar is euhedral to subhedral (less than 3.0 mm in diameter) and is decomposed into albite and a small amount of sericite. Plagioclase shows anhedral to subhedral and occurs albite twin of less than 0.5 mm in grain size. Quartz is anhedral and distributed along the margin of clinopyroxene. Apatite, pyrite, magnetite and carbonate are also observed.

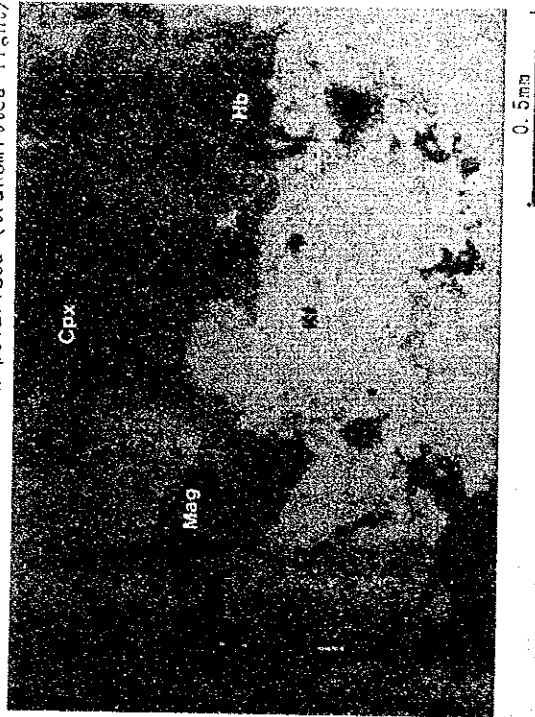
Sample No. 8Y043
Sector: Chilwa Is.
Rock name: Fertilized gneiss
Observation Note:

The specimen is mainly composed of medium grained potassium feldspar, plagioclase and quartz, and fine to medium grained clinopyroxene, hornblende and biotite. Potassium feldspar is subhedral to anhedral and plagioclase occurs albite twin. Both are altered to albite associated with sericite. Quartz is anhedral and is less than 1.5 mm in diameter. Clinopyroxene, hornblende and biotite are anhedral to subhedral (less than 1.7 mm), and in particular clinopyroxene and biotite are partly form aggregates, respectively. Apatite, titan mineral and magnetite are subordinately present.

Plain polarized (transmitted light)



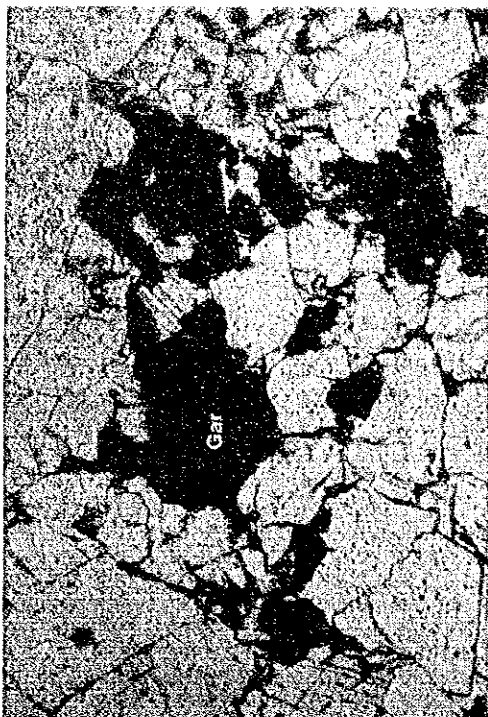
Plain polarized (transmitted light)



Sample No. 8Y057
Sector: Chilwa Is.
Rock name: Sovite
Observation Note:

The specimen consists of anhedral granular carbonate with mosaic texture, which is 0.2 to 0.5 mm (max 3.5 mm) in grain size. Anhedral granular quartz which forms aggregates and dark brown subhedral granular garnet are subordinately present. Pseudomorphs composed of goetite are observed, which are probably derived from hornblende or pyroxene.

Plain polarized (transmitted light)



0.5mm

Sample No. 8Y058
Sector: Chilwa Is.
Rock name: Sovite
Observation Note:

The specimen is mainly composed of anhedral granular carbonate with mosaic texture. Mafic mineral derived from biotite or pyroxene is observed and is completely altered to goetite + quartz + carbonate. Pyrochlore, apatite, quartz, pyrite and magnetite are subordinately present. Occurrence of pyrochlore is closely concerned to apatite and magnetite.

Plain polarized (transmitted light)

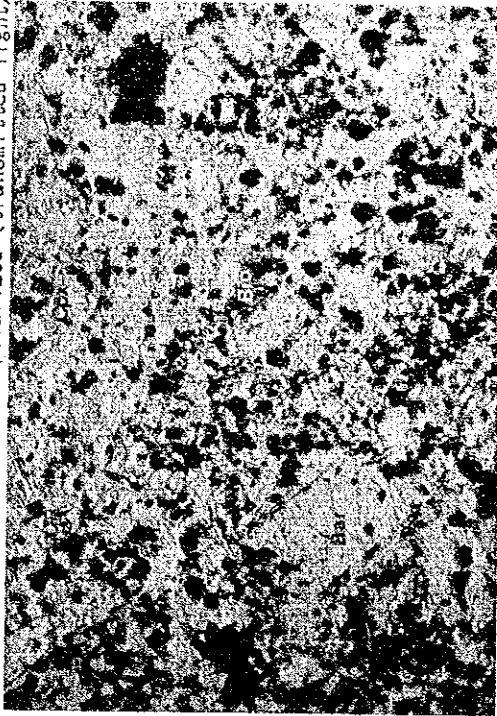


0.5mm

Sample No. 8Y061
Sector: Chilwa Is.
Rock name: Comptonite
Observation Note:

The specimen shows a panidiomorphic texture and is mainly composed of clinopyroxene, biotite, magnetite, pyrite and sericite aggregate. Porphyritic mineral which is mostly barite is also observed and is partly altered to chlorite and carbonate. Apatite is partly concentrated.

Plain polarized (transmitted light)



0.5mm

Sample No. 8Y127
Sector: Chilwa Is.
Rock name: Syenite
Observation Note:

The specimen is mainly composed of plagioclase, potassium feldspar and clinopyroxene. Plagioclase and potassium feldspar occur a graphic intergrowth. Plagioclase is euhedral and is 3.5 mm in maximum length. Clinopyroxene shows yellowish green to green in color and is euhedral to subhedral (less than 2.0 mm). Magnetite, sphalerite are subordinately present. Secondary sericite and carbonate are also occupied.

Plain polarized (transmitted light)

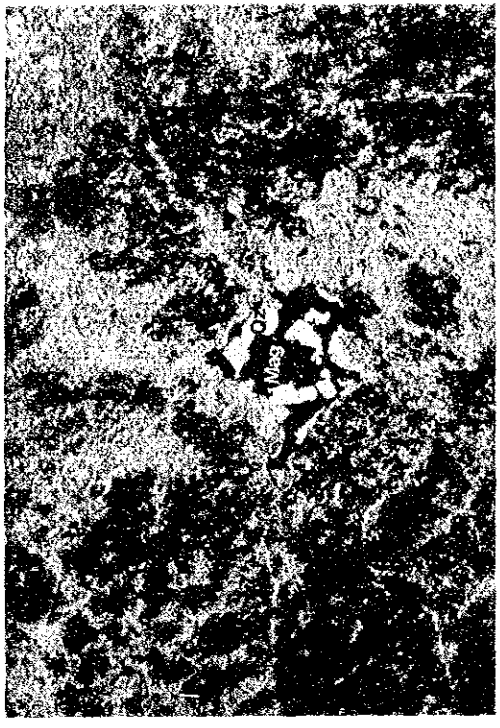


0.5mm

Sample No. 8Y145
 Sector: Chilwa Is.
 Rock name: Alkali syenite
 Observation Note:

The specimen is mostly composed of medium to coarse grained subhedral potassium feldspar which is decomposed into albite. Quartz and magnetite are subordinately present, which are usually associated with together. Magnetite is partly altered to goetite

Plain polarized (transmitted light)



Sample No. 8Y147
 Sector: Chilwa Is.
 Rock name: Sovite
 Observation Note:

The specimen is mainly composed of anhedral granular carbonate with a mosaic texture. Euhedral to subhedral granular light brown garnet is present and is partly altered to carbonate + epidote + opaque mineral. Clinopyroxene, apatite, magnetite, pyrite and biotite are also observed a little. Clinopyroxene is partly altered to epidote and magnetite is partly decomposed into hematite.

Plain polarized (transmitted light)



Appendix 4

X-ray diffractive analysis and charts

Result of X-ray Diffraction Analysis

No.	Sample No.	Sector	Locality	Rock Name	Calcite	Dolomite	Ankerite	Kunahorite	Siderite	Bastnaesite	Calclnastite	Stromantite	Synchysite	Quartz	Plagioclase	K-feldspar	Chlorite	Sericite	Fluorite	Pyrite	Magnetite	Hematite	Goethite	Pyrochlore	Beratite	Barite	Microcline	Halite (?)		
1	C1304	Chilwa Island	JMC-13 17.9m	Ankeritic sovite		2	4									1														
2	C2106	Chilwa Island	JMC-21 28.4m	Altered sideritic carb.	2																		2							
3	C2208	Chilwa Island	JMC-22 33.8m	Ankeritic sovite		4	4				1									1										
4	C2408	Chilwa Island	JMC-24 35.4m	Sideritic carbonatite			1	4									1		3											
5	C2810	Chilwa Island	JMC-28 48.2m	Ankeritic carbonatite			4									2		1												
6	C2904	Chilwa Island	JMC-29 17.1m	Ankeritic sovite			4																							
7	C3003	Chilwa Island	JMC-30 12.7m	Sovite	4	1					2																			
8	S1604	Songwe	JMS-16 14.6m	Iron oxide ore	3	1				2																				
9	T2501	Tundulu	JMT-25 3.2m	Apatite rock	2		2																							
10	8Y057	Chilwa Island	Surface	Sovite	4		4				1																			
11	8Y155	Chilwa Island	Surface	Carbonatite	1					2																				
12	8Y009	Chilwa Island	Surface	Ankeritic sovite			4																							
13	8Y026	Chilwa Island	Surface	Ankeritic sovite	1	4																								
14	8Y038	Chilwa Island	Surface	Sovite	4	1																								
15	8Y058	Chilwa Island	Surface	Sovite	4		2																							
16	8Y068	Chilwa Island	Surface	Sideritic carbonatite																										
17	8Y124	Chilwa Island	Surface	Sideritic carbonatite																										
18	8Y153	Tundulu	Surface	Apatite rock																										
19	8Y154	Tundulu	Surface	Apatite rock																										
20	JMT 7	Tundulu	JMT- 7 19.3m	Carbonatite.	2		3			1		1																		
21	JMT 22	Tundulu	JMT-22 41.6m	Sideritic carbonatite			4																							
22	JMT 26	Tundulu	JMT-26 25.0m	Sideritic carbonatite	3		3																							

1: Rare, 2: Poor, 3: Common 4: Abundant