GEOLOGY

AND

SILICA RESOURCE

ON THE FARM

KLIPFONTEIN 385 JS

MAGISTERIAL DISTRICT

OF

BELFAST

PROVINCE OF MPUMALANGA

9 JUNE 2003

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Chemical analyses

1 Background

Belfast Silica (Pty) Ltd has since 1988 been mining silica, in accordance with a legal mining permit, on the remainder of Portion 1 of the farm Klipfontein 385JS. The owner of Belfast Silica (Pty) Ltd is Mr. H. Kostler.

Mr. Kostler requested an investigation to establish the in situ volume of the existing silica resource that occurs inside the defined mining area (Figures 1 and 2). The mining area has an extent of approximately 19,1880 ha. No drilling was to be done, and all modelling and calculations were to be based on the geological evidence as observed in the two existing quarries and surrounding area. The owner needs this evaluation for his application for renewal of a mining permit.

2 Locality

The area under investigation (Mining area shown in Figures 1 and 2) is situated on the remainder of Portion 1 of Klipfontein 385JS in the magisterial district of Belfast, Mpumalanga province. The property is situated about 10km NW of Belfast, on the eastern slopes of the Steelpoort River valley. The average elevation is more or less 1750m amsl and the geographic position is 29° 58' East Longitude and 25° 39' South Latitude.

3 Surface and Mineral Rights

Mr. Kostler is the owner of both the surface and the mineral rights.

4 Geology

4.1 Regional Geology

Strata of the Pretoria Group and the lowermost zones of the Bushveld Igneous Complex (BIC) underlie the region.

The stratigraphy of the Pretoria Group in this area is the Steenkampsberg Formation (quartzite), overlain by the Houtenbek Formation (quartzite, hornfels, limestone and chert), and is followed by the volcanic rocks and hornfels of the Dullstroom Formation. The thickness of the Steenkampsberg quartzites could be 76m in this region (Hall, 1918). Locally this can only be confirmed by drilling. The succession strikes north (with a variation of 10°), and dips 12 to 18 degrees to the west. Diabase sills intrude this succession.

The Basal Zone of the BIC occurs on the most western part of the original farm Klipfontein 385JS, and further to the west. Gabbro and norite occurs, and is mined as dimension stone in nearby quarries. An investigation by Steyn in 1988 concluded that the gabbro or black granite that occur on Klipfontein are of poor quality and low grade, and thus not economically mineable on a large scale.

4.2 Geology of the Mining Area

The mining area is underlain by rocks of the Steenkampsberg and Houtenbek Formations. No drilling information is available, and therefore the evaluation is based on published regional geology and refined by visual observation of the outcrops. Special attention was paid to the two existing quarries, where the quartzite succession is clearly visible up to a depth of about 20m in places.

On the eastern part of the mining area the Steenkampsberg quartzites outcrop on a dip-slope. The succession strikes at 10° and dips about 12° west. Due to the lack of drilling, the thickness witnessed in the quarries was assumed to be the proven thickness of the quartzites. Overburden or topsoil is virtually non-existent. Three faults with unknown displacement are visible in the quarries (Figure 2). In Quarry no. 2 a shaly layer of 30cm occurs, which is seperated during the mining process.

Several quartzite specimens from in and around the quarries were visually inspected. They are mostly fine-grained, and white to light greyish in colour. Some specimens are light yellowish in colour and fine to medium-grained. Along joint planes some discolouration is visible.

On the western part of the mining area the Steenkampsberg quartzites are overlain by Houtenberg hornfels and a thin layer of quartzite occurs on the top of the hill. A diabase sill has intruded the Houtenbek Formation and is clearly visible where it forms a ridge on the western slope. The calculated thickness of the Houtenberg Formation within the mining area ranges from 0 to 50m (Figure 3).

4.3 Existing Mining Activities and Market

Quartzite mined from the two quarries over the 15 years of its existence is roughly estimated at a total of 210 000 cubic m, or 556 500 tons when a density of 2,65 (Smit and Maree, 1966) is assumed. This translates to a monthly production of 1167 cubic m or 3092 tons. The primary market is in the metallurgical industry where the silica is used as flux. The balance of the product is sold mainly as building material.

4.4 Grade

Chemical analyses (Appendix A) collected over several years of production, reveal that the SiO_2 content of the quartzite ranges from 95% to 98%.

Klipfontein 385JS and adjoining farms are listed by Oosterhuis, 1998 as where the deposits of quartzite consist of exceptionally pure quartz arenites that could possibly yield high-grade SiO_2. Silicon is classified on the basis of its quality as metallurgical, chemical and high-grade. High-grade silicon is used in the electronic industry and is derived from quartz or quartzite with at least 99,5% SiO_2 and less than 0,04-0,08% Fe_2O_3. A typical quartzite used as flux in a ferrochrome plant has a composition of 97,84% SiO_2, 0,26% Fe_2O_3 and 0,48% Al_2O_3.

Based on this specification and the chemical analyses it must be concluded that the quartzite on the property is most likely metallurgical grade and not high grade.

4.5 Volume Modelling

The Miner2 geological modelling software was used to model the stratigraphic succession underlying the mining area, applying the known strike and dip. As mentioned in paragraph 4.2, a conservative estimated thickness of 20m was used for the Steenkampsberg Formation and a calculated thickness of maximum 50m for the Houtenberg Formation. Topographic contours on a 4m interval were digitized and modelled in order to be able to calculate realistic volumes of the underlying strata.

The volumes and tonnages of the different formations within the boundaries of the mining area are reported in the following table:

FORMATION	*CUBIC METERS x 1000*	*ktons*
Houtenbek	1424	-
Steenkampsberg total	3701	9809
Steenkampsberg outcrop	2241	5938

5 Conclusion

Assuming that only the outcropping quartzite will be mined to a depth of 20m and within the boundaries of the mining area, there is a resource of 5,938 million tons of metallurgical grade silica. At a production rate of 5000 tons per month the mine would have a life of 99 years. If the production rate were increased to 20000 tons per month the mine would have a life of almost 25 years.

In the event of the owner wanting to mine to depths greater than 20m, or beyond the boundaries of the current mining area it is recommended that a drilling programme be conducted to investigate and confirm the size and grade of the resource.

C Niesing
NDT(Geol)Pretoria Technikon
Dip Datametrics (Unisa)
012 674 1285
083 609 1304
PO Box 2537
The Reeds
0158

Henk Lingenfelder
BSc Geology (Hons)UP
012 674 1307
083 609 1400
PO Box 262
Derdepark
Pretoria
0035

References

STEYN, M. van R.,1988. Report on a potential Black Granite deposited situated on Klipfontein 385 JS, Belfast district, Eastern Transvaal (unpubl.) .

OOSTERHUIS, W.R., 1998. Silicon and Silica: The Mineral Resources of South Africa, 6th Edition, Council for Geosciences, p. 587-592.

SMIT, P.J. and MAREE, B.D., 1966. Densities of South African Rocks for the Interpretation of Gravity Anomalies, Bulletin 48, Geological Survey of South Africa, p. 9-12.

HALL, A.L., 1918. The Geology of the country round Belfast, Geological Survey of South Africa, p. 28.

FIGURE 1: LOCALITY OF THE MINING AREA

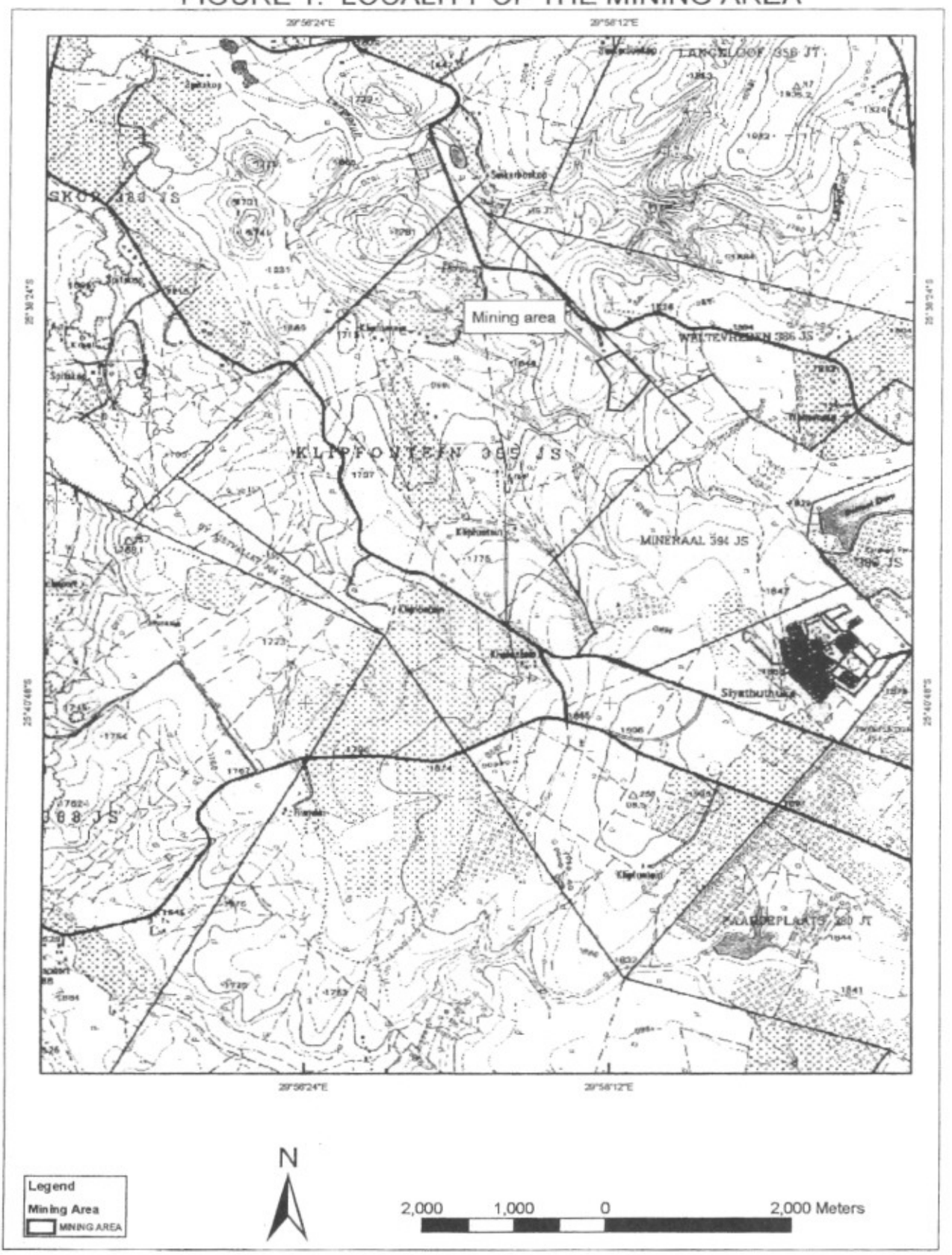


FIGURE 2: GEOLOGY OF THE MINING

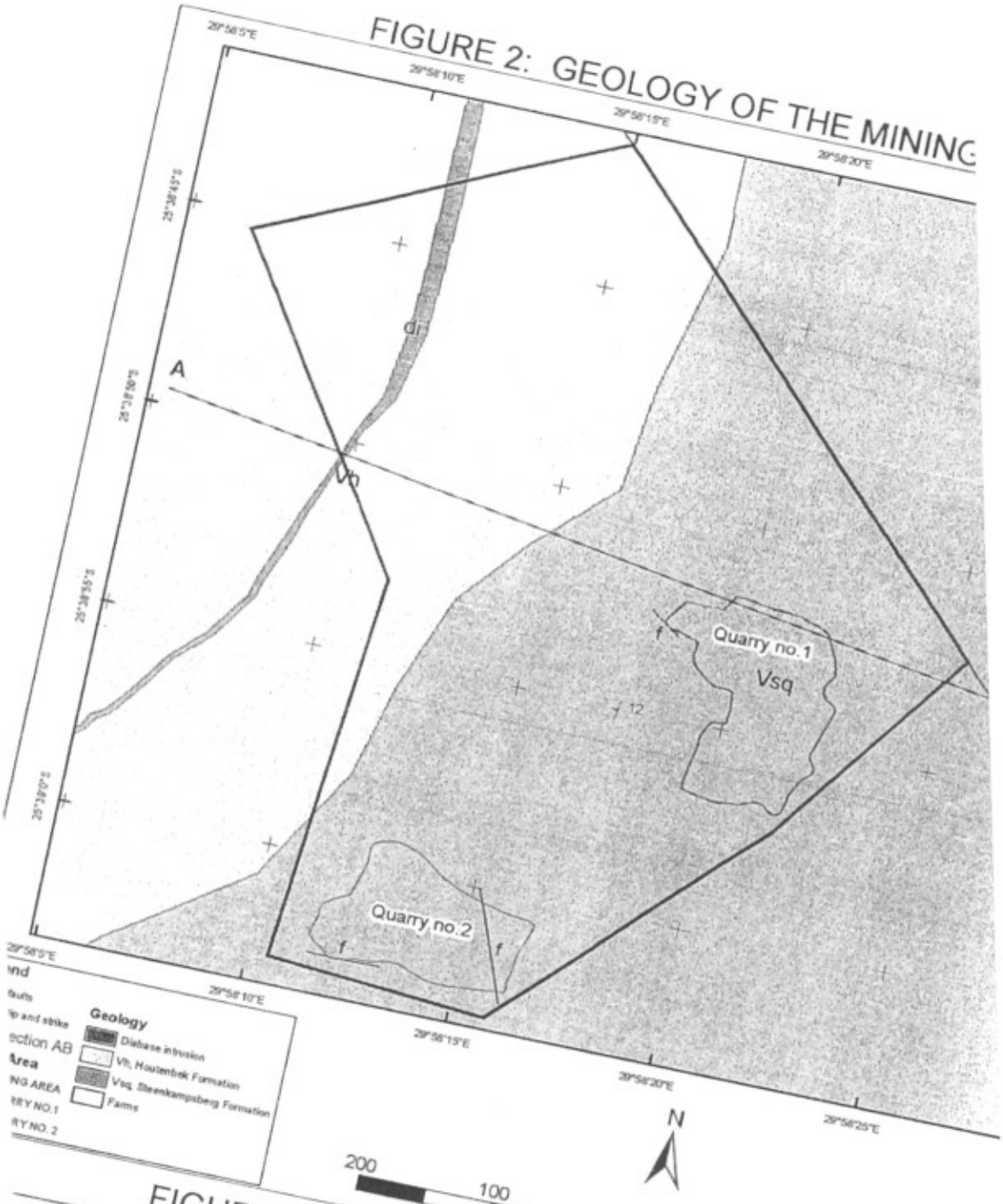
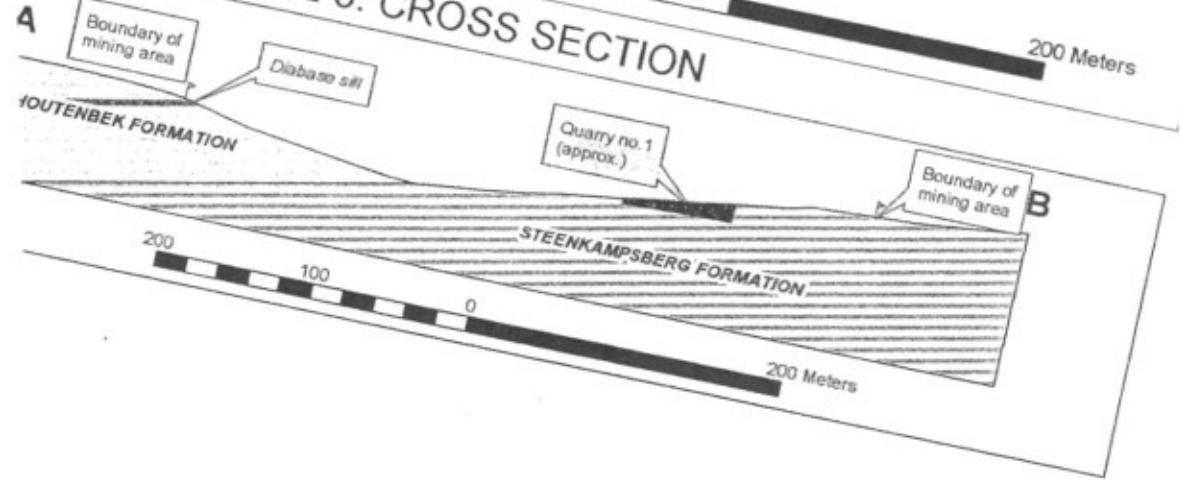


FIGURE 3: CROSS SECTION



Appendix A

CERTIFICATE

Rät. No.: 86 2490
Issue date: 16.10.86

McLACHLAN & LAZAR CC
Reg. No. CK 86/01346/23
Consulting Industrial Chemists, Analysts and Samplers
Incorporating Dr. L. HEYMANN'S LABORATORIES

10 Davies Street, Doornfontein, Johannesburg.
Tel. (011) 402-1947 Telex: 4-85875 SA Cables 'URANIUM'
Postal address: P.O. Box 3344, Johannesburg, 2000.

To: G & W Aggs & Industrial Minerals
P O Box 14052
WADEVILLE
1422 Bt

Subject: Analysis of two samples of ~~SHALE~~ Quartzite - Klipfontein Silica - Belfast.

Marked: As Below. Order No: 47185.

Received On: 08.10.1986.

RESULTS ON MOISTURE-FREE BASIS
EXPRESSED IN PERCENT UNLESS STATED OTHERWISE

SAMPLE MARKS:	KF1	KF2
Loss on Ignition (1000°C)	0,44	0,53
Silicon, as SiO_2	98,5	98,1
Aluminium, as Al_2O_3	0,7	1,0
Total Iron, as Fe_2O_3	0,05	0,12
Titanium, as TiO_2	<0,05	<0,05
Phosphorus, as P_2O_5	0,07	0,05
Calcium, as CaO	<0,05	<0,05
Magnesium, as MgO	<0,1	<0,1
Sodium, as Na_2O	<0,1	0,1
Potassium, as K_2O	0,19	0,12

for McLACHLAN & LAZAR CC

Edna McKay

Appendix A

BELFAST

QUARTZ BELFAST

LAB. No.	DATE	% SIO2	% S
E3290	09.01.96	97.17	0.005
E3294	14.01.96	95.55	0.009
E3312	21.01.96	98.68	0.008
E3321	27.01.96	98.01	<0.001
E3329	27.01.96	98.20	<0.001
E3341	11.02.96	97.15	<0.001
E3360	17.02.96	95.20	<0.001
E3360	23.02.96	98.52	<0.001
E3371	25.02.96	96.45	<0.001
E3390	03.03.96	93.29	0.014
E3390	07.03.96	99.24	0.010
E3390	08.03.96	98.10	0.001
E3397	12.03.96	97.56	<0.001
E3411	18.03.96	96.00	0.006
E3426	25.03.96	97.03	<0.001
E3438	31.03.96	96.68	<0.001
E3450	06.04.96	96.20	0.003
E3450	15.04.96	95.58	0.004
E3463	15.04.96	96.10	0.002
E3474	21.04.96	98.30	0.002
E3486	27.04.96	96.38	<0.001
E3496	07.05.96	95.99	<0.005
E3497	12.05.96	96.59	<0.001
E3508	19.05.96	96.25	<0.001
E3514	03.06.96	96.28	0.0070
E3515	11.06.96	95.37	0.0060
E3515	12.06.96	95.72	0.0060
E3521	18.06.96	95.24	0.0098
E3521	20.06.96	97.19	0.0080
E3530	12.07.96	98.07	0.0034
E3538	18.07.96	96.58	0.0036
E3546	05.08.96	96.98	0.007
E3547	10.08.96	96.81	0.006
E3554	19.08.96	95.66	0.006
E3560	20.08.96	96.98	0.003
E3563	17.09096	97.25	0.008
E3563	18.09.96	.....	0.007
E3565	23.09.96	96.90	0.005
E3571	07.10.96	95.70	0.005
E3571	09.10.96	97.43	0.005
E3575	14.10.96	96.75	0.008
E3580	21.10.96	95.50	0.008
E3580	23.10.96	96.60	0.007
E3585	22.10.96	96.20	0.007
E3586	01.11.96	95.85	0.007
E3587	12.11.96	96.83	0.005
E3589	14.11.96	96.26	0.006
E3599	09.12.96	96.55	0.004
E3604	17.12.96	96.00	0.008
E3608	21.12.96	98.00	0.005
E3614	06.01.97	95.05	0.005
E3615	12.01.97	97.10	0.008
E3620	21.01.97	96.75	0.007
E3627	28.01.97	96.58	0.003
E3635	03.02.97	95.11	0.003
E3644	10.02.97	95.96	0.003
E3650	16.02.97	96.65	0.007
E3658	22.02.97	95.80	0.003

Appendix A

E4768	13.03.99	X	97.44		0.0030				
E4769	20.03.99	X	98.63		0.0006				
E4779	27.03.99	X	97.50		0.0010				
E4788	03.04.99	X	97.68		0.0034				
E4793	10.04.99	X	96.99	e	0.0030				
E4793	12.04.99	X	97.40		0.0002				
E4804	17.04.99	X	98.09		0.0020				
E4816	24.04.99	X	96.00		0.0003				
E4834	01.05.99	X	90.82		0.0020				
E4848	09.05.99	X	84.75		0.0030				
E4848	10.05.99	X	97.32		0.0030				
E4853	15.05.99	X	96.27	b	0.0030				
E4854	22.05.99	X	94.11	a	0.0020				
E4854	26.05.99	X	97.13		0.0005				
E4863	27.05.99	X	93.67	e	0.0020				
E4863	29.05.99	X	96.03		0.0020				
E4870	11.6.99	X	97.84		0.0010				
E4882	12.06.99	X	92.82	e	0.0004				
E4882	16.06.99	X	94.04	e	0.0003				
E4887	20.06.99	X	95.31	a	0.0001				
E4887	22.06.99	X	94.85	e	0.0001				
E4900	25.06.99		98.22		0.0001	—a			
E4912	03.07.99	X	95.63	a	0.0001				
E4922	10.07.99	X	93.57	e	0.0005				
E4922	14.07.99	X	96.39		0.0002				
E4934	17.7.99	X	95.91	e	0.0001				
E4947	24.07.99	X	95.86	e	0.0005				
E4965	31.07.99	X	96.01	e	0.0001				
E4965	03.08.99	X	90.65	a					
E4976	07.08.99	X	93.76	a	0.0004				
E4976	12.08.99	X	96.95		0.0001				
E4980	16.08.99	X	95.93	e	0.0001				
E4996	21.08.99	X	92.26	e	0.0005	m			
E4996	24.08.99	X	93.79	e	0.0007	n			
E5005	28.08.99	X	91.95	e	0.0007	—e			
E5005	2.9.99	X	95.69	e	0.0008				
E5017	4.9.99	X	96.88		0.0010				
E5027	14.9.99	X	93.06	e					
E5027RS	15.9.99	X	96.83		0.0010				
E5039	18.9.99	X	95.79	a	0.0010				
E5046	28.9.99	X	94.11	e	0.0010				
E5046RS	29.9.99	X	96.03		0.0010				
E5064	7.10.99	X	96.64		0.0010				
E5064	9.10.99	X	96.71		0.0060				
E5079	23.10.99		98.36		0.0010				
E5094	26.10.99	X	85.52	a	0.0010				
E5094RS	26.10.99	X	94.70	e	0.0010				
			%Cr2O3		%SiO2	%FeO	%CaO	%MgO	%Al2O3	%S
E6371	19.06.02		<.1		97.13	<.1	<.1	<.1	1.56	0.003
E6381	24.06.02		<.1		97.70	<.1	<.1	<.1	1.88	0.003