

REF:4300 / Garden Gully

28 November 2003

Hoskins & Associates Ltd

PO Box 11-428

Ellerslie Mail Centre

Auckland

Attention: Grant Hoskins

RE: Garden Gully - Vein Quartz Analysis

Dear Grant

Further to your instruction we have completed a preliminary geochemical assessment of the vein quartz samples you provided to us. The assessment was aimed at identifying the SiO₂ content and impurity levels so that we could identify whether there was the potential for use as lump silica smelter feedstock.

Background

1. Three samples of vein quartz provided by Grant Hoskins, and said to come from Garden Gully, Moonlight Creek, West Coast, New Zealand, have been analysed to assess their suitability as silica feedstock for silicon smelting.
2. High precision X-ray fluorescence (XRF) major and trace element analysis has been used to assess the SiO₂ content and purity of the three samples.

Results

3. All XRF analysis results are presented in Table 1 and Table 2 below.
4. Major elements analysed for (as oxides) were titanium, aluminium, iron, manganese, magnesium, calcium, sodium, potassium, and phosphorus.

5. Analysed SiO₂ contents were:

99.63wt % (sample NP-A)

98.98wt % (sample NP-B)

99.79wt% (sample NP-C).

Major Impurity Element Weight % Measured as Oxide and Dosaj Limits Where Given										
Wt%	TiO2	Al2O3	Fe2O3	MnO	MgO	CaO	Na2O	K2O	P2O5	
Limits (Dosaj, 1997, metallurgical grade)	-	-	<1.43	-	-	<0.5596	-	-	-	
Limits (Dosaj, 1997, chemical grade)	<0.0834	<0.3778	<0.572	-	-	<0.1399	-	-	0.02291	
Sample NP-A	0.013	0.307	0.044	0.000	0.029	0.000	0.000	0.039	0.006	
Sample NP-B	0.030	0.728	0.047	0.000	0.025	0.000	0.000	0.060	0.009	
Sample NP-C	0.011	0.017	0.022	0.000	0.007	0.000	0.000	0.001	0.007	

Table 1 –Major Impurity Elements Measured as Oxides

Trace Element Impurities Expressed as Parts Per Million (ppm)																		
Sample	Sc	V	Cr	Ni	Cu	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	La	Pb	Ce	Th	U
NP-A	0	0	18	0	0	0	0	2	3	0	7	0	30	0	0	0	0	0
NP-B	0	0	3	0	0	0	0	3	3	0	9	1	50	0	0	0	0	0
NP-C	0	0	0	0	0	0	0	0	2	0	7	0	19	0	0	0	0	0

Table 2 - Trace Elements Impurities Expressed as Parts Per Million (ppm)

Discussion

6. In all three samples, SiO₂ content is sufficient for use as lump silica smelter feedstock.
7. Major impurity elements are well below Dosaj's (1997) limits for metallurgical grade silicon. Sample NP-C has very low aluminium concentrations and suggests that there is the potential for use as chemical grade silicon smelting feedstock.
8. Concentrations of the trace elements scandium, vanadium, chromium, nickel, copper, zinc, gallium, rubidium, strontium, yttrium, zirconium, niobium, barium, lanthanum, lead, cerium, and thorium in the Garden Gully vein quartz are all very low.
9. The concentrations for all impurity elements analysed for in Garden Gully vein quartz are lower than the limits derived from impurity levels specified by Dosaj (1997) for chemical grade elemental silicon.

Conclusions

10. The results of this analytical work suggest that vein quartz has the potential to be used as feedstock for high grade silicon smelting, and possibly for use as chemical grade silicon.
11. The areal extent of the vein needs to be geologically mapped and representative samples for geochemical analysis taken to determine variation of impurity levels throughout the deposit.

Yours sincerely,

for MINE DESIGN SYSTEMS LTD

A handwritten signature in blue ink, appearing to read 'G. R. Gray', with a long, sweeping underline that extends to the right.

Gary Gray

Mining Engineer