

1981/29. The Hogs Back silica deposit, Hastings, southern Tasmania

T.G. Summons

Abstract

A siliceous clastic sequence of Ordovician age comprises the Hogs Back silica deposit in southern Tasmania, and contains one interval of high grade silica probably suitable for use in the manufacture of ferrosilicon. The geochemical characteristics of the Hogs Back sequence suggest it was formed stratigraphically close to the carbonate sequence (Gordon Limestone correlate) inferred to overlie it.

INTRODUCTION

The Hogs Back [DM876945] silica deposit has been described by Hughes (1960), Forster (1973), Reid (1974), Sharples (1979), and Summons (1981). The Australian Commonwealth Carbide Co. Ltd originally held Mining Leases 11647M, 58M/40 and 13M/41 over the deposit, from which silica was used in the manufacture of ferrosilicon at Electrona during the period 1939-45. In 1974 Consolidated Goldfields Aust. Ltd, through its involvement in Kemmerton Pty Ltd at Electrona, decided to investigate the Hogs Back, and accordingly its subsidiary, the Mt Lyell Mining and Railway Co. Ltd drilled one diamond hole from the west flank of the deposit (fig. 1).

GEOLOGY

The Hogs Back is, as the name implies, a positive topographic feature, comprised of Ordovician age (Sharples, 1979) quartz sandstone/orthoquartzite which is variably massive bedded, or interbedded with argillaceous horizons, overlying a core of older (?Ordovician) greywacke.

The drill hole log of hole HB-1 (Appendix 1) records considerable pyrite (mainly disseminated) throughout the fresh rock, and often in the silty/argillaceous quartzite. From 66.15 - 66.44 m, a fault zone was intersected, beyond which occurred greywacke. Using a combination of the drill hole log data with the surface structure (cross bedding and ripple marks on the west flank indicate facing to the west) of the Hogs Back suggests it is an asymmetric anticline (possibly slightly overturned to the west), with faulting along, or close to, the fold axial plane. It is apparent from Figure 1 that the deposit has not been fully investigated by drilling, as drill hole HB-1 only penetrated to the centre of the fold.

The regional setting of the Hogs Back sedimentary sequence cannot be precisely defined, except that it is inferred to underlie the Gordon Limestone correlate in the Lune River area. The presence of transition beds between the siliceous clastic sequence (Hogs Back) and the overlying carbonate sequence (Gordon Limestone) cannot be demonstrated from current information, although the geochemical characteristics of the siliceous clastic sequence appear to indicate a slightly calcareous and phosphatic nature, implying that the carbonate sequence was stratigraphically close to the Hogs Back sequence.

GEOCHEMISTRY

The data in Table 1 suggests that there is probably only one high grade silica quartzite interval under the Hogs Back, namely the unit intersected in drill hole HB-1 from 44 - 66 m which contains approximately

98% SiO₂.

The apparent high grade silica from 0 - 20 m in HB-1, with approximately 98% SiO₂, is deceptive in that it is only ten metres thick and represents the leached (chemically beneficiated) equivalent of the quartzite intersected from 20 - 38 m in HB-1, containing approximately 94% SiO₂.

Comparison of the grab sample results shown in Table 1 suggests that sample GS3 was collected from the abandoned quarry at the north end of the deposit (i.e. it is a fresh rock sample), and that the other grab samples are the leached equivalents of sample GS3.

Use of the drill core and grab sample analyses has enabled the tentative calculation of leaching factors for the Hogs Back deposit, as shown in Table 1.

Although the average leaching factor for Al₂O₃, Fe₂O₃, P₂O₅, MgO, CaO and K₂O is 0.45, it is apparent that (with the exception of MgO), considerable variation occurs, particularly in the leaching factors for Al₂O₃, Fe₂O₃, and CaO.

Table 1. ANALYTICAL DATA FOR THE HOGS BACK SILICA DEPOSIT, HASTINGS

	ANALYSIS (%)										
	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	FeS ₂	TiO ₂	P ₂ O ₅	MgO	CaO	Na ₂ O	K ₂ O	Total
DDH HB-1 (weighted averages)											
0 - 20 m	98.10	<0.01	(0.18)	0.27	-	0.01	0.02	0.13	-	-	98.54
20 - 38 m	93.85	0.02	(2.14)	3.22	-	0.06	0.04	0.11	-	-	97.30
38 - 44 m	92.90	0.01	-	1.83	-	0.09	0.15	0.10	-	-	95.08
44 - 66 m	97.62	<0.01	(1.02)	1.52	-	0.08	0.08	0.10	-	-	99.41
66 - 81 m	75.58	0.02	-	0.60	-	0.33	0.38	0.13	-	-	77.04
Grab Samples (GS)											
1. Hughes 1960	99.2	-	0.14	-	-	-	-	-	-	-	-
2. Forster 1973	99.45	0.27	0.12	-	0.06	-	0.02	0.02	-	-	-
3. DOM 1979	94.8	0.28	1.33	-	0.10	-	0.03	1.68	0.01	0.05	-
4. EZ 1981	97.4	0.30	1.60	-	0.10	0.10	0.03	0.30	-	0.02	-
Avge of GS1, 2 and 4											
DOM 1979	98.68	0.28	0.62	-	0.08	0.10	0.02	0.16	-	0.02	-
DOM 1979	94.8	0.28	1.33	-	0.10	-	0.03	1.68	0.01	0.05	-
Leaching Factor (0 - 20 m) (20 - 38 m)											
	1.05	0.50	0.08	-	-	0.17	0.50	≈1.0	-	-	-
Leaching Factor GS1, 2 & 4 GS3											
	1.04	1.00	0.47	-	≈0.8	-	0.67	0.10	-	0.40	-
Avge Leaching Factor											
	1.05	0.75	0.27	-	≈1.0	0.17	0.58	0.55	-	0.40	-

(N.B. Fe₂O₃ values in brackets are equivalents of the FeS₂ values)

The concentrations of Al_2O_3 and CaO suggest that in some instances no leaching has occurred; this is difficult to reconcile in the case of a soluble element such as calcium, and may indicate an original irregular distribution of Ca in the sedimentary sequence.

Interpretation of the Al_2O_3 data is complicated by the notable discrepancies in the analyses for the drill core and the grab samples, and may indicate analytical error. Comparison of the analytical data in Table 1 with other orthoquartzites in Tasmania suggests that the Hogs Back deposit is characterised as follows:

- (1) Average to very low Al_2O_3 values;
- (2) Significantly elevated FeS_2 values;
- (3) Slightly to moderately elevated P_2O_5 values;
- (4) Moderately elevated CaO values.

The elevated FeS_2 , P_2O_5 , and CaO values are regarded as indications of the influence of the carbonate sequence inferred to overlie the Hogs Back (siliceous clastic) sequence.

CONCLUSIONS

- (1) High grade silica probably* suitable for use in the manufacture of ferrosilicon occurs over a 22 m thick interval of the Hogs Back siliceous clastic sequence. The indicated levels of concentration of Fe_2O_3 (equivalent), CaO , and P_2O_5 would require careful monitoring in any mining operation at the Hogs Back deposit.
- (2) Although the Hogs Back deposit has not been fully tested by drilling, an inferred tonnage of high grade quartzite can be calculated assuming the high grade interval is repeated in the eastern limb of the Hogs Back anticline; this inferred tonnage amounts to $2 \times 22 \times 50 \times 750 \times 2.4 = 4 \times 10^6$ tonnes.

REFERENCES

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[19 May 1981]

* Note: The quartzite appears to be chemically satisfactory, but its suitability with respect to its physical properties is unknown.

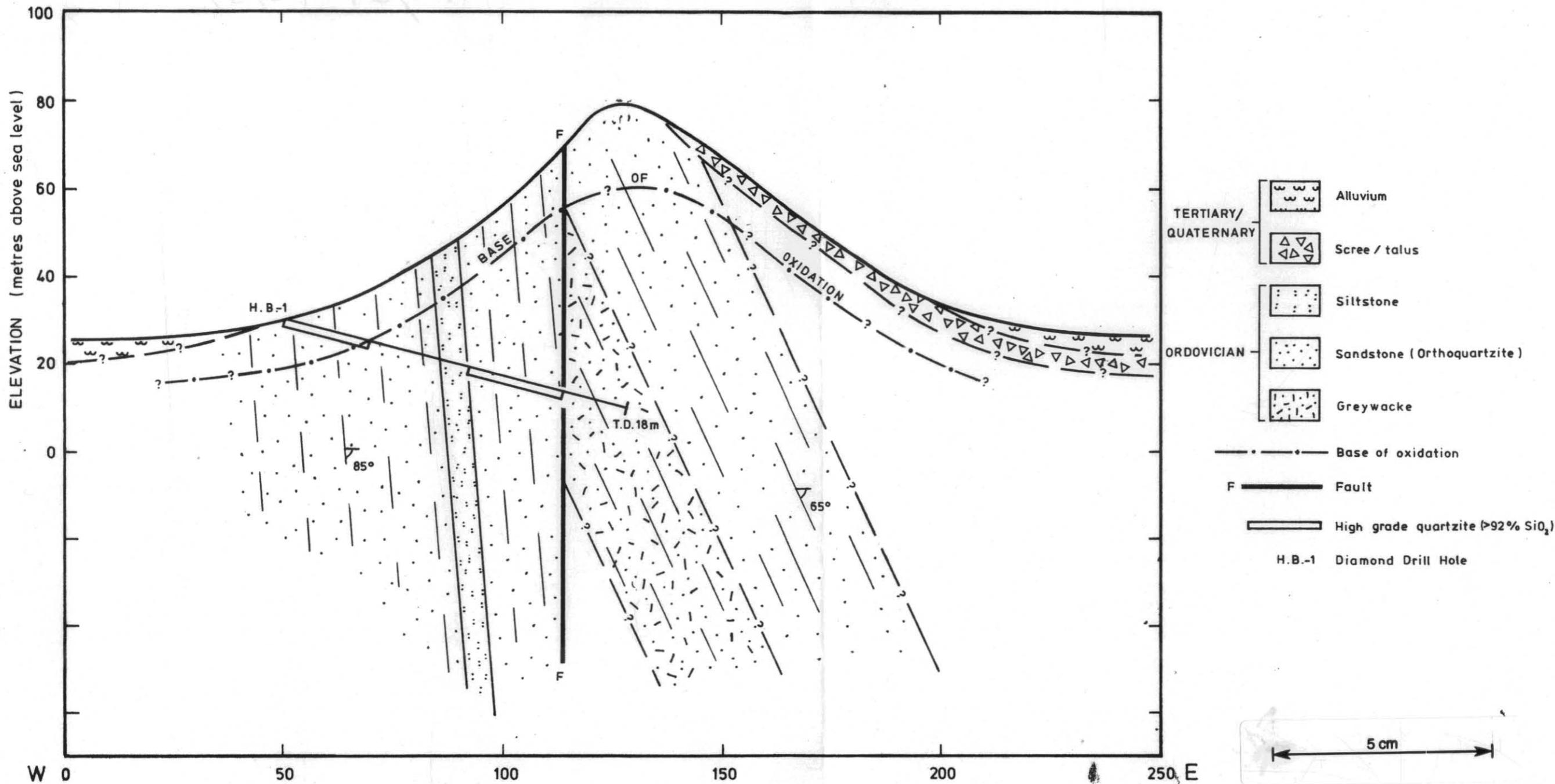
APPENDIX 1

Descriptive log, drill hole HB-1 (from Reid, 1974)

Depth (m)	Description
0 - 19.35	Bleached white medium-grained, hard, massive quartzite occasionally cut by thin drusy and vughy joint planes and finely pitted throughout by leaching. Between about 17.16 m and 17.21 m is a band of medium grey quartzite containing about 5% pyrite - the zone being bounded on either side by a zone of strong limonite staining up to 30 mm wide.
19.35 - 36.94	Grey, massively bedded, medium-grained (< 1 mm) quartzite occasionally cut by drusy joint planes and only minor-moderately pitted due to leaching. Local bleaching of the core occurs between 36.33 - 36.71 m, 30.91 - 32.49 m, and 34.51 - 34.61 m. Elsewhere the core would average about 2% FeS ₂ as extensive fine disseminations and narrow (up to 10 mm) veins or stringers of fine-grained pyrite, generally associated with joint planes at up to 30° to the core axis. Local significant concentrations of pyrite mineralisation occur in the vicinity of 22.85 m, 23.80 m, and 28.70 m. B/CA 70° at 23.35 m and at 36.90 m.
36.94 - 66.44	In this zone, the quartzite is variably dark grey to buff or light grey and with the exception of several thin argillaceous horizons remains essentially similar to the previous interval. The bedding to core axis remains at about 70° throughout. Grey-buff argillaceous horizons occur between 37.99 - 38.40 m, 39.10 - 39.70 m, 42.66 - 42.95 m, 44.36 - 44.60 m, and 60.59 - 60.86 m. Strong concentrations of fine-grained pyrite occur in the vicinity of 37.20 m, 42.40 m, 49.75 m, 50.00 m, 50.85 - 51.00 m, 53.09 m, 54.18 m, 57.96 m, and at 66.10 m, with a band of massive pyrite at least 250 mm wide in a zone of broken core beyond 48.16 m. At 66.15 m the core is extensively broken and ground, and is locally puggy - indicative of a fault (or at least a major fracture).
66.44 - 81.08	Grey, medium to coarse-grained (1 - 2 mm) friable argillaceous sandstone or greywacke, containing scattered shards of black siltstone up to 25 mm long. The proportion of siltstone fragments increases towards the end of the hole. The rock is relatively soft, friable, and porous and contains minor pyrite as weak disseminations and thin veins on joint planes (approximately 1% FeS ₂). Beyond 66.44 m to the end of the hole the core is extensively broken and ground.

END OF HOLE

HOGS BACK SILICA DEPOSIT - HASTINGS



Geology by K.O. Reid * and T.G. Summons (1974 - 1981)

* Former Chief Geologist, Mt Lyell Mining & Railway Co. Ltd.