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Silica in Tasmania

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Abstract

Potential sources of silica occur within Tertiary gravel and sand, and in quantities within sequences of Ordovician, Cambrian and Precambrian age throughout the State. Despite the apparent abundance of quartzite, grades suitable for metallurgical use are not common.

High grade silica 'flour' occurs in the Corinna and Preolenna areas, with the Corinna deposits currently being worked and the raw material exported. Ferrosilicon is produced at Temco, Bell Bay, with the Ordovician Cabbage Tree Formation providing some of the raw feed material for this process. Silicon metal was produced at Electrona, from raw materials collected in the northeast and northwestern parts of the State, until the closure of the plant in August 1991.

Further exploration is expected to delineate useful deposits of metallurgical grade silica.

INTRODUCTION

This report was originally published in 1989 as part of the *Mineral Resources of Tasmania* series (Bacon, 1989). This revision updates the information published in that report.

The report summarises information about the various deposits which have been investigated. Each deposit is described separately, and the location, access, geology, mining and exploration history, current tenure and reserves are listed for each deposit.

The end use of suitable silica-rich rocks, gravel and sand is in the production of silicon metal, glass, ceramics, refractory items, some chemicals, filter sands, ferrosilicon and related alloys of manganese and iron.

Use of fine-grained silica sources are in the production of quartz filtering sands, where the exact size frequency distribution is important — runner sands for blast furnace casting, moulding sand for steel casting, furnace bottom sand for acid open-hearth practice, and blasting sands. Pulverised silica flour is used in the manufacture of specialised silica products, both in powdered and liquid forms, such as synthetic silicas known as 'xerogels' and 'hydrogels'. Pyrogenic and precipitated silica and colloidal silica solutions are used as binding, bonding and anti-slip agents.

For metallurgical use, in the making of silicon metal and related alloys, a lump form of raw feed is generally preferred. The stone must be coherent and not crumble on heating, as fines are undesirable in these processes (Murphy and Henderson, 1983).

For all the various uses of siliceous materials, chemical specifications, grainsize, strength and fusion point requirements apply, and these vary considerably depending on the product being manufactured. The following table shows the approximate chemical requirements for three of the most commonly produced materials:

	Silicon	*Ferrosilicon*	*Silico-manganese*
SiO_2	99	98	95–98
Al_2O_3	<0.15	<0.5	<0.8
Fe_2O_3	<0.2	<1.0	<1.0
TiO_2	<0.003	<0.02	<0.02
CaO	<0.01	<0.1	<0.1
P_2O_5	<0.01	<0.1	<0.1

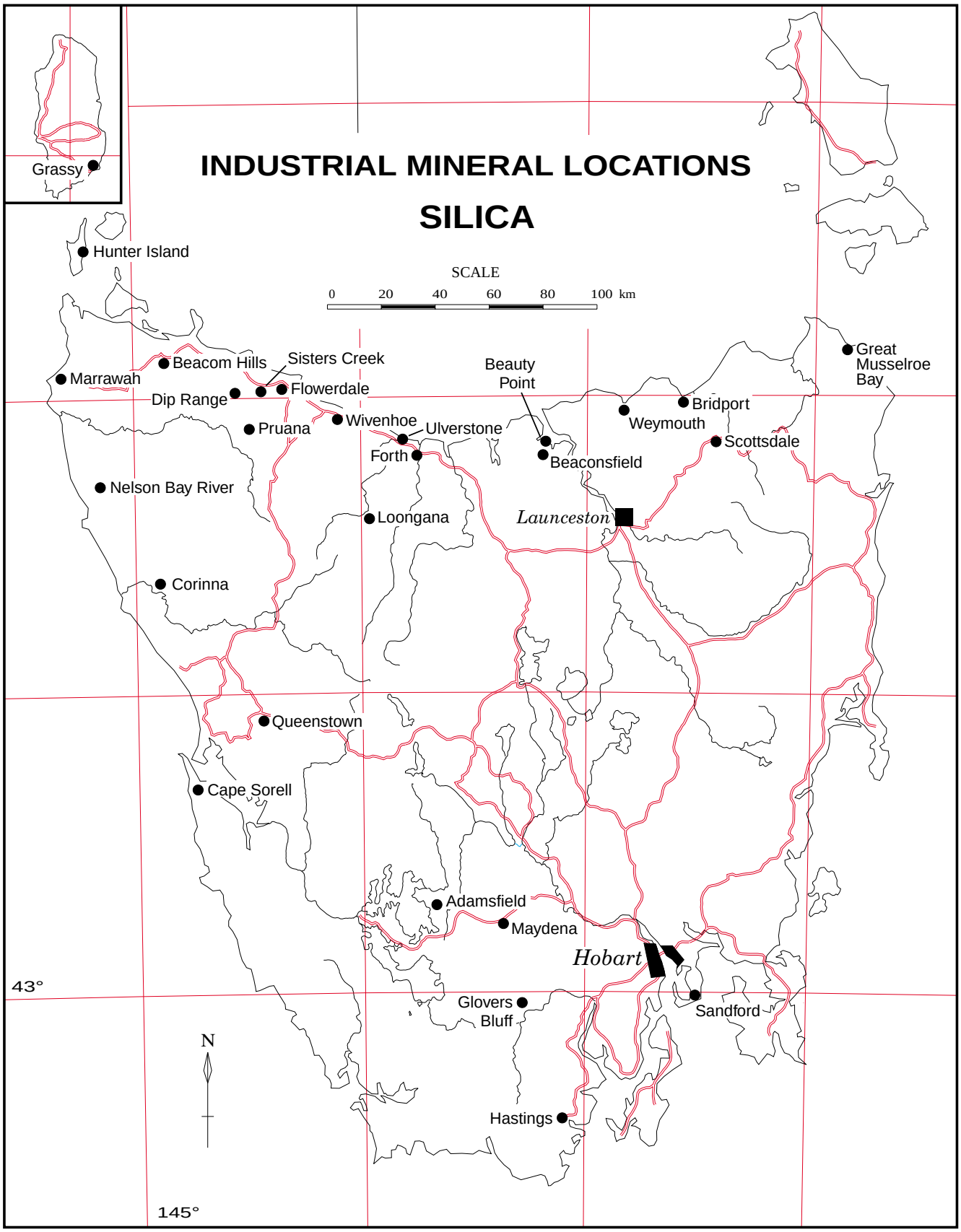

Figure 1

Location of silica deposits in Tasmania

DESCRIPTION OF THE DEPOSITS

A number of different Tasmanian rock types have been examined with regard to their prospectivity for silica.

Potential sources of this commodity are mainly found within the Precambrian sequences, although some younger quartzites, such as the Cabbage Tree Formation (Ordovician), are mined for this purpose. In the northeast and northwest of the State, gravel derived from granite and quartzite respectively is used as a source of silica, and for road metal and aggregate.

The locations of the various deposits of quartzite are given in Figure 1. The age of the various quartzites used are tabulated below.

Age	*Formation*	*Locations*
Tertiary	Sand	Southeast, northwest
	Gravel	Northeast, northwest
Ordovician	Cabbage Tree Formation	Beaconsfield
Cambrian	Forest Conglomerate and Quartzite	Smithton
	Barrington Chert	Forth
Precambrian	Rocky Cape Group	Northwest
	Jacobs Quartzite	Northwest
	Detention Subgroup	Northwest
	Forth Metamorphics	Northwest

FORTH AREA

John Dunhams Prospect (now called Pearsons Prospect)

Location and access

A ridge of Precambrian quartzite occurs immediately to the south of the Forth township [DQ368395].

General geology

The quartzite belongs to the Precambrian Forth Metamorphics. In the area of the prospect, the quartzite is described by Carey (1945) as being 'lithologically .... unusually pure quartzite, clean white in colour, and tending to be friable'. The rock crops out over a distance of 320 m, strikes N5°W and dips west at 65–75°. The quartzite weathers to a fine sand.

Mining and exploration history

The deposit was examined by Carey (1945) and since then has produced, intermittently, small quantities of quartzite for use in the making of ferrosilicon and for other purposes. The workings consist of a series of pits along the strike of the quartzite.

The deposit was examined by BHP between 1975 and 1977 during an exploration programme aimed at locating sufficient quantities of silica to supply the TEMCO plant at Bell Bay. Surface sampling and percussion drilling were done over this deposit and the results were reported in 1977 (BHP, 1977*a*). The deposit was thought to be surface-enriched with silica due to the leaching out of impurities. Tonnages were insufficient for the explorer's needs.

The deposit was again examined and drilled in 1984 by Queensland Mines and Pioneer Concrete (Tas.) Pty Ltd. Results were reported by Queensland Mines (1985*a*), with a reserve of 80 000 tonnes of quartzite proved by drilling, with a further 35 000 tonnes being regarded as a 'probable' reserve.

Current tenure

The prospect is currently covered by mining lease 563P/M in the name of D. D. Pearson.

Quality

Analyses from this prospect are given below:

	1	*2*	*3*	*4*
SiO_2 (%)		99.76	99.79	99.80
Fe_2O_3 (%)	<0.01–0.05	0.03	0.02	0.03
Al_2O_3 (%)	0.04–2.00	0.18	0.11	0.10
K_2O (%)	0.01			
TiO_2 (%)	0.01–0.03	0.02	0.01	0.02
CaO (%)	<0.01			
Na_2O (%)	<0.01			

1. 1985 exploration (Queensland Mines, 1985*a*)
2, 3, 4. Carey (1945)

Reserves

Reserves were estimated by Carey (1945) at 850 000 tonnes, at up to 30 m depth. More recent exploration has resulted in reserves being defined at 80 000 tonnes 'proved' and 35 000 tonnes 'probable' (Queensland Mines, 1985*a*).

Hopkins Prospect

This deposit, located south of Forth [DQ373373], was drilled in 1975 by BHP and a lease (ML941P/M) applied for. Tonnages of suitable material were considered to be too small for the deposit to be a viable mining concern at that time.

The deposit was again drilled in 1985 (Queensland Mines, 1985*a*), then being held under ML1206P/M. The surface material was found to be leached and of good quality, but the quality generally deteriorated with depth. The exploration defined a probable reserve deposit of 134 000 tonnes with the following analytical characteristics:

SiO (%)	99.2
Fe_2O_3 (%)	0.07
Al_2O_3 (%)	0.08

The rock type of this deposit is quartzite of the Precambrian Forth Metamorphics.

Johns Prospect

A small area of quartzite (of the Forth Metamorphics) near DQ322373 was drilled in 1975 and lease 942P/M taken out. The tonnages of quartzite suitable for metallurgical use were found to be too small for the deposit to be of economic interest.

LOONGANA

Reef quartz boulders scattered across a button grass area near Jean Brook [DQ195155] were inspected by Carey (1945), who described the boulders as lying in a 'drift' of glacial origin, which overlies a tuffaceous conglomerate. The deposit was estimated at 100 tonnes.

ULVERSTONE AREA

Leven

Location and access

A small area on the southern bank of the River Leven, opposite the mouth of Stinking (Masons) Creek, has been quarried for silica by means of two small pits. The deposit is located at DQ292427.

General geology

The deposit is described by Dickenson (1945) as a rock flour, derived 'from the alteration *in situ* of massive quartz, which appears to have been subjected to intense shearing strains with a resultant development of granulitic texture'. The silica sand or rock flour is composed of angular quartz particles of uneven grain size, and is white in colour except where iron stained.

Mining and exploration history

Two small pits have been dug into the deposit and small quantities were extracted from 1942 to 1945.

Current tenure

Leases 117M/44 and 83M/42 were held over the deposit but have now lapsed.

Quality

A grab sample from one of the pits was analysed in 1942:

SiO_2 (%)	98.0
Fe_2O_3 (%)	0.02
Al_2O_3 (%)	0.70
LOI (%)	0.58

Reserves

The deposit is estimated to contain 100 000 t of silica over the area of the two leases and additional surrounding ground.

Hays Creek

Several gravel pits in this area west of Ulverstone [DQ248427] have been worked for coarse aggregate and road metal. The rock type is the Precambrian Barrington Chert. During a 1985 exploration programme the chert at one pit (called Allisons prospect by the explorer) was drilled (Queensland Mines, 1985*a*). Reserves were estimated at 100 000 tonnes, with a representative quality being:

SiO_2 (%)	98–99
Fe_2O_3 (%)	0.1
Na_2O (%)	0.2
Al_2O_3 (%)	0.4–0.7
K_2O (%)	0.3–0.4
MgO (%)	0.15

The small size of the deposit and the marginal quality of the product make the deposit of limited future potential.

Stones Prospect

A quarry near DQ328402, 3 km southeast of Ulverstone, was operated by a Mr Stone during the 1970s for the extraction of sand. The quarry was examined in 1975 by BHP. The sand is formed from very friable, weathered quartzite. Currently the area is held under mining lease 965P/M owned by C & J Hazell Holdings Pty Ltd.

Jones Prospect

Near Abbotsham [around DQ322373] another small quarry has been worked for sand derived from weathered quartzite. An analysis of this sand gave:

SiO_2 (%)	98.8%
Al_2O_3 (%)	0.38%

This deposit is very small.

WIVENHOE

Location and access

A small area of silica sand was located at Wivenhoe, close to where the Bass Highway and the railway cross the Emu River [DQ099526].

General geology

This silica sand deposit was formed from the weathering of Precambrian siltstone, and now forms a thin veneer over the basement rocks.

WIVENHOE – SIZING ANALYSES (adapted from Hughes, 1959)

BS sieves	mm	1		2		3	
		% passing	cumulative %	% passing	cumulative %	% passing	cumulative %
+6	2.81	0.7	0.7	1.2	1.2		
+25	0.60	2.8	3.5	4.8	6.0		
+36	0.42	1.3	4.8	1.6	7.6		
+44	0.35	1.0	5.8	1.5	9.1		
+60	0.252	1.3	7.1	2.1	11.2	12.5	12.5
+72	0.211	0.7	7.8	1.3	12.5	-	-
+100	0.152	2.0	9.8	3.0	15.5	5.3	17.8
+150	0.105	2.9	12.7	4.2	19.7	-	-
+200	0.076	2.9	15.6	5.3	25.0	12.2	30.0
	0.056	84.4	100	75.0	100	8.4	38.4
	0.040					12.6	51.0
	0.028					13.5	64.5
	0.020					11.8	76.3
	0.014					9.4	85.7
	0.010					6.6	92.3
	<0.010					7.7	100

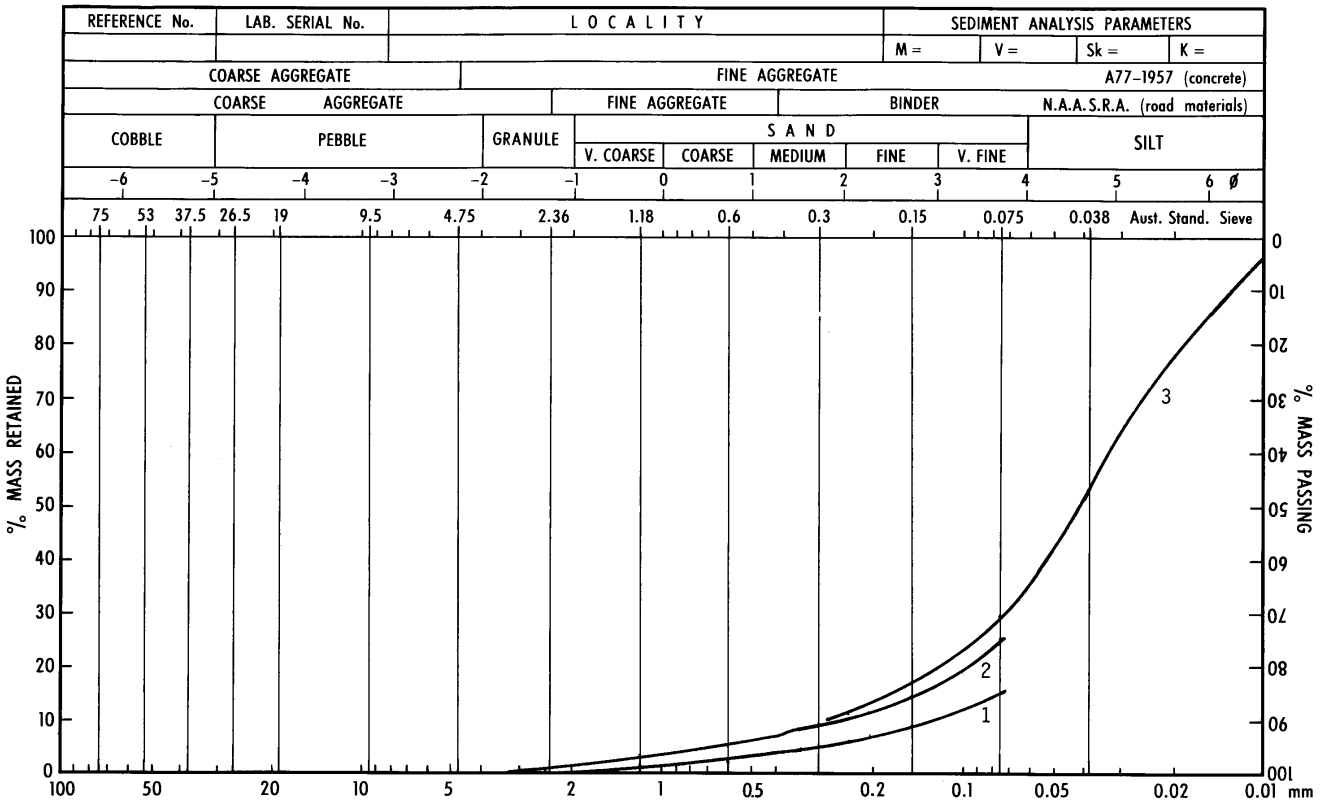

Figure 2

Grainsize analysis of sand samples, Wivenhoe

Mining and exploration history

Small quantities of the sand were used in the mid 1950s as an industrial abrasive and in sand soap.

Quality

Representative analyses of samples gave the following results:

SiO_2 (%)	99.1	99.6	99.7
Al_2O_3 (%)			1.04
Fe_2O_3 (%)	0.1	0.1	0.16
TiO_2 (%)			0.66

Reserves

The original deposit was very small and the area has now been built upon. Any remaining remnant is unavailable for extraction.

DIP RANGE – DETENTION RIVER – CANN CREEK AREA

Three areas to the south of Rocky Cape have been examined with a view to using the quartzite as a source of silica. These are:

(1) an area at the northern end of the Dip Range, along the banks of Hogarth Creek [around CQ720630];

(2) an area in the southern part of the Dip Range, two kilometres north of Detention Peak [around CQ715598]; and

(3) Cann Creek area [around CQ680450]

Dip Range – Hogarth Creek – Quartzite Peak area

This area, 35 km west of Burnie, is reached via a track from Newhaven Road.

General geology

The quartzite is part of the Detention Quartzite of Precambrian age, and is usually thinly bedded and dips at steep angles.

Good exposures of quartzite are found in Hogarth Creek and other creeks which have cut fault-controlled gullies across the strike of the quartzite forming the Dip Range.

The geology of the area is shown on the Geological Atlas 1:63,360 series Table Cape sheet (Gee, 1966).

Mining and exploration history

An exploration licence (EL43/70) was taken out in 1970 by Mineral Holdings Ltd over a large area, including the Dip Range. Some prospecting activity and chip sampling was done and exploration for silica continued on a small scale for some years. Recent interest in Tasmania for a source of silica to supply the Electrona silicon smelter resulted in an upswing in exploration for this commodity.

An extensive programme of percussion drilling and costeaning was carried out in 1981 by Longworth and McKenzie, for the Kaiser Aluminium–Mineral Holdings Joint Venture partnership. The quartzite in the Hogarth Creek prospect was found to vary laterally and vertically in the degree of silicification and quality. The deposit was considered to be sufficient in quantity but was not of the quality required by Kaiser Aluminium, and the joint venture partnership ended. Since then (1985) Monier Pty Ltd has investigated this area and has indicated that some high quality silica sand does exist. Recent exploration is summarised in Threader (1989).

Quality

	1	*2*	*3*	*4*	*5*
Fe_2O_3 (%)	0.23	0.068	0.017	0.21	0.018
Al_2O_3 (%)	0.08	0.68	0.05	4.2	0.16
TiO_2 (%)	0.082	0.60	0.087	0.11	0.029
Cr_2O_3 (%)	<0.001	<0.001	<0.001	0.002	<0.001
CaO (%)	0.01	0.01	<0.01	0.01	<0.01
MgO (%)	<0.01	0.02	<0.01	0.48	0.01
Na_2O (%)	0.01	0.01	<0.01	0.02	<0.01
K_2O (%)	0.02	0.20	0.01	1.0	0.04
LOI (%)	0.11	0.12	0.05	0.68	0.07
SiO_2 (%)	99.6	98.8	99.7	93.2	99.6

1. Dip Range No. 1 North Prospect Costean — four hand samples.
2. Dip Range No. 1 North Prospect Costean — bulk sample 17117
3. Dip Range No. 1 North Prospect Costean — bulk sample 17118
4. Quartzite (Shakespeare) Peak — blister blasted sample 17123
5. Quartzite (Shakespeare) Peak — blister blasted sample 17120

Current tenure

Mineral Holdings Australia Pty Ltd hold Mining Lease 8M/89 and Exploration Licence 25/88 over this area. They also hold EL's 11/92 and 20/93 in an area approximately 10 km to the south.

Reserves

Reserve figures are not available.

Dip Range South

The area around CQ715598 was named 'Dip Range No. 2 Prospect' by the explorer and briefly examined during the 1981 exploration, although no drilling or sampling was done in this area, which is currently not held under any form of mineral tenement.

Maynes Creek

An outcrop of the Jacob Quartzite near Maynes Creek [CQ755560] was examined in 1981 by BHP. Two percussion holes were drilled and a bulk sample taken. The quality in the drill holes was reported by Longworth and McKenzie (1987) as:

DDH		*SiO_2 (%)*	*Fe_2O_3 (%)*	*Al_2O_3 (%)*
SC 11	0–6 m	98.9	0.45	0.10
	9–15 m	99.0	0.25	0.10
SC 12	0–6 m	98.7	0.30	0.05
	6–12 m	98.5	0.35	0.10

Work by Amatek/Wolston Developments Pty Ltd/Monier Ltd on EL15/85 suggested a resource of

some 4 million tonnes of fine sand with the following physical gradings:

+600 µm	2.50%
+425 µm	7.40%
+300 µm	24.0%
+212 µm	45.6%
+150 µm	12.4%
+150 µm	12.4%
+106 µm	5.00%
+75 µm	2.00%
-75 µm	1.10%

This area is now vacant.

Pokes Road

Two quarries in the Jacob Quartzite at CQ711520, used to provide road materials for the Wynyard Council, were examined around 1980/81 by BHP.

No analyses have been reported from the area and the prospect is currently not held under any mineral tenement, being in the relinquished portion of EL43/70.

Cann Creek – Champion Road

Mineral Holdings Australia Pty Ltd currently have tenure over this area as ML45M/89 and EL24/88. Threader (1989) reported the occurrence of fine grained silica (flour) at Cann Creek in association with carbonates and along cuttings at Champion Road. He suggested that the deposits result from the redistribution of original silica flour replacements of carbonate.

Twenty-one samples were assayed and had a spread of results as follows;

SiO_2 (%)	98.61 – 99.68
Al_2O_3 (%)	0.17 – 0.378
CaO (%)	0.004 – 0.035
Fe_2O_3 (%)	0.005 – 0.2
TiO_2 (%)	0.015 – 0.365

PRUANA ROAD

Location

Pruana Road runs south from Preolenna towards West Takone, through an area of forestry operations. Various small gravel pits have been opened up to provide materials for the forestry roads in the area. One such pit occurs on the western side of Pruana Road at approximately CQ690450.

General geology

The area has recently been mapped by Industry Safety and Mines; compilations at 1:25 000 scale are available on request. The outcrop of 'silica flour' appears to be derived from the *in situ* weathering of a quartzite, possibly one of the quartzite units within the Rocky Cape Group.

Previous mining and exploration

Two nearby areas are covered by retention licences (RL8718 and RL8717 held by CRA Exploration Ltd) over magnesite deposits. To the west Mineral Holdings Australia Pty Ltd have EL24/88 and to the southwest Allstate Prospecting Pty Ltd have EL36/94. Hooker Mining Pty Ltd held EL23/88 adjacent to EL24/88 over an occurrence of silica flour (Skene, 1989).

In the Lapoinya area to the north, Wolston Developments Pty Ltd explored for silica sand deposits derived from the Jacob Quartzite (orthoquartzite) in the now relinquished EL15/85.

Quality

A small 'grab sample' from the pit was analysed at:

SiO_2 (%)	99.7
Al_2O_3 (%)	0.50
Fe_2O_3 (%)	0.07

Dry screening a sample from Pruana Road gave the following results:

Particle size (µm)		*Mass (%)*	*Cumulative % mass*
-4750	+2360	5.7	5.7
-2360	+1180	13.4	19.1
-1180	+600	23.2	42.3
- 600	+300	24.3	66.6
-300	+150	15.7	82.3
-150	+75	8.6	88.9
-75	+38	5.0	94.9
-38		4.1	100.0

Reserves

The reserves of this deposit have not been estimated.

SISTERS CREEK

Location

An area near Sisters Creek, around DQ815665, two kilometres southwest of Boat Harbour, has been prospected for silica.

General geology

Two quartzite horizons; the Jacob Quartzite and the older Detention Sub-Group, which is largely orthoquartzite; occur in the Sisters Creek area. Both units are part of the Rocky Cape Group.

Previous mining and exploration

The area around Sisters Creek was examined by surface sampling and drilling by BHP in 1977 (BHP, 1977*b*). Most of the quartzite was found to contain too much alumina for metallurgical use, although small patches of reasonably pure quartzite were noted.

Additional sampling was done during the early 1980s by Mineral Holdings Australia Pty Ltd in the Sisters

Creek area and in an area around DQ870630. The Sisters Creek area has more recently been examined by Zetetic on behalf of Monier Ltd, when an augering programme was done (Everett and Shaw, 1986).

Quality

A selection of analyses from the 1977 drilling are as follows:

	SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)
1.	98.9	0.10	0.15
2.	98.9	0.15	0.25
3.	98.7	0.15	0.25

1. Hole SC22, samples 3–6 m.
2. Hole SC22, samples 6–12 m.
3. Hole SC23, samples 0–6 m.

Reserves

Reserves are not known but are likely to be small.

WYNYARD AREA

Flowerdale Ballast Pit

Location and access

A large gravel reserve, known as the Ballast Pit, is located on the Calder Main Road, 5 km west of Wynyard [CQ873617].

General geology

Large deposits of Tertiary gravel occur in the valleys of the Flowerdale, Inglis and Cam Rivers. The largest deposit of gravel is found in the lower reaches of the Inglis River, where the material has been and still is used in the manufacture of concrete and in road-making aggregates, hotmix sealants for roads, and in concrete blocks. The area is covered by the Geological Atlas 1:63,630 scale Table Cape sheet (Gee, 1966).

A study of the gravel within the 34 ha Ballast Reserve is given in Threader (1981).

Mining and exploration history

The Ballast Pit, formerly owned by the Tasmanian Government Railways, was used to provide track ballast. A comprehensive study involving mapping, seismic traverses, test pitting and sizing analyses has been made by Threader (1981).

Threader's report follows on from a Department of Mines project during 1974/75, when a number of gravel pits in the area were examined and extensively sampled. Sizing analyses of samples from these pits, together with descriptions of the deposits, are given by Threader (*in* Gee, 1977).

Current tenure

A mining lease 1140P/M is currently held by the Wynyard Council over most of the area of the former Ballast Reserve.

Quality

No data relating to chemical quality of these gravels are available. This pit was not examined during recent exploration, which concentrated on several other nearby pits.

Reserves

The reserves of *in situ* sand and gravel in the Ballast Reserve are estimated at 3.6 million m^3, of which 3.0 million m^3 would be available for mining. Recoverable reserves are likely to be 2–2.5 m^3 (Threader, 1981).

Consolidated Lease 68M/80

This lease is held by Besser Tasmania Pty Ltd, the gravel being used in hotmix bitumen and the making of concrete blocks. The pit was examined in 1982/83 by AMDEL on behalf of Pioneer Concrete Services Ltd. Production figures indicate yields of around 68% of the 2.36 mm fraction, these yields being finer than those to the north in the old ballast pit where the 2.36 mm fraction comprises 41% of the gravel.

Costeaning during 1982/83 provided bulk samples for analysis which showed the average quality to be:

SiO_2 (%)	99.43
Al_2O_3 (%)	0.19
Fe_2O_3 (%)	0.04
TiO_2 (%)	0.06
MnO (%)	<0.001
CaO (%)	0.0067
Na_2O (%)	0.03
K_2O (%)	0.04
P_2O_5 (%)	0.0018

A number of other pits and leases over small gravel deposits similar in type to the Ballast Reserve and the Consolidated Lease exist in the area. Mining Leases of over 5 ha in size are listed below:

Lease	*Owner*
55M/78	E. V. Summers
1042P/M	M. R. Margetts
24M/77	P. M. Voss
19M/89	P. M. Voss
910P/M	C. J. Beveridge
62M/78	L. G. Holloway
699P/M	G. M. & T. J. Easton
1195P/M	R. M. Davies
29M/88	D. J. Rowell
737P/M	Besser Tasmania Pty Ltd
45M/90	D. J. Rowell
48M/90	C. W. & R. G. Brown
104M/84	F. N. Crawford

1231P/M	M. C. Humble
45M/75	Boral Resources (Tas.) Ltd
57M/90	Pioneer Concrete Tasmania Pty Ltd

SMITHTON (BEACOM HILLS)

Location

An area five kilometres southeast of Smithton, known as Beacom or White Hills, contains a number of small pits which have been quarried to produce road construction materials.

General geology

The material quarried is the Forest Quartzite, of Precambrian age, which overlies the Rocky Cape Group and is overlain by the Smithton Dolomite. The geology of the Smithton area is given in Lennox *et al*. (1982). The quartzite is well jointed and cleaved, and is also weathered and friable and easily broken into fist-sized lumps. Blasting is required to extract some of the more resistant quartzite horizons.

Iron staining and other brown stains by peaty or iron-laden percolating groundwater have discoloured part of the quartzite. The outcrop area covers around four square kilometres.

Mining and exploration history

The workings in the Beacom Hills area were visited by V. M. Threader in 1984. At that time, quartzite was being quarried from Mining Lease 879P/M by the Department of Main Roads for use as a road base. A bulk sample of 2000 t was being removed by Brambles Holdings Ltd from ML917P/M. T. Ling was working ML1082P/M on a small scale, and an unleased pit on Odgers' property was similarly being worked intermittently. The bulk sample was crushed and screened to produce a 500 t sample of -125 mm to +38 mm material (a 25% recovery) for use by Pioneer Concrete Pty Ltd.

The unleased pit on Odgers' property was examined by AMDEL in 1982 on behalf of a Kaiser Aluminium–Mineral Holdings Australia Pty Ltd joint venture (Ware, 1982). Eight shallow airtrack holes were drilled, and AMDEL concluded that the quartzite had been subject to secondary silicification, and leaching had resulted in surface enrichment. Reserves would depend on the chemical specifications and size distribution required for the final product.

Recently Pioneer Silicon Industries Pty Ltd (see Hofto,1991) explored for a source of lump silica for the now closed silicon smelter at Electrona. EL19/89 over the Beacom Hills was recognised as having potential for high grade quartzite. No further work was done because of the closure of the smelter.

Mineral Holdings Australia Pty Ltd explored to the east of the Beacom Hills in the South Forest area as part of EL29/80 (see Threader, 1988; 1989). Shallow drilling in this area gave the following assays;

SiO_2	98.76% to 99.14%
Al_2O_3	0.20% to 0.62%
Fe_2O_3	0.04% to 0.24%

Current tenure

Several leases are currently held over the quartzite in the Beacom Hills area. These are:

ML879P/M	Circular Head Council
ML1085P/M	M. K. and G. J. Francome and P. McBain
ML1279	T. J. & M. J. Leis
ML16M/93	N. E. Popowski
29M/93	N. E. & H. K. Smith
1398P/M	W. E. Purdy
1179P/M	H. B. De Ley

Quality

Samples from pits in the Faheys Lane (samples 1, 2) and Beacom Hills areas (Samples 3–9) were collected by V. M. Threader in 1984. The results of testing were:

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
SiO_2 (%)	96.1	81.3	98.5	98.9	98.8	95.9	96.9	96.2	94.1
Al_2O_3 (%)	0.90	7.24	0.15	0.11	0.11	1.63	0.42	0.76	0.80
Fe_2O_3 (%)	1.26	5.72	0.92	0.74	0.74	0.92	1.66	2.06	1.37
K_2O (%)	0.12	1.56	0.03	0.02	0.02	0.28	0.07	0.12	0.12
Na_2O (%)	0.04	0.13	0.09	0.09	0.08	0.10	0.07	0.09	0.06
CaO (%)	0.07	0.17	0.01	0.14	0.18	1.01	0.06	0.96	0.03
LOI (%)	1.31	3.20	0.24	0.03	0.03	0.06	0.72	0.70	3.46

One pit was examined in 1982 by AMDEL on behalf of a Kaiser Aluminium and Chemical Corporation Pty Ltd and Mineral Holdings Australia Pty Ltd Joint Venture (Ware, 1982).

Reserves

The Beacom Hills outcrop occupies an area of about one square kilometre. Reserves of *in situ* quartzite, regardless of particle size or quality, are one million cubic metres per metre of depth. Assuming recoverable quartzite to two metres depth, the reserves of the deposit are two million cubic metres. Calculations by V. M. Threader suggest that the recovery of the +38 mm fraction is around 20% and the reserves of this fraction are in the order of one million tonnes.

HUNTER ISLAND

Location and access

Hunter Island is located north of Cape Grim, on the far northwestern tip of Tasmania. The area which has been explored is the land between Cave Bay

[CR113105] and Ainslie Beach [CR115060] on the east coast of the island.

General geology

The quartzite in the area examined is of Precambrian age. The coastline of the island has been mapped by D. J. Jennings, who noted three lithological divisions of the quartzites, identified as the 'lowest', 'intermediate', and 'uppermost' sequences. The lowest sequence was only seen in the Cuvier Bay area and consisted of crumpled, kink banded, cleaved and laminated black shale with rare, thin quartzite horizons. This succession grades into an overlying, more massive, cleaner quartzite, the 'intermediate' sequence. These rocks are massively bedded, well sorted, pure quartz sandstone with abundant cross bedding and ripple marking. This sequence forms the most common rock type on the island and was what was examined as a potential source of silica.

A younger ('uppermost') sequence of interbedded siltstone-shale-quartzite is downfaulted and now juxtaposed adjacent to the underlying massive quartzite at several locations on the island. All three sequences are thought to be part of the lower Precambrian (D. J. Jennings, unpublished data).

Mining and exploration history

Hunter Island was explored in 1979 (EL35/79) by the Tasmanian Electro Metallurgical Company Pty Ltd to ascertain the availability of quartzite suitable for the manufacture of ferrosilicon and manganese silicon. Two traverses were made across the strike in the Cave Bay area, with chip samples being taken every few metres. Samples were also taken at Shepherds Bay and Cuvier Point. Exploration was discontinued due to a combination of unpromising results, access difficulties, and potential land use conflicts.

Current tenure

No licences or mining leases for silica are currently in force on Hunter Island.

Quality

Chip samples were taken from various parts of the island and over two traverses in the Cave Bay area. The range of sample value for each of the two traverses was:

	Traverse 1 (14 samples)	*Traverse 2 (7 samples)*
SiO_2 (%)	95.6–98.0	97.6–99.3
Al_2O_3 (%)	0.27–3.04	0.14–0.87

Reserves

Further work is required to determine the viability or otherwise of the quartzite in the area between Cave Bay and Ainslie Beach, although the area must be classed as having a low prospectivity for economic deposits of silica.

MARRAWAH

Location and access

An area near Marrawah, east of West Point, has been examined as a potential source of silica.

General geology

The rock is part of an unmetamorphosed Precambrian sequence and is described by Brandt (1974) as an homogenous sedimentary sequence of medium-grained orthoquartzite some 650 m thick. The quartzite lies within a structural basin five kilometres long and 800 m wide.

Mining and exploration history

The area was examined in 1974 by the Australia and New Zealand Exploration Company (ANZECO). Chip samples were taken from the outcrop.

Quality

Average analyses of samples from this area are as follows:

SiO_2 (%)	98.0–99.4
Al_2O_3 (%)	0.3–0.8
Fe_2O_3 (%)	0.1–0.2
K_2O (%)	0.1–0.2

Reserves

Reserves were estimated by the 1974 exploration to be in the order of 150 million tonnes, but the quality was considered not good enough for the material to be used for ferrosilicon production. However Summons (1981*a*) considers that the area holds some potential and should be investigated by drilling to properly ascertain the nature of the resource.

CORINNA

Location and access

The Corinna silica deposits are located to the east and southeast of Mt Donaldson [around CP430910 and CP415880]. These deposits can be reached from the Corinna Road, which runs between Savage River and Corinna. Rough tracks suited only to four-wheel drive vehicles lead off from the Corinna Road to the main resource areas.

General geology

The silica flour results from silicification of the Corinna Dolomite followed by leaching under a protective blanket of Tertiary sediments. The Corinna 1:50 000 scale Geological Atlas Series map sheet (Turner *et al.*, 1992) shows these deposits in a regional context. Notes from a field excursion to this area (edited by Turner, 1992) give further details on the regional and prospect geology. Khin Zaw *et al.* (1992) studied the genesis of these deposits using fluid inclusions, and concluded

that the silicification most likely resulted from magmatic fluids (Devonian granite related?) at temperatures of about ± 250°C. The late stage formation of the silica flour by disaggradation of the silicified dolomite occurred in the presence of a fluid with a temperature of less than 150°C.

Mining and exploration history

Possible uses for the silica sand were recognised by H. Nolan in the early 1980s. Exploration of the deposits since then has resulted in mining leases being taken out covering known areas of the resource.

Current tenure

Areas in which the silica flour occur are held under mining lease by H. D. Nolan (8M/90 and 62M/85 — 62M/85 and 38M/90 will become consolidated lease 25M/90; 36M/90 and 37M/90 are applications).

Quality

The silica flour is 99.9% or more SiO_2 and is suitable for the manufacture of optical fibre, high quality lens glass, silicon chips and lead crystal. Most of the material ranges in size from silt to fine-sand grade, although lump-sized pieces of quartz do occur.

Reserves

Reserve figures are not available.

NELSON BAY RIVER

Location and access

An area south of the Nelson Bay River, about 10 km northeast of Temma on the West Coast [around CQ415125], has been examined for silica.

General geology

The Precambrian rocks in this area are described by Brandt (1973) as "... fine-grained, greenish, banded siltstones and slates with narrow intercalations of pure white, medium-grained quartzite". The sequence strikes northwest and dips 30–35° to the northeast.

Mining and exploration history

Trenches were dug over an outcrop of quartzite at the above locality in 1973, and samples from this exploration were analysed.

Quality

Typical analyses are:

SiO_2 (%)	99.7	99.2
Al_2O_3 (%)	0.12	<0.01
Fe_2O_3 (%)	0.89	0.95
TiO_2 (%)	0.04	0.05
CaO (%)	0.04	0.04
P_2O_5 (%)	0.02	<0.01

Reserves

Reserves were estimated at 75 000 tonnes (Brandt, 1973), and this was considered to be too small a tonnage to be of economic interest.

CAPE SORELL

Location and access

On Cape Sorell, on the West Coast of Tasmania, exploration for high quality quartzite has been centred around Mt Antill, Mt Obvious and The Grandfathers [around CP520320].

General geology

The quartzite is of Precambrian age and is metamorphosed. The geology of the area was mapped as part of the Strahan 1:50 000 scale Geological Atlas Series map sheet (Baillie *et al.*, 1977). The regional geology of the area is discussed in detail by Baillie and Corbett (1985).

The quartzite on Cape Sorell peninsula forms part of a "structurally complex lower greenschist-facies assemblage of inter-layered orthoquartzite, micaceous quartzite, phyllite and minor siliceous conglomerate of Late Proterozoic age" (Baillie, *in* Baillie and Corbett, 1985).

Massively bedded quartzite has been found to be of more consistent composition than thinly bedded quartzite, in which surface leaching of iron and alumina gives a false impression of high grade silica, which does not persist at depth.

Mining and exploration history

Part of Cape Sorell peninsula was explored by Comalco Ltd during 1974/75 and the quartzite sampled by costeaning. The aim was to locate quartzite suitable for use as a raw material in the production of silicon metal. The detailed exploration results are given in Picken (1975). A study of the possibility of a silicon smelter on Cape Sorell was undertaken by Comalco (1975).

Current tenure

The area is currently vacant.

Quality

Typical analyses of rocks from the area are:

SiO_2 (%)	99.13	99.02
Fe_2O_3 (%)	0.05	0.04
Al_2O_3 (%)	0.34	0.22
TiO_2 (%)	0.02	0.01
MgO (%)	0.10	0.04
Na_2O (%)	0.09	0.01
K_2O (%)	0.08	0.01
P_2O_5 (ppm)	28	36
CaO (%)	<0.01	0.01
LOI (%)	0.18	0.17

Reserves

Reserves of 2.7 million tonnes of good quality quartzite have been estimated for this area in three separate blocks:

Mt Anthill	1.7 million tonnes
North Escarpment	0.8 million tonnes
Mt Obvious	0.2 million tonnes

The reserves are of 'indicated' status only and further work is needed to clearly define the deposit.

QUEENSTOWN

Quartzite was used as a flux in the smelters at Queenstown during the period of their operation from 1896 to 1968. The short-lived smelters at Crotty, which operated unsuccessfully from 1901 to 1903, did not require the use of silica as a flux, as the North Lyell ore used was much higher in silica content than the Mt Lyell ore used at Queenstown.

Location

Silica was mined in the Queenstown area [around CP800410] for use as flux.

General geology

The flux feed was the Crotty Quartzite, a fairly impure, often crumbly white quartzite of Silurian age. The geology of the Queenstown and Lynchford areas is shown on the Lyell 1:50 000 scale Geological Atlas Series map sheet (Calver *et al.*, 1987). Surficial leaching results in a friable clean sand.

Mining history

The quartzite was used as a flux to enable the separation of iron and copper during the smelting process. In 1899 the Queenstown smelter used one tonne of silica for every three tonnes of ore (Blainey, 1967). Whilst no quartzite has been needed since the smelters closed in December 1969, the quarry areas are now held by Copper Mines of Tasmania (1M/95, 2M/95, and 28 to 38M/94).

Quality

No detailed analyses are available for the Crotty Quartzite. Spot samples taken from outcrops on the Kelly Basin Road from near the King River bridge [CP884315] and the Crotty turn-off [CP874288] (both locations are now flooded by Lake Burbury) gave the following results:

	King River	*Crotty Road*
SiO_2 (%)	96.81	98.39
Al_2O_3 (%)	1.46	0.92
Fe_2O_3 (%)	0.29	0.13

Reserves

No reserve figures are available. The reserves are likely to be quite large, although distance from markets makes the Crotty Quartzite an unattractive exploration target.

MAYDENA — ADAMSFIELD

A fairly clean quartz arenite, the Wings Sandstone, occurs around Wings Lookout in the Adamsfield area. This unit is massively bedded, and weathered parts of the sequence have been quarried in the past as a source of road-making materials.

Beds of siliceous conglomerate, chert and quartz sandstone of the Denison Subgroup have been quarried in the vicinity of Clear Hill, in the Adamsfield area, and also used for road making.

In 1988 Pioneer Silicon Industries took out EL14/88 over the Pine Hill Quartzite, five kilometres southwest of Maydena, in an attempt to locate a silica supply close to the Electrona smelter. Initial exploration was encouraging (see Jones, 1989) and was followed with a 2650 tonne bulk sample being taken in 1990. The sample was quarried and jaw crushed to give 1034 tonnes of +20 mm–150 mm material (see Paterson, 1990). An analysis of this material gave:

Al_2O_3 (%)	0.084
Fe_2O_3 (%)	0.028
TiO_2 (%)	0.020
CaO (%)	0.031

The sample was reported to have performed satisfactorily in furnace trials.

During the early exploration a deposit of silica sand was discovered on the eastern end of Pine Hill. Samples were taken in 1992 (see Forster, 1992) from test pits and sent to ACI Operations Pty Ltd for assaying and grainsize analysis. These samples met the ACI standard for tableware. An averaged chemical analysis from ten samples gave:

SiO_2	99.93%
Na_2O	0.03%
K_2O	0.01%
CaO	0.02%
MgO	0.01%
Al_2O_3	0.01%
TiO_2	0.01%
Fe_2O_3	0.004%
Cr_2O_3	0.0001%

Particle size distribution

Size	*Raw (%)*	*Pump washed (%)*
19.00 mm	0	
12.50 mm	0.2	
9.50 mm	0.4	
6.50 mm	0.7	
4.75 mm	1.2	
3.35 mm	1.3	
2.36 mm	1.4	
1.70 mm	1.5	
1.18 mm	1.6	
850 µm	1.4	0
600 µm	2.3	Tr
500 µm	2.1	2.6
425 µm	1.8	3.3
300 µm	6.7	11.1
212 µm	10.3	18.2
150 µm	11.9	20.8
106 µm	13.4	24.4
75 µm	12.1	18.1
53 µm	9.2	Tr
Pan	19.9	1.3
APS No.		78.89
Dry Screened (before pump wash)		
+4.75 mm		4.08
Wet Screened (after pump wash)		
+600		7.94
–600 +75		56.69
–75		31.30

The Northwest Bay Company Pty Ltd have taken out Mining Lease 1519P/M over the Pine Hill area.

HASTINGS AREA

Deposits of silica in the Hastings area include Ordovician orthoquartzite outcrops (as found on the Hogs Back and North Lune Road) and more recent secondary deposits, such as those near Hastings Caves Road and on South Lune Road.

Hogs Back and North Lune Road

Location and access

The Hogs Back (formerly called the Boars Back) is a north-trending ridge which rises abruptly from the surrounding button-grass plain. The ridge is 50 m high, 130 m wide and 800 m long. A continuation of this ridge is found in a small outcrop on North Lune Road.

General geology

The Hogs Back is composed of orthoquartzite, thought by Hughes (1960) to be of Precambrian age. More recent fossil evidence suggests that the rock is of Ordovician age (Sharples, 1979) and underlies the limestone in the area.

Mining and exploration history

The Hogs Back has been examined by Hughes (1960) and Summons (1981*b*). During World War II quartzite from this deposit was quarried for use in the manufacture of ferrosilicon. An old quarry exists on the western flank of the ridge, where the bedding dips steeply westwards (Hughes, 1960). The ridge is formed from a tightly-folded anticline, with beds of quartz sandstone and interbedded argillaceous horizons overlying an older core of greywacke (Summons, 1981*b*).

One hole has been drilled into the Hogs Back. The results of this, which are given in Reid (1974) and Summons (1981*b*), show that one 20 m thick high-grade siliceous interval, averaging 98% SiO2, was intersected. Various grab samples have been collected by different interested parties; the results of testing are tabled below. These samples were all taken from the leached and weathered surface of the deposit and so are enriched in SiO_2.

Several holes were drilled across the outcrop in North Lune Road during a drilling programme in 1986. Details of this exploration are given in Threader and Bacon (1987). The massively-bedded quartzite dips steeply (50°) eastwards. The outcrop is only 5 m wide and of very limited areal extent. An analysis from this outcrop is given below.

Current tenure

No mining leases or exploration licences are currently in force over this area.

Quality

	1	*2*	*3*	*4*
SiO_2 (%)	97.62	99.2	99.45	96.7
Al_2O_3 (%)	0.01	-	0.27	0.63
Fe_2O_3 (%)	1.02	0.14	0.12	-
FeS_2 (%)	1.52	-	-	-
TiO_2 (%)	-	-	0.06	-
P_2O_5 (%)	0.08	-	-	-
MgO (%)	0.08	-	0.02	0.01
CaO (%)	0.10	-	0.02	0.03

1. Hogs Back, DDH HB1, interval 44–66 m (Summons, 1981*b*)
2. Hogs Back, grab sample (Hughes, 1960)
3. Hogs Back, grab sample (Forster, 1973)
4. Outcrop on North Lune Road, interval 2.2–4.0 m DDH 6 (Threader and Bacon, 1987)

Reserves

The reserves of quartzite on the Hogs Back have been tentatively assessed at 4 million tonnes (Summons, 1981*b*). The reserves at North Lune Road are negligible.

South Lune Road

Location and access

The South Lune Road connects with the Lune River to Catamaran road two kilometres south of Lune River.

General geology

A sandy quartz gravel, probably of Quaternary age, covers the plain and low hills north of South Lune Road. The gravel is composed of sand and silt particles, as well as larger cobble-sized fragments of stone.

Mining and exploration history

Chip holes were drilled in the South Lune Road area in 1986 by the Department of Mines.

Current tenure

No mining leases or exploration licences are currently in force over this area.

Quality

The quality of the gravely material is very poor, around 95% SiO_2.

Reserves

The reserves are negligible and the quality too inferior for the area to be of any interest.

Hastings Caves Road - Creekton Road

Location and access

A quarry on Hastings Caves Road near Hastings [DM893838] has been worked by the Department of Main Roads to produce road surfacing material.

General geology

The silica in this area is in the form of a gravel, in parts consolidated and showing a curious box-work texture. The deposit is considered to be formed from the replacement of Precambrian dolomite (Sharples, 1979). In the Creekton Road area drilling showed a surface veneer of this silica overlying dolomite.

Mining and exploration history

The silica gravel has been used as a road surfacing material for some years. Hughes (1960) examined the deposit, and the area was mapped by Sharples (1979). Seven chip holes were drilled in this area in 1986 (Threader and Bacon, 1987).

Quality

Seven holes were drilled into the secondary silica deposit to depths of 7.5, 4.0, 2.0, 3.0, 2.5, 6.0 and 8.0 metres. Because of caving of the holes or high water tables, it was only possible to obtain representative samples from three of the holes. The Al_2O_3 content in these holes was:

DDH	*Depth (m)*	*Al_2O_3 (%)*
1	7.5	0.65
2	2.0	0.19
3	1.3	0.51

The gravel pits on Hastings Caves Road were sampled by Hughes (1960) and high purity silica was recorded. Such results may only be representative of leached surface material. It is predicted, therefore, that only the upper two metres of this deposit is of acceptable purity.

Reserves

If half of this 28 km² area contained a two metre thickness of usable silica which was 50% recoverable, the resource could amount to two million tonnes at most. The resource is small, of marginal quality, and is of no real economic importance.

In addition, this fairly meagre resource lies close to a popular tourist destination, and any attempt at mining would involve the destruction of 2 km² of natural forest.

GLOVERS BLUFF

Location and access

The Glovers Bluff deposit [DN770350], 21 km northwest of Geeveston, is reached via a network of unsealed forestry roads from Geeveston, with the last 0.5 km or so of track being quite rough.

General geology

Glovers Bluff forms part of a strike ridge of Precambrian quartzite, which trends N25°W and rises sharply from the valley of the Weld River. The bluff top is some 200 m above the river level. The outcrop is 20–30 m wide and several hundred metres long. The dip of the beds is near vertical.

Mining and exploration history

Exploration began in 1975, with the opening of a small pit to provide a 1000 t bulk sample of unweathered material for a test production run of ferrosilicon at Electrona. The same small quarry was used in 1984/85 to provide a sample to test the suitability of the material for silicon metal production.

The drilling in 1974/75 of four diamond and four percussion drill holes by Consolidated Gold Fields Australia Ltd (looking for silica for ferrosilicon production) resulted in the definition of 15 million tonnes of quartzite in three separate blocks suitable for this purpose.

The first hole was drilled on the slopes of the Bluff, but the quartzite was found to be of poor quality (80–90% SiO_2). The remaining holes were drilled on top of the Bluff, and the quality was found to be much improved.

Results of exploration are given by Consolidated Gold Fields (1974, 1975). Surface samples were very pure, due to the leaching out of impurities.

Exploration by BHP (TEMCO) in 1980 resulted in six holes being drilled, and a deposit of 1.5 million tonnes of very high quality silica (having less than 0.9% Al_2O_3) was defined (Hassel, 1981).

More recently (1985–1987) the deposit was examined by Pioneer Concrete Industries, with a view to using the quartzite at their Electrona plant. Results from this exploration are not available.

Current tenure

The deposit is currently held under EL3/94 by the Northwest Bay Company Pty Ltd.

Quality

	1	*2*
SiO_2 (%)	99.3	97.9
Fe_2O_3 (%)	0.25	0.05
Al_2O_3 (%)	0.05	0.50
TiO_2 (%)	<0.03	0.03
Na_2O (%)	-	0.01
CaO (%)	0.05	0.02
MgO (%)	0.03	0.04
K_2O (%)	0.02	0.24
LOI (%)	0.33	0.33

1. Grab sample, Glovers Bluff (Forster, 1973)
2. Bulk sample, DDH2 (Consolidated Gold Fields, 1975)

Reserves

Reserves have been defined as 15 million tonnes of quartzite having less than 1.5% Al_2O_3 (Consolidated Gold Fields, 1975), or 1.5 million tonnes having less than 0.9% Al_2O_3 (Hassel, 1981).

HOBART — SANDFORD AREA

Location and access

Hobart's sand supplies for building and glass manufacture are predominantly sourced from small pits in the Sandford–South Arm area, with some supplies coming from Huonville, New Norfolk and Penna. A recent study of the sand resources in the greater Hobart area by Matthews and Donaldson (1994) discusses the geology, present reserves and future requirements.

General geology

The Sandford deposit is described in Threader (1974). The sand used for glass manufacture is a white, Tertiary-aged sand, probably representing an old dune series. Younger dune sands are also quarried in the area and are used as a fine aggregate in the manufacture of concrete, and for other domestic purposes.

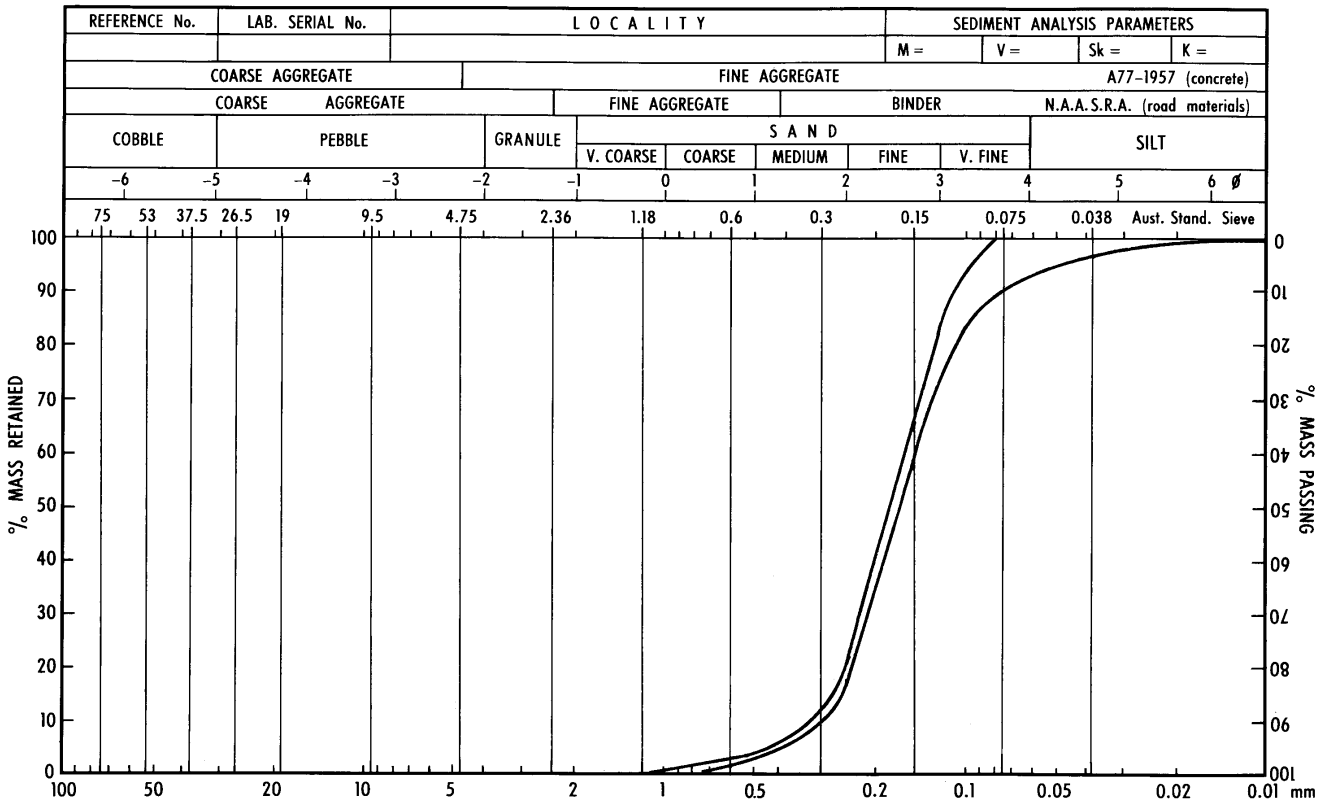

Figure 3

Grainsize analysis of sand samples, Sandford

Mining and exploration history

The white sand has been mined since 1969 for use by ACI in glass manufacture. The sand is wet screened to remove the clay fraction and any organic matter. Current production is around 200 tonnes per year.

Current tenure

See Matthews and Donaldson (1994).

Quality

A grainsize analysis of the glass-making sand is given in Figure 3.

Reserves

Reserves of Tertiary sand were estimated* (Threader, 1974) to be:

Sandford Peninsula	4.2 million cubic metres
Lauderdale	30 million cubic metres
Seven Mile Beach	338 million cubic metres
The Neck (excluding narrow central portion)	30 million cubic metres

* estimates only; insufficient data for these figures to be classed as proven reserves.

NORTH EAST TASMANIA

A number of gravel pits in the northeast were examined by Pioneer Concrete (Tas.) Pty Ltd to determine their potential as sources of silica. After an initial reconnaissance survey of some of the gravel pits (Queensland Mines, 1985*b*), several areas were examined in more detail (Queensland Mines, 1986). Summarised results of exploration details available to date are given below.

Weymouth

A large area of Tertiary gravel occurs 5 km west of Weymouth. This area has been extensively quarried in the past for road construction material. The gravel comprises coarse, angular quartzite cobbles.

Several test pits were dug in the deposit in 1986 (Queensland Mines, 1986), but the results were described as 'disappointing'. The gravel in this area is thin, being about one metre thick.

Brambles Pit

Iron-stained gravel in the Pipers River area has been quarried for aggregate for many years. The gravel here is about two metres thick.

Lees Pits

A number of previously-worked gravel pits occur within ML1019P/M around grid reference EQ245560, held in the name of V. M. Lee. The gravel here is up to 1.5 m thick.

Bridport (Bridwood)

White quartzite gravel occurs on Bridwood Station, a farm west of Bridport. The gravel has been quarried for use on internal farm roads. The deposit was examined by a series of test pits in 1985 (Queensland Mines, 1986). A total reserve of 74 000 tonnes in four separate areas was defined by this exploration.

Halfway Road

An area of gravel occurs five kilometres south of the old township of Waterhouse, around EQ553649.

Forester

A Forestry Commission gravel reserve at EQ558512, one kilometre southwest of Forester, has been worked to provide road construction materials.

Scottsdale

Stornoway Hewitt Pty Ltd hold EL15/91 and ML11M/91 over a Tertiary gravel resource approximately 10 km north of Scottsdale. Assay and sizing results from a number of samples are presented in a brief report (Anon., 1992) on this deposit. It is stated that an adequate deposit of glass-grade sand exists but only 30% of the material was in the required size range.

Quality and Reserves

Quality and reserve data are given below in tabulated form.

	Area (km^2)	Thick-ness (m)	Reserves (t)	SiO_2 (%)	Al_2O_3 (%)	Fe_2O_3 (%)
Weymouth*	2.0	1.5	960	99.9		
Brambles*	0.5	1.0	270	99.8	0.025	0.014
V. Lees*	0.75	1.5	405	99.8	0.025	0.013
Bridport (Bridwood)*	0.15	1.0	162	99.6	0.095	0.095
Halfway Rd*	0.6	0.5	194	99.7	0.095	0.021
Forester*	0.75	1.5	243	99.8	0.025	0.024
Bridwood†			74			

* Queensland Mines (1986)
† Pioneer Concrete, unpublished data

GREAT MUSSELROE BAY

Location and access

The sand in Great Musselroe Bay, northeastern Tasmania, was examined as a source of silica sand within the size range –20 to +30 mesh.

General geology

The sand is modern beach sand of the Recent epoch.

Mining and exploration history

Sand deposits within the bay were examined in 1974 (Blacklow, 1983) as a possible source of both silica and heavy minerals. The area was then held under

EL17/75. Silica sand is used at Tioxide, Burnie, as an additive to various paints. The possibility of supplying this market with a local source was one aim of the investigations.

Quality

The quality of the sand is too poor to be of any commercial interest. Whilst 10% of the grains are of marketable size, most of the sand was stained with iron. Some improvement could be made by beneficiation but the scale of the exercise would not be economically viable.

Reserves

Reserves of sand are too small for the area to have any commercial potential.

BEACONSFIELD

Location and access

Silica is quarried from leases held on Cabbage Tree Hill to the west of the Beaconsfield township.

General geology

Cabbage Tree Hill is a northwest-trending strike ridge of quartzite. The quartzite is part of the Cabbage Tree Formation which is thought to have been derived from the underlying Cambrian chert and not from the Precambrian rocks of the Asbestos Range (Gee and Legge, 1979). The extent of the Cabbage Tree Formation in the Beaconsfield area can be seen on the Beaconsfield geological map sheet (Gee and Legge, 1971).

The rock on Cabbage Tree Hill is described by Gee and Legge (1979) as: "... a well-bedded coarse, gritty sandstone in bedding units up to one metre in thickness and containing lenses of chert and quartz conglomerate at the base of each bed and within cross-bedded lenses. The actual conglomerate pods contain well rounded particles ranging from 4–20 mm in diameter in a quartz granule matrix."

The quartzite now forms well-developed scree slopes on the flanks of Cabbage Tree Hill and Salisbury Hill, southwest of Beaconsfield. The *in situ* boulders range in size up to one metre in diameter.

Mining and exploration history

The deposit has been held under mining lease since 1969. The scree material is quarried and screened, with the +19 mm material being used in the production of ferrosilicon at the nearby TEMCO plant, and the undersize 19 mm being used in road construction.

Current tenure

A consolidated mining lease 147M/69 is held by BHP over the deposits on Cabbage Tree and Salisbury Hills. Boral Resources Tasmania Ltd currently hold leases 14M/60, 45M/87, 1486P/M, and 887P/M.

Quality

Few analyses are available from this deposit:

SiO_2 (%)	98.7–99.4
Al_2O_3 (%)	0.13–0.38
Fe_2O_3 (%)	0.09–0.19%

Reserves

Reserves are estimated at 20 million tonnes (5 million m^3) of unscreened, *in situ* material. Reserves of –19 mm material are estimated at one to two million cubic metres, and reserves of +19 mm material at three to four million cubic metres (Threader *in* Gee and Legge, 1979).

BEAUTY POINT

Location and access

Some areas of gravel near Beauty Point, seven kilometres north of Beaconsfield, have been examined as a potential silica source.

General geology

The gravel is of Tertiary age and is part of a fossil river terrace. Gravel from within the Tamar and Rubicon valleys has been described by Blake (1928), Reid (1929), and Threader (*in* Gee and Legge, 1979), with sizing analyses from various places given in the latter report.

The deposits are described by Reid (1929) as white quartz sand and gravel, and white clay, and are in the form of wide discontinuous terraces marking a former level of the river. The Beauty Point deposits were estimated at ten metres thick.

Mining and exploration history

At the time of Reid's (1929) visit the deposits were being worked by Cementoid Silica Ltd, for sand and gravel for construction material purposes.

More recently these gravels have been investigated by Pioneer Concrete. Three areas near Beauty Point were found to be of interest. These are around DQ816470, DQ793453, and DQ778445. Results of this exploration are not available.

Current tenure

Some of these areas are held under Mining Leases:

DQ816470:	952P/M — H. G. Reid
DQ793453:	not held
DQ778455:	916P/M — W. L. & N. J. Hoggett
	33M/76 — W. L. & N. J. Hoggett

Quality

Analyses are given in Reid (1929) and Threader (*in* Gee and Legge, 1979):

SiO_2 (%)	99.4
Al_2O_3 (%)	0.05
Fe_2O_3 (%)	0.03

Reserves

Reid (1929) estimated that some 5.4 million cubic metres of sand and gravel occurred in the Beauty Point area. Recent exploration has defined reserves suited for use as a source of silica at 426 000 tonnes.

GRASSY — KING ISLAND

Peko Exploration Ltd investigated the viability of developing high quality silica sand deposits on the mine lease and surrounding exploration licence at Grassy (ML17M/79 and EL54/89). Mathison (1992) reported that the sand was suitable for glass making, with an indicated resource of 2–3 million tonnes on 17M/79 and a possible additional resource of 15–20 million tonnes on EL54/89 (now relinquished). Reports on market studies were completed, resulting in the conclusion that the deposit could not sustain a large-scale operation but that a smaller operator may have some success.

REFERENCES

ANON. 1992. *Annual Report December 1992. EL15/91 – Scottsdale*. Stornoway Hewitt Pty Ltd [TCR 93-3419].

BACON, C. A. 1989. Silica. *Mineral Resources of Tasmania* 12.

BAILLIE, P. W.; CORBETT, K. D. 1985. Geological atlas 1:50 000 series. Sheet 57 (7913N). Strahan. *Explanatory Report Geological Survey Tasmania*

BAILLIE, P. W.; CORBETT, K. D. *et al*. 1977. Geological atlas 1:50 000 series. Sheet 57 (7913N). Strahan. *Department of Mines, Tasmania*.

BHP EXPLORATION DEPARTMENT. 1977*a. Exploration Licence 18/75, Forth, Tasmania. Final report*. BHP Exploration Department [TCR 77-1242].

BHP EXPLORATION DEPARTMENT. 1977*b. Exploration Licence 18/76, Sisters Creek, Tasmania. Exploration programme*. BHP Exploration Department [TCR 77-1194].

BLACKLOW, C. C. J. 1983. *Final report, EL17/75*. [TCR 83-1982].

BLAINEY, G. 1967. *The Peaks of Lyell* (3rd edition). Melbourne University Press.

BLAKE, F. 1928. Clay and sand deposits of Tasmania. *Unpublished Report Department of Mines Tasmania* 1928(2):45–50.

BRANDT, R. T. 1973. *Summary report on Exploration Licence 8/72, Tasmania*. Australia and New Zealand Exploration Co. [TCR 74-981].

BRANDT, R. T. 1974. *Summary report on Exploration Licence 11/73 for the period May–December 1973*. Australia and New Zealand Exploration Co. [TCR 74-993].

CAREY, S. W. 1945. Report on John Dunham's quartzite prospects in the Ulverstone district. *Unpublished Report Department of Mines Tasmania* 1945:31-34.

CALVER, C. R.; BAILLIE, P. W.; EVERARD, J. L.; *et al*. 1987. Geological atlas 1:50 000 series. Sheet 58 [8013N]. Lyell. *Department of Mines, Tasmania*.

COMALCO LTD. 1975. *Silicon smelter at Cape Sorell, Tasmania. Technical description*. Comalco Limited [TCR 75-1092].

CONSOLIDATED GOLD FIELDS. 1974. *Glovers Bluff silica. Monthly report. Mineral leases*. Consolidated Gold Fields Australia Ltd [TCR 74-1030].

CONSOLIDATED GOLD FIELDS. 1975. *Final report, Glovers Bluff quartzite*. Consolidated Gold Fields Australia Ltd [TCR 75-1088].

DICKENSON, D. R. 1945. Silica at Ulverstone. *Unpublished Report Department of Mines Tasmania* 1945:5-11.

EVERETT, M. P.; SHAW, R. W. L. 1986. *Quarterly report to 4 February 1986. Exploration Licence 18/76*. Report by Zetetic for Monier Ltd [TCR 86-2583].

FORSTER, M. C. 1973. *Proposed silicon-ferrosilicon-magnesium industry in southern Tasmania*. [Unpublished] [TCR 73-955].

FORSTER, M. C. 1992. *EL14/88 Maydena. Annual Report – Year 4. 5th August 1991 to 4 August 1992*. Northwest Bay Co. Pty Ltd [TCR 92-3397].

GEE, R. D. 1966. Geological atlas one mile series. Sheet 22 (8016S). Table Cape. *Department of Mines, Tasmania.*

GEE, R. D. 1977. Geological atlas one mile series. Sheet 28 (8015N). Burnie. Explanatory *Report Geological Survey Tasmania*.

GEE, R. D.; LEGGE, P. J. 1971. Geological atlas 1 mile series. Sheet 30 (8215N). Beaconsfield. *Department of Mines, Tasmania*.

GEE, R. D.; LEGGE, P. J. 1979. Geological atlas 1 mile series. Sheet 30 (8215N). Beaconsfield. *Explanatory Report Geological Survey Tasmania*.

HASSEL, D. J. 1981. *Report on E.L. 35/79 for six months ended 4 December 1981*. Tasmanian Electro-Metallurgical Co. [TCR 82-1668].

HOFTO, P. 1991. *Exploration Licence 19/89 – Lake Mikany. Annual Report: Year 1 (Relinquishment report)*. Pioneer Silicon Industries Pty Ltd [TCR 91-3276].

HUGHES, T. D. 1959. A deposit of fine silica at Wivenhoe. *Technical Report Department of Mines Tasmania* 3:57–59.

HUGHES, T. D. 1960. Silica deposits near Hastings. *Technical Report Department of Mines Tasmania* 4:28–34.

JONES, P. A. 1989. *Exploration Licence No. 14/88 – Maydena. Progress report on exploration activity. 5 August 1988 to 5 July 1989*. Phil Jones and Associates Pty Ltd [TCR 89-2982].

KHIN ZAW; TURNER, N. J.; LARGE, R. R.; NOLAN, H.; MERNAGH, T. 1992. Geology and genesis of silica flour and gold in the Corinna district, western Tasmania. *Bulletin Geological Survey Tasmania* 70:96.

LENNOX, P. G.; CORBETT, K. D.; BAILLIE, P. W.; *et al*. 1982. Geological atlas 1:50 000 series. Sheet 21 (7916S). Smithton. *Department of Mines, Tasmania.*

LONGWORTH & MCKENZIE PTY LTD. 1981*a. Report on Stage 2 – geological investigation of E.L. 43/70 for Kaiser Aluminium*. Longworth and McKenzie Ltd [TCR 81-1553].

LONGWORTH & MCKENZIE PTY LTD. 1981*b*. *Report on preliminary drilling programme. Stage 3. Silica prospect E.L. 43/70 Tasmania for Kaiser Aluminium*. Longworth and McKenzie Ltd [TCR 81-1573].

LONGWORTH & MCKENZIE PTY LTD. 1987. *Preliminary assessment of the Kaiser–Mineral Holdings silica prospect, E.L. 43/70, Tasmania*. Longworth and McKenzie Ltd [TCR 87-2753].

MATHISON, I. 1992. *EL 54/89 Grassy. Report on exploration activity. April 1991 to March 1992*. Peko Exploration Ltd [TCR 92-3351].

MATTHEWS, W. L.; DONALDSON, R. C. 1994. A review of sand resources in the Hobart area. *Report Mineral Resources Tasmania* 1994/10.

MURPHY, T. D.; HENDERSON, G. V. 1983. Silica and Silicon, *in:* LEFOND, S. J. (ed.). *Industrial Minerals and Rocks (5th edition)*. 1167–1185. American Institute of Mining, Metallurgical and Petroleum Engineers : New York.

PATERSON, W. 1990. *Exploration Licence 14/88 – Maydena. Annual report on exploration activity. 6th July 1989 to 4th August 1990*. Pioneer Silicon Industries Pty Ltd [TCR 90-3202].

PICKEN, I. D. 1975. *Proposals and "indicated" quartzite ore (not reserves) – Cape Sorell, western Tasmania*. Comalco Limited [TCR 75-1083].

QUEENSLAND MINES LTD. 1985*a*. *Relinquishment report for EL's 2/84 and 37/84. Report for Pioneer Concrete (Tasmania) Pty Ltd*. Queensland Mines Ltd [TCR 85-2517].

QUEENSLAND MINES LTD. 1985*b*. *Quarterly report EL16/85. Period 30.8.85–30.11.85*. Report by Queensland Mines Ltd for Pioneer Concrete (Tasmania) Pty Ltd. [TCR 87-2748].

QUEENSLAND MINES LTD. 1986. *Quarterly report EL16/85. Period 29.2.86–30.5.86*. Report by Queensland Mines Ltd for Pioneer Concrete (Tasmania) Pty Ltd [TCR 87-2575].

REID, A. M. 1929. Tamar sands. *Unpublished Report Department of Mines Tasmania* 1929:114–128.

REID, K. O. 1974. *Hogs Back quartzite deposit*. Mt Lyell Mining and Railway Co. Ltd [TCR 74-1055].

SHARPLES, C. E. 1979. *The Ordovician System in the Ida Bay area*. B.Sc. (Hons) thesis, University of Tasmania : Hobart.

SUMMONS, T. G. 1981*a*. Silica in Tasmania. *Unpublished Report Department of Mines Tasmania* 1981/12.

SUMMONS, T. G. 1981*b*. The Hogs Back silica deposit, Hastings, southern Tasmania. *Unpublished Report Department of Mines Tasmania* 1981/29.

THREADER, V. M. 1974. Sand resources, Sandford–South Arm Peninsula. *Technical Report Department of Mines Tasmania* 17:49–54.

THREADER, V. M. 1981. Sand and gravel reserves in the Flowerdale ballast pit. *Unpublished Report Department of Mines Tasmania* 1981/39.

THREADER, V. M. 1988. *EL 29/80. Annual report for year ending 29.6.1988*. Mineral Holdings Australia Pty Ltd [TCR 88-2843].

THREADER, V. M. 1989*a*. *EL 29/80. Annual report for year ending 29.6.1989*. Mineral Holdings Australia Pty Ltd [TCR 89-2974].

THREADER, V. M. 1989*b*. *Annual report EL 25/88 (Dip Range)*. Mineral Holdings Australia Pty Ltd [TCR 89-3047].

THREADER, V. M.; BACON, C. A. 1987. Silica deposits in the Hastings Caves–Lune River area. *Unpublished Report Department of Mines Tasmania* 1987/35.

TURNER, N. J.; BROWN, A. V.; MCCLENAGHAN, M. P.; SOETRISNO, Ir. 1991. Geological Atlas 1:50 000 series. Sheet 43 (7914N). Corinna. *Division of Mines and Mineral Resources, Tasmania*.

TURNER, N. J. (ed.). 1992. Corinna 1:50 000 Geological Map. Field guide to selected rock exposures. *Report Department of Mines Tasmania* 1992/06.

WARE, M. D. 1982. *Quartzite quarry, Smithton - Tasmania. EL29/80*. Australian Mineral Development Laboratories. [TCR 83-1977].

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