A REPORT TO COMINEX

ON

A STUDY ON THE GENESIS OF SILICA FLOUR AND IT'S EXPLORATION POTENTIAL IN THE CORINNA DISTRICT (E.L.'S 37/82, 57/83 and 35/85), WESTERN TASMANIA.

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INTRODUCTION

In 1984 an occurrence of high purity silica flour was discovered by Cominex in an area five kilometers north east of Corinna within E.L. 37/82 (Fig. 1). An option agreement was reached with Monier Limited to explore the silica flour deposit and determine it's suitability for marketing. Monier contracted Longworth and McKenzie Pty. Ltd. to carry out an evaluation programme which subsequently led to the identification of an economic deposit of high purity silica flour with proven reserves of 732,000 tonnes at greater than 99.9% SiO_2 and less than 106 microns. An agreement for Monier to mine and treat the silica has now been reached between Cominex and Monier. Mining is due to commence in June 1987, and will proceed at an initial rate of about 20,000 tonnes per year.

Exploration by Cominex has continued through the period 1984 to 1987 and new silica flour occurences have been located within all three exploration licences (E.L.'s 37/82, 57/83, and 35/85). However none of these occurrences appear to have potential for economic mining because they are either too small or of low purity (below 99.9% SiO2). Because of the lack of any obvious exploration criteria for discovery of new silica flour deposits this project was undertaken to :

1) Identify the geological processes that have led to the formation of the silica flour deposits, and develop an exploration model for use in the area, and
2) Identify the areas within E.L.'s 37/82, 57/83 and 35/85 which have the best potential for further silica deposits.

Acknowledgements:
This report has benefited considerably from very fruitful discussions with Hugh Nolan and Nick Turner.

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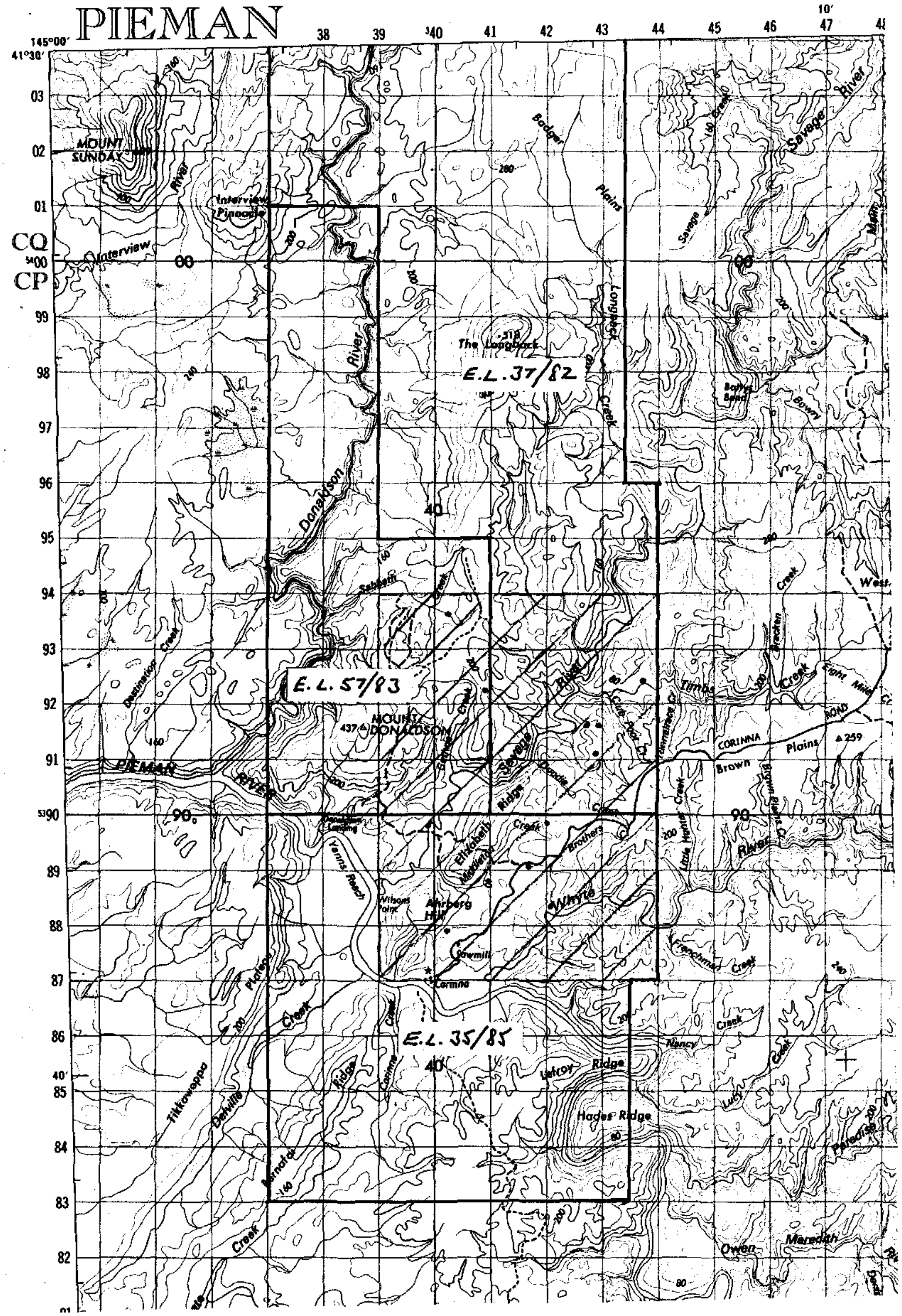

Figure 1) Locality map showing Corinna district and E.L's 37/82, 57/83 and 35/85.
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SUMMARY

1) Silica flour deposits in the Corinna district have formed in Recent times on a bedrock of dolomite and are overlain or adjacent to Tertiary gravels.

2) The dolomites form part of the Sigma Group, a sequence of (?)Upper Proterozoic dolomites and mafic volcanics. Two high purity dolomite formations are present in the area; the Savage Dolomites underlie the Bernafai Volcanics, and the Corinna Dolomites overlie the volcanics.

3) Scanning Electron Microscope studies of the silica flour indicate that it has not formed in the Tertiary alluvial system, but has developed in-situ by a process of dolomite silicification followed by disaggregation.

4) Petrographic studies of the dolomites and silicified dolomites suggest that the major silicification event was probably post Tabberabberan deformation and associated with crustiform (lacy) quartz veining.

5) Key exploration criteria for the silica flour are the coincidence of aeromagnetic lows with mapped or interpreted areas of the Sigma Group.

7) A number of high potential areas for further silica flour have been identified within E.L.'s 37/82, 57/83 and 35/85.

GEOLOGY OF THE CORINNA DISTRICT

Due to poor outcrop and inaccessability very little previous geological mapping has been carried out in the areas covering the three E.L.'s. Since the preliminary geological mapping of Spry (1964) the only field mapping has been by Geopeko (Pemberton, 1984) in the northern section of E.L. 37/82 and by the Mines Department (Turner, 1984 and in prep.) who are currently mapping the Corinna 1 : 50,000 sheet.

Mapping by Spry (1964) identified a number of stratigraphic horizons in the Corinna area of probable Precambrian age striking roughly north easterly between the Donaldson River and the Arthur Lineament (see Fig. 2). Spry reported that poor outcrop, steep dips and lack of facings prevented determination of the structure, however he favoured the following succession

Top	Savage Dolomite
	Delville Chert
	Unconformity ?
	Bernafai Volcanics
	Corinna Slate
	Fault
	Donaldson Group
Bottom	Interview Slate

Spry suggested that the Corinna slate outcropped in the centre of a north east trending anticlinal structure (see Fig. 2). Carey (1981, 82) undertook a detailed regional geological photo interpretation of a large area of the Rocky Cape Group extending from the west coast to the Arthur Lineament between the Arthur and Pieman Rivers, which included the Corinna area. Carey grouped the Savage Dolomite, Bernafai Volcanics and Corinna Slate into a succession he referred to as the Sigma Group. Carey reversed the stratigraphic order within the group and argued that the Corinna Slate occurs in the core of a major syncline rather than the anticline proposed by Spry (1964). Carey's interpretation is shown in Fig. 3.

Recent mapping by Turner (1984) has shown that the Savage Dolomite does in fact

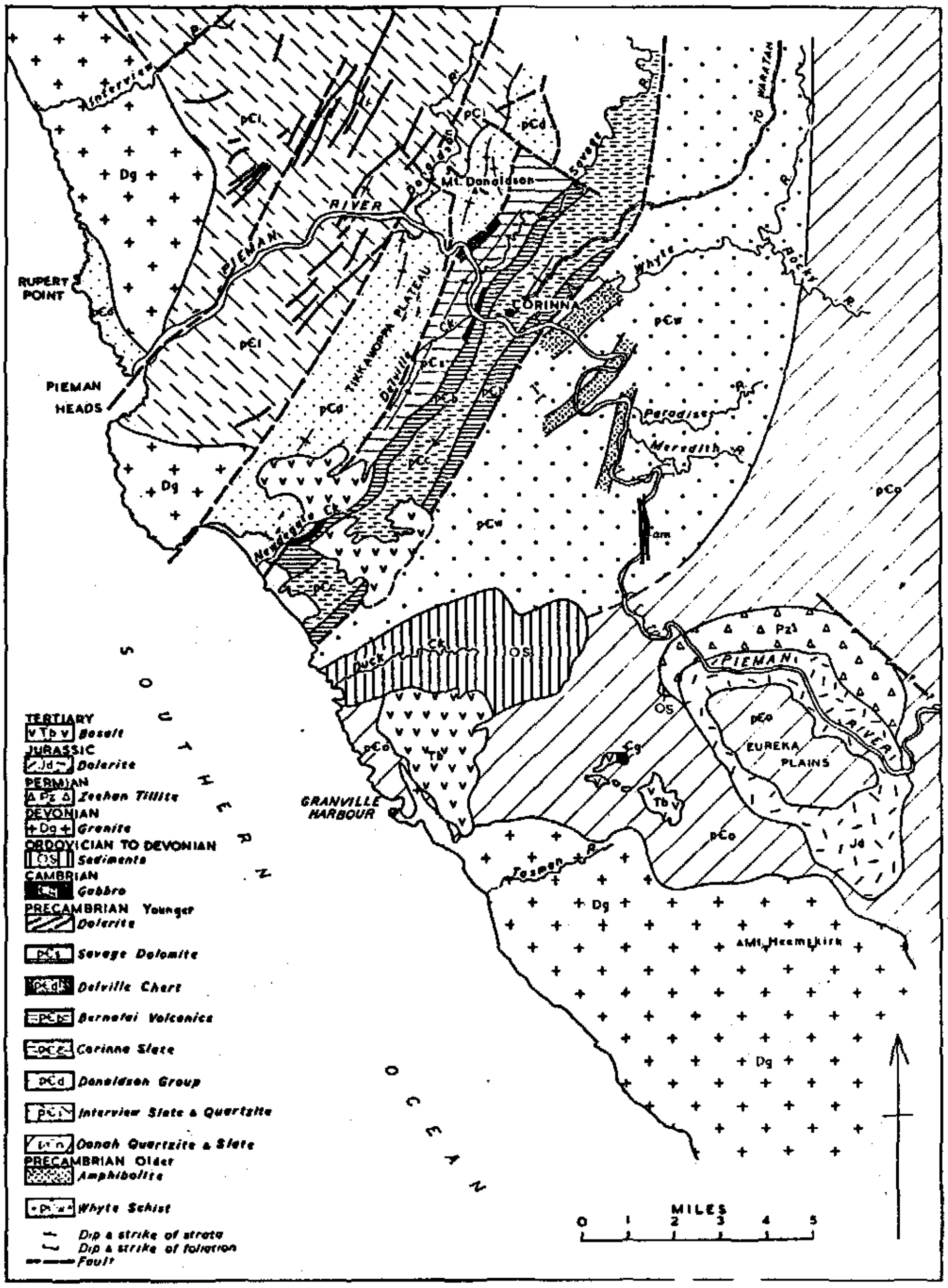

Fig. 1.—Geology of the Zeehan-Corinna Area. (Plate by courtesy of the Geological Society of Australia.)

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Figure 2) Geological map of the Corinna district by Spry (1964) underlie the Bernafai Volcanics, and conformably overlies a sandy quartzwacke turbidite and conglomeratic turbidite sequence (Spry's Donaldson Group). Turner reports that the Donaldson Group unconformably overlies the Interview Slate and Quartzite of the Rocky Cape Group.

A geological interpretation of the area incorporating all the recently available data is shown in Fig. 4. The map is based on the photo interpretation by Carey (1981) but modified using observations from Spry (1964), H.D. Nolan (Cominex), Turner (in prep.) and incorporating some aeromagnetic interpretation by the author.
The presently accepted stratigraphic sequence is

Top		Corinna Dolomite
	Sigma Group	Bernafai Volcanics
		Savage Dolomite
		Donaldson Group
		~~ unconformity ~~~
Bottom		Rocky Cape Group

The favoured structural cross section is shown in Fig. 3, with the Corinna Slate occupying the core of a syncline, as suggested by Carey (1981). The Corinna Slate was defined by Spry (1964) to consist of slatey siltstone and slate. However mapping by Cominex and Turner (in prep.), has indicated that this formation is principally composed of fine grained pure grey dolomite with patches of silicified dolomite. Mudstones and siltstones appear to be confined to the margins of the dolomite sequence i.e. stratigraphically below the dolomite and above the Bernafai volcanics. To avoid confusion the Corinna Slate will henceforth be termed the Corinna Dolomite.

The presence of major dolomite formations on both sides of the Bernafai ridge suggests the possibility that the Savage Dolomite and Corinna Dolomite belong to the same formation folded about an anticlinal axis passing along the Bernafai ridge (see Fig. 3). This is considered unlikely but requires field testing.

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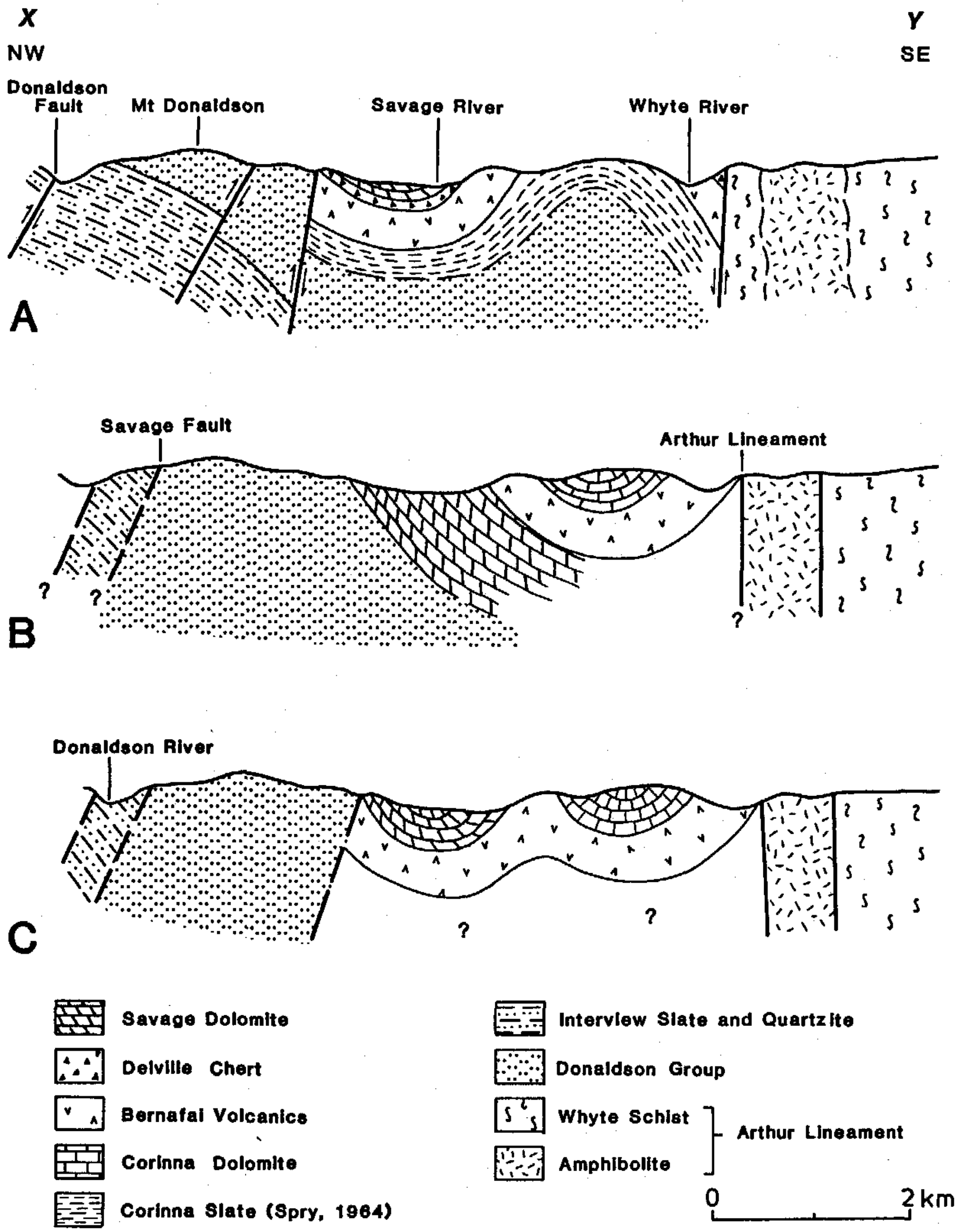

Figure 3) Proposed geological E.W. cross sections north of Corinna
a) Spry (1964)
b) Carey (1981), this report
c) Alternative, less favoured interpretation.

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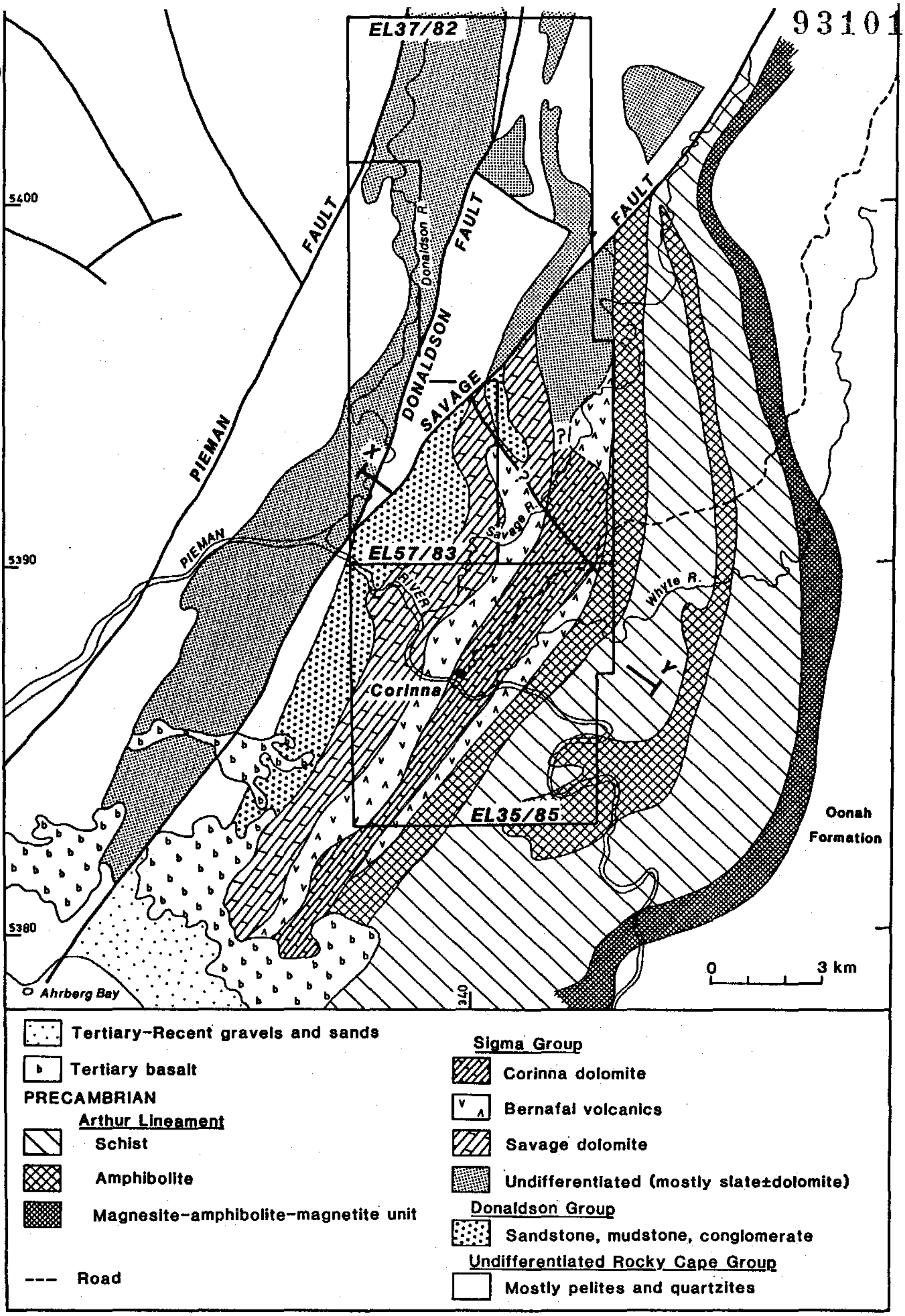

Figure 4) Interpretive geological map of the Corinna district including E.L.'s 37/82, 57/83 and 35/85. Based on Spry (1964), Carey (1981), N. Turner (in prep.), H.D. Nolan (pers. comm., 1986) and areomagnetic interpretation by the author.

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Correlation of the Sigma Group

Based on photo interpretation, Carey (1981) correlated the Sigma group at Corinna with the basalt-dolomite sequences in the Smithton Trough. This is now supported by the very similar stratigraphic succession established for the two areas. Large (1982) and Pemberton (1983) re-interpreted the stratigraphic succession in the Smithton and Montagu areas and showed that major dolomite units occur stratigraphically above and below the magnetic basalts. The same succession is now shown to occur at Corinna (Fig. 5). In both cases the dolomites below the basalts are stromatolitic with zones of extensive silification, whilst the dolomites above the basalts are non-stromatolitic, and commonly show minimal silification. This correlation is supported by recent geochemical studies (Crawford, pers comm.) which show similar chemical characteristics for the Smithton basalts and Bernafai Volcanics.

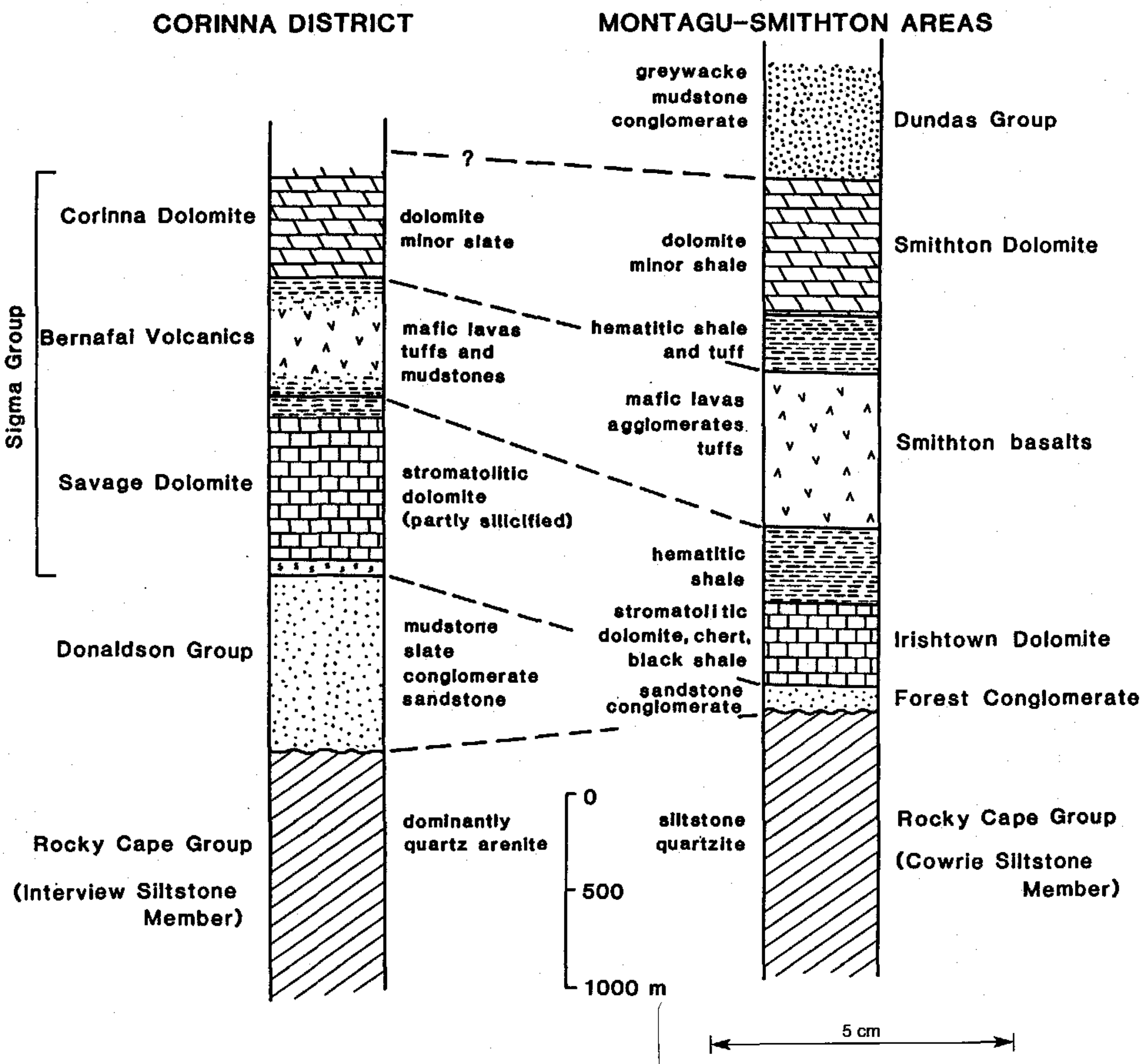

Figure 5) Stratigraphic columns of the Corinna district and Smithton Trough.

RELATIONSHIP BETWEEN SILICA FLOUR OCCURENCES AND GEOLOGY

The silica flour deposits within E.L.'s 37/82, 57/83 and 35/85 all occur over bedrock of the Sigma Group, and in particular the best deposits (in terms of size and purity) are developed on bedrock of the Corinna Dolomite. Minor occurrences occur over the Savage Dolomite, however these are typically less well developed with relatively high contamination. In addition to the relationship between high purity silica flour and the Corinna Dolomite bedrock, there is also a relationship with the occurrence of Tertiary lead gravels. These relationships are clearly depicted in the interpreted geology map (Fig. 6 from Turner, in prep.) covering the central portion of E.L. 37/82.

An east-west zone of Tertiary lead gravels cover the Arthur Lineament bedrock along the Corrina-Savage River road and extend over the Sigma Group. Passing westward into E.L. 37/82, the gravels change to a south westerly trend and are confined to a corridor of Corinna Dolomite. This zone of gravels probably marks the original position of the Tertiary lead, and indicates a westerly and then south westerly flowing alluvial system. In Tertiary time the synclinal outcrop zone of Corinna Dolomite probably occupied a broad valley which was filled by the west flowing alluvial system. Minor alluvial input may also have come from the north and straight down the valley.

In Fig. 6 it is evident that the major occurrences of silica flour are developed on the dolomite bedrock and adjacent to the higher ground of Tertiary gravels. In other words, Tertiary gravels overlie silica flour which in turn overlies dolomite bedrock. However this is not a stratigraphic sequence, as will be shown later, the silica flour is considered to develop after Tertiary gravel deposition. If the silica flour was pre-Tertiary it would be eroded, reworked and contaminated by the gravels; which is not the case.

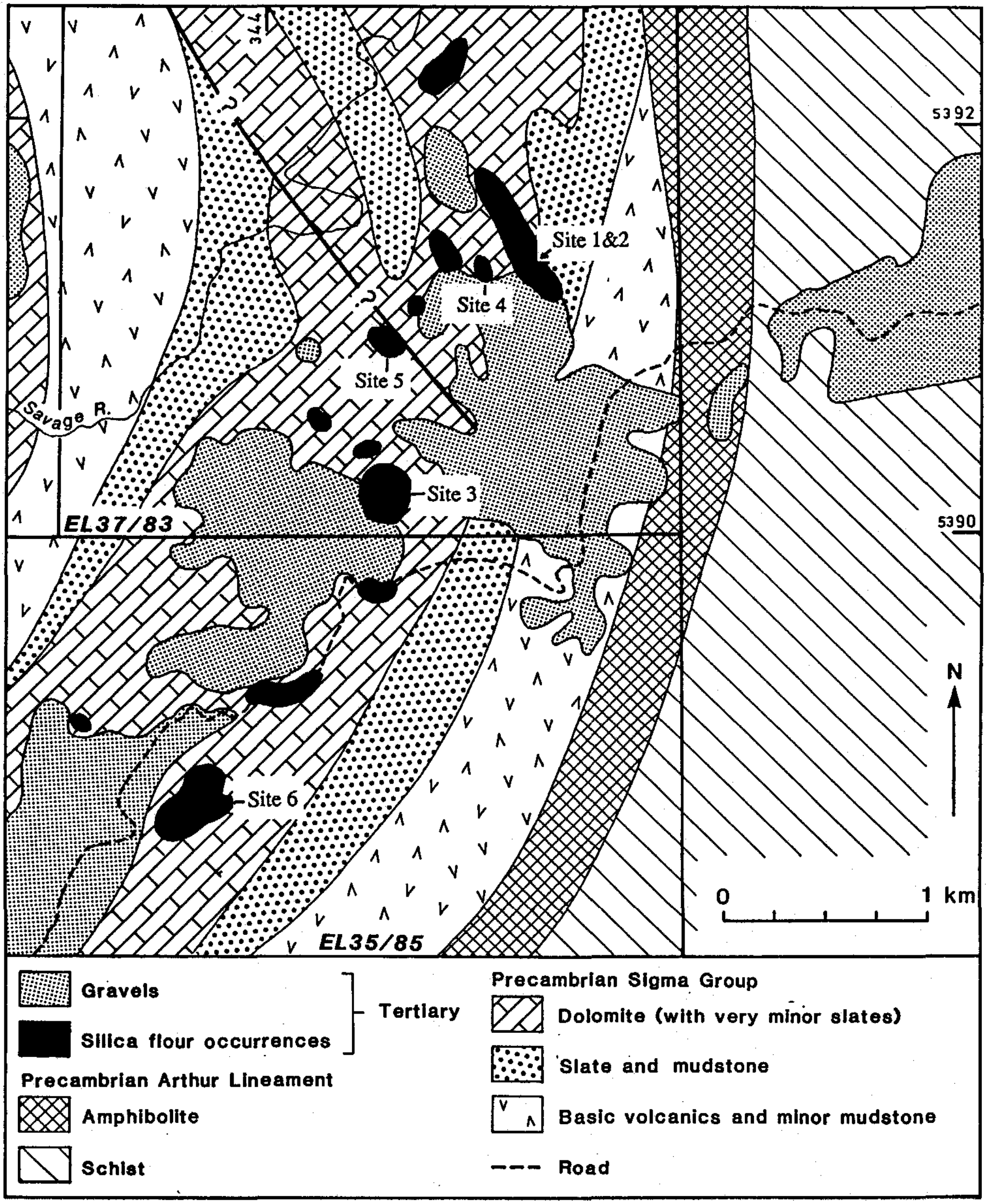

Figure 6) Interpretive geological map showing relationship of silica flour occurrences to Tertiary gravels and dolomite bedrock (modified from Turner, in prep.).

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SOURCE ROCK FOR THE SILICA FLOUR

Based on the geological relationships described above the probable source rock for the silica flour is either;

1) Precambrian dolomites (in particular the Corinna Dolomite)

or

2) Tertiary gravels and sands.

If the Tertiary gravels were the source then the flour should occur with Tertiary gravels irrespective of the bedrock. However 90% of the flour deposits occur on dolomite bedrock, about 10% on mudstone bedrock adjacent to dolomite, and no deposits occur where the gravels are on bedrock of Bernafai volcanics or Arthur Lineament schists or amphibolites.

By a process of elimination it is concluded that dolomites of the Sigma Group are the source of the silica flour. In order to test this hypothesis and also determine whether any particular horizons or textural and compositional types of dolomite are more suitable silica flour sources a detailed study of the petrography and composition of particular samples of dolomite and silica flour was undertaken.

Composition and Texture of the Silica Flour

Detailed studies by Longworth and McKenzie (1985) indicate that the silica flour deposits within the proposed mining area (E.L. 37/82) have the following composition

	less than 53 micons	**53-106 microns**
SiO_2	>99.9%	>99.9%
Al_2O_3	240 ppm	120 ppm
Fe_2O_3	130	60
Cr_2O_3	neg.	neg.
Ca O	195	220
Mg O	80	80
Na_2O	neg.	neg.

K_2O	neg.	neg.
TiO_2	270	130
MnO	neg.	neg.

Impurities are extremely low, with the major contaminents being : aluminium, iron, calcium and titanium. This data suggests that the source rocks were also of high purity.

Scanning electron microscope studies were undertaken at the University of Tasmania, Central Science Laboratory, in order to determine the nature of the silica grains, and possible precursors. As shown in the plates 1 to 3, the silica grains are very angular with a fairly random size distribution from 10 to 100 microns. The high angularity indicates they have not been transported by fluvial processes, and confirms that they are not part of the Tertiary alluvial gravel system.

Under high power on the S.E.M. it becomes evident that the silica flour particles are either single zoned crystals (eg. plate 2) or aggregates of crystals (eg. plate 3). Some of the crystal aggregates show overgrowth silica textures , whilst other aggregates are extremely porous suggesting the dissolution of chemically soluble inter-crystalline minerals. Occasional examples of negative rhomb crystal outlines were observed on the silica grain surfaces, indicative of dolomite dissolution. It is significant that no cement material was observed binding the silica particles together in the aggregates and no impurities were observed under the S.E.M. All these observations are compatible with the hypothesis that the silica flour developed during a process of silification followed by disaggregation of pure dolomite.

Chemical analyses of selected samples of silica flour undertaken for Cominex by Analabs are shown in Appendix 1. The location of these samples are given in Fig. 7. Four of the samples are from flour developed on the Corinna Dolomite and two from flour developed in the Savage dolomite. Samples over the Savage dolomite in E.L. 57/83 (Samples 8708 and 8710) have a higher concentration of impurities (especially Al_2O_3, Fe_2O_3 and TiO_2) than flour from the Corinna Dolomite. The high TiO_2 content suggests that these impurities are probably due to minor contamination with Tertiary

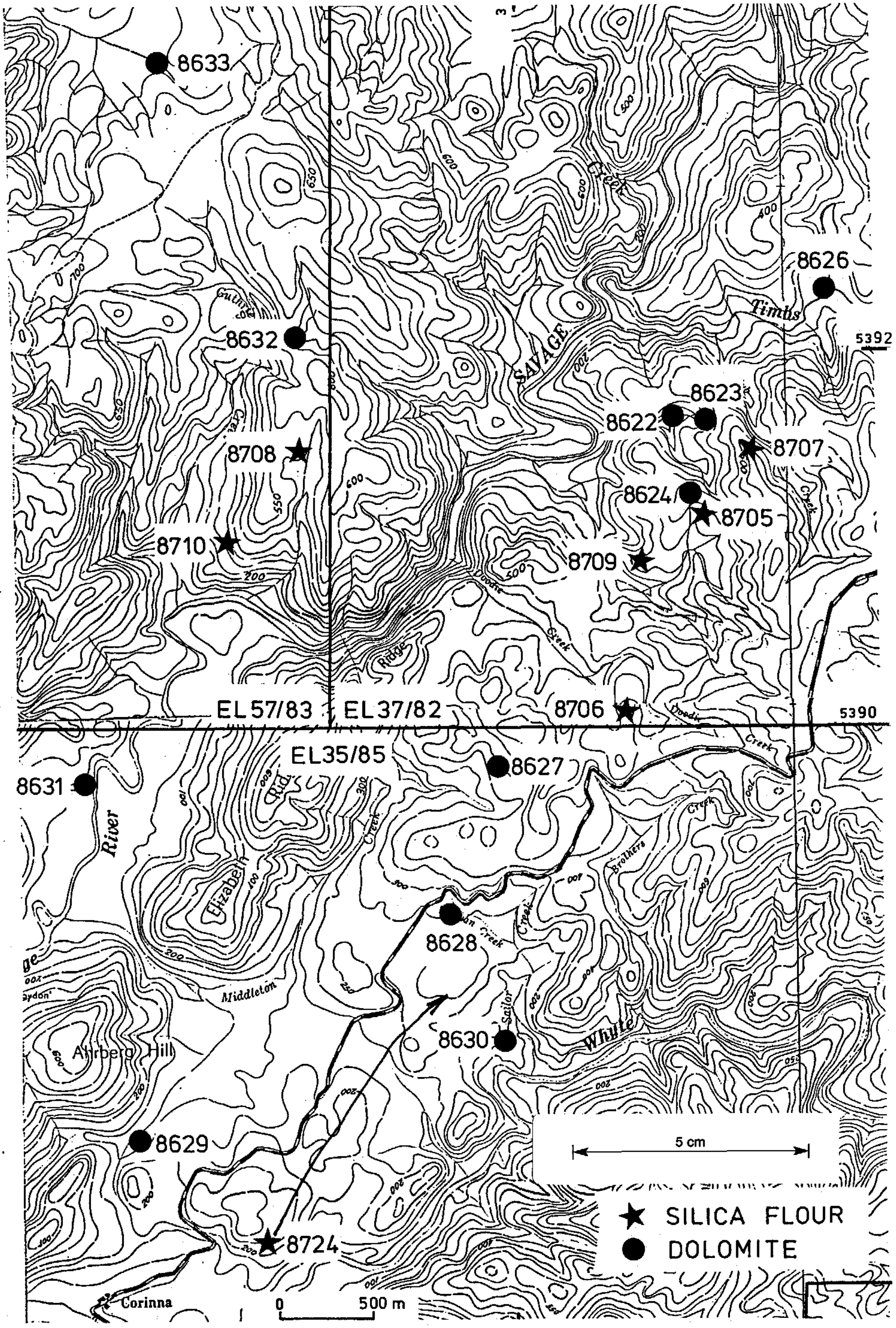

Figure 7) Location of silica flour and dolomite samples used in this study .

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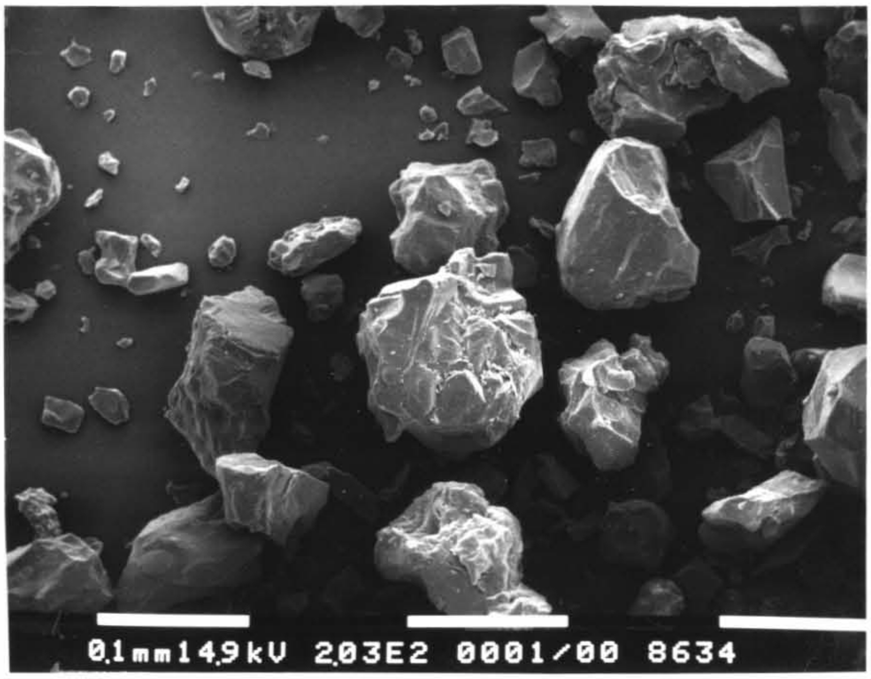

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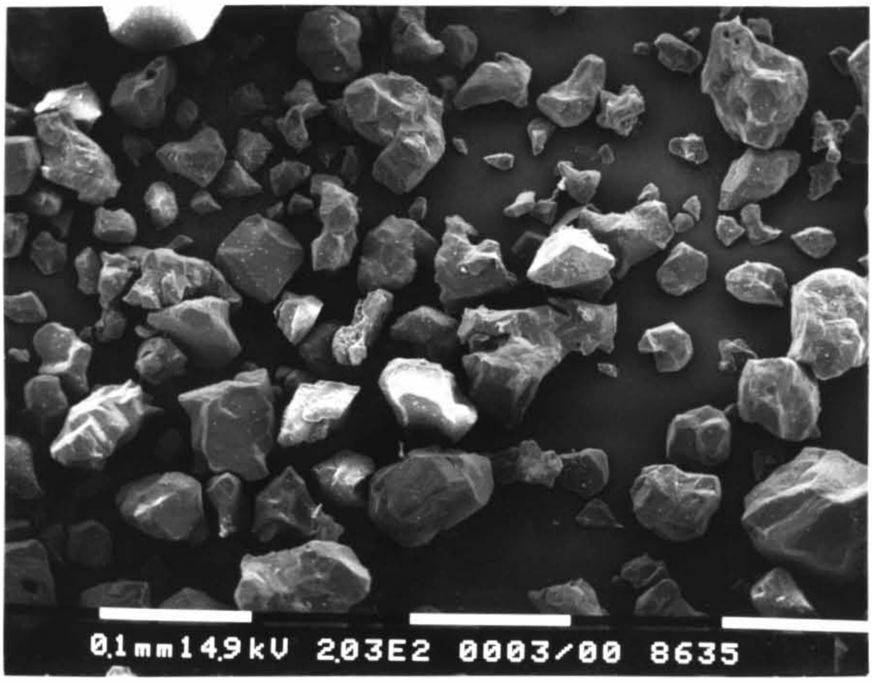
Plate 1) S.E.M. photographs of silica flour sample 8634 from Site 1, Corinna Deposit.
The white/black bar at the bottom of each photo indicates the scale.



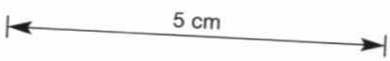


Plate 2) S.E.M. photographs of silica flour sample 8635 from Site 3, Corinna Deposit.
The white/black bar at the bottom of each photo indicates the scale.

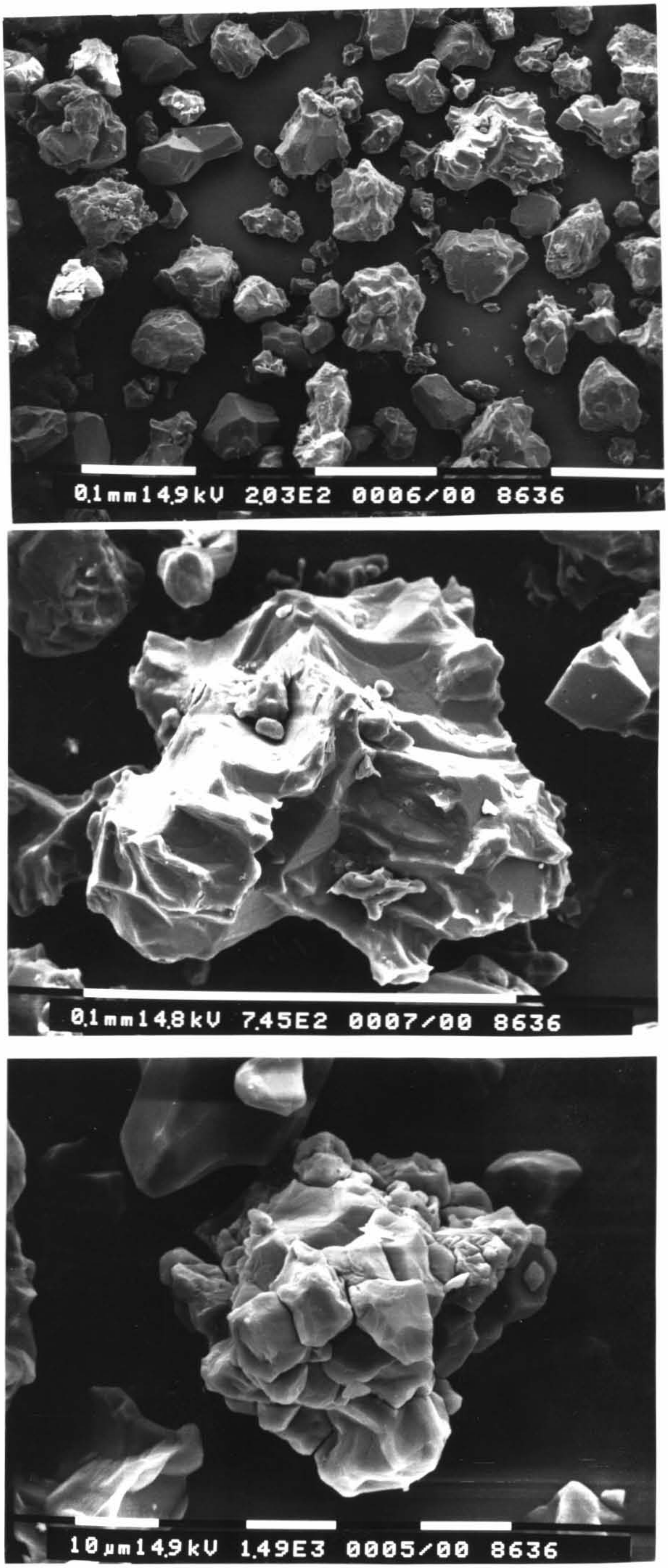


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Plate 3) S.E.M. photographs of silica flour sample 8636 from Site 4, Corinna Deposit. The white/black bar at the bottom of each photo indicates the scale.

gravels rather than original impurities in the Savage Dolomite source rock.

Composition and Texture of the Dolomites

Fourteen samples of Precambrian dolomite were selected for detailed study in order to characterise the features of the silica flour source rocks. Locations of samples are shown in Fig. 7; ten of the samples came from the Corinna Dolomite and four from the Savage Dolomite. Detailed petrographic notes for each sample are included in Appendix 2.

Textures of the Dolomites:

In general the Corinna Dolomites are cream to grey fine grained dolomites with very minor impurities. The typical non-recrystallised dolomites have a grain size of 1.0 to 40 microns, similar to the grain size of the silica flour. However they contain very little primary silica. Minor enhedral to subhedral grains of quartz of probable diagenetic origin may account for up to 5% SiO_2 in some fine grained samples (eg. 8622), but are generally less than 1%.

The samples studied show various stages of recrystallisation and silification as outlined below.

1) Fine grained dolomites initially exhibit irregular patches of coarse dolomite, varying from 20 to 300 microns in size. Minor anhedral quartz grains commonly occur in the centre of the same dolomite patches (eg. 8628).
2) Proportion of recrystallised dolomite increases and the silica patches and veinlets become more abundent (eg. 8624, 8627).
3) Total silification of dolomite. Interlocking silica grains, with no matrix, are dominantly in the size range of 1 to 40 micons with no grains exceeding 100 microns (eg. 8625). Very minor ultra-fine dolomite occurs as inclusions in some quartz grains.
4) Dis-aggregation of silicified dolomite. Samples of friable but compact silica are formed within the silica flour deposits and represent the silicified dolomite in the process of breakdown and conversion to flour (eg. 8634 A).

Samples of banded crustiform quartz veins (eg. 8635 B), locally referred to as lacy agate , occur as float in areas of silicified dolomite and silica flour. These veins show banded silica flour precursor material interlayered with coarse grained zoned quartz crystals. The zoned quartz crystals contain primary fluid inclusions and show little evidence of deformation. Some silica grains in the silicified dolomite show undulose extinction or" deformation bands", but the majority of grains appear undeformed. It is concluded that the major phase of silicification and quartz veining of the dolomites (i.e. the event that produced the silica flour source rocks) was post Tabberabberan deformation. This event may coincide with Devonian granite intrusion, or maybe much later, in the Tertiary or Recent. It is noteworthy that the crustiform quartz veins have textural features similar to the host veins for epithermal gold deposits. The presence of alluvial gold in the Tertiary gravels at Corinna may not be a coincidence, and the occurrence of primary gold mineralisation associated with the silicification event requires evaluation.

Two of the three samples of savage Dolomite show similar textures to the Corinna Dolomite, however sample 8631 is coarser grained with a greater abundence of impurities.

Composition of the Dolomites:
Analyses of the twelve dolomite samples are shown in Appendix 3. Except for the effects of silicification the dolomites are generally of high purity with low Al_2O_3, Fe_2O_3 and TiO_2 contents. However they are not as pure as the silica flour material. In fact the dolomite samples with highest Al_2O_3 and Fe_2O_3 content (8622 and 8623) are those which are adjacent to the main deposit of silica flour. It is apparent that the process of conversion of the dolomite to silica flour also involves purification of the source rock. For example, the Al_2O_3 and Fe_2O_3 contents of the dolomite are about 2,000 ppm and 3,000 ppm respectively compared to the flour which contains only 240 ppm Al_2O_3 and 130 ppm Fe_2O_3. It is therefore concluded that extreme purity of the dolomite precursor is probably not a prerequisite for the production of high quality silica flour. Dolomites with less than about 0.3% Al_2O_3 and Fe_2O_3 are probably sufficient.

It is interesting to note that the samples of Savage Dolomite (8631, 8632, 8633) are of similar or better purity than samples of the Corinna Dolomite. However the silica flour developed on the Savage Dolomite has been found to be of lower purity (eg. 8700, 8710, Appendix 1). As stated before, this is probably due to to contamination by Tertiary gravels.

GENESIS OF THE SILICA FLOUR

Combining the previous discussion on the geology of the area with the source rock studies it is now possible to outline a geological history of the Corinna district which incorporates the relevent stages in the genesis of the silica flour deposits (see also Fig. 8).

1) Deposition of the Sigma Group in late Proterozoic times in the Corinna area and Smithton Trough. Stromatolitic Savage Dolomite was followed by basalts, tuffs and mudstones and finally the Corinna Dolomite. Minor diagenetic silica formed in the dolomites but accounts for less than 2% of the rock.

2)Tabberabberan deformation led to folding of the sequence into a regional syncline. This event was probably accompanied by patchy recrystallisation of the dolomite and minor silicification.

3) The major silicification event was post Tabberabberan deformation (possibly related to Devonian Granite intrusion?? or much later) and was accompanied by emplacement of crustiform quartz veins. This event led to irregular zones of silicification throughout both the Corinna Dolomite and Savage Dolomite.

4) Erosion of the Corinna Dolomites to form a south-south-west trending valley along the syncline axis, with the Bernafai volcanics forming the adjacent parallel ridges. (Note : the silicification event (3) may be post erosion, ie. Tertiary or Recent, as previously silicified zones would stand out above the eroded valley (eg. the Delville Chert)).

5) Deposition of Tertiary gravels in a fluvial lead which passed east to west across the Arthur Lineament and then south-south-west down the valley of the Corinna Dolomite.

6) Ground waters circulating along the base of the Tertiary gravels react with the partially silicified dolomites, causing disaggregation of the silica, leaching of remanent dolomite plus impurities, and production of the flour. This is the critical

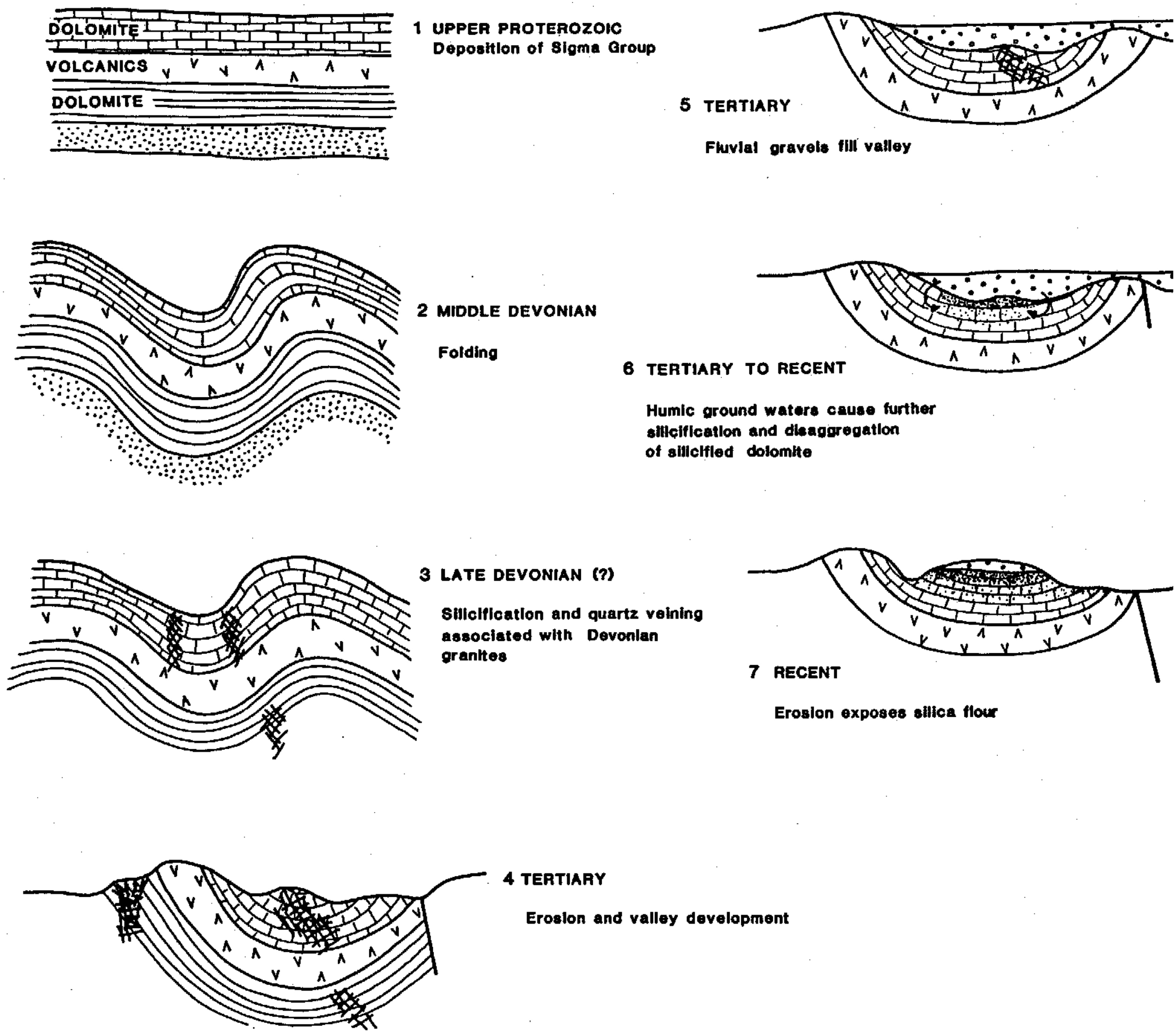

Figure 8) Geological history of Corinna district showing stages in the genesis of the silica flour deposits.

step in the chain of events, and is yet to be completely understood. Turner (1986, pers comm) suggests that humic acids within the ground waters may be a necessary ingredient causing the breakdown and purification of the silicified dolomite. The presence of the gravels is important as they are considered to act as a blanket under which the silica flour formation occurs. They also protect the flour from complete erosion or contamination.

7) Erosion of the Tertiary gravels by the present stream system exposes the silica flour.

A diagramatic sketch outlines these events in Fig 8 .

AN EXPLORATION MODEL FOR SILICA FLOUR

An exploration model for silica flour deposits in western Tasmania, developed from the previous discussion, is depicted in Fig. 9. All the aspects of this model have been discussed previously except for the geophysical criteria. Inspection of the aeromagnetic contour map of the area (Mines Dept. Survey 1982) shows that the Proterozoic Dolomite source rocks occur in areas of magnetic low character whilst adjacent rock units such as the Bernafai Volcanics and Arthur Lineament rocks have strongly positive magnetic character. Using this criteria it is possible to eliminate those areas which show a moderate to strong aeromagnetic character and concentrate the silica flour search in areas of low magnetic character.

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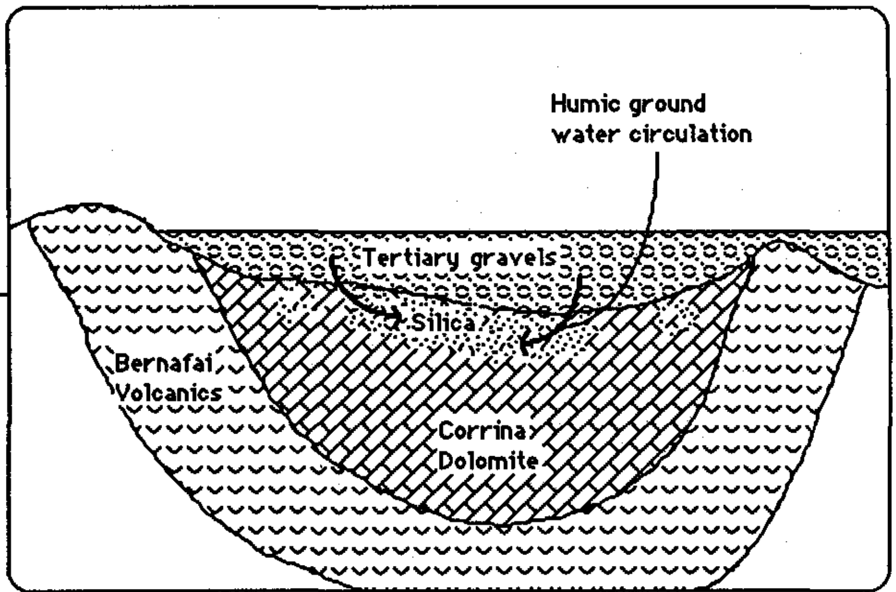
KNOWN DEPOSITS

COMINEX-MONIER DEPOSIT, E.L. 37/82



SILICA FLOUR EXPLORATION MODEL

GEOCHEMICAL CRITERIA

- High purity flour; low Fe , Al and Ti

GEOPHYSICAL CRITERIA

- Aeromagnetic lows help to delineate Proterozoic dolomites

GEOLOGICAL CRITERIA

- Upper Proterozoic Sigma Group
- Best potential in dolomites above basalt sequence (eg. Corrina Dolomite)
- Syncline zones in dolomite
- Topographic low areas
- Tertiary gravels overlying dolomite
- Evidence of silicification of dolomites eg. crustiform quartz veins.

Figure 9) Exploration model for high purity silica flour deposits in Tasmania.

EXPLORATION POTENTIAL WITHIN E.L.'S 37/82, 57/83, 35/85

Using the exploration model outlined above it is now possible to identify other areas of silica flour potential in the Corinna district. The two key criteria at the regional level are;

a) Presence of Upper Proterozoic Sigma Group as oulined in Fig. 4.

b) Areas of magnetic low character indicative of pure dolomites as outlined in Fig. 10.

The most obvious high potential areas for follow-up investigation are ;

1) Immediately north and south of the known high purity silica flour deposits along the strike extent of the Corinna Dolomite syncline structure (E.L.'s 37/82 and 35/85).

2) The low magnetic zone over the Savage Dolomite between Mt. Donaldson and Elizabeth Ridge (E.L 57/82). Low quality flour has already been identified in this area.

3) East of the Longback on the western slopes above Longback Creek (E.L. 37/82). Previous mapping (Pemberton, 1984) shows dolomite outcrops and Tertiary gravels in this area. The broad magnetic low covering this region is very encouraging.

4) In the north west of E.L 37/82 immediately east of the Donaldson River where Sigma Group rocks have been interpreted by Carey (1981) in an area of magnetic lows.

Follow-up work in these areas should include

- geological traversing of dolomite and Tertiary gravels
- sampling and analysis of all silica flour occurences.

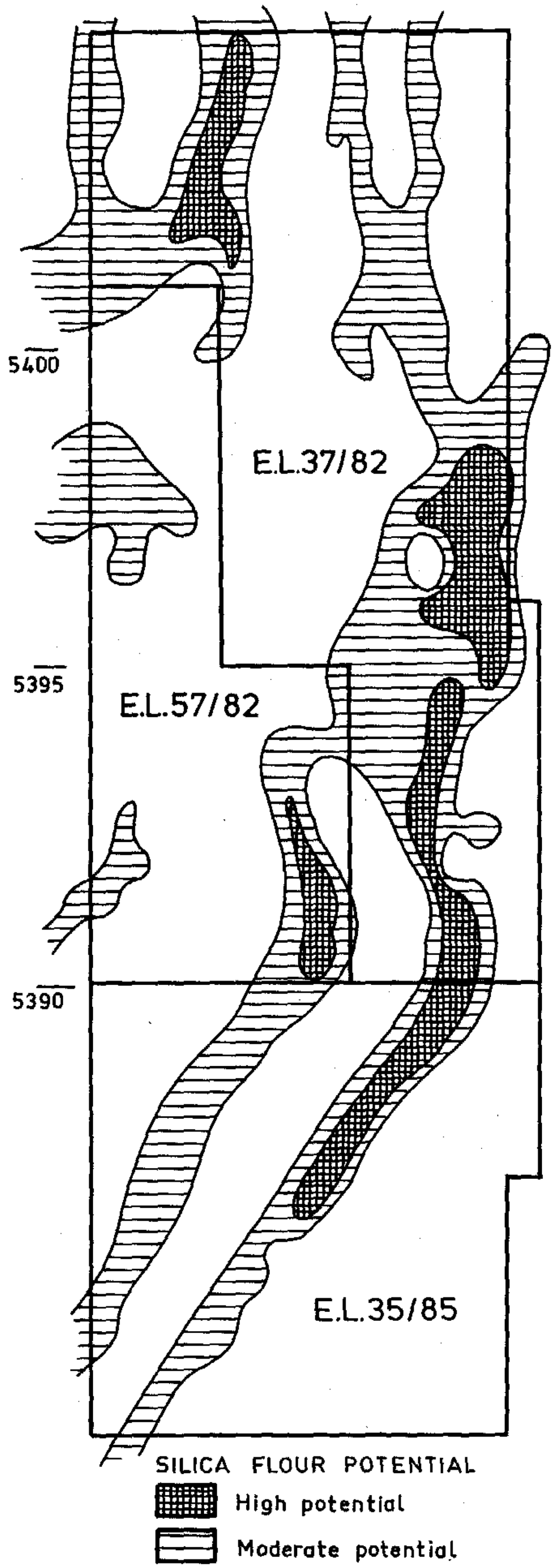


Figure 10) Aeromagnetic lows in E.L.;s 37/82, 57/83 and 35/85 indicating areas of good potential for dolomite bedrock and silica flour deposits.

EXPLORATION POTENTIAL ELSEWHERE IN WESTERN TASMANIA

Outside of the Corinna district potential exists for silica flour in areas where the Proterozoic Sigma Group Dolomites are overlain by Tertiary gravels. Areas for investigation include the following ;

1) The Smithton Trough - especially the subcropping zones of Smithton Dolomite along the Montagu River and Duck River Valleys. Also southeast of Trowutta to Balfour where Proterozoic basalts and dolomites are mapped.

2) A strip extending north west from Pyramid Hill to the junction of the Frankland and Leigh Rivers. Carey (1981) has interpreted Sigma Group rocks unconformably overlying the Rocky Cape Group along a belt 20 km long by 4 km wide in this area.

3) In the Tyennan Region where Proterozoic dolomites have been mapped, eg. the upper reaches of the Weld River Valley and the Jane River Goldfield.

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APPENDIX 1

Chemical analyses of silica flour samples
(sample locations in Fig 7.)

See last page.

APPENDIX 2

PETROGRAPHIC NOTES ON DOLOMITE SAMPLES
from the Corinna Dolomite and Savage Dolomite

Sample 8622 - Corinna Dolomite.

Fine grained pure dolomite with minor opaques (probably pyrite and oxidised iron oxide).

Dolomite - 10 to 40 um grainsize

Silica - rare subhedral to enhedral grains (50 - 100 um) probably of diagenetic origin.

Impurities - pyrite (~ 5%) and iron oxides (< 2%).

veins - minor, filled with coarse dolomite and quartz.

Sample 8623 - Corinna Dolomite

Fine grained dolomite with veins of coarse dolomite and veinlets of iron oxide stained clays (?).

Dolomite - 10 to 50 um grainsize

Silica - rare euhedral crystals (<2%)

Impurities - yellow to brown stained clays (?) along veinlets

Veins - minor, coarse dolomite.

Sample 8624 - Corinna Dolomite

Fine grained dolomite with irregular network of coarse grained dolomite-silica veins and patches.

Dolomite - 5 to 100 um

Silica - irregular grains (20 - 200 um) within coarse dolomite veins and patches (about 5%)

Impurities - negligible

Veins - coarse dolomite and minor quartz resulting in a psuedo-breccia texture. Probably diagenetic and unrelated to silica flour (too coarse grained!).

Sample 8625 - Savage Dolomite

Fine grained totally silicified dolomite.

Dolomite - very minor ultra-fine inclusions in quartz grains

Silica - 100% - 1 to 10 um anhedral interlocking crystals with no matrix. Very even grain size.

Impurities - minor (<1%) iron oxides

Veins - none, some patches of coarser grained silica (>10 um)

Comment - this sample probably represents a precursor to the silica flour development . ie. the dolomite has been silicified but not disaggregated.

Sample 8626 - Corinna Dolomite

Fine grained patchy black spotted dolomite

Dolomite - very fine grained 0.5 to 3.0 um

Silica - none

Impurities - black patches up to 1 mm across aligned parallel to bedded may be graphitic material intergrown with the dolomite. Minor yellow stains adjacent to fractures. Minor development of tremolite.

Veins - 10% - coarse grained dolomite.

Sample 8627 - Corinna Dolomite

Partly silicified and recrystallised dolomite

Dolomite - dominantly 1-5 um with coarser dolomite adjacent to silicified zones

Silica - in irregular network of veins and patches (20-30% of rock). Grainsize from 5 to 300 um, most around 10-20 um.

Comment - probably represents an early stage of silicification that has not reached completion.

Sample 8628 - Corinna Dolomite

Partly recrystallised dolomite

Dolomite - variable grainsize 5-300 um due to patchy recrystallisation

Silica - 20 to 500 um anhedral grains developed in the centres of the coarsely crystalline dolomite aggregates.

Impurities - negligible

Comment - recrystallised dolomite but with only minor silicification.

Sample 8629 - Corinna Dolomite

Fine grained yellow stained dolomite

Dolomite - 15-30 um very even grain size

Silica - rare anhedral grains 10-100 um (< 2%)

Impurities - A yellow stain is concentrated along grain boundaries in the dolomite imparting an overall yellow tinge to the rock.

Sample 8630 - Corinna Dolomite

Coarse grained dolomite

Dolomite - coarse interlocking dolomite rhombs from 100 to 500 um across. The larger rhombs show internal zoning.

Silica - none

Impurities - abundent inclusions of f.g. iron oxides and minor yellow staining

Comment - much coarser grained, totally unlike the other samples.

Sample8631 - Savage Dolomite

Medium grained dolomite with abundent impurities.

Dolomite - medium grained (50-100 um) with "feathery" interlocking texture

Silica - isolated subhedral grains (diagenetic?)

Impurities - ovoid bodies (20-50um) outlined by iron oxides. May be concretions or fossil remains. Also yellow staining and iron oxides along grain boundaries.

Comment - greater impurities than previous samples from Corinna Dolomite.

Sample 8632 - Savage Dolomite

Patchy recrystallised fine grained dolomite.

Dolomite - mostly 10-30 um but with coarser recrystallised patches.

Silica - less than 2% anhedral grains in the coarse recrystallised dolomite patches. Rare euhedral diagenetic type silica.

Impurities - very minor

Comment - Similar to samples from the Corinna Dolomite

Sample 8633 - Savage Dolomite

Fine grained dolomite with coarser grained patches.

Dolomite - dominantly 5-30 um with coarser patches from 30 to 100 um

Silica - none

Impurities - minor veins carry clays and iron oxides

Comment - Similar to Corinna Dolomite.

Sample 8634(A)

Compact rock flour from within the silica flour deposit at Site 3 (locally termed lump silica), ie. the silicified dolomite partly disaggregated.

Dolomite - very minor ultra-fine rhombs

Silica - 100% - irregular interlocking anhedral grains with variable size. Dominantly 10 to 50 um with irregular coarser grained patches. Very few grains exceeding 100 um.

Impurities - fine grained black opaques in patches along grain boundaries.

Sample 8635(B) - **Site 6**

Banded crustiform **quartz vein.**

Dolomite - none

Silica - coarse zoned euhedral quartz crystals radiate outwards from vein walls. Fine grained quartz of silica flour type is concentrated between the coarse zoned quartz crystal bands.

Impurities - very minor

Comment - The coarse quartz crystals within the bands show little evidence of deformation. Individual crystals show growth zoning parallel to crystal faces. Within the growth zones are concentrations of primary fluid inclusions. Commonly liquid rich with a small vapour bubble. This vein material has an identical texture to that recorded from epithermal gold deposits.

APPENDIX 3

Chemical analyses of dolomite samples from the Corinna Dolomite and Savage Dolomite (see Appendix 2 for descriptions of each sample and Fig. 7 for locations.)

ANALABS

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ANALYTICAL DATA

SAMPLE PREENT ORDER No.	PAGE	FIX	REPORT NUMBER	REPORT DATE	CLIENT ORDER No.	PAGE
	1 OF 2		999.01.08.04302	25/03/87		2 OF 2

TUBE No.	SAMPLE No.	Al2O3	CaO	Fe2O3	K2O	LOI	MgO	MnO	Na2O	P2O5	SiO2	TOTAL	TiO2
1	~~8701~~	–	–	–	–	–	–	–	–	–	–	–	–
2	8622	1.55	27.000	0.52	0.070	44.00	20.70	0.040	0.040	0.213	6.25	100.61	0.030
3	8623	0.40	29.900	1.26	0.060	46.40	21.10	0.080	0.025	0.247	0.40	99.89	0.020
4	8624	0.50	30.000	0.11	0.040	46.60	22.00	0.010	0.005	0.082	1.00	100.70	<0.010
5	8625	0.35	<0.100	0.26	0.040	0.20	0.10	0.010	0.015	0.005	98.50	99.62	0.050
6	8626	0.25	30.200	0.24	0.010	46.70	22.00	0.040	0.005	0.179	0.25	99.87	<0.010
7	8627	0.20	17.100	0.38	0.010	25.90	10.80	0.020	0.020	0.183	44.70	99.31	<0.010
8	8628	0.15	30.400	0.06	0.010	46.90	21.10	<0.010	0.015	0.050	0.40	99.10	<0.010
9	8629	0.15	30.000	0.14	0.020	46.90	22.60	0.020	0.015	0.110	0.45	100.36	<0.010
10	8630	0.10	30.200	0.17	0.010	47.10	22.40	0.040	0.015	0.087	0.10	100.22	<0.010
11	8631	0.15	30.200	0.13	0.010	47.10	22.00	0.020	0.015	0.069	0.30	99.99	<0.010
12	8632	0.15	28.900	0.12	0.030	44.00	19.90	0.020	0.005	0.066	6.25	99.44	<0.010
13	8633	0.15	30.200	0.39	0.070	47.10	22.00	0.020	0.015	0.101	<0.05	100.05	<0.010
14													
23	DETECTION	0.05	0.100	0.01	0.010	0.10	0.10	0.010	0.005	0.001	0.05	0.10	0.010
24	UNITS	%	%	%	%	%	%	%	%	%	%	%	%
25	METHOD	408	408	408	408	408	408	408	408	408	408	408	408

Results in ppm u[illegible] [illegible] nless otherwise specified
T = element p[illegible] resent; but concentration too low to measure
X = element c[illegible] oncentration is below detection limit
— = element n[illegible] ot determined

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SILICA FLOUR ANALYSES

SAMPLE	Al203 ppm	CaO ppm	Fe2O3 ppm	K2O ppm	MgO ppm	MnO ppm	TiO2 ppm	Na2O ppm	STRATA
8705	560	380	175	96	245	5	610	30	CORINNA DOLOMITE
8706	70	295	100	4	115	3	90	9	CORINNA DOLOMITE
8707	50	90	50	3	55	1	50	9	CORINNA DOLOMITE
8708	430	320	180	32	25	3	640	34	SAVAGE DOLOMITE
8709	170	135	95	11	65	5	320	40	CORINNA DOLOMITE
8710	530	295	245	34	210	6	1370	42	SAVAGE DOLOMITE
8724	120	205	80	9	70	1	470	13	CORINNA DOLOMITE