TOPAZ

Potential and Outlook

Topaz occurs as primary occurrences related to granitic intrusive rocks and as secondary alluvial occurrences, such as placer deposits. Substantial topaz deposits in the form of silexite (quartz-topaz rock) are known in New South Wales (Figure 29, Photograph 23).

In New South Wales, deposits of industrial topaz suitable for refractory uses occur as silexite in association with the Mole Granite at Torrington (Henley et al. 2001) and the Gumble Granite at Gumble (Pogson & Watkins 1998) (Figure 29). The Torrington silexite deposits are the only potentially commercial deposits known in New South Wales. Development of these silexite deposits as a source of mullite will depend on whether markets can be developed for topaz-derived mullite.

Nature and Occurrence

Topaz is a complex fluoro-silicate of aluminium (Table 41) mainly occurring in felsic igneous rocks, particularly granite, pegmatites and rhyolite. It is typically associated with the products of late-stage pneumatolytic activity, occurring with quartz in vein deposits and with quartz, feldspar, mica and other minerals in pegmatite (Lishmund 1974).

Topaz is a common constituent of greisen and also occurs in contact metamorphic zones. It is also found in placer deposits in alluvial sediments draining areas of suitable granitic intrusive rocks.

Table 41. Main properties of topaz

Commodity	Topaz
Formula	$Al_2SiO_4(F,OH)_2$
Colour	Colourless, pale blue, yellow, yellowish brown or red
Specific Gravity	3.5–3.6
Hardness	8

Source: Lishmund (1974)

Photograph 23. Topaz, mullite sand and products. The topaz was obtained from the Torrington silexite deposit, New England region. Mullite is a synthetic, fused (calcined) crystalline aluminium silicate produced in electric arc furnaces from alumina and silica for such applications as refractory tubes, industrial crucibles, analytical equipment and refractory cements. (Photographer D. Barnes)

New South Wales Occurrences

Over 200 occurrences of topaz are recorded throughout New South Wales (Ray et al. 2003). The majority of topaz occurrences are alluvial deposits in the northern New England region. In the Torrington area (Henley et al. 2001), colourless topaz occurs in silexite, associated with cassiterite, wolframite and bismuth mineralisation.

The Torrington topaz (Photograph 23) has potential uses as a raw material for refractories, as a flux in steel making, in the production of fluorine compounds, and in ceramics and glassmaking (Winward 1976).

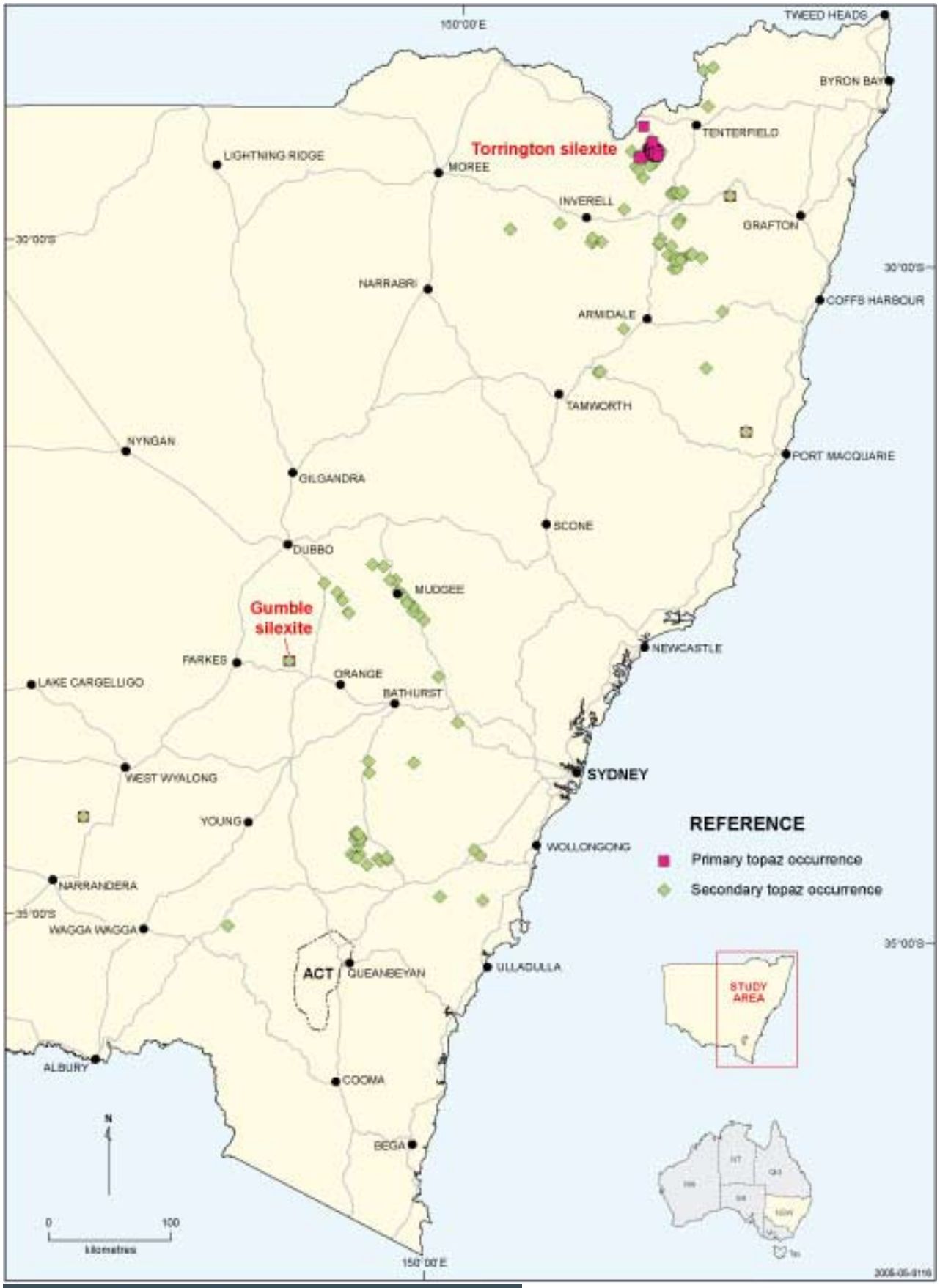

Figure 29. Topaz occurrences in eastern New South Wales

Indicated resources of silexite are approximately 1.1 Mt and inferred resources are about 5 Mt. The total topaz content is about 1.2 Mt (Winward 1976).

McClatchie (1994) evaluated the potential of a group of eight silexite bodies (the Gumble silexite) along the western margin of the Gumble Granite, at a locality about 7 km north of Manildra, or about 45 km west of Orange. The silexite is coarse-grained, dominantly quartzose, and has various accessory minerals. Although topaz content is highly variable, one silexite body (of unknown extent and depth) was found to contain 14% to 30% topaz. Ceramic testing indicates that Gumble topaz could produce an acceptable mullite product, although the presence of iron oxides produced decolourisation in some test samples. No resource information has been determined for the Gumble silexite. McClatchie (1994) reported that there were approximately 150 000 tonnes of silexite tailings (from tungsten-mining operations in the late 1970s) available for immediate processing. Other potential products from the Gumble Granite at this locality may include feldspar, construction stone and wollastonite (from associated skarns).

Minor primary topaz mineralisation is found in high-grade metamorphic rocks in the Precambrian Willyama Supergroup at Broken Hill, and is usually associated with sillimanite (Lishmund 1974). Topaz is also known from greisen in the Ardlethan Granite at Ardlethan.

Elsewhere in New South Wales topaz occurrences are in alluvial placer deposits associated with sapphire, diamond and cassiterite.

Applications

The economic potential of the Torrington deposits depends on the feasibility of beneficiating the material (Lishmund 1974). Topaz is used mainly as a gemstone but also has refractory potential. However, there are potential health and environmental problems associated with calcining of topaz due to production of fluorine.

There are many alternative materials that can be calcined to produce mullite, including sillimanite and kyanite (see separate chapter). Mullite can also be produced synthetically.

Economic Factors

Topaz is mainly produced for use as a gemstone. Apart from this use, topaz occurring in silexite deposits has a number of possible industrial uses. These include use as a raw material for refractories, as a steelmaking flux, in the production of fluorine compounds, and in ceramic and glass manufacture (Winward 1976).

References

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