



NSW DEPARTMENT OF  
**PRIMARY INDUSTRIES**

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## Potential and Outlook

Although perlite occurrences are known in New South Wales, they are largely restricted to areas in the northeast of the state that are environmentally sensitive and where opportunities for mining are limited.

The only commercially significant Australian deposits are near Chillagoe, in the Tertiary volcanic province of southeastern Queensland, and northeastern New South Wales. Production is currently restricted to Queensland. In New South Wales, many occurrences of perlite occur near Nimbin, in mostly rhyolitic sequences associated with the Mount Warning Central Complex (Figure 20).

Perlite has also been identified in Carboniferous volcanic rocks of the Tamworth Trough, but because it is much older it is largely devitrified and unsuitable for commercial use.

Important factors for commercial perlite deposits are: the degree of expansion when heated, which is dependent on the water content; and lack of impurities, such as mineral and rock inclusions. In general, deposits with suitable expansion characteristics and freedom from crystal/lithic fragments are rare.

## Nature and Occurrence

Perlite is an amorphous, hydrated volcanic glass formed through the secondary alteration of obsidian by the incorporation of water into the glass silica structure (Table 27).

**Table 27. Main properties of perlite**

<b>Material</b>	Perlite
<b>Formula</b>	Amorphous aluminosilicate glass
<b>Colour</b>	Grey
<b>Specific Gravity</b>	2.2–2.4
<b>Hardness</b>	5.5–7

Source: Harben (1999)

Commercial deposits are known in silicic volcanic rocks of Tertiary to Early to Middle Quaternary age. The volcanic glass in rocks of this age is old enough to be hydrated and young enough not to have been devitrified. More recently formed volcanic glass is not likely to be completely hydrated. Commercial deposits of perlite occur mainly in steep-sided, block-type lava domes of limited areal extent (Harben & Kuřvart 1996).

Major producing countries include USA, Greece, Japan, Hungary and Turkey. Greece is the leading exporter. Perlite is also mined in a number of other countries, including Bulgaria, Slovakia, Macedonia, Armenia, Italy, South Africa, The Philippines, China, Australia, New Zealand, Mexico and Argentina.

World production of perlite has averaged about 1.8 Mt per annum in the last five years (Table 28) (Bolen 2005). Estimated production from the main perlite-producing countries for 2004 is shown in Table 28. World capacity is reported to be 2.4 Mt (Harben 1999).

**Table 28. World processed perlite production 2004**

Country	Production (tonnes)
<b>USA</b>	510 000
<b>Greece</b>	500 000
<b>Japan</b>	255 000
<b>Hungary</b>	150 000
<b>Turkey</b>	150 000
<b>Other</b>	240 000
<b>Total</b>	<b>1 805 000</b>

Source: Bolen (2005)

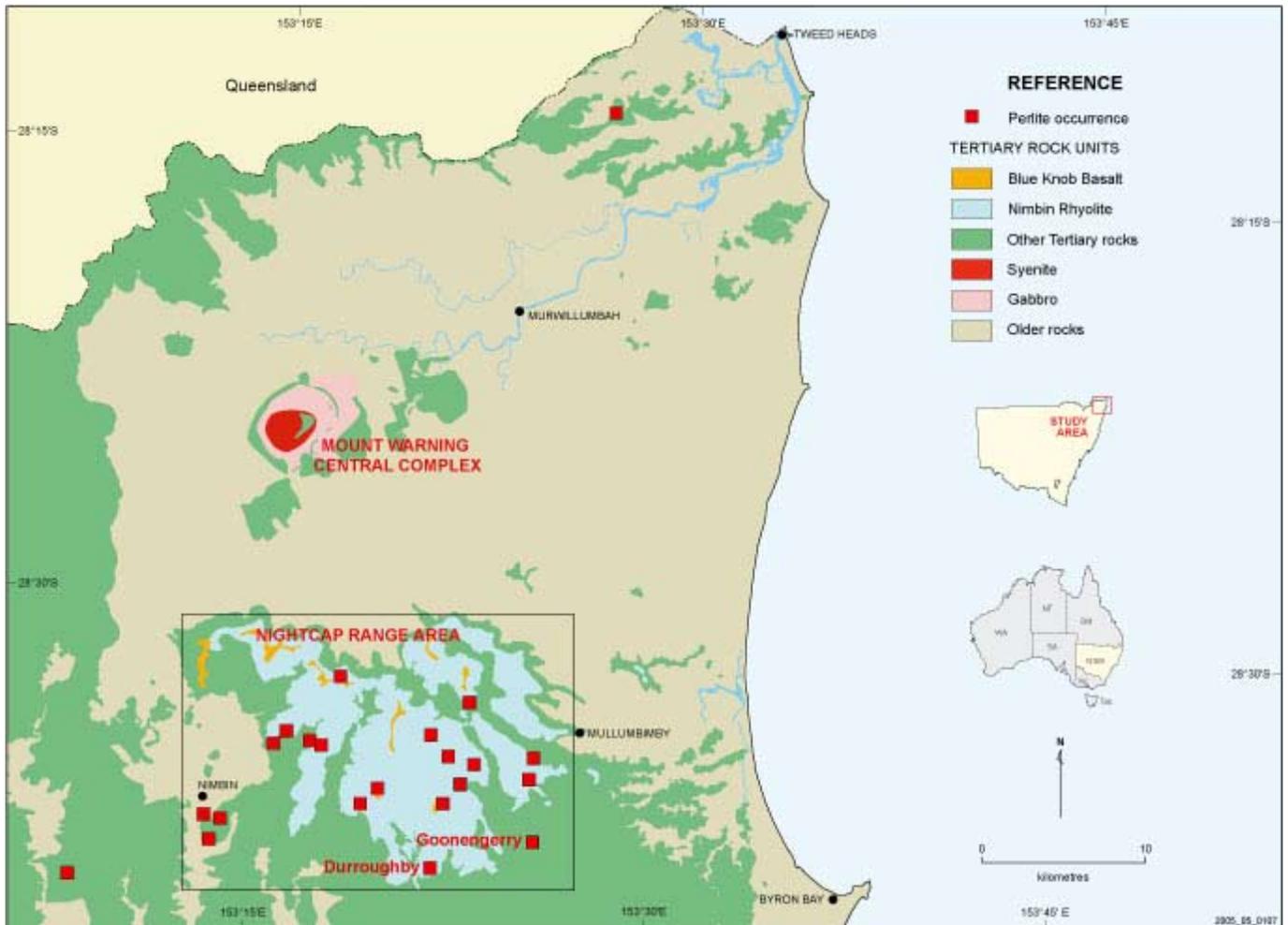


Figure 20. Perlite occurrences in northeastern New South Wales

## Main Australian Deposits

Queensland is Australia's only current perlite-producing state. Perlite is produced at two locations, Nychum, near Chillagoe and Numinbah in southeastern Queensland. Production in recent years has been around 5000–6000 tpa.

## New South Wales Occurrences

There is no production of perlite in New South Wales, although small amounts have been produced in the past. Perlite is currently mined in the Queensland portion of the Tertiary volcanic province of

southeastern Queensland and northeastern New South Wales. In the New South Wales portion of the province, there are many known occurrences in the vicinity of Nimbin in rhyolitic lavas, porphyritic pitchstones, obsidian, tuff and agglomerate of the Nimbin Rhyolite, which is associated with the Mount Warning Volcanic Complex (Dickson 1969). Some 23 perlite occurrences are recorded in the New South Wales Industrial Minerals Database (Ray et al. 2003).

Although there is good potential for the discovery of commercial perlite deposits associated with silicic volcanic rocks of the Mount Warning Central Complex, in the Nightcap Range area (Figure 20), the environmental constraints in this area limit the

likelihood of exploitation. The rugged topography of the Nightcap Range area is also a potential constraint.

The main prospective unit is the Nimbin Rhyolite. Beds are up to 9 m thick. Exploration to date is not considered to have fully assessed the potential of the Mount Warning Central Complex. Several occurrences with economic potential occur south and southeast of the Nightcap Range.

Herbert (1976) reported inferior perlite from the Early Permian Alum Mountain Volcanics near Stroud. There is probably relatively low potential for commercial discoveries in that area because of the age of the volcanic sequence.

## Applications

### Main Uses

Physical properties of perlite that are exploited commercially include its chemistry (Si, Al); state (alkaline, inert, hydrated); habit (amorphous, fibrous) and physical behaviour (thermal insulator, low density and porosity) — as summarised below (Lin 1998).

- in the ceramics and hollow glass industries by utilising the silica, alumina and alkaline components
- for production of explosives, using the structural water in the raw material which is suitable for serving as heat points
- in filter manufacture, where it is used as an inert bed aggregate
- in electrode manufacture, using its composition, granulation and amorphous nature
- in cement production, utilising the aluminosilicate composition as an amorpho-pozzolanic aggregate in Portland cement
- in the zeolite industry as a raw material for the hydrothermal process
- as a mineral additive aggregate in the production of wet phosphoric acid from phosphate rock
- in mineral fibre manufacture
- in metallurgical operations as a covering for molten metal as thermal insulation, for prevention of oxidation and for collection of flux materials.

There are many alternatives or substitutes for perlite depending on the application, as listed in Table 29.

**Table 29. Substitutes for perlite**

Use	Substitute
Animal feed supplement	Bentonite, sepiolite, talc, vermiculite, zeolite
Filler	Barite, calcite, feldspar, kaolin, mica, nepheline syenite, pyrophyllite, silica, talc, wollastonite
Fire retardant	Antimony oxide, asbestos, borates, bromine, chromite, diatomite, magnesite, magnesia, phosphates, pumice, vermiculite
Filter media	Activated carbon/anthracite, asbestos, cellulose, diatomite, garnet, ilmenite, magnetite, pumice, silica sand
Foundry	Bauxite and alumina, chromite, kaolin, olivine, pyrophyllite, silica sand, vermiculite, zircon
Lightweight aggregate	Expanded clay, pumice, vermiculite, zeolite
Soil additive / amendment	Bentonite/kaolin, diatomite, gypsum, peat, vermiculite, zeolite
Thermal or sound insulator	Asbestos, brick clays, diatomite, foamed glass, cement, mineral wool, pumice, vermiculite, wollastonite, zeolite

Source: Harben (1999)

## Economic Factors

Perlite usage is dependent on the level of construction activity — which is related to economic conditions. Perlite has an advantage over pumice in that perlite can be shipped in compact form then expanded at its market (Harben 1995).

Formed products used in the construction industry drive the market for perlite. Demand for filtration-grade perlite depends on consumption of beer, wine and on sugar refining (Anon 2002).

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