

Mining at Lightning Ridge

Lightning Ridge is famous for its precious black opal. But the Ridge also has potential for the discovery of black gold.

Geology

Lightning Ridge lies in a large geological feature called the Surat Basin, which is part of the vast Great Australian Basin. The Great Australian Basin covers 1.7 million square kilometres of eastern Australia.

It was formed during the Cretaceous period about 140 million years ago, when dinosaurs walked the Earth and the sediments of the Basin lay at the bottom of a large inland sea. It is these sediments that later hosted the formation of precious opal.

The sedimentary host rocks are essentially horizontal. This is because they were deposited on the floor of the inland sea and have not been deformed.

The rocks which host the opal at Lightning Ridge were deposited in shallow water near the edge of the Basin, probably in an estuary.

Overlying the Cretaceous sedimentary rocks are sandstones and conglomerates that were deposited by streams and rivers in the Tertiary period, about 15 million years ago.

Many of these younger rocks have hardened to form silcrete and are often quarried for road materials.



Plane conducting aeromagnetic survey near Walgett - part of the recently completed 'Discovery 2000' exploration initiative. It is hoped that 'Discovery 2000' and its successor, 'Exploration NSW', will lead to the discovery of commercial petroleum deposits in NSW

Most opal is found between 6 and 18 metres from the surface - not so deep that they are out of the reach of smaller miners, but deep enough to make their mining hard work.

Petroleum potential

The sedimentary rocks of the Lightning Ridge region may also contain petroleum deposits. The Surat Basin stretches beyond New South Wales into Queensland, where it hosts a large number of oil and gas fields.

While no commercial oil or gas discoveries have been made in the New South Wales part of the basin, the lack of exploration success does not reflect the potential that is there.

Most exploration effort has focused on Queensland. Only six wells have been drilled in New South Wales and large areas remain virtually unexplored.

Water samples collected from deep artesian bores in the New South Wales section of the basin have contained methane gas accompanied by varying amounts of carbon dioxide. Most samples record small quantities of ethane and a few bores contain traces of propane and butane.

The Department of Mineral Resources is conducting ongoing studies to determine the source of the gas in the artesian water.

About \$3 million of the Department's recently completed \$35 million 'Discovery 2000' exploration program was spent searching for oil and gas in the Surat Basin.

Funding from the new \$30 million 'Exploration NSW' program will see a further \$1 million spent on oil and gas exploration in the Surat Basin over the next three years.

Opal

In New South Wales the most important seams of opal are found in sedimentary rock, with the opal lying at shallow depths, usually less than 30 metres. Its formation occurs this way:

Silica weathered from overlying rock percolates down through the rock mass to a cavity or fault where it is deposited as a gel.

Gradual loss of water from the gel results in hardening of the material and the formation of opal, the whole process taking hundreds of thousands of years.

Opals are made up of minute spheres of silica which have grown around a central nucleus. Precious opal consists of larger silica spheres

arranged in a regular pattern.

The orderly arrangement of the spheres creates a regular three-dimensional array of spaces and voids between the spheres.

Diffraction and interference of light waves travelling through the transparent spheres and voids produce the brilliant play of colours of precious opal.

Precious opal

Precious opal is usually classified on the basis of the background colour of the stone and the type of colour pattern.

Black opal shows a play of colours in a dark background, accentuating the colour flashes. Lightning Ridge is the world's major producer of black opal.

Light opal has a background colour ranging from clear to milky. The clear varieties are known as crystal or jelly opal. Beautiful light opal is found at White Cliffs.

Fire opal is a transparent to translucent stone with a red to honey-yellow background, and usually with a bright play of colours in red and green.

Opal mining history

1877 - Mining for precious opal in igneous rocks begins at Rocky Bridge Creek, a tributary of the Abercrombie River, in the Central West.

1881 - Opal is discovered at Milparinka, near Tibooburra in the Far West.

1884 - Opal is discovered in sedimentary rock at White Cliffs in the Far West.

1889 - Precious opal is discovered at White Cliffs.

1880s or 1891 - Opal is discovered in sedimentary rock at Lightning Ridge (Wallangulla) and other localities in the area, but its commercial value is not recognised.

1890 - Precious opal mining begins at White Cliffs (continuing to 1915 then going into decline).

1896 - Opal is discovered at Purnanga and Grenville-Bunker Field. These occurrences are near White Cliffs and so extend the size of that opal-bearing district.

1897 - Opal is discovered in igneous rock at Tooraweenah, near Coonabarabran.

1901 - Opal is discovered in igneous rock at Tintenbar, on the Far North Coast.

1901-1905 - Opal mining begins at Lightning Ridge. The first shaft was put down around 1901 or 1902 by Jack Murray, a boundary rider who lived on a property nearby. Some time later, possibly a few months, a miner from Bathurst named Charlie Nettleton arrived and commenced shaft sinking. It was he who in 1903 sold the first parcel of gems from the field for \$30, not a fiftieth of the price that could have been obtained five years later.

1908 - Opal mining begins at the Grawin-Sheepyard Field in the Lightning Ridge area, increasing the importance of the opal fields in the district.

1919 - Opal mining begins at Tintenbar, continuing to 1922.

1920 - The Newfield opal area is discovered.

1985 - Seminal work by the Geological Survey of New South Wales leads to better, more scientifically controlled exploration for opals.

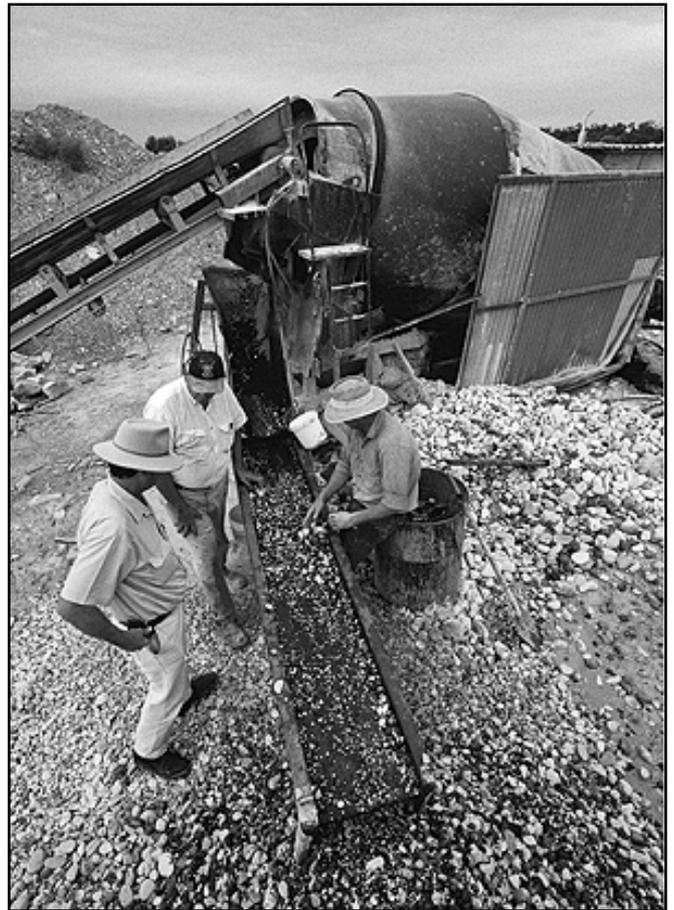
1989 - The Coocoran opal area is discovered in the Lightning Ridge district.

1998-1999 - The estimated value of opal production in the State is about \$44 million. New South Wales (and Australia) is a leading world producer of opals.

The role of the Department

The New South Wales Department of Mineral Resources is responsible for:

- Assessing and reporting on the geology of New South Wales, especially by preparing geological maps and notes.
- Ensuring that exploration and mining companies comply with environmental requirements.
- Issuing exploration and mining titles.
- Monitoring health and safety at mines.
- Encouraging development of the mining industry in the State and value adding to mineral products.



Officer from the Department's Lightning Ridge office providing safety advice to opal miners

Lightning Ridge Office

The Department's Lightning Ridge Office provides a variety of services to the mining industry in the region:

- Processing of exploration and mining titles, including mineral claims and opal prospecting licences. There are currently 6400 mineral claims covering the Lightning Ridge region. Between 1500 and 2500 mineral claims and from 50 to 100 opal prospecting licences are processed by the office each year.
- Monitoring of mine safety and environmental management.
- Mine safety courses. Almost 80 courses have been conducted by the Department's Mines Inspection Branch since July 1993, with about 2000 opal miners attending. The courses cover subjects such as pegging claims, above and below ground surveying, safety planning, ground support and control, ventilation and legal responsibilities. Courses are also conducted in the use and handling of explosives.