MINERALS AND METALS AVAILABILITY IN NEW SOUTH WALES AUSTRALIA

Compiled by
Industry Coordination
Division of Resources & Energy

Using information available in August 2012
The Crown does not warrant that the document is a definitive list of all mineral commodity suppliers in NSW, nor warrant that the document is free of error. The Crown will not be liable for any loss caused or arising from reliance upon information provided herein.
PREFACE

The Department of Trade & Investment, Regional Infrastructure and Services, Division of Resources & Energy (DRE) has prepared this publication to provide information regarding the supply of mineral commodities produced within New South Wales (NSW). This document provides references to non-coal mineral commodities and products available from NSW mines and processing plants. It lists the major or significant producers.

Please check the Department’s website listed below for the latest version.

Company contact details are included to facilitate direct trade enquiries to the major commodity producer(s). When contacting the listed companies it is important to provide detailed information regarding specifications, purchasing method, consignment size, port of entry and delivery dates.

Industry associations are listed to facilitate access to additional information on smaller-scale producers not included in this document.

Commodities are arranged under the following classifications:

- Metallic mineral concentrates and metals
- Construction materials
- Industrial minerals and products

Information on mine ownership, production, reserves, location, geology and on coal and petroleum may be sought from publications including:

- New South Wales Minerals Industry Annual
- New South Wales Coal Industry Profile

Detailed geological enquiries relating to industrial and metallic mineral resources should be directed to:
Geological Survey of NSW
Division of Resources & Energy
Phone: 61 2 4931 6666
Fax: 61 2 4931 6790
Website: www.resources.nsw.gov.au

For further information or changes to any listing please contact:

Minerals Liaison Officer
Industry Coordination
Division of Resources & Energy
NSW Trade & Investment
PO Box 344
Hunter Region Mail Centre, NSW 2310
Australia

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www.dnrm.qld.gov.au

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customer.service@dpi.vic.gov.au  
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NEW SOUTH WALES MINERALS INDUSTRY OVERVIEW

The New South Wales (NSW) mining industry makes a significant contribution to the state’s economy, bringing infrastructure and investment to many regional areas, providing new jobs and strengthening regional development.

Favourable geology has resulted in the discovery and development of many world class mineral deposits.

A diverse range of mineral commodities are produced in NSW including coal, metals, gas, industrial minerals and construction materials. Major mineral and processed metal exports include coal, iron and steel and aluminium.

The mining of minerals is the state’s largest export industry, representing over one third of total NSW merchandise exports.

The industry (including major minerals processing operations) directly employs around 40,000 people, many of these in rural centres. Generally speaking, for every direct mine site job up to an additional three positions are created in other sectors of the economy. This multiplier effect has profound flow-on benefits to the general economy.

- Total NSW mineral production in 2010-11 was valued at $20.2 billion. Preliminary figures for 2011-12 suggest that the estimated value of NSW mineral production was around $23 billion.

- Saleable coal production was 156.5 million tonnes (Mt) and is the state’s largest mining sector. Metallic and industrial minerals and construction materials production is also very significant - valued at around $3.9 billion.

- The NSW minerals industry includes 60 coal mines, 12 major metalliferous mines, 11 significant industrial minerals operations, 2 gas production sites, plus a large number of smaller metallic and industrial mineral mines and numerous construction materials operations.

- Coal mining operations are spread throughout the five NSW coalfields: Hunter, Newcastle, Gunnedah, Western and Southern Coalfields. The highest concentration of mining occurs on the known resources of high quality black coal in the Sydney-Gunnedah Basin.

- Metallic mining operations and projects are concentrated in three main areas of the State - Broken Hill, Orange and Cobar. These areas are all well served by existing infrastructure and rural communities.

- In addition to existing mining operations, presently there are more than 30 coal and 38 metallic and industrial mineral projects proposed for development over the next decade in NSW. Together these potential developments, if all were to proceed, would involve a cumulative investment of more than $13 billion and generate over 9000 direct jobs.

- Industrial minerals production in NSW comprises largely low value, high volume extractive materials, such as sand and coarse aggregate essential for building and construction. There are also numerous medium value commodities such as clays, limestone, magnesite, magnetite, diatomite, high purity silica, mineral
sands and dimension stone produced in NSW, which are essential raw materials for many other industries.

- Value-added mineral processing, including established steel and aluminium smelting and refining operations, is an important component of the NSW minerals industry.
- The value of annual output is estimated at over $5 billion, with much of this production exported.
- Mineral processing, like mining, is an important sector of the economy with a number of new projects under development or planned.

**Exploration**

The exploration industry in Australia continues to grow strongly. The Australian Bureau of Statistics reports that private sector investment in mineral exploration (excluding petroleum) in NSW reached $153.1 million in 2010-11. This is a 17% increase over the previous year's expenditure of $130.4 million. In addition, petroleum exploration expenditure was around $147 million, making total expenditure on exploration around $300 million in 2010-11. The number of exploration licence applications received in 2010-11 has increased by 11% to 225 applications over the past two years. This increase is part of a world-wide trend of increasing mineral exploration arising from a surge in commodity prices driven by demand from expanding economies, such as China and India. NSW has benefited from a substantial inflow of funds from:

- new stock exchange listings of junior explorers with NSW interests.
- joint ventures between local small cap companies and overseas giants such as Newmont, CVRD Inco Limited and JOGMEC.
- Western Australian based companies now investing substantially in exploration in NSW.

The NSW Government also provides many incentives to invest in NSW through its exploration initiatives.

The NSW Government’s New Frontiers exploration program will continue on an ongoing basis, following the introduction of an industry rental fee to continue funding of the initiative. The program focuses on promoting exploration opportunities in under-explored areas of NSW. At present, the focus is on both mineral and petroleum opportunities in the frontier regions in the far west of the state. Major geophysical programs, in particular seismic surveys, will identify new exploration opportunities across NSW.

The reported petroleum industry’s exploration expenditure for 2011-12 was around $64 million, total expenditure on petroleum exploration is estimated at around $453 million since 2007-08. The forecast petroleum exploration expenditures for 2012-13 is around $112 million. The number of petroleum exploration licence applications received has more than doubled over the past three years.
METALLIC MINERAL CONCENTRATES AND METALS

ALUMINA and ALUMINIUM

Aluminium is a malleable, light weight (about one-third the density of steel), strong and durable material. Aluminium resists corrosion and has a variety of surface finishes depending on the alloy and application of the product. Aluminium is the most used non-ferrous metal.

The Australian aluminium industry is an integrated industry with bauxite mining, smelting, casting and semi-fabrication facilities located across Australia.

Employment in the bauxite, alumina and aluminium sectors of the industry is centred on regional areas throughout Australia reflecting the location of the main production facilities. In 2010 the bauxite, alumina and aluminium operations employed around 16,700 employees, of which 13,800 were directly employed (13,000 in 2009) and around 2900 were contractors (4400 in 2009).

Australian primary aluminium metal production was 1.94 Mt in 2010 – marginally lower than the 1.95 Mt recorded in 2009. The 2010 result reflected the impact of the Global Financial Crisis on production.

Overall the Australian smelting industry maintained its position as the fourth largest producer of primary aluminium in the world, despite the reduced production levels.

Tomago Aluminium operates the largest and most modern aluminium smelter in Australia. It is located in an industrial area at Tomago and employs around 1200 people. The smelter currently produces 530,000 tonnes (t) of aluminium annually. Tomago is one of the world’s more efficient aluminium smelters.

Tomago produces aluminium remelting ingots and tees, extrusion billets and rolling slabs. Most of the products are exported to South East Asia, Japan and China, where they are processed by a variety of manufacturers into end products.

The other Hunter Valley aluminium smelter at Kurri Kurri west of Newcastle had been in operation since 1969. The smelter is owned and operated by Hydro Aluminium Australia Pty Ltd and employed 500 people directly. This plant produced over 163,000 t of aluminium annually. The owner operator announced that it will close the Kurri Kurri plant during 2012.

Contact information for the NSW aluminium smelter:

Tomago Aluminium
PO Box 405
RAYMOND TERRACE  NSW  2324

Phone:  (02) 4966 9669
Fax:      (02) 4966 9711
Metal_sales@tomago.com.au
ANTIMONY

The largest applications for metallic antimony are as alloying material for lead and tin and for lead antimony plates in lead-acid batteries. Alloying lead and tin with antimony improves the properties of the alloys which are used in solders, bullets and plain bearings. Antimony compounds are prominent additives for chlorine- and bromine-containing fire retardants found in many commercial and domestic products. An emerging application is the use of antimony in microelectronics.

The only antimony produced in NSW had been derived from antimony-gold concentrates mined at the Hillgrove mine near Armidale, which closed in 2009 due to poor stibnite recovery. The mine was placed on care & maintenance in August 2009. In May 2012, the owner of the mine, Straits Resources Ltd announced that it is pursuing negotiations for the sale of the Hillgrove Antimony /Gold Mine.

COPPER

The major applications of copper are in electrical wires (60%), roofing and plumbing (20%) and industrial machinery (15%). Copper is mostly used as a metal, but when a higher hardness is required it is combined with other elements to make an alloy (5% of total use) such as brass and bronze. A small part of copper supply is used in production of compounds for nutritional supplements and fungicides in agriculture.

NSW is one of the lowest-cost copper-producing regions in the world. NSW copper mining operations are successful bulk mining operations employing advanced technology and modern processing methods. Examples include block caving at
Northparkes, sublevel caving at Cadia Ridgeway and bulk ore haulage and large scale, open cut mining at Cadia Hill.

New South Wales produced 149 kilotonnes (kt) in 2010, largely from Northparkes, Cadia, Ridgeway and Tritton, valued at $1.4 billion

Copper production at the Cadia-Ridgeway mine (Newcrest Mining Ltd) was 26 kt for Cadia and 17 kt for Ridgeway for 2010. Ridgeway's production was 10 kt less than in 2009 because of transition from the sub-level cave to the Ridgeway Deeps block cave, which has been completed. The Ridgeway gold-copper mine is located 3 km from the Cadia Hill open pit and the top of the Ridgeway deposit lies approximately 500 metres (m) below the surface. Ridgeway Deeps was successful in ramping up to a design production rate of 6 million tonnes per annum (Mtpa). The Cadia Hill pit is nearing completion and has a forecast mine life to early 2013.

The Cadia East project feasibility study was completed at the end of 2009. In January 2010, the New South Wales Government granted Newcrest Mining Limited the approval to proceed with the construction of the A$1.9 billion project. The Cadia East underground panel cave mine will be Australia's largest underground mine and will underpin production from the Cadia Valley province for at least the next 30 years. Construction began in April 2010. Cadia East will enable production to increase to around 100 kt of copper and 800 000 ounces (oz) of gold per year. The existing Cadia Valley processing plant capacity will be expanded from 24 Mtpa to 26 Mtpa.

The Northparkes and CSA mines have performed solidly in recent years and smaller amounts of copper have also been produced from the Mineral Hill mine and at the Peak Gold Mine.

The Northparkes mine (Rio Tinto) is a block caving operation. The inexpensive bulk mining method is unique in Australia and has been made possible by the brittle nature of the near-vertical 'Bornite Porphyry' ore body. The Northparkes block-caving operation is regarded as the most efficient underground mine in the world with respect to output per person. The operation processes produced 38,986 t of copper in 2009-10

The CSA mine (Cobar Management Pty Ltd) is one of the deepest underground mines in Australia. The ore grade averages over 6% and with some as high as 12%, making it one of the richest copper ore deposits in the world. In 2009-10 the mine produced 56,062 t of copper, a marked increase on the previous years.

The Tritton copper mine near Nyngan opened in 2005. Since opening, copper production from the mine has steadily increased. During the year to June 2011 Tritton largely completed and delivered on a capital reinvestment programme. The improvements led to a total production of 23,936 t of copper in concentrate and cement over the 12 month period to June 2011, with the last two quarters producing at above a 25,000 tonnes per annum rate.

The Peak Gold Mine at Cobar produced 3742 t copper in 2009. The Peak operation consists of five producing gold and copper deposits that are being mined from underground to provide mill feed to a central gold/copper processing plant. The ore bodies currently being mined by Peak Gold Mines are Peak, New Occidental, New Cobar, Perseverance and Chesney.
The major NSW copper concentrate and metal suppliers include:

**Newcrest Mining Ltd**  
Cadia Valley Operations  
9th Floor,  
600 Street Kilda Road  
MELBOURNE VIC 3004  

Phone: (03) 9522 5333  
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corporateaffairs@newcrest.com.au  
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Fax: (02) 6893 7268
IRON and STEEL

Iron ore is a key input in the production of steel and occurs in two main forms – hematite which is red and has an iron ore content typically greater than 55%, and magnetite which is black and has an iron ore content as low as 30%. Up to now, all Australian commercial iron ore production has been hematite ore; while magnetite ore is the most abundant iron oxide in Australia, it requires more intensive processes to remove its impurities, which significantly increases production costs.

Western Australia accounts for 97% of Australia's iron ore production, which is extracted from open-cut mines located mostly in the Pilbara region in the north west of the state. After being blasted off the working face, iron ore is crushed and screened to produce rock lumps (greater than 5 mm) or fines (less than 5 mm), and then transported to ports for shipping. Most of Australia's iron ore production is exported, predominantly to Asia. After rapid growth in the past decade, the main export market for Australia's iron ore is now China (almost 70% of iron ore exports in 2010), with Japan and Korea importing most of the balance.

NSW currently ‘imports’ all of its iron ore requirements, primarily from Western Australia. The state has the potential to develop large deposits of high-grade iron ore suitable for steelmaking. Recent exploration of channel iron deposits and massive magnetite deposits has provided strong indication that NSW will become a producer.

The companies involved in exploration and/or development in NSW are:

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<td>Carpentaria Exploration Limited</td>
<td>Hawsons Iron Project, NSW</td>
<td>Phone: (07) 3220 2022</td>
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<tr>
<td></td>
<td></td>
<td>Fax: (07) 3220 1291</td>
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<tr>
<td>Standard Iron Pty Ltd</td>
<td>Lockhart &amp; Tottenham Channel Iron Ore Projects, NSW</td>
<td>Phone: (02) 9264 0022</td>
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<td>Fax: (02) 9264 0777</td>
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Within NSW there is iron and steel production capacity of about 6.4 Mtpa

Bluescope Steel’s Port Kembla Steelworks is the largest steel production facility in Australia and one of the world’s competitive producers of steel products. Just under 46% of Bluescope Steel’s Australian flat products finished steel output was exported.

Port Kembla Steelworks, is an integrated steelmaking operation with an annual production capacity of approximately 2.6 Mt of crude steel. Port Kembla Steelworks is the largest manufacturer and supplier of flat steel in Australia by volume and manufactures slab, hot rolled coil and plate products.

The steel works has the following facilities and processes available:-

- Sinter plant (capacity 6.6 Mtpa)
- Three coke ovens batteries
- One blast furnace (iron making capacity 2.6 Mtpa)
- Two BOS vessels (accept slab capacity 2.6 Mtpa)
- Steel ladle injection unit and vacuum degasser
- CAS-OB steel ladle treatment station
- Three continuous slab casters (capacity 2.6 Mtpa)
- One tonnage oxygen generating plant
- Hot strip mill (capacity 2.9 Mtpa)
- Plate mill (capacity 450,000 tpa)

Bluescope Steel Ltd also has two metallic coating and painting facilities located in Springhill, New South Wales and Western Port, Victoria; and, steel painting facilities in Western Sydney, New South Wales, and Acacia Ridge, Queensland.

Arrium Limited (formerly OneSteel) also has a significant presence in Australian steel as an integrated manufacturer of steel and finished steel products. Arrium Limited is an Australian manufacturer of steel long products and is a leading metals distribution company in Australia and New Zealand. The company manufactures and distributes a wide range of steel products including hot rolled structural sections, rail, rod, bar, wire and structural pipe and RHS products, and distributes sheet and coil, plate and aluminium products.

Arrium Limited includes Australia’s long products manufacturing business as well as the largest structural pipe, RHS and wire manufacturing businesses in Australia. The long products manufacturing facilities combine integrated and electric arc steel making facilities, and rolling mills. Steel making capacity is 2.5 Mt. This steel is rolled into a wide range of finished long products including reinforcing bar and rod, structural’s, merchant bar, rail and wire products. These products service the needs of the Australian construction, mining, manufacturing and agricultural markets.

Businesses within Arrium Limited include:

- Whyalla Steelworks: includes structural rolling mills, rail products facilities, slabs & billets, steelmaking by-products
- Laverton Steel Mill: includes electric arc furnace and rolling mills
- Sydney Steel Mill: electric arc furnace and Sydney Bar Mill
- Wire Mills: Newcastle Wire Mill and Geelong Wire Mill
GOLD

Besides its widespread monetary and symbolic functions, gold has many practical uses in dentistry, electronics, and other fields. Its high malleability, ductility, resistance to corrosion and most other chemical reactions, and conductivity of electricity led to many uses, performing critical functions in computers, communication equipment, spacecraft, jet aircraft engines and a host of other products.

NSW is Australia’s second largest gold producing state. In 2010-11, NSW produced 32 t of gold, an increase of 10% on the previous year. With NSW gold production increasing, the state’s gold industry increased its share of Australia’s total annual gold production to nearly 13%. Preliminary figures suggest NSW gold production will increase further in 2011-12 to at least 36 t.

In 2010-11, gold produced in NSW was valued at $1.3 billion.

Most current gold production in NSW comes from mines located within the Lachlan Orogen with additional production from the New England Oregen. The Lachlan Orogen has become a highly prospective region for porphyry copper-gold deposits. The prospectivity of the region has been enhanced by ongoing company exploration, the commissioning of successful mining operations and the wealth of information provided by the NSW Government exploration initiatives.

Major NSW gold mines operating during 2010-11 are as follows.

<table>
<thead>
<tr>
<th>Mine</th>
<th>Location</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cadia Valley Operations - Cadia Hill</td>
<td>23 km SW Orange</td>
<td>Newcrest Mining Ltd</td>
</tr>
<tr>
<td>Cadia Valley Operations - Ridgeway</td>
<td>3 km NW of Cadia Hill</td>
<td>Newcrest Mining Ltd</td>
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<tr>
<td>Cowal</td>
<td>37 km N of West Wyalong</td>
<td>Barrick Gold of Australia Ltd</td>
</tr>
<tr>
<td>Mineral Hill</td>
<td>65 km NNW Condobolin</td>
<td>KBL Mining Ltd</td>
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</tbody>
</table>
Over the next few years NSW is expected to account for an expanding share of Australia’s gold production due to the development of large scale gold mines and expansions of existing mines. Significant production comes from the Cadia Valley Operations (Cadia Hill open cut mine and Ridgeway underground mine) near Orange, Northparkes mine near Parkes, Cowal gold mines near West Wyalong and the Peak gold mine at Cobar.

NSW gold producers have implemented measures to reduce their operating costs in recent years. Productivity improvements have been advanced through the employment of the latest technology, equipment and mining methods.

Cadia Hill and Ridgeway (Cadia Valley Operations) are world-class mines utilising the latest mining equipment to achieve economies of scale and cost savings in the critical areas of ore extraction, haulage and crushing. For the financial year ending June 2012, 473,195 oz of gold was produced.

Barrick Gold’s Cowal mine is located in Central NSW, approximately 32 km north of West Wyalong. Cowal is an open pit operation, mined by a fleet of dump trucks, excavators and ancillary equipment. In 2011, Cowal produced 269,000 oz of gold. Proven and probable mineral reserves as of 31 December 2011 was 2.2 million ounces (MOZ) of gold.

The Northparkes mine current operations are from the Endeavour (E26) underground mine.

Peak Gold Mine’s New Cobar underground mine produced 85,407 oz of gold in 2011. The Peak operation consists of five producing gold and copper deposits that are being mined from underground to provide mill feed to a central gold/copper processing plant. The ore bodies currently being mined by Peak Gold Mines are Peak, New Occidental, New Cobar, Perseverance and Chesney.

Polymetals Mining Services Pty Ltd re-opened the Mount Boppy Mine at Cobar in 2002, establishing open cut operations over the historic underground mine. Between 2002 and the mine closure in 2005, the operations produced approximately 68 koz of gold from 500,000 t of ore with an average grade of 5.29 grams per tonne (g/t) of gold (4.2 g/t of gold recovered). The site is currently under care and maintenance. Polymetals plans to add to the mining inventory of 560,000 t at 5.14 g/t of gold by delineating additional high-grade ore sources prior to re-commencing mining. Plant and infrastructure on care and maintenance means there can be a short lead time to production.

A comprehensive listing of Sydney based gold merchants involved in the refining and trading of gold bullion, gold coins and nuggets and other precious metals can be found in the Sydney Yellow Pages under the section ‘Gold Buyers &/or Refiners’ and ‘Gold and Silver Merchants’.
CBH Resources Ltd
Level 4
100 Mount Street
NORTH SYDNEY NSW 2060

PO Box 1967
NORTH SYDNEY NSW 2059

Tel:   (02) 9925 8100
Fax:   (02) 9925 8111

www.cbhresources.com.au
office@cbhresources.com.au

Mine Site
CBH Resources Ltd - Mineral Hill
Mineral Hill
BOONA MOUNT NSW 2877

Phone:  (02) 6893 7219
Fax:     (02) 6893 7268

Barrick Gold of Australia Ltd
Level 10, 2 Mill Street
PERTH WA 6000

Locked Bag 12,
CLOISTERS SQUARE WA 6850

Phone:  (08) 9212 5777
Fax:     (08) 9322 5700

www.barrick.com

Mine Site
Barrick Gold of Australia Ltd - Cowal
PO Box 210
West Wyalong, NSW 2671

Phone:  (02) 6975 4700
Fax:     (02) 6975 4740

Newcrest Mining Ltd
Cadia Valley Operations
9th Floor,
600 Street Kilda Road
MELBOURNE VIC 3004

Phone:  (03) 9522 5333
Fax:     (03) 9525 2996

corporateaffairs@newcrest.com.au
www.newcrest.com.au

Mine Site
Cadia Holdings Pty Ltd
1460 Cadia Road
c/- Post Office
SOUTH ORANGE NSW 2800

Phone:  (02) 6392 2300
Fax:     (02) 6366 4333
newcrest@newcrest.com.au

Straits Resources Ltd
Level 1, 35 Ventnor Avenue
WEST PERTH WA 6005

Phone:  (08) 9480 0500
Freecall: 1800 672 208
Fax:     (08) 9480 0520

info@straits.com.au
www.straits.com.au

Mine Site
Tritton Resources Ltd
Yarrandale Road
HERMIDALE NSW 2831

Phone:  (02) 6838 1100
Fax:     (02) 6838 1101
LEAD and ZINC

Zinc is the 23rd most abundant element in the Earth’s crust and the 4th most common metal in use after iron, aluminium and copper. The construction, transport and appliance manufacturing industries use large amounts of zinc, mainly as anti-corrosion coatings (galvanizing) on sheet steel, steel beams, vehicle panels, chain-link fencing, guard rails and light posts. World-wide, around 4 (Mt) of zinc is used annually to protect around 100 Mt of steel, representing almost half of the world’s total consumption of zinc. The widespread use of zinc as a protective coating is due mainly to its resistance to normal weathering. This is an electrochemical reaction known as galvanic action. Zinc is more reactive than iron or steel and consequently attracts almost all local oxidation. A protective surface layer of oxide and carbonate forms as the zinc corrodes. Zinc is used also in brass (almost 20% zinc), alloys (16%) such as for die cast precision components, pigments, salts, as oxide additives to rubber and for agricultural chemicals as well as for wrought or rolled products.
The widespread occurrence of lead, its relatively simple extraction and a combination of desirable properties have made it useful to humans since at least 5000 BC. In deposits mined today, lead, mainly in the form of galena (PbS), is usually associated with zinc, silver and sometimes copper and is extracted as a co-product of those metals. The largest use is in batteries for vehicles, which accounts for 80% of modern lead usage. The remaining 20% of applications include underwater cable sheathing, solder, casting alloys, chemical compounds, ammunition, glassware and radiation protection. Uses for lead could increase in the future in large storage batteries used for load-levelling of electrical power and in electric vehicles. The growing popularity of electric bikes, particularly in China, has led to the e-bike now consuming more than 8% of world lead production. More than half of the lead currently used is from recycling rather than from mining. Lead recycling plants jointly owned by Nyrstar NV and the Sims Group are in Melbourne, Victoria and in Sydney, New South Wales. Nyrstar NV’s Port Pirie smelter in South Australia is the world’s largest primary lead smelting facility and a leading global silver producer.

In 2010-11, NSW lead production was 77,000 t and zinc production was 102,000 t. The production of zinc and lead in NSW has stabilised since declining in previous years largely due to a fall in production cut backs at key operations due to declining prices.

In 2010-11, NSW lead production was valued at $184 million and NSW zinc production was valued at $239 million.

In 2010 Perilya Limited increased ore production from their Southern Operations at Broken Hill, treating a total of 1.64 Mt, compared with 1.4 Mt in 2009. However, the processing of lower grade ore resulted in decreased production of metal-in-concentrate. Relative to 2009, zinc production, at 63.6 kt, and lead production, at 51.2 kt, each decreased 10%. Silver production was 44.7 t, down from 56 t in 2009. In December Perilya reported an 18% increase in ore reserves for its Southern Operation to 15.26 Mt at 5.3% Zn, 4.0% Pb and 42 g/t Ag and a 13% increase in total mineral resources to 23.7 Mt at 9.4% Zn, 7.3% Pb and 89 g/t Ag. These reserves provide for at least 10 years of production at the Southern Operations. Perilya’s three other developments, North Mine, North Mine Deeps and the Potosi project remained on care and maintenance throughout 2010.

CBH Resources Ltd’s Rasp Mine at Broken Hill received development approval from the New South Wales Department of Planning & Infrastructure in January 2011 and construction was completed on schedule in April 2012. Steady state production is expected to be achieved by Q3 2012 and annual production is planned to average 34,000 t of zinc metal in concentrate, 28,000 t of lead metal in concentrate, and 1 million oz of silver in the lead concentrate. Rasp Mine employs 160 people and will have a mine life in excess of 15 years.

The Endeavor Mine near Cobar in NSW is an underground mine that commenced operation in 1983 and was acquired by CBH Resources Limited in 2003. The mine is currently working to an operating plan of 720,000 tpa to produce approximately 85,000 t of zinc metal in concentrate and 50,000 t of lead metal in concentrate.
Other lead/zinc/silver projects in NSW in early stages of development include Argent Mineral's Kempfield project and Kingsgate Consolidated’s Bowdens project, which are the subject of feasibility studies due in 2012. At Kempfield, oxide/mixed and sulphide resources of 5.8 Mt grading 58 g/t Ag and 0.1 g/t Au and 14.4 Mt grading 49 g/t Ag, 0.1 g/t Au, 1.2% Zn and 0.6% Pb, respectively. In addition, the deposit contains large amounts of barite. At Bowdens, a total resource of 58.2 Mt grading 52.9 g/t Ag, 0.40% Zn and 0.30% Pb has been defined.

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Fax: (02) 6830 2557
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BROKEN HILL NSW 2880

Phone: (08) 8088 8582
Fax: (08) 8088 8664
perilya@wt.com.au

HydroMet Operations (Southern) Pty Ltd produces a range of base metal chemicals, including lead, tin, iron and zinc. The company produces zinc sulphate for the agriculture and fertiliser industries at its Unanderra plant.

HydroMet Operations (Southern) Pty Ltd
PO Box 42
UNANDERRA NSW 2526

Phone: (02) 4271 1822
Fax: (02) 4271 6151
office@hydromet.com.au
www.hydromet.com.au
**NICKEL and COBALT**

More than 80% of nickel production is used in alloys. When alloyed with other elements, nickel imparts toughness, strength, resistance to corrosion and various electrical, magnetic and heat resistant properties. About 65% of world nickel output is consumed in the manufacture of stainless steel, which is used widely in the chemical industry, motor vehicles, the construction industry and in consumer products such as sinks, cooking utensils, cutlery and white-goods.

Cobalt is found in various ores, and is used in the preparation of magnetic, wear-resistant, and high-strength alloys. Its compounds are used in the production of inks, paints, and varnishes.

Cobalt is usually not mined alone, and tends to be produced as a by-product of nickel and copper mining activities.

In the medium term, NSW could become a producer of nickel-cobalt. The Syerston nickel project was purchased by Ivanplats Syerston Pty Ltd in July 2004. The progression of the project is awaiting improvements in the Nickel market. If development proceeds, Syerston will be the first nickel project to be developed in NSW, producing around 53,000 tpa of mixed sulphide precipitate for the proposed 30 year lifespan of the mine.

Jervois Mining Limited is continuing to carry out metallurgical test work on its nickel/cobalt/iron laterite projects at both Young and Nyngan in NSW. In addition, a drilling program for its Syerston project is being undertaken.

The new projects explore laterite ores (oxides) which are cheaper to mine enabled by new technologies including high temperature & pressure acid leaching, ion exchange and electrowinning to produce a 99.8% nickel at the one site. Not only using cheaper ores, the laterite ores contain cobalt which is about eight-times more valuable than nickel (up to 40% of the value of total production).

Zinc concentrates produced from the Broken Hill mine (see "Lead and Zinc" section) contain small but economically significant amounts of cobalt. It is estimated that about 20 t of cobalt per annum is available as an unprocessed commodity contained in zinc concentrates.

**Ivanplats Syerston Pty Ltd**  
Level 3,  
231 Adelaide Terrace  
PERTH WA 6000  
Phone: (08) 9221 4700  
Fax: (08) 9221 8946

**Jervois Mining Limited**  
Level 2, Suite 12  
10 Jamieson St  
Cheltenham VIC 3192  
Phone: (03) 9583 0637  
Fax: (03) 9583 0698  
admin@jervoismining.com.au  
www.jervoismining.com.au
SILVER

Silver has long been valued as a precious metal, and it is used as an investment, to make ornaments, jewellery, high-value tableware, utensils (hence the term silverware), and currency coins. Today, silver metal is also used in electrical contacts and conductors, in mirrors and in catalysis of chemical reactions. Its compounds are used in photographic film, and dilute silver nitrate solutions and other silver compounds are used as disinfectants and micro biocides.

Most of NSW silver production occurs as a by-product of the mining of other metals, particularly the base-metals lead and zinc. In 2010-11 NSW silver production was 73,000 t, steady at the previous years production.

NSW silver production in 2010-11 was valued at $51 million.

Perilya Limited through its exploration program and since a resizing in 2008, their Broken Hill operation has significantly improved its productivity, profitability and cashflow. Current reserves from June 2011 indicate at least a further 10 year mine life.

CBH Resources Limited’s Rasp Mine at Broken Hill received development approval from the New South Wales Department of Planning in January 2011 and construction was completed on schedule in April 2012. Steady state production is expected to be achieved by late 2012 and annual production is planned to average 34,000 t of zinc metal in concentrate, 28,000 t of lead metal in concentrate, and 1 million ounces of silver in the lead concentrate. Rasp Mine employs 160 people and will have a mine life in excess of 15 years.

TriAusMin Ltd recently completed a conceptual scoping study for a possible underground gold, silver and base metal mining operation at its Lewis Ponds project near Orange. A potential mine life of six years at a production rate of 400 000 tpa is estimated. The Company will progress the project when development is achieved at their Woodlawn project. Meanwhile, exploration will continue in an effort to add to the current resources of the project.

TriAusMin’s Woodlawn Project is a high grade zinc, lead, and copper deposit containing by-product gold and silver and is located 250 km south-west of Sydney. Two principle projects of Woodlawn Project are the Woodlawn Retreatment Project (WRP) and the Woodlawn Underground Project (WUP). The WRP contains reserves of 11.2 Mt in tailings material left over from historic mining at the former Woodlawn Mine. The WRP involves reprocessing these tailings to produce separate zinc, lead and copper concentrates that contain gold and silver by-product with a mine life of 7.5 years. The WRP is near-development with final NSW State regulatory project approvals expected during 2012. The WRP is scheduled to commence production in early 2014 with an initial construction phase scheduled to start late 2012.

Cobar Consolidated Resources Limited began work on the Wonawinta silver project in 2008. After completing a target mineralisation estimate of 20 MOZ of silver early in 2008, the Company undertook two campaigns of resource definition drilling to establish an inferred resource estimate of 31 MOZ of silver. The Company has estimated an inferred and indicated resource of 53 MOZ of silver, based on a cut-off grade of 22 g/t, including a probable ore reserve of 26 MOZ of silver. The project is fully funded and fully permitted and started commissioning in March 2012.
Exploration has identified a number of silver-rich ore bodies that are being considered for development in NSW. These prospects include: Bowdens, Conrad, Gundaroo, and Drake. If these prospects prove to be commercial, Bowdens could support a moderate to large sized mine, while results at the others are suggestive of resource bases that may be sufficient to support moderate to small mines.

A comprehensive listing of Sydney-based silver merchants involved in the refining and trading of silver bullion can be found in the Sydney Yellow Pages under the section ‘Gold and Silver Merchants’.

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admin@ccrlimited.com.au
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Polymetals Mining Services Pty Ltd
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**Rio Tinto**
Level 33, 120 Collins Street
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Phone: (03) 9283 3333
Fax: (03) 9283 3707

www.riotinto.com/contactus.asp
www.riotinto.com

**Straits Resources Ltd**
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Fax: (08) 9480 0520

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**Glencore Australia Pty Ltd**
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www.glencore.com

**Goldcorp Inc**
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VANCOUVER CANADA BC V6C 2X8

Phone: 1 (604) 696-3000
Fax: 1 (604) 696-3001
info@goldcorp.com
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**Mine Site**

**Cobac Management Pty Ltd**
CSA Mine
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COBAR NSW 2835

Phone: (02) 6836 5100
Fax: (02) 6836 2746

administration@cmpl.com.au
www.cmpl.com.au

**Peak Gold Mines**

PO Box 328
COBAR NSW 2835

Phone: (02) 6830 2213
Fax: (02) 6836 2999
URANIUM

Major uses for uranium are as fuel in nuclear power reactors for electricity generation, in the manufacture of radioisotopes for medical applications and in nuclear science research using neutron fluxes.

Most of Australia’s known uranium resources are in South Australia, the Northern Territory and Western Australia. Australia has the world’s largest reasonably assured resources of uranium and is currently the world’s third largest producer of uranium after Kazakhstan and Canada.

Uranium exploration and mining have been prohibited in New South Wales since 1986. Since that time, however, there have been significant improvements in the management and regulation of exploration activities.

Most recently, changes in nationally endorsed safety and environmental regulation provide greater protection to workers on exploration sites and ensure high standards of environmental management.

Uranium exploration poses no greater risks than exploration for other minerals where naturally occurring radioactive elements may be present.

As a result, the NSW Government passed the Mining Legislation Amendment (Uranium Exploration) Act 2012 No 16 on 4 April 2012. This Act removes the ban on uranium exploration to help gain an understanding of what resources may exist in the State.

The Act defines uranium to include uranium minerals and uranium ores. The ban on uranium mining remains in place.

Enquiries should be made to the following Mineral Resources offices:

**Maitland**
516 High Street
MAITLAND NSW 2320
PO Box 344
Hunter Region Mail Centre NSW 2310
Phone: 1300 736 122
Fax: (02) 4931 6776 Att: Titles Unit.

**Orange**
161 Kite Street
ORANGE NSW 2800
Locked Bag 21
ORANGE NSW 2800
Phone: (02) 6360 5333
Fax: (02) 6360 5363 Att: Titles Unit
CONSTRUCTION MATERIALS

Only the top 50 construction material (gravels, crushed stone, and sand) producers were included in this document because of the large number of operations and the close links between production and domestic markets. For more information on major sources and producers of these materials please contact:

NSW Trade & Investment
Resource & Energy
Geological Survey
Phone: (02) 4931 6666
Fax: (02) 4931 6700
Web: www.resources.nsw.gov.au/

Top 50 Construction Material Producers

<table>
<thead>
<tr>
<th>COMPANY NAME</th>
<th>QUARRY NAME</th>
<th>PHONE CONTACT</th>
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<tr>
<td>Hanson Construction Materials Pty Ltd</td>
<td>Bass Point</td>
<td>02 4295 1352</td>
<td>Coarse aggregate - latite</td>
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<tr>
<td>Boral Resources (NSW) Pty Ltd</td>
<td>Dunmore</td>
<td>02 4232 2002</td>
<td>Coarse aggregate - latite</td>
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<tr>
<td>Hanson Construction Materials Pty Ltd</td>
<td>Kulnura</td>
<td>02 4376 1288</td>
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<td>Boral Resources (NSW) Pty Ltd</td>
<td>Penrith Lakes Scheme</td>
<td>02 6768 7080</td>
<td>Construction sand, gravel</td>
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<tr>
<td>Rinker Australia Pty Ltd</td>
<td>Albion Park</td>
<td>02 4256 7222</td>
<td>Coarse aggregate - latite</td>
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<tr>
<td>Rocla Quarry Products</td>
<td>Kurnell</td>
<td>02 9668 8259</td>
<td>Construction sand</td>
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<tr>
<td>Rinker Australia Pty Ltd</td>
<td>Queanbeyan</td>
<td>02 6297 2211</td>
<td>Coarse aggregate - granite, dacite</td>
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<tr>
<td>Railcorp</td>
<td>Bombo</td>
<td>02 4232 1142</td>
<td>Coarse aggregate - latite</td>
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<td>Boral Resources (Country) Pty Ltd</td>
<td>Seaham Hill</td>
<td>02 4987 2303</td>
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<tr>
<td>Railcorp</td>
<td>Martins Creek</td>
<td>02 4938 5540</td>
<td>Coarse aggregate - andesite</td>
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<td>Metromix Pty Ltd</td>
<td>Teralba</td>
<td>02 4950 6640</td>
<td>Coarse aggregate - conglomerate</td>
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<tr>
<td>Lismore City Council</td>
<td>Blakebrook</td>
<td>02 6629 3236</td>
<td>Coarse aggregate - gravel</td>
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<tr>
<td>Penrith Lakes Development Corporation</td>
<td>Penrith Lakes Scheme</td>
<td>02 4729 0044</td>
<td>Construction sand, gravel</td>
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<tr>
<td>Hanson Construction Materials Pty Ltd</td>
<td>Brandy Hill, Seaham</td>
<td>02 4988 6166</td>
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<td>Sita Australia</td>
<td>Kemps Creek</td>
<td>02 4774 8866</td>
<td>Unprocessed construction materials - shale</td>
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<td>Boral Resources (Vic) Pty Ltd</td>
<td>Culcaim</td>
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<tr>
<td>Rinker Australia Pty Ltd</td>
<td>Penrith Lakes Scheme</td>
<td>02 4730 5246</td>
<td>Construction sand, gravel</td>
</tr>
<tr>
<td>Cleary Bros (Bombo) Pty Ltd</td>
<td>Albion Park</td>
<td>02 4256 5566</td>
<td>Coarse aggregate - latite</td>
</tr>
<tr>
<td>Rinker Australia Pty Ltd</td>
<td>North Boambee</td>
<td>02 6656 8666</td>
<td>Coarse aggregates - argilite</td>
</tr>
<tr>
<td>Company</td>
<td>Location</td>
<td>Contact No</td>
<td>Description</td>
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<td>Austral Brick Company Pty Ltd</td>
<td>Horsley Park</td>
<td>02 9830 7700</td>
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<tr>
<td>Boral Resources (NSW) Pty Ltd</td>
<td>Peats Ridge</td>
<td>02 9220 6300</td>
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</tr>
<tr>
<td>Boral Resources (NSW) Pty Ltd</td>
<td>Prospect, Greystanes</td>
<td>02 9631 2499</td>
<td>Coarse aggregate - dolerite, picrite</td>
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<td>Brantag Pty Ltd</td>
<td>Lavis Lane, Williamburg</td>
<td>02 4969 8511</td>
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<tr>
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<td>Syl's Quarry, Tabbimobile</td>
<td>02 6682 2667</td>
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<td>02 4566 8348</td>
<td>Construction sand</td>
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<tr>
<td>Boral Resources (Country) Pty Ltd</td>
<td>Cobar Road, Byrock, Coramba Road, Coffs</td>
<td>02 6875 7355</td>
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<tr>
<td>Jung Quarries</td>
<td>Harbour</td>
<td>02 6652 7355</td>
<td>Coarse aggregate - metasediments</td>
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<td>Hunter Quarries Pty Ltd</td>
<td>Karuah</td>
<td>02 4997 5966</td>
<td>Coarse aggregate - andesite</td>
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<tr>
<td>Gradex Civil Contractors</td>
<td>Lennox Head</td>
<td>02 6674 2291</td>
<td>Construction sand</td>
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<tr>
<td>PF Formation Pty Ltd</td>
<td>Wisemans Ferry Rd, Maroota</td>
<td>02 4566 8308</td>
<td>Construction sand</td>
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<tr>
<td>Reedy Creek Quarries</td>
<td>Tumbulgum</td>
<td>02 6676 6131</td>
<td>Coarse aggregate - siliceous shale</td>
</tr>
<tr>
<td>Boral Resources (Country) Pty Ltd</td>
<td>Johns River</td>
<td>02 6556 5033</td>
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<td>Calga Sands (Rocla Quarry Products)</td>
<td>Calga</td>
<td>02 4375 1151</td>
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<td>Action Sands Pty Ltd</td>
<td>Chinderah, Kingscliff</td>
<td>02 6674 3643</td>
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<td>Boral Resources (Country) Pty Ltd</td>
<td>Stockton</td>
<td>02 4920 1406</td>
<td>Sand</td>
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<td>Hanson Construction Materials Pty Ltd</td>
<td>Somersby</td>
<td>02 4372 1238</td>
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<td>02 6355 2640</td>
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<td>Hanson Construction Materials Pty Ltd</td>
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<td>02 6672 4003</td>
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<td>Brush</td>
<td>02 6554 3169</td>
<td>Coarse aggregate - greywacke</td>
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<td>Hurd Haulage Pty Ltd</td>
<td>Cooperabung</td>
<td>02 6585 0999</td>
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<td>Rinker Australia Pty Ltd</td>
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<td>02 6285 5305</td>
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<td>Daracon Group</td>
<td>Stockington</td>
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<td>Coarse aggregate - ridge gravel</td>
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<td>Holmes Pty Ltd</td>
<td>Clovass Quarry, Casino</td>
<td>02 6663 1441</td>
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<td>Teven</td>
<td>02 6687 8566</td>
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<td>Teven Quarry</td>
<td>02 6687 8360</td>
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<td>Badgerys Creek</td>
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<td>SCEResources</td>
<td>Hebden</td>
<td>02 6576 1640</td>
<td>Coarse aggregate - andesitic ignimbrite</td>
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<td>Newman Quarrying Pty Ltd</td>
<td>Woodburn</td>
<td>02 6682 2667</td>
<td>Aggregates - gravel, rock, sand, sandstone, soil</td>
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<td>Pacific Blue Metal Pty Ltd</td>
<td>Possum Brush, Nabiac</td>
<td>02 6554 3206</td>
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INDUSTRIAL MINERALS AND PRODUCTS

Industrial minerals are a diverse set of mostly non-metallic mineral commodities that have a wide range of uses. NSW is a major producer of industrial minerals and products for domestic and export markets, with numerous deposits throughout the state. The total benefits accruing from the industrial minerals industry include production of many value added downstream materials such as bricks, cement, glass, ceramics and refractories.

In 2007 the Geological Survey of New South Wales completed a comprehensive review of the occurrence of, and potential for, industrial minerals in NSW. The review entitled *Industrial Mineral Opportunities in New South Wales* is aimed at encouraging further exploration and development of industrial minerals and is available for purchase from NSW Trade & Investment.

The following includes the minerals that (either before or after processing) have properties that service diverse technical applications or meet relatively exacting standards. Thus, glass-making sand has been included since it has more critical specifications than construction sand.

The processing of various industrial minerals may give increased product diversity; hence, only an indicative range of mineral properties is given.

Major producers of cement, ceramic products and refractory products in NSW are also listed. A more comprehensive listing for these commodities for the Sydney region is given in the Sydney *Yellow Pages telephone directory*.

BARITE and BERYL

Barite or baryte (BaSO₄) is a soft, inert mineral with a high density. It is used primarily as a weighting agent in oil drilling muds, as a filler and extender in paint and plastics, as a flux in glassmaking and as source material for barium chemicals.

The main prospective zone for volcanogenic base metal related barite in NSW occurs in Late Silurian felsic volcanics between the Kempfield area in the north and the Captains Flat area in the south. Recent regional geological mapping in the Goulburn 1:250,000 map sheet has significantly increased the extent of prospective rocks in this zone.

The Kempfield barite deposit, about 30 km south of Blayney, which is associated with silver, lead and zinc mineralisation is undergoing intensive exploration work by Argent Mineral Limited. The size of the barite resource at Kempfield is over 2 Mt of barite.

Industrial grade beryl (Be₃Al₂Si₆O₁₈) is used as a feedstock for beryllium metal, alloys and oxide, all of which have many high-tech applications particularly in the nuclear, electronic and ceramic industries. Small quantities of beryl are produced as a by-product of feldspar mining at Broken Hill.
CALCIUM CARBONATE POWDERS

Typical applications for the use of calcium carbonate powders include fillers and extenders in paint, rubber and plastics, animal feed supplementation, abrasive blasting, coal mining applications, agriculture, welding, chemical neutralisation, paper filling, propellants and synthetic marble.

Omya Australia Pty Ltd and Sibelco Australia Ltd produce a wide range of high-quality, finely ground calcium carbonate (CaCO₃) products from limestone deposits in NSW. Omya operates two plants in NSW at Bathurst and Moss Vale. Some of the products are characterised by extremely fine particle sizes and a high degree of brightness.

Sibelco prides itself on its capabilities in operations management, process engineering and research and development. They use innovative methods and sophisticated equipment to respond to increasingly stringent material specifications.
CEMENT

About 50% of NSW limestone production is used in the manufacture of cement. Cement grade limestone should contain more than 95% CaCO_3_, less than 3% MgCO_3_ and be free of sulphides and phosphates. Approximately 1.5 t of limestone are required to make 1.0 t of cement.

While Australia is a relatively small market by world standards it has a good supply of raw materials for cement manufacturing. The industry has invested and worked to remain globally competitive by modernising plants and opening cement standards to the use of supplementary cementitious materials in concrete and mineral additions in cement. These actions also reduce production costs. However, the industry has been constrained due to imported product.

In NSW, limestone for cement is mined by Blue Circle Southern Cement Ltd at South Marulan.

Blue Circle Southern Cement Ltd’s quarry at South Marulan is the largest limestone quarry in Australia. Reserves at Marulan are estimated to be between 200 and 300 Mt of predominantly high grade limestone containing more than 95% calcium carbonate. Annual production is about 3 Mt. About 50% of the production is railed to the BCSC cement works at Berrima.

Silica sand for use in cement manufacture is produced from a deposit of weathered (friable) sandstone near Penrose, in the Southern Highlands, for the Blue Circle Southern Cement works at Berrima.

Cement Australia Ltd
Level 2,
40 McDougall Street,
MILTON, QLD 4064

PO Box 1328,
MILTON, QLD 4064

Boral Ltd
Level 39, AMP Centre
50 Bridge Street
SYDNEY NSW 2000

Phone: (02) 9220 6300
Fax: (02) 9233 6605

Sibelco Australia – Attunga
Garthowen Road
ATTUNGA NSW 2345

PO Box 180
ATTUNGA NSW 2345

Phone: (02) 6769 5501
Fax: (02) 6769 5707

nsw.limesales@sibelco.com.au
CLAY PRODUCTS

There are three types of clays mined in NSW, structural clays and cement clay shale; kaolin and refractory clays; and bentonite clay. In 2010–11 NSW produced around 1.1 Mt of clay with an estimated value of about $9.8 million.

Structural Clays and Cement Clay/Shale

Structural clays are the major clay type mined in the state, making up around 97% of total clay production in 2010–11. Structural clays are used in the manufacture of building products such as bricks, pavers, terra cotta roofing tiles and pipes. The Sydney region, which is the major market for structural clay products, is the source of about 80% of the NSW total output as there are now very few country brickworks in operation. Clay/shale is also extracted from several sites within the state for use as a source of alumina in the manufacture of cement.

In 2010–11, the total recorded production of structural and cement clays in NSW was around 1 Mt, valued at around $5.2 million. Significant quantities of structural clay/shale, estimated at up to an additional 0.5 Mtpa, may be obtained from excavations for major building and construction projections. Most structural clay/shale is used for making bricks and pavers, with less than 5% used to make roofing tiles.

Demand for structural clay products is dependent on the level of activity in the building industry, particularly the housing sector. Demand is currently depressed due to the downturn in housing construction which has led to cutbacks in brick production and the closure of some plants. However, construction activity in NSW is expected to grow significantly in the coming decade due to a strong immigration and a growing population continuing to drive demand for housing, infrastructure, retail premises and commercial buildings.

Kaolin and Refractory Clays

Kaolin is used in its raw state as a filler and coater in paper, and as a filler and extender in rubber, paints, and plastics. Calcined (fired) kaolin is used to make ceramic whitewares, pottery, ceramic tiles, insulators and refractories.

The Coorabin/Oaklands area is currently the major source of high quality kaolin in NSW. Other sources of kaolin are Swan Bay, Gulgong, Ulan, and Barraba. Over 8 300 t of kaolin valued at almost $0.5 million, was produced in NSW in 2010–11.
Demand for kaolin in NSW is sensitive to fluctuations in the building and refractory industries, which provide the major markets. Reduced ceramics and refractories production have contributed to a decrease in kaolin production in recent years. The National Ceramics Industries Australia Pty Ltd plant at Rutherford, near Maitland, uses kaolin clay obtained during coal mining by the Westside coal mine, which is near Lake Macquarie.

There is good potential for the development of known resources and for the discovery of additional deposits. However, as yet, no known or potential resources of paper-coating grade kaolin have been identified.

**Bentonite**

Bentonite (including fuller's earth) is used mainly as a viscosity and filtration control agent in water-based drilling muds, as a bonding agent in foundry sands, to pelletise iron ore and stockfeeds, as a sealant in dams and irrigation channels and in other civil engineering applications.

Bentonite is mined at two locations in NSW. Total production for 2010–11 was about 22,000 t with a value of about $4 million. At Cressfield, near Scone in the upper Hunter Valley, calcium-magnesium bentonite is mined by Sibelco Australia Ltd. Bentonite from the Cressfield mine is transported to Sydney for additional processing. The major uses are in the foundry industry, construction/civil engineering applications and for waste water treatment.

A large deposit of sodium-magnesium bentonite, located 80 km north-east of Mildura, is being mined by Arumpo Bentonite Pty Ltd. This resource exceeds 70 Mt of sodium-magnesium bentonite. Production is marketed primarily for use in cat litter and as a stock food additive. Bentonite also has potential for use in sealing irrigation canals and a range of engineering and other applications.

NSW has substantial resources of bentonite and there is good potential for additional discoveries, mainly near Scone and in the southern part of the Murray Basin.

**Austral Brick Co Pty Ltd**

Wallgrove Road  
HORSLEY PARK NSW 2164

Phone: (02) 9830 7777  
Fax: (02) 9831 3771

infonsw@australbricks.com.au  
www.australbrick.com.au

**CSR Ltd**

Lot 21 Townson Road  
SCHOFIELDS NSW 2762

Sales Enquiries: 13 15 79  
www.csr.com.au
ADVANCED CERAMIC MATERIALS

Advances in knowledge about the chemical, mineralogical and physical properties of other materials such as zircon and ceramic grade alumina are responsible for the development of a range of advanced ceramic materials. These materials possess a low specific gravity, low coefficient of thermal expansion, extreme hardness and are highly resistant to corrosion. They are finding increasing use in specialised wear resistant, abrasive and insulation applications.

Major NSW suppliers of advanced ceramic materials and products are:
DIATOMITE

Diatomite is a soft, chalk-like, sedimentary rock composed of the fossilised remains of microscopic aquatic plants known as diatoms. Diatomite, also known as diatomaceous earth, is highly absorbent and chemically inert.

Due to the ability of diatomite to absorb its own weight in liquid, its major use in Australia is for pet litter absorbent. Industrial uses are mainly as a filtering aid, especially for dry-cleaning fluids, beverages, sugar, oils, hydrocarbon fuels, and chemicals and in filters for water supplies and swimming pools. Diatomite is also used as a general absorbent for oil and chemical spills and as a soil conditioner (due to its trace element content).

The Kyooma Mine near Barraba is the state’s only diatomite producer and also Australia’s largest. In 2008-09 the mine produced 246 t of diatomite.

The raw material is processed on site and sold for use mainly as pet litter and for industrial and agricultural purposes. It is crushed and separated from impurities by suspension in hot air blowers. About 90% of the milled product is calcined at 1 000°C to fuse the finer particles and remove volatiles, as this increases its absorptive properties. It is noteworthy that Supersorb Environmental NL (former operator of the

K C Industries Pty Ltd
402 Liverpool Rd, CROYDON NSW 2132
PO Box 77 CROYDON NSW 2132
Phone: (02) 9797 9844
Fax: (02) 9798 8640
admin@kcindustries.com.au
www.kcindustries.com.au

Taylor Ceramic Engineering
65 Anderson Road Mortdale NSW 2223
Phone: (02) 9534 1300
Fax: (02) 9534 6504
sales@taylorceramicengineering.com
info@taylorceramicengineering.com

National Ceramics Industries Australia Pty Ltd
175 Racecourse Rd RUTHERFORD NSW 2320
Phone: (02) 4931 8400
sales@ncia.com.au
www.nationalceramicindustries.com.au
mine) developed a new processing method to enable NSW diatomite to be made suitable for use in food processing.

The potential for developing new commercially viable diatomite deposits in New South Wales needs to be reassessed. Deposits that in the past produced inferior quality diatomite may have potential to be upgraded with new processing methods.

**Agripower Australia Limited**

Suite 1, Level 5  
71 Macquarie Street  
SYDNEY NSW 2000

Phone:  (02) 9251 8884  
Fax:  (02) 9241 7691  
sales@agripower.com.au

**DIMENSION STONE (Granite, Sandstone, Slate)**

Dimension stone is natural stone cut to specific dimensions and valued for its beauty, texture and durability. It is used mainly for cladding on buildings; for interior and exterior features; walls; floors and paving; kitchen and bathroom fittings; and, bench tops.

Dimension stone produced in NSW is classified by the industry into four broad groups: granite, marble, sandstone and slate. In 2010–11, NSW produced over 57 300 t of dimension stone (mainly sandstone and granite) valued at an estimated $11.8 million.

Besides partially serving the domestic market, the Australian dimension stone industry exports significant quantities of processed sandstone and processed and unprocessed granite. Gosford Quarries and Nepean Quarries continue to export sandstone product due to the unique characteristics of the Hawkesbury sandstone.

Other than for sandstone, there are limited prospects for large scale dimension stone processing in NSW due to the difficulty of competing against lower cost processing of granite and marble overseas.

**Granite**

Quarries near Mulyandry (south-east of Forbes), Tocumwal, Mudgee, Cowra, and Temora produce most of the state’s granite dimension stone. A significant amount of the granite produced in NSW is exported to various countries in Europe and Asia.
Sandstone
Most of the state’s dimension sandstone comes from Triassic sandstone units in the Mt White, Somersby, Bundanoon and Kurrajong areas. The sandstone produced from these units is plain or banded, in colours ranging from white, orange, tan and brown to purple.

Slate
Almost all the local market for slate is now for decorative and paving tiles. Although this is a relatively small sector of the building industry, it has good growth potential.

Contact details for NSW major dimension stone producers/processors are:

**Australian Dimension Stone Pty Ltd**
Level 7, 66 King Street
SYDNEY NSW 2000
Phone: 0418 444 482
Activity: **Granite** block producer

**Bundanoon Sandstone Pty Ltd**
Lever Park Rd
BUNDANOOON NSW 2578
Phone: (02) 4883 6179
Fax: (02) 4883 6075
bundysandstone@bigpond.com
Activity: **Sandstone** producer and processor

**Central West Granite Supplies**
Nanima Street
EUGOWRA NSW 2806
Phone: (02) 6859 2301
Fax: (02) 6947 2657
grandeequarry@hn.ozemail.com.au
Activity: **Granite** producer and processor

**Gosford Quarries (NSW) Pty Ltd**
300 Johnston Street
ANNANDALE NSW 2038
PO Box 86
ANNANDALE NSW 2038
Phone: (02) 9810 7555
Fax: (02) 9810 1669
sales@gosfordquarries.com.au
www.gosfordquarries.com.au
Activity: **Sandstone** and **Granite** producer and processor

**Nepean Quarries**
Brownlow Hill Loop Road
Camden NSW 2570
Phone: (02) 4651 2565
Fax: (02) 4651 2539
enquiries@nepeanquarries.com.au

**Melocco Stone**
1 Booth Street
Annandale NSW 2038
Phone: (02) 9552 1414
Fax: (02) 9552 1229
www.melocco.com.au
**DOLOMITE**

Dolomite is very similar to limestone in nature, but is composed of calcium-magnesium carbonate (dolomite, CaCO$_3$.MgCO$_3$), rather than calcium carbonate (calcite, CaCO$_3$). The minerals calcite and dolomite form a continuous substitution series, resulting in rocks of all compositions between pure limestone and pure dolomite. Generally, dolomite is regarded as rock containing more than 15% MgCO$_3$.

Dolomite has many applications. In its raw state, it is used in metallurgical fluxes, fertilisers, water treatment, glass and chemical manufacture, ceramics and as filler. When calcined, it is used in the manufacture of cements, refractory bricks and as a source for magnesium chemicals.

Dolomite is produced by Mudgee Dolomite and Lime Pty Ltd, and B.W. & R.F. Murdoch Pty Ltd, near Mudgee. These deposits are the source of a range of products with diverse agricultural, industrial and mining applications. Almost 17 300 t were produced in 2010–11.
Large resources of dolomite suitable for most applications occur at Lucknow and Mount Hope, west of Rylstone. Major untested dolomite resources exist north of Broken Hill that may have potential for future mining.

**Mudgee Dolomite and Lime Pty Ltd**  
Buckaroo Lane  
MUDGEE NSW 2850

PO Box 342  
MUDGEE NSW 2850

Phone: (02) 6373 3939  
Fax: (02) 6373 3766

info@mudgeedolomitelime.com.au  
sales@mudgeedolomitelime.com.au  
www.mudgeedolomitelime.com.au

**FELDSPAR/FELDSPATHIC MATERIALS**

Feldspar and feldspathic materials are used as a source of alumina and alkalis in glass and ceramic manufacture. In glassmaking, depending on the type of feldspar used the alumina retards devitrification in the finished product, while the alkalis act as a flux.

Feldspars are principally used as a source of alumina and alkalis in glass-making and the ceramic industry. Manufacturers use sodium-rich feldspar for glass making and potassium-rich feldspar for ceramic production. Due to the availability of cheaper alternative materials many Australian consumers have changed to substitutes such as calcined alumina and soda ash for glassmaking.

NSW has potential for the discovery of large, high-grade feldspar deposits, particularly in the Broken Hill area and as a result of new studies, in the Lachlan Fold Belt. The potential for possible sources of feldspathic material varies from excellent for granitic sources to low for nepheline syenite. A large resource of granite, lithologically similar to the Oberon alaskite, occurs at Goombargana north-west of Albury.
GARNET
Garnet is used mainly as an abrasive. It is also used as a filtration medium and in non-skid surfaces. The only current source in NSW is at Triple Chance in the Broken Hill area. This operation is now owned by Sibelco Australia Ltd. In 2010–11, 33 t of garnet production was recorded.

Interest in the use of garnet as an alternative to silica and slags in the abrasive industry is increasing. There is good potential for expansion of garnet production in the Broken Hill area as well as for the discovery of resources in other parts of NSW.

GEMSTONES (Opal, Sapphire, Ruby, Diamond, Other)

Opal

NSW is the world’s principal source of high-quality black opal, with the Lightning Ridge fields accounting for almost all of this. The White Cliffs fields in the far west make a much smaller contribution to opal production.

In 2010–11, about $21.6 million of opal is estimated to have been produced in NSW. There are around 5000 mining claims in the Lightning Ridge area and 300 in the White Cliffs area.
Mining, cutting and polishing of opals is carried out by a large number of individual miners or groups of miners. Trading in opals is largely performed by individual mine operators at Lightning Ridge and White Cliffs.

The opal miners’ Association listed below can assist prospective buyers by providing contact details for its members on the opal fields. Contact details for opal traders and merchants in the metropolitan areas can be obtained via the Jewellers Association of Australia or the Sydney Yellow Pages phone directory.

<table>
<thead>
<tr>
<th>Jewellers Association of Australia</th>
<th>Lightning Ridge Miners' Association</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suite 33, Level 8, 99 York Street, SYDNEY NSW 2000</td>
<td>Lot 60 Morilla St, LIGHTNING RIDGE NSW 2834</td>
</tr>
<tr>
<td>Phone: (02) 9262 2862</td>
<td>Phone: (02) 6829 0427</td>
</tr>
<tr>
<td>Freecall: 1800 657 762</td>
<td>Freecall: (02) 6829 0830</td>
</tr>
<tr>
<td>Fax: (02) 9262 2541</td>
<td>Fax: (02) 6829 0830</td>
</tr>
<tr>
<td><a href="mailto:info@jaa.com.au">info@jaa.com.au</a></td>
<td><a href="mailto:lrma@lightningridge.net.au">lrma@lightningridge.net.au</a></td>
</tr>
</tbody>
</table>

**Sapphire and Ruby**

Most of the state’s sapphire production has been extracted from Tertiary volcanics and associated alluvial gravels in the New England region near Glen Innes and Inverell. Since 2002 due to poor market conditions all GTN Resources Ltd sapphire operations in the Kings Plains, near Inverell have been reduced to care and maintenance operations, with sales continuing from accumulated stocks.

Despite a long history of production, the New England area still has good potential for further major sapphire production. Possible new production from deposits in the valleys of the eastern feeder of Kings Plains Creek would help stem the historic decline in output.

Ruby was produced in the Barrington Tops area in the Upper Hunter Valley by Cluff Resources (now Torian Resources NL). The mine was placed on care and maintenance in March 2007.
Before the development of the Argyle deposits in Western Australia, NSW was the largest producer of diamonds of any Australian state, mostly from the New England region. Recorded production from the Copeton-Bingara area from 1872 to 1922 was 200,000 carats, but actual production may have been as high as 500,000 carats. All NSW production of diamonds has come from alluvial deposits, and source rocks have not been identified.

The subduction model for diamond genesis and emplacement in eastern Australia, developed by the Geological Survey of NSW in 1994, stimulated increased interest in diamond exploration in the state. The level of activity has declined since 1996 due largely to global factors such as general economic trends and developments in diamond marketing. However, encouraging exploration results have been achieved, especially in the New England region, near Brewarrina and White Cliffs, and in the central highlands.
Other Gemstones

Small quantities of gem quality beryl, emerald, garnet, nephrite, rhodonite, topaz and turquoise have been/are produced in NSW. For additional information on deposits of these and other gems please contact the Department's Geological Survey, (phone: (02) 4931 6666). The Jewellers Association of Australia (listed under the Opal section) may also be of assistance or the Sydney Yellow Pages phone directory.

GYPSUM

Gypsum is the major commercial form of calcium sulphate (CaSO₄·2H₂O). In its natural state, gypsum is generally associated with various impurities such as sand, clay and limestone. Much of NSW production is used locally by farmers as a soil conditioner.

In 2010–11, gypsum production in NSW was around 106,897 t, valued at about $1.8 million. The largest producer is the White Plains mine near Balranald, with other mines around Bourke, Moulamein, Manara and Goolgowi. All mines produce gypsum for soil conditioning and other agricultural and horticultural applications. Since 2003, Paxtons mine has produced high purity crystalline gypsum suitable for a range of applications in the agriculture, construction and food industries.

Distance from the large urban markets in NSW and competition from large deposits close to the coast in other states, notably South Australia, have been major constraints on growth in NSW gypsum production. Although NSW production is expected to continue to supply mainly local agricultural markets, there has recently been an increase in demand for gypsum in soil conditioning. Ongoing drought conditions had severely diminished demand for agricultural gypsum in recent years. One supplier, Balranald Gypsum, is supplying customers throughout NSW from operations in the Balranald area.

The two major NSW gypsum producers are:
HALITE/SOLAR SALT
Salt (sodium chloride, NaCl) is the most abundant source of sodium and chlorine. Salt occurs in the solid state as the mineral halite. Rock salt consists of 95% to 99% halite, the main impurity being anhydrite (CaSO4). Pure halite is a completely soluble, soft, vitreous mineral that is usually colourless or white but may be tinted red, yellow, blue or purple. Salt is an evaporative mineral and therefore occurs in association with other minerals such as gypsum, calcite and dolomite. It also occurs together with clastic sedimentary materials, such as clay or sand.

Larmon Pty Ltd has constructed a factory in Mildura for the purpose of producing gourmet pink flake salts, and high grade magnesium sulphate (Epsom salt) from the saline ground water extracted from the Buronga Salt Interception Scheme in the Murray Darling Basin.

In 2010-11 some 5950 tonnes of halite/solar salt was produced for sale.

LIMESTONE
Limestone is a sedimentary rock composed largely of calcium carbonate (CaCO3). Beside speciality calcium carbonate powders (see separate entry), limestone is mined for use in the manufacture of cement (see Cement), as a flux for local iron and steel manufacture, in the production of calcined (quick) and hydrated limes, for chemical production and for agricultural uses (including acid soil amelioration).

NSW has abundant deposits of limestone, although deposits of commercial potential are not present in the Sydney, Wollongong, and Newcastle regions because of the
lack of marine sequences in these areas. The largest deposits supply processing plants within economic haulage distance of these markets. The most important quarries are near Marulan and Wombeyan in the Southern Highlands, in the central west of NSW, (from Kandos to Mudgee and south of Bathurst) and at Attunga near Tamworth.

Recorded production of limestone in NSW in 2010–11 was around 4.3 Mt valued at about $48.6 million.

Blue Circle Southern Cement’s (BCSC) quarry at South Marulan is the largest limestone quarry in Australia. Reserves at Marulan are estimated to be around 200 Mt of predominantly high grade limestone containing more than 95% calcium carbonate. Annual production is about 3 Mt. About 50% of the production is railed to the BCSC cement works at Berrima. The Port Kembla Steelworks consumes about one-third as a flux in steel making and the remainder is sold for various uses, including agricultural lime.

The NSW cement industry, which consumes around 50% of limestone production, is dependent on developments in the housing and construction industries. Whilst housing activity has softened considerably over the past few years, non-residential construction and infrastructure sectors have continued to grow, hence cement production is expected to remain strong. A recovery in housing construction activity has been predicted and this should maintain growth within the cement industry.

Demand and prices for agricultural limestone are showing signs of recovery with improved economic conditions. There is good potential for further growth in the agricultural lime market because of the increasingly serious problem of soil acidity in eastern NSW, particularly on the south-west slopes.

The major limestone producers listed below manufacture various grades of limestone for a range of uses (besides cement production).
Boral Ltd
Level 39, AMP Centre
50 Bridge Street
SYDNEY NSW 2000
Phone: (02) 9220 6300
Fax: (02) 9233 6605
www.bluecirclesoutherncement.com.au

Mine Site
Blue Circle Southern Cement Ltd
– Marulan
Hume Street
MARULAN SOUTH NSW 2579
Phone: (02) 4820 3000
Fax: (02) 4841 1617

Sibelco Australia Ltd
Level 16
111 Pacific Highway
NORTH SYDNEY NSW 2060
Locked Bag 969
NORTH SYDNEY NSW 2059
Phone: (02) 9458 2929
Fax: (02) 9458 2900
info@unimin.com.au

Hyrock Pty Ltd
“Astrolabe”
Rutherford Lane
LITHGOW NSW 2790
Phone: (02) 63512281
Fax: (02) 63428452
Mobile 0428 625 789
www.hyrock.com.au

Omya Australia Pty Ltd
Level 2, 280 Pacific Highway
LINFIELD NSW 2070
PO Box 430
Lindfield NSW 2070
Phone: (02) 9416 6077
Fax: (02) 9416 8008
Orders: 1800 251 306
www.omya.com.au

Cement Australia Ltd
Level 2,
40 McDougall Street,
MILTON, QLD 4064
PO Box 1328,
MILTON, QLD 4064
Phone: (07) 3335 3000
Fax: (07) 3335 3227
Reception.Milton@cemaust.com.au
www.cemaust.com.au

Mudgee Dolomite and Lime Pty Ltd
Buckaroo Lane
MUDGEE NSW 2850
PO Box 342
MUDGEE NSW 2850
Phone: (02) 6373 3939
Fax: (02) 6373 3766
info@mudgeedolomitelime.com.au
sales@mudgeedolomitelime.com.au
www.mudgeedolomitelime.com.au
MAGNESITE

Magnesite (magnesium carbonate - MgCO₃) occurs as bedded sedimentary deposits, replacement deposits or alteration deposits with minor amounts of limestone, silica and iron. Commercially acceptable magnesite should contain at least 95% MgCO₃. The most important magnesite deposits in NSW are located at Thuddungra (north-west of Young). Other deposits are found at Fifield (north-west of Condobolin), Lake Cargelligo and Attunga.

Magnesite (magnesium carbonate) is marketed in three main forms:

- Crude magnesite, primarily for use in chemicals and agriculture.
- Dead-burned magnesia (magnesium oxide produced by sintering at 1,450°C), a durable refractory for use in cement, glass, steel and metallurgical industries.
- Caustic calcined magnesia (produced by calcining at temperatures between 700°C and 1,000°C for use in making oxychloride and oxysulphate cements for flooring and wallboards, mouldings and acoustic tiles, and for use in various environmental and chemical applications. Calcined magnesia is also the feedstock to produce electrofused magnesia (at temperatures of about 2,600°C in an electric arc furnace) which is used as a superior refractory material and in electrical insulation applications.

In 2010–11, NSW produced almost 25,180 t of magnesite. At Thuddungra, north-west of Young, a deposit of exceptionally high purity is mined by Causmag International. In recent years, Causmag International has expanded production and developed new markets domestically and overseas for different magnesia grades.

There is good potential for the discovery of additional resources of magnesite in the Thuddungra and Fifield areas. Exploration in the Thuddungra area has already identified two further ore bodies to the north and north-west of the currently mined deposit. The high-purity deposits at Thuddungra have the potential to produce high-grade magnesia products including electro-fused magnesia.

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Causmag International
Park Avenue
YOUNG NSW 2594

PO Box 438
YOUNG NSW 2594

Phone: (02) 6382 1177
Fax: (02) 6382 4176
causmag@causmag.com.au
www.causmag.com.au

Paton Fertilizers Pty Ltd
126 Andrews Road
PENRITH NSW 2750

PO Box 524
PENRITH NSW 2750

Phone: (02) 4729 2888
Fax: (02) 4729 2810
sales@paton.com.au
www.paton.com.au
MAGNETITE

Magnetite (magnetic iron oxide - Fe₃O₄) is valuable as an iron-bearing ore. Magnetite produced in NSW has been used exclusively by the coal processing industry. Magnetite is highly magnetic and has a high specific gravity. When finely milled, it remains suspended in water, giving a dense medium suitable for separating impurities from coal. The magnetite is easily recovered in a magnetic field.

The majority of magnetite production in NSW is from the Tallawang mine near Gulgong, owned by Sibelco Australia Ltd. About 57 300 t of magnetite was produced in 2010–11.

Carpentaria Exploration’s Hawson Iron Project has the potential to produce large tonnage of magnetite for steel production. Currently 30% of global steel production uses magnetite. Magnetite has not been commonly mined and processed in Australia. The mining and processing techniques are well known and have low technical risk. The final product can be of a high grade, clean, concentrate product that attracts a premium due to the high iron grade. The steel production from magnetite requires less energy and has a significant smaller effect on the environment than would be achieved through smelting of hematite ores.

Sibelco Australia Ltd
Level 16
111 Pacific Highway
NORTH SYDNEY NSW 2060

Locked Bag 969
NORTH SYDNEY NSW 2059

Phone: (02) 9458 2929
Fax: (02) 9458 2900

info@sibelco.com.au

Carpentaria Exploration Limited
Level 6, 345 Ann St
BRISBANE QLD 4000

PO Box 10919,
Adelaide St
BRISBANE QLD 4000

Phone: (07) 3220 2022
Fax: (07) 3220 1291

Mine Site
Sibelco Australia Ltd – Tallawang
Dunedoo Road,
GULGONG NSW 2852

Phone: (02) 6375 9667
Fax: (02) 6375 9667

MINERAL SANDS

Ilmenite & Rutile are the richest ore of the metal titanium containing at least 95% titanium dioxide (TiO₂). Ilmenite contains about 45% titanium dioxide. Much of the world’s rutile and almost all the world’s ilmenite production is used to make non-toxic white titanium dioxide pigments for paint, paper, plastics, textiles and inks. Titanium metal’s characteristics of strength, and low specific gravity, coupled with its high
melting point and resistance to corrosion, make it ideal for use in alloys for the aerospace and aviation industries, in special lightweight alloys for sporting goods, spectacle frames, and as an abrasive.

Zircon, the main ore of the metal zirconium, is a valuable refractory and is used as ceramic tile glaze, as foundry sand, in aluminium and glass furnaces, and as ladle linings in steel-making.

Monazite is the main ore of thorium and contains about 6% thorium oxide with varying amounts of rare earth elements such as cerium, lanthanum, yttrium, neodymium, and europium. The most important market for monazite is as a source of cerium dioxide (used for glass polishing powders) and other rare earth materials.

As the world’s largest producer of mineral sand, Australia supplies over 30% of world zircon production, about 50% of rutile concentrate, and more than 20% of ilmenite and weathered ilmenite (leucoxene).

Mining at Cristal Mining Australia Limited’s Ginkgo operation in the Murray Basin began in late 2005. In 2010–11 total, mineral sand production was 352,038 t.

Cristal Mining Australia Limited
Level 14, 133 Mary Street
BRISBANE QLD 4169
PO Box 15164
CITY EAST QLD 4002
Phone: (07) 3210 7900
Fax: (07) 3210 7999
info@cristalmining.com
www.cristalmining.com

Iluka Resources Ltd
Level 23 140 St Georges Terrace
PERTH WA 6000
GPO Box U1988
PERTH WA 6845
Phone: (08) 9360 4700
Fax: (08) 9360 4777
www.iluka.com

PERLITE

Perlite is a glassy volcanic rock, derived from lava formed in geologically recent times, which has cooled very quickly and then undergone hydration. Perlite generally contains between 2% and 5% water.

Industrial perlite is produced in two stages. Firstly, natural perlite is mined, beneficiated and graded near to the mine site to yield crude perlite. In the second stage, which usually takes place near to centres of consumption, perlite is rapidly heated for a short time to temperatures between 800°C and 1000°C to yield expanded perlite, a sterile, ultra lightweight aggregate.

Major uses of perlite are in hydroponic cultivation, plant propagation and cultivation, fire protection products, refractories, insulation and filtration of wine, beer and vegetable oils. There is no current production of natural perlite in NSW. However, Australian Perlite Pty Limited was incorporated in 2006 to purchase the business and
assets of the perlite and vermiculite business carried on by ORICA Australia Pty Limited at Bansksmeadow in Sydney, NSW. The company processes more than 6000 Mt of perlite per annum, for various applications including filtration of liquids, cryogenic insulation, horticulture and fire proofing.

**Australian Perlite Pty Limited**  
18-22 Mcpherson Street  
BANKSMEADOW NSW 2019

PO Box 305  
BOTANY NSW 1455

Phone: (02) 9316 0052

info@ausperl.com.au  
www.ausperl.com.au

**PYROPHYLITE and TALC**

Pyrophyllite is a hydrated aluminium silicate mineral with industrially important properties similar to those of talc. Deposits of talc, (a hydrated magnesium silicate mineral) in NSW are mostly fairly small and not of high quality. Pyrophyllite is used predominantly as a constituent in refractories and white ware ceramics, and as mineral filler.

There was no pyrophyllite production in NSW in 2010–11 and the potential for future production is uncertain. Market demand for pyrophyllite has declined with production becoming intermittent in recent years. This is the result of decreased refractory production and the use of refractory materials other than pyrophyllite in the steel-making industry.

**Mudgee Dolomite and Lime Pty Ltd**  
Buckaroo Lane  
MUDGEE NSW 2850

PO Box 342  
MUDGEE NSW 2850

Phone: (02) 6373 3939  
Fax: (02) 6373 3766

info@mudgeedolomitelime.com.au  
sales@mudgeedolomitelime.com.au  
www.mudgeedolomitelime.com.au

**REFRACTORY PRODUCTS**

Refractories are materials that are capable of withstanding high temperatures and corrosive environments without fusing or decomposing. Refractory products are used
in steel, aluminium, brick, base metal and mineral production or processing, the cement, glass making and power generation industries and in many other high temperature industrial processes.

Shinagawa Thermal Ceramics has three production centres in Australia/New Zealand (one at Unanderra) with a combined capacity of 47,000 tonnes a year.

KC Industries Pty Ltd product range includes resistor formers, Terminal Blocks, beads and spacers for electrical insulation, element supports tubes, high temperature radiants for the heating industry, metal sampling devices, milling balls, tower packing and boiler tubes for the chemical engineering industry, grinding media, stud welding ferrules, combustion boats and many other specialist applications. Goods are often produced to specifications arrived through consultation with its customers.

<table>
<thead>
<tr>
<th>Shinagawa Refractories Australasia Pty Ltd</th>
<th>KC Industries Pty Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 Glastonbury Avenue</td>
<td>402 Liverpool Rd,</td>
</tr>
<tr>
<td>UNANDERRA NSW 2526</td>
<td>CROYDON NSW 2132</td>
</tr>
<tr>
<td>Phone: (02) 4221 1700</td>
<td>P.O. Box 77</td>
</tr>
<tr>
<td>Fax: (02) 4221 1799</td>
<td>CROYDON NSW 2132</td>
</tr>
<tr>
<td><a href="mailto:sales@shinagawa.biz">sales@shinagawa.biz</a></td>
<td>Phone: (02) 9797 9844</td>
</tr>
<tr>
<td><a href="http://www.shinagawa.biz">www.shinagawa.biz</a></td>
<td>Fax: (02) 9798 8640</td>
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<td></td>
<td><a href="http://www.kcindustries.com.au">www.kcindustries.com.au</a></td>
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**SERPENTINITE**

Serpentinite is a rock composed largely of serpentine, a magnesium-rich silicate mineral associated with ultra basic igneous rocks. Its prime use in NSW is as a flux in steel-making although serpentine can also be used in agricultural applications.

Somerset Mining Pty Ltd operates the Somerset Mine near Gundagai in southern New South Wales. The Somerset Mine supplies serpentine to BlueScope Steel in Port Kembla for steel-making. The mine is the only serpentine mine in NSW.

In 2010–11, the Somerset mine produced 15 t of serpentine, down from 58,699 t in 2009-10. Its major use is as a flux in steel-making. Future production will be dependent on a continuation of the contract to supply the Port Kembla steelworks, with some material also used as aggregate.
SILICA

Silica is used in the manufacture of glass, cement, ceramics, as a foundry sand, metallurgical flux, filtration medium and in producing silicon metal, ferrosilicon and fused silica. It is also used for a range of applications in the electronics, chemical and construction industries.

Sources of silica are commonly classified as either:
- fine silica, which consists of silica sand and friable sandstone; or
- coarse silica, (also referred to as lump silica) which includes quartz, quartzite and quartz gravel.

**Fine Silica**

The main sources of fine silica in NSW are the coastal sand deposits of the Stockton Bight-Port Stephens area. Silica sand is also obtained from deposits of friable weathered sandstone.

NSW requirements for sand for use in the manufacture of colourless glass are obtained from high-purity ‘inner barrier’ dune deposits on the Tilligerry Peninsula near Tanilba Bay, Port Stephens. These resources are mined by Sibelco Australia Ltd. The main source of sand for the manufacture of amber glass and plate glass is the Salt Ash mine at Williamtown, also operated by Sibelco Australia Ltd. Sibelco Australia Ltd mines amber sand from deposits at Anna Bay. The glass manufacturing industry is the states major consumer of fine silica.

Silica sand is also used as foundry sand and in the production of cement. The ‘outer barrier’ dunes of Stockton Bight are now the states principal source of foundry sand. The main producers are Sibelco Australia Ltd, Robinson’s Anna Bay Sand, and Metromix Pty Ltd. Silica sand for use in cement manufacture is produced from a deposit of friable (weathered) sandstone near Penrose, in the Southern Highlands, for the Blue Circle Southern Cement works at Berrima.

Studies by NSW DPI identified excellent potential for producing fused silica from high-purity fine and coarse silica sources in NSW. In 2010–11, a total of about 133,103 t of fine silica was produced in NSW.
Producers listed below manufacture various silica grades for use in glassmaking or as foundry sand.

**Glassmaking Sand**

**PB White Minerals Pty Ltd**  
PO Box 935  
POTTS POINT NSW 1335  

Phone: (02) 9331 1727  
Fax: (02) 9331 2379  
whitemin@optusnet.com.au

**Sibelco Australia Ltd**  
Level 16  
111 Pacific Highway  
NORTH SYDNEY NSW 2060  

Locked Bag 969  
NORTH SYDNEY NSW 2059

Phone: (02) 9458 2929  
Fax: (02) 9458 2900  
info@sibelco.com.au

**Foundry Sand**

**Boral Ltd**  
Blue Circle Southern Cement Ltd  
Level 39, AMP Centre  
50 Bridge Street  
SYDNEY NSW 2000

Phone: (02) 9220 6300  
Fax: (02) 9233 6605  
www.bluecirclesoutherncement.com.au

**Metromix Pty Ltd**  
Level 4,  
107 Phillip Street  
PARRAMATTA NSW 2150

Phone: (02) 9849 7400  
Fax: (02) 9635 4816  
info@metromix.com.au  
www.metromix.com.au

**Quality Sand & Ceramics Pty Ltd**  
Lavis Lane  
WILLIAMTOWN NSW 2318

Phone: (02) 4965 1429  
Fax: (02) 4965 1740

**Robinson’s Anna Bay Sand**  
41 Gan Gan Rd  
ANNA BAY NSW 2316

Phone: (02) 4982 1177  
Fax: (02) 4982 2007  
admin@robinsonssand.com.au  
www.robinsonssand.com.au

**Coarse Silica**

Quartzite, quartz gravel and reef quartz deposits are the major sources of coarse silica in NSW. Quartzite is mined at Marrangaroo, near Lithgow, by Metromix Pty Ltd, for use as a flux in steelmaking and as coarse aggregate.
Near Cowra, gravel deposits composed predominantly of high purity quartz pebbles are quarried at two locations - at 'Glenella' by Glenella Aggregates Pty Ltd and at 'Mulyan' by Mittagong Sands Pty Ltd - principally for use as decorative aggregate and filtration gravels. The deposits are also suitable for specialised industrial applications.

In 2010–11, a total of about 191.083 t of coarse silica valued at about $3.1 million was produced in NSW.

**Darryl McCarthy Contractors Pty Ltd**
PO Box 246
TENTERFIELD NSW 2372
Phone: (02) 6736 1988
Fax: (02) 6736 1385
dmccarthy@nqq.com.au

**Glenella Quarry Pty Ltd**
483 Battery Rd
COWRA NSW 2794
Phone: (02) 6345 4253
Fax: (02) 6345 4212
info@glenellaquarry.com
www.glenellaquarry.com

**Metromix Pty Ltd**
Level 4, 107 Phillip Street
PARRAMATTA NSW 2150
Phone: (02) 9849 7400
Fax: (02) 9635 4816
info@metromix.com.au
www.metromix.com.au

**Mittagong Sands Pty Ltd**
Glen Logan Road,
COWRA NSW 2794
Phone: (02) 6341 3888
Fax: (02) 6341 3877
www.cowraquartz.com.au

**ZEOLITES**

Zeolites are microporous, aluminosilicate minerals commonly used as commercial adsorbents. The atomic structure and surface properties of zeolites make them suitable for many industrial and agricultural uses. Various natural zeolites have applications in agriculture; aquaculture; water treatment and pollution control; in soil conditioning; as an odour control agent in stock feeds; pet litters; fertilizers; sewage treatment; and many other uses.

Two mines are now operating and production has been steadily increasing as markets are developed. In 2010–11 NSW produced around 2545 t of zeolites.

Natural zeolite minerals occur in various sedimentary, igneous and low grade metamorphic rocks. A major study undertaken by the department in the 1980s found that potentially commercial zeolite deposits occur in rocks of acid to intermediate volcanic origin in the Carboniferous Tamworth Belt.

Zeolite Australia Ltd operates the Escott mine and processing plant, 5 km south-west of Werris Creek. Zeolites from the Escott deposit are now being used in many parts of Australia and some are being exported. A treated zeolite product from Escott is being used in a number of major water and sewage treatment projects. Zeolite Australia has recently completed a major plant upgrade which has increased the processing capacity for zeolites from the Escott mine.
Castle Mountain Enterprises Pty Ltd is producing zeolites at Bindawalla, near Quirindi.

<table>
<thead>
<tr>
<th>Zeolite Australia Ltd</th>
<th>Castle Mountain Enterprises Pty Ltd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escott Road</td>
<td>Station Street</td>
</tr>
<tr>
<td>WERRIS CREEK NSW 2341</td>
<td>QUIRINDI NSW 2343</td>
</tr>
<tr>
<td>PO Box 6</td>
<td>PO Box 54</td>
</tr>
<tr>
<td>WERRIS CREEK NSW 2341</td>
<td>QUIRINDI NSW 2343</td>
</tr>
<tr>
<td>Phone: (02) 6768 7080</td>
<td>Phone: (02) 6746 3555</td>
</tr>
<tr>
<td>Fax: (02) 6768 7764</td>
<td>Fax: (02) 6746 2488</td>
</tr>
<tr>
<td><a href="mailto:sales@zeolite.com.au">sales@zeolite.com.au</a></td>
<td><a href="mailto:sales@cmzeolites.com.au">sales@cmzeolites.com.au</a></td>
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