# Lead and zinc

Australia contains about 9% of the world's economic demonstrated resources of lead and 7% of the world's zinc. It is the Western world's largest mine producer and exporter of lead, and the second largest mine producer and exporter of zinc (after Canada).

Since the discovery in 1883 of the **Broken Hill** lead–zinc–silver orebody, perhaps the richest the world has ever known, Australia has been a major producer of lead and zinc ore. This position was reinforced by the discovery in 1923 and subsequent exploitation of the large orebody at **Mount Isa**, now the site of the biggest single producing lead–silver mine in the world.

Together the mines at **Broken Hill** and **Mount Isa** account for about 75% of total lead output and over 50% of zinc output. Most of the remainder comes from **Elura, Cobar** and **Woodlawn** (N.S.W.), **Rosebery** and **Que River** (Tas.), and **Woodcutters** (N.T.). Zinc is also produced at **Beltana** (S.A.), where a zinc silicate deposit is mined intermittently. At **Teutonic Bore** (W.A.) zinc was mined in association with copper until the orebody was exhausted in 1986.

Several major development proposals for new lead–zinc mines are now well advanced. The **Hilton** region, just to the north of Mount Isa, is emerging as one of the world's great silver–lead–zinc areas. By the mid 1990s the production rate at Hilton is scheduled to be 2.5 Mt of ore per year which will compensate for a corresponding decline in production at Mount Isa as ore reserves there are depleted. Other deposits being developed or for which development proposals are nearing completion include **Lady Loretta** north-west of Mount Isa, **Benambra** in north-eastern Victoria, **Hellyer** near Que River (Tas.) and **Cadjebut** near Fitzroy Crossing (W.A.).

Lead–zinc ores yield a range of mine products, differing mainly in their relative proportions of lead and zinc and associated by-products. The three main concentrate types are lead (–silver), zinc (–cadmium), and lead–zinc or 'mixed' concentrates.

Lead and zinc processing are among Australia's longest established mineral industries, having formed the basis of much of the country's industrialisation in the early part of the 20th century. Today there are lead smelters at **Mount Isa** and at **Cockle Creek** near Newcastle (N.S.W.), an integrated lead smelter/refinery at **Port Pirie**, and zinc refineries at **Port Pirie**, **Cockle Creek** and Risdon (Tas.).

The smelter at **Mount Isa** has an annual capacity of 180 000 t of lead and processes most locally produced lead concentrates. The lead bullion and lead concentrates not treated by the smelter are railed to Townsville for shipment overseas.

Lead smelting and refining commenced at Port Pirie, the nearest port to Broken Hill, in 1897. Now, with an annual production capacity of 235 000 t of refined lead, the **Port Pirie** lead smelter/refinery is the world's largest. Early attempts to integrate zinc refining were unsuccessful but in 1967 an electrolytic refinery with an annual capacity of 45 000 t was installed to recover zinc remaining in the residue after lead smelting and from stockpiled slag, both of which contain about 17% zinc.

Lead and zinc concentrates from Broken Hill, Cobar and Woodlawn are treated at **Cockle Creek** using the Imperial Smelting Process (which enables the zinc content of both lead and mixed lead–zinc concentrates to be recovered) to produce lead bullion, all of which is exported, and refined zinc. The rated capacity of the plant is 28 000 t of lead bullion and 80 000 t of refined zinc per annum though plans are in hand to increase total zinc capacity of the operation in stages, as economic conditions permit, over the coming years.

The largest of Australia's three zinc refineries, and the second largest in the world, at **Risdon** near Hobart, has an annual capacity of 214 000 t of high grade electrolytic zinc. The refinery was originally established in 1916 to process zinc-rich ores from the Tasmanian west coast but now treats zinc concentrates from most Australian lead–zinc mines.

Australia is the largest exporter of lead, accounting for nearly 30% of world exports of lead ores and concentrates, lead bullion and refined lead. The bulk of the lead bullion from Mount Isa is exported to the U.K. for refining; the remainder goes to Japan for toll refining and marketing in Asia. About two-thirds of Australia's refined lead production is exported, mainly to India and other Asian countries.

Unlike lead, where 80% of the concentrate produced is processed in Australia, less than half the zinc concentrate produced is processed locally. Over half of the zinc ore and concentrate is exported to Japan, with much of the remainder going to Western Europe and Korea. Refined zinc is exported mainly to various Asian countries and the U.S.A.

**Table 8. Lead and zinc production, 1984–86**

| | *1984* | *1985* | *1986* |
|---|---|---|---|
| | thousand tonnes | | |
| **Lead** | | | |
| Mine production of lead | 441 | 498 | 449 |
| Production of lead bullion | 179 | 183 | 188 |
| Production of primary refined lead | 199 | 200 | 156 |
| Exports of lead ore and concentrate | 151 | 181 | 218 |
| Exports of lead bullion (lead content) | 199 | 175 | 185 |
| Exports of refined lead | 147 | 154 | 111 |
| **Zinc** | | | |
| Mine production of zinc | 677 | 759 | 712 |
| Production of primary refined zinc | 302 | 289 | 303 |
| Production of secondary refined zinc | 5 | 5 | 5 |
| Exports of zinc ore and concentrate | 840 | 836 | 876 |
| Exports of refined zinc | 221 | 215 | 217 |

**The Cadjebut lead–zinc mine, north-west Western Australia**
*The Cadjebut deposit is one of several discovered recently after many years of exploration and drilling in the Kimberley area. Although small, the deposit is high grade and easily mined via a shallow decline. The concentrates, which are free of many impurities, are trucked to Wyndham for shipment to Australian or overseas smelters.*